FM 4-45

COAST ARTILLERY FIELD MANUAL

SEACOAST ARTILLERY

SERVICE OF THE PIECE

12-INCH GUN, RAILWAY MOUNT, M1918, RAILWAY ARTILLERY

Prepared under direction of the
Chief of Coast Artillery

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FM 4–45, Coast Artillery Field Manual, Seacoast Artillery, Service of the Piece, 12-inch Gun, Railway Mount, M1918, Railway Artillery, is published for the information and guidance of all concerned.

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BY ORDER OF THE SECRETARY OF WAR:

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TABLE OF CONTENTS

	Paragraph	Page
SECTION I. GENERAL.		
Scope	1	1
References	2	1
II. ORGANIZATION OF THE GUN SECTION.		
Composition	3	1
Gun squad	4	2
Ammunition squad	5	2
Formation	6	2
III. DUTIES OF PERSONNEL.		
Battery executive	7	2
Assistant executive	8	4
Chief of section	9	4
Gun pointer	10	7
Elevation setter	11	8
Chief of breech	12	8
Battery commander's telephone operator	13	8
Display board operators	14	9
Recorder	15	9
Aiming rule operator	16	10
Chief of ammunition	17	10
Ammunition squad	18	11
Ammunition reserve detail	19	12
Artillery mechanic	20	12
IV. NOTES ON THE SERVICE OF THE PIECE.		
General	21	13
Service of ammunition	22	13
Loading	23	13
Pointing and firing	24	16
Drill during simulated firing	25	17
At the command RE-LAY	26	17
At the command STAND FAST	27	17
V. SAFETY PRECAUTIONS.		
General	28	17
At the command CEASE FIRING	29	17
Firing mechanisms	30	18
Lanyards	31	18
Primers	32	18
Fuzes	33	19
Service of powder charges	34	19
Sponging powder chamber	35	19
Cover for gun section	36	19
Poor visibility	37	19
Misfires	38	19
VI. CARE AND ADJUSTMENT OF MATÉRIEL.		
General	39	20
To fill recuperator	40	20
To fill recoil cylinders	41	21
To exercise recoil mechanism	42	21
To open breech mechanism (M1895 and M1895MI guns)	43	22

TABLE OF CONTENTS

	Paragraph	Page
SECTION VI. CARE AND ADJUSTMENT OF MATÉRIEL—Continued.		
To close breech mechanism	44	22
To assemble and adjust obturator	45	22
Firing mechanism, M1903	46	23
To check and adjust slip-friction device	47	24
To check and adjust antifriction device	48	25
Liquid for recoil and recuperator mechanisms	49	25
Sponging solution	50	25
Soda ash cleaning solution	51	26
VII. RAILWAY OPERATING EQUIPMENT.		
General	52	26
American Railway Association rules	53	26
Brakes	54	27
Journal boxes and bearings	55	27
Composite clearance diagram	56	28
Weight	57	28
Requirements of good tracks	58	30
Movement of explosives	59	30
Suggestions for preparations	60	30
VIII. EMPLACEMENT.		
General	61	31
Site	62	31
Preparation of position	63	32
Preparation of ground platform car	64	33
Assembly of ground platform	65	34
Emplacement of gun on ground platform	66	38
Withdrawal from position	67	39
IX. STATISTICAL DATA AND DRILL TABLE.		
12-inch gun, railway mount, M1895A1 and M1895MIA1	68	40
12-inch gun, railway mount, M1918	69	40
Drill table		40
Appendix		41

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(The matter contained herein supersedes TR 435–234, June 30, 1928.)

SECTION I

GENERAL

■ 1. SCOPE.—This manual prescribes the service of the piece for 12-inch guns M1895A1 and M1895MIA1 when mounted on railway gun mount M1918 and if emplaced on a base ring for all around fire in coast defense. The duties of the members of the gun section in the service of the piece are shown in the drill table in section IX. The emplacing and the service of the piece as prescribed are intended as guides in the assignment of individuals and duties. Changes in the details of the service of the piece to meet local conditions and available personnel may be made.

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

SECTION II

ORGANIZATION OF THE GUN SECTION

■ 3. COMPOSITION.—Each emplacement of one gun is manned by a gun section consisting of a gun squad, an ammunition squad, an engineman, and an artillery mechanic. One staff sergeant (electrician) is authorized for the firing section of the battery. The peace strength of the gun section is 37 enlisted men; the war strength is 39 enlisted men (T/O 4–57).

■ 4. GUN SQUAD.—The gun squad (23 enlisted men) consists of the gun commander (chief of section), gun pointer, elevation setter, battery commander's telephone operator, azimuth (deflection) display board operator, elevation display board operator, aiming rule operator, recorder, chief of breech, and 14 cannoneers numbered from 1 to 14, inclusive. Men are assigned to permanent positions according to their aptitude but will be interchanged frequently in drill positions to develop flexibility and facilitate replacement.

■ 5. AMMUNITION SQUAD.—At peace strength, the ammunition squad (12 enlisted men) consists of the chief of ammunition, 6 ammunition handlers numbered from 15 to 20, inclusive, and 5 reserves numbered from 21 to 25, inclusive. At war strength, the ammunition squad consists of 14 enlisted men, the reserve detail being increased by Nos. 26 and 27. This squad is divided by its chief into details for the service of powder and projectiles and miscellaneous duties required by local conditions.

■ 6. FORMATION.—Each section assembles in two ranks with 4 inches between files and 40 inches between ranks. Unnumbered cannoneers form on the right of their squads in both front and rear ranks. Numbered cannoneers form in the order of their numbers from the right, even numbers in the front rank and odd numbers in the rear rank. The staff sergeant, if present, forms with the first gun section 30 inches to the right of the gun commander. The chief of ammunition forms in the front rank on the right of his squad and is not covered off. The artillery mechanic and engineman form on the left of the gun section, the artillery mechanic in the front rank, and the engineman in the rear rank. After forming the section, the chief of section takes post in the front rank 30 inches to the right of the gun pointer. (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. He is responsible to the battery commander for—

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

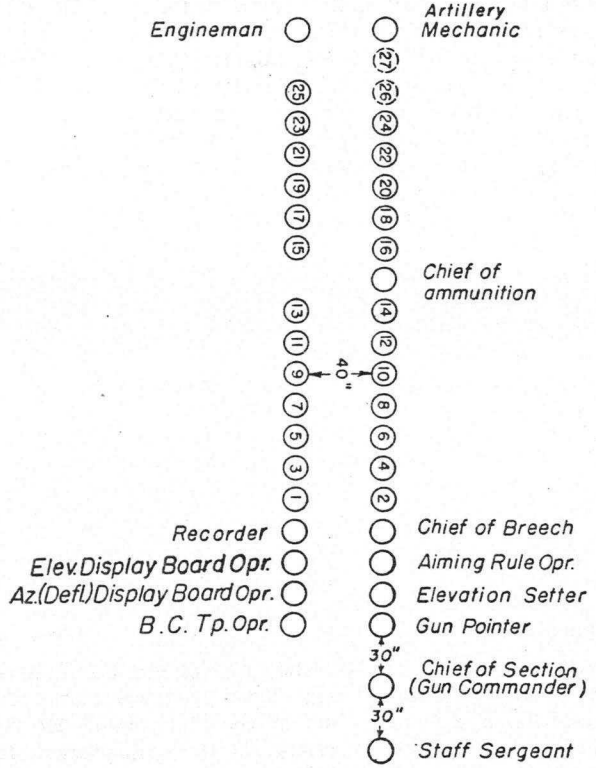


FIGURE 1.—Formation of the gun section.

(2) Condition of matériel and ammunition under his charge.

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

(4) Police of all emplacements.

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

b. 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 or an assistant executive test all firing devices before each drill or firing, paying special attention to the safety features.

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

d. He exercises general supervision over loading and pointing. If for any reason, he desires to hold fire for one firing interval, he commands: RE-LAY, and reports his action to the battery commander.

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

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

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

■ 8. ASSISTANT EXECUTIVE.—Each assistant executive will perform 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 is also chief of the gun squad. He is responsible to the officer in charge of the emplacement for—

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

(2) Condition of matériel and ammunition under his charge.

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

(4) Firing of the piece.

(5) Observance of all safety precautions at his emplacement.

(6) Police of the emplacement.

b. He supervises preparation of the firing position, emplacement of the mount, removing gun and platform (or base ring) from position, loading of equipment, the service of the piece, and the service of ammunition, and he personally directs the work of care and preservation of all matériel.

c. The gun being emplaced for firing, he commands: 1. DETAILS, 2. POSTS, and supervises the procuring of equipment. After all details have reached their posts (fig. 2), he commands: EXAMINE GUN. He then makes an inspection of the gun, carriage, and other matériel, paying special attention to recoil cylinders, recuperator pressures, firing mechanism, safety devices, oiling of the various bearings, condition of the ground platform, wedges, and tension screws (or condition of base ring and supports). He receives the reports of the chief of ammunition and of the various details of the gun squad and reports to the officer in charge of the emplacement, "Sir, No. ------ in order," or reports any defects which he is unable to remedy without delay.

