

MOUNTING MACHINE GUN

CALIBER .50, HB, M2

FLEXIBLE

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1. DESCRIPTION OF .50 CAL. MACHINE GUN, M.B., M2

I. Instructional steps.

A. Principals of operation.

1. Recoil operated.
2. Air cooled.
3. Belt fed.

B. Types.

1. Flexible.
2. Fixed (Uses side plate trigger and recess).

C. Feeding.

1. Metallic disintegrating link belt.
2. Left or right feed.

D. Cooling.

1. Heavy barrel retards over heating.
2. Circular holes in barrel support allow circulation of air around breech.

E. Types of mounts.

1. M - 3 Tripod.
2. M - 32 (2½ ton truck).
3. On M - 10 destroyer.
4. On turret M - 8 vehicle, - modified

F. General data.

1. Weight flexible receiver.....54 pounds
2. Weight fixed receiver.....52 pounds
3. 45 inch barrel (bell shaped muzzle)....27.5 pounds
4. 45 inch barrel (straight).....30 pounds
5. 100 rounds of ammunition.....30 pounds
6. Ammunition chest.....5-6 pounds
7. Capacity ammunition chest.....100 rounds
8. Cyclic rate of fire.....400/500 rounds/minute
9. Muzzle velocity.....2865-2935 ft/sec
2935 ft/sec (Ball M2 and
A.P. M2)
2865 ft/sec (Tracer M1)
10. Weight M3 tripod.....40 pounds
11. Chamber pressure.....52,000 lbs./sq.in.
12. Maximum range.....7200 yards
13. Usable rate of fire.....40 rds/min for 500 rds.
14. Maximum rates of fire:
 - a. With a cool gun, maximum burst of 150 rds.
 - b. 300 rds at rate of 75 rds per minute.

G. Sights.

1. Leaf & blade. Rear sight-(1) graduated in yards to 2600.
(2) Mils to.....64.
2. Telescope (M 1, new; T 3, old)

H. Outside parts.

1. Muzzle.
2. Carrier handle.
3. Barrel support.
4. Front sight.
5. Trunnion block.
6. Belt holding pawl brackets.
7. Bullet guides.

8. Belt holding pawl pins.
9. Receiver switch nut.
10. Trigger bar retaining pin.
11. Backplate.
12. Spade grips.
13. Trigger.
14. Bolt latch release.
15. Bolt latch release lock.
16. Back plate buffer.
17. Adjusting screw.
18. Backplate latch lock.
19. Backplate latch.
20. Retracting slide bracket.
21. Retracting slide handle.
22. Bolt stud.
23. Link stripper, cartridge stops.
24. Cover.
25. Cover latch.
26. Rear sight bracket.
27. Elevation screw.
28. Windage screw.
29. Sight leaf.
30. Recess for M1 telescopic sight.
31. Top plate.
32. Bottom plate.
33. Breech lock cam screw.

I. Ammunition.

1. Ball M2 (used for target practice).
2. Tracer M1 (observation and as incendiary).
3. Armor piercing M2 (combat).
4. Blank.
5. Dummy (training).

II. There are the following small but important details. See Supplement 1 on description of .50 caliber machine gun.

- A. Side plate trigger recess on each side of gun.
- B. Auxiliary bolt handle.
- C. Round holes in barrel support.
- D. 45 inch barrel (muzzle ball); weighs 27.5 lbs.
- E. Dual driving springs, lighter bolt.

III. General Rule Armor Penetration (Engineers Field Manual).

A. P. ammunition will penetrate armor twice as thick as the Caliber at ranges up to 500 yards. For complete protection from A. P. ammunition the armor should have a thickness equal to 4 times the caliber of the ammunition.

2. FIELD DISASSEMBLY AND ASSEMBLY OF GUN

I. Instructional steps:

A. To disassemble gun

1. Unscrew and remove barrel.
 2. Raise cover.
 3. Remove backplate (bolt latch release up)
 - a. Release latch lock.
 - b. Release latch.
 - c. Lift out backplate.
 4. Remove driving spring and rod.
 5. Remove bolt stud.
 - a. Pull back on retracting slide (center bolt stud).
 - b. Push retracting slide forward.
 - c. Remove bolt stud.
 6. Remove bolt.
 7. Remove oil buffer and barrel extension.
 - a. Disengage oil buffer body (spring) lock.
 8. Separate oil buffer from barrel extension.
 - a. Trip accelerator.
 9. Remove oil buffer tube.
- NOTE: Gun is now field disassembled.

B. To assemble gun

1. Insert oil buffer tube into oil buffer body.
2. Connect oil buffer to barrel extension.

NOTE: Make sure hook of shank of barrel extension is seated in cross groove of piston rod.
3. Insert oil buffer and barrel extension into receiver.
4. Insert bolt (cocking lever forward)

NOTE: Rear end of bolt must be depressed to raise front end and prevent tripping accelerator. Bolt latch must be raised in order to insert bolt.
5. Insert bolt stud.
6. Push recoiling parts forward smartly.
7. Insert driving spring and rod.
8. Seat stud of driving spring and rod in recess in receiver.
9. Insert backplate.

