

## 3" ANTITANK GUN, ML, TOWED

### I CHARACTERISTICS

The three inch antitank gun, ML, towed, is a high velocity, flat trajectory weapon of the field gun type. The gun is the standard three inch antiaircraft gun M5 mounted on a split-trail-type carriage ML, similar to the 105 Howitzer. This gun is of the two-man-control type and can be fired in both Direct and Indirect Fire. It is a weapon which has tremendous striking power, firing both Armor Piercing (A.P.) and High Explosive (H.E.) ammunition to ranges in excess of 12,000 yards.

#### GENERAL DATA

1. Single shot.
2. Flat Trajectory.
3. Horizontal, sliding, wedge-type breechblock.
4. Traverse 800 mils.
5. Elevation, 450 mils.
6. Depression 173 mils.
7. Weight in firing position 4875 lbs.
8. Rate of fire: Dependent upon training, and skill of gun crew. Six to twenty-five rounds per minute, prolonged fire rate approximately three rounds per minute. Continuous pull type firing mechanism.

#### BARREL

1. The barrel is a one piece construction, cold-worked in three forgings.
8. Rate of fire: Dependent upon training, and skill of gun crew. Six to twenty-five rounds per minute, prolonged fire rate approximately three rounds per minute. Continuous pull type firing mechanism.

#### BARREL

1. The barrel is a one piece construction, cold-worked in three forgings.
2. Weight of barrel: 1600 lbs.
3. Length of bore is 50 calibers (150 inches).
4. Rifling: uniform right hand twist, one turn in 40 calibers.
5. Length of rifling: 125.8 inches.
6. 28 grooves.
7. Chamber pressure: 34000 lbs. per sq. inch.
8. Life of barrel: 2500 rounds (approximately).

#### RECOIL MECHANISM

1. Hydro-pneumatic, constant, floating-piston type.
2. Oil capacity: 9 1/8 pts.
3. Length of recoil: 26 - 30 inches.

#### CARRIAGE

1. Split Trail type.
2. Axle is I beam forging.

3. Equalizer axle.
4. Spring type equilibrator (pull down action)
5. Wheels: conventional auto-disc type.
6. Size of tire: 9.00X20.
7. Tire pressure: 45 lbs.

#### PRIME MOVER

1. The prime mover for the 3" antitank gun M1 may be either the standard 2½ ton 6x6 Cargo truck, or the half track personnel carriage M3. However, the vehicle recommended for this job is the personnel carriage M5.

#### DISASSEMBLY AND ASSEMBLY

1. Open the breech and inspect the bore. Make sure the bore is clear.
2. With the breechblock open, remove:
  - a. The trigger shaft.
  - b. Rotate the Operating Lever assembly until the assembly line on the lever coincides with the right edge of the breechblock ring, then remove the Operating Lever Pivot.
  - c. Slide the Breechblock to the right until the Operating Lever Crosshead clears the Breechring and remove the Operating Lever Assembly.
  - d. Slide the Breechblock to the left and remove the Extractor. (Care must be taken not to slide the Breechblock too far to the left, forcing it from the Breechring.)
  - e. Slide the Breechblock to the right, place both hands in the lightening cut, remove it from the Breech recess.
  - f. Place the Breechblock front face down on the gun cover, then rotate the firing lock one-sixth turn in either direction and remove it from the Breechblock.
  - g. With a small screw driver, remove detent spring retaining screw. Care must be taken not to slide the Breechblock too far to the left, forcing it from the Breechring.)
  - e. Slide the Breechblock to the right, place both hands in the lightening cut, remove it from the Breech recess.
  - f. Place the Breechblock front face down on the gun cover, then rotate the firing lock one-sixth turn in either direction and remove it from the Breechblock.
  - g. With a small screw driver, remove detent spring retaining screw.
  - h. Turn the Breechblock over the Detent Spring, Detent and Detent Handle will drop out. Care must be taken not to lose any of these small parts.

#### DISASSEMBLY OF THE FIRING LOCK, M-13

1. Remove the Trigger Fork from the Firing Case.
2. Insert Trigger shaft to engage the yoke ends of the sear.
3. Depress the Sear against the action of the Sear Spring by pressing the exposed forward end of the Sear so as to disengage it from the Firing Pin Holder.
4. Slide the Firing Pin Holder Assembly from the Firing Case.
5. Remove the trigger shaft.
6. Remove the Sear and the Sear Spring. (It may be necessary to use a screw-driver to remove the Sear Spring from its seat in the Firing Case.)
7. Press the Firing Pin Holder Sleeve slightly forward and unhook it from the Firing Pin Holder.
8. Remove the Firing Pin Holder Sleeve.
9. Remove the Firing Spring.
10. Remove the Cotter Pin from the Firing Pin Holder.
11. Unscrew the Firing Pin Bushing, and remove the Firing Pin.



