

FIELD MANUAL

RIFLE, 5.56-MM, M16A1

HEADQUARTERS, DEPARTMENT OF THE ARMY

MARCH 1970

FIELD MANUAL }
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HEADQUARTERS
 DEPARTMENT OF THE ARMY
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RIFLE, 5.56-MM, M16A1

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*This manual supersedes FM 23-9, 12 July 1966, including all changes.

CHAPTER 1

INTRODUCTION

Section I. GENERAL

1. Purpose and Scope

This manual provides guidance for presenting instruction with the rifle, 5.56-mm, M16A1. (Guidance provided herein is also applicable to the rifle, M16). It contains a detailed description of the rifle and its general characteristics, procedures for disassembly and assembly, operation and functioning of the rifle, types of ammunition, and maintenance. When supplemented by FM 23-71 and FM 23-16, it provides information in sufficient detail for conducting marksmanship training with the rifle. This manual is applicable to both nonnuclear and nuclear warfare.

2. Responsibilities of Commanders

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Section II. CHARACTERISTICS

3. Description of the Rifle

a. The rifle, M16A1 (fig 1), is a 5.56-mm, magazine-fed, gas-operated, air-cooled, shoulder weapon. It is designed for either semiautomatic or full automatic fire through the use of a selector lever.

b. The rifle is equipped with a flash suppressor which also serves as a stationary piston permitting the launching of rifle grenades without the use of supplementary attachments.

c. The barrel is surrounded by two aluminum-lined fiberglass handguards which are notched to permit air to circulate around the barrel, and further serve to protect the gas tube.

d. A hard rubber pad is attached to the butt of the stock to partially reduce the effects of recoil.

e. A forward assist assembly located on the right rear of the upper receiver permits the closing of the bolt when this is not done by the forces of the action spring.

Notes. Provided in M16A1 only. M16 version does not provide forward assist assembly (fig 2).

f. A "clothespin" bipod is used in the prone and foxhole positions. The bipod is attached to the barrel directly beneath the front sight between the bayonet lug and the front sling swivel (fig 3).

g. The trigger guard is easily adaptable to winter operations. A spring-loaded retaining pin is depressed with a cartridge point to allow ready access to the trigger when wearing arctic mittens.

h. An ejector port cover is provided to prevent dirt or sand from getting into the ejection port. The cover should be closed during periods when firing is not anticipated. It will open automatically by the forward or rearward movement of the bolt carrier.

4. General Data

a. Weights.

	Pounds
(1) Rifle without magazine and sling.....	6.5
(2) Empty magazine (aluminum).....	.2
(3) Full magazine (20 rounds).....	.7
(4) *Sling, M1.....	.4
(5) Firing weight (fully loaded, plus sling).....	7.6
(6) Bipod, M3.....	.6
(7) Bipod case.....	.2
(8) Bayonet-knife, M7.....	.6
(9) Scabbard, M8A1.....	.3

*Sling, small arms, FSN 1005-714-9749, is an authorized substitute for sling M1. This sling is extra long and will enable a firer to carry the weapon slung across the front of his body in a position allowing him to remove both hands from the weapon, yet keep it available for use. It would be especially useful for personnel designated as automatic riflemen or for personnel who must carry equipment such as radios and binoculars.

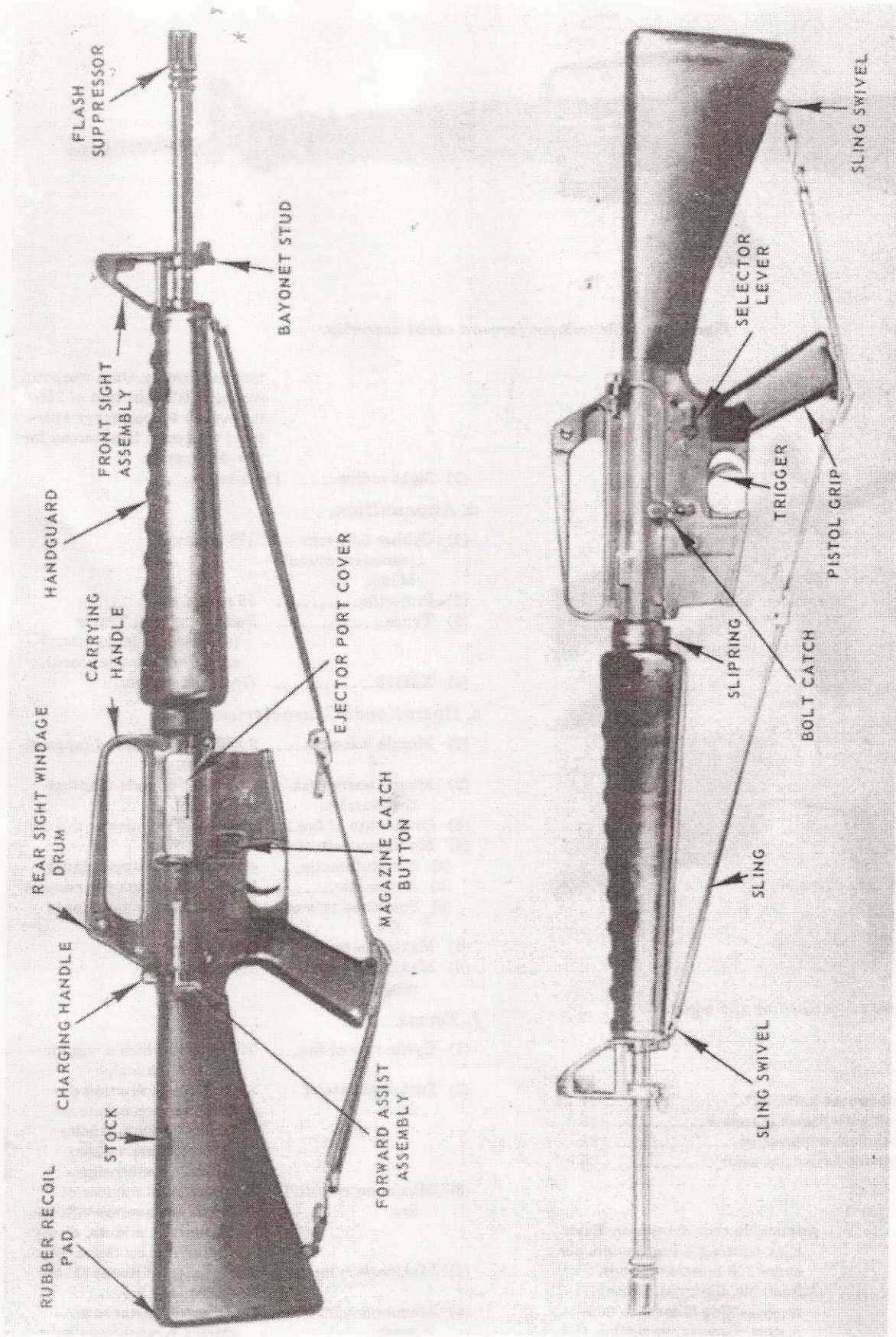


Figure 1. Rifle, 5.56-mm, M16A1, right and left side views.

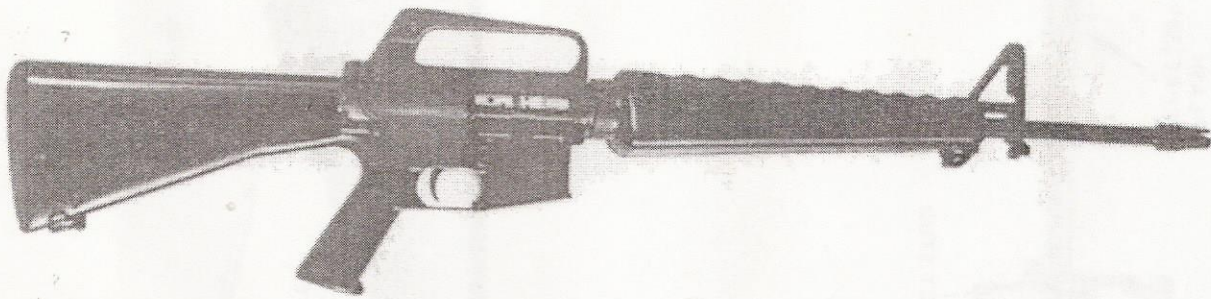


Figure 2. Rifle without forward assist assembly.



Figure 3. Attaching the bipod.

b. Lengths.

	<i>Inches</i>
(1) Rifle with bayonet-knife, M7.....	44.25
(2) Rifle overall with flash suppressor.....	39
(3) Barrel (with flash suppressor).....	21
(4) Barrel (without flash suppressor).....	20

c. Sights.

- (1) Front..... Adjustable click-type post. Each click equals 2.8 centimeters per every 100 meters of range.
- (2) Rear..... Adjustable, flip type. Normal range setting is for 0 to 300 meters. Long-range setting (L), 300 to 500 meters. Each notch of the windage drum equals 2.8 centimeters per every 100

meters of range. On a weapon set for battlesight zero of 250 meters flip to long range aperture; weapon is then zeroed for 290-375 meters.

- (3) Sight radius..... 19.75 inches.

d. Ammunition.

- (1) Caliber 5.56-mm (complete round) M193..... 179 grains.
- (2) Projectile..... 55 grains.
- (3) Types..... Ball (standard). Tracer (standard). Blanks (standard). Dummy (standard).
- (4) XM195..... Grenade launcher.

e. Operational Characteristics.

- (1) Muzzle velocity..... 3,250 feet per second (approximately).
- (2) Muzzle energy (at the muzzle)..... 1,300 foot-pounds (approximately).
- (3) Cyclic rate of fire... 700 to 800 rounds per minute.
- (4) Maximum rate of fire:
 - (a) Semiautomatic... 45 to 65 rounds per minute.
 - (b) Automatic..... 150 to 200 rounds per minute.
 - (c) Sustained rate of fire..... 12 to 15 rounds per minute.
- (5) Maximum range.... 2,653 meters.
- (6) Maximum effective range..... 460 meters.

f. Terms.

- (1) Cyclic rate of fire... The rate at which a weapon fires automatically.
- (2) Sustained rate of fire. Actual rate of fire that a weapon can continue to deliver for an indefinite length of time without seriously overheating.
- (3) Maximum rate of fire. The maximum number of rounds the average rifleman can fire in 1 minute, disregarding hits on the target.
- (4) Maximum range.... The greatest distance that a weapon can fire.
- (5) Maximum effective range. The greatest distance at which a weapon may be expected to fire accurately to inflict casualties or damage.

Section III. GRENADE LAUNCHING CAPABILITY

5. General

To increase the firepower of the rifleman, the M16A1 rifle offers grenade launching capabilities. He can launch pyrotechnics and signal devices for communications, and employ harassing agents and high explosive ammunition against enemy personnel, bunkers, or armored vehicles.

6. Restrictions

When firing pyrotechnics and rifle grenades the following restrictions will be observed:

a. Pyrotechnics and rifle grenades will not be fired with the butt of the weapon against the shoulder or any other part of the body.

b. Firing over the heads of friendly troops should be avoided.

c. Under no circumstances should the M19A1 or M19A2 signal parachute illumination, or the M64 signal, ground smoke be launched from the M16A1.

7. Authorized Grenades and Pyrotechnics for the M16A1 Rifle

The following grenades are authorized for use with the M16A1 rifle with the use of additional accessories:

a. Rifle Grenades.

(1) M19A1 WP.

(2) M22A2 smoke series.

(3) M23 smoke streamer series.

b. Hand grenade, with M2A1 grenade projection adapter, M7A3 CS.

CHAPTER 2

MECHANICAL TRAINING

Section I. DISASSEMBLY AND ASSEMBLY

8. General

a. The purpose of mechanical training is to give the individual soldier a knowledge of the working parts of the M16A1 so that he will understand its operation, be able to locate and reduce stoppages, and properly maintain the weapon.

b. The individual soldier is authorized to dis-

semble the M16A1 to the extent called *field stripping*. This can be accomplished without supervision and is adequate for normal maintenance.

c. The frequency of disassembly and assembly should be kept to the minimum consistent with proper maintenance and instructional requirements.



Figure 4. Selector lever pointing to *SAFE*.

d. The M16A1 is easily disassembled and assembled. No force is required to accomplish disassembly or assembly.

e. As the weapon is disassembled, the parts should be laid out on a table or other clean surface in the order of removal, from left to right. This makes assembly easier because the parts are assembled in the reverse order of disassembly. Nomenclature (the names of the parts) should be taught as the weapon is disassembled and assembled to enable the soldier to better understand further instruction on the weapon.

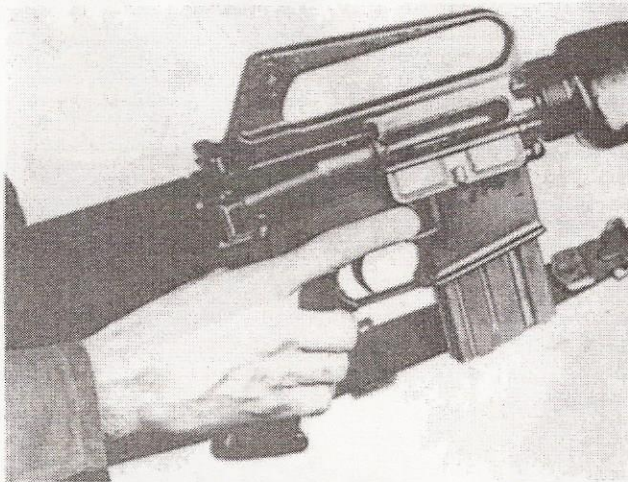


Figure 5. Removing the magazine.

9. Clearing the M16A1

The first consideration in handling any weapon is to make it safe by clearing it. To clear the rifle—

a. Attempt to point the selector lever toward **SAFE** (fig 4). If the weapon is *not* cocked, the selector lever *cannot* be pointed toward **SAFE**. If this is the case, do *not* cock the weapon at this time; instead, go on to the next step in clearing the weapon.

b. Remove the magazine by applying pressure on the magazine catch button with the index finger and allowing the magazine to fall clear of the weapon into your hand (fig 5).

Note. Adjusting the magazine catch: the magazine catch should hold the magazine firmly but should not interfere with magazine removal when the catch button is depressed. To adjust, press in on the catch button with the nose of a cartridge or the end of the cleaning rod, pushing the catch out far enough on the left side of the weapon to clear the catch housing. To tighten, turn the magazine catch clockwise; to loosen, turn it counterclockwise.

c. Lock the bolt open by grasping the charging handle with the thumb and forefinger of the right hand, depressing the charging handle latch with the right thumb, and pulling to the rear (fig 6); press the bottom of the bolt catch with the thumb or forefinger of the left hand (fig 7) when the bolt is fully rearward. Allow the bolt to move slowly forward until it engages the bolt catch, and return the charging handle to its forward position.

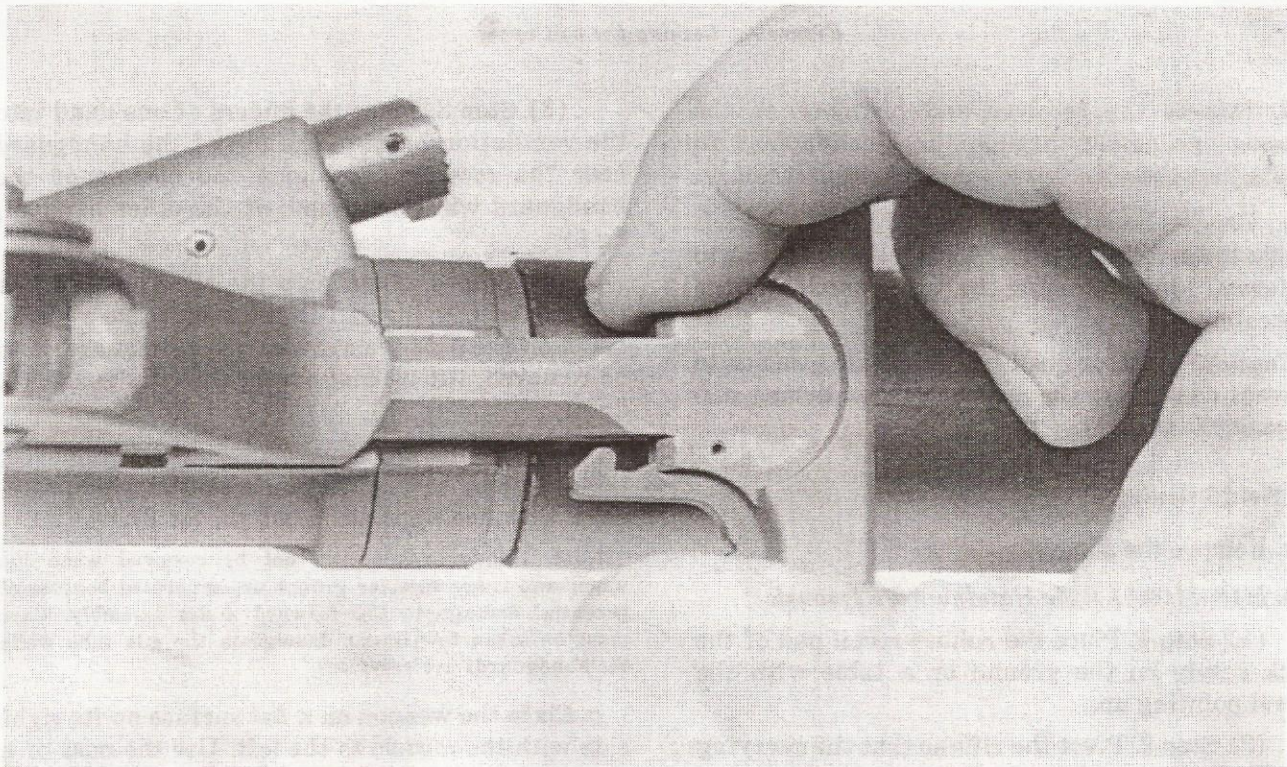


Figure 6. Pulling the charging handle rearward.



Figure 7. Locking the bolt open.

d. Inspect the receiver and chamber of the weapon by looking through the ejection port to insure that these areas contain no ammunition.

e. Check the selector lever to insure that it points toward SAFE (fig 4) and allow the bolt to go forward by depressing the upper portion of the bolt catch.

Caution: Selector must be in the safe position to prevent damage to the automatic sear during disassembly/assembly.

10. Field Stripping

a. Remove the sling.

b. *M16/M16A1 Rifle Handguard Removal.*

(1) Step 1. Place the rubber recoil pad of the stock firmly on the ground or a table with the barrel pointing up.

(2) Step 2. Pivot the rifle so that the carrying handle (upper receiver) is facing away from you.

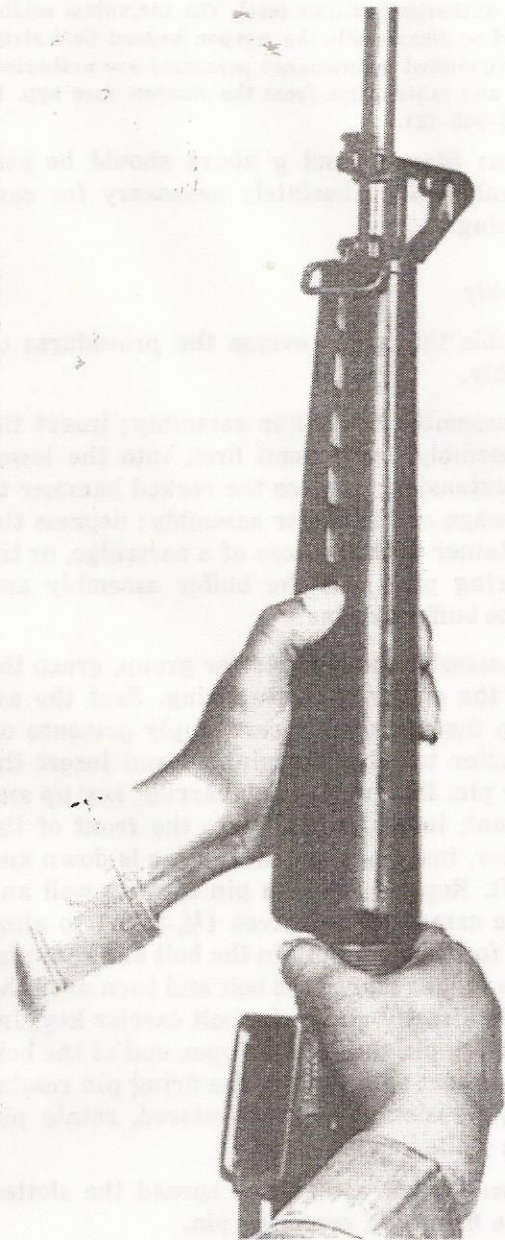
(3) Step 3. Place the fingers of one hand into the ventilation holes in the top of the handguard near the receiver, and grip the bottom of the handguard with the thumb of the other hand (1, fig 8).

(4) Step 4. Then grip the slpring with the thumb and forefinger. While pushing the slpring down on the side from which the handguard is to be removed, lift up and out on the handguard (2, fig 8).

(5) Step 5. Once one handguard is removed, the other can be removed by repeating this procedure with the opposite hand (3, fig 8).

Note. Handguards should not be removed when the upper and lower receiver groups are separated because of potential damage to the forward assist assembly. Care must be taken to prevent damage to the gas tube while the handguards are removed.

c. Place the weapon on a flat surface on its right side with the muzzle to the left. Use the nose of a cartridge to press the takedown pin (fig 9) until



①
Figure 8. Removing the handguards.

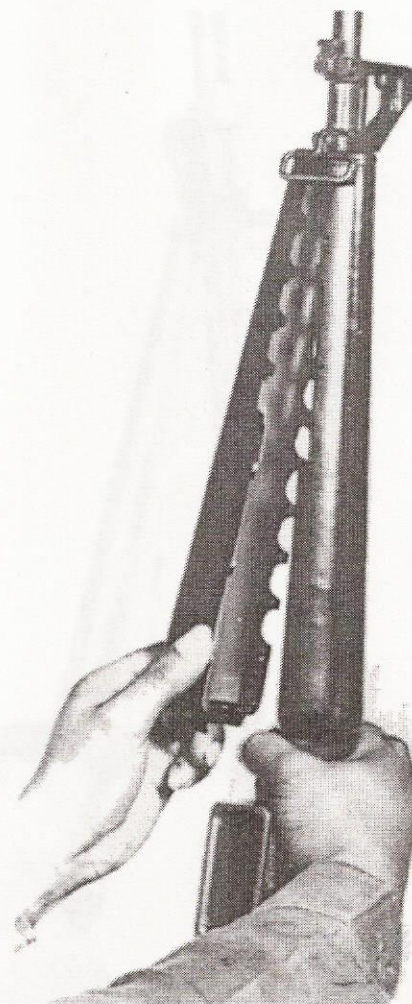
the upper receiver swings free of the lower receiver (fig 10).

Caution: The takedown pin does not come out of the receiver.

d. Again using the nose of a cartridge, press the receiver pivot pin (fig 11). Separate the upper and lower receiver groups (fig 12) and place the lower receiver group on the table.

Caution: The receiver pivot pin does not come out of the receiver.

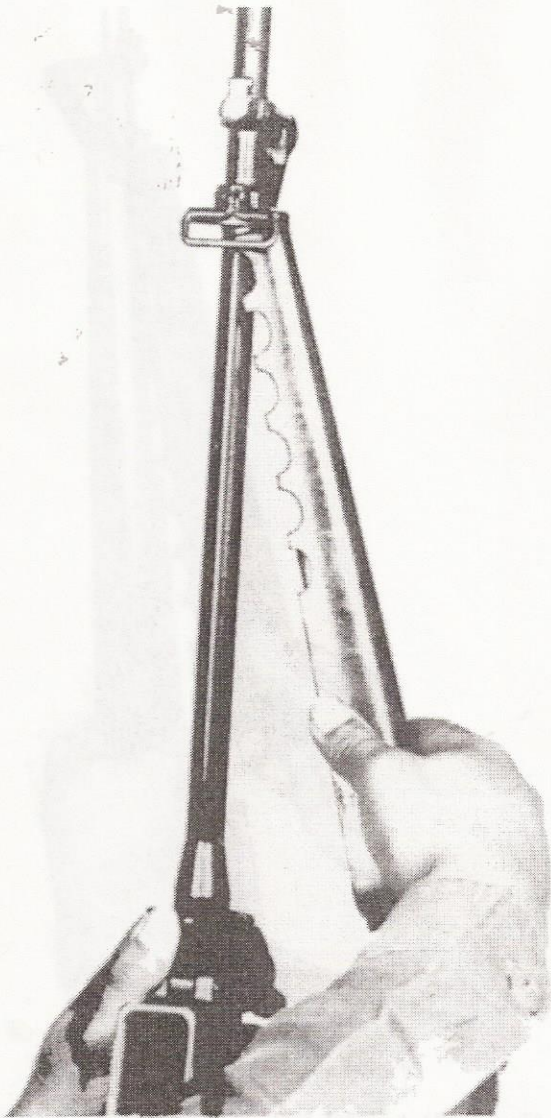
e. Pick up the upper receiver group; keep the muzzle pointed to the left. Grasp the charging handle, pressing in on the latch, and pull to the



②
Figure 8.—Continued.

rear (1, fig 13) to withdraw the bolt carrier from the receiver. Grasp the bolt carrier and pull it from the receiver (2, fig 13). When the bolt carrier is removed, the charging handle will fall free of its groove in the receiver when pulled to the rear (fig 14). Place the receiver on the table.

f. To disassemble the bolt carrier group, press out the firing pin retaining pin by using the nose of a cartridge (fig 15). Elevate the front of the bolt carrier and allow the firing pin to drop from its well in the bolt (fig 16). Rotate the bolt until the cam pin is clear of the bolt carrier key and remove the cam pin by rotating it 90 degrees ($\frac{1}{4}$ -turn) and lifting it out of the well in the bolt and bolt carrier (fig 17). After the cam pin is removed, the bolt can be removed easily from its recess in the bolt carrier (1, fig 18). Remove the extractor by first pushing the extractor pin out with the firing pin (or a pointed object) while maintaining pressure on the extractor with the index finger (2, fig 18). Release the pressure from the extractor and remove. The extractor should be



③
Figure 8.—Continued.

removed only when necessary for cleaning. Since the extractor pin is quite small, it should be handled with care to prevent loss or damage.

