WAR DEPARTMENT

COAST ARTILLERY FIELD MANUAL

SEACOAST ARTILLERY
SERVICE OF THE PIECE
10-INCH GUN
(DISAPPEARING CARRIAGE)

FM 4–65

COAST ARTILLERY FIELD MANUAL

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SERVICE OF THE PIECE
10-INCH GUN (DISAPPEARING CARRIAGE)

Prepared under direction of the
Chief of Coast Artillery

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BY ORDER OF THE SECRETARY OF WAR:

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The Adjutant General.

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SEACOAST ARTILLERY

SERVICE OF THE PIECE

10-INCH GUN (DISAPPEARING CARRIAGE)

(The matter contained herein supersedes TR 435–265, May 7, 1924, including C 1, January 2, 1929.)

SECTION I

GENERAL

■ 1. SCOPE.—*a.* Guns, carriages, and batteries differ in type, arrangement, and design, and for this reason the service of the piece as prescribed herein is intended only as a guide for the battery commander in the assignment of individuals and duties. Changes in the details of the service of the piece to meet local conditions may be made.

b. The duties of the members of the gun section in the service of the piece, which are not covered in the body of this manual, are shown in the drill table in section VII.

■ 2. REFERENCES.—See appendix.

SECTION II

ORGANIZATION OF THE GUN SECTION

■ 3. COMPOSITION.—*a.* Each emplacement of one gun is manned by a gun section consisting of a chief of section, a gun squad, and an ammunition squad.

b. Under war strength organization, the gun section consists of 43 enlisted men. Under peace strength organization, it consists of 39 enlisted men.

■ 4. GUN SQUAD.—The gun squad, under both peace and war strength organization (25 enlisted men), consists of the gun commander (chief of section), the gun pointer, the range setter, two display board operators, two recorders, the chief of breech, and 17 cannoneers, numbered from 1 to 17, inclusive.

■ 5. AMMUNITION SQUAD.—*a*. Under war strength organization, the ammunition squad (18 enlisted men) consists of the chief of ammunition and 17 cannoneers, numbered from 18 to 34, inclusive.

b. Under peace strength organization, the squad (14 enlisted men) consists of a chief of ammunition and 13 cannoneers, numbered from 18 to 30, inclusive.

c. The squad is divided by the chief of ammunition into details for the service of powder and projectiles.

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

SECTION III

DUTIES OF PERSONNEL

■ 7. BATTERY EXECUTIVE.—*a*. The battery executive commands the firing section of the battery and is in charge of the gun emplacements and accessories.

b. He is responsible to the battery commander for the training and efficiency of the personnel of the firing section, for the condition of the matériel and ammunition under his charge, for the observance of all safety precautions pertaining to the service of the piece, and for the police of the emplacements.

c. He inspects the matériel and ammunition under his charge, and personally verifies the adjustment of all pointing devices as frequently as necessary to insure accuracy. He tests all circuits and firing devices before each drill or firing, paying special attention to the safety features.

d. He receives the reports of the assistant executive 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.

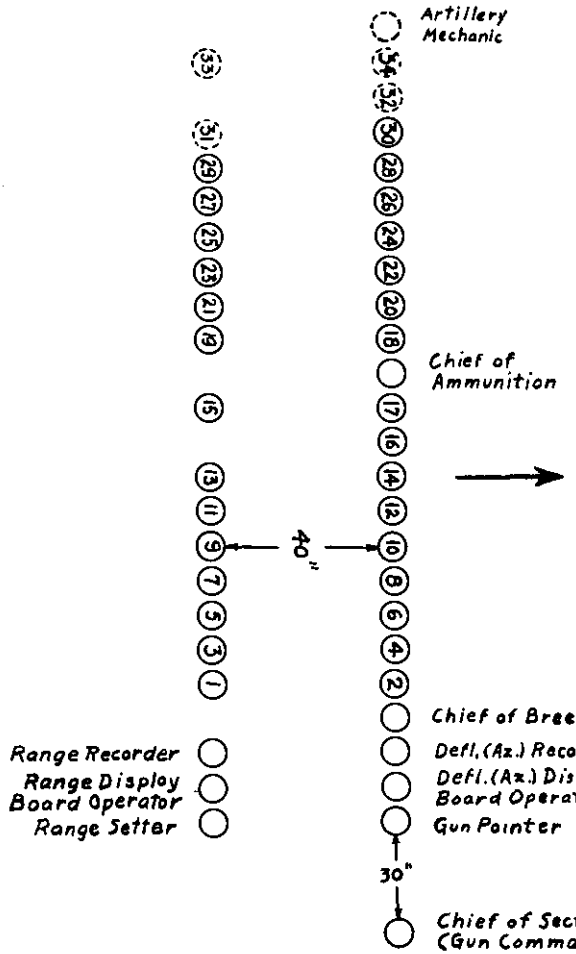

FIGURE 1.—Formation of gun section.

NOTE.—Cannoneers Nos. 31 to 34, inclusive, are included in the war strength organization only.

e. When firing on time interval signal, he is responsible that the guns are fired immediately upon receipt of the proper firing signal, safety precautions permitting. If it becomes necessary to suspend fire for a time interval, he commands: RE-LAY, and reports his action to the battery commander.

f. At the conclusion of 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. CHIEF OF SECTION.—*a.* The chief of section (gun commander), a noncommissioned officer, is in command of the gun section and gun squad. He supervises the service of the piece and the service of ammunition, and personally directs the work of care and preservation at the emplacement to which his section is assigned. He is responsible to the officer in charge of the emplacement for the training and efficiency of the personnel of his section, for the condition of the matériel and ammunition under his charge, for the observance of all safety precautions at the emplacement, and for the police of the emplacement.

b. He commands: 1. DETAILS, 2. POSTS, when the section arrives in rear of 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 gun, carriage, and other matériel, paying special attention to the recoil and counterrecoil systems, firing mechanism, safety devices, and the oiling of the various bearings. He receives the reports of the chief of ammunition and from the various details of the gun squad, and reports to the officer in charge of the emplacement, "Sir, No. ——— in order," or reports defects which he is unable to remedy without delay.

