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FM 4-55

WAR DEPARTMENT

COAST ARTILLERY FIELD MANUAL

SEACOAST ARTILLERY

SERVICE OF THE PIECE

12-INCH MORTAR (FIXED ARMAMENT)

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COAST ARTILLERY FIELD MANUAL

SEACOAST ARTILLERY

SERVICE OF THE PIECE

12-INCH MORTAR (FIXED ARMAMENT)

CHANGES No. 1

WAR DEPARTMENT,
WASHINGTON, April 23, 1943.

FM 4–55, May 15, 1940, is changed as follows:

SECTION VI½ (ADDED)

DESTRUCTION OF MATÉRIEL

■ 53. 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's 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—

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

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

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

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.

■ 55. 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 unfuzed HE shell and either M9A1 AT grenade or M6 AT rocket.—(1) Remove the recoil cylinder 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 (in (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, boostered, point-detonating HE shell 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 rear of the piece and about 20° off the line of fire.

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

c. Demolition by TNT blocks and HE shell.—Remove the recoil cylinder drain plug. Ram an HE shell (without base fuze) into the forcing cone, place 120 ½-pound TNT blocks in the chamber of the gun, and close the breech. 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 TNT blocks.—(1) Remove the recoil cylinder drain plug. Insert 120 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 3 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.

e. Demolition by incendiary grenades.—If evacuation is imminent and it is desired to accomplish demolition without telltale explosions, the following 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 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.

■ 56. 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.

■ 57. RECOIL MECHANISM AND CARRIAGE.—The method explained in paragraph 55*b*, *c*, or *d* for destroying the tube will destroy the recoil mechanism and carriage if the drain plug on the recoil mechanism is opened, allowing the recoil fluid to drain before detonating the TNT charge. It is not necessary to wait

for the recoil fluid to drain completely before detonating the charge.

■ 58. 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 nobody is in the path of a possible ricochet. Switch panels, sockets, plugs, and fuse or circuit-breaker panels should be smashed with a sledge or ax.

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

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

■ 61. 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.

■ 62. FIRE CONTROL AND OBSERVATION STATIONS AND AMMUNITION MAGAZINES.—*a.* These installations can best be destroyed by demolition with TNT.

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

[A. G. 062.11 (3–26–43).] (C 1, Apr. 23, 1943.)

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff

OFFICIAL:

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

U. S. GOVERNMENT PRINTING OFFICE: 1943

FM 4–55

COAST ARTILLERY FIELD MANUAL

SEACOAST ARTILLERY

SERVICE OF THE PIECE

12-INCH MORTAR (FIXED ARMAMENT)

Prepared under direction of the
Chief of Coast Artillery

UNITED STATES
GOVERNMENT PRINTING OFFICE
WASHINGTON: 1940

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WAR DEPARTMENT,
WASHINGTON, *May 15, 1940.*

FM 4–55, Coast Artillery Field Manual, Seacoast Artillery, Service of the Piece—12-inch Mortar (Fixed Armament) is published for the information and guidance of all concerned.

[A. G. 062.11 (4–6–40).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

E. S. ADAMS,
Major General,
The Adjutant General.

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SERVICE OF THE PIECE

12-INCH MORTAR (FIXED ARMAMENT)

(The matter contained herein supersedes TR 435-255, December 24, 1924, including C1, January 2, 1929.)

SECTION I

GENERAL

■ 1. SCOPE.—*a.* This manual prescribes the service of the piece for the 12-inch mortar, fixed armament. 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 in section VII.

b. The service of the piece prescribed herein is intended as a guide for the battery commander. Changes in the details of the service of the piece may be made to meet local conditions.

c. The following combinations of mortars and carriages may be found in service: M1890MI mortar on M1896MI carriage, M1890MI mortar on M1896MII carriage, M1912 mortar on M1896MIII carriage, and M1908 mortar on M1908 carriage. The drill in this manual is for use with all of these combinations of mortar and carriage.

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

SECTION II

ORGANIZATION

■ 3. GUN SECTION.—Each emplacement of two mortars is manned by a gun section consisting of a pit commander, two

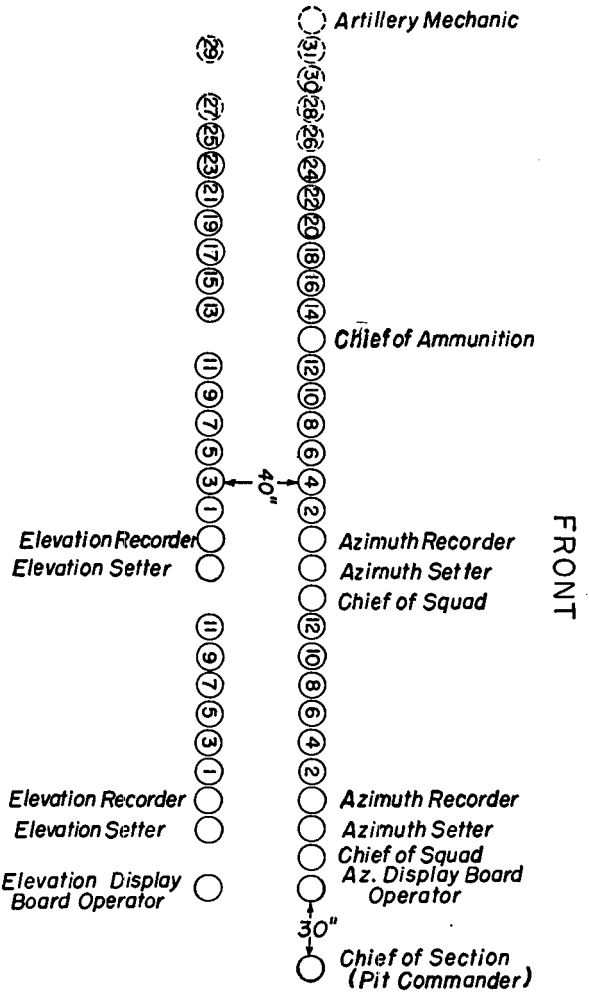

FIGURE 1.—Formation of the gun section.

NOTE.—Nos. 26 to 31, inclusive, are for war strength organization only.

mortar squads, an ammunition squad, and two display board operators. The war strength of the gun section is 57 enlisted men; the peace strength is 51 enlisted men.

■ 4. MORTAR SQUAD.—At both peace and war strength, each mortar squad (17 enlisted men) consists of a chief of squad, an azimuth setter, an elevation setter, an azimuth recorder, an elevation recorder, and 12 cannoneers, numbered from 1 to 12, inclusive.

■ 5. AMMUNITION SQUAD.—At peace strength, the ammunition squad consists of a chief of ammunition and 13 cannoneers, numbered from 13 to 25, inclusive. At war strength, the ammunition squad has six additional cannoneers, numbered from 26 to 31, inclusive. The squad is divided by its chief into details for the service of powder and projectiles.

