

# FM 6-95

DEPARTMENT OF THE ARMY FIELD MANUAL

USAAMS LIBRARY

JUL 11 1967

## 8-INCH GUN M1 AND 240-mm HOWITZER M1 TOWED

*RESCINDED BY CIR 310-43*

UF  
160.23  
A5  
1954



DEPARTMENT OF THE ARMY • MARCH 1954

FIELD MANUAL }  
No. 6-95DEPARTMENT OF THE ARMY  
WASHINGTON 25, D. C., 15 March 1954

## 8-INCH GUN M1 AND 240-MM HOWITZER M1 TOWED

	<i>Paragraphs</i>	<i>Page</i>
CHAPTER 1. INTRODUCTION.....	1-3	3
2. ORGANIZATION.....	4, 5	7
3. SECTION DRILL		
Section I. General.....	6, 7	10
II. Preliminary commands and for- mations.....	8-13	11
CHAPTER 4. PREPARING THE GUN FOR FIRING AND TRAVELING		
Section I. Preparations for firing, crane method.....	14-19	20
II. Preparations for traveling, crane method.....	20, 21	56
III. Preparations for firing, winch method.....	22, 23	58
IV. Preparations for traveling, winch method.....	24, 25	88
CHAPTER 5. DUTIES IN FIRING.....	26-43	97
6. TECHNIQUES AND SITUA- TIONS THAT REQUIRE SPECIAL ATTENTION....	44-53	148
7. BORE SIGHTING AND BASIC PERIODIC TESTS		
Section I. Introduction.....	54, 55	167
II. Bore sighting.....	56-60	169
III. Basic periodic tests.....	61-66	191
CHAPTER 8. MAINTENANCE AND IN- SPECTIONS.....	67-77	202

\*This manual supersedes FM 6-95, 1 February 1946, including C 1, 10 February 1947.

	<i>Paragraphs</i>	<i>Page</i>
CHAPTER 9. DECONTAMINATION OF EQUIPMENT.....	78-81	247
10. DESTRUCTION OF EQUIP- MENT.....	82-84	250
11. SAFETY PRECAUTIONS....	85-88	252
12. TRAINING		
Section I. General.....	89-92	255
II. Minimum training schedule....	93-95	257
III. Tests for qualification of gun- ners.....	96-107	262
APPENDIX REFERENCES.....	-----	283
INDEX.....	-----	286

# CHAPTER 1

## INTRODUCTION

---

### 1. Purpose and Scope

This manual is a guide to assist commanders in developing the sections of 8-inch gun M1 and 240-mm howitzer M1 firing batteries into efficient, smooth-working teams that have a sense of discipline that will impel them to operate effectively under the stress of battle. This manual prescribes individual duties and section drills, inspection and maintenance drills, tests and adjustments of sighting and fire control equipment, and methods for the destruction and decontamination of equipment.

### 2. Definitions and Terms

*a. Gun.* Throughout this manual the term *gun* is used generally to include howitzer.

*b. Section.* Tables of organization and equipment prescribe the *personnel* and *equipment* comprising each section of a battery (figs. 1 and 2). In this manual the term *section* is often used to designate *only the personnel* required to serve the gun and equipment of one section.

*c. Coupled.* The gun load or carriage load is coupled when the drawbar of the transport wagon is attached to a prime mover.

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



*Figure 1. 240-mm howitzer M1 section (T/O & E 6-517A).*

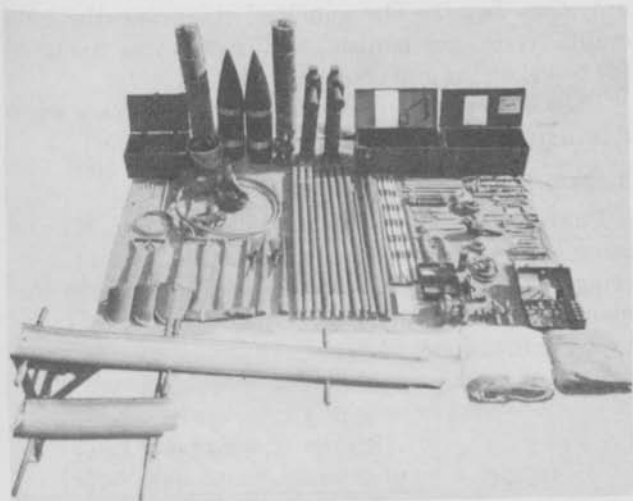


Figure 2. A method of displaying equipment of a 240-mm howitzer (T/O & E 6-517A).

*e. Front.* The front is the direction in which the muzzle of the gun points when in firing position. When the gun 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.

*f. Right (Left).* The direction right (left) is the right (left) when facing to the front. For determining the right or left of *the gun*, coupled or uncoupled, the front is the direction in which the muzzle points.

*g. Carriage Load.* The carriage load comprises the carriage, spades, and accessories mounted for travel on the carriage transport wagon.

*h. Gun Load.* The gun load comprises the gun, cradle, recoil mechanism, and accessories mounted for travel on the gun transport wagon.

*i. In Battery.* A gun is said to be *in battery* when it is in its normal firing position.

### **3. References**

Publications pertaining to the 8-inch gun M1 and 240-mm howitzer M1 and auxiliary equipment, covering related matters not discussed in detail in this manual, are listed in the appendix.

## CHAPTER 2

### ORGANIZATION

---

#### 4. Composition of the Gun Section

*a.* The gun section consists of section personnel, a carriage, an 8-inch gun or a 240-mm howitzer, two prime movers, and auxiliary equipment (fig. 1).

*b.* The personnel of a gun section are—

(1) A chief of section (CS).

(2) A gun squad, consisting of a gunner (G), an assistant gunner (No. 1), eight cannoners, numbered from 2 to 9, a prime mover driver, a crane operator, and a heavy truck driver (crane truck).

(3) An ammunition squad, consisting of an ammunition corporal (AC), five cannoners, numbered from 10 to 14, four ammunition handlers, numbered from 15 to 18, and a prime mover driver.

*c.* Section equipment is listed in T/O & E 6-517A and SNL's appropriate to the weapon and unit (app.).

#### 5. General Duties of Personnel

*a. Chief of Section.* The chief of section is the noncommissioned officer in command of the section and, as such, is responsible to the battery executive for—

(1) Training and efficiency of personnel.



- (2) Performance of duties listed under section drill, duties in firing, testing and adjustment of sighting and fire control equipment, and inspection and maintenance of all section equipment including the crane and prime movers.
- (3) Observance of safety precautions.
- (4) Preparation of field fortifications for protection of equipment, ammunition, and personnel.
- (5) Camouflage discipline; local security; and radiological, biological, and chemical security discipline.
- (6) Maintenance of the gun book.
- (7) Police of the section area.

*b. Gunner.* The gunner is the assistant to the section chief in carrying out the duties specified in *a* above. The gunner's specific duties are prescribed in the appropriate chapters of this manual.

*c. Cannoneers and Ammunition Handlers.* Cannoneers and ammunition handlers perform duties as listed in this manual, and any other duties that the chief of section prescribes.

*d. Ammunition Corporal.* The ammunition corporal is responsible that ammunition is properly stored, handled, and prepared for firing.

*e. Artillery Mechanic.* The artillery mechanic, although not a member of the section, works closely with both gun sections and is responsible to the chief of firing battery for the proper mechanical functioning of the guns. He supervises the cleaning and lubrication of the guns, carriages, and transport wagons.

*f. Drivers.* Each driver's primary duty is the driving of his vehicle. He also performs maintenance and such other duties as are prescribed by this manual, by the technical manual for his vehicle, or as may be prescribed by the chief of section.

*g. Crane Operator.* The primary duty of the crane operator is the operation and maintenance of the crane.

## CHAPTER 3

### SECTION DRILL

---

#### Section I. GENERAL

##### 6. Objective

The objective of section drill is the attainment of efficiency: Maximum precision coupled with high speed.

##### 7. Instructions

*a.* To develop maximum efficiency and to prevent injuries to personnel and equipment, the drills prescribed in this manual must be observed. Section drill should be conducted in silence except for commands and reports. The section must be drilled until reactions to commands are automatic, rapid, and efficient.

*b.* Mistakes are corrected immediately. Each member of the section must be impressed with the importance of reporting promptly to the chief of section any mistakes discovered after the command to fire has been given. The chief of section will report mistakes immediately to the executive.

*c.* Battery officers supervise the drill to insure that instructions are carried out and that maximum efficiency is obtained.

*d.* Duties should be rotated during training so that each member of the gun section can perform all the duties within the section. In addition, battery over-

head personnel not assigned specific duties during drill periods should be trained in the fundamentals of section drill in order that they will be capable of functioning efficiently with a gun section if required.

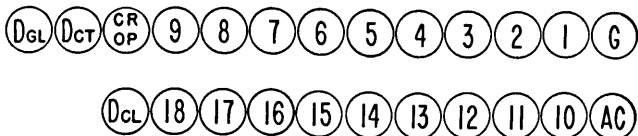
## Section II. PRELIMINARY COMMANDS AND FORMATIONS

### 8. To Form the Section

*a. To Fall In.* The chief of section takes his post. On the command of execution the section forms in a double rank at close interval, centered on and facing the chief of section at a distance of 3 paces (fig. 3). Higher numbered cannoneers, if present, form in order between No. 18 and the carriage load driver. The chief of section may indicate in his preparatory command the place and direction the section is to form. At the first formation for a drill or exercise the caution, "As gun section(s)," precedes the command. The commands are FALL IN; or 1. IN FRONT (REAR) OF YOUR GUN(S), 2. FALL IN; or 1. ON THE ROAD FACING THE PARK, 2. FALL IN. Execution is as follows: The gun section moves at double time and forms at close interval at attention guiding on the gunner (fig. 3).

*b. To Call Off.* The section being in formation the command is CALL OFF. At the command, all personnel in ranks, except the gunner and the ammunition corporal, execute eyes right. The section then calls off in sequence, "Gunner," "1," "2," "3," "4," "5," "6," "7," "8," "9," "Crane operator," "Driver," "Driver," "AC," "10," "11," "12," "13," "14," "15," "16," "17," "18," "Driver." As each man after the gunner and ammunition corporal calls out

CS



CS-CHIEF OF SECTION  
G-GUNNER  
1-ASSISTANT GUNNER  
CR OP-CRANE OPERATOR  
D(CT)-DRIVER, CRANE TRUCK

D(GL)-DRIVER, GUN LOAD  
AC-AMMUNITION CORPORAL  
D(CL)-DRIVER, CARRIAGE LOAD

Figure 3. Gun section in formation.

his designation, he turns his head and eyes smartly to the front.

### 9. Posts of Section

The command is 1. CANNONEERS, 2. POSTS. The command is general and is applicable whether the section is in or out of ranks and at a halt or marching. All movements are executed at double time and are terminated at the position of attention. Higher numbered cannoneers, if present, take posts as prescribed by the chief of section. Execution is as follows:

*a. Loads Coupled.* The section moves to posts as shown in figure 4. All personnel face to the front and are alined 2 feet outside of and parallel to the sides of the section vehicles, except the chief of section who takes a position 3 paces in front of and centered on the vehicles.

*b. Loads Uncoupled, Not Prepared for Action.* The section moves to posts as shown in figure 5. All personnel face to the front and are alined 2 feet

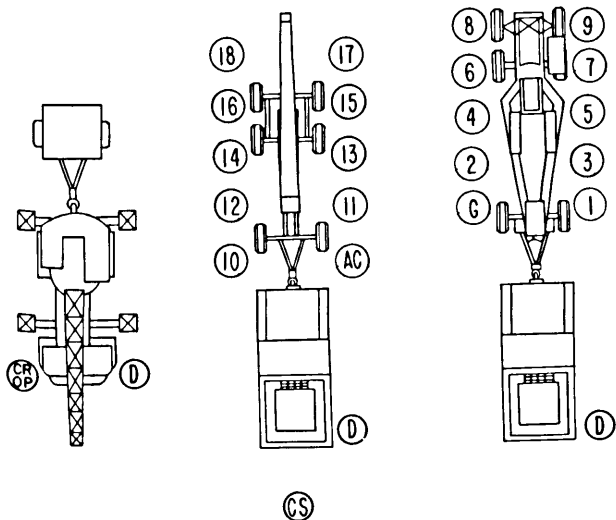
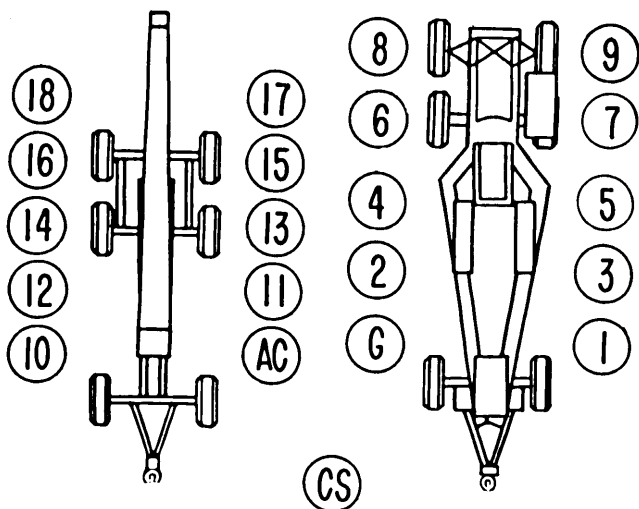


Figure 4. Posts of section, loads coupled.

outside the wheels, except the chief of section who takes a position 3 paces in front of and centered on the loads.

*c. Gun Prepared for Action.* The section moves to posts as shown in figure 6. All personnel face to the front except as indicated below.

- (1) *Chief of section.* The chief of section is free to move where he can best control the service of the gun, hear commands, and perform his duties effectively. A convenient post is approximately halfway up the right trail.
- (2) *Gunner.* Seated in the gunner's seat, facing the panoramic telescope mount.



*Figure 5. Posts of section, loads uncoupled, not prepared for action.*

- (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.

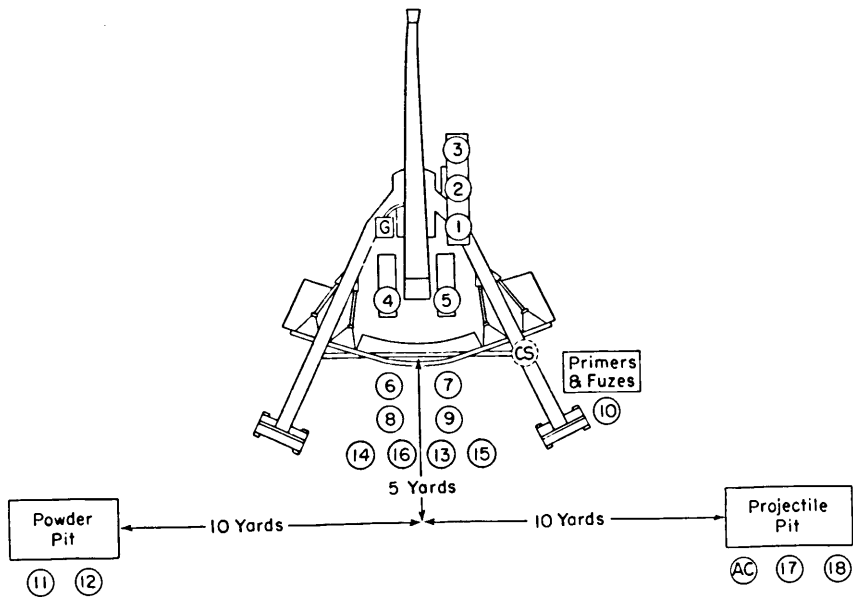


Figure 6. Posts of section, gun prepared for action.



- (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.
- (12) *Nos. 13 to 16.* In line 1 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.

#### 10. To Change Posts

To acquaint the members of the section with all duties and lend variety to drill, posts should be changed frequently. The section being *in formation* the commands are 1. CHANGE POSTS, 2. MARCH, or 1. SECTION, CHANGE POSTS, 2. MARCH.

*a.* At 1. CHANGE POSTS, 2. MARCH, all numbered cannoneers except Nos. 9 and 18 (or the highest numbered cannoneer) take 2 left steps, thus placing them at the post of the next higher numbered cannoneer. Nos. 9 and 18 move at double time in rear of the section to the posts of Nos. 10 and 1, respectively. All other members of the section stand fast.

*b.* At 1. SECTION, CHANGE POSTS, 2. MARCH, all members of the section except the leftmost members of the two ranks take 2 left steps. The leftmost members move at double time in rear of the section to the posts of the gunner and ammunition corporal respectively.

## 11. To Mount

The commands are 1. PREPARE TO MOUNT, 2. MOUNT, or MOUNT. If any members of the section are to remain dismounted, their designations are announced with the caution, "stand fast," given between the preparatory command and the command of execution. For example; 1. PREPARE TO MOUNT, "drivers stand fast," 2. MOUNT.

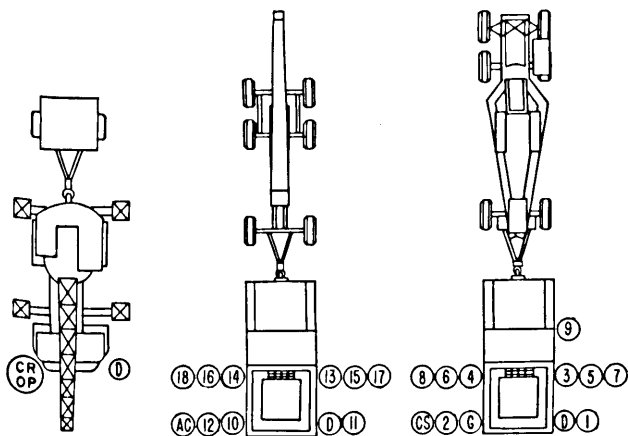


Figure 7. Section prepared to mount.

a. 1. PREPARE TO MOUNT, 2. MOUNT. At the preparatory command, the section moves at double time to positions shown in figure 7. At the command of execution, personnel mount in order from their columns and take seats as indicated in figure 8. Each man is assisted in mounting by the man directly behind or in front. Prior to mounting, the commanders of the vehicles and the drivers verify that

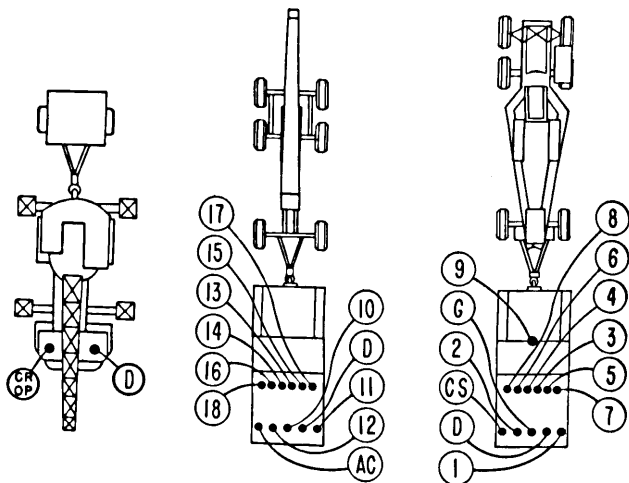


Figure 8. Section mounted.

the load is properly coupled, that personnel and equipment are aboard, and that the safety straps are secure.

**b. MOUNT.** At the command **MOUNT**, the section immediately mounts in the same order and manner that is prescribed for the command **1. PREPARE TO MOUNT, 2. MOUNT**.

## 12. To Dismount

The commands are **1. PREPARE TO DISMOUNT, 2. DISMOUNT** or **DISMOUNT**.

**a. 1. PREPARE TO DISMOUNT, 2. DISMOUNT.** At the preparatory command, members of the section assume positions from which they can dismount promptly; at the command of execution, they dismount and take their posts (fig. 4) at double time.

b. **DISMOUNT.** At the command **DISMOUNT**, the section executes all that is prescribed for the command 1. **PREPARE TO DISMOUNT**, 2. **DISMOUNT**.

### 13. To Fall Out

a. *At Drill.* When it is desired to give the personnel a rest from drill or to relieve them temporarily from a *formation or post*, the command **FALL OUT** is given. The command may be given at any time, and infers that the section is to remain in the drill area.

b. *When Firing.* When firing has been suspended temporarily, but it is desired to have the section remain in the vicinity of the gun, the command **FALL OUT** is given. Men stand clear of the gun to insure that settings and laying remain undisturbed. During these periods the chief of section may direct his men to improve the position, replenish ammunition, or do other necessary work.

## CHAPTER 4

### PREPARING THE GUN FOR FIRING AND TRAVELING

---

#### Section I. PREPARATIONS FOR FIRING, CRANE METHOD

#### 14. Truck-Mounted Crane M2

*a. General.* One truck-mounted crane is provided in each section to help dig the pits, place the gun in firing position, and replace the gun in traveling position. The crane crew consists of a crane operator and a driver. The crane operator is responsible for the operation and maintenance of the crane. All operations to emplace or prepare the crane are under his direction, subject to supervision by the chief of section. *The operations of digging the pit, emplacing the gun, and replacing the gun in traveling position are under the direction of the chief of section.*

*b. Positions for Crane Truck.* The nature of the terrain and natural obstacles will determine the position the crane truck will occupy with respect to the pit. Two satisfactory positions are shown in figure 9. The crane may be emplaced on either side of the pit, provided the same distance and angular ratio is maintained. Figure 9② has several advantages over figure 9①.

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

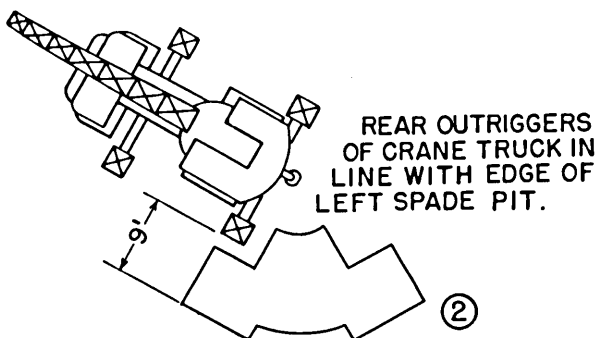
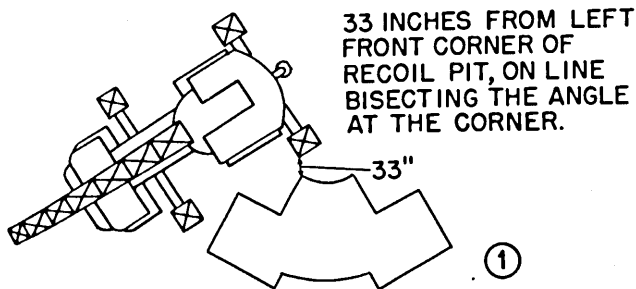


Figure 9. Alternate positions of crane truck for assembly of gun.

- (2) The gun 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 gun 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 fresh dirt will be beneath the camouflage net.

*c. Digging Pits in Hard Ground.* In positioning the crane for digging in hard ground, the crane should be brought close enough to the pit position to allow for a high boom angle thus giving additional drop distance for the clam shell.

*d. Clam Shell Trailer M16.*

- (1) The clam shell trailer M16 transports the clam shell 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 supports. 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 six others 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, 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.

## 15. Crane Operations

a. The following operations normally are used for digging and in handling materiel.

(1) *Swing motions.*

(a) The boom may be swung to the left or to the right.

(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. *Important: The auxiliary swing brake must be applied when the carriage or the gun 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.

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

(c) The load may be "backed down." This is a special operation which permits ex-



treme accuracy in placing the load. This method should be used whenever the gun or carriage loads are lowered.

(3) *Boom hoist.*

(a) The boom may be raised. This operation raises the top of the boom and moves the load in closer to the turntable.

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

(4) *Clam shell.*

(a) The clam shell can be opened in midair. This operation is used in dumping.

(b) The clam shell can be closed in midair. (This is usually undesirable and should be avoided in normal operation.)

(c) The clam shell can be lowered either closed or open.

(d) The clam shell can be raised either closed or open.

(e) The clam shell can be closed on the ground and raised. This is the operation used in taking a bite.

(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 to use the precision lowering device may be used for both engaging and disengaging the device.

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

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

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.

## **16. Crane Hand Signals**

Hand signals for the operations listed in paragraph 15 are as shown in FM 21-60. 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.

## **17. Assembling the Gun by the Crane Method**

a. Assembling the gun 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.
- (2) The spade pits and recoil pit are dug with the clam shell bucket of the crane. Final trimming of the pits is accomplished by hand.
- (3) The crane is placed in position for assembling the gun. The clam shell 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 gun 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 gun prepared for action.

*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 as directed by the chief of section.

*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 ammunition corporal, and the gunner assist in supervising suboperations as prescribed or as may be directed by the chief of section.

*d.* After the gun has been placed in firing position, it is cleaned and lubricated and the chief of section assisted by the mechanic inspects it. 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 gun will be made by the executive.

## **18. Preliminary Operations**

*a. General.* The section column habitually approaches the gun position from the rear. When the crane accompanies the section, it will proceed first,

followed by the carriage load and the gun load in turn. If the pit has been dug previously and the position prepared, the crane will proceed to the position as described in *c* below. 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 gun 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's command to dig the pit is DIG 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 clam shell bucket to the crane.

*Note.* Time may be saved on this operation by rigging the clam shell to the crane for tracking. This is done by passing the cables back over the cab of the crane to the clam shell. If the terrain to be traversed contains tree limbs that are likely to become entangled in the cables, this technique should not be used.

- (3) The crane operator directs the driver of the crane truck into position.
- (4) The pit is dug under the supervision of the chief of section, who directs the crane operator. Cannoneers working in groups of four, alternate both in guiding the clam shell 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 gun and place them in a convenient position. Emplacement time may be reduced if the spades are dropped from the transport wagon and manhandled to the pits. The ammunition squad unloads and stores ammunition under the direction of the ammunition corporal.

*c. Preparing Crane for Assembling Gun.* After the pit is dug, the command to prepare the crane is **PREPARE CRANE.**

(1) *Description of operation.*

- (a) The clam shell bucket is removed from the crane and placed on its trailer.
- (b) 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 9.
- (c) The floats of the crane are positioned and outriggers secured to them (fig. 10).

*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.*

1. When the crane is emplaced on sloping ground, the crane must be leveled by means of the outrigger screws. After

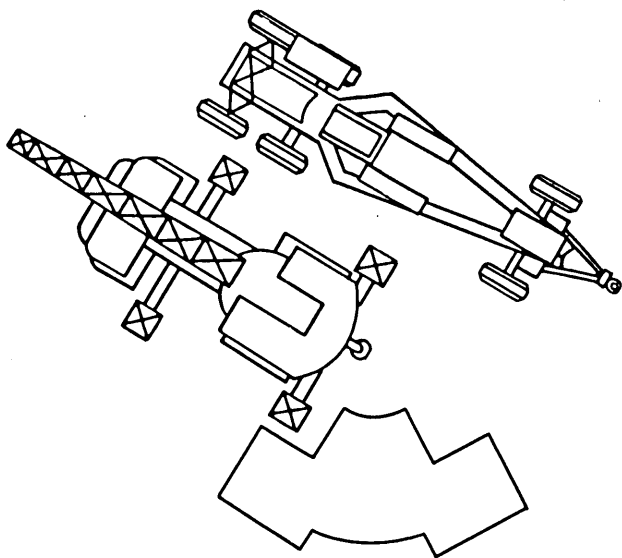
the crane has been placed in position and the outriggers have been extended and locked, the boom is swung to the low side of the truck and the floats on



*Figure 10. Emplacing outrigger float.*

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.



*Figure 11. Carriage load in position beside crane truck.*

2. Floats must be placed so that their handles are to the front and rear and not to the side of the crane.
- (d) 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 a load is lifted.

(e) The carriage load is brought forward and positioned as shown in figure 11.

*d. Detailed Duties of Members of Section.*

(1) The chief of section commands **PREPARE CRANE.**

(2) The crane operator places the clam shell bucket on its trailer assisted by Nos. 16, 17, and 18 who disconnect it from the crane boom.

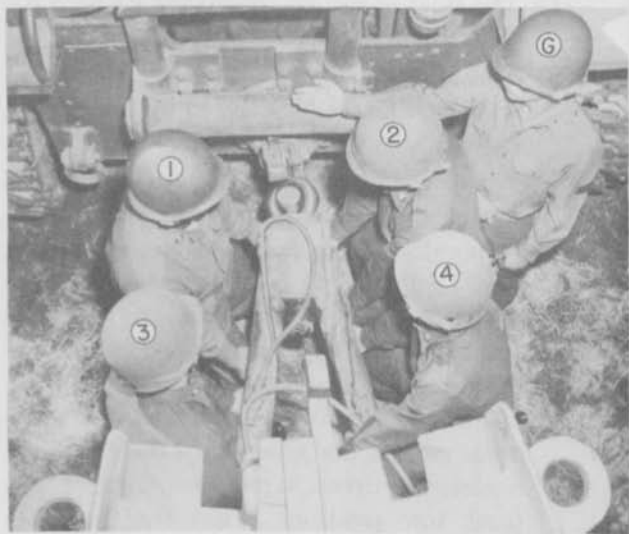
(3) Under the supervision of the ammunition corporal, Nos. 10, 12, and 14 on the left, and Nos. 11, 13, and 15 on the right, extend the crane outriggers. They remove the mats from the trailer and place them in position to support the crane truck during the lifting operations. Next they remove the two 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 operator in attaching the lifting sling and extension cables to the main lifting hook.

*e. Uncoupling.* When it is necessary to separate the towed loads from the prime movers the drawbars of the transport wagons are detached from the pintle.



The command is **UNCOUPLE**. Personnel designate themselves as shown in figure 12 and perform duties as prescribed in table I.



*Figure 12. Uncoupling.*

### **19. Prepare for Action**

When the pit is prepared, crane and carriage load positioned (fig. 11), and the carriage load uncoupled, the command is **PREPARE FOR ACTION**. At the command members of the section perform duties as prescribed in table II. On completion of prescribed duties members of the section take posts as shown in figure 6.

Table II.—Individual Duties in Prepare for Action (Crane Method)

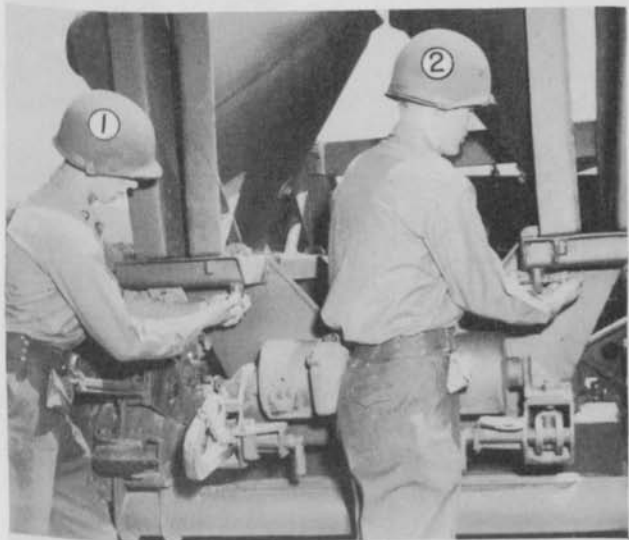
Sequence	Chief of section	Gunner	No. 1 (assistant gunner)	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	Ammunition corporal	Nos. 10 to 18 inclusive	Hv truck driver (crane truck)	Crane operator	Prime mover driver (carriage load)	Prime mover driver (gun load)
1	Commands PREPARE FOR ACTION. Supervises work of all members of the section throughout all sequences.	Directs the work performed by the gun squad throughout all sequences.	Remove top carriage cover (fig. 13).										Directs the work performed by the ammunition squad.	Under direction of ammunition corporal prepare ammunition pit and ammunition.		Operates crane to facilitate operations throughout all applicable sequences.	When load is uncoupled moves prime mover clear of boom swing.
2			Closes equilibrators shutoff valve.	Loosen the spade traveling clamps (fig. 14).	Unfastens carriage hold-down bolts (fig. 15).	Swing platforms to middle position (fig. 16).	Unscrews the inside spade jacks so that they are loose in their trail brackets (fig. 17).	Remove the trail cross braces (fig. 18), the stud bolts (fig. 19), and cap screws (fig. 20).	Removes the loading ramp and places it 5 yards to the rear of the recoil pit.								
3			Indicates to chief of section when carriage is ready to be lifted.	Attach lifting sling and extension cables to carriage (fig. 21).					Attach the guide ropes to the trail ends.								
4	Directs crane operator to lift and swing carriage into position.	Supervises Nos. 1-8 in maneuvering carriage with guide ropes.	Under the direction of the gunner, stand by guide ropes and maneuver the carriage during the lifting and emplacing operation (fig. 22).										Brings two crowbars and sledge to trail ends.				
5		Opens the shutoff valve to the equilibrators pressure tank (fig. 23).	Couple carriage wagon to prime mover.				Detach lifting slings from carriage. Detach lifting sling from crane.				Removes guide ropes from trail ends.	Positions prime mover so that carriage wagon may be coupled.					
6			Attach the single line hook of the crane to spades as the spades are lifted one by one from the carriage transport wagon and emplaced in the spade pits (par. 18b (4)).	Remove trail floats (fig. 24) and place them where they will be convenient for assembly when trails are spread: Top float to the right, bottom float to the left.				Unfasten loading tray from floats and place it 10 yards to the rear.		With sledge removes trail locking key.		Moves carriage wagon so that spades are convenient for attaching single line hook.					
7			Pass the lifting sling extension cables through the cradle jack hangers and hook inside the rear platform hinge support so that both trails can be lifted together or attach single line hook to trails in turn.			Working with crowbars, spread trails slightly.						Drives prime mover with carriage wagon clear of position.					
			Spread trails (fig. 25). With the trails suspended at the spread position, hang floats (fig. 26).														
			Detach hook.														
8			When trail tie beam is difficult to align, assist No. 9 in locking it in firing position (fig. 27). Move trail ends of loading ramp rack to firing position and tighten wing nuts. Hang spades on trail hooks (fig. 29) and screw spade jacks firmly into the spade sockets (fig. 30). If spades are not seated firmly against the rear of the pit, fill and tamp spoil in void spaces.										Unpins the trail tie beam from the traveling position. Swings beam to firing position and locks it (fig. 28).	Brings up gun load and positions it as in figure 31.			
9			Uncouple gun load from prime mover.					Clean and lubricate all seats and keyways to receive gun.					Moves prime mover clear of swing of crane boom.				
10		Indicates to chief of section when tube and cradle are ready to be lifted.	Remove gun cover and muzzle cover, or plug, and breech cover.														
			Disconnect cradle traveling locks (fig. 32) and remove tube fastening strap (fig. 33).	Attach lifting sling to cradle (fig. 34).	Clean and lubricate all seats and keys that bear on the false cradle.	Attach guide rope to muzzle.											
11	Directs crane operator to lift and swing tube and cradle into position (fig. 51).	Indicate when keys are properly positioned over keyways.	Man guide rope to assist in maneuvering tube over and into false cradle (fig. 35). <i>Note.</i> In this and the following sequence the procedure that must be followed is: The tube is lowered until it rests upon the false cradle and the top carriage roller. With the tube in this position, the rear hooks of the lifting sling are disengaged from the cradle. By using only the front clevises 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 tube is held in this position and 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 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.														
12			Couple gun wagon to prime mover.					Disengage rear hooks of lifting sling.					Removes guide rope from muzzle.	Prepare crane truck and crane for traveling. Move crane clear of position.	Brings up prime mover. When wagon is coupled, drives clear of position.		
			Move road traveling locks from traveling to firing position (fig. 38) and secure.	Insert and tighten stud bolts (fig. 36).					Remove front hooks of lifting sling. Insert and tighten cap screws (fig. 37).								
13	With gunner's quadrant checks level of gun and verifies adjustment of elevation quadrant. When all operations have been completed, reports to executive, "Sir, No. (so - and - so) in order" or reports any defects that the section cannot remedy without delay.	Places panoramic telescope in mount. Bore sights gun if time permits. Aligns aiming posts at 2200 if directed.	Removes elevating mechanism cover. Tests operation of elevating hand-brake. Assists chief of section in verifying adjustment of elevation quadrant.	Pins front elevating crank handle in firing position. Operates the elevating mechanism paying particular attention to the equilibrators system. Reports any maladjustments found.	Places front platform ladder in firing position.	Swings left platform to firing position and locks it.	Swings right platform to firing position and locks it.	Assemble rammer and/or chamber brush to rammer staff sections. Place loading ramp in breech recess.	Procures water for swabbing the powder chamber.	Assembles aiming posts and sets them out (fig. 39) if directed.							
					Locks percussion hammer in safe position.	Removes M1 firing mechanism.	Open breech and inspect vent, breech, chamber, and bore for cleanliness and freedom from obstructions.		Places oiler, cleaning reamer, cleaning bit, lanyard wiping cloths, and waste conveniently for use.	Fills primer belt with primers.							

*Table I.—Duties in Uncoupling*

Sequence	Chief of section	Gunner	No. 1	No. 2	No. 3	No. 4	
1	Commands UNCOUPLE. Supervises operation throughout all sequences.	Directs work of personnel.	Closes right air valve. Disconnects left brake hose and electric jumper cable.	Closes left air valve. Disconnects right brake hose.	Block wheels on towed load as directed by gunner.		
2			Connects right brake hose to dummy coupling on drawbar. Secures jumper cable.	Connects left brake hose to dummy coupling on drawbar.			
3			Unlatches pintle.	Disengage the drawbar			
4			Signals driver to move prime mover forward.				