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

e. He indicates to the ammunition squad the projectile, fuze, and powder charge to be used.

f. At the command TARGET, he repeats the command and target designation. As soon as the gun pointer is on the target (or aiming point), he reports or signals to the officer in charge of the emplacement, "Sir, No. ------ on target."

g. At the command LOAD, he repeats the command and supervises the loading. After the piece is loaded and laid, he calls, "No. ------ ready." He also commands: LOAD before each shot of a series. The piece is not fired, however, until the command COMMENCE FIRING is given and the proper firing signal received.

h. At the command COMMENCE FIRING, if the piece is unloaded, he commands: LOAD and supervises the work of his

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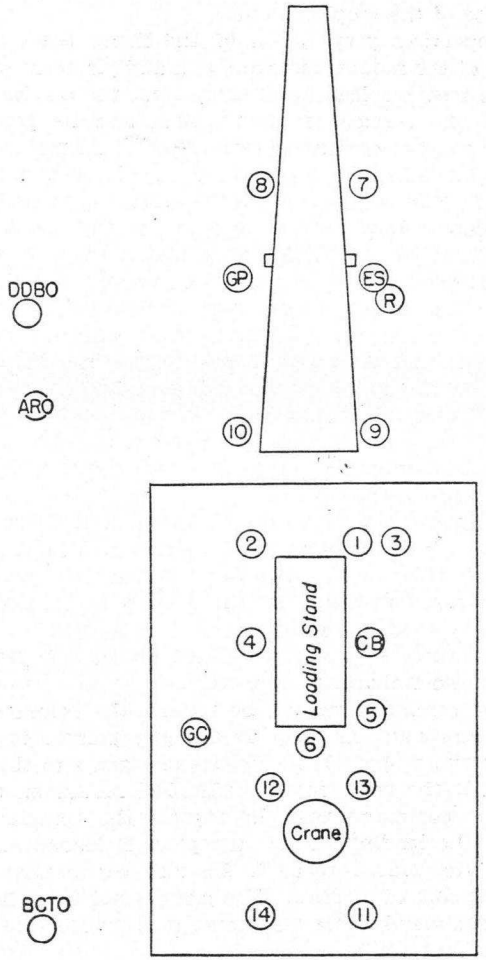


FIGURE 2.—Positions at DETAILS, POSTS.

section. After the piece is loaded and laid he sees that all personnel are clear.

i. He commands: CEASE FIRING when the number of shots specified has been fired. He repeats the command CEASE FIRING when it is received. At the conclusion of a series of shots he reports, "Sir, No. ------ (so many) rounds fired." When dummy ammunition is used, he commands: UNLOAD and supervises the unloading.

j. During firing, the gun commander carefully observes the action of the piece to see that recoil and counterrecoil are smooth and normal and whether any leaks develop in the recoil cylinder stuffing boxes. He pays particular attention to the position of the recuperator piston rod as shown by the relative position of the movable guard and fixed guard. When the end of the movable guard is flush with the end of the fixed guard, it shows that the maximum amount of reserve liquid is contained in the plunger. When the movable guard projects from the fixed guard about 8.5 inches, it indicates that the liquid supply is at its minimum and should be replenished. The movable guard should never be allowed to approach nearer than ½ inch to either extreme. Within these limits, the liquid pressure is always 10 percent higher than the air pressure, this being determined by the dimensions of the parts. If the indicated pressures of air and liquid are not in this ratio, the cause should be ascertained at once and corrected before firing.

k. In case of a misfire, he calls, "No. ------ misfire." He sees that the precautions described in paragraph 38 are observed.

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

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

■ 10. GUN POINTER.—The gun pointer (noncommissioned officer) is charged with the duty of laying the piece in direc-

tion. He is responsible to the gun commander for the proper operation, care, and adjustment of the sight, aiming rule, and traversing mechanism. For detailed duties of the gun pointer, see drill table in section IX.

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

■ 12. CHIEF OF BREECH.—The chief of breech (noncommissioned officer) is responsible to the gun commander for—

a. Efficiency of personnel of breech detail.

b. Condition and serviceability of breech mechanism, breechblock, breech recess, firing mechanism, chamber, and bore.

c. Observance of safety precautions insofar as they pertain to his detail.

d. Proper loading of the piece. He pays particular attention to the seating of the projectile and sees that the igniter is on the rear end of the last section of the powder charge. He listens for the explosion of the primer which may be audible if the powder charge fails to ignite. For detailed duties of the chief of breech, see drill table in section IX.

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

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

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

c. At the command LOAD or COMMENCE FIRING, he transmits the command to the officer in charge of the emplacement and continues to transmit all messages until properly relieved from his duties.

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

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

b. At the command EXAMINE GUN, they clean the display board if necessary, put on the telephone headsets, test the telephones to the fire-control car, and report to the gun commander, "Azimuth (deflection) display board and elevation display board in order," or report any defects they are unable to remedy without delay.

c. At the command TARGET, they receive azimuths (deflections) and elevations from the fire-control car, post them on the display board, and record them on the recorder's sheet.

d. At the command CEASE FIRING, they continue posting and recording data received from the fire-control car.

■ 15. RECORDER.—The recorder is charged with the duty of recording all elevations and azimuths (deflections) set on the piece.

a. At the command DETAILS, POSTS, he procures a record book and pencil for recording data and takes post in rear of the elevation setter, facing the piece.

b. At the command EXAMINE GUN, he assists the elevation setter in his duties.

c. At the command TARGET, after the piece has been laid, he records each elevation and deflection set on the piece, reading the elevation actually set and obtaining the azimuth (deflection) from the gun pointer. He will give special attention to indentifying properly the actual data upon which the piece is fired.

d. At the command RE-LAY, he performs the duties prescribed under the command TARGET.

e. At the command CEASE FIRING, he continues to record the data set on the piece until CEASE TRACKING is received.

■ 16. AIMING RULE OPERATOR.—The aiming rule operator is responsible to the gun commander for the operation, care, and adjustment of the aiming rule and its sight.

a. At the command DETAILS, POSTS, he procures the aiming rule sight and crossbar, places them near the aiming rule stakes, and takes post behind the aiming rule stakes, facing the piece.

b. At the command EXAMINE GUN, he places the aiming rule crossbar in position on the stakes and places his sight in its bracket on the crossbar. He sets his sight in accordance with the data given him by the battery executive or the gun commander and moves his sight along the bar until the vertical cross hair is exactly on the gun sight.

c. At the command TARGET, he keeps the vertical cross hair of his sight exactly on the center of the gun sight by sliding his sight along the crossbar without changing the deflection set on his sight.

d. At the command RE-LAY or CEASE FIRING, he continues to perform the duties prescribed under the command TARGET, unless otherwise directed.

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

(1) Efficiency of personnel under his charge.

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

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

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

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

(6) Uninterrupted service of ammunition during action.

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

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

d. He keeps a thermometer in a selected powder container and reports temperature of the powder when directed.

e. At the command DETAILS, POSTS, he opens the ammunition car or magazines and posts the members of the ammunition squad.

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

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

h. At the command REPLACE EQUIPMENT, he supervises the replacing of equipment, sees that all ammunition, other matériel, and cars are properly secured, forms his squad, and reports to the chief of section.

■ 18. AMMUNITION SQUAD.—*a.* At the command DETAILS, POSTS, the ammunition squad, less reserve detail, takes post in the ammunition car as directed by the chief of ammunition.

b. At the command EXAMINE GUN, Nos. 15 to 20, inclusive, under direction of the chief of ammunition, prepare car equipment and ammunition for firing or drill.

c. At the command LOAD—

(1) Nos. 15 and 16 secure shot tongs to projectile, hook shot tongs to hoisting chain, and by means of the triplex block, hoist until projectile will clear gun platform. They then push the projectile forward to Nos. 19 and 20.

(2) Nos. 17 and 18 remove powder charge from container, place it on the powder tray, hoist it by means of the triplex block, and push it forward to Nos. 19 and 20.

(3) Nos. 19 and 20, stationed at front end door of the car, receive the projectile and powder charge as they are pushed forward, lower them to gun platform, free them from the hoist tackle, and push triplex block back into the car.

d. At the command RE-LAY, Nos. 15 to 20, inclusive, continue with their duties of preparing the ammunition for service.

e. At the command CEASE FIRING, when dummy ammunition is used—

(1) Nos. 15 and 16 receive dummy projectile from Nos. 19 and 20 and place it in its proper position.

(2) Nos. 17 and 18 receive dummy powder charge from Nos. 19 and 20 and place it in its proper position.

(3) Nos. 19 and 20 hook the tray with dummy powder charge to the hoist tackle, hoist it clear of the platform, and push it back to Nos. 17 and 18. They hook shot tongs with dummy projectile to hoist tackle, hoist it clear of the platform, and push it back to Nos. 15 and 16.

■ 19. AMMUNITION RESERVE DETAIL.—*a.* When the gun is being fired from the track platform (limited traverse), this detail (Nos. 21 to 25, inclusive, at peace strength; Nos. 21 to 27, inclusive, at war strength) is available for miscellaneous duties about the emplacement and furnishes a reserve for replacements.

b. When the gun is emplaced on the base ring for all around traverse, this detail forms an intermediate ammunition service squad between the ammunition car and the gun carriage. In general, the supply of ammunition in this case will be as follows: The gun having been emplaced, and the most probable field of fire decided upon, it will be necessary to construct a platform in rear of the piece for storage of a sufficient number of projectiles to maintain a constant supply without traversing the gun back to a fixed loading position between shots. At the same time the powder must be transported from the car (or field magazine) to the rear of the gun where it can be handled by the gun hoist. A short stretch of temporary railway from the ammunition car (or field magazine) to the rear of the gun emplacement, upon which small hand cars can be transported, is a possible solution. This service will be carried on by the reserve detail.

■ 20. ARTILLERY MECHANIC.—The artillery mechanics, assisted by other members of the gun sections, make such minor repairs and adjustments as can be made with the means available. The chief artillery mechanic is custodian of supplies pertaining to gun emplacements to which his

battery is assigned. He is responsible for the condition of supply cars or storerooms pertaining to gun emplacements and the supplies contained therein. The chief mechanic or his assistant issues such equipment, tools, oils, paints, and cleaning materials to the other members of the gun sections as may be necessary for the service and care of the guns and accessories.

SECTION IV

NOTES ON THE SERVICE OF THE PIECE

■ 21. GENERAL.—*a.* This gun (fig. 3) cannot be fired at an elevation of less than 15° from the limited traverse emplacement.

b. The service of the piece will be conducted with dispatch and precision and with as few orders as possible. Except for necessary orders, reports, and instructions, no talking will be permitted. Changes in the positions of cannoneers will be made at a run, except those men posted on the carriage, who will change positions as rapidly as practicable.

c. Commands will be given in the prescribed forms. (See FM 4–5.) Signals may be substituted for commands whenever practicable. (See FM 4–20.)

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

■ 22. SERVICE OF AMMUNITION.—When action or target practice is imminent, the ammunition car loaded with projectiles and powder charges will be placed immediately behind the gun. Primers and point detonating fuzes will be stored in a convenient place away from the projectiles and powder charges and protected from the weather.

■ 23. LOADING.—*a.* At the command LOAD—

(1) Nos. 15 and 16 raise projectile by means of triplex block and push it forward to Nos. 19 and 20, who push it through ammunition car door and lower it on gun platform. The triplex block is then pushed back into the car to Nos. 17 and 18, who attach powder tray with charge. Nos. 17 and 18 push powder charge forward to Nos. 19 and 20, who place it on gun platform in same manner as the projectile.

