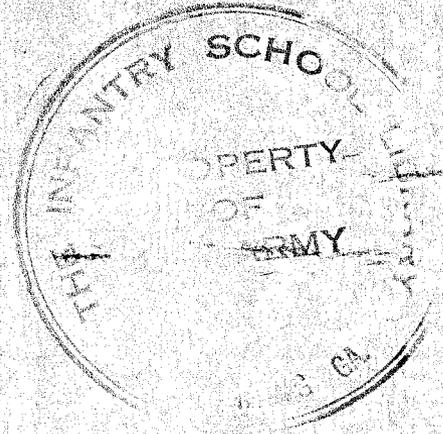


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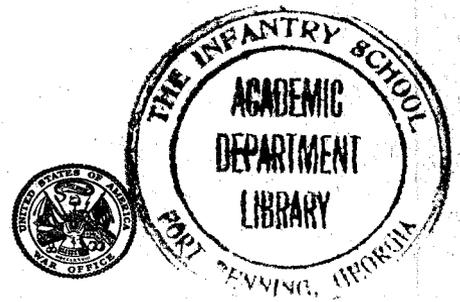
WAR DEPARTMENT BASIC FIELD MANUAL

FM 23-75

F.B.

This manual supersedes FM 23-75, 57-mm Gun, Antitank, M1 (tentative).

# 57-MM GUN, M1



WAR DEPARTMENT • 15 JUNE, 1944

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WAR DEPARTMENT,

WASHINGTON, D. C., 15 June, 1944.

FM 23-75, 57-mm Gun M1, is published for the information and guidance of all concerned.

[A. G. 300.7 (12 May 44).]

BY ORDER OF THE SECRETARY OF WAR:

G. C. MARSHALL,  
*Chief of Staff.*

OFFICIAL:

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

DISTRIBUTION:

As prescribed in paragraph 9a, FM 21-6, except, Inf Sch (90003); IR 7 (2); IBn 7 (2); IC 7 (5), (15), 17 (5); C 9 (2).

IR 7: T/O & E 7-11, Inf Regt;  
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IC 17: T/O & E 17-2, Hq Co, Armd Div.

For explanation of symbols, see FM 21-6.

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This manual supersedes FM 23-75, 57-mm Gun, Antitank, M1 (tentative). (Attention is directed to FM 21-7, for details as to how appropriate training films and film strips are intended to be used, and how they are made available for use during training with the 57-mm gun, M1.)

## CHAPTER 1

### INTRODUCTION

**1. PURPOSE AND SCOPE.** a. This manual provides the unit commander with the data necessary for the step-by-step training of antitank units in the elements of antitank gunnery, as executed with the 57-mm gun M1.

b. Pertinent material which is presented adequately in other manuals is omitted from this text to avoid duplication. Appropriate references to other manuals are made at the point where such material is omitted.

c. The instructor can prepare a progressive training plan by following the continuity of the text. Suggestions on the organization of the work and the presentation of each step of training are provided in chapter 8.

NOTE. For military terms not defined in this manual, see TM 20-205.

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CHAPTER 2

MECHANICAL TRAINING

Section I. GENERAL

**2. DESCRIPTION.** The 57-mm gun M1, is a flat trajectory weapon of the field gun type with a semi-automatic drop-type breechblock. It fires a projectile which weighs approximately 6 pounds. The gun is mounted on a carriage of the split-trail type, equipped with pneumatic tires. It is designed for one-man control of aiming, elevating, depressing, traversing and firing. When the trails are closed and locked, the gun can be towed by the prime mover on roads and across country.

**3. GENERAL DATA AND DETAILED DESCRIPTION.** See TM 9-303.

Section II. DISASSEMBLY AND ASSEMBLY

**4. REFERENCE.** TM 9-303 contains complete instructions on disassembly and assembly of the 57-mm gun M1.

**5. LIMITATIONS ON USING ARMS.** The using arms, for the purpose of maintaining, cleaning, adjusting, and repairing the gun, are permitted to remove and disassemble in detail the following groups only:

- a. Striker (firing) case assembly.
- b. Breechblock.
- c. Barrel and slipper (sleigh).
- d. Firing gear linkage from the gun carriage.

Section III. MEECHANICAL FUNCTIONING

**6. REFERENCE.** See TM 9-303.

**7. PHASES OF FUNCTIONING.** Instruction in functioning is divided and presented in five phases, as follows:

- a. Opening the breech.
- b. Closing the breech.
- c. Firing the piece.
- d. Recoil and counterrecoil.
- e. Safety features of the firing mechanisms.

**8. OPENING THE BREECH.** The sequence of this instruction is as follows:

- a. By hand.
  - (1) Retraction of the firing pin.
  - (2) Lowering the breechlock.
  - (3) Cocking.
  - (4) Extraction.
  - (5) Compression of the breechlock closing spring.
  - (6) Retaining the breechlock in the lower position.
- b. By action of the semiautomatic gear mechanism.

**9. CLOSING THE BREECH.** The sequence of this instruction is as follows:

- a. Releasing the breechblock.
- b. Raising the breechblock.
- c. Forcing the round into the chamber.
- d. Return of the firing pin cocking link to the firing position.

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**10. FIRING THE PIECE.** The sequence of this instruction is as follows:

- a. Operation of the firing gear linkage.
- b. Operation of the striker (firing) case assembly.

**11. RECOIL AND COUNTERRECOIL.** See TM 9-303.

**12. SAFETY FEATURES OF FIRING MECHANISM.** The sequence of instruction on this subject is as follows:

a. The safety catch.

b. The safety features designed to prevent premature firing. The piece will not fire unless the breechblock is fully raised, for the following reasons:

(1) The flange on the firing lever does not coincide with its slot in the breechlock until the breechblock is fully raised.

(2) The firing pin cocking link projects beyond the rear face of the breechblock until the breech is fully closed, and thus prevents the cocking sleeve and firing pin from going completely forward.

(3) The firing pin is not lined up with the primer of the cartridge until the breechblock is fully raised.

#### Section IV. STOPPAGES AND IMMEDIATE ACTION

**13. DEFINITIONS.** a. A stoppage is the accidental stopping of fire.

b. Immediate action is the unhesitating application of a probable remedy to reduce a stoppage.

**14. STOPPAGES.** a. **Prevention of stoppages.** The number of stoppages can be reduced to the minimum if the gun crew has a practical working knowledge of the weapon and applies proper care before, during, and after firing.

b. **Causes of stoppages.** (1) A stoppage will occur if the gun fails to fire or if the breech fails to open or close completely.

#### TABLES OF STOPPAGES.

Table I. Failure to fire.

Cause	Probable remedy
(1) Safety catch set on SAFE.	(1) Rotate safety catch to FIRE position.
(2) Defective ammunition.	(2) Apply immediate action.
(3) Defective firing mechanism.	(3) Replace firing case.
(4) Gun not in battery.	(4) Apply immediate action.
(a) Adjusting valve incorrectly set.	(a) Adjust valve.*
(b) Expansion of recoil oil.	(b) Withdraw a little oil through air plug.
(c) Burs or dirt on liners.	(c) Remove dirt or burs—lubricate.
(d) Weak or broken counterrecoil springs.	(d) Notify ordnance personnel.
(e) Packing too tight.	(e) Slacken packing gland.*

Table II. Failure of breech to close.

Cause	Probable remedy
(1) Extractors not released.	(1) Reload with sufficient force to release extractors.
(2) Dirt or obstruction on breechblock or in chamber.	(2) Clean and lubricate.
(3) Gun not in battery.	(3) See table I, remedy (4) above.
(4) Breechblock closing spring broken.	(4) Notify ordnance personnel.
(5) Lack of lubrication of breechblock bearing surfaces.	(5) Remove, clean, and lubricate breechblock; clean and lubricate breechring.

Table III. Failure of breech to open.

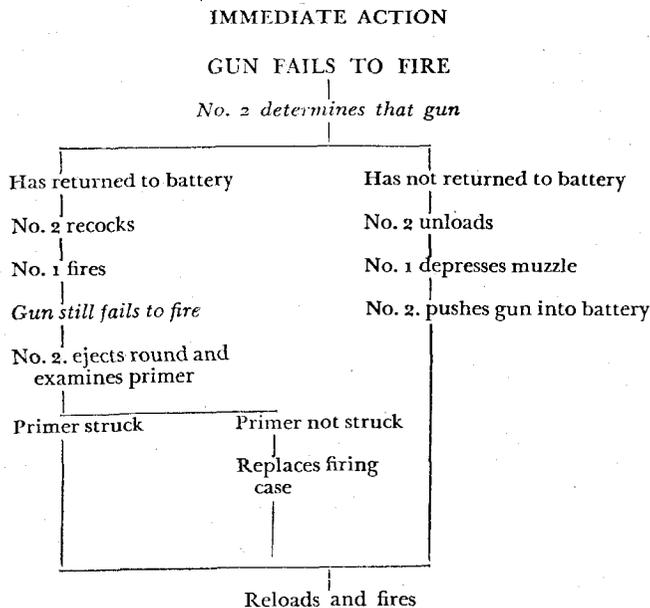
Cause	Probable remedy
(1) Shifting cam lever not set at SA.	(1) Move lever to SA.
(2) Semiautomatic gear inoperative.	(2) Notify ordnance personnel, operate by hand.
(3) Gun not in battery.	(3) See table I, remedy (4).

\*Except in case of emergency, this remedy should be applied by skilled ordnance personnel. For adjustment of counterrecoil, see TM 9-808.

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(2) TM 9-303 contains a complete and detailed list of stoppages. However, the tables below list those stoppages most likely to be encountered, with the probable remedy for each stoppage.

**15. IMMEDIATE ACTION.** The procedure to be followed for the prompt reduction of the usual stoppages is given in the table below. It consists of a positive and automatic manual operation unhesitatingly applied without detailed consideration of the cause.



NOTE. Immediate action must be applied in time to cause the ejected round to leave the chamber not longer than 45 seconds from the original attempt to fire. If gun cannot be pushed into battery, the cause must be analyzed and the remedy applied as given in the Tables of Stoppages. (See par. 14.)

## Section V. CARE AND PRESERVATION

**16. REFERENCE.** See TM 9-303.

**17. SEQUENCE OF INSTRUCTION.** The following subjects should be included in instruction on this phase of mechanical training:

- a. Care and cleaning.
- b. Lubrication.
- c. Filling the recoil mechanism.
- d. Adjustment of recoil mechanism.
- e. Inspections before, during, and after firing.
- f. Special precautions during unusual conditions.

**18. CARE WHEN SUBJECT TO GAS ATTACK. a. General.**

(1) It is important to prevent chemicals used in a gas attack from coming in contact with the gun, ammunition, and accessories. When a gas attack is anticipated, the following action will be taken: apply oil to all outer surfaces of the gun and accessories. If the gun is not to be used, cover gun, accessories, and ammunition. Do not apply oil to ammunition.

(2) After the attack, determine by means of detector crayon or paper whether or not the matériel is contaminated. If uncontaminated, clean matériel with dry-cleaning solvent.

**b. Decontamination.** If contaminated, the following action will be taken:

(1) Protective clothing and a service gas mask must be worn by personnel engaged in decontamination.

(2) Matériel contaminated with chemicals other than mustard or lewisite must be cleaned as soon as possible with dry-cleaning solvent or denatured alcohol.

(3) Do not allow the chemical agents to come into contact with the skin. Burn or bury all rags or wiping

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materials used for decontamination. *Extreme caution should be taken to protect men against fumes created by burning.*

(4) If the surface of the matériel is coated with grease or oil and has been in a mustard or lewisite attack, remove the grease or oil by wiping with rags wet with dry-cleaning solvent.

(5) Decontaminate the gun with a solution of noncorrosive decontaminating agent. Prepare this by mixing one part of noncorrosive decontaminating agent with 15 parts of solvent (acetylene tetrachloride) by weight, or by mixing one part of noncorrosive decontaminating agent with 6 parts of solvent by volume.

(6) After decontamination, clean the matériel thoroughly.

**c. References.** Detailed information on decontamination is contained in FM 21-40, TM 9-850, and 3-220.

## Section VI. DESTRUCTION OF ORDNANCE MATERIEL

### 19. DESTRUCTION OF ORDNANCE MATERIEL IN EVENT OF IMMINENT CAPTURE IN COMBAT ZONE. a. General.

The decision to destroy ordnance matériel to prevent its capture and use by the enemy is a command decision and will be ordered and carried out only on authority delegated by the division or higher commander.

**b. Principles governing destruction.** The following are the fundamental principles to be observed in the execution of an order to destroy equipment:

(1) The destruction must be as complete as the circumstances will permit.

(2) Lacking time for complete destruction, the parts essential to operation of the weapon must be

destroyed, beginning with those parts most difficult of duplication by the enemy.

(3) *The same essential parts of each weapon must be destroyed to prevent the reconstruction of a complete weapon from several damaged ones.*

**c. Training.** The training of individuals before they reach the combat zone will be such as to insure their ability to destroy quickly and adequately the organic weapons in an established and uniform sequence based on the principles stated in b above. Training will not involve the actual destruction of matériel.

**20. METHODS. a. Destruction of 57-mm gun M1 (tube, breech, and recoil mechanism).** (1) *Sighting equipment.* Detach all sighting equipment. If evacuation is possible, carry it; if evacuation is not possible, thoroughly smash the equipment.

(2) *Method No. 1 (a)* Open filling hole plug and air plug on recoil mechanism, allowing recoil fluid to drain. *It is not necessary to wait for the recoil fluid to drain completely before firing in (d) below.*

(b) Place an armed (*safety pin removed*) antitank rifle grenade M9A1 in the tube about 6 inches in front of and with the nose (ogive) toward, the AP shell in (c) below.

(c) Insert an AP round into the gun and close the breech.

(d) Use a lanyard at least 100 feet long. The person firing should be under cover to the rear of the piece and approximately 20 degrees off the line of fire. Elapsed time: Approximately 2 to 3 minutes.

(e) The danger zone is approximately 200 yards.

(3) *Method No. 2.* Insert 1/2-pound TNT blocks, cap, and fuze in the bore near the muzzle and in the chamber of the gun. Close the breechblock as far as possible without damaging the safety fuze. Plug the muzzle tightly with earth to a distance of approximately 7 inches from the muzzle. Detonate the TNT

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charges simultaneously. The number of 1/2-pound TNT blocks needed for effective demolition is two to three (with cardboard cases removed) in the bore, and four to six in the chamber. If it is not possible to plug the bore, a larger number of TNT blocks will be needed for effective demolition.

**b. Destruction of 57-mm gun carriages, M1, M1A1, M1A2, and M1A3.** (1) *General.* Whenever possible, artillery carriage destruction should be accomplished in conjunction with the demolition of the tube, breech, and recoil mechanism. When this cannot be done, destruction of the tube, breech, and recoil mechanism will have priority.

(2) *Method No. 1 (a)* Place six 1/2-pound TNT blocks on the top carriage below the cradle in the vicinity of the pintle. Detonate TNT charges simultaneously, using detonating cord, tetryl nonelectric caps, and at least 5 feet of safety fuze. Elapsed time by this method is 5 to 10 minutes. The minimum danger zone is 200 yards.

(b) This method of demolition may be combined with destruction of the tube, breech, and recoil mechanism, by simultaneous detonation.

(3) *Method No. 2. (a)* With one 57-mm gun, fire at other guns at point-blank range using AP shells. A great number of hits will be necessary to destroy the carriages. Fire from cover. Danger space is from 200 to 500 yards.

(b) Destroy the last gun and carriage by the best means available.

(c) The possibility of enemy personnel salvaging undamaged parts of several guns and combining these parts into a serviceable weapon is greater in this method than in other methods.

**c. Destruction of pneumatic tires.** (1) *General. (a)* Rubber is such a critical item that, whenever matériel is subject to capture or abandonment, an attempt to destroy pneumatic tires always must be made, *even if*

*time will not permit destruction of the remainder of the carriage.*

(b) With adequate planning and training, however, the destruction of tires may be accomplished in conjunction with destruction of the weapon without increasing the time necessary.

(2) *Method No. 1. (a)* Ignite an M14 incendiary grenade under each tire.

(b) To insure the best results, when this method is combined with the destruction by TNT of 57-mm carriages, M1, M1A1, M1A2, and M1A3, be certain that the incendiary fires are started well before detonation of the TNT.

(3) *Method No. 2.* Damage the tires with an ax, pick, or heavy machine-gun fire (deflate them before doing this, if possible). Pour spare gasoline on tires, dousing each one, and ignite.

**d. Destruction of ammunition.** (1) *General. (a)* When sufficient time and materials are available, ammunition may be destroyed as indicated below. At least 30 to 60 minutes will be required to destroy the ammunition carried by combat units.

(b) In general, the methods and safety precautions outlined in chapter 4, TM 9-1900, will be followed.

(2) *Unpacked, complete round, ammunition.* Stack ammunition in small piles. Stack or pile most of the available gasoline in cans and drums around the ammunition. Throw onto the pile all available inflammable material such as rags, scrap wood, and brush. Pour the remaining available gasoline over the pile. Sufficient inflammable material must be used to insure a very hot fire. Ignite the gasoline and take cover.

(3) *Packed, complete round, ammunition.* Stack the boxed or bundled ammunition in small piles. Cover with all available inflammable materials, such as rags, scrap wood, brush and gasoline in drums or cans. Pour gasoline over the pile. Ignite the gasoline and take cover.

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Section VII. SPARE PARTS, EQUIPMENT,  
AND ACCESSORIES

21. EQUIPMENT, SUBCALIBER, CALIBER. .22-.30. Sub-caliber equipment for the 57-mm gun, M1, consists of—  
Subcaliber mount, caliber .22-.30, M6, with extension and bushings for 57-mm gun and firing attachments.

U.S., Rifle, subcaliber, caliber .22, M2A1.

U.S., Rifle, subcaliber, caliber .30, M1903A2.

Necessary spare parts and accessories are listed under articles for instructional purposes in the organizational spare parts and equipment section of SNL C-36.

a. Description of subcaliber mount (fig. 1). The sub-caliber mount consists of a long tube, which extends the full length of the 57-mm gun barrel, a breech housing which fits into the rear bushing for the mount, and a receiver locking frame which will receive either the caliber .30 or caliber .22 subcaliber rifles. The mount is retained in place in the barrel of the gun by means of a nut which screws on the tube of the subcaliber mount and bears against the muzzle bushing which in turn bears against the muzzle of the gun.

b. To install subcaliber mount. (1) Open breech. Slide the breech bushing and coupler spacer onto the subcaliber mount tube. Using the coupler, couple the extension to the tube. Insert the assembled tube in the barrel of the 57-mm gun. Push breech housing into the breech with the trigger trip to the left. Place the leather washer, muzzle bushing and muzzle spacer over the protruding end of the tube. Screw the muzzle locking nut onto the threaded end of the tube in order to lock the mount in place. The subcaliber mount is equipped with a flexible steel cable for actuating the trigger of the caliber .22 or caliber .30 rifle which is positioned in the mount. The cable head

is machined to fit the 37-mm gun. Until the mount is modified, it will be necessary to improvise a means of actuating the subcaliber rifle. The following method is suggested:

(2) Secure a piece of  $\frac{3}{16}$ -inch stiff metal rod, long enough to connect the trigger trip on the receiver locking frame of the subcaliber mount to an improvised clamp on the rear end of the connecting rod. The clamp must be attached to the connecting rod, just in front of the rear turnbuckle, and must provide a linkage for the stiff metal rod. When hooked at the ends, this metal rod will firmly connect the trigger trip and connecting rod. This device will enable the gunner to fire by pulling the trip lever to the rear in the normal manner.

c. To install subcaliber rifles in subcaliber mount. To install either the caliber .30 or caliber .22 sub-caliber rifle in the subcaliber mount, remove floor plate, magazine spring, and follower from the rifle. Remove front and rear trigger guard screws. Insert rifle muzzle with rifle bushing in subcaliber mount breech housing, until rifle is completely seated, with bolt up. Insert trigger guard assembly in receiver locking frame. Swing receiver locking frame into its raised position. Replace front and rear trigger guard screws. Replace floor plate, magazine, spring, and follower. Check to make sure that trigger trip of subcaliber mount is ahead of rifle trigger.

NOTE. Always check to see that the brass rifle bushing is on the muzzle of the rifle before inserting the rifle in the subcaliber mount tube. Only one of these bushings is issued with the equipment; it fits both the caliber .30 and caliber .22 rifles. Whenever the caliber of the firing is changed, it is necessary to change the bushing from one rifle to the other. To remove, withdraw the pin holding the bushing to the front sight of rifle and tap the rear of the bushing gently with a drift.

d. To remove subcaliber rifles from subcaliber mount. Remove floor plate, magazine spring, and follower. Remove front and rear trigger guard screws. Remove trigger guard. Swing receiver locking frame downward

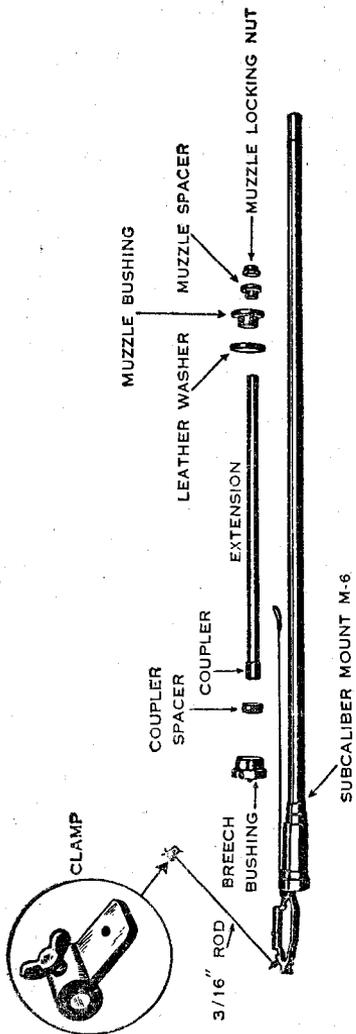


Figure 1. Subcaliber mount and firing attachments for 57-mm gun.

until rifle trigger is cleared. Remove subcaliber rifle to the rear.

**22. ADDITIONAL EQUIPMENT.** For information on other equipment, including artillery gun book, see TM 9-303. The individual towing equipment used with the 57-mm gun M1, is the "rope, drag, with shoulder strap, M1918," and is referred to throughout this manual as the drag rope.

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CHAPTER 3

PREPARATORY GUNNERY

Section I. GENERAL

**23. PURPOSE AND SCOPE.** The training outlined in this chapter and in chapter 4 is designed to make the gun squad proficient in servicing, laying, and firing the gun at either stationary or moving targets and to prepare the squad for the firing of subcaliber and service ammunition. Training subjects are presented progressively in order to provide a cumulative instruction plan and to insure thoroughness in training individuals and squads.

**24. TRAINING PRINCIPLES.** Assign a squad permanently to each gun and train it as a team. The initial training objective is to make each man a trained gun commander and gunner and to teach him to perform the duties of every other member of the squad. This is accomplished by assigning each man a squad position and rotating him through the duties of the other positions within the squad, as training progresses. Good gunnery habits are acquired only through the maintenance of strict training discipline. This discipline is maintained by preserving each squad intact under the control of its regularly assigned leader. Such a method develops a competitive spirit between squads and a sense of responsibility in the squad leaders. Each step in training should be critiqued in order to emphasize important doctrine and to correct errors. Before progressing to subsequent steps in training the instructor

must determine by short examinations that each man is proficient in the training already covered.

Section II. CARE, USE, AND ADJUSTMENT OF  
FIRE CONTROL EQUIPMENT

**25. SIGHTING EQUIPMENT. a. Telescopes, M18, and M69C.** See TM 9-303 for description, mechanical use, care and preservation, and boresighting.

**b. Telescope mounts, M24, M24A1, and M63, and instrument light, M33.** See TM 9-303 for description, mechanical use, care and preservation, and boresighting.

**c. Off carriage fire control instruments.** For mechanical and technical data concerning binoculars, compass, and aiming post, see TM 9-575.

Section III. CREW DRILL — GENERAL

**26. PURPOSE AND SCOPE. a.** The purpose of training in crew drill is to develop in the squad precision, teamwork, and speed in placing the gun in action, taking it out of action, serving it during firing, and continuing it in action with a reduced squad. This training consists of two phases, elementary and advanced. Elementary crew drill is training initially without and later with the prime mover. Advanced crew drill is the application of elementary crew drill to field conditions and should not be given until each member of the squad is proficient in elementary training.

**b.** Precision is acquired by performing each operation and making each move in proper sequence with exactness and in accordance with prescribed procedure.

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c. Teamwork is attained when each member of the squad can perform his duties and thoroughly understands their relation to and effect upon the duties to be performed by the other squad members.

d. Speed is developed through practice, during which each member of the squad learns to perform each operation automatically. Development of speed is stressed as training progresses.

e. Continuing the gun in action with a reduced squad is assured by training each member of the squad in the duties of the other members, particularly in the duties of the squad leader and No. 1. This is accomplished by rotating the members during drill.

**27. GENERAL RULES.** a. Drill will be executed and commands and signals given as described in FM 22-5. Particular attention should be given to drill for motor units, extended order, and signals. In executing the drills described herein, the individual soldier will, as far as practicable, conduct himself in accordance with those provisions of FM 22-5 pertaining to the soldier without arms and the soldier with arms.

b. Except when forming the squad at the command FALL IN, all training is executed at ease.

c. All movements in assuming position, other than the movement of the gun by hand, will be executed at a run. Speed of execution should be developed gradually as individual and squad proficiency is attained.

d. The position of the squad leader, unless prescribed otherwise, will be that from which he can best supervise and direct training.

e. The drag rope will be worn in the slung position for all training, except when actually used for towing the gun. Nos. 1, 3, and 5 will adjust the breast strap over the right shoulder and across the chest to the left hip; Nos. 2, 4, and 6 over the left shoulder and across the chest to the right hip. The rope will be passed across the front of the body, then com-

pletely around the back of the body and the hook engaged in front of the body in the ring of the breast strap. (See fig. 2.)

f. Whenever the gun is being moved by hand and the command HALT is given, the trails of the gun carriage will be lowered to the ground.

g. Training of the squad will include periods of drill while wearing the gas mask.