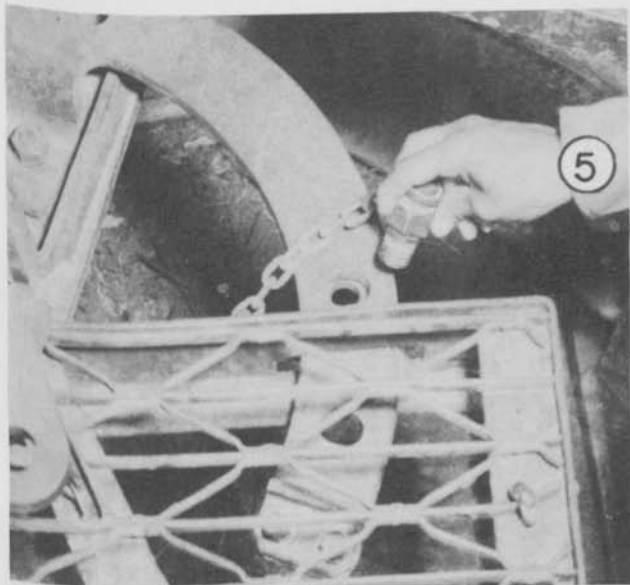
*Figure 13. Removing carriage cover.*



*Figure 14. Loosening spade clamps.*



*Figure 15. Loosening hold-down bolt of carriage.*



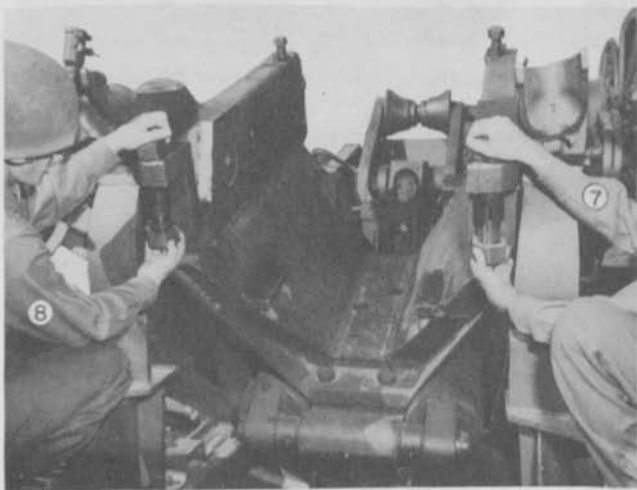
*Figure 16. Swinging rear platform to middle position.*



*Figure 17. Loosening an inside spade jack in trail spade jack saddle.*

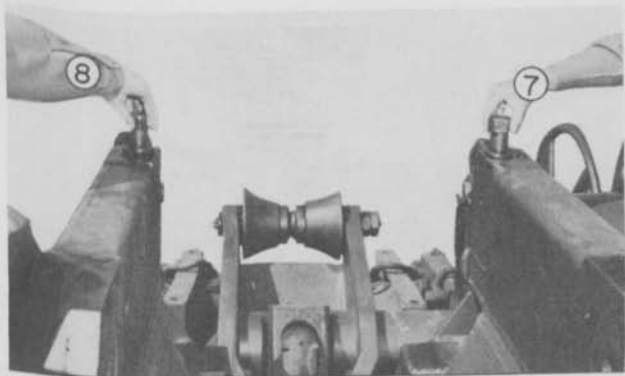


*Figure 18. Removing trail cross braces.*



*Figure 19. Removing stud bolts from false cradle.*





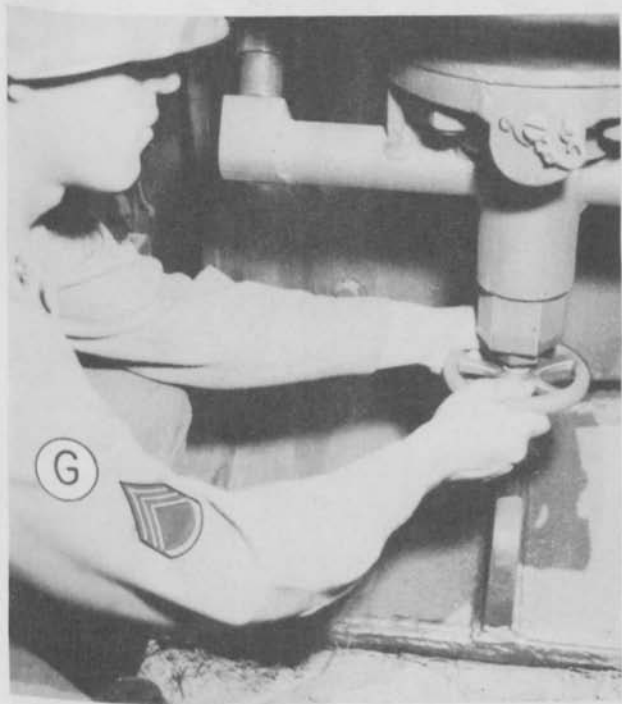
*Figure 20. Removing cap screws from false cradle.*



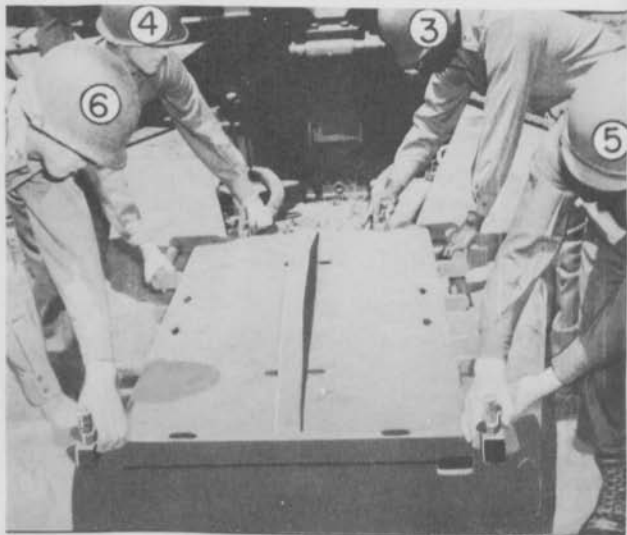
*Figure 21. Attaching cable extensions.*



*Figure 22. Guiding carriage into prepared position.*



*Figure 23. Opening equilibrator shut-off valve.*



*Figure 24. Removing top float.*



*Figure 25. Spreading left trail using single line from the crane.*



*Figure 26. Hanging left float.*

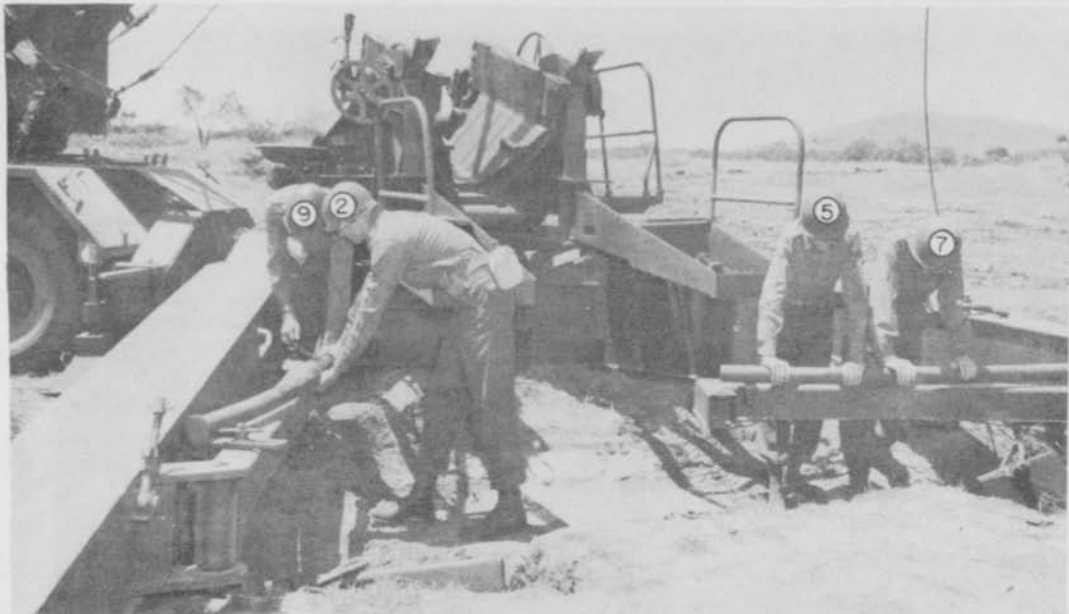
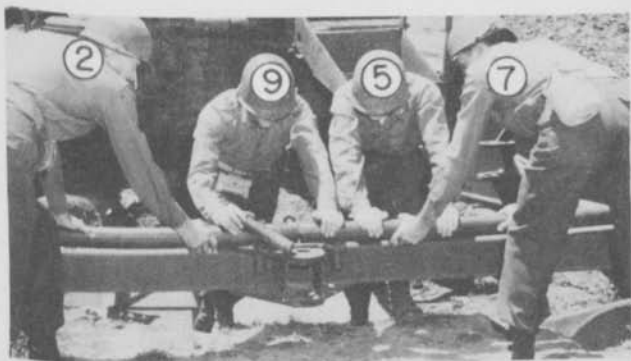


Figure 27. Positioning tie beams.



*Figure 28. Locking trails in firing position with tie beam.*

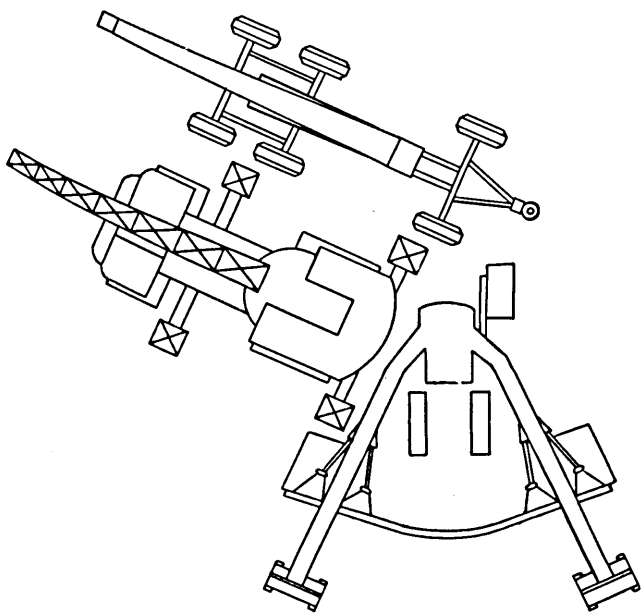


*Figure 29. Hanging spade.*



*Figure 30. Adjusting an inside spade jack.*





*Figure 31. Gun load in position beside crane truck.*



*Figure 32. Unlocking the cradle traveling lock.*



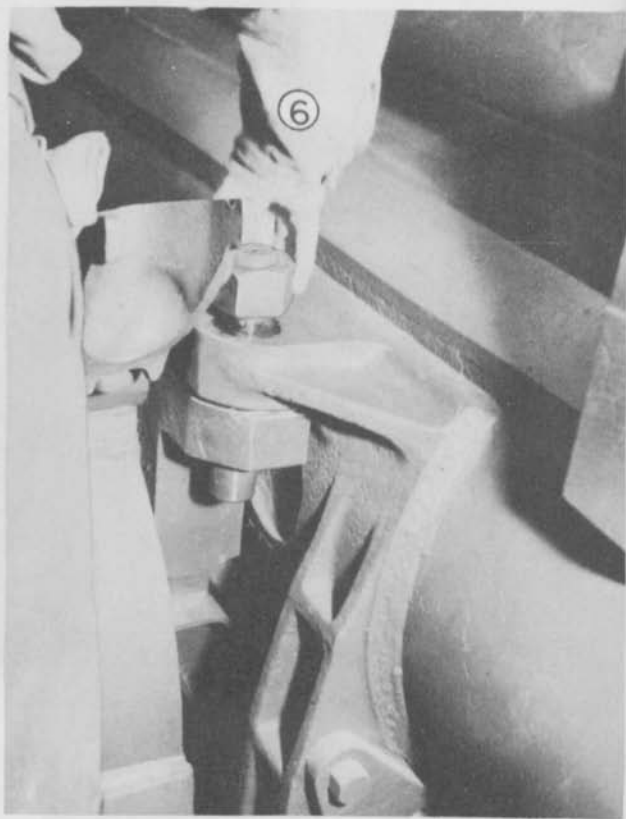
*Figure 33. Removing the tube fastening strap.*



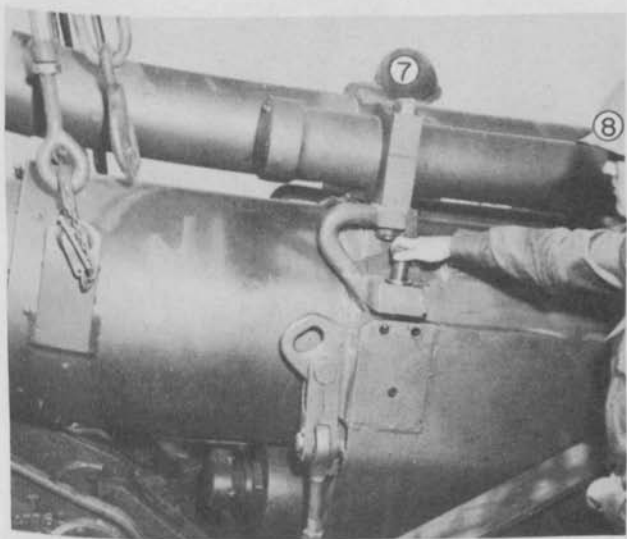
*Figure 34. Attaching lifting sling to cradle.*



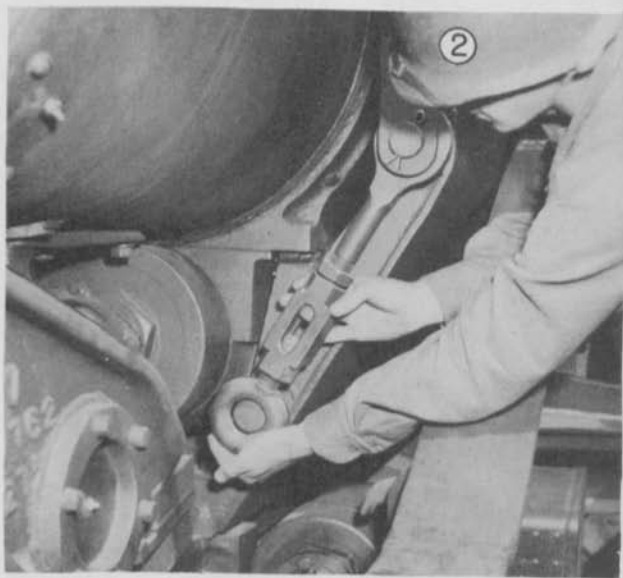
Figure 35. Positioning tube over false cradle.



*Figure 36. Inserting stud bolt to secure cradle to false cradle.*

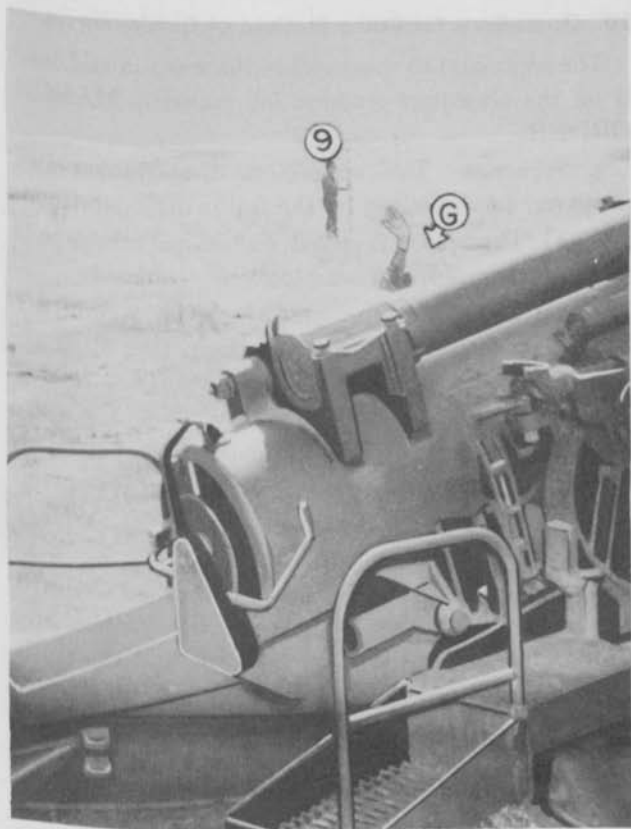


*Figure 37. Inserting cap screw to secure cradle to false cradle.*



*Figure 38. Moving road lock to firing position.*





*Figure 39. Alining aiming posts.*

## Section II. PREPARATIONS FOR TRAVELING, CRANE METHOD

### 20. Operations for Crane Method of Displacement

The command to disassemble the weapon and load it on the transport wagons for travel is **MARCH ORDER**.

*a. Sequence.* The weapon is disassembled and prepared for traveling by the following operations:

- (1) The breech is closed, panoramic telescope is removed, and road locks are fastened.
- (2) The crane and gun transport wagon are placed in position and the lifting sling attached to the cradle preparatory to lifting the gun.
- (3) The gun is lifted off the carriage, placed on its transport wagon, and secured for travel.
- (4) The gun load 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 jacks in or out of the housings, the fact must be reported to the artillery mechanic for corrective action. Forcing the jacks into the housing will cause burring of the threads and will result in the jack 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

TABLE III.—Individual Duties in March Order (Crane Method)

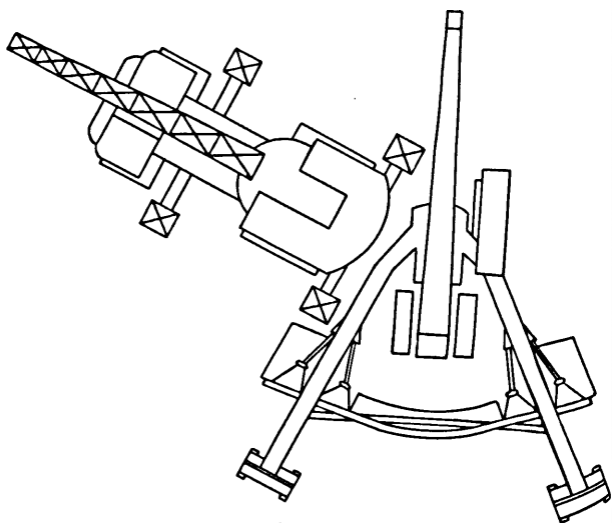
Sequence	Chief of section	Gunner	No. 1 (assistant gunner)	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	Ammunition corporal	Nos. 10 to 18 inclusive	Hvy truck driver (crane truck)	Crane operator	Prime mover driver (carriage load)	Prime mover driver (gun load)	
1	Commands MARCH ORDER. Supervises work of all members of the section throughout all sequences.	Directs work performed by gun squad throughout all sequences.  Places gun in center of traverse. Removes panoramic telescope from mount and secures in carrying case. Installs mount cover.	Depress gun to minimum elevation.			Close breech.			Remove loading ramp. Disassemble rammer staff.	Attach guide rope to muzzle of gun. Put muzzle cover or plug in place.	Directs work of ammunition squad in preparing ammunition for traveling.		Under the direction of the ammunition corporal, prepare ammunition for traveling.	Uncouple trailer.			Places gun load wagon in position parallel to and as close as possible to the crane.	
2	Closes shutoff valve to equilibrator tank.  Directs crane operator to make line taut.		Uncouple gun load wagon from prime mover.			Note. In this sequence the steps that must be followed are—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 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.			Brings in aiming posts, disassembles, and places in cases.								Moves prime mover forward clear of the path of the tube when lifted to wagon.	
			Move road locks from firing to traveling position.				Remove cap screws. Attach front clevises of lifting sling.			When tension has been applied, remove stud bolts. When tube is lowered to rest on roller, attach rear hooks.								
3	Directs crane operator to lift tube and cradle from carriage to transport wagon.		Assists chief of section by checking to insure tube and cradle clear the carriage properly and is placed on the transport wagon properly.	Man the guide rope to assist in maneuvering the tube and cradle from the false cradle to the transport wagon.														
4			Connect cradle traveling locks and tube fastening strap.	Detach lifting sling.					Removes guide rope from muzzle.									When load is secure, moves prime mover and load clear of position.
			Couple gun load to prime mover.					Replace gun cover.										
5			Unscrew spade jacks and place them in traveling brackets (only outside jacks are screwed tightly). Assisted by the single line hook of the crane remove spades from trail hooks (spades are left in pit). Assist No. 9 as required if tie beam operation is difficult.								Unlocks trail tie beam from firing position. Swings to traveling position and locks.				Places carriage load wagon in position parallel to and as close as possible to crane.			
6			Attach single line hook to trails in turn; detach floats as trails are lifted, close trails, detach hook.	As trails are lifted, detach floats. Assist in closing trails.														
			Place and secure floats on top of trails (left trail float upside down and on bottom; right trail float right side up and on top).								Clamps loading ramp in traveling position.						When carriage load wagon has been uncoupled moves prime mover forward clear of the path of the carriage when lifted to wagon.	
			Attach lifting slings to the carriage. Replace cap screws and stud bolts.			Place loading tray in position and secure it for travel.		Emplaces trail locking key. Attaches the guide ropes to the trail ends.										
When not engaged in other duties during this sequence uncouple carriage load wagon from prime mover.																		
7	Directs crane operator to lift carriage from ground to transport wagon.	Opens equilibrator shutoff valve.	Man the guide ropes to assist in maneuvering the carriage to rest properly on the transport wagon.															
		Assist chief of section by checking to insure that the carriage is lowered properly on the transport wagon.	Detach lifting slings from carriage. Detach lifting sling from crane.															
8			Load spades: As spades are lifted to wagon, unhook from single line hook and secure.  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.	Fastens carriage hold down bolts.	Swing rear platforms to traveling position and lock.	Screws the inside spade jacks firmly against their traveling sockets.	Fasten the trail cross braces in traveling position.	Removes guide rope from trail ends.								Prepares outriggers for travel.		
			Assist crane truck driver to prepare outriggers for travel.															
9	When all operations have been completed, reports to executive, "Sir, No. (so-and-so) in order" or reports any defects that the section cannot remedy without delay.		Replace cover. Stow equipment.								With shovels assist crane operator fill pits. Couple clam shell trailer to crane truck.						Backs prime mover to carriage load for coupling.	
			Couple carriage load to prime mover.															

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. Individual Duties.* 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 as directed by chief of section. The chief of section directs the operations, giving such orders, instructions, and signals as may be required to expedite and coordinate the work. The ammunition corporal and the gunner assist in supervising suboperations as prescribed or as may be directed by the chief of section. After the loads have been prepared for traveling (table III) members of the section take posts as shown in figure 4. The chief of section, assisted by members of the section, makes an inspection to verify that the loads are well protected and secured. When all operations have been completed he reports to the executive, "Sir, No. (so-and-so) in order," or reports any defects which the section cannot remedy without delay.

*Note.* 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.



*Figure 40. Crane truck in position for disassembly of weapon.*

## **21. Moving Out of Position**

When leaving a position the chief of section will inspect his area to insure that no section equipment is being left behind and that proper policing has been accomplished. The order of march for the section vehicles will be the crane, the carriage load, and then the gun load.

### **Section III. PREPARATIONS FOR FIRING, WINCH METHOD**

## **22. Winch Assembly of Weapon**

*a. General Operations.* Assembling the gun by winch method is accomplished by the following operations;

- (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 gun load is placed in front of it so that the distance between drawbars is approximately 40 yards (fig. 41).
- (2) The front axle of the carriage wagon is removed (fig. 42) 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 (fig. 43).
- (4) The trails of the carriage are set parallel (fig. 44) and spade pits dug.
- (5) The gun load is winched up the trails of the carriage (fig. 45).
- (6) The gun is jacked up from its traveling support (fig. 46) and lowered into the top carriage roller.
- (7) The gun is winched forward on the rails (fig. 47) of the wagon and raised from the wagon with screw jacks.
- (8) The gun wagon is removed from the trails.
- (9) The gun 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 carriage wagon is reassembled and removed. (This operation may be eliminated at the discretion of the executive.)

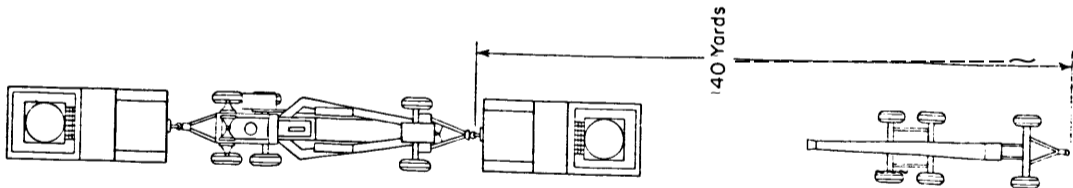


Figure 41. Materiel in position for winch assembly.



Figure 42. Removing front axle from carriage wagon.





Figure 43. Removing carriage from transport wagon.

*b. To Remove Axle.*

- (1) The carriage load prime mover remains coupled to the carriage wagon. The top carriage cover is removed. The gun load is brought to a point 40 yards in front of and in line with the carriage load. The gun load prime mover is uncoupled from the gun



*Figure 44. Emplacing trail spacer bar.*

- wagon and backed into position in rear of the carriage wagon where it is coupled to the rear drawbar legs. The winch is paid out through the slots provided in the carriage wagon.
- (2) The loading ramp, wheel ramps, spacer bar, trail support, spade, and loading tray are removed from the wagon. The trail floats

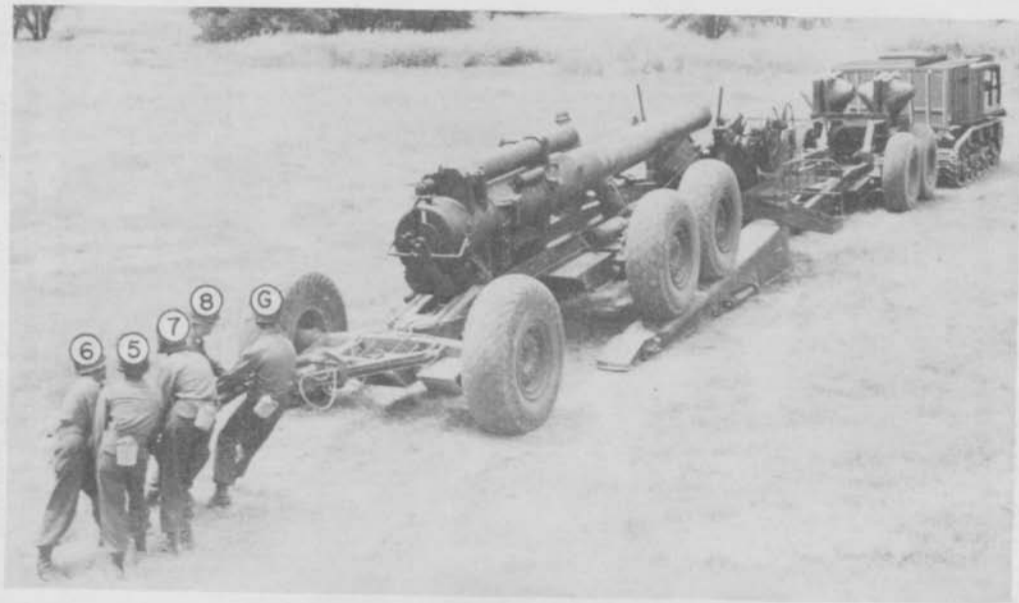
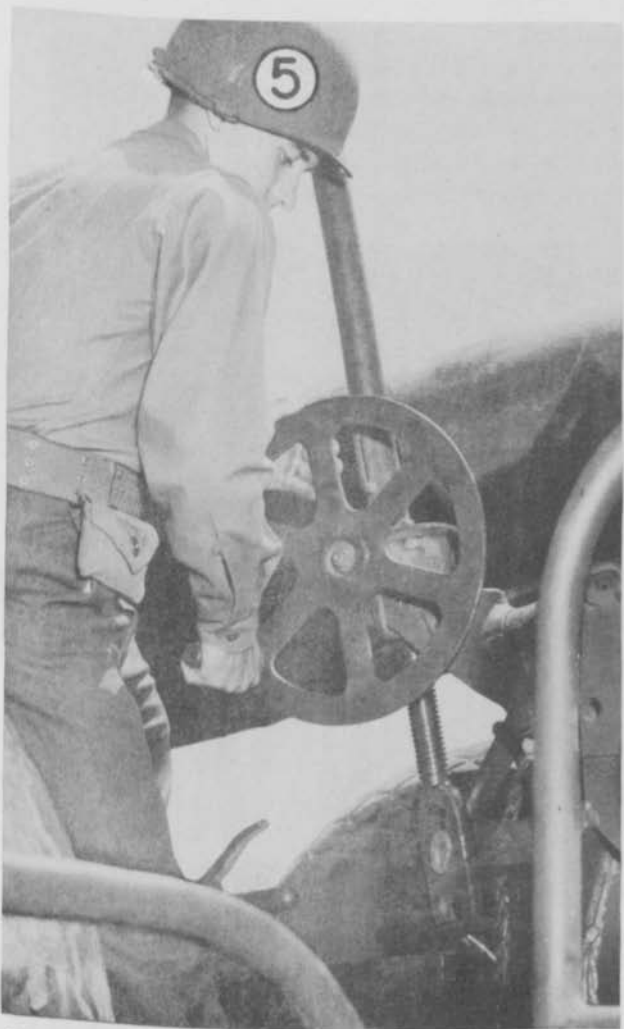


Figure 45. Using maneuvering bar to guide gun transport wagon on trails.



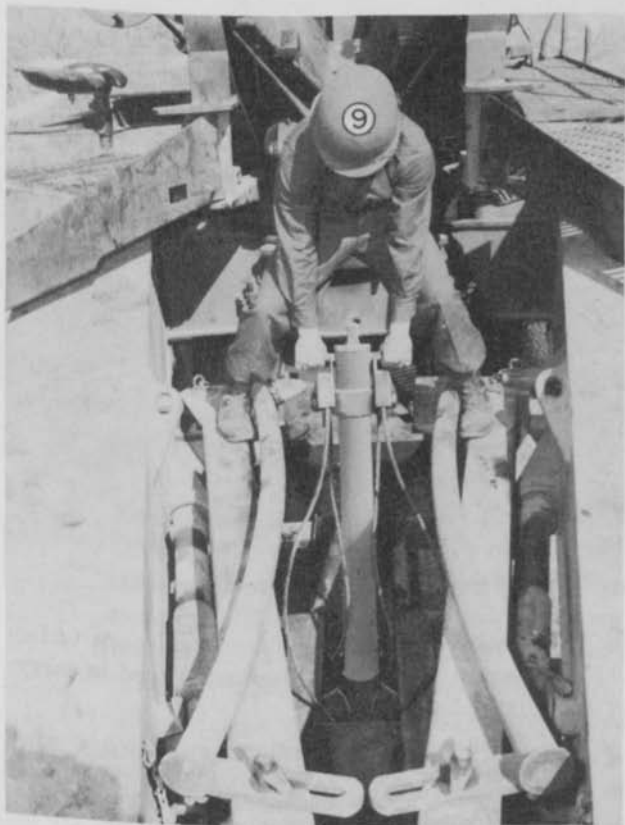
*Figure 46. Lifting tube with screw jack and lifting saddle.*



Figure 47. Winching tube forward to false cradle.

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 (fig. 48). The trail float is placed



*Figure 48. Setting wagon jack.*

in position under the built-in jack. The winch cable of the gun load prime mover is attached to the jack line equalizer.

- (4) The carriage hold-down bolts, inside spade jacks, trail cross braces, and the wagon lock lever are unfastened. The inner ends of the



*Figure 49. Emplacing trail support.*

brake cables on the front axle are unfastened. The porter bars 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 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 (fig. 42). The trails are lowered onto the trail support (fig. 49) and the frame of the wagon is lowered until the trail spade jack saddles 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. The wagon frame and trails are lowered until they rest on the ground.
- c. *To Remove Carriage from Transport Wagon.*
- (1) The carriage load prime mover is brought to the trail ends and its winch cable attached to the trails.
  - (2) The built-in jack of the carriage wagon is disconnected from the winch of the gun 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 (fig. 43). 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 tube and cradle is mounted.

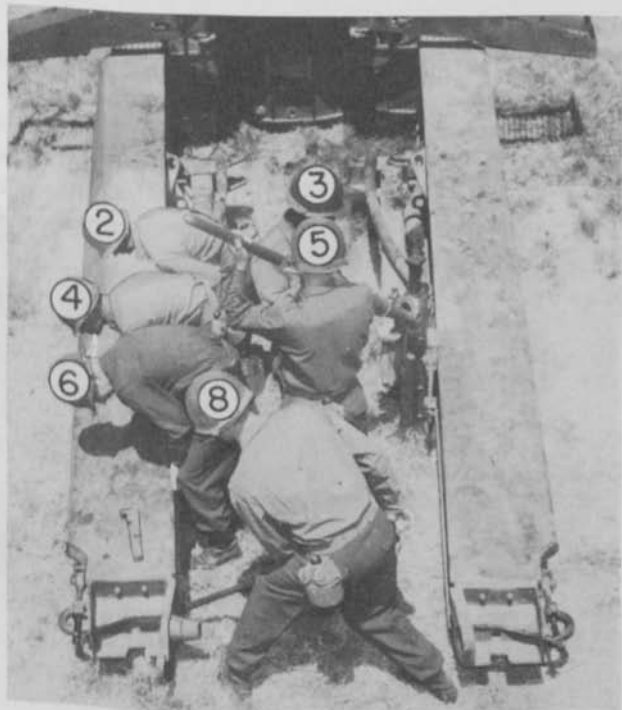
*Note.* If the carriage wagon is to be left disassembled while the gun is in position, the air reservoir is drained and the wagon is dragged to a point 6 feet from the bottom carriage to facilitate later replacement of the front axle.

- (4) The panoramic telescope is installed in its mount and the alinement 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. The panoramic telescope is then removed.

*d. To Prepare Carriage to Receive Cannon Wagon.*

- (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 (fig. 44).

*Note.* When possible, trails are spread by hand. This method is preferred. However, under some conditions this is impracticable and jacks must be employed (fig. 50). One trail is raised by means of a jack and the other trail spread. The spread trail is then jacked up and the other trail spread. Lift may also be applied by the winch cable of the carriage load prime mover (fig. 51). 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 employed from the flank to spread the trails. This method will result in excessive disturbance of the



*Figure 50. Using jack to assist in spreading trails.*

ground around the gun position, thus increasing camouflage difficulties, so should be used only as a last resort.

- (3) The wheel ramps are placed on the ends of the trails.
- (4) The position of the rear parapet of each spade pit is marked out (TM 9-336 and/or TM 9-341). Excavation of the spade pits is started.

*e. To Place the Tube and Cradle in Carriage.*

- (1) The gun load is winched on the trails and the attaching links of the wagon are attached to the top carriage (fig. 52). While the gun wagon is being winched toward the trail ends, the overall cover and muzzle cover are removed; templates are removed



*Figure 51. Spreading trails with assistance of winch cable.*

from the bed of the wagon and the gun 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 loading cable. The other end of the extension cable is attached to the winch fitting at the front of the cradle.

*Note.* The winch loading cable is supplied with section equipment so that the recoil bearing surface of the tube will not be scarred by the winch cable. The loading cable, which is  $\frac{3}{4}$ -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.



*Figure 52. Fastening wagon attaching link to carriage.*

- (3) The muzzle of the gun is raised with the screw jacks and lifting saddle until the tube support halves of the transport wagon can be folded out (fig. 53).
- (4) The muzzle is lowered into the top carriage roller.

- (5) The gun 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 and the jack yokes are bolted into lifting position. The



*Figure 53. Removing tube support.*

- breech end of the gun is raised until the cradle clears 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 gun is lowered with the jacks until the cradle cap screw lugs rest on the front of



*Figure 54. Operating screw jack to push keys down into keyway guides.*

the false cradle. The closed eyes of the jacks are then released from the jack yokes, and the open ends placed on the jack yokes (fig. 54). The breech of the gun 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 gun 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 gun 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 gun is bolted into position in the false cradle; the cradle and the cradle jack yokes are bolted into firing position; road locks are fastened in the firing position.

*f. To Complete Emplacement of Gun.*

- (1) The spades are removed from the carriage transport wagon and placed in the spade pits. 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 positions.
- (4) The trails are raised by jacks and the floats attached. The left float is not attached at this time if the carriage transport wagon is to be reassembled.

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

(6) The recoil pit is dug.

*g. To Reassemble Carriage Transport Wagon.*

Unless it is anticipated that the gun will be placed in traveling position by winch method within a short time, the carriage wagon should be reassembled and removed.

(1) The carriage wagon is dragged rearward by the rear drawbar to give sufficient room to replace the front axle, and to couple the prime mover to it.

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

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

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



- (8) The wheel ramps, spacer bar, trail support, trail cross braces, and trail spade jack saddles are replaced on the wagon. The gun load prime mover is coupled to the wagon and the wagon is removed.

### 23. Individual Duties in Prepare for Action, Winch Method

*a. Preliminary Operations.* The command is **PREPARE FOR ACTION**. At the command, section personnel perform duties as indicated in table IV. On completion of duties prescribed personnel take posts as shown in figure 6. 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 as directed by chief of section. Nos 10 to 18 are not assigned specific duties but may be employed under the direction of the ammunition corporal in digging the pits as well as unloading and preparing ammunition.

*b. Precautionary Check.* As in the crane method, after the gun has been placed in firing position a final check is made by the chief of section to insure that the weapon is clean and properly lubricated. If actual firing is to occur the executive makes a similar inspection. 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.