### ALTERNATE METHOD OF DISASSEMBLING FIRING LOCK ML3

1. Assemble the trigger shaft to the firing case and the trigger fork.
2. Force the arm of the trigger shaft to the rear, firing the lock.
3. Remove the trigger shaft.
4. Remove the trigger fork, the firing pin holder assembly, the sear and the sear spring.

CAUTION: When firing the lock DO NOT have any part of the hands in front of the firing pin.

### ASSEMBLY OF THE FIRING LOCK, ML3

1. Replace the firing pin in the firing pin bushing.
2. Screw the firing pin bushing into the firing pin holder.
3. Place the cotter pin in the firing pin holder, spreading the end so it will clear the edge of the firing case.
4. Assemble the firing spring onto the firing pin holder by turning the holder until all coils of the spring have passed over the rear end of the firing pin holder.
5. Place the firing pin holder sleeve over the firing spring, force the sleeve against the spring until the beveled surface of the sleeve and the firing pin holder are hooked together.
6. Place the sear spring in its recess in the firing case and replace the sear.
7. Press the sear down against the sear spring and assemble the trigger shaft into the firing case and the sear yoke ends.
8. Press the sear down. This may be accomplished by using a screwdriver through the hole in the firing case.
6. Place the sear spring in its recess in the firing case and replace the sear.
7. Press the sear down against the sear spring and assemble the trigger shaft into the firing case and the sear yoke ends.
8. Press the sear down. This may be accomplished by using a screwdriver through the hole in the firing case.
9. Assemble the firing pin holder assembly into the firing case until it is latched by the sear.
10. Remove the trigger shaft.
11. Insert the trigger fork into the firing case, with the rounded projections of the trigger fork arms forward, push trigger fork in as far as it will go. (The trigger fork has an assembly mark on it for correct assembly of the lock.) Assemble remaining parts of the breechblock in reverse order of disassembly.

### III MECHANICAL FUNCTIONING

#### First Phase: Opening of the Breech

1. To open the breechblock, grasp the operating lever handle, press down and pull the handle to the right.
2. Opening motion is transmitted from the operating lever handle to the operating lever.
3. From the operating lever to the operating lever arm.
4. From the operating lever arm to the operating lever cross-head.
5. The operating lever cross-head moves rearward and to the right in the cross-head cam groove, forcing the breechblock to the right.
6. Motion is stopped by the operating lever striking the breech ring.

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## Second Phase: Extraction

1. The extractor cam trunnion slides in the extractor cam groove on the bottom of the breechblock.
2. As the breechblock moves to the right, the extractor pivots on the extractor pivot trunnion.
3. The lip of the extractor is positioned in front of the rim of the cartridge case and as the long arm of the extractor moves rearward it extracts and ejects the empty cartridge case.

## Third Phase: Loading

1. The round is positioned into the chamber until the rim of the cartridge case engages the lip of the extractor.
2. As the breechblock moves to the left, the forcing bevel cams the round forward and seats it fully into the chamber.

## Fourth Phase: Firing

1. Pull the lanyard.
2. Motion is transmitted from the lanyard to the firing mechanism plunger, forcing the firing mechanism plunger to the rear, this compresses the firing mechanism plunger spring.
3. The firing mechanism plunger engages the trigger shaft arm, rotating it to the rear.
4. The rotary motion is transmitted from the trigger shaft to the trigger fork, this forces the trigger fork and the firing pin holder sleeve forward, and increases the pressure on the firing spring.
5. The firing pin holder sleeve contacts the cam on the sear which forces the sear down against the action of the sear spring, this allows the firing pin holder to snap forward under the action of the compressed firing spring and causes the firing pin to strike the primer.
4. The rotary motion is transmitted from the trigger shaft to the trigger fork, this forces the trigger fork and the firing pin holder sleeve forward, and increases the pressure on the firing spring.
5. The firing pin holder sleeve contacts the cam on the sear which forces the sear down against the action of the sear spring, this allows the firing pin holder to snap forward under the action of the compressed firing spring and causes the firing pin to strike the primer.