■ 6. FORMATION.—The gun section assembles in two ranks with 4 inches between files and 40 inches between ranks (fig. 1). The post of the chief of section (pit commander) is in the front rank, 1 pace to the right of his section. The artillery mechanics, members of the maintenance section, form on the left of the first and second gun sections.

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 emplacements. He is responsible to the battery commander for—

(1) Technical handling of the mortars.

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

(3) Condition of matériel under his charge.

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

(5) Police of the emplacements.

b. He supervises preparation of the armament for firing.

c. He inspects the matériel under his charge and personally verifies the adjustment of all pointing devices as frequently as is necessary to insure accuracy. He or the assistant bat-

tery executive tests all circuits and firing devices before each drill or firing, paying special attention to safety features.

d. He receives the reports of the pit commanders and reports to the battery commander, "Sir, — pit (pits) in order," or reports defects he is unable to remedy without delay.

e. If it becomes apparent that one of the mortars will not be laid in time, he gives to that squad the command: NO. — TAKE COVER. If it becomes apparent that neither piece of an emplacement will be laid in time, he commands: RE-LAY and reports his action to the battery commander. When one or more pieces are laid and all details have taken cover, he closes the safety switch (if firing by electricity) and reports or signals to the battery commander, "— pit (pits) ready." 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.

f. When the mortars are equipped for firing by electricity, they are fired by the battery executive upon receipt of the signal from the battery commander. When the lanyard is used, the battery executive commands: FIRE upon receipt of the signal.

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

■ 8. ASSISTANT BATTERY EXECUTIVE.—The assistant battery executive performs the duties of the battery executive insofar as they pertain to the emplacement or emplacements to which he is assigned.

■ 9. PIT COMMANDER (CHIEF OF SECTION).—*a.* The pit commander (noncommissioned officer) is in command of the gun section. He is responsible to the battery executive for the training and efficiency of the personnel of his section, for the condition of the matériel under his charge, and for the police of the emplacement to which assigned.

b. He supervises the service of the piece and the service of ammunition at his emplacement and personally directs the work of care and preservation at the emplacement.

c. He gives the command DETAILS, POSTS, when the section arrives at the emplacement and supervises the procuring of

equipment. After all details have reached their posts (fig. 2), he commands: EXAMINE GUN. He then makes an inspection of the mortars, carriages, and other matériel, paying special attention to the recoil cylinders, firing mechanisms, safety devices, and the oiling of the various bearings. He receives the reports of the chiefs of squads and reports to the battery executive, "Sir, — pit in order," or reports defects he is unable to remedy without delay.

d. When necessary to verify the section, he commands: CALL OFF. The cannoneers of the section call off their titles

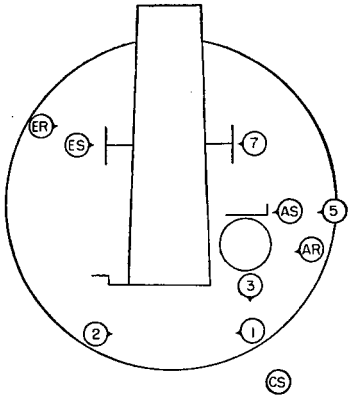

FIGURE 2.—DETAILS, POSTS.

or numbers in succession, beginning with the unnumbered members of the section proper, followed by the squads in order. The squads call off successively from right to left, beginning in each squad with the unnumbered cannoneers followed by the numbered cannoneers in order. (See fig. 1.)

e. At the command LOAD, the pit commander repeats the command and supervises the work of his section. As soon as one or more of the mortars are loaded and laid and all details have taken cover, he reports or signals to the battery executive, "Sir, — pit ready." The pit commander also commands: LOAD before each salvo of a series. The mortars are not fired, however, until the command COMMENCE FIRING is given and the proper firing signal received.

f. At the command COMMENCE FIRING, if the pieces are unloaded, the pit commander commands: LOAD and supervises the work of his section. The mortars are not fired until receipt of the proper firing signal.

g. The pit commander 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, "Sir, — pit, (so many) rounds." When dummy ammunition is used, he supervises unloading of the mortars.

h. In case of a misfire, the pit commander calls, "No. — misfire." He sees that the precautions prescribed in paragraph 42 are observed.

i. At the command REPLACE EQUIPMENT, the pit commander supervises the replacing of equipment, sees that all matériel is properly secured and the emplacement policed, and then, unless otherwise directed, forms his section.

j. The pit commander is responsible to the battery executive for the observance of all safety precautions at his emplacement. When the lanyard is being used, under no circumstances will he permit a piece to be fired prior to the receipt of both the command COMMENCE FIRING and the proper firing signal.

■ 10. CHIEF OF MORTAR SQUAD.—*a.* The chief of the mortar squad (noncommissioned officer) is responsible to the pit commander for the training and efficiency of his squad and for the condition and serviceability of the matériel to which assigned.

b. At the command DETAILS, POSTS, he takes post where he can best supervise his squad.

c. At the command EXAMINE GUN, he makes a careful inspection of the piece and carriage, receives the reports of the various details of his squad, and reports to the pit commander, "No. — in order," or reports defects he is unable to remedy without delay.

d. At the command LOAD, he supervises the work of his squad, gives the commands for and assists in ramming the projectile. He verifies the laying of the piece in azimuth and if practicable in elevation. If he notes an abnormal change in azimuth differences as indicated by the chalk marks, he

notifies the battery executive; if not, he calls or signals, "No. — ready," and takes cover after the other members of his squad have reached their cover positions. If his squad is ordered to take cover before the piece is laid, he breaks the firing circuit or, if the firing is by lanyard, requires No. 2 to drop the lanyard. When the mortar is fired, he listens for the explosion of the primer which may be audible if the powder charge does not explode. He observes the muzzle of his mortar when a salvo is fired and notes whether or not the piece is discharged. In case of a misfire, he calls out "No. — misfire," and sees that the precautions described in paragraph 42 are taken.

e. At the command RE-LAY, his duties are the same as at the command LOAD.

f. At the command CEASE FIRING, when dummy ammunition is used, he supervises the work of his squad in removing the dummy projectile.

g. He is responsible to the pit commander for the observance of all safety precautions at his piece.

■ 11. AZIMUTH SETTER.—The azimuth setter is charged with the duty of laying the piece in direction. He is responsible to the chief of the mortar squad for the proper operation, care, and adjustment of the traversing mechanism and for checking adjustment of the azimuth index. For detailed duties of the azimuth setter, see drill table in section VII.

■ 12. ELEVATION SETTER.—The elevation setter is charged with the duty of laying the piece in elevation. He is responsible to the chief of the mortar squad for the proper operation, care, and adjustment of the quadrant and elevating mechanism. For detailed duties of the elevation setter, see drill table, in section VII.

■ 13. CHIEF OF BREECH.—The chief of breech (No. 1) is responsible to the chief of squad for the condition and serviceability of the breech mechanism, breechblock, breech recess, firing mechanism, chamber, and bore. He is also responsible for the efficiency of the breech detail and for the observance of safety precautions insofar as they pertain to his detail. For detailed duties of the chief of breech, see drill table, in section VII.