NOTE: a. Be sure that latch lock is in unlocked position until backplate is latched.
b. Oil buffer tube lock flush with end of body.
10. Screw in barrel until resistance is met from face of bolt.
11. Adjust headspace by backing off 2 notches.
12. Close and latch cover (only when bolt is forward).
13. Test assembly.

3. ADJUSTING HEADSPACE

I. Instructional Steps:

- A. With the bolt fully forward, screw the barrel into the barrel extension until resistance caused by contact with the bolt is felt.
 - B. Check to see that the barrel extends through the barrel extension.
 - C. Unscrew two notches.
- NOTE: If the gun operates sluggishly, unscrew one additional notch.

II. Tight Headspace Adjustment will cause:

- A. Poor functioning due to the breech lock not fully entering its recess in the bolt.
- B. Sluggish operation due to the binding of moving parts.
- C. Extraction trouble due to improper timing of locking and unlocking.

III. Loose Headspace may cause:

- A. A ruptured cartridge case.

4. DETAILED DISASSEMBLY

I. Disassembly and assembly of bolt.

A. To disassemble bolt:

1. Remove extractor by rotating up and removing it to left.
 2. Lift out bolt switch and stud.
 3. Remove cocking lever pin and cocking lever by:
 - a. Rotating cocking lever to rear and,
 - b. Releasing firing pin by depressing sear.
 - c. Removing cocking lever pin from left.
 - d. Removing cocking lever.
 4. Remove sear stop and pin by:
 - a. Swinging sear stop to center of bolt, and
 - b. Turning bolt over, pushing sear stop pin up.
 - c. Turning bolt over, removing sear stop from slot.
 5. Remove sear slide by pressing down on sear.
 6. Remove sear and sear spring.
 7. Remove firing pin extension and firing pin.
 8. Remove firing pin from firing pin extension.
- NOTE: The bolt is now disassembled.

B. To assemble bolt:

1. Engage firing pin to firing pin extension.
2. Replace firing pin and firing pin extension (with shoulder down).
3. Replace sear spring (using edge of cocking lever to position spring).
4. Replace sear.
5. Replace sear slide
6. Replace sear stop (Move into recess on the left).
7. Replace cocking lever (toe down and to rear).
8. Replace cocking lever pin (from left side).
9. Replace bolt switch and stud (keeping proper groove open).
10. Replace extractor.
11. Check assembly.

II. Disassembly and assembly of oil buffer body.

A. To disassemble oil buffer body:

1. Remove tube spring lock by
 - a. Rotating accelerator to horizontal position.
 - b. Lifting up on stud of oil buffer tube lock spring and
 - c. Rotating accelerator to the vertical removing lock spring.
2. Remove spring body lock by prying from its recess. (only to replace).
3. Remove accelerator by:
 - a. Drifting out accelerator pin.
 - b. Removing accelerator.

NOTE: The oil buffer body is now disassembled.

B. To assemble oil buffer body:

1. Position accelerator.
2. Replace accelerator pin.
3. Replace spring lock (body).
4. Replace spring lock (tube).

III. Disassembly and assembly of barrel extension.

A. Disassembly of barrel extension:

1. Pry out barrel locking spring (only when replacing it)
2. Remove breech lock pin.
3. Remove breech lock.

B. Assembly of barrel extension:

1. Replace breech lock.

NOTE: Make sure double-beveled edge is up and to front.

2. Replace breech lock pin.
3. Replace barrel locking spring.

IV. Disassembly of parts dismantled only for repair or replacement.

A. Disassembly of cover group:

1. Remove cotter pin.
2. Remove cover pin.
3. Remove cover.
4. Remove cotter pin from belt feed lever pivot.
5. Remove belt feed lever.
6. Remove belt feed lever plunger and spring.
7. Remove belt feed slide.
8. Remove belt feed pawl pin.
9. Remove belt feed pawl.
10. Remove belt feed pawl spring.
11. Remove belt feed pawl arm.
12. Remove cover latch spring.
13. Remove cotter pin from cover latch shaft.
14. Remove cover latch shaft.
15. Remove cover extractor spring.

Assembly of cover group:

1. Replace cover latch shaft.
2. Replace cover shaft cotter pin.
3. Replace cover extractor spring.
4. Replace cover latch spring.
NOTE: Make sure that rear end of cover latch spring is seated on top of lug on cover latch.
5. Replace belt feed pawl arm.
6. Replace belt feed pawl spring.
7. Replace belt feed pawl.
8. Replace belt feed pawl pin.
9. Replace belt feed slide.
10. Replace belt feed lever plunger and spring.
11. Replace belt feed lever.
12. Replace cotter pin to belt feed lever pivot.
13. Replace cover.
14. Replace cover pin.
15. Replace cotter pin.