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

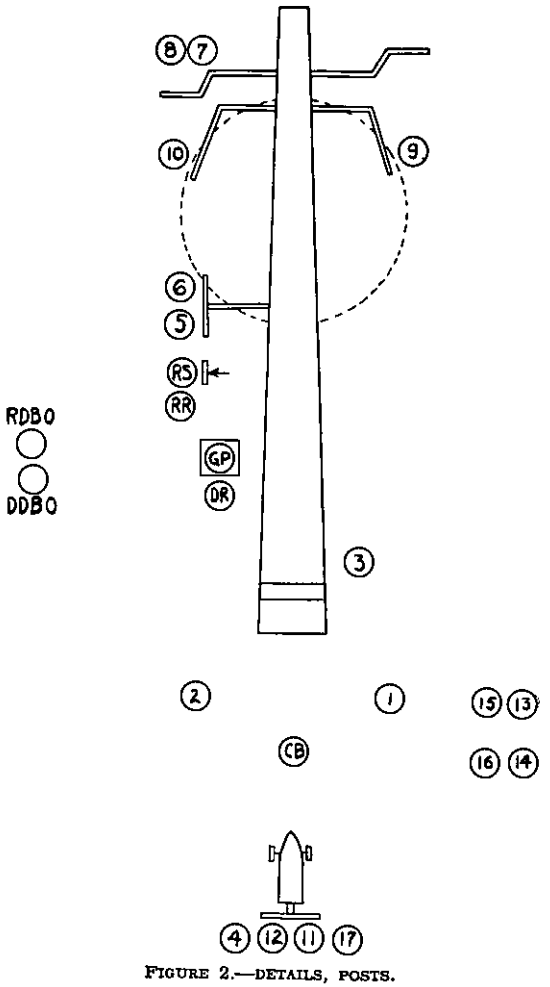

FIGURE 2.—DETAILS, POSTS.

d. At the command TARGET, he repeats the command and target designation. As soon as the gun pointer is on the target, the chief of section reports or signals to the officer in charge of the emplacement, "Sir, No. ——— on target." He indicates to the chief of ammunition the projectile, fuze, and powder to be served.

e. At the command LOAD, the chief of section repeats the command and supervises the loading. However, under no circumstances will he permit his gun to be fired prior to the receipt of the command COMMENCE FIRING from the battery commander.

f. At the command COMMENCE FIRING, if the piece is unloaded the chief of section commands: LOAD. He also commands: LOAD, before each shot of a series.

g. At the command TRIP, the gun commander supervises the tripping of the gun and sees that it goes fully into battery.

h. In case II firing, after receiving the report "Range set" from the range setter, the gun commander calls and signals "Ready," indicating to the gun pointer that the piece is ready to fire.

i. In case III firing, after receiving the reports "Range set" and "Azimuth set" from the range setter and gun pointer, respectively, he calls and signals "Ready," indicating that the gun is ready to fire. At the sounding of the proper time interval signal, he commands: 1. NO. ------, 2. FIRE.

j. When firing on time interval signal, he is responsible to the officer in charge of the emplacement that the piece is fired immediately upon the proper signal, safety precautions permitting. 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 given by the officer in charge of the emplacement.

k. In case of a misfire, he calls "No. ------ misfire." He sees that the precautions described in paragraph 39 are observed.

l. The chief of section commands: CEASE FIRING, when the number of shots specified has been fired. When the number of shots has not been specified, he repeats the command CEASE FIRING when it is given by the battery commander

and reports to the officer in charge of the emplacement, "Sir, No. _____ (so many) rounds fired." When dummy ammunition is used he commands: UNLOAD, and sees that the piece is unloaded.

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

n. At the command REPLACE EQUIPMENT, the chief of section supervises the replacing of equipment, sees that all matériel is properly secured and the emplacement policed, and then unless otherwise directed 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, the traversing mechanism, and the electric firing mechanism and circuit (if used). For detailed duties, see drill table, section VII.

■ 11. RANGE SETTER.—The range setter is charged with the duty of laying the piece for range. He is responsible to the gun commander for the proper operation, care, and adjustment of the elevating mechanism. For detailed duties, see drill table, section VII.

■ 12. CHIEF OF BREECH.—The chief of breech, a noncommissioned officer, is responsible to the gun commander for the efficiency of the personnel of the breech detail. He is specially charged with the observance of safety precautions insofar as they pertain to his detail. He listens for the explosion of the primer which may be audible if the powder charge fails to explode. For detailed duties, see drill table, section VII.

■ 13. DISPLAY BOARD OPERATORS.—*a.* The deflection (azimuth) and range 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 plotting room.

b. At the command DETAILS, POSTS, they procure chalk, blackboard erasers, forms for recording data, and telephones, and take post at the display boards.

c. At the command EXAMINE GUN, they clean the display boards if necessary, put on the telephone headsets and test the telephones to the plotting room, and report to the gun commander, "Deflection (azimuth) display board and range display board in order," or report any defects they are unable to remedy without delay.

d. At the command TARGET, they receive deflections (azimuths) and ranges from the plotting room, post them on the display boards, and record them on the data forms.

e. At the command CEASE FIRING, they continue posting and recording data received from the plotting room.