■ 14. AZIMUTH RECORDER.—*a.* The azimuth recorder is charged with the duty of recording all azimuths posted on the display board and of checking, marking, and recording each azimuth set on the mortar by the azimuth setter.

b. At the command DETAILS, POSTS, he gets a pencil, chalk, and forms for recording azimuths and takes post near the azimuth setter.

c. At the command TARGET, he records all azimuths posted on the display board. As soon as he hears the azimuth setter call "Set," he checks and records the azimuth setting on the mortar and immediately signals or calls, "Azimuth set," in a loud voice, makes a chalk mark on the loading platform opposite a reference mark on the racer, and takes cover.

d. At the command RE-LAY, he performs the same duties as at the command TARGET.

e. At the command CEASE FIRING, he continues to record the azimuths posted on the display board until the command CEASE TRACKING is received.

■ 15. ELEVATION RECORDER.—*a.* The elevation recorder is charged with the duty of recording all zones and elevations posted on the display board and of checking and recording all elevations set on the mortar by the elevation setter.

b. At the command DETAILS, POSTS, he gets a pencil and forms for recording zones and elevations, and takes post near the elevation setter.

c. At the command TARGET, the elevation recorder records each zone and elevation posted on the display board. As soon as he hears the elevation setter call "Set," he checks and records the elevation setting on the mortar, signals or calls, "Elevation set," and takes cover.

d. At the command RE-LAY, he performs the same duties as at the command TARGET.

e. At the command CEASE FIRING, he continues to record the elevations and zones posted on the display board until the command CEASE TRACKING is received.

■ 16. CHIEF OF AMMUNITION.—*a.* The chief of ammunition (noncommissioned officer) is responsible to the pit commander for the efficiency of the personnel of his squad, for the care and preservation of ammunition and ammunition han-

dling apparatus (trolleys, cranes, blocks and chains, shot hoists, receiving and delivery tables and trucks), for the observance of all safety precautions in the care and service of ammunition, and for the police of the magazines and galleries under his charge.

b. Before the beginning of an action, he is responsible to the pit commander that all shot trucks are loaded and adjusted and that delivery tables are filled with projectiles. He will see that the service of ammunition is uninterrupted during the action.

c. At the command DETAILS, POSTS, the chief of ammunition opens the galleries (and magazines if necessary) and posts the members of his squad.

d. At the command EXAMINE GUN, the chief of ammunition inspects the matériel under his charge and gives instructions for preparing ammunition and equipment for service or drill and reports to the pit commander, "Ammunition service in order," or reports defects he is unable to remedy without delay.

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

f. At the command CEASE FIRING, when dummy ammunition is used, he causes the dummy projectiles and dummy powder charges to be put in their proper places in the gallery.

g. At the command REPLACE EQUIPMENT, he supervises the replacing of equipment, sees that all matériel is properly secured, forms his squad, and reports to the pit commander.

■ 17. AMMUNITION SQUAD.—The ammunition squad, at peace strength 14 men, at war strength 20 men, is divided into two details; the projectile detail and the powder detail. The size of the two details depends on local conditions; for example, the method of ammunition service and the distance that the ammunition must be moved. The duties of the two details may be summarized briefly as follows:

a. Projectile detail.—The projectile detail places the projectiles on the delivery tables and assists in loading them on the shot trucks. One of the cannoneers is designated as chief of detail by the chief of ammunition and the one so designated supervises the work of the detail. At times when they have no other duties, they clean, paint, and mark

projectiles; clean, oil, and paint dummy projectiles and shot trucks; clean, oil, and adjust hoists and delivery tables; and police projectile magazines and corridors.

b. Powder detail.—The powder detail removes the charges from the containers; checks and records their weights and all pertinent data, especially lot number; sees that the powder bags are not defective; records temperature of magazines; removes empty containers and places them in a location where they will not interfere with the work of the squad; carries the powder charges to the emplacement and turns them over to No. 6 of each mortar squad. One of the cannoneers is designated by the chief of ammunition as chief of detail and the one so designated supervises the duties of the detail. At times when they have no other duties, they police the powder magazines; police the portion of the corridors assigned them; and assist the projectile detail, if necessary, in any of its duties.

■ 18. AZIMUTH DISPLAY BOARD OPERATOR.—*a.* The azimuth display board operator is charged with the duty of receiving and posting in legible figures on the azimuth display board all azimuths received from the plotting room. He repeats all commands and messages received from the battery commander's station and plotting room, making sure that they are received by the person for whom they are intended.

b. At the command DETAILS, POSTS, he gets chalk and a blackboard eraser and takes post in front of the azimuth display board, facing it.

c. At the command EXAMINE GUN, he cleans his display board, puts on his telephone headset, and tests communication to the plotting room (deflection board operator) and battery commander's station extension. He reports to the pit commander, "Azimuth and BC line in order," or any defects he is unable to remedy without delay.

d. At the command TARGET, he repeats in a loud voice the azimuth received from the plotting room and posts it in legible figures on the display board. As soon as he receives new data, he erases the old data and posts the new. He continues this procedure as long as data are being transmitted or until the command CEASE TRACKING is received.

■ 19. ELEVATION DISPLAY BOARD OPERATOR.—*a.* The elevation display board operator is charged with the duty of receiving and posting in legible figures on the elevation display board all zones and elevations received from the plotting room.

b. At the command DETAILS, POSTS, he gets chalk and a blackboard eraser and takes post in front of the elevation display board, facing it.

c. At the command EXAMINE GUN, he cleans his display board, puts on his telephone headset, and tests communication to the plotting room (elevation board operator). He reports to the pit commander, "Elevation line in order," or any defects he is unable to remedy without delay.

d. At the command TARGET, he repeats in a loud voice the zone and elevation received from the plotting room and posts them in legible figures on the data board. As soon as he receives new data, he erases the old data and posts the new. Whenever there is a change in zone, he calls, "Change to zone —," and makes certain that the chief of ammunition is notified. He continues this procedure as long as data are being transmitted or until the command CEASE TRACKING is received.

■ 20. ARTILLERY MECHANICS.—The artillery mechanics, assisted by members of the gun sections, make such minor repairs and adjustments as can be made with the means available. The chief artillery mechanic is the custodian of supplies pertaining to the mortar pits to which his battery is assigned. He is responsible for the condition of storerooms pertaining to the mortar pits and 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 are necessary for the service and care of the mortars and accessories.

SECTION IV

NOTES ON THE SERVICE OF THE PIECE

■ 21. GENERAL.—*a.* The drill set forth in this manual is for a M1912 mortar mounted on a M1896MIII carriage. Variations in the drill for other mortars are—

(1) *M1890MI.*—The operation of the breech mechanism is different. (See par. 24*a*.)