B. Disassembly of trigger bar:

1. Rotate trigger bar pin down 90°.
2. Remove to left.
3. Remove trigger bar.

Assembly of trigger bar:

1. Replace trigger bar.
2. Replace trigger bar pin.
3. Rotate 90° up.

C. Disassembly of bolt latch:

1. Remove trigger bar.
2. Drift out bolt latch pin.
3. Remove bolt latch.

Assembly of bolt latch:

1. Replace bolt latch.
2. Replace bolt latch pin.
3. Replace trigger bar.

5. MECHANICAL FUNCTIONING

I. General.

- A. Every gunner should have a practical working knowledge of the mechanical operation of the gun to keep it in action.
- B. Many parts operate simultaneously, but to facilitate instruction, functioning is divided into phases.
- C. Explanation begins with gun assumed to be loaded and ready to fire.

II. Instructional steps.

A. Trigger action - 1st shot (flexible)

- 1. Trigger actuated.
- 2. Trigger bar pivoted on retaining pin.
- 3. Sear pushed down.
- 4. Sear notch lowered.
- 5. Firing pin extension shoulder released.
- 6. Firing pin spring expands.
- 7. Firing pin moves forward.
- 8. Cartridge is fired.

B. Trigger action - automatic fire.

- 1. Trigger held down.
- 2. Sear disengaged prior to bolt reaching forward position.
NOTE: Camming action starts $1/8$ inch from forward position but after breech has been locked.
- 3. Firing pin released.

C. Backward movement of recoiling parts.

- 1. Bolt, barrel extension, barrel locked together.
- 2. Move backward $1 \frac{1}{8}$ inches.
NOTE: Locked together first $9/16$ inches. (Fully locked)
- 3. Breech lock depressors act on breech lock pin. (after $9/16$ inch)
- 4. Breech lock forced down.
- 5. Bolt unlocked from barrel extension. (just prior to $1 \frac{1}{8}$ ")
- 6. Accelerator rotated rearward.

D. Backward action of accelerator.

- 1. Tips of accelerator strike lower projections of bolt.
- 2. Bolt accelerated to rear.
- 3. Barrel extension shank engaged by claws of accelerator.
- 4. Barrel extension and oil buffer body are now locked together.

E. Backward movement of bolt.

1. Driving spring compressed.
2. Cartridge carried from bolt by extractor.
3. Empty case carried from chamber by T slot.
4. Cam lug on extractor rides on top of receiver switch.
5. Cover extractor cam causes cam lug on extractor to force switch down.
6. Switch rises when cam lug is clear and to the rear.

F. Action of oil buffer.

1. Oil buffer piston rod and head move rearward.
2. Oil buffer spring compressed.
3. Restricted flow of oil through openings in piston head supplements action of spring.

G. Cocking action.

1. Cocking lever rotated in top plate bracket.
2. Firing pin carried to rear.
3. Firing pin spring compressed between sear stop pin and firing pin spring retaining pin.
4. Firing pin extension shoulder engages sear notch.

H. Action of driving spring.

1. Bolt moving to rear compresses driving spring.
2. Bolt strikes buffer plate, fiber disks absorb remaining shock.
3. Driving spring expands forcing bolt forward.

I. Action of bolt latch.

1. Bolt latch engages and holds bolt in rearward position.
2. Action of bolt latch release when held down permits bolt to go forward.
3. Read supplement #2 at end of pamphlet for purpose.

J. Forward movement of bolt.

1. Extractor rotated down under action of receiver switch.
2. Cartridge carried down in T-slot.
3. Empty case forced out of T-slot by new round.
4. Cocking lever moves away from firing pin.

K. Release of recoiling parts.

1. Accelerator is struck by bolt and rotated forward.
2. Barrel extension and oil buffer unlock.
3. Barrel and barrel extension move forward.

L. Loading and Locking action.

1. Extractor cammed up by extractor cam.
2. Cover extractor spring assists extractor to grip first round in belt.
3. Breech lock is cammed up, locking bolt to barrel extension.
4. Breech is locked before recoiling parts are completely forward.

M. First act of feeding.

1. Belt feed lever stud moves in cam groove of bolt.
2. Belt feed slide moves in opposite direction (to the left).
3. Belt holding pawl holds round in feedway.

N. Second act of feeding.

1. Belt feed lever stud moves in cam groove of bolt.
2. Belt feed slide moves in opposite direction (to the right).
3. First cartridge carried against stops.
4. Next cartridge carried just over belt holding pawl.

O. Adjustment of oil buffer (adjustable type).

1. Cyclic rate changes (open is faster).
2. Piston rod head on Piston rod is keyed indirectly to oil buffer body.
3. Piston rod valve keyed to oil buffer tube.
4. Size of oil passages are changed by turning tube.

