

MHI  
Copy 3

**FM 4-49**

**WAR DEPARTMENT**

**COAST ARTILLERY  
FIELD MANUAL**

**SERVICE OF THE PIECE**

**SEACOAST ARTILLERY**

**8-INCH GUN, MARK VI,**

**MODIFICATION 3A2,**

**ON RAILWAY MOUNT M1A1**

**AUGUST 6, 1942**

~~RESTRICTED~~

REGRADED UNCLASSIFIED BY

AUTHORITY OF DOD DIR. 5200.1 R

BY Rakels ON 092003

FM 4-49

C 1

## COAST ARTILLERY FIELD MANUAL

### SERVICE OF THE PIECE

### SEACOAST ARTILLERY

#### 8-INCH GUN, MARK VI, MODIFICATION 3A2 ON RAILWAY MOUNT M1A1

CHANGES }  
No. 1 }

WAR DEPARTMENT,  
WASHINGTON, April 5, 1943.

FM 4-49, August 6, 1942, is changed as follows:

#### SECTION XI (ADDED)

### DESTRUCTION OF MATÉRIEL

■ 64. 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 matériel that 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.

*b.* The working principles to be followed are:

(1) Methods for the destruction of matériel 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 most important features of the matériel should be destroyed, and parts essential to the operation or use of the matériel, and which cannot be easily duplicated, ruined, or removed. *The same essential parts must be destroyed on all like units to prevent the enemy constructing*

*one complete unit from several damaged ones by "cannibalization."*

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

*c.* To accomplish adequate and uniform destruction of matériel, it is essential that—

(1) All echelons prepare plans for the destruction of matériel 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 matériel issued to them. Training will not involve the actual destruction of matériel.

*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, the vehicles for which issued, and the conditions under which destruction will be effected *are command decisions in each case*, according to the tactical situation.

■ 65. PRIORITY OF DESTRUCTION.—*a.* Destruction should be accomplished in the following priority:

- (1) Tube.
- (2) Power equipment.
- (3) Carriage and mount.
- (4) Sights and observation instruments.
- (5) Plotting room equipment.
- (6) Ammunition.
- (7) Locomotive and railway cars.

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

■ 66. TUBE.—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.

## 8-INCH GUN, MARK VI

*a. Demolition by unfuzed HE shell and either M9A1 AT grenade or M6 AT rocket.*—(1) Remove the recoil cylinder drain plug. It is not necessary to wait for the recoil fluid to drain completely before firing the piece as in (4) below.

(2) Lay an *armed (safety pin removed)* M9A1 AT grenade, HE, or M6 AT rocket in the tube about 6 inches in front of the projectile (see (3) below) with the ogive nose end toward the shell. The grenade or rocket must be centered in the tube, using either a wooden adapter or a wad of waste.

(3) Place an *unfuzed, point-detonating, HE shell M103* and propelling charge in the gun and close the breech.

(4) Fire the gun electrically if possible; if not use a lanyard at least 100 feet long. The person firing the piece should be under cover in the rear of the piece and about 20 degrees off the line of fire.

(5) When using this method, the danger zone is about 500 yards in radius.

*b. Demolition by TNT blocks.*—(1) Remove the recoil cylinder drain plug. Insert 30 to 50 ½-pound TNT blocks in the chamber and close the breechblock. Plug the muzzle end of the tube tightly with earth to a distance of approximately 2 feet from the muzzle. Detonate the TNT charge by means of a detonating cord routed through the primer vent.

(2) The firer should be under cover. The danger zone is about 500 yards.

(3) For instructions on the wiring and firing of TNT, see FM 5-25, paragraphs 21 to 27, inclusive.

*c. Demolition by TNT blocks and HE shell.*—Remove the recoil cylinder drain plug. Ram an HE shell into the forcing cone, place 30 to 50 ½-pound TNT blocks in the chamber, and close the breechblock. Detonate the TNT with a detonating cord routed through the primer vent. A sufficient length of safety fuze should be used to permit personnel to reach cover.

*d. Demolition by incendiary grenades.*—If evacuation is imminent and it is desired to accomplish demolition without tell-tale explosions, the following method should be used: Place 10 to 12 *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 gun quickly to its maximum elevation. The metal from the grenades will fuse with the interior of the breechblock, making it impossible to open the breech.

*e. Demolition by firing guns at each other.*—(1) Fire adjacent guns at each other at point-blank range, using HE or AP shell. Two or more hits on a vital spot such as the breech mechanism, recoil mechanism, or tube should adequately destroy a gun. Fire from cover. The danger space is from 200 to 500 yards.

(2) Destroy the last gun and carriage by the best means available.

(3) *Danger from "cannibalization" is inherent in this method.*

■ 67. BREECH.—Any of the above methods for destroying the tube should also destroy the breech; but if the method selected does not, a heavy sledge may be used to render the breech useless.

■ 68. RECOIL MECHANISM.—*a.* If the methods explained in paragraph 68*a*, *b*, or *c* are used to destroy the tube and breech, the carriage and recoil mechanism should be adequately destroyed.

*b.* No other hasty method of destroying the recoil mechanism has been proposed.

■ 69. RAILWAY MOUNT.—*a.* The truck is the critical part of the railway mount and the parts contained in the journal boxes of the trucks are the most important to attack in the demolition of the mount. Only one journal box and the parts contained therein need be destroyed for each pair of wheels as the wheels are pressed on the axle and must rotate together. The journal box and journal-box parts may be destroyed by removing the journal-box packing, placing  $\frac{1}{2}$ -pound TNT blocks inside the journal box, and detonating the charge. The machined surface of the axle journal may be mutilated or defaced by a sledge or track chisel. The journal bearing and journal-bearing wedge should be broken with a sledge if they are not destroyed by the detonation of the TNT.

*b.* The coupler knuckle pins may be removed and the knuckles thrown away, into deep water if possible. The lack of coupler knuckles will prevent the coupling of the railway mount to a locomotive or another railway car except by the use of chains.

## 8-INCH GUN, MARK VI

c. The triple or AB valves should be broken with a sledge. The destruction of the valves will render the air brakes useless.

d. The air-brake hoses on the mount should be cut off.

e. If motive power is available, the mount should be derailed before car parts are destroyed by—

(1) Running the mount through a switch with the switch points open.

(2) Running the mount off the end of a spur track.

(3) Removing a rail and running the mount off the track.

(4) Disconnecting the rail at a rail joint, spreading the rail, and running the mount off the track.

f. If possible, cars should be derailed down an embankment.

■ 70. POWER EQUIPMENT.—All auxiliary power equipment should be rendered useless. Electric motors and generators can most effectively and easily be put out of operation by injuring the field or armature windings. If time is available, the motor shell may be broken with a sledge and the coils ruined with a crowbar. If time is short, a small-arms bullet may easily be directed into the coils through the air vents in either end bell, but care should be taken to see that no one is in the path of a possible ricochet. Switch panels, sockets, plugs, and fuze or circuit-breaker panels should be smashed with a sledge or ax.

■ 71. SIGHTS AND OBSERVATION INSTRUMENTS.—Sights and observation instruments should be evacuated if possible. If they cannot be carried away, they should be smashed thoroughly.

■ 72. PLOTTING ROOM EQUIPMENT.—All boards and instruments should be smashed and burned if possible. Data transmitters and all communication equipment should be smashed.

■ 73. AMMUNITION.—*a. Projectiles.*—Projectiles are stacked horizontally 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 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 destroyed satisfactorily by sympathetic detonation.

*b. Powder.*—Separate loading propelling charges can be destroyed best by burning. This is accomplished most effectively

when the charges are out of their containers or the containers are split.

■ 74. LOCOMOTIVE AND RAILWAY CARS.—See FM 4-51 (when published) for detailed instructions.

[A. G. 062.11 (3-16-43).] (C 1, Apr. 5, 1943.)

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL.

*Chief of Staff.*

OFFICIAL:

J. A. ULIO,

*Major General,*

*The Adjutant General.*

**FM 4-49**

**WAR DEPARTMENT**

**COAST ARTILLERY  
FIELD MANUAL**



**SERVICE OF THE PIECE  
SEACOAST ARTILLERY**

**8-INCH GUN, MARK VI,  
MODIFICATION 3A2,  
ON RAILWAY MOUNT M1A1**



*Prepared by The Coast Artillery School  
under the direction of*

**THE COMMANDING GENERAL,  
ARMY GROUND FORCES**

*Printed at*

**THE ARMY FIELD PRINTING PLANT**

**COAST ARTILLERY SCHOOL, FORT MONROE, VIRGINIA: 1942**

WAR DEPARTMENT  
WASHINGTON, August 6, 1942.

FM 4-49, Coast Artillery Field Manual, Service of the Piece, 8-inch Gun, Mark VI, Modification 3A2, on Railway Mount M1A1, is published for the information and guidance of all concerned.

[A. G. 062.11 (7-18-42).]

BY ORDER OF THE SECRETARY OF WAR.

G. C. MARSHALL,  
*Chief of Staff.*

OFFICIAL:

J. A. ULIO,  
*Major General,*  
*The Adjutant General.*

DISTRIBUTION:

IBn and H 4 (5); IC 4 (100).

(For explanation of symbols see FM 21-6.)

## TABLE OF CONTENTS

SECTION I. GENERAL.	Paragraph	Page
Scope .....	1	1
References .....	2	1
II. ORGANIZATION.		
Gun section .....	3	1
Gun squad .....	4	2
Ammunition squad .....	5	3
Formation .....	6	3
III. DUTIES OF PERSONNEL.		
Battery executive .....	7	3
Assistant battery executive .....	8	4
Chief of section .....	9	4
Gun pointer .....	10	8
Elevation setter .....	11	9
Chief of breech .....	12	9
Battery commander's telephone operator	13	9
Display board operators .....	14	9
Aiming rule operator .....	15	10
Chief of ammunition .....	16	11
Ammunition squad .....	17	12
Artillery mechanics .....	18	12
IV. NOTES ON THE SERVICE OF THE PIECE.		
General .....	19	13
Service of ammunition .....	20	14
Opening breech .....	21	15
Closing breech .....	22	16
Loading .....	23	16
Changing powder charge .....	24	17
Pointing, case III .....	25	17
Elevation, case III .....	26	18
Firing, case III .....	27	18
Firing, case II .....	28	18
Drill during simulated firing .....	29	19
The command RE-LAY .....	30	20
The command STAND FAST .....	31	20
V. SAFETY PRECAUTIONS.		
General .....	32	20
The command CEASE FIRING .....	33	20
Firing mechanism .....	34	21
Lanyard .....	35	21
Primers .....	36	21
Fuzes .....	37	22
Service of powder charge .....	38	22
Sponging powder chamber .....	39	23
Cover for gun section .....	40	23
Poor visibility .....	41	23
Misfires .....	42	23

## TABLE OF CONTENTS—Continued

	Paragraph	Page
VI. CARE AND ADJUSTMENT OF MATERIEL.		
General .....	43	24
Recoil mechanism .....	44	24
To fill recoil cylinder .....	45	24
Obturator .....	46	25
Navy firing lock, Mark VIII, Modification II .....	47	25
Sponging solution .....	48	26
Care of bore .....	49	26
VII. EMPLACEMENT FOR FIRING.		
General .....	50	27
Precautions .....	51	27
Lifting jacks .....	52	29
Outriggers .....	53	29
Site .....	54	30
Preparation of position .....	55	30
Locating mount .....	56	30
Elevating and leveling mount .....	57	32
Assembly of outriggers and floats .....	58	33
VIII. PREPARATION FOR RAIL MOVEMENT.		
General .....	59	35
Loading and securing equipment .....	60	35
IX. STATISTICAL DATA.		
Gun .....	61	38
Ammunition .....	62	38
Mount, railway, M1A1 .....	63	40
X. DRILL TABLE .....		42
APPENDIX. LIST OF REFERENCES .....		41

**SERVICE OF THE PIECE**  
**8-INCH GUN, MARK VI, MODIFICATION 3A2**  
**ON RAILWAY MOUNT M1A1**

	Paragraphs
SECTION I. General .....	1-2
II. Organization .....	3-6
III. Duties of personnel .....	7-18
IV. Notes on the service of the piece .....	19-31
V. Safety precautions .....	32-42
VI. Care and adjustment of materiel .....	43-49
VII. Emplacement for firing .....	50-58
VIII. Preparation for rail movement .....	59-60
IX. Statistical data .....	61-63
X. Drill table .....	64

**SECTION I**

**GENERAL**

	Paragraph
Scope .....	1
References .....	2

■ 1. SCOPE.—*a.* This manual prescribes the service of the piece for the 8-inch gun, Mark VI, Modification 3A2, on railway mount M1A1. The duties of the members of the gun section in the service of the piece are contained in section III and in the drill table, section X.