(2) *M1908.*—The mortar is brought to the loading position by means of the quick-loading mechanism without changing the carriage elevation. This operation is similar to the operation of depressing the other types of mortars.

b. The service of the piece will be conducted with dispatch and precision and with as few orders as possible. Commands will be given in the prescribed form. Signals may be substituted for commands whenever practicable. Except for the necessary orders, reports, and instructions, no talking will be permitted. Cannoneers change positions at a run. Loading with dummy ammunition and pointing the piece as for service firing is the normal practice at drill. Fired service primers will be used at drill.

c. In manning the rammer, the men take their places in the following order: The chief of squad at the end, Nos. 1 and 5 on the right, and Nos. 2 and 4 on the left, each man grasping the rammer with both hands and as near the outer end of the rammer stave as possible, thumbs to the rear. As the truck comes to a stop at the breech, the projectile is rammed home instantly and with all possible force, utilizing its momentum, the speed of ramming being accelerated so that the maximum is reached as the projectile goes into its seat. Although speed in loading is desired, it must be subordinated to caution in "running" up the shot truck to the breech recess and in ramming the projectile. Carelessness may result in injury to the threads of the breech recess, causing the breechblock to stick and slow up the rate of fire. Smooth drill and properly adjusted shot truck buffers will reduce the possibility of burring the threads of the breech recess.

■ 22. COVER POSTS.—*a*. At the command TAKE COVER, given at any time, the squads take position in rear of the emplacement. Each squad is in double column as shown in figure 3.

b. Normally the cover post for No. 4 is the same as his regular post and the squad forms on him at the command TAKE COVER. He does not quit the rammer except at the command CEASE FIRING, or when directed to do so, in which case he places the rammer on the rack or prop.

c. When powder is not served from the rear of the pit, the cover post of No. 6 is near the entrance to the gallery from which the powder is served.

d. At the commands, LOAD, RE-LAY, and WITHDRAW POWDER CHARGE, cannoneers having duties to perform proceed to their posts as quickly as possible without interfering with each other. Similarly, in taking cover, the details proceed to their posts as rapidly as possible but should avoid interfering with those whose duties at the piece have not been completed.

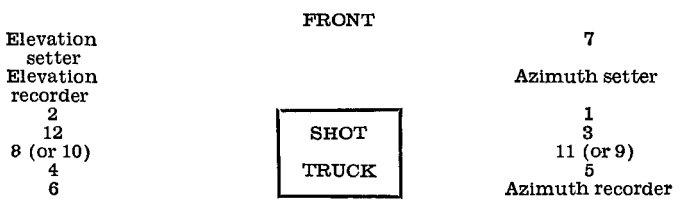

FIGURE 3.—COVER POSTS.

■ 23. STAND FAST.—If it is desired to halt all movements of matériel and personnel, the officer in charge of the emplacement or the pit commander commands: STAND FAST.

■ 24. OPERATION OF BREECH.—*a. M1890MI mortar.*—(1) *To open breech.*—No. 2 pulls out rotating crank lock and turns rotating crank three times in the direction indicated by arrow marked "Open." No. 1 then turns translating crank counterclockwise ending with a quick motion in order to bring the breechblock to its final position in the tray with a jar sufficient to release tray latch. No. 1 then grasps tray handle, and assisted by No. 2, swings block until tray back latch engages in its catch.

(2) *To close breech.*—No. 2 releases tray back latch by raising the handle. He then grasps tray handle and assisted by No. 1 swings tray until it brings up against the face of the breech. No. 2 then turns translating crank three times in a clockwise direction. No. 1 grasps rotating crank handle and turns crank in a clockwise direction until rotating crank lock engages.

b. M1908 and M1912 mortars.—(1) *To open breech.*—No. 2 unlocks breechblock and turns operating crank clockwise until the tray comes to rest against the hinge.

(2) *To close breech.*—No. 2 turns operating crank in a counterclockwise direction until breechblock is translated, rotated, and locked in the closed position.

■ 25. SERVICE OF AMMUNITION.—*a. When using point detonating fuzes, the fuzes must be handled with greatest care.* Projectiles are fuzed only as required and in accordance with the following procedure: The adapter plug is unscrewed from the fuze socket and the fuze, *fitted with its felt or rubber washer,* is inserted. The fuze is screwed home by hand, the final seating being accomplished with the fuse wrench but without the use of any great force. If there is any difficulty in screwing the fuze home, the fuze should be removed and another inserted. If the same trouble is experienced with the second fuze, the shell should be rejected. Point detonating fuzes are used for special missions only.

b. Prior to firing, the primer pouch should be examined to make certain that it contains live primers only. Fired primers should be discarded as soon as they are removed from the firing mechanism. Electric and friction primers should not be mixed. Electric primers may be distinguished from friction primers by the presence of insulation on the button wire.

c. All members of the gun section should be familiar with the appearance of equal-section (aliquot) and base and increment propelling charges for all zones with particular attention to the difference between the igniter end and the front end of the charge. A misfire or hangfire may occur if the propelling charge is loaded with the igniter against the projectile.

d. When the propelling charge is inserted, it should be pushed into the powder chamber to such a distance that the breechblock in closing will give the charge a final push into the chamber.

e. Propelling charges are removed from their containers only as they are needed; for any given round, the propelling charge must not be brought out of the gallery until the preceding round has been fired, the chamber sponged, and the mushroom head wiped.

■ 26. LOADING.—At the command LOAD, given by the pit commander, the following action is taken by each mortar squad: No. 2 unlocks and opens the breechblock, No. 1 assists him by grasping the body of the block and helping to swing the block clear. No. 3 holds the block back during the loading of the projectile and propelling charge. The truck detail runs up the truck; as the truck passes the rammer detail, No. 4 raises the rammer to a horizontal position and places the head against the base of the projectile. The chief of squad and Nos. 1, 2, 4, and 5 take their places on the rammer and follow the truck. As soon as the truck brings up against the face of the breech, the brake is set, the truck detail swings out and around the truck handles, faces the rear, and holds the truck firmly against the breech; crouching down out of the way of the rammer detail. As soon as the truck brings up against the face of the breech, the men on the rammer run forward and seat the projectile with one motion, using all possible force. (If the projectile fails to seat, the chief of squad commands: HOME RAM, and all men working together heave on the rammer until the projectile is pushed home.) No. 6 places the propelling charge on the truck with the igniter pad to the rear. No. 2 pushes the charge into the chamber by hand until its face barely clears the gas check seat so that it will be pushed into the chamber by the mushroom head. No. 2, assisted by No. 1, closes the breech. As soon as the breech is locked, No. 3 inserts the primer, lowers the firing leaf, and then commands or signals: ELEVATE. When the mortar is elevated to 43°, No. 3 inserts the firing circuit plug (firing by electricity) or hooks the short lanyard and unhooks the S–hook from the safety lanyard device (firing by lanyard). When firing by lanyard, after the rest of the squad has taken cover, No. 2 hooks the long lanyard and takes post about 20 feet to the rear of the mortar facing the battery executive and awaiting the command or signal: FIRE.