**28. DEFINITIONS AND TERMS.** a. **Coupled.** A gun is coupled when the lunette is attached to the pintle of the prime mover.

b. **Uncoupled.** A gun is uncoupled when the lunette is detached from the pintle of the prime mover.

c. **Front.** Front, with the gun coupled, is the direction in which the prime mover is headed; with the gun uncoupled, it is the direction in which the muzzle of the gun points.

d. **Right (left).** The direction right (left) is the right (left) of one facing to the front.

e. **Readiness for action.** Being uncoupled, the gun may be held in one of two stages of readiness for action:

(1) *In firing position.* The gun is prepared to fire instantly.

(2) *In cover position.* The gun is near a reconnoitered and prepared firing position. The gun is prepared for firing as far as practicable in the tactical situation and held under cover.

**29. ORGANIZATION AND EQUIPMENT** (fig. 2). a. The 57-mm gun squad is organized as follows:

- (1) Squad leader.
- (2) Gunner, No. 1.
- (3) Cannoneer (loader), No. 2.
- (4) Cannoneer, No. 3.
- (5) Cannoneer, No. 4.
- (6) Cannoneer, No. 5.
- (7) Ammunition bearer, No. 6.

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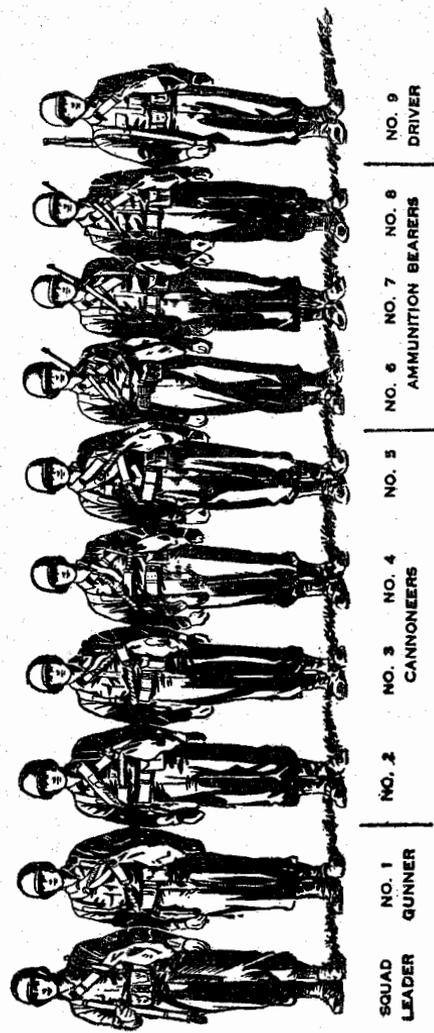


Figure 2. Organization of 57-mm gun squad.

- (8) Ammunition bearer, No. 7.
  - (9) Ammunition bearer, No. 8.
  - (10) Truck driver, No. 9.
- b. Each member of the squad is given a number as indicated above. If the truck driver is present for training without his vehicle, he is designated as No. 9 and functions as an additional ammunition bearer.
- c. For equipment of the gun squad, see Table of Organization and Equipment.

**30. DUTIES. a. Squad leader (observer).** The squad leader (observer) is in direct command of the gun and its equipment, including the prime mover, when present. He conducts the squad in accordance with the orders or instructions of his platoon leader or of the commander of the unit to which he is attached. He is responsible for the care and maintenance of the gun and its equipment. In combat, he is responsible for the accomplishment of the squad's mission. He controls and conducts the fire of the gun and is responsible for its proper concealment. He keeps the platoon leader informed of the status of ammunition supply.

**b. Gunner, No. 1.** The gunner lays and fires the gun and acts as squad leader in the latter's absence. He is careful to coordinate his actions with No. 2.

**c. Cannoneer, No. 2.** No. 2 loads the gun and coordinates his movements and duties at the gun with No. 1.

**d. Cannoneer, No. 3.** No. 3 hands ammunition to No. 2 to facilitate loading.

**e. Cannoneer, No. 4.** No. 4 delivers ammunition to the close proximity of No. 3. He swabs out the bore at the direction of the squad leader. He may be used as an air-antitank guard.

**f. Cannoneer, No. 5.** No. 5 assists No. 4 in preparing ammunition and may be used as an air-antitank guard.

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g. Nos. 6, 7, and 8. Nos. 6, 7, and 8 are ammunition bearers.

h. **Truck driver No. 9.** The truck driver is responsible for driver maintenance of his prime mover and for its concealment and camouflage when halted. When not engaged in his duties as driver, he performs the duties of ammunition bearer.

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#### Section IV. ELEMENTARY CREW DRILL WITHOUT PRIME MOVER

**31. EQUIPMENT.** For training without the prime mover, the articles of equipment carried may be modified to meet the actual needs of the training being conducted; except that the drag rope will be worn. One 57-mm gun, complete, with dummy ammunition, will be used.

**32. TO SECURE EQUIPMENT.** For training without the prime mover, the squad normally will be formed, and arms will be inspected as a part of a larger unit (platoon). Under direction of the squad leader, matériel will be inspected and the individual members of the squad will secure the equipment necessary for the particular training to be conducted. Gun covers will be removed.

**33. TO FORM THE SQUAD** (fig. 3). **a.** Equipment having been secured and the gun having been moved to the location designated by the squad leader, the squad forms as follows: the squad leader places himself to the left, and 3 paces in rear of the trail spades, facing the front, so that, when the squad forms, its center will be aligned with the spades. He then commands: **FALL IN.** The squad forms on the right of the squad leader in four ranks at close interval. The two men in the front rank align themselves on the right of

the squad leader. The men in the succeeding ranks cover off the two men in the front rank.

**b.** To form the squad in any other location or facing in any other direction than that prescribed in a above, the squad leader places himself at that location or faces the described direction and prefaces the command **FALL IN** with an indication of the assembly point; as, "In front of gun," "In front of truck." When the command is given, the members of the squad form on the squad leader as described in a above.

**c.** If the members of the squad have been assigned numbers previously, each will take position in his appropriate place, at the command **FALL IN.**

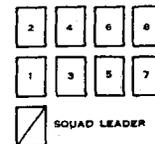
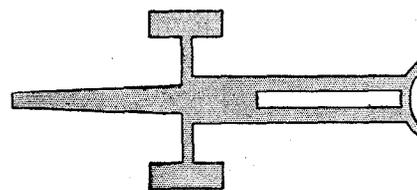


Figure 3. Fall in. (Driver is with prime mover.)

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34. **TO CALL OFF.** a. The command is: CALL OFF. in the FALL IN positions, the man on the right of the squad leader calls, "One;" the man on the right of No. 1, "Two;" the man in the rear of No. 1, "Three;" the man on the right of No. 3, "Four," continuing in this manner until each member of the squad has called his number.

b. Once having called off, if a subsequent formation is ordered, the men fall in their proper order.

35. **INSPECTION OF ARMS.** When the squad is first formed for any drill or exercise, and it has not been inspected as part of a larger unit, arms will be inspected immediately after the execution of the command CALL OFF.

36. **TO TAKE POSTS AT THE GUN** (fig. 4). a. The command is: POSTS. The members of the squad move to their posts. No. 1 places himself in rear of the left wheel and alongside the trail; No. 2 in rear of the right wheel and alongside the trail; Nos. 3 and 4 alongside the left and right spades, respectively; Nos. 5 and 6 move up behind Nos. 3 and 4, respectively; all face to the front. Nos. 7 and 8 remain at their FALL IN positions, at ease.

b. For preliminary instruction, the squad is formed as described in paragraph 33 and the command posts is given from that formation. However, the command posts may be used whether the members of the gun squad are in or out of ranks.

37. **TO CHANGE NUMBERS AND DUTIES IN THE SQUAD.**

a. The squad being in any formation, the command is: FALL OUT ONE (TWO, THREE) (or any other number of the squad). When a number is directed to fall out, he takes the position of the last number of the squad. For example, when No. 1 falls out, he moves to the position of No. 8, No. 2 moves to the position of No. 1. No. 3 moves to the position

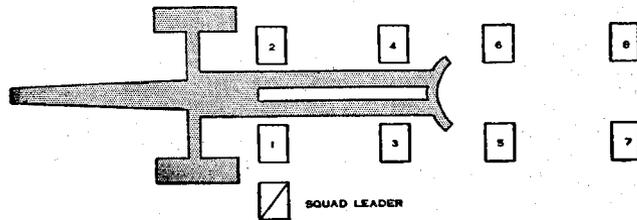
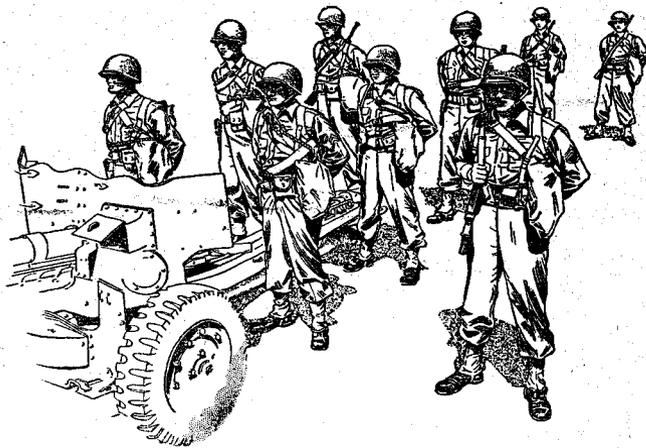


Figure 4. Posts of gun squad. (Driver is with prime mover.)

of No. 2, and in this manner throughout the squad each man moves up one number. The numbers, following the designated number, move to their new positions. The men having lower numbers than the designated number do not change their positions. At the end of any change of position, the squad members CALL OFF without command.

b. During preliminary training, the command for rotating the members within the squad should be

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given only after a movement or command has been executed. After each member of the squad is familiar with the duties of the other positions within the squad, the command may be given before the completion of a movement. In such cases, each man ceases the execution of his duties and takes up the duties of his new position.

**38. TO MOVE GUN BY HAND** (fig. 5). The squad having taken posts, the squad leader commands: **BY HAND**. Normally the gun is towed by hand to the rear. At this command, Nos. 1 and 2 engage the hooks of their drag ropes in the drag washers on the wheel

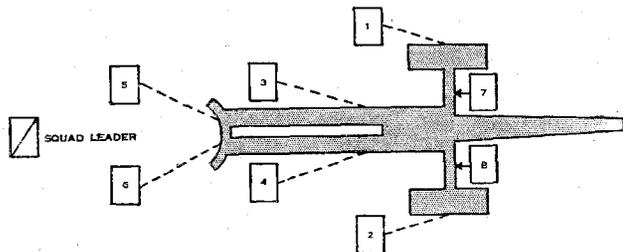


Figure 5. Moving the gun by hand. (Driver is with prime mover.)

hubs. Nos. 3 and 4 engage the hooks of their drag ropes in the towing rings on the trails. No. 4 removes the handspike from the outside of the right trail, and inserts it through the trail lifting handles. Nos. 5 and 6 take positions behind the trails and hook their drag ropes to the locking pin holes in the handspike sockets. Nos. 7 and 8 place the ammunition on the apron or lower carriage and then place themselves alongside the barrel in front of the shield to push on the shield and add weight to the barrel when necessary.

**39. TO PREPARE GUN FOR FIRING. a. General.** The gun may be prepared for firing when the members of the squad are in or out of ranks, when the gun is being moved by hand or prime mover, at a halt, or in a position of readiness. During preliminary training, however, the squad is trained to prepare the gun for action from the position of posts. After becoming proficient in this operation, the squad will be trained to go into action under varying conditions. At the command **ACTION**, the crew will immediately prepare the gun for firing as described below, regardless of the state of readiness of the gun for firing or of the status of the gun squad. Steps already completed are omitted; such additional steps as may be necessary to prepare the gun properly for firing in the location indicated by the squad leader, such as mounting the telescope in its holder, are added.

**b. To place the gun in action.** With the gun squad posted, the command is: **ACTION**. At the command **ACTION**—

(1) The squad leader indicates the general direction for firing.

(2) Nos. 3, 4, 5, and 6 raise the trails and turn the gun so that the muzzle points in the direction indicated by the squad leader; they then lower the spades to the ground. Nos. 1 and 2 assist in turning the gun by pushing on the shield or wheels.

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(3) The squad leader moves in front of the shield and places his weight on the barrel.

(4) No. 4 unlocks the lunette; No. 6 rotates it to its firing position, and No. 4 locks it in position.

(5) Nos. 1 and 2, with hands nearest the gun, grasp the firing support levers and lower the firing supports.

(6) The squad leader calls "Rear," at which time Nos. 3, 4, 5, and 6 lift the spades slightly off the ground and pull the gun onto the firing supports, assisted by Nos. 1 and 2, who pull on the shield. Nos. 1 and 2 check to be sure that the gun is locked on the firing supports and set the hand brakes.

(7) The squad leader gets off the barrel, lowers the apron, and takes a position to the left of the left wheel and on either knee.

(8) No. 3 unlatches the trail traveling lock and disengages the hook from the loop. Nos. 3 and 5 spread the left trail; Nos. 4 and 6 spread the right trail.

(9) No. 2 then unclamps the trail spreader from the retaining bracket on the right trail by reaching up underneath the right trail and unscrewing it with his right hand. The trail spreader is moved to the open position by No. 2. No. 1 steps over the trails, assumes his firing position, which is on both knees, and locks the trail spreader in place.

(10) Nos. 5 and 6 secure the ammunition and place it to the left rear of the right spade.

(11) Nos. 3 and 4 remove the ammunition from the containers, and arrange it near the right spade, outside the arc formed by the right spade.

(12) No. 3 takes his firing position which is on either knee, near to and inside the right trail, and prepares to pass a round of ammunition to No. 2. No. 4 takes a prone position about 2 paces to the right of the right spade where he can observe to the right.

(13) No. 2 steps over the trail and, with his right hand, releases the traversing stop by pulling out on the traversing stop handle and turning it one-quarter

turn in either direction. He then grasps the breechblock actuating lever, opens the breech and inspects to see that the chamber and bore are clear and clean. He closes the breech, tests the firing mechanism by pulling on the trip lever, opens the breech, and raises the breechblock actuating lever.

NOTE. To close the breech manually, the following method is suggested: lower the breechblock until the stop surfaces on the front face of the breechblock just clear the extractor hooks. With the left hand, palm up, index finger and little finger extended, push the extractors forward. At the same time, allow the breechblock to rise slowly until the stop surfaces on the breechblock are higher than the extractor hooks. Withdraw the left hand from the breech. With the right hand, raise the breechblock actuating lever to the latched position, and the breechblock will rise automatically to its closed position.

(14) No. 2 makes certain that the shifting cam lever is set at SA, assumes his firing position, which is kneeling on the left knee, and calls "Ready."

(15) No. 1 sets the range quadrant at 700 (M24 and M24A1 telescope mounts), glances through the telescope to be sure that it is clear and clean, grasps the elevating handwheel with his left hand and levels the barrel. He tests the traverse by placing his right arm over the traversing shoulderpiece and moving the gun in traverse. When he hears No. 2 call, "Ready," and after he has completed all of his duties he calls, "Up."

(16) Nos. 5 and 6 remove the handspikes from the trail, position them in the handspike sockets, and fasten them by means of the handspike locking pins. No. 5 then moves about 2 paces to the left and rear of the left spade.

(17) Nos. 6, 7, and 8 unload ammunition from the prime mover and performs such additional duties as the squad leader may direct.

**40. OUT OF ACTION. a. General.** (1) The gun may be taken out of action from a firing position or from a cover position. For preliminary training, however, the squad is trained to go out of action from a firing

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position only. After becoming proficient in this operation, the squad will be trained to go out of action under varying conditions. At the command OUT OF ACTION, regardless of the state of readiness of the gun for firing, the gun crew will prepare the gun for movement as described in b below, eliminating any part of the procedure already accomplished or adding to it any steps necessary to comply with the instructions of the squad leader.

(2) If desired, the squad leader may combine the operation of going out of action with an order to move the gun by hand by giving the command: OUT OF ACTION, BY HAND. The squad executes OUT OF ACTION, modifying the procedure and adding the steps necessary to prepare the gun for movement by hand in the most expeditious manner.

**b. To place the gun in the traveling position.** The command is: OUT OF ACTION.

(1) The squad leader moves in front of the shield and raises the apron.

(2) No. 1 approximately centers the gun in traverse. He then unclamps the trail spreader and swivels it so it may be easily clamped to the right trail. He steps outside the trail.

(3) No. 2 unloads the gun, if loaded, or if unloaded, checks the chamber to be sure it is clear, closes the breech and actuates the firing mechanism. He steps over the trail, reaches up from under the trail, and locks the trail spreader to the right trail.

(4) No. 1 grasps the elevating handwheel and depresses the breech rapidly while Nos. 3 and 5 on the left trail, and Nos. 4 and 6 on the right trail, move the trails until they are about 10 inches apart. No. 1 depresses the breech of the gun until the pillow block pins are aligned with the tapered holes in the lugs at the rear end of the cradle; he then calls, "Close." Nos. 3, 4, 5, and 6 close the trails.

(5) No. 3 locks the trails by connecting the hook and the loop of the trail traveling lock and pressing

downward on the trail traveling lock handle, making sure that the handle is held securely by the latch.

(6) No. 2 locks the traversing stop by pulling out on the traversing stop handle and turning one-quarter turn in either direction. He then pulls inward on the firing support lever with his left hand and holds the lever at its innermost position. With his right hand, he releases the right wheel brake.

(7) No. 1, with his right hand, pulls inward on the firing support lever and holds the lever at its innermost position. With his left hand, he releases the left wheel brake.

(8) The squad leader places his weight on the barrel and commands: FORWARD. Nos. 3, 4, 5, and 6 raise the trails slightly and assisted by Nos. 1 and 2, who push on the shield, move the gun forward off the firing supports.

(9) Nos. 1 and 2 raise and lock the firing supports in the traveling position and take their position of posts.

(10) Nos. 3 and 4 remove the hand spike locking pins, and Nos. 5 and 6 remove the handspikes from the sockets on the left and right trails respectively. Nos. 3 and 4 replace the pins. Nos. 5 and 6 pass the handspikes to Nos. 3 and 4, who fit them into the brackets on the trail. No. 4 lowers the lunette and locks it in the traveling position.

(11) Nos. 5 and 6 place the ammunition to the right rear.

(12) The squad leader and Nos. 3 through 8 take their position of posts.

**41. SERVICE OF THE PIECE. a. General.** (1) Efficient service of the piece requires the coordinated effort of the entire gun squad. The squad will be trained as a team in the mechanics of servicing the piece prior to firing subcaliber or service ammunition. Simulated firing, using dummy ammunition, will be employed to give practice to the squad in loading, firing, and

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unloading. Rapid loading and unloading should be emphasized. Before conducting this training, sufficient instruction must be given to members of the squad in the use of the telescope and in laying the piece to enable them to aim properly. Initially, only fixed targets which are easily seen should be employed; as instruction in marksmanship progresses, all types of targets may be used.

(2) In order to simulate fire, the squad leader will give an appropriate fire order; for example: DUMMY AMMUNITION, RIGHT FRONT, TANK, SIX HUNDRED, ONE LEAD, COMMENCE FIRING.

**b. Positions of gun squad during firing** (figs. 6 and 7). (1) The squad leader kneels as near No. 1 as is necessary to control the firing and to obtain a view of the target similar to that of No. 1. A suitable position for the squad leader, during drill, is about 1 pace to the left of and on line with No. 1.

(2) No. 1 should be on both knees with the traversing shoulder-piece under his right arm and held to his body in such a manner that by moving his body he can traverse the gun smoothly. His right hand grasps the trip lever underneath the cradle. His left hand is on the elevating handwheel.

(3) No. 2 is in a kneeling position on the left knee. His nearness to the breech depends on his size and the length of his arms. He must be able to load easily. He watches the breech at all times.

(4) No. 3 is on either knee and near the right spade. He should be able to pass a round to No. 2 and be out of the path of the ejected cases.

(5) No. 4 insures that sufficient ammunition is immediately behind and within convenient reach of No. 3. He is 2 paces to the right of the right space in the prone position.

**c. To load** (figs. 8, 9, and 10). (1) The gun is loaded on the first element of the fire order, unless specifically ordered otherwise.

(2) No. 3 grasps a round with his left hand about

midway on the case. He passes the round to No. 2, placing it against No. 2's chest. No. 2 grasps it with his right hand under the projectile and his left hand at the base. He swings his arms and body toward the breech and carefully inserts the round in the breech opening. He pushes the round into the chamber with his left fist, using a forward and upward motion of his arm. The rim of the cartridge will trip the extractors, allowing the breechblock to rise automatically. When the breech is closed, No. 2, making certain he is clear of the path of recoil, calls, "Up" so that No. 1 will know that the gun is ready to fire; he then

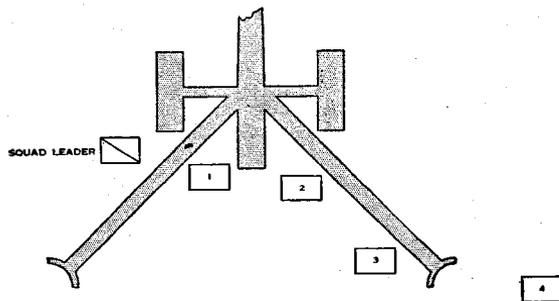
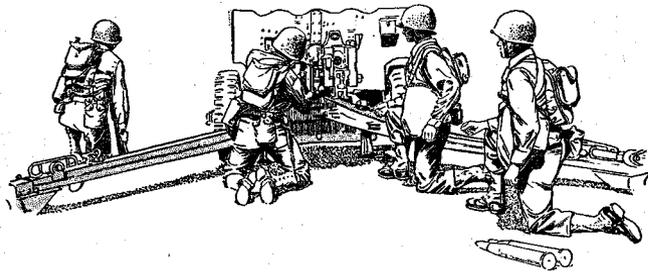


Figure 6. Squad leader, Nos. 1, 2, and 3 in firing positions.

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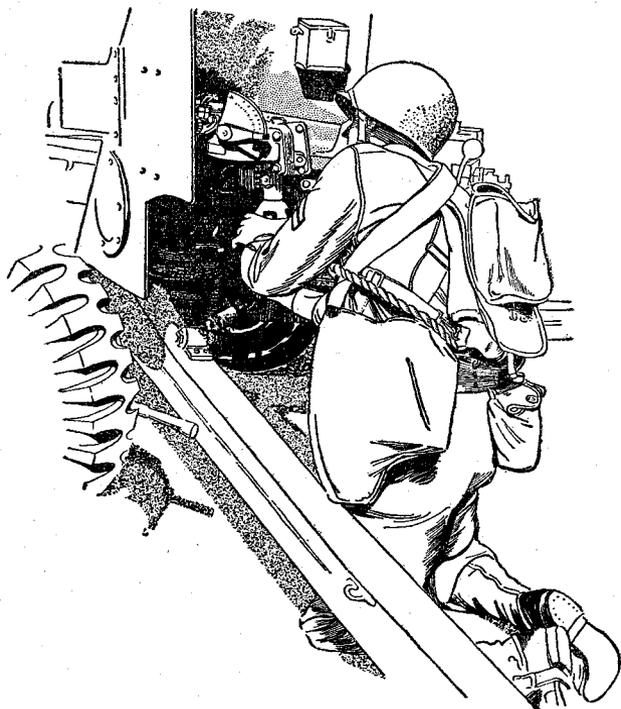


Figure 7. No. 1 in firing position.

watches the breech and swings his hands and body back ready to receive another round from No. 3.

**d. To fire the gun.** The gun having been loaded and the command **COMMENCE FIRING** having been given, No. 1 fires as soon as the gun is laid on the target. To fire the gun, No. 1 pulls the trip lever to the rear and quickly releases it. In the event of a misfire, "Immediate action" (par. 15) is applied. During combat, No. 2 immediately unloads the misfire and reloads.

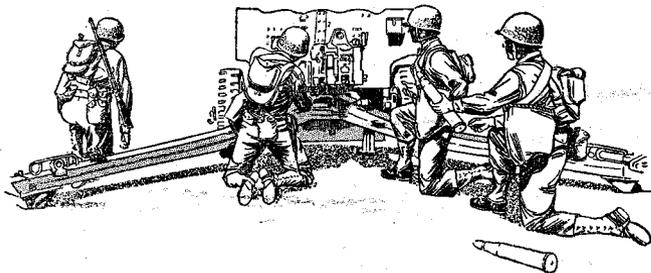


Figure 8. Passing a round to No. 2.

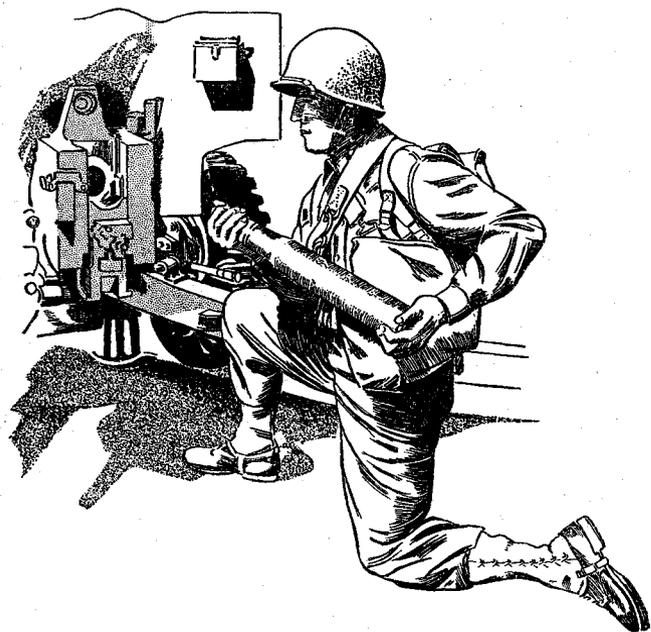


Figure 9. Preparing to load.