Note. The extractor spring should not be removed from the extractor. If the spring becomes separated from the extractor it can be replaced by the user.

g. Using the index finger of the right hand, push in on the buffer assembly. With the nose of a cartridge, or the tip of the firing pin, push down on the buffer retainer. Depress the hammer to the rear (downward) sufficiently to allow the buffer assembly to clear the hammer. Remove the buffer assembly and the action spring (1, 2, 3, fig 19).

Note. The action spring is under pressure and care must be taken in removing it.

h. This completes field stripping (fig 20).

Note. Detailed disassembly consists of removing the remaining operating parts from the lower receiver (fig 21)

and is not authorized at user level. The individual soldier has no need to disassemble the weapon beyond field stripping. Only qualified maintenance personnel are authorized to remove any other parts from the weapon (see app. B, TM 9-1005-249-12).

Caution: Steps *b* and *g* above should be performed only when absolutely necessary for care and cleaning.

11. Assembly

To assemble the rifle, reverse the procedures of disassembly.

a. To assemble the buffer assembly; insert the buffer assembly, spring-end first, into the lower receiver extension; depress the cocked hammer to allow passage of the buffer assembly; depress the buffer retainer with the nose of a cartridge, or tip of the firing pin; seat the buffer assembly and release the buffer retainer.

b. To assemble the bolt carrier group, grasp the bolt and the extractor with spring. Seat the extractor in the extractor recess, apply pressure on the extractor to align the pinhole and insert the extractor pin. Pick up the bolt carrier, key up and to the front, insert the bolt into the front of the bolt carrier, insuring that the ejector is down and to the left. Replace the cam pin into its well and rotate the cam pin 90 degrees ($\frac{1}{4}$ -turn) to align the holes for the firing pin in the bolt and cam pin. Grasp the lugged rim of the bolt and turn until the cam pin is directly under the bolt carrier key. Insert the firing pin through the open end of the bolt carrier and seat fully. Insert the firing pin retaining pin (if resistance is encountered, rotate pin clockwise while inserting).

Caution: Do not attempt to spread the slotted end of the firing pin retaining pin.

Note. Check for proper assembly by elevating the front of the bolt. If the firing pin drops out, the firing pin retaining pin is not between the front and rear spool and the bolt carrier group is improperly assembled.

c. Grasp the upper receiver with the carrying handle up. Place the charging handle into the groove in the top of the upper receiver. The lugs on the charging handle must be seated in their grooves in the receiver. Place the bolt carrier group into the open end of the receiver, insuring that the bolt carrier key is in the slot on the underside of the charging handle and the bolt is forward in the unlock position. Push forward on the bolt carrier group and charging handle until fully seated.

d. Place the upper receiver group and lower receiver group together and reseal the receiver pivot pin.



Figure 9. Pressing the takedown pin to the right.

e. With the hammer cocked and selector lever in the safe position, close the weapon and seat the takedown pin.

f. To assemble the handguard, reverse the procedures for disassembly.

g. Alternate method of installation: In some cases, when the sliping is exceptionally stiff, it may be necessary to use the following method for installing the handguards:

(1) Step 1. Position the forward end of the handguard into the handguard cap.

(2) Step 2. Grip the sliping with the thumb and forefinger of the other hand, and while pushing down on the sliping, force the base of the handguard into place.



Figure 10. Breaking the upper receiver away from the lower receiver.

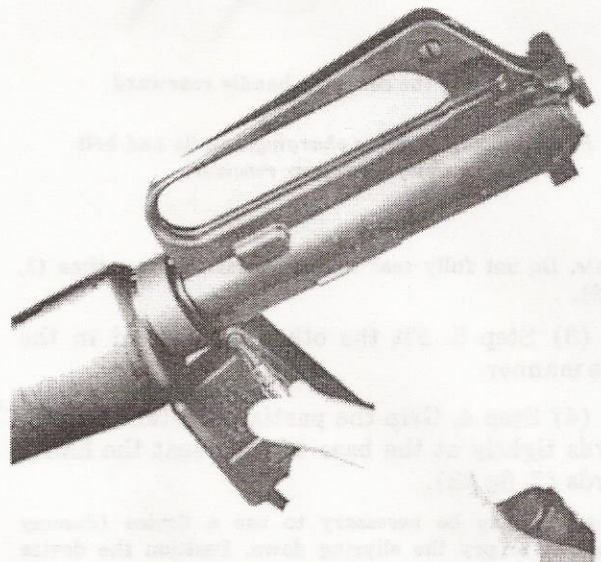


Figure 11. Pressing out the receiver pivot pin.

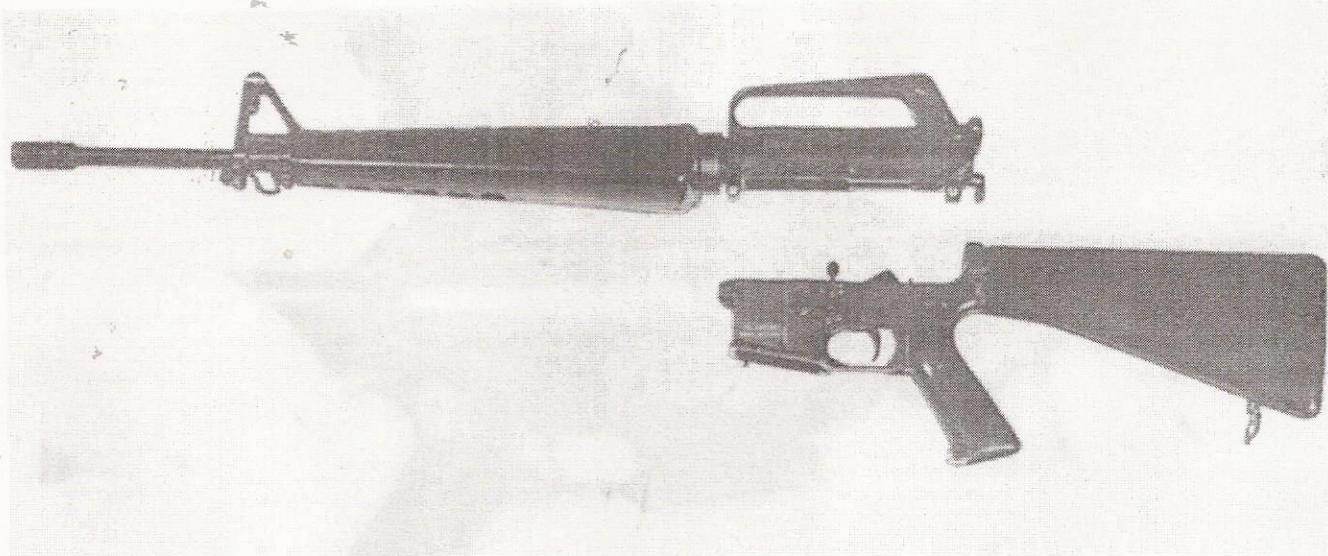
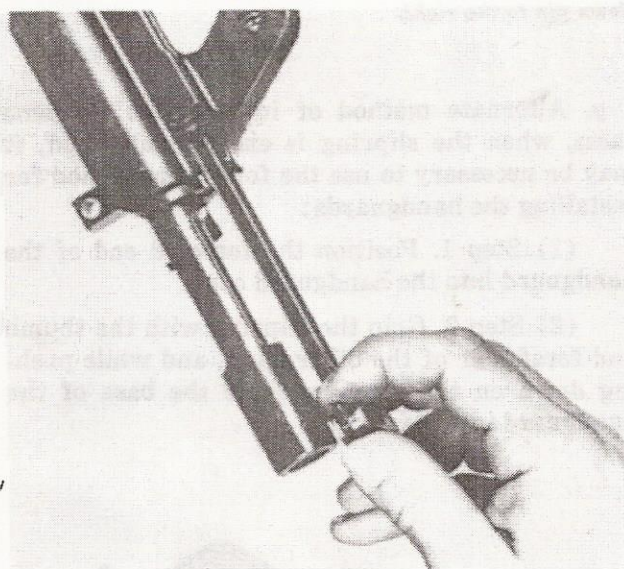
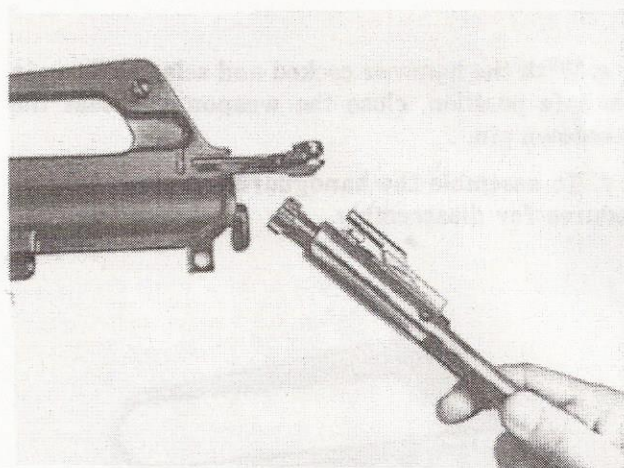


Figure 12. Upper and lower receiver groups.



① Pulling the charging handle rearward



② Removing bolt carrier

Figure 13. Removing charging handle and bolt carrier from upper receiver.

Figure 13—Continued.

Note. Do not fully seat the handguard at this time (1, fig 22).

(3) Step 3. Fit the other handguard in the same manner.

(4) Step 4. Grip the partially installed handguards tightly at the base to fully seat the handguards (2, fig 22).

Note. It may be necessary to use a device (dummy cartridge) to pry the slipring down. Position the device under the tang of a serration on the barrel nut and pry downward against the slipring (3, fig 22).

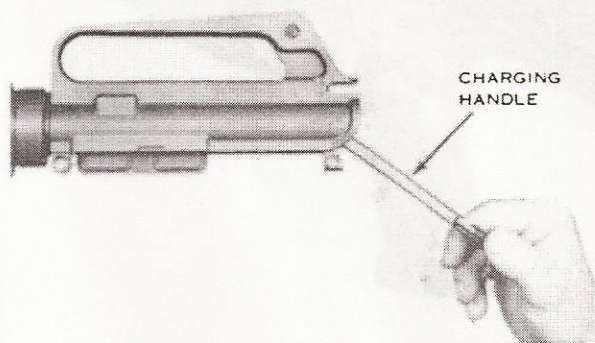


Figure 14. Removing the charging handle.

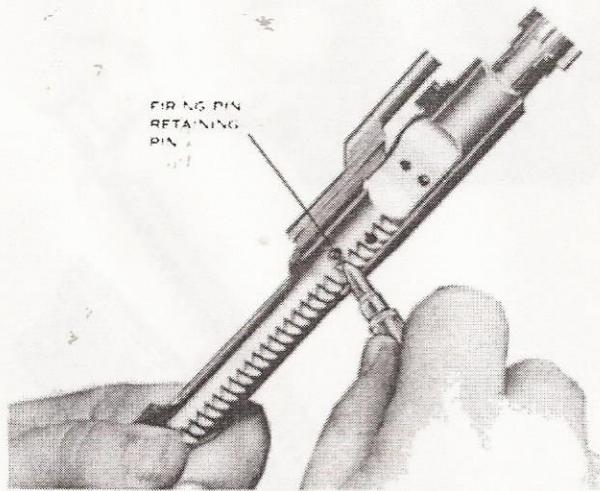


Figure 15. Pressing out firing pin retaining pin.

h. A complete function check of the rifle consists of checking the operation of the weapon while the selector is in the **SAFE**, **SEMI**, and **AUTO** positions. The following sequence is used for a rapid, complete check. Any portion of the check may be used alone to determine the operational condition of any specific fire selection.



Figure 16. Removing the firing pin.

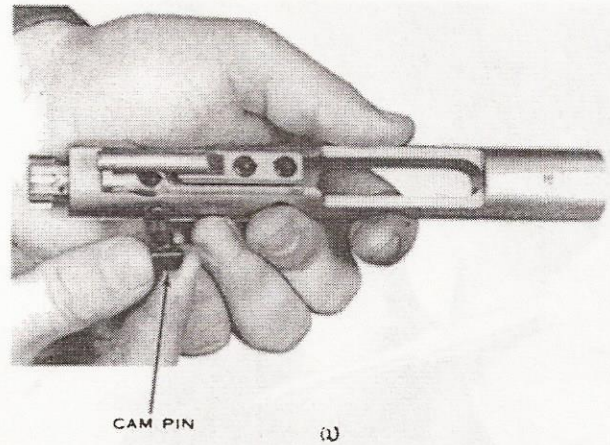


Figure 17. Removing the cam pin.

Note. Disengage the takedown pin and pull the upper receiver away from the lower receiver. Hammer shall be in the cocked position.

(1) **SAFE** position. Pull trigger, hammer should not fall.

(2) **SEMI** position. Pull trigger, hammer should fall. Hold trigger to rear, recock hammer, and release trigger. Hammer should transfer from hammer hooks and disconnecter to the hammer notch and trigger nose.

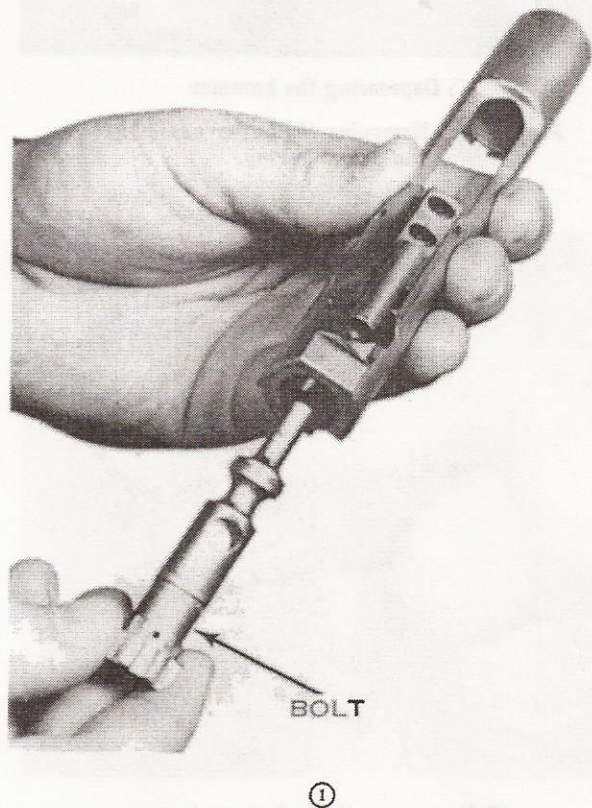
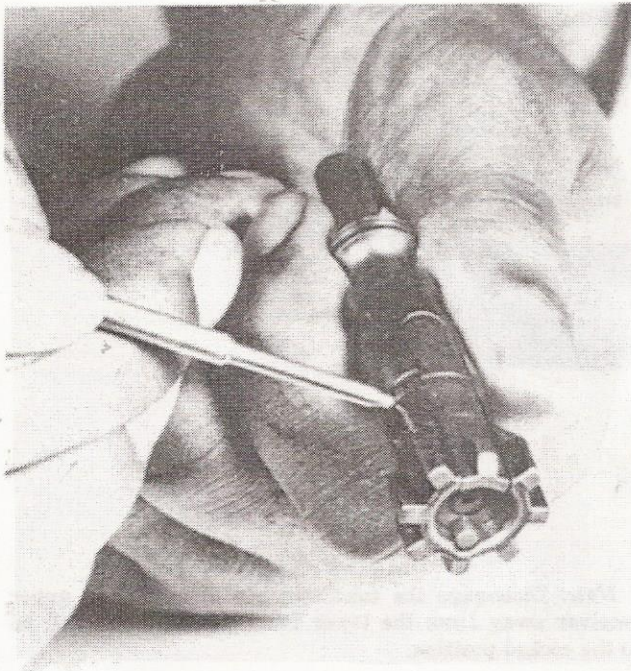
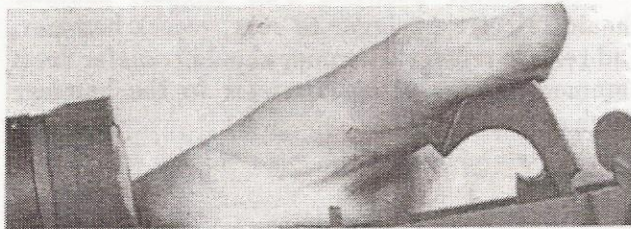


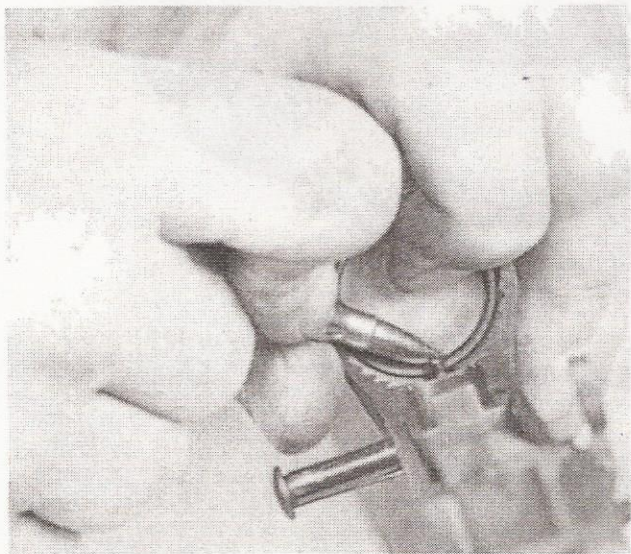
Figure 18. Removing the bolt.



② Removing the extractor
Figure 18—Continued.



① Depressing the hammer
Figure 19. Removing the buffer assembly and action spring.



② Depressing the buffer retainer
Figure 19—Continued.



③ Removing assembly and spring
Figure 19—Continued.

(3) *AUTO position.* Pull trigger, hammer should fall. Hold trigger to the rear and recock the hammer. Upper hammer hook is now engaged with the automatic sear. Hold trigger to the rear, push forward on the automatic sear. Hammer should fall. Hold trigger to the rear, recock hammer, release trigger, and push forward on the automatic sear. Hammer should transfer from hammer hook and automatic sear to hammer notch and trigger nose. Move selector lever to **SAFE** position, close receiver, and engage takedown pin.

Caution: Failure to move selector lever to **SAFE** or **SEMI** position, before closing receivers, will damage automatic sear.

(4) *SEMI position.* Pull charging handle to the rear. Make certain chamber is clear, then release charging handle. Pull the trigger. Hammer should fall.

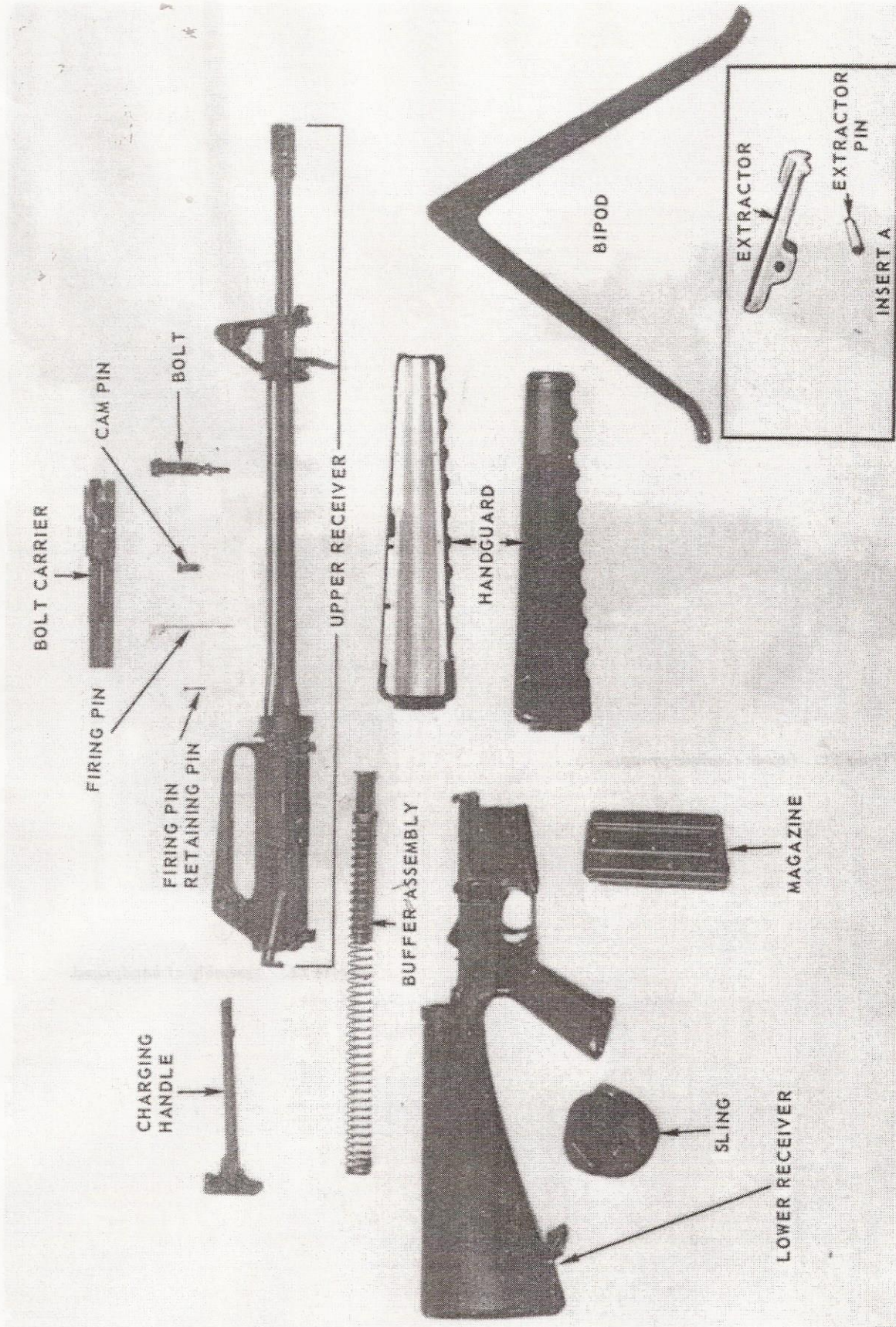


Figure 20. The M16A1 rifle field stripped.

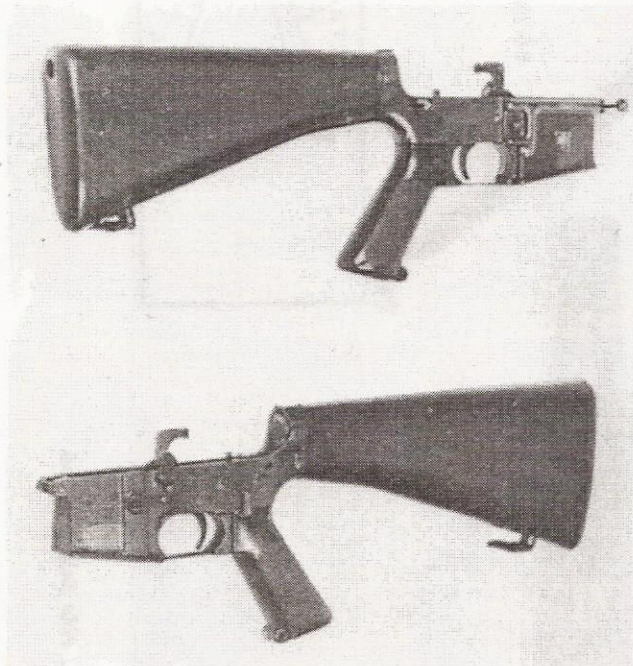
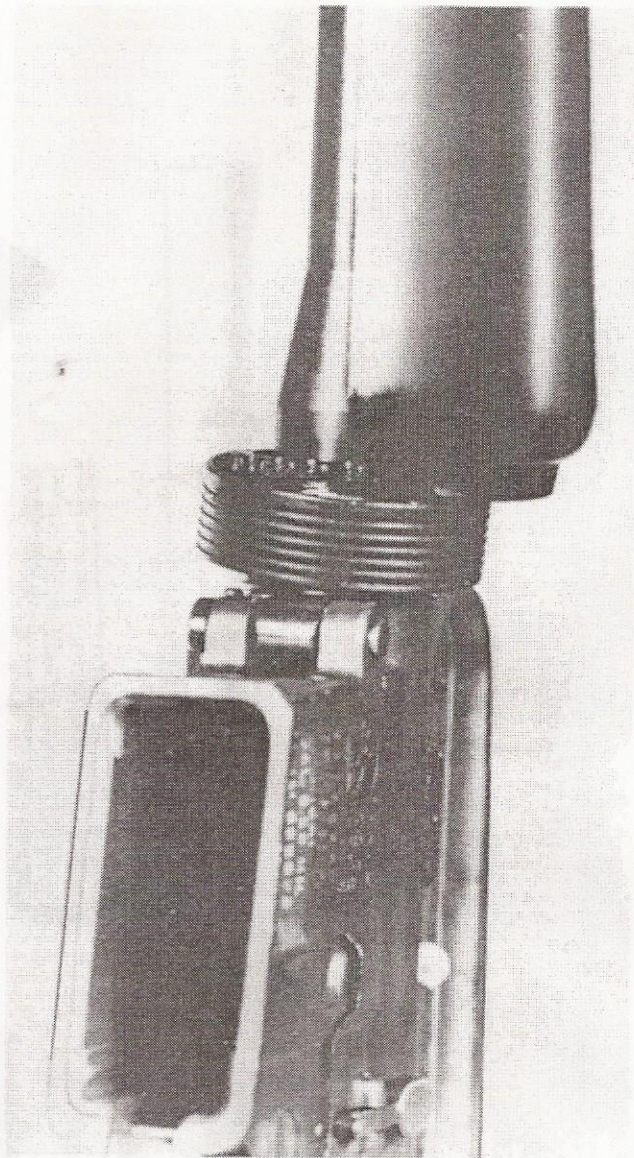


Figure 21. Lower receiver group.