*b.* The emplacing and the service of the piece as described herein are intended as a guide for the battery commander. Changes in the details of the emplacing and the service of the piece may be made to meet local conditions.

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

**SECTION II**

**ORGANIZATION**

	Paragraph
Gun section .....	3
Gun squad .....	4
Ammunition squad .....	5
Formation .....	6

■ 3. GUN SECTION.—Each emplacement of 1 gun is manned by a gun squad and an ammunition squad. The strength is 26 enlisted men.

■ 4. GUN SQUAD.—The gun squad (17 enlisted men) consists of the gun commander (chief of section), gun pointer, elevation setter, battery commander's telephone operator, display board operators, aiming rule operator, chief of breech, and 9 cannoneers numbered from 1 to 9, inclusive. Men are assigned to permanent positions according to their aptitude, but will be interchanged frequently in drill positions in order to develop flexibility and facilitate replacement.

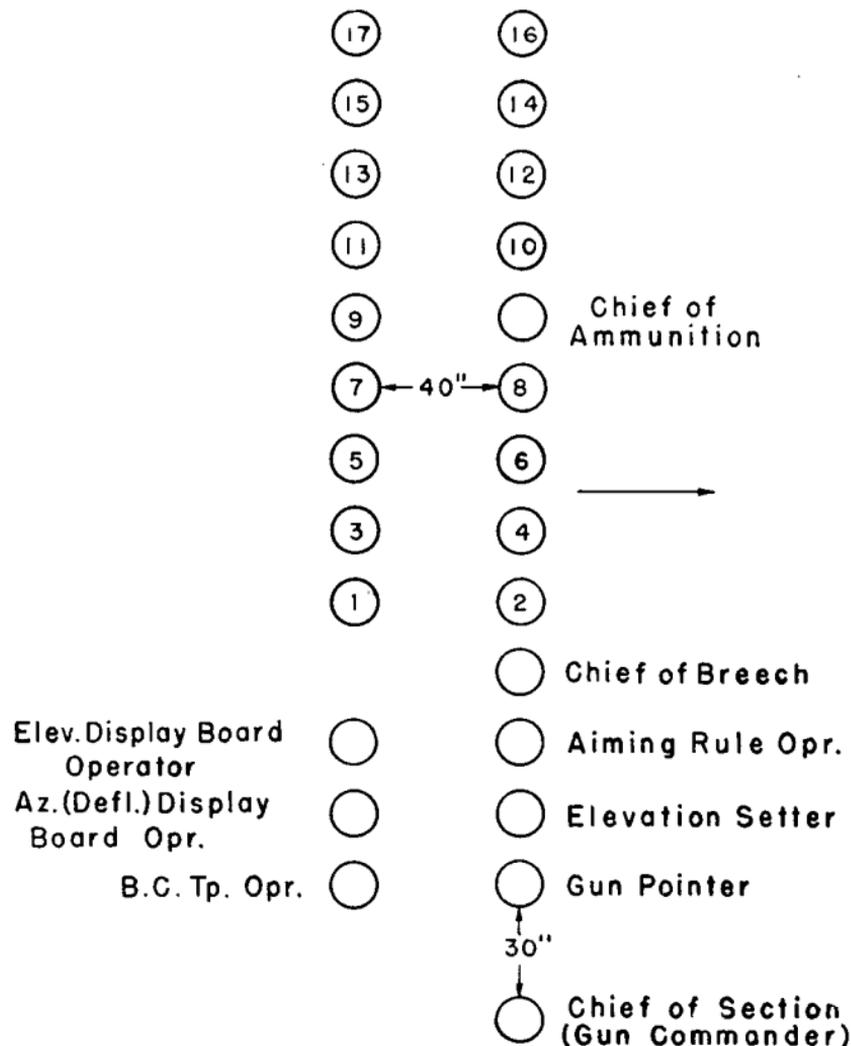


FIGURE 1.—Formation of gun section.

■ 5. **AMMUNITION SQUAD.**—The ammunition squad (9 enlisted men) consists of the chief of ammunition and 8 ammunition handlers numbered from 10 to 17, 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.**—Each gun section assembles in two ranks as shown in figure 1. Unnumbered cannoneers form on the right of their respective squads. The chief of breech and the chief of ammunition form at the right of the numbered cannoneers in the gun squad and ammunition squad, respectively. After forming the gun section, the chief of section takes post in the front rank, 30 inches to the right of the gun pointer.

### SECTION III DUTIES OF PERSONNEL

	Paragraph
Battery executive .....	7
Assistant battery executive .....	8
Chief of section .....	9
Gun pointer .....	10
Elevation setter .....	11
Chief of breech .....	12
Battery commander's telephone operator .....	13
Display board operators .....	14
Aiming rule operator .....	15
Chief of ammunition .....	16
Ammunition squad .....	17
Artillery mechanics .....	18

■ 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 for the—

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

(2) Condition of the materiel under his charge.

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

(4) Police of all emplacements.

(5) Emplacement and orientation of the guns when they are moved into position, and their preparation for railroad travel when they are taken out of position.

(6) Camouflage of all emplacements.

*b.* He inspects the materiel under his charge and personally verifies the adjustment of all pointing devices as frequently as necessary to insure accuracy. He or an assistant battery executive tests all firing devices before each drill or firing, paying particular attention to the safety features.

*c.* He receives the reports of the assistant battery executives or chiefs of sections and reports to the battery commander, "Sir, firing section in order," or reports defects which he is unable to remedy without delay.

*d.* He exercises general supervision over the loading and pointing. 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.

*e.* At the conclusion of drill or firing, the battery executive commands: REPLACE EQUIPMENT, inspects the emplacements, and reports to the battery commander.

*f.* He selects the positions for and supervises the emplacement and employment of the machine guns of the firing section.

*g.* As battery railway officer he is responsible for the condition and maintenance of the railway materiel assigned to the battery.

■ 8. ASSISTANT BATTERY EXECUTIVE.—Each assistant battery executive will perform the duties of the battery executive that pertain to the emplacement or emplacements to which he is assigned.

■ 9. CHIEF OF SECTION.—*a.* The chief of section (gun commander), a noncommissioned officer, is in command of the gun section and is also chief of the gun squad. 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 the materiel under his charge.
- (3) Emplacement of the piece and its preparation for firing, including camouflage discipline and gas discipline when necessary.
- (4) Firing of the piece.

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

(6) Police of the emplacement.

b. He supervises the preparation of the firing position, the emplacement of the mount, the removing of it from position, the unloading and loading of equipment, the service of the piece, and the service of ammunition, giving the necessary commands and instructions for carrying out these operations. He personally directs the care and preservation of the materiel.

c. The gun being emplaced for firing, he commands: 1. DETAILS, 2. POSTS, and supervises the procuring of equipment. After all details have reached their posts (figs. 2 and 3), he commands: EXAMINE GUN. He then makes an inspection of the gun, carriage, and other materiel, giving particular attention to the recoil and recuperator systems, firing mechanism, recoil parts lock and other safety devices, oiling of the various bearings, and the condition of the track, outriggers, and floats. He receives the reports of the chief of ammunition and of the various details of the gun squad, 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.

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

e. He 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 the target designation. As soon as the gun pointer is on the target (or aiming point), the gun commander reports or signals to the officer in charge of the emplacement, "Sir, No. ——— on target."

g. At the command LOAD, he repeats the command and supervises the loading. After the piece is loaded and laid, he calls or signals, "No. ——— ready." He also commands:

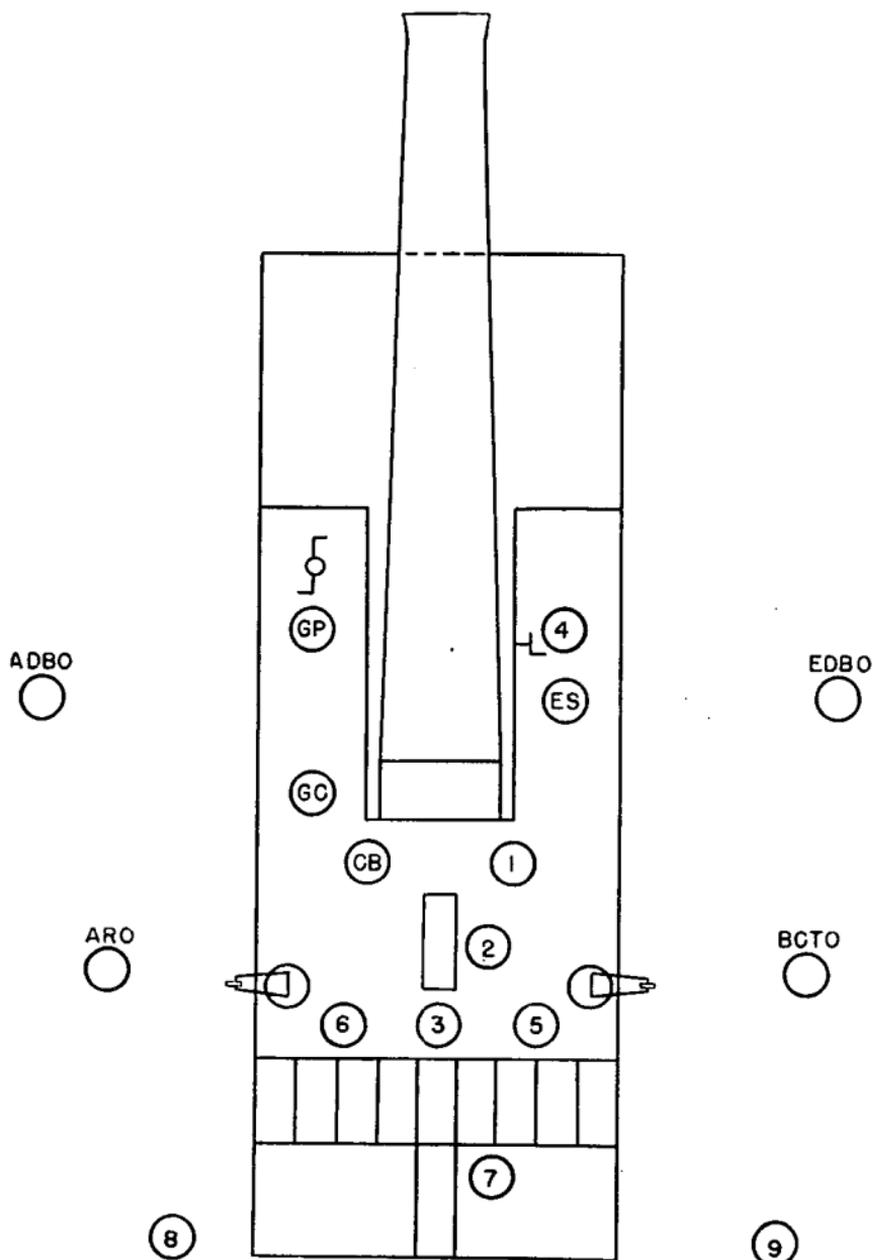


FIGURE 2.—Positions of gun squad at DETAILS, POSTS.

