WAR DEPARTMENT FIELD MANUAL

FM 6-95

This manual supersedes FM 6-240-mm Howitzer, M1918, 2 21 May 1942 and C

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SERVICE OF THE PIECE

8-INCH GUN M1

AND

240-MM HOWITZER M1

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This manual supersedes FM 6–95, Service of the Piece, 240-mm Howitzer M1918, 2 January 1940, including C 1, 21 May 1942 and C 2, 31 August 1943.

SECTION I
GENERAL

1. PURPOSE AND SCOPE. This manual prescribes the duties to be performed in the service of the piece by the personnel normally assigned to one howitzer or gun section of the firing battery and by other firing battery personnel. Since the manual covers both the 8-inch Gun M1 and 240-mm howitzer M1, the term howitzer when not specifically limited refers to either howitzer or gun.

2. REFERENCES. For military terms not defined in this manual, see TM 20–205; for list of training publications see FM 21–6; for training films, film strips and film bulletins, see FM 21–7; and for training aids, see FM 21–8.

3. DEFINITIONS AND TERMS. a. Section. Tables of Organization and Equipment prescribe that a section of the firing battery comprises one piece, and the additional materiel and the personnel to serve the piece. The term *section* is also frequently used in this manual in a restricted sense: to denote only the prescribed personnel of the section.

b. Carriage load. The carriage load comprises the howitzer carriage, spades, and accessories mounted for travel on the carriage transport wagon.

c. Howitzer load. The howitzer load comprises the howitzer, cradle, recoil mechanism, and accessories mounted for travel on the cannon transport wagon.

d. Coupled. The howitzer load or carriage load is

coupled when the drawbar of the transport wagon is attached to a prime mover and all brake and lighting connections are properly in place.

e. Uncoupled. The howitzer load or carriage load is uncoupled when the drawbar of the transport wagon is not attached to a prime mover.

f. Front. The front is the direction in which the muzzle of the howitzer points when in firing position. When the howitzer is being placed in or taken out of position, front is in the direction of fire. When the loads are coupled, the front of a load is the direction in which the drawbar points.

SECTION II
ORGANIZATION

4. COMPOSITION. The personnel of a howitzer section consists of:

a. A chief of section.

b. A howitzer squad (a gunner and nine cannoneers, numbered from 1 to 9).

c. An ammunition squad (an ammunition corporal and nine cannoneers, numbered from 10 to 18).

d. An artillery mechanic.

e. Two drivers.

5. FORMATION. a. Order of formation. The howitzer section is formed at normal interval as in figure 1. Drivers and higher numbered cannoneers, if present, form to the left of the mechanic or as directed by the chief of section.

b. To form. (1) The place of formation is indicated in the commands given, for example, 1. IN REAR OF THE PIECE, or 1. ON THE ROAD FACING THE PARK, 2. FALL IN. The chief of section shows the gunner where the right of the section is to rest, takes position 2 paces in front of and facing the place where the center of the section is to rest, and repeats the command, FALL IN. The gunner hastens to the point where the right of the section is to rest, facing in the proper direction. Other members of the section move at the double time and fall in at attention in their proper places.

(2) For the first formation of the howitzer sections for any drill or exercise, the caution, "As

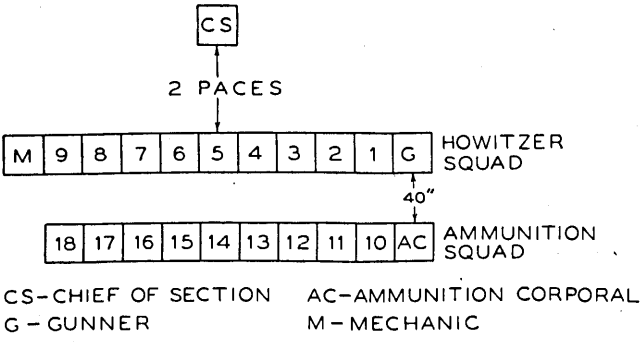

Figure 1. Formation of personnel of howitzer section.

howitzer sections," precedes the first command.

(3) Either of the squads may be formed separately. In such cases, the chief of section shows the gunner or ammunition corporal the place where his squad is to form, and the gunner or ammunition corporal thus designated forms his squad at the indicated point by the same commands and in the same manner as outlined above.

c. To call off. (1) The command is: CALL OFF. The cannoneers call off in order, starting with No. 1. The gunner, ammunition corporal, mechanic, and drivers do not call off.

(2) After having called off, if a subsequent formation is ordered, the members of the section fall in at once in their proper places.

SECTION III
POSTS—MOUNTING AND DISMOUNTING

6. POSTS OF HOWITZER SECTION. a. Transport wagons coupled. The cannoneers of the howitzer section are posted as in figure 2. All are 2 feet outside the wheels and facing to the front.

b. Transport wagons uncoupled. The cannoneers of the howitzer section are as shown in figure 3. All are 2 feet outside the wheels and facing to the front.

c. Howitzer prepared for action. See Paragraph 49 and figure 41.

d. Howitzer secured (see par. 50). The section is formed as shown in figure 1, the chief of section 4 paces from the rear of the recoil pit.

7. TO POST HOWITZER SECTIONS. The sections, having been marched to the vicinity of the pieces, are posted at the command: SECTIONS TO THE RIGHT (REAR) OF YOUR PIECES. Each chief of section marches his section to its piece and posts it in the position indicated.

8. TO POST CANNONEERS. a. The commands are: 1. CANNONEERS, 2. POSTS. Each chief of section repeats the command: POSTS. The members of the section leave ranks, if formed, and move at the double time to their posts.

b. For preliminary instruction, the sections on entering the park are first posted with their pieces, and the cannoneers are then sent to their posts by the foregoing command. However, the command

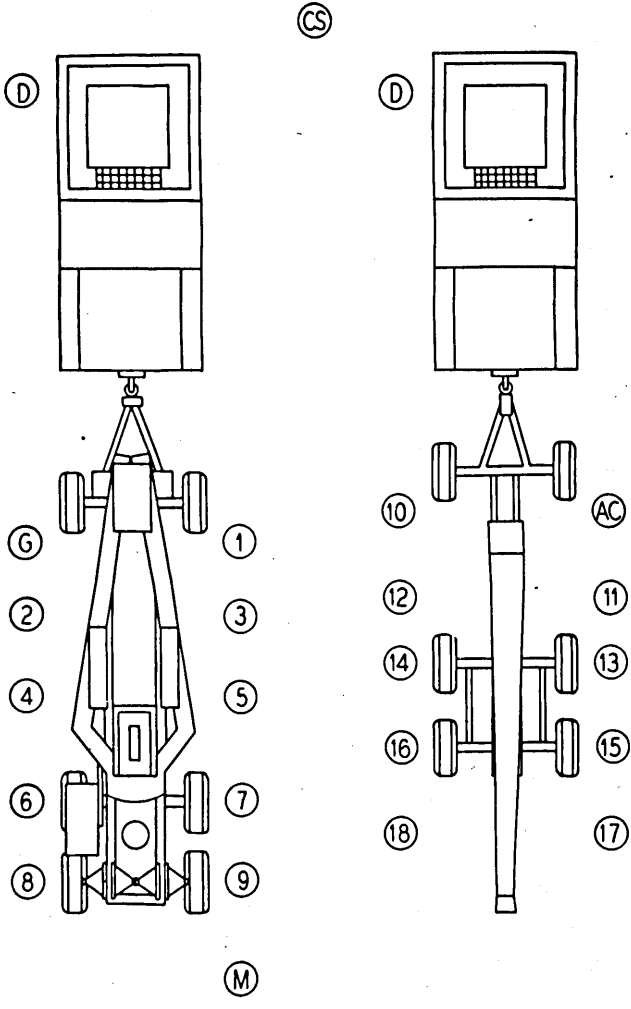

Figure 2. Posts of cannoneers, loads coupled.

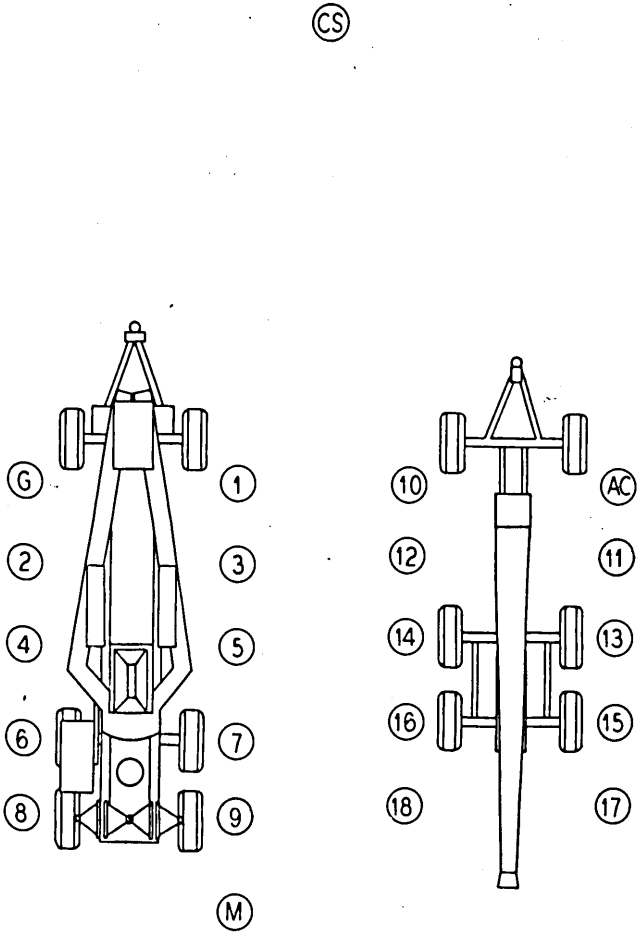

Figure 3. Posts of cannoneers, loads uncoupled.

is general and is applicable when the cannoneers are in or out of ranks, at a halt or marching, and when the loads are coupled or uncoupled.

c. At drill, all members of the section stand at attention at their posts. In firing and combat, minor modifications of these posts may be required for the more efficient performance of the duties in the service of the piece and for protection of personnel. Higher numbered cannoneers, if present, take posts as prescribed by the chief of section.

9. TO MOUNT CANNONEERS. a. In general, the howitzer squad will be mounted on the carriage prime mover, and the ammunition squad on the howitzer prime mover. In each squad personnel are seated in the body of the prime mover in the order prescribed by the battery commander. The chief of section is seated beside the driver of the carriage load prime mover.

b. The commands are: 1. CANNONEERS, PREPARE TO MOUNT, 2. MOUNT. At the first command, the members of the section move at the double time to positions on the ground, convenient for mounting. At the second command, all mount and seat themselves. If the chief of section and drivers are to be included in the movement, the commands are: 1. PREPARE TO MOUNT, 2. MOUNT.

c. If the commands are: 1. CANNONEERS, 2. MOUNT, all personnel execute at the command MOUNT all that has been prescribed for the commands CANNONEERS PREPARE TO MOUNT and MOUNT. If the chief of section and drivers are to be included in this movement the command is: MOUNT.

10. TO DISMOUNT CANNONEERS. a. The commands are: 1. CANNONEERS, PREPARE TO DISMOUNT, 2. DISMOUNT. At the first command, the cannoneers assume positions from which they can dismount properly; at the second command, they jump to the ground and take their posts at the double time. If the chief of section and drivers are to be included in this movement, the commands are: 1. PREPARE TO DISMOUNT, 2. DISMOUNT.

b. If the commands are: 1. CANNONEERS, 2. DISMOUNT, the cannoneers execute at the command DISMOUNT all that has been prescribed for the commands CANNONEERS, PREPARE TO DISMOUNT, and DISMOUNT. If the chief of section and drivers are to be included in this movement, the command is: DISMOUNT.

SECTION IV
UNCOUPLING AND COUPLING

11. UNCOUPLING. The command is: UNCOUPLE. The cannoneers, if mounted, dismount and cannoneers Nos. 1, 3, and 5 go to the right side of the drawbar of the carriage wagon and Nos. 2 and 4 go to the left side. Nos. 1 and 2 close the air valve, disengage the brake and lighting connections, and connect the brake lines to the dummy couplings on the wagon. No. 1 unlatches the pintle. Under the supervision of the gunner, Nos. 1 to 4 disengage the drawbar and No. 5 pulls the support bar forward so that the drawbar may be rested on it. When this has been completed, the gunner signals the driver to drive on. The above operations are repeated on the cannon wagon, with cannoneers Nos. 11 to 15 working under the supervision of the ammunition corporal.

12. COUPLING. The command is: COUPLE. Each prime mover is maneuvered back toward its load under the direction of the gunner (ammunition corporal). Cannoneers Nos. 1 to 5 (11 to 15) raise the drawbar and engage the lunette in the pintle of the prime mover. No. 5 (15) moves the support bar to its rear position. Nos. 1 and 2 (11 and 12) engage the brake and lighting connections and open the air valve. The transport wagon brakes are tested after coupling.

SECTION V
TO PLACE HOWITZER IN FIRING POSITION (CRANE METHOD)

13. TRUCK-MOUNTED CRANE M2. a. General. One truck-mounted crane is provided in each battery to help dig the pits, place the howitzers in firing position, and replace the howitzers in traveling position. The crane crew consists of a crane operator and a driver. The crane operator is responsible for the crane, and all operations of emplacing or preparing the crane are under his direction, subject to the supervision by the chief of section of the location of the crane for the emplacement. *The operations of digging the pit, emplacing the howitzer, and replacing the howitzer in traveling position are under the direction of the chief of section.*

b. Positions for crane truck. In different situations the crane truck will have to occupy different positions with respect to the pit. Two satisfactory positions are shown in figure 4. Of these two, the second shown has several advantages:

(1) Less swinging of the boom is required in handling the loads.

(2) The howitzer and cradle can be lowered into the false cradle without lowering the boom.

(3) The weight of the front part of the truck acts as a counterweight while the boom is at its lowest position.

(4) The pit can be dug from the same approximate position.

(5) It is possible, after raising the howitzer

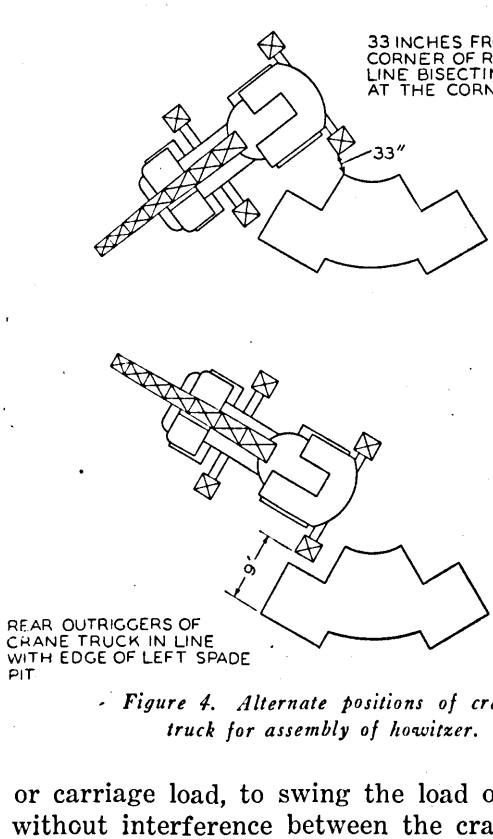

Figure 4. Alternate positions of crane truck for assembly of howitzer.

or carriage load, to swing the load over the pit without interference between the crane cab and the tire on the transport wagon.

If the pit is to be dug from the same position, the right spade pit should be dug first. The crane truck should then be moved forward 3 or 4 yards to eliminate excessive booming operations during the digging of the recoil and left spade pits. The excavated dirt should be dropped outside the left trail and to the rear of the forward edge of the

recoil pit. In this position, the dirt pile will be beneath the camouflage net.

c. Clamshell trailer M16. (1) The clamshell trailer M16 transports the clamshell bucket and ten planks, or mats, used with the truck-mounted crane M2. During travel the trailer is coupled to the crane truck; when uncoupled from the truck, it is supported by front and rear legs. Chock blocks are furnished with the trailer since there are no brakes.

(2) The mats carried on the trailer furnish additional flotation for the crane truck during lifting operations or during travel over soft ground. When used during lifting, four of the mats should be placed beneath the floats of the crane truck outriggers. The other six provide extra support for the wheels. When used during travel over soft or swampy ground, the mats are laid down along the course the truck is to follow. Five mats provide a track for the right wheels and five for the left. When laying the mats for tracks, be sure that the rear end of each mat is placed beneath the forward end of the mat behind it. Otherwise the rear ends of the mats will spring up and be displaced by the rear wheels of the truck when the front wheels of the truck rest on the front ends of the mats.

14. CRANE OPERATIONS. a. The following operations normally are used for digging and in handling materiel (see figs. 5 to 20 incl.):

(1) *Swing motions. (a)* The boom may be swung to the left or to the right. (See figs. 7 and 8.)

(b) The turntable may be locked to prevent swing.

(c) Lateral motion of the boom may be prevented by the use of the auxiliary swing brake. (See fig. 5.) **Important.** *The auxiliary swing brake must be applied when the carriage or the howitzer is lifted from the transport wagons, to prevent the loads from drifting and damaging the brackets on the transport wagons.*

(2) *Main hoist. (a)* The load may be lifted. (See fig. 11.)

(b) The load may be lowered by slipping the main hoist brake. (See fig. 12.)

(c) The load may be "backed down." This is a special operation which permits extreme accuracy in placing the load. (See fig. 13.) This method should be used whenever the howitzer or carriage loads are lowered.

(3) *Boom hoist. (a)* The boom may be raised. (See fig. 9.) This operation raises the top of the boom and moves the load in closer to the turntable.

(b) The boom may be lowered. (See fig. 10.) This operation lowers the top of the boom and moves the load out to a greater radius from the turntable.

(4) *Clamshell. (a)* The clamshell can be opened in midair. (See fig. 14.) This operation is used in dumping.

(b) The clamshell can be closed in midair. (This is usually undesirable and should be avoided in normal operation.) (See fig. 15.)

(c) The clamshell can be lowered either closed or open. (See fig. 12.)

(d) The clamshell can be raised either closed or open. (See fig. 11.)

(e) The clamshell can be closed on the ground and raised. This is the operation used in taking a bite. (See fig. 15.)

(5) *Precision boom lowering device.* The precision boom lowering device should be engaged when lowering the boom; it should be disengaged when backing down a load. The signal shown in figure 19 may be used for both engaging and disengaging the device.

(6) *Power lowering device.* The load can be lowered under power. (See fig. 20.)

(7) *Main clutch.* During short periods of inactivity the main clutch should be disengaged, all brakes set, and the engine idled. (See fig. 18.)

b. Certain of the above operations can be combined by an experienced operator. Principal among these are raising or lowering the load by the hoist at the same time that the boom is raised, lowered, or swung laterally. Also, the boom may be raised or lowered at the same time that it is swung. (See fig. 17.)

15. CRANE HAND SIGNALS. The following signals are to be used in directing the crane operator to perform the operations listed in paragraph 14. Signals to the crane operator should be given by one man, *and one man only.* Signals may be given by the chief of section, or he may delegate this duty. All signals illustrated are *as seen by the crane or winch operator.*

Figure 5. Lock auxiliary swing brake. (Hold either forearm out approximately 45° from vertical, and grasp forearm with opposite hand.)

Figure 6. Stop. (Applicable to all operations, particularly those illustrated in figures 7 to 17. Swing arms across each other horizontally several times.)

Figure 7. Boom right. (Clench either fist with thumb pointed in direction in which boom is to be swung. Move fist in direction thumb is pointing. Distance of swing is indicated by length of thrust.)

Figure 8. Boom left. (Executed in manner similar to boom right.)

Figure 9. Boom up. (Clench either fist with thumb pointed up. Move fist up. Distance boom is to be raised is indicated by length of fist movement.)

Figure 10. Boom down. (Executed in manner similar to boom up.)

Figure 11. Raise load. (Point forefinger up and describe small circles. Distance load is to be lifted indicated by speed of rotation.)

Figure 12. Lower load. Hold forearms forward and rotate through vertical circles going down on inside. Distance load is to be lowered, indicated by size of circles. Signal may be executed with one hand in conjunction with another signal given with other hand for a combined operation (see fig. 7).)

Figure 13. Back down load. (Hold forearms near chest, horizontal and parallel. Rotate arms slowly, downward motion next to body.)

Figure 14. Open bucket. (Hold hands together, palms up, and then swing hands out and up simulating desired operation. Bucket may be opened slightly by executing signal slowly and through short arc.)

Figure 15. Close bucket. (Hold hands out and then moving them in and down, clasping them sharply. Bucket may be closed slightly by executing incomplete signal, moving hands together only slightly.)

Figure 16. Proceed to dig. (Hold hands palms down and clench fists several times.)

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Figure 17. Boom left and lower load. (This is a sample of a signal for a combined operation. In this case the right hand is signaling for the load to be lowered (fig. 12) and the left hand is signaling for the boom to be swung left (fig. 7).)

Figure 18. Disengage main clutch. (Hold arms straight at a slight angle below horizontal with one hand holding back of other hand, palms down.)

igure 19. Use precision om lowering device. (Right rm straight, extended to ar and down (about 45° om the vertical), fist enched. Arm is swung rough small arc to left d right.)

gure 20. Lower load un- r power. (Right fist clench- , driving down. Left hand en, held horizontally, palm , and below right fist. ove fist up and down short stance—distance load is to lowered is indicated by tance between right fist d left palm. This is for wering load short distance ly.)

16. TO EXECUTE ACTION FRONT. a. The command is: ACTION FRONT. At this command, the howitzer is assembled and prepared for firing as indicated in paragraph 17.

b. In the preliminary instruction of the howitzer sections and whenever conditions require close supervision of the execution of the detailed duties of individual cannoneers, assembly of the howitzer by crane method is executed in successive steps by the use of the following commands: 1. BY DETAIL, 2. ACTION FRONT, 3. PIT, 4. CRANE, 5. CARRIAGE, 6. TRAILS, 7. HOWITZER, 8. PREPARE FOR ACTION. (See par. 47.)

c. Upon completion of the duties prescribed in any given step, cannoneers will either form as a section (fig. 1) or take positions preparatory to performing their duties in the next step, as may be prescribed by the chief of section. When the cannoneers are instructed sufficiently, all the steps will be executed successively at the single command: ACTION FRONT.

17. OPERATIONS FOR CRANE ASSEMBLY OF HOWITZER. a. Assembling the howitzer by the crane method is accomplished by the following operations:

(1) The line of fire is staked on the ground and the outline of the pit materialized by use of the canvas template. (See par. 72b and c.)

(2) The spade pits and recoil pit are dug with the clamshell bucket of the crane. Final trimming of the pits is accomplished by hand.

(3) The crane is placed in position for assembling the howitzer. The clamshell bucket is removed and the lifting hook rigged.

(4) The carriage is lifted from its transport wagon and placed in position over the recoil pit. The trails are spread and locked. Spades and floats are attached to the trails.

(5) The howitzer and cradle are lifted from their transport wagon, placed in position on the carriage, and locked in place.

(6) The road locks are released from the top carriage and the howitzer prepared for action. (See par. 47.)

b. In general, odd numbered cannoneers work on the right and even numbered cannoneers work on the left. Members of the section not assigned a specific duty in any operation assist wherever needed.

c. The chief of section directs the operations, giving such orders, instructions, and signals as may be required to expedite and coordinate the work. The mechanic, the ammunition corporal, and the gunner assist in supervising suboperations as prescribed or as may be directed by the chief of section.

d. After the howitzer has been placed in firing position, the chief of section, assisted by the mechanic and the cannoneers, cleans, lubricates, and inspects the howitzer. When the operations have been completed, the chief of section reports to the executive, "Sir, No. (so-and-so) in order," or reports any defects which the section cannot remedy without delay.

e. When actual firing is to occur, a similar inspection of the howitzer will be made by the executive.

18. TO EXECUTE BY DETAIL, ACTION FRONT. If the pit has not been previously prepared, the commands are: 1. BY DETAIL, 2. ACTION FRONT, 3. PIT. (See par. 19 if the pit has been previously prepared.)

a. Description of operation. The section column habitually approaches the howitzer position from the rear. If the crane accompanies the section, it will proceed first, followed by the carriage load and the howitzer load in turn. If the pit has previously been dug and the position prepared, the crane will proceed to the position described in paragraph 19. If the pit has not been prepared and the crane is to be used in digging the pit, the crane is backed into position 5 feet from the outline of the rear edge of the recoil pit. The howitzer load and carriage load remain in concealment at some distance from the position until the pit is finished.

b. Detailed duties of members of section. (1) The chief of section commands: PIT.

(2) Nos. 16, 17, and 18 uncouple the trailer from the crane and place the support legs and chock blocks in position. Under the direction of the crane operator, they rig the clamshell bucket to the crane.

(3) The crane operator directs the driver of the crane truck into position.

(4) The pit is dug under the supervision of the gunner, who directs the crane operator. All cannoneers present, in groups of four, alternate both in guiding the clamshell bucket during the digging operation and in trimming the pit to its final shape, as indicated by the templates. Cannoneers

not so engaged procure the tools and equipment used in assembling the howitzer and place them in a convenient position for use. The ammunition squad unloads and stores ammunition under the direction of the ammunition corporal.

19. TO PREPARE CRANE FOR ASSEMBLING HOWITZER. The operation of digging the pit having been completed, the command is: CRANE.

a. Description of operation. (1) The clamshell bucket is removed from the crane and placed on its trailer.

(2) Under the direction of the chief of section, the crane truck is placed on the left (right) side of the pit, as indicated in figure 4.

(3) The floats of the crane are placed and outriggers are secured to them.

Note: When wheel mats are to be used with the crane floats, the mats are removed from the trailer by lifting the rear end of the mat, resting it upon the trailer tire, and then lifting the front end of the mat while it is balanced on the tire. Care must be taken that the mat for the float nearest the trail is so placed that the trails can be spread without interfering with the mat. *If the ground is uneven or sloping, mats must be leveled by the removal of dirt and not by filling.*

(a) When the crane is emplaced on sloping ground, the crane must be leveled by means of the outrigger screws. After the crane has been placed in position and the outriggers have been extended and locked, the boom is swung to the low side of the truck and the floats on that side are placed in position with the outrigger screws retracted. Next, the boom is swung to the high side of the truck, and the outrigger screws on

that side tightened until weight is partially removed from the tires. The crane is then leveled by tightening the outrigger screws on the low side of the truck.

(*b*) Floats must be placed so that their handles are to the front and rear and not to the side of the crane.

(4) The lifting sling is attached to the main lifting hook and the extension cables are attached to it. It is important to keep the lifting sling in proper adjustment, or binding will result when the howitzer is assembled and removed from the carriage.

b. Detailed duties of members of section. (1) The chief of section commands: CRANE.

(2) The crane operator places the clamshell bucket on its trailer. Nos. 16, 17, and 18 disconnect it from the crane boom and assist the crane operator to rig the mainlifting hook.

(3) Under the supervision of the ammunition corporal, Nos. 10, 12, and 14 on the left, and Nos. 11, 13, and 15 on the right, extend the crane outriggers, then remove the mats from the trailer and place them in position to support the crane truck during the lifting operations. Next they remove the two crane floats nearest the pit and put them in place to assist the driver in maneuvering the crane truck into position. After the crane has been directed to its proper position by the crane operator, they fix the outriggers and floats in position for lifting. The floats should be placed so that the handles on the float are to the front and rear and not to the side of the crane.

(4) Nos. 16, 17, and 18 assist the crane opera-

tor in attaching the lifting sling and extension cables to the main lifting hook.

20. TO PLACE CARRIAGE OVER PIT. The command is: CARRIAGE.

a. Description of operation. (1) The top carriage cover is removed from the carriage.

(2) The carriage hold-down bolts are unfastened.

(3) The trail cross braces are loosened and removed.

(4) The inside spade jacks are screwed out of their traveling sockets.

(5) The cap screws and stud bolts are removed from the false cradle.

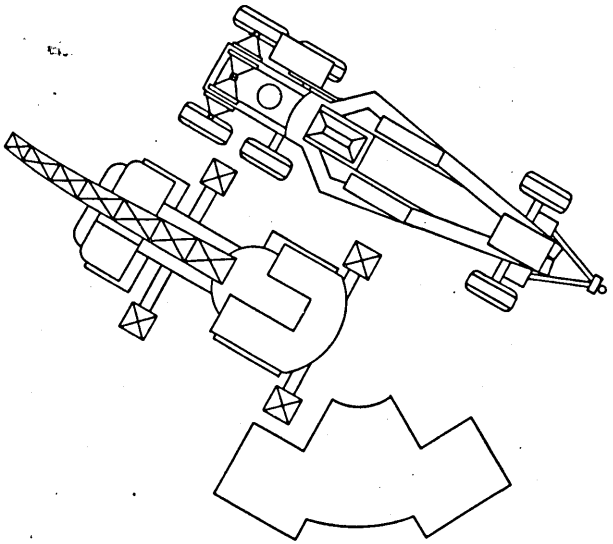


Figure 21. Carriage load in position beside crane truck.

(6) The carriage load is moved as close as possible and parallel to the crane truck. (See fig. 21.)

(7) The spade traveling clamps are loosened.

(8) A guide rope is attached to the trail ends.

(9) The swinging platforms on the carriage are bolted in the middle position.

(10) The lifting sling is attached to the carriage.

(11) The valve to the equilibrator pressure tank is closed.

(12) The carriage is lifted from the transport wagon and placed over the pit.

(13) The lifting sling and guide rope are removed from the carriage.

(14) The valve to the equilibrator pressure tank is opened.

b. Detailed duties of members of section. (1) The chief of section commands: CARRIAGE. This command should be given before the crane is in position in order that the carriage may be prepared during the final preparation of the crane. The gunner supervises the work of cannoneers Nos. 1 to 9 and the ammunition corporal Nos. 10 to 18.

(2) Nos. 1 to 6 remove the top carriage cover, pass it to Nos. 7 and 8, who fold the cover and place it on the side of the pit not occupied by the crane.

(3) Nos. 4 and 5 swing the platforms to the middle position.

(4) Nos. 1 and 2 loosen the spade traveling clamps.

(5) No. 3 unfastens the carriage hold-down bolts.

(6) No. 6 screws the inside spade jacks out of their traveling sockets.

(7) Nos. 7 and 8 remove the trail cross braces and the taper stud bolts and cap screws.

(8) No. 9 removes the loading ramp and places it 5 yards to the rear of the recoil pit.

(9) Nos. 8 and 9 attach the guide rope to the trail ends.

(10) Directed by the gunner, the driver of the carriage load prime mover maneuvers the carriage into position beside the crane. (See fig. 21.)

(11) Nos. 3 to 6 attach the lifting sling and extension cables to the carriage.

(12) The artillery mechanic closes the valve to the equilibrator pressure tank.

(13) The gunner reports to the chief of section when the carriage is prepared.

(14) The chief of section commands: GUIDE ROPE.

(15) Directed by the chief of section, the crane operator lifts the carriage, swings it around, and places it in its position over the pit.

(16) Nos. 8 and 9 remove the guide rope from the trail ends.

(17) Nos. 3 to 6 detach the lifting sling and extension cables from the carriage and the extension cables from the sling.

(18) The artillery mechanic opens the valve to the equilibrator pressure tank.

(19) Nos. 10 to 18 stand by the guide rope and maneuver the carriage during the lifting operation, under the direction of the ammunition corporal. (See fig. 22.)