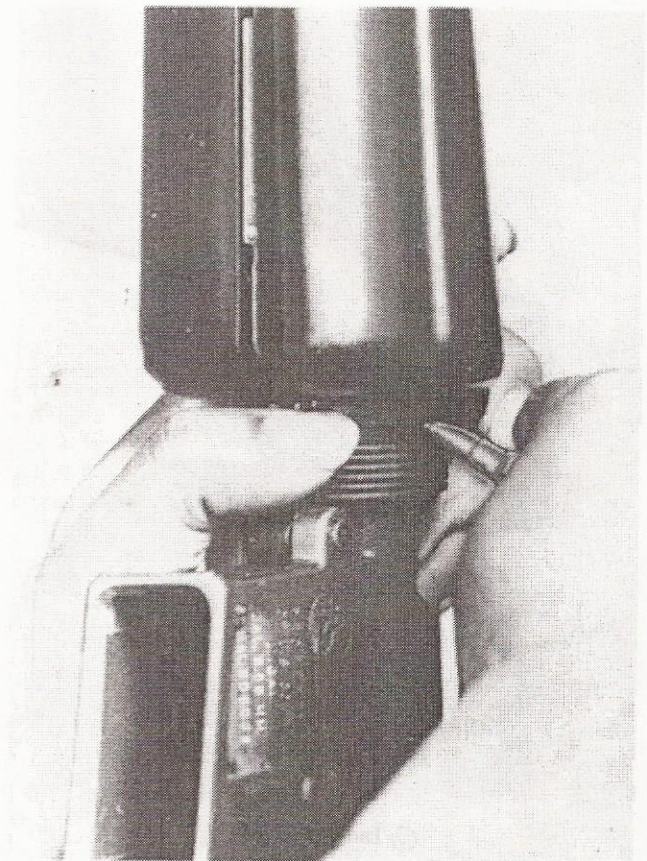
①

Figure 22. Assembly of handguard.



②

Figure 22—Continued.



③

Figure 22—Continued.

Section II. OPERATION AND FUNCTIONING

12. Operation

a. Loading the Magazine.

(1) The magazine has a capacity of 20 rounds and may be loaded with any amount up to that capacity. The magazine follower has a raised portion generally resembling the outline of a cartridge.

(2) Cartridges are loaded into the magazine so that the tips of the bullets point in the same direction as the raised portion of the follower (1, fig 23).

Note. Rounds in the magazine should be removed and checked daily for corrosion and dents and wiped off with a dry cloth.

(3) A magazine charger and magazine charger strip (2c, fig 23) are provided for faster loading of the magazine. Connect magazine charger to the magazine until it is fully seated (2a, b, fig 23). Insert magazine charger strip into magazine charger until the charger strip stops are

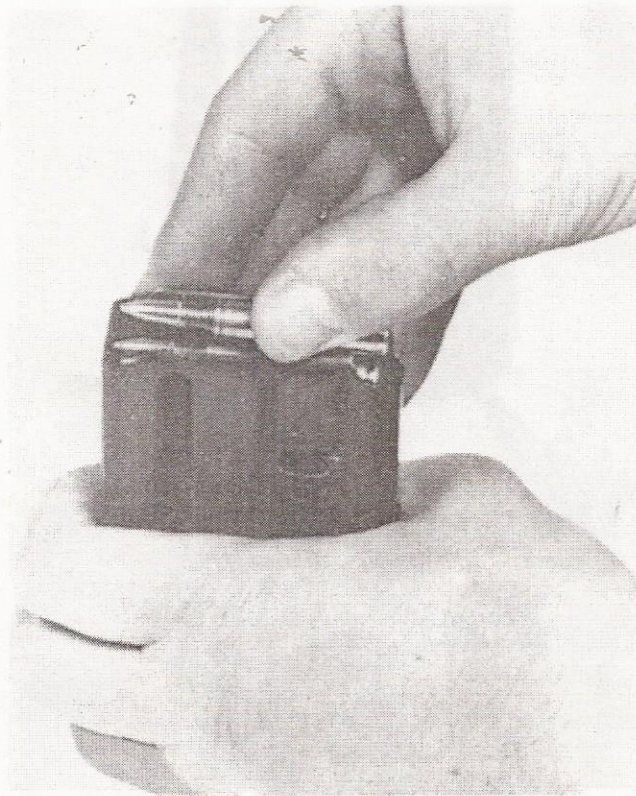
in contact with the magazine charger. Push down on top cartridge, forcing cartridges into magazine (2c, fig 23).

Caution: Do not load or attempt to load more than 20 rounds in the magazine. Overloading will deform the lips of the magazine and cause malfunctions.

b. *Unloading the Magazine.* To prevent damage to the lips of the magazine, removal of ammunition is accomplished in the following manner:

(1) Hold the magazine in the left hand with the open end away from the body, nose of the cartridge down (1, fig 24).

(2) Using the nose of a cartridge, depress the center of the second round in the magazine allowing the first round to drop out of the magazine (2, fig 24). This process is repeated until all rounds have been removed from the magazine except the last.



① Individually

Figure 23. Loading cartridges into the magazine.

(3) To remove the last round, use the nose of a cartridge and depress the follower allowing the last round to drop out of the magazine (3, fig 24).

c. Disassembly and Assembly of the Magazine.

(1) To properly perform maintenance on the magazine, it must be disassembled.

(2) The magazine is disassembled in the following manner:

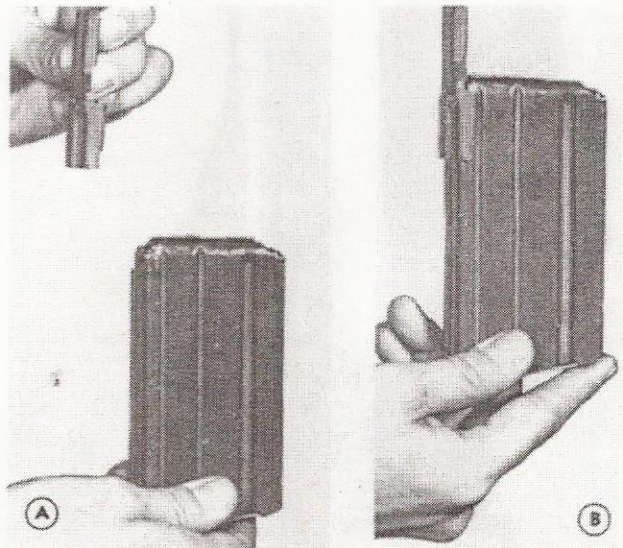
(a) Hold the magazine in the left hand, open end to the left, short edge near the body (1, fig 25).

(b) Insert the nose of a cartridge into the hole in the base of the magazine, depressing the spring steel lock band and at the same time exerting a slight pressure on the base, pushing it away from the body or toward the long edge of the magazine (1, fig 25).

(c) Slide the base forward until it is free of the tabs (2, fig 25).

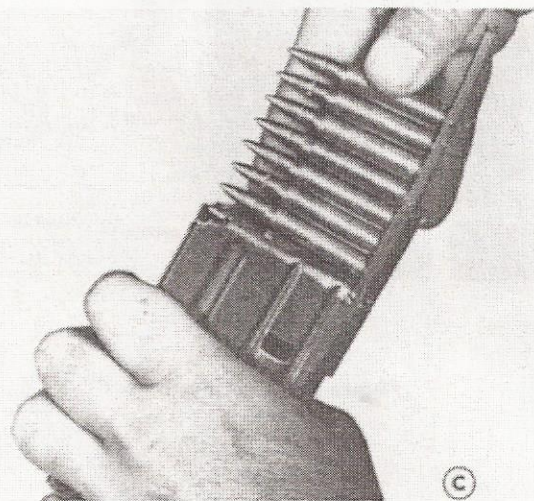
Note. Keep the left thumb over the magazine spring to prevent it from jumping out of the magazine.

(d) To remove the magazine spring, disengage it from the tabs on the magazine first from one side and then the other until it is free of the magazine (3, fig 25).



Ⓐ

Ⓑ



Ⓒ

② With magazine loading strip and charger

Figure 23—Continued.

(e) The follower, attached to the end of the magazine spring, must be *canted* in order to clear the tabs (4, fig 25).

(f) Clean the exterior and interior of the magazine with a dry patch. The magazine is kept dry. The magazine spring is lightly lubricated with LSA oil (5, fig 25).

(3) To assemble the magazine, the parts are replaced in the reverse order of removal.

(a) Place the small end of the follower in the magazine; slip it under the spring steel lock band and cant the follower to clear the magazine tabs; insure that the follower is seated properly prior to feeding the spring into the magazine.

(b) Feed the spring into the magazine by pushing down and from side to side until the last coil is under the tabs.

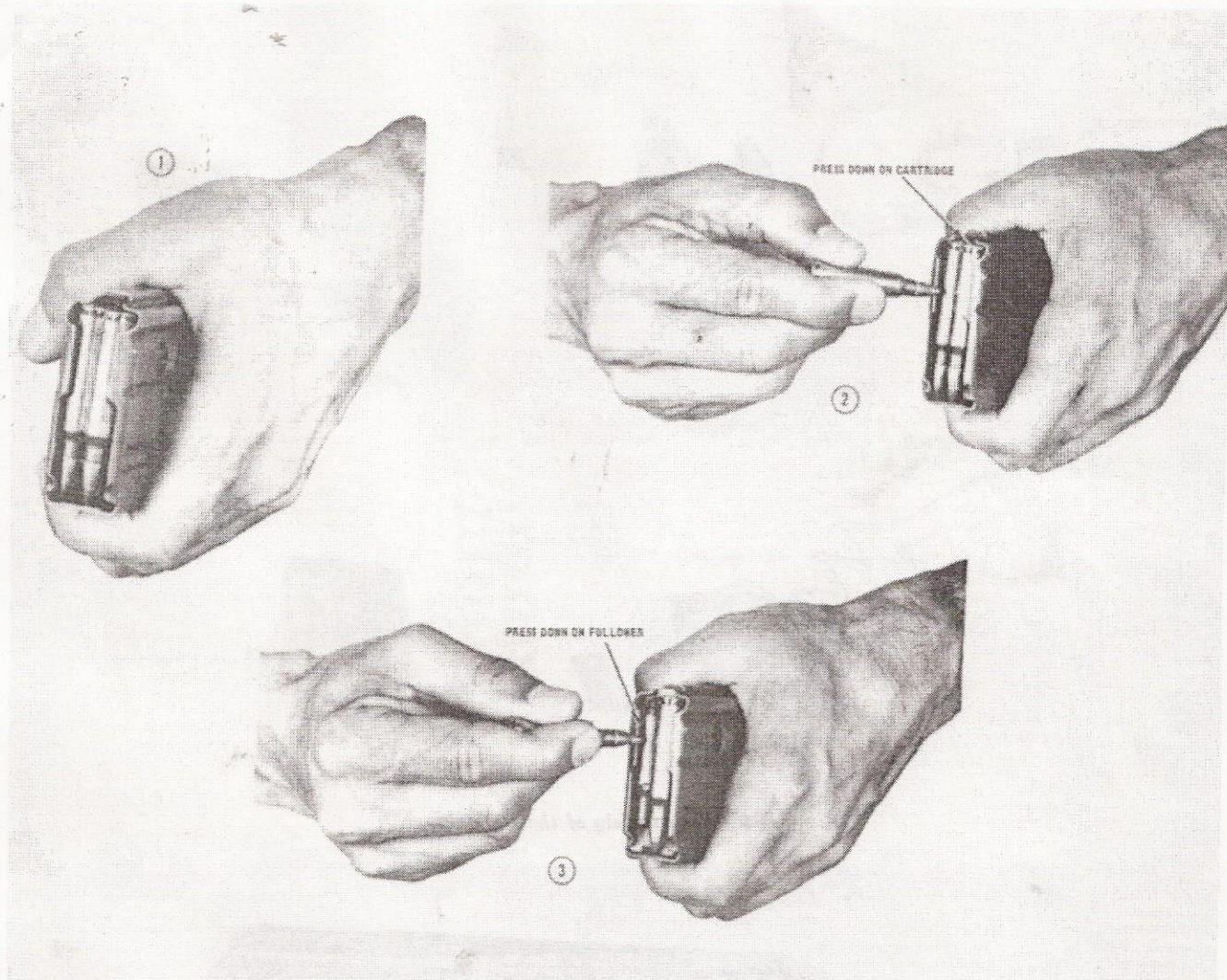


Figure 24. Unloading the magazine.

(c) Hold the spring down with the thumb and insert the base under the first set of tabs.

(d) Depress the spring steel lock band; seat the base of the magazine insuring that the lock band is fully engaged. Depress the follower several times to insure that it moves freely.

d. Loading the Rifle.

(1) With the hammer cocked, place the selector lever on SAFE (fig 4). The magazine may be inserted with the bolt opened or closed. However, the soldier should be taught to load the weapon with the bolt open. This will reduce the possibilities of a first round stoppage and save the time needed to pull the charging handle to the rear.

(2) Point the muzzle in a safe direction. With the left hand, insert a loaded magazine into the magazine housing. Push upward until the magazine catch engages and holds the magazine. Rap

the base of the magazine with the heel of the hand to insure positive engagement. Depress the upper portion of the bolt catch (fig 26) with the thumb of the left hand, allowing the bolt to close, chambering a round. If the bolt is closed when the magazine is inserted, pull the charging handle fully to the rear with the right hand and release it. The forward assist assembly will be used at all times to insure that the bolt is fully forward and locked.

Notes. 1. Left-handed personnel should follow the procedure above by reversing the position of their hands, using the left index finger to depress the upper portion of the bolt catch.

2. Do not *ride* the charging handles forward with the right hand. If the charging handle is eased forward from the open position, the bolt may fail to lock.

3. When operating the M16 rifle pull the charging handle fully to the rear and release it sharply. The M16 does not have a forward assist assembly (fig 2).

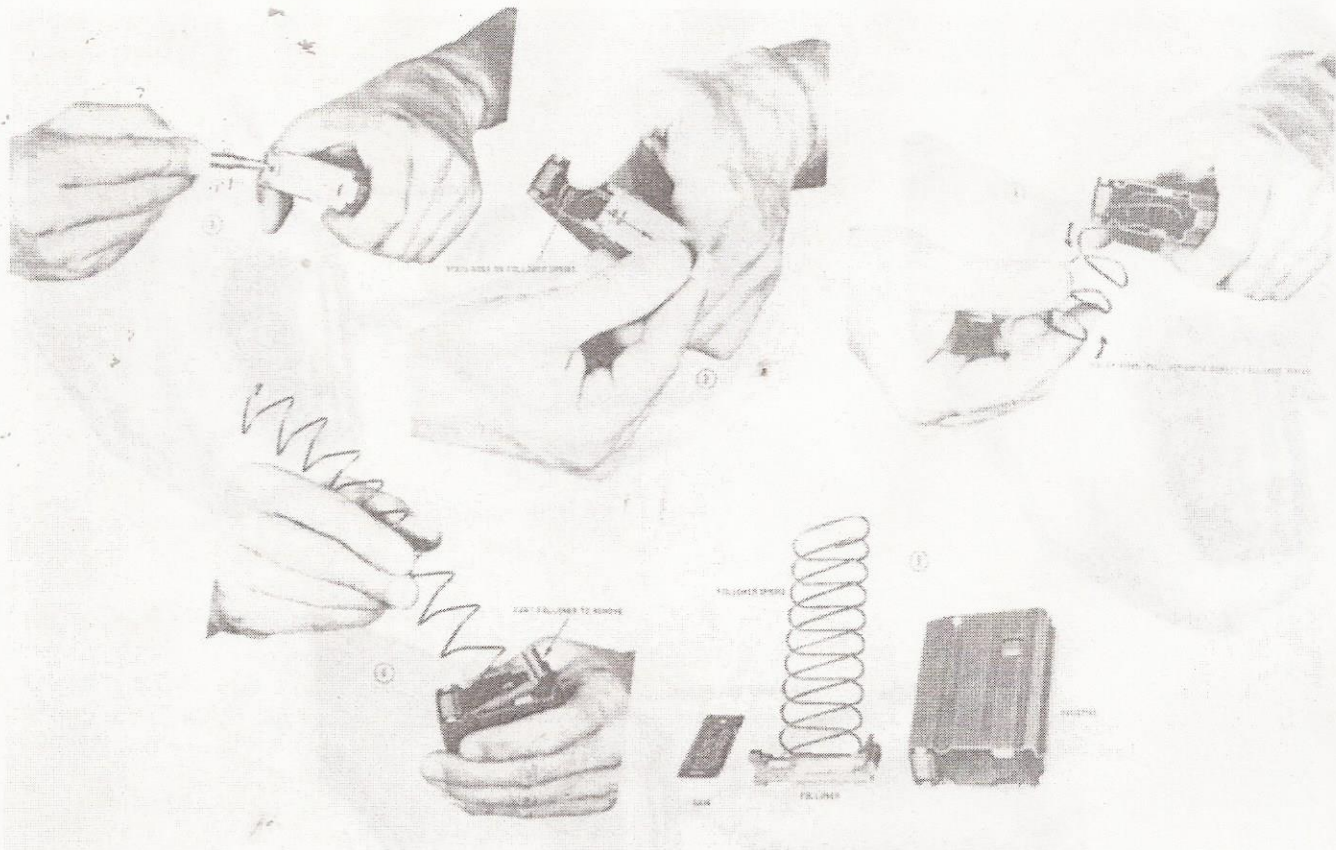


Figure 25. Disassembly of the magazine.



Figure 26. Depressing the upper portion of the bolt catch.

(3) The bolt catch will hold the bolt carrier to the rear after the last round is fired. To change magazines for reloading, press the magazine catch button and remove the empty magazine from the weapon. Place the new magazine into the magazine housing and push up until fully seated.

e. Unloading. To unload the rifle and make it safe, the firer first places the selector lever on safe, presses in on the magazine catch button to remove the magazine, pulls the charging handle to the rear, inspects the chamber and receiver to insure they are clear, locks the bolt carrier to the rear by depressing the lower portion of the bolt catch, and returns the charging handle forward. The rifle is clear *only* when no brass or rounds are in the chamber or the receiver, the magazine has been removed, the bolt carrier is to the rear, and the selector lever is on the SAFE setting.

13. Functioning

a. Functioning consists of eight basic steps. Keep in mind that more than one of these steps takes place at a time. The eight steps are—

- (1) Firing.
- (2) Unlocking.
- (3) Extracting.
- (4) Ejecting.
- (5) Cocking.
- (6) Feeding.
- (7) Chambering.
- (8) Locking.

b. Functioning in the rifle may be either automatic or semiautomatic through the use of the selector lever. Certain differences in the operation of parts take place when the selection is made.

(1) Semiautomatic fire.

(a) Firing. With a round in the chamber, the hammer cocked and the selector on the SEMI setting, the firer pulls the trigger. The trigger rotates on the trigger pin depressing the nose of the trigger and disengaging the notch on the bottom of the hammer. The hammer is thrown forward by action of the hammer spring. The hammer strikes

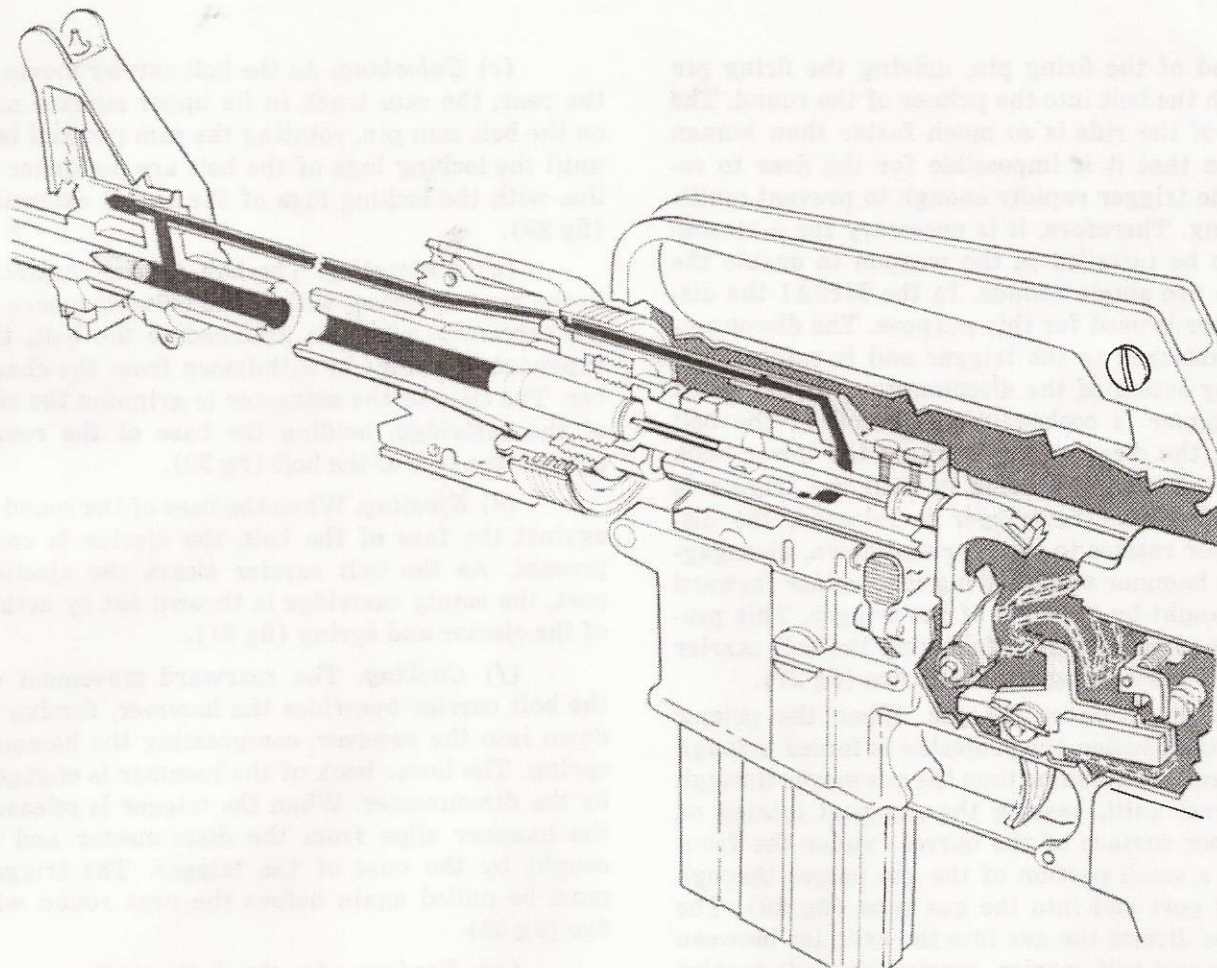


Figure 27. Firing.

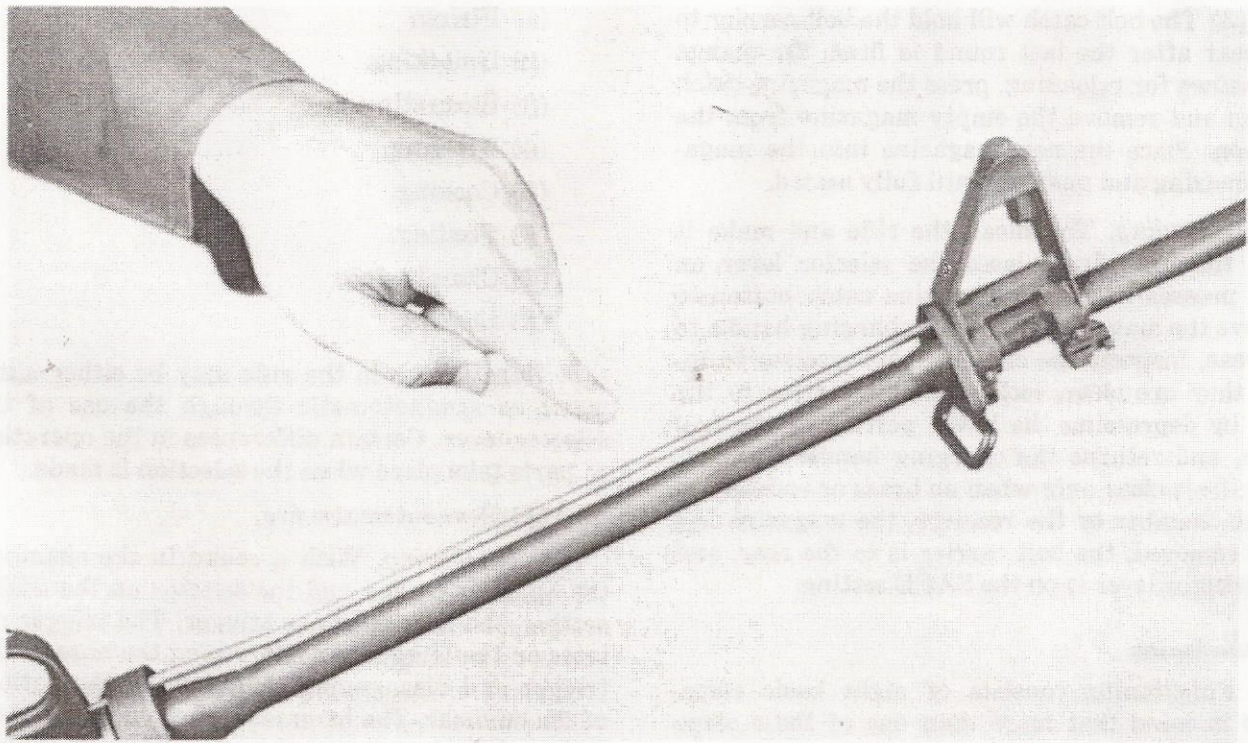


Figure 28. Gas tube.

the head of the firing pin, driving the firing pin through the bolt into the primer of the round. The action of the rifle is so much faster than human reaction that it is impossible for the firer to release the trigger rapidly enough to prevent multiple firing. Therefore, it is necessary for a mechanism to be installed in the weapon to enable the firer to fire single rounds. In the M16A1 the disconnecter is used for this purpose. The disconnecter is attached to the trigger and is rotated forward by action of the disconnecter spring. When the hammer is cocked by the recoil of the bolt carrier, the disconnecter engages the lower hook of the hammer and holds it until the trigger is released. When the trigger is released, the disconnecter rotates to the rear and down, disengaging the hammer and allowing it to rotate forward until caught by the nose of the trigger. This prevents the hammer from following the bolt carrier forward and causing automatic fire (fig 27).