6. CHANGING DIRECTION OF FEED

I. Changes must be made in the following groups:

- A. Cover.
- B. Receiver.
- C. Bolt.

II. Instructional Steps:

A. Cover (Disassembly).

1. Cotter pin.
2. Belt feed lever with plunger and spring.
3. Belt feed slide.
4. Belt feed pawl pin.
5. Feeding pawl.
6. Spring.
7. Arm.

Cover (Assembly)

1. Arm on pawl (smooth side up, square end away, place arm on whatever side you want to feed from).
2. Assemble slide.
3. Slide in cover.
4. Change plunger on feed lever (cover open, plunger is above pivot for left-hand feed).
5. Replace lever and cotter pin.

B. Receiver (Disassembly).

1. Front and rear cartridge stops and link stripper with pin.
2. Belt holding pawl with pin.

C. Bolt.

1. Remove extractor.
2. Turn switch so that proper track (lettered L or R) is open.
3. Replace extractor.

Caution: Check work to make sure all necessary changes have been made.

7. FILLING OIL BUFFER TUBE

I. Instructional steps:

- A. Remove oil buffer tube filling screws.
- B. Insert nozzle of oiler.
- C. Fill with oil.
- D. Replace filler screws.

NOTE: Do not release pressure on oiler until nozzle has been removed from filling hole, thus air bubbles in buffer tube are prevented.

8. CARE AND CLEANING

I. General.

- A. Cleaning essential.
- B. Bore most important.
- C. Mounts, spare parts and ammunition should not be overlooked.

II. Special precautions.

- A. Don't close cover unless bolt is forward.
- B. Don't leave live round in hot chamber.
- C. See that oil buffer tube is full.

III. Materials.

- A. Soda ash.
- B. Prepared cleaning solution.
- C. Water and G. I. soap.
- D. Sperm oil.
- E. Aircraft Instrument & M.G. oil.
- F. Cosmoline.
- G. Racoil oil (M.G. Light)
- H. Crocus cloth.

IV. Instructional Steps.

A. Bore.

- 1. Clean.
- 2. Dry.
- 3. Oil (sperm or aircraft).

B. Moving parts.

- 1. Clean thoroughly.
- 2. Oil sparingly but often.
(use sperm, aircraft, instrument & M.G. oil)

C. Oil Buffer.

- 1. Keep filled.

D. Mount.

- 1. Tighten parts.
- 2. Clean and oil.

E. Spare parts.

- 1. Keep complete set.
- 2. Keep serviceable and lightly oiled.

F. Care during gas attack.

- 1. Cover gun, parts and ammunition (gun cover, oil or cosmoline).
- 2. After gas attack wash in neutralizing solution, dry and oil.
NOTE: Don't oil ammunition.

G. Care during cold weather.

- 1. Use light lubricant.
- 2. Test operation frequently.

V. Points to be observed before, during and after firing.

A. Before.

1. Bore clear and clean.
2. All parts clean and oiled.
3. Oil buffer filled.
4. Headspace correct.
5. Gun mount adjusted.
6. Ammunition in good condition.
7. Spare parts checked.

B. During.

1. Observe functioning to anticipate failures.
2. Lubricate.

C. After.

1. Disassemble, clean and oil (gun and mount).
2. Assemble and check operation.
3. Release firing pin spring.
4. Replenish ammunition and spare parts.

9. ACCESSORIES

AND SPARE PARTS

I. General

Accessories are tools and equipment for disassembling, assembling, cleaning, preserving and repairing equipment.

A. Spare Parts 1-4; Accessories 5-11.

1. Used to replace unserviceable parts.
2. Keep up supply.
3. SNL A-39 shows allowance.
4. M2 Spare parts kit.
 - a. 12 1/2 x 6 x 8 (2 partitions).
 - b. Carries parts and 40 rounds ammunition in links.
5. M2 Ammunition chest.
 - a. Outwardly looks same as spare parts kit.
 - b. Holds 100 rounds.
6. M4 Cal. .50 Cleaning brush.
 - a. Bronze bristles on brass core that screws into end of cleaning rod.
7. Link loading machine M2.
 - a. Holds 10 rounds.
 - b. Links are placed on loading bed adjacent to stops.
 - c. Loading is performed by operating handle.
8. Oiler, filling oil buffer.
 - a. Holds 1/2 pint and nozzle is 5 in. long.
9. M1 Cleaning Rod.
 - a. Disassembles into 5 sections.
10. M2 Cleaning Rod.
 - a. Single rod with swivel handle.
11. Wrench Combination M2.
 - a. Openings marked to show use.

10. STOPPAGES & IMMEDIATE ACTION

I. Stoppage.

Is any unintentional cessation of fire.