Table IV.—Individual Duties in Preparing for Action (Winch Cable Method)

Sequence	Chief of section	Gunner	No. 1 (assistant gunner)	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	Ammunition corporal	No. 10-18 Inclusive	Prime mover driver (carriage load)	Prime mover driver (gun load)	
1	Commands PREPARE FOR ACTION. Supervises work of all members of the section throughout all sequences. Directs gun load driver into position at rear of carriage.	Directs work of gun squad throughout all sequences. Directs gun load driver into position at rear of carriage.	Uncouple gun load from prime mover.				Place a paulin 5 feet to the left of the front axle of the carriage transport wagon. Unload tools and accessories required for assembling the gun and place them on the paulin.				Directs work of ammunition squad throughout all sequences.	Under direction of ammunition corporal prepare ammunition and ammunition pit or perform other duties that may be specified.		When load is coupled, drive prime mover to rear of carriage.		
2			Remove top carriage cover.				Remove trail cross braces, loading ramp and place them on the paulin.		Removes wagon lock lever (figs. 55 & 56) and places it on the paulin.							
			Extend and fasten rear drawbar (fig. 57) and couple it to the gun load prime mover (fig. 58).		Remove wheel ramps (fig. 59).			Fold top carriage cover and place it to the right of the paulin.						Maneuvers prime mover to assist No. 2 and 3 in coupling.		
3			Thread winch cable through slots in wagon and over rear axle.		Removes trail support and places it to the right of the trails.		Remove spacer bar.		Loosens wagon jack and places it in socket of trail float (fig. 40). Top of jack should tilt slightly (about 15°) away from trail ends.							
			Unfasten trail floats and drop them to the right side of the trails. Turn one float upside down and place it beneath the trails to receive the wagon jack.		Unfastens carriage hold-down belts.		Clean and apply grease to top surface of wagon frame.		Unpins tie beam. Unscrews inside spade jacks, leaving jacks on trail brackets.		Disconnect and secure electric cables. Disconnect the inner ends of the brake lines from the wagon frame, connect ends to dummy couplings. Swing porter bars of the front axle to carrying position.					
4	Checking to insure that lock angle does not become too acute, signals to have gun load driver tighten slack on cable and move vehicle forward slightly.	Relays signals to gun load driver.	Relays signals to carriage load driver.												Tightens slack on cable. Moves vehicle forward slightly.	
	Signals to have carriage load driver pull axle free.														Drives vehicle forward to pull axle from carriage wagon. Pulls axle to flank and stops.	
	Signals to have cable paid out to lower trails to support and wagon to ground.				Place float and trail support in position under trail ends. Match top of support with slots in bottom of trails as trails are lowered. When wagon rests on ground, remove trail spade jack saddles (fig. 61).		Uncouple axle from prime mover. (No. 6 disconnects left air hose and attaches it to dummy coupling; unclashes pin. No. 7 disconnects right air hose and electric cable and secures.)								Unreels winch cable slowly to lower trails to support an unsupported end of wagon to ground.	
5	Signals to have trails raised so that support may be removed. Signals to have trails lowered.	Checks to insure that the cables of the built-in jack and the loading ramp rack chains are below the top of the wagon bed.			As trails are raised remove support and clean and place them to the right flank. When trails are lowered raise and lock the carriage guide bars in the middle position.		When trails are lowered, disconnect winch cable from jack cable. Replaces jack in traveling position.		When trails are lowered, extends winch cable of carriage load prime mover and connects it to trails.		When trails are lowered, attaches gun load prime mover winch cable to front of carriage (fig. 62).				Backs prime mover to trail end of carriage far enough to permit the carriage to be pulled off the wagon.	Applies pull on winch cable. When support and float are removed, pays out winch cable.
6	Signals to have carriage pulled from wagon.		Place blocking beneath bottom carriage just before it clears the frame of the wagon.		If trail ends tend to plough up ground, dig out ground ahead of trail ends.		Guides winch cable on winch of carriage load prime mover.		When carriage is free of wagon, unbooks gun load prime mover winch cable from front of carriage. Brings two crowbars and sledge to trail ends.				Applies pull to winch cable, pulling carriage from wagon. Pulls sledge to flank and stops.	Unreels winch cable maintaining amount of cable pulled on ground.		
7	Signals carriage load prime mover to move out.	Installs panoramic telescope and checks orientation of carriage. If misaligned, carriage load prime mover shifts trails with winch.	Swing platforms to even position and secure.				Disconnects winch cable from trail ends and guides on winch.		With sledge removes trail locking key.				Drives prime mover clear of space between trail ends and gun wagon.			
8	Drains air reservoir of gun wagon, closes drain cock.		Place wheel ramps on trail ends. Mark out spade pits and begin excavation. (Excavation of pits must be continuous. When other duties are designated for these men, they will be spelled by personnel not assigned a specific duty.)		Remove gun cover, muzzle cover, templates, screw jacks, tube lifting saddle, tube fastening strap. Release cradle traveling locks. Attach hand maneuvering bar to drawbar of gun wagon.		Attaches gun load prime mover winch cable to rear of gun wagon (cable atop roller).						If gun load prime mover cable does not reach gun wagon, backs gun load up to trails.	Pays out winch cable.		
9	Signals to have gun load pulled up on trails.	Relays signals to gun load driver.			Man maneuvering bar as gun load is winched up trails.		Guides winch cable on winch.		When attaching links are in place, disconnects winch cable from wagon. Attaches winch line extension cable to cradle hook (fig. 64), threads extension over roller and attaches to winch cable forward of roller.				Backs prime mover to facilitate coupling. Locks brakes.	Applies pull on winch cable.		
10			Employs lifting saddle (fig. 65) and fasten it to screw jacks.		Clean and grease gun wagon rails.											
			Pull pin to release link holding support halves together. As tube is lifted fold out tube supports.		Turn jack handles in unison until tube supports can be folded out. Lower jacks in unison until tube rests on roller and lifting saddle can be removed.											
11	Signals to have tube pulled forward on wagon rails until keys are directly over keyways of false cradle.	Relays signals to gun load driver.	Relays signals to carriage load driver.								Guides winch cable on winch.			Applies pull on winch cable.		
					Bolt jacking yokes on cradle in lifting position (fig. 66). Attach jacks to yokes. Raise jacks in unison until cradle clears gun wagon rails.											
					Release attaching links holding wagon to carriage.								Maneuvers vehicle to facilitate release of attaching links.			
	Signals to have gun wagon pulled from trails.		When carriage wagon is removed, lower jacks and free them from jacking yokes. Shift jacks so that open ends are atop yokes. Lower jacks to push bearing surfaces of cradle to rest on bearing surfaces of false cradle. Remove jacks. Bolt yokes in firing position.		Insert and tighten stud bolts in rear holes of cradle and false cradle.		After stud bolts are tightened, insert and tighten cap screws.		Disconnects winch cable extension from cradle and winch cable. Secures winch cable on winch.				Fulls gun wagon off trails.			
12			Transfer road traveling locks from traveling to firing position.		Assisted by No. 6, removes wheel ramps from trails.		Swing platforms to firing position and secure.		Assists No. 3 in removing wheel ramps from trails.		Remove spacer bar.			Drags carriage load clear of muzzle blast area of wagon. Unreels winch cable.		
			Remove spades from carriage transport wagon and drop them in pits. Spread trails. Lock tie beams and loading ramp rack in firing position. Attach trail floats (only one float is attached now if carriage transport wagon is to be reassembled). Hang spades and screw spade jacks into them. Lay out and start digging recoil pit.		If carriage load wagon is to be left in position, uncouple gun load prime mover from wagon.											
13	With gunner's quadrant, checks level of gun and verifies adjustment of elevation quadrant. When all operations have been completed, reports to executive, "Sir, No. (so-and-so) in order."	Places panoramic telescope in mount. Bore sights gun if time permits. Directs No. 9 in setting out aiming posts when directed by chief of section or executive officer.	Tests operation of elevation handbrake. Assists chief of section in verifying adjustment of elevation quadrant.		Has front elevation crank handle in firing position. Operates the elevating mechanism paying particular attention to the stabilizer system. Reports any maladjustments found.		Places front platform ladder in firing position.		Remove breech cover. Locks percussion hammer in safe position. Opens breech and inspects vent, breech, chamber, and bore for cleanliness and freedom from obstructions. Places oiler, cleaning rammer, cleaning bit, lanyard wiping cloths, and waste conveniently for use. Fills primer belt with primers.		Assembles rammer and/or chamber brush to rammer shaft sections. Places loading ramp in breech recess. Procures water for swabbing the powder chamber. Assembles aiming posts and sets them out (fig. 29) if directed.					
14		Drains air reservoir of carriage wagon, closes drain cock.			Place a trail float in position beneath jack. The jack should be tilted at an angle of about 20°.		Together with No. 8, places bottom of jack on trail float.		Threads winch cable through slots in carriage, connects it to hook on jack line.		Together with No. 7, places bottom of jack on trail float.			Pays out winch cable.		
15	Signals to have wagon raised.	Relays signals to gun load driver.									Guides winch cable on winch.			Applies pull on winch cable.		
	Signals to have wagon lowered to axle.				Man axle drawbar, porter bars, and wheels, maneuver the axle until the axle extension fits into the eye on the wagon frame and the axle recess is directly below the lug.									Pays out winch cable.		
16	When all operations to be performed have been completed, reports to executive, "Sir, No. (so-and-so) in order" or reports any defects which the section cannot remedy without delay.		Uncouple rear drawbar and return it to traveling position. Place trail support in traveling position and trail support in bed of wagon.		Remove trail float and employ it beneath trail.		Unhook and secure winch cable. Replace built-in jack in traveling position.		Connect the inner ends of the brake lines to the fittings on the wagon frame. Replace spacer bar in traveling position and place cross braces in bed of wagon.		Replaces wagon lock lever and pins it in place.			If prime mover is to be coupled to carriage wagon, moves vehicle as directed to facilitate uncoupling of gun load wagon and coupling of carriage load wagon.		



*Figure 55. Removing lock lever pin from wagon lock lever.*



*Figure 56. Removing wagon lock lever.*



*Figure 57. Assembling front drawbar on carriage transport wagon.*



*Figure 58. Attaching front drawbar to prime mover.*



*Figure 59. Removing wheel ramps.*



*Figure 60. Attaching winch line to wagon jack line.*



*Figure 61. Removing trail spade jack saddle.*

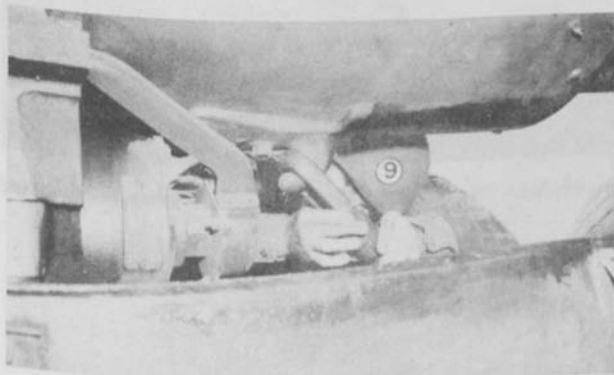


*Figure 62. Attaching holding cable to front of carriage.*

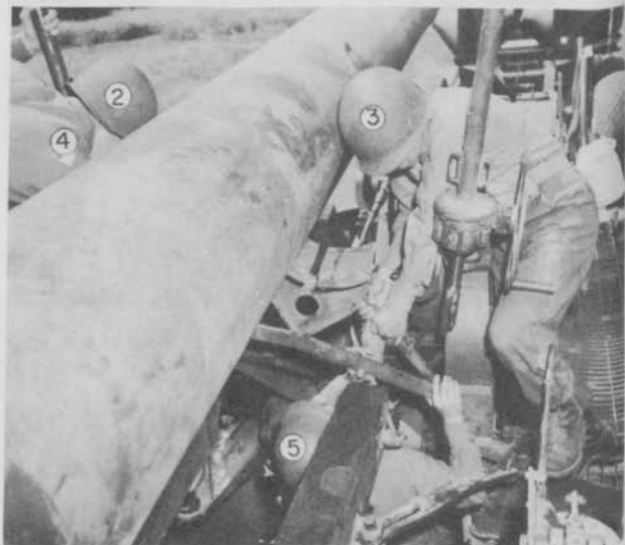




*Figure 63. Attaching screw jacks to trunnion supports.*



*Figure 64. Attaching winch cable to cradle hook.*



*Figure 65. Emplacing tube lifting saddle prior to attaching it to screw jacks.*



*Figure 66. Securing jacking yoke prior to lifting tube to false cradle.*

## Section IV. PREPARATIONS FOR TRAVELING, WINCH METHOD

### 24. Winch Disassembly of Weapon

*a. General Operations.* The weapon is disassembled and prepared for traveling by the following operations:

- (1) The tube 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 locked in place.
- (2) The breech end of the tube is jacked up from the false cradle.
- (3) The gun wagon is backed up the trails and attached to the top carriage.
- (4) The breech end of the tube is lowered until the cradle locking lugs rest on the wagon. The tube 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 tube is lowered, jacks removed, and the tube and cradle secured to the wagon for travel.
- (5) The gun 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 gun 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. *To Prepare Carriage to Receive Cannon Wagon.*

(1) The gun is placed at center traverse, depressed to minimum elevation, and the road locks are secured in traveling position. The panoramic telescope is placed in the carrying case, and covers are placed 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.

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

c. *To Remove Gun from Carriage.*

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

coupled to the rear drawbar. The winch cable is then spooled out and attached to one end of the winch loading cable. The other end of the loading 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 the open ends are free of the yokes. The closed eyes of the jacks are then attached to the yokes, and the breech of the gun is raised for loading on the gun wagon. The platforms are bolted in the open position.
- (3) The gun wagon is coupled to the front pintle of the carriage load prime mover. The air reservoir of the gun wagon is drained and the wagon is backed up the trails of the carriage until the attaching links can be bolted to the top carriage.

*Note.* The gun wagon may also be backed up the trails by the winch of the gun load prime mover. The prime mover is uncoupled from the rear draw bar and moved slightly to the left of the line of fire so that the winch cable when extended will not interfere with the carriage wagon. The winch cable 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 bogle axle (rear axle in traveling position) and the winch cable 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 cable 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 gun wagon is uncoupled from the front pintle of the carriage load prime mover, the prime mover is reversed, and the wagon coupled to its rear pintle.
- (5) The winch of the carriage load prime mover is spooled out and attached to the tube.
- (6) The breech end of the tube 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 gun is winched down the rails of the wagon. The winch of the gun load prime mover is paid out slowly to prevent the gun from sliding too fast.
- (8) The winch line of the gun load prime mover is removed from the loading cable and the loading cable from the cradle. The tube lifting saddle is installed on the jacks.
- (9) The muzzle of the tube is raised until the tube support halves can be placed in traveling position and secured. The tube is then lowered onto the tube support. During this operation, the stud bolts and cap screws are replaced in the false cradle.
- (10) The gun is secured to the wagon for travel and the jacks and lifting saddle are replaced in traveling position on the wagon. The attaching links are unfastened from the top carriage, the gun load is removed from the

trails, covers are placed on the gun, and the templates are replaced on the bed of the wagon.

*d. To Prepare Carriage for Loading.*

- (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 assembled, the operations described in *e* below must be performed at this time.

*e. To Disassemble Carriage Wagon.* If the carriage wagon is not already disassembled and in position to load the carriage, the following operations are performed.

- (1) The built-in jack is set in position on the trail float. The winch cable of the gun 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 carriage load prime mover is uncoupled from the gun 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 gun load prime mover will back his vehicle slowly toward the carriage. The winch of the carriage load prime mover is removed from the carriage wagon and re-wound on the winch drum.

*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.

#### *f. To Load Carriage and Spades.*

- (1) The winch line of the gun 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. Dur-

- ing this operation the stud bolts and cap screws are replaced in the false cradle.
- (2) The winch cable of the gun 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 gun load prime mover is attached to 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, left trail float, 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 rearward by the rear 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 rear 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 taken 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.

## **25. Individual Duties in March Order, Winch Method**

*a.* To place the weapon in traveling position the command is **MARCH ORDER**. At the command members of the section perform duties as prescribed

in table V. 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 as directed by chief of section. 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.

b. 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 properly secured. He reports to the executive that the section is in order or reports any defects which the section cannot remedy without delay.

## CHAPTER 5

### DUTIES IN FIRING

---

#### 26. Duties of Individuals

The general instructions given in paragraphs 6 and 7 on the conduct of section drill apply equally to section drill in duties in firing. For duties of the battery executive, see FM 6-140. In general, the duties of individuals in the section in firing are as follows:

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

*b.* The gunner sets the announced deflection, levels the telescope mount, lays the gun for direction, and refers the gun.

*c.* No. 1 operates the elevation quadrant and the elevation handbrake and, assisted by Nos. 2 and 3, lays the gun for elevation.

*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 gun 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 directed by the chief of section.

Table V.—Individual Duties in March Order (Winch Cable Method)

Sequence	Chief of section	Gunner	No. 1 (assistant gunner)	No. 2	No. 3	No. 4	No. 5	No. 6	No. 7	No. 8	No. 9	Ammunition corporal	Nos. 10 to 18 inclusive	Prime mover driver (carriage load)	Prime mover driver (gun load)
1	Commands MARCH ORDER. Supervises work of all members of the section throughout all sequences.	Directs work performed by gun squad throughout all sequences.	Depress gun to minimum elevation.			Close breech.			Remove loading ramp. Disassembles rammer staff.	With sledge removes float locking keys.	Retrieves aiming posts, disassembles and secures in cases.	Directs work of ammunition squad throughout all sequences.	Under the direction of ammunition corporal prepare ammunition for traveling or perform other duties that may be specified.	If carriage wagon has been removed from the gun position, moves carriage wagon to front of carriage.	
		Places gun in center of traverse. Removes panoramic telescope from mount and secures in carrying case. Covers mount.	Lock the elevation brake in traveling position. Pin the crank handle of the front elevating handwheel in traveling position.	Places the cover on the elevating mechanism.	Replaces the oiler, primer, vent cleaning reamer, vent cleaning bit, waste, and wiping cloths in section chest.	Closes firing lock. Detaches and coils lanyard, returns it to section chest.									
2		Relays signals to prime mover drivers.	If front axle of carriage wagon is coupled to prime mover, uncouple. Extend and attach rear drawbar to gun load prime mover.	Unscrew spade jacks and screw them in their traveling brackets (only the outside jacks are screwed tightly). Detach spades and either leave them in pits for recovery later or lift them out and place to the flanks.	Jack up trails in turn; remove floats and slide them to the flanks. Unpin tie beam from firing position. Swing tie beam ends forward.										
3			Couple gun load prime mover to rear drawbar. (If front axle of carriage wagon is to be removed: Couple carriage load prime mover to front axle of carriage wagon. When axle is free of wagon and to flank, uncouple. Couple carriage load prime mover to gun load wagon.)			Emplace trail float for jack. Connect cable to jack. Unlock axle from wagon. When wagon is lowered to ground remove float.			Emplaces and removes built-in jack.			(If axle is to be removed from carriage load.) Drives prime mover to facilitate operation.	Operates winch to facilitate operation.		
			Guide axle as it is drawn from beneath wagon and to flank.			Man porter bars as axle is pulled clear of carriage.									
			Close trails to parallel position, centered on center line of carriage.												
4			Move road traveling locks from firing to traveling position.	Place wheel ramps on the trail ends.	Remove cap screws.	Unclamp loading ramp rack and swing to traveling position. Thread loading cable over roller. Hook one end to cradle hook and other end to gun load prime mover winch cable.			Insert spacer bar and lock its ends to the tie beam.					Pays out winch to facilitate fastening to extension.	
			Bolt jacking yokes on cradle in lifting position. Attach jacks to yokes and jack down to facilitate easy removal of stud bolts.		Remove stud bolts. Swing platforms to open position and lock.										
5	Signals to have gun wagon backed on trails.	Drains air reservoir of gun wagon.	Operate jacks so muzzle end of tube rests on roller, keys are clear of keyways, and breech is high enough so gun wagon can be moved in under cradle locking lugs.			Connect wagon attaching links to top carriage.			Attaches carriage load prime mover winch line to rear hook on counter-recoil block.			Backs gun load wagon up trails. Pays out cable.	Retracts cable.	Pays out cable.	
	Insures that tube is pulled only until the locking lugs on the cradle contact the anchor clamps on the wagon.	Closes drain cock of air reservoir.	Lower jacks until rear of cradle rests on wagon, making sure that cradle guide is centered so it clears both wagon sills.						Disconnects winch cable extension from cradle hook. Removes from roller and disconnects from prime mover cable.						
6			Emplace lifting saddle and fasten it to screw jacks.			As tube is lifted, fold support halves together and pin in place.			Operate jacks until support halves can be locked together. Lower jacks and remove.	As jacks are lowered sufficiently, remove jacks from jack yokes.					
			Emplace tube fastening strap. Tighten cradle traveling locks.	Bolt jack yokes in traveling position.	Replace cap screws and stud bolts in false cradle.										
7	Signals to have gun load removed from trails.		Release attaching links.			Stows jacks, tube lifting saddle, and template roll.			Uncouple gun load from carriage load prime mover. Replace breech cover, muzzle cover (plug), and over-all gun load cover.				Backs load to facilitate loosening attaching links. Drives gun load off trails.		
			Close trails and lock together with tapered key. Place second key in the trail float socket.												
8			Remove wheel ramps from trails and secure in traveling position.			Pull pins, remove spacer bar, fold tie beam members back, and fasten to trails.			Swing platforms to closed position and lock.				Spots prime mover at trail end of carriage.		
			Clean and grease wagon sills.												
9	Drains air reservoir of carriage wagon.	Places front platform ladder in traveling position and secures.	Dig out under end of carriage so that tapered end of transport wagon will slide under carriage.			Runs winch line over front carriage roller and attaches it to wagon frame.		Disconnects winch cable.				Pays out winch cable.	Backs up prime mover.		
	Signals to have carriage wagon drawn to carriage.	Closes drain cock of air reservoir.	Attaches gun load prime mover winch cable to center bracket in bottom carriage.												
10	Signals to have carriage wagon drawn to carriage.		If spades have not been removed from pits, lift out and begin filling pits.			Lower guide bars to first hole. Remove timbers under front of carriage.			Attaches gun load prime mover winch cable to center bracket in bottom carriage.				Retracts winch cable until beveled edge of carriage is just over wagon frame.		
	Signals to have carriage pulled to traveling position.		Place one trail float in position for jack. Place the other float in position to accommodate trail support.			Drop guide bars to lowest position.		Unfastens cable.				Full carriage to traveling position on carriage wagon.			
11			Emplace trail support beneath trails. Continue filling pits.			Couple carriage load front axle to carriage load prime mover.			Emplaces built-in jack in lifting position.					Pays out winch cable.	
			Emplace and secure trail spade jack saddles on wagon frame.										Drives prime mover to facilitate coupling.		Retracts winch cable to lift trails above support. Pays out winch cable to lower wagon to ground.
12	Signals to have wagon raised and lowered.		Remove trail support. Continue filling pits.											Retracts winch cable to lift carriage wagon high enough to emplace axle.	
			Remove float used beneath trail support.			Man porter bars to assist guiding axle in position.			Emplaces and secures wagon lock lever.				Backs axle beneath front of carriage wagon.		Pays out winch cable to lower wagon to axle. (Tee pin into hitch shaft.)
13	Signals to have wagon raised and lowered.		Connect front axle air hose and electric cable to wagon frame.			Screw inside spade jacks into saddles tightly.			Swing porter bars to traveling position and secure. Fasten trail cross braces in traveling position.		Places wagon jack in traveling position.				
			Secure spade clamps.	Tightens carriage hold-down bolts.	Secure spades on carriage wagon.										
14			Uncouple rear drawbar from gun load prime mover and return it to traveling position.			Replace and secure trail floats atop trails. Stow section equipment for travel. Replace overall cover on carriage load.								Moves vehicle to facilitate coupling.	
			Couple gun load to gun load prime mover. Connect cables and air hoses on both loads.												
15	When all operations have been completed, reports to executive, "Sir, No. (so-and-so) in order" or reports any defects which the section cannot remedy without delay.														

f. No. 4, assisted by No. 5, opens and closes the breech (figs. 67 and 68) and seats the loading ramp in the breech recess; attaches the lanyard; releases the percussion hammer safety latch.

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, removes and inserts the M1 firing mechanism (fig. 69), and inserts and removes primers from firing mechanism.



*Figure 67. Closing the breech.*



*Figure 68. Raising the breech rotating lever to locked position.*

*h.* No. 6 checks to be sure that the bore is clear. Assisted by No. 7, he places the rear end of the loading ramp in position for loading and checks alignment of the ramp; assisted by Nos. 7, 8, 9, 15, and 16, rams projectiles; assisted by Nos. 7, 8, and 9, inserts propelling charges; and fires the gun.





*Figure 69. Inserting firing mechanism M1.*

*i.* No. 7 assists No. 6 in placing the rear end of the loading ramp in the loading position; assists Nos. 6, 8, 9, 15, and 16 to ram projectiles; and assists Nos. 6, 8, and 9 to insert 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 (fig. 70).

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



*Figure 70. Preparing powder charge.*

n. Nos. 13 to 16 carry projectiles from the projectile pit to the loading ramp (fig. 71). Nos. 15 and 16 assist Nos. 6 to 9 in ramming projectiles (fig. 72).

o. Nos. 17 and 18 prepare projectiles.

p. The ammunition corporal supervises the storage, handling, and preparation of ammunition by the ammunition squad.

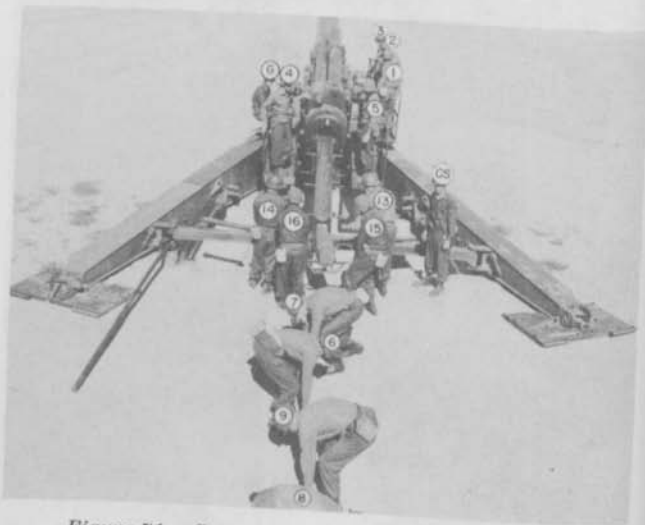


Figure 71. Carrying projectile to loading ramp.

q. After the gun has been prepared for action and the vehicles unloaded, the drivers are normally directed to the truck park, where they perform maintenance or such other duties as directed.

## 27. Chief of Section

### a. List of Duties.

- (1) Measures the site to the mask.
- (2) Indicates to the gunner the aiming point.

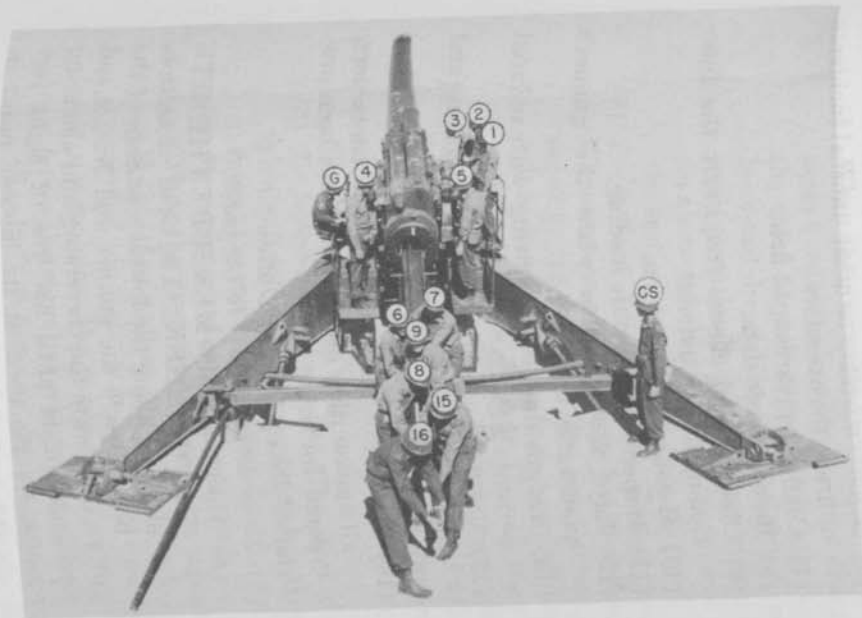


Figure 72. Ramming.

- (3) Follows fire commands.
- (4) Indicates when the gun is ready to fire.
- (5) Gives the command to fire.
- (6) Reports mistakes or other unusual incidents of fire to the executive.
- (7) Conducts prearranged fires.
- (8) Records basic data.
- (9) Observes and checks frequently the functioning of the materiel.
- (10) Measures the elevation.
- (11) Inspects fuzes before loading.
- (12) Lays for elevation when the gunner's quadrant is used.
- (13) Assigns duties when firing with reduced personnel.
- (14) Verifies the adjustment of the sighting and fire control equipment.
- (15) Directs swabbing of the bore.
- (16) Checks, before it is placed in containers, all ammunition not fired that has been prepared for firing.

*b. Detailed Description of Duties.*

- (1) *To measure the site to the mask.*

(a) The command is **MEASURE THE SITE TO THE MASK**. The chief of section, sighting along the lowest elements of the bore, directs the gunner and Nos. 2 and 3 to operate the traversing and elevating mechanism until his line of sight just clears the crest at its highest point in the probable field of fire. He then has No. 1 measure, by means of the elevation quadrant, the elevation at which the gun is laid. The chief of section verifies the

reading on the elevation quadrant and reports to the executive, "No. (so-and-so), site (so much)."

- (b) When the executive announces the minimum quadrant elevation for each charge, the chief of section records it in a notebook and directs No. 1 to chalk the minimum elevation for each charge to be used on a convenient part of the carriage or on the section data board (par. 53).
- (2) *To indicate to gunner the aiming point.* Whenever an aiming point has been designated by the executive, the chief of section will make sure that he has properly identified the point designated. He will then indicate it to the gunner. If there is any possibility of misunderstanding, the chief of section will turn the panoramic telescope 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. He will repeat the commands as required.
- (4) *To indicate when the gun is ready to fire.* When the executive can see arm signals of the chief of section, the chief of section will extend his right arm vertically upward as a signal that the gun is ready to fire. He gives the signal as soon as the gunner calls "Ready." 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 his arm signals cannot be seen, he commands orally NO. (SO AND-SO) FIRE. *The chief of section will not give the signal or command to fire until all the cannoneers are in safe positions.*

- (6) *To report mistakes and other unusual incidents of fire to executive.* If for any reason the gun cannot be fired, the chief of section will report promptly that fact to the executive and the reason, for example, "No. (so-and-so) out, misfire." Whenever it is discovered that the gun has been fired with a mistake 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, at the first lull in firing the chief of section will report that fact and request permission to realine them. Likewise, other unusual incidents that affect the service of the weapon are reported promptly.
- (7) *To conduct prearranged fires.* Whenever the execution of prearranged fires is ordered, the chief of section will conduct the fire of his section in conformity with prescribed data.
- (8) *To record basic data.* The chief of section will record data of a semipermanent nature in a notebook. These include such data as minimum elevations; aiming points used and their deflections; prearranged fires

when section data sheets are not furnished; safety limits in elevation and deflection; number of rounds fired, with the date and hour; and calibration corrections when appropriate.

- (9) *To observe and check functioning of materiel.* The chief of section closely observes the functioning of all parts of the materiel during firing. Before the gun is fired, he makes certain that the recoil and counter-recoil systems contain the proper amount of oil; thereafter he carefully observes the functioning of these systems. He reports to the executive any evidence of malfunctioning (TM 9-336 or TM 9-341).
- (10) *To measure the elevation.* At the command **MEASURE THE ELEVATION**, the gun having been laid, the chief of section directs No. 1 to center the cross-level bubble on the quadrant mount. The chief of section then sets the micrometer of the gunner's quadrant at zero and places it on the seats of the quadrant mount. He then performs the following:
- (a) Moves the index arm of the gunner's quadrant until the bubble passes to the end of the vial away from the index arm hinge.
  - (b) Lowers the index arm slowly until the bubble just passes to the end of the vial toward the hinge.
  - (c) Turns the micrometer until the bubble is accurately centered.



- (d) Removes the quadrant and reports the elevation thus set to the nearest 0.1 mil as "No. (so-and-so), elevation (so much)."
- (11) *To assign duties when firing with reduced personnel.* Whenever the personnel of the section serving the gun is temporarily reduced in number below that indicated in this manual, the chief of section will make such redistribution of duties as will best facilitate firing. Understrength units, loss of cadremen, casualties, and various details will necessitate gun section operation with a reduced number of personnel to the extent that it is almost normal for cannoneers to double up on duties. When round-the-clock firing is to be rendered, cannoneers must split up and work in shifts so that provision can be made for relief. Duties that lend themselves to convenient combinations are—

Chief of section and gunner

Gunner and No. 4

No. 1 and No. 2

No. 1 and No. 3

No. 1 and No. 5

No. 6 and No. 14

No. 7 and No. 13

No. 8 and No. 16

No. 9 and No. 15

No. 10 and No. 11

No. 10 and No. 12

No. 11 and No. 18

No. 12 and No. 18.

(12) *To lay for elevation when gunner's quadrant is used.*

(a) The command is **QUADRANT (SO MUCH)**. In laying for elevation, the gunner's quadrant is always used on the gunner's quadrant seat on the M30 mount. The quadrant seats on the tube are used only when some part of the M30 mount mechanism is damaged or impractical to use.

(b) An announced quadrant of 361.8, for example, is set on the gunner's quadrant as follows: The upper edge of the index plate is set opposite the 360 mark of the graduated arc on the quadrant frame and the micrometer on the index arm is turned to read 1.8. Care must be taken to use the same side of the quadrant in setting both the index plate and the micrometer knob.

(c) The announced quadrant having been set on the gunner's quadrant, the gun loaded, and the breechblock closed, the gunner's quadrant is set on the gunner's quadrant seat of the telescope mount. The words *line of fire* must be at the bottom of the quadrant and the arrow pointing toward the muzzle. The chief of section must be sure to use the arrow which appears on the same side of the quadrant as the scale that he is using. He stands squarely opposite the side of the quadrant and holds it firmly on the quadrant seat, parallel to the axis of the bore.

*It is important that he take the same position and hold the quadrant in the same manner for each subsequent setting and views the quadrant bubble from the same angle.*

- (d) The chief of section then directs Nos. 1, 2, and 3 to elevate or depress the gun until the bubble is centered, being careful that the last motion is in the direction in which it is more difficult to turn the handwheel. The chief of section cautions Nos. 1, 2, and 3 when the bubble is approaching the center in order that the final centering may be performed accurately.
- (e) Normally, if special and calibration corrections are used they will be added algebraically at the battery fire direction center. The quadrant then would be announced as NO. (SO-AND-SO), QUADRANT (SO MUCH).
- (13) *To verify adjustment of sighting and fire control equipment.* See TM 9-341 (TM 9-336) and chapter 7 for detailed instructions on testing and adjusting sighting and fire control equipment.
- (14) *To direct swabbing of bore.* During lulls in firing and if possible after every 10 rounds, the chief of section will direct the cannoneers to swab the bore. For this operation, it is necessary to assemble the bore brush with all sections of the rammer staff. Water should be used freely to assist in cooling the gun.

## 28. Gunner

### a. *List of Duties.*

- (1) Sets or changes the deflection.
- (2) Lays the gun for direction.
- (3) Centers the cross-level bubble on the panoramic telescope mount.
- (4) Calls "Ready."
- (5) Refers the gun.
- (6) Alines aiming posts, assisted by No. 9.
- (7) Sets a common deflection on a common aiming point after the gun has been laid.
- (8) Applies special corrections for deflection.
- (9) Corrects for aiming post displacement.
- (10) Assists the chief of section in verifying the adjustment of the sighting and fire control equipment.

### b. *Detailed Description of Duties.*

- (1) *To set or change a deflection.* The command is DEFLECTION (SO MUCH). If, for example, the command is DEFLECTION 2483, the gunner disengages the throwout lever with his left thumb and turns the rotating head of the sight (fig. 73) to 24 (2400). He releases the throwout lever, and with his right hand turns off the remaining 83 mils on the micrometer scale (fig. 74). He then traverses the gun until the vertical hair is on the aiming post, being careful that the last motion is such as to cause the vertical hair of the telescope to approach the aiming point from the left to take up any lost motion in the mechanism.

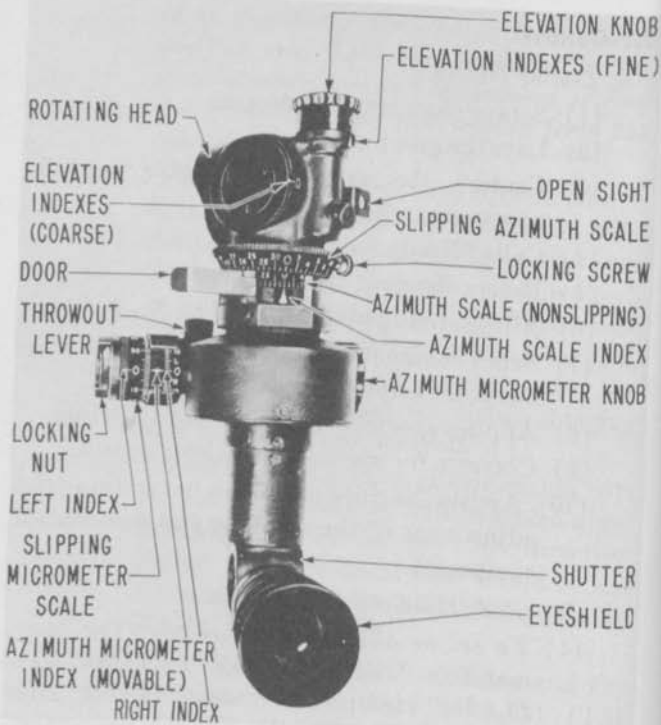


Figure 73. Panoramic telescope M12A7-series.

(2) *To lay the gun for direction.*

(a) The gun being in position but not laid for direction, the gunner zeroes the sight as follows:

1. Aligns the movable azimuth micrometer index (gunner's aid) of the sight with the right (fixed) index (fig. 73).
2. Loosens the slipping micrometer scale locking nut by turning it counterclock-

wise, firmly holding the azimuth micrometer knob with his right hand (fig. 75).

3. Slips the slipping micrometer until its zero is in coincidence with the left index (fig. 76), tightens the locking nut, and verifies the alinement of zero of the scale with the left index.
4. Turns the azimuth micrometer knob so that the left index and zero of the

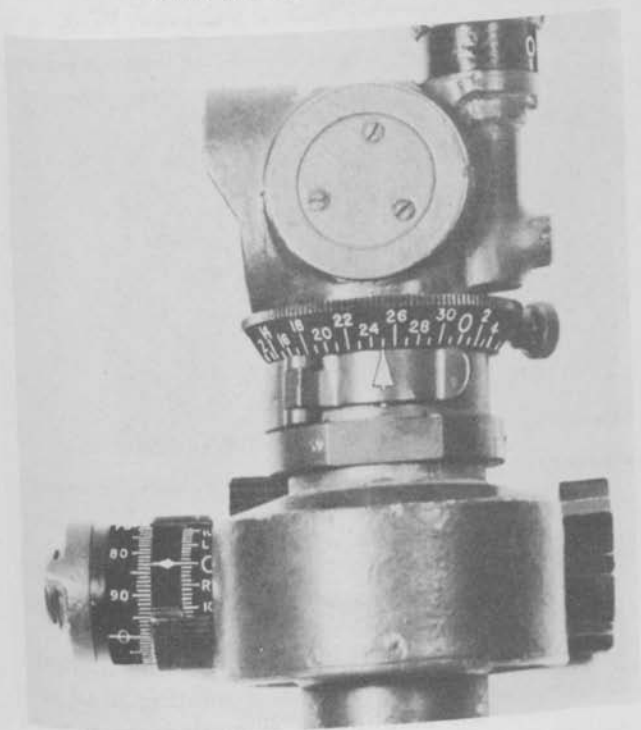
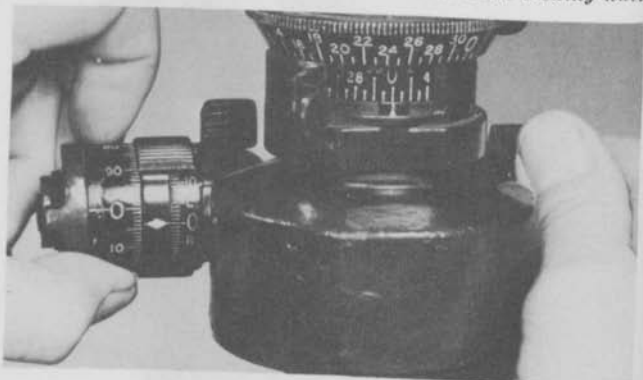


Figure 74. Deflection 2483.