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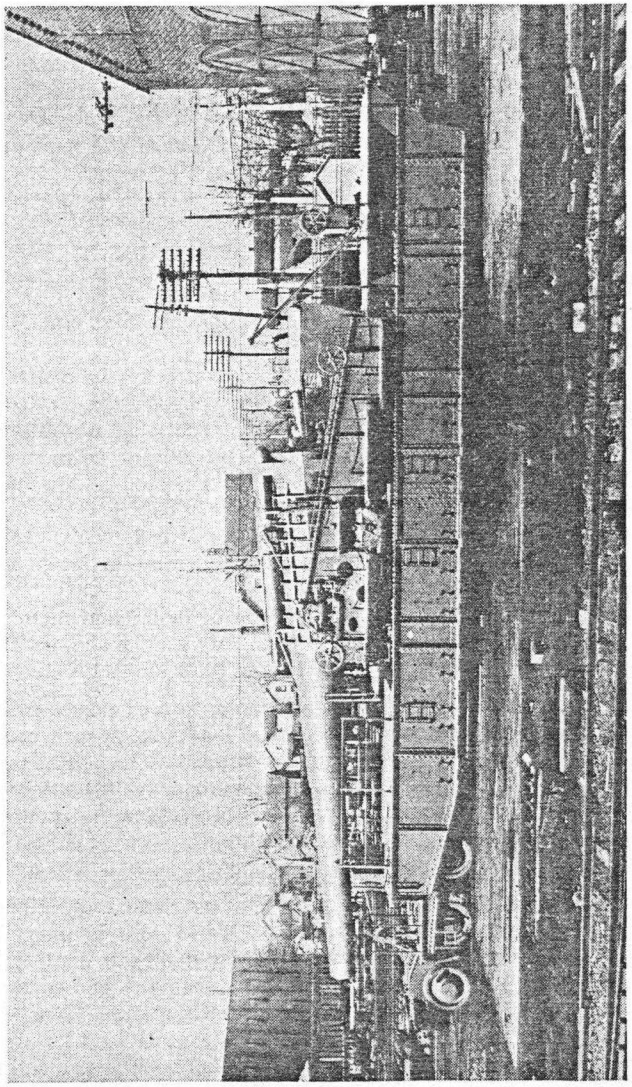


FIGURE 3.—12-inch gun on railway mount M1918 (traveling position).

(2) No. 11 attaches crane hook to shot tongs (fig. 4) and commands: HOIST. Nos. 12 and 13 raise projectile to height of loading stand and No. 14 swings boom around until projectile is directly over loading stand. No. 11 commands: LOWER. Nos. 12 and 13 lower projectile to loading stand and No. 11 releases shot tongs and swings back the boom. After No. 14 has unhooked shot tongs, No. 11 hooks crane hook to powder tray and causes powder charge to be hoisted to loading stand in the same manner. (See fig. 4.)

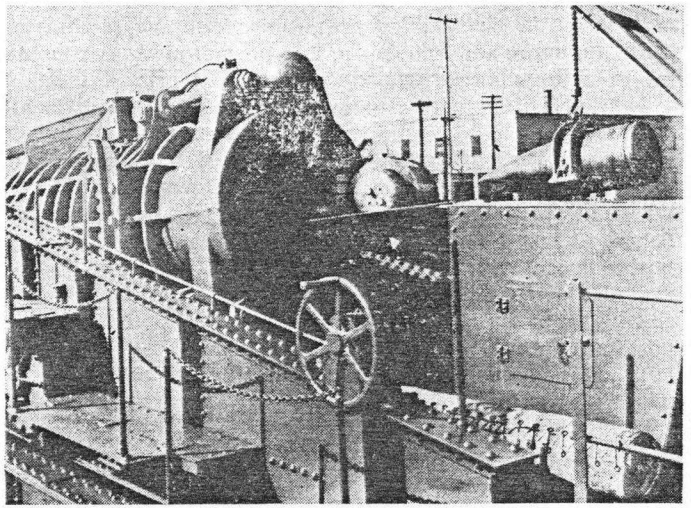


FIGURE 4.—Loading stand and shell trough of the 12-inch gun on railway mount M1918.

(3) No. 2 releases breechblock locking device. No. 3, assisted by No. 1 if necessary, opens the breech. Nos. 1 and 2 place shell trough in position. Nos. 1, 2, 4, 5, and 6 push home projectile and powder charge. Nos. 1 and 2 remove shell trough, No. 1 closes breech, and chief of breech hooks the lanyard. No. 3 inserts primer, lowers firing leaf, straightens out lanyard, and takes position for firing. Nos. 1 and 2 fold back folding platform and chief of breech commands or signals: ELEVATE to elevation setter.

b. Loading of the projectile is done by hand, Nos. 1 and 5 on right side of loading stand and Nos. 2 and 4 on left. No. 6 stands directly behind the loading stand and assists in getting the projectile under way rapidly by pushing on its base. The projectile being started, the four men walk rapidly forward with it, accelerating it to the utmost while it slides down the shell trough and into the gun. No rammer is used; perfect seating of the projectile results from the velocity it has acquired before it strikes home. The bottom of the shell trough must be kept smooth, free from paint, and will be lightly greased before use.

■ 24. POINTING AND FIRING.—*a.* The normal method of pointing these guns is case III.

b. For case III firing, the gun pointer sets (on his sight) deflection posted on display board and directs Nos. 9 and 10 to traverse the piece until vertical cross wire of his sight is on aiming point or aiming rule. The elevation setter sets his quadrant to correspond to elevation posted on display board, directs Nos. 7 and 8 to elevate the piece until level bubble is centered, and calls or signals, "Elevation set." The gun pointer then centers cross level bubble, directs the piece to be traversed until vertical cross wire of sight is accurately on aiming point, and calls or signals, "Deflection set." The gun commander commands or signals: FIRE at the sounding of proper time interval signal.

c. For case II firing, the gun pointer sets (on his sight) the deflection as posted and directs that the piece be traversed until his line of sight is slightly ahead of the target. Concurrently, the elevation setter sets his quadrant to correspond to elevation as posted, directs that the piece be elevated until level bubble is centered, calls or signals, "Elevation set," and keeps bubble centered as the piece is traversed. The gun pointer then centers cross level bubble, causes the piece to be traversed to keep vertical cross wire of his sight on the target, and when the gun commander calls, "Ready," he commands: FIRE.

d. At the command or signal FIRE, No. 3 pulls the lanyard. After the piece is fired, the gun is depressed to loading position, folding platform replaced by Nos. 1 and 2, lanyard unhooked by chief of breech, and breech opened by No. 3.

No. 6 hands sponge to No. 2 who, assisted by chief of breech, sponges powder chamber and chief of breech returns sponge to No. 6. No. 2 wipes off gas check seat and breech recess. No. 1 wipes off mushroom head and breechblock, oiling threads if required. No. 3 removes and throws away fired primer, clears vent, and cleans primer seat.

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

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

b. 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, No. 1 closes the breech and the operations of pointing and firing proceed as for service ammunition.

■ 26. AT THE COMMAND RE-LAY.—At the command RE-LAY, the gun pointer and elevation setter continue to point the piece in direction and elevation as at the command LOAD; display board operators post the new data on their display boards as they receive it and No. 3 slacks his lanyard.

■ 27. AT 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 commands: STAND FAST.

SECTION V

SAFETY PRECAUTIONS

■ 28. GENERAL.—*a.* These 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 battery executive according to the circumstances existing at the time of any particular emergency.

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

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

b. At the command CEASE FIRING, given when the piece is loaded, lanyards will be detached.

■ 30. FIRING MECHANISMS.—*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 safety features of the mechanism, a friction primer will be inserted before the breech is rotated. A strong pull will be exerted on the lanyard while the block is being rotated to ascertain if it is possible to fire the primer before the breech is closed and locked.

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

■ 31. LANYARDS.—Lanyards will be pulled with a quick strong pull (not a jerk) from a position as near the rear of the piece as convenient.

■ 32. 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 used in test of safety features, primers will not be inserted until after the breechblock has been closed and locked in its recess.

d. Primers will never 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 because of the possibility of a primer hangfire.

■ 33. 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 plug from fuze socket.

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

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

d. If there is any difficulty in screwing home the fuze, 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.

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

■ 35. SPONGING POWDER CHAMBER.—After each shot, the powder chamber will be sponged and the face of the mushroom head wiped with the liquid provided for that purpose. (See par. 50.)

■ 36. 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.)

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

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

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

c. If the primer is not heard to fire, at least three attempts will be made to fire it. If a special device by which the primer can be removed by an individual standing clear of the path of the recoil 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 since the last attempt to fire. If such a special device is not available, the primer will not be removed nor the breechblock opened until 10 minutes have elapsed since the last attempt to fire. (See FM 4–20.)

SECTION VI

CARE AND ADJUSTMENT OF MATÉRIEL

■ 39. 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 on the part of all officers and others having matériel in their charge.

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

■ 40. TO FILL RECUPERATOR.—*a. To fill plunger.*—The liquid must be filtered before being poured into the pump reservoir. There is a strainer provided at the pump intake but it cannot be reached for cleaning except by emptying and disassembling the pump. If the liquid has not been previously filtered this strainer will very soon become clogged with dirt. Pour liquid (par. 49) into pump reservoir, open liquid valve at front end of recuperator air cylinder, and by means of the liquid pump, pump liquid into plunger until piston is ½ inch from its extreme rearmost position. Under no conditions

should pumping be continued until the piston is at its extreme rearward limit as the piston rod may be damaged by so doing. Close liquid valve and drain liquid from pump reservoir by means of pump drain plug. The normal pressure of the liquid is 1,721 pounds per square inch (121 kilograms per square centimeter).

b. To fill air cylinder.—Make certain that air valve on air cylinder is closed. Connect air bottle to air pipe connection below air gage, open valve on air bottle, then open air cylinder until air pressure as shown by air pressure gage reaches a value of 1,566 pounds per square inch (110 kilograms per square centimeter). Close valve on air bottle, close air valve on air cylinder, and disconnect air bottle. When the gun is elevated, it is held in the "battery" position by the compressed air in the recuperator. It is therefore essential that the air pressure is checked before elevating the gun, especially so if the gun has been idle for a number of days.

■ 41. TO FILL RECOIL CYLINDERS.—Remove filling plug and insert end of filling tube in the hole. It will be necessary for one man to hold the funnel while another pours the liquid. Fill the cylinder, leaving no void. Be sure that the cylinder is entirely filled with proper liquid (par. 49) and that all air is expelled.