Assume headspace has been properly checked and gun correctly assembled.

II. Principal causes in order of their frequency of occurrence.

A. Friction:

Recoiling energy is used up, overcoming friction before complete cycle takes place.

CAUSES:

Lack of lubrication, dirt, tight belt links, or bent driving spring rod.

B. Combination Failure to Feed and Load.

Round not extracted from belt and seated to chamber.

CAUSES:

Defective belt feed pawl, short round, weak cover extractor spring, loose cover or defective extractor.

C. Failure to fire.

Firing mechanism not functioning properly.

CAUSES:

Worn firing pin, weak firing pin-spring, worn cocking lever, defective sear spring, or defective primer.

D. Broken parts.

As many stoppages as there are parts.

E. Obstruction in Chamber.

New round cannot be placed in chamber.

CAUSES:

Dirt in chamber or ruptured case.

Stoppages can be reduced or prevented by proper care of weapon before, during, and after firing.

III. IMMEDIATE ACTION.

Is the unhesitating application of a probable remedy for a stoppage.

IMMEDIATE ACTION TABLE

Gun fails to fire

(1st Phase)

Pull bolt to rear, release it, re-
lay and attempt to fire.

If gun still fails to fire

(2nd Phase)

Tap cover, pull bolt to rear slowly, release
it, check belt & bolt stud.

If belt feeds

Relay and
attempt to fire

If gun still fails to fire

(4th phase)

Replace broken or
worn parts in bolt

If belt does not feed

(3rd Phase)

Raise cover, check feeding
mechanism, remove first round,
reload, relay, and FIRE.

11. OPERATING GUN

I. Instructional steps:

A. Half load.

1. Push double end of belt into feedway.
2. Pull bolt to rear and release.

NOTE: Before bolt will go forward bolt latch release must be locked or manually pressed down.

B. Load.

1. Execute half load.
2. Pull bolt to rear again and release.

C. Unload.

1. Raise cover.
2. Remove bolt.
3. Retract bolt.
4. Make sure chamber and T-slot are clear.
5. Release bolt.
6. Lower cover.
7. Press trigger.

D. Clear.

1. Unload gun.
2. Place wooden clearing block between bolt and barrel.

E. Fire semiautomatic.

1. Bolt latch release must be unlocked.
2. Press bolt latch release.
3. Press trigger.
4. Repeat above operations.

F. Fire automatic.

1. Bolt latch release must be locked down.
 2. Hold trigger down.
- NOTE: To fire single-shot, automatic action, raise thumb quickly after pressing trigger.

12. GUN DRILL

I. GENERAL.

In this pamphlet, Ground or Dismounted Gun Drill will not be covered as such. Reference is given to FM 23-60, Chapter II. The remaining explanation will concern itself with drill relevant to the needs of Tank Destroyers.

II. PROCEDURE.

The detailed movements of the several members of the gun crew in dismounting the gun, ammunition, and accessories from combat vehicles and placing the gun in dismounted action will necessarily vary with the type of vehicle and size of the crew used. In the efficient handling of this weapon for ground operations, three men are required to place the gun in and out of position. As most combat vehicle gun crews do not consist of more than two (2) men, usually the car commander must assist in these operations in addition to his other duties.

When thus putting the gun into action the car commander takes the tripod to the place selected for the gun position and sets it up; he then reassumes his normal duties. The gunner and the assistant gunner, working together, carry the receiver and the barrel attached as follows: The gunner carries the receiver end of the gun by means of spade grips in his left hand and the ammunition box or belt in his right hand. He is preceded by the assistant gunner who carries the muzzle end of the gun by means of grasping the front end of the barrel in his right hand; in his left hand, the assistant gunner also carries a box or belt of ammunition.

The driver remains in the vehicle, if it has not been disabled. The vehicle should be disposed for its protection against possible surprise air or ground attack.

In taking the gun out of dismounted action, the duties of the crew are generally the reverse of placing the gun in action, except that the gunner, grasping the spade grips with his left hand precedes the assistant gunner who grasps the barrel or carrier handle in his right hand.

13. MARKSMANSHIP

I. General.

- A. Marksmanship is the basic step in training the gunner to employ successfully his weapon in combat. A gunner will subconsciously apply in combat the principles he has been taught in marksmanship. To become proficient, the soldier must be thoroughly trained in the basic fundamentals of marksmanship, as applied to the .50 Caliber Machine Gun.

II. Fundamentals.

- A. Accurate delivery of initial fire on stationary targets.
- B. Accurate delivery of fire on moving targets.
 - 1. Axis of the bore ahead of the target.
- C. Adjustment of fire from observation of strike, burst or tracer.
- D. Mechanical skill in manipulation.
- E. Maintenance of an adequate volume of fire to destroy target in the shortest time.
- F. Rapid shifting of fire to new target.