(b) *Action of the gas.* When the primer ignites the powder, the projectile is forced through the barrel. At the same time the gas moves through the barrel until, passing the gas port located on the upper surface of the barrel (under the front sight), a small portion of the gas passes through the gas port and into the gas tube (fig 28). The gas tube directs the gas into the cylinder between the bolt and bolt carrier, causing the bolt carrier to move rearward.

(c) *Unlocking.* As the bolt carrier moves to the rear, the cam track in its upper surface acts on the bolt cam pin, rotating the cam pin and bolt until the locking lugs of the bolt are no longer in line with the locking lugs of the barrel extension (fig 29).

(d) *Extracting.* The bolt carrier continues to the rear, carrying with it the bolt. By means of the extractor, which is attached to the bolt, the expended cartridge is withdrawn from the chamber. The claw of the extractor is gripping the rim of the cartridge, holding the base of the round against the face of the bolt (fig 30).

(e) *Ejecting.* When the base of the round is against the face of the bolt, the ejector is compressed. As the bolt carrier clears the ejection port, the empty cartridge is thrown out by action of the ejector and spring (fig 31).

(f) *Cocking.* The rearward movement of the bolt carrier overrides the hammer, forcing it down into the receiver, compressing the hammer spring. The lower hook of the hammer is engaged by the disconnecter. When the trigger is released the hammer slips from the disconnecter and is caught by the nose of the trigger. The trigger must be pulled again before the next round will fire (fig 32).

(g) *Feeding.* As the bolt carrier group clears the top of the magazine, the follower and

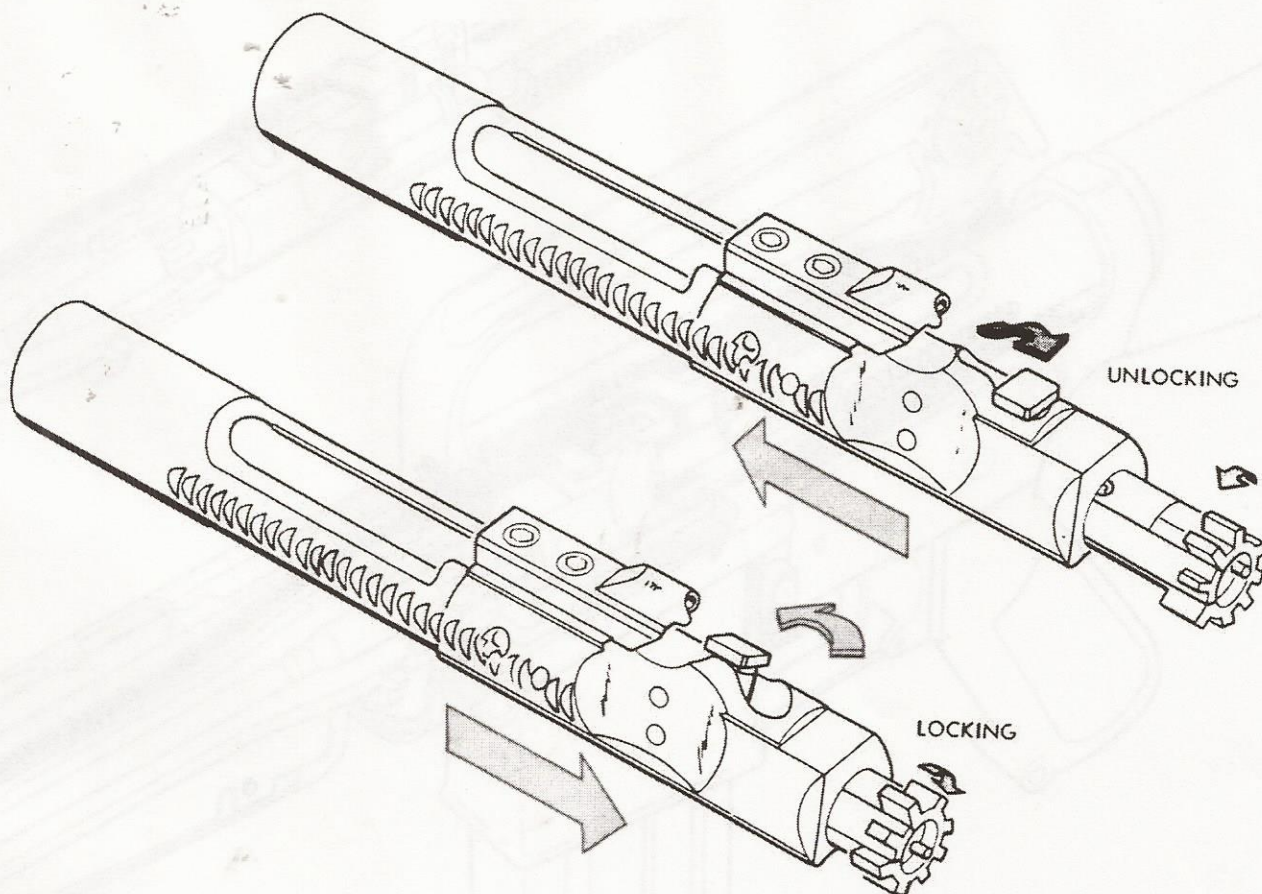


Figure 29. Locking and unlocking.

spring in the magazine push a new round up into the path of the bolt (fig 33).

(h) *Action of the buffer assembly.* As the bolt carrier group is moving rearward, the head of the buffer assembly is struck. This sends the buffer assembly rearward into the receiver extension and compresses the action spring. The expansion of the action spring sends the buffer assembly forward with enough force to drive the bolt carrier group forward toward the chamber. The buffer assembly is designed to reduce the recoil of the weapon.

(i) *Chambering.* On the forward stroke of the bolt carrier group, the face of the bolt strips a round from the magazine and thrusts it into the chamber. At the same time the extractor claw grips the rim of the cartridge and the ejector is compressed (fig 34).

(j) *Locking.* When the bolt carrier group enters the last half inch of its forward movement, the bolt cam pin emerges from the guide channel in the upper receiver and moves along the cam track, rotating the bolt *counterclockwise* into the locked position. The weapon is then ready to fire and the cycle begins again.

(2) Automatic fire.

(a) When the selector level (fig 35) is set on the AUTO position, the rifle will continue to fire as long as the trigger is held back and ammunition is in the magazine. The functioning of certain parts of the weapon changes when firing automatic.

(b) As the rifleman pulls the trigger, the cycle of operation begins. As the bolt carrier group recoils, the hammer is cocked, but the center cam of the selector prevents the disconnecter from engaging the hammer.

(c) The automatic sear catches the upper hook of the hammer and holds it until the bolt carrier group moves forward, striking the top of the sear, releasing the hammer, and causing the rifle to fire automatically (fig 36).

(d) If the trigger is released, the hammer moves forward and is caught by the nose of the trigger. This ends the automatic cycle of fire until the trigger is pulled again.

(e) All other portions of the cycle of operation remain the same as in semiautomatic fire.

c. The functioning of the rifle through the cycle of operation stops when the trigger is released or when the magazine is empty. In the latter case

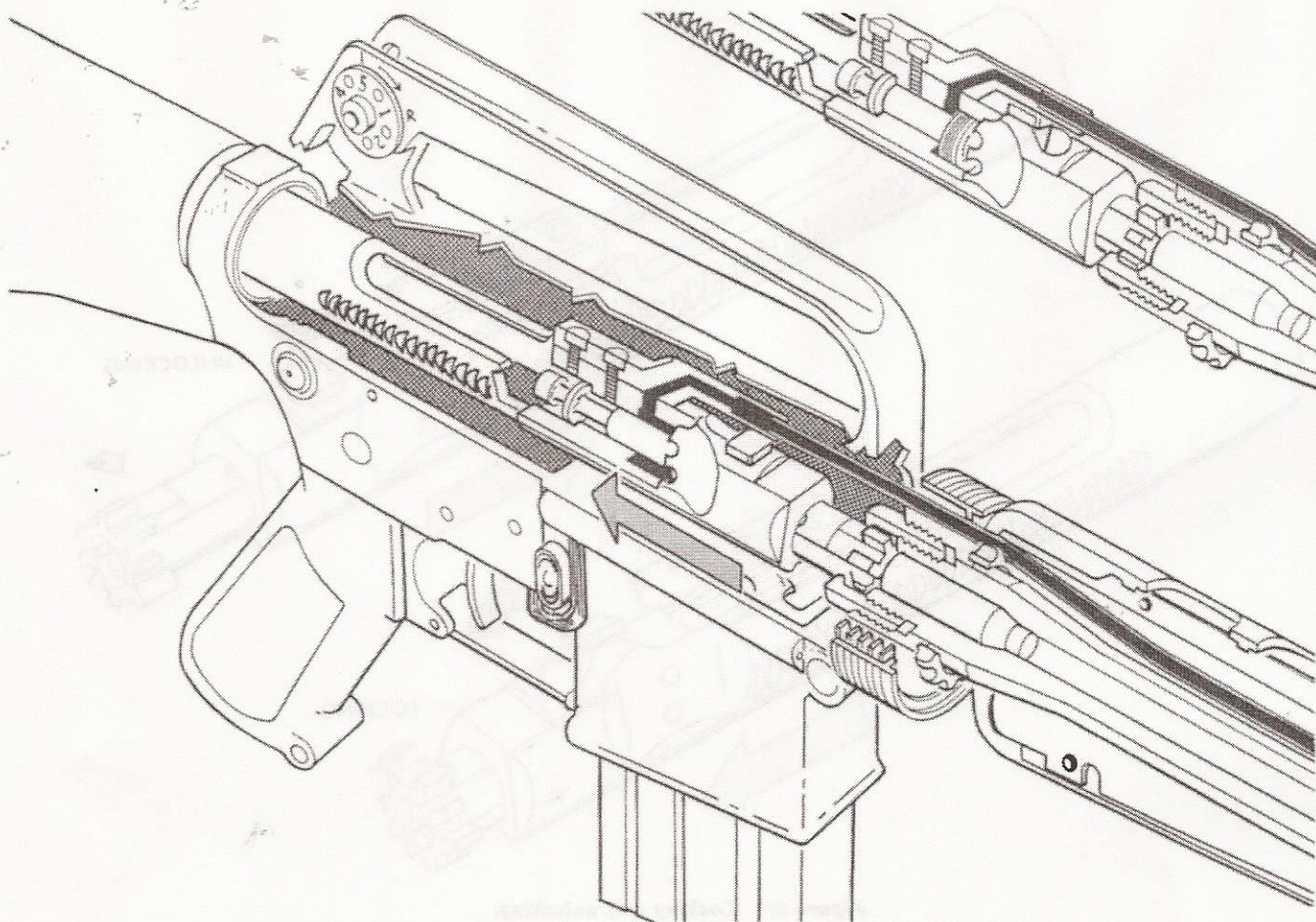


Figure 30. Extracting.

certain actions take place within the weapon to tell the firer that he must change magazines.

(1) When the last round of a magazine has been chambered, the magazine follower rises to the top of the magazine and contacts the bolt stop. As the bolt carrier group recoils after the last round is fired, the bolt stop is forced into the path of the bolt face by action of the magazine spring. This holds the bolt carrier group to the rear.

(2) Removal of the magazine does not release the bolt carrier group due to the force of the action spring holding the face of the bolt tightly against the catch. To release the bolt carrier group, the firer must press in on the top of the bolt catch located on the left side of the receiver.

Caution: If a new magazine has been inserted and the bolt carrier group goes forward, the weapon is charged and ready to fire.

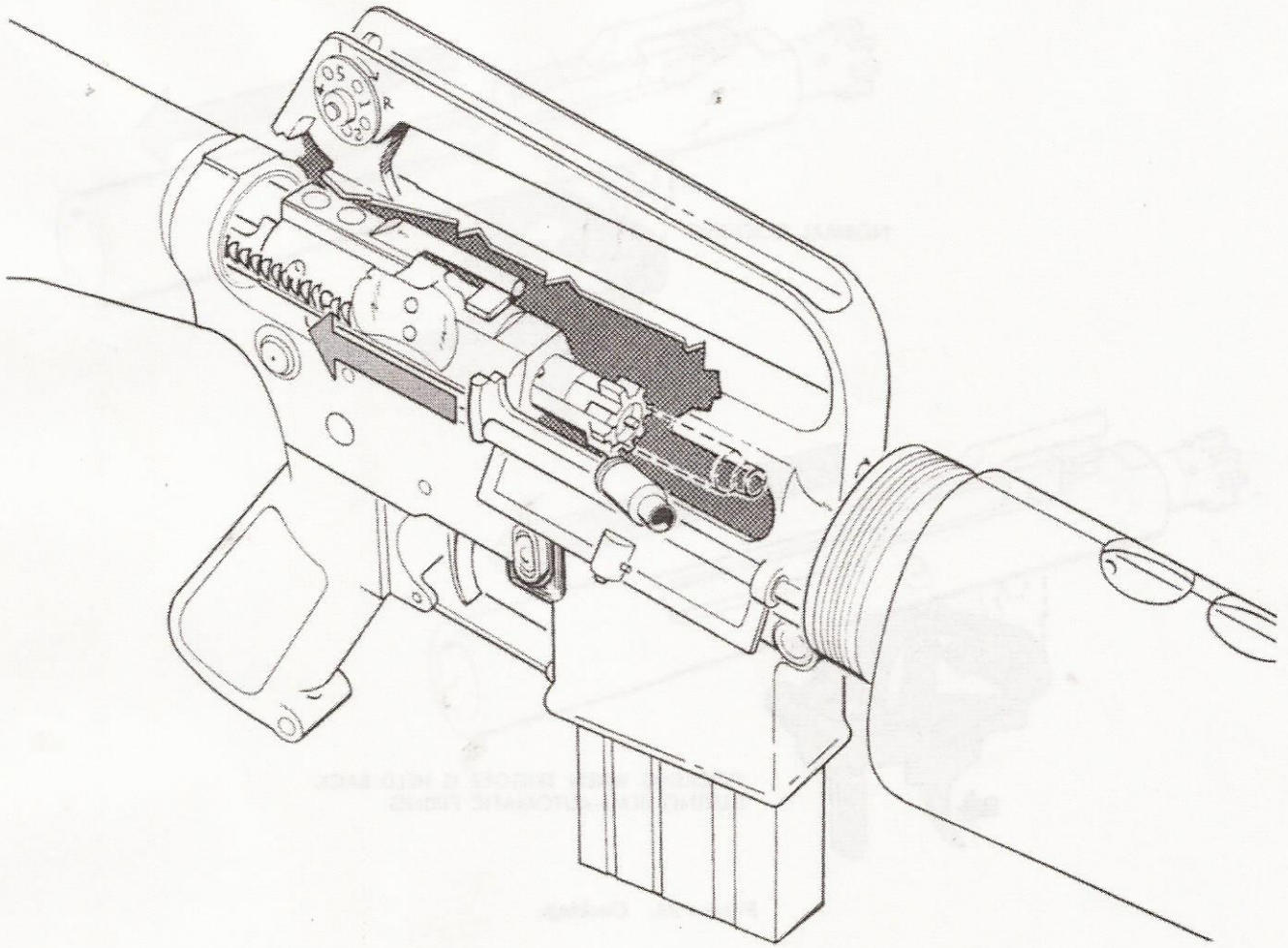


Figure 31. Ejecting.

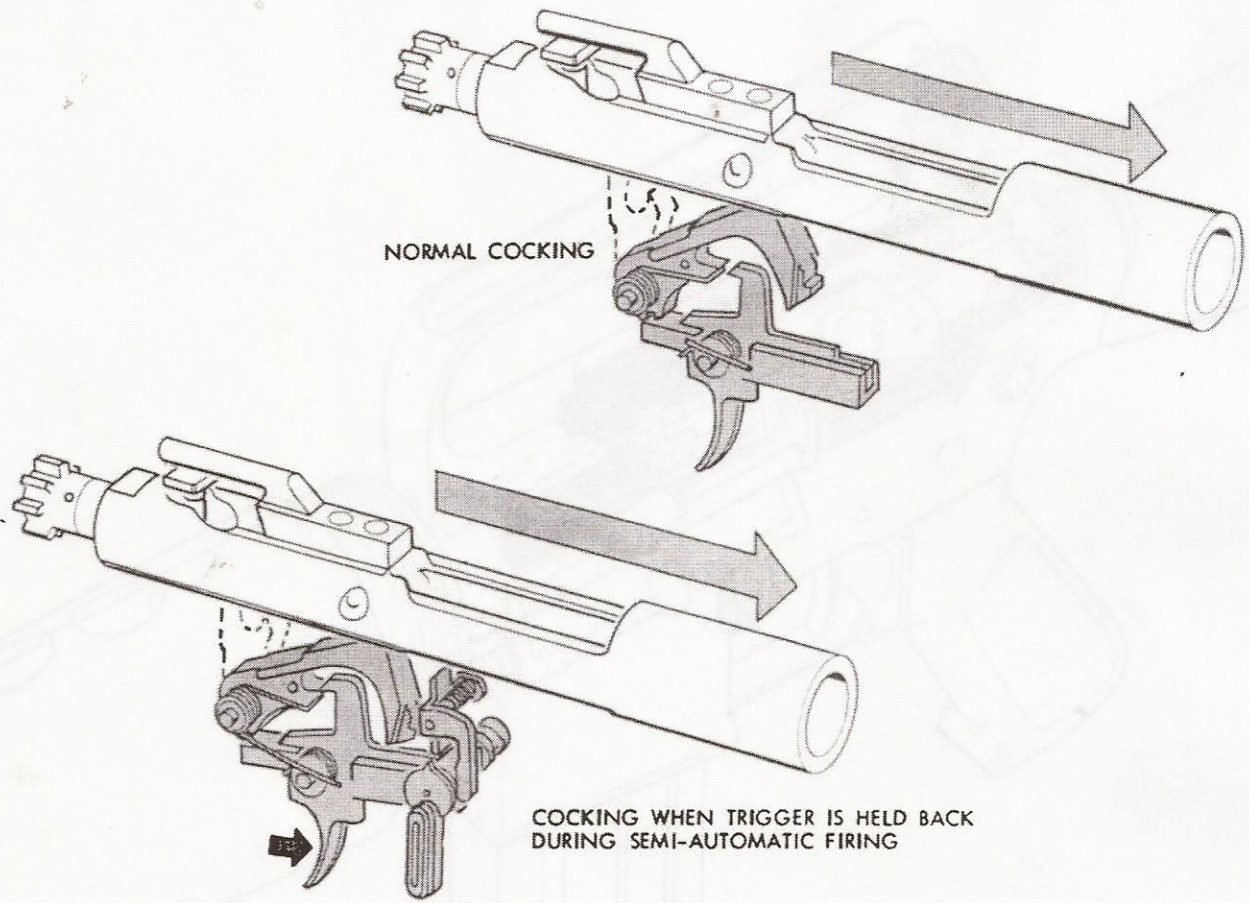


Figure 32. Cocking.

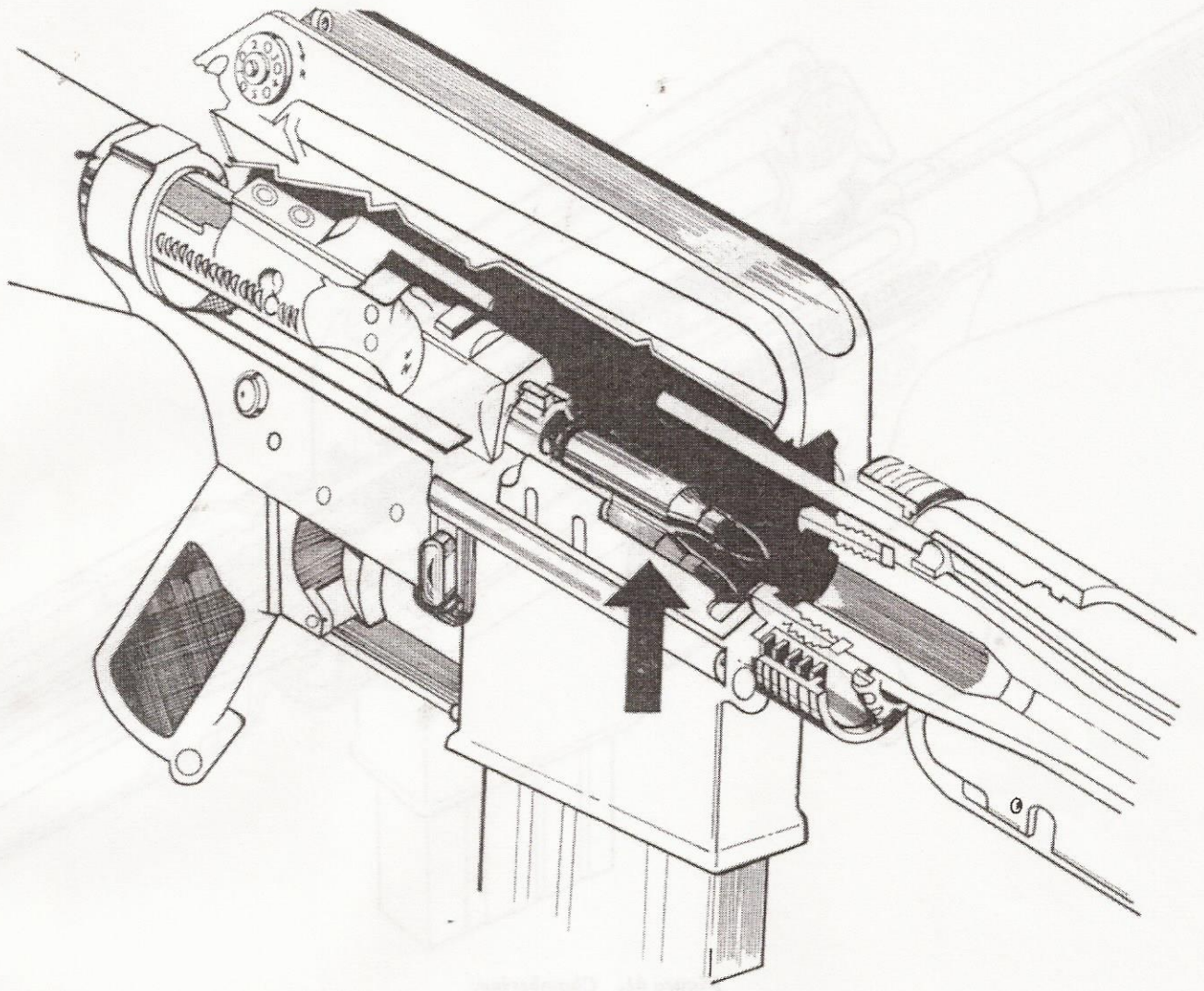


Figure 33. Feeding.