## Fifth Phase: Retraction

1. The firing spring, still under its initial pressure, forces the firing pin holder sleeve to the rear.
2. The firing pin holder sleeve forces the trigger fork to the rear, the latter retracts the firing pin holder.
3. The rearward movement of the firing pin holder sleeve allows the sear to rise under the action of the compressed sear spring.
4. The sear engages its seat on the firing pin holder and holds the firing lock in the cocked position.
5. The firing mechanism plunger spring returns it to its normal position.

## IV MALFUNCTION AND CORRECTION

### 1. Failure to Fire:

#### a. Cause

- (1) Defective primer
- (2) Broken or deformed firing pin.
- (3) Broken or weak firing spring.
- (4) Firing mechanism parts not working freely.
- (5) Breechblock not fully closed.
- (6) Gun out of battery.



b. Correction

- (1) Eject faulty round and insert a new round.
- (2) Disassemble firing lock and replace firing pin.
- (3) Disassemble firing lock and replace broken or weak firing spring.
- (4) Thoroughly clean firing lock, remove all burrs or rough surfaces with crocus cloth, lubricate and reassemble.
- (5) Close breechblock.
- (6) Check recoil for proper reserve; clean slides.

2. Failure to extract:

a. Cause-

- (1) Broken extractor.
- (2) Defective cartridge case.
- (3) Fitted or burred chamber.

b. Correction:

- (1) Carefully remove cartridge case from the chamber, using rammer staff. Examine chamber for burrs or foreign substance. Replace the extractor if necessary.

3. Gun Fails to Return to Battery:

a. Cause-

- (1) Insufficient Oil Reserve.
- (2) Low nitrogen pressure.
- (3) Excess of friction, due to insufficient lubrication.
- (4) Damaged slides, piston rod, or pistons.
- (5) Complete loss of nitrogen pressure.

b. Correction:

- (1) Withdraw the reserve oil and establish a new full reserve.
- (2) Notify ordnance personnel.
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- (4) Damaged slides, piston rod, or pistons.
- (5) Complete loss of nitrogen pressure.

b. Correction:

- (1) Withdraw the reserve oil and establish a new full reserve.
- (2) Notify ordnance personnel.
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- (4) Notify ordnance personnel.
- (5) Drain off reserve and notice condition of oil.

4. Gun returns to battery with too great a shock.

a. Cause

- (1) Too much oil reserve.
- (2) Respirator improperly adjusted.
- (3) Excessive nitrogen pressure.

b. Correction:

- (1) Assemble the oil release and withdraw oil until the oil index is half way in. When the mechanism has cooled off, refill to normal.
- (2) Adjust properly.
- (3) Notify ordnance personnel.

MALFUNCTION OF THE OIL INDEX

1. Oil index remains stationary when oil is forced in against evident pressure:

a. Cause:

- (1) Oil index packing too tight.
- (2) Index is broken or locked by some foreign substance.

(7)  
(8)  
(9)  
cc  
b.

b. Correction:

- (1) Drain off all reserve and refill. While injecting the oil, tap the index gently, as the screw filler is turned. If the index fails to move after the above action, notify the ordnance personnel.

2. Loss of Reserve Oil:

a. Cause.

- (1) Leakage.

b. Correction:

- (1) Drain the remainder of the reserve oil and refill.

3. Loss of Nitrogen Pressure:

a. Cause:

- (1) Normal wearing of floating piston.

b. Correction:

- (1) Notify ordnance personnel.

NOTE: To detect the loss of nitrogen pressure, assemble the oil screw filler and force oil into the system; if no resisting pressure is encountered and the oil index fails to move out, this may be taken as a very good indication of loss of nitrogen pressure.

MALFUNCTION OF THE ELECTRIC BRAKES

1. No Brakes.

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MALFUNCTION OF THE ELECTRIC BRAKES

1. No Brakes.

a. Cause:

- (1) Broken wire circuit.
- (2) Controller defective.
- (3) Poor connections.
- (4) Broken wire on magnet.
- (5) Poor ground connection in circuit.
- (6) Defective plug or socket.

b. Correction:

- (1) Check entire circuit for wiring (Broken wiring).
- (2) Short out the controller by connecting both wires to one terminal and see if brakes are effective.
- (3) Check, clean, and tighten all connections.
- (4) Repair broken wire if possible; if not, replace magnet.
- (5) Clean up and tighten all connections.
- (6) Repair or replace plug or socket.