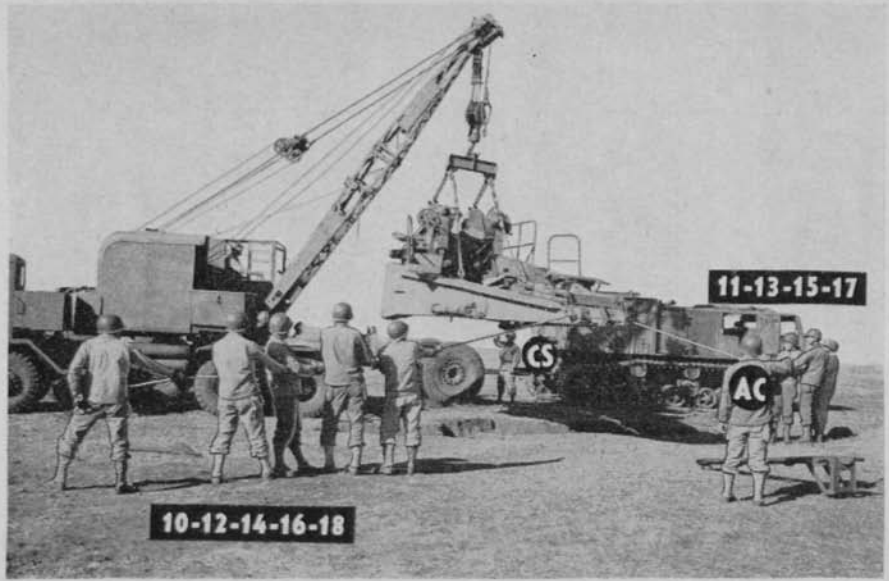


Figure 22. Lowering carriage over pit.

21. TO PREPARE CARRIAGE TO RECEIVE HOWITZER. The command is: TRAILS.

a. Description of operation. (1) The spades are transferred from the transport wagon to the spade pits by the crane.

(2) The loading tray and trail floats are removed from the trails and placed in a convenient position for use.

(3) The trail locking key is removed and the trails are spread slightly with crowbars and sledge.

(4) The trails are spread by use of the crane and floats installed thereon. (See fig. 24.)

(5) The trail tie beam is swung to the firing position and locked.

(6) The spades are hung in position on the trails and the spade jacks seated firmly in the spade sockets. (See fig. 25.)

(7) The keyways and seats in the false cradle are cleaned and lubricated to receive the howitzer.

(8) After operation (1) has been completed and while operations (2) to (7) are being performed, the howitzer cover is removed. The howitzer and cradle are disconnected from the wagon, and a guide rope is attached to the muzzle in preparation for lifting the howitzer. The carriage wagon is moved away and the cannon wagon brought toward the same position. (See fig. 26.)

b. Detailed duties of members of section. (1) The chief of section commands: TRAILS, supervises the operations, and directs the crane operator when necessary.

(2) Nos. 1 and 2 connect the single line hook of the crane to a spade. Each spade is transferred

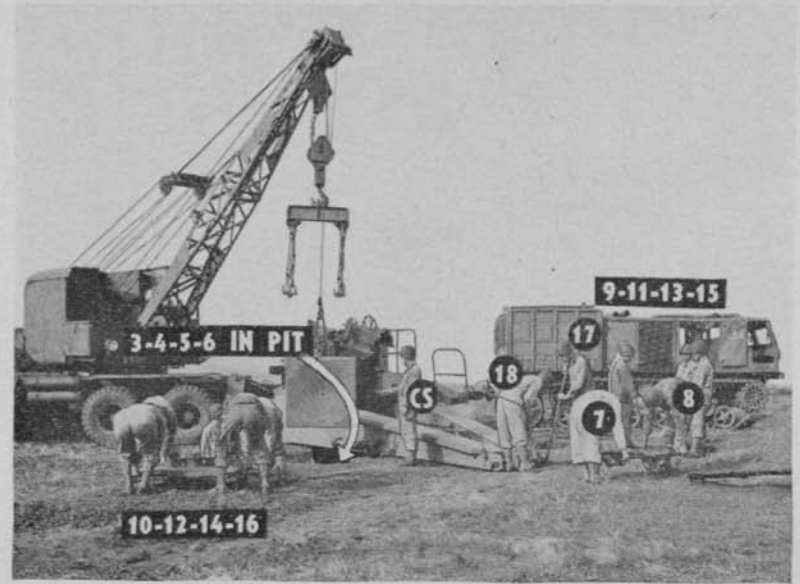


Figure 23. Placing spades in pit and placing floats.

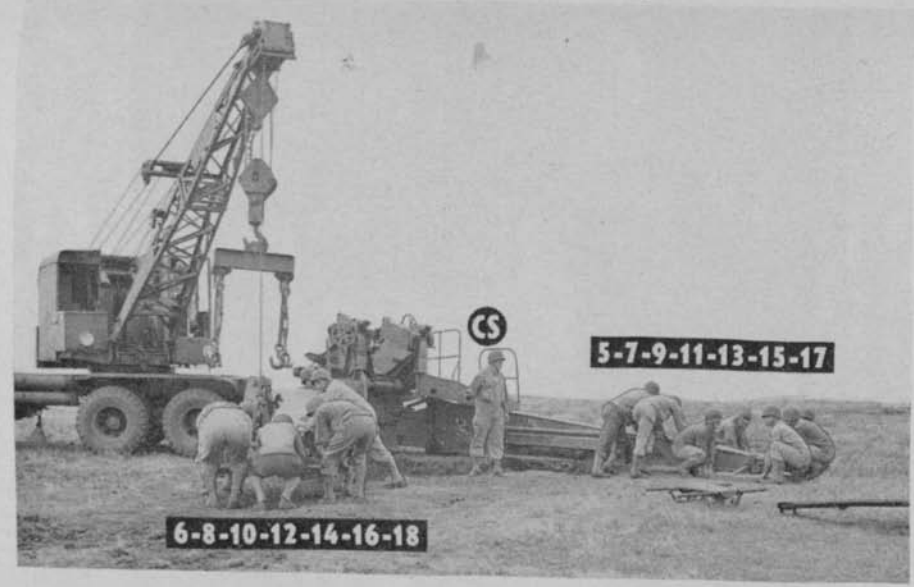


Figure 24. Spreading trails.

Figure 25. Hanging spades.

in turn to the spade pits where it is set in place and the hook released by Nos. 3 to 6. (See fig. 23.)

(3) Nos. 7 and 8 unfasten the loading tray from the floats and place it 10 yards to the rear.

(4) Nos. 9, 11, 13, and 15 remove the top trail float and place it to the right rear in a position convenient for assembly when the right trail is spread.

(5) Nos. 10, 12, 14, and 16 remove the lower trail float and place it to the left rear in a position convenient for its assembly when the left trail is spread.

(6) No. 17 gets a sledge and removes the trail locking key.

(7) No. 18 gets two crowbars and brings them to the trail ends.

(8) Nos. 9 to 12, working with the crowbars, spread the trails slightly.

(9) The trails are raised by the single line hook and spread by Nos. 5 to 18.

(10) While the trails are still free of the ground, Nos. 9, 11, 13, and 15 attach the right trail float and Nos. 10, 12, 14, and 16 attach the left trail float. No. 7 inserts the key in the right trail float, and No. 8 inserts the key in the left trail float. The chief of section then signals the crane operator to lower the trails to the ground.

Note: In very soft ground it may be necessary to raise and spread each trail separately.

(11) The spades are then hung in position on the trails with the single line hook of the crane. The ammunition corporal directs the crane operator while the spades are being hung. Nos. 3 to 6

assist in this operation. Nos. 5 and 6 screw the spade jacks firmly into the spade sockets.

(12) Nos. 7 and 8 unpin the trail tie beam from the traveling position. Under the supervision of the chief of section, Nos. 9 to 18 swing the tie beam to firing position and lock it. Nos. 9 and 10 clamp the ends of the loading ramp rack in firing position.

(13) Nos. 7 and 8 clean and lubricate all seats and keyways to receive the howitzer.

(14) After all spades have been removed from

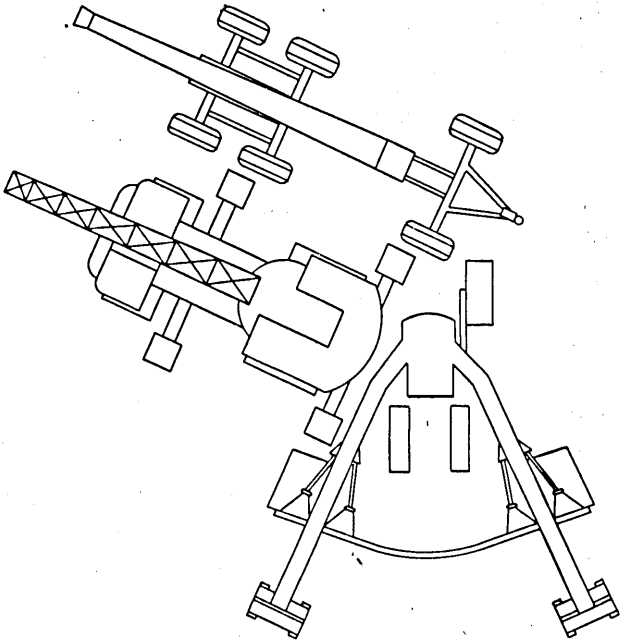


Figure 26. Howitzer load in position beside crane truck.

the carriage wagon and while operations (3) to (13) are being performed—

(a) The gunner signals the driver of the carriage load prime mover to move out and directs the driver of the howitzer load prime mover to be ready to move into position for mounting the howitzer. (See fig. 26.) He then commands: PREPARE HOWITZER.

(b) Nos. 1 and 2 disconnect the cradle locking clamps from the cannon wagon, and remove the howitzer hold-down strap. Assisted by Nos. 3 and 4, they remove the howitzer cover and muzzle cover or plug. They then clean and lubricate all seats and keys which bear in the false cradle when the howitzer is mounted. Nos. 8 and 9 attach guide ropes to the muzzle of the howitzers.

(15) Directed by the gunner, the driver of the howitzer load prime mover places the cannon wagon in position for the howitzer to be lifted.

22. TO MOUNT HOWITZER. The command is: HOWITZER.

a. Description of operation. (1) The main hook of the crane, with lifting sling attached, is fastened to the cradle.

(2) With cannoneers maneuvering the load by use of the guide ropes, the howitzer and cradle are lifted from the wagon, swung around, and slowly lowered into place in the false cradle. (See figs. 27 and 28.)

Note: The following procedure must be strictly adhered to: The howitzer is lowered until it rests upon the false cradle and the top carriage roller. With the howitzer in this position, the rear hooks of the lifting sling are

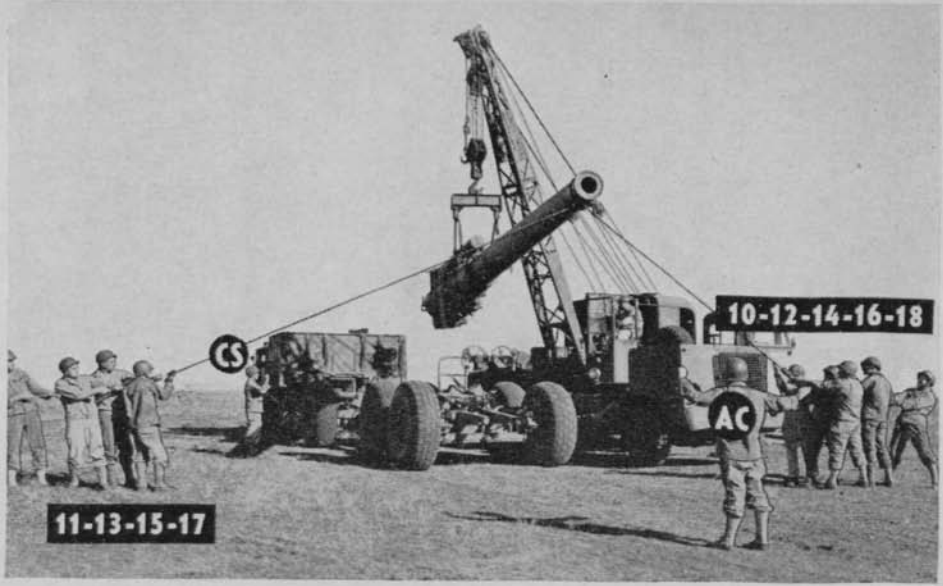


Figure 27. Raising howitzer from transport wagon.

disengaged from the cradle. *By using only the front clevices of the lifting sling,* the muzzle end of the tube is raised until the keys on the cradle are firmly seated in their keyways in the false cradle. The howitzer is held in this position and the stud bolts inserted and tightened. If the stud bolts are tapered, the bottom nuts are screwed on tight, and then the upper nuts are screwed down by hand. If the stud bolts are straight, both upper and lower nuts must be drawn up very tight. The straight bolts may be inserted into the holes from either the top or bottom, the bottom nut used as a stop, and the upper nut tightened with the proper wrench until both upper and lower nuts and washers are firmly seated. After the stud bolts are tightened, the tension is released from the crane and the cap screws inserted and tightened. *The cap screws are never inserted until the stud bolts have been drawn up tightly.*

(3) The guide rope is removed from the howitzer.

(4) The cannon wagon is moved off.

b. Detailed duties of members of section. (1) The chief of section commands: HOWITZER, supervises the operations, and directs the crane operator.

(2) Nos. 3 and 4 attach the lifting sling to the cradle.

(3) At the command HOWITZER, Nos. 10 to 18 stand by the guide rope and maneuver the howitzer during the lifting operation, under the direction of the ammunition corporal.

(4) Nos. 1 and 2, supervised by the artillery mechanic, procure the proper wrenches and station themselves on the carriage on each side of the false cradle. When the howitzer has been lowered onto the top carriage roller and false cradle, they disengage the rear hooks of the lifting sling from the cradle. When the cradle keys are prop-

erly seated, they insert and tighten the taper stud bolts and the cap screws.

(5) Nos. 8 and 9 remove the guide rope from the howitzer.

(6) The gunner signals the driver of the howitzer load prime mover to move off.

Figure 28. Lowering howitzer into false cradle.

23. SPECIAL METHODS OF EMPLACEMENT. a. Combat conditions may require the use of special methods of emplacing the howitzer. Practice during advanced training in such methods will give flexibility in the employment of the weapon.

b. The following methods may be used in occupying positions where, because of intervening terrain, it is impossible to move prime movers or any

vehicle forward of the piece position. Duties of individual cannoneers in these operations will be as directed by the chief of section.

(1) *First method. (a)* Back the carriage transport wagon (spades removed) directly over the staked position in alignment with directional stakes. (See (a), fig. 29.)

(b) Place the crane in position so that the boom is over the center of the crane truck when midway between the point at which it lifts the tube and the point at which it places the tube upon the carriage. The rear of the crane must be close (6 inches) to the carriage position to avoid excessive boom angles. (See (b), fig. 29.)

(c) Using the crane, lift the carriage sufficiently to permit withdrawal of the carriage transport wagon. The left platform is swung to the left limit of its movement. Lower the carriage into the required position (about 3 inches from the crane truck pintle) and set the trails parallel. Care must be taken that the platform clears the crane truck. (See (c), fig. 29.)

(d) Use the prime mover of the cannon transport wagon, coupled by the front pintle, to push the cannon transport wagon up the trails. (See (d), fig. 29.)

(e) Lift the tube from the transport wagon and swing into position. Remove the cannon transport wagon. (See (a), fig. 30.)

(f) Move the crane to the rear of the trails to permit digging of spade pits by clamshell. The clamshell must be carefully guided in digging to prevent striking trails. (See (b), fig. 30.)

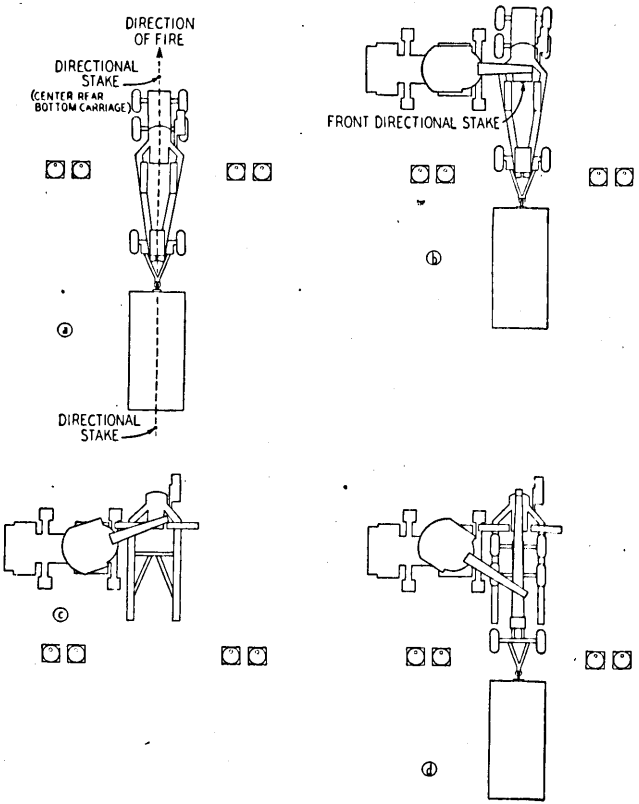


Figure 29. Special methods of emplacement (first method).

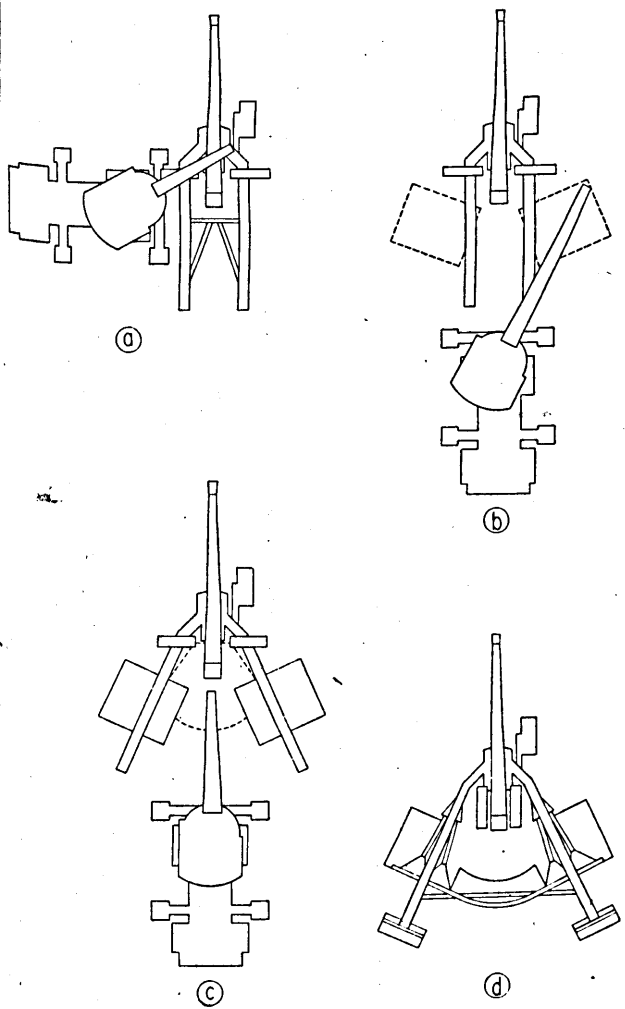


Figure 30. Special methods of emplacement (first method continued).

(g) Spread the trails to permit digging of the recoil pit. (See (c), fig. 30).

(h) Prepare piece for action. (See (d), fig. 30.)

(2) *Second method. (a)* Place the crane and carriage transport wagon as shown in (a), figure 31. Remove the spades.

(b) Lift the carriage and swing it until the boom is centered over the rear of the crane truck. Remove the carriage transport wagon. Lower the

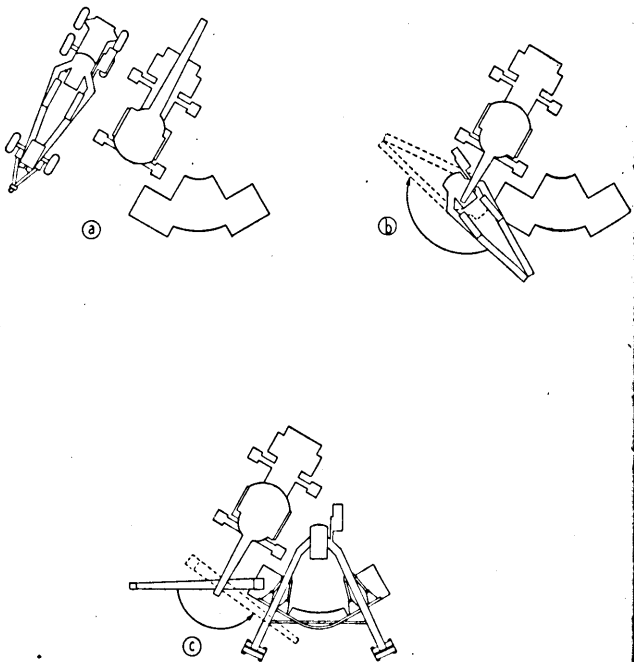


Figure 31. Special methods of emplacement (second method).

boom and rotate the carriage 180° with the guide ropes, moving the short end (of the load) under the boom over the rear of the crane truck. Raise the boom and swing the carriage into the required position. (See (b), fig. 31.)

(c) Back the cannon transport wagon into position where the tube can be emplaced upon the carriage by following the procedure in *(b)* above. Remove the cannon transport wagon. (See (c), fig. 31.)

(d) Prepare piece for action.

Caution: Care must be taken that the boom is not lowered below the safe boom distance over the rear of the crane. After lifting each load, it may be necessary to move the transport wagon to prevent the counterweight on the crane from interfering with the transport wagon tires.

SECTION VI
TO PREPARE HOWITZER FOR TRAVELING (CRANE METHOD)

24. TO EXECUTE MARCH ORDER (CRANE METHOD). The command is: MARCH ORDER.

a. At this command the piece is disassembled, loaded on the transport wagons, and prepared for traveling as described in paragraph 25.

b. In the preliminary instruction of the howitzer sections and whenever conditions require close supervision of the execution of the detailed duties of individual cannoneers, preparing the howitzer for travel by crane method is executed in successive steps by the use of the following commands: 1. BY DETAIL, 2. MARCH ORDER, 3. PREPARE HOWITZER AND CRANE, 4. HOWITZER, 5. PREPARE CARRIAGE, 6. CARRIAGE, 7. FILL PIT.

c. Upon completion of the duties prescribed in any given step, cannoneers will either form as a section or take positions preparatory to performing their duties in the next step, as may be prescribed by the chief of section. When the cannoneers are sufficiently instructed, all steps will be executed successively at the single command: MARCH ORDER.

25. OPERATIONS FOR MARCH ORDER. a. The piece is disassembled and prepared for traveling by the following operations (duties of individuals are listed in pars. 26 to 30 incl.):

(1) The breech is closed, panoramic telescope is removed, and road locks are fastened.

(2) The crane and cannon wagon are placed in position and the crane and lifting sling attached to the cradle preparatory to lifting the howitzer.

(3) The howitzer is lifted off the carriage, placed on its transport wagon, and secured for travel.

(4) The cannon wagon is moved off and the carriage wagon takes its place.

(5) The spades and floats are detached from the trails, the trail tie beam is unlocked and pinned in traveling position, and the trails are closed and locked.

Note. If excessive effort is necessary to screw the spade struts in or out of the housings, the fact must be reported to the artillery mechanic for corrective action. Forcing the strut into the housing will cause burring of the threads and will result in the strut freezing in the housing.

(6) The floats and loading tray are fastened on the trails, the platforms bolted in the middle position, and the crane hook, with lifting sling and extension cables attached, is connected to the carriage preparatory to lifting.

(7) The carriage is lifted from the ground, placed on its transport wagon, and secured for travel.

(8) The spades are placed in their traveling position on the carriage wagon.

(9) The recoil and spade pits are filled.

b. In general, odd numbered cannoneers work on the right and even numbered cannoneers work on the left. Members of the section not assigned a

specific duty in any operation assist wherever needed.

c. The chief of section directs the operations, giving such orders, instructions, and signals as may be required to expedite and coordinate the work. The mechanic, the ammunition corporal, and the gunner assist in supervising suboperations as prescribed or as may be directed by the chief of section.

d. So far as practicable, tools and equipment will be loaded in such order that those articles which will be needed first on arriving at a subsequent position will be available without disturbing the articles needed later.

e. After the loads have been prepared for traveling the chief of section, assisted by the mechanic and members of the section, makes an inspection to verify that the loads are well protected and secured and, when all the operations have been completed, reports to the executive, "Sir, No. (so-and-so) in order," or reports any defects which the section cannot remedy without delay.

26. TO PREPARE HOWITZER AND CRANE. The command is: 1. BY DETAIL, 2. MARCH ORDER, 3. PREPARE HOWITZER AND CRANE.

a. Description of operation. (1) The crane is brought to the howitzer position, maneuvered into position for lifting, and halted. (See fig. 32.) The crane outriggers and floats are placed and the lifting sling is attached to the main hook.

(2) The cannon wagon is maneuvered into position parallel to and as close as possible to the crane, preparatory to receiving the howitzer.

(3) The howitzer is placed at minimum elevation and center traverse; the panoramic telescope (and telescope mount extension) are removed from the mount and placed in the carrying case. Covers are placed on the panoramic telescope mount and elevation quadrant. The breech is closed and the road locks are fastened. A guide rope is attached to the muzzle of the howitzer.

(4) The lifting sling is attached to the cradle, and the howitzer so maneuvered that the cap screws and taper stud bolts may be unfastened from the cradle.

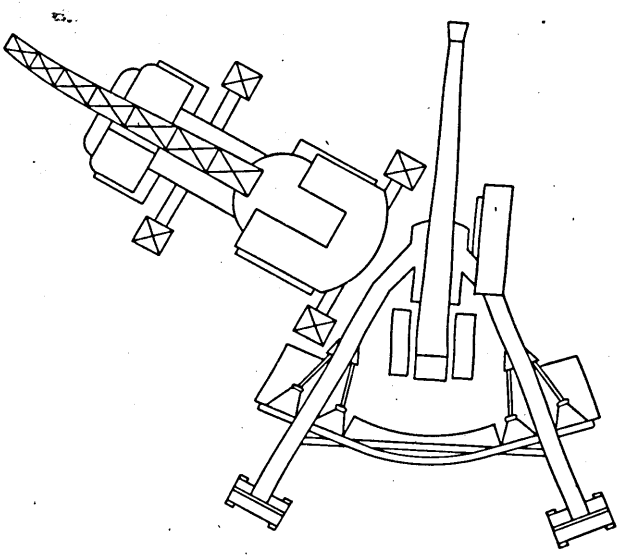


Figure 32. Crane truck in position for disassembly of howitzer.

Note. The following sequence of operations must be strictly adhered to: Remove the cap screws from the cradle; attach the lifting sling, *using the front clevises only;* raise the crane hook until the hitch is under tension; remove taper stud bolts; lower muzzle end of tube until the recoil surface rests on the top carriage roller; and attach rear hooks of sling to cradle.

b. Detailed duties of members of section. (1) The chief of section commands: PREPARE HOWITZER AND CRANE, and supervises the operations.

(2) The gunner places the howitzer in center traverse and removes the panoramic telescope (and telescope mount extension) from the mount and places them in the carrying case. He installs the cover on the panoramic telescope mount. After the crane is in position, he directs the driver of the howitzer load prime mover in placing the cannon wagon in position to receive the howitzer.

(3) The ammunition corporal directs the driver of the crane truck in placing the crane and supervises its preparation.

(4) No. 1 directs Nos. 2 and 3 to depress the howitzer to minimum elevation, places the cover on the elevation quadrant, locks the elevation brake in traveling position, and performs the prescribed operations (a(4) above) with the lifting sling, cap screws, and taper stud bolts on the right side of the carriage.

(5) No. 2 assists No. 3 to depress the howitzer to minimum elevation, fastens the left road lock and performs the prescribed operations (a(4) above) with the lifting sling, cap screws, and taper stud bolts on the left side of the carriage.

(6) No. 3, assisted by No. 2, depresses the howitzer to minimum elevation. He then fastens the right road lock.

(7) Nos. 4 and 5 close the breech. No. 5 closes the firing lock. Nos. 4 and 5 replace the breech cover. No. 4 replaces the oiler, primer seat cleaning reamer, vent cleaning bit, waste, and wiping cloths in the section chest. If the M1 firing mechanism is used, No. 5 inserts the firing mechanism and No. 4 locks the percussion hammer in the traveling position.

(8) No. 6 detaches and coils the lanyard, and returns it to the section chest.

(9) Nos. 8 and 9 attach a guide rope to the muzzle.

(10) Nos. 16, 17, and 18 uncouple the trailer from the crane truck, extend the legs, and block the wheels.

(11) Nos. 10, 12, and 14 on the left, and Nos. 11, 13, and 15 on the right extend the outriggers of the crane. They remove the mats from the trailer and place them in position to support the crane truck during lifting operations. They then remove the two floats which are to be nearest the pit and put them in their proper places to assist the driver in maneuvering the crane truck into position. When the crane is in its proper position, they secure the outriggers to the floats for lifting.

(12) Nos. 16 to 18 assist the crane operator in attaching the lifting sling to the main lifting hook of the crane.

27. TO DISMOUNT HOWITZER. The command is: HOWITZER.

a. Description of operation. (1) With cannoneers standing by the guide rope, the howitzer and cradle are lifted from the false cradle, swung around, and lowered into position on the transport wagon.

(2) The tube and cradle are fastened to the transport wagon. The lifting sling is detached from the cradle.

(3) Covers are placed on the howitzer and cradle, and the howitzer load is moved off.

b. Detailed duties of members of section. (1) The chief of section commands: HOWITZER, supervises the operations, and directs the crane operator.

(2) At the command, HOWITZER, Nos. 10 to 18, supervised by the ammunition corporal, stand by the guide rope and maneuver the howitzer during the lifting operation.

(3) Supervised by the gunner, Nos. 1 and 2 procure the proper wrenches and, after the howitzer has been lowered into place on the transport wagon, they remove the lifting sling, engage and tighten the cradle locking clamps and howitzer hold-down strap (in that order).

(4) Nos. 3 and 4 install muzzle cover or plug.

(5) Nos. 1 to 4 install the howitzer cover.

(6) Nos. 8 and 9 remove the guide rope from the muzzle of the howitzer.

(7) The gunner signals the driver of the howitzer load prime mover to move off.

28. TO PREPARE CARRIAGE FOR LOADING. The command is: PREPARE CARRIAGE.

a. Description of operation. (1) The carriage wagon is maneuvered into position to receive the carriage.

(2) The spade jacks are unscrewed from the spades and placed in their brackets on the trails. The spades are unhooked from the trails and dropped into the spade pits.

(3) The ends of the loading ramp rack are clamped in traveling position. The trail tie beam is unlocked and swung to traveling position.

(4) The trails are lifted by the crane, and the floats removed from them.

(5) The trails are closed and locked and the floats and loading tray are secured in traveling position on the trail ends.

(6) The platforms are bolted in the middle position.

(7) The crane hook, with lifting sling and extension cables attached, is affixed to the carriage.

(8) The valve to the equilibrator tank is closed.

(9) A guide rope is attached to the trail ends.

b. Detailed duties of members of section. (1) The chief of section commands: PREPARE CARRIAGE, supervises the operations, and directs the crane operator when necessary. The command PREPARE CARRIAGE is given as soon as the howitzer has been lowered onto its wagon. When the cannoneers are sufficiently instructed in their duties, many of these operations may be performed while the howitzer is being dismounted.

(2) After the howitzer load has moved out, the gunner directs the driver of the carriage load

prime mover in maneuvering the carriage wagon into position parallel to and as close as possible to the crane truck.

(3) No. 3 bolts the platform ladder in traveling position. No. 2 pins the crank handle on the front elevating handwheel in traveling position.