*Figure 75. Loosening slipping micrometer scale locking nut.*



*Figure 76. Alining the zero of the slipping micrometer scale with the left index.*

slipping micrometer are alined with the zero of the gunner's aid and right index (fig. 73).

5. Opens the door and with the azimuth micrometer knob or rotating head sets the nonslipping azimuth scale at zero (fig. 77) and closes the door.

6. Loosens the slipping azimuth scale locking screw; moves the slipping azimuth scale until its zero coincides with the index on the outside of the door (fig. 78).
7. Tightens the locking screw and verifies the reading. With the sight thus zeroed, the gunner in indirect fire will habitually set and read deflections on the slipping azimuth scale at the index



Figure 77. Turning the nonslipping azimuth scale to zero.





*Figure 78. Slipping zero of the slipping azimuth scale to index on door.*

on the door, setting and reading the last two digits of the deflection on the azimuth micrometer.

- (b) The executive commands AIMING POINT THIS INSTRUMENT, NO. (SO-AND-SO), DEFLECTION (SO MUCH). The gunner sets the deflection for his gun on the panoramic telescope by

disengaging the throwout lever and turning the rotating head to the announced hundred mil graduation. He releases the throwout lever and turns off the last two digits of the deflection on the azimuth micrometer scale, using the azimuth micrometer knob. He then traverses the gun until his line of sight through the telescope is on the executive's aiming circle. He checks to insure that his bubbles are level and announces "No. (so-and-so) ready for recheck." As additional deflections are announced by the executive he sets them on the sight and traverses the gun so that his vertical hair is on the aiming circle. When the executive announces **NO. (SO-AND-SO) IS LAID** the tube is oriented and should not be traversed except on order of the executive.

- (3) *To center the cross-level bubble on the panoramic telescope mount.* The gunner centers the cross-level bubble on the telescope mount as part of all operations that involve the use of the panoramic telescope. This bubble is centered prior to using the telescope and the level of the mount is verified before firing.
- (4) *To call "Ready."* The gun having been laid for direction and No. 1 having called "Set," the gunner verifies the laying, moves his head clear of the telescope, and calls "Ready" to indicate that the gun is ready to be fired.

- (5) *To refer the gun.* The command from the executive is **AIMING POINT THIS INSTRUMENT (OR OTHER POINT), REFER.** Without disturbing the laying of the gun the gunner turns only the sight until, with the bubbles level, the vertical hair is on the point designated. He then reports the deflection to the executive "No. (so-and-so), deflection (so much)."
- (6) *To aline aiming posts.* The gun having been laid, as in (2) above, the executive may command **AIMING POINT, AIMING POSTS, DEFLECTION 2200, REFER.** At this command the gunner sets the panoramic telescope at deflection 2200 (fig. 79) and, with hand signals, directs No. 9 in the alinement of the posts (fig. 39) with the vertical hair of the sight. If, because of the nature of the terrain the posts cannot be set out at deflection 2200, the gunner turns the azimuth micrometer knob until the slipping azimuth scale is on another even hundred mil graduation. He alines the posts at this new deflection. The chief of section reports the altered deflection to the executive "No. (so-and-so) aiming posts at (so many hundred), deflection 2200 in lake (or other reason)." The executive will then command **NO. (SO-AND-SO), DEFLECTION 2200, REFER.** At this command the gunner loosens the slipping azimuth scale locking screw and moves the slipping azimuth scale to deflection 2200.

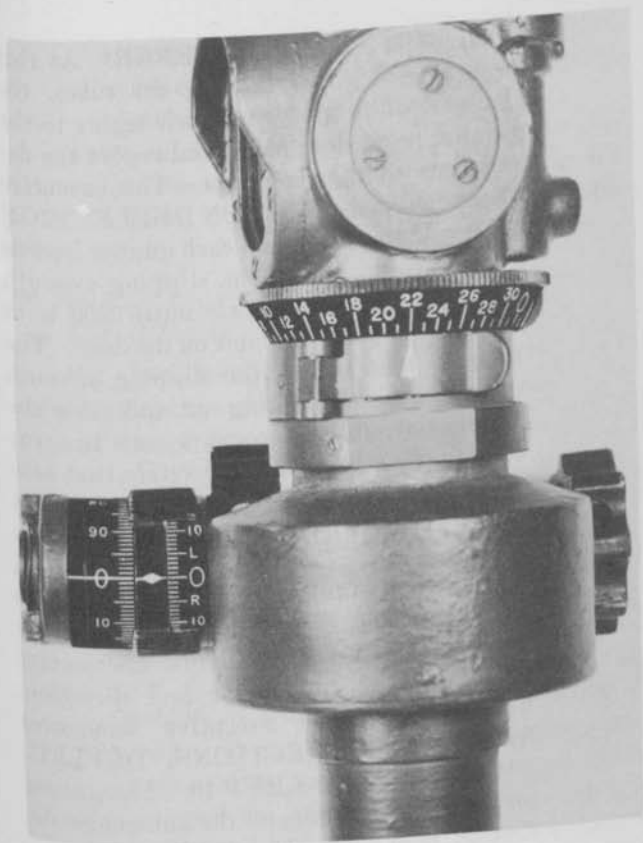


Figure 79. Common deflection 2200.

He then tightens the locking screw and verifies the adjustment.

- (7) *To set a common deflection on a common aiming point after the gun has been laid.* The battery having been laid, the executive may command **AIMING POINT**,

**CHURCH STEEPLE, REFER.** At this command without moving the tubes, the gunners of all guns turn their sights to the aiming point designated and report the deflections to the executive. The executive then commands **COMMON DEFLECTION 2200.** At this command each gunner loosens the locking screw of the slipping azimuth scale and moves the scale until 2200 is in coincidence with the index on the door. The gunners then unlock the slipping azimuth micrometer scale locking nut and move the slipping azimuth micrometer scale to zero; tighten the locking nut and verify that zero is in coincidence with the index and that the line of sight is still on the aiming point.

(8) *To apply special corrections for deflection.* The gunner applies special corrections to the announced deflection for his gun by moving the movable azimuth micrometer index the proper amount and direction. For example, the executive announces **SPECIAL CORRECTIONS, DEFLECTION 2265, NO. 1 LEFT 10.** The gunner on No. 1 gun first sets off the announced deflection, then moves the azimuth micrometer index (gunner's aid) upward 10 mils. He then resets the announced deflection at the index in its new position. Subsequent deflections, which are set on the azimuth micrometer scale, will be increased 10 mils automatically. The *special correction* is left on the gunner's aid until completion of the mission or until a new special correction

is announced. The new special correction is set off as commanded and is *not* applied algebraically by the gunner.

- (9) *To make correction for aiming post displacement.* For details of correcting for aiming post displacement, see paragraph 46d.

## 29. No. 1

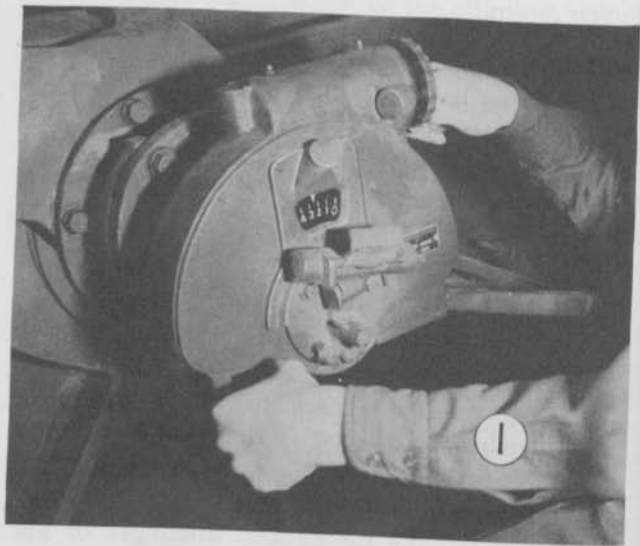
### a. *List of Duties.*

- (1) Cross levels the elevation quadrant.
- (2) Lays the gun for quadrant elevation.
- (3) Operates the elevation brake.
- (4) Calls "Set."

### b. *Detailed Description of Duties.*

- (1) *To cross level elevation quadrant.* No. 1 turns the cross-leveling knob until the cross-level bubble is centered. After the gun is laid for quadrant elevation and before making the final check of the longitudinal bubble, he will verify the cross leveling.
- (2) *To lay the gun for quadrant elevation.* No. 1 grasps the handle of the elevation knob between the thumb and forefinger of his right hand and turns it until the announced quadrant elevation is set off (fig. 80). For example, if the command is QUADRANT ELEVATION 230, No. 1 will turn the micrometer until the index in the window of the elevation quadrant is between 2 and 3 and the graduation corresponding to 30 mils is directly opposite the micrometer index.

- (3) *To operate elevation brake.* After No. 4 has called "Loaded" and the announced quadrant elevation having been set, No. 1 depresses the elevation brake lever and directs Nos. 2 and 3 in elevating the gun until the longitudinal bubble is centered. No. 1 then releases the lever, locking the elevating



*Figure 80. Setting a quadrant elevation.*

- 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 handwheel.
- (4) *To call "Set."* When all of the above operations have been completed, No. 1 calls "Set" sharply to notify the gunner that the op-

erations necessary for laying the gun in elevation are finished.

### 30. No. 2

#### a. *List of Duties.*

- (1) Operates the rear elevating handwheel for fine elevation changes.
- (2) Assists No. 3 in operating the crank handle on the front elevating handwheel for large elevation changes.
- (3) Assists No. 1 in laying the gun for elevation.

b. *Detailed Description of Duty.* To operate elevating handwheel No. 2 will stand facing the rear elevating handwheel and elevate or depress the gun as directed by hand signals from No. 1.

### 31. No. 3

#### a. *List of Duties.*

- (1) Operates the crank handle on the front elevating handwheel.
- (2) Measures 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 9-336 and TM 9-341).

### 32. No. 4

#### a. *List of Duties.*

- (1) Opens and closes the breech.
- (2) Cleans the breech after each round.
- (3) Places the loading ramp in the breech recess.
- (4) Attaches the lanyard.



- (5) Calls "Loaded."
  - (6) Releases the percussion hammer safety latch.
- b. *Detailed Description of Certain Duties.*
- (1) *To open and close breech.* To open the breech, No. 4 depresses the rotating lever latch plunger with the thumb of his right hand, and swings the rotating lever down through the full range of its travel. Holding the carrier operating 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 carrier operating handle in his right hand, depresses the breechblock slightly, pushes the breechblock carrier lock pedal with his left knee (fig. 67), and, assisted by No. 5, swings the breech shut. No. 4 then swings the breechblock operating lever to the closed position (fig. 68), 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 swab the face of the obturator spindle after each round with a water-saturated cloth. In addition, he will pass the vent cleaning tool 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, lubricating, preservative, medium (for temperatures of 32° F. and above) or oil, lubricating, preservative, special (below 32° F.). When necessary, he will oil the operating parts of the breech mechanism with same oil as specified for the breech recess and breechblock.

- (3) *To attach lanyard.* 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 gun 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 gun is ready to be laid for elevation.
- (5) *To release percussion hammer safety latch.* Having called "Loaded" No. 4 releases the percussion hammer safety latch.

### 33. No. 5

#### a. *List of Duties.*

- (1) Assists No. 4 in opening and closing the breech.
- (2) Assists No. 4 in placing the loading ramp in the breech recess.
- (3) Checks the powder charge after it is placed on the loading ramp.
- (4) Examines primers for cleanliness and for the closed seal at the open end.

- (5) Inserts primers into the firing mechanism (fig. 81).
- (6) Inserts and removes the firing mechanism M1 (fig. 69) and removes fired primers from the firing mechanism.

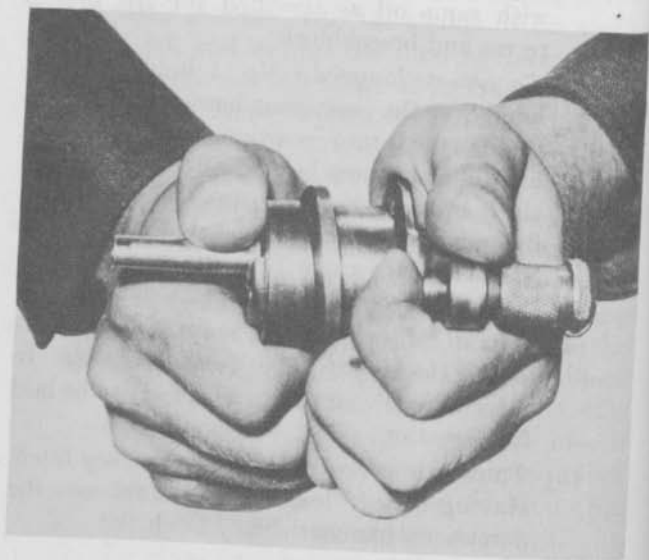


Figure 81. Inserting primer in firing mechanism M1.

*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 carrier operating handle with his left hand.
- (2) *To check powder charge after it is placed on loading ramp.* After No. 12 places the prepared powder 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, he checks to be sure the igniter pad is 3 inches forward of the gas check seat.

- (3) *To insert primers into 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. 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 (fig. 81). The precaution of keeping the right hand clear of the front end of the primer must be observed.
- (4) *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 contacts the firing mechanism block handle arm stop and is latched. It is important that the mechanism is *screwed home and latched in position.* If the gun is fired without this having been done, damage to the breechblock and injury to personnel 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 should be removed and the primer seat cleaned or another primer inserted. Unfired primers to be discarded are turned over to the ammunition corporal.

- (5) *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.

#### 34. No. 6

##### *a. List of Duties.*

- (1) Assisted by No. 7, places the rear end of loading ramp in position.
- (2) Rams projectiles.
- (3) Inserts powder charges.
- (4) Gives the commands for ramming.
- (5) Fires the gun.
- (6) Swabs 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 (fig. 82) with its forward end resting on the loading ramp rack.

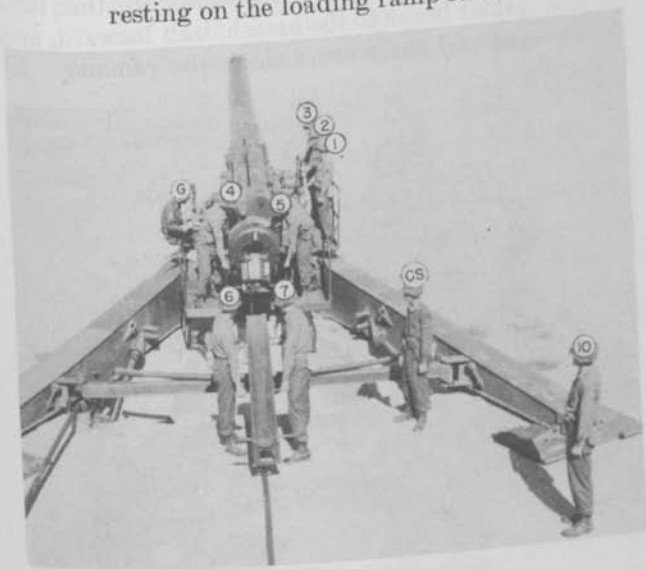


Figure 82. Removing loading ramp.

- (2) *To ram projectiles.* 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 posi-

tions along the rammer staff, No. 15 on the right and No. 16 on the left (fig. 83). 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

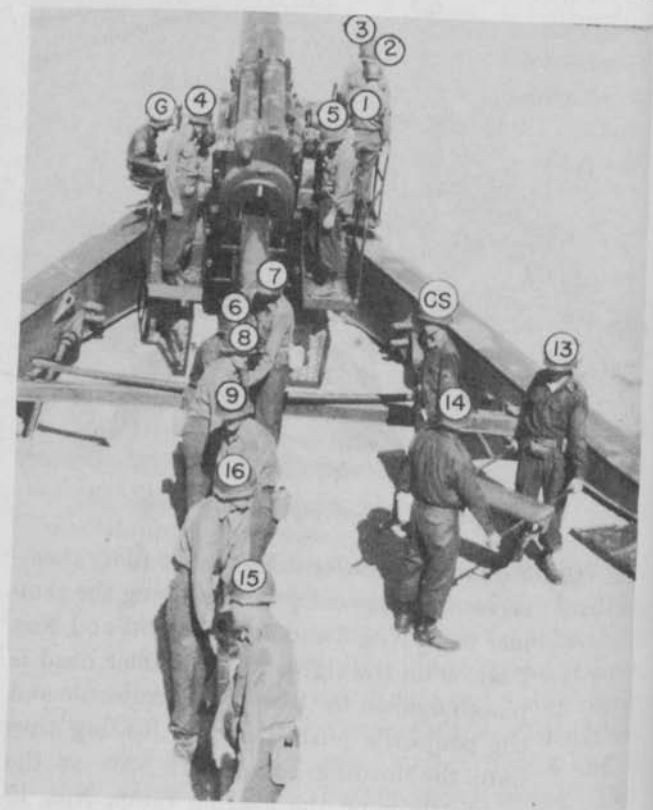


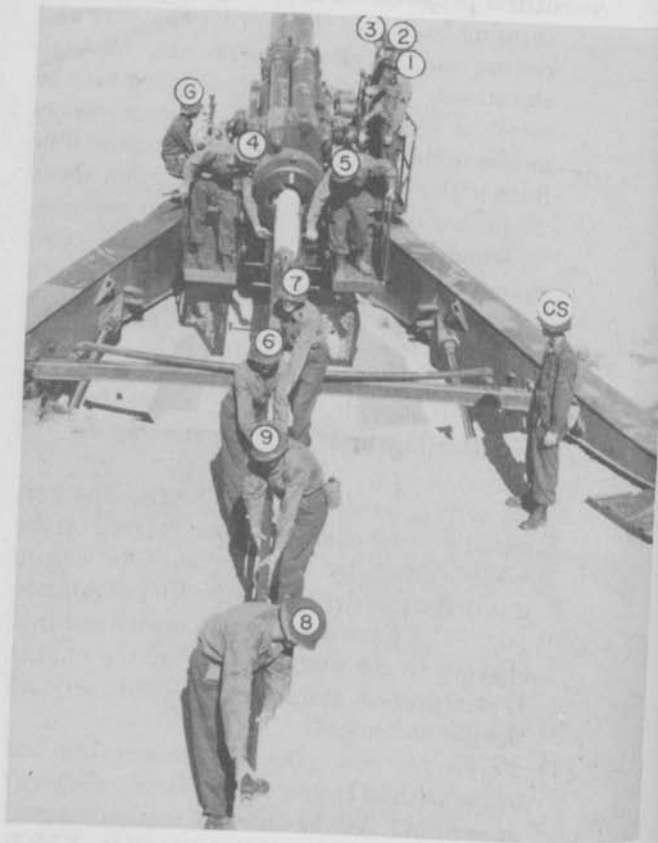
Figure 83. Loading projectile.

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. 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.

- (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 (fig. 84). Care must be taken with reduced charges to see that the base of the charge is not pushed more than 3 inches beyond the gas check seat.
- (4) *To fire the gun.* No. 6 takes a station out of the path of the recoil and facing the chief of section. At the chief of section's signal or command **NO. (SO-AND-SO) FIRE,**



No. 6 grasps the handle of the lanyard and without raising his hand pulls the lanyard. To insure the hammer hitting the striker, a strong pull with a prolonged movement is used. *Under no circumstances will No. 6 grasp the lanyard until the chief of section so directs.*



*Figure 84. Loading powder charge.*

(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 the 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.

### 35. No. 7

#### *a. List of Duties.*

- (1) Assists No. 6 in placing the rear end of the loading ramp in position.
- (2) Rams projectiles.
- (3) Inserts powder charges.
- (4) Swabs the powder chamber.

*b. Detailed Description of Certain Duties.* For details of certain duties, see paragraphs 34b(1), (2), (3), and (5).

### 36. Nos. 8 and 9

#### *a. List of Duties.*

- (1) Rams projectiles.
- (2) Inserts powder charges.
- (3) Swabs the powder chamber.

*b. Detailed Description of Certain Duties.* For details of certain duties, see paragraphs 34b(2), (3), and (5).

### 37. No. 10

#### *a. List of Duties.*

- (1) Fuzes projectiles.
- (2) Sets fuzes.
- (3) Removes fuzes from projectiles.

b. *Detailed Description of Certain Duties.*

(1) *To fuze projectiles.*

(a) *Fuzes M51, M67, VT, and M500 series.*

1. *240-mm projectiles.* 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 of the projectile, inspects the socket for rust and dirt, removes (or replaces) the supplemental charge if necessary, and screws in the designated fuze. In tightening or removing the fuze of a projectile, only the authorized fuze wrench should be used. VT fuzes should be screwed in by hand and tightened with fuze wrench M18 using only manual force. *Do not hammer on the wrench or use an extension handle.* If a time fuze is used, No. 10 removes the safety pull wire from the fuze, and, if a booster is present, the safety pin from the booster. Boosters without safety pins must not be used.

2. *8-inch projectiles.* Projectiles are shipped fuzed with the PD fuze M51A5 (or M51A4) MOD 3, .05-second delay, and inert head (for delay action). A superquick fuze head, which is packed in the box with the shell, may replace the inert head if superquick action is required. VT fuze is not available for this projectile. To fuze projectile with time fuze (M67, M500), No. 10 performs the following steps:

- (a) Unscrews the delay head in the nose of the windshield, loosens the set-screw in the base of the windshield, and removes the windshield.
  - (b) Loosens the setscrew in the nose of the shell and unscrews the fuze that is already on the projectile. If the M51A5 MOD 3 is replaced by the M67A3, the M78, the M78A1, or the M500, the flash tube is removed and discarded.
  - (c) Removes the cotter pin and ring from the booster which is assembled to the time fuze to be used.
  - (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 projectile.* 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 fuze wrench M16. No. 10 then screws the fuze into the fuze cavity and tightens securely with the fuze end of the wrench.

2. *8-inch projectile.* 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) Discards the flash tube.
- (c) Loosens the setscrew in the nose of the shell and unscrews the fuze.
- (d) Removes the safety pin from the booster and, using fuze wrench, screws the booster into the booster cavity in the shell.
- (e) Screws M78 fuze into the fuze cavity and tightens it with wrench.
- (f) Tightens the setscrew in the nose of the shell.
- (g) Assembles the inert delay head in the nose of the windshield using the retaining screw.
- (h) Assembles the windshield to the shell and tightens the setscrew in the base of the windshield.

(2) *To set the fuze setter.*

- (a) *Fuze setter M22.* The corrector scale is not used. No. 10 makes certain that the corrector scale is locked at corrector setting 30. He releases the time scale clamping screw marked T and, holding the fuze setter by the outer ring, turns the inner

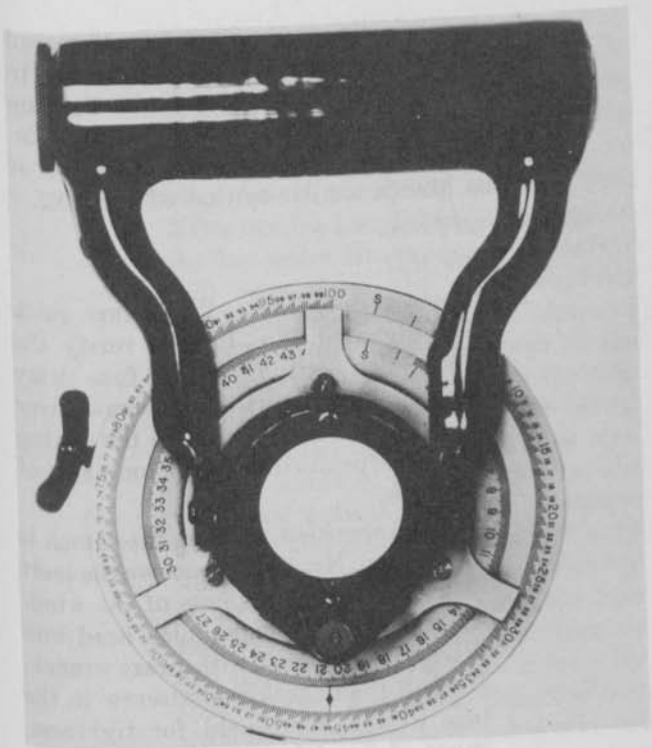


Figure 85. Fuze setter M28.

body until the index on the body is opposite the announced time on the time scale. He then locks the time scale clamping screw, being careful not to disturb the setting. For accuracy, No. 10 looks squarely at the scales and indexes in the same manner each time.

(b) *Fuze setter M28* (fig. 85). This fuze setter has no corrector scale. It has two

time scale rings; one for use on 45-second fuzes and one for 100-second fuzes. In addition the M28 has a night lighting device incorporated in the handle. Except for the corrector scale, operation of the M28 is similar to that of the M22.

(3) *To set fuzes.*

(a) *Fuze M51.*

1. *240-mm ammunition.* When fuze quick is designated, No. 10 will verify the superquick setting. When fuze delay is designated, he will use a screwdriver or fuze wrench M18 to turn the setting sleeve perpendicular to the long axis of the fuze.

2. *8-inch ammunition.* 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 and M500 series.*

1. *General.* The M67 fuze has no impact element so must be set for some time less than the time of flight of the projectile. The M500 has a percussion

element that will detonate the round upon impact if the time element fails. For percussion action with this fuze, No. 10 aligns the S on the setting ring with the index on the fixed ring.

2. *Using fuze setter M22, M26, or M28.* After making the announced settings on the fuze setter, No. 10 removes the safety pull wire from the fuze, carefully places the fuze setter over the fuze, and turns the setter until the notch on the time ring of the fuze engages the stop on the setting ring of the fuze setter. He places the handle in the most convenient position, pushes down on the fuze setter until the notch fully engages the stop, and continues to turn it until the pawl in the adjusting ring assembly drops into the notch of the fixed fuze ring. This prevents further turning and indicates that the fuze is set. He then lifts the fuze setter from the fuze without rotating it, and makes a visual check of the fuze setting to insure that the fuze ring notch was actually engaged and that the fuze is properly set. Once set, if time setting on the fuze is to be changed, the fuze setter is reset to the desired time setting and the fuze is set again as described above.

3. *Using fuze setter M14 or M27.* These are wrench-type fuze setters in which the fuze time scale is used in setting the



fuze. After the safety pull wire has been removed, place the fuze setter on the fuze with the taper contour of the hole fitting the fuze. Engage the key in the wrench with the slot on the fuze, and turn the wrench in the direction of increasing readings until the index mark on the fuze aligns with the required time setting on the fuze scale. Remove the wrench, being careful to avoid changing the setting. Make a visual check of the fuze to insure that the fuze is properly set.

- (c) *VT and concrete-piercing fuzes.* Current models of these fuzes require no setting on the part of using personnel. VT fuze is not available for ammunition for the 8-inch gun.
- (4) *To remove fuzes from projectiles.* If for any reason, a projectile (240-mm) which has been fuzed is not to be fired, the fuze will be removed. The operation of inserting a fuze is reversed. Supplemental charges (240-mm) will be replaced, provided the projectile was issued with the charge. Combination superquick and delay fuzes are reset to SQ (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 (240-mm).

## 38. Nos. 11 and 12, List of Duties—Prepare Powder Charges

*a. 240-mm Charges.* 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 Charges.*

- (1) *Propelling charge M13.* Propelling charge M13 is the standard charge used with the 8-inch gun M1. It consists of a base section and two increments, thus three charges are possible. This charge replaces the M9 and M10 charges described below.
- (2) *Propelling charges M9 and M10.* If these propelling charges are supplied for use with

the 8-inch gun M1, the M9 will be known as the green bag charge and the M10 as the white bag charge. Each of these charges is made up of a base charge and one increment, thus each charge permits only 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 airtight 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.

### 39. Nos. 13 and 14

#### a. *List of Duties.*

(1) Place projectile on loading tray.

(2) Carry projectiles to the gun.

b. *Detailed Description of Certain Duties.* 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 lift the projectile and place it on the loading tray. No. 16 removes the shell tongs from the projectile. Nos. 13, 14, 15, and 16 then carry the loading tray with projectile to the rear of the right trail where the projectile is fuzed by No. 10. 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 stand by the front handles until the projectile has been pushed on the loading ramp. They then return the loading tray 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.

### 40. Nos. 15 and 16

#### a. *List of Duties.*

(1) Carry projectiles to the gun.

(2) Ram projectiles.

*b. Detailed Description of Certain Duties.*

(1) *To carry projectiles to the gun.* For detailed description of duties, see paragraph 39b.

(2) *To ram projectile.* After the projectile is pushed off the loading tray, Nos. 15 and 16 hasten to the end of the rammer staff where they take staggered positions behind Nos. 6 to 9.

**41. Nos. 17 and 18**

*a. List of Duties.* 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 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 gun, 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 gun is fired.

**42. Ammunition Corporal**

*a. List of Duties.*

(1) Receives and accounts for ammunition for the section.

(2) Enforces proper methods of handling ammunition.

(3) Supervises the storage of ammunition.

(4) Supervises the preparation of ammunition for firing.

(5) Insures that the designated powder charge, projectile, and fuze are used.

(6) Determines powder temperature and announces it when so directed.

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 receives and accounts for such ammunition as may be required by the section. He checks the amount received and receipts for it, maintains a record of all ammunition received and fired, and keeps 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 requires the cannoneers to handle ammunition properly. He prevents any of the following:

(a) Smoking in the vicinity of ammunition.

(b) Use of lights, other than flashlights, in the vicinity of powder charges.

(c) Dropping projectiles, powder containers, and fuze and primer boxes.

(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.* For details on storing ammunition, see paragraph 52, FM 6-140, TM 9-341, TM 9-336, and TM 9-1900.

- (4) *To have ammunition properly prepared for firing.* The ammunition corporal supervises carefully the work of the cannoneers in preparing rounds for firing. He sees that the projectiles are cleaned thoroughly and that all burrs on the rotating bands have been removed by filing. He requires 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 insures 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 follows the fire commands and indicates to the cannoneers concerned the projectiles, powder charges, and fuzes to be used. For any single fire mission, the projectiles should be of the same weight and the powder charges should be all the same lot number.
- (6) *To determine powder temperature and announce it when so directed.* Propellants must be protected from excessive and rapid changes in temperature. High temperatures greatly accelerate the normal rate of deterioration and cause excessive and irregular chamber pressures in firing, resulting in erratic ranges. Sudden changes in temperature may also cause moisture to condense upon the charges. The ammunition corporal

determines and reports the powder temperature when directed by the chief of section.

### 43. Artillery Mechanic

#### a. *List of Duties.*

- (1) Watches the functioning of the gun.
- (2) Supervises the lubrication of the gun.
- (3) Checks from time to time, and during lulls in firing, the position of the replenisher piston, oil index, and the oil level gage of the equilibrator pressure tank. The position of the replenisher piston should be checked after every three rounds.
- (4) Checks the nitrogen pressure of the equilibrator system.
- (5) Is responsible to the chief of section for the proper mechanical functioning of the gun.
- (6) Supervises the cleaning and lubrication of the transport wagons.

b. *Detailed Description of Duties.* For detailed explanations of duties listed above, see TM 9-336 and TM 9-341.



## CHAPTER 6

# TECHNIQUES AND SITUATIONS THAT REQUIRE SPECIAL ATTENTION

---

### 44. Special Methods of Emplacement

*a.* Combat conditions may require the use of special methods of emplacing the gun. Practice in such methods during advanced training will give flexibility in the employment of the weapon.

*b.* Where, because of intervening trees or uneven terrain, or when camouflage security may dictate the inadvisability of having prime movers or any vehicle forward of the gun position, the following methods may be used in occupying positions. 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 alinement with directional stakes (fig. 86 ①).

(*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 (fig. 86 ②).

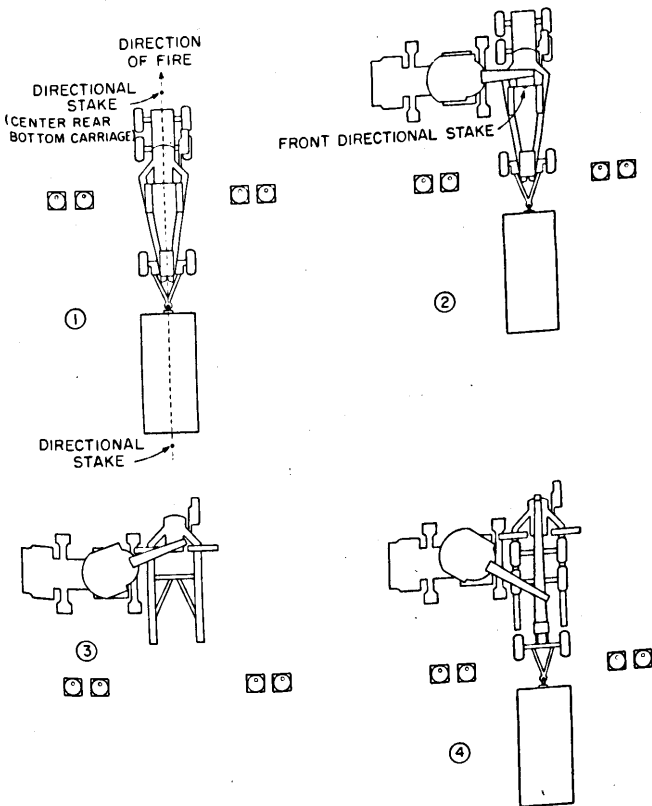


Figure 86. Special methods of emplacement (first method).

- (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 (fig. 86 ③).

- (d) Use the prime mover of the gun transport wagon, coupled by the front pintle, to push the gun transport wagon up the trails (fig. 86 ④).
  - (e) Lift the tube from the transport wagon and swing into position. Remove the gun transport wagon (fig. 87 ①).
  - (f) Move the crane to the rear of the trails to permit digging of spade pits by clam shell. The clam shell must be carefully guided in digging to prevent striking trails (fig. 87 ②).
  - (g) Spread the trails to permit digging of the recoil pit (fig. 87 ③).
  - (h) Prepare gun for action (fig. 87 ④).
- (2) *Second method.*
- (a) Dig the spade and recoil pits.
  - (b) Place the crane and carriage transport wagon as shown in figure 88①. Remove the spades.
  - (c) 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 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 the boom and swing the carriage into the required position (fig. 88②).
  - (d) Back the gun transport wagon into position where the tube can be emplaced upon

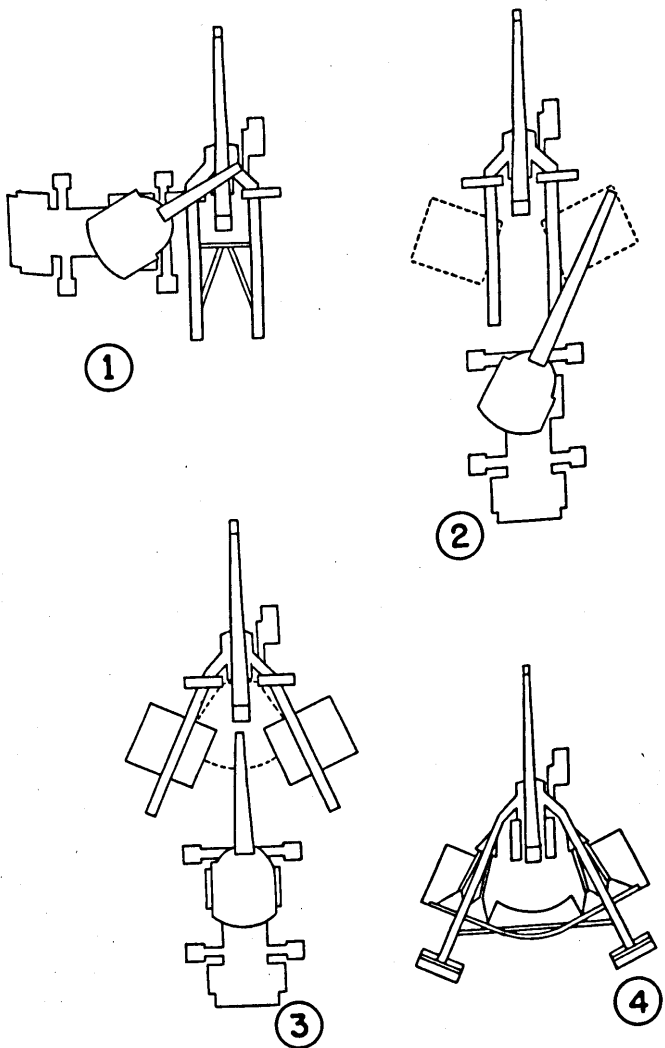


Figure 87. Special methods of emplacement (first method continued).

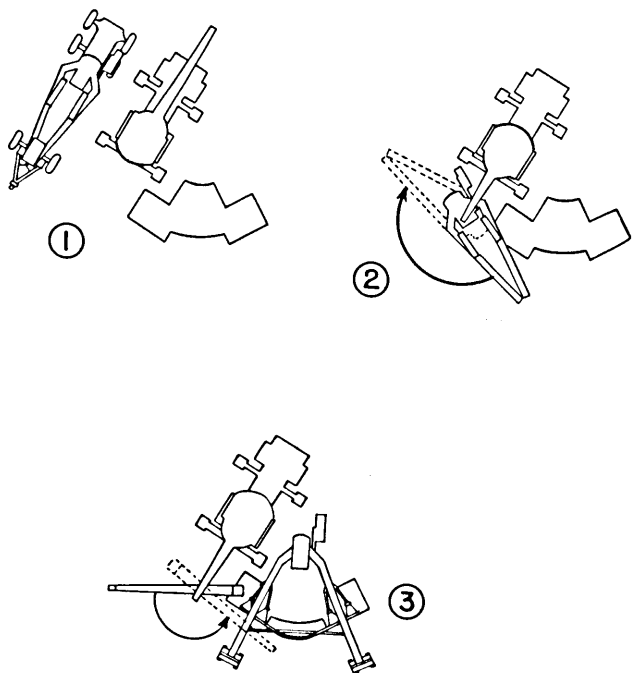


Figure 88. Special method of emplacement (second method).

the carriage by following the procedure in (c) above. Remove the gun transport wagon (fig. 88③).