■ 42. TO EXERCISE RECOIL MECHANISM.—If firing is not conducted, the recoil mechanism will be exercised at intervals of approximately 6 months. Any firing during a period may be counted as an exercising. The method to be employed in exercising the mechanism is as follows:

a. With the recuperator fully charged, recoil cylinders filled, gun well lubricated in the cradle, and cradle at zero elevation, the maneuvering valve will be closed.

b. The gun will then be set at maximum elevation (against the stops).

c. The air valve on the recuperator cylinder will then be opened.

d. The maneuvering valve will be opened and the air in the recuperator allowed to escape. The air pressure gage will indicate the existing pressure.

e. When the air pressure has dropped sufficiently, the gun will slide back a short distance, being stopped by the building up of air pressure in the recuperator.

f. The gun will thus be brought to the full recoil position by successive movements, then the maneuvering valve will be closed.

g. The condition of the piston rods and the under side of the gun will then be ascertained.

h. To return the gun to battery, fully charged air cylinders will be coupled to the maneuvering valve outlet and the recuperator charged as prescribed above.

i. All valves will then be closed, the gun depressed to zero elevation, and the air pressure reduced to the service pressure of 1,566 pounds per square inch.

■ 43. To OPEN BREECH MECHANISM (M1895 AND M1895MI GUNS).—The breech mechanism is of the Stockett type. To open the breech, No. 2 presses downward on the locking bolt handle, releasing block locking bolt. No 3 turns operating crank continuously toward the muzzle (clockwise) until the tray comes to rest against the hinge.

■ 44. To CLOSE BREECH MECHANISM.—No. 1 turns the operating crank to the rear (counterclockwise) until the block is completely rotated.

■ 45. To ASSEMBLE AND ADJUST OBTURATOR.—*a.* With the breechblock in the open position, the spindle with split rings, gas check pad, and filling-in disk upon it will be inserted into the block. Special care must be taken that the front and rear split rings are not interchanged. The large ball bearing will be put in place upon the rear end of the spindle projecting through the block and the spindle will be secured by screwing up the spindle nut by hand. The breechblock will then be translated and rotated halfway into the firing position. The split nut will be screwed up as tightly as possible with the wrenches provided for that purpose and locked in place by the clamping screw. The spindle will be properly adjusted if, while it has no play longitudinally, it can be turned around freely by taking hold of the mushroom head with both hands.

b. If after firing a few rounds the spindle is found to have longitudinal play, the adjusting operation described in *a* 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 to do so will cause injury to the gas check pad.

■ 46. FIRING MECHANISM, M1903.—*a. Care.*—(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 well oiled and free from rust and dirt.* It will be removed from the gun when not in use, kept in the small box provided for it, 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. To assemble mechanism on gun.—(1) Clasp hinged collar over end of spindle with the two ribs of collar engaging in the corresponding grooves of spindle, keeping hinge at the top.

(2) Take mechanism in the right hand, holding collar with the left, and put mechanism over end of collar. Screw collar to the left until catch on the under side of mechanism engages and locks it in position. While doing this, see that guide bar which projects from the right side of mechanism enters groove cut in the breechblock for it, and that pin on safety bar slide (which is attached to the gun) enters the hole in outer end of safety bar of mechanism. *Do not attempt to use the mechanism until it is absolutely certain that the collar has been screwed entirely home and locked.*

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

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

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

(3) To remove firing leaf and slide catch from slide, start split pin which passes through 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 lower edge of 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.

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

(2) There is also a safety bar which holds the firing leaf until it is withdrawn by the safety bar slide, actuated by the rotation of the block.

e. Inspection and tests.—(1) From time to time and *before firing,* the firing mechanisms 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) 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 that gun in order to insure proper functioning.

■ 47. To Check and Adjust Slip-Friction Device.—The slip-friction device should be in adjustment when the pinion shaft nut is screwed down until it comes to a bearing on the adjusting collar. The Belleville washers should exert enough pressure on the friction disks to give them the necessary holding power for all normal loads. It is intended that these disks shall slip only enough to prevent breakage of any of the parts of the elevating mechanism under an overload. Should the friction disks become so worn that when the pinion shaft nut comes to a bearing on the adjusting collar the disks fail to hold the normal load, the body of the adjusting collar should be slightly shortened by facing off the end or if necessary the disks should be renewed.

■ 48. To Check and Adjust Antifriction Device.—*a.* The antifriction device is a mechanism used to eliminate the friction between the cradle trunnion and its bearing and thus make elevating and depressing the gun easier. This is possible by supporting the dead weight of the gun on smaller trunnion plugs or trunnions and giving the cradle trunnions a clearance so that they float in their bearings. On this mount, the cradle trunnions have a clearance of 1 millimeter on their diameters in their bearings. The guide bracket adjusting screw and the plunger bracket adjusting screw (above and below the Belleville washers respectively) are used to effect this clearance.

b. The adjustment is made in the following manner: screw plunger bracket adjusting screw up or down until cradle trunnion has 0.5-millimeter (0.020-inch) clearance all around it in the trunnion bearing. Set up adjusting screw lock nut. Bring guide bracket adjusting screw down until it very nearly touches the lever and set up its check nut.

c. This clearance will be carefully checked before each drill or firing.

■ 49. Liquid for Recoil and Recuperator Mechanisms.—*a.* The glycerin-water mixture used in the recoil and recuperator cylinders will conform to the following:

Neutral glycerin, 50 parts by volume.

Pure water, 50 parts by volume.

To each 3 gallons of the mixture add 1 ounce of caustic soda (sodium hydroxide) (NaOH) (1 pound of caustic soda to 48 gallons).

b. Water sufficiently pure for use in storage batteries, such as filtered rain water, will be used. In case of doubt, distilled water will be used.

c. Excess of caustic soda will cause disintegration of the packings and corrosion of the bronze surfaces in the mechanisms. After the caustic soda is thoroughly dissolved and well stirred in, the alkalinity of the solution may be tested by inserting a piece of red litmus paper which will turn blue if the solution has been properly mixed.

■ 50. 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 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 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.

■ 51. SODA ASH CLEANING SOLUTION.—The purpose of this solution is to clean the bore after firing. From ½ to 1 pound of soda ash (depending on the strength desired) will be dissolved in 1 gallon of boiling water. Burlap will be wrapped around the bore sponge body when applying this solution. When the bore is clean, new burlap will be used to dry it.

SECTION VII

RAILWAY OPERATING EQUIPMENT

■ 52. GENERAL.—This section is intended to serve as a guide to battery commanders for the care and maintenance of the railway operating equipment, its preparation for movement, and for emergencies which may arise during movement. In time of peace, Interstate Commerce Commission and local railway regulations will govern. Equipment which is accepted by one railroad may not be acceptable to another. Therefore the battery commander must familiarize himself with the regulations of the railroad companies over which his equipment will be moved.

■ 53. AMERICAN RAILWAY ASSOCIATION RULES.—*a.* Railroad companies will not accept railway equipment for movement or interchange which does not conform to the American Railway Association rules. Instructions concerning the care and upkeep of the running gear, air brake equipment, and

other strictly railway operating features contained in these rules will govern the maintenance operations on all railway matériel.

b. Copies of these rules should be in the files of all ordnance officers charged with the maintenance of railway matériel. They can be obtained by application, through channels, to the Commanding Officer, Raritan Arsenal, (FSD), Metuchen, N. J.

■ 54. BRAKES.—Each truck is equipped with both hand and air brakes, the hand brake being so arranged that it operates through the same lever system as the air brake. The air brake is standard equipment. Local railway officials are usually very willing to cooperate by instructing a limited number of men in the care and maintenance of air brake equipment in the railway repair shops. This instruction should be utilized whenever practicable. American Railway Association rules require air brakes to be cleaned and tested annually and certain data stenciled on the equipment.

■ 55. JOURNAL BOXES AND BEARINGS.—*a.* The journal box bearing, a babbitt-lined bronze casting, is held in place in the journal box support by the journal. Before installing journal bearings, they must be thoroughly clean, have a smooth bearing surface free from irregularities and a proper bearing. Sandpaper, emery paper, or emery cloth should never be used for the purpose of removing irregularities from the bearing surface. A half-round file or scraper should be used. Care must be taken that the wedge has a good contact on the crown of the journal bearing. The surface of the journal should be smooth and thoroughly clean before the bearing is installed. When installing a journal bearing, a coat of lubricating oil must be applied to the bearing surface. Never wipe the bearing surface of the journal bearings with waste.

b. A woolen pad mounted in a steel plate is pressed against the lower surface of the journal by four springs. The pad is kept saturated with oil drawn up by wicks from the lower part of the journal box.

c. A piece of boiler plate or 4- by 6-inch oak plank, sufficiently long to rest on two ties, should be available as a base for each jack when changing bearings.

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■ 56. COMPOSITE CLEARANCE DIAGRAM.—The composite clearance diagram (fig. 5) includes all coastal lines, Mexican border lines, some transcontinental lines and a few central, north, and south lines. It allows 4 inches clearance between actual obstructions and the outline. As it makes no allowance for curves the overhang of the mount in rounding curves must be computed. It is safe to assume a maximum curve of 17°, 337 feet radius, on main lines. The Corps of Engineers maintains a complete and up-to-date record showing clearances, strength of bridges, and other pertinent data on all railroad lines.