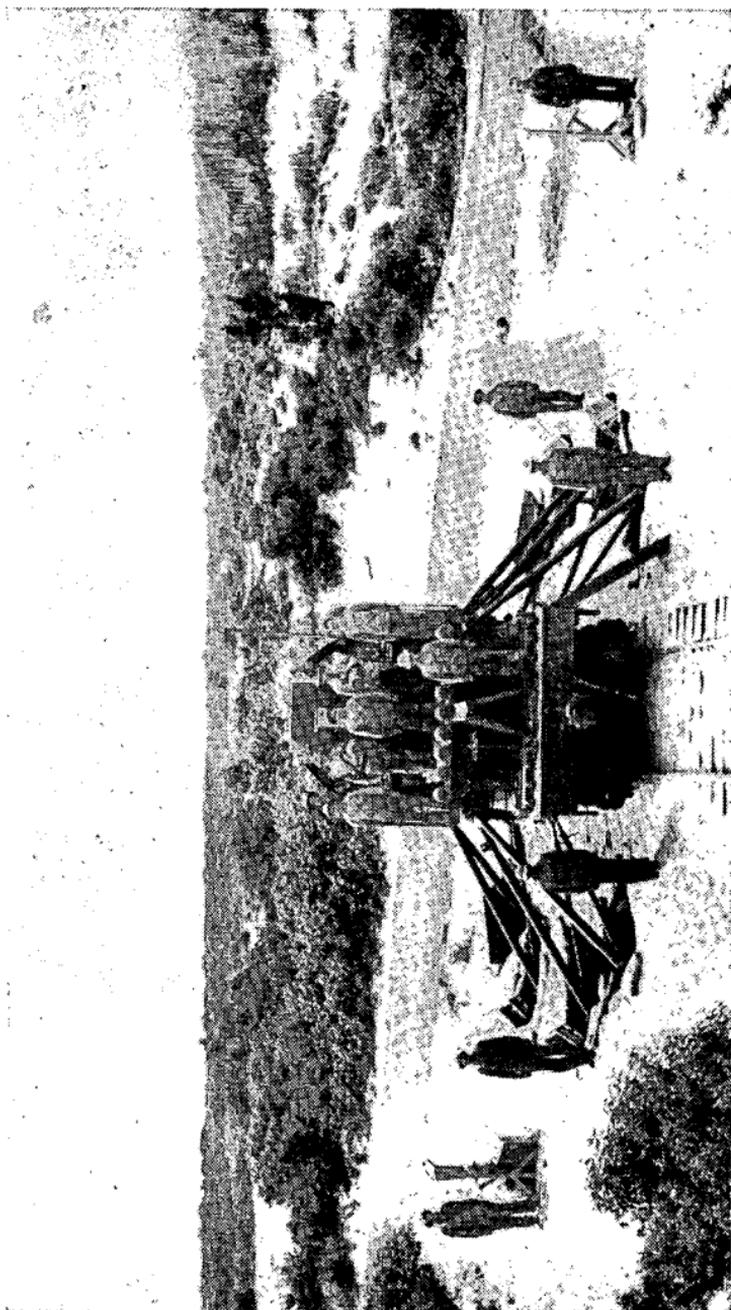


FIGURE 3.—Gun squad at DETAILS, POSTS.

LOAD before each shot of a series. The piece is not fired until the command, COMMENCE FIRING, is given and the proper firing signal received.

*h.* At the command COMMENCE FIRING, if the piece is unloaded he commands: LOAD, and supervises the work of his section. After the piece is loaded and laid, he sees that all personnel are clear.

*i.* 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 to the officer in charge of the emplacement, "Sir, No. ——— (so many) rounds fired." When dummy ammunition is used, he commands: UNLOAD, and supervises the unloading.

*j.* During the firing he stations himself in such a position as best to observe the functioning of the gun section and the gun. He pays particular attention to the action of the gun in recoil and counterrecoil in order that a loss of recoil oil by leakage may be observed in time to be corrected.

*k.* In case of a misfire, he calls, "No. ——— misfire." He sees that the precautions described in paragraph 42 are observed.

*l.* When firing on a time interval signal, he commands: RE-LAY in case the time interval signal fails to sound at the gun, or in case his gun is not ready to fire when the time interval signal sounds. He repeats the command RE-LAY, when it is received.

*m.* At the command REPLACE EQUIPMENT, he supervises the replacing of all equipment, sees that all materiel is properly secured and the emplacement policed, and then, unless otherwise directed, he forms his section.

■ 10. GUN POINTER.—The gun pointer (noncommissioned officer) 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 sight, azimuth indicator, traversing mechanism, and for the supervision of the aiming rule operator. For detailed duties of the gun pointer, see the drill table, section X.

■ 11. **ELEVATION SETTER.**—The elevation setter is charged with the duty of laying the piece in elevation. He is responsible to the gun commander for the proper operation, care, and adjustment of the trunnion quadrant, elevation indicator, and the elevating mechanism. For the detailed duties of the elevation setter, see the drill table, section X.

■ 12. **CHIEF OF BREECH.**—The chief of breech (noncommissioned officer) is responsible to the gun commander for the efficiency of the personnel of the breech detail; for the condition and serviceability of the breech mechanism, chamber, and bore; for the observance of safety precautions that pertain to his detail; and for the 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. He attaches the firing cable if firing electrically or the lanyard when the lanyard is used. For the detailed duties of the chief of breech, see the drill table, section X.

■ 13. **BATTERY COMMANDER'S TELEPHONE OPERATOR.**—*a.* The battery commander's telephone operator is charged with the duty of receiving and transmitting all messages passing between the battery commander and the officer in charge of the emplacement, and the keeping of such records as may be directed.

*b.* At the command **DETAILS, POSTS**, he procures a telephone with headset and handset and takes post as directed. He reserves the handset for the use of any person to whom the battery commander may wish to speak.

*c.* At the command **EXAMINE GUN**, he connects his telephone and establishes communication with the battery commander's station, reporting to the gun commander in case of failure to obtain satisfactory communication.

*d.* He relays all commands and messages until properly relieved from his duties.

■ 14. **DISPLAY BOARD OPERATORS.**—*a.* The azimuth and elevation display board operators are responsible to the gun commander for the proper operation of the display boards and for the recording of all data received from the fire-control car.

b. At the command **DETAILS, POSTS**, they procure display boards, chalk, blackboard erasers or waste, and telephones. The azimuth display board operator places his equipment on the ground to the left of the piece, and takes post at the display board. The elevation display board operator places his equipment on the ground to the right of the piece, and takes post at the display board.

c. At the command **EXAMINE GUN**, they clean their display boards if necessary, put on the telephone headsets, test the telephones, and report to the gun commander, "Azimuth display board in order," or, "Elevation display board in order," or report any defects they are unable to remedy without delay.

d. At the command **TARGET**, they relay the azimuths and elevations received from the fire-control car and post the data on their display boards.

e. At the command **CEASE FIRING**, they continue to post data received from the fire-control car until the command **CEASE TRACKING** is received.

■ 15. **AIMING RULE OPERATOR.**—*a.* The aiming rule operator is responsible to the gun commander for the proper operation, care, and adjustment of the aiming rule.

*b.* At the command **DETAILS, POSTS**, the aiming rule operator, assisted by No. 9, procures the aiming rule sight and cross bar, places them near the aiming rule stakes, and takes post behind the aiming rule stakes facing the piece when the aiming rule is to be used. When the aiming rule is not to be used, the aiming rule operator takes post on the ground to the left of the piece.

*c.* At the command **EXAMINE GUN**, the aiming rule operator places the aiming rule cross bar in position on the stakes and places his sight in its bracket on the cross bar. He sets the data determined during orientation of the aiming rule on his sight, moves the sight along the cross bar until the vertical cross wire is exactly on the center line of a targ placed on top of and centered on the gun sight, and reports, "Aiming rule in order," or reports any defects which he is unable to remedy without delay.

*d.* At the command TARGET he keeps the vertical cross wire on his sight exactly on the center of the targ on the gun panoramic telescope by sliding his sight along the cross bar without changing the azimuth set on his sight.

*e.* At the command RELAY or CEASE FIRING, he continues to perform the duties prescribed under the command TARGET unless otherwise directed.

■ 16. CHIEF OF AMMUNITION.—*a.* The chief of ammunition (noncommissioned officer) is responsible to the chief of section for the—

(1) Efficiency of the personnel under his charge.

(2) Care and preservation of the ammunition and the ammunition car or magazine, including the equipment contained therein.

(3) Camouflage discipline and gas discipline at the ammunition cars or shelters pertaining to his section.

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

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

(6) Uninterrupted service of ammunition during action.

*b.* He keeps a record of all ammunition received and ammunition used by his gun, exercising particular care that projectiles and fuzes are listed under proper name and type.

*c.* He keeps the chief of section informed regarding ammunition on hand, checks the weights 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.* At the command DETAILS, POSTS, he opens the ammunition car or magazine and posts the members of the ammunition squad.

*f.* At the command **EXAMINE GUN**, 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.

*g.* At the command **LOAD**, he directs and supervises the service of ammunition.

*h.* At the command **REPLACE EQUIPMENT**, he supervises the replacing of equipment, sees that all materiel is properly secured, forms his squad, and reports to the chief of section.

■ **17. AMMUNITION SQUAD.**—*a.* At the command **DETAILS, POSTS**, the ammunition squad (Nos. 10 to 17, inclusive) takes post in the ammunition car or as directed by the chief of ammunition.

*b.* At the command **EXAMINE GUN**, the squad prepares the car equipment and the ammunition for firing or drill.

*c.* At the command **LOAD**—

(1) Nos. 10 and 11 stationed outside the car receive in turn the powder charges and deliver them to No. 3 on the gun platform.

(2) Nos. 12 and 13 remove the powder charge from the container and stand ready to deliver it to No. 10 or 11.

(3) No. 14 is responsible for the proper fuzing of projectiles.

(4) Nos. 15, 16, and 17 stand ready to refill the projectile table on the car platform as opportunity offers.

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

■ **18. ARTILLERY MECHANICS.**—*a.* The artillery mechanics are members of the executive officer's detail. They make minor repairs and adjustments, assisted by members of the gun section. The chief artillery mechanic is the custodian of supplies pertaining to the gun emplacements to which his battery is assigned. He is responsible for the condition of the store cars assigned to the battery and for the supplies contained therein. The chief mechanic 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.

b. Under the supervision of the gun commander, the artillery mechanics will perform daily the following duties—

(1) Check the level of the oil in the recoil cylinders at zero degrees elevation, and add more oil if necessary.

(2) Check the position of the intensifier rod. The index should point to a graduation between 1 and 7. If not, more oil must be pumped into the intensifier by operating the oil pump on the cradle. The valve in the oil pipe near the intensifier must be open before pumping.

(3) Open the needle valve at the air end of the intensifier and note the reading on the air pressure gage. If the pressure is lower than the pressure indicated by the red mark on the gage (1,600 pounds per square inch), a cylinder of compressed air must be attached to the maneuvering valve filling hole and the air pressure in the recuperator system increased to 1,600 pounds per square inch. After testing, the needle valve at the air end of the intensifier must be closed.

#### SECTION IV

#### NOTES ON THE SERVICE OF THE PIECE

	Paragraph
General .....	19
Service of ammunition .....	20
Opening breech .....	21
Closing breech .....	22
Loading .....	23
Changing powder charge .....	24
Pointing, case III .....	25
Elevation, case III .....	26
Firing, case III .....	27
Firing, case II .....	28
Drill during simulated firing .....	29
The command <i>RE-LAY</i> .....	30
The command <i>STAND FAST</i> .....	31

■ 19. GENERAL.—a. The service of the piece will be conducted with dispatch and precision and with as few orders as possible. Except for the necessary orders, reports, and instructions, no talking will be permitted. Cannoneers will

change positions at a run, except those men posted on the carriage who will change positions as rapidly as practicable.

b. Commands will be given in the prescribed forms (see FM 4-5). Signals may be substituted for commands whenever practicable (see FM 4-20).

c. Loading with dummy ammunition and pointing the piece as for firing is the normal practice at drills.

d. 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. Prior to and during lulls in firing, Nos. 5 and 6 and the ammunition detail place as many projectiles as practicable on the ammunition table.