■ 27. POINTING AND FIRING.—*a.* As soon as the piece is loaded, the azimuth setter traverses the piece to the azimuth posted on the data board, and calls, "Set," to the azimuth recorder. He takes cover only after the azimuth recorder has checked and recorded the azimuth set and called "Azimuth set" in a loud voice. When No. 3 commands: ELEVATE, the elevation

setter assisted by No. 7 unlatches the mortar and elevates to the approximate elevation expected. When the elevation is posted on the data board, the elevation setter sets his quadrant, lays the piece for elevation, and clamps it. He then calls, "Set," to the elevation recorder. The elevation setter takes cover only after the elevation recorder has checked and recorded the elevation set and called "Elevation set" in a loud voice. The chief of squad then verifies the laying of the piece, insertion of the firing circuit plug (firing by electricity), and makes a chalk mark on the loading platform opposite the reference mark on the racer. If he notes a sudden increase in azimuth differences, he notifies the battery executive; otherwise he calls, "No. — ready," and takes cover. All members of the squad take cover posts as soon as their duties are completed and in such manner as not to interfere with others whose duties are not completed.

b. At the command or signal FIRE, No. 2 pulls the lanyard (firing by lanyard). The chief of squad listens for the explosion of the primer which may be heard if the propelling charge does not ignite. If a salvo is fired, he watches the muzzle of his mortar and notes whether it fires. As soon as the piece is discharged, the cannoneers take posts at a run. The elevation setter unclamps the elevating mechanism and assisted by No. 7 depresses the mortar to the loading position rapidly but without shock, and sees that the spring latch engages. When necessary, the azimuth setter traverses the mortar to the nearest limit of the loading position. No. 2 assisted by No. 1 opens the breech. No. 1 wipes off the mushroom head. No. 12 assisted by No. 2 sponges the chamber. When necessary, No. 2 cleans the breech recess and the gas check seat. No. 3 hangs the short lanyard in the lanyard safety device, removes the old primer, clears the vent, and cleans the primer seat. All members of the squad stand ready for the next round.

■ 28. DRILL WITH DUMMY AMMUNITION.—*a.* For simulated fire using dummy ammunition, the following procedure is recommended:

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

(2) For the second and succeeding even-numbered rounds, the operations of sponging and loading are omitted and the operation of unloading is substituted therefor. As soon as the projectile is removed, the breech is closed and the operation of pointing and firing proceed as for service ammunition.

b. Unusual events, such as misfires, which may occur during firing, should be simulated during the drill. They should be called by the executive or pit commander without prior information to the mortar squad and in such a manner as to inject realism into the drill.

■ 29. POSTING DATA.—Mortar pits are normally equipped with a mechanical system for posting data which is operated from the plotting room. This equipment is seldom used. It is considered better practice to have the data transmitted by telephone and posted on blackboards by display board operators who should be trained to make legible figures. If the mechanical system is used, its operation should be checked frequently.

■ 30. BUTTERFLY NET.—The butterfly net mentioned herein is not an article of issue. One may be readily constructed by a variety of methods. One method is to take a long-handled landing net or a crab net, replace the netting with burlap, and fasten a heavy hook of small diameter to the handle and within the hoop in such fashion that the hook may be used to unlatch the firing mechanism, the primer dropping into the net.

■ 31. PROTECTION FROM CONCUSSION.—The concussion caused by mortar firing is very strong. Personnel should not stand near walls or over drains when the piece is being fired. When possible, the knees should be flexed and the mouth opened. In general, all doors and windows in the emplacement and in buildings in the vicinity should be opened. If the plotting room adjoins the pit, it may be found necessary to close all openings to prevent the loss of range charts and plotting paper. The emplacement book should be consulted for information on damage caused by concussion in previous firings with a view to preventing its recurrence.

■ 32. LOADING POSITION LIMITS.—Loading position limits should be clearly marked, both on the racer and on the floor of the pit. These markings are necessary on both sides of any sector of the field of fire in which loading is impossible. The marking should extend far enough back from the mortar to enable the correct positioning of the shot trucks. A method of marking is to have two parallel lines painted, the distance between them being the width of the shot truck. Drill should be conducted at these limiting positions to determine whether or not there is sufficient clearance for proper ramming.

SECTION V

SAFETY PRECAUTIONS

■ 33. GENERAL.—*a.* The safety precautions given in this section are prescribed for peacetime conditions. They indicate as well the general principles to be followed in war service conditions.

b. Further instructions concerning safety precautions are found in AR 750–10 and FM 4–20.

■ 34. 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—

(1) If firing by electricity, the executive opens the firing circuit at the main switch and the chiefs of squad open the circuit at the mortars by pulling out the firing circuit plug.

(2) If firing by lanyard, the lanyards are detached.

■ 35. FIRING MECHANISM.—*a.* The firing mechanism will be inspected and tested frequently, and immediately before firing to insure proper operation and functioning of the safety features.

b. To test the proper functioning of the safety features of the mechanism, a friction primer will be inserted before the breechblock is rotated. A strong pull will be exerted on the lanyard while the block is rotated to ascertain if it is possible to fire the primer before the breechblock is locked. The mechanism will also be tested in a similar manner with an

electric primer, the magneto being operated continuously while the breechblock is being rotated.

c. Previous to firing, all primers to be used will be inserted in the primer seat and the firing leaf and slide will be lowered to their firing positions in order to verify the proper functioning of these parts with each primer.

d. A firing mechanism which has been tried and is known to function satisfactorily in a particular mortar will be stamped with the serial number of that mortar and will be used with that mortar in order to insure proper functioning.

■ 36. LANYARD.—The lanyard will not be attached to the firing mechanism until the mortar has been elevated to 43° and will be detached before the mortar (loaded) is depressed below 43°. If the mortar is loaded and if a butterfly net is available, it is advisable to remove the primer by means of the net before the lanyard is detached. Lanyards will be pulled with a quick, strong pull (not a jerk) from a position directly in rear of the piece.

■ 37. PRIMERS.—The following precautions will be taken in the care and handling of primers:

a. Prior to firing, the primer pouch will be examined to make certain that it contains live primers only.

b. Care will be taken not to drop primers.

c. Except when used in testing safety features, primers will not be inserted until after the breechblock has been closed and locked in its recess.

d. Primers will not be inserted or removed by means of the button or wire.

e. The greatest care will be exercised in lowering the leaf of the firing mechanism.

f. Fired primers will be discarded as soon as they are removed from the firing mechanism.

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

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

i. After the primer has been inserted, the slide is lowered until the catch engages in the notch of the housing. Pre-

caution should be exercised to insure that *the slide is entirely down before attempting to fire the piece;* otherwise the primer may be blown to the rear, endangering the members of the mortar squad.

■ 38. FUZES.—Projectiles equipped with base detonating fuzes are received properly fuzed for firing. Projectiles equipped with point detonating fuzes are received unfuzed and will be fuzed as required. (See par. 25*a*.)