- (e) Prepare gun 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.

## 45. Precision in Laying

*a.* Sighting and laying instruments, fuze setters, and elevating and traversing mechanism must be properly operated to reduce the effects of lost motion. For uniformity and accuracy the last motion in setting instruments and in laying should be in the direction prescribed in this manual. To insure accurate laying, personnel who lay the gun must be required to verify the laying after the breech has been closed.

*b.* The line of sight when setting and reading a scale or centering a bubble should be at a right angle to the scale or level vial to prevent parallax errors. Bubbles should be centered exactly.

*c.* For uniformity and accuracy in laying on aiming posts, the vertical hair in the reticle of the panoramic telescope should be alined with the left edge of the aiming posts.

## 46. Aiming Points and Displacement Corrections

*a. General.* After the gun has been laid initially for direction it is referred to the aiming posts and usually to one or more distant aiming points. An aiming point must have a sharply defined point or vertical line clearly visible from the gun so that the vertical hair of the panoramic telescope can be alined on exactly the same place each time the gun is relaid.

*b. Distant Aiming Point.* A distant aiming point is one at sufficient distance (at least 3500 yards) so that normal displacements of the gun in firing or traverse will not cause a horizontal angular change in direction (with the same settings on the azimuth

scales) of more than  $\frac{1}{2}$  mil. The executive officer usually designates the distant aiming point or points to be used.

*c. Aiming Posts.*

- (1) Two aiming posts are used for each gun. Each post is equipped with a light for use at night. The most desirable distance from the gun to the far aiming post is 100 yards, considering accuracy of laying, visibility, and ability to control the aiming post lights. The near post is set up at the midpoint between the far post and the gun and is alined by the gunner so that the vertical hair of the telescope and the two aiming posts are in alinement. To insure equal spacing of aiming posts, the distance to both the near and the far post should be paced by the same man. Where ground conditions make pacing inaccurate, the distance from the gun to the posts may be measured using the panoramic telescope and the aiming posts as measuring devices ((4) below).
- (2) For night use, the aiming post lights should be adjusted so that the far one will appear several feet above the near one. The two lights placed in this way will establish a vertical line for laying the gun.
- (3) Since the panoramic telescope is mounted at considerable distance from the center of rotation of the top carriage, large changes in deflection will cause misalinement of the aiming posts. Placing the aiming posts to the left front at a deflection of approximately 2200 when the gun is in the center of

traverse will keep this misalignment to a minimum and still allow for maximum visibility (*d* below).

- (4) To measure the distance from gun to aiming posts the stadia method may be employed, using panoramic telescope and the aiming post as measuring devices. No. 9 cannoneer, when setting out the aiming posts, holds the upper section of one of the aiming posts in a horizontal position, perpendicular to the line of sighting. The gunner measures the length of this section in mils on the reticle of the panoramic telescope. For example, the upper section of the aiming post is  $4\frac{1}{2}$  feet long, so that it measures 15 mils when it is 100 yards from the gun. The proper location for the near post, in this case, would be at the point at which the  $4\frac{1}{2}$ -foot section measures 30 mils. In many cases, the ideal spacing of 50 and 100 yards cannot be obtained but the posts will be properly spaced when the near post is set at a point where the  $4\frac{1}{2}$ -foot section measures twice the number of mils it measured at the far post location. This measurement may be performed at night by attaching the night lighting devices at the  $4\frac{1}{2}$ -foot marks on the aiming posts.

*d. Correction for Displacement of Aiming Posts.*

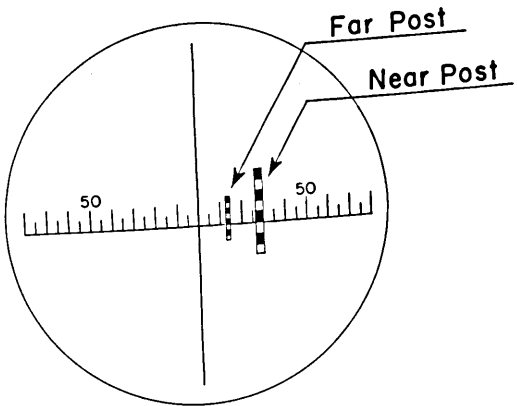
When the gunner notes that the vertical hair of the telescope is displaced from the line formed by the two aiming posts (or aiming post lights), he lays the gun in such a manner that the far aiming post (light) appears exactly midway between the near aiming



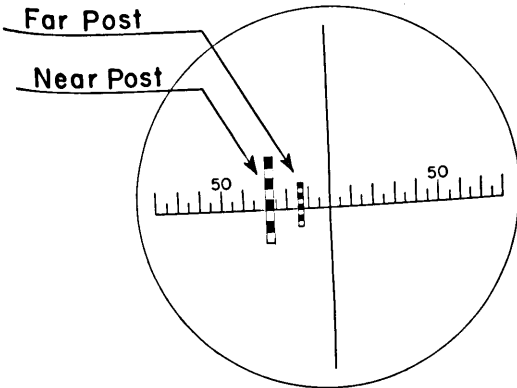
post (light) and the vertical hair (fig. 89). If the displacement is due to traversing the gun, the gunner continues to lay as described above. If the displacement is due to progressive shifting of the carriage from shock of firing or other cause, the gunner will notify the chief of section, who, at the first lull in firing, will notify the executive and request permission to realine the aiming posts. To realine, the gun is laid with the far post midway between the near post and the vertical hair (fig. 89). The far aiming post is moved into alinement with the vertical hair of the telescope and then the near aiming post is alined. If terrain conditions make it impracticable to move one of the two aiming posts, the gun is laid for direction and *referred* to the aiming post which cannot be moved. This deflection is reported to the executive. The other post is alined and the azimuth micrometer scale is slipped to retain the same deflection that was used prior to realinement of the aiming posts.

#### **47. Preparation of Position for Emplacement of Gun**

*a. General.* To facilitate emplacement and to insure stability of the carriage during firing, the gun 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



**Left Displacement**



**Right Displacement**

*Figure 89. Correction for aiming post displacement.*

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 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 gun 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.

*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 grom-

met which is  $13\frac{1}{2}$  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.

(2) Recoil and spade pits must be dug carefully. 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 damage to the spades in firing. After the seating round and periodically thereafter, the spade jacks should be tightened to insure the proper position of the spades. When the gun 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.

- (3) The chief of section should make sure that the pits are not dug 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 clam shell 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.

#### 48. Testing Targets

*a. Limitations.* Because of the minimum elevation of the weapon, there will be few opportunities for bore sighting with the testing target.

*b. Improvements.* When it can be used, the testing target will be more useful if the following improvements are made.

- (1) The target should be mounted on a flat piece of masonite, wallboard, or similar material.
- (2) To insure stability of the testing target throughout bore sighting, it should be fastened to a stand in a manner similar to that shown in figure 90.
- (3) For use in either leveling or canting the test target a mil scale may be inscribed at the

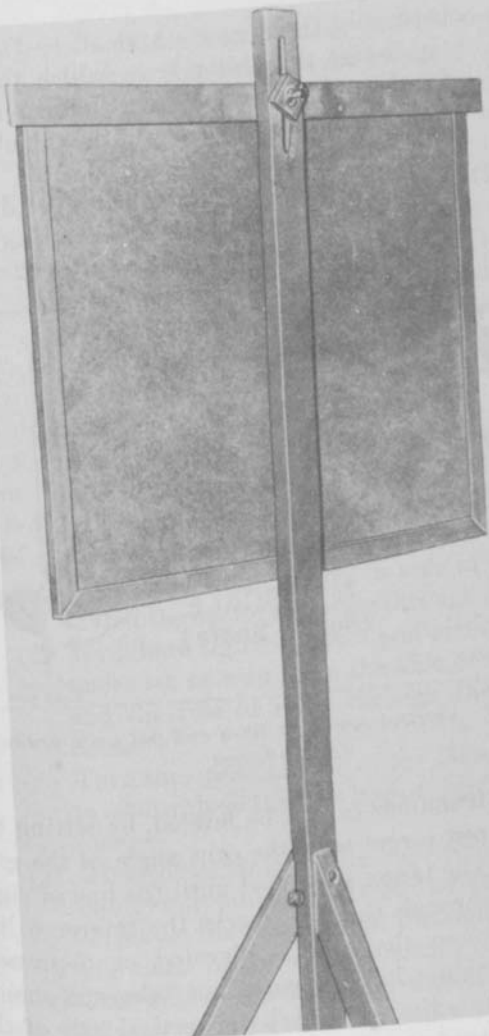


Figure 90. Rear view of bore sighting target stand.

bottom of the target. A small nail at the top marks the center from which the arc for the mil scale was drawn and provides a hook from which to suspend the plumb line (fig. 91).

- (4) Vertical reference lines may be drawn through the centers of each of the diagrams (fig. 91). These lines may be used when the

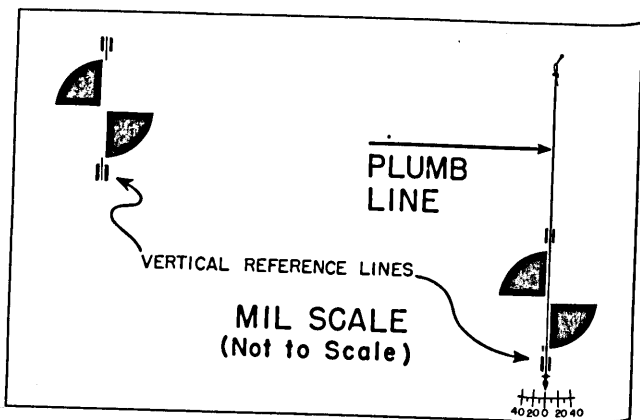


Figure 91. Vertical reference lines and mil scale drawn on testing target.

trunnions cannot be leveled, by setting the test target with the cant angle of the gun. The target is rotated until the line of sight through the tube tracks the reference line when the tube is elevated or depressed. Similarly, the panoramic telescope should be adjusted so that the vertical hair of the reticle tracks the appropriate reference line when the tube is elevated or depressed.

- (5) To facilitate bore sighting in darkness bore a  $\frac{1}{16}$  inch hole through the mounted testing target at the center of each aiming diagram. A flashlight held against the target behind the appropriate hole provides an aiming point for use in blackout conditions. Fasten patches of felt padding on the back of the target covering the regions of each hole so that light from the flashlight will not escape. The flashlight must be lighted only after it is placed firmly in position. Care must be taken to prevent disturbing the position of the testing target.

*c. Variation in Use of Testing Target.* When sufficient time is available a testing target may be used for bore sighting in conjunction with the aiming circle method (par. 57) to gain more accuracy.

- (1) Set up the aiming circle in rear of the gun so that the operator can see through the tube.
- (2) With bore sights in place and aiming circle scales set at zero aline the axis of the bore and the line of sight through the aiming circle.
- (3) Turn the upper motion of the aiming circle to 3200 mils so that the line of sight is to the rear.
- (4) At 50 yards from the aiming circle aline the panoramic telescope butterfly of the testing target on the line of sight through the aiming circle in the same vertical plane.
- (5) The axis-of-the-bore butterfly is used for alining the telescope. If the tube is cross leveled, level the cross-level bubble of the telescope mount and make the necessary ad-



justments: If the tube is not cross leveled, match the cross level scribed lines and make adjustment.

*Note.* If the trunions are canted the test target must be canted correspondingly.

#### **49. Cease Firing**

The command **CEASE FIRING** is normally given to the gun section 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 gun is loaded, the chief of section will report that fact to the executive. The executive acknowledges this report by saying "No. (so-and-so) loaded." If **CEASE FIRING** came from the fire direction center, firing is resumed at the announcement of the quadrant. If **CEASE FIRING** came from within the firing battery the executive will investigate the condition which caused the command to be given. When the condition has been corrected, firing is resumed by the executive's command of **QUADRANT ELEVATION (QUADRANT) (SO MUCH)**.

#### **50. Changes in Data During Firing**

If it is necessary to correct any element of firing data, all firing previously ordered, but not yet executed is stopped by the command **CEASE FIRING**. Corrected data is then announced. If the gun is not loaded, the new data will be set off and firing resumed at the command of **QUADRANT ELEVATION (QUADRANT) (SO MUCH)**. If the gun is loaded and no change in fuze setting is required, or if the gun is loaded with percussion-fuzed shell, the new

data is set off and firing is resumed at the announcement of the quadrant. If the gun is loaded with time-fuzed shell, and the data requires a change in fuze setting, the chief of section will suspend firing and that fact will be reported to the executive, for example, "No. 2 loaded, time (so much)." The gun will not be unloaded unless so directed by the executive. In continuous fire, changes in data are so applied as not to stop the fire or break its continuity.

### **51. To Unload the Gun**

Once a projectile has been rammed, it should always be fired rather than unloaded. Under almost all conditions, it will be possible to fire the gun to remove the round, and every effort should be made to use this method. When this is impossible, unloading will be accomplished under the direct supervision of the battery executive. If difficulty is encountered in removing the round from the tube with the unloading rammer, ordnance personnel must be called to unload the weapon.

### **52. Care of Ammunition**

*a.* To insure uniform results in firing, to prolong the life of the tube, and to avoid accidents, care must be exercised in the storage and handling of ammunition at the battery. Provisions of TM 9-1900 applicable to field service should be followed carefully. In the field, conditions existing in each position will determine the amount of time, labor, and materials required to store and preserve the ammunition adequately. If the position is to be occupied for only a few hours, a tarpaulin spread on the ground may be sufficient; for longer periods of time more elaborate facilities should be provided.

b. Ammunition must be protected from damage. When ammunition is received, it should be sorted into lots and placed in the best available storage. Powder temperature should be kept as uniform as possible. Ammunition data cards should be kept until after all ammunition for that lot is expended. Ammunition should be left in containers until its early use is expected. Protection should be provided against moisture, dirt, direct rays of sun, and, as far as practicable, hostile artillery fire and bombing. Protection against weather, dirt, and sun may be obtained by use of tarpaulins below and above the ammunition, and suitable dunnage between the layers. Protection against hostile fire may be obtained by use of small dispersed stacks, trenches, or dugouts. Each stack should contain not more than 25 rounds and should be not more than one layer high. Stacks should be at least 10 yards apart.

c. For further information on care of ammunition, see FM 6-140, TM 9-1900, and TM 9-1901.

### **53. Section Data Board**

When positions are occupied for more than a few hours, data boards may be used by each section for recording such items as deflections to aiming points, calibration corrections when appropriate, minimum elevations, data for barrages and counter-preparations, and other data which may be needed quickly. If such information assumes a standard pattern, the section may paint a form on a convenient part of the weapon and chalk in the various items of information in the appropriate spaces.

## CHAPTER 7

# BORE SIGHTING AND BASIC PERIODIC TESTS

---

### Section I. INTRODUCTION

#### 54. Purpose and Scope

This chapter outlines the procedures for bore sighting and making basic periodic tests of on-carriage fire control equipment. The procedures covered include only those that may be accomplished at battery level.

#### 55. Equipment

The following equipment is needed for bore sighting and periodic tests:

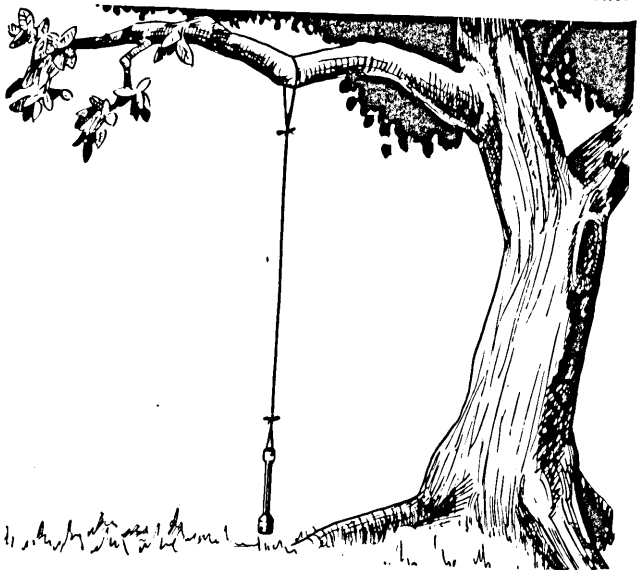
*a. Bore Sights.* Front and rear bore sights or improvised substitutes are necessary for basic periodic tests and, for all but the standard angle method, for bore sighting. If bore sights are not available, cross hairs may be fastened on the muzzle, and the obturator spindle vent hole in the breechblock bushing may be used as a rear sighting guide by removing the firing mechanism from the closed breechblock.

*b. Testing Target.* A testing target or suitable substitute is needed for testing and for certain methods of bore sighting. If a testing target is not available, a clearly defined aiming point 3500 or more yards from the gun may be used to accomplish approximately the same purpose as the testing target.

*c. Tools.* The section equipment includes all the

necessary tools for bore sighting and testing. Care must be taken in using the screw drivers and wrenches to insure that damage does not result through carelessness or the use of inappropriate tools.

*d. Plumb Line.* It is essential that a plumb line be used in the basic periodic test in order to obtain



*Figure 92. Plumb line suspended from tree.*

maximum accuracy. The farther from the gun that the plumb line is placed, the longer the line must be. For example, to be effective throughout maximum elevation at 5 feet in front of the tube of the 240, the line must be about 62 feet long. (If such a long line is not feasible, testing should be accomplished with the longest practicable line.) To keep a long plumb line taut it may be necessary to add weight to it.

Wrenches or rocks may be used. The tendency of the weight to swing may be decreased by placing a bucket containing water or other liquid under the plumb line so that the plumb bob or other weight is partially immersed in the liquid. A plumb line strung from a building or tree as in figure 92 is desirable to gain the height that is needed for the line. Units in garrison may find it convenient to rig a plumb line on a tall building. The line may then be nailed in place so that it can be used permanently.

## Section II. BORE SIGHTING

### 56. General

*a. Description.* Bore sighting is the process of verifying that the alinement of the on-carriage fire control equipment is parallel both for deflection and, except for the aiming circle method, for elevation with the axis of the tube of the weapon. Any mis-alinement discovered through bore sighting is corrected as described in paragraph 57. The gun should be placed near its center of traverse prior to bore sighting. All instruments and mounts must be positioned securely; there must be no free play. Bore sighting is conducted before firing and when necessary during lulls in firing.

*b. Leveling.* Although it is not absolutely necessary to level the trunnions for bore sighting, it is advisable to do so whenever possible. Accurate results can be obtained more readily if the trunnions are level, because then a tilt corresponding to the cant does not have to be introduced in the telescope mounts and the testing target when used. The trunnions should be leveled by leveling the ground under the

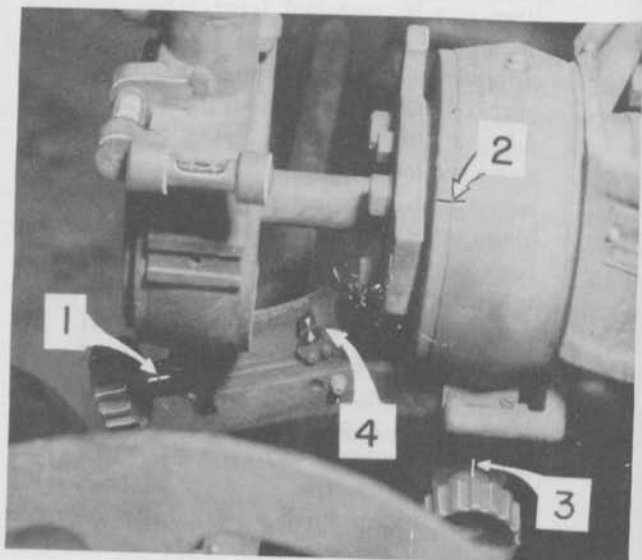
trails or by jacking up one trail and blocking beneath it. Approximate leveling may be measured by use of the gunner's quadrant placed on the flat surface adjacent to the hinge pin of the left trail. In no case should there be more than 20 mils cant.

- (1) *Plumb line.* The best method to check leveling is by means of the plumb line. The line is suspended directly in front of the axis of the bore. The line of sight should track the plumb line as the tube is depressed and elevated between minimum elevation and at least 800 mils of elevation, or the limits described by a plumb line that is as long as practicable. When the trunnions are level, the line of sight tracks the plumb line exactly through all elevations. If the trunnions cannot be leveled exactly and the cant is only slight, the following technique may be used. Traverse the tube from center and shift the trails to bring the line of sight through the tube back to the plumb line. Elevate the tube to determine whether it more nearly tracks the plumb line. Repeat this experimentation until the line of sight tracks the plumb line exactly.
- (2) *Gunner's quadrant.* In leveling operations using the gunner's quadrant, a quadrant that has been tested (par. 62) and found to be accurate is required.
- (3) *Gun not level.* When it is impossible to level the trunnions the cross-level bubbles cannot be used (except as discussed in paragraph 57d). As the tube cannot be depressed to zero elevation, the longitudinal-

level bubbles are not used. To permit bore sighting when the gun cannot be cross leveled, and to set the sight mount at the same elevation as the tube, lines should be scribed on the sight mount at the periodic test (pars. 61-66) when the mount is in correct adjustment. These scribed lines can be matched later, when leveling is impossible, to retain the same relationship between the axis of the bore and moving parts of the on-carriage sighting equipment. After a basic periodic test with the trunnions leveled and with the tube and sighting equipment in perfect alinement, use a knife blade or other sharp metal point to scribe lines as shown in figure 93. Care should be taken that the lines are scribed in the paint only and are not cut into the metal. To establish scribed line ① in figure 93, insure that, with the trunnions level (axis of the bore tracks a plumb line), the cross-level bubble is centered exactly. Scribe the line straight across the junction of the cross-leveling worm knob shaft and the cross-leveling worm housing. This scribed line is the fine cross-level index. The indexes on the cross-leveling segment and the cross-leveling worm housing (fig. 93 ④) are brought into coincidence for coarse cross leveling. To establish scribed lines ② and ③ in figure 93 insure that the elevation quadrant is in correct adjustment (checked against an accurate gunner's quadrant). Set elevation 300 on the elevation quadrant



and level the bubble exactly with the elevating handwheel. Place the quadrant set at 300 on the gunner's quadrant seat of the telescope mount, and with the longitudinal-leveling knob, level the bubble of the gunner's quadrant exactly. Scribe lines ② and ③ figure 93. Fill the scribed lines with



*Figure 93. Scribed lines.*

white paint and wipe off the excess. Once established, these lines are used to maintain control between the axis of the bore and the telescope mount when bore sighting. The positions of the scribed lines are verified at subsequent periodic tests and adjusted if necessary.

*c. Methods.* The four methods of bore sighting for use on this weapon are—

- (1) Aiming circle.
- (2) Standard angle.
- (3) Distant aiming point.
- (4) Testing target.

## 57. Aiming Circle Method

*a. General.* The aiming circle method of bore sighting is used most often because the weapon cannot be depressed sufficiently to make the test target method or the distant aiming point method practicable. It is more accurate than the standard angle method. Before bore sighting with the aiming circle certain preparatory steps (*b* below) must be performed, preferably after a basic periodic test (pars. 61-66) when the panoramic telescope mount is in correct adjustment.

### *b. Preliminary Operations.*

- (1) *Accuracy.* The greatest care must be exercised in all phases of these operations. All final movements of the instruments must be made so that the hair of the reticle approaches the final position from left to right in order to eliminate the effects of lost motion in the gears.
- (2) *Parallax.* Parallax in the aiming circle and the panoramic telescope must be eliminated. This is done with the aiming circle after focusing by placing in front of the eyepiece lens a dark colored cardboard or metal parallax shield of the same diameter as the eyepiece lens housing. The shield should have a vertically and horizontally

leveled slot  $\frac{1}{16}$  inch wide and  $\frac{1}{4}$  inch long. It is held in place with a piece of adhesive tape around the edge of the focusing sleeve. To eliminate parallax in the panoramic telescope, a shield of the same diameter as the eyepiece lens housing and having an exactly centered hole  $\frac{1}{16}$  inch in diameter is mounted in front of the eyepiece lens. A more permanent parallax shield may be constructed of brass or bronze shim stock. When constructed of metal a series of fingers approximately  $\frac{3}{16}$  inch wide and  $\frac{1}{4}$  inch long separated by  $\frac{1}{4}$  inch spaces should extend beyond the perimeter of the shield. These fingers should be bent along the circumference of the circle until they form an angle of  $90^\circ$  with the surface of the shield (fig. 94). They serve as a means of clipping the shield in place quickly and permit easy removal. Where the eyepiece has a rubber eyeguard, the fingers permit alignment within the guard without its removal.

(3) *Bore sight marks.* The aiming circle method requires that bore sight marks be located on the top surface of the tube at the muzzle end and on the rear of the breech ring (fig. 95). The position of these bore sight marks must be accurately defined by painting a white stripe about 1 inch wide and several inches long on the tube and from the top of the breech ring to the breech recess. The left edge of the stripe lies in the same vertical plane as the exact center of the bore when the trunnions are level. The location

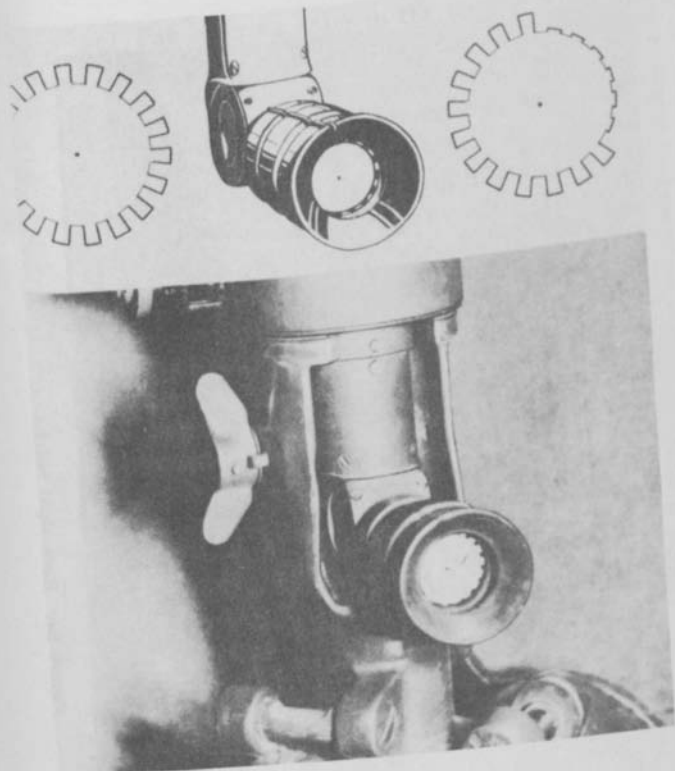


Figure 94. Parallax shield.

of bore sighting marks is determined as follows:

- (a) Level the trunnions.
- (b) Set up an aiming circle equipped with a parallax shield directly in rear of the gun at a distance that will permit sighting through the tube when the weapon is at minimum elevation.



*Figure 95. Bore sight marks*

- (c) Fasten cross hairs in the muzzle witness marks.
- (d) With adhesive tape fasten a bright common pin in the top witness mark so that it projects above the muzzle.
- (e) Place the breech bore sight in place. If the breech bore sight is not available or if vision through the center hole is difficult, a strip of wood placed vertically in the breech may be used. This strip must have the horizontal center marked and its edge must be on the vertical center of the breech.
- (f) Sight through the aiming circle and, if necessary, traverse the gun until the breech bore sight or the wood strip and the vertical thread on the muzzle are alined with the right edge of the vertical hair of the aiming circle.
- (g) Place a straightedge in a vertical position on the rear face of the breech ring and aline the side of the straight edge with the hole of the breech bore sight or the edge of the wood strip and the right edge of the vertical hair of the aiming circle. Draw a pencil line along the side of the straightedge on the upper rear portion of the breech ring (fig. 96).
- (h) Without changing the horizontal direction of the aiming circle or traversing the gun, elevate the gun until the pin and part of the top of the muzzle is clearly visible.

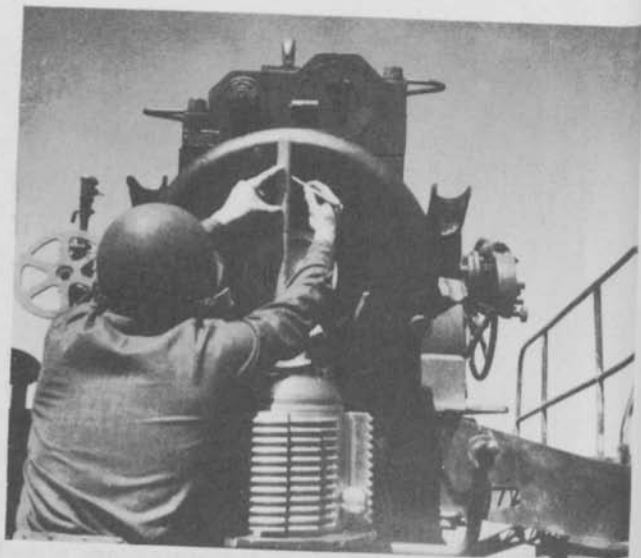


Figure 96. Drawing pencil line for breech bore sight stripe.

- (i) Lay the straightedge atop the tube at the muzzle along the same line of sight and draw a pencil line.
- (j) Paint the white stripes on the tube and breech so that the left edge of the stripes are exactly on the pencil lines.
- (k) Depress the tube and adjust the elevation knob of the aiming circle until the cross hairs of the muzzle bore sight and the hole of the breech bore sight are centered on the cross hairs of the aiming circle reticle.
- (l) Measure the *outside* diameter of the muzzle with a ruler. Divide this measurement by two, thereby obtaining the radius. Mark this distance off on the straightedge.

(m) Place the right edge of the straightedge along the left edge of the breech bore sight stripe with the radius distance mark aligned with the horizontal hair of the aiming circle. At the top of the straightedge place a mark (fig. 97). Turn the straightedge horizontally against the breech aligning its upper edge with the pencil mark. Draw a line from the pencil mark to the left. The point where this line intersects the bore sight stripe is the radius point.

(n) To make the point easy to identify, paint a short white stripe to the left, the top of the white stripe falling on the pencil line (fig. 95).

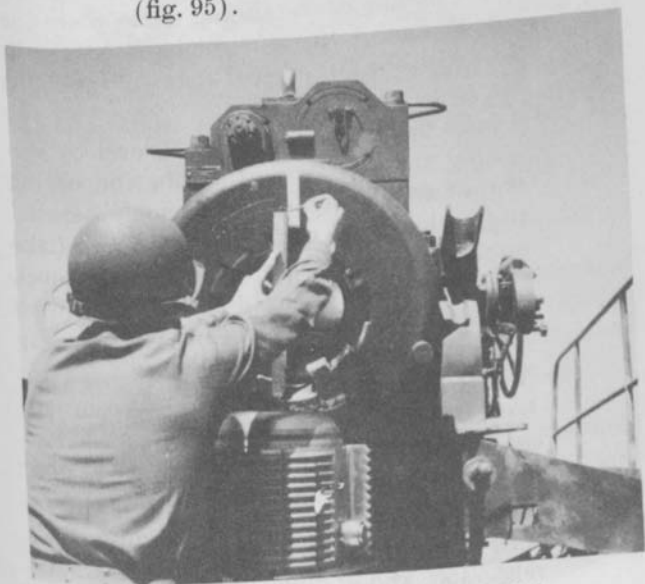


Figure 97. Marking the radius point.



*c. Procedure (Trunnions Level).* The gun having been prepared as in *b* above, at any later time the gun may be bore sighted by the aiming circle method as follows:

- (1) Set up the aiming circle 30 to 50 yards in rear of the gun.
- (2) Zero the aiming circle's scales and level the instrument.
- (3) Elevate the gun until the two bore sighting marks are plainly visible from the aiming circle. Do not elevate the tube any more than is necessary for clear definition of the edges of the white bore sight marks.
- (4) By traversing the gun and turning the lower motion of the aiming circle, place the right edge of the vertical hair exactly in line with the left edge of the two bore sight stripes.
- (5) Check that the trunnions are level by elevating and depressing the tube and noting if the two bore sight stripes remain parallel to the right edge of the vertical hair of the aiming circle. If the trunnions are level, the radius point is not used. Proceed with steps (6) through (10) below. If they are not level proceed as in *d* below.
- (6) Verify that the cross-level and longitudinal-level bubbles are leveled, and that the azimuth scales of the telescope are set at zero (3200) and the indexes are in coincidence.
- (7) With the upper motion of the aiming circle turn to the objective lens of the panoramic telescope. Make certain that equal amounts

- of the housing appear on each side of the vertical hair.
- (8) Read the angle on the azimuth scales of the aiming circle.
  - (9) Set the angle from the aiming circle ((8) above) on the azimuth micrometer scale of the panoramic telescope.
  - (10) Loosen the tangent screw locking screws (fig. 98) and adjust the tangent screws (fig. 99) until the vertical hair of the telescope is



Figure 98. Loosening a tangent locking screw.

exactly on the center of the objective lens of the aiming circle. Tighten the locking screws and recheck the angle settings and the alinement of the vertical hairs.

*d. Procedure (Trunnions Not Level).*

- (1) Follow the steps set forth in *c*(1) through (5) above. Sighting on the bore sight stripes must be made at prescribed points on the stripes when the trunnions are not level. The right edge of the vertical hair of the

aiming circle must be alined with the top left edge of the muzzle bore sight stripe and with the radius point on the left edge of the breech bore sight stripe. These two points are equally distant from the axis of the bore. If this is not accomplished, the line of sight through the aiming circle will not be parallel to a vertical plane through the axis of the bore and an error in alinement will result.

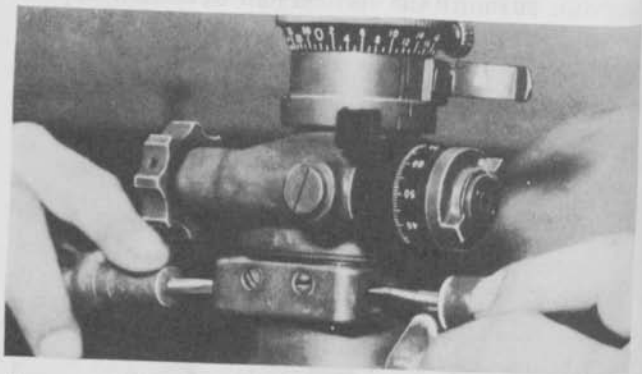


Figure 99. Adjusting the vertical hair of the reticle with tangent screws.

- (2) Verify that the cross-level and longitudinal-level bubbles are level. Do *not* match the scribed lines. Proceed with the steps given in *c*(7) through (10) above.

*e. Elevation Quadrant.* Set elevation 300 on an accurate gunner's quadrant (or one with the known correction applied). Place the quadrant on the breech ring quadrant seats and elevate the tube until the bubble of the quadrant is centered exactly. Level the longitudinal- and cross-level bubble of the eleva-

tion quadrant. If the elevation quadrant micrometer scale does not read zero loosen the three screws in the end of the micrometer knob and rotate the scale to zero. Tighten the screws and verify the adjustment.

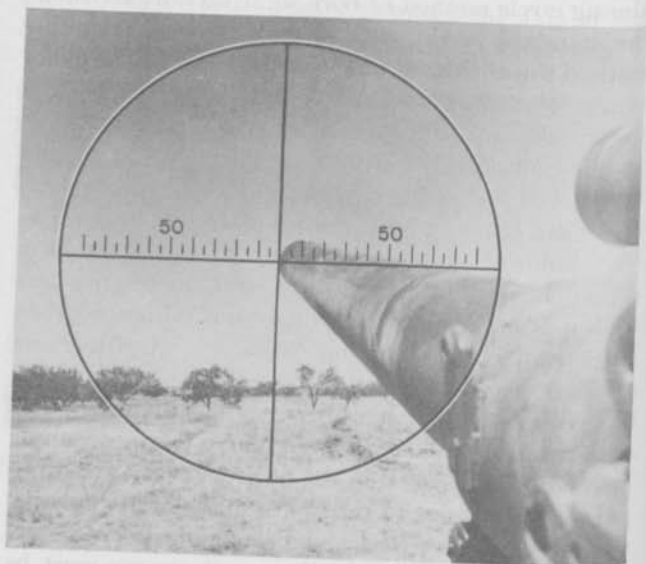
## 58. Standard Angle Method

*a. General.* When conditions exist to make the aiming circle method of bore sighting impracticable, the standard angle method may be used. In this method the alinement of the optical axis of the panoramic telescope parallel to the axis of the bore is tested and adjusted by referring to a selected point on the muzzle. The deflection and elevation angles necessary to refer the line of sight of the telescope to the selected point on the muzzle are referred to as the standard angles. Once standard angles have been determined, they may be used for a quick test of the alinement of the panoramic telescope when more precise methods cannot be used. Misalignment discovered and corrected as a result of this test should be verified by a more accurate method at the earliest opportunity. When using the standard angle method of bore sighting the position of the recoiling parts with respect to the nonrecoiling parts must be the same as when the standard angles were determined. Because of this, the recoil system must be checked to see that it contains the proper amount of recoil oil before determining the standard angles. Standard angles are usable only as long as the same tube-carriage combination is intact. If interchange of tubes or carriages is made, standard angles must be re-established.

*b. Preliminary Operations.* The ideal time to determine standard angles for later use is after per-

forming basic periodic tests, when the trunnions are level and the panoramic telescope mount has been found to be in correct alinement. Procedure for determining standard angles is as follows:

- (1) With the tube in battery, scribe a line in the paint on the tube flush with front end of the cradle.



*Figure 100. Sight picture of projecting pin.*

- (2) Verify that the trunnions are level.
- (3) With friction tape fasten a bright common pin in the left horizontal witness mark. Allow the pin to project to the left of the muzzle (fig. 100).
- (4) Fasten the parallax shield over the eyepiece of the panoramic telescope.

- (5) Verify that the coarse and fine elevation knob indexes on the telescope are at zero.
- (6) Elevate the tube to exactly 300 mils.
- (7) Level the cross-level bubble of the telescope mount. By using the azimuth micrometer knob and the longitudinal-level knob, place the cross hairs of the sight on the metal pin in the left horizontal witness mark of the tube. Verify that the sight mount is level and that the cross hairs are exactly on the junction of the pin with the muzzle.
- (8) Read the angle from the azimuth scales of the panoramic telescope to the nearest  $\frac{1}{4}$  mil and record it. (Since the graduations are to the nearest mil it is necessary to interpolate to the nearest  $\frac{1}{4}$  mil.) This is the standard azimuth (horizontal) angle for the gun tested.
- (9) With a knife blade or other sharp metal point scribe lines in the paint across the rocker and actuating arm and across the junction of the elevating knob shaft and its bracket. These lines establish control for the telescope mount at quadrant elevation 300.
- (10) Fill the scribed lines with *red* paint and wipe off the excess.