■ 20. SERVICE OF AMMUNITION.—When action or target practice is imminent, the ammunition car loaded with pro-

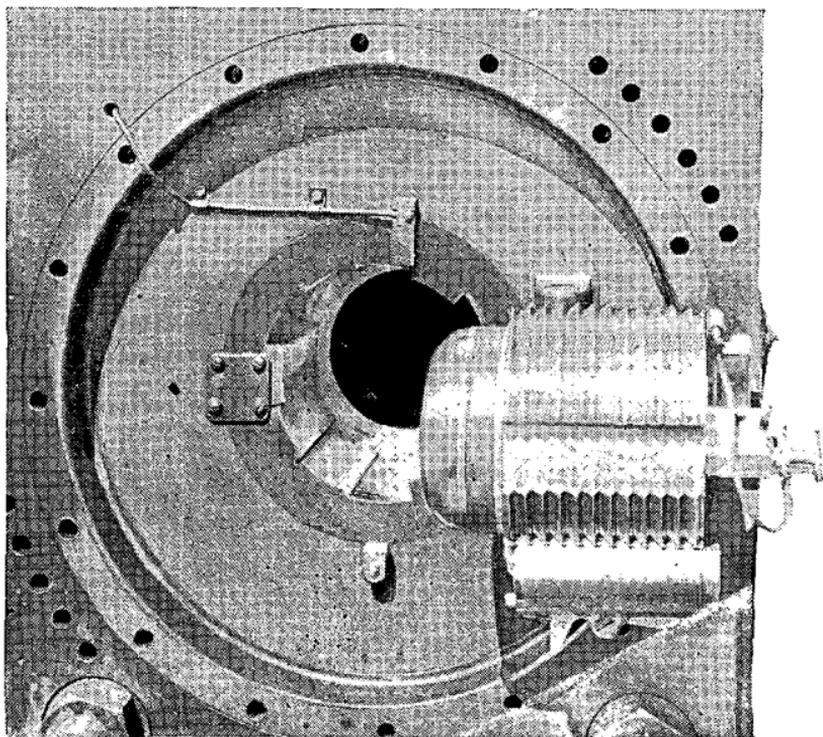


FIGURE 4 —Breech open

jectiles and powder charges will be placed immediately behind the gun, or on an adjacent parallel track, unless there is a field magazine at the emplacement. Primers and point detonating fuzes will be stored in a convenient place away from the projectiles and powder charges and protected from the weather.

■ 21. OPENING BREECH.—*a.* No. 1 turns the breech operating crank handle counterclockwise until the breechblock clears the breech opening (fig. 4). The breechblock must be held in full open position; otherwise, the loading trough will strike the mushroom head.

*b.* After each round, No. 1 opens the breech, extracts the used primer, reams the vent, and wipes off the mushroom head with oily waste.

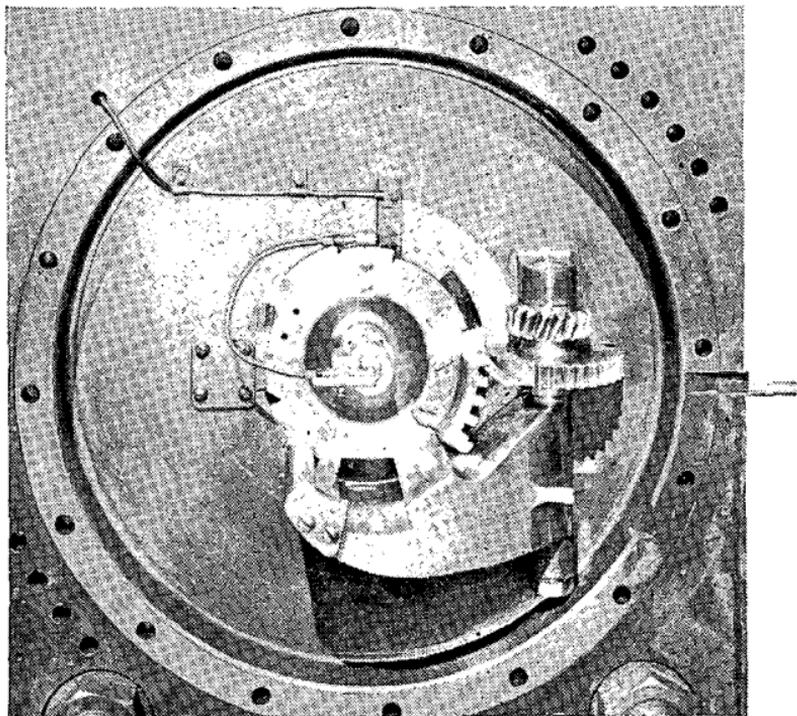


FIGURE 5.—Breech closed.

■ 22. CLOSING BREECH.—No. 1 turns the breech operating handle clockwise until the breechblock is locked tight in the breech recess (fig. 5).

■ 23. LOADING.—The ammunition table on the car platform should be filled with projectiles prior to the command LOAD. At the command LOAD, No. 7 fastens the shot tong, attached to the cable of the ammunition crane, to a projectile on the ammunition table. When the shot tong is fastened, No. 7 calls, "Ready," whereupon No. 5, assisted by No. 6, hoists the

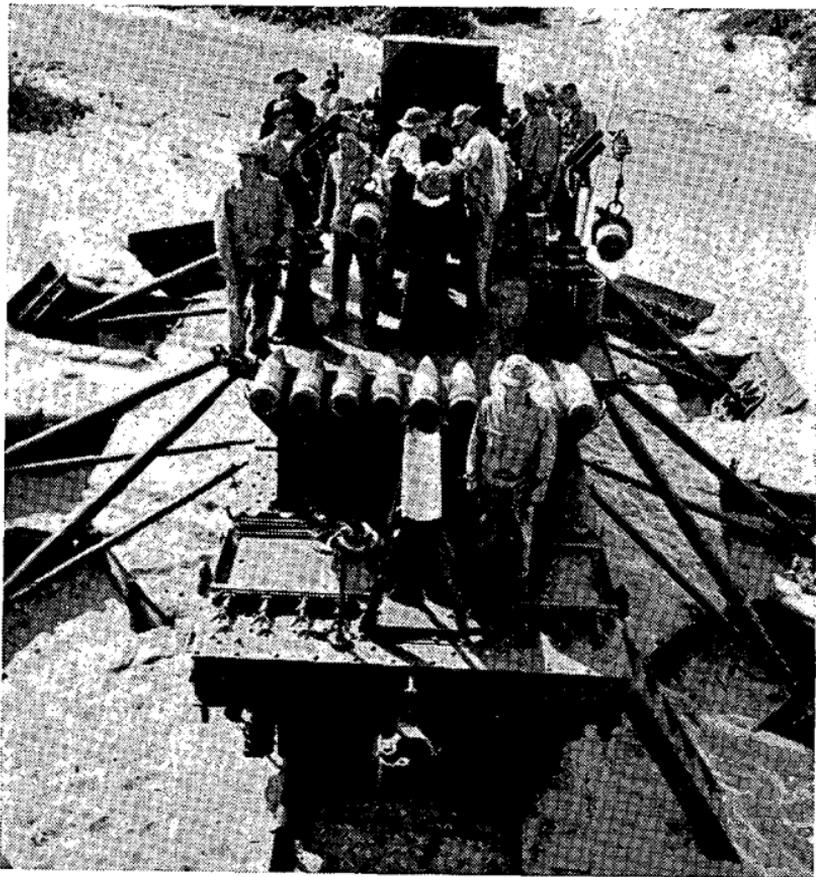


FIGURE 6.—The chief of breech and No. 2 shove the projectile home.

projectile from the ammunition table to the loading stand by means of the ammunition crane. No. 5 removes the shot tong from the projectile and lowers the tong to No. 7 in preparation for the next round. The chief of breech lowers the loading trough until the forward end rests firmly into the breech recess. The projectile is pushed home by the chief of breech with his right hand and No. 2 with his left hand (see fig. 6). The projectile should be shoved slowly off the trough and then pushed home with all possible force. The speed of the projectile is increased so that the projectile goes into its seat at maximum speed. No. 11 of the powder detail passes the propelling charge to No. 3 who places it on the loading stand. The chief of breech shoves the propelling charge into the powder chamber until it just clears the end of the loading trough. After the breechblock has been rotated and locked, the chief of breech inserts the primer, commands or signals: **ELEVATE**, and calls, "Primed." If the lanyard is to be used, the chief of breech attaches the lanyard hook in the trigger eye, inserts the primer, and calls, "Primed."

■ **24. CHANGING POWDER CHARGE.**—In the event that it becomes necessary to change the powder charge either by removing or inserting the increment after the command **RE-LAY** has been given, the gun commander will give the necessary instructions. At his command the designated cannoneers will perform such portions of the duties prescribed for the command **CEASE FIRING** or **LOAD** as are applicable.

and mechanical pointers are matched, calls, "Azimuth set" and keeps the pointers matched at all times, except when it is necessary to traverse the piece for loading.

(2) When the azimuth indicator is used without the data transmitter, the gun pointer traverses the piece until the mechanical pointer indicates the azimuth received over his telephone headset or posted on the azimuth display board, and calls, "Azimuth set."

■ 26. ELEVATION, CASE III.—*a. Using elevation quadrant.*—

The elevation setter sets on his quadrant the elevation received over his telephone headset or posted on the elevation display board and assisted by No. 4, he elevates the piece until the level bubble is centered and calls or signals, "Elevation set." He must keep the cross level bubble centered.

*b. Using elevation indicator.*—(1) When using the elevation indicator with the data transmitter in the fire-control car, the elevation setter, assisted by No. 4, elevates the piece until the electrical and mechanical pointers are matched and calls, "Elevation set." He keeps the pointers matched at all times except when it is necessary to depress the piece to the loading position.

(2) When the elevation indicator is used without the data transmitter, the elevation setter, assisted by No. 4, elevates the piece until the mechanical pointer indicates the elevation received over his telephone headset or posted on the elevation display board, and calls, "Elevation set."

*c.* The elevation setter should set the elevation in the same manner each time by depressing to the proper setting rather than setting sometimes by elevating and sometimes by depressing, except when matching the pointers.

■ 27. FIRING, CASE III.—After the chief of breech calls, "Primed," the gun commander commands or signals: FIRE (fig. 7), at the sounding of the proper time-interval signal, and presses the gun commander's push button. The chief of breech may be detailed to press the gun commander's push button at the gun commander's command or signal.

■ 28. FIRING, CASE II.—The gun pointer sets on his sight the deflection received over his telephone headset or posted on

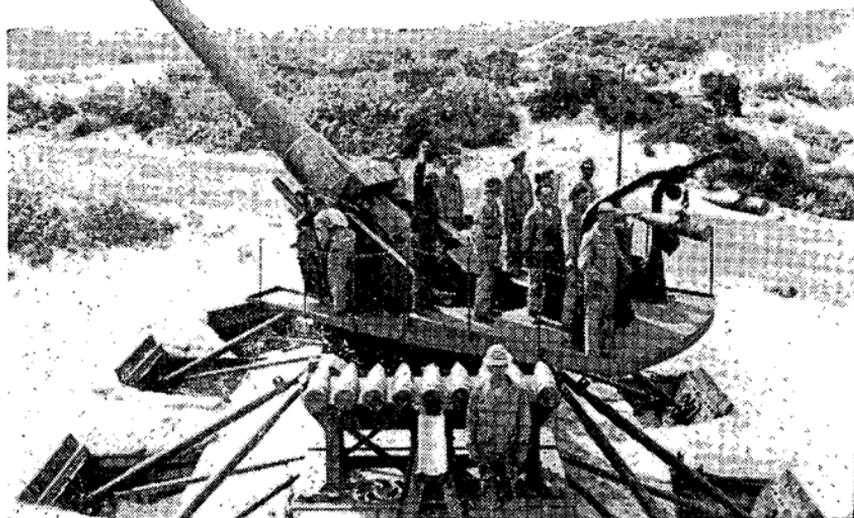


FIGURE 7.—Ready to fire.

the display board and traverses the piece, keeping the vertical cross wire of his sight on the target. The elevation setter sets the elevation as in paragraph 26 and calls or signals, "Elevation set." The gun pointer centers the cross level bubble, traverses the piece to keep the vertical cross wire of his sight on the target, and when the gun commander calls, "Ready," he commands: FIRE, and pulls the trigger of the firing switch.