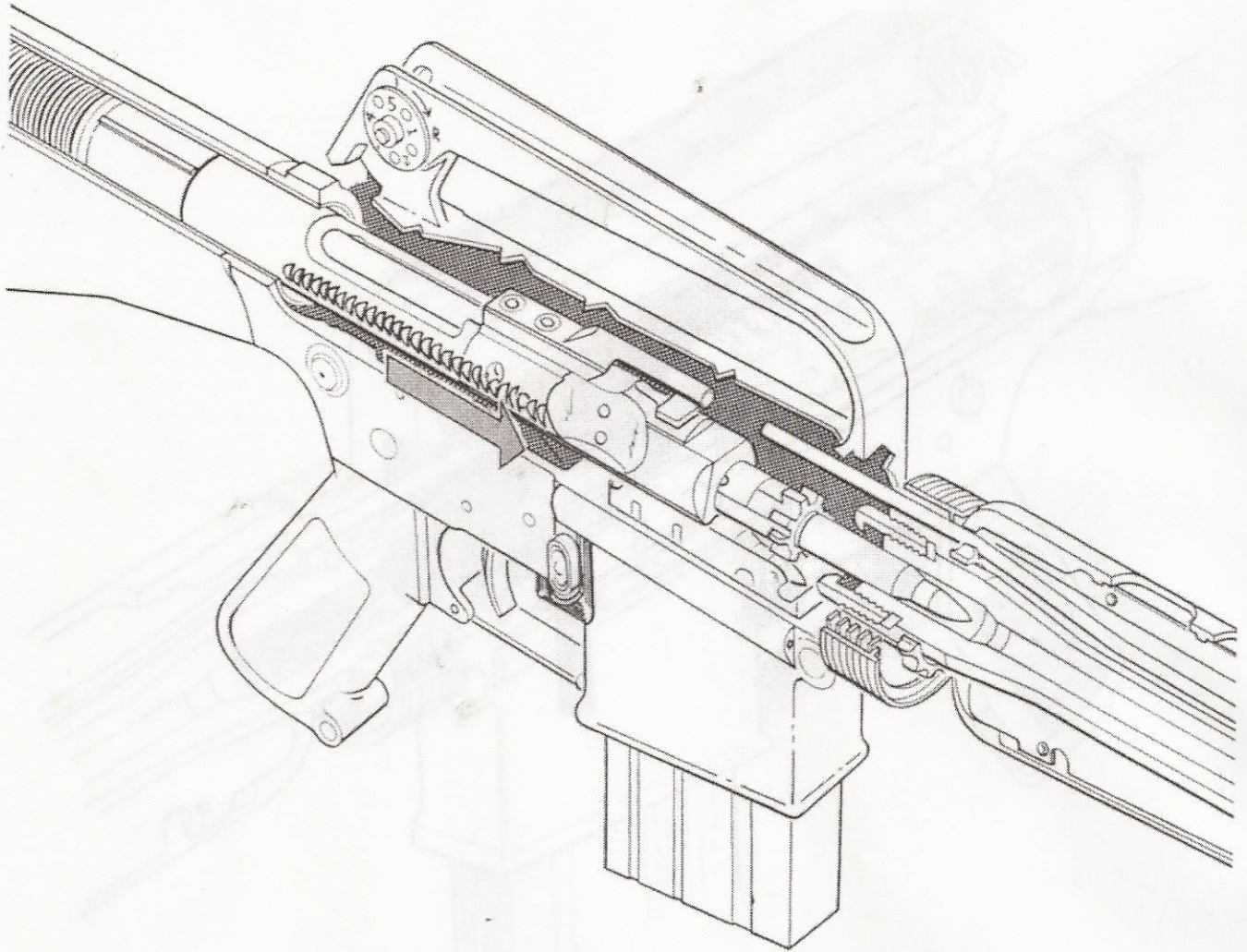


Figure 34. Chambering.

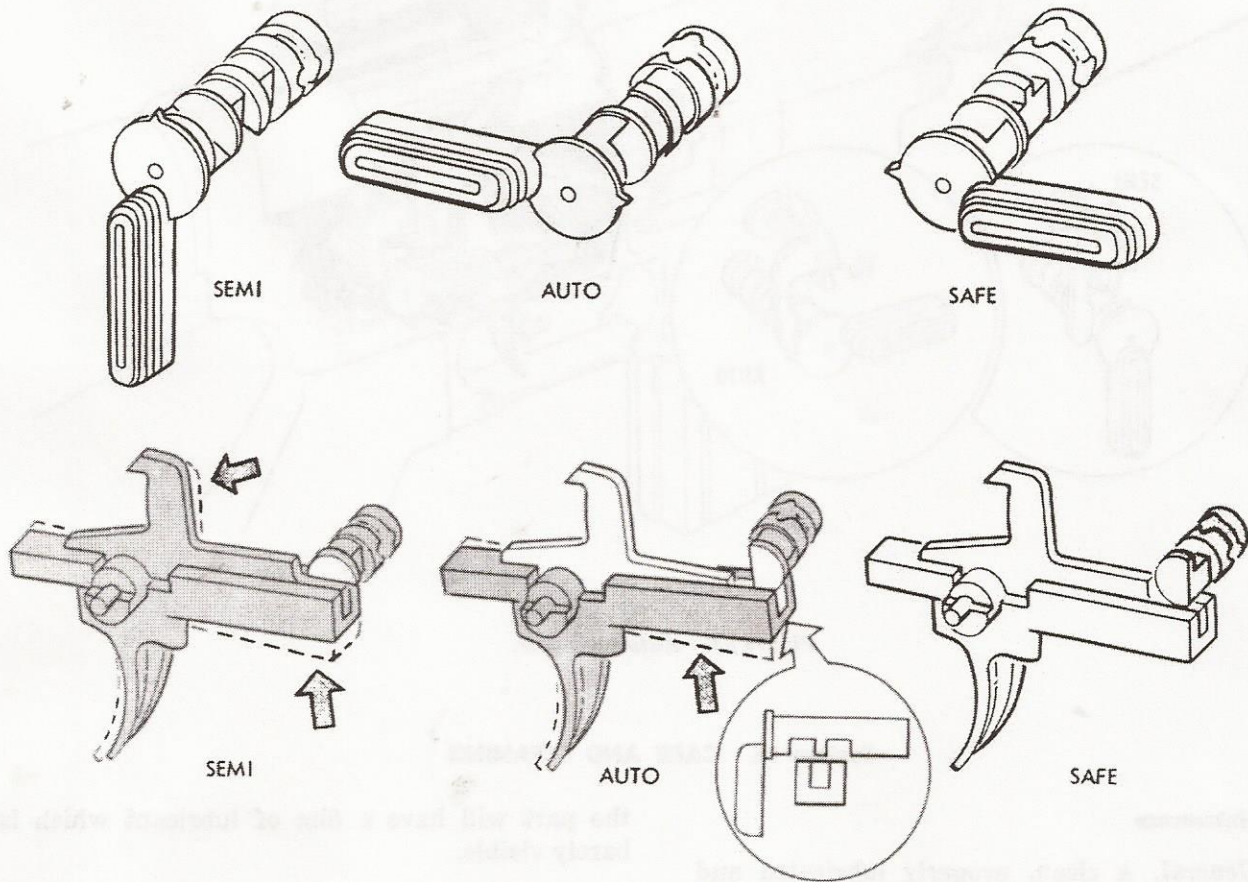


Figure 35. Selector lever.

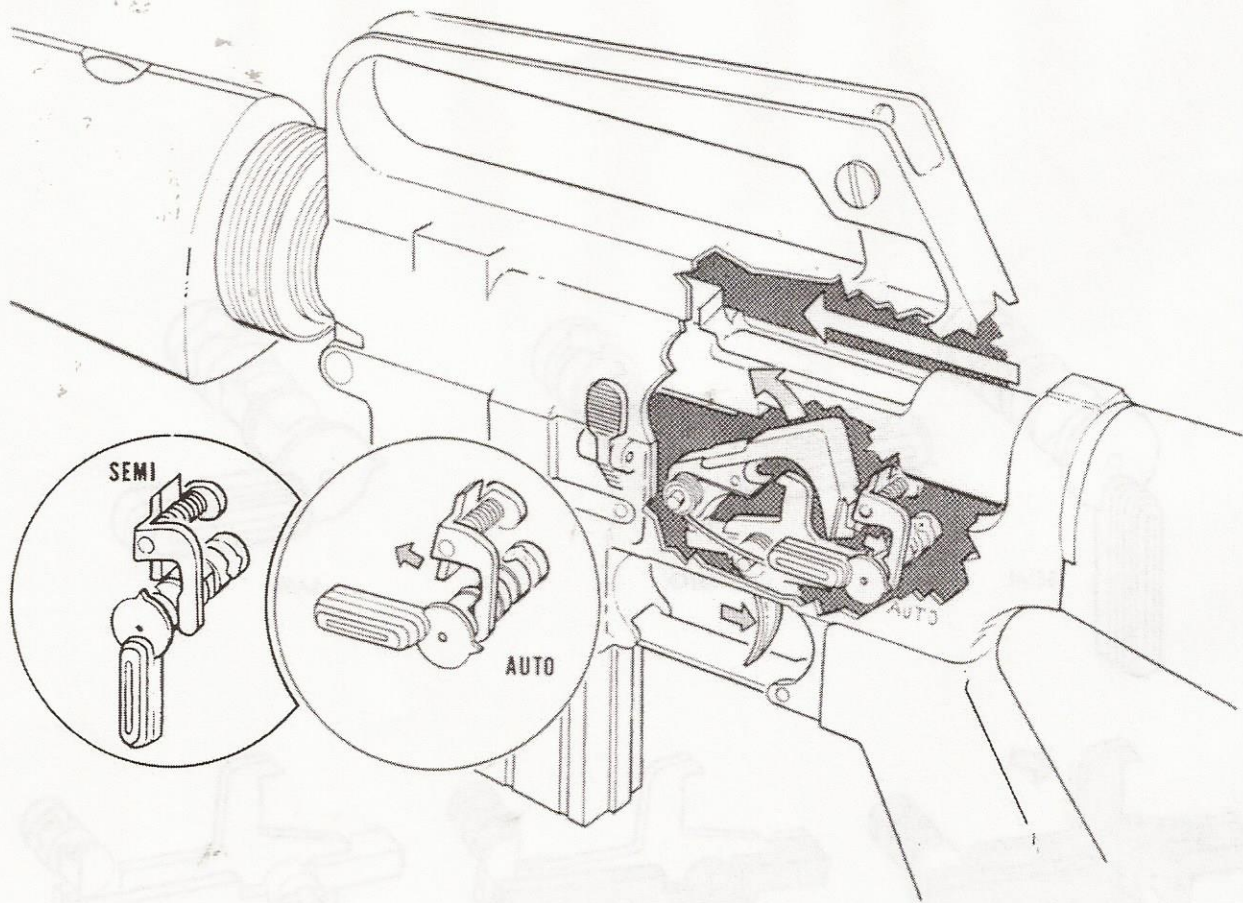


Figure 36. Automatic sear.

Section III. CARE AND CLEANING

14. Maintenance

a. General. A clean, properly lubricated and maintained rifle loaded with clean ammunition will fire when needed. In order to keep the M16A1 rifle and ammunition in good condition they must have daily care and cleaning. Under bad weather conditions certain key parts of the rifle and ammunition may need care and cleaning several times a day (fig 37). To insure proper maintenance of the M16A1 rifle, it is imperative that certain procedures be followed.

b. Cleaning and Lubrication. Refer to table 1.

c. Definition for the Application of LSA. Definitions for the amount of LSA specified in table 1 are listed below.

(1) *One drop.* Dip the end of the swab holder section into lubricant and allow one drop to fall from the tip.

(2) *Light coat.* Apply lubricant to a cloth until it becomes just damp enough so the oil cannot be squeezed from the cloth. When applied,

the part will have a film of lubricant which is barely visible.

(3) *Generous coat.* Apply lubricant to a cloth until it becomes saturated and the oil can be squeezed from the cloth. When applied, the part will have a film of lubricant heavy enough so that it can be spread with the finger.

15. Preventive Maintenance

a. General. Preventive maintenance is the systematic care, inspection, and servicing of equipment to keep it in serviceable condition to prevent breakdowns and assure maximum operational readiness. The operator's role in the performance of preventive maintenance service is—

(1) To perform daily service each day the rifle is operated.

(2) To help the organizational unit armorer perform any scheduled periodic services which are authorized to them.



Figure 37. Cleaning equipment.

b. Specific Procedures.

(1) Table 2 gives the specific procedures to be performed by the operator.

(2) In addition to procedures outlined in table 2, perform the following: remove dirt, rust, grit, gummed oil, and water as these will cause

rapid deterioration of the inner mechanism and outer surfaces. Take particular care to keep all surfaces clean and lubricated. Do not clean or polish outer surfaces of the weapon with a treated cloth or other commercial compounds.

(3) Tighten loose parts and replace broken or worn parts, as authorized.

16. Functioning Check

Each time the weapon is disassembled and cleaned, a check should be made to insure that all

parts are properly assembled and the mechanisms are working properly in the SAFE, SEMI, and AUTO settings (para 11h).

Table 1. Cleaning and Lubricating Instructions

Item	After firing	As required	Maintenance level	Action required
Rifle			C*	<p><i>Note.</i> Lubricants listed below and specified within this table will be utilized. Do not use any commercial products for cleaning and lubricating purposes. Semi-fluid lubricating oil (LSA) for temperature ranges of -35 degrees Fahrenheit and above. Weapons oil lubricating (LAW) for temperature ranges below zero degrees.</p> <p><i>Note.</i> Either lubricant can be used at temperatures ranging from zero to -35 degrees Fahrenheit.</p> <p>Before Operation</p> <ol style="list-style-type: none"> 1. Prior to firing, visually inspect the bore and chamber for condition and obstruction. Clean by pushing swabs through the bore (from chamber to muzzle) until the swabs protrude through the flash suppressor. <p>Caution: When inserting rod, into bore, hold at joints to prevent flexing or damage to rod.</p> <ol style="list-style-type: none"> 2. After cleaning, apply a light coat of oil to the bore and chamber, with a swab, to prevent corrosion and pitting. Lightly lubricate the lugs in the barrel extension. 3. The bolt carrier group may be removed and dirt and oil cleaned off the firing pin, outer and inner surfaces of the bolt and bolt carrier with clean dry swabs or rags. Also clean firing pin hole using a pipe cleaner. Lubricate the bolt and bolt (piston) rings. Make certain rings are well lubricated. Apply a coating of lubricating oil to the inner surfaces of the bolt carrier. Give special attention to the slide and cam pin area. <p>Warning: Most cleaning solutions are toxic and if the vapors from them are inhaled for extended periods, it could be very harmful. These materials should be used sparingly and in a well ventilated location.</p> <p><i>Note.</i> The use of the rifle cover does not take the place of normal cleaning and lubrication.</p>
Magazine assembly	X	X	C	<p>Disassemble and wipe dirt from the magazine tube, spring, and follower. Apply a light coat of lubricant to the magazine spring.</p> <p><i>Note.</i> Because moisture will collect in the plastic magazine bag, from condensation, the magazine must be removed, unloaded, and dried every 24 hours to prevent corrosion. After the cartridges and magazines have been dried, apply a light coat of lubricating oil to the magazine spring.</p>

**Note.* The letters in the maintenance level column indicate the lowest level of maintenance at which corrective action can be performed. Letter C indicates operator and letter O organizational maintenance.

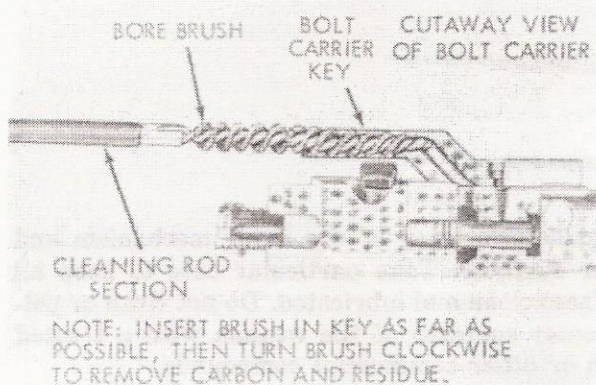


Figure 38. Cleaning carrier key.

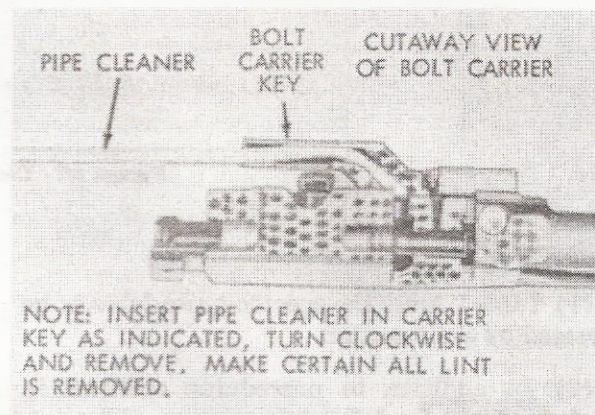


Figure 39. Drying carrier key.

Table 1. Cleaning and Lubricating Instructions—Continued

Item	After firing	As required	Maintenance level	Action required
Bolt carrier group	X	X	C	1. Disassemble the bolt carrier group and wash all components and outer surfaces with a swab saturated in rifle bore cleaner.
	X	X	C	2. Clean bolt carrier key with a worn bore brush dipped in rifle bore cleaner (fig 38).
	X	X	C	3. Dry bolt carrier key using pipe cleaners (fig 39).
	X	X	C	4. Using a small brush dipped in rifle bore cleaner, scrub carbon deposits and dirt from the locking lugs of the bolt.
				Caution: Brush the outer surface of the bolt, paying particular attention to area behind the bolt rings and under lip of the extractor. Do not attempt to remove discoloration caused by heat.
	X	X	C	5. Remove extractor from bolt. Using a small brush dipped in rifle bore cleaner scrub extractor to remove carbon. Also clean firing pin recess and firing pin. Do not remove the spring from extractor unless it is damaged.
	X X	X X	O* C	6. Clean ejector and spring by scrubbing with brush using rifle bore cleaner. 7. When dry and before final assembly, apply a generous coat of lubricant to the outside bolt body, rings, and a drop in bolt carrier key (fig 40).
			Caution: The firing pin and firing pin recess in the bolt should have only a light coat of lubricant.	
	X	X	C	8. During cleaning and lubricating, inspect the bolt for cracks especially in the bolt cam pin hole area.
Upper receiver	X	X	C	1. Clean the upper receiver of powder fouling with rifle bore cleaner.
				Caution: Do not use wire brush on aluminum surface.
	X	X	C	2. Clean the outside surface of the protruding gas tube in the receiver with a worn bore brush attached to a section of the cleaning rod (fig 41). Clean top of the gas tube by inserting rod and brush through the back of the receiver. Clean sides and bottom of gas tube from the bottom of the receiver.
	X	X	C	3. After cleaning, coat the inner surfaces of the upper receiver with lubricant and apply a light coat to the outer surfaces.
				Caution: Do not use any type of abrasive material to clean the gas tube.

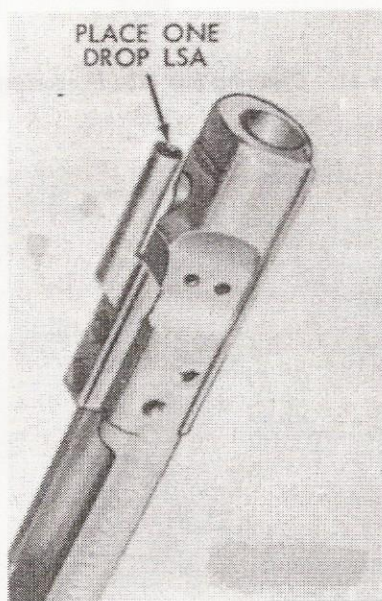


Figure 40. Oiling carrier key.

Table 1. *Cleaning and Lubricating Instructions—Continued*

Item	After firing	As required	Maintenance level	Action required
Barrel.....	X	X	C	1. Attach the wire bore brush to rod, dip in rifle bore cleaner, and brush the bore from chamber to muzzle (fig 42). Push the brush through the bore until it extends beyond the muzzle. Do NOT reverse direction of brush while in the bore. Continue until the bore is well covered with compound.
	X	X	C	2. Attach the chamber brush to the cleaning rod, dip in rifle bore cleaner, and insert in chamber (fig 43). Use a minimum of five plunge strokes and three rotational (360°) motions.
	X	X	C	3. Remove brush from chamber and cleaning rod. Dry the bore and chamber with clean swabs. Do not reverse direction of swabs while in the bore. Continue until swabs come out clean and dry.
	X	X	C	4. After cleaning, lightly lubricate the bore and chamber with a swab to prevent corrosion and pitting. Lightly lubricate the lugs in the barrel extension.
	X	X	C	5. Lightly lubricate all the outer surfaces of the barrel and sight (including surfaces under the handguard).
	X	X	C	6. Apply lubricant generously to the front sight post screw, detent, and spring. Depress detent several times to work the lubricant into the spring.

Note. Moisture, from condensation, will collect in the bore of the rifle when the protective cap is used on the muzzle. The cap must be removed and the bore cleaned and lubricated every 24 hours.

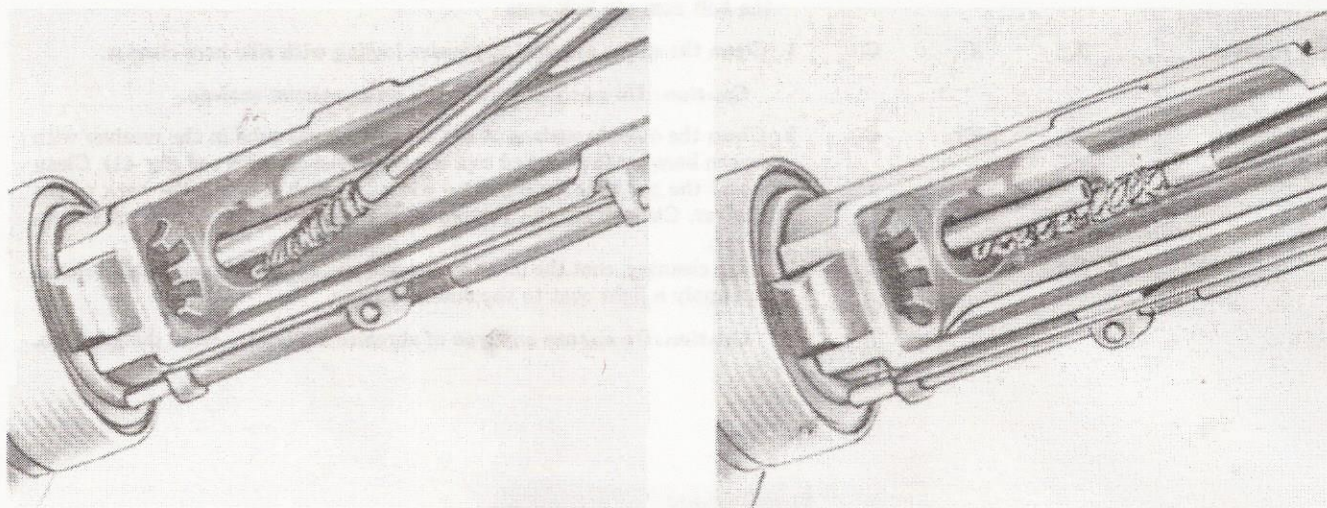


Figure 41. *Cleaning gas tube in receiver.*

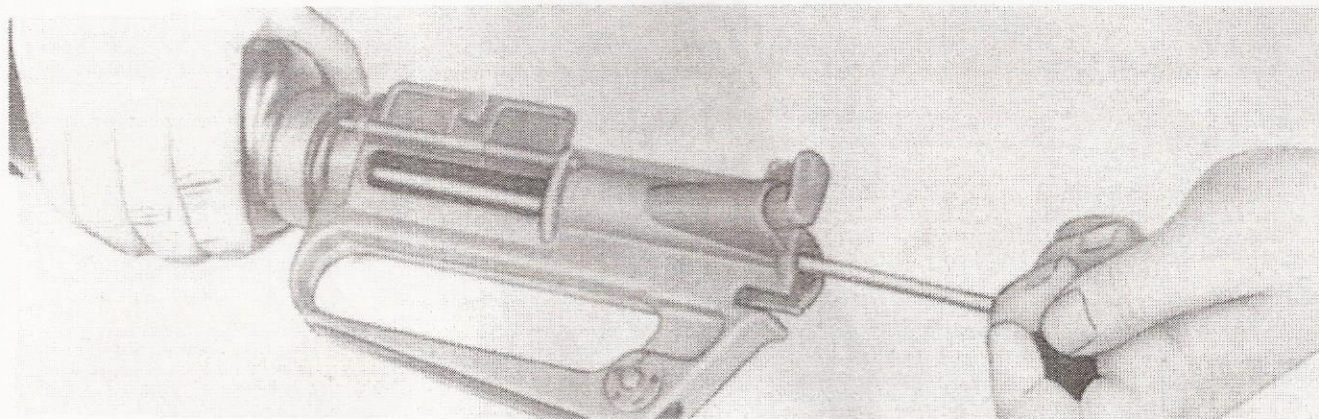


Figure 42. *Cleaning the bore.*

Table 1. Cleaning and Lubricating Instructions—Continued

Item	After firing	As required	Maintenance level	Action required
Lower receiver group...	X	X	C	1. Wipe dirt from trigger mechanism with a clean swab or brush. <i>Caution: Do not use wire brush on aluminum surface.</i>
	X	X	C	2. Components which are coated with carbon will be cleaned with rifle bore cleaner and an artist brush or similar brush. Use a scrubbing action to remove all carbon and foreign material. Drain rifle bore cleaner from lower receiver cavity and wipe dry. Use the opposite end of the brush with a piece of rag or cloth wrapped around it to get into the hard-to-get-at places.
	X	X	C	3. Clean drain holes in butt cap screw using a pipe cleaner.
	X	X	C	4. After the lower receiver has been cleaned and dried, apply a light coat of lubricant to the buffer, action spring, and inner surface of lower receiver extension. Also apply a generous coating inside the lower receiver and all components including the takedown and pivot pins.
	X	X	O	5. Apply a generous amount of lubricant in the detent well, to the detents and springs for the takedown pins, pivot pin, selector lever, and outer surfaces of lower receiver extension.
	X	X	O	6. If the detents and springs are frozen the following procedures should be accomplished: a. Attempt to depress the detent by inserting a small punch into the slot of the pivot pin, thus forcing the detent into the recess. (Later production rifles have a hole in the pivot pin for this purpose.) Only limited movement is required to permit removal of the pivot pin. b. If the detent cannot be depressed enough to permit removal of the pivot pin, disassemble the rifle. Place the forward portion of the lower receiver in a container of penetrating oil, bore cleaner, or PC-111 carbon removing compound, and allow to soak for a period of 24 hours. Then attempt to remove the components as described in a above. <i>Warning: Avoid skin contact. The compound should be washed off thoroughly with running water if it comes in contact with the skin. A good lanolin base cream, after exposure to compound, is helpful. The use of gloves and protective equipment is recommended.</i> c. After disassembly, the spring, detent, and detent well should be thoroughly cleaned, then generously lubricated with (LSA) before assembly to the rifle. d. If the rifle cannot be disassembled by trying the methods described above, turn the weapon into direct support maintenance for repair.
Inactive weapons.....		X	C	Inactive weapons will be preserved with a generous coat of (LSA) lubricating oil. Inspect these weapons on a weekly basis to determine condition of preservation. Weapons having corrosion or rust will be cleaned immediately and preserved in accordance with above instructions. All inactive weapons will be thoroughly cleaned and preserved every 90 days.