■ 57. WEIGHT.—The weight of the mount is just as important as clearance in determining where and how it may be transported. (See fig. 6.) The great weight of this gun and mount

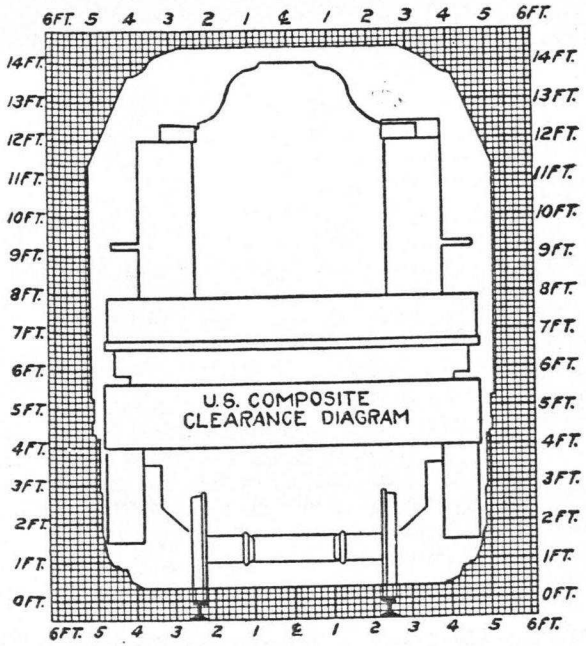
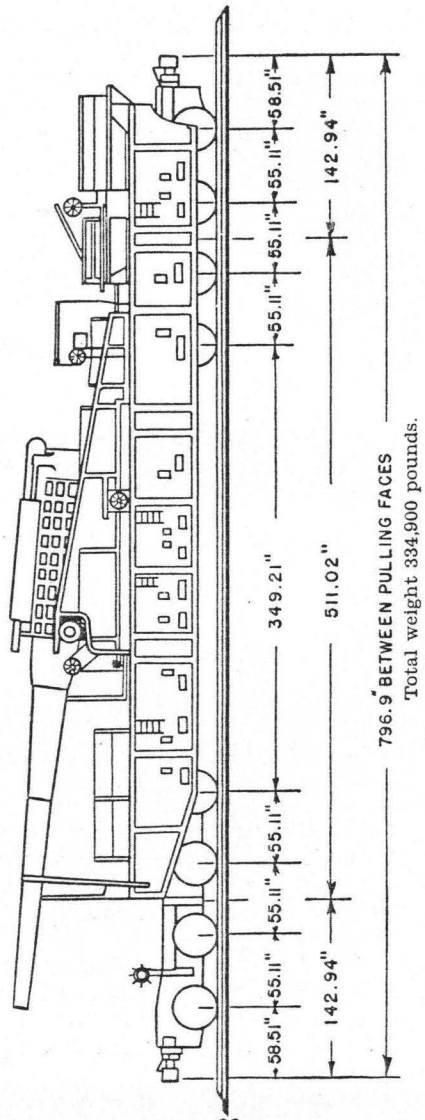


FIGURE 5.—Composite clearance diagram.



Total weight 334,900 pounds.

FIGURE 6.—Weights and dimensions.

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(334,900 pounds) makes it mandatory that the strength of all bridges, trestles, and culverts to be crossed is carefully checked either from data obtained from the Chief of Engineers or from the officials of the lines to be used.

■ 58. REQUIREMENTS OF GOOD TRACKS.—A good track must be regular in alinement and profile and without kinks or sharp bends. In going over the line to verify the profile by a glance of the eye, from time to time place the eye close to the rails, looking along the track as far as possible. The ends of the rails must not touch each other as sufficient space for expansion is required between them. Each joint must be made with two splice plates fastened with four bolts (six bolts for heavy work). Every bent or broken rail must be replaced. Loose ties (insufficiently tamped) must be made solid by tamping. Broken and rotted ties which depress under the passing of trains must be replaced. The ballast must be porous and firm; if the base is wet or muddy, it lacks resistance, and must be drained or the track will not retain its profile.

■ 59. MOVEMENT OF EXPLOSIVES.—The movement of explosives by rail is covered by regulations of the Interstate Commerce Commission and also by the municipal ordinances of various cities. Local railway officials should be consulted with reference to these regulations.

■ 60. SUGGESTIONS FOR PREPARATIONS.—The following suggestions are listed to assist the battery commander in training his organization and preparing his matériel for railway movements:

a. Instruct the individual in charge of a rail movement in the procedure to be followed if repair work on the road becomes necessary, such as the supply department to which bills are to be sent, limitations on the cost of repairs he may authorize, and necessary forms and reports to be accomplished.

b. Have personnel trained and equipment available for packing journal boxes and replacing bearings. At each stop all journals should be inspected for overheating.

c. Arrange for a preliminary inspection of running gear by the receiving railway officials.

d. Exercise running gear whenever possible. Equipment should be moved a sufficient distance so that journals will become "warmed up."

e. Have spare air hoses available.

f. Whenever possible, move gun with muzzle trailing.

g. If gun is to be fired from the limited traverse platform, be sure that it arrives at the position with muzzle pointing in direction of fire.

h. Make up train with an empty flat car at each end of gun car.

i. See that ground platform car is properly loaded. (See par. 64.)

j. Be sure explosive labels are placed on ammunition cars.

k. Have sandbags and marlin available for revetments in case heavy rains threaten washouts on a firing spur.

SECTION VIII

EMPLACEMENT

■ 61. GENERAL.—*a.* The method of emplacing covered in this section is for the limited traverse platform only. Emplacing of the fixed base ring for all around traverse will be covered in pertinent ordnance regulations, upon completion of tests, if this method of use is adopted.

b. For purposes of explanation, duties in emplacing have been assigned to men by their numbers in the gun section. In actual practice, the chief of section may find it necessary to reassign duties in accordance with the physical qualifications of the men.

c. The reserve detail of the ammunition squad (Nos. 21 to 25, inclusive, at peace strength and Nos. 21 to 27, inclusive, at war strength) is available to perform duties as directed by the chief of section.

■ 62. SITE.—The location of the gun position having been determined, access tracks are inspected to see that they are straight and level for at least 100 feet immediately approaching the position. This is extremely important, as it will be difficult if not impossible to emplace the gun if this requirement is not met. The ties should be sound and properly spaced (20 ties per rail), rails securely spiked, and track well ballasted.

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■ 63. PREPARATION OF POSITION.—The gun commander is charged with preparation of the position for emplacement of the gun. The gun pointer and the chief of ammunition assist him in supervising the work. Other members of the gun section are assigned definite duties as described below.

a. As it is necessary to remove the rails and ties before laying the ground platform, the places where the rails are to be cut are marked with chalk by the executive or assistant executive after he has measured the length of the six sections of the platform. They should measure 44 feet. He should allow about 1 inch clearance in laying off the length of the platform. If one end of the ground platform can be located at a rail splice, it will be necessary to cut the rails at only three places, otherwise four cuts will be necessary. The cuts should be started with cold chisels. The rails are cut with the rail saws by Nos. 1, 2, 3, and 4 of the gun section or an acetylene torch may be used. The rail splice plates are removed by Nos. 9 and 10 while the spikes are pulled by Nos. 5, 6, 7, and 8. When these operations are completed, Nos. 1 to 8, inclusive, remove the rails with the rail tongs and the remaining members of the gun section remove and pile the ties.

b. The ground thus laid bare is carefully leveled 11½ inches below the upper surface of the rails. This work is done by Nos. 1 to 18, inclusive, Nos. 1 to 6 being equipped with square-pointed shovels, Nos. 7 to 12 with round-pointed shovels, and Nos. 13 to 18 with picks. Care should be taken to remove all large stones and clods from the site. The place thus cleared should be 12 feet wide. If crushed rock is available, it makes an excellent surface for this cleared space.

c. The six ground platform spade pits are staked out by Nos. 19 and 20, the recorder, deflection and elevation display board operators, and aiming rule operator, under direct supervision of the gun commander. The pit measuring frames are used for this work. The line which the rails will follow should be marked with tapes to insure centering and alinement of the pits.

d. In digging the pits, excavation gages are used to determine the proper size and shape. The work is done by Nos. 1 to 18, inclusive, equipped with tools as in *b* above. Nos. 1, 7,

and 13 work in the first pit; Nos. 2, 8, and 14 in the second pit; and so on. The gun commander sees that the pits are properly dug, vertical walls to the rear, and that loose earth is not spilled on the leveled ground.

■ 64. PREPARATION OF GROUND PLATFORM CAR.—*a.* While the pits are being dug, the recorder, deflection and elevation display board operators, and aiming rule operator, under charge of the gun pointer, prepare the ground platform car. (See fig. 7.)

b. These men first inspect the car to see that it is properly loaded and on the correct side of the emplacement. Proper loading requires that one end section be on the upper shelf at the crane end of the car and the other on the lower shelf at the winch end of the car. These two sections may be identified by the fact that they have bolt holes in only one end of their side frame webs. The car is on the correct side of the excavation if the end of the upper end section, which has no bolt holes, will lie adjacent to the access track when the section is laid with the vertical side of the spade to the rear of the emplacement. This check should be made before the rails are removed, as it may be necessary to move the platform car beyond the emplacement to get it on the correct side.

c. The deflection and elevation display board operators procure machinists' hammers and mount the ladders on either side of the car. They remove the four coupling pins that lock the hoist runway extension in the traveling position.

d. The recorder and aiming rule operator take post at the winch at the other end of the car.

e. When the coupling pins have been removed, the gun pointer commands: HOIST, and the men at the winch operate it, raising the runway extension. The gun pointer takes a position where he can see when the female coupling bearings register with the male bearings in the operating position. When the pinholes meet, he commands: HALT. The men on the ladders then insert the pins to lock the runway extension in the operating position, securing the pins with the split keys attached thereto.

f. The men at the winch slack the cable and lock the winch, and the men with the hammers replace them in the tool box.

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The gun pointer sees that the hoist operating chain, hoisting mechanism, trolley, and other working parts are in order. If he finds that the chain slips from the pulley, he should insure that the chain is guided when the hoist is in use.

g. The gun pointer then causes his detail to procure two car pushers and place them convenient to the rear wheels, one on either side. He next has them procure two 60-foot lengths of rope, attach one end of each to the hoist traveler, and coil the remainder on the front platform of the car. He reports to the gun commander that the platform car is ready.

h. When the pits are dug and the platform car is ready, the gun commander reports to the officer in charge of the emplacement. The latter makes a careful personal inspection of both car and ground, noting particularly the securing of the hoist extension, the leveling of the ground, and the size and shape of the pits. He should also make sure that the vertical walls of the pits are to the rear. He causes any defects to be remedied, and when all is in readiness he directs the gun commander to lay the platform.