■ 29. DRILL DURING SIMULATED FIRING.—For simulated firing using dummy ammunition, the following procedure is recommended:

a. For the first and succeeding odd-numbered rounds, the operations of loading, pointing, and firing, are as given above for service ammunition.

b. For the second and succeeding even-numbered rounds, the operation of unloading is substituted therefor. As soon as the projectile is removed, No. 1 closes the breech, and the operation of pointing and firing proceed as for service ammunition. The dummy projectile must be removed slowly to prevent burring the threads in the breech recess.

■ 30. THE COMMAND RE-LAY.—At the command RE-LAY, the gun pointer and the elevation setter continue to point the piece in direction and elevation as at the command LOAD and the display board operators post the new data on their display boards as they receive it.

■ 31. THE COMMAND STAND FAST.—If it is desired to halt all movements of materiel and personnel, the officer in charge of the emplacement or the chief of section commands: STAND FAST.

## SECTION V

### SAFETY PRECAUTIONS

	Paragraph
General .....	32
The command CEASE FIRING .....	33
Firing mechanism .....	34
Lanyard .....	35
Primers .....	36
Fuzes .....	37
Service of powder charges .....	38
Sponging powder chamber .....	39
Cover for gun section .....	40
Poor visibility .....	41
Misfires .....	42

■ 32. GENERAL.—The following safety precautions are prescribed for peacetime conditions. They indicate as well the principles to be followed under war service conditions, but should be interpreted by the battery executive according to the circumstances existing at the time of any particular emergency. Further instructions concerning safety precautions are prescribed in AR 750-10 and FM 4-20.

■ 33. THE COMMAND CEASE FIRING.—*a.* Any individual in the military service will command or signal CEASE FIRING if he observes any condition which makes it unsafe to fire.

*b.* At the command CEASE FIRING, given when the piece is loaded, the lanyard will be detached if the gun is being fired by use of the lanyard.

■ 34. FIRING MECHANISM.—*a.* The firing mechanism is a Navy firing lock, Mark VIII, Modification II.

*b.* The firing mechanism will be inspected and tested at frequent intervals. It is essential that the firing mechanism be checked immediately before firing to insure proper operation and functioning of the safety features.

*c.* To test the safety features of the firing mechanism, a combination electric percussion primer will be inserted before the breech is rotated. With the gun commander's push button pressed, the trigger of the firing switch will be pulled, while the block is being rotated, to ascertain if it is possible to fire the primer before the breechblock is locked.

■ 35. LANYARD.—The lanyard will be pulled with a quick, strong pull (not a jerk) from a position as near the rear of the piece as is convenient. There is no safety device on this gun that operates when it is fired by the lanyard; therefore, the greatest care must be exercised in hooking the lanyard to the firing mechanism, and in handling the lanyard thereafter, to avoid firing before the gun is elevated. The firing lock must not be cocked until after the lanyard is attached.

■ 36. PRIMERS.—Precautions in the care and handling of primers will be observed as follows:

*a.* Prior to firing, the primer pouch will be examined to make certain that it contains live primers only. Each primer of a new lot will be tested electrically prior to firing and also to check the fit of the primer in the primer seat. If the primers do not fit, the primer seat will be examined to see that it does not contain any foreign particles which would interfere with the seating of the primer.

*b.* Care must be taken not to drop the primers.

*c.* Primers will not be inserted until after the breechblock has been closed and locked excepting when primers are used to test the safety devices.

*d.* No. 1 places fired primers in his pocket after extracting them and discards them at the first opportunity.

*e.* Necessary precautions will be taken to prevent any attempt to use a primer that has failed.

*f.* Any primer removed after an attempt to fire will be handled with great care because of the possibility of a primer hangfire.

■ 37. FUZES.—*a.* Normally, projectiles equipped with base detonating fuzes will be received properly fuzed for firing. The high-explosive shell is fitted with Fuze, P. D., M51-Mod. 1, w/Booster M21. The fuze, as received, is arranged for delay action. Delay action requires that the delay head (inert) be used. Superquick action is obtained when the superquick head is used in place of the delay head. The superquick head, which contains a firing pin and primer, is shipped in a separate container, but in the same packing box as the shell. The delay head is made of solid brass, whereas the superquick head is closed with a disk of aluminum, crimped in place. The delay action is always operative; hence, if the fuze is arranged for superquick action and this action should fail, the fuze will still function with delay action.

*b.* A retaining screw, packed in the box with the high-explosive projectile, is intended for use only with the delay head when the Fuze, P. D., M51-Mod. 1, is replaced by a time fuze. The time fuze does not have an extended flash tube. Therefore, it requires the retaining screw to secure the delay head to the end of the windshield.

*c.* To arrange the fuze for superquick action:

(1) Unscrew the delay head from the point of the projectile with the fuze wrench provided for that purpose.

(2) Assemble the superquick head in place of the delay head and tighten with the fuze wrench.

*d.* For further instructions on the care and handling of fuzes, see FM 4-20 and appropriate Technical Manuals.

■ 38. SERVICE OF POWDER CHARGES.—In the ammunition car (or in the field magazine) all powder charges will be kept in their containers except the charge which is to be served to the piece for the next succeeding round. The powder charge for any given round will not be brought near the breech until the preceding round has been fired, the powder chamber sponged, and the face of the mushroom head wiped.

■ 39. SPONGING POWDER CHAMBER.—After each shot the powder chamber will be sponged and the face of the mushroom head wiped with the liquid provided for that purpose (see par. 48).

■ 40. COVER FOR GUN SECTION.—When firing high-explosive ammunition and cover is prescribed, each member of the gun section will be required to take adequate shelter each time the piece is fired (see AR 750-10).

■ 41. POOR VISIBILITY.—During target practice, firing will be stopped at once, if visibility becomes so poor as to endanger the tug or shipping in the field of fire.

■ 42. MISFIRES.—*a. General.*—A misfire occurs if the piece fails to fire when desired. In case of a misfire all personnel must remain clear of the path of recoil, and the piece is kept pointed at the target or at a safe place in the field of fire.

*b. Primer heard to fire.*—If the primer is heard to fire, it will *not* be removed nor the breechblock opened until 10 minutes have elapsed since the primer fired.

*c. Primer not heard to fire.*—If the primer has not fired, at least three attempts will be made to fire it. If a special device, by which the primer can be removed by an individual standing clear of the path of recoil, is available, the primer may be removed 2 minutes after the last attempt to fire. If the primer *has not fired* a new one may be inserted and firing continued. If the primer *has fired*, a new primer will not be inserted nor the breechblock opened until at least 10 minutes have elapsed since the last attempt to fire. If a special device for removing the primer is not available, the primer will not be removed nor the breechblock opened until 10 minutes have elapsed since the last attempt to fire (see FM 4-20).

## SECTION VI

### CARE AND ADJUSTMENT OF MATERIEL

	Paragraph
General .....	43
Recoil mechanism .....	44
To fill recoil cylinder .....	45
Obturator .....	46
Navy firing lock, Mark VIII, Modification II .....	47
Sponging solution .....	48
Care of bore .....	49

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

*b.* The methods prescribed for the operation, care, and preservation of materiel are those described herein and in other publications issued by the War Department (see Appendix), a thorough understanding of which is required on the part of all officers and others having materiel in their charge.

*c.* Major repairs will be made by the services concerned. Adjustments and minor repairs will be made by battery personnel.

■ 44. RECOIL MECHANISM.—The recoil mechanism is contained in two recoil cylinders, one long and one short, fitted into the lower section of the cradle below the gun, and one recuperator cylinder located between the two recoil cylinders. The length of recoil (approximately 27 inches) is uniform for all elevations. The recoil cylinders should be kept filled with oil at all times. The recoil cylinders should be drained, flushed thoroughly, and refilled once in each 6-month period.

■ 45. TO FILL RECOIL CYLINDER.—The recoil cylinders are filled with recoil oil, heavy, as follows:

*a.* Set the gun at zero degrees elevation and lock the gun to the cradle with the recoil parts locking device. Inspect the draining plugs, recoil cylinder heads, stuffing boxes, and other parts of the mechanism to see that these parts are securely in place.

*b.* Remove the plugs located at the top rear of both the long and short recoil cylinders, and insert a funnel in the hole.

*c.* Pour heavy recoil oil (specification 2-96A) into the funnel until the level of the oil reaches the top of the filling hole. Allow any air present to escape, then pour in more oil until it is level with the top of the filling hole.

*d.* Insert plugs and screw up tight.

■ 46. OBTURATOR.—*a.* With the breechblock in open position the obturator spindle with split rings and gas check pad assembled on it is inserted into the block. The obturator spindle spring is placed on the spindle and the obturator nut is screwed on until the rear end of the nut is flush with the spindle shoulder at the rear of the threads. With the rear of the nut flush with the shoulder, the keyway in the nut is lined up with the keyway in the obturator spindle, and the nut is given one complete turn. The obturator nut key is then driven into place. The proper amount of compression of the obturator spindle spring is obtained with the nut in this position. If the obturator gives indication of being loose after long use, the obturator nut should be tightened one additional turn.

*b.* Before tightening the obturator nut, the gas check pad and the split rings must be centered. If they are not centered properly, the front edge of the front split ring will strike the rear face of the tube which may injure the ring or burr the gun when the breechblock is closed.

*c.* The hexagonal portion of the obturator spindle fits the hexagonal hole in the breechblock. This arrangement forces the obturator to rotate with the breechblock.

■ 47. NAVY FIRING LOCK, MARK VIII, MODIFICATION II.—*a.* Combination percussion and electric primers are used in the Navy firing lock, Mark VIII, Modification II.

*b.* The firing lock housing is screwed on the rear end of the obturator spindle (fig. 5) and is secured by the housing latch which enters a square slot in the spindle. A primer is supported in its seat in the spindle by the wedge which closes behind it. The wedge is raised and lowered to its open and closed positions by rotating the hammer.

*c.* To cock the firing lock, grasp the hammer and pull gently to the rear about 1/16 inch. Then turn the hammer to the left about 45 degrees, keeping up a pull to the rear. When the hammer begins to move directly to the rear, keep a slight pressure tending to revolve it to the right. When the

hammer has reached its rear position, it will revolve 45 degrees to the right, bringing the hammer contact piece in line with the firing pin and the sear will engage the hammer stem.

*d.* To uncock the firing lock, grasp the hammer and pull it about 1/16 inch to the rear and revolve it about 45 degrees to the left. Ease the hammer forward until it reaches the forward limit of its travel. Then revolve the hammer 45 degrees to the right to its closed position.

*e.* To reprime the firing lock, grasp the hammer and pull it about 1/16 inch to the rear. Then rotate the hammer to the left until the wedge is in its lowest position, insert primer, and revolve the hammer to the right until the hammer contact piece is in line with the firing pin.

*f.* Care should be used to prevent breaking the firing lock by attempting to cock it by pulling the hammer directly to the rear without rotating it in the manner prescribed in 47c.

■ 48. SPONGING SOLUTION.—*a.* The sponging solution is a solution of water and castile soap. Its purpose is to provide a sponging liquid that will extinguish burning residue in the chamber of the gun and also serve to lubricate the breech recess. If the soap solution is not available, plain water may be used.

*b.* The solution consists of 1 pound of castile soap in 4 gallons of water. Yellow soaps should not be used as they are liable to leave a gummy residue in the breech recess. The soap is shaved from the bar to facilitate dissolving. Then it is added to the water and the water heated until the soap is dissolved. The water should be stirred with as little agitation as possible to prevent foaming.