(4) Nos. 3 to 6 unscrew the spade jacks from the spades and hang the jacks in their brackets on the trails. Only the outside jacks are screwed all the way into their traveling sockets. The spades are detached from the trails by the crane and dropped into the pit.

(5) While operations (2), (3), and (4) are being performed, Nos. 9 and 10 clamp the ends of the loading ramp rack in traveling position. Nos. 7 and 8 remove the pins from the trail tie beam. Nos. 9 to 18 assist in this operation by rocking the tie beam to loosen the pins and swing it to traveling position.

(6) No. 17, after operation (5) has been completed, connects the single line hook of the crane to the trail nearer the crane.

(7) The trails are raised by the crane. Nos. 7 and 8 remove the float locking keys.

(8) The trails are closed by Nos. 5 to 18. The trails are lowered to the ground and No. 17 inserts the trail locking key.

(9) Nos. 10, 12, 14, and 16 place the left trail float upside down on the trail ends. Nos. 9, 11, 13, and 15 place the right trail float on top of it and secure the floats in traveling position. Nos. 7 and 8 place the loading tray in position and secure it for travel.

(10) Nos. 4 and 5 bolt the platforms in the middle position.

(11) Nos. 3 to 6 affix the crane hook, with lifting sling and extension cables attached, to the carriage.

(12) The artillery mechanic closes the valve to the equilibrator tank.

(13) Nos. 8 and 9 attach a guide rope to the trail ends.

(14) Nos. 9 and 10 place the loading ramp in traveling position on the carriage wagon.

29. TO LOAD CARRIAGE AND SPADES. The command is: CARRIAGE.

a. Description of operation. (1) The carriage is lifted from the ground, swung around, and placed on the transport wagon.

(2) The lifting sling is removed from the carriage and from the crane hook. The taper stud bolts and cap screws are replaced in the false cradle. The platforms are bolted in the closed position. The guide rope is removed from the carriage. The valve to the equilibrator tank is opened.

(3) The carriage is secured to its transport wagon for travel.

(4) The crane outriggers and floats are placed in traveling position and the spades are transferred from the pits and secured on the wagon. These two operations are simultaneous.

Note. In loading spades, care should be taken to place two right hand spades or two left hand spades together in the center. (A right hand spade is defined as a spade which may be used on the right side of either trail.) In this way interference between the sockets of the two center spades will be avoided.

(5) Covers are placed on the carriage.

(6) The carriage load is moved off.

b. Detailed duties of members of section. (1) The chief of section commands: CARRIAGE, and supervises the operations.

(2) Nos. 10 to 18, under the direction of the ammunition corporal, stand by the guide rope and maneuver the carriage during the lifting operation.

(3) When the carriage has been placed on its wagon, Nos. 8 and 9 remove the guide rope from the trail ends. Nos. 3 to 6 remove the lifting sling and extension cables from the carriage and assist the crane operator in removing the lifting sling from the crane hook. (No. 3 removes the right hook, No. 6 the left hook; No. 5 unfastens the right clevis, No. 4 the left clevis.) They then replace the taper stud bolts and cap screws in the false cradle.

(4) No. 3 fastens the carriage hold-down bolts.

(5) No. 6 screws the inside spade jacks into their traveling sockets. When the operation is completed, Nos. 7 and 8 pin the tie beam in traveling position.

(6) Nos. 7 and 8 install the trail cross braces.

(7) Nos. 4 and 5 bolt the platforms into the closed position.

(8) The artillery mechanic opens the valve to the equilibrator tank.

(9) One at a time, the spades are attached to the single line hook of the crane by Nos. 3 to 6; transferred to the carriage wagon; and unhooked from the crane and clamped to the wagon by Nos. 1 and 2.

(10) Nos. 11, 13, and 15 on the right and Nos. 10, 12, and 14 on the left unscrew the crane outriggers from the crane floats and secure the outriggers and floats in traveling position. When the crane truck moves out, they replace the mats on the trailer.

(11) Nos. 1 to 6 install the top carriage cover which is handed to them from the ground by Nos. 7 and 8.

30. TO FILL PIT. The command is: FILL PIT.

a. Description of operation. (1) The clamshell bucket is attached to the crane.

(2) The crane truck is backed to a point 5 feet in rear of the recoil pit. Outriggers and floats are not required.

(3) The crane operator then fills the pit and leaves the position.

b. Detailed duties of members of section. (1) Nos. 16, 17, and 18 assist the crane operator to attach the clamshell bucket to the crane. If time permits, they will smooth the surface of the ground with shovels after the pit has been filled.

(2) When the pit has been filled, the crane operator replaces the bucket on the trailer. Nos. 16, 17, and 18 assist the crane operator in removing the bucket from the crane. They then couple the trailer to the crane truck and return the legs and chock blocks to traveling position.

Note. Whenever the crane is prepared for travel, the main lifting hook should be secured to the crane truck. A length of chain or cable should be passed over the hook and fastened to the two hooks on the front of the truck which are supplied for this purpose.

SECTION VII
TO PLACE HOWITZER IN FIRING POSITION (WINCH METHOD)

31. TO EXECUTE ACTION REAR a. The command is: ACTION REAR. At this command, the howitzer is assembled and prepared for action as indicated in paragraph 32.

b. In the preliminary instruction of the howitzer sections and when conditions require close supervision of the execution of the detailed duties of individual cannoneers, assembly of the howitzer by winch method is executed in successive steps by the use of the following commands: 1. BY DETAIL, 2. ACTION REAR, 3. REMOVE AXLE, 4. REMOVE CARRIAGE, 5. TRAILS PARALLEL, 6. MOUNT HOWITZER, 7. TRAILS, (8. CARRIAGE WAGON), 9. PREPARE FOR ACTION. (See par. 47.)

c. Upon completion of the duties prescribed in any given step, cannoneers will either form as a section or take positions preparatory to performing their duties in the next step, as may be prescribed by the chief of section. When cannoneers are sufficiently instructed, all the steps will be executed successively at the single command: ACTION REAR.

d. Hand signals for raising and lowering the load by the winch are given as illustrated in figures 6, 11, and 12.

32. OPERATIONS FOR WINCH ASSEMBLY OF HOWITZER. a. Assembling the howitzer by winch method is accomplished by the following operations:

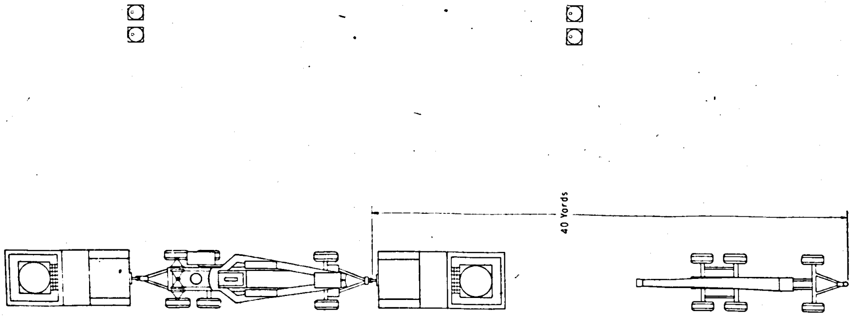


Figure 33. Materiel in position for winch assembly.

(1) The carriage load is brought into position on the line of fire with lunette over the position to be occupied by the center of the bottom carriage. The howitzer load is placed in front of it so that the distance between drawbars is approximately 40 yards. (See fig. 33.)

(2) The front axle of the carriage wagon is removed and the trails of the carriage are lowered to the ground.

(3) The carriage is pulled from its wagon into its correct position on the ground.

(4) The trails of the carriage are set parallel and spade pits dug.

(5) The howitzer load is winched up the trails of the carriage.

(6) The howitzer is jacked off its traveling support and lowered into the top carriage roller.

(7) The howitzer is winched up the rails of the wagon and raised from the wagon with screw jacks.

(8) The cannon wagon is removed from the trails.

(9) The howitzer is lowered with screw jacks into position in the false cradle and bolted in place.

(10) The trails are spread and locked, the recoil pit is dug, and the spades and floats are attached to the trails.

(11) The howitzer is prepared for action. (See par. 47.)

(12) The carriage wagon is reassembled and removed. (This operation may be eliminated at the discretion of the executive.)

b. In general, odd numbered cannoneers work

on the right and even numbered cannoneers work on the left. Members of the section (especially Nos. 10 to 18) not assigned a specific duty in any operation assist wherever needed. Nos. 10 to 18 are not assigned specific duties but are employed under the direction of the ammunition corporal in digging the pits and unloading and preparing ammunition.

c. After the howitzer has been placed in firing position, the inspections prescribed in paragraph 17d and e are made.

Note. Careful inspection should be made of the winch cables of the prime mover. After every emplacement and after every displacement, the winch line should be spooled out and rewound under slight tension unless inspection shows the cable is properly wound. If the winch line is not properly wound on the winch drum, it may be severely damaged in a single operation.

33. TO EXECUTE BY DETAIL, ACTION REAR. The command is: 1. BY DETAIL, 2. ACTION REAR, 3. REMOVE AXLE.

a. Description of operation. (1) The carriage load prime mover remains coupled to the carriage wagon. The top carriage cover is removed. The howitzer load is brought to a point 40 yards in front of and in line with the carriage load. The howitzer load prime mover is uncoupled from the cannon wagon and backed into position in rear of the carriage wagon where it is coupled to the demountable drawbar. (See fig. 35.) The winch is paid out through the slots provided in the carriage wagon.

(2) The loading ramp, wheel ramps, spacer bar, trail support, and loading tray are removed

from the wagon. The trail floats are removed from the trails. The float to be used with the wagon jack is placed in position near the jack, and the other float is assembled to the trail support.

(3) The built-in jack is placed in an upright position. The trail float is placed in position under the built-in jack. The winch cable of the howitzer load prime mover is attached to the built-in jack. (See fig. 34.)

(4) The carriage hold-down bolts, inside spade jacks, trail cross braces, and the wagon lock lever are unfastened. The inner ends of the brake cables on the front axle are unfastened. The front axle maneuvering handles are placed in carrying position.

Note. Whenever brake connections are unfastened, the open ends of the brake lines must be protected by the dummy couplings provided for this purpose. If these dummy couplings are not used, the brake lines may become clogged with dirt and may be rendered unserviceable. In the operation described in (4) above and (5) below, special care must be taken. If the dummy couplings on the front axle are not used, the brake lines may be cut by the axle and its extension as the axle is removed.

(5) The frame of the wagon is raised by the built-in jack. The front axle is pulled out by the carriage load prime mover. (See fig. 35.) The trails are lowered onto the trail support and the frame of the wagon is lowered until the trail traveling supports can be removed.

(6) The frame of the wagon is raised until the weight of the trails is removed from the trail support. The trail support and float are removed. (See fig. 36.) The wagon frame and trails are lowered until they rest on the ground.

Figure 34. Placing built-in jack.

Figure 35. Removing front axle and placing trail support.

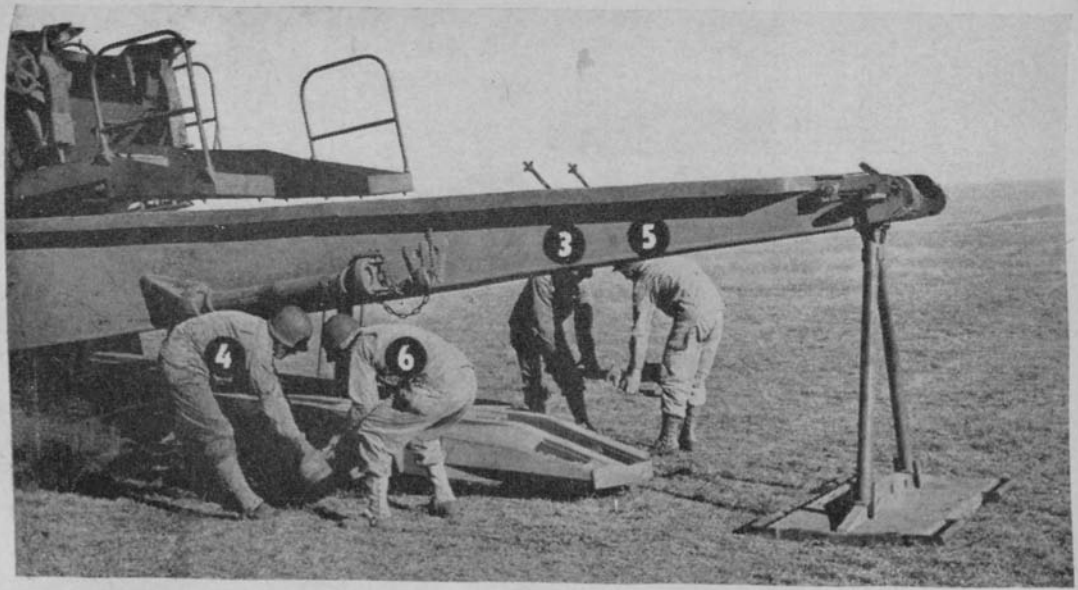


Figure 36. Removing trail traveling support.

b. Detailed duties of members of section. (1) The chief of section commands: REMOVE AXLE.

(2) Nos. 1 to 9 unload the tools and accessories required for assembling the howitzer and place them on a paulin 5 feet to the left of the front axle of the carriage transport wagon.

(3) Nos. 5 to 9 uncouple the howitzer load prime mover, which is then directed into position at the rear of the carriage load by the gunner.

(4) Nos. 7 and 8 remove the trail cross braces. No. 9 removes the wagon lock lever. Nos. 9 and 10 then remove the loading ramp, and place it on the paulin.

(5) Nos. 1 to 6 remove the top carriage cover and hand it down to Nos. 7 and 8, who fold it and place it to the left of the paulin.

(6) Nos. 1 and 2 extend and fasten the demountable drawbar and couple it to the howitzer load prime mover. They then lead the winch cable through the slots in the wagon.

(7) Nos. 3 to 6 remove the wheel ramps and place them to the rear. No. 5 removes the trail support and places it to the right of the trails.

(8) Nos. 7 and 8 remove the spacer bar. They then remove the loading tray and pass it to No. 9, who places it on the paulin. Nos. 7 and 8 then unfasten the trail floats and drop them to the right side of the trails.

(9) Nos. 4, 6, 7, and 8 place the trail float upside down in position under the jack. Assisted by No. 4, No. 5 places the bottom of the jack in the socket in the float with the top of the jack tilted slightly toward the trail ends. No. 4 connects the jack to the winch cable.

(10) No. 3 unfastens the carriage hold-down bolts. No. 6 unscrews the inside spade jacks. (No. 6 will unpin the tie beam to facilitate this operation.) Nos. 7 and 8 disconnect the inner ends of the brake lines from the wagon frame, and swing the maneuvering handles of the front axle to carrying position. (See fig. 34.)

(11) The gunner and cannoneers station themselves as follows:

Gunner—In position to signal the driver of the howitzer load prime mover.

No. 1—At the winch of the howitzer load prime mover to guide the cable.

Nos. 2 to 6—At the trail ends, after assembling the trail support on the trail float.

Nos. 7 and 8—At the maneuvering handles of the front axle.

No. 9—In position to signal the driver of the carriage load prime mover.

(12) The chief of section verifies that the built-in jack is at the proper angle. He then directs raising the frame of the wagon free of the axle, keeping a constant watch to see that the jack angle does not become too acute.

(13) When so directed by the chief of section, No. 9 signals the driver of the carriage load prime mover to move forward.

(14) The front axle is pulled off to one side. Nos. 7 and 8 support the axle extension until the prime mover stops and then, assisted by Nos. 5 and 6, uncouple the axle from the prime mover.

(15) Nos. 2 to 6 place the trail support and float under the trail ends. As soon as the trail support is in position, Nos. 5 and 6 assist Nos. 7

and 8 in uncoupling the front axle from the carriage load prime mover.

(16) The chief of section directs the lowering of the load until the trails rest on the trail support and the trail traveling supports can be folded out.

(17) When the trail traveling supports clear the trails, they are removed by Nos. 3 to 6.

(18) The chief of section directs the raising of the wagon frame until the trails clear the trail support. He then directs Nos. 2 to 6 to remove the float and trail support and to place the float to the right rear.

(19) The chief of section directs the lowering of the trails to the ground.

34. TO REMOVE CARRIAGE FROM TRANSPORT WAGON. The command is: REMOVE CARRIAGE.

a. Description of operation. (1) The carriage load prime mover is brought to the trail ends and its winch attached to the trails.

(2) The built-in jack of the carriage wagon is disconnected from the winch of the howitzer load prime mover and replaced in traveling position. The jack float is moved to the left rear. The carriage guide bars are raised to the middle position.

(3) The carriage is pulled off the wagon onto the ground by the prime mover, using the winch line as a tow cable. (See fig. 37.) Just before the front of the bottom carriage is pulled off the wagon, blocking is placed under the bottom carriage to prevent tipping when the howitzer is mounted.

Figure 37. Carriage pulled off transport wagon.

Note. If the carriage wagon is to be left disassembled while the howitzer is in position, the air reservoir is drained and the wagon is dragged to a point 6 feet from the bottom carriage to facilitate later replacement of the front axle.

(4) The panoramic telescope is installed in its mount and the alignment of the carriage along the direction of fire is checked by the executive, with an aiming circle. If the orientation of the carriage is unsatisfactory, the carriage load prime mover is used to pull the carriage into the correct position.

b. Detailed duties of members of section. (1) The chief of section commands: REMOVE CARRIAGE.

(2) No. 9 directs the driver of the carriage load prime mover to back toward the trail ends.

(3) Nos. 7, 8, and 9 extend the winch of the carriage load prime mover and fasten it to the trails.

(4) No. 4 disconnects the winch cable of the howitzer load prime mover from the built-in jack.

(5) No. 5, assisted by No. 4, replaces the built-in jack in traveling position. Nos. 4, 6, 7, and 8 move the trail float to the left rear.

(6) Nos. 5 and 6 raise and lock the carriage guide bars in the middle position.

(7) The chief of section verifies that the bed of the wagon has been cleared so that the carriage may be removed without interference.

Note. The chief of section must pay particular attention to the cables of the built-in jack and to the clamps which secure the loading ramp rack in traveling position. If the cables protrude above the bed of the wagon, they may be

cut by the bottom carriage. If the clamps are above the bed of the wagon, they will be broken off.

(8) At a signal from the chief of section, No. 9 directs the driver of the carriage load prime mover to pull the carriage onto the ground. No. 8 will guide the winch line onto the drum during this operation.

(9) Nos. 1 and 2 place blocking under the bottom carriage just before it clears the frame of the wagon.

(10) Nos. 1 and 2 rewind the winch cable of the howitzer load prime mover on the winch drum.

(11) The gunner installs the panoramic telescope in its mount and checks the orientation of the carriage under the direction of the executive.

(12) Nos. 7, 8, and 9, after the orientation of the carriage has been checked, remove the winch line from the trail ends and rewind the winch cable. No. 9 then signals the driver to move out.

35. TO PREPARE CARRIAGE TO RECEIVE CANNON WAGON. The command is: TRAILS PARALLEL.

a. Description of operation. (1) The platforms are bolted in the open position.

(2) The trail locking key is removed, the trails are spread to the parallel position, and the spacer bar is inserted and pinned to the ends of the tie beam. (See fig. 38.)

Note. When possible, trails are spread by hand. This method is preferred. However, under some conditions this is impracticable and jacks must be employed. One trail is raised by means of a jack and the other trail spread. The second trail is then jacked up and the first trail spread. Crowbars are used to break the trails apart initially and

may be used to assist in further spreading. Under some conditions it may be necessary to use the winch of the carriage load prime mover to spread the trails, but since this method will result in excessive disturbance of the ground around the howitzer position and thus increases camouflage difficulties, it should be used only as a last resort.

(3) The wheel ramps are placed on the ends of the trails.

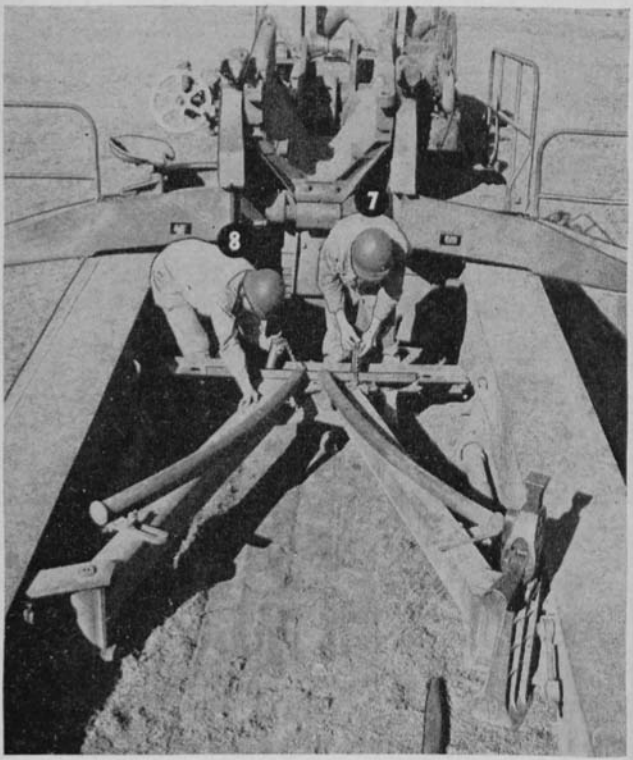


Figure 38. Spacer bar locking trails parallel.

(4) The position of the rear parapet of each spade pit is marked out. Excavation of the spade pits is started.

Note. In the winch method of assembly of the howitzer, the following procedure is prescribed for marking out the rear parapets of the spade pits. With the trails parallel to the center line of the bottom carriage, pins are driven into the ground just outside each trail at points 88 inches from the ends of the trails. Next, marks are made on the trails 124 inches from the trail ends. Pins are driven into the ground 88 inches from the trails along lines perpendicular to the trails at these marks. The two points thus fixed outside each trail determine the line of the rear wall of the spade pits.

The general shape of the recoil pit is outlined by the inside edges of the trails when spread, by a curved line 13½ inches (gun — 26½ inches) from the rear of the bottom carriage, and by a more gradually curved line 24 inches (gun — 12 inches) in front of the loading ramp rack. The depth of all pits and the slope of their walls are determined from the depth templates. (See fig. 51 and par. 72.)

b. Detailed duties of members of section. (1) The chief of section commands: TRAILS PARALLEL.

(2) Nos. 4 and 5 then bolt the swinging platforms in the open position.

(3) No. 9 gets a sledge and removes the trail locking key.

(4) No. 7 gets two crowbars and brings them to the ends of the trails.

(5) Nos. 1 to 9 spread the trails by hand. If jacks are required, Nos. 1, 8, and 9 procure the jacks and operate them. If the prime mover winch is required, No. 9 attaches the winch to the trails and the gunner directs the driver. In any case,

Nos. 7 and 8 insert the spacer bar and lock the ends of the tie beam to it.

(6) Nos. 3 to 6 place the wheel ramps on the ends of trails.

(7) The ammunition corporal, assisted by No. 9, marks out the position of the rear parapet of each spade pit, as described above. Members of the ammunition squad designated by the ammunition corporal dig the spade pits.

36. TO PLACE HOWITZER IN CARRIAGE. The command is: MOUNT HOWITZER.

a. Description of operation. (1) The howitzer load is winched on the trails and the spacer links of the wagon are attached to the top carriage. While the cannon wagon is being winched toward the trail ends, the over-all cover is removed, the muzzle cover is removed, templates are removed from the bed of the wagon, and the howitzer and cradle are disconnected from the transport wagon.

(2) The winch line is disconnected from the transport wagon and attached to one end of the winch line extension cable. The other end of the extension cable is attached to the winch fitting at the front end of the cradle.

Note. The winch line extension cable is supplied with section equipment so that the recoil bearing surface of the tube will not be scarred by the winch cable. The extension cable, which is ¾ inch in diameter, is small enough to fit down into the groove in the top carriage roller without touching the recoil bearing surface of the tube.

(3) The muzzle of the howitzer is raised with the screw jacks and lifting saddle until the tube support halves of the transport wagon can be folded out.

(4) The muzzle is lowered into the top carriage roller.

(5) The howitzer is winched up the rails of the transport wagon until the cradle stops contact the false cradle.

(6) The closed eyes of the screw jacks are connected to the cradle jack yokes, the jack yokes are bolted into lifting position, and the breech end of the howitzer is raised off the transport wagon.

(7) The cannon wagon is disconnected from the top carriage and removed from the trails. The platforms are bolted in the closed position.

(8) The howitzer is lowered with the jacks until the cradle cap screw lugs rest on the front of the false cradle. The eyes of the jacks are then released from the jack yokes, and the open ends placed on the jack yokes. The breech of the howitzer is then jacked down until the seats on the cradle contact those in the false cradle.

Note. In all jacking operations great care must be taken to prevent damage to the jacks. While the howitzer is being lifted as described in (3) above, the jacks must be perpendicular to the tube. Equal strain must be kept on both jacks, and they must be operated at the same speed. This is accomplished by having the chief of section count at each revolution of the jack handles. Similarly when the breech end of the howitzer is being lowered as described in (8) above, the strain on the jacks and their speed of operation must be equal. In the final jacking operation described in (8) above, jacking must stop as soon as the seats on the cradle contact those in the false cradle. It will be noted that when this contact is made, clearance still exists between the bolting lugs on the cradle and the top of the false cradle.

(9) The howitzer is bolted into position in the

false cradle and the cradle jack yokes are bolted into firing position.

b. Detailed duties of members of section. (1) The chief of section commands: MOUNT HOWITZER.

(2) Nos. 1, 2, and 3 extend the winch cable of the howitzer load prime mover and attach it to the rear of the howitzer wagon. No. 1 then stands by the winch to guide the cable during the winching operation.

(3) No. 4 drains the air reservoir of the cannon wagon.

(4) Nos. 5 to 9 attach the hand maneuvering bar to the drawbar of the howitzer wagon.

(5) The gunner stations himself to relay the signals of the chief of section to the driver of the howitzer load prime mover.

(6) With Nos. 5 to 9 standing by the maneuvering bar to steer the wagon, the chief of section causes the cannon wagon to be winched up the trails.

(7) Nos. 1 to 4 remove the howitzer cover, muzzle cover, templates, and tube hold-down strap, and unfasten the cradle locking clamps. Nos. 3 and 4 remove the screw jacks from the cannon wagon and place them in the carriage jack arms. Nos. 1 to 4 remove the taper stud bolts and cap screws from the false cradle and clean and lubricate the seats and keyways.

(8) Nos. 5 and 6 connect the spacer links to the top carriage.

(9) No. 4 closes the petcock on the air reservoir of the cannon wagon.

(10) Nos. 1 and 2 disconnect the winch cable from the wagon and attach it to the winch line extension cable. They attach the other end of the extension cable to the cradle.

(11) Nos. 7 and 8 take the lifting saddle from the wagon and hand it to Nos. 5 and 6, who, assisted by Nos. 3 and 4, place it in position on the jacks for lifting the tube. (See fig. 39.)

Figure 39. Placing lifting saddle preparatory to lifting tube.

(12) Nos. 1 to 4, working in shifts, and supervised by the chief of section, jack up the tube. When the howitzer has cleared the support halves, No. 7 commands STOP, and Nos. 7 and 8 fold the support halves outward.

(13) Nos. 1 to 4, supervised by the chief of section, lower the tube until it rests on the top carriage roller. They continue to lower on the jacks until the lifting saddle is free of the tube and can be dropped to the ground. When the lifting saddle has been removed, they shorten the jacks in preparation for lifting the breech.

(14) While operation (13) above is being performed, Nos. 5 to 9 remove the maneuvering bar from the drawbar of the cannon wagon and couple the wagon to the carriage load prime mover.

Note. The carriage load prime mover should be coupled to the cannon wagon and all brakes set before the howitzer is winched up the rails of the wagon.

(15) The chief of section, his signals relayed by the gunner, causes the howitzer to be winched up the rails of the wagon until the cradle stops contact the false cradle. No. 1 guides the cable onto the winch drum during this operation.

(16) Nos. 1 and 2 attach the screw jacks to the cradle jack yokes, and Nos. 3 and 4 bolt the jack yokes into lifting position.

(17) Nos. 1 and 2, supervised by the chief of section, jack up the howitzer. No. 7 commands STOP as soon as the cradle locking lugs clear the wagon rails. Nos. 5 and 6 disconnect the spacer links from the top carriage.

(18) The chief of section, his signals relayed by No. 9, causes the driver of the carriage load prime mover to pull the cannon wagon from the trails. Nos. 4 and 5 bolt the platforms in the closed position.

(19) Nos. 1 to 4, supervised by the chief of sec-

tion, jack the howitzer into the false cradle as described in a(8) above.

(20) Nos. 1 and 2 insert and tighten the stud bolts.

Note. The stud bolts must be tightened before the cap screws are drawn down. Do not tighten the cradle cap screws.

(21) Nos. 3 and 4 insert and tighten the cradle cap screws.

(22) Nos. 1 and 2 remove the jacks and replace them in position on the cannon wagon.

(23) Nos. 3 and 4 bolt the cradle jack yokes into firing position.

(24) Nos. 7 and 8 unfasten the winch line from the extension cable and, under the direction of the gunner, rewind it on the winch drum of the howitzer load prime mover. They then remove the extension cable from the cradle and place it on the paulin. Nos. 5 and 6 return the lifting saddle and hand maneuvering bar to traveling position on the cannon wagon.

37. TO COMPLETE EMPLACEMENT OF HOWITZER. The command is: TRAILS.

a. Description of operation. (1) The spades are removed from the carriage transport wagon and placed in the spade pits. (If the spade pits have not been completed, they must be finished before this operation can be performed.) The spades should be removed to the sides of the wagon, rather than to the rear, to prevent damage to the brake handles.

(2) The wheel ramps and spacer bar are removed from the trails.

(3) The trails are spread and the trail tie beam is locked in firing position. The ends of the loading ramp rack are clamped in firing position.

(4) The trails are raised by jacks and the floats attached.

(5) The spades are hung on the trails and the spade jacks screwed into them.

(6) The recoil pit is dug.

b. Detailed duties of members of section. (1) The chief of section commands: TRAILS.

(2) Nos. 1, 3, 5, and 7 remove the spades for the right trail from the carriage transport wagon and drop them into the right spade pit.

(3) Nos. 2, 4, 6, and 8 remove the spades for the left trail from the carriage transport wagon and drop them into the left spade pit.

(4) Nos. 3 to 6 remove the wheel ramps from the trails.

(5) Nos. 7 and 8 remove the spacer bar from the trails.

(6) Nos. 1 to 9 spread the trails and place the trail tie beam in firing position. Nos. 7 and 8 insert the locking pins in the trail tie beam and No. 9 clamps the ends of the loading ramp rack into firing position. The procedure described in paragrah 35a(2) is followed. (If the trails must be raised with jacks, the floats may be attached at this time.)

(7) Nos. 1, 3, 5, and 7 attach the right float to the trail. No. 9 inserts the locking key.

(8) Nos. 2, 4, 6, and 8, attach the left float to the trail. The gunner inserts the locking key. If

the trail float is used as a base plate for the built-in jack, it should not be assembled to the trail until the carriage wagon is reassembled.

(9) If it is necessary to jack up the trails to attach the floats, the jacks are operated by Nos. 1, 2, 8, and 9.

(10) Nos. 1, 3, 5, and 7 hang the spades on the right trail and screw the spade jacks into them.

(11) Nos. 2, 4, 6, and 8 hang the spades on the left trail and screw the spade jacks into them.

(12) As soon as the trails are spread, members of the ammunition squad, under the direction of the ammunition corporal, dig the recoil pit.