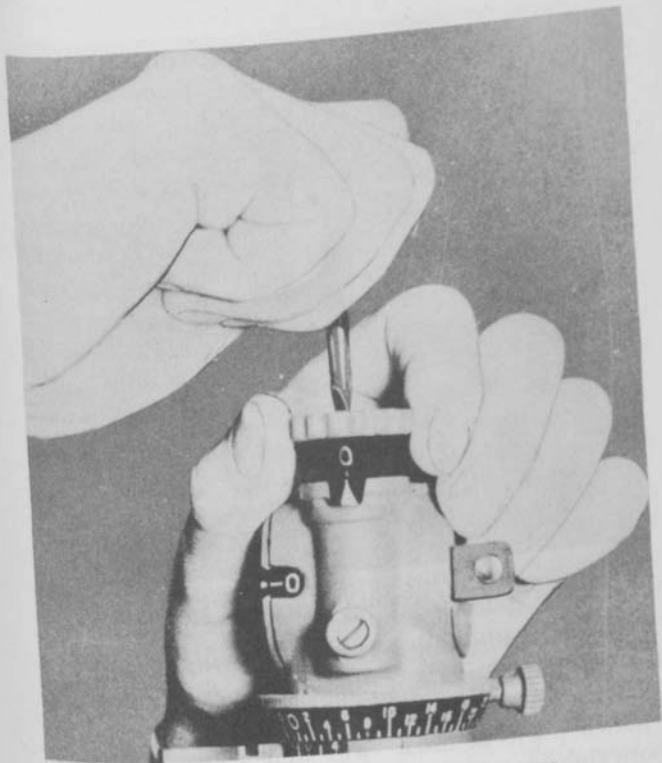
*c. Procedure.* Once the standard angles have been determined, steps in performing the standard angle method of bore sighting are as follows:

- (1) Verify that the parts that move in recoil are in the same position with respect to the non-recoiling parts as they were when the standard angles were determined. If they

are not in the same position, the amount of recoil oil in the recoil mechanism must be checked.

- (2) Verify that the trunnions are not canted more than 10 mils; if feasible, level the trunnions.
- (3) With friction tape fasten a pin in the left horizontal witness mark so that the pin projects out to the left of the muzzle.
- (4) Set quadrant elevation 300 on the elevation quadrant and elevate the tube to level the longitudinal bubble exactly.
- (5) Place the parallax shield on the eyepiece of the telescope.
- (6) Insure that the *white cross-level scribed lines* are alined. Set the standard azimuth angle on the panoramic telescope. Make sure that the red (longitudinal control) scribed lines are in coincidence.
- (7) If the vertical hair of the reticle is not exactly on the junction of the pin and the muzzle, adjust the tangent screws until the vertical hair of the reticle is properly alined.
- (8) If the horizontal hair of the reticle is not exactly on the junction of the pin and the muzzle, turn the elevating knob of the panoramic telescope until it is properly alined. If the indexes are not in coincidence loosen the clamping screws (fig. 101) and adjust the zero of the elevation knob scale so that it is in alinement with the index (fig. 102).

*d. Elevation Quadrant.* To adjust the elevation quadrant, follow the procedure given in paragraph 57e.

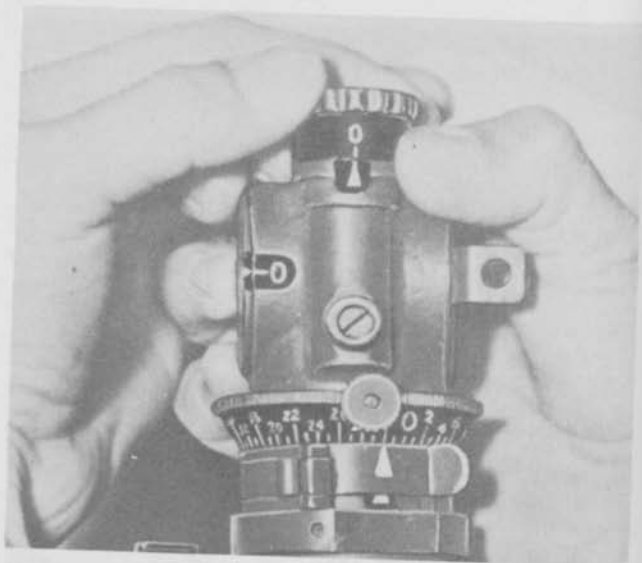


*Figure 101. Loosening clamping screws.*

### **59. Distant Aiming Point Method**

The elevation quadrant is alined as in paragraph 57*e*. This method consists of alining the on-carriage fire control equipment and the line of sight through the tube on a common point at least 3,500 yards from the gun. If the moon or a star is used as an aiming point, care must be taken that the lines of sight through the tube and the telescope are on the same point at the same time. Accurate cross leveling of





*Figure 102. Shifting zero of the elevation knob to its index.*

the trunnions is unnecessary when bore sighting on a distant aiming point because the lines of sight converge on a single point. The white scribed lines (par. 56) will be used. The steps to be followed in bore sighting on the distant aiming point are:

- a.* Check the level of the trunnions.
- b.* Place the cross hairs on the muzzle and either insert the breech bore sight or remove the firing mechanism.
- c.* Match the white scribed lines on the telescope mount.
- d.* Set the panoramic telescope scales at zero.
- e.* Traverse and elevate until the line of sight through the tube is exactly on the distant aiming point.

f. Sight through the panoramic telescope and note the position of the vertical and horizontal hairs of the reticle.

g. If the vertical hair is off the aiming point, loosen the tangent locking screws and adjust the tangent screws until the vertical hair is properly alined. Tighten the locking screws and verify the adjustment.

h. If the horizontal hair is off the aiming point, turn the elevation knob until the hair is properly alined. Loosen the clamping screws, shift the zero into coincidence with the index. Tighten the clamping screws and verify the adjustment.

## 60. Testing Target Method

The elevation quadrant is alined as in paragraph 57e. This method consists of bringing the line of sight of the on-carriage fire control equipment into parallel alinement with the tube, using the aiming diagrams of the testing target as aiming points. Although this is the most accurate method of bore sighting, it is rendered least feasible because the tube cannot be depressed sufficiently to permit alinement of the testing target on flat terrain. This method may be used if the weapon is emplaced facing a steep hill or building on which the testing target may be alined with the tube. Steps to follow are—

a. *Trunnions.* Check the level of the trunnions.

b. *Telescope Mount Lateral Control.* Match the cross-level scribed lines.

c. *Bore Sights.* Place the cross hairs on the muzzle and either insert the breech bore sight or remove the firing mechanism.

d. *Testing Target Alinement.* The target nor-

mally should be located at least 50 yards in front of the muzzle. If the trunnions are level, level the testing target by means of a plumb line or the vertical reference lines (fig. 91). If the trunnions are not level, cant the target to correspond to the cant of the trunnions. In either case the face of the target is perpendicular to the axis of the bore, both laterally and longitudinally. Without moving the gun (except for elevating and depressing slightly when using testing target reference lines) aline the gun tube testing target diagram with the line of sight through the tube.

*e. Telescope Mount Longitudinal Control.* Place an accurate gunner's quadrant set at the same elevation as the elevation quadrant, atop the gunner's quadrant seat of the telescope mount. Turn the longitudinal leveling knob until the bubble of the gunner's quadrant is leveled. This establishes the mount in longitudinal alinement with the line of sight through the bore.

*f. Panoramic Telescope Lateral Alinement.* Set the panoramic telescope scales at zero. If the vertical reticle is not in alinement with its aiming diagram, loosen the tangent locking screws and adjust the tangent screws until the vertical hair is properly alined. Tighten the locking screws and verify the adjustment.

*g. Panoramic Telescope Horizontal Alinement.* If the horizontal reticle is out of alinement, turn the elevation knob of the telescope until the hair is alined properly. Loosen the clamping screws and rotate the scale (zero) into coincidence with the fixed index. Tighten the clamping screws and verify the adjustment.

### Section III. BASIC PERIODIC TESTS

#### 61. General

Basic periodic tests are performed by the section under the supervision of the battery executive and the artillery mechanic. These tests are performed at the discretion of the unit commander. Suggested times for performance are—once each year if the gun is used only for nonfiring training; once every 3 months if the gun is fired; as soon as possible after extensive use, accidents, interchange of tube or carriage or traversing extremely rough terrain; and whenever the gun fires inaccurately for no readily apparent reason. The tests reveal whether or not the on-carriage sighting equipment, the gunner's quadrant, and the fuze setter are in correct adjustment. For the on-carriage equipment to be in correct adjustment, the following conditions must exist:

*a.* The line of sight of the panoramic telescope remains in a plane parallel to the vertical plane passing through the axis of the bore as the weapon is elevated through its limits of elevation.

*b.* All indexes and scales, except the elevation scale, must read zero.

*c.* Keeping the sight mount longitudinal-level bubble centered, the cross-level bubble remains centered throughout the limits of elevation of the tube.

*d.* The sight mount longitudinal-level bubble remains centered when the movable cross-level segment is operated throughout its limits.

*e.* The sighting equipment must be accurately bore sighted as described in paragraphs 56 through 60.

*f.* Prior to all tests of on-carriage fire control equipment it is essential that the trunnions be level.

Leveling the trunnions is most easily accomplished by raising or lowering one trail. The best check that the trunnions are level is accomplished by seeing that the axis of the bore tracks a plumb line as described in paragraph 55*d*. If a plumb line cannot be used, approximate leveling may be accomplished with the gunner's quadrant atop the leveling surface near the left trail hinge pin.

## **62. Test of Gunner's Quadrant**

*a. General.* The gunner's quadrant must be in proper adjustment before conducting tests and adjustments of other sighting and fire control equipment. Inspect the shoes of the gunner's quadrant for dirt, nicks, or burrs. Similarly, inspect the leveling plates on the upper surface of the breech ring and the gunner's quadrant seat of the telescope mount. Dirt, nicks, or burrs on these surfaces will cause the instrument to give inaccurate readings.

### *b. End-for-End Test.*

- (1) Set both the radial arm and micrometer scale of the gunner's quadrant at zero, making sure the auxiliary indexes match.
- (2) Place the quadrant on the gunner's quadrant seat of the telescope mount, the line-of-fire arrow pointing to the front, and center the quadrant bubble with the longitudinal leveling knob.
- (3) Reverse the position of the quadrant (turn it end-for-end). If the bubble recenters, the quadrant is in adjustment and the test is completed.

- (4) If the bubble does not recenter, try to center it by turning the micrometer knob of the gunner's quadrant.
- If bubble centers, read black figures and divide by two. This is the correction.
  - Place correction on micrometer and place it again on the quadrant seat. Relevel the bubble with the longitudinal leveling knob.
  - Check by again reversing the quadrant. Bubble should center.
- (5) If bubble does not center by turning the micrometer knob as in (4) (a) above, move the radial arm down one graduation (10 mils).
- Turn micrometer until bubble centers.
  - Take reading on micrometer add ten to it and divide sum by two.
  - Place this reading on micrometer leaving the arm at minus 10; level the bubble with the longitudinal leveling knob.
  - Check by reversing quadrant. Bubble should center.
  - Quadrant should be sent to an ordnance unit if correction of error amounts to more than plus or minus 0.4 mil.

c. *Micrometer Test.*

- Set the radial arm to read 10 mils on the elevation scale and set the micrometer scale at zero.
- Place the quadrant on the telescope mount quadrant seat, the line-of-fire arrow pointing to the front, and center the quadrant bubble with the longitudinal leveling knob.

- (3) Set the radial arm at zero on the elevation scale and turn the micrometer one revolution to read 10 mils.
- (4) Reseat the quadrant on the leveling surface. The bubble should center.

**Caution:** Do not turn the longitudinal leveling knob after step (3) above.

- (5) If the bubble does not center, the micrometer is in error and must be adjusted by ordnance personnel.

*d. Comparison Test.* Compare readings taken at low, medium, and high elevations with all of the gunner's quadrants of a battery on the quadrant seats of a *single* gun. The trunnions of this gun should be level. Any quadrant differing from the average by more than 0.4 mil at any elevation should be sent to an ordnance unit for adjustment.

*e. Correction.* When a gunner's quadrant requires a correction as determined by the end-for-end test, this correction is not carried during firing but is recorded and is applied only when making sight tests and adjustments.

### 63. Test of Elevation Quadrant

*a. Cross-Level Bubble Test.*

- (1) With the trunnions level, center the cross-level bubble.
- (2) Turn the elevation knob throughout its limits of motion.
- (3) The cross-level bubble should remain centered to within  $\frac{1}{2}$  vial graduation; if it does not, the cross level vial is incorrectly alined. The weapon should be sent to an ordnance unit for adjustment.

*b. Mount Alinement Test.*

- (1) Verify that the trunnions are still level.
- (2) Center the previously tested cross-level bubble.
- (3) Elevate and depress the tube, at the same time watch the cross-level bubble.
- (4) The bubble should remain centered to within  $\frac{1}{2}$  vial graduation.
- (5) If the bubble moves off center in excess of this amount, the elevation quadrant is not properly mounted. Send the weapon to an ordnance unit for adjustment.

*c. Pivot Vertical Alinement Test.*

- (1) Center the longitudinal-level bubble.
- (2) Operate the cross-leveling knob throughout the limits of motion; the longitudinal-level bubble should remain centered.
- (3) If the bubble moves off center in excess of  $\frac{1}{2}$  vial graduation, either the elevation quadrant is improperly mounted or the longitudinal level vial is not correctly alined. Send the weapons to an ordnance unit for adjustment.

*d. Comparison Test.*

- (1) Set low, medium, and high elevations on a gunner's quadrant that has been found to be in correct adjustment. For each elevation place the quadrant on the leveling plates on the breech and elevate the tube until the bubble is centered.
- (2) With the longitudinal-level knob center the longitudinal-level bubble for each elevation.
- (3) Compare the readings set on the gunner's quadrant with those on the elevation quad-



rant at the low, medium, and high elevations of the tube.

- (4) If the two instruments do not agree at all elevations, send the weapon to an ordnance unit for adjustment.

#### **64. Accuracy Tests for Telescope Mount M30**

*a. General.* The purpose of these tests is to determine whether the azimuth compensating mechanism of the telescope mount actually establishes the tube (regardless of cant) in the correct vertical plane at all elevations. It checks the adjustment and mounting of the telescope mount, the setting of the cross-level and longitudinal-level vials, and the alinement of the telescope socket. Test *b* (below) may be performed with the trunnions either level or canted. It reflects total errors of the entire mechanism. Because compensating errors of various parts of the mount may result in the weapon testing out properly with test *b*, the other tests specified in *c* through *e* must be performed regardless of the result of test *b*. Total errors found in test *b* may then be reduced to errors in specific components.

##### *b. Test of Telescope Mount.*

- (1) With the bore sights in place and tube at a low elevation, traverse so the line of sight through the tube is on the plumb line; level the telescope mount by centering both the cross-level and longitudinal-level bubbles.
- (2) Place the intersection of the cross hairs of the panoramic telescope reticle on any sharply defined aiming point and note the deflection set.

(3) Elevate the tube from minimum to maximum elevation (or limit of the plumb line) in 100-mil steps. At each step, traverse the weapon (if necessary) to bring the line of sight through the tube back on the plumb line. Relevel the telescope mount in both directions and check for deviation of the line of sight from the aiming point. If the vertical hair is off the aiming point, it is turned to the aiming point with the azimuth micrometer knob and the deviation is measured on the azimuth micrometer. If the horizontal hair is off it is brought to the aiming point with the leveling knobs and the bubble displacement is noted.

(4) If the vertical hair deviates from the aiming point by more than  $\frac{1}{2}$  mil from the original deflection at any elevation tested, or if the correction for the deviation of the horizontal hair causes either of the bubbles to travel in excess of  $\frac{1}{2}$ -vial graduation, the telescope mount is out of adjustment or improperly mounted. The weapon must be referred to authorized ordnance maintenance personnel for adjustment or correction.

*c. Basic Test for the Panoramic Telescope Mount and Panoramic Telescope.*

(1) *Cross-level test.*

(a) Center the cross-level bubble.

(b) Turn the elevation knob throughout its limits of motion.

(c) The cross-level bubble should remain centered within  $\frac{1}{2}$ -vial graduation.

(2) *Pivot alinement test.*

- (a) Center the cross-level bubble and place the line of sight of the panoramic telescope on a sharply defined aiming point. (Plumb line may be used.)
- (b) Elevate the tube to maximum elevation while keeping the telescope mount level longitudinally.

*Note.* Do not readjust the cross-level bubble after initial setting.

- (c) Check at low, medium, and high elevation of the tube. The line of sight of the panoramic telescope should not deviate more than 1 mil and the cross-level bubble should remain centered within  $\frac{1}{2}$ -vial graduation.
- (3) *Vertical alinement test of telescope mount.*
- (a) Relevel the tube using the gunner's quadrant.
  - (b) Center the longitudinal-level bubble.
  - (c) Operate the cross-leveling knob throughout its limits of motion. The longitudinal-level bubble should remain centered within  $\frac{1}{2}$ -vial graduation.
- (4) *Basic test for the panoramic telescope.*

- (a) Zero the scales on the panoramic telescope.
- (b) Traverse and elevate the tube as necessary to place the panoramic telescope reticle cross hairs on an aiming point.
- (c) Rotate the telescope head through a complete circle (6400 mils). The telescope cross hairs should return to the aiming point within 1 mil.

(d) Rotate the telescope head through a complete circle in the opposite direction. The telescope cross hairs should again return to the aiming point to within 1 mil.

(5) *Telescope mount socket alinement test.*

(a) Center the cross-level bubble.

(b) With the panoramic telescope scales set at zero, traverse the tube until the vertical hair of the telescope reticle is on the plumb line with both the cross-level and longitudinal-level bubbles centered.

(c) Sight through the telescope and rotate the elevation micrometer knob throughout its limits of motion. The vertical hair should remain on the plumb line within 1 mil.

(d) Set the panoramic telescope scales at 1600 mils, and shift the trails until the vertical hair is on the plumb line with both the cross-level and longitudinal-level bubbles centered.

(e) Rotate the telescope elevation micrometer knob throughout its limits of motion. The vertical hair should remain on the plumb line within 1 mil.

(6) *Allowable errors.* If the range quadrant, telescope mount, or panoramic telescope exceeds the tolerance authorized on any of the tests outlined, the howitzer and/or panoramic telescope should be sent to ordnance for adjustment.

## 65. Fuze Setters

*a. General.* Examine the stop which fits into the slot in the movable time ring and the adjusting pawl which engages the notch in the fixed fuze ring to see that their edges are not burred or bent. Depress the adjustable pawl against its spring to see that the movement of the pawl is free. In the following tests be sure to test the fuze setter with the fuze for which it is designed; the time scale on the fuze setter must have the same graduations as the time ring on the fuze.

*b. Time Scale Test.* Set the corrector, if applicable, to 30 and set any convenient time on the time scale. Test the time scale of the fuze setter by setting several fuzes.

**Caution:** Before setting a fuze, make sure that the "T" and "C" screws of the fuze setter are tight to prevent any slipping of the scale indexes when the handle of the fuze setter is rotated.

The time set on the fuze should agree with the time setting on the fuze setter within one-fourth of the smallest graduation on the fuze time ring. The tolerance amounts to 0.05 second for fuzes having 0.2 second graduations, and 0.125 second for fuzes having 0.5 second graduations. If the fuzes set do not agree with the time set on the fuze setter, repeat the test as a check with a different setting. If the fuzes set still do not agree with the fuze setter, refer the instrument to an ordnance unit for adjustment.

**Caution:** Do not set any one live fuze more than twice. The fuze from a dud must never be used. Reset all fuzes to SAFE and replace the safety wire or cotter pin.

## **66. Ordnance Check**

It is not contemplated that using units will have the necessary facilities, tools, or skilled personnel to perform the more precise tests and adjustments of sighting and fire control equipment. When deficiencies recur or when defects cannot be corrected in the field, ordnance checks should be scheduled.

## CHAPTER 8

### MAINTENANCE AND INSPECTIONS

---

#### 67. General

Maintenance and inspection is essential to insure that the section is prepared to carry out its mission immediately. Systematic maintenance and inspection drills provide the best insurance against unexpected breakdown at the critical moment when maximum performance is essential.

#### 68. Disassembly, Adjustment, and Assembly

Disassemblies and adjustments of the weapon authorized to be performed by battery personnel are prescribed in TM 9-341 and TM 9-336, supplemented by instructions contained in Department of the Army Supply Catalogs. No deviation from these procedures is permitted unless authorized by the responsible ordnance officer.

#### 69. Records

*a.* The principal records pertaining to the weapon are the Weapons Record Book (DA Forms 9-13 and 9-13-1), formerly Artillery Gun Book (OO Form 5825), a field report of accidents (SR 385-310-1), and the Unsatisfactory Equipment Report (DA Form 468) (SR 700-45-5). Information on

the purpose and use of these records may be found on the forms themselves.

*Note.* In accordance with SR 750-115-20, Weapons Record Book, DA Forms 9-13 and 9-13-1, will replace Artillery Gun Book, OO Form 5825. OO Form 5825 will continue to be used until supply is exhausted.

*b.* The chiefs of sections, battery executive, and battery commander also should keep semipermanent records on their weapons for information and guidance.

## **70. Maintenance**

For detailed instructions concerning maintenance of the 240-mm howitzer, see TM 9-341 and LO 9-336, and for the 8-inch gun, see TM 9-336 and LO 9-336. For detailed instructions concerning maintenance of the prime movers, see the technical manuals and lubrication orders pertaining to those vehicles.

## **71. Inspections**

Regular inspections are required to insure that materiel is maintained in serviceable condition.

*a.* The chief of section is responsible for the equipment within his section. He should inspect it thoroughly each day. If he sees the need for repair or adjustment, he notifies the battery executive immediately so that the necessary action may be taken.

*b.* The executive, accompanied by the artillery mechanic, should make a daily spot check inspection. Each day he inspects different parts of the weapons to insure complete coverage every few days. At least once a month, the executive makes a thorough mechanical inspection of weapons, auxiliary equipment, tools, and spare parts.



c. Battery, battalion, and higher commanders should make frequent command inspections to assure themselves that the equipment in their commands is being maintained at prescribed standards of condition, appearance, and completeness.

d. For details on inspecting the 240-mm howitzer and 8-inch gun, see TM 9-341 and 9-336 respectively. For details on inspecting the vehicles being used as prime movers, see the appropriate technical manual for that vehicle. Deficiencies found during inspections should be corrected promptly.

e. Duties of individuals in performing the necessary inspections and maintenance of the gun are outlined in paragraphs 72 through 77. Maintenance and inspection should be made routine, thorough, and rapid by following the drills outlined in these paragraphs. When the section is reduced in strength the chief of section must reassign duties to insure that all maintenance steps are completed.

## **72. Duties in Inspection Before Operation (March)**

a. *General.* The inspection performed before operation is a final check on materiel prior to leaving the motor park for training in the field, the bivouac area for combat, or before displacement. When time and facilities permit, bore sighting is accomplished at this inspection. After inspection, and when all deficiencies have been corrected, the section is ready for action.

b. *Individual Duties.* The chief of section commands **PERFORM INSPECTION**. At the command, section personnel perform duties as listed below.

(1) *Chief of section.*

(ALL EQUIPMENT)

- (a) Supervises inspections made by members of the section.
- (b) Inspects recoil system for signs of oil leakage.
- (c) Inspects ammunition for condition, lot number, and loading.
- (d) Verifies presence of weapons record or gun book, trip ticket, accident report, lubrication orders, technical manuals, and emergency supply of gasoline, oil, and rations.
- (e) Checks security of coupling.
- (f) Verifies security of camouflage net, poles, and all accessories.
- (g) Receives reports from the gunner, ammunition corporal, and crane operator 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.

(2) *Gunner.*

(CARRIAGE AND GUN LOADS)

- (a) Verifies security of all sighting and laying equipment.
- (b) Checks section chest for completeness of contents.
- (c) Receives reports from members of the gun squad. When all reports have been rendered to him he reports to the chief of section, "Gun squad ready."

(3) *No. 1.*

(GUN LOAD)

- (a) Notes whether oil index and replenisher piston of recoil system are in proper position (TM 9-336 and TM 9-341).

(CARRIAGE LOAD)

- (b) Checks equilibrators for leaks and verifies that shutoff valve is in open position.
- (c) Checks to see that drain valve of air reservoir is closed.
- (d) Reports, "No. 1 ready."
- (4) *No. 2.*

(CARRIAGE LOAD)

- (a) Checks carriage load service brake connections and jumper cable connections. Disconnects emergency brake connection on signal from No. 8.
- (b) Verifies security of trail locking key, trail float key, trail floats, and loading tray.
- (c) Reports, "No. 2 ready."
- (5) *No. 3.*

(CARRIAGE LOAD)

- (a) Verifies tightening of spade jack (on right side) and cross braces.
- (b) Checks position and locking of wagon lock lever.
- (c) Reports, "No. 3 ready."

(6) No. 4.

(CARRIAGE LOAD)

- (a) Checks air pressure in tires with gage.
- (b) Inspects wheels for loose or missing nuts or cap screws, valve caps, stones in treads.
- (c) Verifies tightening of spade jack on left side.

(CARRIAGE LOAD PRIME MOVER)

- (d) Assists driver of carriage load prime mover.
- (e) Examines vehicle for damage since last inspection.
- (f) Checks for presence and proper mounting of fire extinguishers. Makes sure the seal wires are not broken.
- (g) Checks engine oil in right engine; checks water in radiators. Replenishes if necessary.
- (h) Checks accessories and drives of right engine for security of mounting, good condition, and connections. Checks drive belts for condition and adjustment.
- (i) Checks fluid supply in torque converter. Replenishes if necessary.
- (j) Checks for all fluid leaks. Locates source and corrects or reports them.
- (k) Checks for presence, condition, and mounting of tools and equipment.
- (l) Checks for condition and attachment of load and tarpaulins.
- (m) Reports, "No. 4 ready."

(7) *No. 5.*

(CARRIAGE LOAD)

(a) Verifies security of spacer bar, wagon jack, loading ramp, wheel ramps, and over-all cover.

(b) Reports, "No. 5 ready."

(8) *No. 6.*

(CARRIAGE LOAD PRIME MOVER)

(a) Assists driver of carriage load prime mover.

(b) Examines vehicle for damage since last inspection.

(c) Checks all nuts and cap screws on drive sprockets, suspension wheels, idlers, and track support rollers for presence and security.

(d) Checks suspension wheel tires for cuts and embedded stones and trash. Checks for dead blocks, loose and bottomed wedges. Checks track tension.

(e) Inspects springs for breakage and permanent set. Cleans out debris in suspension system.

(f) Checks presence, condition, and operation of lights, reflectors, and switches. (Driver operates all switches except floodlight switch.)

(g) Checks mounting and locking devices of towing connections.

(h) Assists No. 4 in checking tools. Checks condition and mounting of winch.

(i) Checks side curtains and ammunition box.

(j) Reports, "No. 6 ready."

(9) *No. 7.*

(CARRIAGE LOAD)

(a) Verifies security of hold-down bolts, trail support, tire jack and jack base, and over-all cover.

(b) Reports, "No. 7 ready."

(10) *No. 8.*

(CARRIAGE LOAD)

(a) Checks hand brakes after coupling to see that they are released.

(b) Signals No. 2 to break emergency line and watches for push rod travel.

(c) Checks push rod travel when driver applies service brake.

(d) Verifies fastening of over-all cover.

(e) Reports, "No. 8 ready."

(11) *No. 9.*

(CARRIAGE LOAD)

(a) Verifies fastening of spades and over-all cover.

(b) Reports, "No. 9 ready."

(12) *No. 10.*

(GUN LOAD)

(a) Assists No. 11 in removing and replacing breech cover.

(b) Opens breechblock, checks to see that bore is clear. Inspects breechblock and bore for cleanliness. Closes breechblock.

(c) Reports, "No. 10 ready."

(13) *No. 11.*

(GUN LOAD)

- (a) Assists No. 10 in removing and replacing breech cover.
  - (b) Assists No. 10 in opening breech.
  - (c) Verifies security.
  - (d) Verifies fastening of cradle locking clamps on right side.
  - (e) Reports, "No. 11 ready."
- (14) *No. 12.*

(GUN LOAD)

- (a) Checks service brake connections. Disconnects emergency brake connections on signal from No. 17. Reconnects.
  - (b) Inspects connections of jumper cable.
  - (c) Verifies fastening of cradle locking clamp on left side.
  - (d) Reports, "No. 12 ready."
- (15) *No. 13.*

(GUN LOAD)

- (a) Uses gage to measure pressure in tires.
- (b) Inspects wheels for loose or missing nuts or cap screws, valve caps, stones in treads.

(GUN LOAD PRIME MOVER)

- (c) Assists driver of gun load prime mover by performing operations on gun load prime mover similar to those performed by No. 4 on the carriage load prime mover.
- (d) Reports, "No. 13 ready."

(16) *No. 14.*

(GUN LOAD)

- (a) Verifies security of screw jacks, tube lifting saddle, and cover.
  - (b) Checks attaching link of tube support for fastening.
  - (c) Reports, "No. 14 ready."
- (17) *No. 15.*

(GUN LOAD PRIME MOVER)

- (a) Assists driver of gun load prime mover by performing operations on gun load prime mover similar to those performed by No. 6 for carriage load prime mover.
  - (b) Reports, "No. 15 ready."
- (18) *No. 16.*

(GUN LOAD)

- (a) Assists No. 17 in removing and replacing muzzle cover so No. 10 can inspect bore.
  - (b) Checks to see that drain valve of air reservoir is closed.
  - (c) Verifies fastening of rammer staff and aiming posts.
  - (d) Reports, "No. 16 ready."
- (19) *No. 17.*

(GUN LOAD)

- (a) Assists No. 16 in removing and replacing muzzle cover.
- (b) After coupling, inspects to see that hand brakes are released.



- (c) Signals No. 12 to break emergency line and watches for push rod travel.
  - (d) Watches for push rod travel when driver applies service brake.
  - (e) Reports, "No. 17 ready."
- (20) *No. 18.*
- (a) Assists ammunition corporal.
  - (b) When duties prescribed by ammunition corporal are completed, reports, "No. 18 ready."
- (21) *Ammunition corporal.*
- (a) 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.
  - (b) Receives reports from ammunition squad. When all reports have been rendered to him he reports to the chief of section, "Ammunition squad ready."
- (22) *Driver(s)*

### (PRIME MOVERS)

- (a) Examines vehicle for damage since last inspection.
- (b) Checks fuel, transmission oil. Checks left engine oil. Replenishes if necessary.
- (c) Checks accessories and drives of left engine for security of mounting, good condition, and connections. Checks drive belts for condition and adjustment.
- (d) Checks air brake tanks and lines for security and condition. Closes the tank drain valve.

- (e) Checks for all fluid leaks. Locates source, corrects or reports them.
  - (f) Observes starting action and idling speed. Checks for abnormal operational noises.
  - (g) Checks operation while starting. Resets choke as required during the warm up.
  - (h) Checks instruments for correct operation and reading.
  - (i) Checks operation, mounting, and condition of siren, windshield wipers, glass, and mirror.
  - (j) Operates switches for No. 6 (No. 15) to check lights. Checks reflectors.
  - (k) Checks operation of steering linkage. Levers should pull back evenly. Lever locks should operate correctly. Checks free lever travel.
  - (l) Checks engine during operation for sound and general condition.
  - (m) Verifies possession of driver's permit. Checks vehicle for technical manuals, lubrication order, Standard Form 91, and identification card.
  - (n) Reports, "Driver ready."
- (23) *Crane operator.*

### (CRANE MECHANISM)

- (a) Supervises detailed inspection of truck-mounted crane.
- (b) Examines crane for damage since last inspection.
- (c) Checks fuel tank, engine crankcase, and radiator of crane mechanism for fuel, oil, and water. Replenish if necessary.

- (d) Checks for condition, security of mounting, and connections of accessories. Checks drive belts for condition and tension.
  - (e) Checks for all fluid leaks. Locates source. Corrects or reports.
  - (f) Observes starting action and idling speed. Checks for abnormal operational noise.
  - (g) Checks operation of choke while starting.
  - (h) Checks engine oil pressure gage, ammeter.
  - (i) Checks carrier and trailer lights, assisted by driver.
  - (j) Checks for adjustment of clutches.
  - (k) Inspects for fastening and condition of cables.
  - (l) Checks for security of outriggers and floats.
  - (m) Checks coupling of clam shell trailer. Checks security of clam shell and mats. Checks tires with pressure gage. Checks brakes, assisted by driver.
  - (n) Reports to chief of section, "Crane ready."
- (24) *Driver.*

### (TRUCK-MOUNTED CRANE)

- (a) Examines vehicle for damage since last inspection.
- (b) Check fuel tank, engine crankcase, and radiator. Replenishes fuel, oil, and water if necessary.

- (c) Checks for condition, security of mounting, and connections of accessories. Checks drive belts for condition and tension.
- (d) Checks for all fluid leaks. Locates source. Corrects or reports.
- (e) Observes starting action and idling speed. Checks for abnormal operational noise.
- (f) Checks operation of choke while starting. Resets as required during warm up.
- (g) Checks fuel gage, engine oil pressure gage, coolant temperature gage, ammeter, the tachometer, the air gage, and the low pressure buzzer for correct reading.
- (h) Checks operation, condition, and mounting of horn and windshield wipers.
- (i) Cleans and inspects glass and rearview mirrors.
- (j) Operates switches for crane operator to check lights.
- (k) Checks all parts of steering linkage for condition and security.
- (l) Checks engine during operation for sound and general condition.
- (m) Checks for presence, condition, and security of tools and equipment.
- (n) Verifies possession of driver's permit. Checks vehicle for manual, lubrication order, Standard Form 91, and identification card.
- (o) Checks presence, content, and proper mounting of fire extinguisher.

- (p) Checks air brake tanks and lines for security and condition. Closes tank drain valves.
- (q) Checks presence and tightness of wheel and flange nuts.
- (r) Checks general condition of tires and pressure.
- (s) Checks condition and attachment of springs and suspensions, fenders and bumpers, and towing connections.
- (t) Reports to crane operator, "Driver ready."

### 73. Duties in Inspection During Operation (March)

*a. General.* The inspections performed during operation are constant checks on the functioning of the vehicles, weapon components, and the security of all stowed equipment. The supervision of march discipline is the responsibility of the chief of section.

*b. Individual Duties.* Although no command is given to initiate the during operation inspection, personnel perform duties as listed below while the section is in motion.

- (1) *Chief of section.*

#### (CARRIAGE LOAD)

- (a) Assigns duties to Nos. 1 to 9 inclusive, as antitank and antiaircraft sentries.
- (b) Checks prime mover instruments and controls for proper functioning.
- (c) Listens for unusual noises.

(2) *Ammunition corporal.*

(GUN LOAD)

- (a) Assigns duties to Nos. 10 to 18 inclusive, to observe carriage towed load in preceding wagon in column.
  - (b) Assigns duties to Nos. 10 to 18 inclusive, as antitank and antiaircraft sentries.
  - (c) Checks prime mover instruments and controls for proper functioning.
  - (d) Listens for abnormal operational noises.
- (3) *Driver.*

(PRIME MOVERS)

- (a) Checks steering brake action. Checks lever free travel.
- (b) Checks for effective operation of foot and hand brakes.
- (c) Checks clutch operation. Clutch should operate quietly and smoothly.
- (d) Checks for proper operation of transmission.
- (e) Checks operation of controls. Checks noises and "feel" for general engine condition.
- (f) Checks reading and action of all instruments and gages.
- (g) Listens for abnormal operational noises.
- (h) Checks for listing of tractor and side pull of trailer.

(4) *Driver.*

(TRUCK-MOUNTED CRANE)

- (a) Checks for effective operation of steering gear. Checks for pull, wander, and shimmy.
- (b) Checks for effective operation of foot and hand brakes.
- (c) Checks for free travel and smooth operation of clutch.
- (d) Checks for proper operation of transmission.
- (e) Checks for proper operation of transfer.
- (f) Checks operation of controls. Checks noises and "feel" for general engine trouble.
- (g) Checks reading and action of all instruments and gages.
- (h) Listens for abnormal operational noises.

**74. Duties in Inspection During Halt**

*a. General.* The inspection at the halt is made to insure that the vehicles and towed loads are in satisfactory operational condition. The halt provides the section an opportunity to inspect for malfunctions that could not be detected during operation. The inspection is performed under the supervision of the chief of section.

*b. Individual Duties.* The chief of section commands **PERFORM HALT INSPECTION**. At the command, personnel perform duties as prescribed below.

(1) *Chief of section.*

(ALL EQUIPMENT)

- (a) Sees that personnel remain inside left wheel line, except for inspection of left wheels and track. Supervises inspection and maintenance.
- (b) Receives reports from the gunner, ammunition corporal, and crane operator 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.

(2) *Gunner.*

(CARRIAGE AND GUN LOADS)

- (a) Verifies presence and security of sighting equipment.

(PRIME MOVER)

- (b) Verifies presence and security of section chest.
  - (c) Receives reports from members of the gun squad. When all reports have been rendered to him, he reports to the chief of section, "Gun squad ready."
- (3) *No. 1.*

(CARRIAGE AND GUN LOADS)

- (a) Inspects for leaks in recoil or equilibrators systems.
- (b) Reports, "No. 1 ready."



(4) *No. 2.*

(CARRIAGE LOAD)

- (a) Checks connections of brakes and stop light.
  - (b) Inspects for security of trail locking key, trail float key, trail floats, and loading tray.
  - (c) Reports, "No. 2 ready."
- (5) *No. 3.*

(CARRIAGE LOAD)

- (a) Verifies fastening of spade jacks on right side.
  - (b) Inspects cross braces for tightness.
  - (c) Inspects wagon lock lever for position. Verifies locking.
  - (d) Reports, "No. 3 ready."
- (6) *No. 4.*

(CARRIAGE LOAD)

- (a) 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.
  - (b) Verifies fastening of spade jacks on left side.
  - (c) Reports, "No. 4 ready."
- (7) *No. 5.*

(CARRIAGE LOAD)

- (a) Verifies position and fastening of spacer bar, wagon jack, loading ramp, wheel ramps, over-all cover.
- (b) Reports, "No. 5 ready."