*c.* To avoid the necessity of handling large receptacles, as much soap as will be required may be dissolved in one bucket of water. This concentrated soap solution will be added to water in other receptacles in the prescribed proportions.

■ 49. CARE OF BORE.—As soon as possible after firing and every day thereafter until all "sweating" has stopped, the

bore of the gun will be cleaned, dried, and oiled. The cleaning solution is made by dissolving  $\frac{1}{2}$  pound of soda ash in each gallon of boiling water. The bore is washed with this solution, using a bore sponge wrapped with burlap. Then the bore is wiped thoroughly dry with new burlap. Finally, the bore is coated with medium or heavy rust-preventive compound, depending on local conditions.

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

## SECTION VII

### EMPLACEMENT FOR FIRING

	Paragraph
General .....	50
Precautions .....	51
Lifting jacks .....	52
Outriggers .....	53
Site .....	54
Preparation of position .....	55
Locating mount .....	56
Elevating and leveling mount .....	57
Assembly of outriggers and floats .....	58

■ 50. GENERAL.—*a.* The method of emplacing described in this section permits firing through 360 degrees of traverse and from 0 to 45 degrees of elevation (see fig. 8).

*b.* Specific duties have been assigned to individual members of the gun section; however, the chief of section may find it necessary to reassign duties in accordance with the physical qualifications of the men.

*c.* The end of the gun car which carries the muzzle of the gun when it is in its normal traveling position is the A end of the car; the opposite or breech end is the B end of the car.

■ 51. PRECAUTIONS.—*a.* The traveling lock pins must not be withdrawn until the gun has been leveled approximately; an unlevelled gun on uneven track has been damaged because it traversed by itself when the traversing lock pins were withdrawn.

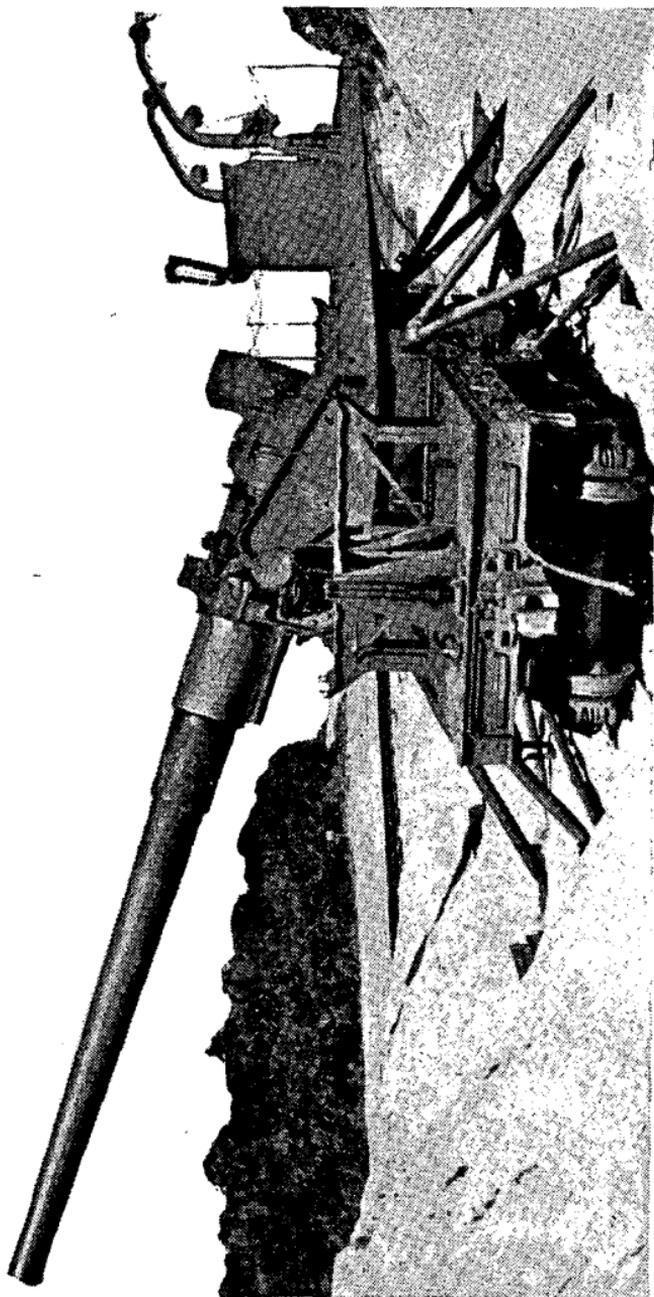


FIGURE 8.—Mount emplaced with gun traversed 70° right.

b. The mount should not be jacked at either end a sufficient distance to disengage the body bolster plates out of the center plates of the car trucks. Under this condition the male and female parts of the center plates are liable to be thrown out of alinement during firing.

c. The gun should never be traversed 90 degrees unless the pedestals are in position under the base plate and one side outrigger is in place on the muzzle side of the mount to provide stability.

■ 52. LIFTING JACKS.—*a.* Four built-in jacks are located in the corners of the base plate directly above the rails of a standard gage railroad track. The jacks should be operated semimonthly to lower the mount and return it to its normal firing position when the gun is emplaced, or to raise the mount off its trucks and return it to the traveling position when the gun is not emplaced. When the gun is in traveling position, the locking pawl near the inside end of the pinion shaft must be in place on the ratchet wheel, to prevent the ram from moving downward while the gun is being moved.

b. For the proper operation of the lifting jack mechanism, it is essential that the rotating and sliding surfaces be well lubricated and free of dust, dirt, and grit. All setscrews and bolts must be kept tight and locked securely in place.

■ 53. OUTRIGGERS.—*a.* There are eight outriggers which act as braces to prevent the mount from tipping over or from sliding on its foundation during firing. The outriggers are made of steel tubing with adjusting screws on one end and a clevis and pin on the other. The adjusting screws have ball ends that contact the sockets in the footplates, which distribute the load over the wood floats. The upper ends of the outriggers are hinged at the sides of the car. Chords or tie rods are fastened to the car below the outriggers and act as braces to support the outriggers. When in traveling position, the outriggers and chords are folded against, and secured to, the sides of the car.

b. The floats are constructed of two layers of white oak blocks bolted together. Two pieces of angle iron are bolted

to the upper surface of each float and act as a guide to the footplate. When not in use the floats and footplates are stored on the car floor.

c. To insure freedom of movement of the outrigger struts and chords, the hinges and other fittings by which the outriggers are attached to the car body must be kept clean and lubricated. The locking devices for the outriggers and chords must be inspected to see that they are in good condition, particularly those devices that retain the outrigger parts in traveling position.

■ 54. SITE.—The site selected should be on straight level track with the level of the ground not much below the top of the ties. Deep ditches and swampy or extremely rocky soil should be avoided (see FM 4-5).

■ 55. PREPARATION OF POSITION.—*a.* Defective ties or any that do not give a good bearing surface outside of the rails should be replaced. The spacing of ties should not be greater than 24 inches, center to center. If time permits, ties should be relocated with a spacing of 16 inches, center to center. The track should be leveled both longitudinally and laterally with the ballast well tamped under the ties.

*b.* A spike is driven in a tie to mark the position of the gun pintle center. An area about 17 feet on both sides of the rails and 25 feet along the track in both directions from the pintle spike is then graded to the level of the top of the ties.

*c.* (1) Excavation work, supervised by the chief of section, can be completed prior to the arrival of the gun (see fig. 9).

(2) Cannoneers numbered 1 to 9, inclusive, work on the right side of the mount under the direction of the gun pointer; the ammunition handlers numbered 10 to 17, inclusive, work on the left side of the mount under the direction of the chief of ammunition.

■ 56. LOCATING MOUNT.—*a.* When the mount arrives at the position, the pintle center of the gun is located directly over the pintle spike. The location of the mount and the spacing of the ties must be arranged to provide at least two ties for the support of each pedestal.

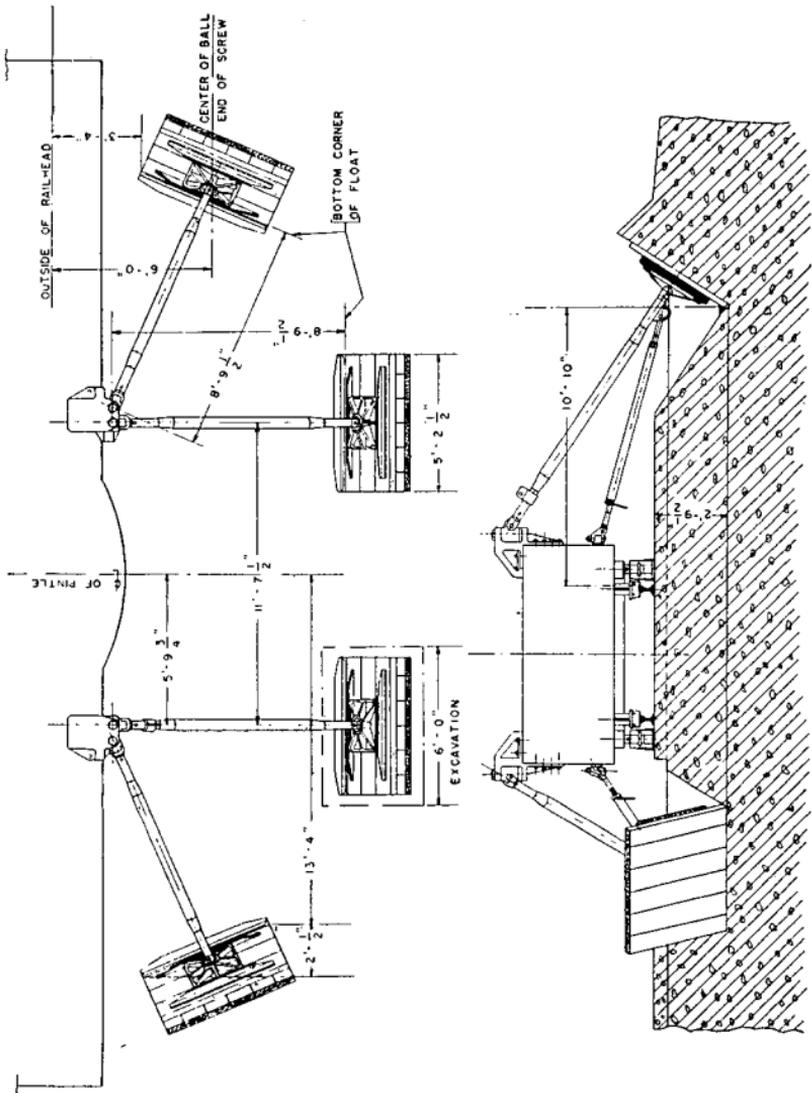


FIGURE 9.—Location of outriggers and floats in firing position.

b. The air brakes are released by pulling outward on the two release valve rods projecting from the side sills.

■ 57. ELEVATING AND LEVELING MOUNT.—*a.* Nos. 1, 2, and 3 raise the outriggers on the right side of the A end of the car high enough for No. 4 to remove the lifting jack lever that is stored under the ammunition table, after which they replace the end of the outrigger on its clip. They remove the lifting jack lever from the B end of the car on the right side in a similar manner. At the same time No. 13, assisted by Nos. 10, 11, and 12, removes the lifting jack levers from the left side of the car.

b. While the operations in *a* are being performed, Nos. 7, 8, and 9 remove the four footplates from the right side of the A end of the car and place them on the ground near the approximate positions at which the four outrigger floats will be located when in firing position. No. 7 stations himself on the car, unlocks the footplates, and hands them to Nos. 8 and 9 on the ground. The footplates on the left side are removed in a similar manner by Nos. 14, 15, and 16 with No. 14 being stationed on the car.

c. Cannoneers take posts at the lifting jack positions as follows:

- (1) Nos. 1 and 2 at right front lifting jack.
- (2) Nos. 3 and 4 at right rear lifting jack.
- (3) Nos. 10 and 11 at left front lifting jack.
- (4) Nos. 12 and 13 at left rear lifting jack.

d. Nos. 1, 3, 10, and 12 unlock their respective lifting jacks by raising the inner pawls from the ratchet wheels. After releasing the pawls, they lower the jack plungers to the rails by spinning the jack lever socket. Nos. 2, 4, 11, and 13 insert the jack levers into the sockets.

e. The lifting jack details simultaneously elevate the gun mount by raising and lowering the jack levers under the direction of the gun commander, who sounds the cadence, UP, DOWN. The gun mount is raised sufficiently to permit the pedestals with the screws run completely down to be placed under the base plate. One inch should be the maximum height to which the car body is raised off the car trucks.