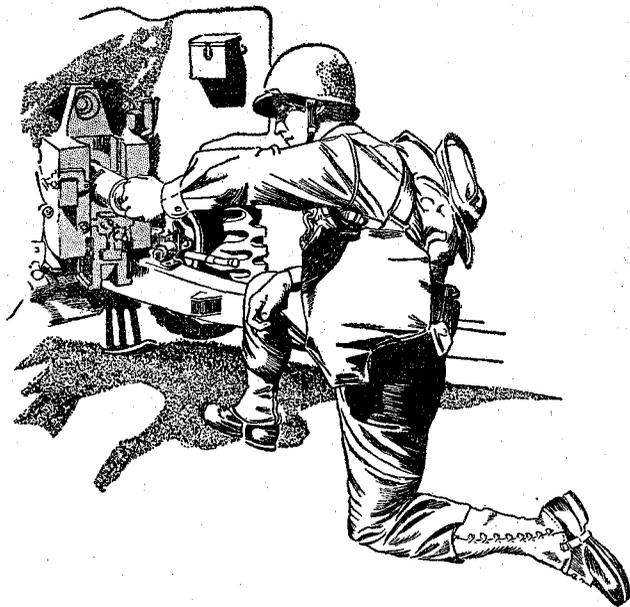


Figure 10. Pushing the round into the chamber.

**e. To cease firing.** Firing is stopped, and the gun, if loaded is unloaded on command or signal **CEASE FIRING**.

**f. To clear gun.** If the gun has been put into action with service or subcaliber ammunition present, the gun must be cleared before anyone moves in front of the muzzle. At the command **CLEAR GUN**, No. 2 unloads the gun and leaves the breech open. During practice firing, an officer then inspects the gun to make sure there is no ammunition in the chamber. Under service conditions, or in the absence of an officer, the squad leader makes the above inspection. When using subcaliber ammunition, the same procedure is followed, except that —

(1) When firing the caliber .30 subcaliber rifle, all rounds will be ejected from the chamber and receiver, and the bolt left open after ejecting the last round.

(2) When firing the caliber .22 subcaliber rifle, the ammunition magazine will be removed, the chamber emptied, and the bolt left open.

**g. To shift trails (new direction)** (fig. 11). To fire the gun in a new direction which cannot be reached by traversing, the squad leader, or No. 1, orders **NEW DIRECTION RIGHT (LEFT)**. At this command, No. 1 centers the gun in traverse. No. 5 grasps the handspike on the left trail; No. 4 grasps the handspike on the right trail, and together they swing the gun to the new direction. No. 3, assisted by No. 4, carries the ammunition to the new position. Nos. 1 and 2 move in conformity to their positions at the gun, releasing the hand brakes before, and resetting them after the move. This movement should be practiced often in preliminary training to insure rapidity of action and the least possible cessation of fire when it becomes necessary to shift the trails while engaging a moving target.

**h. To seat trail spades** (fig. 12). When time is too limited to dig holes for the trail spades prior to firing the first shot, Nos. 3 (on right) and 4 (on left) will lie across the trails, feet to the rear to assist in reducing the recoil of the carriage and to cause it to seat



Figure 11. Shifting the trails (new direction).

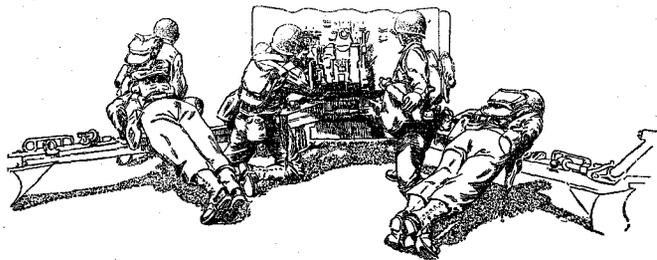


Figure 12. Seating the trail spades.

itself quickly in a stable position. No. 1, under such circumstances, must hold his eye 20 to 25 inches from the eyepiece of the telescope. Whenever time permits, holes will be dug for the trail spades, and the dirt will be dug out from under the wheels, so that the firing supports will rest on the ground.

**i. Removal of rammer staff.** If, after the gun has been placed in action, it appears desirable to have the rammer staff ready for use, the squad leader directs No. 4 to remove the sections and assemble them.

## Section V. ELEMENTARY CREW DRILL WITH PRIME MOVER

**42. GENERAL.** The provisions of sections III and IV are applicable to training with the prime mover. Details of execution should be modified where necessary, to meet any changes brought about by the presence of the prime mover.

**43. EQUIPMENT.** For training with the prime mover, individual members of the squad are equipped as prescribed in paragraph 27. In addition, the squad is equipped with a 1½-ton truck, 6 x 6, for towing the gun and transporting the gun squad, accessories,

and ammunition. The truck driver, who is a member of the gun squad, operates the vehicle under direct supervision of the squad leader.

**44. CARE OF TELESCOPE.** **a.** The telescope should be removed from the gun whenever its use is not necessary. Exposure to moisture and other elements, rough handling, and jarring, may render the telescope unusable.

**b.** No. 1, under the direction of the squad leader, will remove the telescope when the gun is to be moved by prime mover for considerable distances or at any but very slow speeds, and will replace it when action is anticipated. He will also remove and protect it from dew or inclement weather to prevent the condensation of moisture or the formation of ice in the telescope.

**45. DISPOSITION OF GUN COVERS.** The gun covers should be on the gun whenever it is towed, whenever it is to be separated from its prime mover for a considerable length of time, or when it may be exposed to a gas attack or inclement weather. For preliminary training with the prime mover, however, the gun covers will be placed on the gun whenever it is coupled, and removed whenever it is uncoupled. After removal, the squad leader will indicate whether the covers are to be left in the prime mover or taken with the gun. If taken with the gun, the covers are bundled up and tied to the front of the shield.

**46. TO LOAD PRIME MOVER.** The command is: **LOAD TRUCK.** At this command, the gun is coupled to the prime mover and the ammunition and equipment loaded on the prime mover under the direction of the squad leader as follows:

**a.** The gun is moved to a position in rear of the prime mover, convenient for coupling, and the trails are grounded.

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b. Nos. 5, 6, 7, and 8 load the prime mover. Nos. 7 and 8 take position in the prime mover and pass out the gun covers to Nos. 5 and 6, and stow the ammunition and equipment passed to them by Nos. 5 and 6.

c. Nos. 1 and 2 replace the breech cover; Nos. 5 and 6 replace the muzzle cover.

d. When all the ammunition and equipment have been loaded, the gun is coupled to the prime mover. Nos. 3 and 4 raise the trails and insert the lunette over the towing pintle hook and secure the latch. Nos. 5 and 6 assist by pushing the gun forward from positions at the right and left wheels, or at the shield.

e. The men then mount on the prime mover and take seats (fig. 13). The squad leader takes the seat besides the truck driver; Nos. 7, 5, 3, and 1 in that order from front to rear sit on the right side of the prime mover, Nos. 8, 6, 4, and 2 on the left side.

f. If operating with other prime movers, the squad leader signals, "Ready to start" to the next higher commander; otherwise the truck moves in accordance with the squad leader's instructions.

g. The truck driver should be trained to assist in loading the prime mover.

**47. TO UNLOAD PRIME MOVER.** a. The squad being in the prime mover, the command is: UNLOAD TRUCK. At this command, all members of the squad, except Nos. 7, 8, and the truck driver, will dismount and take positions at the rear of the prime mover. The gun is uncoupled and the prime mover unloaded as follows:

(1) Nos. 1 and 2 remove the breech cover; Nos. 5 and 6 remove the muzzle cover and place both covers either in the prime mover or on the gun carriage (par. 45), as directed by the squad leader.

(2) At the same time, Nos. 3 and 4, working on the right and left sides of the trails, respectively, uncouple the gun, No. 3 calling, "Forward" to the truck driver as the lunette is pulled clear of the pintle. The

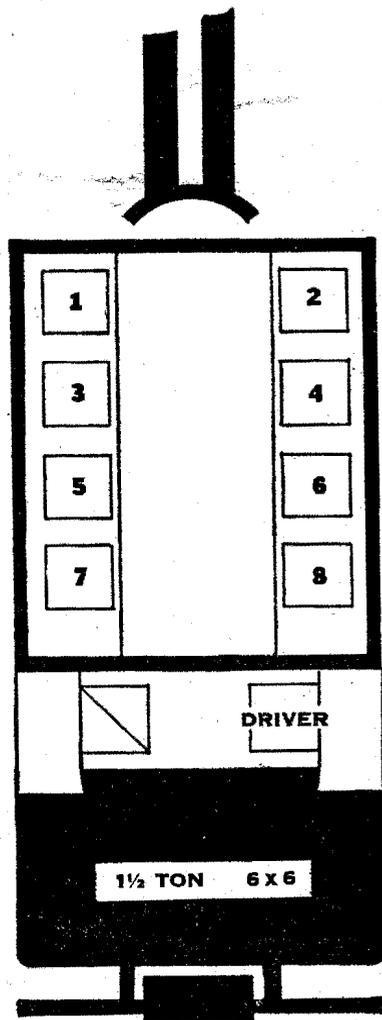


Figure 13. Positions of the gun squad in the prime mover.

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prime mover moves forward about 3 paces and Nos. 3 and 4 ground the spades.

(3) Nos. 7 and 8, from their positions in the prime mover, pass initial loads of three rounds each to Nos. 5 and 6, who place them on the ground near the gun. Nos. 7 and 8, unload additional ammunition and equipment as directed by the squad leader, then dismount.

(4) When the gun, ammunition, and equipment have been unloaded, the members of the squad take posts, or continue their duties to prepare the gun for movement by hand, or for action, depending upon the instructions of the squad leader.

(5) When unloaded, the prime mover is driven to a nearby position of cover as directed by the squad leader, or as prescribed by higher command.

b. The command UNLOAD TRUCK may be given when the squad is dismounted from the prime mover and the men are in or out of ranks. The truck driver, if dismounted, takes his seat in the truck, Nos. 7 and 8 mount, and the gun is uncoupled; the prime mover is unloaded as described in a above.

c. Additional ammunition and equipment, if present, are unloaded and stacked in accordance with instructions of the squad leader. To expedite the unloading, the truck driver will assist Nos. 7 and 8. Nos. 1 and 2 also assist in unloading after they have completed their prescribed duties.

**48. UNCOUPLING EXPEDIENT.** As a battlefield expedient, the following improvisation may be made to reduce the time required for unloading the truck: on prime movers which are equipped with a spring type pintle latch, run a wire cable from the pintle latch to the driver's seat. Whenever speed is essential, the driver turns the vehicle so that the muzzle of the gun is pointing generally in the direction of fire, slows to 5 mph, pulls the cable, and speeds up slightly. This releases the lunette from the pintle and drops the

spades to the ground, and materially reduces the time for placing the gun in action. In training, the spades should be dropped only in soft ground.

**49. TO DISMOUNT.** The squad being in the prime mover, the command or signal is: DISMOUNT. All (except the driver) get out of the prime mover, leaving the gun equipment in the prime mover. If the command FALL OUT follows, the men leave ranks and the truck driver dismounts. They remain in the vicinity of the prime mover. The squad leader may direct other necessary action after dismounting the squad, such as FALL IN, UNLOAD TRUCK, OF ACTION.

**50. TO MOUNT.** The squad being in or out of ranks (par. 33), the command or signal is: MOUNT. The driver takes his place and the remaining members of the squad take their prescribed seats in the prime mover. The squad leader checks the men and, when all are present, signals, "Ready to start" to his next senior commander, if operating with other vehicles; otherwise he directs the movement of the prime mover.

**51. CASTER WHEEL DRILL. a. General.** For units having guns equipped with the caster wheel, drill (secs. III, IV, and V) will be modified as follows:

b. **To move the gun by hand** (fig. 14). (1) Prior to fastening tow ropes to the gun, Nos. 3, 4, 7 and 8 raise the trails so that the trail spades are approximately 3 feet from the ground.

(2) No. 5 removes the handspike locking pin from the handspike fork of the caster wheel and places it in the fork spindle. No. 5 brings the caster wheel forward and positions it beneath the trails.

(3) Nos. 3, 4, 7, and 8 lower the trails on the caster wheel. No. 5 raises the locking plate, positions it on top of the trails, rotates it one-quarter turn in either direction and locks it in place by tightening the nut.

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(4) No. 6 secures a handspike and, maintaining his grip on the rear end, passes its front end forward to No. 4 who removes the locking pin from the caster wheel spindle and locks the handspike in position.

(5) No. 6 secures the other handspike and, assisted by No. 5, places it through the collar of the handspike attached to the caster. No. 5 locks it in place.

(6) Nos. 5 and 6 then take positions at the handspike to assist in moving the gun by either pushing or pulling on the handspike.

(7) Nos. 7 and 8 place the ammunition on the apron or lower carriage and then assist in moving the gun by pushing against the shield.

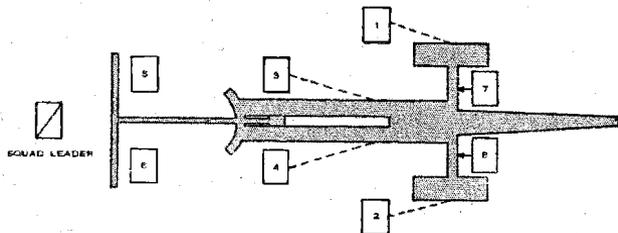
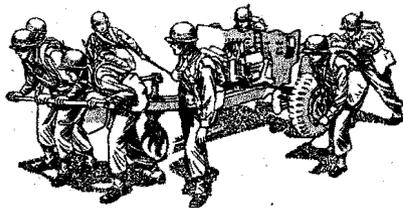


Figure 14. Moving the gun by hand with trail caster.  
(Driver is with the prime mover.)

**c. To prepare gun for firing.** (1) After the squad leader places his weight on the barrel and the firing supports are dropped by Nos. 1 and 2, the gun is pulled onto the firing supports without raising the lunette.

(2) No. 5 raises the longitudinal handspike. No. 6 pulls the handspike locking pin to release and remove this handspike to the right.

(3) No. 3 unlocks the trail traveling lock. No. 4 loosens the nut.

(4) With the squad leader's weight on the barrel, No. 3 spreads the left trail and No. 4, the right.

(5) No. 5 pulls the caster wheel approximately 3 paces to the rear, removes the handspike locking pin from the handspike fork and places and locks the handspike in the handspike socket on the left trail.

(6) Nos. 4 and 6 raise and lock the lunette.

(7) No. 6 places and locks the other handspike in the handspike socket on the right trail.

**d. Out of action.** (1) After the trails have been closed and the lunette lowered, the squad installs the caster wheel as described in b above.

(2) Nos. 3, 4, 7 and 8 push the gun off the firing supports, keeping the trails raised while No. 5 brings the caster wheel forward and positions it beneath the trails. Because the trail spades are off the ground, as the gun is pushed off the firing supports, it will be necessary for Nos. 1 and 2 to limit the forward movement of the gun by applying the hand brakes.

**e. To load prime mover.** (1) After the covers have been placed on the gun, and prior to coupling the gun to the prime mover, the caster wheel will be removed. The procedure will follow that described in d above, except that the trails will not be unlocked.

(2) To remove the caster wheel with the trails closed, No. 6 will hold the handspikes, while No. 5 removes the handspike locking pin from the handspike fork.

(3) No. 6 separates the handspikes, No. 4 loosens

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the nut, and No. 5 removes the caster.

(4) All matériel is placed in the prime mover.

f. To unload prime mover. The caster wheel will remain in the prime mover unless the squad leader's subsequent command requires that it be placed on the gun or in the vicinity of the gun.

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**Section VI. ADVANCED CREW DRILL**

**52. PURPOSE AND SCOPE.** a. The primary purpose of advanced crew drill is to develop an efficient operating procedure for the squad under field conditions. The squad, with complete individual and unit equipment, is taught to adapt all of the operations prescribed in sections III, IV, and V to varied field conditions. Training is conducted on varied terrain under all conditions of visibility and weather.

b. The general instructions in the paragraphs below do not cover the entire scope of advanced training. They are based upon practical tests and experience and emphasize important features. They are offered as a guide only, and may be modified, as the unit becomes experienced and develops its own procedure.

**53. EQUIPMENT.** Camouflage nets will be included in addition to the equipment prescribed for elementary training.

**54. MOVING WITH GUN COUPLED TO PRIME MOVER.**

a. The prime mover is operated in accordance with the regulations and instructions contained in FM 25-10. Provisions of FM 22-5, where pertinent, are applicable.

b. When operating over very difficult terrain, the gun crew should dismount and be prepared to assist the vehicle forward when necessary. Under certain

conditions, it may be desirable to uncouple the gun from the prime mover and move each independently.

c. The truck driver is taught that, while it is essential for the unit to arrive at the firing position quickly, it is even more important that the gun is not injured en route. He is trained to understand fully the travel limitations of his vehicle with the gun coupled. He is taught the clearance of the prime mover and gun carriage when operating over rough ground; how to negotiate turns and avoid obstacles without injuring his vehicle and gun; and the effect the trailing gun has on the truck when starting and stopping.

d. In order to prevent damage to the truck or the gun, the following common sense rules are observed:

(1) Do not increase speed in turning about to couple or uncouple the gun.

(2) Do not exceed 30 mph on good roads.

(3) Reduce speed —

(a) Upon unimproved, slippery, winding roads.

(b) When passing other vehicles or troop columns.

(c) Approaching areas where road blocks or obstacles are probable.

(d) When visibility is poor.

e. Whenever practicable, the route the vehicle is to follow should be reconnoitered in advance. Movement over unreconnoitered routes may result in unnecessary delay at unexpected obstacles or necessitate selecting a new route, requiring backtracking and a loss of time disastrous to the accomplishment of the assigned mission.

**55. MOVING UNCOUPLED GUN.** a. Facility in moving the gun by hand over difficult terrain is gained only by repeated practice.

b. The uncoupled gun is usually moved from the—

(1) Prime mover to cover or firing position.

(2) Cover position to a firing position or the reverse.

(3) Primary firing position or cover position to an

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alternate or supplementary firing position.

(4) Firing or cover position to the prime mover.

c. Movements by hand should be made as short and, except when required by combat necessity, as seldom as practicable.

d. Moving a loaded gun except to change direction in firing is prohibited. This rule will be enforced even while training with dummy ammunition.

e. Whenever practicable, the route to be followed by the gun crew, when the gun is moved by hand, should be reconnoitered in advance by the squad leader. When time does not permit such advance reconnaissance, the squad leader rapidly precedes the squad, giving the direction of movement and simultaneously reconnoitering the route ahead.

**56. MOVEMENT OF PRIME MOVER.** The squad leader directs the movement of the prime mover when the gun is moved by hand. Usually he will direct it to join other trucks of the platoon at a previously designated point or he will order the vehicle to await further orders, in the nearest available cover. When the prime mover is placed under cover, the truck driver removes his rifle from the carrier on the truck and carries it with him. He is responsible for concealing his vehicle and is trained to use his camouflage net for this purpose. The position of the prime mover is usually within visual signaling distance of the cover or firing position, in order to bring it forward quickly should a change of position or OUT OF ACTION be necessary. The truck driver is trained to maintain visual contact with the squad leader and reconnoiter routes leading from the prime mover to the gun. Usually, when changing position the gun will be drawn by hand to the position where the prime mover has been ordered to report. Repeated training is given the gun crew and truck driver in this operation with a view to reducing to a minimum the possibility of hostile observation.

**57. APPROACH TO FIRING POSITION.** The squad is trained to approach and occupy varied cover and firing positions. The following procedure is suggested: the squad leader, or his representative, leads the vehicle by a previously reconnoitered route to an uncoupling position close to the firing position, where the gun is uncoupled from the prime mover. This location will be determined by the terrain and the enemy situation. At this point, instructions should be given relative to ammunition supply, disposition of the prime mover, and movement of the gun by hand. The gun is then moved by hand at the direction of the squad leader to a point where preparations are made for firing. Observation of the battlefield must be continuous. The final movement into firing position will be executed by the crew, pushing the gun, muzzle forward, so that the shield provides protection from enemy small-arms fire. (See fig. 15.)

**58. PREPARING FIRING POSITION.** The extent to which a firing position is prepared depends upon the tactical situation, particularly in relation to the time available and the contemplated action. It must be remembered, however, that the guiding principle in the preparation and organization of a position is to fire without delay. Such operations as digging in the gun and ammunition and provision of individual shelter

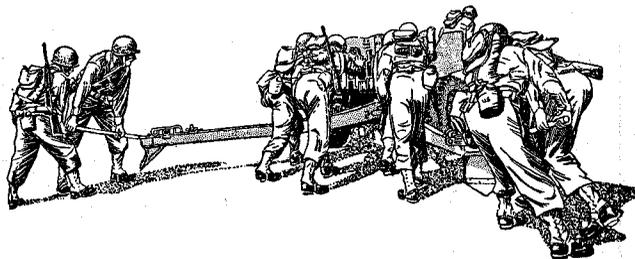


Figure 15. Pushing the gun.

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are subordinate to immediate delivery of fire. For training purposes, the squad will be instructed in occupying and preparing firing positions in accordance with specific situations. In addition, the following must also be considered:

**a.** In the attack, the gun is usually fired from positions which afford good natural concealment. Maximum advantage is taken of partial defilade. Cover and concealment for the gun crew in the immediate vicinity of the firing position, or in a cover position, should be provided.

**b.** Proper concealment is essential, and the squad must be trained to camouflage the firing position expertly. The squad should be trained to take full advantage of all available natural foliage and to use the camouflage net.

**c.** When the gun is placed in partial defilade, a check should be made by a quick glance through the gun barrel (not through the telescope) to insure that the projectile will clear the cover. Measures should be taken to reduce the effect of muzzle blast before the gun is fired, such as thoroughly dampening the ground in front of the muzzle.

**d.** In defense, the basic type of emplacement is the fan type. See FM 7-35 for details.

**e.** The gun should have an excellent field of fire.

**f.** Holes should be dug for seating the trail spades, regardless of the direction in which the gun is to be fired.

**g.** When practicable, ammunition is placed below ground in such manner that it is protected and readily accessible to the gun crew. Its location should not interfere with the occupation of the firing position or the quick shifting of the gun in traverse. If time is available, covering should be placed over the ammunition.

**h.** Local protection in the form of wire, mines, other artificial obstacles, or natural obstacles, is desirable.

**i.** Covered approaches between the firing position

and the location of the prime mover should be reconnoitered and used.

**59. COVER POSITION. a.** The firing position is usually subject to hostile fire and observation. It is therefore essential that the gun and equipment be kept under cover in close proximity to the firing position and so concealed that the enemy cannot recognize or discover the firing position prior to opening fire. This nearby position is known as the cover position. The squad is trained in selecting and preparing cover positions and should practice repeatedly the occupation and evacuation of the firing position. Care must be exercised in such training to insure that the gun or crew is not silhouetted against the skyline or bright background.

**b.** Suitable cover positions may be found in draws, reverse slopes, wooded areas, behind cliffs, cut banks, or heavy stone fences. Equipment and personnel should be so situated that they are well concealed.

**c.** In open terrain, nearby cover and concealment may be scarce, and a suitable cover position may be lacking. The unit is trained to resort to artificial means for cover and concealment. Use of camouflage for this purpose is emphasized. However, in a surprise meeting with enemy tanks or mechanized forces, speed in delivering effective fire upon the enemy will be a more important consideration than cover and concealment. Consequently, the squad should be trained to move rapidly into a firing position directly from the prime mover.

**d.** While in a cover position, the gun, equipment, and ammunition are prepared for firing as far as practicable. The degree of preparedness depends upon the distance between the cover position and the firing position, and the character of the intervening terrain. When the command ACTION is given, the gun is quickly moved into the firing position to engage the enemy.

**e.** If the gun is in a cover position and the squad

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leader wishes to occupy the firing position quickly and engage a target, he may employ one of the following methods:

(1) *If target is visible from cover position.* The squad leader commands: **LEFT FRONT, EDGE OF WOODS, TANK FOURTH FROM LEFT, EIGHT HUNDRED, ONE LEAD.** The gunner announces that he recognizes the target. The squad leader then commands: **ACTION.** Upon the command **ACTION**, the gun is moved quickly into its firing position, prepared for action, and laid on the target. Firing begins at the command **COMMENCE FIRING.**

(2) *If target is not visible from cover position.* Upon the command **ACTION**, the gun will be moved into the firing position quickly and prepared for action; the fire order follows: **FRONT, TANK THIRD FROM RIGHT, SIX HUNDRED, ONE LEAD, COMMENCE FIRING.** Fire is opened when the gun is laid on the target.

**60. ALTERNATE AND SUPPLEMENTARY FIRING POSITIONS.** An alternate position should be selected for each primary firing position. The squad is trained to move rapidly from its primary firing position or cover position into an alternate position and open fire on the enemy. An alternate firing position is a position from which the same fire missions can be executed as from the primary firing position. Similar training is conducted in connection with the occupation of supplementary positions. A supplementary position is a position from which can be executed fire missions other than those to be executed from the primary position. An alternate position should be selected for each supplementary firing position. Care must be exercised by the squad, while changing position, to take full advantage of available cover and concealment to avoid enemy observation.