■ 65. ASSEMBLY OF GROUND PLATFORM (fig. 8 ① and ②).—*a.* At direction of gun commander, Nos. 1, 2, 3, and 4 take post at rear of car, equipped with two car pushers. Nos. 5 and 6 each procure a wooden chock and take posts at front of car, one on either side. No. 7 takes post at hand brake wheel. The remainder of the section station themselves along the sides of the car.

b. After the brake is released, the gun commander commands: HEAVE. At this command, Nos. 1, 2, 3, and 4 operate the car pushers and the men at the sides push the car forward. When the coupler knuckle is just above the end of the track, the gun commander commands: HALT. At this command, all cease pushing, No. 7 sets the brakes, No. 5 places his chock in front of front wheel of front truck, and No. 6 places his chock in rear of rear wheel of front truck.

c. When the car is in position, Nos. 5, 6, 7, and 8 mount car and attach hoist to first platform section. They then move to the rear of this section and remain there to guide it as

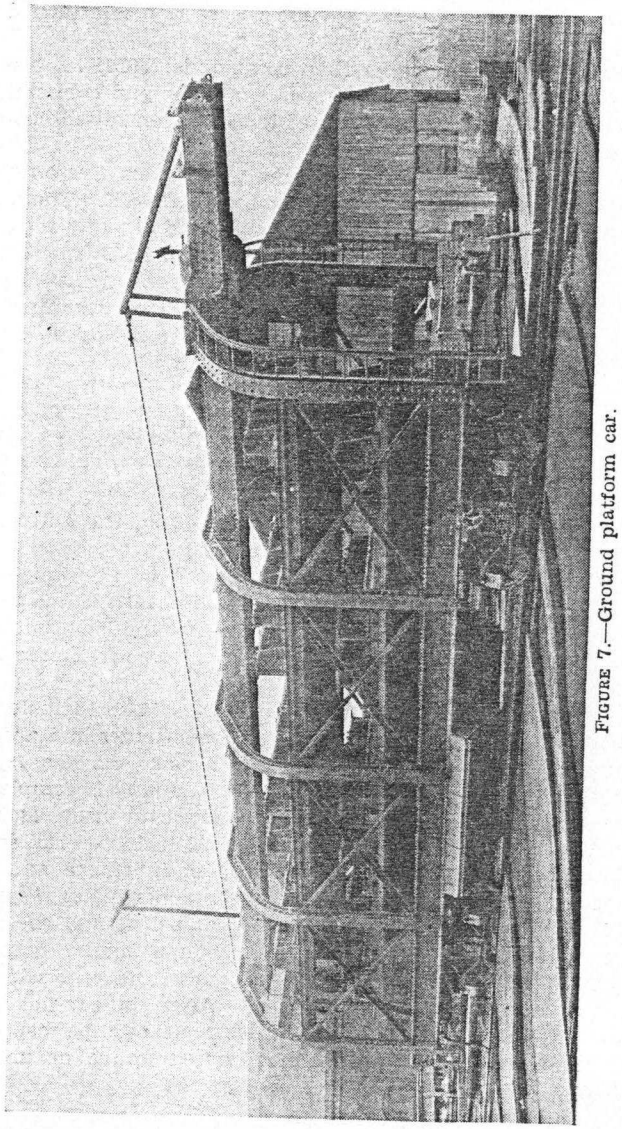


FIGURE 7.—Ground platform car.

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JAN 30 1942

it is pulled from the car. When the section is attached to the hoist, No. 5 calls, "Ready."

d. The gun commander then commands: HOIST. Nos. 9 and 10 operate hoist operating chain. The gun commander commands: HALT when the section has been raised enough to clear the shelf.

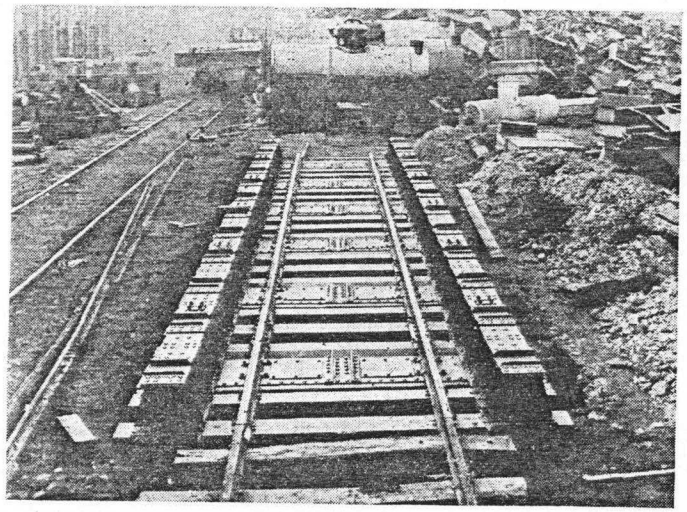
e. Nos. 11 to 20, inclusive, having taken posts, five on each rope, the gun commander commands: HEAVE. The men on the ropes draw the traveler slowly and steadily forward until the gun commander commands: HALT when the traveler has reached the end of the runway extension. There are stops to prevent the traveler from running off the end but the load is so heavy that care should be taken not to bump it too hard against these stops.

f. As the gun commander commands: LOWER, Nos. 9 and 10 lower the section by means of hoist chain. The men who were on the ropes move to the section, swing it so that the spade is over the pit, and guide it until it is in position, taking care not to get under it.

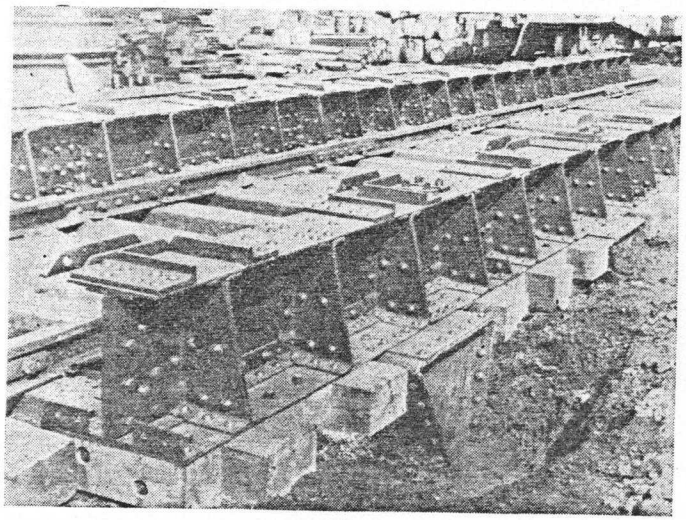
g. When the section is almost in position, the gun commander carefully supervises its manipulation so that the rails of the section are against, in line with, and on the same level as the rails of the approach. When he is satisfied as to its position, he levels the section both laterally and longitudinally with the track level. Slight movements may be effected best with the pinch bars.

h. The gun commander then directs Nos. 11 to 16, inclusive, to tamp earth, crushed rock, or sand well under and around the spade. Nos. 11 and 12 use tamping picks and Nos. 13, 14, 15, and 16, tamping bars. When the tamping is completed, the gun commander again levels the track to insure against uneven tamping. Nos. 17, 18, 19, and 20 fasten on rail splice plates between the section and the main tracks and the recorder and aiming rule operator screw down screw spikes.

i. The car is again moved forward as before and the next section from the upper shelf is laid in a similar manner. The clip bolts are inserted and tightened before hoist is removed and second section tamped. After the car has been run onto the newly laid track, the latter should be inspected to see that the weight has not caused undue or uneven



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FIGURE 8.—Ground platform in position.

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settling. Such settling should be corrected, as the gun cannot be readily emplaced unless the platform is perfectly laid and the greater weight of the gun will increase the defects, making it extremely difficult to get the gun out of position again.

j. After the two platform sections have been laid, the gun pointer assumes charge of coupling them together. The aiming rule, elevation, and deflection display board operators and the recorder fasten the clips on the ends of the sections. Nos. 17, 18, 19, and 20 attach rail splice plates. Nos. 1, 2, 3, and 4 attach web splice plates. The recorder and aiming rule operator screw down screw spikes. This procedure is repeated at each joint.

k. If, at the completion of the platform laying, the tracks thereof do not meet the regular tracks closely enough to permit the passage of the truck, it will be found simpler to unspike some of the regular track and relay it temporarily so that it will meet, than to attempt to rectify the platform.

l. When the platform is laid, the gun commander reports to the officer in charge of the emplacement who inspects the approach track and the track ahead of the platform to see that it will permit passage of the gun. He inspects the platform to see that it is level, well tamped, and properly ballasted, that rail and web splice plates are properly placed and fastened, that screw spikes are screwed down, and that end clips are bolted together. He causes any defects to be remedied and when all is in readiness, he directs the gun commander to emplace the gun.

■ 66. EMPLACEMENT OF GUN ON GROUND PLATFORM.—*a.* After removal of the platform car, which has been cleared of the platform by hand before the locomotive is allowed to pick it up, the gun is brought as close to the platform as possible by the locomotive. No attempts will be made under any conditions to push the gun onto the platform by means of the locomotive.

b. Nos. 1, 2, 3, and 4 take post at the rear with car pushers. Nos. 5, 6, and 7 man the front warping device, Nos. 8, 9, and 10 rear warping device, and the remainder of the men station themselves along the sides of the car. The gun commander stations himself on one side and the gun pointer on the other.

At the commands of the gun commander, the gun is moved slowly forward and halted. The gun commander and gun pointer watch closely to see that no part of the gun fouls the side frames of the platform.

c. The gun car is halted so that the wedge locating angles on the bottom of car side frames exactly coincide with the corresponding ones on the top of platform side frames. The warping devices are thrown out of gear and locked.

d. Nos. 1 to 12, inclusive, insert wedges in position between wedge locating angles on the right-hand side (looking from breech to muzzle). Nos. 13 to 20, inclusive, the recorder, aiming rule operator, and elevation and deflection display board operators insert the wedges on opposite side. Nos. 13, 14, 15, and 16 under the gun commander and Nos. 17, 18, 19, and 20 under the gun pointer, jack up gun from front truck and lower gun onto the wedges. The men on the wedges, using wedge operating handles, extend the wedges under command of the gun commander (assisted by the gun pointer), who commands: HEAVE and HALT as necessary. Care must be taken that all wedges are extended uniformly.

e. When wedges are extended, the gun commander causes tension screws to be inserted in proper clips by Nos. 1 to 12, inclusive. He levels gun and makes any necessary corrections in wedges. Nos. 8, 9, 10, and 11 remove gun band and tie rods and lower gun support. The gun commander reports to the officer in charge of the emplacement that the gun is emplaced.

f. The officer inspects gun car to see that wedges are properly placed and extended, tension screws properly fastened, and gun leveled. He causes any defects to be remedied, and when this has been done, reports to the battery commander, "No. ____ gun is emplaced."

■ 67. WITHDRAWAL FROM POSITION.—To remove the gun car from the platform and to take up the platform sections and replace them on the platform car, the procedure outlined in paragraph 66 is reversed.