■ 14. RECORDERS.—*a.* The deflection (azimuth) recorder and the range recorder are responsible for the checking and recording of all deflections (azimuths) and ranges, respectively, set on the gun.

b. At the command DETAILS, POSTS, they procure pencils and forms for recording data. The deflection (azimuth) recorder takes post convenient to the gun pointer, and the range recorder takes post convenient to the range setter.

c. At the command TARGET, they keep a continuous record of the data at which the gun is set, being especially careful to record, check, and identify the data at which the gun is actually fired.

d. At the command CEASE FIRING, they continue to record data as long as data are being set on the gun.

■ 15. CHIEF OF AMMUNITION.—*a.* The chief of ammunition (noncommissioned officer) is responsible to the chief of section for the efficiency of the personnel of his squad, for the care of the ammunition and ammunition handling apparatus, for the uninterrupted service of ammunition, 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. He keeps a record of all ammunition received into or delivered from the magazines and galleries under his charge, exercising particular care that the projectiles, fuzes, and powder charges are listed under proper name and type. He keeps the chief of section informed regarding the ammunition on hand and reports any defects found.

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, he inspects the matériel under his charge, gives the necessary instructions for preparing ammunition and equipment for drill or firing, and reports to the chief of section, "Ammunition service in order," or reports defects that 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 ammunition and matériel is properly secured, forms his squad, and reports to the chief of section.

■ 16. AMMUNITION SQUAD.—The chief of ammunition divides the cannoneers of the ammunition squad into two details, the projectile detail and the powder detail. The size of each detail depends on local conditions and is determined by the battery commander.

a. Projectile detail.—The chief of ammunition designates one of the cannoneers as chief of detail who supervises the work of the detail. Previous to and during firing, the detail places projectiles on the delivery tables, loads them on shot trucks, runs the loaded trucks to the emplacement and turns them over to the truck detail, and receives empty trucks to be run to the delivery tables and reloaded. In addition, the detail maintains the ammunition and ammunition handling apparatus and polices the magazines and corridors.

b. Powder detail.—The chief of ammunition designates one of the cannoneers as chief of detail who supervises the work of the detail. The detail keeps a record of all pertinent data including weights of charges, lot number of powder, and temperature of magazines. In the service of powder, the detail removes from the container the powder charge which is to be served to the gun for the next round, places it on a powder tray with igniter end to the rear, removes the powder tag,

and sees that the powder bag is not defective. The detail carries the loaded tray to the emplacement and turns it over to the powder serving detail of the gun squad, and receives an empty tray to be brought back to the magazine for reloading. In addition, the detail maintains the powder handling devices and assists the projectile detail.

■ 17. 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 the supplies pertaining to the gun emplacements to which his battery is assigned. He is responsible for the condition of the storerooms pertaining to the gun emplacements 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 guns and accessories.

SECTION IV

NOTES ON THE SERVICE OF THE PIECE

■ 18. GENERAL.—The service of the piece should be conducted with dispatch and precision and with as few orders as possible. Loading with dummy ammunition and pointing the piece as for firing is the normal practice at drill. Cannoneers change position at a run. Except for the necessary orders, reports, and instuctions, no talking should be permitted. Commands should be given in the prescribed forms. Signals may be substituted for commands whenever desirable. See FM 4–5 and FM 4–20.

■ 19. THE COMMAND STAND FAST.—If it is desired to halt all movements of matériel and personnel, the officer in charge of the emplacement or the chief of section (gun commander) commands: STAND FAST.

■ 20. THE COMMAND RE-LAY.—At the command RE-LAY, the display board operators post the new data on the display boards, the gun pointer and range setter continue to point the gun in direction and elevation according to the new data, and No. 3 slacks the lanyard (if used).

■ 21. FIRING MECHANISM.—*a.* Before firing, No. 3 assembles the firing mechanism to the gun and sees that the vent is clear and that the primer seat is clean and unpitted. He sees that the firing leaf cannot be drawn back until the slide has been closed and the breechblock closed and locked.

b. In firing, the chief of breech hooks the lanyard (if used), and No. 3 inserts a primer after the breechblock is closed and locked. No. 3 completely closes the slide of the firing mechanism before attempting to fire the gun, otherwise the primer may be blown to the rear endangering the gun squad. After the gun has been fired, the chief of breech unhooks the lanyard, and as soon as the breech is open No. 3 removes the fired primer.

c. It is of great importance that No. 3 clean the primer seat and vent after each shot, for when a primer sticks it is usually due to powder residue having collected between the primer and the primer seat or vent, or the primer seat having become pitted. A fired primer that has become stuck may be removed by using a drift through the vent, at the same time opening the firing mechanism slide.

■ 22. OPERATION OF THE BREECH, M1895.—The service of the piece as given in section VII is for a gun fitted with an M1895 breech mechanism.

a. To *open* the breech, the chief of breech unhooks the lanyard (when one is used) from the eye of the firing leaf, and No. 2 turns the crank continuously in a clockwise direction until the tray comes to rest against the hinge plate and the securing latch catches.

b. To *close* the breech, No. 1 releases the securing latch and turns the crank in a counterclockwise direction until the projecting shoulder on the rotating lug striking the gear prevents further motion. The latch is released before the truck is withdrawn from the breech, No. 1 holding the breech open by the operating crank until time to close it.

c. It will be found convenient to fasten a wire around the piece back of the elevating band. This wire should have a loop in it in which the safety lanyard (if one is used) may be hooked during the loading. The chief of breech after unhooking the lanyard swings it over the teeth of the breech

mechanism and hooks it in the loop of the wire. Thus it is kept from being caught in the mechanism and is convenient to the chief of breech when the time comes to hook it again.