*f.* The gun commander checks level of the base plate by the four built-in levels located on the base plate near each lifting jackscrew. If the mount is not provided with the built-in levels, then gunner's quadrants placed on the four machined surfaces on the base plate must be used to level the gun.

*g.* While the gun mount is being jacked and leveled, the elevation setter releases the wing nuts on the locking devices holding the firing pedestals in place on the right side of the B end of the car. Then, assisted by the display board operators on the ground, and Nos. 5 and 6, operating the right ammunition crane, the elevation setter removes the four firing pedestals, placing them on the ground near the base plate. The chief of breech, assisted by the aiming rule operator and the battery commander's telephone operator on the ground and Nos. 15 and 16 at the left ammunition crane, removes the firing pedestals from the left side and places them near the base plate.

*h.* When the gun mount is level, the same cannoneers who removed the firing pedestals from the car, place them in position on the ends of the ties and run the pedestal screws up until they seat uniformly against the underside of the base plate. All pedestal screws are then adjusted by No. 17 using the pull of one hand on a 3-foot lever. When all pedestals are carrying the load evenly and the mount is level, the lifting jack plungers are raised  $\frac{1}{2}$  inch above the rail head. The level of the mount is rechecked and, if not level, the lifting jacks are used again and the pedestal screws are readjusted. The pedestal screws must not be used to raise and level the gun mount.

■ 58. ASSEMBLY OF OUTRIGGERS AND FLOATS.—*a.* To remove the side outriggers from their traveling positions, the gun must be traversed slightly; therefore the gun must be first prepared for traversing. The elevation display board operator lowers the muzzle support, using a lifting jack lever to turn the muzzle support screw, a sufficient distance to permit the elevation setter to depress the gun. The gun pointer retracts the plungers of the breech support into their recesses in the recoil band by use of the crank located under

the breech counterweight. After this operation the locking pin in the crank must be engaged in its hole in the recoil band.

b. The outriggers are swung to their approximate emplacement positions and the chords assembled to them by Nos. 1, 2, 3, and 4 on the right side, and Nos. 10, 11, 12, and 13 on the left side in the following sequence:

- (1) Side outriggers hinged at A end of car.
- (2) Side outriggers hinged at B end of car.
- (3) End outriggers at B end of car.
- (4) End outriggers at A end of car.

c. The excavations for the floats must be completed as shown in figure 9. If the excavations have not been prepared by an advance party prior to bringing the gun into position, the work must be detailed by the gun commander to the cannoneers as they complete their assigned duties in performing the preceding operations.

d. When the float excavations are ready, Nos. 7, 8, and 9 remove and emplace the floats located on the right side of the B end of the car, assisted by Nos. 5 and 6 operating the right ammunition crane. The chief of breech traverses the gun so the loading platform clears the floats located beneath it. Nos. 14, 15, and 16, assisted by Nos. 13 and 17 operating the left ammunition crane, remove and emplace the floats located on the left side of the B end of the car. When these floats are in position and the outriggers have been assembled to them, the gun is traversed 180 degrees and the floats at the A end of the car are unloaded and emplaced in a similar manner.

e. In assembling the main outrigger tubes and the chords, the length of the chord is adjusted so that the ball end of the outrigger screw is level with the bottom of the ties. When emplaced, the thrust surface of the float should be perpendicular to the main outrigger tube, with the footplate centrally located on the float. The ball-end screws are adjusted to seat firmly in the sockets of the footplates and must be kept firmly seated during firing. Too tight an adjustment must be avoided, as it may lift the car and affect

the level of the mount. The ball-end adjusting screws should project as little as possible and never more than 10 inches. If an extension of more than 10 inches is required for proper tightening, the screws should be run completely in and the floats relocated.

*f.* The earth behind the floats must be packed after each 10 shovelfulls of earth. Earth is piled level with the top of the floats for a distance of 10 feet behind them. Two rows of sand bags are placed on top of the earth immediately in back of each float. The excavation in front of the float should be filled with earth to a point level with the bottom of the sockets in the footplates.

*g.* All dirt must be cleaned from the footplate sockets and adjusting screws. These parts should be greased and the threads covered with burlap.

*h.* A final inspection of all floats is made by the gun commander, who also makes a final check of the level of the mount.

*i.* The azimuth indicator and the panoramic sight are oriented and the gun clinometered.

*j.* The gun is prepared for drill or firing.

## SECTION VIII

### PREPARATION FOR RAIL MOVEMENT

	Paragraph
General .....	59
Loading and securing equipment .....	60

■ 59. GENERAL.—Members of the gun section handle the same elements of materiel in preparation for movement that they handle in preparing the emplacement. Float holes must be filled and the roadbed and track left in good condition.

■ 60. LOADING AND SECURING EQUIPMENT.—*a.* Four of the floats are placed on the B end of the car in a recess below the loading platform, and the remaining four are placed on the A end of the car. All floats are secured by the retaining forks provided for that purpose. The footplates are stacked on end, immediately in front of the ammunition table, at the A end of the car and secured with the locking bars. The

pedestals are stored on the B end of the car, in back of the ammunition table, and secured in place by the locking bars.

b. The lifting jacks are raised to their highest positions, and the locking pawl near the bevel gear is dropped into place. The lifting jack levers are placed in their traveling positions under the ammunition tables.

c. The outriggers and chords are swung against the sides of the car to their respective traveling positions. The ball ends of the side outrigger tubes attached to the B end of the car are supported in sockets. The other main outrigger tubes are held in place on the supports provided for that purpose by pins which are locked in place with cotter pins. The adjusting screws on both the outriggers and the chords must be secured by wire to prevent the screws from turning while the car is en route.

d. The ammunition cranes are locked together by a pin inserted through the fittings located at the top of the crane masts for that purpose.

e. The traveling lock pins are inserted in the flange of the racer, locking the racer to the base plate. The breech traveling support handle is rotated until the breech traveling support plungers protrude from the breech band, locking the gun in elevation.

f. The muzzle support screw is run up until it supports the muzzle and then locked in place. The gun is now in traveling position (fig. 10).

g. The gun commander makes a final check to see that all equipment is properly secured and does not project over the sides of the car. He inspects the journal boxes for proper lubrication and to see that the boxes are free of dirt or grit. He inspects the gun position for proper police and sees that all equipment and tools have been loaded. He makes certain the gun is in locked position. He tests both the hand and air brakes, checks the position of the retainer valve handles, or makes certain that they are tested and checked before the gun is moved out of position.

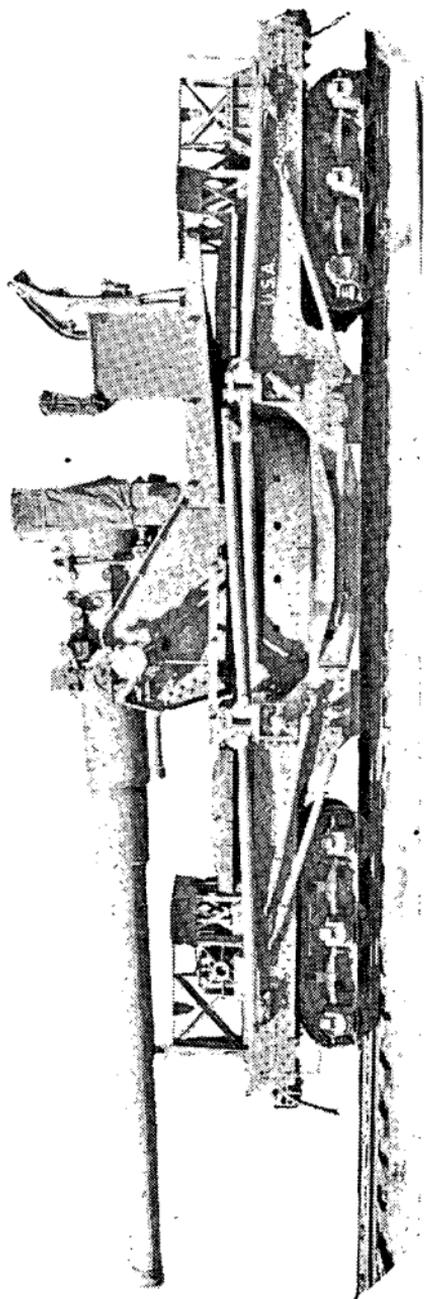


FIGURE 10.—Traveling position.

## SECTION IX

## STATISTICAL DATA

	Paragraph
Gun .....	61
Ammunition .....	62
Mount, railway, M1A1 .....	63

## ■ 61. GUN.—

Diameter of bore between lands..inches .....	8.00
Diameter of bore between grooves .....	8.14
Length of bore.....calibers .....	45
Length of rifling.....inches .....	288.79
Weight of gun with breech mechanism .....	42,000
Type of breechblock .....	Interrupted screw
Type of firing mechanism.....	Electrical and percussion

■ 62. AMMUNITION.—*a. Projectiles.*—

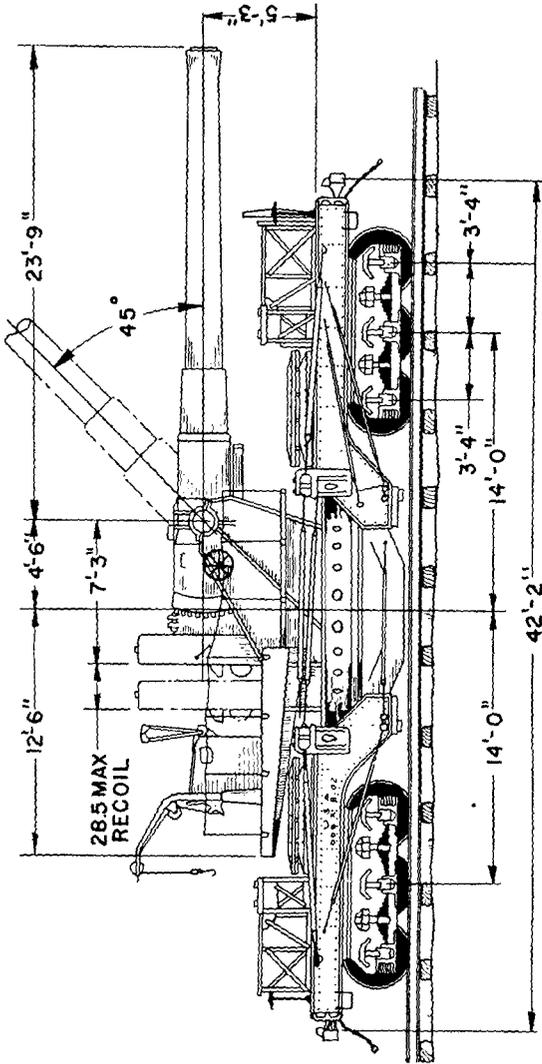
Shell, High-Explosive, 240 pounds, M103
Shell, Armor-Piercing, 260 pounds, Mk. XX
Shell, Target-Practice, 260 pounds, Mk. XVIII

*b. Muzzle velocity.*—

Shell, H.-E., 240 lbs., M103	
(normal charge) .....	2,150
(supercharge) .....	2,840
Shell, A.-P., 260 lbs. Mk. XX	
(normal charge) .....	2,100
(supercharge) .....	2,750
Shell, T.-P., 260 lbs., Mk. XVIII	
(normal charge) .....	2,100
(supercharge ) .....	2,750

*c. Fuzes.*—

Fuze, Point Detonating, M51, Mod. 1
Fuze, Base Detonating, Mk. X



BETWEEN PULLING  
FACES

FIGURE 11.—General dimensions of gun and mount.