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SECTION IX

STATISTICAL DATA AND DRILL TABLE

68. 12-INCH GUN, RAILWAY MOUNT, M1895A1 AND M1895MIA1.

Length, calibers	35
Length, inches	442.56
Weight (approximate), pounds	119,900
Range, yards	19,000 to 29,000

69. 12-INCH GUN, RAILWAY MOUNT, M1918.

Loading angle, degrees	−5
Traveling angle, degrees	+5
Firing angle, degrees	+15 to +38
Traverse (right or left) degrees	5
Length between truck centers, inches	511.02
Length between pulling faces of couplers, inches	796.9
Number of trucks	2
Number of wheels per truck	8
Type of trucks	French
Journals, inside, inches	6.693×12.2
Weight of truck, pounds	32,500
Total weight on track (including gun) pounds	334,900
Loads at rail per axle, front, pounds	41,292
Loads at rail per axle, rear, pounds	42,433
Normal air pressure in recuperator, pounds, square inch	1,566
Normal liquid pressure in recuperator, pounds, square inch	1,721

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APPENDIX

LIST OF REFERENCES

Ammunition, drill	TM 9–905 (now published as TR 1370–D).
Ammunition, general	TM 9–905 (now published as TR 1370–A).
Camouflage, cover, local security, machine-gun defense, protection against air and chemical attacks.	FM 4–5.
Care and maintenance of matériel	TM 4–245 (now published as TR 1160–20). TM 9–850 (now published as TR 1395–A). FM 4–20.
Commands	FM 4–5.
Description of 12-inch guns and their breech mechanisms.	Ord. Doc. No. 1665.
Examination for gunners	FM 4–150.
Fire control and position finding	FM 4–15.
Gunnery	FM 4–10.
Organization of the battery	FM 4–5. T/O 4–57.
Railway operating equipment	American Railway Association rules
Reconnaissance, selection, and occupation of positions.	FM 4–5.
Safety precautions in firing	AR 750–10. FM 4–20.
Service at the emplacement	FM 4–20.
12-inch gun, railway carriage, M1918, and ground platform car.	Ord. Doc. No. 2020.

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COAST ARTILLERY FIELD MANUAL

SEACOAST ARTILLERY

SERVICE OF THE PIECE

12-INCH GUN, RAILWAY MOUNT, M1918, RAILWAY ARTILLERY

CHANGES No. 1

WAR DEPARTMENT,
WASHINGTON, January 12, 1942.

FM 4–45, April 10, 1940, is changed as follows:

■ 49. LIQUID FOR RECOIL AND RECUPERATOR MECHANISMS.—*a.* The glycerin-water mixture used in the recoil and recuperator cylinders will conform to the following:

Glycerin, grade A, USP, 50 parts by volume.
Water sufficiently pure for use in storage batteries, 50 parts by volume (such as filtered rain water or, in case of doubt, distilled water).

To each 3 gallons of the mixture add 1 ounce of sodium hydroxide, CP (NaOH), sticks or pellets.

b. This recoil fluid will not function properly at Arctic temperatures. However, the changing of the formula must not be attempted for this or any other reason. Either raising or lowering the glycerin content will vary antifreeze protection and will change considerably the specific gravity and viscosity. When cannon are to be fired where Arctic temperatures are prevailing, the temperature of the recoil mechanism should be maintained above 10° F. if practicable in order to avoid injury to matériel or personnel during firing.

c. Excess of sodium hydroxide will cause disintegration of the packings and corrosion of the bronze surfaces in the mechanisms.

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*These changes supersede paragraph 3, Training Circular No. 59, War Department, 1941.

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d. Glycerin-water recoil liquid should be replaced with fresh liquid whenever it is found necessary to drain cylinders. In cases of emergency the old liquid may be strained through a clean piece of linen or muslin and used for refilling the recoil mechanism.

[A. G. 062.11 (9–9–41).] (C. 1, Jan. 12, 1942.)

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,
Chief of Staff.

OFFICIAL:

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

U. S. GOVERNMENT PRINTING OFFICE: 1942

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DRILL TABLE

Service of the piece, 12-inch gun, railway mount, M1918, railway artillery

Details	DETAILS, POSTS	(*a*) EXAMINE GUN (*b*) REPORT	TARGET	LOAD	CEASE FIRING
Gun pointer (noncommissioned officer).	Procures sight. Places sight in position on sight bracket. Takes post on gun pointer's platform.	(*a*) Examines and adjusts sight and bracket. Supervises and assists in adjustment of aiming rule. Supervises Nos. 9 and 10 in testing traversing mechanism. (*b*) Reports to gun commander, "Traversing in order," or any defects he is unable to remedy without delay.	Sets deflections posted on display board on sight. Directs traversing of gun so as to sight on aiming point. Centers bubble on cross level of sight. Checks setting of sight on aiming point. Calls or signals, "Deflection set."	Continues setting deflections as posted on display board. Keeps gun traversed so as to sight on aiming point. Keeps bubble on cross level of sight centered. Checks setting of sight on aiming point. Calls or signals, "Deflection set," or commands: FIRE after gun commander has called "Ready."	Keeps piece laid in direction until CEASE TRACKING is received.
Elevation setter (noncommissioned officer).	Takes post on right platform at quadrant rest, facing gun.	(*a*) Examines and adjusts quadrant. Supervises and assists Nos. 7 and 8 in examining and testing elevating mechanism. (*b*) Reports to gun commander, "Elevation in order," or any defects he is unable to remedy without delay.	Sets elevations posted on display board on quadrant.	Continues setting elevations as posted on display board. At command or signal, ELEVATE, given by chief of breech, directs elevating of piece until bubbles of quadrant levels are centered. Calls or signals, "Elevation set." As soon as the piece has been fired, causes it to be depressed as rapidly as possible to loading position.	Causes piece to be depressed to loading position.
Chief of breech (noncommissioned officer).	Posts his detail after assuring himself that each man has procured necessary cleaning material and equipment. Takes post where he can best supervise work of detail.	(*a*) Examines— Breech mechanism. Breechblock. Breech recess. Firing mechanism. Chamber. Bore. Gives necessary orders for cleaning and putting them in condition for service. (*b*) Upon completion, reports to gun commander, "Breech in order," or any defects he is unable to remedy without delay.	Sees that breech detail is prepared to perform duties, if command LOAD is given.	Supervises work of breech detail. Sees that projectile is pushed along loading tray and into breech with sufficient velocity properly to seat it. Supervises loading of powder charge. Hooks lanyard *after* breechblock is closed and locked. Commands or signals: ELEVATE to elevation setter after hinged platform is folded back. After piece is fired, unhooks lanyard, assists in sponging, and returns sponge to No. 6.	Unhooks lanyard. Supervises unloading when dummy ammunition is being used.
No. 1 (breech detail)----	Procures— Operating crank. Wiper of cotton waste. Can containing lubricating oil. Places wiper and oilcan convenient to breech. Takes post 1 foot to rear and 2 feet to right of breech, facing it.	(*a*) Assisted by No. 2, removes breech cover and places it in designated place. Assists No. 3 in opening breech. Examines, cleans, and oils breechblock and breech mechanism. (*b*) Reports to chief of breech any defects of matériel.	Stands ready to perform his duties at command LOAD, if that command is given.	If breech is closed, assists No. 3 in opening breech, if necessary. Assists No. 2 in placing shell trough in position. Assists in pushing projectile down shell trough. Assists in loading powder charge. Closes breech as soon as shell trough is removed. Assisted by No. 2, folds back folding platform. After piece is fired, assisted by No. 2, replaces folding platform. Assists in opening breech, if necessary. Wipes mushroom head and breechblock, oiling threads if required.	Assists in opening breech. Assists in withdrawing dummy projectile when dummy ammunition is used.
No. 2 (breech detail)----	Procures— Wiper of cotton waste. Shell trough. Places shell trough convenient to breech. Takes post 1 foot to rear and 2 feet to left of breech, facing it.	(*a*) Assists No. 1 in removing breech cover. Examines, cleans, and oils breech recess and gas check seat. (*b*) Notifies chief of breech if chamber or bore requires cleaning.	Stands ready to perform his duties at command LOAD, if that command is given.	Releases breechblock locking device. Assisted by No. 1, places shell trough in position. Assists in pushing projectile down shell trough. Assists in loading powder charge. Assisted by No. 1, removes shell trough. Assists No. 1 in folding back folding platform. After piece is fired, assists No. 1 in replacing folding platform. Receives sponge from No. 6 and assists in sponging. Wipes off gas check seat and breech recess.	Assisted by No. 1 places shell trough in position. Assists in withdrawing dummy projectile when dummy ammunition is used.
No. 3 (breech detail)----	Procures— Firing mechanism. Lanyard. Primer pouch containing— Primers. Punch. Drill. Reamer. Takes post 2 feet to right of No. 1, facing breech.	(*a*) Assisted by No. 1, opens breech. Examines firing mechanism and places it on obturator spindle. Clears vent. Cleans primer seat. Examines lanyard, passes it through pulley, and coils up slack. (*b*) No duties.	Stands ready to perform his duties at command LOAD, if that command is given.	Assisted by No. 1, if necessary, opens breech. After breechblock has been fully closed and locked and after lanyard has been hooked— Inserts primer. Lowers firing leaf. Straightens out lanyard. Takes position for firing. At command FIRE, fires piece by a quick, strong pull (not a jerk) on lanyard. After piece is fired— Opens breech. Removes fired primer. Clears vent. Cleans primer seat.	If piece has fired, opens breech and removes fired primer. If piece is *loaded*, removes primer and opens breech when so directed by officer in charge of emplacement.