■ 23. OPERATION OF THE BREECH, M1888.—If the gun is fitted with an M1888 breech mechanism, the duties of Nos. 1 and 2 are changed as follows:

a. To *open* the breech, No. 2 releases the rotating crank by turning the wing nut of the catch to the left, and then turns the rotating crank clockwise, as indicated by the "open" arrow, until it is stopped in a horizontal position and is secured by its catch; No. 1 turns the translating crank briskly counterclockwise. When the shoulders of the groove strike against the ends of the rails, the block stops short and the shock frees the tray latch from its catch; No. 1 swings the tray and block to the right until the securing latch engages in the catch.

b. To *close* the breech, No. 2 releases the securing latch from its catch; No. 1 swings the tray and block around to the left smartly; No. 2 seizes the handle of the tray and continues the swinging of the block until the tray abuts against and is latched to the face of the breech, then he turns the translating crank clockwise until the breech is translated completely; No. 1 releases the rotating crank by turning the wing nut and turns the rotating crank counterclockwise, as indicated by the "close" arrow, until it is stopped in a vertical position and is secured by its catch.

■ 24. LOADING.—*a.* At the command LOAD, the breech is opened and the truck detail moves the truck up to the face of the breech. Nos. 1, 2, 4, 9, and 10 man the rammer as near the outer end as possible. No. 1 places the head of the rammer against the base of the projectile. As soon as the truck is brought up against the face of the breech, No. 12 sets the brake. At the command HOME, given by the chief of breech, the men on the rammer push the projectile off the truck. The projectile is seated at the command RAM, given by the chief of breech, as soon as the base of the projectile is just inside the powder chamber. The projectile is rushed forward in one motion at increasing speed so that it will have its fastest movement when it comes up hard

against its seat. The truck is withdrawn and run off to one side. Nos. 9 and 10 quit the rammer for the tripping levers. Nos. 1, 3, and 4 move back far enough so that the powder serving detail can place the nose of the powder tray in the breech recess. No. 1 places the head of the rammer against the base of the powder charge, and at the command RAM, given by the chief of breech, the men on the rammer push the powder into the powder chamber to such distance that the breechblock in closing will give the powder a final push into the chamber. No. 4 then replaces the rammer on the hooks.

b. An alternate method of powder service may be employed in batteries where the shot trucks are equipped with powder trays. In such cases, a shot truck is loaded with a projectile by the projectile detail and then with a powder charge by the powder detail. The truck detail takes the completely loaded shot truck to the gun. After the truck is run up to the breech, the rammer detail rams the projectile and then the powder directly from the shot truck. The empty truck is withdrawn and turned over to the projectile detail.

■ 25. TRIPPING THE GUN.—*a.* The gun is held from battery by the engagement of pawls with the teeth in the crosshead which prevents the counterweight from descending. Raising the tripping levers releases the pawls from the crosshead teeth enabling the counterweight to descend and the gun to rise into battery, while safety latches retain the pawls clear of the descending crosshead teeth. At the command IN BATTERY, Nos. 9 and 10 seize the tripping levers, and at the command TRIP, raise them quickly to the full limit of upward movement. A slight downward movement on the tripping levers will indicate if the safety latches have engaged.

b. If the gun fails to go completely into battery, the gun commander orders Nos. 4, 9, 10, and 17 to use the pinch bars. These are engaged in the notches on the chassis and the gun is forced into battery.

Battery commanders will observe defects which prevent the gun from going completely into battery at drill and will have them remedied before firing.

■ 26. RETRACTING THE GUN BY HAND.—*a.* At the command FROM BATTERY, given by the gun commander, No. 7 releases the retaining pawl and turns the speed crank to permit the pulling out of the cables. Nos. 3 and 4 mount chassis and Nos. 9 and 10 mount gun levers. Nos. 1 and 2 pull out cables to their full length and pass the ends to Nos. 3 and 4, who pass cables to Nos. 9 and 10, who place ends of cables on hooks. No. 7 then throws on retaining pawl and turns speed crank to take up all slack. No. 8 pushes in clutch, Nos. 3, 4, 9, and 10 return to loading platform, and Nos. 7 and 8 put on retraction cranks.

b. The gun squad is divided into two reliefs by the gun commander. The first relief takes post at the retraction cranks, and at the command HEAVE, starts to retract the gun. The reliefs alternate as directed by the gun commander. Care is taken to see that the cables are under equal tension and are guided to the pulleys without kinks. As soon as the crosshead teeth engage their pawls, the retraction shaft retaining pawl is thrown off, and remains off until the cables have been unhooked from the gun levers.

c. The gun commander designates a cannoneer to call off the notches of recoil indicated by the engagement of the pawls with the crosshead teeth. When the gun has reached the loading position, the gun commander commands: HALT. At this command Nos. 7 and 8 remove retraction cranks. No. 7, using speed crank, lets out enough slack to enable Nos. 1 and 2 to unhook cables. After the cables are unhooked, No. 7 takes up all slack with speed crank and then throws retaining pawl on. No. 8 then pulls out clutch.