38. TO REASSEMBLE CARRIAGE TRANSPORT WAGON. Unless it is anticipated that the howitzer will be placed in traveling position by winch method within a short time, the carriage wagon should be reassembled and removed. The command is: CARRIAGE WAGON.

a. Description of operation. (1) The carriage wagon is dragged backward by the demountable drawbar to give sufficient room to replace the front axle, and to couple the prime mover to it.

(2) The winch cable of the howitzer load prime mover is paid out through the slots provided in the carriage wagon.

(3) The built-in jack is placed in upright position. The trail float is placed in position under the built-in jack. The winch cable of the howitzer load prime mover is attached to the built-in jack.

(4) The frame of the wagon is raised and the front axle moved into position. The frame of the wagon is lowered onto the axle, the wagon lock

lever is inserted, and brake connections are attached.

(5) The winch cable of the howitzer load prime mover is unfastened from the built-in jack and rewound on its drum. The built-in jack is replaced in traveling position.

(6) The left float is assembled to the left trail.

(7) The demountable drawbar is uncoupled from the howitzer load prime mover and placed in traveling position.

(8) The wheel ramps, spacer bar, trail support, trail cross braces, and trail traveling supports are replaced on the wagon. The howitzer load prime mover is coupled to the wagon and the wagon is removed.

b. Detailed duties of members of section. (1) The chief of section commands: CARRIAGE WAGON.

(2) No. 1 drains the air reservoir.

(3) Following signals from the chief of section, the gunner directs the driver of the howitzer load prime mover to pull the carriage wagon away from the carriage.

(4) Nos. 1 and 2 lead the winch cable through the slots in the carriage wagon.

(5) Nos. 4, 6, 7, and 8 place the trail float in position under the jack. Assisted by No. 4, No. 5 places the bottom of the jack on the trail float. (The jack should be at a greater angle than when the front axle is removed.) No. 4 connects the jack to the winch cable.

(6) The gunner and cannoneers station themselves as follows:

Gunner—In position to signal the driver of the howitzer load prime mover.

No. 1—At the winch of the howitzer load prime mover to guide the cable.

No. 2—At the left wheel of the front axle.

No. 3—At the right wheel of the front axle.

Nos. 4 to 6—At the drawbar of the front axle.

Nos. 7 and 8—At the maneuvering handles of the front axle.

No. 9—At the drawbar of the front axle.

(7) The chief of section verifies that the built-in jack is at the proper angle. He then directs the raising of the frame of the wagon until it is high enough to allow replacement of the front axle.

(8) Nos. 2 to 9 maneuver the front axle into position so that the axle extension fits into the eye on the wagon frame and so that the recess for the wagon frame lug is directly below the lug.

(9) The chief of section directs the lowering of the wagon frame onto the front axle.

(10) No. 9 replaces the wagon lock lever and pins it in position. Nos. 7 and 8 connect the inner ends of the brake lines to the fittings on the wagon frame.

(11) No. 4 releases the winch cable from the built-in jack.

(12) Nos. 1 and 2 uncouple the demountable drawbar from the prime mover, place the drawbar in traveling position, and rewind the winch cable on the winch drum.

(13) No. 5, assisted by No. 4, replaces the built-in jack in traveling position.

(14) Nos. 4, 6, 7, and 8 remove the trail float from under the built-in jack and attach the float to the left trail. The gunner inserts the locking key.

(15) No. 5 replaces the trail support in traveling position.

(16) Nos. 7 and 8 replace the spacer bar in traveling position and place the trail cross braces and trail traveling supports in the bed of the wagon.

(17) Nos. 3 to 6 replace the wheel ramps in traveling position.

(18) The gunner directs the driver of the howitzer load prime mover into position for coupling to the carriage wagon.

(19) Nos. 5 to 9 raise the drawbar of the wagon and couple it to the howitzer load prime mover.

(20) The gunner signals the driver of the howitzer load prime mover to move out.

SECTION VIII
TO PREPARE HOWITZER FOR TRAVELING (WINCH METHOD)

39. TO EXECUTE MARCH ORDER (WINCH METHOD). The command is: MARCH ORDER.

a. At this command, the howitzer is disassembled, loaded on the transport wagons, and prepared for traveling. (See par. 40.)

b. In the preliminary instruction of the howitzer sections and whenever conditions require close supervision of the detailed duties of individual cannoneers, preparing the howitzer for travel by winch method is executed in successive steps by the use of the following commands: 1. BY DETAIL, 2. MARCH ORDER, 3. TRAILS PARALLEL, 4. DISMOUNT HOWITZER, 5. PREPARE CARRIAGE, (6. PLACE WAGON), 7. LOAD CARRIAGE, 8. FILL PIT.

c. Upon completion of the duties prescribed in any given step, the cannoneers will either take their posts or take positions preparatory to performing their duties in the next step, as may be prescribed by the chief of section. When the cannoneers are sufficiently instructed, all steps will be executed successively at the single command: MARCH ORDER.

40. OPERATIONS FOR MARCH ORDER. a. The howitzer is disassembled and prepared for traveling by the following operations (duties of individuals are listed in pars. 41 to 46 incl.):

(1) The howitzer is placed at minimum elevation and center traverse. The road locks are fastened. The spades and floats are detached from the trails. The trails are placed in parallel position and the spacer bar is inserted.

(2) The breech end of the howitzer is jacked up from the false cradle.

(3) The cannon wagon is backed up the trails and bolted to the top carriage.

(4) The breech end of the howitzer is lowered until the cradle locking lugs rest on the wagon. The howitzer is winched down the rails of the wagon and the muzzle jacked up until the tube support halves can be pinned in traveling position. The howitzer is lowered, jacks removed, and the howitzer secured to the wagon for travel.

(5) The cannon wagon is unbolted from the top carriage and removed from the trails.

(6) The spacer bar is removed and the trails closed.

(7) If the carriage wagon was assembled and removed when the howitzer was emplaced, it is brought to the front of the carriage, the front axle removed, and the bed of the wagon placed in position so that the carriage may be winched onto it.

(8) The carriage is winched onto the carriage wagon.

(9) The front axle is replaced under the carriage wagon and the carriage secured for travel.

(10) The recoil and spade pits are filled.

b. In general, odd numbered cannoneers work on the right and even numbered cannoneers work on the left. Members of the section (especially

Nos. 10 to 18) not assigned a specific duty in any operation assist wherever needed. Nos. 10 to 18 are not assigned specific duties, but are employed under the direction of the ammunition corporal in filling the pits and loading ammunition.

c. The chief of section directs the operations, giving such orders, instructions, and signals as may be required to expedite and coordinate the work. The mechanic, the ammunition corporal, and the gunner assist in supervising suboperations as prescribed or as may be directed by the chief of section.

d. So far as practicable, tools and equipment will be loaded in such order that those articles which will be needed first on arriving at a subsequent position will be available without disturbing the articles needed later.

e. After the loads have been prepared for traveling, the chief of section, assisted by the members of the section, makes an inspection to verify that the loads are well protected and secured and reports to the executive, "Sir, No. (so-and-so) in order," or reports any defects which the section cannot remedy without delay.

41. TO PREPARE CARRIAGE TO RECEIVE CANNON WAGON. The command is: TRAILS PARALLEL.

a. Description of operation. (1) The howitzer is placed at center traverse, depressed to minimum elevation, and the road locks are secured. The panoramic telescope (and the telescope mount extension) are placed in the carrying case, and covers are installed on the elevation quadrant and telescope mount.

(2) The spade jacks are unscrewed from the spades and placed in their traveling brackets. The spades are unhooked from the trails and dropped into the spade pits.

(3) The trails are jacked up and the floats removed.

(4) The ends of the loading ramp rack are clamped into traveling position. The trail tie beam is unlocked and the trails swung to the parallel position. (See par. 35a(2) for detailed procedure.)

(5) The spacer bar is inserted and pinned to the ends of the tie beam. The wheel ramps are placed on the ends of the trails.

b. Detailed duties of members of section. (1) The chief of section commands: TRAILS PARALLEL.

(2) The gunner places the howitzer in center traverse, removes the panoramic telescope (and telescope mount extension) from the mount and puts them in the carrying case, and puts the cover on the telescope mount.

(3) No. 1 puts the cover on the elevation quadrant, directs Nos. 2 and 3 to depress the howitzer to minimum elevation, and locks the elevation brake in traveling position.

(4) Under the direction of No. 1, Nos. 2 and 3 depress the howitzer to minimum elevation. No. 2 secures the left road lock. No. 3 secures the right road lock.

(5) Nos. 4 and 5 close the breech. Nos. 4 and 5 replace the breech cover. No. 4 replaces the oiler, primer seat cleaning reamer, vent cleaning bit, waste and wiping cloths in the section chest.

(6) Nos. 3 to 6 unscrew the spade jacks from the spades and place them in their traveling brackets.

(7) The gunner removes the left float locking key. No. 9 removes the right float locking key.

(8) Nos. 1, 2, 8, and 9 procure jacks and jack up the trail ends.

(9) Nos. 2, 4, 6, and 8 remove the left float. They then unhook the spades from the left trail and drop the spades into the pit.

(10) Nos. 1, 3, 5, and 7 remove the right float and place it in front of the carriage in a convenient position for assembly to the trail support They then unhook the spades from the right trail and drop the spades into the pit.

(11) Nos. 7 and 8 unpin the tie beam from firing position. Nos. 1 to 6 will assist in this operation by slightly rocking the tie beam to loosen the pins. No. 9 clamps the ends of the loading ramp rack in traveling position.

(12) Nos. 1 to 9 close the trails to the parallel position. Nos. 7 and 8 insert the spacer bar and pin the ends of the tie beam to it.

(13) Nos. 3 to 6 place the wheel ramps on the ends of the trails.

42. TO REMOVE HOWITZER FROM CARRIAGE. The command is: DISMOUNT HOWITZER.

a. Description of operations. (1) If the carriage wagon was not left in position when the piece was assembled, it is brought into position in front of and in line with the carriage, facing to the rear. The carriage load prime mover is uncoupled and moved to the rear of the wagon where it is coupled

to the demountable drawbar. The winch cable is then spooled out and attached to one end of the winch line extension cable. The other end of the extension cable is attached to the cradle.

(2) The cradle jack yokes are bolted in lifting position and the screw jacks installed with the open end on the jack yokes. The jacks are then tightened and the stud bolts and cap screws removed. The jacks are raised until they are free. The closed eyes of the jacks are then attached to the yokes, and the breech of the howitzer is raised for loading on the cannon wagon. The platforms are bolted in the open position.

(3) The cannon wagon is coupled to the front pintle of the howitzer load prime mover. The air reservoir of the wagon is drained and the cannon wagon backed up the trails of the carriage until the spacer links can be bolted to the top carriage.

Note. The cannon wagon may also be backed up the trails by the winch of the carriage load prime mover. The prime mover is uncoupled from the demountable drawbar and moved slightly to the left of the line of fire so that the winch line when extended will not interfere with the carriage wagon. The winch line is spooled out and passed between the bottom carriage and the left rear platform, to the left of the traversing arc and to the right of the left trail. A short length of chain is wrapped around the nearer bogie axle (rear axle in traveling position) and the winch line fastened to it. The point of attachment to the axle should be at the left end (right end in traveling position) close to the brake fittings. When the winch line is chained in this position, interference between the cable and the platform will be at a minimum while the wagon is on the trails.

(4) The cannon wagon is uncoupled from the front pintle of the howitzer load prime mover, the

prime mover is reversed, and the wagon coupled to its rear pintle.

(5) The winch of the howitzer load prime mover is spooled out and attached to the howitzer.

(6) The breech end of the howitzer is lowered until the cradle locking lugs rest on the midspan rails of the wagon. The jacks are unfastened and the cradle jack yokes bolted in traveling position.

(7) The howitzer is winched down the rails of the wagon. The winch of the carriage load prime mover is paid out slowly to prevent the howitzer from sliding too fast. (See fig. 40.)

(8) The winch line of the carriage load prime mover is removed from the extension cable and the extension cable from the cradle. The tube lifting saddle is installed on the jacks.

(9) The muzzle of the howitzer is raised until the tube support halves can be placed in traveling position and secured. It is then lowered onto the tube support. During this operation, the stud bolts and cap screws are replaced in the false cradle.

(10) The howitzer is secured to the wagon for travel and the jacks and lifting saddle are replaced in traveling position on the wagon. The spacer links are unfastened from the top carriage, the howitzer load is removed from the trails, covers are placed on the howitzer, and the templates are replaced on the bed of the wagon.

b. *Detailed duties of members of section.* (1) The chief of section commands: DISMOUNT HOWITZER.

(2) The gunner directs the driver of the carriage load prime mover as he brings the carriage wagon into position in front of the carriage. Nos.

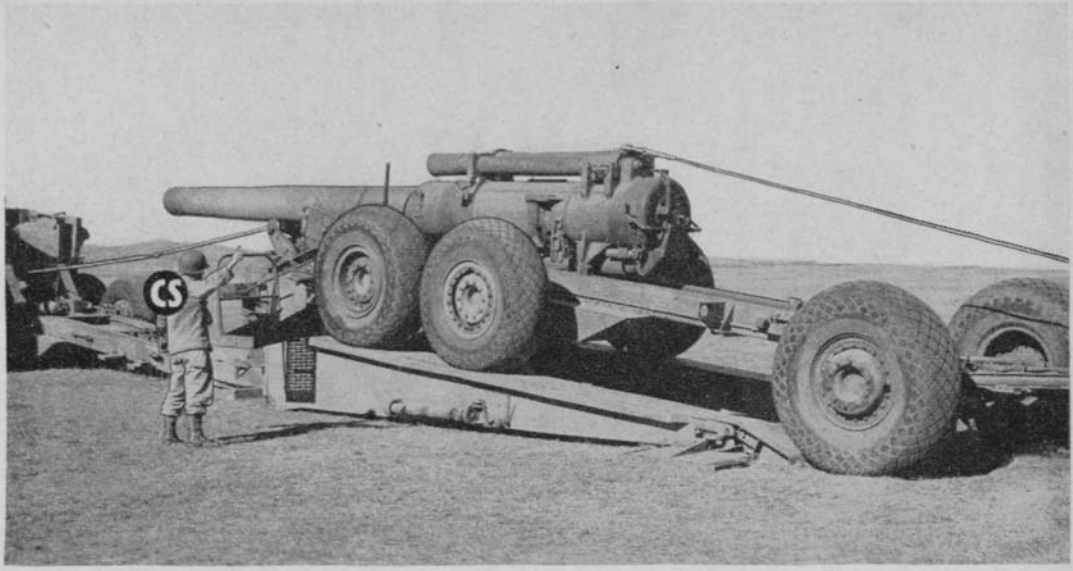


Figure 40. Pulling howitzer onto cannon transport wagon.

1 to 5 uncouple the prime mover. (This operation does not apply if the carriage wagon has been left in position.)

(3) Nos. 1 and 2 couple the prime mover to the demountable drawbar of the carriage wagon. They then extend the winch cable of the prime mover and attach it to the winch line extension cable. They attach the other end of the extension cable to the cradle.

(4) Nos. 3 and 4 remove the screw jacks from their traveling sockets and place them in the carriage jack arms. They then bolt the jack yokes in lifting position.

(5) Nos. 3 and 4 place the open ends of the jacks on the jack yokes and extend the jacks until they are tight. Nos. 1 and 2 remove the stud bolts. Nos. 3 and 4 remove the cap screws.

(6) Nos. 1 to 8, working in shifts, raise the breech end of the howitzer as described in a(2) above. Nos. 4 and 5 then bolt the platforms in the open position.

(7) While operations (2) to (6) above are being performed, No. 9 directs the driver of the howitzer load prime mover in placing the cannon wagon in prolongation of the trails. Nos. 5 to 9 then uncouple the wagon from the rear pintle of the prime mover and couple it to the front pintle. No. 7 drains the air reservoir of the wagon.

Note. If the winch of the carriage load prime mover is to be used to pull the cannon wagon into position, Nos. 1, 2, and 3 uncouple the demountable drawbar from the carriage load prime mover, extend the winch line, and fasten the winch line to the cannon wagon axle. (See a(3) above.) They recouple the prime mover and fasten the

winch line to the winch line extension cable when the operation is completed. Nos. 5 to 9 uncouple the howitzer load prime mover from the cannon wagon and attach the hand maneuvering bar to the drawbar. When the operation is completed, they recouple the howitzer load prime mover to the cannon wagon. No. 7 drains the air reservoir of the cannon wagon before the winching operation and closes the petcock when the wagon is bolted to the top carriage.

(8) The chief of section directs the driver of the howitzer load prime mover in placing the wagon on the trails.

(9) Nos. 5 and 6 connect the spacer links to the top carriage.

(10) Nos. 5 to 9 uncouple the cannon wagon from the front pintle of the prime mover and couple it to the rear pintle. They then extend the winch of the prime mover and attach it to the howitzer.

(11) Nos. 7 and 8 remove the howitzer lifting saddle and fold out the support halves.

(12) Nos. 1 and 2 lower the jacks until the cradle locking lugs rest on the mid-span rails. They then release the jacks from the jack yokes but continue to extend the jacks in preparation for their use with the howitzer saddle. Nos. 3 and 4 bolt the jack yokes in traveling position.

(13) The chief of section, his signals relayed by the gunner and No. 9, directs the winching of the howitzer onto the transport wagon. No. 8 guides the winch line of the howitzer load prime mover onto the drum.

(14) Nos. 1 and 2 disconnect the winch cable of the carriage load prime mover from the extension cable and the extension cable from the

cradle. Nos. 7, 8, and 9 disconnect the winch cable of the howitzer load prime mover from the howitzer and rewind the winch cable.

(15) Nos. 7 and 8 hand the tube lifting saddle to Nos. 5 and 6, who, assisted by Nos. 3 and 4, fix the screw jacks and lifting saddle in lifting position.

(16) Nos. 1 to 8, working in shifts, jack up the muzzle of the howitzer. The two cannoneers not occupied on the jacks replace the stud bolts and cap screws in the false cradle.

(17) When the howitzer has been jacked sufficiently high, No. 7 calls STOP. Nos. 7 and 8 swing the tube support halves under the tube, and No. 8 connects the halves together.

(18) Nos. 3 and 4 lower the tube onto the tube support and, assisted by Nos. 5 and 6, remove the screw jacks and lifting saddle. Nos. 3 and 4 replace the jacks in their traveling sockets.

(19) Nos. 5 and 6 release the spacer links from the top carriage and return the lifting saddle to traveling position on the wagon.

(20) The chief of section, his signals relayed by No. 9, directs the driver of the howitzer load prime mover to remove the wagon from the trails.

(21) Nos. 1 and 2 fasten the cradle locking clamps and tube hold-down strap and place the templates in the bed of the wagon. Assisted by Nos. 3 and 4, Nos. 1 and 2 install the muzzle cover (plug) on the howitzer.

43. TO PREPARE CARRIAGE FOR LOADING. The command is: PREPARE CARRIAGE.

a. Description of operation. (1) The wheel ramps

and float keys are removed from the ends of the trails. The spacer bar is removed, and the trail tie beam is pinned in traveling position. The trails are closed and locked.

(2) The left float is placed in position near the wagon jack and the right float is placed in front of the carriage in a convenient position for assembly to the trail support. The platforms are bolted in the closed position, and the front platform ladder is folded to traveling position and secured.

(3) If the carriage wagon is not disassembled, the operations described in paragraph 44 must be performed at this time.

b. Detailed duties of members of section. (1) The chief of section commands: PREPARE CARRIAGE.

(2) Nos. 3 to 6 remove the wheel ramps from the trails and place them in a convenient place for loading on the carriage wagon.

(3) Nos. 7 and 8 unpin the trail tie beam from the spacer bar, remove the spacer bar, and swing the tie beam to traveling position. No. 7 places the spacer bar in a convenient place for loading on the carriage wagon.

(4) Nos. 1 to 9 close the trails. No. 9 inserts the trail locking key.

(5) Nos. 6 to 9 place the left float in position near the wagon jack.

(6) No. 3 folds the front platform ladder into traveling position, and No. 2 pins the crank handle on the front elevating handwheel in traveling position. Nos. 4 and 5 bolt the platforms in the closed position.

44. TO DISASSEMBLE CARRIAGE WAGON. If the carriage wagon is not already disassembled and in position to load the carriage, the command is: PLACE WAGON.

a. Description of operation. (1) The built-in jack is set in position on the trail float. The winch cable of the carriage load prime mover is extended through the slots in the carriage wagon and fastened to the jack.

(2) The wagon lock lever is removed, the inner ends of the brake lines are released, and the maneuvering handles of the front axle are swung to carrying position.

(3) The frame of the wagon is raised with the built-in jack and the front axle removed. The bed of the wagon is lowered to the ground. The winch cable is unfastened from the built-in jack and returned to the winch drum. The built-in jack is replaced in traveling position and the trail float removed from beneath the wagon. The air reservoir is drained.

(4) The howitzer load prime mover is uncoupled from the howitzer load and backed into position in the rear of the carriage. Its winch cable is extended over the top carriage roller and attached to the frame of the carriage wagon. The carriage wagon is winched toward the carriage until the end of the wagon frame is approximately 6 feet from the bottom carriage. During this operation the driver of the carriage load prime mover will back his vehicle slowly toward the carriage. The winch of the howitzer load prime mover is removed from the carriage wagon and rewound on the winch drum. The howitzer load

prime mover is then coupled to the cannon wagon.

Note. It may be necessary to use crowbars to guide the wagon as it is winched toward the carriage. It may also be necessary to dig a small trench for the end of the wagon frame in order to allow the bottom carriage to slide easily onto the wagon.

b. Detailed duties of members of section. (1) The chief of section commands: PLACE WAGON.

(2) Nos. 1 and 2 lead the winch cable of the carriage load prime mover through the slots in the carriage wagon.

(3) Nos. 4, 6, 7, and 8 place the trail float in position under the jack. Assisted by No. 4, No. 5 places the bottom of the jack on the trail float. No. 4 connects the jack to the winch cable.

(4) No. 9 removes the wagon lock lever.

(5) Nos. 7 and 8 release the inner ends of the brake lines from the wagon frame. They then swing the maneuvering handles of the front axle to the carrying position.

(6) The gunner and cannoneers station themselves as follows:

Gunner—In position to signal the driver of the carriage load prime mover.

No. 1—At the winch of the carriage load prime mover to guide the cable.

No. 2—At the left wheel of the front axle.

No. 3—At the right wheel of the front axle.

Nos. 4, 5, and 6—At the drawbar of the front axle.

Nos. 7 and 8—At the maneuvering handles of the front axle.

No. 9—At the drawbar of the front axle.

(7) The chief of section verifies that the built-in jack is at the proper angle. He then directs the raising of the frame of the wagon until it is high enough to allow removal of the front axle.

(8) Nos. 2 to 9 remove the front axle.

(9) The chief of section directs the lowering of the wagon frame to the ground.

(10) No. 4 releases the winch cable from the built-in jack and assists No. 5 to replace the jack in traveling position. Nos. 4, 6, 7, and 8 then remove the trail float from beneath the wagon. No. 1 drains the air reservoir.

(11) Nos. 5 to 9 uncouple the howitzer load prime mover from the howitzer load. No. 9 directs the driver as he backs into position to the rear of the carriage. Nos. 7, 8, and 9 pull the winch cable of the howitzer load prime mover over the top carriage roller and attach it to the frame of the carriage wagon.

(12) The chief of section, his signals relayed by the gunner and No. 9, directs the winching of the carriage wagon into position as described in a(4) above. No. 8 guides the winch line onto the winch drum.

(13) Nos. 7, 8, and 9 remove the winch cable from the wagon frame and rewind it on the winch drum. Nos. 5 to 9 then couple the howitzer load to the howitzer load prime mover.

45. TO LOAD CARRIAGE AND SPADES. The command is: LOAD CARRIAGE.

a. Description of operation. (1) The winch line of the carriage load prime mover is attached to the front of the carriage. The carriage is winched into

position on the wagon frame. When the guide bars have cleared the carriage hold-down bolts, they are dropped to their lowest position. During this operation the stud bolts and cap screws are replaced in the false cradle.

(2) The winch cable of the carriage load prime mover is unfastened from the bottom carriage and paid out through the slots provided in the carriage wagon.

(3) The built-in jack is placed in upright position. The trail float is placed in position under the built-in jack. The winch cable of the carriage load prime mover is attached to the built-in jack.

(4) The trail support is assembled to the right trail float.

(5) The wagon frame and trails are raised with the built-in jack and the trail support is placed under the trail ends.

Note. During all operations involving the use of the built-in jack the chief of section must keep a constant watch to see that the jack remains at the correct angle and winching must be stopped immediately if the jack angle becomes too acute.

(6) The trail ends are lowered onto the trail support and the wagon frame is lowered until the spade jack saddles can be placed in position.

(7) The wagon frame is raised, the trail support removed, the wagon frame lowered, the right float placed on the trails, the wagon frame raised, and the front axle placed in position under the wagon frame.

(8) The wagon frame is lowered onto the front axle. The wagon lock lever is inserted and the inner ends of the brake lines are connected.

(9) The winch cable is unfastened from the built-in jack and rewound on the drum. The built-in jack is replaced in traveling position.

(10) The wheel ramps, spacer bar, trail support, loading tray, and loading ramp are replaced and secured in traveling position.

(11) The carriage hold-down bolts, trail cross braces, inside spade jacks, and tie beam are secured in traveling position.

(12) The carriage wagon is pulled backward by the demountable drawbar until there is sufficient room between the wagon and the pit to allow the front drawbar to be coupled to the prime mover. The demountable drawbar is then uncoupled and placed in traveling position.

(13) The carriage load prime mover is coupled to the carriage load and covers are placed on the carriage.

(14) The spades are transferred from the pits and secured on the wagon. In loading spades, care should be taken to place two right hand spades or two left hand spades together in the center. (A right hand spade is defined as a spade which may be used on the right side of either trail.) In this way interference between the sockets of the two center spades will be avoided.

b. Detailed duties of members of section. (1) The chief of section commands: LOAD CARRIAGE.

(2) Nos. 1 and 2 attach the winch line of the carriage load prime mover to the front of the carriage.

(3) The chief of section, his signals relayed by the gunner, directs the pulling of the carriage onto

the wagon frame. No. 1 guides the cable onto the winch drum.

(4) Nos. 5 and 6 lower the guide bars to their lowest position as soon as the guide bars have cleared the carriage hold-down bolts.

(5) Nos. 1 and 2 unfasten the winch cable from the bottom carriage and extend it through the slots in the carriage wagon.

(6) Nos. 4, 6, 7, and 8 place the trail float upside down in position under the jack. Assisted by No. 4, No. 5 places the bottom of the built-in jack on the trail float. No. 4 connects the winch cable to the built-in jack.

(7) Nos. 2 to 6 assemble the trail support to the right float and bring it to the ends of the trails.

(8) The chief of section, his signals relayed by the gunner, directs the raising of the wagon frame and trails.

(9) Nos. 2 to 6 place the trail support and float under the trail ends.

(10) The chief of section directs the lowering of the wagon frame.

(11) Nos. 3 to 6 place the spade jack saddles in position on the wagon.

(12) The chief of section directs the raising of the wagon frame and trails.

(13) Nos. 2 to 6 remove the float and trail support.

(14) The chief of section directs the lowering f the wagon frame to the ground.

(15) Nos. 1 to 6 secure the right float in traveling position.

(16) The chief of section directs the raising of the wagon frame.

(17) Nos. 2 to 9 replace the front axle. (See par. 38b(6) and (8).)

(18) The chief of section directs the lowering of the wagon frame onto the front axle. No. 9 replaces the wagon lock lever and pins it in position. Nos. 7 and 8 connect the inner ends of the brake lines to the fittings on the wagon frame.

(19) No. 4 releases the winch cable from the built-in jack. No. 5, assisted by No. 4, replaces the built-in jack in traveling position.

(20) Nos. 1 and 2 rewind the winch cable on the winch drum.

(21) No. 5 places the trail support in traveling position.

(22) Nos. 3 to 6 place the wheel ramps in traveling position.

(23) Nos. 7 and 8 place the spacer bar in traveling position.

(24) No. 9 places the loading ramp in traveling position.

(25) Nos. 7 and 8 clamp the loading tray in traveling position.

(26) No. 3 fastens the carriage hold-down bolts.

(27) No. 6 screws the inside spade jacks into their traveling sockets. When this operation is completed, Nos. 7 and 8 pin the tie beam in traveling position.

(28) Nos. 7 and 8 fasten the trail cross braces.

(29) Directed by the gunner, the driver of the carriage load prime mover moves the carriage

load backwards until there is sufficient room between the pit and the wagon for coupling.

(30) Nos. 1 and 2 uncouple the demountable drawbar from the carriage load prime mover and replace it in traveling position.

(31) The gunner directs the driver of the carriage load prime mover into position for coupling to the front drawbar.

(32) Nos. 5 to 9 couple the carriage load prime mover to the front drawbar. Nos. 1 to 8 install the top carriage cover.

(33) Nos. 1 to 9 remove the spades from the spade pits.

(34) Directed by the gunner, the driver of the carriage load prime mover moves the carriage wagon to a convenient position beside the pit for loading the spades.

(35) Nos. 1 to 9 place the spades in their traveling positions on the carriage wagon. They then load the section tools and accessories on the prime mover.

46. TO FILL PIT. The command is: FILL PIT. Filling the pits is accomplished by members of the ammunition squad under the direction of the ammunition corporal. Normally, the chief of section's command will be given and filling of the recoil pit begun as soon as the carriage has been dragged off the pit.

SECTION IX
FURTHER STEPS IN PREPARATION OF THE PIECE FOR FIRING

47. TO PREPARE THE PIECE FOR ACTION. a. The howitzer being assembled in firing position, the command is: PREPARE FOR ACTION.

b. Duties of individuals are as follows (each man takes his post upon completion of his duties):

(1) *Chief of section. (a)* Supervises the work of the cannoneers.

(b) Procures a gunner's quadrant and, assisted by No. 1, verifies the adjustment of the elevation quadrant.

(c) Inspects the materiel and, when all operations have been completed, reports to the executive, "Sir, No. (so-and-so) in order," or reports any defects which he cannot remedy without delay.

(2) *Gunner. (a)* Removes the cover from the panoramic telescope mount.

(b) Removes the panoramic telescope (and telescope mount extension if necessary) from the carrying case and inserts it in the mount.

Note. The telescope mount extension should not be used if the panoramic telescope can be operated satisfactorily without it. Adjustment of the seat for the gunner may make the extension unnecessary.

(c) Verifies the alignment of the panoramic telescope and the panoramic telescope mount.

(d) Levels the telescope mount.

(e) Directs the placing of the aiming posts.

(3) *No. 1. (a)* Removes the cover from the elevation quadrant.

(b) Tests the operation of the elevation hand brake.

(c) Assists the chief of section to verify the adjustment of the elevation quadrant.

(4) *No. 2. (a)* Disengages the left road lock from the top carriage.

(b) Pins the elevating crank handle on the front handwheel in firing position.

(c) Operates the elevating mechanism and reports any maladjustments, particularly in the equilibrator system.

(5) *No. 3. (a)* Disengages the right road lock from the top carriage.

(b) Places the front platform ladder in firing position.

(6) *No. 4. (a)* Swings the left platform into firing position and bolts it in place (crane method only).

(b) Assisted by No. 5, removes the breech cover.

(c) If the M1 firing mechanism is used, unlocks the percussion hammer from the traveling position and locks it in the safe position.

(d) Assisted by No. 5, opens the breech.

(e) Gets an oiler, primer seat cleaning reamer, vent cleaning bit, lanyard, waste, and wiping cloths.

(f) Examines the breech to see that it is well oiled and clean and that the vent is clear.

(7) *No. 5. (a)* Swings the right platform into firing position and bolts it in place (crane method only).