**61. RANGE CARDS** (fig. 16) . a. Immediately upon occupation of a position, the squad leader should pre-

pare a range card for his gun. The purpose of the range card is to familiarize the squad with the ranges to the prominent terrain features surrounding the gun. The use of the range card will facilitate rapid determination of ranges to targets wherever they may appear regardless of the supposed direction of the enemy.

b. The squad leader should make a range card for each of the positions — primary, alternate, and supplementary. The card should show the gun position, principal direction of fire, a means of orientation, a 360° sector of fire, principal terrain features and ranges thereto.

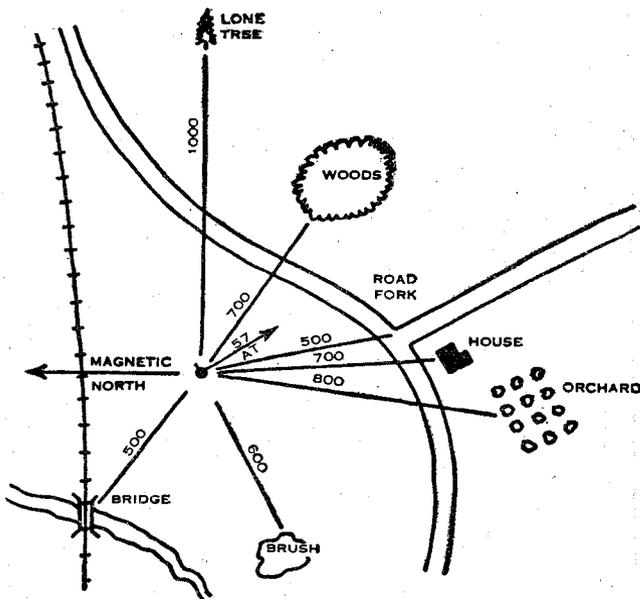


Figure 16. Range card.

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**62. AVOIDING HOSTILE FIRE.** The gun crew must be trained to take cover quickly to avoid a hostile artillery concentration. While firing, at the command or signal, DOWN, or TAKE COVER, Nos. 1, 2, and 3 spring sideways from the gun. All members of the crew lie close to the ground, taking advantage of nearby natural cover and concealment, or seeking protection in fox holes.

**63. CHANGE OF POSITION.** a. The importance of training in the rapid movement of the gun from one firing position to another, or to a cover position, must be understood by all members of the gun squad. Once fire has been opened, the gun will immediately draw fire from an alert enemy. The squad, although trained not to withdraw during a tank attack, must be trained in methods of changing its position when necessary to fulfill its mission. The squad must be trained to accomplish these movements with a minimum loss of time and with a minimum amount of exposure to observation and fire. Movement to a new position will usually be made during a lull in or at the completion of the fire fight. The methods set forth in b and c below are given as a general guide.

b. With the gun in a defiladed position, the squad leader commands: OUT OF ACTION, BY HAND, or OUT OF ACTION, LOAD TRUCK, if the truck can be brought to the gun position. The squad executes the command. However, if the gun position is in partial defilade, the squad will pull the gun back to full defilade before executing the command. To bring the truck forward to the loading point, the squad leader signals ASSEMBLE to the truck driver, who brings the truck forward and halts, facing in the direction indicated by the squad leader.

c. When the gun is in a position from which going out of action would expose the squad, and cover is close at hand, the squad leader commands: OUT OF ACTION, COVER CLOSE BEHIND (or otherwise). The squad unloads the gun, closes the trails, pushes

the gun off the firing supports, and pulls it to the cover position. Once in the cover position, the squad completes the operation of taking the gun out of action, or moves it to a new position as directed by the squad leader.

**64. AMMUNITION SUPPLY.** The squad is trained in moving ammunition from the prime mover to the firing position. During action, the squad leader must know at all times the amount of ammunition on hand, and where and how he can replenish it. Sufficient ammunition must be available at the gun position to insure successful completion of the fire missions. Upon occupation of a firing position, the squad leader indicates the amount of ammunition to be placed in the close proximity of the gun. Arrangements are made for rapid replenishment of ammunition from the prime mover. The amount of ammunition used for the accomplishment of a fire mission should be reported to the platoon leader, who must arrange for its replenishment. For duties of the platoon leader in ammunition supply, see FM 7-35.

## Section VII. LAYING THE GUN

**65. PURPOSE.** The purpose of training in laying the gun is to teach members of the squad to lay the correct sight picture on the target, and in the case of a moving target, teach them to maintain the correct sight picture and take new sight pictures as the target moves.

**66. SCOPE.** a. Training in laying the gun is divided into two phases:

- (1) Aiming and gun manipulation.
- (2) Tracking and simulated firing.

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b. Instruction in the first phase of training forms the basis for training in the second phase. It is essential that the sequence of instruction be such that each member of the squad becomes proficient in the first phase before proceeding to the second.

c. Two telescopes are issued for use with the 57-mm gun M1. The use of each in laying is discussed in the paragraphs below.

67. **METHOD OF INSTRUCTION.** a. **General.** Training in laying the gun consists primarily of a series of exercises in which each member of the squad becomes familiar with the methods of aiming, gun manipulation, tracking, and simulated firing. The methods of instruction described in FM 21-5 will be followed.

b. **Training for aiming and gun manipulation.** (1) Training is divided into three steps:

(a) Aiming for range.  
(b) Aiming with leads.  
(c) Aiming for range and lead.  
(2) Initially, members of the squad must understand the use of the telescope reticle in firing at various ranges. Each man must learn the correct sight picture and the selection of aiming points on the reticle. The second step is aiming with leads in which each man must understand angular leads and how to take leads using the reticle. The third step combines the first two, and each man learns to aim for range and leads. Accuracy of each sight picture and speed in manipulation of the gun in setting sight pictures is the goal in this training. This training should be conducted using stationary targets only.

c. **Training for tracking and simulated firing.** (1) Training in this phase is divided into two steps:

(a) Tracking moving targets.  
(b) Simulated firing on a moving target.  
(2) This phase of instruction teaches the soldier to maintain the correct sight picture on a moving target, and to change sight pictures as he continues to track

the target. After each man has demonstrated his ability to track a moving target, he should be advanced to training in simulated firing. This training should be conducted if possible on the 1,000-inch range.

d. **Equipment.** The following equipment is required for training three squads:

- (1) 3 57-mm guns M1.
- (2) 1 transparent diagram of the telescope reticle.
- (3) 1 small portable blackboard.
- (4) 2 portable standing frames and the following improvised aiming silhouette targets (fig. 30):
  - (a) 2 single-tank.
  - (b) 2 multiple-tank. (See par. 68e.)
- (5) 1 sled, target carrier.
- (6) Stop watch.
- (7) Tape measure, 50 feet or longer.
- (8) One progress chart (shown below) for each squad undergoing instruction.

e. **Procedure** (fig. 17). (1) Initial training in laying the gun can be conducted in the immediate vicinity of barracks. A cleared, fairly level area of ground measuring about 180 feet by 45 feet will accommodate a three-gun platoon.

(2) The arrangement shown in figure 17 permits simultaneous instruction of all gun squads within a relatively small area and facilitates control and supervision by the platoon leader. Instruction for the assembled platoon is conducted at some convenient point, such as *D*. Upon the completion of this instruction, the men are sent to their respective guns along the lines *A-B* and *E-F*. Here, the squad leaders conduct individual instruction under the direct supervision of the platoon leader or trained assistant instructors. For aiming exercises, the portable aiming targets, with aiming silhouettes (fig. 30) on both sides, are arranged along line *C-D*.



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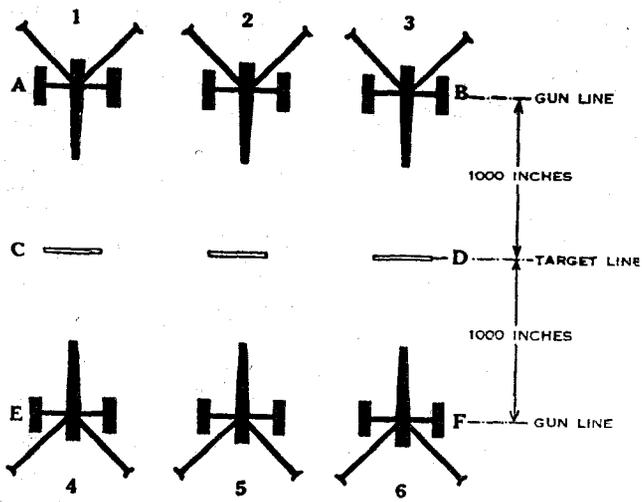


Figure 17. Gun and target arrangement for aiming and tracking.

**68. AIMING AND GUN MANIPULATION — TELESCOPE M18.**

**a. Aiming for range.** (1) *Initial laying.* Initial laying of the telescope on a stationary target for range is a matter of placing the intersection of the vertical and horizontal cross hairs on the target after the gunner has set the desired range on the range quadrant. The point of aim on all targets is the center of the visible mass or the center of the target. Due to the flat trajectory of the 57-mm projectile, it is not necessary to have a different setting on the quadrant for every 100 yards of range for the initial lay. Using the M24 telescope mount, the 300-yard setting is used for all ranges up to 300 yards. Use the 700-yard setting for ranges from 400 to 700 yards. For all ranges over 700 yards, the 900-yard setting is used. When using the M24A1 telescope mount, the 300-yard setting is used for ranges up to 300 yards. Use the 500-yard setting up to 500 yards; the 700-yard setting up to

700 yards; the 900-yard setting up to 900 yards; the 1,100-yard setting up to 1,100 yards; and the 1,300-yard setting up to 1,300 yards. The scale is graduated in 100-yard units from 1,300 to 2,500 yards for exact setting when firing at stationary targets.

(2) *Subsequent laying* (fig. 18). (a) To secure effective hits on various types of targets, it will be necessary to make range changes smaller than those provided for on the range quadrant. Range changes of 400 yards or less will be made by interpolation on the telescope reticle. If range changes exceed 400 yards, changes must be made on the range quadrant. The range unit will seldom be less than 200 yards.

(b) Intersecting the horizontal line on the reticle are four vertical lines. Changing the aiming point on the reticle from the horizontal line to the top or bottom of the vertical lines will vary the range approximately 400 yards. Interpolation should be made on this basis.

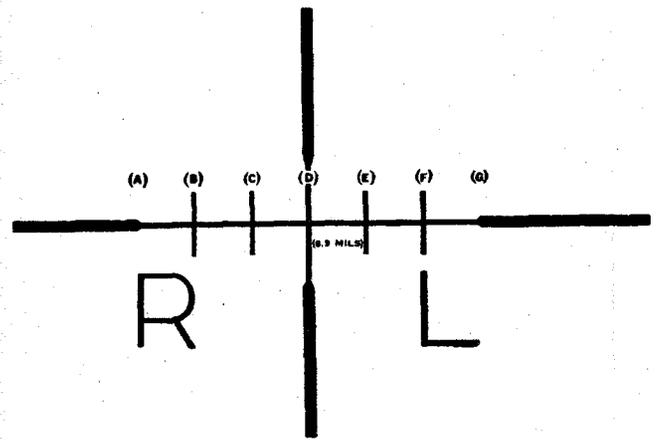


Figure 18. Reticle, M18 telescope (letters and numerals shown in parentheses do not appear on the reticle).

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(3) *Exercises.* These exercises are conducted on stationary aiming silhouette targets so that instruction in aiming will not involve the more advanced element of tracking. Exercises should be designed to require the gunner to set the range quadrant and sight picture for the initial order, following that with range changes of less than 400 yards which he must make by interpolation on the telescope reticle.

**b. Aiming with leads.** (1) The technique of engaging a moving target differs from that of engaging a stationary target in that the axis of the bore must be aimed ahead of the target to cause the projectile and target to meet. A 30-minute or 8.9-mil angular lead has been taken as the unit of measure of leads. To afford the gunner a scale for applying these leads, the telescope reticle is provided with a horizontal line graduated in six 8.9-mil units, three on either side of center. Points below *A* and *G*, shown in figure 18, where the line begins to thicken, are the 3-lead markings.

(2) The gunner is taught how to apply the lead graduations when engaging a moving target. (See fig. 18.) In aiming at a moving target, the bore must be aimed ahead of the target. The vertical cross hair in the center of the telescope indicates the direction of the bore of the gun. Thus, if a gunner is engaging a target moving to the right with one lead, and the correct range has been set on the range quadrant, the vertical cross hair in the center of the telescope is to the right (ahead) of the target. He places the intersection of the horizontal cross hair and vertical line *C* on the target. The intersection of the horizontal cross hair and line *E* is used if the target is moving to the left.

(3) When aiming for one-half leads, the gunner interpolates between the lead markings.

(4) The letters "*R*" and "*L*" are etched on the reticle as an aid in aiming at the target. If the target is moving to the *right* the lead markings above the

letter "*R*" are used as aiming points; if the target is moving to the *left* the lead markings above the letter "*L*" are used.

**c. Exercises consist of having the squad member lay the appropriate lead marking on an aiming silhouette target. Stationary targets assumed to be moving right or left should be used. One-half leads should be included in the instruction.**

**d. Aiming for combined range and lead.** (1) *Initial laying.* Range and lead are combined automatically on the telescope reticle by setting the range on the range quadrant, and using the appropriate lead mark.

(2) *Subsequent laying.* Changes in range of 400 yards or less are made by interpolation above or below the horizontal line. Therefore, it will be necessary when measuring for one-half lead to project an imaginary intersection of the proper aiming point for range and the appropriate lead. This intersection becomes the aiming point to be placed on the target.

(3) *Exercises.* Each squad member is required to lay the gun with different ranges and leads on an aiming silhouette target, an assumed direction of travel being specified in each case. These exercises require the gunner to interpolate on the telescope reticle.

**e. Exercises to develop speed in manipulation.** Finally, to develop facility in manipulating the elevating handwheel and the traversing shoulderpiece, the gunner is taught to engage the successive tank target. This target consists of three rows of three aiming silhouettes (fig. 30), equally spaced on the target paper. The target is not an item of issue. In this exercise, the silhouette target to be engaged, an assumed direction of movement of the target, and a range and lead are announced as, "Center tank, right to left, eight hundred, one lead;" the gunner lays the gun accordingly. Different tanks are then successively designated as "center right tank" or "lower left tank;" and any changes in direction of travel, range, or lead

desired are announced; the gunner complies with each new order.

**69. LAYING GUN WITH OPEN SIGHT. a. General.** The telescope mounts M<sub>24</sub> and M<sub>24A1</sub>, are equipped with an open sight for use when the telescope is damaged. The open sight consists of two parts:

- (1) A front band.
- (2) A horizontal and a vertical cross hair encased in a frame.

**b. Aiming for range.** The gunner sets the range on the range quadrant. (See par. 68.)

**c. Aiming with leads.** The gunner sets leads by turning the deflection knob on the mount. Turning the deflection knob one click is equal to setting a lead of 20 minutes or approximately 6 mils. *Example:* If the target requires two leads and is moving to the left, the gunner sets two leads left on the deflection scale. In this case, since the deflection is set on the open sight, the gunner aligns his sight on the center of the mass of the target. He does *not* aim ahead of the target.

**d. Sight picture.** For initial laying, the gunner places the intersection of the vertical and horizontal cross hairs on the center of the front bead, and places that sight picture on the center of the visible mass or the center of the target. Subsequent laying is accomplished by interpolation.

**70. AIMING AND GUN MANIPULATION — TELESCOPE**

**M69C** (figs. 19 and 20). **a. Aiming for range.** (1) *Initial laying.* The telescope M69C is provided with range graduations on the reticle. At the top of the etched portion is a small cross hair which marks the center of the telescope and represents a range of zero yards. Directly below the small cross hair is a series of vertical lines each corresponding in length to a range change of 200 yards. The vertical lines are separated by spaces each of which corresponds to a range change

of 200 yards. The bottom of the lowest vertical line represents a range of 3,400 yards. Short horizontal lines extend to the right and left of the vertical lines and are spaced vertically to correspond in range to the top of each vertical line. The short horizontal lines are numbered every 800 yards. In aiming at a stationary target or a moving target requiring zero leads, the aiming point on the reticle representing the correct range is laid on the center of the visible mass or the center of the target.

(2) *Subsequent laying.* Subsequent laying is identical with initial laying since the range unit used is seldom less than 200 yards.

(3) *Exercises.* These exercises are conducted on stationary aiming silhouette targets so that aiming will

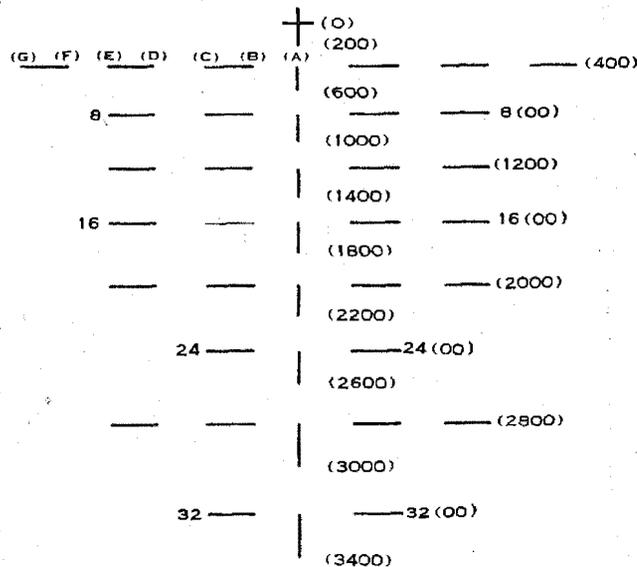


Figure 19. Reticle, M69C telescope (letters and numerals shown in parentheses do not appear on the reticle).

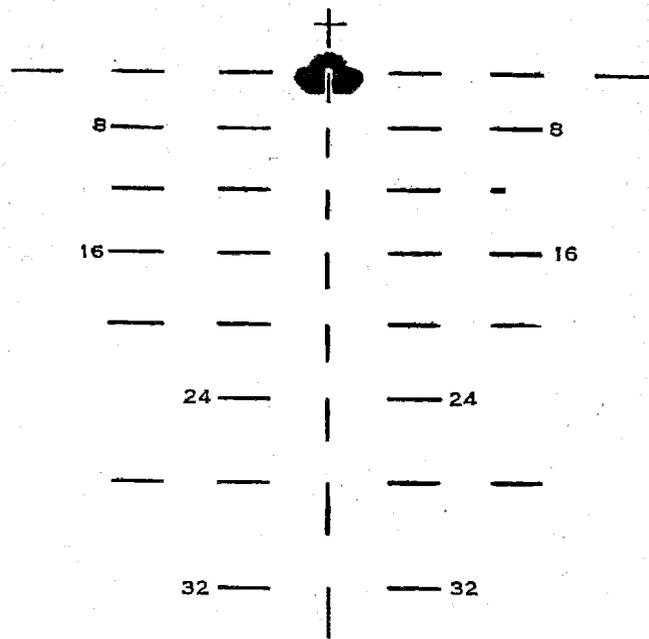


Figure 20. Aiming, M69C telescope. Stationary target, range 400 yards.

not involve tracking. Exercises require the gunner to set the correct sight picture for every 200 yards of range.

**b. Aiming with leads.** (1) The technique of engaging a moving target differs from that of a stationary target in that the axis of the bore must be aimed ahead of the target to cause the projectile and target to meet. A 5-mil angular lead is taken as the unit of measure. With the telescope M69C, "one lead" corresponds to a 5-mil lead. Two leads are 10 mils. Lead markings are etched on the reticle by a series of horizontal lines, 5 mils in length, with a distance of

5 mils horizontally between lines. Referring to figure 22, point *B* is 5 mils from point *A* and represents one lead. The line *BC* is 5 mils in length; point *C* represents two leads. Horizontal lead markings on each side of the series of vertical lines are identical. Thus, if a gunner is engaging a target at a range of 400 yards, moving from left to right and requiring one lead, he places point *B* in the center of the target. The series of vertical lines must be out ahead of the target. For a target moving from right to left, the lead markings on the right side of the series of vertical lines are used. (See fig. 21.)

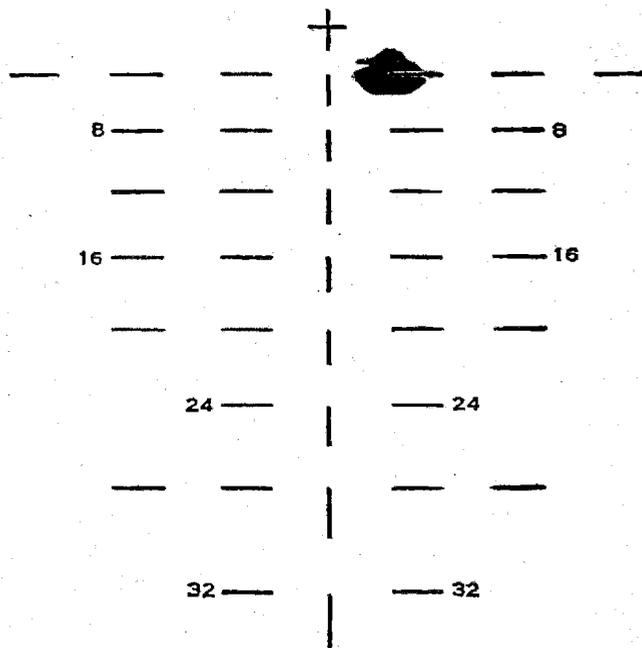


Figure 21. Aiming, M69C telescope. Target moving right to left, range 400 yards, one lead.

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(2) Exercises require the gunner to lay appropriate lead markings on an aiming silhouette target. Stationary targets assumed to be moving right or left at a range of 400 yards should be used for these exercises.

**c. Aiming for range and leads** (fig. 22). (1) *Initial and subsequent laying.* Range and lead are combined automatically within the telescope by the series of horizontal lead lines extending from the right and left of center at 400-yard-range intervals. For targets requiring leads at ranges other than those etched on the telescope reticle, some interpolation is necessary. Select the appropriate range and lead points in the

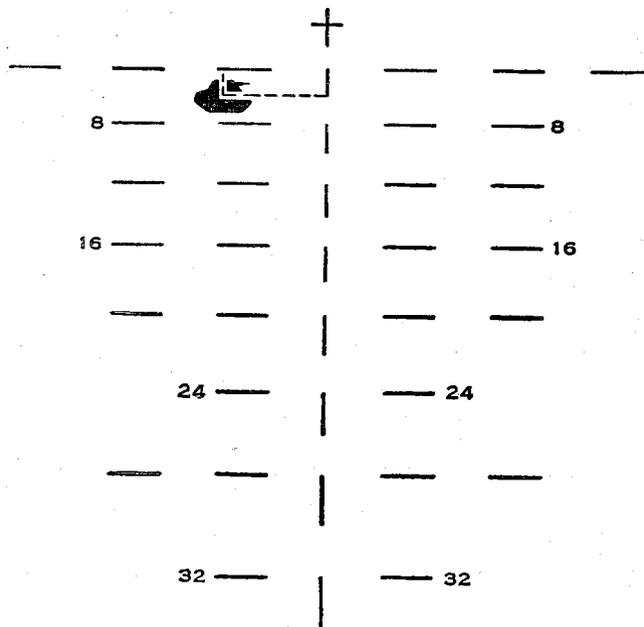


Figure 22. Aiming, M69C telescope. Target moving left to right, range 600 yards, two leads.

telescope reticle and project them to an imaginary point of intersection. This aiming point is laid on the center of the visible mass or center of the target.

(2) *Exercises.* Each squad member is required to lay the gun with different ranges and leads on a stationary aiming silhouette target, an assumed direction of movement being specified in each case. These should include exercises requiring the gunner to interpolate.

**d. Exercises to develop speed in manipulation.** This training will consist of that prescribed in paragraph 68e.

**e. Use of the lighted reticle.** At least one period of training will be devoted to use of the lighted reticle in order to accustom all men to laying the gun during hours of limited visibility. (See a, b, and c above.)

**71. TRACKING AND SIMULATED FIRING.** The gunner next learns how to track a moving target and simulate firing while maintaining the correct sight picture. To accomplish this, exercises are conducted on targets moving over a course designed to give practice in tracking and firing at targets which, as to speed and direction, approximate those that will be encountered in combat.

**a. Procedure.** These exercises should be conducted on the 1,000-inch range and the procedure corresponds as nearly as practicable to that followed when conducting 1,000-inch range firing. (See pars. 110 and 113.) By so doing, the squad undergoing instruction will receive early training in a systematic and orderly range procedure for efficient conduct of firing exercises. If a 1,000-inch range is not available these exercises can be conducted on the set-up shown in figure 17.

**b. Equipment.** The range equipment described in paragraphs 67 and 106 is necessary. Either targets similar to those used for the aiming exercises or the standard 1,000-inch range targets may be used. (See

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pars. 107 and 108.) The set-up shown in figure 17 requires that all targets have the aiming silhouette targets on both sides.

**c. Organization.** If a 1,000-inch range is not available for tracking exercises, an organization of the platoon similar to that shown in figure 17 will be satisfactory. Duties should be assigned as follows for either plan.

(1) The *platoon leader* conducts instruction and supervises the work of the entire platoon.

(2) The *platoon sergeant* issues the orders for conducting the exercises and controls operation of the target by signal.

(3) The two *drum operators* operate the drum (or target sleds) so that the target will be exposed at a uniform speed for the time specified.

(4) The *squad leaders* conduct individual instruction and check execution of the exercises by the gunners.

(5) The *gunners* execute the exercises at the guns.

(6) The *loaders* assist in coaching as directed by the instructor or his assistants.

(7) The *remainder of the platoon* is held clear of the guns and arranged numerically, ready to move forward to the guns when directed.

**d. Target speeds, 1,000-inch moving targets.** (1) The approximate speeds at which 1,000-inch moving targets should move on a single run, to represent speeds at various ranges, are shown in the table below. The time of exposure of a target for a particular run may be determined by dividing 500 inches by the target speed shown in the table.