■ 27. RETRACTING THE GUN BY POWER.—Assuming the idler to be out of gear, the cables to be hooked to the gun levers, the slack taken out by No. 7, and the clutch thrown in by No. 8, at the command HEAVE, given by the gun commander, No. 8 throws the idler in gear. As soon as this is done, the range setter closes the main switch of the controller cabinet and moves the arm so as to turn on the power. The movements at the command HALT are the same as those prescribed for hand retraction, except that the range setter pulls the main switch of the controller cabinet, after which No. 8 throws

the idler out of gear. The cables are then unhooked and the slack taken up as prescribed for hand retraction.

■ 28. ADJUSTMENT OF SHOT TRUCKS.—Before firing, shot trucks are adjusted to the highest point to which it is anticipated that the gun will recoil, since a downward adjustment is much more easily and rapidly made than an upward one. Marks corresponding to "notches of recoil" may be placed on the shot trucks to facilitate loading after the first round has been fired.

SECTION V

SAFETY PRECAUTIONS

■ 29. GENERAL.—*a.* The following safety precautions are prescribed for peacetime conditions. They indicate, as well, the principles to be followed in war service conditions, but should be interpreted by the personnel concerned according to the circumstances existing at the time of any particular emergency.

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

■ 30. THE COMMAND CEASE FIRING.—Any individual in the military service will command or signal CEASE FIRING if he observes any conditions which make it unsafe to fire. At the command CEASE FIRING, lanyards will be detached if firing by lanyard, or the safety firing switch opened if firing electrically.

■ 31. FIRING MECHANISM.—The firing mechanism will be inspected and tested frequently to insure proper operation and functioning of the safety features. Just before firing, the mechanism will be tested with a friction primer which 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 breech is closed and locked.

■ 32. LANYARD.—*a.* The lanyard will be pulled with a quick, strong pull (not a jerk) from a position as near the rear of the piece as convenient, and sufficiently to the right of the line of recoil to insure safety.

b. There is a safety device to prevent the possible firing of the gun by lanyard except when fully in battery or nearly so. The device consists of a short lanyard running from the primer to a ring on the end of a cord wound on a reel. The reel is carried in a housing attached to the elevating band on the gun. One end of the firing lanyard is attached to a ring on the reel cord; the other is held by the cannoneer who is to fire the piece. The short lanyard can be pulled to the rear so as to fire the primer only by first unwinding the reel cord from the drum. This is prevented while the gun is from battery by the action of a pawl which engages a ratchet on the drum. When the gun rises into battery, this pawl is automatically tripped by a cam attached to the rear face of the elevating arm. This permits the reel to be unwound and the pull to come upon the short lanyard attached to the primer. The reel is provided with a spiral spring which causes it to rotate and wind up the reel cord as soon as the pull upon the lanyard is released. The initial tension of this spring should be such as to cause the reel cord to be wound up with certainty with the lanyard attached.

c. A safety device on the firing mechanism prevents possible firing of the primer by lanyard until the bleechblock is locked, whether the gun is in the loading or in the firing position.

■ 33. 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.

b. Care will be taken not to drop primers.

c. Except when testing safety devices, primers will not be inserted until after the breechblock has been closed and locked.

d. Primers will never be inserted or removed by means of the button or wire.

e. Care will be exercised in moving the leaf of the firing mechanism to the firing position.

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

g. Precautions will be taken to prevent any attempt to use primers that have failed. They will be handled with great care due to the possibility of a primer hangfire. These primers will be turned in to the ordnance officer for inspection.

■ 34. FUZES.—Projectiles equipped with base detonating fuzes will normally be received properly fuzed for firing. Projectiles equipped with point detonating fuzes will normally be received unfuzed and will be fuzed as required in the following manner:

a. Unscrew the plug from the fuze socket.

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

c. Screw up the fuze with the fuze wrench but without using any great force.

d. If there is any difficulty in screwing the fuze home, it should be removed and another inserted. If the same trouble is experienced with the second fuze, the shell should be rejected.

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

■ 35. POWDER CHARGES.—In the magazines, 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 of the gun until the preceding round has been fired, the powder chamber sponged, and the face of the mushroom head wiped.

■ 36. 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 this purpose.

■ 37. COVER FOR GUN SECTION.—When firing high explosive shell 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.)

■ 38. POOR VISIBILITY.—Firing will be stopped at once if visibility becomes so poor as to endanger the tug or shipping in the field of fire.

■ 39. MISFIRES.—*a. In case the discharge of the primer is heard but the powder charge has failed to ignite,* at least 10 minutes must elapse after the firing of the primer before the old primer is removed or the breechblock is opened. During this period all persons will stand clear of the breech. The piece will be kept directed on the target or on a safe place in the field of fire.

b. In case the discharge of the primer is not heard, if a special device is available which permits removal of the primer by a person entirely clear of the path of recoil, the primer may be removed after 2 minutes have elapsed since the last attempt to fire. If, after removal, it is found that the primer actually failed to fire, no further wait is necessary before inserting a new primer or opening the breech. If, on the other hand, examination shows that the primer has fired, the precautions prescribed in *a* above will be observed. If no special device can be employed for the removal of the primer, the same precautions will be observed.

SECTION VI

CARE AND ADJUSTMENT OF MATÉRIEL

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

b. The methods prescribed for the operation, care, and preservation of matériel are those described herein and in other publications issued by the War Department, a thorough understanding of which is required of all officers and others having matériel in charge.

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

d. Cleaning and preserving materials will be used strictly according to *TM 9–850.

■ 41. FIRING MECHANISM.—*a. General.*—(1) 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

*See Appendix.

well oiled and free from rust and dirt. It will be removed from the gun when not in use, kept in a small box provided, and stored in the armament chest.