	Wiper of cotton waste. Can containing lubricating oil. Places wiper and oilcan convenient to breech. Takes post 1 foot to rear and 2 feet to right of breech, facing it.	breechblock and breech mechanism. (*b*) Reports to chief of breech any defects of matériel.		tile down shell trough. Assists in loading powder charge. Closes breech as soon as shell trough is removed. Assisted by No. 2, folds back folding platform. After piece is fired, assisted by No. 2, replaces folding platform. Assists in opening breech, if necessary. Wipes mushroom head and breechblock, oiling threads if required.	
No. 2 (breech detail)	Procures— Wiper of cotton waste. Shell trough. Places shell trough convenient to breech. Takes post 1 foot to rear and 2 feet to left of breech, facing it.	(*a*) Assists No. 1 in removing breech cover. Examines, cleans, and oils breech recess and gas check seat. (*b*) Notifies chief of breech if chamber or bore requires cleaning.	Stands ready to perform his duties at command LOAD, if that command is given.	Releases breechblock locking device. Assisted by No. 1, places shell trough in position. Assists in pushing projectile down shell trough. Assists in loading powder charge. Assisted by No. 1, removes shell trough. Assists No. 1 in folding back folding platform. After piece is fired, assists No. 1 in replacing folding platform. Receives sponge from No. 6 and assists in sponging. Wipes off gas check seat and breech recess.	Assisted by No. 1 places shell trough in position. Assists in withdrawing dummy projectile when dummy ammunition is used.
No. 3 (breech detail)	Procures— Firing mechanism. Lanyard. Primer pouch containing— Primers. Punch. Drill. Reamer. Takes post 2 feet to right of No. 1, facing breech.	(*a*) Assisted by No. 1, opens breech. Examines firing mechanism and places it on obturator spindle. Clears vent. Cleans primer seat. Examines lanyard, passes it through pulley, and coils up slack. (*b*) No duties.	Stands ready to perform his duties at command LOAD, if that command is given.	Assisted by No. 1, if necessary, opens breech. After breechblock has been fully closed and locked and after lanyard has been hooked— Inserts primer. Lowers firing leaf. Straightens out lanyard. Takes position for firing. At command FIRE, fires piece by a quick, strong pull (not a jerk) on lanyard. After piece is fired— Opens breech. Removes fired primer. Clears vent. Cleans primer seat.	If piece has fired, opens breech and removes fired primer. If piece is *loaded*, removes primer and opens breech when so directed by officer in charge of emplacement.
No. 4 (loading detail)	Procures hand extractor and places it on left side of platform near railing. Takes post on left side of loading stand.	(*a*) Assists in cleaning breech when called upon. (*b*) No duties.	No duties.	Takes post on left side of loading stand. Assists in pushing home projectile and powder charge.	Brings up hand extractor. Assists in withdrawing dummy powder charge and dummy projectile when dummy ammunition is used.
No. 5 (loading detail)	Procures bore sponge and places it near hand extractor. Takes post at right rear end of loading stand.	(*a*) Assists breech detail in cleaning when called upon. (*b*) No duties.	No duties.	Takes post on right side of loading stand. Assists in pushing home projectile and powder charge.	Assists in withdrawing dummy powder charge and dummy projectile when dummy ammunition is used.
No. 6 (sponge detail)	Procures chamber sponge and a tub containing sponging liquid, and places them on platform near bore sponge. Takes post at left side of loading stand.	(*a*) Brings up sponge called for and assists in sponging. (*b*) No duties.	No duties.	Takes post in rear of loading stand. Pushes on base of projectile until it is well under way. Assists in handling powder charge. After piece is fired, passes chamber sponge to No. 2, receives it back from chief of breech, and replaces it. Before passing sponge to No. 2, he dips it in the liquid and allows excess liquid to run off.	Assists in withdrawing dummy powder charge and dummy projectile when dummy ammunition is used.
Nos. 7 and 8 (elevating detail).	Take post at elevating handwheels. No. 7 at right handwheel, No. 8 at left handwheel.	(*a*) No. 7 removes muzzle cover and hands it to No. 8. No. 8 places muzzle cover on front platform. Both assist elevation setter in examining elevating mechanism and in cleaning and oiling gears. (*b*) No duties.	Depress piece to loading position if it is elevated.	Elevate or depress piece under direction of elevation setter. As soon as piece is fired they depress piece as rapidly as possible to loading position.	Depress piece to loading position.
Nos. 9 and 10 (traversing detail).	Take post at traversing handwheels. No. 9 at right handwheel, No. 10 at left handwheel.	(*a*) Examine and test traversing mechanism. Clean and oil gears under supervision of gun pointer. (*b*) No duties.	Traverse piece as directed by gun pointer.	Traverse piece as directed by gun pointer.	No duties unless directed to traverse piece to a designated position.
No. 11 (chief of hoist detail).	Takes post at right of loading crane.	(*a*) Examines and tests hoisting mechanism. Cleans and oils parts. (*b*) Upon completion, reports to gun commander, "Hoist in order," or any defects he is unable to remedy without delay.	No duties.	Hooks crane hook to shot tongs and commands: HOIST. Steadies projectile as it rises. Commands: HALT when projectile is at height of loading stand. Assisted by No. 14, swings boom around until projectile is directly over loading stand. Commands: LOWER, releases shot tongs and swings boom back. After No. 14 has unhooked shot tongs, hooks crane hook to powder tray and causes it to be hoisted to loading stand in a similar manner.	When dummy ammunition is used, causes dummy ammunition to be removed from loading stand and to be placed on gun platform near ammunition car, by reverse of procedure prescribed for command LOAD.
No. 12 (hoist detail)	Procures wrench for recoil cylinder filling plugs. Takes post at left crane handwheel, facing it.	(*a*) Removes filling plugs from recoil cylinders. Notifies gun commander that recoil cylinders are ready for inspection. If more liquid is re-	No duties.	Operates left handwheel of ammunition crane. Hoists and lowers at commands of No. 11. Sets pawl when boom is being swung around with projectile or powder charge.	Assists in removing dummy ammunition from loading stand to gun platform when dummy ammunition is used.

	Drill. Reamer. Takes post 2 feet to right of No. 1, facing breech.			At command FIRE, fires piece by a quick, strong pull (not a jerk) on lanyard. After piece is fired— Opens b[illegible]. Remov[illegible]d primer. Clears vent. Cleans primer seat.	
No. 4 (loading detail)	Procures hand extractor and places it on left side of platform near railing. Takes post on left side of loading stand.	(a) Assists in cleaning breech when called upon. (b) No duties.	No duties.	Takes post on left side of loading stand. Assists in pushing home projectile and powder charge.	Brings up hand extractor. Assists in withdrawing dummy powder charge and dummy projectile when dummy ammunition is used.
No. 5 (loading detail)	Procures bore sponge and places it near hand extractor. Takes post at right rear end of loading stand.	(a) Assists breech detail in cleaning when called upon. (b) No duties.	No duties.	Takes post on right side of loading stand. Assists in pushing home projectile and powder charge.	Assists in withdrawing dummy powder charge and dummy projectile when dummy ammunition is used.
No. 6 (sponge detail)	Procures chamber sponge and a tub containing sponging liquid, and places them on platform near bore sponge. Takes post at left side of loading stand.	(a) Brings up sponge called for and assists in sponging. (b) No duties.	No duties.	Takes post in rear of loading stand. Pushes on base of projectile until it is well under way. Assists in handling powder charge. After piece is fired, passes chamber sponge to No. 2, receives it back from chief of breech, and replaces it. Before passing sponge to No. 2, he dips it in the liquid and allows excess liquid to run off.	Assists in withdrawing dummy powder charge and dummy projectile when dummy ammunition is used.
Nos. 7 and 8 (elevating detail).	Take post at elevating handwheels. No. 7 at right handwheel, No. 8 at left handwheel.	(a) No. 7 removes muzzle cover and hands it to No. 8. No. 8 places muzzle cover on front platform. Both assist elevation setter in examining elevating mechanism and in cleaning and oiling gears. (b) No duties.	Depress piece to loading position if it is elevated.	Elevate or depress piece under direction of elevation setter. As soon as piece is fired they depress piece as rapidly as possible to loading position.	Depress piece to loading position.
Nos. 9 and 10 (traversing detail).	Take post at traversing handwheels. No. 9 at right handwheel, No. 10 at left handwheel.	(a) Examine and test traversing mechanism. Clean and oil gears under supervision of gun pointer. (b) No duties.	Traverse piece as directed by gun pointer.	Traverse piece as directed by gun pointer.	No duties unless directed to traverse piece to a designated position.
No. 11 (chief of hoist detail).	Takes post at right of loading crane.	(a) Examines and tests hoisting mechanism. Cleans and oils parts. (b) Upon completion, reports to gun commander, "Hoist in order," or any defects he is unable to remedy without delay.	No duties.	Hooks crane hook to shot tongs and commands: HOIST. Steadies projectile as it rises. Commands: HALT when projectile is at height of loading stand. Assisted by No. 14, swings boom around until projectile is directly over loading stand. Commands: LOWER, releases shot tongs and swings boom back. After No. 14 has unhooked shot tongs, hooks crane hook to powder tray and causes it to be hoisted to loading stand in a similar manner.	When dummy ammunition is used, causes dummy ammunition to be removed from loading stand and to be placed on gun platform near ammunition car, by reverse of procedure prescribed for command LOAD.
No. 12 (hoist detail)	Procures wrench for recoil cylinder filling plugs. Takes post at left crane handwheel, facing it.	(a) Removes filling plugs from recoil cylinders. Notifies gun commander that recoil cylinders are ready for inspection. If more liquid is required, assisted by No. 14, procures a bucket containing a mixture of glycerin and water, and filling device, and fills cylinders under supervision of gun commander. Assisted by No. 14, screws filling plugs well home and replaces equipment. Assists in putting more air or liquid in recuperator, if necessary. (b) No duties.	No duties.	Operates left handwheel of ammunition crane. Hoists and lowers at commands of No. 11. Sets pawl when boom is being swung around with projectile or powder charge.	Assists in removing dummy ammunition from loading stand to gun platform when dummy ammunition is used.
No. 13 (hoist detail)	Procures a box wrench for air and liquid valves of recuperator. Takes post at right crane handwheel, facing it.	(a) Opens air and liquid test valve on recuperator Uncovers air and liquid gages for inspection by gun commander. If more air or liquid is required, assisted by Nos. 12 and 14, procures necessary liquid, funnel, air pipe connections, and air bottle, charges recuperator to proper air and liquid pressures under supervision of gun commander, and replaces equipment. (b) No duties.	No duties.	Operates right handwheel of ammunition crane. Hoists and lowers at command of No. 11.	Assists in removing dummy ammunition from loading stand to gun platform when dummy ammunition is used.
No 14 (hoist detail)	Takes post near left handwheel of ammunition crane.	(a) Assists No. 11 in cleaning and oiling hoist. Assists in filling recoil cylinders and recuperator, if called for. (b) No duties.	No duties.	Assists No. 11 in steadying powder charge and projectile and in swinging boom. Unhooks empty shot tongs and empty powder tray and passes them into ammunition car.	Assists in removing dummy ammunition from loading stand to gun platform when dummy ammunition is used.