Proficiency in these fundamentals is attained through the preparatory exercises. The purpose of the preparatory exercises is to develop in the soldier fixed and correct habits of marksmanship.

III. The Preparatory Exercises consist of the following six (6) distinct steps:

- A. Sighting and Aiming.
- B. Position.
- C. Manipulation.
- D. Sight setting and laying.
- E. Tracking and leading.
- F. Examination.

1. Sighting and Aiming: The purpose is to teach correct alignment of metallic sights on the target. Method: Through use of the:
 - a. Sighting bar detects easily small errors and assists in explaining such errors.
 - b. Triangulation: Using a fixed gun and a target, the gunner directs the movement of the sighting target into correct alignment, and has the point marked.
 - c. An enlarged model of a sight picture can be used for large classes and when time does not permit for practical work.
2. Positions: Firing is done from either the prone or sitting positions, when using the ground mounts, and from a crouch or standing position when using vehicular mounts.

Note: The position of the body may be varied, according to conformation of the individual so that the eye is in the proper position to permit alignment of the sights.

 - a. Prone position - Fixed Gun:
 - (1) Gunner directly behind and close to the gun, legs well apart.
 - (2) Left elbow on the ground, close to the body.
 - (3) Left hand on the elevating handwheel, left thumb on the traversing slide lever.
 - (4) Right hand grasps the right space grip, thumb at the trigger.

b. Prone Position - Free Gun:

- (1) The heel of the left hand under the corner of the left spade grip, with the fingers around the spade grip. (Maximum support assured, and the right hand assists in manipulation and controls the trigger action).
- (2) Otherwise similar to "a" above.

c. Sitting Position - Fixed Gun:

- (1) Gunner is directly behind and close to the gun.
- (2) Legs crossed or extended under the tripod.
- (3) Elbows close against the body.
- (4) Left hand on the elevating handwheel, thumb at the traversing slide lever.
- (5) Right hand on the spade grip, thumb at the trigger.

d. Sitting Position - Free Gun:

- (1) The heel of the left hand under the corner of the left spade grip, with the fingers around the spade grip.
- (2) The left elbow against the body. (Firm support assured, and tendency of the gun to search up is prevented.)
- (3) Otherwise similar to "c" above.

Note: In the absence of vehicular mounts, stress should be placed on this position which is relatively similar to that in a vehicle, except that the gunner is standing or in a crouched position in a vehicle.

3. Manipulation consists of shifting direction of the gun from one definite point to another.

- a. Accuracy and speed are the results of constant practice.
- b. Elevating Mechanism (Push up, pull down) The left thumb around the handwheel is the guide to push or pull.

4. Sight Setting and Laying:

- a. The purpose is to teach use of the metallic sights and develop speed and accuracy in their use.
 - (1) Metallic battle sight is set to shoot "on the mark" at 750 yards.
 - (2) Rear sight graduated in 100's of yard to 2600, with a windage deflection of 5 mils right and 5 mils left of zero.

b. Examples of Exercise:

Sight Setting - Range 800, sight right 2.

Sight Setting and Laying - Range 1000, sight left 2, paster # 2.

Commence firing.

- (1) Gunner repeats command. At command of Execution he sets the sights and aims on the prescribed target.

5. Tracking and Leading:

- a. General technique of engaging a moving target differs from that of engaging a stationary target in that the gun must be aimed ahead of the target a sufficient distance to cause bullet and target to arrive simultaneously at the same point.
- b. Leads using metallic sights are target lengths.
- c. Leads dependent upon:
 - (1) Speed.
 - (2) Range.
 - (3) Direction of moving target.

d. Lead Table.

Mathematical computation or the use of a voluminous lead table is impracticable in combat. The simple lead table shown below gives amount of lead necessary to hit a target moving at right angles, 90° , to direction of fire at speed and ranges indicated.

Speed in miles per hour	Range of Target		
	300	500	900
15	2 target length	1 target length	2 target lengths

- (1) The angle at which the target is moving will also alter amount of lead to be taken; that is, if the angle between line of fire and line of travel of the target is 45° or less use one-half the lead shown in the table.
- (2) Intelligent use of the lead table includes immediate application of fire with estimated lead followed by necessary corrections based upon observation of strike or tracer.

e. Lead Exercises - (1000 inch)

- (1) Gunner required to take a position at the gun, swing the gun through the announced target silhouette, and aim at a point ahead of the target equal to the prescribed lead.
- (2) Assistant moves the marking silhouette until the forward edge is at a point of aim.
- (3) The assistant marks the point and the gunner repeats, until he can make a triangle less than one inch in size.

f. Tracking consists of maintaining correct alignment of the sights on a moving target.

- (1) Rules:
 - (a) Pick up the target from the rear and swing out to estimated leads.
 - (b) Gain the proper elevation as you move on the target.
 - (c) Continuing traversing while firing.
 - (d) Don't stop, just slow-up if ahead of the target.