(2) Distortion of the firing leaf, or battering of the safety bar seat in the side of the firing leaf, may be caused by the application of force under the firing leaf to raise it. The application of force in this manner is prohibited.

b. Inspection and tests.—(1) From time to time and before firing, the firing mechanism will be carefully inspected to insure that all parts are in good condition. Any firing leaf that is damaged to the extent that firing the gun is possible before the breechblock is closed and locked, or any spring found too weak to keep the firing leaf pressed against the slide, will be replaced.

(2) Previous to firing, each of the primers to be used in target practice will be inserted in the obturator spindle in order to test the proper fit of each primer. The firing leaf and slide will be lowered to the firing position in order to demonstrate that these parts will function properly with each primer.

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

■ 42. CARE OF THE CARRIAGE.—*a.* Carriages will be traversed and guns elevated and depressed at least twice a month throughout their entire allowed movement. From time to time the azimuth at which they stand should be changed to prevent uneven settling of the platform.

b. The habitual position of guns on disappearing carriages is "from battery," but at least once a month the guns will be allowed to rise to the firing position.

c. The retracting mechanism must be carefully examined before all firings to see that the teeth are not burred, and that the action of the pawls is not sluggish due to weak springs or lack of lubrication.

d. All parts of carriages must be kept free from rust at all times. If rust is found it will be removed immediately. Its removal from all bearing parts, and especially piston rods,

requires particular attention in order that clearances shall not be unduly increased. The use of sandpaper or emery cloth for this purpose by battery personnel is forbidden, and nothing more abrasive than crocus cloth will be used.

e. The retracting wire ropes will at all times be kept well-oiled with "oil, lubricating, gear, chain and wire rope."

f. If any leakage occurs from the hydraulic recoil system it will be remedied immediately, calling upon the ordnance officer if necessary for the services of trained ordnance personnel.

g. The repacking of stuffing boxes may be done, when necessary, by trained enlisted men under the supervision of an officer, but will be done preferably by trained ordnance personnel.

h. Before removing a cylinder head containing a stuffing box, or drawing a piston rod through a stuffing box, the pressure of the packing on the rod should be released by unscrewing the follower several turns.

i. The vulcanized fiber or copper gaskets between cylinders and their heads should be in good condition, and consequently will be replaced whenever necessary in order to prevent leakage.

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

k. When the carriage is to be kept in readiness for service and is in daily or frequent use, all bearing parts must be kept thoroughly cleaned and lubricated. Special attention will be given to the lubrication of trunnion beds, crosshead guides, rollers, pintle surfaces, shaft bearings, and sliding surfaces; gun lever axle beds, crosshead pins, elevating rack, elevating band trunnions; and the elevating, traversing, tripping, and retracting mechanisms; including the teeth of all gears. These parts will be lubricated at frequent intervals whether the carriage is maneuvered or not. In preparation for firing, heavy grease will be removed from the crosshead and guides to permit prompt return to battery. When car-

riages are in use for daily drills, a thorough lubrication twice each week should be sufficient for all but the most severely used parts.

■ 43. REFILLING RECOIL CYLINDERS.—The recoil cylinders will be emptied and refilled at least every 3 months. "Recoil oil, light" is prescribed. Nos. 9 and 10, each carrying a wrench, mount chassis and remove filling plugs from recoil cylinders. No. 11 brings funnel and measure containing oil. If oil is needed, No. 9 calls on No. 11 for funnel and measure and pours oil into right cylinder slowly. No. 10 watches oil hole in left cylinder. Any air that may be present is allowed to escape, then No. 9 pours in more oil until the system is filled to the level of the filling holes. The cylinders will not be full, but as nearly full as they are intended to be. The filling holes are intentionally placed below the highest point on the cylinders in order to leave above their level an air space equal to the volume of the counterrecoil buffer plus a few cubic inches to allow for expansion of the oil when heated by the weather or other manner. No. 9 hands the funnel and measure back to No. 11 and notifies the gun commander that the cylinders are ready for inspection, after which Nos. 9 and 10 screw the filling plugs well home.

■ 44. OBTURATOR.—*a.* With the breechblock in the loading (open) position, the spindle, with split rings, 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. The obturator spindle washers are put in place upon the rear end of the spindle projecting through the block, and the spindle is secured by screwing up the spindle nut by hand. The breechblock is then translated and rotated halfway into the firing position. The spindle nut is then screwed up with the wrenches provided for that purpose and locked in place. 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 will be repeated.

c. The proper adjustment of the obturator is of great importance. It will not be made with the breechblock open as this will cause injury to the gas check pad.

d. Under no circumstances will the obturator spindle nut be removed from the end of the spindle when the breechblock is locked, otherwise an attempt to open the mechanism will jam the gas check pad and injure the split rings.

e. Mushroom heads, obturator spindles, and split rings require continual care to prevent rusting and pitting. Gas check pads when removed from the gun will be inclosed in suitable containers to preserve them from deformation or contact with moisture.

■ 45. 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. The 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 liable 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 will be required may be dissolved in one bucket of water. This concentrated soap solution can then be added to water in other receptacles in the prescribed proportions.

■ 46. CARE OF THE BORE.—*a.* As soon as possible after any period of 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 ½ pound 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 wipe the bore thoroughly dry with new burlap. Finally, coat the bore with rust preventive compound grade A (heavy) or grade B (medium) depending on local conditions.

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.