Note. Do not use the rifle cover or protective cap on rifles which are to be stored over 24 hours.

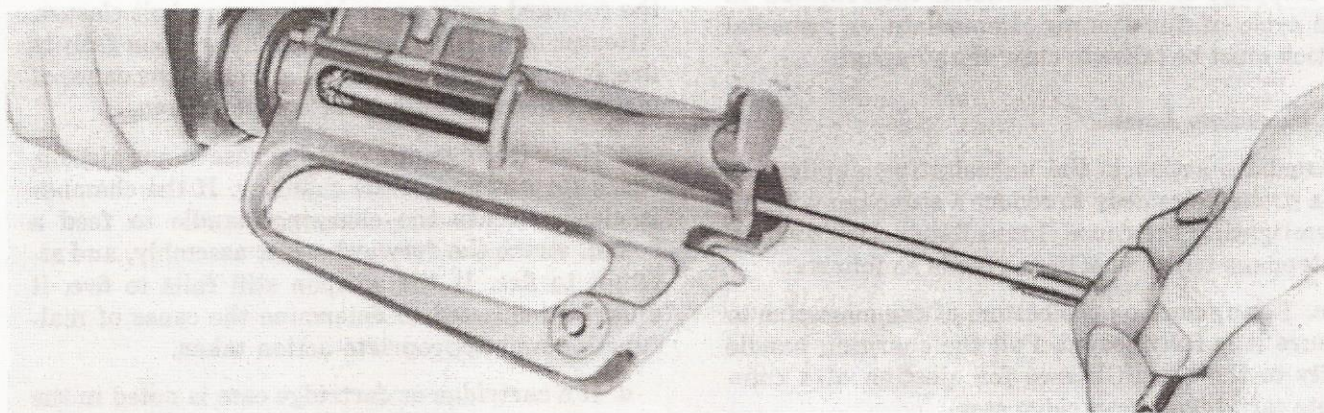


Figure 43. Cleaning the chamber.

Table 1. *Cleaning and Lubricating Instructions—Continued*

Item	After firing	As required	Maintenance level	Action required
Bipod rifle.....		X	C	1. Remove dirt or grease, using rifle bore cleaner.
		X	C	2. Apply a generous amount of lubricant to all surfaces, making certain the tension spring is well lubricated.
Bayonet-knife M7.....		X	C	1. Clean dirt and grease from bayonet-knife. Apply a light coat of lubricant to the blade and generously lubricate the release. The release should work freely and return to lock position.
			O	2. Minor nicks and dents will be removed with file or stone.
			O	3. Remove grips to clean shank of blade assembly and apply a light coat of lubricant.
Scabbard M8A1 and Sling.....		X	C	1. To prevent mildew, shake out and air the scabbard and sling at frequent intervals. Mildewed canvas is cleaned by scrubbing with a dry brush.
		X	C	2. Examine mildewed fabric carefully for evidence of rotting or weakening by stretching and pulling the fabric. If fabric shows indication of loss of tensile strength, turn in for replacement.
		X	C	3. Make certain all mildew is removed before water is used to remove dirt. Oil and grease may be removed by scrubbing with issue soap and water. Rinse well with water and dry thoroughly.
Caution: Do not use gasoline or any solvent to remove oil or grease from canvas.				

Table 2. *Preventive Maintenance Checks and Services*

Item No.	*Operator			Item to be inspected	Procedure
	B	D	A		
1	X	-----	-----	Rifle.....	Wipe excessive oil from bore and chamber.
**2	X	-----	-----	Rifle.....	Retract bolt to insure free movement between bolt carrier and gas tube.
**3	X	-----	-----	Rifle.....	Hand function to insure proper operation.
**4	X	-----	-----	Rifle.....	Check magazine for positive retention and functioning of bolt catch.
**5	-----	-----	X	Rifle.....	Clean and lubricate. Be sure to clean bolt carrier key.
*6	X	-----	-----	Bipod.....	Clean and lubricate. Check bipod legs. Make certain they move freely from closed to open position under spring tension, and that tension is of sufficient strength to hold the bipod to the rifle.

*B-before, D-during, A-after, operation.

**—Will be performed weekly, unless daily schedule is performed as a result of firing.

Section IV. IMMEDIATE ACTION, REMEDIAL ACTION, AND MALFUNCTIONS

17. Stoppage

A stoppage is any unintentional interruption in the cycle of functioning. Immediate or remedial action must be taken to clear the stoppage.

18. Immediate Action

Immediate action is the unhesitating application of a probable remedy to reduce a stoppage without investigating the cause. Immediate action to clear a stoppage with the M16A1 rifle is as follows:

a. Tap upward on the bottom of the magazine to insure it is fully seated. Pull the charging handle fully to the rear. Observe for ejection of a complete cartridge or cartridge case.

b. If a cartridge or cartridge case is ejected,

release the charging handle to feed a new round (do not ride the charging handle forward). Strike the forward assist assembly to insure bolt closure. Attempt to fire the weapon. If the weapon fails to fire, it must be inspected to determine the cause of malfunction and appropriate action taken.

c. If a cartridge or cartridge case is not ejected, check for a round in the chamber. If the chamber is clear, release the charging handle to feed a round, strike the forward assist assembly, and attempt to fire. If the weapon still fails to fire, it must be inspected to determine the cause of malfunction and appropriate action taken.

d. If a cartridge or cartridge case is noted in the chamber, it must be removed before attempting to reload and recycle the weapon.

Note. When handling the M16 rifle delete "Strike the forward assist assembly to assure bolt closure." (b above), and "... strike the forward assist assembly" (c above). M16 rifle does not have forward assist assembly.

19. Remedial Action

When the application of immediate action fails to reduce the stoppage, remedial action must be applied. Remedial action is the continuing effort through inspection of the weapon to apply a remedy to clear the malfunction identified and return the weapon to operation.

20. Malfunctions

a. A malfunction is an unplanned cessation of fire due to a stoppage caused by a mechanical failure of the weapon, magazine, or ammunition.

b. Seven major categories of malfunctions and related subtypes common to the M16A1 rifle are discussed in detail and illustrated below.

(1) *Designation.* Failure to feed and chamber the first round from the magazine.

(a) *Description.* This failure occurs when the bolt is manually released by depressing the bolt catch and the bolt and bolt carrier fail to move fully forward to feed and chamber the first round from a fully loaded magazine.

(b) *Probable cause.* This malfunction is usually the result of an accumulation of dirt or fouling in and around the bolt and bolt carrier, although it can occur as a result of a defective magazine, an improperly inserted or improperly loaded magazine, or a damaged (dented or bulged) round. In the case of an improperly loaded magazine, the projectile end of the top round in the magazine becomes inadvertently tipped down and the cartridge cannot clear the front of the maga-



Figure 44. Failure to feed the first round from the magazine.

zine; this is often referred to as a "stubbed" round when describing the resultant malfunction.

(c) *Corrective action.* Use of the bolt assist device will often overcome the malfunction of completing closure of the bolt. However, the carrier should not be forced; if resistance is encountered, as may occur with a "stubbed" round, the bolt should be retracted and held to the rear while the magazine is removed and the malfunction cleared.

Note. While repetitive occurrences of this malfunction may be temporarily overcome by lubricating the bolt carrier without disassembly, the weapon should be field stripped, cleaned, and lubricated at the earliest opportunity.

(d) *Malfunction subtypes.* The malfunction subtypes depend upon the severity of the malfunction and are identified by the degree to which

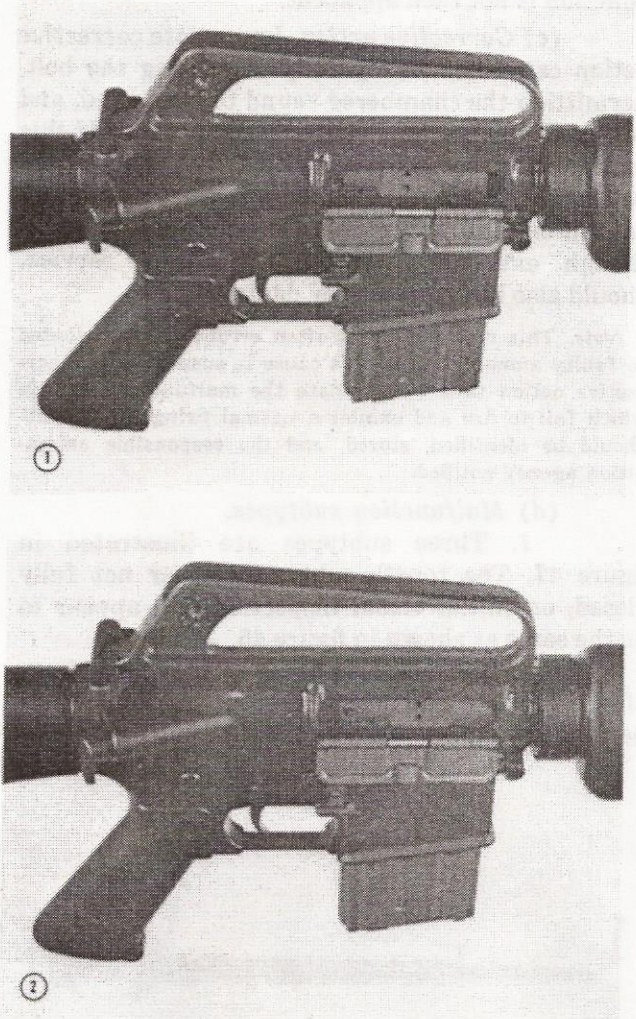


Figure 45. Top—a failure to feed the first round from the magazine with the bolt carrier not fully closed. Bottom—view shows bolt carrier in a normal, fully closed position.

the carrier has failed to close. The various subtypes are shown in figures 44 and 45.

(2) *Designation.* Failure of a cartridge to fire despite the fact that a round has been chambered and the trigger or the automatic sear has released the hammer.

(a) *Description.* This failure occurs when the firing pin either strikes the primer with insufficient energy or fails to strike the primer at all. Superficial visual inspection usually does not indicate the nature of the malfunction and the weapon appears normal with the bolt carrier closed.

(b) *Probable cause.* Carbon or fouling accumulation on the firing pin, as shown in figure 46, is often the cause, and the full forward travel of the firing pin is restricted. This malfunction also occurs when the bolt carrier fails to fully close and the hammer strikes the carrier rather than the firing pin. However, the hammer striking the carrier may cause the carrier to move fully forward and, on inspection, the cause of the malfunction is not then apparent.

(c) *Corrective action.* Immediate corrective action can be taken by fully retracting the bolt, permitting the chambered round to be ejected, and releasing the bolt to chamber a new round. If this malfunction becomes repetitive, the firing pin, bolt, and bolt carrier should be inspected and any carbon or fouling removed. The firing pin tip, although extremely durable in normal service, should also be inspected for damage.

Note. This malfunction is often erroneously attributed to faulty ammunition. If this cause is suspected, and corrective action fails to eliminate the malfunction, rounds which fail to fire and exhibit a normal firing pin indent should be identified, stored, and the responsible ammunition agency notified.

(d) *Malfunction subtypes.*

1. Three subtypes are illustrated in figure 47. The fourth subtype, carrier not fully closed, on initial visual inspection will appear to be the same as shown in figure 45.

2. It should also be noted that the primer of a cartridge which has been loaded and chambered during automatic gun action, but intention-

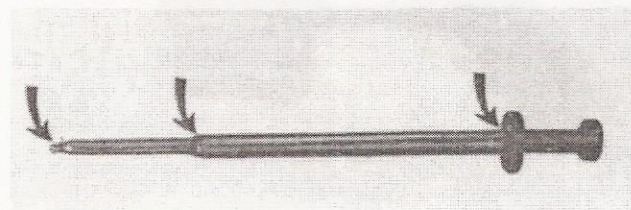


Figure 46. Arrows indicate critical areas where fouling accumulation may cause failures to fire.

ally not fired, will often show a very light firing pin imprint. This imprint is caused by a forward movement of the relatively free-floating firing pin; this normal signature effect may be quite indistinct with some weapons.

(3) *Designation.* Failure of a fired case to be completely ejected from the rifle.

(a) *Description.* Ejection of a fired case is a function of automatic gun action regardless of the mode of fire. A malfunction occurs when the fired case is not successfully cleared through the ejection port and becomes jammed in the mechanism as the bolt closes. On some occasions, the fired case, while initially clearing the rifle, may strike an outside surface and bounce back into the path of the bolt. This is usually referred to as spin-back.

(b) *Probable cause.* Ejection failures are difficult to diagnose but are often related to a weak or damaged extractor spring and, much less commonly, to a weak or damaged ejector spring. Failures to eject can also be caused by an accumulation of carbon or fouling on the ejector spring, on the extractor, and from short recoil. Short recoil is usually due to an accumulation of fouling in the mechanism which may result in any of a number of failures including a failure to eject. Difficult extraction from a fouled or corroded chamber can also cause ejection failures.

Note. Short recoil may also be caused by a fouled or obstructed gas tube. This problem is discussed in (7) below.

(c) *Corrective action.*

1. Immediate action should be taken carefully to avoid the risk of further jamming the rifle. While retraction of the charging handle will usually free the fired case and permit its removal, the charging handle must not be released until the position of the next live round is determined. If a live round has been sufficiently stripped from the magazine, or in some cases completely stripped from the magazine, then the magazine and all live rounds may also require removal before the charging handle should be released.

2. If repetitive malfunctions occur and are not corrected by cleaning and lubricating, it is recommended that the ejector spring, the extractor spring, and the extractor be replaced even if damage is not apparent. The ejector itself does not often require replacement. Note that the extractor spring cannot be easily removed from the extractor without damaging the spring, although a new extractor spring can be properly installed, if care is exercised.

(d) *Malfunction subtypes.* The four subtypes of failure-to-eject are shown in figures 48

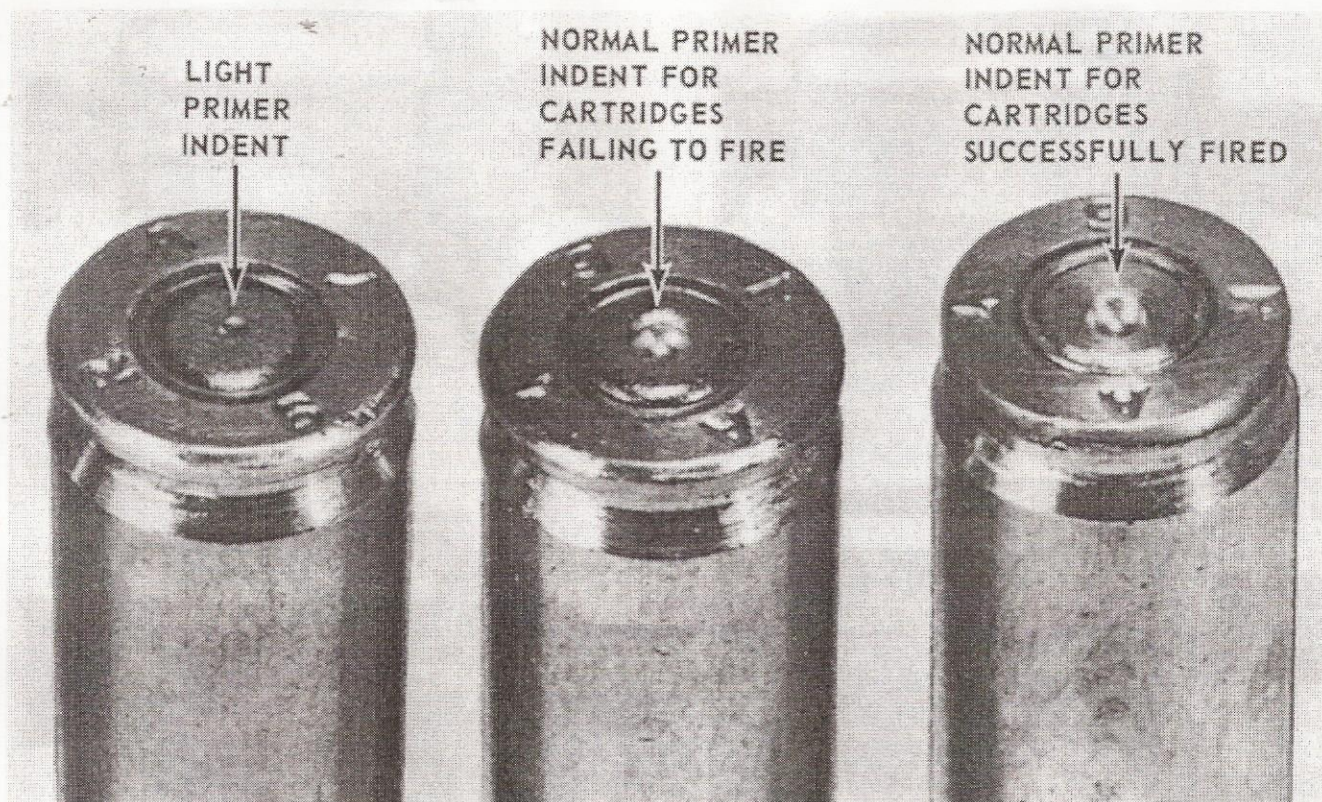


Figure 47. Various degrees of primer indent on 5.56-mm cartridges. Note that for cartridges successfully fired the primer, and particularly the circumference of the primer indent, shows a distinct flattening of the primer surface as a result of normal propellant pressure.

and 49. On rare occasions a fifth subtype may be encountered where the fired case, which has not been successfully ejected, is found to be completely rechambered and the bolt is fully closed and locked. This should not be confused with a failure-to-extract (4) below. The determining factor in deciding whether a failure-to-eject or a failure-to-extract has occurred is the nature of the clearing action required to overcome the malfunction. If the fired case can be cleared by simply retracting the charging handle, a failure-to-eject has occurred; if difficulty is encountered to the extent that repeated charging handle cycles are required, or if tools (cleaning rod, bayonet) are required to clear the malfunction, then a failure-to-extract has occurred.

(4) *Designation.* Failure of a fired case to be successfully extracted from the rifle chamber.

(a) *Description.* A failure-to-extract results when the fired case remains in the rifle chamber. While the bolt and bolt carrier may move rearward only a very short distance, more commonly the bolt and carrier recoil fully to the rear, leaving the fired case in the chamber. A live round is then forced into the base of the fired case as the

bolt returns in counterrecoil. This malfunction is considered to be one of the most difficult to clear.

Note. The distinction between certain failures-to-eject and a failure-to-extract is determined by the nature of the clearing action required to overcome the malfunction. As the latter malfunction is considered to be an extremely serious one that requires the use of tools to clear, it is essential that it be properly identified and reported. Relatively easy-to-clear failures-to-eject must not be incorrectly reported as extraction failures.

(b) *Probable cause.* Short recoil cycles or fouled or corroded rifle chambers are the most common causes of failures-to-extract. A damaged extractor or a weak or broken extractor spring can also cause this malfunction.

(c) *Corrective action.*

1. The severity in nature of a failure-to-extract determines the corrective action procedures which will be successful. If the bolt has moved rearward sufficiently to engage a live round, the magazine and all live rounds must be removed prior to attempting to extract the fired case. A cleaning rod must then be inserted in the bore, in order to remove the fired case. While the gun must be completely unloaded and the bolt and carrier retracted prior to insertion of the cleaning



Figure 48. Two subtypes of failure-to-eject. Top—failure-to-eject the fired case, base exposed. Bottom—fired case, mouth exposed.

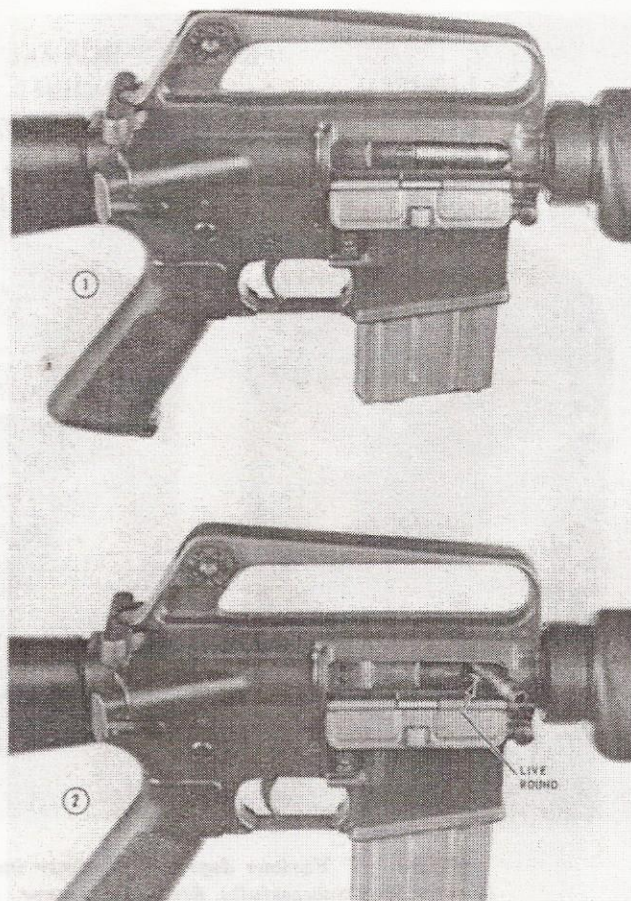


Figure 49. Two subtypes of failure-to-eject. Top—failure-to-eject with no portion of the fired case outside the ejection port. Bottom—failure-to-eject with a live round jammed.

rod, the extractor tool can usually be used successfully and safely without magazine removal.

2. Where cleaning and inspection of the mechanism and the chamber reveal no deficiencies in these areas, and failures to extract persist, the extractor and extractor spring should be replaced. If the chamber surface is damaged, the entire barrel must be replaced.

(d) *Malfunction subtypes.* Various degrees of cartridge case rim damage are shown in figure 50 and illustrate, together with figure 51, types of failure-to-extract.

(5) *Designation.* Failure of a live round to be successfully stripped from the magazine and fully chambered.

(a) *Description.* This malfunction occurs during a firing sequence, as opposed to the previously discussed malfunction (1) above which occurs only after manual bolt release following insertion of a loaded magazine. Feeding failures can be divided into basic types as listed (1) above.

(b) *Probable cause.* The majority of feeding failures are due to one of two causes: short

recoil, or a defective magazine. In short recoil, the bolt lacks sufficient energy to move fully rearward to engage the cartridge base, or, with the base engaged, lacks sufficient energy to complete the feeding operation. As previously discussed, short recoil is usually due to an accumulation of fouling or dirt in the mechanism. The problem of defective magazines is discussed in the paragraph dealing with miscellaneous malfunctions (7) below.

(c) *Corrective action.*

1. Immediate action should be taken carefully to avoid the risk of further jamming the rifle. Where only one round is involved and the bolt is behind the base of the round to be fed, the bolt assist device may be used to complete the feeding action. However, if resistance is encountered, the bolt should be retracted and held to rear while the magazine is removed and the malfunction cleared.

2. In instances where the bolt has overridden the base of the next round to be fed, or where the bolt has closed on an empty chamber, the bolt should first be retracted with the charging handle. Inspection of the position of the round will

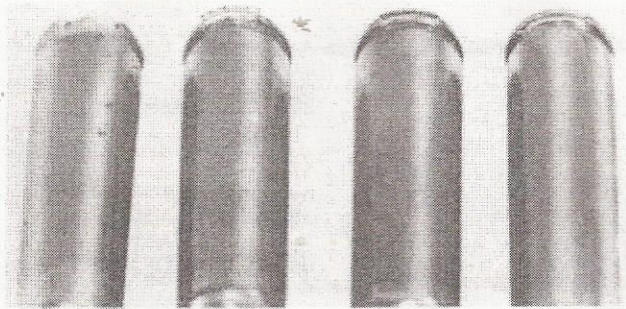


Figure 50. Various degrees of rim damage which may occur as a result of a failure to extract. Left to right—rim is completely sheared; partial rim shears illustrated on next two cartridges; hard rim extraction.

then indicate if the bolt can be released in an attempt to complete feeding under action-spring force or whether the magazine must be removed to clear the malfunction. Magazine removal is usually required to clear a double feed.

(d) *Malfunction subtypes.* Various feeding failure subtypes are shown in figures 52 and 53. Due to the relative frequency of feeding failures, the subtypes are often identified as follows:

1. Bolt behind the cartridge base.
2. Bolt override of the cartridge base.
3. Bolt closes on an empty chamber.
4. Double feed of two cartridges.

(6) *Designation.* Failure of the bolt to remain in a rearward position, engaged by the bolt catch, after the last round has been fired.



Figure 51. Failure to extract a live round jammed against the base of the fired case.