6. Examination of men before firing.

- a. Men must pass preliminary gunners test (Practical examination on preparatory range training).

14. ZEROING

I. Purpose

- A. The process used to determine and apply the corrections for mechanical errors in the gun, barrel, or sights so that the line of aim and the trajectory will intersect at the point of aim. (Target)

II. Methods

- A. 1000 inch target method (similar to that used in .30 Caliber Machine Gun, rear sight set at 400 yards.)
- B. Field Range Method:
 - 1. Select a target on the range.
 - 2. Estimate range.
 - 3. Set the estimated range and deflection on sight.
 - 4. Fire three (3) shots (single), relaying after each shot.
 - 5. Locate the center of impact (of strike or tracer).
 - 6. Without moving the gun, line sights on the center of impact.
 - 7. Relay and fire 1 or 2 confirming shots.

15. NIGHT FIRING

I. General:

- A. Night operations are of major importance in modern combat.
- B. Preparations for night firing should be made in daylight hours when possible.
- C. All training in night firing is applicable to smoke or fog.

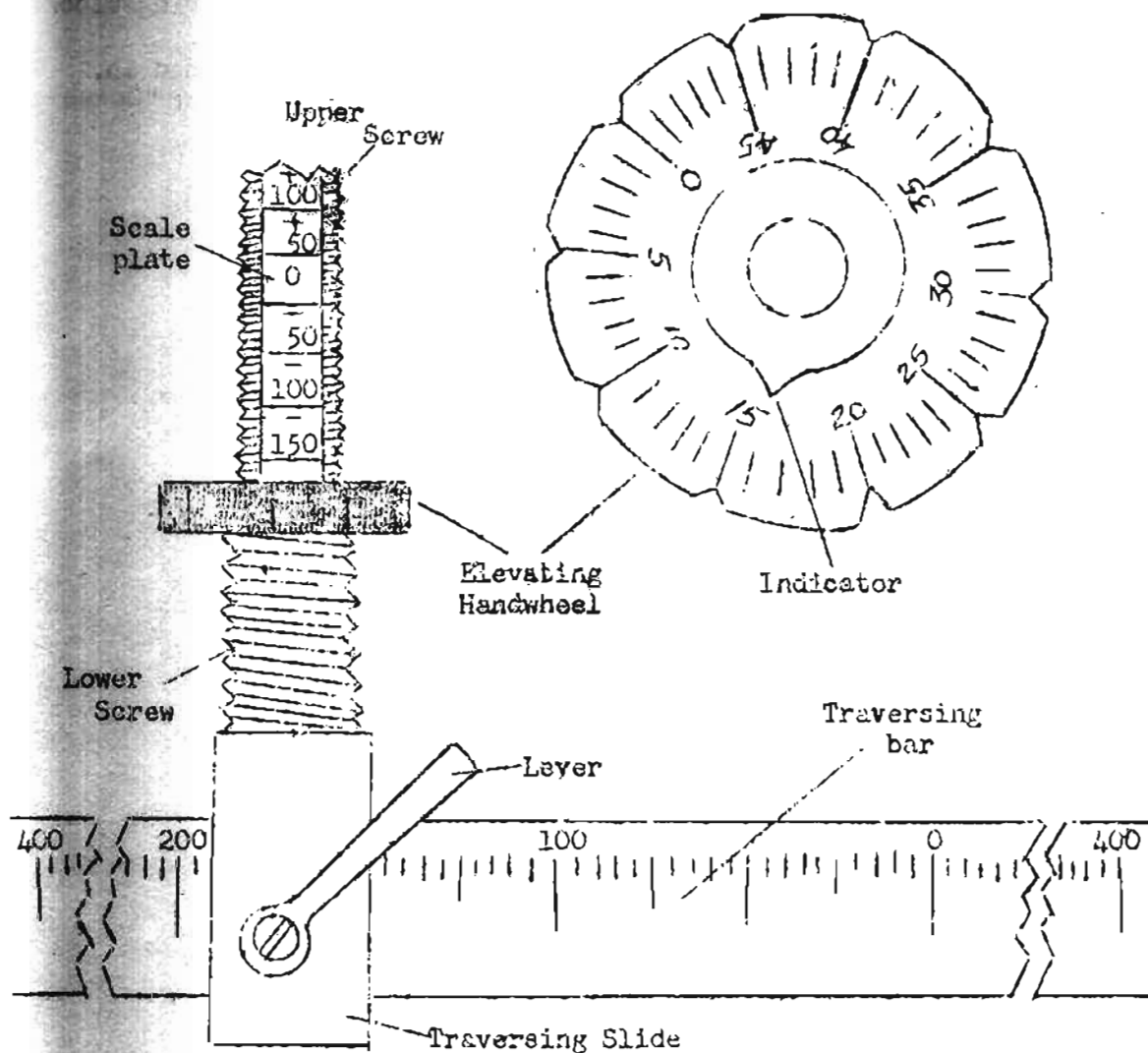
II. Setting up gun for night firing:

- A. How set up may be used:
 - 1. To cover bivouac area.
 - 2. To be able to lay fire on bridges, road junctions, etc. at night.
- B. Place gun in action:
 - 1. Tripod legs on firm ground.
 - 2. All clamps tight.
 - 3. Keep gun level.
- C. Fire on target.
 - 1. Use sights on first shot.
 - 2. Observation of strike thereafter.
 - 3. Cease firing when on target.
- D. Recording information of gun.
 - 1. Standard range card (not necessary).
 - 2. Information desired.
 - a. Number and description of target.
 - b. Traversing reading (right or left).
(Right when muzzle is to right.)
 - c. Elevation reading (plus or minus).

III. Reading elevating and traversing mechanisms:

- A. Elevating Mechanism (parts).
 - 1. Elevating handwheel assembly secured to lower elevating screw.
 - 2. Upper elevating screw equipped with an engraved brass scale.
 - 3. Scale graduated into 50 mil subdivisions.
 - 4. Scale reads 100 mils plus from 0 to 250 mils minus.
 - 5. Elevating handwheel has a single click system from 1 to 50.
- B. Reading elevating mechanism.
 - 1. Brass scale: read first number above line not covered by top of elevating handwheel; such as -150.
 - 2. Handwheel: read number below indicator; such as --(dash) 16.
 - 3. Elevation thus -150 --(dash) 16.
- C. Reading traversing mechanism.
 - 1. Traversing bar, graduated 400 mils left and right of 0.
 - 2. Divided into 5 mil subdivisions.
 - 3. Read left side traversing clock.
 - 4. Reading is called right when muzzle is to right.
 - a. Example (Right 190 - on left side of traversing bar.)

D. Elevating and Traversing Mechanism.



IV. Range Set up (after preliminary work).

A. Throw off gun in

1. Deflection.
2. Elevation.

B. At command place fire on target (following operations are performed in the dark).

1. Set correct traverse reading.
2. Set correct elevation reading.
3. Commence firing (upon signal or command).

Note: Aiming stake not required for this set up.

16. CONDUCT ON THE RANGE.

- I. CHECK HEADSPACE BEFORE FIRING*****
- II. Guns will be loaded only on command.
- III. Firing will begin only on command of officer in charge.
- IV. No one will go ahead of the firing line at any time unless so ordered.
- V. All guns that are clear will be marked by inserting clearing blocks.
- VI. Don't fire outside safety limits.
- VII. All brass and links will be promptly policed up and turned in.
- VIII. Firing will stop immediately upon the command or signal of "Cease Firing".

17. SUPPLEMENT #1 - NOTES ON DESCRIPTION OF THE GUN

The .50 caliber Machine gun, manufactured by the A.C. Spark Plug Company, and branch of General Motors Production Division, includes the following modifications:

- I. There is a Side Plate Trigger Recess on each side of the Receiver. Thus, if the gun is used as a fixed gun with the Trigger Mechanism attached the Side Plate Trigger may be installed on either side. If the Side Plate Trigger is changed, the flat end of the Sear Slide must be placed so as to face the direction of the change. The Retracting Slide Bracket is changed to the opposite side.
- II. An auxiliary bolt handle similar to that used with the .30 caliber Machine gun is provided for use when the gun is made fixed. In order to install this bolt handle, the retracting slide bracket is removed.
- III. There is a change in the barrel support similar to that made in the .30 Caliber Machine Gun; round holes have replaced the narrow slots. This change is an aid in mass production, and does not affect the circulation of the air around the breech end of the barrel. This receiver will be known as the New Receiver.
- IV. The muzzle end of the Barrel is bell-shaped. This change results from a new manufacturing process whereby a better barrel with stronger steel structure is produced. This barrel will be known as the 45 inch barrel (muzzle bell). It weighs 27½ pounds.
- V. There is a new modified rear cartridge stop which fits into the old Rear Cartridge Stop Bracket. This provides a spring action to hold the cartridge firmly against the Extractor. An auxiliary Link Stripper and a Rear Cartridge Stop are provided in case it is desired to change to Right hand feed. ~~The Pawl on the modified Cartridge Stop will be known as the Short Round Eliminator.~~
- VI. The new guns are received with a dual Driving Spring on the Driving Spring Rod. The smaller spring inside the regular Driving Spring is turned in a different direction to prevent overlapping when compressed. The bolt is cut away above the Bolt rails to reduce weight and for balance.

SUPPLEMENT #2

- I. Function of bolt latch:
 - A. Keeps live round out of hot chamber.
 - B. Used to clear gun.
 - C. Gives temporary cooling cessation between each shot.
 - D. Assures positive single shot action.