■ 47. SLIP FRICTION ADJUSTMENT.—Before firing, the elevating mechanism slip friction will be tested on the 10-inch disappearing carriage, M1896 or M1901. The friction test can be made by bringing the gun against the depression stops, then continuing in the direction of depression. Slip of the friction device should result from the combined maximum effort of two men. If slippage is too free, the nut should be tightened to increase friction. Unless the elevating mechanism is adjusted so as to provide the above slippage at the time of firing, the elevating mechanism may be damaged.

SECTION VII

DRILL TABLE

Service of the piece, 10-inch gun (disappearing carriage)

Details	DETAILS, POSTS	(*a*) EXAMINE GUN (*b*) REPORT	TARGET	LOAD	CEASE FIRING
Gun pointer	Procures the sight, places it in its seat, and takes post on the gun pointer's platform.	(*a*) Examines sight and verifies adjustment of azimuth index; examines and tests traversing mechanism and electric firing mechanism and circuit (if used).	See note 1	Keeps the piece laid in direction. In case II firing, repeats to the recorder the deflection he sets on the sight; fires the piece or gives the command FIRE as soon after the gun commander has called or signaled "Ready" as the piece is pointed. When so directed, endeavors to locate the position of the splash of the shot and corrects his deflection if necessary. In case III firing, sets the azimuth index to the azimuth posted on the display board and calls "Azimuth set."	Keeps the piece laid in direction until the command CEASE TRACKING is given.
Range setter	Takes post facing the range scale	(*a*) Examines elevating and retracting mechanisms; cleans and oils the gears, if necessary. (*b*) Reports to the gun commander, "Elevation and retraction in order," or defects he is unable to remedy.	See note 2	Lays the piece in range; calls "Range set"	Keeps the piece laid in range until the command CEASE TRACKING is given.
Chief of breech	Posts his detail after assuring himself that each man has procured the necessary cleaning material and equipment; takes post 2 yards in rear of the breech, facing it.	(*a*) Examines the breech mechanism, breechblock, breech recess, chamber and bore, and gives the necessary orders for cleaning and putting them in condition for service. (*b*) Reports to the gun commander, "Breech in order," or defects he is unable to remedy.	No duties	Gives the command HOME RAM for ramming the projectile, giving HOME as the projectile is being pushed off the truck, and RAM when the base of the projectile is just inside the powder chamber. Also gives the command RAM for ramming the powder charge. After the breechblock has been closed, hooks the lanyard (if used) to the firing leaf before the primer is inserted. After the primer has been inserted and the firing leaf completely lowered, commands: 1. IN BATTERY, 2. TRIP. After the piece has been fired, unhooks the lanyard.	Unhooks the lanyard (if used). Supervises the unloading if dummy ammunition is used.
No. 1 (breech detail)	Procures cotton waste, can containing lubricating oil, and sponge; places them in a convenient place, and takes post 1 yard to the rear and right of the breech, facing it.	(*a*) Removes the breech cover and places it at the designated place; cleans and oils the breechblock and breech mechanism. (*b*) No duties.	No duties	Places the head of the rammer against the base of the projectile as the truck approaches the breech, assists in ramming the projectile and powder, and closes the breech; assists in sponging the chamber.	Cleans the breechblock and breech mechanisms. Assists in withdrawing the dummy powder charge and dummy projectile when dummy ammunition is used.
No. 2 (breech detail)	Procures the operating crank for the breech mechanism and places it in position; procures cotton waste; takes post 1 yard to the rear and left of the breech, facing it.	(*a*) Cleans and oils the breech recess and gas check seat. (*b*) No duties.	No duties	Opens the breech and assists in ramming the projectile and powder charge. After each shot, wipes off the mushroom head, gas check seat, and breech threads; assists in sponging the chamber.	Opens the breechblock, if so directed. Cleans the breech recess and gas check seat. Assists in withdrawing the dummy powder charge and dummy projectile when dummy ammunition is used.
No. 3 (breech detail)	Procures lanyard (if to be used), primer pouch, primers, punch, drill, reamer, and firing mechanism; takes post on the right side of the piece, about 1 foot to the right and in front of the elevating band, facing to the rear.	(*a*) Examines vent and firing mechanism; cleans the vent and primer seat; places the firing mechanism in position and coils the long lanyard (if used) and hangs it over the end of the elevating arm. (*b*) No duties.	No duties	Inserts a primer after the breechblock has been closed and locked, and the lanyard hooked (if used); lowers the leaf of the firing device completely down and steps back to the right rear as the gun goes into battery. If the firing is by lanyard, lets the lanyard uncoil as the gun goes into battery, pulls it at the command FIRE; then coils the long lanyard and hangs it in the proper place. As soon as the breech is open after the piece has been fired, removes the old primer, clears the vent, and cleans the primer seat.	Removes the primer when so directed.
No. 4 (breech detail)	Procures the rammer and places it on its hooks near the rail. Procures the extractor for the dummy projectile and places it near the rammer. Takes post about 2 yards from the head of the rammer, within reach of its staff, facing the piece.	(*a*) Assists the breech detail in cleaning. (*b*) No duties.	No duties	Assists in ramming the projectile and powder. After ramming, replaces the rammer on the hooks.	When dummy ammunition is used, brings up the extractor, and pulls the dummy powder sections back upon the powder tray. Hooks the extractor into the dummy projectile and assists in withdrawing it.
Nos. 5 and 6 (elevating detail).	Take post at the elevating handwheel on the same side of the carriage as the range setter, facing the piece.	(*a*) Assist the range setter in examining the elevating and retracting mechanism and in cleaning and oiling the gears. (*b*) No duties.	See note 2	Elevate or depress the piece under the direction of the range setter.	No duties.
Nos. 7 and 8 (traversing detail).	Procure the traversing cranks, place them on the traversing shaft, and take post facing to the rear at the crank on the same side of the carriage as the gun pointer.	(*a*) Remove the drip pans, and examine, test, clean, and oil the traversing mechanism under the supervision of the gun pointer. No. 8 receives the muzzle cover from No. 11 and places it in the designated place. (*b*) No duties.	See note 1	They stop traversing while the piece is being loaded, and resume traversing, under the direction of the gun pointer, as soon as the loading operations are completed. They halt when the piece is fired.	No duties.
Nos. 9 and 10 (tripping detail).	No. 9 procures a wrench for filling plugs, a measure containing recoil oil, and a funnel; places them in a convenient place and goes to the right tripping lever, facing it. No. 10 procures a wrench for filling plugs and takes post at the left tripping lever, facing it.	(*a*) Examine the recoil cylinders and fill if necessary. After inspection of the cylinders by the gun commander, Nos. 9 and 10 screw the filling plugs well home and take posts. (*b*) No duties.	No duties	Assist in ramming the projectile. As soon as the projectile is seated, they quit the rammer and run to the tripping levers. At the command IN BATTERY, they seize the tripping levers, and at the command TRIP, raise them quickly to the stops, hold them for an instant, then let go. When the gun is in battery, they run back to their posts at the rammer, where they stand by for the next shot. If firing by electricity, No. 9 (or 10) closes the safety firing switch as soon as the gun is in battery.	When dummy ammunition is used, they assist in starting the projectile from its seat.
Nos. 11 and 12 (truck detail).	Bring out the shot trucks to be used and take post at the trucks, No. 11 on the right and No. 12 on the left.	(*a*) No. 11 removes the muzzle cover, hands it to No. 8, and assists No. 9 in filling the recoil cylinders, passing up the oil measure and funnel when needed. Nos. 11 and 12 examine the trucks, clean and oil them when necessary, and turn them over to the ammunition squad for loading. (*b*) No duties.	See note 3	Run the loaded truck forward so that the tray enters the breech recess squarely. When the truck is stopped by the face of the breech, No. 12 sets the brake. After the projectile has been pushed off the truck, they withdraw the truck and turn it over to the ammunition squad. They then take post behind a loaded truck and stand by for the next shot.	When dummy ammunition is used, they push a truck into position at the breech to receive the dummy projectile. As soon as the truck is loaded, they return it to its position in rear of the breech.
Nos. 13, 14, 15, and 16 (powder serving detail).	Take post at a point on the loading platform most convenient for receiving the powder charge from the ammunition squad.	(*a*) As soon as the ammunition is served by the ammunition squad, they take post opposite the first loaded tray, Nos. 13 and 15 on the right, Nos. 14 and 16 on the left; Nos. 13 and 14 in the rear; No. 13 sees that the powder sections are arranged in the order in which they are to be inserted. During drill, when no ammunition is being served, the detail stands by the empty tray. (*b*) No duties.	No duties	As soon as the rammer has been withdrawn after seating the projectile, the nose of the powder tray is inserted in the breech by the powder serving detail; the rammer detail pushes the powder charge off the tray into the chamber. The tray is then removed and turned over to the ammunition squad for refilling.	When dummy ammunition is used, they bring up the empty powder tray to receive the dummy powder sections, and return the loaded tray to a convenient point.
No. 17 (sponge detail)	Procures the chamber sponge and a vessel containing liquid for sponging, places them near the railing at a convenient distance from the rammer, and takes post near the chamber sponge, facing the gun.	(*a*) Brings up the chamber sponge when called for and assists in sponging the chamber. (*b*) No duties.	No duties	Dips the chamber sponge in the liquid for sponging and allows the excess liquid to run off. As soon as the breech is opened after each shot, assisted by the breech detail, he sponges the chamber as quickly as possible.	No duties.