(b) Assists No. 4 to remove the breech cover.

(c) Removes firing mechanism if M1 firing mechanism is used.

(d) Assists No. 4 to open the breech.

(e) Inspects the bore to see that it is clean and that the muzzle cover has been removed.

(f) Procures primers from the primer pit and fills his primer belt.

(8) *Nos. 6 and 7. (a)* Assemble the chamber brush to the rammer staff.

(b) Place the loading ramp in the breech recess.

(9) *No. 8. (a)* Assisted by No. 9, assembles the rammer to the staff sections.

(b) Procures water for swabbing the powder chamber.

(10) *No. 9. (a)* Assists No. 8 in assembling the rammer to the staff sections.

(b) Under the direction of the gunner, places the aiming posts.

(11) *Nos. 10 to 15. (a)* Assisted by the crane operator and the driver of the crane truck, prepare the crane for movement away from the position (crane method only).

(b) Supervised by the ammunition corporal, prepare and store ammunition. (See par. 48.)

(12) *Nos. 16, 17, and 18.* Supervised by the ammunition corporal, prepare and store ammunition. (See par. 48.)

(13) *Ammunition corporal.* Supervises the preparation and storage of ammunition. (See par. 48.)

(14) *Artillery mechanic. (a)* Checks that the valve below the equilibrator pressure tank is open.

(b) Checks the position of the replenisher piston and oil index.

(c) Adjusts the oil level and nitrogen pressure of the equilibrator system, if necessary.

(d) Checks all bearings and sliding parts to see that they are properly lubricated.

48. TO PREPARE AND STORE AMMUNITION. a. As soon as the howitzer is assembled and Nos. 10 to 15 have completed their duties with the crane, the ammunition squad, under the supervision of the ammunition corporal, prepares and stores ammunition. If time is available before opening fire, the members of the howitzer squad, under the direction of the gunner, assist in the work of getting all ammunition below ground level. When speed is essential, projectiles and powder charges may be laid on paulins, but must be covered with additional paulins or brush for protection from weather conditions.

b. Habitually, all cannoneers will participate in unloading and storing ammunition. However, the cannoneers responsible for the operation are as follows:

(1) The ammunition corporal is in general charge of, and responsible to the chief of section for, the handling and storage of ammunition.

(2) No. 10 digs a fuze and primer pit outside the right trail.

(3) Nos. 11 to 14 unload, sort, and store powder charges.

(4) Nos. 15 to 18 unload, sort, and store projectiles.

(5) The projectiles, powder, primers, and fuzes will be located as directed by the executive. A suggested arrangement is shown in figure 41.

49. POSTS OF CANNONEERS, HOWITZER PREPARED FOR ACTION. a. The howitzer being assembled and prepared for action, personnel take posts as follows (fig. 41):

(1) *Chief of section.* The chief of section is free to move where he can best control the service of the piece, hear commands, and perform his duties effectively. A convenient post is about halfway up the right trail.

(2) *Gunner.* Seated in the gunner's seat, facing the panoramic telescope mount.

(3) *No. 1.* On the front platform, facing the elevation quadrant.

(4) *No. 2.* On the front platform, facing the rear elevating handwheel.

(5) *No. 3.* On the front of the front platform, facing to the rear.

(6) *No. 4.* On the left rear platform, facing the breech.

(7) *No. 5.* On the right rear platform, facing the breech.

(8) *Nos. 6 and 7.* One pace behind the trail tie beam and covering Nos. 4 and 5 respectively, facing to the front.

(9) *Nos. 8 and 9.* One pace behind and covering Nos. 6 and 7 respectively, facing to the front.

(10) *No. 10.* At the fuze and primer pit, facing to the front.

(11) *Nos. 11 and 12.* At the powder pit, facing to the front.

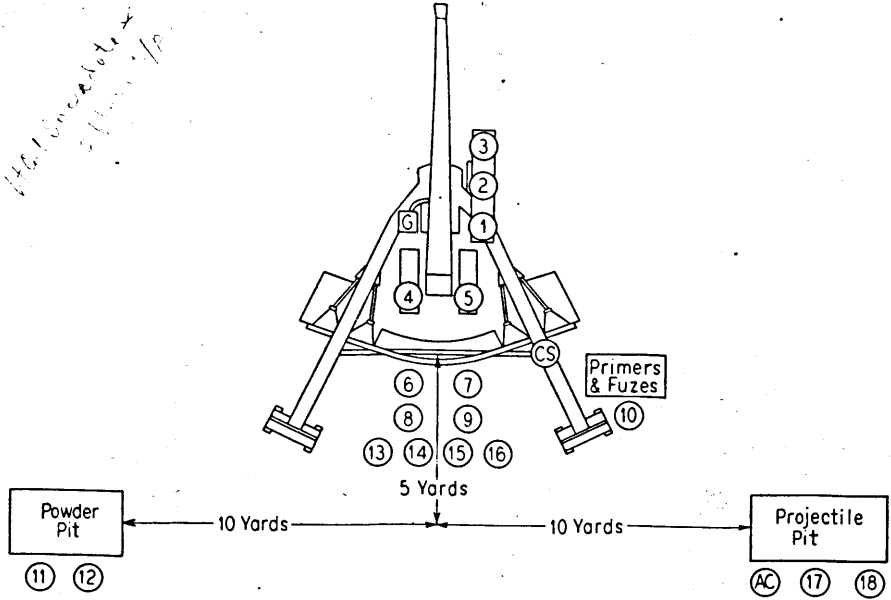


Figure 41. Posts of cannoneers, howitzer prepared for action

(12) *Nos. 13 to 16.* In line one pace behind and centered on Nos. 8 and 9, facing to the front.

(13) *Nos. 17 and 18.* At the projectile pit, facing to the front.

(14) *Ammunition corporal.* At the projectile pit, facing to the front.

(15) *Artillery mechanic.* Free to move where he can best watch and check the functioning of the materiel.

b. All cannoneers (except the gunner) stand at attention at their posts facing the prescribed direction. Higher numbered cannoneers, if present, take posts as prescribed by the chief of section.

c. In order to practice the cannoneers in all the duties connected with the service of the piece, to relieve cannoneers who carry projectiles, and to lend variety to the drill, the posts of the individual cannoneers should be changed frequently.

50. TO SECURE THE PIECE. a. If during training, the howitzer is left in the firing position it must be protected from weather. The command is: SECURE PIECE.

b. At this command, the howitzer is cleaned and lubricated and the members of the section perform the following duties (each cannoneer takes his post upon completion of his duties):

(1) *Chief of section. (a)* Supervises the work of the cannoneers.

(b) Inspects the materiel and, when the operations have been completed, reports to the executive, "Sir, No. (so-and-so) in order."

(2) *Gunner. (a)* Brings howitzer to center of traverse.

(b) Sets all scales of the panoramic telescope at zero, removes the telescope from its mount and places it in its carrying case. Closes the covers of the leveling bubbles on the mount.

(c) Places the cover on the panoramic telescope mount.

(3) *No. 1. (a)* Directs Nos. 2 and 3 in depressing the howitzer to minimum elevation.

(b) Installs the cover on the elevation quadrant.

(c) Locks the elevating brake in the "on" position.

(4) *No. 2. (a)* Assists No. 3 to depress the howitzer to minimum elevation.

(b) Installs the muzzle cover.

(5) *No. 3.* Assisted by No. 2, depresses the howitzer to minimum elevation.

(6) *No. 4. (a)* Places the oiler, primer seat cleaning reamer, vent cleaning bit, and lanyard in the section chest.

(b) Assisted by No. 5, closes the breech and installs the breech cover.

(c) Locks the percussion hammer in the traveling position if the M1 firing mechanism is used.

(7) *No. 5. (a)* Assists No. 4 to close the breech.

(b) Closes the firing lock. If M1 firing mechanism is used, inserts mechanism.

(c) Assists No. 4 to install the breech cover.

(d) Returns unused primers to the primer pit.

(8) *Nos. 6 to 9.* Disassemble and put away the rammer staff and sponge.

(9) *No. 10.* Covers and secures the primers and fuzes.

(10) *Nos. 11 to 14.* Cover and secure powder charges. Put away dummy propellant used in drill.

(11) *Nos. 15 to 18.* Cover projectiles with a paulin or put away dummy projectile used in drill.

(12) *Artillery mechanic (a)* Supervises the cannoneers in cleaning and lubricating the howitzer. Makes the inspections prescribed in TM 9–341. (TM 9–336).

(b) Takes steps to have any damaged item of equipment repaired.

(c) Checks accessories and tools and stores them in the chests provided.

SECTION X
DUTIES IN FIRING

51. GENERAL. In general, the duties in firing are as follows (see figs. 42 to 48 incl.):

a. The chief of section is responsible that all duties are properly performed, all commands executed, and all safety precautions observed.

b. The gunner sets the deflection, levels the telescope mount, lays the piece for direction and calls, "Ready."

c. No. 1 operates the elevation quadrant; operates the elevation hand brake; assisted by Nos. 2 and 3, lays the piece for elevation; calls, "Set."

d. No. 2 operates the rear elevating handwheel, assists No. 3 in operating the crank handle on the front elevating handwheel, and assists No. 1 in laying the piece for elevation.

e. No. 3, assisted by No. 2 when necessary, operates the crank handle on the front elevating handwheel. He measures the length of recoil when so directed by the chief of section.

f. No. 4, assisted by No. 5, opens and closes the breech and seats the loading ramp in the breech recess, attaches the lanyard; if the M1 firing mechanism is used, releases the percussion hammer safety latch; calls, "Loaded."

g. No. 5 assists No. 4 in opening and closing the breech and seating the loading ramp in the breech recess; checks the powder charge after it is placed on the loading ramp; inserts primers into the firing lock; closes the firing lock; and operates the firing lock handle to extract the primer after fir-

ing, or removes and inserts the M1 firing mechanism, if used.

h. No. 6 checks to be sure that the bore is clear. Assisted by No. 7, he places the loading ramp in position for loading, checks alinement of the loading ramp; assisted by Nos. 7, 8, 9, 15, and 16, rams projectiles; commands HOME—READY, RAM, in loading the projectile; assisted by Nos. 7, 8, and 9, inserts propelling charges; and fires the piece.

i. No. 7 assists No. 6 in placing the loading ramp in the loading position; assisted by Nos. 6, 8, 9, 15, and 16, rams projectiles; and assisted by Nos. 6, 8, and 9, inserts propelling charges.

j. Nos. 8 and 9 assist Nos. 6, 7, 15, and 16 in ramming projectiles and assist Nos. 6 and 7 in inserting propelling charges.

k. No. 10 fuzes projectiles and sets fuzes.

l. No. 11, assisted by No. 12, prepares powder charges; records powder temperature, when so directed by the chief of section.

m. No. 12 assists No. 11 to prepare powder charges; carries prepared charges to the loading ramp.

n. Nos. 13 to 16 carry projectiles from the projectile pit to the loading ramp. Nos. 15 and 16 assist Nos. 6 to 9 in ramming projectiles.

o. Nos. 17 and 18 prepare projectiles.

p. The ammunition corporal is responsible that ammunition is properly stored, handled, and prepared for firing; supervises the ammunition squad; has general charge of supply of ammunition to the howitzer.

q. The artillery mechanic reports the length o recoil and the position of the replenisher pisto and watches the functioning of the howitzer.

52. CHIEF OF SECTION. a. *Enumeration of duties.* (1) To measure the site to the mask.

(2) To indicate to the gunner the aiming poin or the referring point.

(3) To follow fire commands.

(4) To indicate when the piece is ready to fire

(5) To give the command to fire.

(6) To report errors or other unusual incident of fire to the executive.

(7) To conduct prearranged fire schedules.

(8) To record basic data.

(9) To observe and check frequently the func tioning of the materiel.

(10) To inspect fuzes before loading.

(11) To assign duties when firing with reduce personnel.

(12) To verify the adjustment of the sighting equipment.

b. *Detailed description of certain duties.* (1) *To measure site to mask. (a)* When the height of the mask warrants it, the command will be: MEASURE THE SITE TO THE MASK. The chief of section sighting along the lowest element of the bore, has Nos. 2 and 3 operate the elevating mechanism until the line of sight just clears the crest. He then has No. 1 measure, by means of the elevation quadrant, the elevation at which the piece is laid. The chief of section checks the reading on the elevation quadrant and reports to the executive, "Site to the mask, No. (so-and-so), (so much)."

(b) When the executive announces the minimum quadrant elevation, the chief of section records it in a notebook and has No. 1 chalk it on the side of the howitzer.

(2) *To indicate to gunner the aiming point, referring point, or target.* Whenever an aiming point, a referring point, or a target has been designated by the executive, the chief of section will make sure that he has properly identified the point in question. He will then indicate it to the gunner. If there is any possibility of misunderstanding, the chief of section will turn the sight until the horizontal and vertical hairs are on the point designated.

(3) *To follow fire commands.* The chief of section will follow the fire commands mentally. He will not repeat the commands, but will be prepared to give any element of the last command to any cannoneer who has failed to hear it.

(4) *To indicate when the piece is ready to fire.* When arm signals between the chief of section and the executive can be observed, the chief of section will extend his right arm vertically as soon as the gunner has called "Ready," as a signal to indicate that the piece is ready to fire. When arm signals cannot be observed, the chief of section reports orally to the executive, "No. (so-and-so) ready."

(5) *To give command to fire.* When No. 6 can see arm signals made by the chief of section, the chief of section will give the command to fire by dropping his right arm sharply to his side. When arm signals cannot be used, the command NO. (SO-AND-SO) FIRE will be given orally. *The chief of section will not give the signal or command to fire until all the cannoneers are in safe positions.*

(6) *To report errors and other unusual incidents of fire to executive.* If for any reason the piece cannot be fired, the chief of section will promptly report that fact to the executive and the reason; for example, "No. (so-and-so) out, misfire." Whenever it is discovered that the piece has been fired with an error in laying, the chief of section will report that fact at once; for example, "No. (so-and-so) fired 40 mils right." Whenever the gunner reports that the aiming posts are out of alinement with the sight, the chief of section will report that fact and request instructions. Likewise, other unusual incidents that affect the service of the piece are promptly reported by the chief of section.

(7) *To direct washing of bore.* During lulls in firing and at least every 20 rounds, the chief of section will direct the cannoneers to wash the bore. For this operation, it is necessary to assemble the chamber brush with all sections of the rammer staff. Water should be used freely to assist in cooling the howitzer.

(8) *To conduct prearranged fire schedules.* Whenever the execution of prearranged fires is ordered, the chief of section will conduct the fire of his section in strict conformity to the schedule prescribed.

(9) *To record basic data.* Data of a semipermanent nature will be recorded in a notebook by the chief of section. This includes such data as minimum elevations; base deflections, including aiming points used; prearranged fires when prepared schedules are not furnished; safety limits in elevation and deflection; number of rounds fired,

with the date and hour; and calibration corrections when appropriate.

(10) *To observe and check functioning of materiel.* The functioning of all parts of the materiel will be observed closely during firing. Before the piece is fired, the chief of section verifies that the artillery mechanic has checked the recoil and counter-recoil systems. Any evidence of trouble is reported promptly to the executive.

(11) *To assign duties when firing with reduced personnel.* Whenever the personnel of the section serving the piece are temporarily reduced in number below that indicated in this manual, the chief of section will make such redistribution of duties as will best facilitate the service of the piece.

(12) *To verify adjustment of sighting equipment.* See TM 9–341 (TM 9–336) and paragraph 82 of this manual.

53. GUNNER. a. *Enumeration of duties.* (1) To set or change the deflection.

(2) To level the telescope mount.

(3) To lay for direction.

(4) To call, "Ready."

(5) To refer the piece.

(6) To record base deflection.

(7) To measure a deflection.

b. *Detailed description of certain duties.* (1) *To set or change deflection. (a) To set deflection.* At the command, for example, DEFLECTION 483, the gunner first sets the azimuth micrometer index (movable) to its zero position and zeros the azimuth micrometer if it is not already so set. Using his left hand, he pushes the throw-out lever, and with

his right hand turns the rotating head until the numeral 4 on the azimuth scale appears opposite the azimuth scale index. He then grasps the azimuth worm knob with his right thumb and forefinger and turns the knob clockwise until the numeral 83 on the azimuth micrometer appears opposite the azimuth micrometer index (movable). The line of sight now makes a horizontal angle of 483 mils with the 0–3200 line of the panoramic telescope. The gunner now turns the azimuth micrometer index (movable) opposite an even ten graduation on the micrometer in preparation for setting off the next shift. This last movement does not change the setting of the azimuth scales.

(b) To change deflection. The gunner should be trained always to grasp the azimuth worm knob with his right thumb and forefinger. He also should be taught that moving his thumb upward (clockwise) will cause the deflection to increase, and the tube must be traversed to the left to bring the line of sight back on the aiming point or aiming posts. Similarly, he should be taught that moving his thumb downward (counter clockwise) causes the deflection to decrease and results in a right shift in the tube when the weapon is relaid. The deflection having been set at 483 mils, if a subsequent shift of RIGHT 55 is commanded, the gunner moves his right thumb downward (counter clockwise) on the azimuth worm knob until the deflection is decreased 55 mils. If the gunner had set the azimuth micrometer index (movable) opposite 80 on the micrometer before the deflection change was given, the numeral 25 would appear opposite the azimuth micrometer index

(movable) after the change. However, the true reading on the azimuth scale is obtained by turning the movable index back to its zero position and noting the reading on the scales, in this case (483 mils — 55 mils=) 428 mils. The azimuth micrometer index (movable) permits the gunner to start from an even ten graduation each time a shift is given. The gunner, having set off R55, would move the azimuth micrometer index (movable) opposite 20 or 30 on the micrometer in preparation for the next shift. Should the command be LEFT (SO MUCH), the gunner changes the setting by moving his thumb upward (clockwise) on the azimuth worm knob, thus increasing the deflection.

(2) *To level telescope mount.* The gunner first uncovers the levels by revolving the covers downward with his right thumb. He then operates the leveling worms until the bubbles are centered.

(3) *To lay for direction. (a)* The telescope mount having been leveled and the deflection set, the gunner brings the vertical hair of the telescope on the aiming point by traversing the piece after No. 4 has called, "Loaded."

(b) A procedure to insure accuracy: To take up lost motion, the final movement of the traversing handwheel should cause the vertical hair of the telescope to approach the aiming point from the left. The gunner should habitually lay with the vertical hair of the telescope on exactly the same part of the aiming point for each round.

(4) *To call, "Ready."* The piece having been laid for direction and elevation, and No. 1 having

called "Set," the gunner verifies the laying, moves clear of the telescope and calls "Ready," to indicate that his piece is ready to be fired. (See fig 48.)

(5) *To refer the piece.* The piece having been laid for direction, to refer the piece, the command is: 1. AIMING POINT (SO-AND-SO), 2. REFER. Without disturbing the laying of the piece, the gunner brings the vertical hair of the telescope on the new aiming point (referring point). He then reads and announces the deflection thus set and records the deflection and the referring point on the side of the howitzer. Two referring points usually are used, one for day and another for night. A referring point should be at least 100 yards from the telescope. Frequently it will be necessary to use the aiming posts as referring points, particularly for night use.

(6) *To record base deflection.* At the command RECORD BASE DEFLECTION, the gunner records the deflection set on his telescope upon some convenient part of the carriage or upon a data board.

(7) *To measure a deflection.* The command is: 1. AIMING POINT (SO-AND-SO), 2. MEASURE THE DEFLECTION. The piece having been established in direction, the gunner centers the bubbles and turns the telescope head until the vertical hair is on the aiming point. He then reads and announces the deflection.

54. NO. 1. a. Enumeration of duties. (1) To cross level the elevation quadrant.

(2) To lay the piece for elevation with the elevation quadrant.

(3) To operate the elevation brake.

(4) To call, "Set."

b. *Detailed description of certain duties.* (1) *To cross level elevation quadrant.* No. 1 turns the cross-leveling knob until the cross-level bubble is centered. After the howitzer is laid for elevation and before making the final check of the elevation bubble, he will verify the cross leveling.

(2) *To lay the piece for elevation.* No. 1 grasps the handle of the elevation micrometer between the thumb and forefinger of his right hand and turns it until the announced elevation is set off. For example, if the command is ELEVATION 532, No. 1 will turn the micrometer until the index in the window of the elevation quadrant is between 5 and 6 and the graduation corresponding to 32 mils is directly opposite the micrometer index.

(3) *To operate elevation brake.* After No. 4 has called, "Loaded," the announced elevation having been set, No. 1 depresses the elevation brake lever and directs Nos. 2 and 3 in elevating the piece until the longitudinal bubble is centered. No. 1 then releases the lever, locking the mechanism at the correct elevation. Before he depresses the brake lever, No. 1 makes sure that Nos. 2 and 3 are clear of the crank handle on the front elevating hand wheel.

(4) *To call, "Set."* When all of the above operations have been completed, No. 1 calls, "Set" sharply to notify the gunner that he is finished.

Figure 42. Preparing projectile.

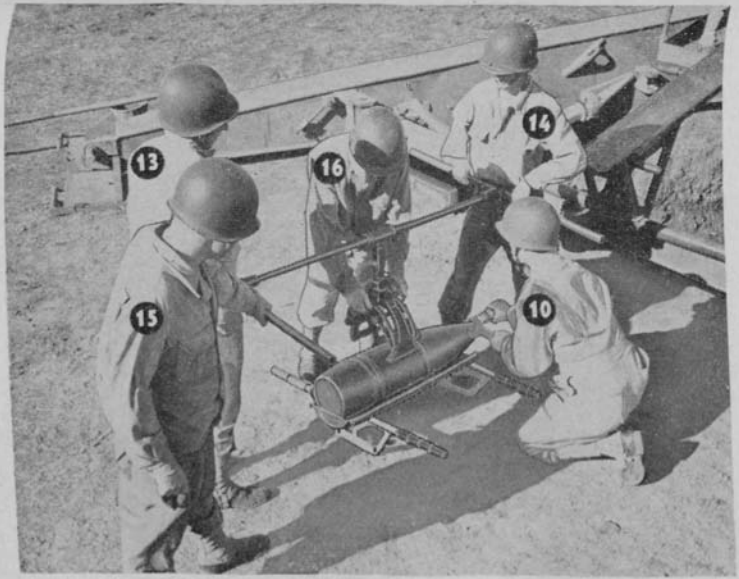


Figure 43. Fuzing projectile.

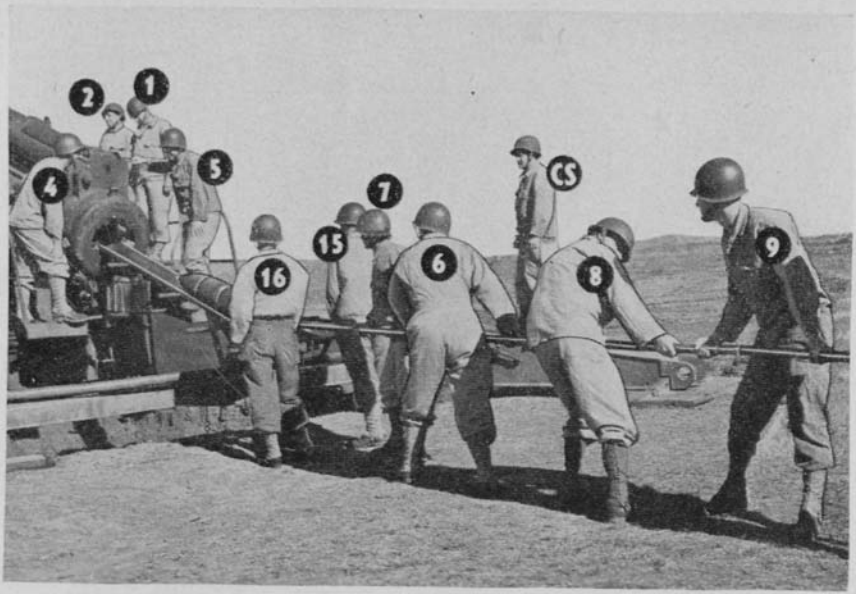


Figure 44. Pushing projectile onto loading ramp.

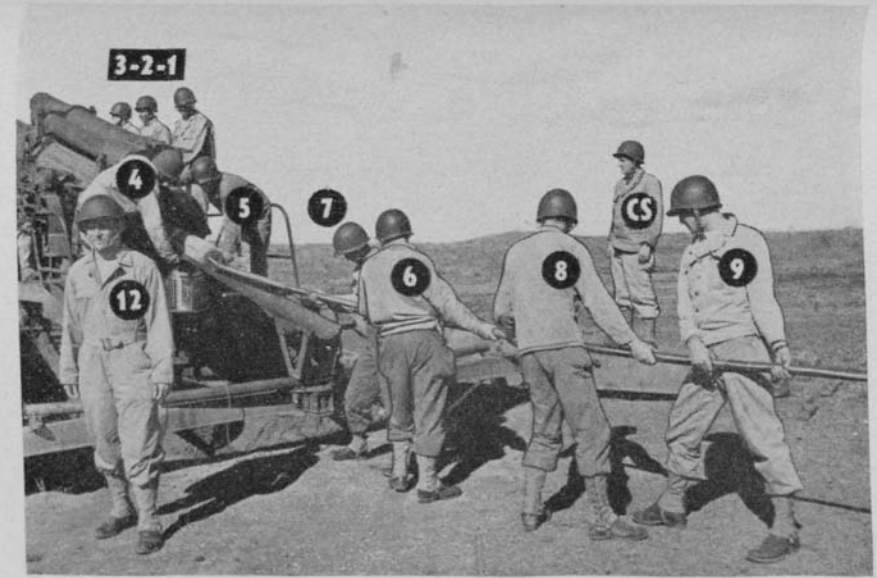


Figure 45. Ramming projectile.

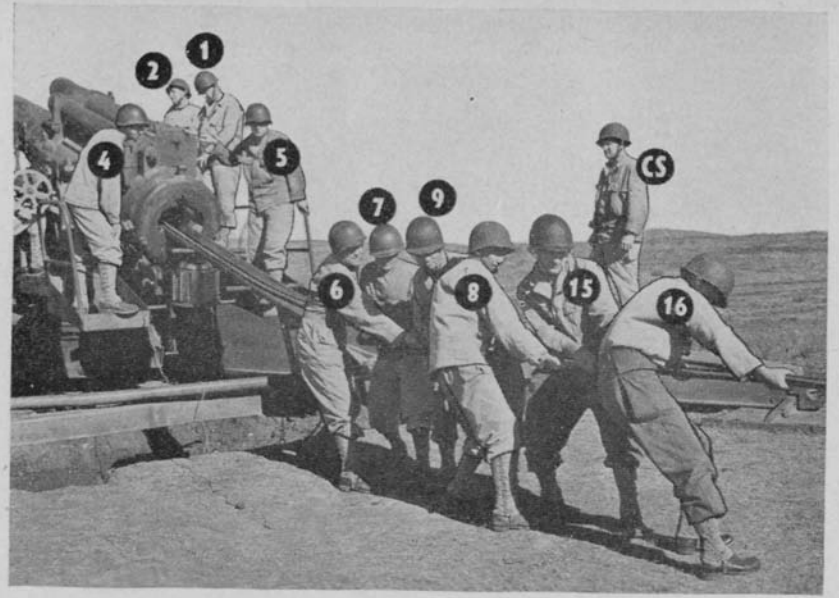


Figure 46. Pushing powder into chamber.

Figure 47. Priming the piece.

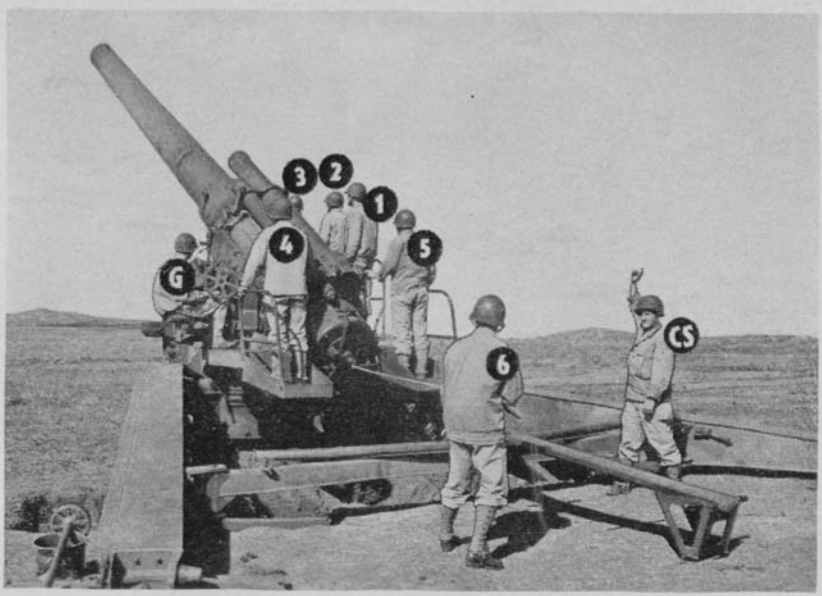


Figure 48. Piece laid and ready to fire.

55. NO. 2. a. Enumeration of duties. (1) To operate the rear elevating handwheel.

(2) To assist No. 3 in operating the crank handle on the front elevating handwheel.

(3) To assist No. 1 in laying the howitzer for elevation.

b. *Detailed description of certain duties. To operate elevating handwheel.* No. 2 will stand facing the handwheel and elevate or depress the piece as directed by hand signals from No. 1.

56. NO. 3. a. Enumeration of duties. (1) To operate the crank handle on the front elevating handwheel.

(2) Measure the length of recoil.

b. Detailed description of certain duties. (1) No. 3 stands facing to the rear and, assisted by No. 2 if necessary, turns the crank handle as directed by hand signals from No. 1.

(2) When directed by the chief of section, No. 3 measures the length of recoil. (TM 9–341 (9–336).

57. NO. 4. a. Enumeration of duties. (1) To open and close the breech.

(2) To clean the breech after each round.

(3) To place the loading ramp in the breech recess.

(4) To attach the lanyard.

(5) To call, "Loaded."

(6) To release the percussion hammer safety latch, when M1 firing mechanism is used.

b. Detailed description of certain duties. (1) *To open and close breech.* To open the breech, No. 4 depresses the operating lever latch plunger with the

thumb of his right hand, and swings the operating lever down through the full range of its travel. Holding the breechblock carrier handle in his left hand, No. 4 allows the breechblock carrier to swing down until it is locked in the open position. He then checks to see that the breechblock locking plunger has locked the rotating breechblock to the carrier. To close the breech, No. 4 grasps the breechblock carrier handle in his right hand, depresses the breechblock slightly, pushes the breechblock carrier latching lever with his left knee, and, assisted by No. 5, swings the breech shut. No. 4 then swings the breechblock operating lever to the closed position, and checks to see that it is latched.

(2) *To clean breech after each round.* Before the breech is opened, No. 4 will clean the primer seat with the cleaning reamer provided for that purpose. He will keep a piece of water-saturated cloth and swab the face of the obturator spindle after each round. In addition, he will pass the vent cleaning bit through the obturator spindle vent several times. From time to time and as necessary No. 4 wipes the mushroom head and threaded sectors of the breech recess and breechblock with a cloth slightly dampened with oil, engine, OE 10 or OE 30 and oils moving parts of the breech assembly.

(3) *To attach lanyard.* No. 4 holds the lanyard in his right hand, and snaps it onto the trigger of the firing lock. He then checks to see that the trigger is in the position which will afford smooth operation when the lanyard is pulled. When the M1 firing mechanism is used, No. 4 holds his left

hand over the percussion hammer and snaps the lanyard into position with his right hand. Care must be taken to keep enough slack in the lanyard to prevent accidental firing of the piece as it is elevated. When not in use the lanyard will be attached to a convenient place on the left platform.