(2) Initially, in conducting the tracking exercises, the slower speeds should be used; as instruction progresses, the speeds used for successive runs of the target should be increased and varied.

(3) Prior to starting the tracking exercises, the instructor should explain how the range and targets on the 1,000-inch moving target range are operated

#### TARGET SPEEDS; 1,000-INCH MOVING TARGETS

Target speeds in mph	Target speeds in inches per second corresponding to—			
	300 yards	600 yards	900 yards	1,200 yards
7½.....	12	6	4	3
10.....	16	8	5	4
15.....	24	12	8	6
20.....	33	16	11	8
30.....	49	24	16	12

and the speeds at which 1,000-inch targets should be run.

**e. First exercise.** (1) *Purpose.* The purpose of this exercise is to develop the gunner's skill in tracking and operating the firing mechanism, while engaging a target moving directly across the front of the gun and over comparatively level ground. Throughout the exercise, emphasis should be placed on the importance of smooth manipulation while fire is simulated.

(2) *Procedure.* (a) The exercise is conducted on the level course of the 1,000-inch moving target range. The target is a single tank target. The assistant instructor, the gunner executing the exercise, and a loader who acts as No. 2 when firing is simulated, or as coach when directed, take positions at each gun. When all are ready, the target is operated. No commands for loading are given. An example of the sequence of command is: ALL GUNS ON AIMING STAKE; when all guns have been laid on the aiming stake and are ready, the command is: LEFT FRONT, TANK, SEVEN (FOUR) HUNDRED, ZERO LEAD, TRACK.

(b) At the command LEFT FRONT, the gunner traverses to the left, and as the target comes into view

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he aims the gun, using the announced lead on the center of the aiming silhouette and tracks the target. As soon as the target is obscured from view by the screen, and without further command, it is immediately set in motion in the opposite direction. As the target reappears, the gunner re-lays on the aiming silhouette and tracks, using the same range and lead, but conforming to the new direction of travel of the target.

(c) The passage of the target once across the course is known as a "run." A "double run" is a passage of the target once over the course in each direction. The exercise is continued until two double runs are completed, when the next order takes position. Frequent changes of gunners and coaches are advisable to avoid monotony.

(d) As soon as the gunner develops some degree of facility in tracking, he is required to simulate firing four or five rounds during each run of the target. To accomplish this, the order issued for the exercise is modified thus: ALL GUNS ON AIMING STAKE, SIMULATE FIRE, FIVE ROUNDS EACH RUN; then, when all are ready, LEFT FRONT, TANK, SEVEN (FOUR) HUNDRED, ZERO LEAD, COMMENCE FIRING. The gunner engages the aiming silhouettes as before and simulates fire by actuating the firing mechanism. After each firing operation, the loader, No. 2, simulates loading. The gunner disturbs his lay on the target as little as possible by the added operation of firing. The assistant instructor checks the gunner's tracking and firing operations; he must develop in the gunner an ability to track and manipulate the trip lever simultaneously. Accurate and continuous tracking while firing requires skill and coordination. Beginners have a tendency to cease tracking whenever they actuate the trip lever. This tendency can be overcome by careful instruction and practice.

(e) The exercise begins with the target operated

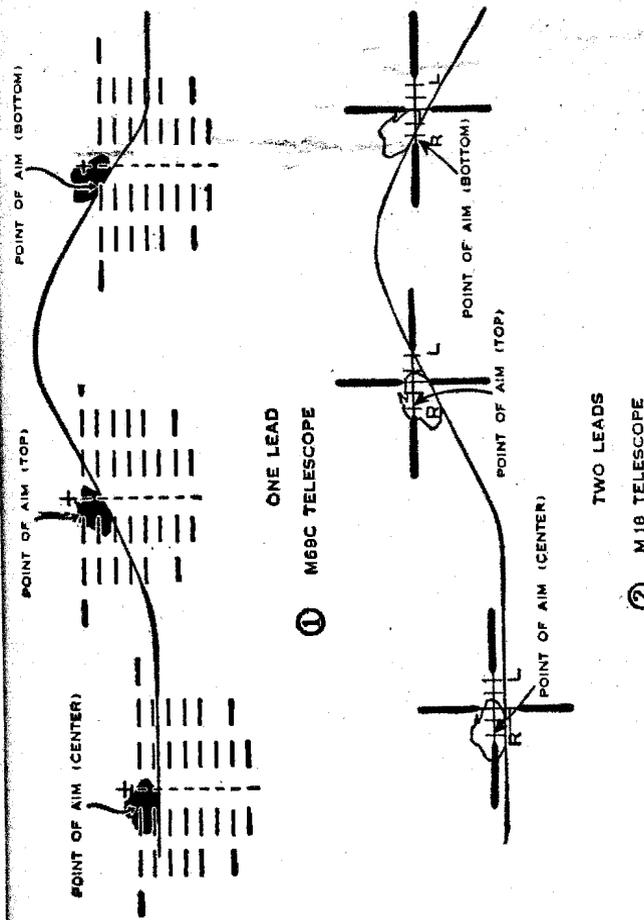


Figure 23. Changes in aiming. Target moving up and down hill, left to right.

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at the slow speeds; only leads having specific markings in the telescope are designated. As the instruction progresses, the target speed is increased and varied. To be proficient, the gunner should be able to track and simulate fire on a target moving at a speed representing 30 miles per hour.

**f. Second exercise.** (1) *Purpose.* The purpose of this exercise is to develop skill in tracking and simulating fire on a target moving over rough ground.

(2) *Procedure.* The exercise is conducted on the hilly course of the 1,000-inch moving target range. The procedure is the same as that described in d above. A change in the sight picture is necessary if the gunner is applying leads to a target moving up or down a hill. (See fig. 23.)

**g. Third exercise.** (1) *Purpose.* This exercise is a modification of the two preceding exercises. Its purpose is to develop the gunner's skill in tracking and simulating fire on successive targets; it represents a situation where the gunner must engage several tanks in rapid succession.

(2) *Procedure.* Either of the courses of the 1,000-inch moving-target range may be used. The sled is equipped with a multiple tank target. The commands for conducting the exercise are modified to indicate which aiming silhouette the gunner is to engage initially, thus: LEFT FRONT, CENTER TANK SEVEN (FOUR) HUNDRED, ONE LEAD, TRACK or COMMENCE FIRING, if firing is to be simulated. When the target appears, the gunner engages the center tank. During the progress of the target over the course, the command to change aiming silhouettes is given thus: TOP RIGHT TANK, or LOWER LEFT TANK. At this command, the gunner ceases tracking the center tank and engages the newly designated tank. Initially, only one or two changes in aiming are ordered during a run of the target; as the men develop skill in manipulation, at least five changes should be made. Changes in speed of the

target and in lead may be made. The gunner's work should be observed carefully and critiqued by the assistant instructor.

## Section VIII. AMMUNITION

**72. GENERAL.** (See TM 9-303). Instruction in ammunition should include the following:

- a. Classification.
- b. Identification and marking.
- c. Mark or model number.
- d. Lot number.
- e. Care, handling, and preservation.
- f. Authorized rounds.

**73. FIRING TABLES.** Firing tables for 57-mm ammunition are issued with each gun. See FM 21-6 for listing of firing tables and information on additional distribution. The following firing tables are printed for use in instruction:

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FIRING TABLES FOR 57-MM GUN M1

Projectile A.P.C., M86 Fuze B.D., M72 MV = 2700 f/s			Shot, A.P., M70 MV = 2950 f/s	
Range	Elevation	Change in elevation for 100 yd. change in range	Elevation	Change in elevation for 100 yd. change in range
yd.	mils	mils	mils	mils
0	3.3	.7	3.4	0.6
100	4.0	.7	4.0	0.6
200	4.7	.7	4.6	0.6
300	5.4	.7	5.2	0.6
400	6.1	.7	5.8	0.6
500	6.8	.8	6.4	0.6
600	7.6	.8	7.1	0.7
700	8.4	.8	7.9	0.8
800	9.1	.8	8.8	0.9
900	9.9	.8	9.7	0.9
1,000	10.7	.8	10.6	0.9
1,100	11.6	.8	11.5	0.9
1,200	12.4	.9	12.5	1.0
1,300	13.3	.9	13.6	1.1
1,400	14.2	.9	14.7	1.1
1,500	15.1	.9	15.9	1.2
1,600	16.0	.9	17.1	1.2
1,700	17.0	1.0	18.4	1.3
1,800	18.0	1.0	19.8	1.4
1,900	19.0	1.0	21.3	1.5
2,000	20.0	1.0	22.9	1.6
2,100	21.0	1.1	24.6	1.7
2,200	22.1	1.1	26.4	1.8
2,300	23.2	1.1	28.3	1.9
2,400	24.3	1.1	30.3	2.1

FIRING TABLES FOR 57-MM GUN M1 (Cont.)

Projectile A.P.C., M86 Fuze B.D., M72 MV = 2700 f/s			Shot, A.P., M70 MV = 2950 f/s	
Range	Elevation	Change in elevation for 100 yd. change in range	Elevation	Change in elevation for 100 yd. change in range
yd.	mils	mils	mils	mils
2,500	25.5	1.2	32.5	2.2
2,600	26.7	1.2	34.7	2.3
2,700	27.9	1.2	37.1	2.4
2,800	29.2	1.3	39.6	2.6
2,900	30.5	1.3	42.3	2.7
3,000	31.8	1.3	45.1	2.8
3,100	33.1	1.3	48.0	3.0
3,200	34.5	1.4	51.1	3.2
3,300	35.9	1.4	54.4	3.3
3,400	37.4	1.5	57.8	3.4
3,500	38.9	1.5	61.3	3.5
3,600	40.5	1.6	64.9	3.7
3,700	42.1	1.6	68.7	3.8
3,800	43.8	1.7	72.6	4.0
3,900	45.5	1.7	76.7	4.1
4,000	47.2	1.7	80.9	4.2
6,955			266.7	
9,275			800.0	
9,840	266.7			
13,555	800.0			

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## Section IX. FIRE ORDERS

**74. GENERAL. a. Types.** Fire orders are of two kinds: initial fire orders, those issued to get the first shot on the way; and subsequent fire orders, those issued to adjust or shift fire.

**b. Elements of initial fire orders in their proper sequence are:**

(1) Ammunition (included only when necessary to specify the type to be used).

(2) Direction.

(3) Description.

(4) Range.

(5) Lead.

(6) Fire control, which includes —

(a) Number of rounds to be fired (only when restriction on number of rounds is necessary).

(b) Time to open fire.

(c) Time to cease fire.

**c. Elements of subsequent fire orders are:**

(1) Correction in range.

(2) Correction in deflection or lead.

(3) To shift fire from one target to another; change only those elements necessary to bring effective fire on the new target.

**75. COMMANDS FOR INITIAL FIRE ORDERS.** It is essential that the commands used convey the squad leader's orders to the gunner and crew with clarity, completeness, and brevity. The use of standard commands eliminates misunderstanding.

**a. Ammunition.** Ammunition is mentioned in the fire order only when a type other than armor piercing is used.

**b. Direction.** (1) Direction is usually indicated by the commands: FRONT; RIGHT (LEFT) FRONT; RIGHT (LEFT) FLANK.

(2) Direction may be indicated by reference to previously established terrain points such as those on the

range card. Examples of such commands would be: RED BARN; LONE TREE; ROAD FORK.

**c. Description.** The description should be very brief and informal. *Examples:* TANK, COMBAT CAR, ARMORED CAR, SCOUT CAR; TANK APPROACHING FROM CLUMP OF BUSHES; TANKS COMING OUT OF WOODS, THIRD FROM RIGHT; LEADING TANK, PILL BOX, MACHINE GUN.

**d. Range.** The range is announced in even hundreds of yards, SIX HUNDRED; EIGHT HUNDRED; ONE THOUSAND; ONE ONE HUNDRED.

**e. Lead.** Leads are announced for all targets thus: ZERO LEAD, ONE LEAD.

**f. Fire control.** (1) *Number of rounds.* When the squad leader desires to restrict the number of rounds fired, this command is announced in the fire order as: FIVE ROUNDS, THREE ROUNDS. After the five (three) rounds are fired, the gunner ceases firing and the loader announces, "Five (three) rounds complete."

(2) *Time to open fire.* The command COMMENCE FIRING will be given by the squad leader when he desires to open fire. To prepare the gun for instant firing but delay opening fire until an opportune time arrives, the command, UPON COMMAND, is given. When the time comes for opening fire, the command COMMENCE FIRING is given. *Example:* RIGHT FRONT, TANKS MOVING UP ROAD, LEADING TANK, ONE TWO HUNDRED, ONE LEAD, UPON COMMAND. The gunner tracks but does not fire on the leading tank. At the desired instant, the squad leader gives the command: COMMENCE FIRING. The platoon leader may employ this method of controlling the time of opening fire, using such control phrases as UPON SIGNAL, OR ON THAT RIDGE LINE. The squad leader issues his fire order and controls the time of opening fire accordingly.

(3) *Time to cease or suspend firing.* Fire may be stopped by the command: CEASE FIRING. The

platoon leader may control the time of arresting fire by such phrases as UPON SIGNAL, OR ON THAT RIDGE LINE; CEASE FIRING; the squad leader controls the fire of his gun accordingly.

**76. COMMANDS FOR SUBSEQUENT FIRE ORDERS. a. General.** The commands prescribed below will be used in ordering corrections in range and deflection.

**b. Corrections in range.** The commands used for ordering range changes are: HIGHER, (LOWER), followed by the amount of range change in yards. *Example:* HIGHER, FOUR HUNDRED.

**c. Corrections in deflection.** The commands used for ordering deflection changes are:

(1) *Moving targets.* ONE LEAD MORE; TWO LEADS LESS.

(2) *Stationary targets.* RIGHT ONE LEAD; LEFT TWO LEADS.

**d. Hit.** Correct range and deflection adjustment is announced by the command HIT.

**e. Shifting fire.** The shifting of fire from one target to another does not require a new initial fire order, but requires only the changing of those elements of the initial fire order which would be incorrect if applied to the new target. The commands used are those already specified for initial and subsequent fire orders.

**77. EXAMPLES OF INITIAL AND SUBSEQUENT FIRE ORDERS.** Since examples to fit all situations are impracticable, the examples on page 81 should be considered as guides:

### Section X. RANGE, SPEED, AND LEAD DETERMINATION

**78. GENERAL.** Accuracy in determining the range to a target, its speed and, ultimately, the lead necessary for the application of effective fire must be acquired by each member of the squad. Each squad member

Initial fire order	Subsequent fire orders			
	1.	2.	3.	4.
1. RIGHT FRONT PILLOX AT EDGE OF WOODS EIGHT HUNDRED ZERO LEAD COMMENCE FIRING	LOWER, FOUR HUNDRED	RIGHT, ONE LEAD	HIT	HIT
2. FRONT LEADING TANK EIGHT HUNDRED ONE LEAD COMMENCE FIRING	NEXT TANK ON RIGHT TWO LEADS	HIGHER FOUR HUNDRED	LOWER TWO HUNDRED ONE LEAD LESS	HIT CEASE FIRING
3. RED BARN TANK SEVEN HUNDRED ZERO LEAD COMMENCE FIRING	ONE LEAD MORE	HIT	HIT	HIT

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should be trained first to determine the range to any target, stationary or moving. Then he should be trained to determine the speed of a target moving at any range and in any direction, thus preparing him for application of the lead table.

**79. RANGE DETERMINATION. a. General.** The most efficient method available to determine the initial range to the target is used. At times ranges may be secured by pacing, measurement by vehicle speedometer, range finders, intersection methods, or by firing. The method usually used is estimation by eye.

**b. Estimation by eye (1) Necessity for training.** Since estimation by eye must be depended upon in combat, each man should be trained in this method. Emphasis should be placed on estimating ranges between 200 and 1,500 yards. Estimations by eye of untrained men are little better than guesses and the average errors of such men will be at least 15 percent of the range. A definite system of range estimation, frequently practiced, is the only way to make estimation by eye sufficiently reliable.

(2) *Application.* (a) Estimation by eye consists of measuring the range by applying to it a unit of measure 100 yards long. This is accomplished by the use of an accurate mental picture of one 100-yard length which the man applies to the distance to the target. When applying the unit of measure beyond 500 yards, it is better to select a point halfway to the target, apply the 100-yard unit up to this halfway point, and multiply the estimated distance by two.

(b) Another very practical method for range estimation is to have the individual develop an accurate mental picture of the apparent size, distinctness, and factors of appearance of tanks and other objects at certain key ranges. The average of a number of estimates by different men will be more accurate than a single estimate.

**80. SPEED DETERMINATION. a. General.** Constant practice in estimating speeds of vehicles is the only method by which the squad can acquire accuracy in speed estimation. Training must include the use of vehicles moving at various ranges, speeds and directions.

**b. Method of instruction.** The squad will be given a demonstration followed by a test, in which vehicles move according to a prearranged plan. Initially, the squad will be shown by demonstration the appearance of vehicles moving at announced speeds and ranges. Then each man will be required to estimate speeds of vehicles moving at various ranges and in various directions.

**81. LEAD DETERMINATION. a. General.** The distance by which a target is led is measured from the point of aim and is equal to the distance the target will travel between the time the projectile leaves the gun and its trajectory crosses the path of the target. It is known as lead and will vary with the speed and path of the target.

**b. Unit of measure.** To compensate for the difference in time of flight of the projectile at various ranges, the telescopes with which this gun is equipped provide measurement of angular leads. (See pars. 68b and 70b.)

**c. Lead determination.** (1) The simple lead table below gives the amount of lead necessary to engage a target moving at a right angle to the line of fire. The lead table is a guide in training. It is not expected that it will be used consciously during actual firing because members of antitank gun squads should be drilled so thoroughly in its use that determination of correct leads becomes second nature.

(2) The angle at which the target is moving will alter the amount of lead to be taken; that is, if the angle between the line of fire and the path of the

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LEAD TABLE

Target moving at right angle to line of fire (mph)	Leads (for all ranges)	
	Telescope M18	Telescope M69C
Slow (less than 10).....	1/2	1
Medium (10 to 20).....	1	2
Fast (over 20).....	1 1/2	3

target is 45° or less, reduce the lead by one half.

(3) For targets moving directly toward or away from the gun, no lead is taken.

(4) The lead table will furnish the amount of lead to be used for the first round; necessary corrections thereafter should be based upon observation of strike or tracer.

CHAPTER 4

TECHNIQUE OF FIRE

Section I. GENERAL

**82. DEFINITION AND SCOPE.** Technique of fire with the 57-mm gun M1 is the delivery of effective fire upon a target. It requires thorough knowledge of the gun and ammunition and a high state of proficiency within the squad in preparatory gunnery training. The squad must be able to function with precision, teamwork, and speed before proceeding into this phase of training. Since direct fire only is employed, technique of fire will be considered in relation to two general types of targets, in the following sequence.

a. Stationary and moving targets with considerable vertical profile, such as armored vehicles.

b. Stationary targets with little or no vertical profile, such as tanks in hull defilade, dug-in and concealed antitank guns and machine guns.

**83. OBSERVATION OF FIRE.** Technique of fire consists principally of fire adjustment, requiring close cooperation between the squad leader (observer) and the gunner. The 57-mm gun has a muzzle blast at the mount which blinds the gunner and prevents him from observing the trace or strike of his round. The amount of blinding caused by muzzle blast varies with the nature of the soil, light conditions, and direction and force of the wind. Because of this blinding, it is necessary for the squad leader to observe for the gunner, sense the trace or strike of the round, and adjust the fire. He accomplishes this by stationing

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himself outside the limits of the blast wherever possible and adjusting the fire by the commands prescribed in section IX, chapter 3, and the procedure outlined in the sections below.

## Section II. STATIONARY TARGETS WITH VERTICAL PROFILE

**84. GENERAL.** This part of technique of fire includes the initial laying, and the use of trajectory in sensing and subsequent laying on stationary targets with vertical profile. This discussion is restricted to stationary targets although the principles apply to moving targets as well. Moving targets are discussed in section III.

**85. INITIAL LAYING.** The squad leader, having determined the initial data to the target, incorporates these data in a fire order to the gunner. The gunner lays the appropriate aiming point of the telescope reticle on the center of mass of the visible portion of the target. At very short ranges, the point of aim may be shifted to a vulnerable spot on the target (fig. 26) such as a lightly armored point on a tank.

**86. SENSING AND SUBSEQUENT LAYINGS. a. General.** Each member of the squad must be trained to observe in order to understand methods of adjusting fire and must be able to bring effective fire on a target. The adjustment of fire consists of sensing the range and deflection error of the strike or trace of the projectile with relation to the target, and announcing the range and deflection correction necessary to bring the strike on the target. When a round penetrates armor plate, a red flash is produced. When a round strikes masonry, ground, or wood, a pattern of striking fragments surrounds the strike. Sensing the strike on targets of this kind is easy. However, a strike on

targets which give off no visible indication of the strike such as cloth targets used in training is not easy to sense. Sensing in the latter case and in the case of rounds which miss the target depends upon observation of the trace of the projectile at the moment it passes the target.

**b. Use of the trajectory.** The path of the projectile may be considered a rigid curve, pivoted at the gun and capable of being raised or lowered about its pivot by elevating or depressing the gun. The trajectory of the 57-mm projectile is relatively flat, its maximum ordinate for a range of 1,000 yards being 61½ feet. For this reason, a round which passes a target at the correct elevation, but wrong deflection, travels far beyond and to the right or left of the target before it strikes the ground (unless the ground rises sharply in the vicinity of the target.) Figure 24 illustrates the paths of the trajectories of three rounds fired so as to strike the tank at three points in its vertical plane. Each round, if deflection is correct, is a hit on the tank. However, if deflection is not correct, each round passes the tank and strikes the ground somewhere beyond and to the right or left of the tank.

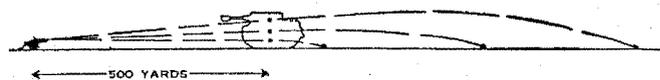


Figure 24. Path of trajectory.

**c. Sensing for range.** Because of the flat trajectory of the projectile, if a round fired is high or low, the squad leader can be practically certain that by making a range change of 400 yards and using the correct deflection, a hit can be secured with the subsequent round. The squad leader should keep his eyes focused on the target and determine by the trace or strike of the projectile whether the round was high or low.

**d. Sensing for deflection.** In sensing for deflection,

the squad leader is guided by the same considerations used in sensing for range. If a round strikes the target, but not at the point of aim, the squad leader senses the deflection error in leads and direction (right or left) it must be moved to hit the desired point on the target. If there is no indication of a strike, the squad leader with his eyes focused on the target senses, in leads, the error of the trace right or left of target center.

**e. Subsequent laying.** (1) Once fire has been opened with the 57-mm gun it is essential that fire be continued and adjustment be made rapidly to destroy or neutralize the target, or shift fire to a new target. In any case, where a new initial fire order is not necessary, fire can be continued, adjusted, or shifted by the commands prescribed for subsequent fire orders in section IX, chapter 3. The resulting subsequent laying is made on the knowledge of the laying used in firing the last round of the preceding fire order and may consist only of correction in one or two elements of the preceding order.

(2) If a round fired at a target is an effective hit the squad leader commands: HIT and the gunner continues firing with the same laying until directed by the squad leader to change targets or cease firing.

(3) If a hit is not effective and must be adjusted to be effective, or if a round fired is a miss, the squad leader orders adjustment by the commands HIGHER (LOWER) FOUR HUNDRED; LEFT (RIGHT) ONE (TWO) LEAD. This adjustment immediately follows the firing of the round. The gunner applies the ordered adjustment to the laying with which the round was fired, making correction if necessary for faults which existed in his last sight picture. The gunner must be trained to call each shot mentally at the moment of firing in order that the correct adjustment will be made. He must know exactly how the gun was laid, for it is on these data that the corrections in range and deflection are made.

(4) (a) If the first round fired on a target is high and a miss, a range change of 400 yards lower is made. If the second round is low, a range change of 200 yards higher is made. Range changes of 100 yards rarely will be made.

(b) If the first round fired is a target hit, but not an effective hit, the squad leader may make an original range change of 200 yards to secure an effective hit.

(5) Deflection corrections, where needed, will be determined by sensing in leads as described above. Movement of the strike of the projectile on a target is shown in the following table:

EFFECT OF ONE-LEAD CHANGE

Ranges (yards)	Movement of strike (feet)	
	Telescope M18	Telescope M69C
500.....	13.3	7.5
1,000.....	26.7	15

The squad leader announces to the gunner, the deflection shift necessary as, "Right one lead; left one-half lead."

### Section III. MOVING TARGETS

**87. GENERAL.** Except for minor changes in the technique of initial laying and subsequent laying, the principles set forth in sections I and II apply generally to moving target firing.

**88. INITIAL LAYING.** The squad leader determines the

initial data to the target and issues a fire order to the gunner. The gunner lays the appropriate aiming point of the telescope reticle on the center of the mass of the visible portion of the target. The gunner traverses smoothly and does not stop tracking when he fires.

**89. SUBSEQUENT LAYING. a. General.** As in stationary target firing, the laying with which the last round was fired will be the basis for every adjustment. The gunner must continue to look through the telescope and track the target as the gun is fired so that he will know the sight picture he used at the instant of firing. The gunner uses this information in subsequent laying as he is given adjustments by the squad leader.

**b. Subsequent fire orders.** Corrections in range in subsequent fire orders for moving targets are identical with those for stationary targets. However, deflection corrections, in terms of leads, are announced as, "One lead more, two leads less."

#### Section IV. TARGETS WITH LITTLE OR NO VERTICAL PROFILE

**90. GENERAL.** The application of fire to targets with little or no vertical profile, or to small fixed targets is governed generally by the same principles used in firing on targets with vertical profile. (See secs. II and III.) Such targets may be tanks in hull or turret defilade, concealed and dug-in antitank and machine guns, or pill boxes.