NOTES

1. AT THE COMMAND TARGET, DUTIES OF GUN POINTER, NOS. 7 AND 8.—In case II firing, the gun pointer sets on the sight the deflection recorded on the display board; Nos. 7 and 8 traverse the piece under the direction of the gun pointer until the line of sight is on the target; the gun pointer calls "On target"; they continue to follow the target. In case III firing, the gun pointer directs Nos. 7 and 8 to traverse the piece so that the azimuth index is set to the azimuth posted on the display board; the gun pointer calls "On target"; they continue to traverse the piece to data recorded on the display board.

2. AT THE COMMAND TARGET, DUTIES OF RANGE SETTER, NOS. 5 AND 6.—Assisted by Nos. 5 and 6, the range setter lays the piece in range continuously according to information obtained from the display board.

3. AT THE COMMAND TARGET, DUTIES OF NOS. 11 AND 12.—They push the first loaded truck to some convenient position in rear of the breech.

APPENDIX

LIST OF REFERENCES

Ammunition, general	TM 9–905 (now published as TR 1370–A).
Cleaning and preserving materials	TM 9–850 (now published as TR 1395–A).
Coast artillery ammunition	TM 4–205.
Coast artillery weapons and matériel	TM 4–210.
Drill ammunition	TM 9–905 (now published as TR 1370–D).
Examination for gunners	FM 4–150.
Fire control and position finding	FM 4–15.
Formations, inspections, service and care of matériel	FM 4–20.
Gunnery	FM 4–10.
Preservation and care of matériel	TM 4–245 (now published as TR 1160–20).
Safety precautions	AR 750–10; FM 4–20.
Tactics and organization	FM 4–5.