■ 63. MOUNT, RAILWAY, M1A1 (see fig. 11).—*a. Elevation.*—

Maximum .....	degrees .....	45
Maximum firing .....	degrees .....	45
Minimum (loading) .....	degrees .....	(—) 5
Minimum firing .....	degrees .....	0

*b. Traverse.*—

Continuous .....	degrees .....	360
------------------	---------------	-----

*c. Recoil mechanism.*—

Initial air pressure in recuperator .....	lb. per sq. in.....	1,600
Final air pressure in recuperator .....	lb. per sq. in.....	2,683
Initial liquid pressure in intensifier .....	lb. per sq. in.....	1,828
Final liquid pressure in intensifier .....	lb. per sq. in.....	3,065
Recoil distance with super- charge (normal) .....	inches .....	27
Recoil distance (maximum) .....	inches .....	28.5

*d. Railway data.*—

Total weight at rail (approximate) .....	pounds .....	230,000
Weight on front truck (muzzle end) .....	pounds .....	125,850
Weight on rear truck (breech end) .....	pounds .....	104,150
Height (traveling position) .....	feet-inches .....	13-10
Length, between couplers .....	feet-inches .....	42-2
Length, over-all (traveling position) .....	feet-inches .....	49-4
Width (traveling position) .....	feet-inches .....	10-3
Diameter of wheels .....	inches .....	28
Journals, diameter and length (plain bearings) .....	inches .....	5½ x 10
Maximum operating speeds for mounts with plain bearings:		
Main line passenger tracks... miles per hour..		50
Main line freight tracks ... miles per hour..		40
Branch line tracks... governed by local track condition		

Maximum operating speed for mounts with roller bearings:

Maximum freight train speed for trackage on which operating.

Limitation of track curvature on movement:

By pinch bar over track with radius of curvature of approximately 60 feet.

At 5-10 miles per hour over track with radius of curvature of approximately 270 feet.

## APPENDIX

### LIST OF REFERENCES

Ammunition, Coast Artillery .....	TM 4-205
Ammunition, drill .....	TM 9-900 (now published as TR 1370-D)
Ammunition, general .....	TM 9-1900
Camouflage, cover, protection against air and chemical attacks, local security, machine gun defense.....	{ FM 4-5 TM 5-265
Care and maintenance of materiel.....	{ FM 4-20 FM 4-51 TM 9-463 TM 9-850 TM 4-245
Commands .....	FM 4-5
Examination for gunners.....	FM 4-150
Fire control and position finding.....	FM 4-15
Gunnery .....	FM 4-10
Organization of the battery .....	{ FM 4-5 T/O 4-47
Reconnaissance, selection, and occupation of positions .....	FM 4-5
Safety precautions in firing .....	{ AR 750-10 FM 4-20

SECTION X  
DRILL TABLE

Service of the piece, 8-inch gun, Mark VI, Modification 3A2, on railway mount M1A1

Details	DETAILS, POSTS	(a) EXAMINE GUN (b) REPORT
Gun pointer (non-commissioned officer).	Procures sight and telephone headset, places sight in position on sight mount, uncovers azimuth indicator; takes post on loading platform in rear of traversing handwheel, facing it.	(a) Examines sight, sight mount, and azimuth indicator; tests traversing mechanism and telephone to fire control car. (b) Reports to gun commander, "Traversing in order," or any defects he is unable to remedy without delay.
Elevation setter . . .	Procures telephone headset, uncovers elevation indicator and elevation quadrant; takes post at elevating handwheel, facing to the rear.	(a) Examines quadrant and elevation indicator; tests elevating mechanism; makes sure gun is unlocked from traveling position. (b) Reports to gun commander, "Elevation in order," or any defects he is unable to remedy without delay.
Chief of breech (noncommissioned officer).	Procures firing mechanism and cable, primer pouch containing primers, and pair of pliers; takes post at left of loading trough, facing to the rear.	(a) Assists No. 1 to remove breech cover. Examines firing mechanism, places it on obturator spindle, and attaches firing cable; tests firing circuit; supervises work of breech detail. (b) Reports to gun commander, "Breech in order," or any defects he is unable to remedy without delay.
Battery commander's telephone operator.	Procures telephone with headset and handset; takes post to right of piece.	(a) Connects and tests telephone to battery commander's station. (b) Reports to gun commander, "Battery commander's telephone in order," or any defects he is unable to remedy without delay.

SECTION X  
DRILL TABLE

Service of the piece, 8-inch gun, Mark VI, Modification 3A2, on railway mount M1A1

LOAD	FIRE	CEASE FIRING
Keeps gun traversed to azimuth received from fire control car. If data transmitter is used, keeps gun traversed so that pointers on azimuth indicator are matched. When firing case III, calls or signals, "Azimuth set." When firing case II, sets deflection on sight, calls, "Deflection set," keeps cross level bubble centered, and tracks target. Calls or signals, "Fire."	Presses trigger . . . . .	Continues receiving and setting data until CEASE TRACKING is received.
Depresses to loading position. When breech is closed, sets elevation by quadrant or by elevation indicator; if data transmitter is used, matches pointers. Calls or signals, "Elevation set."	After piece has been fired, depresses to loading position as rapidly as possible.	Continues receiving and setting data until CEASE TRACKING is received.
Lowers loading trough, places right hand on base of projectile and assisted by No. 2, pushes projectile into chamber, then shoves powder charge into powder chamber so that it will be pushed into place by mushroom head when breechblock is closed, and raises loading trough. When breechblock is closed and locked, inserts primer, signals or commands: ELEVATE, calls, "Primed." If lanyard is used, hooks it, cocks firing lock, signals or commands: ELEVATE, and calls, "Primed."	Listens for the explosion of primer which may be audible if powder charge fails to explode.	Supervises work of unloading and assists in withdrawing projectile when dummy ammunition is used, inserting extractor in base of projectile.
Transmits the command . . . . .	Stands by . . . . .	Transmits the comand. Continues to transmit all commands until relieved.

## SECTION X—Continued

## DRILL TABLE

Service of the piece, 8-inch gun, Mark VI, Modification 3A2, on railway mount M1A1

Details	DETAILS, POSTS	(a) EXAMINE GUN (b) REPORT
Aiming rule operator.	Assisted by No. 9 procures aiming rule sight and cross bar, places them near aiming rule stakes; takes post behind aiming rule stakes, facing the piece. When aiming rule is not used, takes post at left of piece.	(a) Places aiming rule cross bar in position on stakes; mounts sight and sets data on sight; moves sight along bar until vertical cross wire is centered on gun sight targ. (b) Reports to gun commander, "Aiming rule in order," or any defects he is unable to remedy without delay.
Azimuth display board operator.	Procures telephone headset, display board, chalk, and blackboard erasers or waste, placing them on the ground to left of piece; takes post at display board.	(a) Cleans display board; connects and tests telephone to fire control car. (b) Reports to gun commander, "Azimuth display board in order," or any defects he is unable to remedy without delay.
Elevation display board operator.	Procures telephone headset, display board, chalk, and blackboard erasers or waste, placing them on the ground to the right of the piece; takes post at the display board.	(a) Cleans display board; connects and tests telephone to fire control car. (b) Reports to gun commander, "Elevation display board in order," or any defects he is unable to remedy without delay.
No. 1 (breech detail).	Procures cotton waste, lubricating oil, and vent reamer, placing them convenient to breech; removes breech cover, assisted by chief of breech, placing it on car platform; takes post to right of breech at breech crank, facing breech.	(a) Examines, cleans, and oils breechblock in breech mechanism. (b) Reports to chief of breech any defects in breech.
No. 2 (sponging and ramming detail).	Assisted by No. 3 procures sponge and sponge tub containing sponging liquid, placing them in right rear corner of loading platform; removes loading trough cover; takes post at right of loading stand, facing to the rear.	(a) Examines sponge. (b) Reports to gun commander, "Sponging in order," or any defects he is unable to remedy without delay.

## SECTION X—Continued

## DRILL TABLE

Service of the piece, 8-inch gun, Mark VI, Modification 3A2, on railway mount M1A1

LOAD	FIRE	CEASE FIRING
Keeps vertical cross wire on center of gun sight targ without changing the data set on aiming rule sight.	Continues as under LOAD.	Continues as under LOAD unless otherwise directed.
Relays data received to gun pointer, then writes data on display board; continues by using reverse side of board and erasing old data.	Stands by.....	Continues as under LOAD until CEASE TRACKING is received.
Relays data to elevation setter, then writes data on display board; continues by using reverse side of board and erasing old data.	Stands by.....	Continues as under LOAD until CEASE TRACKING is received.
Opens breech, and holds breechblock in full open position; stands by until piece is loaded, then closes breech and faces to rear.	As soon as piece is fired, opens breech, ejects primer, reams vent hole, and wipes off mushroom head.	Opens breech for purpose of removing dummy ammunition or cleaning gun.
Places left hand on base of projectile and assists chief of breech to push projectile into chamber.	As soon as piece is fired, sponges powder chamber with drained sponge fully saturated with sponging liquid.	When dummy ammunition is used, assists in withdrawing dummy projectile.

SECTION X—Continued  
DRILL TABLE

Service of the piece, 8-inch gun, Mark VI, Modification 3A2, on railway mount M1A1

Details	DETAILS, POSTS	(a) EXAMINE GUN (b) REPORT
No. 3 (powder detail).	Assists No. 2 in procuring sponge and sponge tub containing sponging liquid; takes post at rear center of loading platform directly in rear of loading stand.	Stands by . . . . .
No. 4 (elevating detail).	Removes muzzle cover; takes post by elevating handwheel, facing to the rear.	Stands by . . . . .
No. 5 (ammunition crane detail).	Takes post at right ammunition crane, facing to the rear.	(a) Examines and tests right ammunition crane mechanism. (b) Reports to gun commander, "Ammunition cranes in order," or any defects he is unable to remedy without delay.
No. 6 (ammunition crane detail).	Takes post at left ammunition crane, facing to the rear.	(a) Examines and tests left ammunition crane mechanism. (b) Reports to No. 5 any defects in left ammunition crane.
No. 7 (projectile detail).	Procures grease for projectiles, brush, and shot tongs; takes post at right rear of car platform.	Inspects and tests shot tongs, reporting any defects to No. 5.
Nos. 8 and 9 (outrigger detail).	Procure tommy bars. No. 8 procures extractor. No. 9 assists aiming rule operator. No. 8 takes post near left rear float, No. 9 near right rear float.	(a) Examine outriggers on respective sides, adjust them so each has firm bearing on foot-plates. (b) Report to gun commander, "Outriggers in order," or any defect they are unable to remedy without delay.

SECTION X—Continued  
DRILL TABLE

Service of the piece, 8-inch gun, Mark VI, Modification 3A2, on railway mount M1A1

LOAD	FIRE	CEASE FIRING
Receives powder charge from No. 11 of ammunition squad and places it on loading stand as soon as projectile has been pushed into chamber, pushing the powder charge toward the breech.	Stands by.....	When dummy ammunition is used, assists in withdrawing projectile, then passes extractor to No. 9.
Elevates piece at command of chief of breech as rapidly as possible to approximate elevation and faces to the rear.	Stands by.....	Stands by.
Assisted by No. 6, hoists projectile from ammunition table to loading stand, removes shot tong from projectile; lowers shot tong to No. 7 in preparation for next round.	Stands by.....	When dummy ammunition is used, moves projectile from loading stand to ammunition table, assisted by No. 6.
Assists No. 5 in hoisting projectile from ammunition table to loading stand.	Stands by.....	Assists No. 5.
Greases bourrelet and rotating band, then fastens tongs on projectile.	Stands by.....	When dummy ammunition is used, guides projectile onto ammunition table as it is lowered by Nos. 5 and 6.
Inspect and adjust outriggers after each round.	Stand by.....	When dummy ammunition is used, duties are as directed by gun commander. No. 9 passes extractor to No. 3 and receives it after use.