**91. INITIAL LAYING.** The squad leader, having determined the initial data to the target, incorporates them in a fire order to the gunner. The gunner places the appropriate aiming point of the telescope reticle

in the center of the visible mass of the target exactly as in firing at targets with large vertical profile. If the target is small and obscure and oral designation is difficult, the squad leader lays the gun for the gunner, and issues a complete initial order.

**92. SENSING AND SUBSEQUENT LAYING (fig. 25). a.** Sensing the trace or strike of the projectile and its relation to a target with little or no vertical profile is the same as on a target with vertical profile.

**b. (1)** In general, training in subsequent laying on this type of target follows the same pattern as that outlined in section II. However, adjustment of fire on a target with little or no vertical profile usually involves bracketing. A bracket is obtained on a target when two consecutive rounds fired with different range settings are sensed high and low, respectively, with relation to the target. If the first round fired is sensed high, and the second round, fired with a range change of 400 yards lower, is sensed low, then the target is bracketed within a 400-yard bracket. To bring the next round closer to the target it is fired

#### BRACKETING

#### STATIONARY TARGET WITH LITTLE OR NO VERTICAL PROFILE

COMMANDS	RESULTS	SENSINGS
(1) FRONT PILLBOX EIGHT HUNDRED ZERO LEAD COMMENCE FIRING		(1) LOW
(2) HIGHER FOUR HUNDRED		(2) HIGH
(3) LOWER TWO HUNDRED		(3) HIT

Figure 25. Adjustment of fire.

with a 200-yard change into the center of the bracket. This is known as splitting the bracket. If an effective hit is not obtained with this round the bracket is split again.

(2) Situations may arise when it is possible to make a 200-yard range change to establish a bracket and thus place fire on a target more quickly with a saving of ammunition. A general rule to follow in determining the use of a 200-yard bracket or a 400-yard bracket is:

(a) At short ranges, when it is possible to determine positively that a range change of 200 yards will bracket the target or produce an effective target hit on the second round, use a 200-yard range change.

(b) At long ranges, when sensing of the trace or strike of the projectile is not positive, always use a 400-yard bracket.

(3) Deflection correction is ordered by leads, or half leads, right or left, according to the amount and direction of deflection error sensed. Once the correct deflection is obtained it should not be necessary to make further changes while firing on the same target.

### Section V. NIGHT FIRING

**93. GENERAL.** The principles outlined in sections I to IV, inclusive, apply in general to night firing. However, laying at night must be accomplished by means of the lighted reticle and flares or lights and sensing depends almost entirely on observation of the trace of the projectile.

**a.** The following method for firing antitank weapons at night has been successfully employed.

(1) Guns are placed in selected positions and sighted. All possible lines of approach or "tank runs" are located and marked down. Mines are laid to cover these approaches.

(2) An "illuminating party," equipped with flares

and projectors, establishes an observation post well forward and to the flank. This party must make a flare reconnaissance to insure that the flares used will not cast shadows on the likely lines of approach and will, wherever possible, light up the background so as to silhouette the target against its background.

(3) As soon as the sound of approaching tanks is heard, the pieces are loaded, elevation set at normal ranges according to knowledge of the approaches, and pieces set at safety. The illuminating party fires flares at 5-second intervals, continuing the firing of flares as the situation requires. The guns then engage the approaching tanks, firing as the flares reveal the position of the targets.

**b.** Other techniques of employment of flares or lights may prove practicable.

### Section VI. CONDUCT OF FIRE

**94. DEFINITION.** Conduct of fire consists of all operations connected with the preparation and the actual application of effective fire upon targets.

**95. SECTOR OF RESPONSIBILITY. a.** The platoon leader will assign a definite sector of responsibility to the squad leader; the squad leader is responsible for continuous observation of this sector and for taking under fire hostile armored vehicles and other appropriate targets which appear at effective range therein. However, fire is not restricted to the sector of responsibility but will be placed on any appropriate target which constitutes a threat to the flanks or rear when tanks are not operating in the sector of responsibility.

**b.** The platoon leader also assigns a principal direction of fire for each gun within its sector in order to insure that the most likely avenues of tank approach are covered effectively, and to coordinate the fire

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of all guns for the best defense of the unit. The squad leader is responsible for placing the gun in firing positions (primary or alternate) so that it can fire in the assigned *principal direction without shifting the trails*.

c. When sectors of responsibility are assigned, any fire control to be exercised by the platoon leader must be carefully arranged for in advance of the fire fight. During the fire fight, the platoon leader will, as a rule, convey orders to the guns by signal; it is therefore essential that any signals to be employed are understood by all concerned.

**96. OBSERVATION.** Before, during, and after firing, each squad leader is responsible for continuous observation of the battlefield. A system of observation within each gun squad must be established and maintained with every available means. The squad leader may assign various members of his squad to observe for targets. After fire has commenced, these duties must be continued to permit early detection of new targets. In addition to their regular duties, No. 5 may be detailed to observe to the left and left rear and No. 6 to the right and right rear. Individuals in observation must know the mission of the most advanced friendly troops, where they are located, and whether friendly tanks have been or will be employed.

**97. FIRE CONTROL. a. General.** After the gun is placed in the firing position, the squad leader takes a position outside the area of the muzzle blast from which he can control the fire of the gun. He determines the initial data necessary to engage the target, and issues a fire order. He controls each round fired by following the procedure outlined in section I, II, III, and IV.

**b. Selection of targets.** Within his assigned sector, each squad leader is permitted to select his targets. Fire control by platoon leaders is exceptional.

**c. Time to open and cease fire.** (1) The correct time to open fire is very important and at times difficult to determine. Fire may be controlled by the platoon leader; more often, however, the decision is made by the squad leader. Excellent fire discipline on the part of the gun squad is essential. Effective fire depends upon concealment and surprise; to secure maximum effect, fire may be withheld on a moving armored vehicle until there is a reasonable certainty of getting a hit with the opening round. *Normally, with the 57-mm gun, fire will not be opened against tanks at ranges greater than 800 yards.* Often it may be desirable to track the target when it first appears and delay the opening of fire to await a more opportune time. Frequently the enemy will seek by means of ruse or feints to draw fire prematurely and enable hostile observers to locate the gun position. When it is located, enemy supporting weapons will attempt to neutralize it by fire or smoke. If fire is opened too late, the gun crew will not have time to combat the successive moves of tanks. To stop tanks quickly, every effort should be made to engage them so that vulnerable points are brought under fire. The most vulnerable areas are the sides, tracks, traction system mechanisms, and bellies. The turrets and front are the most heavily armored. (See fig. 26.) Therefore, flanking fire is preferred to frontal, and fire should be adjusted so that hits are obtained on the most vulnerable points.

(2) When a tank has been stopped, one more round should be fired into it before another target is engaged. However, no effort should be made to destroy a partially disabled tank as long as a mobile tank is within range, unless the disabled tank is firing upon friendly troops.

**d. Rate of fire.** The rate of fire will be determined by the number, range, and visibility of hostile tanks; and by the varying effect of muzzle blast. At more distant ranges, the rate of fire will be slow due to the

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difficulty in accurately tracking the target. At close range, tanks must be fired on with great rapidity to prevent a breakthrough. The ammunition supply may prove the determining factor.

**e. Action when fire mission is completed.** If operating independently, the gun is immediately withdrawn to the cover position after accomplishing its fire mission. If the situation requires or permits, a change of position is made. If operating under fire control of the platoon leader, these moves are made only upon his order.

**98. SHIFTING OF FIRE.** **a.** When a hit is made, the squad leader calls, "Hit." The gunner continues to fire at the target until directed by the squad leader to change target, or cease firing. When tanks are in an attack formation, the leading enemy vehicle within the assigned sector should be engaged first; however, command vehicles should receive priority. Engaging the leading vehicles of an enemy column passing along a road in order to block the road is effective.

**b.** If the situation so requires (for example, when a command vehicle or tank is recognized or a particular tank is approaching dangerously near), the squad leader may order an immediate change of target by calling, for example, "Third from the right."

**c.** If tanks suddenly appear from a new direction and threaten to overrun the firing position, it may be necessary to shift the trails to meet this threat. The command **NEW DIRECTION LEFT (RIGHT) WHITE HOUSE, TANK, THREE HUNDRED, ZERO LEAD**, is given. The gun is swung in the new direction and firing continues.

**99. VULNERABLE PARTS OF A TANK** (fig. 26). Anti-tank gunners must be thoroughly familiar with the military characteristics of all tanks likely to be encountered in their sectors so that they can apply immediate effective fire to the most vulnerable portions

of the tank, when possible. Hits on the traction system (fig. 26 ①) will usually immobilize the tank making it an easy target. Hits at the junction of the turret and hull (fig. 26 ②) will either jam the turret mechanism or blow the turret off the hull. Hits below the fender line (fig. 26 ③), where the side armor plate is thinnest, will penetrate into the crew compartment, kill the crew, and ignite the ammunition in the turret basket. Penetration of the gasoline tanks (fig. 26 ④), will set the tank afire and force the crew to abandon the vehicle. Penetrations can be made at the ventilating points (fig. 26 ⑤). A hit on the vision slits (fig. 26 ⑥) blinds the crew and renders the tank helpless. Top and bottom plates (fig. 26 ⑦) are of the thinnest armor and should be fired on if possible. Points marked X in the figure are of the heaviest armor plate.

**100. AUXILIARY AIMING POINT.** **a. General.** Situations may arise when the use of an auxiliary aiming point is necessary for the delivery of effective fire on a target. For use with the 57-mm gun M1, the aiming post M1, and the aiming post light M14 are provided. Discussed below are suggested methods of firing by sighting on the aiming post.

**b. When the gun is not in position.** (1) The squad leader selects the gun position and marks the approximate position of the telescope by driving a section of the aiming post in the ground directly below the position of the telescope. He then directs No. 1 to take another section of the aiming post and move approximately 100 feet toward the target from the gun position. This distance should be measured as accurately as the situation permits.

(2) Sighting over the aiming post at the gun position, the squad leader aligns the forward post on the line of sight to the target. Marking this alignment, No. 1 moves the aiming post approximately 24 inches

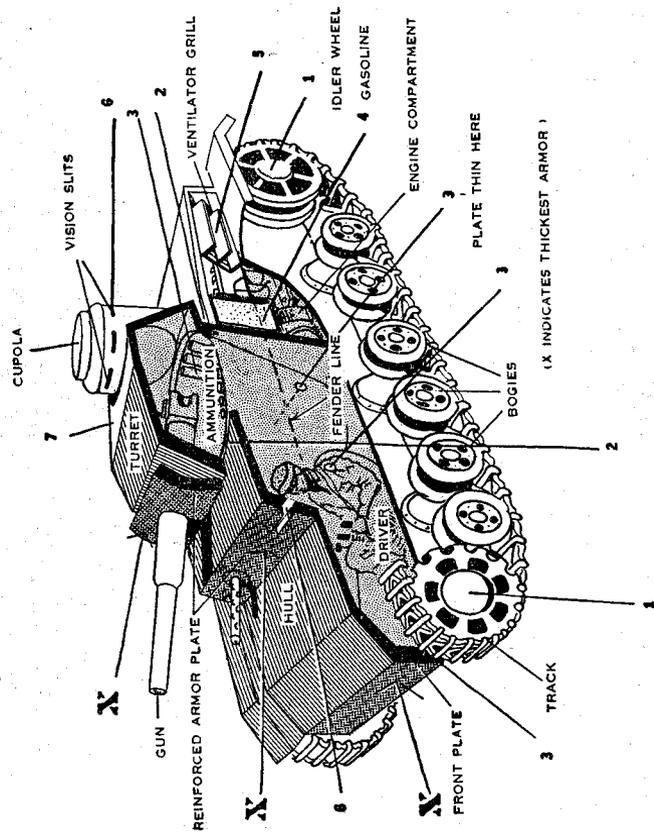


Figure 26. Vulnerable parts of a tank.

to the left of the line of sight to the target and drives the post in the ground.

(3) The squad leader measures approximately 12 inches to the right of the aiming post at the gun position and drives a stake indicating the position of the gun pintle when the gun is in position. He removes the aiming post at the gun position.

(4) When the gun is moved into position, the pintle is placed over the stake. Fire is opened and adjusted on the target by the squad leader. When a hit is obtained the gunner re-lays on the target and records the laying on the aiming post which appears on the telescope reticle. A confirming round is fired with the laying on the aiming post to insure that adjustment is correct.

**c. When the gun is in position and a hit has been obtained.** (1) Place the sight picture on the target so that the gun is laid as it was to obtain the last hit.

(2) No. 1, looking through the telescope, directs No. 2 to place the aiming post approximately 100 feet in front of the gun and in line with the 20 mil (or approximately 20 mil) marking to the left of the center of the reticle.

(3) For subsequent firing on the same target the gunner uses as his point of aim the marking on the aiming post which gives the proper range.

**d. When visibility is poor.** When visibility is poor, the point of aim on the aiming post is marked by the aiming post light.

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CHAPTER 5

SUBCALIBER FIRING

Section I. GENERAL

**101. PURPOSE AND SCOPE.** *a.* The purpose of subcaliber firing is to give the gunner a close-up picture of the effect of each round fired and demonstrate the necessity for accurate laying in order to obtain hits on a target. During this training phase, the gunner learns uniform gun laying and firing. Each exercise should be critiqued with the emphasis on shooting for a good shot group.

*b.* Subcaliber firing includes 1,000-inch range and long-range field firing, initially for instruction practice and later for record practice.

*c.* Because two telescopes, with different units of lead, are issued for this gun, each telescope requires a different target in 1,000-inch moving target firing. Targets for each telescope are included in section III. The course to be fired using either telescope is included in section II.

**102. PROFICIENCY TEST.** Prior to subcaliber firing, all men will be trained thoroughly in the preceding steps of gunnery and will be required to earn a satisfactory credit in the gunner's proficiency tests. (See sec. II, ch. 7.)

Section II. QUALIFICATION COURSE

**103. GENERAL.** *a.* Each member of a squad equipped with the 57-mm gun M1, will fire the course given

below for qualification. Qualification scores are given in paragraph 115, as authorized in AR 775-10. For records and reports, see section II, Circular No. 265, War Department, 1943.

*b.* Rules governing the firing of the qualification course for record practice are prescribed in paragraph 114.

*c.* All moving target firing prescribed in this section, except table V, will be conducted on a 1,000-inch moving target range. The caliber .22-.30 subcaliber mount, M6, with modification for the 57-mm gun, bearing the caliber .22 subcaliber rifle M2A1 as issued by the Ordnance Department will be used for all firing on the 1,000-inch range. Stationary target firing, table I, may be conducted on a 1,000-inch range or other firing areas which meet safety regulations prescribed in AR 750-10.

*d.* The firing of tables I, II, III, and IV, using the M18 telescope, will be executed at an assumed range of 700 yards. The firing of tables I, II, III, and IV, using the M69C telescope, will be executed at an assumed range of 400 yards.

*e.* Firing on the field range will be executed as specified in paragraph 121, with caliber .30 tracer ammunition, fired from the caliber .30 subcaliber rifle M1903A2, mounted in the subcaliber mount, M6 modified. For type of target see paragraph 118.

**104. COURSE A.** *a. Instruction practice.* Fire tables I to V, inclusive, three times.

*b. Record practice.* Fire tables I to V, inclusive, once.

Table I. Stationary manipulation course, 1,000-inch (stationary gun—stationary target) Target C

Number of rounds	Time, seconds	Maximum score
5	31	20
5	31	20

Table II. Level course, 1,000-inch (stationary gun—moving target) Target A

Number of rounds	Speed, inches per second	Time of traverse, seconds	Lead	Maximum score
5	16	31	1	25
5	16	31	1	25
5	24	21	2	25
5	24	21	2	25

Table III. Hilly course, 1,000-inch (stationary gun—moving target) Target A

Number of rounds	Speed, inches per second	Time of traverse, seconds	Lead	Maximum score
5	12	41	0	25
5	12	41	0	25
5	16	31	1	25
5	16	31	1	25

Table IV. Level manipulation course, 1,000-inch (stationary gun—moving target) Target B

Number of rounds	Speed, inches per second	Time of traverse, seconds	Lead	Maximum score
5	12	41	0	25
5	12	41	0	25
5	16	31	1	25
5	16	31	1	25

NOTE. Targets will be run successively from left to right and right to left in tables II, III, and IV.

Table V. Field range (stationary gun—moving target) Target D

Range	Number of rounds	Speed	Lead	Direction of movement of target
Moving on a diagonal from 600 yards to 400 yards.	12	15 miles per hour.	As necessary.	Left to right back to left twice. Exposed 25 seconds 3 rounds each run.

### Section III. CONDUCT OF 1,000-INCH RANGE INSTRUCTION AND RECORD PRACTICE FIRING

**105. GENERAL.** This section includes discussion of the ranges and targets to be used and the method of conducting instruction and record firing on the 1,000-inch range.

**106. 1,000-INCH RANGE.** Ranges are constructed to specifications in TM 9-855 and in accordance with safety restrictions prescribed in AR 750-10. A single range unit is necessary for each three-gun platoon. Two of these range units per platoon will facilitate the conduct of 1,000-inch firing. A range unit consists of two runways, one level and the other hilly, on which a sled target moves to simulate the various movements and speeds of probable combat targets. The sled is moved by a wire cable which runs from a hand-operated drum through a system of pulleys. The wire cable is fastened to both ends of the sled. An aiming stake should be placed midway between the two screens and close to the track. Preparation of the range for stationary target firing is explained in paragraph 109.





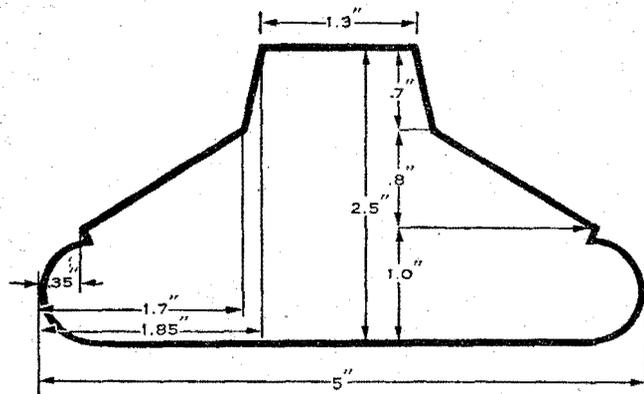


Figure 30. Full-scale aiming silhouette for use in improvising 1,000-inch targets.

**109. 1,000-INCH STATIONARY TARGET** (fig. 31). The target (target C), which must be improvised locally, consists of five 5-inch squares of pasteboard mounted on uprights at the same height from the ground as the level of the axis of the gun and at a distance of 1,000 inches from the gun pintle. Intervals between targets will vary. However, the overall width will not exceed 25 feet for the five targets. Each of the five targets will be numbered, No. 1 target in the center of the group.

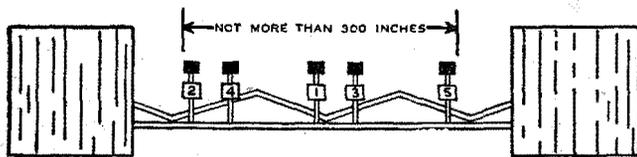


Figure 31. Target C. constructed on 1,000-inch range unit.

**110. DUTIES OF PERSONNEL.** **a. Officer in charge.** The officer in charge of range practice, detailed by the unit commander, is responsible for —

(1) Assignment, coordination, and supervision of ranges and firing areas.

(2) Timely arrangements with the range officer for repairs or alterations of installations.

(3) Procurement of supplies for firing units.

(4) Enforcement of safety precautions prescribed herein and in AR 750-10.

(5) Interpretation of such parts of this manual as may be referred to him for decision.

**b. Range officer.** The range officer is normally a member of the unit or post commander's staff. He is responsible for —

(1) Procurement and distribution of range supplies.

(2) Supervision of construction, alteration, or repair of range installations.

(3) Establishment of safety limits of ranges and coordination of firing to comply with the provisions of AR 750-10.

**c. Company commander.** (1) The company commander is responsible for the efficiency of the marksmanship training of his organization and the conduct of its firing in accordance with the provisions of this manual.

(2) He, or his commissioned representative, will supervise and control all firing personally. He will give, or cause to be given by his representative, appropriate fire orders and signals for firing and for movement of the target(s). The commands LOAD, COMMENCE FIRING, CEASE FIRING, CLEAR GUN, and CHANGE TARGETS, will be given for each order.

(3) During all firing, he, or his commissioned representative, will enforce rigidly local range regulations, safety precautions and instructions pertaining to the service of the piece prescribed herein.

**d. Scoring officers.** (1) Scoring officers will be detailed to supervise record practice firing. Officers for this duty will be detailed from organizations other than the one firing. They will familiarize themselves thoroughly with their duties and the firing procedure

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on the 1,000-inch range prior to the date of record practice firing. The number of scoring officers detailed during record practice firing will be not less than one for each 1,000-inch range unit being operated.

(2) Specific duties of the scoring officers are to —

(a) Inspect loaded magazines and count number of rounds of ammunition to be fired by the gunner for each exercise.

(b) Check dimensions of the targets, aiming silhouettes, and scoring spaces, and see that the range is laid out as prescribed.

(c) See that firing is conducted in accordance with the prescribed procedure.

(d) Verify and render decisions on all misfires, stoppages, and malfunctions at the guns.

(e) Render a decision in event of breakage or stoppages in any of the range apparatus or mechanism.

(f) Inspect each target before it is placed on the sled. Make sure that initially it contains no shot holes and that, after being fired on, it has no unpasted holes before being used for another exercise.

(g) Count the number of shot holes in appropriate scoring space for each exercise fired, score target (s), and record the score.

(h) Check time of exposure of target on each run, and render a decision in event of irregularities.

**e. Assistant instructor.** (1) During all preparatory training and instruction firing, an assistant instructor will be present at each gun to instruct and assist the gunner. His specific duties are to —

(a) Require each man to observe all pertinent individual and general safety precautions, and see that he complies with the instructions pertaining to the service of the piece.

(b) See that the proper amount of ammunition is at the gun and that magazines are loaded with the specified number of rounds for each exercise.

(c) Supervise generally the work at the gun, mak-

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ing sure that the commands LOAD, COMMENCE FIRING, CEASE FIRING, UNLOAD AND CLEAR GUN, and CHANGE TARGETS, are executed properly; to repeat orders or instructions when necessary to insure correct understanding and timely execution by the gunner (No. 1) and loader (No. 2).

(d) See that the gunner executes the firing exercises in accordance with prescribed procedure.

(e) Report all misfires, stoppages, malfunctions, or discrepancies to the officer conducting firing.

(f) Score the target when directed and discuss the execution of the exercise (during instruction practice only) with the gunner.

(2) During record practice firing the assistant instructor will not be present at or near the gun. Except under the conditions prescribed in g below, no coaching of the gunner will be permitted.

**f. Loader.** (1) The primary duty of the loader (No. 2) is to serve the piece during all firing exercises. During instruction practice, he may perform additional duties at the gun or act as an assistant coach in accordance with orders of the assistant instructor. *During record practice firing, he does not coach or instruct the gunner in any way.* (See g below.)

(2) Specific duties of the loader are to secure and have ready for use at the gun the prescribed number of magazines properly loaded for each exercise. He serves the piece as follows:

(a) Loads the subcaliber rifle in accordance with the commands of the officer conducting firing.

(b) When the rifle is loaded and ready to fire, reports, "Up" to the gunner, and when the gunner is ready to begin the exercise, signals, "Ready" to the officer conducting firing.

(c) Repeats all orders to unload, cease firing, and clear gun, and sees that the orders are complied with as described in paragraph 41.

(d) Announces, for the gunner's benefit, when the prescribed number of rounds for each run of the

target has been fired, thus, "Five rounds complete."

(3) He reports all misfires and malfunctions or stoppages to the assistant instructor (scoring officer during record practice firing). During instruction practice firing, in case of a misfire, he immediately re-cocks the rifle without command by raising the bolt handle and attempts to ready the gun for firing as quickly as possible. In case of a minor malfunction or stoppage, such as failure to feed another round into the chamber when the bolt is operated or failure to extract, he remedies the condition without command and as quickly as possible. In case of a misfire, stoppage, or minor malfunction during record practice firing, he proceeds as described in paragraph 114k.

(4) He reloads the gun without command, upon the completion of a run of a moving target.

(5) He exchanges targets on the sled as directed. To expedite operations, he may be assisted in this duty by another member of the squad. At the command CHANGE TARGETS, he secures the target that has been fired on from the sled and returns it to the assistant instructor (scoring officer in case of record practice firing), and sets up the new target.

**g. Coaching.** Coaching is permitted during record practice firing for the period in which no additional compensation for arms qualification is authorized. The following exceptions are made:

(1) The coach will not use any mechanical aid, such as an aiming device to assist the gunner.

(2) The coach will not touch any part of the gunner's body while the gunner is sighting or firing.

**h.** When additional compensation for arms qualification is authorized, the provisions of e (2) above will be effective.

**111. GUNS, MOUNTS, AND TELESCOPES.** **a.** The gun, subcaliber mount, telescopes, and .22 subcaliber rifle will be used as issued by the Ordnance Department

without addition or modification, except as authorized in paragraph 21.

**b.** Before marksmanship firing is begun, each gun, mount, telescope, and all accessories to be used will be examined thoroughly and repaired or adjusted to insure efficient functioning. Excessive play will be removed from the guns and mounts, and adjustments made to permit smooth manipulation.

**c.** Prior to firing, the gun will be targeted carefully for 1,000-inch firing according to the following procedure:

(1) *Telescope M69C.* (a) Place a blank target in the middle of the level course.

(b) With the gun in position on the 1,000-inch firing line, fire three rounds into the blank target without changing the laying of the gun.

(c) Mark the center of the shot group so that it is visible through the telescope, and without changing the laying of the gun, move the telescope by means of the vertical and horizontal collimation drums so that the 400-yard aiming point along the column of vertical lines is laid on the center of the shot group. Tighten the lock nuts.