(4) *To call, "Loaded."* As soon as he has attached the lanyard, No. 4 calls, "Loaded" to inform No. 1 that the piece is ready to be laid for elevation.

(5) *To release percussion hammer safety latch.* Having called "Loaded," No. 4 immediately releases the percussion hammer safety latch.

58. NO. 5. a. Enumeration of duties. (1) To assist No. 4 in opening and closing the breech.

(2) To assist No. 4 in placing the loading ramp in the breech recess.

(3) To check the powder charge after it is placed on the loading ramp.

(4) To examine primers for cleanliness and for the closed seal at the open end.

(5) To insert primers into the firing lock or firing mechanism.

(6) To close and open the firing lock, or insert and remove the firing mechanism and remove fired primers from the firing mechanism, if the M1 firing mechanism is used.

b. Detailed description of certain duties. (1) *To assist No. 4 in opening and closing breech.* No. 5 stands facing the breech and operates the breechblock carrier handle with his left hand.

(2) *To check powder charge after it is placed on loading ramp.* After No. 12 places the prepared pow-

der charge on the loading ramp, No. 5 examines it to make sure that it is the proper charge, that the igniter pad is to the rear, and that the igniter pad protector cap is removed. After the charge has been pushed into the powder chamber by Nos. 6 to 9, No. 5 checks to be sure the igniter pad is not more than 2 or 3 inches beyond the gas check seat. (See fig. 46.)

(3) *To insert primers into firing lock or firing mechanism.* No. 5 removes a primer from his primer belt, inspects it, and inserts it as far as it will go into the primer seat of the firing lock M17. If the M1 firing mechanism is used, No. 5 holds the firing mechanism in his left hand with the primer holder uppermost. With his right hand he inserts the base of a new primer into the holder, and slides it into its proper seat.

(4) *To close firing lock. The firing lock will not be closed until the breechblock is completely closed and locked.* No. 5 grasps the firing lock operating handle with his left hand and pushes it to the left until the firing lock is completely closed. (See fig. 47.)

(5) *To insert and seat firing mechanism. The firing mechanism will not be inserted until the breechblock is completely closed and locked.* No. 5 inserts the firing mechanism into the firing mechanism housing, taking care that the front end of the primer has entered the primer seat in the obturator spindle plug. He then seats the mechanism by turning the handle in a clockwise direction until it has engaged the latch. It is important to make sure that the mechanism is *screwed home and latched in position.* If the piece is fired without this having been done, damage to the breechblock and injury to person-

nel may result. Should a primer be slightly oversize or the primer seat dirty, the mechanism will stick before it has been fully seated. The mechanism should not be seated by force, but it should be removed and the primer seat cleaned or another primer inserted. Unfired primers to be discarded are turned over to the ammunition corporal.

(6) *To remove fired primers from firing mechanism.* No. 5 holds the firing mechanism in his left hand with the primer holder facing him. He grasps the primer with his right hand and slides the base of the primer out of the primer holder.

59. NO. 6. a. Enumeration of duties. (1) Assisted by No. 7, to place the loading ramp in position.

(2) To ram projectiles.

(3) To insert powder charges.

(4) To give the commands for ramming.

(5) To fire the piece.

(6) To swab the powder chamber.

b. Detailed description of certain duties. (1) *To place loading ramp in position.* No. 6 grasps the two rear handles of the loading ramp and No. 7 grasps the two front handles of the ramp initially. They extend it over the recoil pit so that Nos. 4 and 5 may reach the front handles and, with No. 7 shifting his grip to the rear handles, Nos. 4 and 5 guide the ramp into the breech recess. The rear end of the loading ramp is then placed on the loading ramp rack in prolongation of the axis of the bore. When not in use, the loading ramp is placed to the

rear of the recoil pit with its forward end resting on the loading ramp rack.

(2) *To ram projectiles* (see figs. 44 and 45). Nos. 6 to 9 place themselves in staggered positions along the rammer staff, Nos. 6 and 8 on the left and Nos. 7 and 9 on the right. The rammer head is placed against the base of the projectile and the projectile pushed off the loading tray onto the loading ramp. As soon as the projectile is on the loading ramp, Nos. 15 and 16 leave the loading tray and take positions along the rammer staff, No. 15 on the right and No. 16 on the left. No. 6 then commands: HOME. The projectile is pushed up the loading ramp and into the powder chamber. The cannoneers then turn their backs to the breech, lean forward, and extend their arms along the rammer. At the commands: READY—RAM from No. 6, they throw all their weight to their rear (toward the breech), at the same time using their arms to add power to the stroke. Power and uniformity in ramming are essential to the accuracy of fire. Firm seating of the projectile is necessary to prevent its slipping back into the powder chamber and resting on the charge, especially at high elevations.

(3) *To insert powder charges.* After the prepared powder charge has been placed on the loading ramp by No. 12, Nos. 6 to 9 push it into the powder chamber with the rammer. Care must be taken with reduced charges to see that the base of the charge is not pushed more than 2 or 3 inches beyond the gas check seat. (See fig. 46.)

(4) *To fire the piece.* At the chief of section's signal or command: NO. (SO-AND-SO) FIRE, No.

6 grasps the handle of the lanyard with his right hand and without raising his hand pulls the lanyard. Using the firing lock M17, he pulls steadily without jerking. With the firing mechanism M1, he pulls strongly with a quick movement prolonged sufficiently to insure the hammer's hitting the striker. *Under no circumstances will No. 6 grasp the lanyard until the chief of section so directs.*

(5) *To swab powder chamber.* After each round Nos. 6 to 9 swab out the powder chamber immediately after Nos. 4 and 5 open the breech. The chamber brush is dipped in water, and the rear of bore, up to and including the forcing cone, is swabbed. No. 6 inspects for damage or burning fragments in the bore; fragments are removed before firing, and damage reported to chief of section.

60. NO. 7. a. Enumeration of duties. (1) To assist No. 6 in placing the loading ramp in position.

(2) To ram projectiles.

(3) To insert powder charges.

(4) To swab the powder chamber.

b. Detailed description of certain duties. See paragraphs 59b(1), (2), (3), and (5).

61. NOS. 8 AND 9. a. Enumeration of duties. (1) To ram projectiles.

(2) To insert powder charges.

(3) To swab the powder chamber.

b. Detailed description of certain duties. See paragraphs 59 b(2), (3), and (5).

62. NO. 10. a. Enumeration of duties. (1) To fuze projectiles.

(2) To set fuzes.

(3) To remove fuzes from projectiles.

b. Detailed description of certain duties. (1) *To fuze projectiles. (a) Fuzes M51 and M67.*

1. 240-mm howitzer. The projectile having been placed on the loading tray by Nos. 13 to 16, No. 10 unscrews the eyebolt lifting plug from the fuze socket, removes the booster cotter pin from the designated fuze, and screws the fuze home by hand. The fuze is given its final seating by the use of the fuze wrench. No great force should be used. If there is any difficulty in screwing the fuze home, the fuze socket threads should be inspected for dirt or rust, and cleaned if necessary. If the fuze still fails to seat, another fuze should be tried. If it also fails to seat, the projectile should be rejected.

2. 8-inch gun. Projectiles are shipped fuzed with M51, 3 series fuzes; therefore, there is no lifting plug or booster cotter pin to be removed. To fuze projectile with fuze, M67 No. 10 performs the following steps:

(a) Unscrews the delay head in the nose of the windshield, loosens the setscrew in the base of the windshield, and removes the windshield.

(b) Loosens the setscrew in the nose of the shell and unscrews the fuze M51.

(c) Removes the cotter pin and ring from the booster which is assembled to the M67 fuze.

(d) Screws the fuze with booster into the projectile and tightens it with a fuze wrench.

(e) Tightens the setscrew in the nose of the shell.

(f) Removes the safety pull wire.

(g) Sets the fuze for the desired time.

(h) Assembles the inert delay head in the nose of the windshield using the retaining screw.

(i) Assembles the windshield to the shell and tightens the setscrews in the base of the windshield.

(b) M78 concrete piercing fuze.

1. 240-mm howitzer. No. 10 removes the eyebolt lifting plug from the fuze socket, removes the safety pin from the M25 booster, and screws the booster into the booster cavity in the shell. He tightens the booster firmly with the booster end of the wrench for M78 fuzes. No. 10 then screws the fuze into the fuze cavity and tightens securely with the fuze end of the wrench.

2. *8-inch gun.* No. 10 performs the following operations:

(a) Unscrews the delay head in the nose of the windshield, loosens the setscrew in the base of the windshield, and removes the windshield.

(b) Loosens the setscrew in the nose of the shell and unscrews the fuze M51.

(c) Removes the safety pin from booster and, using fuze wrench, screws the booster into the booster cavity in the shell.

(d) Screws M78 fuze into the fuze cavity and tightens it with wrench.

(e) Tightens the setscrew in the nose of the shell.

(f) Assembles the inert delay head in the nose of the windshield using the retaining screw.

(g) Assembles the windshield to the shell and tightens the setscrew in the base of the windshield.

(2) *To set fuzes. (a) Fuze M51.*

1. *240-mm howitzer.* When FUZE QUICK is designated, No. 10 will verify the superquick setting. When FUZE DELAY is designated, he will use a screw driver to turn the setting sleeve

perpendicular to the long axis of the fuze.

2. *8-inch gun.* When FUZE QUICK is designated, No. 10 will remove the inert delay head from the nose of the windshield, screw the superquick head into place, and tighten it with a fuze wrench. He will then check the setscrew in the base of the windshield for tightness. When FUZE DELAY is designated, no changes need to be made in the projectile and fuze as shipped. No. 10 will check the delay head and the setscrew in the base of the windshield for tightness.

(b) Fuze M67.

1. Using fuze setter M23, No. 10 releases the corrector wing nut marked *C* and grasping the handle turns the body and time scale until the index on the time scale is opposite the announced corrector setting on the corrector scale. He then clamps the corrector wing nut, being careful not to disturb the corrector setting. He then releases the time wing nut marked *T*, and grasping the handle turns the body until the index on the body is opposite the announced time on the time scale. He then locks the wing nut being careful not to disturb the setting. For accuracy, the operator looks squarely at the scales and indexes. After the settings have been made, he

carefully places the fuze setter over the fuze and turns it in a clockwise direction until the notch in the time ring on the fuze engages the stop in the setting ring in the fuze setter and then turns the handle to the horizontal position. He then pushes the fuze setter down until the notch fully engages the stop and turns it until the pawl in the adjusting ring assembly drops into the notch in the fixed fuze ring, which prevents further turning and indicates that the fuze is set. He then lifts the fuze setter from the fuze without rotating it further. ***Caution: Rotate the fuze setter only in a clockwise direction. Incorrect settings and loosening of the fuze from the projectile may result from failure to obey this precaution. Fuze setter M23 is used with 75-second fuzes only.***

2. Using fuze setter M14, No. 10 engages the key on the wrenchtype fuze setter in the notch of the setting ring and rotates the setting ring until the fuze setting is opposite the index. When using fuze setter M14, the battery executive determines the fuze setting required from time and corrector commands given by the officer conducting fire. He adds algebraically the time announced and the difference from normal corrector (30), in tenths

of seconds. The result is given to the gun sections as the command for time setting. Corrector is omitted from the executive's command.

Note. An increase of one point in corrector has the effect of decreasing the time of burning one tenth of a second and vice versa. **Example:** A corrector of 35 requires a decrease in the time of burning of 0.5 of a second. A fuze which has been set can be reset to any other time or to SAFE (S) by engaging the key on the fuze setter in the setting ring and rotating the setting ring until the new time or the S is opposite the index.

(3) *To remove fuzes from projectiles.* If, for any reason, a projectile which has been fuzed is not to be fired, the fuze will be removed. The operation of inserting a fuze is reversed. Combination superquick and delay fuzes are reset to superquick. Time fuzes are reset to *SAFE (S),* using the fuze setter, and the safety pull wires are replaced prior to removing the fuzes. Booster cotter pins are then replaced. The eyebolt lifting plugs are replaced in the fuze socket of the projectiles.

63. NOS. 11 AND 12—Enumeration of duties—to prepare powder charges. a. 240-mm howitzer. The propelling charge for the 240-mm howitzer M1 is of the base-and-increment type, and consists of a base section and three increments, permitting four zones of fire. The base section includes an igniter pad on the rear, which is dyed red and contains black powder. Four tying straps are sewed to the base section and provide a means of attaching the increments to the base section. In order to protect the igniter pad, an igniter protector cap is slipped over the rear end of the base section and secured

with a drawstring. This cap must be removed before the charge is loaded. Charges are packed in airtight metal containers, one complete charge in each container. The containers should not be opened until just before using the charge. The command, CHARGE 4, indicates the use of the full charge; CHARGE 2 indicates the base section and first increment; etc. When the charge has been prepared, No. 12 carries it to the loading ramp. After being placed on the ramp, the charge is straightened into its cylindrical form. Unused increments are disposed of as directed by the executive.

b. 8-inch gun. Two propelling charges are supplied for use with the 8-inch gun M1: the M9 or green bag charge and the M10 or white bag charge. Each charge is made up of a base charge and an increment, and thus each charge permits two zones of fire. The base charge, green bag, is referred to as reduced charge. The base charge, white bag, produces the same muzzle velocity as the base charge and increment, green bag, and both are referred to as normal charge. The base section and increment, white bag, is referred to as supercharge. In no case will either the base or increment of either charge be used with the base or increment of the other charge. On the end of the base section of each charge there is a red igniter pad which contains black powder. Four tying straps are sewed to the base section and provide a means of attaching the increment to the base section. An igniter protector cap is placed over the exposed igniter to protect it during storage and shipment. This cap must be removed before

the charge is loaded. Charges are packed in air-tight metal containers, one complete charge in each container. The container should not be opened until just before using the charge. Commands for the various charges are given as follows: REDUCED CHARGE, NORMAL CHARGE GREEN BAG, NORMAL CHARGE WHITE BAG, SUPERCHARGE. When the charge has been prepared, No. 12 carries it to the loading ramp. Unused increments are disposed of as directed by the executive.

64. NOS. 13 AND 14. a. Enumeration of duties. (1) To carry projectiles to the piece.

(2) To return shell tongs to the projectile pit.

b. Detailed description of certain duties. To carry projectiles to the piece. The projectile having been prepared by Nos. 17 and 18, Nos. 13 and 14 place the shell tongs over the projectile. No. 16 turns the locking handle up, grasps the shell tongs by the handles, and lowers the tongs on the projectile. He turns the locking handle down to lock the shell-tong grips around the projectile and calls, "Locked." Nos. 14 and 16 on the left and Nos. 13 and 15 on the right, then carry the projectile to the rear of the howitzer and place it on the loading tray. No. 16 removes the shell tongs from the projectile and Nos. 13 and 14 place the shell tongs to the right of the loading tray. After No. 10 has fuzed the projectile and set the fuze, Nos. 13 to 16 raise the loading tray and place the front edge on the rear of the loading ramp. Nos. 13 and 14 release the front handles and return

the shell tongs to the projectile pit. Nos. 15 and 16 hold the rear of the loading tray until the projectile has been pushed onto the loading ramp by Nos. 6 to 9. (See fig. 44.)

65. NOS. 15 AND 16. a. Enumeration of duties. (1) To carry projectiles to the piece.

(2) To ram projectiles.

b. Detailed description of certain duties. (1) *To carry projectiles to the piece* (see par. 64).

(2) *To ram projectiles.* After the projectile is pushed off the loading tray, No. 16 places the loading tray to the left rear, and then Nos. 15 and 16 hasten to the end of the rammer staff where they take staggered positions behind Nos. 6 to 9. (See par. 59b (2).)

66. NOS. 17 AND 18. a. Enumeration of duties. To prepare projectiles.

b. Detailed description of duties. No. 18, assisted by No. 17, verifies the type, weight, and lot number of each projectile and examines it carefully for defects. The rotating band will be inspected with special care, and if any burrs are found they will be removed with a file. The projectile is then stood upright on its base and the entire surface cleaned with a damp cloth. Should any material length of time intervene between cleaning the projectile and inserting it into the piece, the projectile must be reinspected before loading to see that it is free from sand or dirt. Any sand or dirt on the projectile will cause excessive erosion of the bore when the piece is fired. (See fig. 42.)

67. AMMUNITION CORPORAL. a. Enumeration of duties. (1) To receive and account for ammunition for the section.

(2) To enforce proper methods of handling ammunition.

(3) To supervise the storage of ammunition.

(4) To have ammunition properly prepared for firing.

(5) To insure that the designated powder charge, projectile, and fuze are used.

(6) To act as a replacement for the gunner.

b. Detailed description of certain duties. (1) *To receive and account for ammunition for section.* Subject to the orders of the executive or the chief of section, the ammunition corporal will obtain such ammunition as may be required by the section from the battery ammunition dump, or battery ammunition vehicles. He will check the amount received and receipt for it. He will maintain a record of all ammunition received and fired daily. He will keep the chief of section informed as to the status of the ammunition supply within the section.

(2) *To enforce proper methods of handling ammunition.* The ammunition corporal will require the cannoneers to handle ammunition properly. He will prevent any of the following:

(a) Smoking by anyone handling, or in the vicinity of, ammunition.

(b) Use of any lights, other than flashlights, in the vicinity of powder charges.

(c) Dropping projectiles, powder containers, and fuze and primer boxes from vehicles.

(d) Allowing projectiles to strike together.

(e) Allowing ammunition to become dirty, wet or overheated.

(f) Removal of grommets until the projectile is prepared for firing.

(3) *To supervise storage of ammunition.* See paragraph 48.

(4) *To have ammunition properly prepared for firing.* The ammunition corporal will supervise carefully the work of the cannoneers in preparing rounds for firing. He will see that the projectiles are cleaned thoroughly and that all burrs on the rotating bands have been removed by filing. He will require that all powder charges be kept in their closed containers until just before loading, and that primers and fuzes be kept in their boxes until just before using. He will make sure that powder charges are properly segregated by lot number and that base charges and increment sections of differing lot numbers do not become mixed.

(5) *To insure that designated powder charge, projectile, and fuze are used.* The ammunition corporal will follow the fire commands and will indicate to the cannoneers concerned the projectiles, powder charges, and fuzes to be used. For any one firing mission, he will see that the projectiles are all of one weight and that the powder charges are all of one lot number.

68. ARTILLERY MECHANIC—ENUMERATION OF DUTIES. a. To watch the functioning of the howitzer. (See TM 9–341 (TM 9–336.))

b. To supervise the lubrication of all bearings and sliding parts of the howitzer.

c. To check, from time to time, and during lulls in firing, the position of the replenisher piston, oil index, and the oil level gauge of the equilibrator pressure tank. The position of the replenisher piston should be checked after every three rounds.

d. To check the nitrogen pressure of the equilibrator system.

e. To be responsible to the chief of section for the proper mechanical functioning of the howitzer.

f. To supervise the cleaning and lubrication of the transport wagons.

SECTION XI
ADDITIONAL INFORMATION ON SERVICE OF THE PIECE

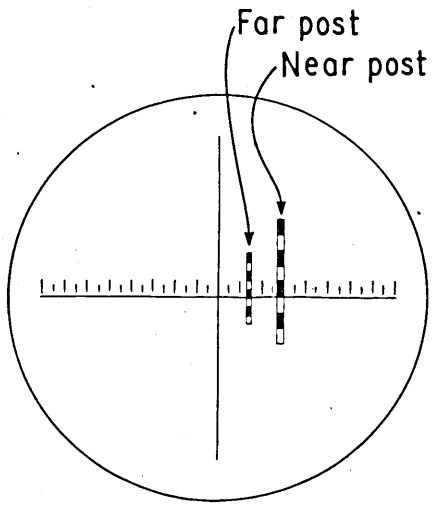
69. ACCURACY IN LAYING. Sighting and laying instruments, fuze setters, and elevating and traversing mechanisms will always be operated so as to reduce the effects of lost motion. This requires that the last motions in setting instruments and in laying should always be made in the same direction. The directions prescribed should be the same for all sections in an organization. The exception to this rule is in laying for elevation. The last motion in laying for elevation is always made in the direction of the greatest handwheel effort. This direction will vary, depending on the particular elevation and the adjustment of the equilibrators.

70. AIMING POSTS. a. After the piece has been initially laid for direction, if a suitable aiming point is not visible, the piece is referred to aiming posts as described in paragraph 53b(5). Two aiming posts are used for each piece. Each post is equipped with a light for use in night firing. One post is set up at least 100 yards from the piece. The other post is set up at the midpoint between the first post and the piece, and is lined in by the gunner so that the vertical hair of the telescope and the two aiming posts are all in the same vertical plane. For night use, the lights should be adjusted so that the far one will appear several feet above the near one. The two lights will then clear

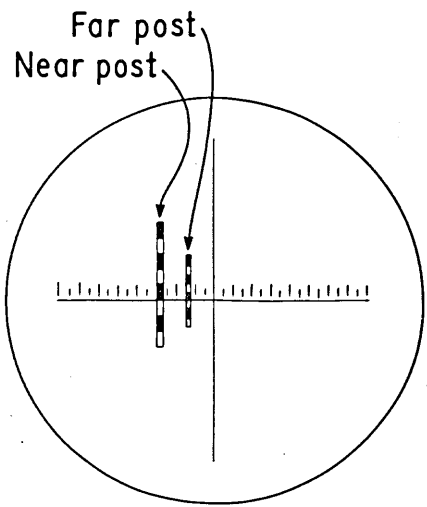
ly establish a vertical line on which the vertical hair of the telescope can be laid.

b. The panoramic telescope is mounted a considerable distance away from the center of rotation of the top carriage. As a result, large changes in deflection will result in misalinement of the aiming posts because of movement of the sight on an arc around the center of the top carriage. Placing the aiming posts between 1000 mils and 950 mils to the left front (deflection 2200 to 2250 when the howitzer is in center traverse) will reduce the effects of this condition. Misalinement of aiming posts may also result from the rearward displacement of the howitzer from firing.

71. CORRECTION FOR DISPLACEMENT. When the gunner notes that the vertical hair of the telescope is displaced from the line formed by the two aiming posts (or aiming post lights), he lays in such a manner that the far aiming post (light) appears exactly midway between the near aiming post (light) and the vertical hair. (See fig. 49.) If the displacement is due to traverse of the piece, the gunner continues to lay as described above. However, if the displacement is due to progressive shift in position of the carriage from shock of firing or other cause, the gunner will notify the chief of section who, at the first lull in firing, will notify the executive and request permission to realine aiming posts. To perform the alinement, the piece is laid with the sight picture described above. The far aiming post is moved into alinement with the vertical hair of the telescope, and then the near aiming post is alined. If due to ter-



Left Displacement



Right Displacement

Figure 49. Correction for aiming post displacement

rain conditions, it is impracticable to move one of the two aiming posts, the piece is laid for direction and referred to the aiming post which cannot be moved. The other post is alined and new deflection setting reported to the executive.

72. PREPARATION OF POSITION. a. General. To facilitate emplacement and to insure stability of the carriage during firing, the piece must be emplaced on level ground, or the position must be so prepared that the bottom carriage, trails, and floats will all be level. In most cases it will be necessary to place matting or blocking under the front end of the carriage, to prevent it from moving forward when the tube is set on the false cradle. The position should be selected with a view to the method of emplacement (crane or winch). If the winch method is to be used, a lane along the direction of fire must be cleared. If the crane method is to be used, consideration must be given to allowing sufficient room for maneuvering the crane and transport wagons on the side of the pit.

b. Line of fire. (1) The importance of accuracy in laying out the line of fire should be strongly stressed. Because of the impracticability of moving the carriage after it is once emplaced, errors in the orientation of the pit may prevent firing the howitzer on targets within its designated sector.

(2) Orientation of the pit on a given azimuth is accomplished in the following manner: An aiming circle is set up and oriented in the direction of fire. By sighting through the aiming circle, the edge of the canvas template which represents the

center line of the pit can be oriented and the pit staked out. This method is used only when the pit is dug before the carriage is emplaced (crane method). When the pit is dug after emplacement of the carriage (winch method), the position of the carriage governs the location of the pit. Orientation is checked as described in section VII.

c. Pits. (1) The outline of one-half of the recoil pit and one spade pit is clearly defined on the canvas template. When the crane method of emplacement is to be used, the template is first oriented as described above, and stakes are driven into the ground through the grommets in the template which indicate the corners of the pit. Two additional stakes should be driven: one through the grommet which is 13½ inches forward of the front edge of the recoil pit; one at the end of the tape which extends to the rear of the template. (The tape must be stretched out in prolongation of the center-line edge of the template.) These two stakes indicate the correct position for the carriage when it is placed over the pit. The first indicates the position of the center-rear of the bottom carriage. The second indicates the position of the trail ends. After these stakes have been placed, the template is turned over and the other half of the recoil pit and the second spade pit are staked out. The template is then removed and the outline of the pits, as indicated by the stakes, is marked out on the ground. A furrow at least 6 inches deep should be dug so that the outline of the pit will not be obliterated during the digging operation. The stakes are then removed. (See fig. 50.)

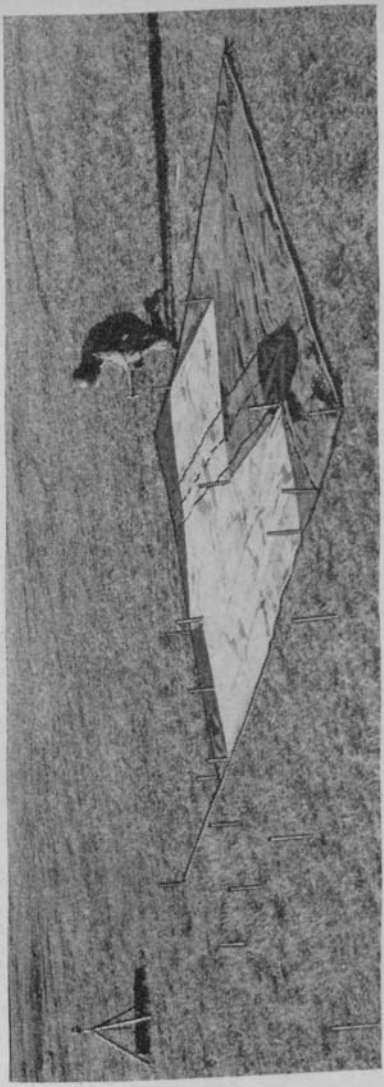


Figure 50. Laying out spade and recoil pit.

(2) Recoil and spade pits must be carefully dug. The spade pits must be perpendicular to the trails, with the rear wall of the pits vertical or slightly overhanging, and of sufficient depth to insure that the spades hang on the trail hooks. Permitting the spades to rest on the bottom of the pit causes injury to the spades in firing. After the seating round and periodically thereafter, the spade struts should be tightened to insure the proper position of the spades. When the howitzer

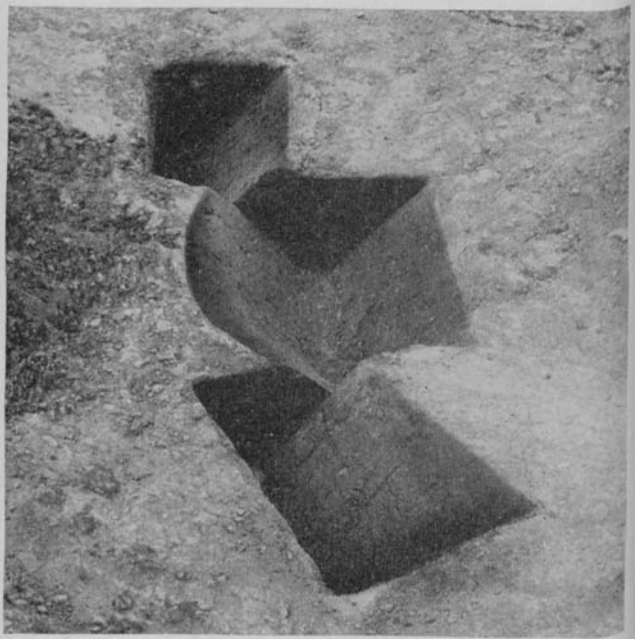


Figure 51. Spade and recoil pit—dug by hand. Crane will excavate larger pit.

is to be in position for an extended period, or on very soft ground, it may be necessary to reinforce the front and sides of the recoil pit with logs or boards to prevent the pit from caving in. (See fig. 51.)

(3) The chief of section should make sure that the pits are dug no larger than necessary. Unnecessary digging wastes time and increases the likelihood that the walls of the pit will cave in with extended use. When the pits are dug with the clamshell bucket of the crane, special care must be taken. Spade pits should be dug as narrow as the dimensions of the bucket will permit; trenches for the spade jacks may then be dug by hand. Cave-ins are most likely to occur in the recoil pit. For this reason the dimensions of the pit, as shown by the templates, should not be exceeded. Similarly, the front wall of the recoil pit should not be vertical, but should slope to the rear.

73. REPORTING ERRORS. Each member of the howitzer section should be constantly impressed with the importance of reporting promptly to the chief of section any error made by members of the section. The chief of section will report errors immediately to the executive as prescribed in paragrah 52.

74. CEASE FIRING. The command, CEASE FIRING, normally is given by the chief of section, but in emergencies anyone present may give the command. At this command, *regardless of its source,* firing will cease immediately. If the piece is loaded, the chief of section will report that fact to the ex-

ecutive. Firing is resumed at the announcement of an elevation.

75. SUSPEND FIRING. The command, SUSPEND FIRING, is given only when the battery is firing on a prearranged schedule and a temporary halt in the firing is desired. At this command, firing is stopped but settings continue to be altered to conform with the schedule. If the piece is loaded, the chief of section will report that fact to the executive. Firing will be resumed at the command RESUME FIRING.

76. CHANGES IN DATA DURING FIRING. The announcement to the section of any new element of firing data serves as a signal to stop all firing previously ordered but not yet executed. At the announcement of a new element of firing data, the new data will be set off and firing resumed at the announcement of the elevation. If no change in time-fuze setting is required, the new data are set off, and firing is resumed. If the pieces are loaded with time-fuzed shell and the new data require a change in fuze setting, that fact will be reported to the executive.

77. RAMMING. Uniformity of ramming is essential to accuracy of fire. Firm seating of the projectile is essential, especially at high elevations, to prevent the projectile from slipping back into the powder chamber and resting on the charge. More uniform ramming may be attained by placing two reference marks on the rammer staff. The first mark will be flush with the face of the

breech when about 20 inches of the ramming stroke remains, at which point No. 6 cannoneer will command, READY—RAM. The second mark will be flush with the face of the breech when the projectile is rammed all the way, and by referring to this mark, the chief of section will be able to check the uniformity of ramming and the firm seating of the projectile.

78. TO UNLOAD THE PIECE. Once a projectile has been rammed, it will not be unloaded by battery personnel. Under almost all conditions, it will be possible to fire the howitzer to remove the round, and every effort should be made to use this method. When this is impossible, the projectile will be unloaded by ordnance personnel only.

79. MISFIRES. a. Misfire of primer. Should the primer fail to fire, no report is heard. Failure may be due to a defective primer or to failure of the firing pin to strike the primer properly. In any case, at least two attempts will be made to fire the primer before it may be removed. If, upon examination, it is found that the primer is not fired, a new primer will be inserted and fire continued. However, before inserting a new primer, the firing lock will be examined for worn or broken parts. If on the other hand, examination shows that the primer has fired, a new primer will not be inserted nor the breech opened, and no person will be permitted to remain near or pass in rear of the breech until at least 60 seconds have elapsed after firing the primer, when the procedure will be as prescribed in b below for a misfire of the charge.

b. Misfire of charge. After 60 seconds have elapsed, the charge may be removed. The faulty charge must be stored separately from other charges. Before removing the faulty charge, the chief of section should note the position and condition of the charge in the chamber, because if the primer has fired, an abnormal condition of the propelling charge is indicated, such as missing igniter, igniter end of charge against the projectile, igniter protector cap not removed, wet igniter, or igniter charge folded over and not accessible to the flash of the primer. If the cause of the misfire is found, report will be made to the executive, who will insure that there is no recurrence of the same fault.