■ 39. SERVICE OF POWDER CHARGES.—In the 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 passed out of the gallery until the preceding round has been fired, the powder chamber sponged, and the face of the mushroom head wiped.

■ 40. SPONGING POWDER CHAMBER.—The powder chamber will be sponged and the face of the mushroom head wiped after each shot with the liquid provided for the purpose. (See par. 44.)

■ 41. 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.)

■ 42. MISFIRES.—A misfire occurs if the piece fails to fire when desired. Failure of the piece to fire is due to one of two causes; failure of the primer to fire or failure of the propelling charge to ignite. In case of a misfire, all persons will remain clear of the path of recoil, the piece will be kept trained on the target or on a safe place in the field of fire, and under no circumstances will the mortar be depressed under 43°.

a. 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 after the firing of the primer.

b. Primer not heard to fire.—If the primer is not heard to fire, at least three attempts will be made to fire it. If a

butterfly net is available, the primer may be removed and examined 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 from the last attempt to fire. If a butterfly net is not available, the primer will not be removed nor the breechblock opened until 10 minutes have elapsed from the last attempt to fire. (See FM 4–20.)

■ 43. EQUALIZING PIPE.—On all mortar carriages, the lower ends of the hydraulic recoil cylinders are connected by an equalizing pipe. Three bronze plugs one of which is a spare are provided to be used in case the equalizing pipe is injured in action, in which case the equalizing pipe can be entirely removed, the plugs screwed into the equalizing pipe seats in the cylinders, the recoil cylinders refilled, and firing continued.

SECTION VI

CARE AND ADJUSTMENT OF MATÉRIEL

■ 44. SPONGING SOLUTION.—*a*. The sponging solution is a solution of water and castile soap. Its purpose is to provide a sponging liquid which 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. Preparation of the solution consists of dissolving 1 pound of castile soap in 4 gallons of water. Yellow soaps should not be used as they are likely to leave a gummy deposit in the breech recess. The soap should be shaved from the bar to facilitate dissolving. It is then 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 is required for the water to be used can be dissolved in one bucket of water. This concentrated soap solution can then be added to water in other receptacles in the prescribed proportions.

■ 45. CARE OF BORE.—*a.* As soon as possible after any period of firing, the bore of the mortar will be cleaned to remove all powder residue and then thoroughly oiled. The cleaning solution is made by dissolving ½ to 1 pound (depending on the strength desired) of soda ash in each gallon of boiling water. Wash the bore with this solution, using a bore sponge around which burlap has been wrapped. Then using a sponge wrapped with dry burlap, wipe the bore thoroughly dry. Coat the bore with medium or heavy rust-preventive compound, depending on local conditions. Daily cleanings for a period of one or two weeks are usually necessary.

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

■ 46. CARE OF CARRIAGE AND BREECHBLOCK.—*a.* All bearing parts should be thoroughly cleaned and lubricated. Special attention should be given to the lubrication of the breechblock, trunnion bearings, crossheads and guides, rollers, pintle bearings, and elevating and traversing mechanism, including the teeth of all gears.

b. The carriage should be exercised frequently to insure that moving parts do not bind and that the whole mechanism is in proper working order. For this reason, the carriage should be traversed occasionally 90° to the right and to the left of its normal position when "in service." During this maneuvering, see that the parts of the traversing mechanism work freely and that there is no binding of the pintle surfaces.

c. The mortar should occasionally be elevated to its maximum elevation and returned to the loading position to insure that the trunnions and elevating mechanism do not bind and that these parts work freely.

d. Recoil cylinders should be kept filled.

e. Drip pans are provided for the lower ends of the recoil cylinders. These should be emptied and cleaned occasionally.

f. If rust should accumulate, its removal from all bearing parts, especially piston rods, requires particular attention in order that clearances shall not be unduly increased. Abra-

sives will be used as prescribed in *TM 9–850. Rust may be softened by using dry-cleaning solvent.

g. Recoil cylinders should be emptied at least every 6 months, thoroughly cleaned after each firing, and at least once each year regardless of whether the mortar has been fired or not.

h. Oil holes must be cleaned out frequently to keep them free from sand, grit, and dirt. They must be kept closed with the screw plugs or countersunk screws provided. Before oiling, wipe off carefully all dirt or grit near the opening that might be carried down into the bearing. All oil plugs, screws, covers, and grease cups should be painted red in order that they may be readily located. Fittings which cannot be painted should have a red ring painted around them.

■ 47. FILLING RECOIL CYLINDERS.—*a. Carriages M1896MI, MII, and MIII.*—To fill the cylinders with oil, remove filling plugs from both cylinders. Pour clean, light recoil oil into the hole of one cylinder until it flows out the hole of the other. Allow any air that may be present to escape. Then pour in more oil until it is level with the filling holes. A little more than 10½ gallons is required to fill the cylinders. Oil which has been withdrawn from the cylinders or which has been used for any purpose must never be put in the cylinders again without being filtered or carefully strained.

b. Carriage M1908.—Filling holes are provided at about the middle of each cylinder. The operation of filling should be done with the mortar horizontal and with both plugs out. It may be necessary to elevate the mortar slightly in order to remove or replace the filling hole plugs. Other details of filling and care are the same as those for the M1896MIII carriage (*a* above).

■ 48. ASSEMBLING AND ADJUSTING OBTURATOR.—*a.* With the breechblock in the loading position (open), the spindle, with split rings (front, rear, and small), gas check pad, and filling-in disk upon it, is inserted into the block. Special care must be taken that the front and rear split rings are not interchanged. Assemble the four obturator spindle washers (two

*See Appendix.

bronze and two steel) upon the rear end of the spindle projecting through the block, with a bronze washer in front and the others alternating steel and bronze. The spindle is then secured by screwing up the obturator nut by hand. The breechblock is then translated and rotated half-way into the firing position. The split nut is then screwed up as tightly as possible with the wrenches provided for that purpose and locked in place by the clamping screw. The spindle is 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.

b. If, after firing a few rounds, the spindle is found to have longitudinal play, the adjusting operation described above is repeated.

c. The proper adjustment of the obturator is of great importance. It should not be made with the breechblock open, due to the possibility of forcing the gas check pad out beyond the split rings and resulting in injury to the pad by pressing it backward over the rear split ring when the block is seated.

d. The obturator nut should never be removed while the breechblock is locked.

e. On the M1908 and M1912 mortars, the four obturator spindle washers are replaced by an obturator spindle spring. There is no change in assembly or adjustment.

■ 49. FIRING MECHANISM.—*a. Care.*—While this mechanism forms part of a heavy gun, the parts are very closely adjusted and the clearances very small. *The greatest care must be exercised, therefore, in keeping the mechanism well oiled and free from rust and dirt.* It should not be left on the gun when not in use, but should be kept in the small box provided for it and stored in the armament chest.

b. To assemble on gun.—(1) Clasp the hinged collar over the end of the spindle with the two ribs of the collar engaging in the corresponding grooves of the spindle, keeping the hinge at the top.