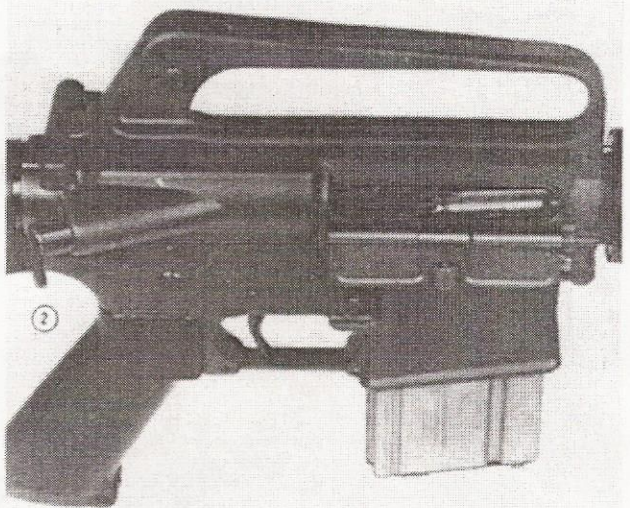
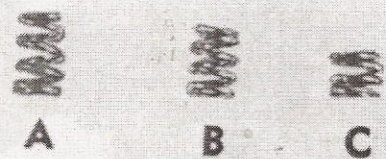


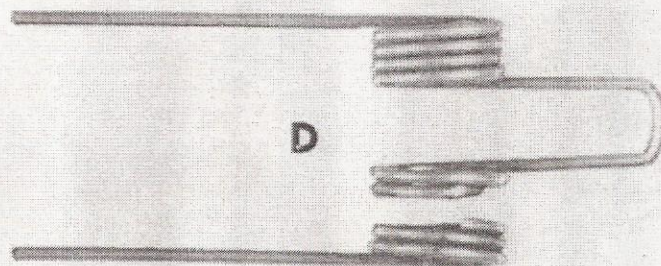
Figure 52. Two subtypes of feeding failures. Top—bolt override of the base of the cartridge. Bottom—bolt behind the base.



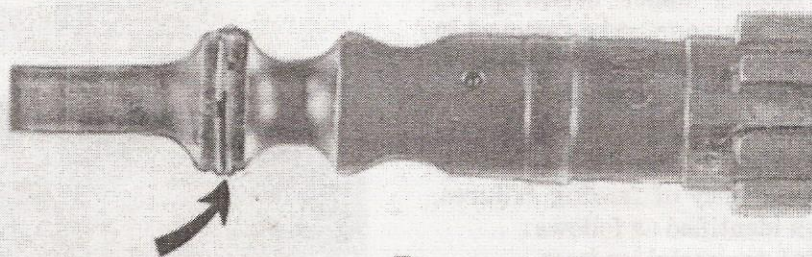
Figure 53. A double feed of two live rounds.



①



②



E



③

Figure 54. Extractor springs: A is new, undamaged spring; B has been set; C is damaged. D is a hammer spring with one leg broken. E shows undamaged center bolt ring and arrow indicates broken ring.

(a) *Description.* When this failure occurs, the soldier has no immediate visual check to determine if a malfunction has interrupted firing or whether the last round has been fired. The weapon appears to be in a normal, bolt-closed position.

(b) *Probable causes.* The malfunction is commonly due to short recoil, where the bolt recoils far enough to complete all other firing operations but not far enough to be engaged by the bolt catch. Fouling and dirt may also interfere with the operation of the bolt catch itself, restricting or prohibiting it from moving freely. This failure is also occasionally due to a high cyclic rate of fire where the bolt catch does not have sufficient time to move into position to arrest the bolt after the last round is fired. The high cyclic rates of fire necessary to induce this malfunction occur only

with certain lots of ammunition and should not be confused with a firing rate controlled by the soldier, i.e., the number of trigger pulls per second, the length of the burst, or time between bursts. It should be noted that special instrumentation is required in order to determine if high cyclic rates of fire are the cause of this malfunction.

(c) *Corrective action.*

1. Immediate corrective action is accomplished by using the charging handle to fully retract the bolt and bolt carrier. The bolt catch will then usually engage and hold the bolt rearward and the empty magazine can be removed and a loaded magazine inserted. A fully loaded magazine should not be inserted with the bolt in a closed position; if the bolt is in a closed position when an empty magazine is removed from the gun, the bolt

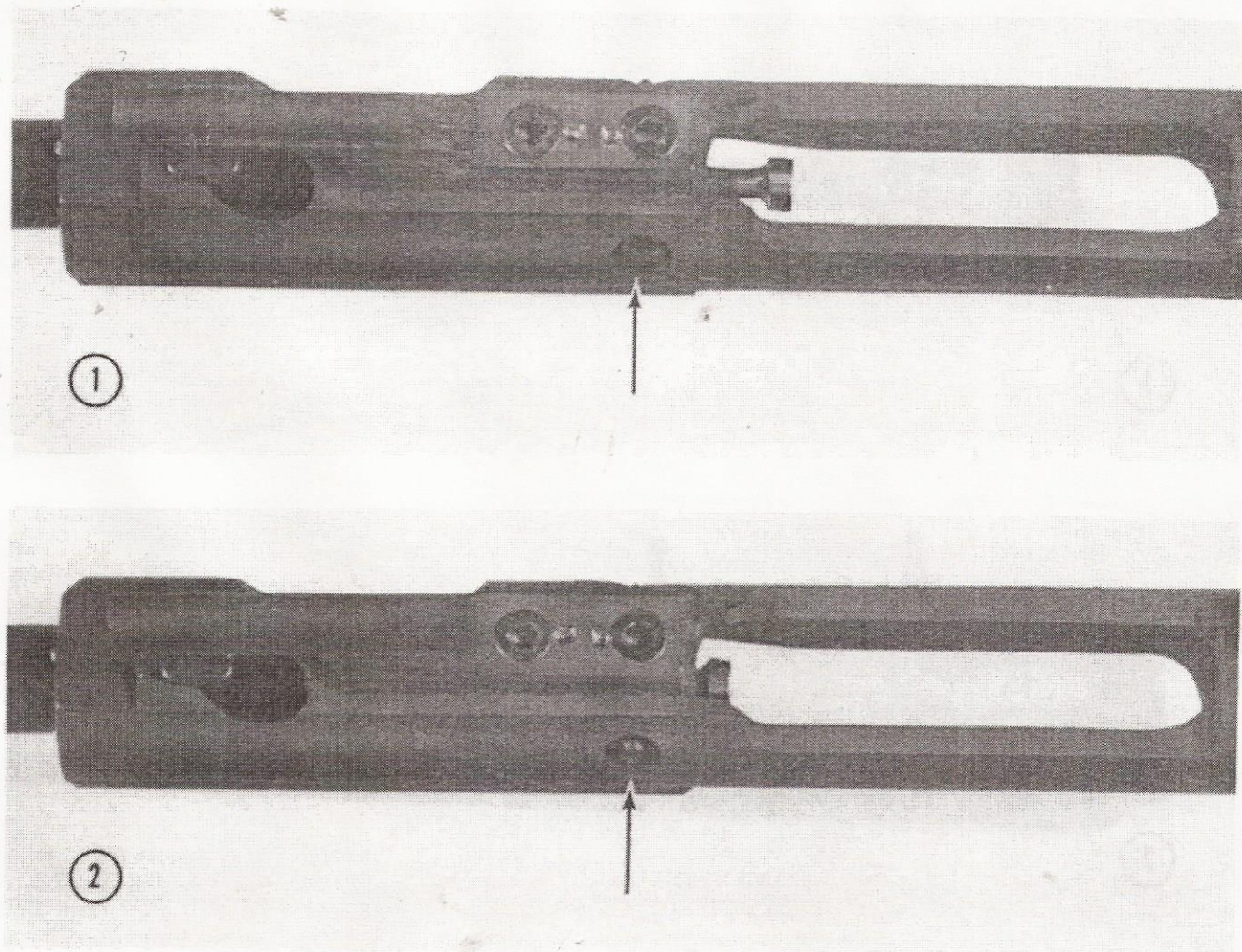


Figure 55. Arrows indicate location of pin which retains the firing pin in the bolt carrier. Top—retaining pin has been incorrectly assembled ahead of the firing pin shoulder. Bottom—correct assembly will avoid failure to fire.

catch will not automatically engage the bolt when the bolt is retracted. Under these conditions the bolt catch must be manually positioned to hold the bolt to the rear.

2. Cleaning, inspection, and lubrication of the mechanism, including the bolt catch assembly, should be accompanied where repetitive failures occur; in the event of continued failure, the bolt catch and bolt catch spring should be replaced.

(7) *Designation and Description.* Any malfunctions which cannot be defined under the previous categories are included here.

(a) *Firing two rounds on a single trigger pull in the semiautomatic mode.* The firing of two rounds on a single trigger pull in the semiautomatic mode is often due to the trigger pin backing out from engagement on one side or the other of

the receiver. Loosening of the trigger pin in turn is due usually to a broken or to an incorrectly assembled hammer spring (fig 54 and 55). Immediate corrective action can be taken without disassembly of the rifle by simultaneously manipulating the trigger and the trigger pin back into position. At the earliest opportunity, the hammer spring should be inspected for damage or for incorrect assembly.

(b) *Bolt catch engages and stops the bolt or the bolt carrier during firing instead of after the last round in the magazine is fired.* The engagement of the bolt or bolt carrier by the bolt catch during burst fire rarely occurs if the gun is being shoulder fired and only occasionally occurs when the gun is fired from a rigid mount. However, if the malfunction occurs repetitively during shoulder fired operations, the bolt catch and spring should be replaced.

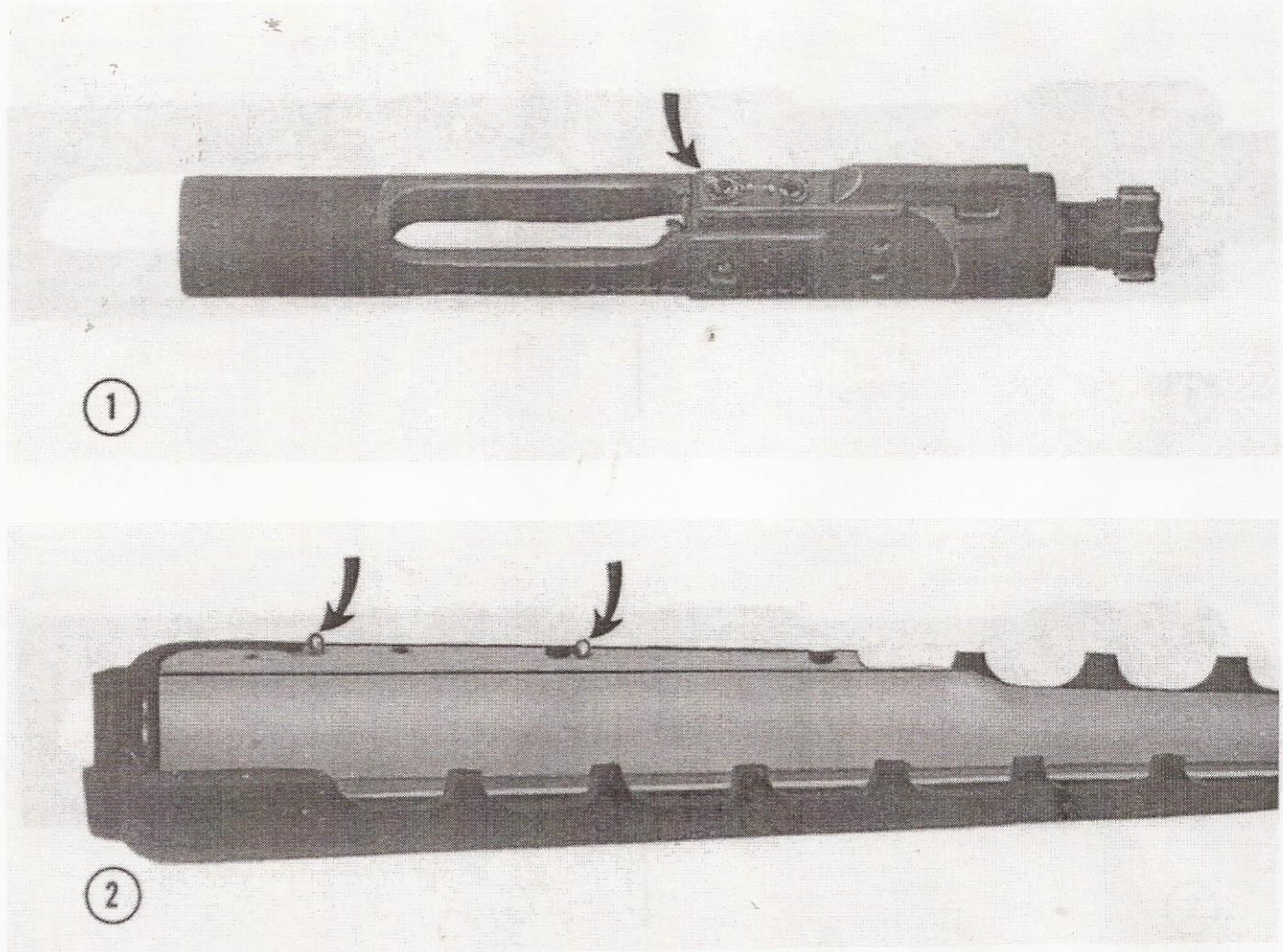


Figure 56. Top—Rear bolt carrier key screw has become unstaked and loosened approximately one-half turn. Bottom—loose rivets on handguard shield.

(c) *Failure of the trigger to return to a forward position after trigger release.* A failure of the trigger to return to a forward position after trigger release is usually due to dirt or an accumulation of fouling in the mechanism, or to a lack of lubricant. While immediate corrective action can be taken by manually repositioning the trigger, permanent corrective action usually requires disassembly, cleaning, and lubrication; in some instances, due to improper engagement surfaces, the hammer and disconnecter may require replacement.

(d) *Failure of the magazine to lock in the weapon.* Repetitive failures of a magazine, or magazines, to lock or stay locked in the weapon are most often due to an accumulation of fouling or dirt in the area of the magazine release lock mechanism. While a magazine can usually be forcibly locked into position, cleaning and lubrication of the magazine release lock mechanism are re-

quired. On occasion, a particular magazine will be found with dimensional irregularities which restrict or prohibit proper locking; such magazines are not repairable.

(e) *Broken or damaged parts.* While broken parts are usually apparent when the rifle is disassembled and inspected, damaged parts are not as readily detected. Figure 54 illustrates a number of damaged and broken components which should be replaced whenever they are identified.

(f) *Incorrectly assembled or loose parts.* Figures 55 through 57 illustrate incorrectly assembled and loose parts.

(g) *Damaged magazine.* Figure 58 illustrates damaged magazines. It should be noted that the illustrations are those of grossly damaged magazines and the degree of misalignment or damage is often much less apparent although such apparently minor damage can cause repetitive feeding failures. Damaged magazines, or those

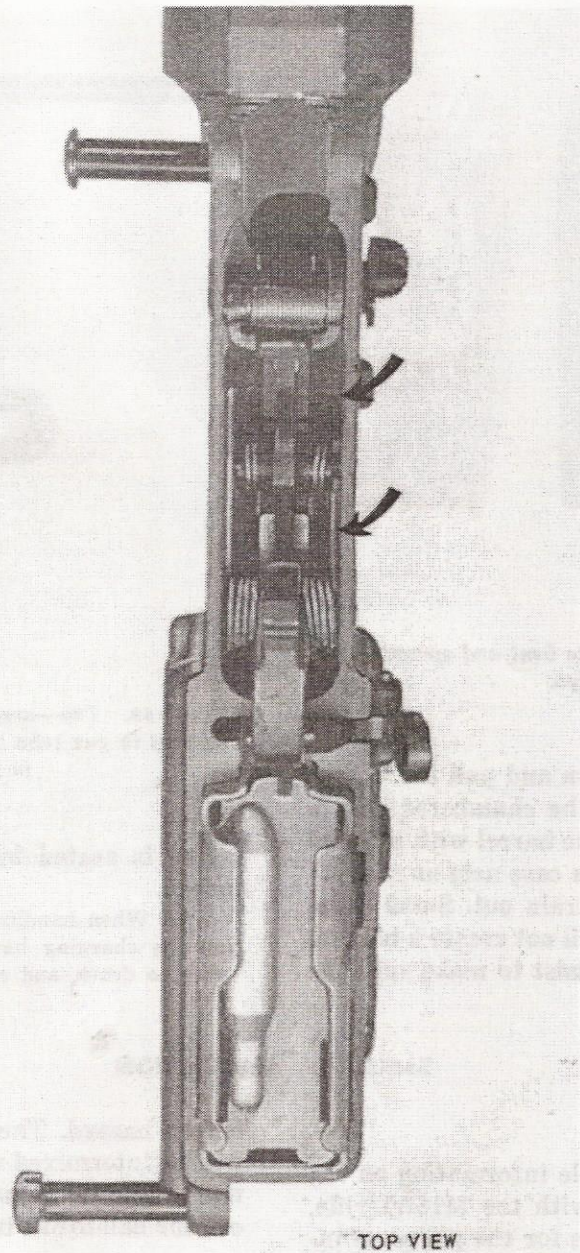


Figure 57. Interior view of the lower receiver. Arrows indicate that one leg of the hammer spring has been incorrectly assembled, and is under, instead of over, the trigger pin. Incorrect assembly may permit trigger pin to work loose; causing two rounds to fire on a single trigger pull in semiautomatic fire.

suspected of damage, should not be used and no attempt should be made to repair them.

(h) *Fouled gas tube.* One cause of short recoil may be due to a fouled or obstructed gas tube. Where short recoil-type malfunctions continue to occur after a thorough disassembly, inspection, cleaning, and relubrication of the mechanism has been accomplished, the gas tube and, if necessary, the front sight base should then be replaced. Figure 59 shows a fouled gas port condition in a gas tube and in a front sight base.

Gas tube inspection is accomplished by technical personnel.

Caution: In case of accidental immersion in water or in cases where rainwater may have entered the barrel, and under conditions where complete and thorough cleaning is impossible, insure that the barrel is drained of water. Failure to do so may cause serious damage to the rifle. Remove water from the barrel in the following manner:

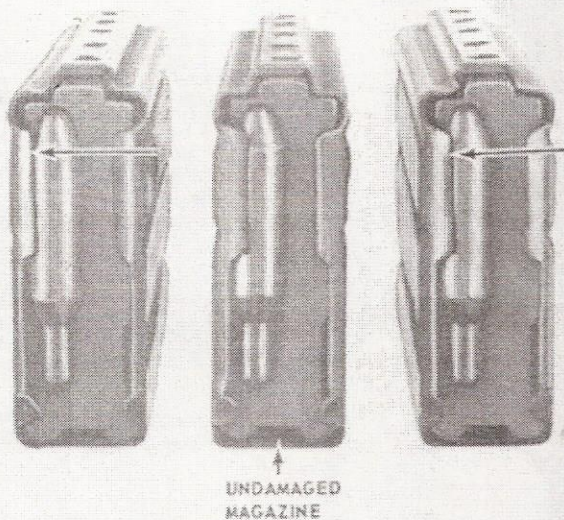


Figure 58. Arrows indicate bent and spread magazine lips.

1. Point the muzzle down and pull the charging handle back to unseat the chambered round. (Water cannot drain from the barrel with a round fully seated, as the cartridge case acts as a seal.)
2. Allow the water to drain out. Small droplets remaining in the bore will not create a hazard.
3. Strike the forward assist to make sure the

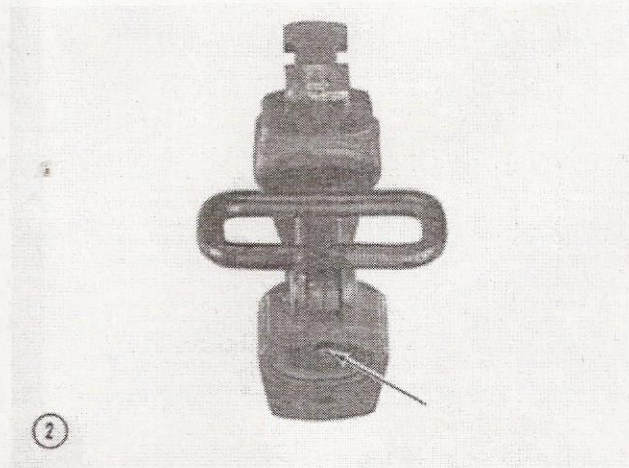
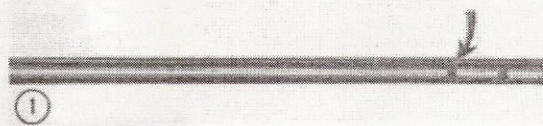


Figure 59. Top—arrow indicates fouled and obstructed gas port in gas tube. Bottom—similar condition indicated in front sight base.

round is seated in the chamber and the bolt is locked.

Note. When handling M16A1 rifle, point muzzle down, pull the charging handle completely to the rear, allow water to drain, and release charging handle.

Section V. AMMUNITION

21. General

This section includes available information on the types of ammunition used with the M16A1 rifle. The types of ammunition are for the purposes indicated.

22. Classification

a. *Cartridge, 5.56-mm, Ball, M193.* The ball ammunition is a 5.56-mm center fire cartridge with a 55-grain, gilding-metal jacketed, lead alloy core bullet. The primer and case are waterproofed. The ball round is the basic cartridge for field use and has no identifying marks.

b. *Cartridge, 5.56-mm, Tracer, M196.* The tracer ammunition has the same basic characteristics as the ball. It is identified by a red-painted tip. Its primary uses are for observation of fire, incendiary effect, and signaling. The use of 100 percent tracer may cause deposits of bullet-jacket material (metal fouling) to form in the bore and rifling grooves of the barrel. Metal fouling is extremely difficult to remove and constitutes a potential

safety hazard. Therefore, when tracer is fired it will be intermixed with ball ammunition in a ratio no greater than one-to-one with a preferred ratio of four ball to one tracer.

c. *Dummy, 5.56-mm, M199.* Cartridge can be identified by six longitudinal corrugations in case.

d. *Cartridge, XM195, Grenade Launcher.* This cartridge can be identified by the case mouth closed with a 7-petal rosette crimp showing a red mouth.

Caution: Do not use this cartridge for blank firing.

e. *Cartridge, M200, Blank.* This cartridge can be identified by the case cannellured approximately 1/2-inch from its head. The case mouth is closed with a 7-petal rosette crimp and shows a white tip.

Caution: Do not use this cartridge for grenade launching.

Note. 1. A blank firing attachment, XM15 (FSN: 1005-921-5481), is presently available for use only at CONUS

training stations. The XM15 is an interim device. Its use is at the discretion of the local commander.

2. An increase in carbon build-up occurs when the attachment is used. This carbon accumulation will cause malfunctions after approximately 2,000 rounds of M200 blank ammunition have been fired. The malfunctions will increase until the rifle ceases to function.

3. Extensive cleaning is required to restore the weapon to serviceable condition. Excessive carbon build-up is apparent throughout the weapon; however, those areas most affected are the bore, gas tube, and carrier key.

4. Special cleaning procedures to be taken by the operator and/or field maintenance personnel are outlined in TM 9-1005-249-12 and TM 9-1005-249-34.

23. Packing

Ammunition for the M16A1 rifle can be found packed in two ways.

a. There are 20 rounds per carton, 36 cartons (720 rounds) per metal box (M2A1), and 2 metal boxes (1,440 rounds) per wire-bound box.

b. There are 10 rounds per magazine loading strip, 2 loading strips (20 rounds) per pocket, six pockets (120 rounds) per bandoleer, six bandoleers (720 rounds) per metal box (M2A1), and 2 metal boxes (1,440 rounds) per wire-bound box.

Section VI. DESTRUCTION OF MATERIEL TO PREVENT ENEMY USE

25. General

Destruction of the M16A1, when subject to capture or abandonment in the combat zone, will be undertaken by the using unit only when, in the judgment of the unit commander concerned, such action is necessary in accordance with orders of, or policy established by, the army commander. The following priorities should be followed when destroying small arms weapons:

- a. Breech mechanisms.
- b. Barrel.
- c. Sighting equipment (including infrared).
- d. Mounts.

26. Methods

The information which follows is for guidance only. Certain of the procedures require the use of

24. Care and Cleaning

a. When necessary to store ammunition in the open, raise it on dunnage at least 6 inches from the ground and protect it with a cover, leaving enough space for circulation of air.

b. Since ammunition and explosives are adversely affected by moisture and high temperature, due consideration should be given as follows:

(1) Do not open boxes until ammunition is to be used. Ammunition removed from airtight containers, particularly in damp climates, is apt to corrode.

(2) Protect ammunition from high temperatures and the direct rays of the sun. More uniform firing is obtained if rounds are kept at an even temperature.

c. Do not attempt to disassemble the cartridge or any of its components.

d. The use of lubricant or grease on cartridges is *prohibited*.

explosives and incendiary grenades which normally may not be authorized items of issue to the using organization. Of the several means of destruction, those most generally applicable are:

- a. Mechanical—requires axe, pick mattock, sledge, crowbar, or similar implement.
- b. Burning—requires gasoline, oil, incendiary grenades, or other flammables.
- c. Demolition—requires suitable explosives or ammunition (see note).
- d. Gunfire—includes artillery, machineguns, rifles using rifle grenades, and launchers using anti-tank rockets (see note).
- e. Disposal—requires burying, dumping in streams or marshes, or scattering so widely as to preclude recovery of essential parts.

Note. Generally applicable only when the rifle is to be destroyed in conjunction with other equipment.

CHAPTER 3

SIGHT ADJUSTMENT AND BATTLESIGHT ZERO

Section I. SIGHT ADJUSTMENT

27. General

Following fundamentals training, the soldier must zero his weapon. In order to accomplish this, the soldier must first learn the operation of the sights, the use of the elevation and windage rule, and how to compute sight changes.