80. CARE OF AMMUNITION. To insure uniform results in firing, to prolong the life of the tube, and to avoid accident, great care must be exercised in the storage and handling of ammunition at the battery. Provisions of TM 9–1900 applicable to field service will be followed carefully. In actual service, the conditions inherent in each situation will largely determine the amount of time, labor, and materials that must be expended to provide the requisite facilities for the proper handling and storage of ammunition. If the position is to be occupied for a few hours only, a paulin spread on the ground may be sufficient, while in a zone defense elaborate magazines may be necessary. In the average situation, resourcefulness and ingenuity in the utilization of facilities and materials available at the position of the pieces will be

necessary. The following procedure should be observed:

a. Protect all ammunition components, such as projectiles, powder charges, fuzes, and primers, from moisture, direct rays of the sun, and sudden changes in temperature. Such protection necessitates keeping the ammunition off the ground, providing waterproof cover and insuring ample circulation of air on all sides of projectiles and containers.

b. Store all components separately and in small amounts, so as to reduce danger from accidental burning of powder or detonations of projectiles, fuzes, and primers. In general, not more than 25 projectiles will be stored in one pit.

c. Enforce rigid observance of all safety precautions in handling ammunition (AR 750–10, TM 9–1900, and par. 67 of this manual).

81. SECTION DATA BOARD. When positions are to be occupied for a considerable length of time, data boards may be used by each section for recording such items as base deflections, calibration corrections when appropriate, data for counterpreparations, and other data the need for which may be urgent.

82. BORESIGHTING. a. General. Because of the high minimum elevation of the 240-mm howitzer (15°) and the 8-inch gun (10°), it is impractical to verify the adjustment of the sighting equipment by alining the bore on a test target or a distant aiming point as is done with other weapons. As a re-

sult, special techniques must be employed and great care exercised to insure accuracy.

b. To verify cross and longitudinal bubbles of telescope mount. Remove the panoramic telescope from the telescope mount. Use the gunner's quadrant as a test level, placing it on a steel or glass plate on the top of the telescope socket. Place the quadrant parallel to the longitudinal bubble to see if the bubble is correct. Then turn the quadrant 90° so it is parallel to the cross-level bubble and test that bubble. If either bubble is in error by more than one division on the level vial, the ordnance maintenance company makes the adjustment.

c. To adjust azimuth compensating mechanism. Lay the howitzer at any convenient elevation by means of a gunner's quadrant on the seats on the breech ring. Without disturbing the setting of the gunner's quadrant, place the quadrant on the seats on the actuating arm of the telescope mount. The bubble should center, indicating that the pivot in the arm is parallel to the axis of the bore. If the bubble does not center, loosen the four clamping screws in the flange of the arm, and turn the eccentric pin at the top of the flange until the bubble is centered. Tighten the four clamping screws and recheck.

d. To verify panoramic telescope for direction. (1) *Method No. 1.* The following preliminary steps are necessary:

(a) Level the trunnions to remove all cant from the piece. Two railroad jacks or the crane may be used to level the carriage, and the cant may be read from a gunner's quadrant on the designated surfaces at the forward end of the trails.

(b) Verify the bubbles of the telescope mount. (See b above.)

(c) Level the mount and adjust the cross-level indexes until they match. Inscribe a line across the segment assembly and cross-leveling worm assembly housing close to the cross-level indexes. This line will serve as a check on the cross-level indexes.

(d) Seat the panoramic telescope in its mount and make sure there is no play between the telescope and the socket. If play exists, loosen the locking screws and tighten the tangent screws of the telescope socket enough to hold the telescope but not so much as to groove the locating surfaces of the telescope. Tighten the locking screws.

(e) Boresight the piece on a celestial body: a star, a point of the crescent moon, or the edge of the sun will serve equally well. (The sun can be used only if a filter of smoked glass or darkened photographic negative is available.) Place cross hairs over the witness marks on the end of the muzzle and open the firing lock to permit sighting through the obturator spindle vent. Move the piece in traverse and elevation (the elevation must not exceed 300 mils, since that is the limit of movement of the elevation knob of the panoramic telescope) until the tube is accurately centered on the celestial body. Place the cross hairs in the telescope reticle on the same point by means of the azimuth worm and elevation knobs on the telescope—the telescope mount must not be thrown out of cross or longitudinal level during this adjustment. In order to eliminate errors arising from the normal motion of celestial bodies, the

gunner must have the cross hairs in the telescope reticle accurately placed on the celestial body as soon as the tube is centered on the celestial body.

(f) If the telescope is in adjustment, the reading on the azimuth scales will be zero. If the azimuth scale and the micrometer scale do not indicate zero deflection and the error is less than 50 mils, adjust in the following manner: Turn the azimuth worm knob until the zero of the azimuth scale is opposite the index. Loosen the three screws in the azimuth micrometer knob and, while holding the azimuth worm knob, slip the micrometer scale until the zero is opposite the micrometer index. Tighten the screws and recheck the scales for zero readings. Then loosen the tangent locking screws at the front of the telescope socket and adjust the tangent screws until the vertical cross hair is on the proper portion of the aiming point. Tighten the tangent locking screws and recheck. If the error is too great to be corrected in this manner, turn the azimuth worm knob until the vertical cross hair is on the proper portion of the aiming point. Then adjust the micrometer scale to read zero as above. If the azimuth scale does not now read zero, loosen the four screws on the collar above the scale and slip the scale around until the zero is opposite the index. Tighten the screws and recheck.

(g) Depress the howitzer to minimum elevation and inscribe a line across the rocker and hub of the telescope mount. When the cross-level indexes and the ends of the line across the rocker and hub are matched at some later time, the tele-

scope mount will return to this same position with regard to the tube.

(h) Place an insert over the eyepiece of the telescope to eliminate parallax. This may be accomplished by placing a shield in front of the eyepiece lens housing. The shield should have an exactly centered hole 1/16 inch in diameter. It may be held in place with a piece of adhesive tape. Refer the telescope to the edge of the muzzle and record the angle. Great care must be taken to measure the angle accurately to the fraction of a mil. The vertical hair of the reticle is brought from the left toward the muzzle until it is just tangent to the muzzle. The gunner should note carefully the position of the vertical hair so that he can duplicate its position later.

(2) To aline line of sighting with the tube at any later time, it is not necessary to level the trunnions. With the piece at minimum elevation, match the cross-level indexes and the ends of the second reference line. (See (1) *(g)* above.) Place the insert in position over the eyepiece and refer the telescope to the edge of the muzzle. If the angle read is the same as the reference angle determined during the preliminary steps, the telescope is in adjustment. If the readings differ, proceed as indicated in (1) *(f)* above.

(3) *Method No. 2. (a)* The following preliminary settings must be made:

1. Seat the panoramic telescope in its mount and make sure there is no play between the telescope and the socket. If play exists, tighten the tangent screws of

the telescope socket enough to hold the telescope but not so much as to groove the locating surfaces of the telescope.

2. Center the longitudinal and cross-level bubbles of the telescope mount. There is no necessity for leveling the carriage.

3. Set up and carefully level an aiming circle 15 to 45 yards behind the breech. A minimum distance of 40 yards is preferable, if possible. Set the azimuth and micrometer scales of the aiming circle at zero.

(b) Two marks for use in boresighting appear on the howitzer. One is centered on the top of the muzzle, and one is centered on the breech ring approximately 8 inches above the primer seat.

(c) By traversing the howitzer and moving the lower motion of the aiming circle, aline the vertical hair of the aiming circle with the marks etched on the breech and muzzle of the howitzer.

(d) Turn the upper motion of the aiming circle until the vertical hair bisects the window of the panoramic telescope, and read the scales. Turn the panoramic telescope in azimuth until the vertical hair is on the lens of the aiming circle and read the deflection. If the two readings agree, the telescope is in adjustment. If the readings do not agree, loosen the locking screws of the azimuth micrometer knob on the telescope and slip the scale until the correct reading is in line with the index; then tighten the locking screws and recheck.

(e) If the azimuth scale is out of adjustment enough to cause confusion in reading deflections between 100-mil divisions, the following procedure will be substituted for the adjustment of the azimuth micrometer scale described in *(d)* above. Turn the upper motion of the aiming circle until the vertical hair bisects the window of the panoramic telescope. Read the scales on the aiming circle, and set this reading on the panoramic telescope. Loosen the locking screws which lock the tangent screws in the telescope socket, and adjust both tangent screws until the vertical hair of the telescope is on the aiming circle, making sure that the telescope still seats firmly in the socket. Tighten the locking screws and recheck. If the limits of travel of the tangent screws are inadequate to permit this adjustment, the azimuth scale must be adjusted by turning the telescope until the vertical hair is on the aiming circle, loosening the locking screws in the azimuth micrometer knob and on the azimuth scale, and slipping both scales until the correct readings are obtained.

(f) Throughout boresighting great care must be exercised to insure accuracy. The telescope mount and the aiming circle should be carefully leveled. Inserts made of cardboard or heavy paper should be placed over the eyepieces of the aiming circle and telescope, with the aiming circle insert having a vertical slit 1/16 inch wide and ¼ inch long, and the telescope insert having a 1/16-inch hole. With the insert in position make a tick-mark on the edge to coincide with a mark on the eyepiece, so that the insert can be placed in the same position each time it is used. Last motions on all settings

should always be made in the same direction. Readings and settings on both the telescope and the aiming circle should be made to a fraction of a mil.

e. To verify elevation quadrant. (1) To verify the adjustment of the longitudinal level vial, the following preliminary steps are required:

(a) Obtain an accurately checked gunner's quadrant.

(b) Cross level the howitzer carriage.

(2) Using the gunner's quadrant on the quadrant seats on the breech ring, lay the howitzer at quadrant elevations of 300, 700, and 1100 mils. At each position, measure the elevation with the elevation quadrant and record the error. If the error is constant for all elevations, proceed as described in f below. If the error is not constant for all elevations, turn the elevation quadrant over to ordnance maintenance personnel for repair.

f. To adjust elevation quadrant. (1) Elevate the howitzer to an even elevation (300 mils is convenient), using the gunner's quadrant on the quadrant seats of the breech ring.

(2) Cross level the elevation quadrant.

(3) Center the longitudinal bubble of the elevation quadrant by means of the elevating knob.

(4) The elevation scale should read 300 mils. If the scale is out of adjustment enough to cause confusion in reading the 100-mil graduations, adjust as follows:

(a) Set the elevation and micrometer scales of the elevation quadrant at 300 mils.

(b) Loosen the nut and two screws which clamp the level bracket, and the two headless screws which clamp the adjusting screws.

(c) Turn the adjusting screws until the longitudinal bubble is accurately centered, and lock the adjusting screws.

(d) Tighten the nut and two screws which clamp the level bracket, being careful not to disturb the centering of the bubble.

(5) If the elevation scale is in adjustment, but the micrometer scale does not read zero after step (3) above, proceed as follows:

(a) Loosen the three screws in the end of the micrometer knob.

(b) Rotate the micrometer scale until the zero mark is opposite the index.

(c) Tighten the screws, and recheck to see that the bubbles are still level and the scales correct.

g. To adjust cross-level vial of elevation quadrant. No adjustment of the cross-level vial is required, as any error in elevation resulting from a possible inaccuracy of the cross-level vial would be negligible.

h. To check elevation quadrant for rotational play. (1) Grasp the quadrant case with both hands at the rear end above the cross-level knob.

(2) By pulling upward, the quadrant bracket and adapter will rotate slightly toward the muzzle if cap screws are loose.

(3) Cross and longitudinally level the elevation quadrant. Record the reading of the elevation micrometer scale.

(4) Grasp the quadrant above the night lighting toggle switch and rotate the case toward the breech.

(5) Cross and longitudinally level the quadrant. If the reading of the micrometer coincides with the reading recorded in (3) above, the quadrant has no excessive rotational play.

i. Adjustment to eliminate rotational play. If the readings do *not* coincide, the following adjustment must be made:

(1) Remove the four cap screws holding the elevation quadrant bracket to the adapter (gunner's quadrant seats machined on top).

(2) Remove the elevation quadrant from the adapter.

(3) Tighten the four cap screws located in the center of the adapter.

(4) Assemble the quadrant, making sure all cap screws are drawn up tight, and recheck as outlined in h above.

SECTION XII
SECTION MAINTENANCE DRILL

83. GENERAL. a. Inspection and maintenance are essential to insure that the howitzer section is ready to move and to shoot at all times. Section drill on inspection and maintenance will make the work routine, thorough, and fast. This drill is applicable when the prime mover and the howitzer are close together.

b. Details on all preventive maintenance services are contained in the Technical Manuals of the particular equipment. The following inspections and maintenance operations are performed by the howitzer section:

(1) Before operation.
(2) During march.
(3) During halt.
(4) Prior to and during firing.
(5) After operation (firing).
(6) Weekly.

c. The outline of duties in the section maintenance drill assigns duties to all members of the section. When the section is reduced in strength, the chief of section will assign duties to insure that all maintenance steps are completed.

84. DUTIES IN INSPECTION BEFORE OPERATION. The section being at dismounted posts, the chief of section commands: INSPECT EQUIPMENT.

CHIEF OF SECTION (ALL EQUIPMENT)

1. Supervises inspections made by members of the section.
2. Inspects recoil system for signs of oil leakage.
3. Inspects ammunition for condition, lot number, and loading.
4. Verifies presence of gun book, trip ticket, accident report, lubrication orders, Technical Manuals, emergency supply of gasoline, oil, and rations.

GUNNER (CARRIAGE AND HOWITZER LOADS)

1. Verifies security of all sighting and laying equipment.
2. Checks section chest for completeness of contents.
3. Reports, "Gunner ready."

ARTILLERY MECHANIC (HOWITZER LOAD)

1. Notes whether oil index and replenisher piston of recoil system are in proper position. (See TM 9–341 (TM 9–336.))

(CARRIAGE LOAD)

2. Checks equilibrators for leaks and verifies that shut-off valve is in open position.
3. Reports, "Artillery mechanic ready."

NO. 1 (CARRIAGE AND HOWITZER LOADS)

1. Assists artillery mechanic in checking recoil system and equilibrators.
2. Reports, "No. 1 ready."

5. *Checks security of coupling.*
6. Verifies security of camouflage net, poles, and all accessories.
7. Receives reports from members of section upon completion of their duties and reports to battery executive when inspection is completed, "Sir, No. (so-and-so) in order" or reports any defects which cannot be remedied without delay or assistance.

NO. 2
(CARRIAGE LOAD)

1. Checks carriage load service brake connections and jumper cable connections. Disconnects emergency brake connection on signal from No. 8.
2. Verifies security of trail locking key, trail float key, trail floats and loading tray.
3. Reports, "No. 2 ready."

NO. 3
(CARRIAGE LOAD)

1. Verifies tightening of spade jack (on right side) and cross braces.
2. Checks position and locking of wagon lock lever.
3. Reports, "No. 3 ready."

NO. 4
(CARRIAGE LOAD)

1. Checks air pressure in tires with gauge.
2. Inspects wheels for loose or missing nuts or cap screws, valve caps, stones in treads.
3. Verifies tightening of spade jack on left side.

(CARRIAGE LOAD PRIME MOVER)

4. Assists driver of carriage load prime mover.
5. Examines vehicle for damage since last inspection.

NO. 5
(CARRIAGE LOAD)

1. Verifies security of spacer bar, wagon jack, loading ramp, wheel ramps, and over-all cover.
2. Reports, "No. 5 ready."

6. *Checks for presence and proper mounting* of fire extinguisher. Makes sure the seal wire is not broken.
7. Checks charge and mounting of decontaminator; checks engine oil in right engine; checks water in radiators. Replenishes if necessary.
8. Checks accessories and drives of right engine for security of mounting, good condition, and connections. Checks drive belts for condition and adjustment.

NO. 4
(CARRIAGE LOAD)

9. Checks fluid supply in torque converter. Replenishes if necessary.
10. Checks for all fluid leaks. Locates source and corrects or reports them.
11. Checks for presence, condition, and mounting of tools and equipment.
12. Checks for condition and attachment of load and tarpaulins.
13. Reports, "No. 4 ready."

NO. 6 (CARRIAGE LOAD PRIME MOVER)

1. Assists driver of carriage load prime mover.
2. Examines vehicle for damage since last inspection.
3. Checks all nuts and cap screws on sprockets, bogie wheels, idlers, and track support rollers for presence and security.
4. Checks bogie tires for cuts and embedded stones and trash. Checks for dead blocks, loose and bottomed wedges. Checks track tension.

N.O 7 (CARRIAGE LOAD)

1. Verifies security of hold-down bolts, trail support, tire jack and jack base, and over-all cover.
2. Reports, "No. 7 ready."

NO. 8 (CARRIAGE LOAD)

1. Checks hand brakes after coupling to see they are released.
2. Signals No. 2 to break emergency line and watches for push rod travel.
3. Checks push rod travel when driver applies service brake.
4. Verifies fastening of over-all cover.
5. Reports, "No. 8 ready."

NO. 9 (CARRIAGE LOAD)

1. Verifies fastening of spades and over-all cover.
2. Checks to see that drain valve of air reservoir is closed.
3. Reports, "No. 9 ready."

NO. 6
(CARRIAGE LOAD
PRIME MOVER)

5. Inspects springs for breakage and permanent set. Cleans out debris in suspension system.
6. Checks presence, condition, and operation of lights, reflectors and switches. (Driver operates all switches except floodlight switch.)
7. Checks mounting and condition of fenders and bumpers.
8. Checks mounting and locking devices of towing connections.

9. *Assists No. 4 in checking tools.* Checks condition and mounting of winch.
10. Checks side curtains and ammunition box.
11. Reports, "No. 6 ready."

NO. 10
(HOWITZER LOAD)

1. Assists No. 11 in removing and replacing breech cover.
2. Opens breechblock, checks to see that bore is clear. Inspects breechblock and bore for cleanliness. Closes breechblock.

NO. 11
(HOWITZER LOAD)

1. Assists No. 10 in removing and replacing breech cover.
2. Assists No. 10 in opening breech.
3. Verifies security.
4. Verifies fastening of cradle locking clamps on right side.

NO. 12
(HOWITZER LOAD)

1. Checks service brake connections. Disconnects emergency brake connections on signal from No. 17. Reconnects.
2. Inspects connections of jumper cable.

NO. 13
(HOWITZER LOAD)

1. Uses gauge to measure pressure in tires.
2. Inspects wheels for loose or missing nuts or cap screws, valve caps, stones in treads.

NO. 10 (HOWITZER LOAD)	NO. 11 (HOWITZER LOAD)	NO. 12 (HOWITZER LOAD)	NO. 13 (HOWITZER LOAD PRIME MOVER)
3. Reports, "No. 10 ready."	5. Reports, "No. 11 ready."	3. Verifies fastening of cradle locking clamp on left side. 4. Reports, "No. 12 ready."	3. Assists driver of howitzer load prime mover by performing operations on howitzer load prime mover similar to those performed by No. 4 on the carriage load prime mover. 4. Reports, "No. 13 ready."

NO. 14 (HOWITZER LOAD)	NO. 15 (HOWITZER LOAD PRIME MOVER)	NO. 16 (HOWITZER LOAD)	NO. 17 (HOWITZER LOAD)
1. Verifies security of screw jacks, saddle and cover.	1. Assists driver of howitzer load prime mover by performing operations on howitzer load prime mover similar to those performed by No. 6 for carriage load prime mover.	1. Assists No. 17 in removing and replacing muzzle cover so No. 10 can inspect bore.	1. Assists No. 16 in removing and replacing muzzle cover.
2. Checks attaching link of tube support for fastening.		2. Checks to see that drain valve of air reservoir is closed.	2. After coupling, inspects to see that hand brakes are released.
3. Reports, "No. 14 ready."		3. Checks attaching link of tube support for fastening.	3. Signals No. 12 to break emergency line and watches for push rod travel.
		4. Verifies fastening of rammer staff and aiming posts.	4. Watches for push rod travel when driver applies service brake.
		5. Reports, "No. 16 ready."	5. Reports, "No. 17 ready."

NO. 18
(PRIME MOVERS)

1. Assists ammunition corporal.

AMMUNITION COPORAL
(PRIME MOVERS)

1. Inspects ammunition. Verifies setting of all time fuzes at safe, point detonating fuzes at superquick, and presence of all booster cotter pins and safety pull wires.
2. Reports, "Ammunition corporal ready."

DRIVER
(PRIME MOVERS)

1. Examines vehicle for damage since last inspection.
2. Checks fuel, transmission oil. Checks left engine oil. Replenishes if necessary.
3. Checks accessories and drives of left engine for security of mounting, good condition, and connections. Checks drive belts for condition and adjustment.
4. Checks air brake tanks and lines for security and condition. Closes the tank drain valve.
5. Checks for all fluid leaks. Locates source, corrects or reports them.

6. *Observes starting action* and *idling* speed. Checks for abnormal operational noises.
7. Checks operation while starting. Resets choke as required during the warm up.
8. Checks instruments for correct operation and reading.
9. Checks operation, mounting, and condition of siren, windshield wipers, glass, and mirror.
10. Operates switches for No. 6 (No. 15) to check lights. Check reflectors.

11. Checks operation of steering linkage. Levers should pull back evenly. Lever locks should operate correctly. Checks free lever travel.
12. Checks engine during operation for sound and general condition.
13. Verifies possession of driver's permit. Checks vehicle for manual, lubrication order, form No. 26, and identification card.
14. Reports, "Driver ready."

CRANE OPERATOR
(CRANE MECHANISM)

1. Supervises detailed inspection of truck-mounted crane.
2. Examines crane for damage since last inspection.
3. Checks fuel tank, engine crankcase, and radiator of crane mechanism for fuel, oil, and water. Replenish if necessary.
4. Checks for condition, security of mounting, and connections of accessories. Checks drive belts for condition and tension.
5. Checks for all fluid leaks. Locates source. Corrects or reports.
6. Observes starting action and idling speed. Checks for abnormal operational noise.
7. Checks operation of choke while starting.
8. Checks engine oil pressure gauge, ammeter.
9. Checks carrier and trailer lights, assisted by driver.
10. Checks for adjustment of clutches.
11. Inspects for fastening and condition of cables.

DRIVER
(TRUCK-MOUNTED CRANE)

1. Examines vehicle for damage since last inspection.
2. Checks fuel tank, engine crankcase, and radiator. Replenishes fuel, oil, and water if necessary.
3. Checks for condition, security of mounting, and connections of accessories. Checks drive belts for condition and tension.
4. Checks for all fluid leaks. Locates source. Corrects or reports.
5. Observes starting action and idling speed. Checks for abnormal operational noise.
6. Checks operation of choke while starting. Resets as required during warm up.
7. Checks fuel gauge, engine oil pressure gauge, coolant temperature gauge, ammeter, the tachometer, the air gauge and the low pressure buzzer for correct reading.
8. Checks operation, condition, and mounting of horn and windshield wipers.

CRANE OPERATOR
(CRANE MECHANISM)

12. Checks for security of outriggers and floats.
13. Checks coupling of clamshell trailer. Checks security of clamshell and mats. Checks tires with pressure gauge. Checks brakes, assisted by driver.
14. Reports to chief of section, "Crane ready."

DRIVER
(TRUCK-MOUNTED CRANE)

9. Cleans and inspects glass and rearview mirrors.
10. Operates switches for crane operator to check lights.
11. Checks all parts of steering linkage for condition and security.
12. Checks engine during operation for sound and general condition.
13. Checks for presence, condition, and security of tools and equipment.
14. Verifies possession of driver's permit. Checks vehicle for manual, lubrication order, form No. 26, and identification card.
15. Checks presence, content, and proper mounting of fire extinguisher.
16. Checks air brake tanks and lines for security and condition. Closes tank drain valves.
17. Checks presence and tightness of wheel and flange nuts.

18. *Checks general condition of tires and pressure.*
19. Checks condition and attachment of springs and suspensions, fenders and bumpers, towing connections.
20. Checks charge and mounting of decontaminator.
21. Reports, "Driver ready."

85. DUTIES IN INSPECTION DURING MARCH.

CHIEF OF SECTION (CARRIAGE LOAD)	AMMUNITION CORPORAL (HOWITZER LOAD)	DRIVER (PRIME MOVERS)	DRIVER (TRUCK-MOUNTED CRANE)
1. Assigns duties to Nos. 1 to 9 inclusive, as antitank and antiaircraft sentries.	1. Assigns duties to Nos. 10 to 18, inclusive, to observe carriage towed load in preceding wagon in column.	1. Checks steering brake action. Checks lever free travel.	1. Checks for effective operation of steering gear. Checks for pull, wander, and shimmy.
2. Checks prime mover instruments and controls for proper functioning.	2. Assigns duties to Nos. 10 to 18, inclusive as antitank and antiaircraft sentries.	2. Checks for effective operation of foot and hand brakes.	2. Checks for effective operation of foot and hand brakes.
3. Listens for unusual noises.		3. Checks clutch operation. Clutch should operate quietly and smoothly.	3. Checks for free travel and smooth operation of clutch.

AMMUNITION CORPORAL
(HOWITZER LOAD)

3. Checks prime mover instruments and controls for proper functioning.
4. Listens for abnormal operational noises.

DRIVER
(PRIME MOVERS)

4. Checks for proper operation of transmission.
5. Checks operation of controls. Checks noises and "feel" for general engine condition.
6. Checks reading and action of all instruments and gauges.
7. Listens for abnormal operational noises.
8. Checks for listing of tractor and side pull of trailer.

DRIVER
(TRUCK-MOUNTED CRANE)

4. Checks for proper operation of transmission.
5. Checks for proper operation of transfer.
6. Checks operation of controls. Checks noises and "feel" for general engine trouble.
7. Checks reading and action of all instruments and gauges.
8. Listens for abnormal operational noises.

86. DUTIES IN INSPECTION DURING HALT.

CHIEF OF SECTION (ALL EQUIPMENT)

1. Sees that personnel remain inside left wheel line, except for inspection of left wheels and track. Supervises inspection and maintenance.
2. Reports to executive, "Sir, No. (so-and-so) in order,"

GUNNER (CARRIAGE AND HOWITZER LOADS)

1. Verifies presence and security of sighting equipment.

(PRIME MOVER)

2. Verifies presence and security of section chest.
3. Reports, "Gunner ready."

ARTILLERY MECHANIC (CARRIAGE AND HOWITZER LOADS)

1. Inspects for leaks in recoil or equilibrator systems, assisted by No. 1.
2. Reports, "Artillery mechanic ready."

NO. 2 (CARRIAGE LOAD)

1. Checks connections of brakes and stop light.
2. Inspects for security of trail locking key, trail float key, trail floats, and loading tray.
3. Reports, "No. 2 ready."

NO. 3
(CARRIAGE LOAD)

1. Verifies fastening of spade jack on right side.
2. Verifies cross braces for tightness.
3. Inspects wagon lock lever for position. Verifies locking.
4. Reports, "No. 3 ready."

NO. 4
(CARRIAGE LOAD)

1. Inspects wheels and tires for loose or missing nuts, hub cap screws, valve caps, stones in tread, cuts, wear, and bruises. Checks for hot wheel bearings and brake drums. Checks for flat tires.
2. Verifies fastening of spade jack on left side.

(CARRIAGE LOAD
PRIME MOVER)

3. Assists driver of carriage load prime mover.

NO. 5
(CARRIAGE LOAD)

1. Verifies position and fastening of spacer bar, wagon jack, loading ramp, wheel ramps, over-all cover.
2. Reports, "No. 5 ready."

NO. 6
(CARRIAGE LOAD
PRIME MOVER)

1. Assists driver of carriage load prime mover.
2. Checks wheels for loose nuts and cap screws in the sprockets and track suspension system.
3. Checks for loose and broken parts of springs and suspensions. Removes trash.
4. Checks tires and tracks for loose or cut tires, dead track blocks, loose wedges and track tension.

4. *Checks mountings,* adjustment, and operation of accessories and belts of right engine.
5. Checks both water radiators and engine oil. Replenishes supply.
6. Checks security of load, condition of tarpaulin, side curtains, and body.
7. Reports, "No. 4 ready."

5. *Checks mounting* and condition of fenders and bumpers.
6. Checks mounting and condition of pintle and locking device. Checks air and electric connections.
7. Cleans and inspects lights, reflectors, windshield, and rear-view mirror.
8. Checks for leaks, locates source, corrects or reports them.
9. Feels bogie and idler hubs and sprocket shaft for excessive heating. Checks final drives.

NO. 6
(CARRIAGE LOAD
PRIME MOVER)

10. Reports, "No. 6 ready."

NO. 7
(CARRIAGE LOAD)

1. Verifies position and fastening of hold-down bolts, trail support, tire jack and jack base, over-all cover.
2. Reports, "No. 7 ready."

NO. 8
(CARRIAGE LOAD)

1. Checks to see that hand brakes are released.
2. Verifies fastening of over-all cover.
3. Reports, "No. 8 ready."

NO. 9
(CARRIAGE LOAD)

1. Checks for fastening of spades and over-all cover.
2. Reports, "No. 9 ready."

NO. 11
(HOWITZER LOAD)

1. Verifies security of hand maneuvering bar.
2. Verifies fastening of cradle locking clamp on right side.
3. Reports, "No. 11 ready."

NO. 12
(HOWITZER LOAD)

1. Checks connections of brakes and stop lights.
2. Verifies fastening of cradle locking clamp on left side.
3. Reports, "No. 12 ready."

NO. 13
(HOWITZER LOAD)

1. Inspects wheels and tires for loose or missing nuts, hub cap screws, valve caps, wear, and bruises. Checks for hot wheel bearings and brake drums. Checks for flat tires.
2. Assists driver of howitzer load prime mover by performing operations on howitzer load prime mover similar to those performed by No. 4 on the carriage load prime mover.
3. Reports, "No. 13 ready."

NO. 14
(HOWITZER LOAD)

1. Verifies security of screw jacks, saddle and cover.
2. Reports, "No. 14 ready."

NO. 15
(HOWITZER LOAD)
PRIME MOVER)

1. Assists driver of howitzer load prime mover by performing operations on howitzer load prime mover similar to those performed by No. 6 on the carriage load prime mover.

NO. 16
(HOWITZER LOAD)

1. Verifies fastening of hold-down strap, tube support, rammer staff, and aiming posts.
2. Reports, "No. 16 ready."

NO. 17
(HOWITZER LOAD)

1. Checks to see that hand brakes are released.
2. Reports, "No. 17 ready."

AMMUNITION CORPORAL
(PRIME MOVER)

1. Checks ammunition for condition, covering, and security.
2. Reports, "Ammunition corporal ready."

DRIVER
(PRIME MOVER)

1. Checks for loose or damaged parts in steering linkage.
2. Checks mounting, adjustment, and operation of units on left engine.
3. Checks for fluid leaks. Locates source and corrects or reports them.
4. Reports, "Driver ready."

CRANE OPERATOR
(CRANE MECHANISM)

1. Supervises inspection and maintenance at the halt. Receives reports from driver on condition of carrier.
2. Checks brake drums, wheel hubs, transfer, transmission, and differentials for overheating. Checks transfer, transmission, and differentials for oil leaks.
3. Checks condition of axle and transfer vents.
4. Checks for all fluid leaks. Locates source, corrects or reports.
5. Checks condition and lubrication of propeller shafts. Removes any foreign material.
6. Checks presence and tightness of wheel and flange nuts.
7. Checks condition of tires. Removes foreign objects.
8. Reports to chief of section, "Crane ready."