(d) Check the sighting by firing three more rounds at another point on the target, and by checking to see that the 400-yard-range aiming point is laid on the center of the shot group. If it is not, move the telescope again without changing the laying of the gun.

(2) *Telescope M18.* (a) Set the range quadrant at 700, and do not change this setting until firing is completed.

(b) Place a blank target in the middle of the level course.

(c) With the gun placed in position on the 1,000-inch firing line, fire three rounds into the blank target without changing the laying of the gun.

(d) Mark the center of the shot group so that it is visible through the telescope and, without changing the laying of the gun, move the telescope by means of

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the adjusting screws until the intersection of the vertical and horizontal cross hairs is laid on the center of the shot group. On some guns it may be necessary to place a thin washer around each of the two rear bolts between the telescope mounting bracket and the elevating mechanism bracket, in order to get enough right deflection. Tighten the jam nuts.

(e) Check the sighting by firing three more rounds at another point on the target and by checking to see that the cross hairs are laid on the center of the shot group.

(3) The telescope with which the gun is to be equipped during marksmanship firing will be used for targeting.

d. *After 1,000-inch firing has been completed, the gun will be boresighted immediately.*

**112. AMMUNITION.** Ammunition in the amounts shown in the table for each score will be loaded in magazines and inspected before firing. For long-range subcaliber firing tracer ammunition will be used.

**113. PROCEDURE FOR FIRING. a. General.** (1) All firing will be controlled by definite fire orders.

(2) During the initial phases of instruction firing, the officer conducting firing may, at his discretion, reduce the speed of the target and the number of rounds fired from those prescribed in the tables. The object of this procedure is to place emphasis initially upon smooth continuous tracking.

(3) For moving targets, a run of the target across the course once in each direction at the same speed will constitute an exercise. For stationary targets, an exercise includes two time intervals in which the gunner fires a total of 10 rounds at stationary targets, 5 in each interval.

(4) Exercises are fired in the order in which they are listed in the tables.

(5) During instruction firing only, when time is

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available, the firing of each table may be preceded by one or more dry runs.

**b. Organization.** For functional purposes, an organization similar to that described in tracking and simulated firing training (par. 71) is suggested. The organization must be modified to meet the requirements of firing live ammunition. During instruction firing only, one group of two guns may fire on each range unit, if targets permit.

**c. Duties.** All personnel will perform the duties prescribed in paragraph 110. During instruction firing, an assistant instructor, gunner (No. 1), and a loader (No. 2) will be at each gun. A third man from each squad may be assigned the duty of loading magazines and furnishing them to the loader. A line of small loading benches placed a short distance (about 5 yards) in rear of the guns will facilitate loading and assure a prompt supply of ammunition to the guns. Other members of the squads may be employed in operating the range and preparing targets for firing.

**d. Instruction practice firing (moving targets).** Before firing on the 1,000-inch range, the officer conducting firing will give a general description of the range and announce specific instructions pertaining to firing procedure.

(1) Guns are placed on the firing line with the pinules 1,000 inches from the rear of the level course. Guns are placed to the right and left of the center stake (par. 106) and as close together as the spread of the trails will permit.

NOTE. For all 1,000-inch range firing, the trail spades must be dug in so that the saddle (top carriage) bracket of the gun carriage is level. Leveling the saddle (top carriage) bracket permits the gun to be traversed in a true horizontal plane without the use of the elevating mechanism. The firing supports will be in position.

(2) No. 1 gun is assigned the portion of the target

marked "1". No. 2 gun is assigned the portion of the target marked "2".

(3) The assistant instructor, gunner, and loader take positions at the gun. The gunner tests the firing, elevating, and traversing mechanisms. The loader secures the necessary ammunition.

(4) When all guns are prepared for firing, all safety precautions having been taken previously, the officer conducting firing gives the fire order.

(5) An example of the sequence of a fire order is as follows:

(a) GUNS ON AIMING STAKE, TWO MAGAZINES, FIVE ROUNDS EACH, LOAD. At these commands, the gunner aims at the aiming stake and the loader reports, "Up" when the gun is loaded and ready to fire. When the gunner is ready to begin the exercise, he so indicates to the loader who signals, "Ready."

(b) In the meantime, for moving targets, the officer conducting firing will have specified to the timekeeper at the drum the course to be traveled by the target and the time of exposure for the exercise.

(c) When all guns have signaled, "Ready," the officer conducting moving-target firing will give a signal to start the target and simultaneously order: LEFT FRONT, TOP (RIGHT, LEFT) TANK, SEVEN (FOUR) HUNDRED, ZERO (ONE, TWO) LEAD (S), COMMENCE FIRING.

(6) As the phrase LEFT FRONT of the fire order is given, the gunner will start traversing toward the left of the range. Upon the appearance of the target from behind the screen, he will engage it, using the announced range and lead, aiming on the announced black silhouette, and firing the number of rounds contained in the magazine. The loader will announce, "Five rounds complete (or appropriate number)" when the magazine is empty. For training purposes, the gunners will be required to track the target dur-

ing its entire time of exposure, even though they have fired the required number of rounds for the run.

(7) When the target is obscured behind the screen, prior to its return run, the loader, without command, will rapidly remove the used magazine and unfired rounds remaining in the rifle and reload with the second magazine provided for the return run of the exercise. As soon as this operation is complete, he will report, "Up" and signal, "Ready" to the officer conducting firing.

(8) Immediately upon indication that all guns are ready and without further oral orders, the officer conducting firing will cause the target to be started upon its return run. The gunner engages the target as indicated in (6) above, traversing from right to left, completing his double run. The gunner will not relay his gun on the aiming stake while the target is obscured between runs of an exercise but will continue to aim at the place where the target disappeared, prepared to re-engage it the instant it reappears.

(9) Upon completion of an exercise, guns are relaid on the aiming stake and firing is continued as described in (3) to (8), inclusive, above.

(10) Upon completion of an exercise, guns are cleared, targets are brought to the gun positions, and the result recorded, analyzed, and discussed.

(11) Upon orders from the officer conducting firing, targets will be replaced and a new order started.

**e. Instruction practice firing (stationary targets).**  
The procedure for the conduct of fire on stationary targets is generally the same as for moving targets with the following exceptions:

(1) The sequence of a fire order for a stationary target is as follows: GUN ON LEFT TARGET, ONE MAGAZINE, FIVE ROUNDS, LOAD. At these commands, the gunner aims at the left target (par. 109) and the loader reports, "Up," when the gun is loaded and ready to fire. When the gunner is ready to begin the exercise, he so indicates to the loader, who signals, "Ready."

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(2) When all guns have signaled "Ready," the officer conducting firing will order: FRONT, CENTER TARGET, SEVEN (FOUR) HUNDRED, ZERO LEAD, COMMENCE FIRING.

(3) As the command FRONT of the fire order is given, the gunner will start traversing toward the center target on the range. As soon as the command COMMENCE FIRING is given, the gunner fires one round in the center target, after which he fires one round in each of the other targets in the order in which they are numbered. Time is taken from the command COMMENCE FIRING. When the fifth round of a clip has been fired, the loader announces, "Five rounds complete."

(4) At the end of the time interval, the officer conducting firing, commands: CEASE FIRING. The loader rapidly removes the magazine and unfired rounds. The targets must be scored before the second half of the exercise can be fired.

(5) As soon as the targets have been scored, the results recorded, analyzed and discussed, the second half of the exercise is fired as described in (1) to (4) inclusive, above.

#### 114. RULES AND PROCEDURE FOR RECORD PRACTICE FIRING.

a. Record practice firing will consist of firing the course prescribed in paragraph 104. The procedure for conducting instruction practice firing applies to record practice firing, except as noted below:

b. Each man will complete the prescribed instruction practice firing for the course specified prior to record practice firing.

c. Once record practice of an individual has commenced, it will be completed without interruption by any other form of firing.

d. As a rule, record practice firing will not be fired by any individual on the same day that he fires any part of instruction practice firing. However, when the time allotted is very limited, the officer in charge of

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firing may authorize record practice firing on the same day.

e. No organization (company or platoon) will conduct instruction practice and record practice simultaneously on the same 1,000-inch range unit.

f. Before firing any exercise for record, the gunner will be required, and will be given a reasonable length of time, to check the condition of his gun, telescope, and ammunition.

g. For record practice firing, only one gun will fire on each range unit at a time. No improvised supports for the gun or gunner will be employed during firing.

h. The target speed for any run or the time interval in which the gunner must fire an exercise or a portion of an exercise will not be announced to the gunner.

i. The decision to disregard a score because of a failure to comply with the specified time limits or because of faulty operation of the target, rests with the scoring officer. He will require each moving target to be operated in such a manner that it will traverse the prescribed course for each run at a uniform rate of speed throughout its entire time of exposure. A variance of 3 seconds under or over the prescribed time for any run will be permitted. If the time of exposure exceeds the prescribed time by more than 3 seconds, the score will be disregarded. If the time of exposure is less than the prescribed time by more than 3 seconds, the gunner will be required to state whether he wants the score to stand before he examines the target. If he chooses to fire the exercise again, he will be permitted to do so. Otherwise the score will be recorded as fired. No variance in time limits for stationary targets will be allowed.

j. Portions of an exercise will be fired in as rapid succession as possible. After a portion of a moving-target exercise has been fired, the loader will be required to load the gun for the balance of the exercise as rapidly as possible, and signal, "Ready" as soon as the gun is ready for firing. For moving targets, the

target will be started on its return run within 5 seconds after the loader has signaled, "Ready."

k. In record practice firing, when a misfire, stoppage, or malfunction occurs, the gunner or loader will hold up his hand and call, "Stoppage." Thereafter, neither the gunner nor loader will touch the gun until so instructed by the scoring officer. The scoring officer will examine the gun.

l. If a misfire, stoppage, or malfunction occurs through no fault of the gunner the score will be disregarded and the gunner will be permitted to refire the exercise.

m. If the misfire, stoppage, or malfunction is manifestly the fault of the gunner due to incorrect manipulation of the gun, the gunner will not be permitted to refire the exercise. Only that part of the exercise which was completed will be scored.

n. Should a mechanical stoppage occur, the gun or subcaliber rifle will be repaired or a different gun or subcaliber rifle substituted and the exercise refired. Substituted guns, which have been repaired, must be retargeted before they are used for firing.

#### 115. SCORING AN INDIVIDUAL QUALIFICATION. a.

**General.** (1) Any departure from the mandatory provisions of this manual will disqualify the man affected for qualification.

(2) After a man has taken his place at the gun, all shots fired by him will count as a part of that exercise.

(3) Failure to use the prescribed aiming silhouette for an exercise or any part thereof will result in hits in the wrong scoring spaces. The gunner who places his hits in the wrong scoring spaces will not be permitted to refire the exercises and will score only those hits which are found in the appropriate scoring space for the designated aiming silhouette.

(4) A hit will be scored for each bullet hole found in the correct scoring space, except that no more hits will be counted in any scoring space (s) than the num-

ber of rounds authorized to be fired at that space. The maximum number of hits to be counted in each of the scoring spaces for a double run of a moving target is:

Zero lead—ten hits each scoring space.

One lead and two leads—five hits each scoring space.

Zero lead (target B)—two hits each scoring space.

One lead (target B)—one hit each scoring space.

The maximum number of hits on each stationary target for one-half the exercise is one.

(5) The shot holes in the target will be counted after each moving-target exercise. For table I, Stationary Target Exercise, the shot holes will be counted after the first five rounds fired. If the number of holes exceeds the number of rounds authorized, the gunner will be penalized five points for each round in excess of the allowance.

(6) During record practice firing, the name of the individual will be placed on the target he is to use before he fires on it. No person will handle the target until after it is scored except under the direct supervision of the scoring officer or his assistant.

(7) A bullet hole which touches the line of a scoring space will be counted as a hit.

(8) Ammunition not fired during the time of exposure of the target for each run of an exercise will be forfeited.

(9) Holes made by ricocheting bullets, rocks, or other foreign matter, will not be counted.

**b. Computation of scores.** (1) Subject to the conditions specified in a above, a total of five points will be counted for each hit in a correct scoring space except in firing the stationary manipulation target. In the scoring of table I, one miss in each five rounds fired will penalize the firer five points; two misses will penalize the firer fifteen points; three or more misses,

no score for that portion of the exercise. The total possible score on table I is forty points for the ten rounds.

(2) The following indicates the total possible score for the authorized A course:

Table I	Table II	Table III	Table IV	Table V	Total possible
40	100	100	100	60	400

**c. Score cards.** Each individual entry for record practice will be made on the score card in ink or indelible pencil and will be authenticated by the scoring officer. Erasures are not permitted. Alterations will be made only by the company commander or the officer who acted as scorer. Such corrections will be authenticated by the officer making the correction.

**d. Individual qualification.** Individual classification and qualification scores are as follows:

	Course A
Expert gunner .....	300
First-class gunner .....	255
Second-class gunner .....	225
Unqualified .....	Less than 225

#### Section IV. CONDUCT OF LONG-RANGE SUBCALIBER FIRING

**116. GENERAL.** This section describes ranges, rules and regulations to be used in the conduct of long-range subcaliber firing. The qualification course to be fired on the field ranges is included in section II.

**117. FIELD RANGE. a. Arrangement.** This range provides one moving target course, running diagonally

from left to right between ranges from the firing line of 600 yards and 400 yards. The length of the target course between the marker flags is  $183 \frac{1}{3}$  yards, the distance traveled by the target in 25 seconds moving at 15 miles per hour. Details of its construction are found in TM 9-855.

**b. Operation.** (1) A pit or target detail controlled by radio or telephone will change, mark, and operate the targets as directed from the firing line.

(2) The speed of the towing motor or vehicle must be regulated so that targets move steadily at 15 miles per hour between the marker flags limiting the course. Starting and stopping positions for the towing vehicle when used are marked clearly.

**118. TARGET.** The target for field range firing will consist of an olive drab panel 5 feet by 8 feet mounted on a target sled. Targets may be arranged in tandem to permit firing of two guns simultaneously during instruction firing.

**119. DUTIES OF PERSONNEL.** Duties of personnel on the field range in conducting long-range subcaliber firing will be the same generally, as those for 1,000-inch firing.

**120. GUNS, MOUNTS, AND TELESCOPE. a.** The gun, subcaliber mount, telescope, and caliber .30 subcaliber rifle will be used as issued by the Ordnance Department without addition or modification, except as specifically authorized in paragraph 21.

**b.** Prior to firing, each gun will be carefully bore-sighted by either of the methods prescribed in TM 9-303.

**121. PROCEDURE FOR FIRING.** The procedure for long-range subcaliber firing will be identical with 1,000-inch moving target firing with the exceptions set forth below.

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**a. Instruction practice firing.** (1) Two guns will be placed on the firing line. The guns will be numbered from left to right. The No. 1 gun will fire on the left target, the No. 2 gun on the right target.

(2) *Fire orders.* Initially all guns firing will be laid on the center of the target course by the command: ALL GUNS ON CENTER. As the targets approach the starting limit flag, guns will be brought on the target by the command: LEFT (RIGHT) FRONT, TARGET SIX (FOUR) HUNDRED, ONE (TWO) LEADS, COMMENCE FIRING. The gunner will fire, call his shot mentally, sense the trace or strike, adjust, and continue to fire until the loader announces, "Three rounds complete," or until the command CEASE FIRING is given.

(3) In this firing, in addition to the gunner (No. 1) and loader (No. 2) a coach and an observer are necessary at each gun. The coach observes the actions of the gunner and loader, and the observer assists the gunner in sensing and adjusting the fire.

(4) The complete exercise will include two double runs of the target. Each gunner will fire 3 rounds during each exposure or target run, a total of 12 rounds for the exercise.

**b. Record practice firing.** The rules for conducting instruction practice firing apply to record practice as well.

**122. SCORING AND INDIVIDUAL QUALIFICATION.** See paragraph 115.

### Section V. SAFETY PRECAUTIONS

**123. GENERAL.** This section prescribes the safety precautions which will govern the firing of the 57-mm gun M1, with either subcaliber or service ammunition. Guiding references are AR 750-10, TM 9-1900, and 9-303.

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**124. RANGE SAFETY.** **a.** Range specification and safety requirements must conform with instructions set forth in AR 750-10.

**b.** Danger flags will be displayed at prominent positions on the range during all firing.

**c.** Range guards will be posted to prevent traffic through danger areas.

**d.** Markers will be placed so as to define clearly the right and left to limits of fire.

**e.** Vehicles and personnel working on the range will carry red flags so that they can be seen at all times. Signals or commands directing their movement must be definite and unmistakable.

**f.** Starting positions for towing vehicles will be at a safe distance on the flank opposite to that on which the target appears.

**125. PERSONNEL.** The following are additions to the duties and responsibilities of individuals listed in paragraph 110.

**a.** The officer in charge of firing will ascertain that—

(1) The range is clear before firing commences.

(2) Guns are loaded only upon command of the officer in charge.

(3) No guns are fired except under the direct supervision of an officer and upon command of the officer in charge.

(4) No person is allowed in front of a gun for any purpose until so directed by the officer in charge and then only after all guns have been cleared and inspected by an officer.

(5) No gun leaves the firing line or position until it has been cleared and inspected by an officer. The inspection for determining that a gun is clear will be made by inserting the fingers into the chamber of the gun.

(6) All personnel are instructed in the significance of range flags, safety markers, and safety precautions; they are instructed to command CEASE FIRING, or give

the prescribed signals therefor, upon observing any condition which makes firing unsafe.

b. At each gun firing, there will be a safety officer or noncommissioned officer, who will ascertain that—

(1) The bore of the gun is kept clear and free of all obstructions before firing, by running the rammer staff completely through the bore.

(2) Excess oil and grease have been removed.

(3) Ammunition at the gun is placed so that it cannot ignite, explode, or detonate in case of an accident at the gun.

(4) Ammunition is clean and free of grease, oil, and dirt.

(5) The gun is loaded and fired only upon command.

(6) Firing ceases immediately upon the command CEASE FIRING, regardless of the source of the command.

(7) The gun never fires outside the prescribed safety limits.

(8) The gun is clear and the gunner stands away from it before the target detail moves into the range.

(9) When firing service ammunition the gunner, until the trails are seated, holds his eye 20 to 25 inches from the telescope and keeps his body clear of the recoiling gun and carriage.

(10) The loader, No. 2, is clear of the recoiling gun and carriage.

**126. AMMUNITION.** a. Handling of ammunition must conform with instructions set forth in TM 9-303 and 9-1900.

b. Misfires will be handled as prescribed in AR 750-10.

## CHAPTER 6

### SERVICE FIRING

#### Section I. GENERAL

**127. PURPOSE AND SCOPE.** a. Prior to firing service ammunition, each squad member must demonstrate thorough proficiency in all phases of gunnery training thus far discussed. His ability to maintain the gun in action and deliver effective fire on a target, as outlined in chapters 3, 4, and 5 must be a matter of habit; for, it is now that he will be introduced to the blinding and flash effect encountered in firing service ammunition, an effect which can be minimized only through correct habits acquired during training.

b. Training in this chapter comprises three progressive steps, as follows:

(1) Preparatory exercises, initial and subsequent laying.

(2) Basic firing, during which each squad member becomes accustomed to firing service ammunition.

(3) Combat range firing, during which the gun squad applies its gunnery training to firing service ammunition at field targets under simulated combat conditions.

c. Immediately prior to commencing preparatory exercises each gunner must demonstrate his proficiency in the duties of gunner by earning a satisfactory credit in the gunner's proficiency tests. (See sec. III, ch. 7.)

#### Section II. PREPARATORY EXERCISES

**128. GENERAL.** This training consists of a series of

exercises designed to train squad members to make range and lead estimations quickly and accurately and deliver correct fire orders with clarity and force. Initial laying exercises should require the other members of the squad, not acting as squad leader, to take positions at the gun as gunner and loader performing their duties as the acting squad leader issues fire orders.

**129. INITIAL LAYING EXERCISES. a. Course (fig. 32).** This course includes stationary targets, with and without vertical profile, and moving targets. The course should include the various types of combat vehicles operating at constant speeds through known distances. It lends reality to the instruction to use different types of armored vehicles when available, since the size of a combat target (armored car or tank) will have a definite influence upon the estimation of its range and speed. Before beginning laying exercises, the squad should be given an opportunity to note the appearance of available types of armored vehicles at ranges between 200 and 1,500 yards, at different angles to the firing point.

**b. Conduct of exercises.** The instructor requires individuals to make estimations and deliver initial orders for each of the exercises listed below. He criticizes each order, emphasizing correctness of commands, accuracy and speed of estimations, clarity and force of the orders given. He demonstrates methods of target designation other than that used in the fire order.

(1) *Exercise No. 1.* Each man estimates the range and announces the correct initial fire order for engaging stationary targets; then repeats the order, using different methods of target designation.

(2) *Exercise No. 2.* A vehicle moves parallel to the front of the group at a range of 200 to 300 yards. Each man estimates the range and speed of the target, announces the corresponding lead, and delivers the cor-

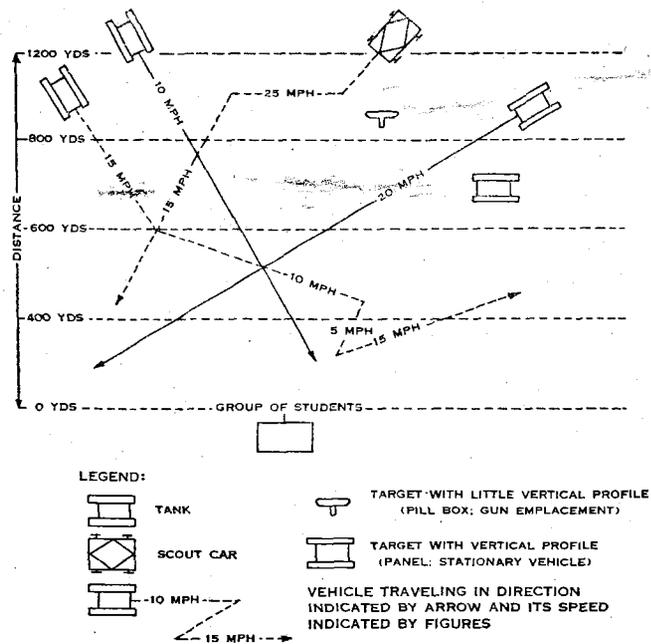


Figure 32. Course for preparatory exercises.

rect initial fire order. It is advisable to start off with a speed of 5 miles per hour and gradually increase the speed as the men become proficient in their estimations. Successively, similar courses are taken by the vehicle at ranges up to 1,500 yards.

(3) *Exercise No. 3.* In this exercise, the vehicles approach or recede at different angles and speeds as shown in figure 32. Each man estimates the range and speed of the target, announces the corresponding lead, and delivers a correct fire order for each run.

(4) *Exercise No. 4.* A number of vehicles appear unexpectedly from various directions and at various

ranges and speeds. The instructor requires each member of the squad to simulate shifting fire from one target to another, changing only those elements of the initial order which are not applicable to the new target.

**130. SUBSEQUENT LAYING EXERCISES. a.** The purpose of this training is to give each member of the squad practice in the application of the technique of sensing and adjustment and in the delivery of subsequent fire orders. Sensings and commands will be delivered orally so that the entire squad can benefit from the instruction given and participate in the critique at the conclusion of each exercise.

**b. Conduct of exercises.** The instructor will announce the initial order, mark the strike or trace in relation to the target, and require individuals to make the correct sensings and deliver the necessary subsequent orders. These are blackboard exercises and may be conducted in classrooms or on the range. For each exercise the instructor draws a picture of the target on the blackboard, announces the initial order, and marks the trace or strike of the first round. Each individual is then required to make a correct sensing and deliver the necessary subsequent order for obtaining an effective hit on the target. Successive sensings and orders should be listed on the blackboard for use in the critique.

(1) *Exercise No. 1.* The target is a stationary tank (vertical profile). The first round is high and to the right.

(2) *Exercise No. 2.* The target is a pill box (little or no vertical profile). The first round is high enough to require a 400-yard range change before a bracket is obtained.

(3) *Exercise No. 3.* The target is a pill box (little or no vertical profile). The first round is low, but close enough to require only a 200-yard range change.

(4) *Exercise No. 4.* The target is a tank, moving

directly across the front at a speed of 15 miles per hour. The first round is high and behind the target.

(5) *Exercise No. 5.* The target is an armored car moving directly across the front at a speed of 25 miles per hour. After the first round, which is ahead, the target changes direction.

### Section III. BASIC FIRING

**131. GENERAL.** Training in this phase introduces the squad to the effect of muzzle blast and recoil shock. It is designed to teach the squad, particularly the squad leader and gunner, to function efficiently as a team in the delivery of effective fire on known distance targets. Because of muzzle blast and recoil shock the gunner is unable to observe the trace of strike of the projectile fired; hence, he must note the laying of the gun used at the instant he fires and mentally call the shot so that he can make the correct adjustments ordered by the squad leader. The squad leader must take a position outside the limits of the muzzle blast, sense each round immediately, and deliver subsequent fire orders clearly and audibly. Teamwork between the squad leader and the gunner, and efficient service of the piece by the other members of the squad are essential.

**132. BASIC FIRING EXERCISES. a. Range.** (1) Basic firing may be conducted on the range described in paragraph 117. Stationary targets, with and without vertical profile, are set up at ranges between 600 and 1,200 yards for stationary target exercises. The firing line is moved back so that ranges up to 800 yards from the moving-target course can be used.

(2) *Operation.* For moving-target firing, the target is moved initially at 5 miles per hour. As firing progresses, the speed of the target is increased.

(3) *Targets.* Moving targets (par. 118). Stationary

targets may be panels or improvised log pill boxes.