2. Very Weak Brakes.

a. Cause:

- (1) Worn out brake lining.
- (2) Glazed magnet facing.
- (3) Stop lights connected in circuit.
- (4) Insufficient current.
- (5) Poor ground connection at brakes.
- (6) Controller burned out.



- (7) Contactor arm on controller pitted.
- (8) Broken Magnet Spring.
- (9) Worn wheel bearings.

b. Corrections:

- (1) Replace brake band assembly.
- (2) Roughen magnet facing, with emery cloth.
- (3) Stop lights must not be connected into the breaking circuit.
- (4) Clean and tighten all connections, check plug and socket for corroded or dirty blades.
- (5) Make good connections at brakes and frame.
- (6) Replace with new controller.
- (7) Smooth out contactor arm with fine emery cloth.
- (8) Replace with new spring.
- (9) Replace wheel bearings.

## V CARE AND CLEANING

### GENERAL

1. The gun crew is responsible for the care and maintenance of the gun. The gun commander is charged directly with the maintenance of the gun, the prime mover, and all equipment pertaining thereto.
2. The purpose of care and cleaning or preventive maintenance is to insure the gun being in first class fighting condition at all times.

### BEFORE FIRING

1. From breechend, swab the tube with a dry cloth.
2. Wipe all oil from exposed bearing surfaces to prevent the collection of dust and dirt, thereby forming an abrasive.
3. Check the recoil index to insure a full oil reserve before firing.
4. Check all working parts to insure their proper functioning.

### DURING FIRING

2. Wipe all oil from exposed bearing surfaces to prevent the collection of dust and dirt, thereby forming an abrasive.
3. Check the recoil index to insure a full oil reserve before firing.
4. Check all working parts to insure their proper functioning.

### DURING FIRING

1. At frequent intervals, and during lulls in firing, swab out the bore with water to cool it off as much as possible.
2. During lulls in firing, check working parts and lubricate slides, etc., as needed.
3. Observe recoil action at all times for any malfunction in operation, also check recoil index frequently during firing.

### AFTER FIRING

1. Clean the bore from the muzzle end with a solution of one pound of Sal Soda or one half pound soda ash to one gallon of water. From muzzle end rinse the bore with clear water, dry thoroughly and oil from the breech end.
2. Disassemble the breech block, thoroughly clean and oil.
3. Inspect all parts before assembly for broken or worn parts, etc.

### THE CARRIAGE

1. Keep the carriage clean at all times and lubricated.
2. The carriage should be lubricated in accordance with existing lubrication charts.
3. Give sighting equipment best care and protection possible at all times since the equipment is expensive and very hard to replace.

## LING THE RECOIL CYLINDER

1. screw filler with heavy recoil oil.

2. up, turn the screw handle until oil begins to run  
3. oil screw filler and insures no air being introduced  
under head.

4. of the oil screw filler into the filling hole in the  
under head.

4. ar once to expel the air from the filling hole, then tighten  
the.

5. Use both hands, on the oil screw filler handle, force oil into the cylinder  
until the oil index is flush with the recuperator cylinder front head, this  
indicates a full reserve.

NOTE: It is important that both hands  
be used on the oil filler handle.  
This prevents the oil screw filler  
being forced out of line with  
the filler hole.

## VI AMMUNITION CHARACTERISTICS

H.E. SHELL M42A1	PD FUZE M48	A.P.C. M62
24.91 lbs.	weight of complete rd.	27.24 lbs.
12.87 lbs.	weight of projectile	14.91 lbs.
2800 fps.	muzzle velocity	2800 fps.
2449 fps.	terminal vel. at 1000 yards	2253 fps.
12,100 yards	maximum effective range	3000 yards.
17.5 yards	bursting radius	

Comparison of the 3" Towed Gun, firing M62 ammunition, and the German 88.

The 3" gun at 1000 yds, and 20 degree angle of impact, penetrated 3.7 inches		
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Comparison of the 3" Towed Gun, firing M62 ammunition, and the German 88.

The 3" gun at 1000 yds, and 20 degree angle of impact, penetrated 3.7 inches  
of armor. The German 88 at 1000 meters (1094 yds.), 20 degree angle of impact,  
penetrated German armor 2.6 inches.

(Armor penetration at 1000 yds. and 90° angle of impact is 4.6 inches.)