(8) *No. 6.*

**(CARRIAGE LOAD PRIME MOVER)**

- (a) Assists driver of carriage load prime mover.
  - (b) Checks wheels for loose nuts and cap screws in the drive sprockets and track suspension system.
  - (c) Checks for loose and broken parts of springs and suspensions. Removes trash.
  - (d) Checks tires and tracks for loose or cut tires, dead track blocks, loose wedges, and track tension.
  - (e) Reports, "No. 6 ready."
- (9) *No. 7.*

**(CARRIAGE LOAD)**

- (a) Verifies position and fastening of hold-down bolts, trail support, tire jack and jack base, and over-all cover.
  - (b) Reports, "No. 7 ready."
- (10) *No. 8.*

**(CARRIAGE LOAD)**

- (a) Checks to see that hand brakes are released.
  - (b) Verifies fastening of over-all cover.
  - (c) Reports, "No. 8 ready."
- (11) *No. 9.*

**(CARRIAGE LOAD)**

- (a) Checks for fastening of spades and over-all cover.
- (b) Reports, "No. 9 ready."

(12) *No. 10.*

**(CARRIAGE LOAD PRIME MOVER)**

- (a) Assists driver of carriage load prime mover.
  - (b) Checks mountings, adjustment, and operation of accessories, and belts of right engine.
  - (c) Checks both water radiators and engine oil. Replenishes supply.
  - (d) Checks security of load, condition of tarpaulin, side curtains, and body.
  - (e) Reports, "No. 10 ready."
- (13) *No. 11.*

**(GUN LOAD)**

- (a) Verifies security of hand maneuvering bar.
  - (b) Verifies fastening of cradle locking clamp on right side.
  - (c) Reports, "No. 11 ready."
- (14) *No. 12.*

**(GUN LOAD)**

- (a) Checks connections of brakes and stop lights.
  - (b) Verifies fastening of cradle locking clamp on left side.
  - (c) Reports, "No. 12 ready."
- (15) *No. 13.*

**(GUN LOAD)**

- (a) 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.

(b) Assists driver of gun load prime mover by performing operations on gun load prime mover similar to those performed by No. 4 on the carriage load prime mover.

(c) Reports, "No. 13 ready."

(16) *No. 14.*

#### (GUN LOAD)

(a) Verifies security of screw jacks, saddle, and cover.

(b) Reports, "No. 14 ready."

(17) *No. 15.*

#### (GUN LOAD PRIME MOVER)

(a) Assists driver of gun load prime mover by performing operations on gun load prime mover similar to those performed by No. 6 on the carriage load prime mover.

(b) Reports, "No. 15 ready."

(18) *No. 16.*

#### (GUN LOAD)

(a) Verifies fastening of hold-down strap, tube support, rammer staff, and aiming posts.

(b) Reports, "No. 16 ready."

(19) *No. 17.*

#### (GUN LOAD)

(a) Checks to see that hand brakes are released.

(b) Reports, "No. 17 ready."

(20) *No. 18.*

(CARRIAGE LOAD PRIME MOVER)

- (a) Checks mounting and condition of pintle and locking device. Checks air and electric connections.
  - (b) Cleans and inspects lights, reflectors, windshield, and rearview mirror.
  - (c) Checks for leaks, locates source, corrects or reports them.
  - (d) Feels suspension wheel and idler hubs and drive sprocket shaft for excessive heating. Checks final drives.
  - (e) Reports, "No. 18 ready."
- (21) *Ammunition corporal.*

(PRIME MOVER)

- (a) Checks ammunition for condition, covering, and security.
  - (b) Receives reports from ammunition squad. When all reports have been rendered to him, he reports to the chief of section "Ammunition squad ready."
- (22) *Driver.*

(PRIME MOVER)

- (a) Checks for loose or damaged parts in steering linkage.
- (b) Checks mounting, adjustment, and operation of units on left engine.
- (c) Checks for fluid leaks. Locates source and corrects or reports them.
- (d) Reports, "Driver ready."

(23) *Crane operator.*

(CRANE MECHANISM)

- (a) Supervises inspection and maintenance at the halt. Receives report from driver on condition of crane truck.
  - (b) Checks brake drums, wheel hubs, transfer, transmission, and differentials for overheating. Checks transfer, transmission, and differentials for oil leaks.
  - (c) Checks condition of axle and transfer vents.
  - (d) Checks for all fluid leaks. Locates source, corrects or reports.
  - (e) Checks condition and lubrication of propeller shafts. Removes any foreign material.
  - (f) Checks presence and tightness of wheel and flange nuts.
  - (g) Checks condition of tires. Removes foreign objects.
  - (h) Reports to chief of section, "Crane ready."
- (24) *Driver.*

(TRUCK-MOUNTED CRANE)

- (a) Checks and replenishes supply of fuel, oil, and water.
- (b) Checks for secure mounting of air cleaners.
- (c) Checks mounting, adjustment, and operation of accessories and belts.

- (d) Checks for loose or damaged parts of steering linkage, springs and suspensions, fenders and bumpers.
- (e) Checks pintle mounting and locking device.
- (f) Cleans and inspects lights, reflectors, windshields, and rearview mirrors.
- (g) Reports, "Driver ready."

### 75. Duties in Inspection Prior to and During Firing

*a. General.* Members of the section perform general duties as prescribed in chapter 5. In addition all members of the section are constantly alert to recognize any evidence of malfunctioning of the weapon. Malfunctions noted are promptly reported to the chief of section.

*b. Specific Duties of Certain Personnel.* In addition to the general duties (*a* above) for all section personnel, the personnel listed below, without command, perform duties as prescribed.

- (1) *Chief of section.* Supervises the work of the section and verifies sight test and adjustment.
- (2) *Gunner.* Performs sight test and adjustment.
- (3) *Drivers.* Inspect all items as listed in paragraph 74. Also assist the motor sergeant and motor mechanics in the performance of all maintenance services (TM 9-788 and TM 9-2810).
- (4) *Crane operator.* Performs duties on crane mechanism as outlined in TM 9-771.

## 76. Duties in Inspection and Maintenance After Operation

*a. General.* After operation the vehicles, weapon components, and items of section equipment are given whatever servicing and maintenance is needed to prepare them in every way for further sustained action or to determine the need for maintenance by higher echelons. Bore sighting is accomplished if time permits. These operations may be performed in the motor park, bivouac area, or combat position. The inspection is under the supervision of the chief of section.

*b. Individual Duties.* The chief of section commands **INSPECT EQUIPMENT**. At the command, section personnel perform duties as prescribed below.

### (1) *Chief of section.*

#### (ALL EQUIPMENT)

- (a) Inspects for signs of oil leakage in recoil system and supervises establishing of correct oil reserve.
- (b) Inspects all ammunition.
- (c) Verifies presence of and current entries in gun book and trip ticket.
- (d) Verifies resupply of emergency rations, gasoline, oil, and water.
- (e) Supervises all cannoneers in the cleaning and lubricating of the bore.
- (f) Receives reports from the gunner, ammunition corporal, and crane operator 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.

(2) *Gunner.*

(a) Cleans panoramic telescope and panoramic telescope mount.

(b) Receives reports from members of the gun squad. When all reports have been rendered to him, he reports to the chief of section, "Gun squad ready."

(3) *No. 1.*

(a) Establishes correct oil reserve in recoil and recuperator system, assisted by additional cannoneers as required.

(b) Inspects and cleans elevation quadrant.

(c) Reports, "No. 1 ready."

(4) *Nos. 2 and 3.*

(GUN)

(a) Clean and lubricate elevating and traversing mechanism.

(b) Verify condition and presence of accessories as in paragraph 72.

(c) Reports, "No. 2 (3) ready."

(5) *No. 4.*

(CARRIAGE LOAD PRIME MOVER)

(a) Assists driver of carriage load prime mover.

(b) Checks radiators and right engine oil. Refills if necessary.

(c) Checks for condition and mounting of accessories, and condition and adjustment of bolts of right engine.

- (d) Checks and cleans, if necessary, the air cleaner and breather caps.
  - (e) Checks all accessible wiring for condition and connections.
  - (f) Checks for leaks. Locates source and corrects or reports them.
  - (g) Checks for presence, condition, and seal of fire extinguishers.
  - (h) Checks mountings, condition, cleanliness, and electrolyte level of batteries. Cleans if necessary.
  - (i) Checks fluid level in torque converters. Refills if necessary. Checks oil level in pump housing.
  - (j) Checks mounting bolts of propeller shafts and for lubricant leaks.
  - (k) Checks mountings of turret and gun, and operation of mount.
  - (l) If winch has been used during the day, assists the driver and Nos. 6 and 8 to clean the cable.
  - (m) Tightens all nuts and cap screws found loose.
  - (n) Assists driver and Nos. 6 and 8 in cleaning tractor.
  - (o) Reports, "No. 4 ready."
- (6) *Nos. 5, 7, 9, 10, and 11.*

### (GUN AND CARRIAGE)

- (a) Clean and lubricate the breechblock, breech recess, powder chamber, and firing lock.
- (b) Verify condition and presence of accessories as in paragraph 76.

(c) Upon completion of assigned duties, report "Ready."

(7) *No. 6.*

### (CARRIAGE LOAD PRIME MOVER)

- (a) Assists driver of carriage load prime mover.
- (b) Checks for leaks, locates source and corrects or reports them.
- (c) Checks for leaks in fuel filters.
- (d) With assistance of No. 8, checks for cut suspension wheel tires and separation of the rubber from the wheels. Checks for loose, bent, or worn connectors. Checks for loose wedges. Checks track tension.
- (e) With assistance of No. 8, checks all nuts or cap screws on drive sprockets, suspension wheels, trailing idler wheels, and track support rollers for presence and security.
- (f) Assisted by No. 8, checks for bent, broken, or loose parts. Removes all stones and trash.
- (g) Checks oil level in final drive housings.
- (h) Checks tow hooks and pintles for good condition and secure mounting. Checks locking devices.
- (i) Tightens all loose nuts and cap screws found. Checks removable hull plates for loose bolts.
- (j) 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.

(k) Assists driver, Nos. 4 and 8, in cleaning tractor.

(l) Reports, "No. 6 ready."

(8) No. 8.

### (CARRIAGE LOAD PRIME MOVER)

(a) Assists driver of carriage load prime mover.

(b) Checks for leaks. Locates source and reports or corrects them.

(c) Checks spare cans of fuel, oil, and water and refills if necessary.

(d) Checks presence, condition, and operation of lights, reflectors, and switches. (Driver operates all switches except flood-light switch.)

(e) Assists No. 6 in checks on all nuts and cap screws on drive sprockets, suspension wheels, idlers, and track support rollers for presence and security.

(f) Assists No. 6 in checking for cut suspension wheel tires, separation of the rubber from the wheel, loose, bent, or worn connectors, and loose wedges. Checks track tension.

(g) Assists No. 6 in checking for bent, broken, or loose parts of springs and suspensions. Removes all stones and trash.

(h) 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.
- (i) Checks for condition and security of the load, covers, and body.
  - (j) Tightens all loose nuts or cap screws found.
  - (k) Assists driver and Nos. 4 and 6 in cleaning vehicle.
  - (l) Reports, "No. 8 ready."
- (9) *Nos. 12, 14, 16, and 18.*

### (CARRIERS AND PITS)

- (a) Assist ammunition corporal in inspecting ammunition, and ammunition handling tools and equipment.
  - (b) Clean ammunition and auxiliary equipment.
  - (c) Report to ammunition corporal on completion of assigned duties.
- (10) *Nos. 13, 15, and 17.*

### (GUN LOAD PRIME MOVER)

- (a) Assist driver of gun load prime mover by performing duties similar to those performed by Nos. 4, 6, and 8 respectively, on the carriage load prime mover.
  - (b) Report to ammunition corporal on completion of assigned duties.
- (11) *Ammunition corporal.*
- (a) Inspects and checks all ammunition, fuzes, and primers.
  - (b) Supervises loading and storage of ammunition.

- (c) Receives reports from ammunition squad. When all reports have been rendered to him, he reports to the chief of section, "Ammunition squad ready."
- (12) *Driver(s)*.

### (PRIME MOVERS)

- (a) Checks engine operation at idle and during acceleration and deceleration.
- (b) With engine running, checks operation, condition, and mounting of all instruments.
- (c) Inspects for broken, loose, or bent parts in steering linkage. Checks free travel of levers.
- (d) Checks fuel in tank. Refills if necessary.
- (e) Checks transmission oil level. Replenishes if necessary.
- (f) Checks mounting, operation, and condition of siren and windshield wipers.
- (g) Checks and cleans glass and mirrors. Adjusts mirror.
- (h) Operates switches for No. 8 (No. 17) to check lights. Checks reflectors.
- (i) Checks accessible wiring for condition and connections.
- (j) Checks for condition and mounting of accessories, condition and adjustment of belts, on left engine.
- (k) Checks and cleans, if necessary, air cleaners and breather caps.
- (l) Drains air brake tanks. Checks for leaks.
- (m) Checks operation and condition of engine controls.

- (n) Checks for leaks, locates source, and corrects or reports them.
  - (o) If winch has been used during the day, cleans winch cable, assisted by Nos. 4, 6, and 8 (Nos. 13, 15, and 17).
  - (p) Tightens all nuts and cap screws found loose.
  - (q) Cleans dirt and trash from vehicle, assisted by Nos. 4, 6, and 8 (Nos. 13, 15, and 17).
  - (r) Lubricates as needed and as directed by the vehicle lubrication order.
  - (s) Reports, "Driver ready."
- (13) *Crane operator.*

### (CRANE MECHANISM)

- (a) Supervises detailed inspection of crane.
- (b) Checks for all fluid leaks. Locates source, corrects or reports.
- (c) Checks all gear cases for lube level. Reports if low.
- (d) Checks condition and attachment of springs, suspension, fenders, and bumpers.
- (e) Checks all parts of steering linkage for condition and security.
- (f) Checks pintle mounting and locking device.
- (g) Cleans thoroughly.
- (h) Checks condition and air pressure of tires. Removes any foreign objects.
- (i) Checks presence, condition, and operation of lights, reflectors, and switches. (Driver will operate switches.)

- (j) Checks contents, cleanliness, and mounting of fire extinguishers.
  - (k) Checks for loose or missing parts of wheels, rims, axle drive flange, and spring U bolt nuts. Tightens as needed.
  - (l) Checks condition and security of propeller shafts, center bearings, and vents. Removes any foreign material.
  - (m) Checks condition and cleanliness of axle and transfer vents.
  - (n) Checks presence, condition, and mounting of tools and equipment.
  - (o) Checks and replenishes supply of fuel, oil, and water.
  - (p) Checks all cables for proper fastening, and looks for excessive cable wear.
  - (q) Reports to chief of section, "Crane in order."
- (14) *Driver.*

#### (TRUCK-MOUNTED CRANE)

- (a) Checks and replenishes supply of fuel, oil, and water.
- (b) Checks operation of engine at idle and during acceleration and deceleration.
- (c) With engine running, checks operation, condition, and mounting of instruments.
- (d) Checks operation, connections, and mounting of horn and windshield wipers.
- (e) Cleans and inspects glass and rearview mirrors. Adjusts mirrors.
- (f) Operates switches for crane operator to check lights.



- (g) Opens pet cocks to drain water in air brake tanks. Checks all connections.
- (h) Checks all accessories for mounting and condition. Checks all belts for condition and adjustment.
- (i) Checks mounting, condition, cleanliness, and electrolyte level of battery. Cleans if necessary.
- (j) Checks accessible wiring for connections and condition.
- (k) Checks air cleaners and breather caps and cleans if necessary.
- (l) Drains accumulated water and dirt in fuel filters.
- (m) Checks condition and operation of engine controls.
- (n) Cleans engine thoroughly. Tightens loose nuts and cap screws. Lubricates as needed and as directed by vehicle lubrication order.
- (o) Reports to crane operator, "Driver ready."

## 77. Duties in Weekly Inspection and Maintenance

*a. General.* In garrison these services are performed weekly. On maneuvers or in combat they are performed after each field operation or as directed. For the vehicles, the back of the drivers' trip ticket (DD Form 110) will be used for the weekly maintenance service. Coordination and supervision of the personnels in the inspection is the responsibility of the chief of section.

*b. Individual Duties.* The chief of section commands **PERFORM WEEKLY INSPECTION.**

At the command section personnel perform duties as prescribed below.

(1) *Chief of section.*

(ALL EQUIPMENT)

- (a) Commands PERFORM WEEKLY INSPECTION.
  - (b) Supervises section in weekly inspection and maintenance of gun, tools, equipment, and accessories. For details, see TM 9-341, TM 9-336, and appropriate Department of the Army Lubrication Orders.
  - (c) Receives reports from the gunner, ammunition corporal, and crane operator 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.
- (2) *Gunner, Nos. 1, 2, 3, 5, 7, and 9.*

(GUN)

- (a) Under direction of gunner, clean gun thoroughly.
- (b) Check gun for loose, damaged, or missing parts.
- (c) Tighten loose fittings as needed.
- (d) Gunner reports damage discovered and missing parts to artillery mechanic.
- (e) On completion of cleaning and inspection, gunner reports to chief of section, "Gun in order."

(3) *Driver(s)*.

(PRIME MOVERS)

- (a) Checks engine operation at idle and during acceleration and deceleration.
- (b) With engine running, checks operation, condition, and mounting of instruments.
- (c) Inspects steering linkage for broken, loose, or bent parts. Checks lever free travel.
- (d) Checks fuel tank. Refills if necessary.
- (e) Checks transmission oil level. Refills if necessary.
- (f) Checks mounting, operation, and condition of siren and windshield wipers.
- (g) Checks and cleans glass and rearview mirrors. Adjusts mirrors.
- (h) Operates switches for No. 8 (No. 17) to check the lights.
- (i) Checks ignition wiring. Checks all accessible conduits, looms, junction boxes, junction plugs, and connections for chafing or breakage.
- (j) Checks and tightens all mountings, checks and adjusts all bolts on the left engine.
- (k) Checks and cleans the left engine air cleaners and breather caps.
- (l) Drains air tank. Checks operation of valves. Checks system for leaks. Checks mountings. Cleans air cleaner.
- (m) Checks operation and condition of engine controls.
- (n) Checks for leaks. Locates source and corrects or reports them.

- (o) Assists No. 6 (No. 15) 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 (Nos. 13, 15, and 17).
  - (p) Tightens all nuts and cap screws found loose.
  - (q) Cleans dirt and trash from inside and outside of tractor (washes if possible), assisted by Nos. 4, 6, and 8 (Nos. 13, 15, and 17).
  - (r) Lubricates as needed and as directed by the vehicle lubrication order.
  - (s) Reports, "Driver ready."
- (4) No. 4.

#### (CARRIAGE LOAD PRIME MOVER)

- (a) Checks radiators and right engine oil. Refills if necessary. Checks antifreeze with a hydrometer.
- (b) Checks and tightens all mountings. Checks and adjusts all belts on right engine.
- (c) Checks and cleans the right engine air cleaners and breather caps.
- (d) Checks ignition wiring. Checks all accessible conduits, looms, junction boxes, plugs, and connections for chafing or breakage.
- (e) Checks for leaks. Locates source and corrects or reports them.
- (f) Checks for presence, condition, and seal of fire extinguishers.

- (g) Cleans batteries, including terminal connections or posts if corroded. Checks electrolyte level and specific gravity. Checks battery mountings. Tightens terminal bolts if loose.
  - (h) Checks fluid level of torque converter. Refills if necessary. Drains sediment from reservoir. Checks oil level in pump housing.
  - (i) Checks mounting bolts and lubricant leaks of propeller shafts.
  - (j) Checks mountings of turret and gun and operation of mount.
  - (k) Assists driver and Nos. 6 and 8 in cleaning and rewinding winch cable.
  - (l) Tightens all nuts and cap screws found loose.
  - (m) Assists the driver and Nos. 6 and 8 in cleaning the tractor.
  - (n) Reports, "No. 4 ready."
- (5) *No. 6.*

### (CARRIAGE LOAD PRIME MOVER)

- (a) Checks for leaks, locates source, and corrects or reports them.
- (b) Checks for leaks in fuel filters. Drains the sediment from filter bowls and fuel tank sump.
- (c) With assistance of No. 8, examines suspension wheel 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.

- (d) Checks and tightens all nuts or cap screws on drive sprockets, suspension wheels, and idlers, assisted by No. 8. Checks condition and security of track support rollers.
- (e) Assisted by No. 8, checks for bent, broken, or loose parts of springs and suspensions. Removes all stones and trash.
- (f) Checks oil level in final drive housing.
- (g) Inspects tow hooks and pintle for good condition and secure mounting. Checks air and electrical connections.
- (h) Tightens all loose nuts and cap screws found. Checks removable hull plates for loose bolts.
- (i) 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.
- (j) Assists driver and Nos. 4 and 8 in cleaning the tractor.
- (k) Reports, "No. 6 ready."

(6) *No. 8.*

### (CARRIAGE LOAD PRIME MOVER)

- (a) Checks for leaks. Locates source and corrects or reports them.
- (b) Checks spare cans of fuel, oil, and water and refills if necessary.
- (c) Checks presence, condition, and operation of lights, reflectors, and switches. (Driver operates all switches except floodlight switch.)

- (d) Checks mounting and condition of fenders and bumpers.
- (e) Assists No. 6 in checking all nuts and cap screws on drive sprockets, suspension wheels, idlers, and track support rollers for presence and security.
- (f) 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.
- (g) Assists No. 6 in checking for bent, broken, or loose parts of springs and suspensions. Removes all stones and trash.
- (h) Checks mounting and security of winch. Checks for leaks. Assists driver, No. 4, and No. 6 in cleaning and rewinding cable.
- (i) Checks condition and security of load, tarpaulins, and body.
- (j) Tightens all loose nuts or cap screws found.
- (k) Assists driver, No. 4, and No. 6 in cleaning the vehicle.
- (l) Reports, "No. 8 ready."
- (7) *Ammunition corporal, Nos. 10, 11, 12, 14, 16, and 18.*
  - (a) Under direction of ammunition corporal, clean and inspect ammunition components and ammunition handling equipment.
  - (b) On completion of inspection, ammunition corporal reports to chief of section, "Ammunition in order."

(8) *Nos. 13, 15, and 17.*

**(GUN LOAD PRIME MOVER)**

(a) Assist driver of gun load prime mover by performing duties similar to those performed by Nos. 4, 6, and 8 respectively on the carriage load prime mover.

(b) Report to gun load driver on completion of assigned duties.

(9) *Crane operator.*

**(CRANE MECHANISM)**

(a) Supervises detailed inspection of crane.

(b) 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.

(c) Checks pintle mounting and locking device. Cleans and lubricates contacting surfaces of the fifth wheel. Tightens all mounting bolts.

(d) Checks contents, cleanliness, and mounting of fire extinguishers.

(e) Checks for loose or missing parts in wheels, rims, axle drive flanges, and spring U bolts. Tightens as needed.

(f) Checks condition and security of propeller shafts. Removes any foreign material.

(g) Checks condition and cleanliness of axle and transfer vents. Cleans all vents thoroughly.



- (h) Checks and tightens all nuts and bolts.
  - (i) Cleans vehicle thoroughly.
  - (j) Checks presence and condition of tools and equipment. Reports missing or damaged tools.
  - (k) Checks for all fluid leaks. Locates source, corrects or reports them.
  - (l) Checks condition of body.
  - (m) Checks condition and attachment of springs, suspensions, fenders, and bumpers. Corrects or reports any abnormal conditions.
  - (n) Checks all parts of steering linkage for security, condition, and adjustment.
  - (o) Checks all lights, light switches, and reflectors for condition and operation. (Driver will operate switches.)
  - (p) Checks and tightens all nuts and bolts.
  - (q) Performs weekly maintenance operations on crane as outlined in TM 9-771.
  - (r) Reports to chief of section "Crane in order," after receiving report of driver of truck-mounted crane.
- (10) *Driver.*

### (TRUCK-MOUNTED CRANE)

- (a) Checks and replenishes supply of fuel, oil, and water. Checks the antifreeze with a hydrometer.
- (b) Checks air brakes for leaks. Drains air tank. Checks connections and mountings. Cleans lines.
- (c) Checks operation of engine at idle and during acceleration and deceleration.

- (d) With engine running, checks operation, condition, and mounting of instruments.
- (e) Checks operation, connections, and mounting of horn and windshield wipers.
- (f) Cleans and inspects glass and rearview mirrors. Adjusts mirrors.
- (g) Operates switches for crane operator to check lights.
- (h) Checks and tightens all mountings. Checks all belts for condition and adjustment.
- (i) Checks all wiring to see that it is securely connected, clean, and not damaged.
- (j) Removes and cleans all air cleaners and breather caps.
- (k) Drains accumulated water and dirt in fuel filters.
- (l) Checks condition and operation of engine controls.
- (m) 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.
- (n) Checks differentials, final drives, transmission, and transfer units for lube level and leaks. Reports if low.
- (o) Cleans engine thoroughly.
- (p) Lubricates as directed by vehicle lubrication order.
- (q) Reports to crane operator, "Driver ready."

c. *Cleaning.* Dirt and grit accumulated in traveling, or from the blast of the gun 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 gun 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. Lubrication.* Lubrication instructions for the weapon and section vehicles are contained in the lubrication orders that pertain to the major items with which the section is equipped.

## CHAPTER 9

# DECONTAMINATION OF EQUIPMENT

---

### 78. General

Equipment which has been contaminated by chemical, biological, or radiological agents constitutes a danger to personnel. *Contamination* means the spreading of an injurious agent in any form and by any means. Persons, objects, or terrain may be contaminated. *Decontamination* is the process of making any contaminated place or object safe for unprotected personnel. This can be done by covering, removing, destroying, or changing into harmless substances the contaminating agent or agents. Generally, only equipment contaminated by persistent agents need be decontaminated.

### 79. Decontamination for Chemical Agents

- a. Ammunition.* With rags, wipe off visible contamination from projectiles. Apply DANC (decontamination agent, noncorrosive, M4), wipe with gasoline-soaked rag, then dry. If DANC is not available, scrub with soap and cool water. Slurry (equal weights of water and chloride of lime) can be used on contaminated ammunition containers, but it must not be allowed to penetrate to the ammunition itself.
- b. Instruments.* If exposed to corrosive gases, clean instruments as soon as possible with alcohol

(or gasoline, if no alcohol is available), and apply a thin coat of light machine oil. A rag dampened with DANC may be used, followed by drying with a clean rag and then applying a coat of machine oil. DANC injures plastic or hard rubber surfaces.

*c. Weapons.* Remove dirt, dust, grease, and oil. Do not apply wet mix but allow surfaces to air after soil and dirt have been removed. DANC can be used on all metal surfaces except the bore. Also effective on metal are hot water, cleaning solvent, or repeated applications of gasoline on swabs. If the emergency use of gasoline-soaked swabs is made (FM 21-40), extreme care must be taken to insure that the gasoline does not spread the contamination and that no gasoline in liquid or vapor form remains. This excess would be ignited when the gun is fired. After decontamination, weapons are dried and oiled.

*d. Automotive Equipment.* Light contamination from spray can be neutralized by exposure to air. For heavier contamination use DANC on interior or exterior surfaces that personnel are likely to touch. For larger area decontamination, wash vehicle with water and scrub painted surfaces with soap and water.

## **80. Decontamination for Biological and Radiological Agents**

*a. General.* After a contaminating attack, recovery of equipment may be achieved either by waiting, to permit the decay of contamination, or by active decontamination, to reduce danger to a level where it is no longer a significant hazard to operating personnel. Decontamination may be either rough or detailed, depending on the urgency of the military

situation. The procedure adopted will be a command decision.

*b. Rough Decontamination.* Rough decontamination is performed when urgency is the main factor. Its purpose is to reduce contamination sufficiently to permit personnel to work with, or close to, equipment for limited periods. Rough decontamination may be achieved by means of water or steam if available. Soap or other detergent used in conjunction with water or steam aids in decontamination.

*c. Detailed Decontamination.* Detailed decontamination, in which the emphasis is on thoroughness, will be carried out in rear areas and repair bases and includes procedures of surface decontamination, aging and sealing, and disposal.

## **81. References**

For further information on decontamination, see FM 21-40, TM 3-220, and TF 3-1407.

## CHAPTER 10

### DESTRUCTION OF EQUIPMENT

---

#### 82. General

a. Tactical situations may arise in which it becomes necessary to abandon equipment in the combat zone. In such a situation all abandoned equipment must be destroyed to prevent its use by the enemy.

b. *The destruction of equipment subject to capture or abandonment in the combat zone will be undertaken only upon authority delegated by a division or higher commander.*

c. All batteries will prepare plans for destroying their equipment in order to reduce the time required should destruction become necessary. The principles to be followed are—

- (1) Plans for destruction of equipment must be adequate, uniform, and easily carried out in the field.
- (2) Destruction must be as complete as the available time, equipment, and personnel will permit. Since complete destruction requires considerable time, *priorities* must be established so that the more essential parts are destroyed first.
- (3) The same essential parts must be destroyed on all like units to prevent the enemy from

constructing a complete unit from damaged ones.

- (4) Spare parts and accessories must be given the same priorities as the parts installed on the equipment.

### **83. Methods**

To destroy equipment adequately and uniformly, all personnel of the unit must know the plan and priority of destruction and be trained in the methods of destruction.

### **84. References**

For detailed information on destruction of barrel assembly and recoil mechanism, carriage or mount, tires, and fire control equipment, see TM's 9-341 and 9-336; for destruction of ammunition, see TM 9-1901. For destruction of vehicle, see the TM appropriate to the vehicle being used as prime mover.



## CHAPTER 11

### SAFETY PRECAUTIONS

---

#### 85. General

Safety precautions to be observed in training are prescribed in SR 385-310-1. Additional information is found in FM 6-140, TM 9-341, TM 9-336, and TM 9-1900. The more important safety precautions are summarized in the following paragraphs.

#### 86. Ammunition

*a.* All ammunition at the firing position must be so placed that it is protected against explosion in case of accident at the gun position. Flames and explosive materials such as gasoline must be kept away from ammunition. Ammunition should be protected from direct rays of the sun by use of a tarpaulin or other suitable covering.

*b.* Battery personnel must not attempt to disassemble fuzes.

*c.* If for any reason a round is not fired after the time fuze has been set, the fuze must be reset to SAFE before it is restowed.

*d.* All rounds not fired which have been prepared for firing must be checked by the chief of section, to insure that all powder increments are present in proper order and condition, and that they are of the proper lot number. He also verifies that the lot

number on the ammunition corresponds to the lot number on the container. For ammunition that is to be returned to ordnance a battery officer must certify that it has been properly reassembled. (For further details, see FM 6-140.)

### 87. Misfires

a. In the event of a misfire, two more attempts are made to fire the gun.

**Caution.** The gun should remain as laid and all personnel must stay clear of the muzzle and path of recoil.

b. If the primer is heard to fire, a minimum of 10 minutes will be allowed before the breech is opened and the faulty charge removed. All personnel not required for the operation should be cleared from the vicinity. The faulty charge must be stored separately from other charges and disposed of as are unused increments and igniter pads (see TM 9-1900 for further details).

c. If primer is not heard to fire, two more attempts to fire will be made. Then proceed as follows:

(1) *If primer can be removed by No. 4, standing clear of the path of recoil.* The primer may be removed and a new one inserted 2 minutes after the second attempt to fire.

(2) *If the primer cannot be removed safely as described above,* no attempt will be made to open the breech or replace the primer for 10 minutes after the second attempt to fire has been made.

d. Misfire primers should be handled carefully and disposed of quickly as there is a possibility of primer hangfire.

## **88. Drill and Firing**

*a.* The gun is kept unloaded except when firing is imminent.

*b.* Members of the gun section pass in rear of the gun when going from one side to another.

*c.* Personnel must stay a safe distance from the breech to prevent injury when the gun recoils.

*d.* During firing, personnel should use waste in their ears to protect eardrums against injury.

*e.* In training there must be a safety officer for each artillery unit firing. For duties of the safety officer, see FM 6-40.

## CHAPTER 12

### TRAINING

---

#### Section I. GENERAL

#### 89. Purpose and Scope

The purpose of this chapter is to present the absolute minimum requirements for training the personnel of a gun section in the performance of their duties in service of the gun. It includes general information on the conduct of training, a minimum training schedule, and tests to be given for the qualification of gunners.

#### 90. Objectives

The objectives are speed in training cannoneers in their individual duties; and, through drill, to weld them into an effective, coordinated team able to function efficiently in combat. During training, supervisors may well keep in mind the proficiency sought by Army Training Tests (ATT) 6-1, 6-2, and 6-5. Maximum efficiency is attained through continuous drills.

#### 91. Conduct of Training

*a.* Training will be conducted in accordance with the principles laid down in FM 21-5. Its goal should be the standards set forth in FM 6-125, TM 6-605, SR 615-25-15, and SR 615-25-20.

b. In general, individual training is conducted by noncommissioned officers as far as practicable. Officers are responsible for training plans, for conducting unit training, and for supervising and testing individual training.

c. Throughout training, the application of prior instruction to current training must be emphasized.

d. A record of the training received by each individual should be kept. This may be done by each chief of section keeping a progress card for each man in his section. This card should show each period of instruction attended, tests taken, and remarks pertaining to progress. Progress cards should be inspected frequently by the battery executive to make sure that they are being kept properly and to determine the state of training. *Requiring the chief of section to keep these records emphasizes his responsibility toward his section.*

e. The necessity for developing leadership and initiative in noncommissioned officers must be emphasized constantly throughout training.

## **92. Standards To Be Attained**

A satisfactory trained gun section must be capable of performing the following functions in the times indicated (TM 6-605) :

a. Firing 10 rounds (drill ammunition) at different deflections, elevations, and time fuze settings, using the same charge, in 15 minutes by day and 20 minutes by night for the 8-inch gun section and in 20 minutes by day and 30 minutes by night for the 240-mm howitzer section. Changes in data should be typical for an area time mission; data is announced from prepared cards.

b. Performing after-firing care and maintenance of gun and carriage. The gun prepared for action in the gun park, clean and lubricate, disassemble and assemble the breech and firing mechanism, and inspect the weapon, in 60 minutes by day and 75 minutes by night. All materials and tools required should be available at the position.

c. Performing 6-months inspection and maintenance of the gun and carriage. The gun prepared for action in the gun park, clean and lubricate, as authorized, all parts and assemblies, and prepare for ordnance inspection in 8 hours. All materials and tools required should be available in the gun park.

d. Each member of the gun section should know the duties of all other members of the section and be able to perform efficiently in all positions. See paragraphs 96 through 107 for tests to be given for the qualification of gunners.

## Section II. MINIMUM TRAINING SCHEDULE

### 93. General

The training schedule outlined in paragraph 95 is a guide to meet the minimum training requirements for personnel of a gun section in subjects covered in this manual.

### 94. Individual Periods

a. Individual periods of training in service of the gun should be arranged, along with other battery training, into a balanced training program, taking into consideration the basic principles of training.

b. In general, except for service practice, periods on any subject should not be longer than 1 hour.

Gun drill periods should be for  $\frac{1}{2}$  hour only and should be conducted in a vigorous manner.

*c.* Periods of gun drill should be preceded and followed by periods on subjects that will be logically related to the drill. For example, precede a period of gun drill with a period of testing and adjustment of sighting and fire control equipment, and follow it with a period on inspection and maintenance drills. A period on aiming post displacement correction may come between two periods of gun drill.

*d.* TM's 9-341 and 9-336 provide information on which to base periods of instruction on description, characteristics, and functioning of the gun; familiarization with the gun, including breech and firing mechanism, tube assembly and top carriage, recoil mechanism, equilibrator, elevating mechanism, sighting and fire control equipment; and field assembly and malfunction. These should be included in the battery training schedule, closely allied with the training in service of the gun outlined in paragraph 95. Approximately 8 hours should be devoted to this instruction.

*e.* Additional service of the gun training may be performed during battery training exercises.

## 95. Schedule

C—conference; D—demonstration; PW—practical work.

Total Hours 110

Method	Hours	Subject	Text references	Training aids and equipment
C, D, PW	1	Organization and composition of gun section; general duties of individuals; formation of gun section.	Pars. 4-8, incl.	Weapon and section vehicles.
C, D, PW	1	Posts and posting of cannon-eers; changing posts; mounting and dismounting.	Pars. 9-13, incl.	Do.
C, D, PW	48 (4 hour periods)	Coupling and uncoupling; prepare for action, and march order.	Pars. 14-25, incl.	T/O & E equipment.
C, D, PW	24 (½ hour periods)	Gun drill, duties in firing.	Pars. 26-43, incl; 45-47, incl; 49-50, incl.	Do.



Total Hours 110

Methods	Hours	Subject	Text references	Training aids and equipment
C, D, PW	6 (1 hour and $\frac{1}{2}$ hour periods)	Testing and adjustment of sighting and fire control equipment.	Pars. 48; 54-66, incl.	T/O & E equipment.
C, D, PW	1 ( $\frac{1}{2}$ hour periods)	Aiming post displacement cor- rection.	Par. 46.	T/O & E equipment, blackboard and chalk.
C, D, PW	4 (1 hour periods)	Inspections and maintenance drills.	Pars. 67-77, incl.	T/O & E equipment.
C, D, PW	1	Decontamination of materiel.	Pars. 78-81, incl.	Decontamination equipment; T/O & E equipment.
C, D, PW	1	Destruction of materiel to prevent use by the enemy.	Pars. 82-84, incl.	Demolition and T/O & E equipment.

C, D	1	Safety precautions.	Pars. 85-88, incl.	T/O & E equipment.
PW	16 (4 hour periods)	Service practice.	Pars. 26-43, incl; 45-47, incl; 49-50, incl.	Do.
C, PW	6 (1 hour periods)	Review and tests of subjects previously covered.	All previous references.	Do.

### Section III. TESTS FOR QUALIFICATION OF GUNNERS

#### 96. Purpose and Scope

This section prescribes the tests to be given in the qualification of gunners. The purposes of the tests are twofold.

a. To provide a means of determining the relative proficiency of the individual artillery soldier in the performance of the duties of the gunner, 240-mm howitzer M1, and 8-inch gun M1. *The tests will not be a basis for determining the relative proficiency of batteries or higher units.*

b. To serve as an adjunct to training.

#### 97. General Instructions

a. *Standards of Precision.* The candidate will be required to perform the tests in accordance with the standards listed below:

- (1) Scale settings must be exact and matching indexes must be brought into coincidence.
- (2) Level bubbles must be exactly centered.
- (3) The vertical hair in the reticle of the panoramic telescope must be alined on the left edge of the aiming post or on exactly the same part of the aiming point or target each time the gun is laid.
- (4) Final motions of azimuth and elevation setting knobs, as well as traversing and elevating handwheels, must be made in the appropriate direction. Final motion for setting scales is from the lower to the higher numbers. For elevating, the final motion of the handwheel should be in the direction of the more difficult movement. Final mo-

tion for traversing is from left to right. Final movement of the vertical hair of the telescope is from left to right.