DRIVER
(TRUCK-MOUNTED CRANE)

1. Checks and replenishes supply of fuel, oil, and water.
2. Checks for secure mounting of air cleaners.
3. Checks mounting, adjustment, and operation of accessories and belts.
4. Checks for loose or damaged parts of steering linkage, springs and suspensions, fenders and bumpers.
5. Checks pintle mounting and locking device.
6. Cleans and inspects lights, reflectors, windshields, and rearview mirrors.
7. Reports, "Driver ready."

87. DUTIES IN INSPECTION PRIOR TO AND DURING FIRING. All members of the section perform duties as outlined in section X. In addition, the following duties are performed by the individuals indicated:

CHIEF OF SECTION (ALL EQUIPMENT)	GUNNER (HOWITZER)	DRIVER (PRIME MOVERS AND TRUCK-MOUNTED CRANE)	CRANE OPERATOR (CRANE MECHANISM)
1. Supervises the work of the section, and verifies sight test and adjustment.	1. Performs sight test and adjustment.	1. Inspects all items as listed in paragraph 86. Also assists the motor sergeant and motor mechanics in the performance of all maintenance services (TM 9–788 and TM 37–2810).	1. Performs duties as outlined in TM 9–771.

CHIEF OF SECTION (ALL EQUIPMENT)

1. Inspects for signs of oil leakage in recoil system, supervises establishing of correct oil reserve.
2. Inspects all ammunition.
3. Verifies presence of and current entries in gun book, trip ticket.
4. Verifies resupply of emergency rations, gasoline, oil, and water.
5. Receives reports of section personnel as they complete their inspections.

GUNNER (HOWITZER)

1. Cleans panoramic telescope and panoramic telescope mount.
2. Reports, "Gunner ready."

ARTILLERY MECHANIC (HOWITZER)

1. Establishes correct oil reserve in recoil and recuperator system, assisted by numbered cannoneers as required.
2. Reports, "Artillery mechanic ready."

NO. 1 (HOWITZER)

1. Inspects and cleans elevation quadrant.
2. Assists artillery mechanic in checking recoil system.

CHIEF OF SECTION
(ALL EQUIPMENT)

6. Supervises all cannoneers in the cleaning and lubricating of the bore.
7. Reports to battery executive, "Sir, No. (so-and-so) in order."

NOS. 2 AND 3
(HOWITZER)

1. Clean and lubricate elevating and traversing mechanism.
2. Verify condition and presence of accessories as in paragraph 84.

NO. 4
(CARRIAGE LOAD PRIME MOVER)

1. Assist driver of carriage load prime mover.
2. Checks radiators and right engine oil. Refills if necessary.

NOS. 5, 7, 9, 10, 11
(HOWITZER AND CARRIAGE)

1. Clean and lubricate the breechblock, breech recess, powder chamber, and firing lock.

NO. 6
(CARRIAGE LOAD PRIME MOVER)

1. Assists driver of carriage load prime mover.
2. Checks for leaks, locates source and corrects or reports them.

3. *Checks for good condition* and mounting of accessories, and condition and adjustment of bolts of right engine.
4. Checks and cleans, if necessary, the air cleaner and breather caps.
5. Checks all accessible wiring for condition and connections.
6. Checks for leaks. Locates source and corrects or reports them.
7. Checks for presence, condition, and seal of fire extinguishers.

2. *Verify condition and* presence of accessories as in paragraph 84.

3. *Checks for leaks in* fuel filters.
4. With assistance of No. 8, checks for cut tires and separation of the rubber from the wheels. Checks for loose, bent, or worn connectors. Checks for loose wedges. Checks track tension.
5. With assistance of No. 8, checks all nuts or cap screws on sprockets, bogie wheels, training idler wheels, and track support rollers for presence and security.

NO. 4
(CARRIAGE LOAD
PRIME MOVER)

8. Checks charge and mounting of decontaminator.
9. Checks mountings, condition, cleanliness, and electrolyte level of batteries. Cleans if necessary.
10. Checks fluid level in torque converters. Refills if necessary. Checks oil level in pump housing.
11. Checks mounting bolts of propeller shafts; lubricant leaks.

NO. 6
(CARRIAGE LOAD
PRIME MOVER)

6. Assisted by No. 8, checks for bent, broken, or loose parts. Removes all stones and trash.
7. Checks oil level in final drive housings.
8. Checks tow hooks and pintles for good condition and secure mounting. Checks locking devices.
9. Tightens all loose nuts and cap screws found. Checks removable hull plates for loose bolts.

12. *Checks mountings* of turret and gun and operation of mount.
13. If winch has been used during the day, assists the driver and Nos. 6 and 8 to clean the cable.
14. Tightens all nuts and cap screws found loose.
15. Assists driver and Nos. 6 and 8 in cleaning tractor.
16. Reports, "No. 4 ready."

10. *Checks presence,* condition, and stowage of tools. Checks ammunition hoist and crane. Assists driver and Nos. 4 and 8 in cleaning winch cable if winch has been used.
11. Assists driver, Nos. 4 and 8, in cleaning tractor.
12. Reports, "No. 6 ready."

NO. 8
(CARRIAGE LOAD PRIME MOVER)

1. Assists driver of carriage load prime mover.
2. Checks for leaks. Locates source and reports or corrects them.
3. Checks spare cans of fuel, oil, and water and refills if necessary.
4. Checks presence, condition, and operation of lights, reflectors, and switches. (Driver operates all switches except floodlight switch.)
5. Checks mounting and condition of fenders and bumpers.

NOS. 12, 14, 16, 18
(CARRIERS AND PITS)

1. Assist ammunition corporal in checking ammunition.

NOS. 13, 15, 17
(HOWITZER LOAD PRIME MOVER)

1. Assist driver of howitzer load prime mover by performing duties similar to those performed by Nos. 4, 6, and 8 respectively on the carriage load prime mover.

6. Assists No. 6 in checks on all nuts and capscrews on sprockets, bogie wheels, idlers, and track support rollers for presence and security.
7. Assists No. 6 in checking for cut tires, separation of the rubber from the wheel, loose, bent, or worn connectors, and loose wedges. Checks track tension.
8. Assists No. 6 in checking for bent, broken, or loose parts of springs and suspensions. Removes all stones and trash.

NO. 8
(CARRIAGE LOAD PRIME MOVER)

9. Checks mounting and security of winch. Checks drive shaft and cable. If winch has been used during the day, cleans the cable, assisted by driver and Nos. 4 and 6.
10. Checks for condition and security of the load, covers, and body.
11. Tightens all loose nuts or cap screws found.
12. Assists driver and Nos. 4 and 6 in cleaning vehicle.
13. Reports, "No. 8 ready."

AMMUNITION CORPORAL
(CARRIERS AND PITS)

1. Inspects and checks all ammunition, fuzes, and primers.
2. Supervises loading and storage of ammunition.
3. Reports, "Ammunition corporal ready."

DRIVER
(PRIME MOVERS)

1. Checks engine operation at idle and during acceleration and deceleration.
2. With engine running, checks operation, condition, and mounting of all instruments.
3. Inspects for broken, loose, or bent parts in steering linkage. Checks free travel of levers.
4. Checks fuel in tank. Refills if necessary.
5. Checks transmission oil level. Replenishes if necessary.
6. Checks mounting, operation, and condition of siren and windshield wipers.
7. Checks and cleans glass and mirrors. Adjusts mirror.
8. Operates switches for No. 8 (No. 17) to check lights. Check reflectors.
9. Checks accessible wiring for condition and connections.
10. Checks for good condition and mounting of accessories, condition and adjustment of belts, on left engine.

11. Checks and cleans, if necessary, air cleaners and breather caps.
12. Drains air brake tanks. Checks for leaks.
13. Checks operation and condition of engine controls.
14. Checks for leaks, locates source, and corrects or reports them.
15. If winch has been used during the day, cleans winch cable, assisted by Nos. 4, 6, and 8 (Nos. 13, 15, 17).
16. Tightens all nuts and cap screws found loose.
17. Cleans dirt and trash from vehicle, assisted by Nos. 4, 6, and 8 (Nos. 13, 15, 17).
18. Lubricates as needed and as directed by the vehicle lubrication order.
19. Reports, "Driver ready."

CRANE OPERATOR
(CRANE MECHANISM)

1. Supervises detailed inspection of crane.
2. Checks for all fluid leaks. Locates source, corrects or reports.
3. Checks all gear cases for lube level. Reports if low.
4. Checks condition and attachment of springs, suspensions, fenders, and bumpers.
5. Checks all parts of steering linkage for condition and security.
6. Checks pintle mounting and locking device.
7. Cleans thoroughly.
8. Checks condition and air pressure of tires. Removes any foreign objects.
9. Checks presence, condition, and operation of lights, reflectors, and switches. (Driver will operate switches.)
10. Checks contents, cleanliness, and mounting of fire extinguishers.
11. Checks charge and mounting of decontaminator.

DRIVER
(TRUCK-MOUNTED CRANE)

1. Checks and replenishes supply of fuel, oil, and water.
2. Checks operation of engine at idle and during acceleration and deceleration.
3. With engine running, checks operation, condition, and mounting of instruments.
4. Checks operation, connections, and mouning of horn and windshield wipers.
5. Cleans and inspects glass and rearview mirrors. Adjusts mirrors.
6. Operates switches for crane operator to check lights.
7. Opens pet cocks to drain water in air brake tanks. Checks all connections.
8. Checks all accessories for mounting and condition. Checks all belts for condition and adjustment.
9. Checks mounting, condition, cleanliness and electrolyte level of battery. Cleans if necessary.

CRANE OPERATOR
(CRANE MECHANISM)

12. Checks for loose or missing parts of wheels, rims, axle drive flange, and spring U-bolt nuts. Tightens as needed.
13. Checks condition and security of propeller shafts, center bearings, and vents. Removes any foreign material.
14. Checks condition and cleanliness of axle and transfer vents.
15. Checks presence, condition, and mounting of tools and equipment.
16. Checks and replenishes supply of fuel, oil, and water.
17. Checks all cables for proper fastening, and looks for excessive cable wear.
18. Reports to battery executive, "Sir, crane in order."

DRIVER
(TRUCK-MOUNTED CRANE)

10. Checks accessible wiring for connections and condition.
11. Checks air cleaners and breather caps and cleans if necessary.
12. Drains accumulated water and dirt in fuel filters.
13. Checks condition and operation of engine controls.
14. Cleans engine thoroughly. Tightens loose nuts and cap screws. Lubricates as needed and as directed by vehicle lubrication order.
15. Reports to crane operator, "Driver ready."

89. DUTIES IN WEEKLY INSPECTION AND MAINTENANCE.

CHIEF OF SECTION (ALL EQUIPMENT)

1. Supervises section in weekly inspection and maintenance of howitzer, tools, equipment, and accessories. (See TM 9–341 (TM 9–336) and War Department Lubrication Orders.) (Cannoneers 4, 6, 8, 13, 15 and 17 assist prime mover drivers.)

DRIVER (PRIME MOVERS)

1. Checks engine operation at idle and during acceleration and deceleration.
2. With engine running, checks operation, condition, and mounting of instruments.
3. Inspects steering linkage for broken, loose, or bent parts. Checks lever free travel.
4. Checks fuel tank. Refills if necessary.
5. Checks transmission oil level. Refills if necessary.

NO. 4 (CARRIAGE LOAD PRIME MOVER)

1. Checks radiators and right engine oil. Refills if necessary. Checks antifreeze with a hydrometer.
2. Checks and tightens all mountings. Checks and adjusts all belts on right engine.
3. Checks and cleans the right engine air cleaners and breather caps.

NO. 6 (CARRIAGE LOAD PRIME MOVER)

1. Checks for leaks, locates source, and corrects or reports them.
2. Checks for leaks in fuel filters. Drains the sediment from filter bowls and fuel tank sump.

DRIVER (PRIME MOVERS)

6. Checks mounting, operation, and condition of siren and windshield wipers.
7. Checks and cleans glass and rearview mirrors. Adjusts mirror.
8. Operates switches for No. 8 to check the lights.
9. Checks ignition wiring. Checks all accessible conduits, looms, junction boxes, junction plugs and connections for chafing or breakage.

NO. 4 (CARRIAGE LOAD PRIME MOVER)

4. Checks ignition wiring. Checks all accessible conduits, looms, junction boxes, plugs, and connections for chafing or breakage.
5. Checks for leaks. Locates source and corrects or reports them.
6. Checks for presence, condition, and seal of fire extinguishers.
7. Checks charge and mounting of decontaminator.

NO. 6 (CARRIAGE LOAD PRIME MOVER)

3. With assistance of No. 8, examines bogie tires for cuts and separation from wheels. Checks for loose, bent, or worn connectors. Checks track tension. Tightens wedge nuts and looks for dead blocks and bottomed wedges.
4. Checks and tightens all nuts or cap screws on sprockets, bogie wheels, and idlers, assisted by No. 8. Checks condition and security of track support rollers.

10. Checks and tightens all mountings, checks and adjusts all bolts on the left engine.
11. Checks and cleans the left engine air cleaners and breather caps.
12. Drains air tank. Checks operation of valves. Checks system for leaks. Checks mountings. Cleans air cleaner.
13. Checks operation and condition of engine controls.
14. Checks for leaks. Locates source and corrects or reports them.

8. Cleans batteries, including terminal connections or posts if corroded. Checks electrolyte level and specific gravity. Checks battery mountings. Tightens terminal bolts if loose.
9. Checks fluid level of torque converter. Refills if necessary. Drains sediment from reservoir. Checks oil level in pump housing.
10. Checks mounting bolts and lubricant leaks of propeller shafts.

5. Assisted by No. 8, checks for bent, broken, or loose parts of springs and suspensions. Removes all stones and trash.
6. Checks oil level in final drive housing.
7. Inspects tow hooks and pintle for good condition and secure mounting. Checks air and electrical connections.
8. Tightens all loose nuts and cap screws found. Checks removable hull plates for loose bolts.

DRIVER (PRIME MOVERS)

15. Assists No. 6 in checking presence, condition, and stowage of tools. Reports breakage or missing items. Cleans and rewinds winch cable assisted by Nos. 4, 6, and 8.
16. Tightens all nuts and cap screws found loose.
17. Cleans dirt and trash from inside and outside of tractor (washes if possible), assisted by Nos. 4, 6, and 8.

NO. 4 (CARRIAGE LOAD PRIME MOVER)

11. Checks mountings of turret and gun and operation of mount.
12. Assists driver and Nos. 6 and 8 in cleaning and rewinding winch cable.
13. Tightens all nuts and cap screws found loose.
14. Assists the driver and Nos. 6 and 8 in cleaning the tractor.
15. Reports, "No. 4 ready."

NO. 6 (CARRIAGE LOAD PRIME MOVER)

9. Assists driver in checking presence, condition, and stowage of tools. Assists driver, No. 4, and No. 8 in cleaning and rewinding winch cable. Checks chain hoist and ammunition crane.
10. Assists driver and Nos. 4 and 8 in cleaning the tractor.
11. Reports, "No. 6 ready."

18. Lubricates as needed and as directed by the vehicle lubrication order.
19. Reports, "Driver ready."

NO. 8
(CARRIAGE LOAD PRIME MOVER)

1. Checks for leaks. Locates source and corrects or reports them.
2. Checks spare cans of fuel, oil, and water and refills if necessary.

NOS. 13, 15, 17
(HOWITZER LOAD PRIME MOVER)

1. Assist driver of howitzer load prime mover by performing duties similar to those performed by Nos. 4, 6, and 8 respectively on the carriage load prime mover.

CRANE OPERATOR
(CRANE MECHANISM)

1. Supervises detailed inspection of crane.
2. Checks air pressure in tires, removes all foreign matter. Checks for proper matching and irregular wear and changes position of tires as required. Removes and replaces any badly injured tires.

DRIVER
(TRUCK-MOUNTED CRANE)

1. Checks and replenishes supply of fuel, oil, and water. Checks the antifreeze with a hydrometer.
2. Checks air brakes for leaks. Drains air tank. Checks connections and mountings. Cleans lines.

NO. 8
(CARRIAGE LOAD
PRIME MOVER)

3. Checks presence, condition, and operation of lights, reflectors, and switches. (Driver operates all switches except floodlight switch.)
4. Checks mounting and condition of fenders and bumpers.
5. Assists No. 6 in checking all nuts and cap screws on sprockets, bogie wheels, idlers, and track support rollers for presence and security.

CRANE OPERATOR
(CRANE MECHANISM)

3. Checks pintle mounting and locking device. Cleans and lubricates contacting surfaces of the fifth wheel. Tightens all mounting bolts.
4. Check contents, cleanliness, and mounting of fire extinguishers.
5. Checks charge and mounting of decontaminator.

DRIVER
(TRUCK-MOUNTED CRANE)

3. Checks operation of engine at idle and during acceleration and deceleration.
4. With engine running, checks operation, condition, and mounting of instruments.
5. Checks operation, connections, and mounting of horn and windshield wipers.
6. Cleans and inspects glass and rearview mirrors. Adjusts mirrors.

6. Assists No. 6 in checking for cut tires, separation of the rubber from the wheel, loose, bent, or worn connectors, and loose wedges. Checks track tension.
7. Assists No. 6 in checking for bent, broken, or loose parts of springs and suspensions. Removes all stones and trash.
8. Checks mounting and security of winch. Checks for leaks. Assists driver, No. 4, and No. 6 in cleaning and rewinding cable.

6. Checks for loose or missing parts in wheels, rims, axle drive flanges, and spring U-bolts. Tightens as needed.
7. Checks condition and security of propeller shafts. Removes any foreign material.
8. Checks condition and cleanliness of axle and transfer vents. Cleans all vents thoroughly.
9. Checks and tightens all nuts and bolts.
10. Cleans vehicle thoroughly.

7. Operates switches for crane operator to check lights.
8. Checks and tightens all mountings. Checks all belts for condition and adjustment.
9. Checks all wiring to see that it is securely connected, clean, and not damaged.
10. Removes and cleans all air cleaners and breather caps.
11. Drains accumulated water and dirt in fuel filters.
12. Checks condition and operation of engine controls.

NO. 8
(CARRIAGE LOAD
PRIME MOVER)

9. Checks condition and security of load, tarpaulins, and body.
10. Tightens all loose nuts or cap screws found.
11. Assists driver, No. 4, and No. 6 in cleaning the vehicle.
12. Reports, "No. 8 ready."

CRANE OPERATOR
(CRANE MECHANISM)

11. Checks presence and condition of tools and equipment. Reports missing or damaged tools.
12. Checks for all fluid leaks. Locates source, corrects or reports them.
13. Checks condition of body.
14. Checks condition and attachment of springs, suspensions, fenders, and bumpers.
    Corrects or reports any abnormal conditions.

DRIVER
(TRUCK-MOUNTED CRANE)

13. Checks battery for damage, leakage, security of mounting and connections. Checks electrolyte level and specific gravity.
    Cleans and tightens terminals securely and coats lightly with grease.
14. Checks differentials, final drives, transmission, transfer units for lube level and leaks. Reports if low.
15. Cleans engine thoroughly.

CRANE OPERATOR
(CRANE MECHANISM)

15. Checks all parts of steering linkage for security, condition, and adjustment.
16. Checks all lights, light switches, and reflectors for condition and operation. (Driver will operate switches.)
17. Checks and tightens all nuts and bolts.
18. Performs weekly maintenance operations on crane as outlined in TM 9–771.
19. Reports to battery executive, "Sir, crane in order."

DRIVER
(TRUCK-MOUNTED CRANE)

16. Lubricates as directed by vehicle lubrication order.
17. Reports to crane operator, "Driver ready."

SECTION XIII
CARE AND MAINTENANCE OF MATERIEL

90. GENERAL. a. This chapter covers such operations in the care and maintenance of the materiel as may be performed by a battery in the field.

b. Complete instructions for battery maintenance, including disassemblies, are found in the Technical Manuals and standard nomenclature lists, especially TM 9–341, TM 9–336, SNL D–31, and SNL D–33. Operations not covered therein are the functions of the ordnance maintenance company.

c. In general, the battery is charged with routine cleaning, lubricating, and care. For routine care and maintenance, specific duties are assigned to individuals, squads, or sections, and a careful performance of such duties is necessary.

d. Disassemblies which may be performed in the battery are the following:

(1) The disassemblies incident to preparing the piece for firing and for traveling.

(2) Breech and firing mechanism.

(3) Lunettes, wheels, and tires of transport wagons.

91. CLEANING. a. Dirt and grit accumulated in traveling, or from the blast of the piece in firing, settle on the bearing surfaces, and in combination with the lubricant itself form a cutting compound. Powder fouling attracts moisture and hastens the formation of rust. Therefore, at lulls during firing and immediately after firing, the piece must be

thoroughly cleaned. At other times it should be cleaned at intervals depending upon the use and condition. Dirt on nonbearing surfaces can usually be removed by water; greasy parts must be cleaned with dry-cleaning solvent or rifle bore cleaner applied with a cloth. The procedure in cleaning the bore and breech mechanism is described in TM 9–341 (TM 9–336).

b. A division of duties for members of the howitzer squad in routine cleaning and maintenance is described in paragraph 88.

92. LUBRICATION. Lubrication instructions for the howitzer, carriage, and transport wagons are contained in TM 9–341 (TM 9–336).

93. PROTECTION AGAINST CHEMICALS. a. Whenever chemical attacks are anticipated, cover all unpainted surfaces with engine oil. Keep propelling charges, fuzes, and primers in sealed containers, and cover projectiles with a paulin.

b. After a gas attack, remove the oil with dry-cleaning solvent, using cloths attached to sticks. Decontaminate painted surfaces with a mixture of equal parts by weight of decontaminating agent (chloride of lime) and water. If chloride of lime is not available, use large quantities of hot water.

c. Unpainted surfaces exposed to *vesicant gas* (mustard or lewisite) must be treated with a mixture of 1 part noncorrosive decontaminating agent and 15 parts solvent (acetylene tetrachloride) by weight. If these materials are not available, use warm water and soap. Clean ammunition the

same way. **Caution:** Do not use chloride of lime near ammunition. Flaming occurs when it touches liquid vesicants.

d. Unpainted surfaces exposed to *nonvesicant gas* may be cleaned with solvent or denatured alcohol, wiped dry, and then coated with oil. (See TM 3–220 for more information on decontamination.)

94. RECOIL MECHANISM. Under no conditions will any dismounting, disassembly, or repair work of any kind be allowed on any part of the recoil mechanism except by qualified ordnance personnel. The only operations permitted by battery personnel are those of draining and filling the oil reserves and such other operations as are described in TM 9–341 (TM9–336).

95. EQUILIBRATOR MECHANISM. Under no conditions will any dismounting, disassembly, or repair work of any description be allowed on any part of the equilibrator mechanism except by qualified ordnance personnel. The only operations permitted to battery personnel are those of draining and filling the system with oil and adjusting the nitrogen pressure in the pressure tank as described in TM 9–341 (TM 9–336).

96. SIGHTING EQUIPMENT. The sighting equipment will not stand rough handling or abuse. All instruments must be kept clean and, when not in use, kept in their cases or covered and protected from injury. Throw-out mechanisms must be fully disengaged to revent injury to the worm and gear teeth. The using arm is not permitted to disassem-

ble sighting equipment. Painting is also prohibited. For lubrication instructions see TM 9–341 (TM 9–336) and current lubrication orders. If any part of the sighting equipment fails to function, refer it to ordnance personnel.

97. TRANSPORT WAGONS. Care should be exercised in cleaning, lubricating, and painting of the transport wagons. Lubrication, with its method and frequency, is shown in TM 9–341 (TM 9–336). After assembly or disassembly, especially by the winch method, the wagons should be inspected for damaged paint, and those parts requiring it should be retouched. Be sure to keep all moving and threaded parts of the wagons covered with lubricant and free from rust. Failure to do this will result in considerable loss of time during assembling and disassembling operations.

SECTION XIV
DESTRUCTION OF MATERIEL

98. GENERAL. a. When capture by the enemy is imminent, materiel will be destroyed. Such destruction is a command decision *to be carried out only on authority delegated by the division or higher commander.* All howitzer batteries will prepare plans for destroying their materiel. Plans must be flexible in the time, equipment, and personnel required.

b. Training will not involve actual destruction of materiel but will stress:

(1) Materiel will be destroyed only when such action is necessary in the judgment of the military commander concerned. (See a above.)

(2) Sequence laid down for the method selected will be strictly followed, to insure uniform destruction.

(3) *The same essential parts will be destroyed on all weapons or vehicles to prevent the enemy from reconstructing a complete weapon or vehicle from several damaged ones.*

c. Some methods require special tools and equipment not normally items of issue. Special issue of such items is a command decision. If magneto exploders are not available, the generator of the standard field telephone can furnish current for tetryl electric blasting caps. With nonelectric blasting caps, at least 5 feet of Bickford safety fuze must be used to allow personnel to reach cover. (See FM 5–25 on demolition charges.)

d. Methods are given *in order of their effectiveness.*

Use method No. 1 where possible, other methods in the priority shown.

99. OPTICAL AND FIRE CONTROL EQUIPMENT. Remove all detachable equipment before destroying the rest of the weapon. *If evacuation is possible, carry detachable items and thoroughly smash nondetachable items.* If evacuation is not possible, thoroughly smash all optical equipment and burn slide rules, firing tables, charts, etc.

100. TUBE, BREECH, RECOIL MECHANISM, AND CARRIAGE. When simultaneous destruction of all these items is impossible, as when the howitzer is disassembled for travel, destruction of the tube, breech, and recoil mechanism will have priority.

a. Howitzer assembled in firing position. (1) *Method No. 1. (a)* Screw filling and drain valve release into the filling and drain hole of the recuperator cylinder and puncture the recoil cylinder, allowing recoil oil to drain. It is not necessary to wait for the oil to drain completely before firing the cannon as described below.

(b) Place an armed (safety pin removed) M6 antitank rocket in the tube from 36 to 42 inches in front of the forcing cone with the ogive end toward the rear. An armed M9A1 antitank grenade may be substituted if the rocket is not available. The grenade or rocket must be centered in the tube; this is done by means of a wooden adapter or waste.

(c) Ram an unfuzed round of HE shell into the forcing cone, insert the maximum propelling charge and close the breach.

(d) Fire the piece from a foxhole at least 100 feet to the rear, about 20 degrees off the line of fire. Elapsed time: 2 to 3 minutes. Danger zone 500 yards.

(2) *Method No. 2.* Ram an HE shell into the forcing cone and place 120 ½-pound TNT blocks behind it in the powder chamber. A sufficient length of safety fuze should be used to permit personnel to reach a safety zone or cover. The fuze may be routed through the vent in the obturator spindle. Close the breechblock and detonate the TNT charge.

(3) *Method No. 3. (a)* Place 12 unfuzed M14 incendiary grenades, on their sides on top of one another, in the chamber. Close the breech. Equip another incendiary grenade with a 15-second Bickford fuze, ignite, and toss it in the muzzle. The tube should be elevated as much as possible beforehand to aid in getting the grenade to the breech end. Elapsed time: 3 to 5 minutes.

(b) The metal from the grenades will fuze with the interior of the breechblock, making it impossible to open the breech. This method should be used only as a last resort, since it will result in no damage to the carriage.

b. Howitzer and carriage on transport wagons. (1) *Howitzer.* Use the same methods described in a above.

(2) *Carriage.* Place one unfuzed HE shell so that its base rests in the front of the false cradle and the ogive rests on the top of the elevating arc. Place a ½-pound block of TNT over the fuze cavity in the shell. Detonate the TNT block, using detonating cord, tetryl nonelectric caps, and at least

5 feet of safety fuze. Approximately 40 ½-pound blocks of TNT may be substituted for the HE shell.

101. PNEUMATIC TIRES OF TRANSPORT WAGONS AND OTHER VEHICLES. Tires must always be destroyed even when time is lacking to destroy the remainder of the wagon or vehicle.

a. Method No. 1. Ignite an M14 incendiary grenade under each tire. If used in conjunction with carriage or vehicle destruction by explosives, incendiary fires must be well started before charges are detonated.

b. Method No. 2. Deflate tires. Damage with axe, pick, or fire from machine gun. Pour gasoline on tires and ignite.

102. AMMUNITION. a. General. (1) Time usually will not permit the destruction of all ammunition in forward combat zones.

(2) When sufficient time and materials are available ammunition may be destroyed as indicated below. At least 30 to 60 minutes will be required to destroy adequately the ammunition carried by combat units.

(3) In general, the safety precautions outlined in TM 9–1900 should be followed whenever possible.

b. Projectiles. Projectiles should be stacked horizontally with ogive ends pointing in the same direction. Screw a fuze into the center shell of the top row of each pile. Pack a detonating cap, with fuze, next to the fuze in each such center shell, and detonate. The danger zone is at least 200

yards. Shells standing on their bases cannot be satisfactorily destroyed by sympathetic detonation.

c. Propelling charges and bulk explosives. Separate-loading propelling charges and bulk explosives can best be destroyed by burning. This is most effectively accomplished when they are out of their containers or when the containers are split.

103. VEHICLES. a. Method No. 1. (Time. 1 to 2 minutes, with charges prepared in advance and carried in vehicle.) If prepared charges are carried in the vehicle, *keep fuzes and caps separated from*

Vehicle	*Pounds TNT*	*Where placed*
Heavy tractor, M6	2	Against center of each engine block at base of distributor shaft.
	2	At the flange joining transmission and differential housing.
	2	On top of track at midpoint.
	1	On each bogie suspension assembly.
Passenger cars	1	Left side of engine block.
	1	Rear of cylinder block on clutch housing. On V-types, between cylinder banks at rear of engine.
Trailers	2	Over axle inside each wheel.
Trucks	2	Top of clutch housing. Open hood to place charge properly.
	2	Left side of engine, low as possible.

charges until used. Remove and empty fire extinguishers. Puncture fuel tanks. Place TNT charges as indicated in the table on p. 228. Insert tetryl non-electric caps with at least 5 feet of safety fuze in each charge. Ignite the fuzes and take cover.

b. Method No. 2. (Time: 5 to 8 minutes.) Remove and empty fire extinguishers. Puncture fuel tanks. Open all doors and hatches. Fire on vehicle with artillery, rockets or grenades. Aim at engine, suspension, and armament in that order. If a good fire is started, vehicle may be considered destroyed.

c. Method No. 3. Choose appropriate variation—

(1) When vehicle contains enough fuel to insure rapid burning, use small arms fire or pioneer tools to puncture in sequence: crankcase oil pan, radiator tank and core, and oil filter. Start engine and let it race with hand throttle open full. Remove and empty fire extinguishers. Puncture bottom of gasoline tank and drench tires, cargo, cab interior, and engine with gasoline, in order named. Ignite fuel from windward side. (Time: 15 to 45 minutes.)

(2) Puncture with small arms fire or pioneer tools, in sequence: crankcase oil pan, radiator tank and core, oil filter, and tires. Start engine and let it race with hand throttle open full. (Time: 5 to 12 minutes.)

(3) With pioneer tools or rifle butt smash or puncture in sequence: distributor cap and housing, ignition coil, carburetor, intake and exhaust manifolds, fuel pump, radiator tank and core, battery, and fuel tank. If flame and smoke will give

no information to enemy, ignite fuel. (Time: 3 to 5 minutes.)

d. Method No. 4. Drive to edge of bluff or ravine, let engine race, and push vehicle over edge. For more thorough destruction, smash additional vehicles onto same pile at bottom.

Note. Whenever practicable, execute the following destruction before proceeding with other methods of destruction: Smash or puncture generator, starting motor, distributor cap and housing, ignition coil, fuel pump, fuel tank, crankcase oil pan, radiator tank and core, battery, and carburetor.

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