**b. Conduct of exercises.** (1) Each member of the squad will be required to perform alternately the duties of squad leader and gunner in firing one exercise on a stationary target, and one on a moving target. It is essential that each member of the squad be able to perform the duties of squad leader and gunner efficiently. Those not engaged in serving the gun will observe the performance of the firing crew and will assist in the critique.

(2) In stationary target firing the instructor will indicate a target to the squad member, who will deliver his initial fire order and adjust by correct subsequent orders until an effective hit is obtained. The instructor will observe the performance closely and will correct improper commands, faulty orders, or gunners' faults as they occur. The squad must be impressed with the necessity for making each round effective.

(3) For initial moving-target exercises the instructor will require the squad member to deliver the correct initial and subsequent fire orders for adjustment as the target moves across the range. Later exercises will require the shifting of fire from one target to another, as they move across the range. A critique will be held at the end of each exercise.

**133. SAFETY PRECAUTIONS.** See section V, chapter 5.

#### Section IV. COMBAT-RANGE FIRING

**134. GENERAL.** Combat-range firing is the phase of training which combines all the training previously discussed in this manual and is designed to require a demonstration of individual and crew proficiency in all phases. For this purpose the squad, under the command of the squad leader, is conducted through a series of exercises which as nearly as possible simulate

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battlefield conditions. The situation for each exercise will be given by the instructor, who will be the exercise umpire; the squad leader will direct and control the squad in the actions required; and at its completion the exercise will be critiqued by the instructor.

**135. EXERCISES.** The instructor should vary the exercise situations and terrain as much as possible, so that the squad will not be presented with the same situation twice. The exercises following are given as a guide for the instructor.

**a. No. 1.** (1) The squad is brought to the position area on its prime mover. The instructor indicates the general direction of a possible approaching tank attack or a stationary target, and the position area for the gun.

(2) The squad is required to unload the prime mover and go into action immediately.

(3) When the gun is prepared for firing, the instructor causes the target to appear.

(4) After the firing is completed, a critique is held to discuss the execution of the exercise by the squad. Speed and teamwork in preparing the gun for action, service of the piece, and conduct of fire are stressed.

**b. No. 2.** (1) The gun is placed in its firing position with the carriage and bore pointing in a direction which will require the trails to be shifted after the first round in order to continue tracking a moving target.

(2) With the squad in firing position, the moving target is released. No. 1 calls out when the limit of traverse is reached; at the squad leader's command trails are shifted and the firing continued.

(3) A critique is held as before, covering the performance of each member of the crew. The importance of suspending fire for as short a time as possible is emphasized.

**c. No. 3.** (1) A situation is presented which requires the squad to move by hand for a distance of 25 to 50

yards to an indicated firing position and engage a target. (If the target is a moving one, it is released when the gun is prepared for firing.)

(2) The critique emphasizes speed of going into action.

**d. No. 4.** The squad (with prime mover and gun) is halted in a defiladed area, about 100 yards in rear of the firing position area. The squad leader is brought forward to the firing position area where he is instructed to place his gun in action to meet an impending attack; the direction of the attack is indicated by the instructor. The necessity for immediate reconnaissance of the position area by the squad leader while the gun crew unloads and moves the gun forward by hand, is emphasized in the critique.

**e. No. 5.** The squad leader is presented with a situation which requires the squad to prepare a firing position and a cover position. A time limit for preparing the positions is given. The gun is placed in the cover position fully prepared for action. While work is progressing on the cover position, an indication of a tank attack requires the crew to push the gun into the firing position and engage the target. The target appears when the firing position is occupied and the gun is ready for firing. Continuous observation of the sector during preparation of the positions and the importance of camouflage, cover and concealment in both positions are emphasized.

**f. No. 6.** Same requirement as in exercise No. 5 except that the firing position area affords "scant cover" and the gun must be moved by hand (trails closed) a considerable distance.

**g. No. 7.** The platoon leader is brought forward and assigned a firing position area and a sector of fire for the platoon. He is told there is a threat of a tank attack from a specified direction which may come in the next 10 or 15 minutes. This situation requires the selection of positions by the platoon leader, preparation and occupation of a firing position by each squad,

and orders of the squad leader to engage a target. The time allowed before the target appears is about 15 minutes. While work is progressing, the target appears. The importance of advance reconnaissance by leaders of firing position areas and gun positions, necessity for continuous battlefield observation, and readiness to engage a target, are discussed in the critique.

## Section V. CONDUCT OF COMBAT-RANGE FIRING

**136. COMBAT RANGE. a. Range.** This range provides four moving-target courses. Details of construction are found in TM 9-855. Two courses run parallel to the front of the firing line at ranges of 400 and 600 yards, respectively. Two courses offer various directions of movement approaching and receding from the gun. As in previous exercises, target speeds should start at 5 miles per hour and gradually increase to 15 miles per hour or greater. Stationary targets, such as *A* and *B*, are placed at varied ranges as required by the exercises given. Vertical profile targets may be tank size, and targets with little or no vertical profile may be improvised log pill boxes or panels placed flat on the ground.

**b. Operation.** (1) When the operating personnel have been trained, an exercise may be fired every 6 to 8 minutes, provided two towing vehicles are used.

(2) The second vehicle, as soon as safety permits after each run, moves to the old target. The towrope is unhooked from the old target and fastened to a new one. The second truck then proceeds around the course in the reverse order while personnel following the truck engage the towrope over the successive pulleys. The target is returned to its starting position, the forward end of the towrope is attached to the towing vehicle, and the firing line is notified that the operating detail is ready.

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(3) When available, two radio sets should be used for communication between the operating detail and the firing line. The set with the operating detail may be placed on the second vehicle, allowing continuous communication while replacing the target. This arrangement saves time and makes the system more flexible.

(4) The safety limits for all firing on the range are established to conform with AR 750-10.

**137. SAFETY PRECAUTIONS.** See section V, chapter 5.

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## CHAPTER 7

### GUNNER'S PROFICIENCY TESTS

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#### Section I. GENERAL

**138. PURPOSE.** The purpose of each test is to—

a. Provide a means of determining the relative proficiency of the individual soldier in the performance of his primary duties as gunner.

b. Provide the soldier with an incentive to excel in the performance of those duties. These tests will not be a basis for determining the relative proficiency of a unit.

**139. CLASSIFICATION.** Any officer, warrant officer, or soldier who completes the following tests in a satisfactory manner will be eligible to compete for the gunners classification.

**140. TESTING PERIODS.** All officers, warrant officers, and enlisted men of an organization whose primary weapon is the 57-mm gun M1, will be tested prior to firing the piece, and at such other times as are deemed necessary to maintain a high standard of proficiency in the individual.

**141. EXAMINING BOARDS.** Each examining board will consist of one or more officers and such enlisted assistants as are necessary. So far as practicable, the examining board for any particular organization will be made up of officers from other organizations. Boards will be appointed by the battalion (and similar unit) commander, for the examination of battalion personnel.

142. **CONDUCT OF EXAMINATIONS.** Examining boards will conduct examinations at the places and times directed by the appointing authority.

143. **RECORDS AND REPORTS.** a. A record will be made by the examining board of each individual tested, to include the credits earned on each test. Maximum total credit on all tests is 100. A total credit of 80 is considered satisfactory.

b. A report will be rendered to the convening authority by the examining board listing the names of all individuals tested. The report will include the total credits earned and will indicate those considered satisfactory.

## Section II. MATERIEL TESTS

144. **GENERAL.** The gunner will be required to perform the following prescribed tests. He will be told the nature of the test before he takes his post.

145. **DISASSEMBLY OF STRIKER (FIRING) CASE (ONE TRIAL).** a. The gunner takes his post. The examining officer commands: DISASSEMBLE STRIKER (FIRING) CASE. The gunner performs the operation as described in TM 9-303.

b. The gunner will be marked on the general merit of his work.

c. If the trial is correctly performed a credit of six points is given.

146. **ASSEMBLY OF STRIKER (FIRING) CASE (ONE TRIAL).** a. All parts of the disassembled striker (firing) case will be arranged in order convenient for the gunners use in assembly. The gunner takes post, and the examining officer commands: ASSEMBLE STRIKER (FIRING) CASE. The gunner performs the operation as prescribed in TM 9-303.

b. The gunner will be marked on the general merit of his work.

c. If the trial is correctly performed, a credit of six points will be given.

147. **LUBRICATION (ONE TRIAL).** a. The piece will be placed in action. A complete set of lubrication equipment and plainly labeled containers for every type of lubricant used on the piece will be made available. The gunner takes post, and the examining officer commands: DAILY LUBRICATION TEST. The gunner selects the proper lubricating devices and lubricants and shows how each place requiring daily lubrication is lubricated, but does not perform the actual lubrication.

b. For each place missed or improperly lubricated and for each time the proper lubricating device or proper lubricant is not selected, a 1/2-point penalty is assessed.

c. If the trial is correctly performed, a credit of eight points will be given.

148. **BORESIGHTING WITHOUT TESTING TARGET (FOUR TRIALS).** a. The piece will be placed in action pointing generally in the direction of several objects at a distance of at least 1,500 yards. The telescope will be placed out of adjustment for deflection and range. The gunner takes post and the examining officer commands: BORESIGHT WITHOUT TESTING TARGET. The gunner places improvised cross hairs on the muzzle of the piece, removes the striker (firing) case, centers the cross hairs on the distant object, and adjusts the telescope by the prescribed method.

b. No credit will be given if the object selected is less than 1,500 yards distance from the piece, or if the center of the telescope and the center of the bore are not aligned on the object.

c. For each trial correctly performed, a credit of five points will be given.

### Section III. DIRECT LAYING TESTS

**149. GENERAL.** Place stationary targets at ranges between 500 and 1,200 yards. Moving targets will move at ranges less than 800 yards. The piece is placed in action. The examining officer checks the laying for range and deflection after each trial. He allows no credit if laying is not precisely correct.

**150. STATIONARY TARGETS (FOUR TRIALS).** a. The gunner takes post. The examining officer transmits an appropriate fire order; for example —

LEFT FRONT  
PILL BOX BETWEEN TWO TALL TREES  
ONE THOUSAND  
ZERO LEAD  
COMMENCE FIRING

b. At the command COMMENCE FIRING, the gunner lays the piece, calls, "Ready" and moves his head clear of the telescope.

c. For each trial a credit of five points will be given only if the telescope is accurately aligned.

**151. SETTING LEADS (FOUR TRIALS).** a. The gunner takes post and the examining officer transmits an appropriate fire order; for example —

RIGHT FRONT  
TANK  
SIX HUNDRED  
ONE LEAD  
COMMENCE FIRING

b. At the command COMMENCE FIRING, the gunner lays the piece, calls, "Ready" and moves his head clear of the telescope.

c. For each trial a credit of five points will be given only if the telescope is aligned correctly as to range and lead.

**152. TRACKING MOVING TARGETS (FOUR TRIALS).** a. The gunner takes post. On signal from the examining

officer a vehicle starts across the line of observation. The examining officer gives the appropriate orders. At the command COMMENCE FIRING the gunner lays the prescribed range and lead and tracks the target. The examining officer checks the laying and tracking by one of the following methods:

(1) *With M18 telescope.* Use the aim checking device M1.

(2) *With M69C telescope.* The telescope must be offset prior to the test so that when the bore is pointed at the target the range and lead markings to be used by the gunner in the test are on the target also. This offset must be made prior to the beginning of the test. The examining officer can check the laying and tracking by looking through the bore, using for sights improvised vertical and horizontal cross hairs on the muzzle.

b. For each trial, a credit of five points will be given if the correct lead and elevation are smoothly maintained.

## ADVICE TO INSTRUCTORS

## Section I. GENERAL

**153. PURPOSE.** The purpose of this chapter is to aid the instructor in presenting the instruction necessary to the successful training of antitank units. In conducting gunnery training, it is necessary that the instructor follow methods of training prescribed in FM 21-5.

**154. TRAINING AIDS.** For the convenience of the instructor, training aids which can be prepared easily and which pertain to the material of this text are listed below:

- a. Cut-away model of the recoil mechanism.
- b. Blackboard picture of the telescope reticle.
- c. Working model of the semiautomatic gear mechanism.
- d. Charts outlining phases of instruction.
- e. Diagrams of specific points of instruction.

## Section II. CONDUCT OF INSTRUCTION

**155. MECHANICAL TRAINING.** Instruction in mechanical training lends itself readily to the use of the applicatory method of instruction. The unit should be divided into squads. Each squad is assembled at the place of instruction with its own gun and set of equipment under the direction of an assistant instructor. The principal instructor, after explaining each phase, should allow periods of practical work on that phase

under the direction of the assistant instructor.

**156. CREW DRILL.** When giving instruction in elementary crew drill, demonstrations by a trained demonstration unit should be used. Demonstration teams can be trained to perform accurately in approximately 5 or 6 days. After explanation of the drill by the instructor and demonstration by the team, squads should be moved to the guns for periods of practical work. Initially, each drill movement is executed, slowly step-by-step, until the assistant instructor in charge of each gun is satisfied with the performance of each man. To avoid monotony in periods of drill instruction, games and quickening exercises should be interspersed throughout training. Speed competitions should be used only when squads have acquired precision in each drill movement. Each phase of advanced crew drill should be covered by a complete and thorough explanation and demonstration.

**157. LAYING THE GUN. a. General.** A conference in which the instructor explains fully the telescope reticle should be the first phase of instruction in laying the gun. The conference should follow the sequence in the manual. A practical work period should follow during which the same sequence is followed. The instructor issues fire orders and the gunners set sight pictures on stationary targets. Tracking and simulated firing follow, with emphasis on the correct gunner's position for tracking a moving target. Frequent rotation of duties within each group, with each man performing each phase of an exercise several times, is preferable to keeping one man at one position a long period of time.

**b. Instructional aid (fig. 33).** A transparent diagram of the telescope reticle will be useful to the instructor in laying the gun and in subcaliber firing. The telescope reticle diagram or overlay is placed on a rectangular sheet of transparent plastic or other similar

transparent material. The material should be fairly rigid so that it will maintain its shape without wrinkling or warping. If it is necessary to use thin sheets, they may be framed. An enlarged copy of the telescope reticle is painted black on the sheet of plastic with the horizontal lead-lines along the longer axis of the rectangle. A coat of thin shellac will fix the painted diagram to the smooth surface of the plastic.

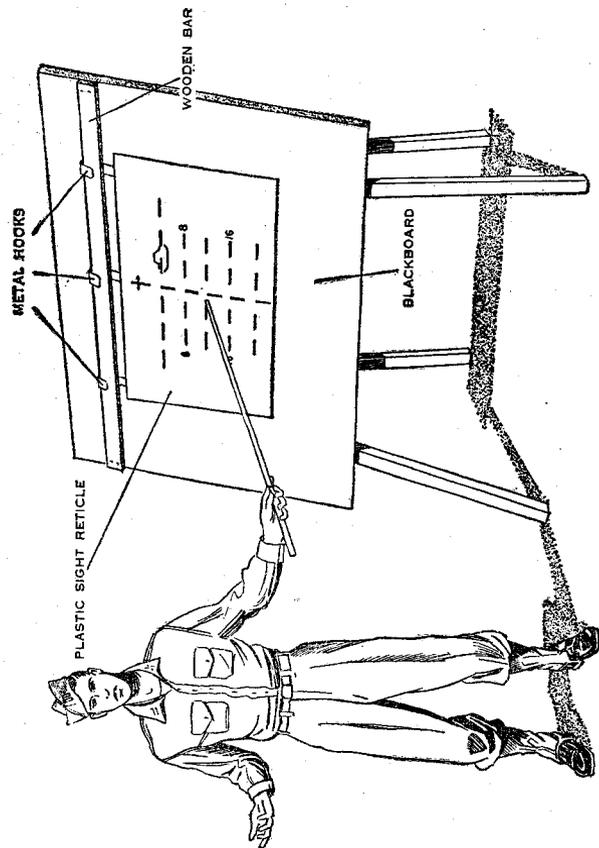


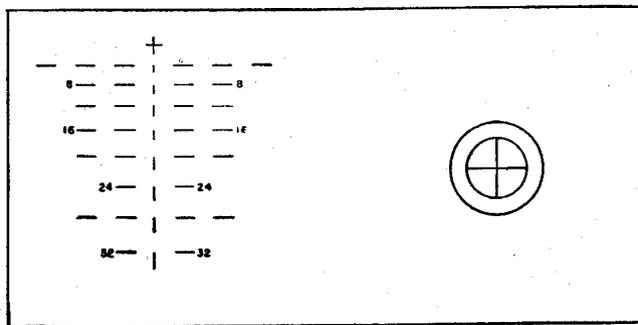
Figure 33. Use of transparent reticle.

**158. GUNNER TRAINER. a. General.** The gunner trainer is a training aid useful in teaching the use of the sight reticle, sight adjustment, leads, and fire adjustment.

**b. Description and construction (fig. 34).** The gunner trainer consists of —

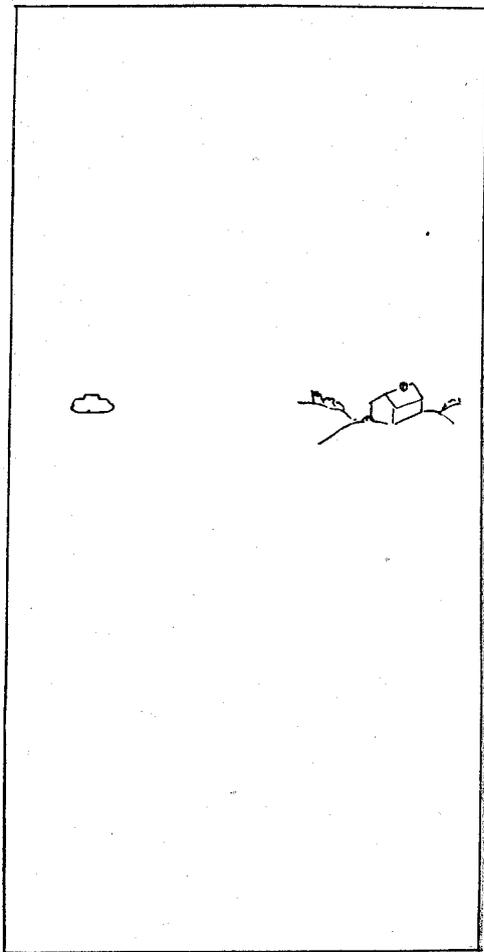
(1) A paddle (fig. 34 ①) made of transparent material on which is inscribed a sight reticle and a circle with cross hairs to represent a muzzle bore sight. A convenient size is  $1\frac{1}{2}$  inches by 3 inches.

(2) A target board (fig. 34 ②) on which is drawn a tank silhouette and an object suitable for use as a distant aiming point. The tank silhouette should be about 8 mils in length measured on the sight reticle of the paddle. A convenient size for the target board is 2 inches by 4 inches. It should be covered with transparent material fastened at the top and bottom but with sides open to permit insertion of the paddle.



① Paddle.

Figure 34. Gunner trainer.



② Target.

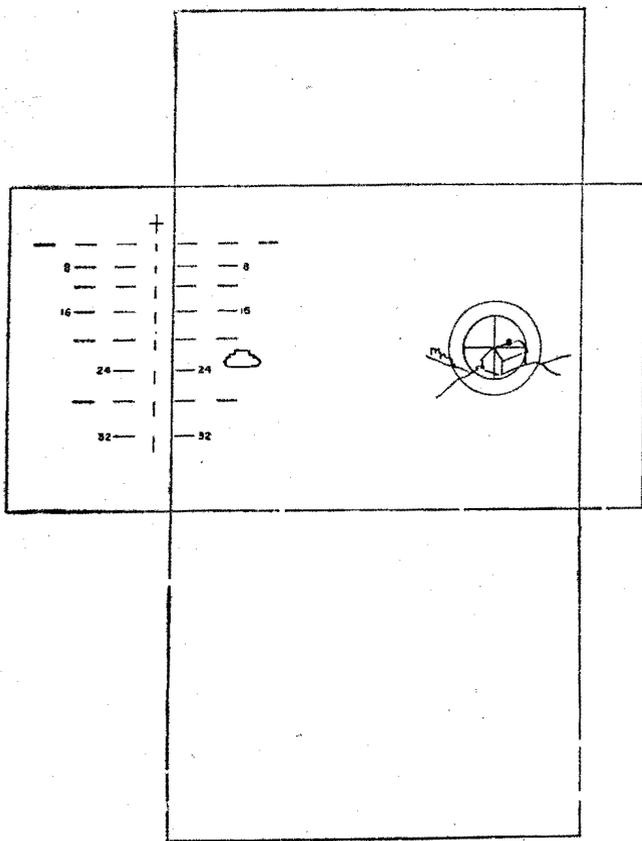
Figure 35. Gunner trainer—Continued.

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**c. Use.** (1) To teach boresighting, require the gunner to place the paddle over the target and move it until the muzzle cross hairs are on the aiming point (fig. 35 ①). Next have him move the paddle until the sight reticle is properly on the aiming point (fig. 35 ②). Have him explain the steps.

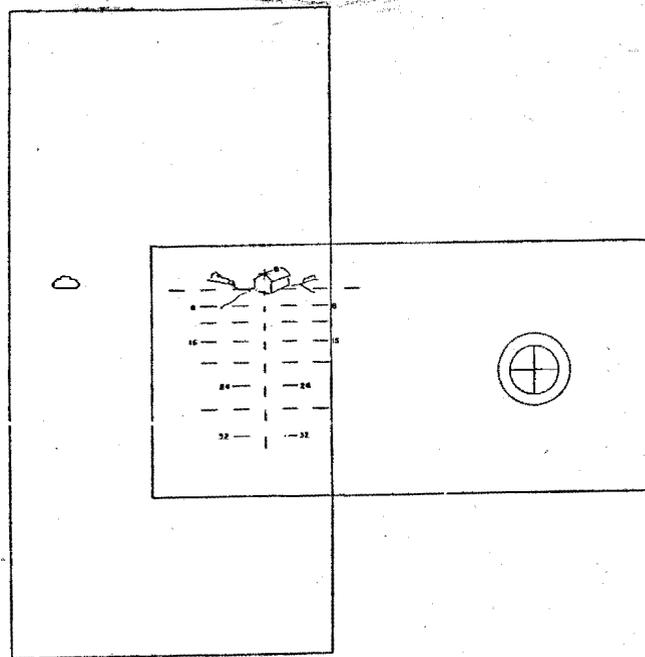
(2) To teach leads, announce a range and lead. Cause the gunner to move the paddle until the sight reticle is on the silhouette tank with the announced range and lead.

(3) To teach fire adjustment, place the gun commander about 20 or 25 feet from a terrain board. Point out a target and have the gun commander give a fire order. The gunner, using the silhouette tank as a target, moves the paddle until the sight reticle is on the tank silhouette with the range and lead, if lead is given, as announced by the gun commander. He then commands: FIRE. The instructor then indicates the point of impact by pointing to a spot on the terrain board near the previously designated target. The gun commander, using field glasses, measures the lateral deviation of the round from the target, estimates the range, and gives a subsequent fire order. The gunner should be checked for correct sighting. Each problem should be critiqued.



① Muzzle boresight on aiming point.

Figure 35. Use of gunner trainer in boresighting.



② Sight reticle on target.

Figure 35. Use of gunner trainer in boresighting--Continued.

159. **SUBCALIBER FIRING.** When firing on the sub-caliber range is contemplated a sufficient number of targets should be prepared well in advance. The necessity for other equipment and spare parts should be anticipated so that firing need not be stopped because of failure to anticipate needs.

a. The following is a check list of equipment necessary for training on the subcaliber range:

Target frames and different types of targets.

Target paste and paste brush.

Pasters (black and white).

Ammunition, caliber .22 and caliber .30.

Magazines, caliber .22.

Stop watches.

Pencils.

Progress chart.

Repair tools for guns and range.

b. Prior to day of firing the instructor should insure that —

(1) All range equipment and apparatus is in working order.

(2) Orders are ready for firing.

(3) A chart for recording scores is provided.

(4) Range is available and marked with safety flags.

c. The instructor should publish promptly the scores made during instruction and record practice to stimulate interest and arouse a spirit of competition.

160. **SERVICE FIRING CRITIQUE.** a. The basis of good instruction in these exercises is intelligent, tactful, and constructive criticism. The critique should constitute a discussion of each step in the solution of the requirements. It should be given on the ground used for the exercise immediately after the conclusion of the exercise.

b. The officer conducting the critique should commend that which was well done and call attention to that which was poorly or incorrectly done. In making corrections, the instructor should avoid ridicule,

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sarcasm, or any remarks which might be harmful to morale or initiative.

c. He must be careful not to base his judgment of execution of the exercise too much on results of the firing. The proper use of terrain, camouflage, fire orders, fire discipline, and fire control must be given due consideration.

APPENDIX

LIST OF REFERENCES

Records and Reports of Qualification in Arms . . . . . (Sec. II, Cir. No. 265, W.D., 1943.)		
Range Regulations for Firing Am- munition for Training and Target Practice . . . . .	AR	750-10
Qualification in Arms and Ammu- nition Training Allowances . . . . .	AR	775-10
Military Training . . . . .	FM	21-5
Defense Against Chemical Attack . . . . .	FM	21-40
Infantry Drill Regulations . . . . .	FM	22-5
Motor Transport . . . . .	FM	25-10
Decontamination . . . . .	TM	3-220
57-mm Gun M1, and Gun Carriages M1, M1A1, M1A2, and M1A3 . . . . .	TM	9-303
Cleaning, Preserving, Lubricating, and Welding Materials and Similar Items Issued by the Ordnance De- partment . . . . .	TM	9-850
Targets, Target Materials, and Rifle Range Construction . . . . .	TM	9-855
Ammunition, General . . . . .	TM	9-1900

NOTE. A complete list of SNL's and other explanatory publica-  
tions relative to the 57-mm gun M1 are contained in TM 9-303.

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