(2) Take the mechanism in the right hand, holding the collar with the left, and put the mechanism over the end of the collar. Screw the collar to the left until the catch on the under side of the mechanism engages and locks 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 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.*

c. To disassemble.—(1) To remove the mechanism from the spindle, draw the collar catch to the rear and unscrew the hinged collar.

(2) To remove the slide from the housing, draw the slide stop out to the left as far as it will go. The slide may then be lifted from the housing.

(3) 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 then free to be removed, and its removal frees the leaf and slide catch from the slide.

(4) The collar catch may be removed by unscrewing the screw at the lower edge of the housing.

(5) The slide stop may be removed by unscrewing it from the housing with the wrench provided for that purpose. The slide stop should not be removed except when necessary to repair it or to replace a broken spring.

(6) The contact clip may be removed from the leaf by unscrewing the nut on the underside of the leaf.

■ 50. To TEST LANYARD SAFETY DEVICE.—With the mortar in the loading position, place the bridle ring (S–hook) in the bridle ring catch. Keeping a strong pull on the lanyard as if attempting to fire the piece, elevate the mortar slowly to 43° elevation. The ring should pull free between 41°45′ and 43°. The drill in this manual prescribes that the lanyard will not be attached to the firing mechanism until the mortar is elevated to 43°.

■ 51. To TEST ELEVATION FRICTION DEVICE.—The elevation friction device should be tested before and after firing in order that proper adjustment may be made. It is properly adjusted when, with the mortar depressed against the stop, the com-

bined efforts of two men, one at each handwheel, are just sufficient to cause slipping of the friction device when an attempt is made to depress the mortar. This test is the same for all mortar carriages with the exception that, on the M1908 carriage, the maximum effort of one man should be sufficient to slip the device.

■ 52. TECHNICAL INFORMATION ON MORTAR CARRIAGES.—While pertaining specifically to the mortar carriage M1896MIII for the M1912 mortar, *TM 9–420 contains a great deal of information on the care and adjustment of matériel that also applies to the other mortar carriages. For this reason, and also because it is the only technical manual published on mortar carriages, it should be obtained by all batteries manning mortars and distributed to include all interested noncommissioned officers.

* See Appendix.

SECTION VII

DRILL TABLE

Service of the piece, 12-inch mortars (fixed armament)