*b. Assistance.* The candidate will receive no unauthorized assistance. Each candidate may select authorized assistants as indicated in the tests. In the event a candidate fails any test because of the fault of the examiner or any assistant, the test will be disregarded, and the candidate will be given another test of the same nature.

*c. Time.* The time for any test will be the time from the last word of the command to the last word of the candidate's report. The candidate may begin any test after the first word of the first command and should not be charged for any time used by examiner.

*d. Scoring.* Scoring will be conducted in accordance with the two subparagraphs *Penalties* and *Credit* under each subject. If a test is performed correctly, credit will be given in accordance with the subparagraph *Credit* under each subject. No credit will be allowed if conditions exist as specified in the subparagraphs headed *Penalties*. No penalty will be assessed in excess of the maximum credit for each test.

*e. Preparation for Tests.* The gun will be prepared for action and the candidate posted at the proper position corresponding to the test being conducted or as indicated in the subparagraph entitled *Special Instructions*. The examiner will insure that the candidate understands the requirements of each test and will require the candidate to report "I am ready," before each test.

*f. Qualification Scores.* Minimum scores required for qualification in the courses are as follows:

<i>Individual Classification</i>	<i>Points</i>
Expert gunner.....	90
First-class gunner.....	80
Second-class gunner.....	70

### 98. Outline of Tests

Para- graph No.	Subject	Num- ber of tests	Points each	Maxi- mum credit
99	Indirect laying, deflection only.	18	2	36
100	Laying for elevation, gunner's quadrant.	4	2	8
101	Laying for elevation, elevation scale.	3	2	6
102	Displacement correction.....	2	-----	6
	Part I.....	(1)	5	(5)
	Part II.....	(1)	1	(1)
103	Measuring site to the mask....	1	5	5
104	Measuring elevation, gunner's quadrant.	1	4	4
105	Referring the gun.....	1	5	5
106	Tests and adjustments of sighting and fire control equipment.	6	-----	10
	Tests 1 and 2.....	(1)	(2)	(4)
	Tests 3 and 4.....	(1)	(3)	(6)
107	Materiel.....	3	-----	20
	Tests 1 and 2.....	(2)	(6)	(12)
	Test 3.....	(1)	(8)	(8)
Total credit.....				100

## 99. Indirect Laying

*a. Scope of Tests.* Eighteen tests (two groups of nine tests each) will be conducted in which the candidate will be required to execute commands similar to those given below. Tests 1 through 9 (and tests 10 through 18) will be executed as one series of commands.

### *b. Special Instructions.*

- (1) Deflection commands will not be in excess of the on-carriage traverse.
- (2) The examiner will select a suitable aiming point and identify it to the candidate.
- (3) Commands for special corrections will be given *only* in the tests indicated in the examples below.
- (4) The command for new deflections for each test will be within the following prescribed limits:

Test number	Maximum change (mils)	Minimum change (mils)
2 and 11	180	140
3 and 12	90	70
4 and 13	40	20
7 and 16	100	60
8 and 17	50	30
9 and 18	20	10

- (5) The gun will be laid with correct settings at the conclusion of each test before proceeding with the next test.

- (6) Aiming posts will be set out at prescribed deflections and distances for these tests.
- (7) The examiner will designate the section number of the gun to be used. The examiner will announce special corrections in deflection to be applied by the candidate.

*c. Outline of Tests.*

Test No.	Examiner commands (for example)	Action of candidate
1 and 10.	<b>SPECIAL CORRECTIONS, DEFLECTION 2290, NO. 1 LEFT 7.</b>	<p>Sets deflection and applies special correction.</p> <p>Centers cross-level and longitudinal-level bubbles.</p> <p>Traverses gun until vertical hair is on left edge of aiming posts.</p> <p>Checks centering of bubbles.</p> <p>Re-lays if necessary.</p> <p>Calls "Ready" and steps clear.</p>
2 and 11.	<b>DEFLECTION 2110.</b>	<p>Sets deflection.</p> <p>Leaves correction on gunner's aid.</p> <p>Lays on aiming post.</p> <p>Checks centering of bubbles.</p> <p>Re-lays if necessary.</p> <p>Calls "Ready" and steps clear.</p>
3 and 12.	<b>DEFLECTION 2180.</b>	<p>Same as test 2 above.</p>

Test No.	Examiner commands (for example)	Action of candidate
4 and 13.	<b>DEFLECTION 2155, NO. 1 RIGHT 3.</b>	Same as test 2 above, but changes gunner's aid to right 3 and resets deflection 2155 opposite index. Gunner moves gunner's aid to zero.
5 and 14.	<b>AIMING POINT, CHURCH STEEPLE, REFER.</b>	Refers telescope to church steeple. Reads deflection and calls "No. 1, deflection (so much)." Slips the slipping azimuth micrometer scale to zero. Slips the slipping azimuth scale to 2200. Verifies that vertical hair of the reticle is on church steeple. Calls "No. 1, deflection 2200" and steps clear. Same as test 1 above.
6 and 15.	<b>DEFLECTION 2200, REFER.</b>	Same as test 1 above.
7 and 16.	<b>SPECIAL CORRECTIONS, DEFLECTION 2280, NO. 1 LEFT 7.</b>	Same as test 2 above.
8 and 17.	<b>DEFLECTION 2330.</b>	Same as test 4 above.
9 and 18.	<b>DEFLECTION 2350, No. 1 LEFT 4.</b>	



*d. Penalties.*

(1) No credit will be allowed if, after each test—

- (a) The deflection is set incorrectly.
- (b) The cross-level or longitudinal-level bubble is not centered.
- (c) The vertical hair of the telescope is not on the aiming point or left edge of aiming posts, as the case may be.

(2) No credit will be allowed if the last motion of traverse was not made to the right.

*e. Credit.*

Time in seconds, exactly or less than—

Tests 1, 10, 6, and 15 each.....	16	17½	18
Other tests, each.....	13	14	15
Credit.....	2.0	1.5	1.0

**100. Laying for Elevation, Gunner's Quadrant**

*a. Scope of Tests.* Four tests will be conducted in which the candidate will be required to execute commands similar to those given below.

*b. Special Instructions.*

- (1) Each test will require a change of settings and the accompanying laying of the tube in elevation within the limits of 40 to 100 mils.
- (2) In tests 1 and 2 the candidate will be posted on the left rear platform facing the breech.
- (3) The candidate will seat the gunner's quadrant on the gunner's quadrant seat of the panoramic telescope mount.
- (4) Three assistants, selected by candidate, will be posted as Nos. 1, 2, and 3.

*c. Outline of Tests.*

Test No.	Examiner commands (for example)	Action of candidate
1	QUADRANT 280..	Sets quadrant on gunner's quadrant. Seats gunner's quadrant on the gunner's quadrant seat. Has Nos. 1, 2, and 3, elevate or depress the gun until the gunner's quadrant bubble is centered. Calls "Ready" and waits for examiner to verify laying.
2	QUADRANT 326..	Same as test 1 above.
3	QUADRANT 272..	Same as test 1 above.
4	QUADRANT 314..	Same as test 1 above.

*d. Penalties.* No credit will be allowed if, after each test—

(1) The quadrant is set incorrectly.

(2) The quadrant bubble is not properly centered.

(3) The quadrant is not properly seated.

*e. Credit.*

Time in seconds, exactly or less than--	15	16	17
Credit-----	2.0	1.5	1.0

### 101. Laying for Elevation, Elevation Quadrant

*a. Scope of Tests.* Three tests will be conducted in which the candidate will be required to execute commands similar to those given below.

*b. Special Instructions.*

(1) Each test will require a change of settings and the accompanying laying of the tube in elevation within the limits of 40 to 100 mils.

- (2) Commands for quadrant elevation for tests 2 and 3 will not be made in multiples of 5 mils.
- (3) Two assistants, selected by candidate, will be posted as Nos. 2 and 3. The candidate will take the post of No. 1.

*c. Outline of Tests.*

Test No.	Examiner commands (for example)	Action of candidate
1	Q U A D R A N T E L E V A T I O N 280.	Centers cross-level bubble. Sets off announced quadrant elevation on the elevation scale and micrometer. Operates elevation brake lever. Directs Nos. 2 and 3 in elevating or depressing the tube until the longitudinal-level bubble is centered. Verifies the centering of the cross-level bubble. Has the longitudinal-level bubble recentered if necessary. Releases elevation brake lever. Calls "Ready" and steps clear.
2	Q U A D R A N T E L E V A T I O N 326.	Same as test 1 above.
3	Q U A D R A N T E L E V A T I O N 272.	Same as test 1 above.

*d. Penalties.*

- (1) No credit will be allowed if, after each test—

- (a) The longitudinal-level or cross-level bubble is not centered.
- (b) The incorrect quadrant elevation is set on the elevation scale and micrometer.
- (2) No credit will be allowed if the last movement of the tube was not in the direction in which it is most difficult to turn the elevating handwheel.

*e. Credit.*

Time in seconds, exactly or less than--	14	15	16
Credit-----	2.0	1.5	1.0

## 102. Displacement Correction

*a. Scope of Tests.* One test, consisting of two parts, will be conducted in which the candidate will be required to execute the commands given below.

*b. Special Instructions.*

- (1) Aiming posts will be set out at the prescribed distances.
- (2) An assistant, selected by the candidate, will be stationed close to the far aiming post.
- (3) The examiner will require the candidate to lay the gun on the announced deflection, and report "I am ready."
- (4) The far post then will be moved so that a displacement of 5 to 10 mils occurs.
- (5) The laying of the gun at termination of part I will not be disturbed for part II.

*c. Outline of Tests.*

- (1) *Part I.*

Examiner commands	Action of candidate
CORRECT FOR DIS- PLACEMENT.	Lays the gun so that the far post appears midway between the near post and the vertical cross hair of the telescope as prescribed in paragraph 46d of this manual. Verifies centering of bubbles. Re-lays if necessary. Calls "Ready" and steps clear.

(2) *Part II.*

Examiner commands	Action of candidate
A LINE AIMING POSTS.	Directs assistant in alining aiming posts. Calls "Ready" and steps clear.

*d. Penalties.* No credit will be allowed if—

(1) *Part I.*

- (a) The far aiming post does not appear midway between the near post and the vertical cross hair of the telescope.
- (b) The cross-level or longitudinal-level bubble is not centered.
- (c) The last motion of traverse was not made from left to right.

(2) *Part II.*

- (a) The deflection is other than the announced deflection.
- (b) The aiming posts are not properly alined.

(c) The vertical hair of the telescope is not on the aiming posts.

e. *Credit.*

Part I, time in seconds, exactly or less than.....	9	10	11	12
Credit.....	5.0	4.0	3.0	2.5
Part II, no time limit.				
Credit.....	1.0	----	----	----

### 103. Measuring Site to the Mask

a. *Scope of Test.* One test will be conducted in which the candidate will be required to execute the command given in c below.

b. *Special Instructions.*

- (1) The gun, prepared for action, will be placed 200 to 400 yards from a mask of reasonable height.
- (2) The tube will be elevated so that it is 100 to 150 mils above the crest and 100 to 150 mils right or left of the highest point of the crest.
- (3) The candidate will take post to the rear of the breech.
- (4) Four assistants, selected by the candidate, will be stationed at the posts of the gunner, No. 1, No. 2, and No. 3 to operate the elevating and traversing mechanisms.

*c. Outline of Test.*

Examiner commands	Action of candidate
<b>MEASURE SITE TO THE MASK.</b>	<p>Sights along lowest element of bore and has Nos. 1, 2, and 3 operate elevating mechanism and the gunner operate the traversing mechanism until the line of sight just clears crest.</p> <p>With the elevation knob, No. 1 levels the longitudinal-level bubble and with the cross-level knob levels the cross-level bubble.</p> <p>The candidate goes to post of No. 1, verifies the leveling of the bubbles and reads the elevation at which the gun is laid.</p> <p>Reports "No. (so-and-so), site to the mask (so much)," and steps clear.</p>

*d. Penalties.* No credit will be allowed if—

- (1) The line of sighting along the lowest element of the bore does not just clear crest.
- (2) The cross-level or longitudinal-level bubble of the elevation quadrant is not properly centered.
- (3) The site is announced incorrectly.

*e. Credit.*

Time in seconds, exactly or less than.....	16	17	18	19
Credit.....	5.0	4.0	3.0	2.5

**104. Measuring Elevation, Gunner's Quadrant**

*a. Scope of Test.* One test will be conducted in which the candidate will be required to measure the elevation by means of the gunner's quadrant.

*b. Special Instructions.* Prior to the test the examiner will lay the tube at a selected elevation, measure the elevation, and then set the gunner's quadrant at zero.

*c. Outline of Test.*

Examiner commands	Action of candidate
MEASURE THE QUADRANT.	Places gunner's quadrant on gunner's quadrant seat of telescope mount. Levels bubble by raising or lowering the index arm and turning the micrometer knob. Announces "Quadrant No. (so-and-so), (so much)," and hands gunner's quadrant to examiner.

*d. Penalties.* No credit will be allowed if—

- (1) The quadrant bubble is not properly centered when the gunner's quadrant is seated properly.
- (2) The quadrant is announced incorrectly.

*e. Credit.*

Time in seconds, exactly or less than--	10	12 $\frac{3}{4}$	13 $\frac{3}{4}$
Credit.....	4.0	3.0	2.5

## 105. Referring the Gun

*a. Scope of Test.* One test will be conducted in which the candidate will be required to measure and report a deflection in accordance with the command given below.

*b. Special Instructions.*

- (1) The gun will be laid with aiming posts to the left front.
- (2) An aiming point within 200 mils to the left or right of the aiming posts will be design-



nated by the examiner and identified by the candidate.

*c. Outline of Test.*

Examiner commands	Action of candidate
NUMBER (SO-AND-SO), AIMING POINT, THAT (SO-AND-SO), REFER.	Centers cross-level and longitudinal-level bubbles. Refers to aiming point. Checks centering of bubbles and re-aligns sight if necessary. Reads deflection and reports "No. (so-and-so), deflection (so much)," and steps clear.

*d. Penalties.* No credit will be allowed if—

- (1) The cross-level or longitudinal-level bubble is not centered properly.
- (2) The vertical hair of the telescope reticle is not on the aiming point.
- (3) The deflection is announced incorrectly.
- (4) The traversing handwheel is turned.

*e. Credit.*

Time in seconds, exactly or less than	5	5%	6	6%
Credit.....	5.0	4.0	3.0	2.5

**106. Test and Adjustment of Sighting and Fire Control Equipment**

*a. Scope of Tests.* Four tests will be conducted in which the candidate will be required to demonstrate the methods employed in making the prescribed tests and authorized adjustments, or describe the action taken (i. e., send to the ordnance maintenance company) if adjustment is not authorized to be made by using personnel.

*b. Special Instructions.*

- (1) The gun will be prepared for the tests by having the trunnions leveled and the tube in center of traverse. Cross hairs will be installed on the muzzle and either the breech bore sight inserted or the firing mechanism removed.
- (2) The following equipment will be required: cross hairs for the muzzle (breech bore sight optional), gunner's quadrant, and suitable screwdrivers and wrenches.
- (3) The candidate will select an assistant, or assistants, who will operate the elevating handwheel at his direction.
- (4) The tests will be conducted in the chronological sequence indicated in *c* below. After the completion of test 2, the gunner's quadrant used in tests 1 and 2 will be used for test 3, with the proper correction as determined in test 1, carried on the quadrant, provided the correction does not exceed 0.4 mil.
- (5) Adjustments which the candidate may be required to accomplish will fall within the following limits:
  - (a) Rotating head coarse elevation index, no adjustment permitted.
  - (b) Rotating head fine elevation index, not to exceed one-fourth turn.
  - (c) Panoramic telescope slipping azimuth scale and elevation quadrant scale, not to exceed one 100-mil graduation.
  - (d) Panoramic telescope slipping azimuth micrometer scale and elevation quadrant

micrometer scale, not to exceed ten 1-mil graduations.

*c. Outline of Tests.*

Test No.	Examiner commands	Action of candidate
1	PERFORM END-FOR-END TEST ON GUNNER'S QUADRANT.	<p>Performs test as prescribed in paragraph 62b of this manual.</p> <p>Calls "Correction (so many mils), quadrant serviceable (unserviceable)" and hands quadrant to examiner for verification.</p> <p><i>Note:</i> Prior to test 2 the tube will be placed at approximately 300 mils elevation.</p>
2	PERFORM MICROMETER TEST ON GUNNER'S QUADRANT.	<p>Performs test as prescribed in paragraph 62c of this manual.</p> <p>Calls "Quadrant micrometer is (is not) in error," and states any further action which should be taken.</p>
3	TEST ELEVATION QUADRANT.	<p>Performs tests as prescribed in paragraph 63 of this manual.</p> <p>Announces after each test whether the results are satisfactory.</p>
4	TEST TELESCOPE MOUNT.	<p>Performs tests as prescribed in paragraph 64 of this manual.</p> <p>Announces after each test whether the results are satisfactory.</p>

*d. Penalties.*

(1) *General.* The tests are not essentially speed tests. The purpose of the prescribed time limits is to insure that the candidate can perform the operation without wasted effort.

(2) *Test 1.* No credit will be allowed if—

(a) The bubble of the gunner's quadrant does not center when verified by the examiner.

(b) The correction (one-half of the amount of the angle that was indicated when the quadrant was first reversed and the bubble centered by moving the radial arm and micrometer) is announced incorrectly by the candidate.

(c) The candidate fails to declare the quadrant unserviceable if the error (necessary correction) exceeds 0.4 mil, or fails to declare the quadrant serviceable if the error (necessary correction) is 0.4 mil or less.

(d) The time to complete the test exceeds 2 minutes.

(3) *Test 2.* No credit will be allowed if—

(a) The procedure is not followed correctly.

(b) The time to complete the test exceeds 1 minute.

(4) *Test 3.* No credit will be allowed if—

(a) The bubble of the gunner's quadrant is not centered in either direction.

(b) The cross-level scribed lines are not matched.

(c) The candidate does not announce correctly in regard to the status of either the

cross-level or the longitudinal-level bubble.

(d) The time to complete the test exceeds 8 minutes.

(5) *Test 4.* No credit will be allowed if—

(a) The procedure is not followed correctly.

(b) The candidate does not announce correctly whether each test is satisfactory.

(c) The time to complete the test and adjustment exceeds 10 minutes.

e. *Credit.*

(1) The candidate will be scored on the general merit of his work in addition to the specific requirements above.

(2) If the tests and adjustments are performed correctly within the prescribed time limit, maximum credit will be given as follows:

Test 1	-----	2
Test 2	-----	2
Test 3	-----	3
Test 4	-----	3
Total	-----	10

## 107. Materiel

a. *Scope of Tests.* The candidate will be required to perform three tests as outlined below.

b. *Special Instructions.*

(1) *Tests 1 and 2.* For tests 1 and 2 a paulin will be placed on the ground convenient for the use of the candidate in laying out the disassembled parts. The candidate will be allowed to select the tools and accessories necessary for the performance of the tests prior to the start of the tests. The candi-

date may select assistants to aid him in lowering and lifting the breechblock.

(2) *Test 3.*

(a) A complete set of lubrication equipment authorized for use by battery personnel will be made conveniently available on a paulin adjacent to the gun.

(b) Every type of lubricant used on the gun will be placed conveniently available in plainly labeled containers.

*c. Outline of Tests.*

Test No.	Examiner commands	Action of candidate
1	DISASSEMBLE BREECH MECHANISM AND FIRING MECHANISM.	Performs the operation as described in TM 9-341 or TM 9-336, laying the parts on the paulin. After disassembly, identifies all parts to examiner.
2	ASSEMBLE FIRING MECHANISM AND BREECH MECHANISM.	Performs the operation as described in TM 9-341 or TM 9-336.
3	PERFORM DAILY, WEEKLY, AND MONTHLY LUBRICATION TEST.	Selects proper lubricating equipment and lubricant and tells <i>how, when,</i> and with <i>which lubricant</i> each lubrication point is serviced. (Actual lubrication is not performed.)

*d. Penalties.*

(1) The tests are not essentially speed tests. The purpose of the maximum time limits

allowed is to insure that the candidate can perform the operations without wasted effort.

- (2) No credit will be given if the following time limits are exceeded:

Test 1.....	15 minutes
Test 2.....	20 minutes
Test 3.....	12 minutes

- (3) A penalty of one-half point will be assessed for each component part not correctly identified or omitted in test 1. There is no time limit imposed on the identification of component parts. However, the examiner may reduce the grade if it becomes obvious that the candidate is not familiar with the nomenclature.

- (4) A penalty of one-half point will be assessed for each lubrication point missed and for each time the proper lubricating device or proper lubricant is not selected.

*e. Credit.*

- (1) The candidate will be scored on the general merit of his work in addition to the specific requirements above.
- (2) If each test is performed correctly within the prescribed time limits, maximum credit will be given as follows:

Test 1.....	6
Test 2.....	6
Test 3.....	8

## APPENDIX REFERENCES

---

AR 600-70

AR 750-5

ATP 6-300

ATT 6-1

ATT 6-2

ATT 6-5

SR 110-1-1

SR 310-20-series

SR 320-5-1

SR 320-50-1

SR 385-310-1

SR 615-25-15

SR 615-25-20

SR 700-45-5

T/O & E 6-517A

TF 3-1407

FM 5-15

Badges.

Maintenance Responsibilities and Shop Operation.

Army Training Program for Field Artillery Unit.

Training Test for Field Artillery Howitzer or Gun Battery.

Training Test for Field Artillery Battalion Firing.

Training Test for Light and Medium Field Artillery Battalion Involving Displacement and Continuous Fire Support.

Index of Army Motion Pictures, Kinescope Recordings, and Film Strips.

Military Publications.

Dictionary of United States Army Terms.

Authorized Abbreviations.

Regulations for Firing Ammunition for Training, Target Practice, and Combat.

Military Occupational Specialties.

Career Fields.

Unsatisfactory Equipment Report.

Field Artillery Battery, 240-mm Howitzer or 8-Inch Gun, Towed.

Decontamination Procedures—

Part I. Basic Techniques.

Field Fortifications.



FM 5-20	Camouflage, Basic Principles.
FM 5-20B	Camouflage of Vehicles.
FM 5-20D	Camouflage of Field Artillery.
FM 5-25	Explosives and demolitions.
FM 6-40	Field Artillery Gunnery.
FM 6-101	The Field Artillery Battalion.
FM 6-125	Qualification Tests for Specialists, Field Artillery.
FM 6-140	The Field Artillery Battery.
FM 21-5	Military Training.
FM 21-8	Military Training Aids.
FM 21-30	Military Symbols.
FM 21-40	Defense Against Chemical Attack.
FM 21-60	Visual Signals.
FM 22-5	Drill and Ceremonies.
FM 23-65	Browning Machine Gun, Cal. .50, HB, M2.
FM 25-10	Motor Transportation, Operations.
TM 3-220	Decontamination.
TM 6-605	Field Artillery Individual and Unit Training Standards.
TM 9-336	8-inch Gun M1 and Carriage M2.
TM 9-341	240-mm Howitzer Materiel M1.
TM 9-575	Auxiliary Sighting and Fire Control Equipment.
TM 9-771	Crane, Truck-Mounted, M2 and Trailer, Clam Shell, M16.
TM 9-788	38-Ton High Speed Tractor, M6.
TM 9-850	Abrasive, Cleaning, Preserving, Sealing, Adhesive, and Related Materials Issued for Ordnance Materiel.
TM 9-1527	Gunner's Quadrants M1 and M1918, and Machine Gun Clinometer M1917.
TM 9-1545	Telescope Mounts and Range and Elevation Quadrants for Motor Carriages, Field Artillery and Antiaircraft Artillery.

TM 9-1590	Ordnance Maintenance, Fuze Setters M14, M22, M23, M25, and M27.
TM 9-1900	Ammunition, General.
TM 9-1901	Artillery Ammunition.
TM 9-2300	Artillery Materiel and Associated Equipment.
TM 9-2810	Tactical Motor Vehicle Inspections and Preventive Maintenance Services.
TM 9-2853	Preparation of Ordnance Materiel for Deep Water Fording.
TM 9-6111	Ordnance Maintenance: Panoramic Telescopes M1, M12, M12A2, M12A5, and M12A6.
TM 21-300	Driver Selection and Training.
TM 21-301	Driver Selection, Training, and Supervision, Half-Track and Full-Track Vehicles.
TM 21-305	Driver's Manual.
TM 21-306	Manual for the Full-Track Vehicle Driver.
DA ORD Supply Manuals:	
SNL D-31	Howitzer, 240-mm, M1.
SNL D-33	Gun, 8-Inch, M1.
SNL K-1	Cleaning and Preserving Materials.
SNL P-1	Projectiles for Heavy Artillery.
SNL P-2	Charges, Propelling.
SNL P-6	Subcaliber Ammunition.
SNL P-7	Fuzes and Primers.
SNL P-8	Ammunition Instruction Material.
SNL R-7	Demolition Materiel, Land Mines and Fuzes.
DA Form 468	Unsatisfactory Equipment Report.
DA Forms 9-13 and 9-13-1	Weapons Record Book.
DD Form 110	Vehicle and Equipment Operational Record.
OO Form 5825	Artillery Gun Book.

## INDEX

	<i>Paragraph</i>	<i>Page</i>
Accuracy tests for telescope mount M30.....	64	196
Action, to prepare for.....	19	32
Agents, procedures for decontaminating:		
Biological.....	80	248
Chemical.....	79	247
Radiological.....	80	248
Aiming circle method, bore sighting.....	57	173
Aiming point:		
Displacement corrections.....	46	153
Distant:		
Method of bore sighting.....	59	164
To:		
Indicate to gunner.....	27	102
Set a common deflection on.....	28	111
Aiming posts:		
Correction for displacement.....	28, 46	111, 153
Lights.....	46	153
To:		
Aline.....	28	111
Set out.....	46	153
Ammunition:		
Care.....	52	165
Decontamination, chemical agents.....	79	247
Safety precautions.....	86	252
Ammunition corporal, duties in firing.....	42	144
Angle, standard method of bore sighting.....	58	183
Artillery mechanic, duties in firing.....	43	147
Assembly, disassembly, and adjustment.....	68	202
Assign duties with reduced personnel, to.....	27	102
Basic data, to record.....	27	102
Basic periodic tests:		
Accuracy tests for telescope mount M30..	64	196
Fuze setters.....	65	200

	<i>Paragraph</i>	<i>Page</i>
Basic periodic tests—Continued		
General.....	61	191
Ordnance check.....	66	201
Test of:		
Elevation quadrant.....	63	194
Gunner's quadrant.....	62	192
Basic periodic tests and bore sighting.....	54	167
Biological agents, procedures in decontaminating.....	80	248
Board, section data.....	53	166
Bore, swab.....	34	128
Bore sighting:		
Aiming circle method.....	57	173
Distant aiming point method.....	59	187
Elevation quadrant.....	57	173
Equipment.....	55	167
General.....	56	169
Standard angle method.....	58	183
Testing target method.....	60	189
Bore sighting and basic periodic tests.....	54	167
Bore sights, equipment.....	55	167
Brake, elevation.....	29	121
Breech, to open and close.....	32, 33	123, 125
Breechblock, to clean and oil.....	32	123
Call off.....	8	11
Cannoneers.....	9	12
Care of ammunition.....	52	165
Carriage load.....	2	3
Cease firing.....	49	164
Chamber, to swab.....	34	128
Change:		
A deflection, to.....	28	111
Posts.....	10	16
Changes in data during firing.....	50	164
Charges:		
To:		
Check after placed on loading ramp.....	33	125
Place in chamber.....	34-36	128
Prepare.....	38	141
Chemical agents, decontamination procedures for.....	79	247

	<i>Paragraph</i>	<i>Page</i>
Chief of section, duties:		
General.....	5	7
In firing.....	27	102
Commands and formations, preliminary.....	8	11
Comparison test of:		
Elevation quadrant.....	63	194
Gunner's quadrant.....	62	192
Composition, gun section.....	4	7
Correction, test of gunner's quadrant.....	62	192
Corrections for displacement of aiming posts.....	46, 153, 269	
	102	
Coupled, definition.....	2	3
Crane hand signals.....	16	25
Crane method:		
Displacement for operations.....	20	56
Of assembling gun.....	17	25
Preparations for firing.....	14	20
Preparations for traveling.....	20	56
Crane operations.....	15	23
Crane, truck-mounted, M2.....	14	20
Data:		
Basic, to record.....	27	102
Board, section.....	53	166
Changes in.....	50	164
Decontamination:		
For:		
Biological and radiological agents..	80	248
Chemical agents.....	79	247
General.....	78	247
Of:		
Ammunition.....	79	247
Automotive equipment.....	79	247
Instruments.....	79	247
Rough.....	80	248
Weapon.....	79	247
Definitions and terms.....	2	3
Destruction of equipment:		
General.....	82	250
Methods.....	83	251

	<i>Paragraph</i>	<i>Page</i>
Destruction of equipment—Continued		
References.....	84	251
Disassembly, adjustment, and assembly of weapon.....	68	202
Dismount, to.....	12	18
Displacement correction.....	46, 102	153, 271
Distant aiming point method of bore sight- ing.....	59	187
Drill:		
Safety precautions.....	88	254
Section, instructions.....	7	10
Section, objective.....	6	10
Duties in firing:		
Ammunition corporal.....	42	144
Artillery mechanic.....	43	147
Chief of section.....	27	102
General.....	26	97
Gunner.....	28	111
No. 1.....	29	121
No. 2.....	30	123
No. 3.....	31	123
No. 4.....	32	123
No. 5.....	33	125
No. 6.....	34	128
No. 7.....	35	133
Nos. 8 and 9.....	36	133
No. 10.....	37	133
Nos. 11 and 12.....	38	141
Nos. 13 and 14.....	39	143
Nos. 15 and 16.....	40	143
Nos. 17 and 18.....	41	144
Duties in inspection:		
Before operation (march).....	72	204
During halt.....	74	218
During operation (march).....	73	216
Prior to and during firing.....	75	226
Duties in inspection and maintenance:		
After operation.....	76	227
Weekly.....	77	236
Duties of personnel, general.....	5	7

	<i>Paragraph</i>	<i>Page</i>
Elevation quadrant:		
Bore sighting.....	57	173
Test of.....	63	194
To cross level.....	29	121
To lay for elevation with.....	29, 101	121, 269
Elevation, qualification tests, laying for, with gunner's quadrant.....	100	268
Emplacement of gun:		
Preparation of position for.....	47	156
Special methods.....	44	148
End-for-end test, gunner's quadrant.....	62	192
Equipment:		
Bore sighting.....	56	169
Decontamination of.....	78	236
Destruction of.....	82	250
Fall in, to.....	8	11
Fall out, to.....	13	19
Fire, the gun, to.....	34	128
Fire commands, to follow.....	27	102
Fires, prearranged, to conduct.....	27	102
Firing:		
Cease.....	49	164
Changes in data during.....	50	164
Duties, general.....	26	97
Preparation for.....	14-19, 22-23	20, 58
Form the section, to.....	8	11
Formations and commands, preliminary.....	8	11
Formations, section.....	8	11
Front, definition.....	2	3
Fuze setters.....	65	200
Fuze, to:		
Inspect before loading.....	27	102
Remove.....	37	133
Set.....	37	133
Fuze or change fuze of projectile.....	37	133
Gun:		
Definition of.....	2	3
Preparation for emplacement of.....	47	156
Special method of emplacement.....	44	148

	<i>Paragraph</i>	<i>Page</i>
Gun—Continued		
To:		
Conduct fire of .....	27	102
Fire .....	34	128
Indicate when ready to fire .....	27	102
Lay for direction .....	28	111
Load .....	32	123
Prime .....	33	125
Refer .....	28	111
Unload the .....	51	165
Gunner's:		
Duties:		
General .....	5	7
In firing .....	28	111
Quadrant:		
Laying for elevation .....	100	268
Test of .....	62	192
Qualification test .....	96	262
Gun section, composition of .....	4	7
Halt, duties in inspection during .....	74	218
In battery, definition .....	2	3
Inspection and maintenance .....	67, 71	202, 203
Instructions, section drill .....	7	10
Instruments, procedure for decontamination .....	79	247
Lanyard, to attach .....	32	123
Laying for elevation:		
Elevation quadrant .....	101	269
Gunner's quadrant .....	100	268
In precision .....	45	153
Level telescope mount .....	28	111
Line of fire .....	47	156
Maintenance .....	70	203
Maintenance and inspection .....	67	202
Materiel .....	107	280
Mask, to measure site to .....	103	273
Mechanic, artillery .....	43	147
Measure, to:		
Elevation .....	104	274
Site to mask .....	103	273



	<i>Paragraph</i>	<i>Page</i>
Micrometer test, gunner's quadrant.....	62	192
Minimum training schedule.....	93	257
Misfires:		
Report.....	27	102
Safety precautions for.....	87	253
Mount, telescope, to level.....	28	111
Mount, to.....	11	17
Moving out of position.....	21	58
No. 1, duties in firing.....	29	121
No. 2, duties in firing.....	30	123
No. 3, duties in firing.....	31	123
No. 4, duties in firing.....	32	123
No. 5, duties in firing.....	33	125
No. 6, duties in firing.....	34	128
No. 7, duties in firing.....	35	133
Nos. 8 and 9, duties in firing.....	36	133
No. 10, duties in firing.....	37	133
Nos. 11 and 12, duties in firing.....	38	141
Nos. 13 and 14, duties in firing.....	39	143
Nos. 15 and 16, duties in firing.....	40	143
Nos. 17 and 18, duties in firing.....	41	144
Objective:		
Section drill.....	6	10
Training.....	90	255
Operations for crane method of:		
Assembly.....	17	25
Displacement.....	20	56
Ordnance check.....	66	201
Panoramic telescope, testing target method of bore sighting.....	60	189
Periodic tests, basic.....	61	191
Personnel, general duties of.....	5	7
Pits:		
Recoil.....	47	156
Spade.....	47	156
Plumb line.....	55	167
Position:		
Emplacement of gun, for preparation of..	47	156
Moving out of.....	21	58

	<i>Paragraph</i>	<i>Page</i>
Police of area.....	21	58
Posts:		
Aiming.....	46	153
Of section.....	9	12
To change.....	10	16
Prearranged fires, to conduct.....	27	102
Precautions, safety.....	85-88	252
Precision in laying.....	45	153
Preliminary:		
Commands and formations.....	8	11
Operations.....	18	26
Preparations:		
For firing:		
Crane method.....	14	20
Winch method.....	22	58
For traveling:		
Crane method.....	20	56
Winch method.....	24	88
Gunner's qualification tests.....	97	262
Preparation of position, emplacement of gun..	47	156
Prepare:		
For action.....	19	32
To dismount.....	12	18
To mount.....	11	17
Quadrant:		
Elevation.....	63	194
Gunner's.....	62	192
Qualification scores, gunner's qualification tests.....	97	262
Radiological agents, procedures in decontaminating.....	80	248
Ram, to, the projectile.....	34-36	128
"Ready," to call.....	28	111
Recoil, length of, to measure.....	31	123
Record basic data.....	27	102
Records.....	69	202
Refer the gun, to.....	28	111
Reference lines on testing target.....	48	160
Reporting mistakes.....	27	102

	<i>Paragraph</i>	<i>Page</i>
Safety precautions:		
Ammunition.....	86	252
Drill and firing.....	88	254
General.....	85	252
Misfires.....	87	253
Schedule, minimum training.....	93-95	257
Scores, qualification tests.....	97	262
Section:		
Composition.....	4	7
Data board.....	53	166
Definition.....	2	3
Drill:		
Instructions.....	7	10
Objective.....	6	10
Posts of.....	9	12
To form.....	8	11
"Set," to call.....	29	121
Setters, fuze.....	65	200
Shell tongs.....	39	143
Sighting and fire control equipment, tests and adjustments.....	106	276
Site to mask, measuring.....	103	273
Special methods of emplacement.....	44	148
Standard(s):		
Angle method of bore sighting.....	58	183
Of precision.....	97	262
To be attained.....	92	256
Targets, testing.....	48	160
Telescope mount, to level.....	28	111
Telescope mount lateral control, test target method.....	60	189
Terms and definitions.....	2	3
Test:		
Elevation quadrant.....	63	194
Gunner's quadrant, general.....	62	192
Testing target:		
Alinement.....	60	189
Equipment.....	55	167
Method of bore sighting.....	48, 60	160, 189

	<i>Paragraph</i>	<i>Page</i>
Tests for qualification of gunners:		
General instructions.....	97	262
Indirect laying.....	99	265
Outline of tests.....	98	264
Purpose and scope.....	96	262
Sighting and fire control equipment.....	106	276
Time, qualification tests.....	97	262
Time scale test, fuze setters.....	65	200
Tools, equipment.....	55	167
Training:		
Conduct of.....	91	255
Minimum schedule.....	93-95	257
Objectives.....	90	255
Purpose and scope.....	89	255
Standards to be obtained.....	92	256
Truck-mounted crane M2.....	14	20
Trunnions, testing target method of bore sighting.....	60	189
Uncoupled, definition.....	2	3
Unload the gun.....	51	165
Weapons:		
Decontamination of.....	79	247
Winch assembly of.....	22	58
Winch disassembly of.....	24	88
Winch:		
Assembly of weapons.....	22	58
Disassembly of weapons.....	24	88
Method:		
Individual duties in prepare for action.....	23	78
Precautionary check.....	23	78
Preliminary operations.....	23	78
Preparations for firing.....	22	58
Preparations for traveling.....	24	88

BY ORDER OF SECRETARY OF THE ARMY:

M. B. RIDGWAY,  
*General, United States Army,*  
*Chief of Staff.*

OFFICIAL:

WM. E. BERGIN  
*Major General, United States Army,*  
*The Adjutant General.*

DISTRIBUTION:

*Active Army:*

Tech Svc (1); Admin & Tech Svc Bd (1); AFF (10);  
AA Comd (2); OS Maj Comd (2); Base Comd  
(2); MDW (1); Log Comd (2); A (2); CHQ (1);  
Div (2); Brig 6 (2); Regt 6 (2); Bn 6 (2); FT (1);  
USMA (5); Sch (2) except 6 (400); PMS & T 6  
(2); Tng Div (2); PRGR 9 (2); Mil Dist (1);  
T/O & E 6-515A (10); 6-517A (10).

NG: Same as Active Army except one copy to each unit.

USAR: None.

For explanation of distribution formula, see SR 310-90-1.