Details	DETAILS, POSTS	(*a*) EXAMINE GUN (*b*) REPORT	TARGET	LOAD	CEASE FIRING
Azimuth setter	Takes post at traversing handwheel, facing mortar.	(*a*) Examines azimuth index for adjustment, by observing mark made on racer when piece was last oriented, and examines and tests traversing mechanism. (*b*) Reports to chief of squad, "Traversing in order," or any defects he is unable to remedy without delay.	See note 1	If not already at his post, takes post at a run and traverses piece rapidly to nearest limit of loading position. As soon as projectile is rammed, traverses piece as rapidly as possible to azimuth setting called off by display board operator and posted on display board. When piece has been laid accurately in azimuth, calls, "Set," to azimuth recorder; takes cover after azimuth recorder has checked and marked azimuth setting and has either signaled or called, "Azimuth set," in a loud voice.	Continues to lay piece at azimuth posted on display board until the command CEASE TRACKING is given. When dummy ammunition is used, traverses piece to nearest limit of loading position.
Elevation setter	Takes post at quadrant and elevating handwheel, facing piece.	(*a*) Examines quadrant and tests elevating mechanism, clamp, and loading position latch. (*b*) Reports to chief of squad, "Elevation in order," or any defects he is unable to remedy without delay.	See note 1	If not already at his post, takes post at a run, unclamps elevating mechanism, depresses piece to loading position as rapidly as possible but without shock, and sees that spring latch is engaged; sets quadrant for elevation as soon as elevation is called off by display board operator and is posted on display board. Assisted by No. 7, lays piece accurately in elevation, clamps it, calls, "Set," to elevation recorder; takes cover after elevation recorder has checked elevation setting and has signaled or called, "Elevation set," in a loud voice.	Continues to set quadrant at elevation posted on display board until the command CEASE TRACKING is given. When dummy ammunition is used, returns to the piece at a run, and unclamps elevation mechanism, depresses piece to loading position as rapidly as possible but without shock, and sees that spring latch is engaged.
No. 1 (chief of breech)	Gets cotton waste and a can containing lubricating oil; places them convenient to breech; takes post 1 yard to rear and right of breech, facing it.	(*a*) Assisted by No. 2, removes breech cover and places it at designated place. Then examines breech mechanism, breechblock, breech recess, chamber, and bore, and gives necessary instructions for cleaning and putting them into condition for service. (*b*) Reports to chief of squad, "Breech in order," or any defects he is unable to remedy without delay.	No duties	Takes post at a run, assists No. 2 in opening breech, assists in ramming, and assists No. 2 in closing breech; takes cover as soon as breech is closed. After each shot, wipes off mushroom head and cleans and oils breech, if necessary.	When dummy ammunition is used, assists No. 2 in opening breech; assists Nos. 2, 4, and 5 in withdrawing projectile.
No. 2 (breech detail)	Gets cotton waste and long lanyard (if a lanyard is used), which he coils with hook on top and places convenient to breech; takes post 1 yard to rear and left of breech facing it.	(*a*) Assists No. 1 in removing breech cover; examines breech recess, gas check seat, obturator head and pad, and cleans and oils them if necessary; examines long lanyard (if one is used) and assists in sponging. (*b*) No duties.	No duties	Takes post at a run, assisted by No. 1, opens breech, examines breech recess, wipes any powder residue from breech recess and gas check seat; assists in ramming; pushes powder charge into chamber by hand until its base barely clears gas check seat, so that it will be pushed into chamber by mushroom head as breech is closed. Assisted by No. 1, then closes breech. When mortar is to be fired by lanyard, attaches long lanyard to short one, straightens it out after the detail has taken cover, and pulls it at the command FIRE. After each shot, assists No. 12 in sponging chamber.	When dummy ammunition is used, assisted by No. 1, opens breech; withdraws dummy charge and hands it to No. 6; engages extractor in dummy projectile; assists Nos. 1, 4, and 5 in withdrawing projectile.
No. 3 (breech detail)	Gets primers, primer pouch, punch, drill, reamer and firing mechanism, and takes post to right of breech, facing No. 1.	(*a*) Examines firing mechanism and places it on obturator spindle; cleans vent and primer seat, and examines short lanyard. (*b*) No duties.	No duties	Takes post at a run, after breechblock is closed and locked, inserts a primer in vent, lowers leaf of firing mechanism *completely down*, and commands or signals: ELEVATE. When piece is elevated to 43°, inserts firing circuit plug (firing by electricity) or hooks short lanyard and unhooks S-hook from safety lanyard device (firing by lanyard) and takes cover. After each shot, unhooks short lanyard and hangs lanyard in lanyard safety device. As soon as breech is open, removes fired primer, clears vent, and cleans primer seat; holds block back during loading of projectile and powder charge.	When dummy ammunition is used, removes primer as soon as breech is opened.
No. 4 (rammer detail)	Gets rammer and extractor, places latter on rack or prop at a convenient point, and takes post well in rear of mortar, rammer vertical, with its head on floor of emplacement.	(*a*) Places rammer on prop and assists in sponging when necessary. (*b*) No duties.	No duties	Raises rammer to a horizontal position, places rammer head against projectile, and runs forward with truck. Assisted by chief of squad and Nos 1, 2, and 5, rams projectile home with all possible force as soon as truck comes to rest with its buffer against face of breech. All then quit rammer except chief of squad and No. 4. The chief of squad pulls rammer smartly to the rear. No. 4 grasps it at the balance, carries it above his head, and takes post, bringing rammer to a vertical position.	When dummy ammunition is used, carries rammer to prop and assists Nos. 1, 2, and 5 in withdrawing projectile. He then takes rammer to his post.
No. 5 (rammer detail)	Gets a wrench for filling plugs and places it convenient to piece. Then takes post 1 yard in rear of azimuth setter, facing piece.	(*a*) Assists No. 6 in examining and filling recoil cylinder. (*b*) No duties.	No duties	Assists chief of squad and Nos. 1, 2, and 4 in ramming	When dummy ammunition is used, brings up extractor and assisted by Nos. 1, 2, and 4, withdraws projectile. Then returns extractor to prop.
No. 6 (powder serving detail).	Gets a wrench for filling plugs, a measure containing recoil oil, and a funnel, and places them convenient to piece and takes post near entrance to powder magazine.	(*a*) Assisted by No. 5, unscrews filling plugs of *both* recoil cylinders and, if oil is needed, fills them. Then notifies chief of squad that recoil cylinders are ready for inspection. After inspection, screws filling plugs well home and replaces his implements. (*b*) No duties.	No duties	Receives powder charge from a member of ammunition squad and follows truck to breech; as soon as rammer has been withdrawn from breech recess, places powder charge on truck directly in rear of breech recess, with igniter pad to the rear, and takes his post.	When dummy ammunition is used, receives the powder charge from No. 2 and returns it to ammunition squad.
No. 7 (elevating detail)	Takes post at right-hand elevating handwheel, facing it.	(*a*) Removes muzzle cover and places it at designated place; assists elevation setter in testing elevating mechanism and cleans and oils gears, if necessary. (*b*) No duties.	No duties	Takes post at a run; at the command ELEVATE, assists elevation setter in elevating mortar rapidly to approximate elevation and takes cover.	When dummy ammunition is used, returns to piece and assists in depressing it to loading position.
Nos. 8, 9, 10, 11 (truck detail).	Nos. 8 and 9 bring out a loaded truck and run it to a point about 10 feet in rear of breech, No. 8 on the left and No. 9 on the right. Nos. 10 and 11 run an empty truck alongside delivery tables in shot gallery, No. 10 on the left and No. 11 on the right. No. 11 then assists No. 12 in bringing out sponge tub.	(*a*) Nos. 8, 9, 10, and 11 examine trucks and clean and oil them if necessary. (*b*) No duties.	No duties	Nos. 8 and 9 (or Nos. 10 and 11) run a truck from position of cover to loading position (about 10 feet in rear of breech), and Nos. 10 and 11 (or Nos. 8 and 9) run a loaded truck from the gallery to position of cover just vacated by Nos. 8 and 9 (or Nos. 10 and 11). At the proper time, Nos. 8 and 9 (or Nos. 10 and 11) push truck forward rapidly and bring it up solidly against face of breech, holding it there by setting brake and by pressure on truck handles. As soon as projectile has been rammed home and powder charge inserted, they withdraw truck promptly and run it backward into shot gallery and alongside delivery table. They then roll a new projectile onto the truck. At the next shot they run loaded truck to position of cover just vacated by Nos. 10 and 11 (or Nos. 8 and 9), who have pushed their truck forward to loading position.	When dummy ammunition is used, Nos. 8 and 9 (or Nos. 10 and 11) bring out an empty truck from the gallery and, when projectile is drawn back on truck, return it to gallery.
No. 12 (sponge detail)	Assisted by No. 11, gets sponge tub and sponge, which he places well in rear of emplacement. Fills tub with sponging fluid and then takes post facing mortar and holds sponge vertical with its head in vessel. (Whenever necessary to move tub it will be *carried*, not dragged, No. 12 being assisted by other members of squad.)	(*a*) Brings up sponge when called for by No. 1 (*b*) No duties.	No duties	Removes head of sponge from vessel and allows excess liquid to run off. After each shot, rushes forward with sponge and as soon as breechblock is opened, sponges chamber, assisted by No. 2.	No duties.

NOTES

1. As soon after the command TARGET is given as data are received, the elevation setter sets his quadrant, the azimuth setter traverses the piece to the proper azimuth (or nearest loading position), and Nos. 8 and 9 shift the truck as required.

2. At the command RE-LAY, No. 2 slacks the lanyard, if used, and the members of the mortar squad perform such of their duties at the command TARGET and/or LOAD as may be necessary to lay the mortar on the new data. If the new data involve a change in zone, the command WITHDRAW POWDER CHARGE is given by the pit commander, the mortar squad proceeds as for the command LOAD, except that No. 3 removes the primer *before* the breechblock is unlocked, No. 1 withdraws the old powder charge, No. 6 inserts the new charge in the *chamber*, and No. 1 turns over the old charge to No. 6 who takes it back to the magazine.

3. At the command CEASE FIRING the lanyard is detached or the firing circuit opened.

4. At the command TAKE COVER, all members of the squad take cover posts at a run.

5. At the command STAND FAST, all movements of personnel and matériel are halted.

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APPENDIX

LIST OF REFERENCES

Ammunition, general	TM 9–905 (now published as TR 1370–A).
Camouflage, cover, protection against air and chemical attacks, local security, machine-gun defense	FM 4–5.
Care and maintenance of matériel	TM 9–850 (now published as TR 1395–A). FM 4–20.
Coast Artillery ammunition	TM 4–205.
Coast Artillery weapons and matériel	TM 4–210.
Commands	FM 4–5.
Drill ammunition	TM 9–905 (now published as TR 1370–D).
Examination of gunners	FM 4–150.
Fire control and position finding	FM 4–15.
Firing tables:	
Deck piercing, equal section (aliquot) propelling charge	12–A–4.
Deck piercing, base and increment propelling charge	12–G–1.
700 lb. HE shell Mk VI and VIa, base and increment propelling charge	12–I–1.
Gunnery	FM 4–10.
Mortar matériel, including mortar, carriage, and firing mechanism	Ord. Docs. 1705 and 1820. TM 9–420 (now published as TR 1315–12M).
Organization of the battery	T/O 4–67. FM 4–5.
Safety precautions in firing	AR 750–10. FM 4–20.