28. The Sights

The sights of the M16A1 rifle are adjustable for both elevation and windage. Windage adjustments are made on the rear sight; elevation adjustments on the front sight.

a. The rear sight consists of two apertures (fig 60) and a windage drum with a spring loaded detent (fig 61). The aperture marked L is used for ranges beyond 300 meters, and the unmarked aperture for ranges from 0 to 300 meters. With a weapon battlesight zeroed for 250 meters, flip to the long-range aperture. The weapon is then zeroed for 290 to 375 meters. Adjustments for windage are made by pressing in on the spring loaded detent with a sharp instrument, or the tip of a cartridge, and rotating the windage drum in the desired direction of change.

b. The front sight consists of a rotating sight post with a spring loaded detent (fig 62). Adjustments are made by using a sharp instrument, or the tip of a cartridge. To raise or lower the front sight posts, depress the spring loaded detent and rotate the post in the desired direction of change.

c. During training in marksmanship fundamentals all firing exercises should be conducted with the rear sight of the weapon centered and set on the short range aperture. The front sight post should be set at 24 clicks from its lowest position. This setting should not be changed until the firer is able to fire tight shot groups. The reason for this is two-fold: first, untrained firers will tend to focus their attention on manipulating the sights rather than learning to properly apply marksmanship fundamentals. Second, during fundamental training, the precise location of a shot group on the target is unimportant since it is the size of

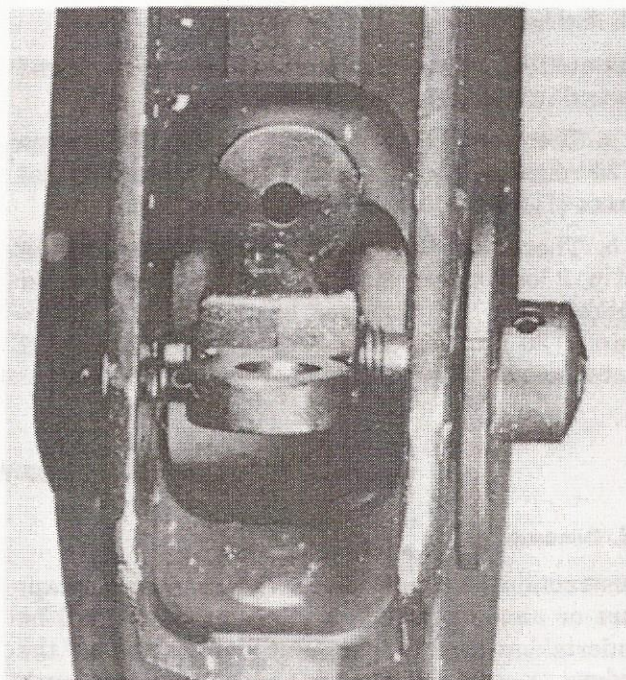


Figure 60. Rear sight aperture.

the short group, not the location, that governs the proficiency of the firer.

29. Elevation and Windage Rule

The elevation and windage rule states that one click of elevation or windage will move the strike of a bullet a specific distance at a specific range. At a range of 25 meters, one click of either elevation or windage on the sights of the M16A1 rifle will move the strike of the bullet approximately .7 centimeters. To compute the distance that one click of elevation or windage will move the strike of a bullet at a given range, divide the range (expressed in meters) by 25 meters and multiply by .7 centimeters.

$$D = \frac{R}{25m} \times .7 \quad D = \text{Distance in centimeters}$$

R = Range in meters

Example: To compute the distance that one

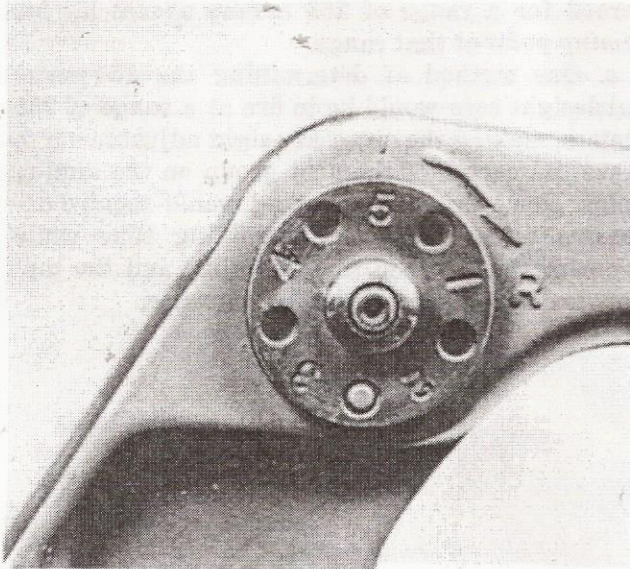


Figure 61. Windage drum.

click of elevation or windage will move the strike of the bullet at a range of 250 meters, simply divide 250m by 25m and multiply by .7cm.

$$D = \frac{250m}{25m} = 10 \times .7 = 7 \text{ cm.}$$

Therefore, $D = 7 \text{ cm.}$

30. Sight Changes

a. To make sight changes, the firer first locates the center of his shot group and then determines the distance between it and the desired location. An error in elevation is measured vertically, while a windage error is measured horizontally. These distances are converted to clicks by using the elevation and windage rule. As a general rule, bold adjustments will prove more advantageous to the firer. For example, if there is a question whether to move two or three clicks, the firer normally

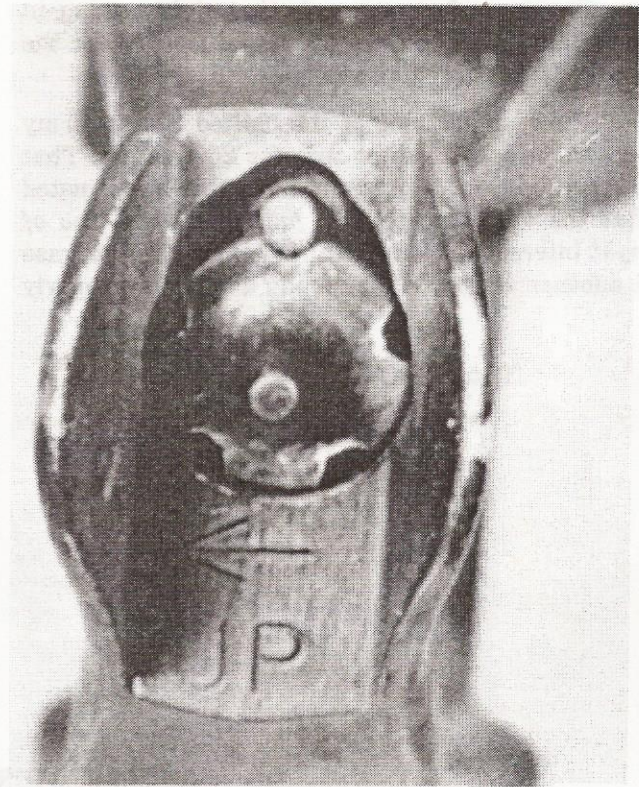


Figure 62. Front sight.

should make the adjustment requiring the greater number of clicks.

b. To raise the strike of the bullet, the firer must rotate the front sight post in the direction of the arrow marked UP (stamped on the front sight base); thus, the strike of the bullet is raised but the post is lowered. Reverse the direction of rotation to move the strike of the bullet down. To move the strike of the bullet to the right, rotate the windage drum the desired amount of clicks clockwise (in the direction of the R, right). Reverse the direction of rotation to move the strike of the bullet to the left.

Section II. BATTLESIGHT ZERO

31. Principles of Zeroing

a. In order to understand the principles of zeroing, the soldier should have a basic knowledge of ballistics: specifically, the relationship between the path of the bullet in flight and the line of sight. In flight, a bullet will follow a relatively straight line until loss of velocity and gravity combine to cause it to fall to earth, describing an arc as it does so. It will thusly appear to have a curved trajectory (fig 63). If the muzzle of a rifle is elevated at the time of firing the trajectory of the round will describe an even greater arc. The greater the distance a

bullet travels before impact, the higher it must travel in its trajectory. On the other hand, the *line of sight* is a *straight line* through the *rear sight aperture* and across the *front sight post* to the *aiming point on the target*.

b. When the bullet leaves the rifle muzzle, it is initially below the line of sight. Due to the angle of the bore, the bullet will rise until it reaches its maximum ordinate, at which time it will begin to drop and will eventually intersect the line of sight. The range at which this *intersection* occurs is the *zero* for that *sight setting*.

c. The zero of a weapon is that sight setting in elevation and windage that will cause a hit at the *point of aim* for a given range.

d. Current doctrine of the United States Army prescribes a battlesight zero for 250 meters. That is, the sights of a weapon should be so adjusted that the *trajectory of the bullet* and the *line of sight* intersect at a range of 250 meters. To phrase it another way, a soldier firing a weapon properly

zeroed for a range of 250 meters should hit his *aiming point* at that range.

e. One method of determining the 250-meter battlesight zero would be to fire at a range of 250 meters, making the necessary sight adjustments to place the center of the shot group on the aiming point. However, such a method would require extensive terrain and waste training time while firers moved between the firing line and the targets to check the location of shot groups.

TRAJECTORY

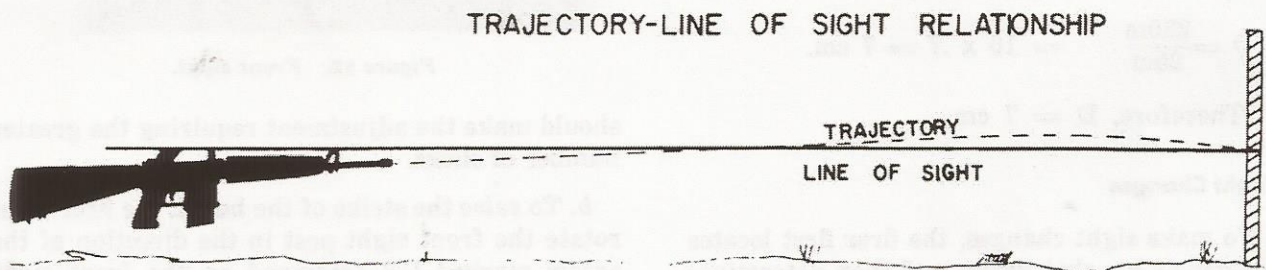


Figure 63. Trajectory.

PRINCIPLES OF BATTLESIGHT ZEROING

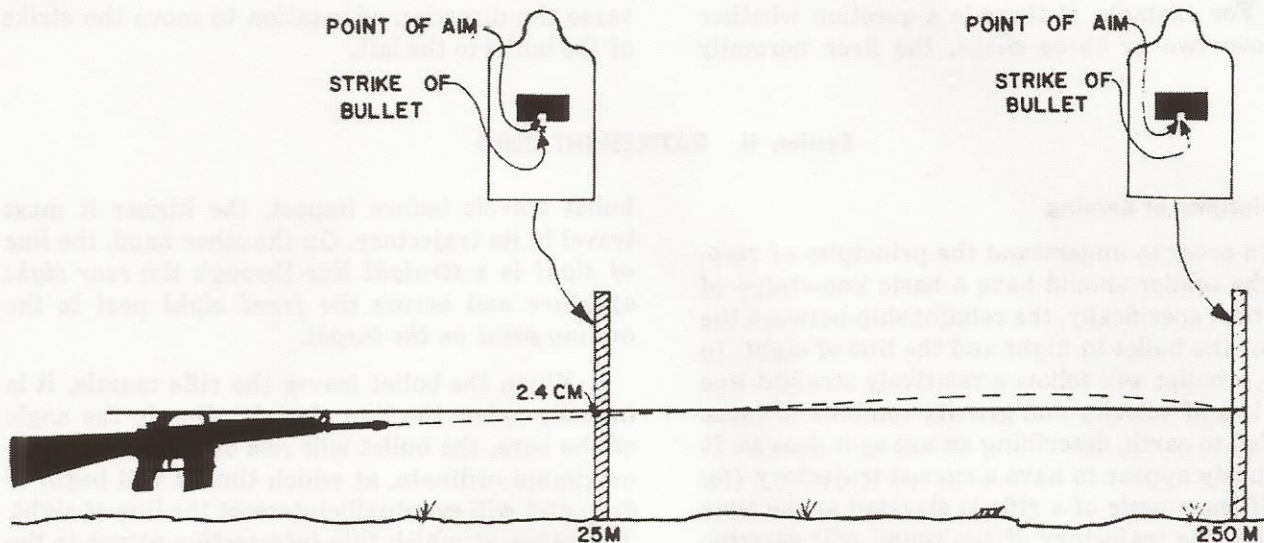
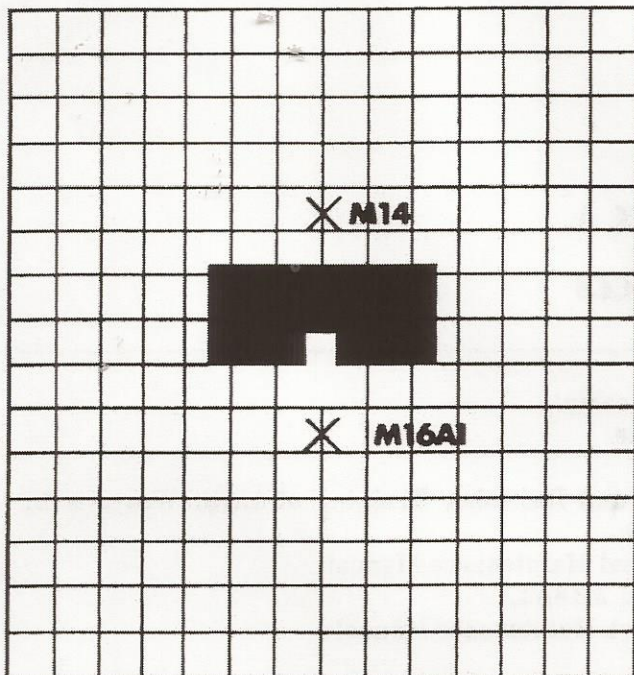


Figure 64. Battlesight zero.



NOTE. TWO CLICKS OF ELEVATION OR WINDAGE WILL MOVE THE STRIKE OF THE BULLET ONE SQUARE ON THIS TARGET.

Figure 65. The 25-meter (1,000 inch) target (FSN 6920-906-0169).

f. A more suitable method of determining the 250-meter battlesight zero can be accomplished at a range of 25 meters, or 1,000 inches (fig 64). This method is based on the principle that bullets of the same type and caliber fired at the same range have the same trajectory. That is, if several bullets were fired from the same weapon and all hit the same 250-meter aiming point, the trajectories of all these bullets are the same. Therefore, when each of these bullets reaches a distance of 25 meters, or 1,000 inches, from the muzzle of the weapon, they are all the same distance below the firer's line of

aim. Thus, by placing an aiming point at a range of 25 meters, or 1,000 inches, the firer has only to adjust the weapon sights until his shot group is the prescribed distance below his 25-meter, or 1,000-inch, aiming point to obtain a zero for 250 meters.

32. Battlesight Zero Target

The standard 25-meter target (FSN 6920-906-0169) previously used during fundamentals training, is locally modified as illustrated in figure 65 when determining a battlesight zero for the M16A1. In order to use the elevation and windage rule effectively, the firer must know the dimensions of the squares on the target. Vertical and horizontal lines are printed on the target, forming 1.4 centimeter squares. As indicated in paragraph 29, one click of elevation or windage will move the strike of the bullet .7 centimeters at a range of 25 meters. (Although 25 meters is a slightly lesser distance than 1,000 inches, the difference is insignificant, and the same adjustment data can be used for 1,000-inch firing). Thus, in terms of the 25-meter target, two clicks of elevation or windage will move the strike of the bullet one square.

33. Determining the Battlesight Zero

The 250-meter battlesight zero is determined by firing a series of three-round shot groups at the 25-meter target described in paragraph 30. The firer aims at the distinctive aiming point at the bottom center of the black rectangle (base of the white cutaway portion) and adjusts his sights until the center of his shot group is located 2.4 centimeters directly below the aiming point (fig 65).

APPENDIX A

REFERENCES

23-71

FM 23-16	Automatic Rifle Marksmanship.
FM 23-30	Grenades and Pyrotechnics.
FM 23-71	Rifle Marksmanship.
ASubjScd 7-11B10	MOS Technical Training and Refresher Training of Light Weapons Infantryman, MOS 11B10.
TM 9-1005-249-12	Operator and Organizational Maintenance Manual: Rifle, 5.56-mm, M16 and M16A1.
TM 9-1005-249-34	Direct and General Support Maintenance Manual: Rifle, 5.56-mm, M16A1.

By Order of the Secretary of the Army:

Official:

KENNETH G. WICKHAM,
Major General, United States Army,
The Adjutant General.

W. C. WESTMORELAND,
General, United States Army,
Chief of Staff.

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Barrel Installation/Removal Instructions for AR-15/M-16 Rifle

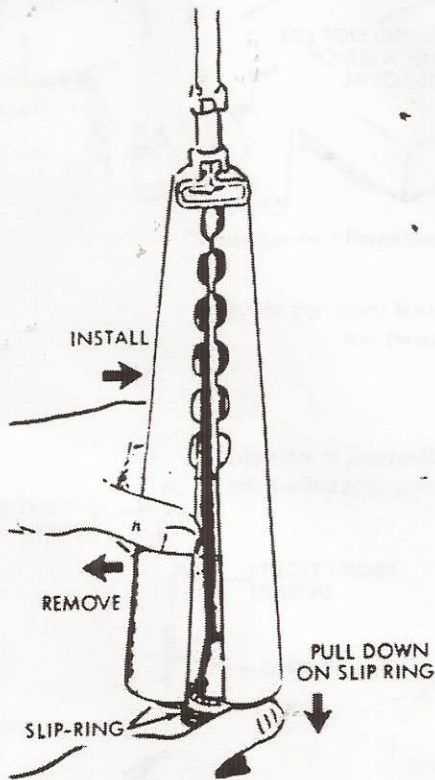
Please read these instructions carefully before attempting to install/remove barrel on your AR-15/M-16 Rifle.

Tools Required List

4" or larger vise
 Armorer's wrench
 Small Hammer
 1/16" Punch
 Rawhide or rubber mallet
 1/2" Breaker Bar
 Torque wrench (in lbs)
 Pliers

Additional/Optional Tools

Barrel Vise Jaws
 Snap Ring Pliers
 Front Sight Adjustment Tool
 1/8" Punch
 0.77 OD X 2 3/4" LG Rod
 Vise Grips



Remove/Install handguards.

1. ASCERTAIN THAT WEAPON IS UNLOADED.
2. Push takedown pin partially out of rifle. Swing upper receiver up, opening the gun, and remove bolt carrier assembly and charging handle.
3. Detach upper receiver from lower by unscrewing pivot screw or by pushing pivot pin out. Set the lower half of gun aside.
4. Remove handguards by depressing handguard slip ring and swinging handguards out. See illustration at left.
5. Place barrel in a good vise, gas tube up. The illustration shows the gunsmith using a set of barrel vise jaw blocks, which are very helpful in installing the barrel without marring the finish of the gun.

CAUTION

If vise is not tight and barrel turns while barrel nut is turned, gas tube will be damaged.

6. Using a small punch, drive out gas tube pin from front sight assembly. Take care not to lose this pin. Pull gas tube to the rear until it comes just far enough back that it may be pushed to the side far enough to clear the handguard cap, then pulled forward out of the upper receiver. A pair of ordinary pliers or vise grips are helpful in pulling the gas tube when it has become frozen from carbon buildup, but care should be taken not to crush or bend the tube. The gas tube has sufficient flex to allow for removal.
7. Place barrel nut wrench/armorer's tool onto barrel nut, making certain the prongs of wrench are securely fitted in teeth of nut. Loosen nut either with a 1/2" breaker bar or by tapping wrench with a hard mallet.

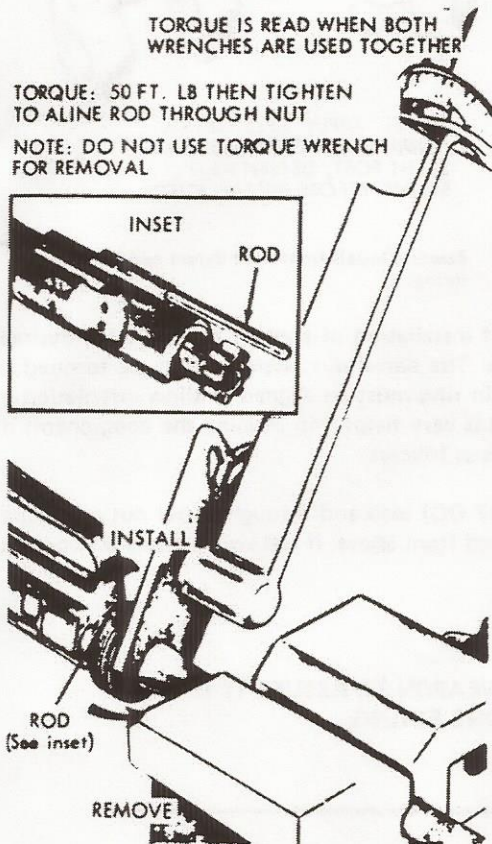
NOTE

The barrel nut assembly unscrews counter clockwise when viewed from in front of muzzle end of gun.

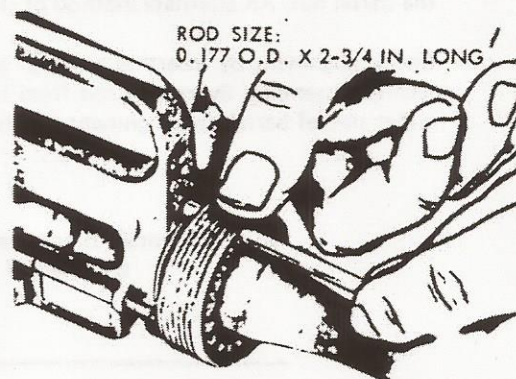
Unscrew nut assembly and remove wrench.

8. Using a mallet, tap upper receiver rearward off of barrel.

(over)



Remove/Install barrel nut assembly.



Install and align barrel nut assembly.

Barrel Installation/Removal Instructions for AR-15/M-16 Rifle (Cont.)



Remove/Install front sight and gas tube.

TORQUE IS READ WHEN BOTH
WRENCHES ARE USED TOGETHER
TORQUE 15-20 FT. LB.

NOTE: DO NOT USE
TORQUE WRENCH
FOR REMOVAL



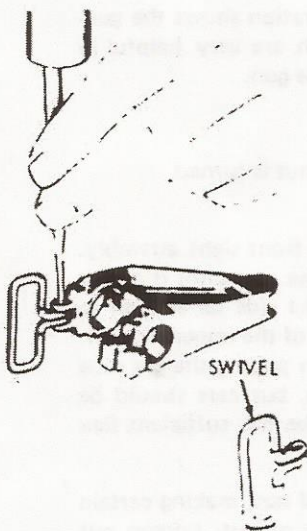
Remove/Install flash suppressor.

9. If it is desired to disassemble the slip ring group, etc. then proceed as follows:

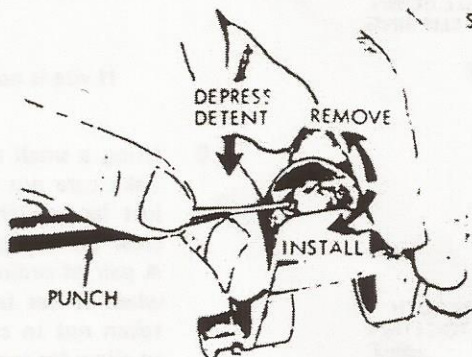
Using a pointed object carefully remove snap ring from groove in barrel nut. A set of external snap ring pliers makes this job, and reassembly, much easier. Pull weld spring and slip ring rearward off of barrel nut.

To remove small parts from front sight base, proceed as follows:

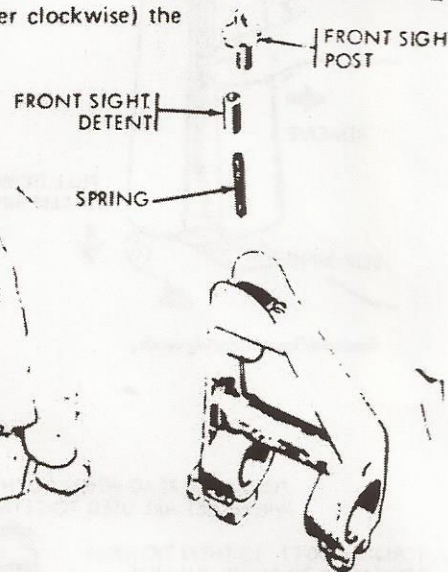
Remove sling swivel by driving rollpin or rivet out, then removing swivel from bracket. Remove front sight group by depressing detent with small punch or a pointed object, then unscrewing (counter clockwise) the front sight post from base. A front sight adjustment tool makes this job easier.



Remove/Install swivel.



Remove/Install front sight post.



NOTE: APPLY RIFLE GREASE
(LUBRIPLATE) TO THREADS ON
SIGHT POST, DETENT AND
SPRING BEFORE INSTALLATION.

Remove/Install front sight detent and front sight spring.

10. The barrel group is now completely removed from the gun. If installation of another rifle barrel is desired then proceed in reverse order following the instructions above. The barrel nut assembly is to be torqued to approximately 50 ft. lbs. and the weld spring, snap ring and slip ring must be aligned to allow installation of the gas tube. A 0.1770D. x 2 3/4" long rod used as illustrated is very helpful in aligning the components of the barrel nut. An alternate method of checking this alignment is as follows:

Check alignment by inserting a rod of gas tube diameter (0.177 OD) into and through barrel nut and upper receiver assembly. Swing the rod from left to right. When viewed from above, if rod swings equal distances to either side of barrel, the alignment should be correct.

WARNING

When reassembly is complete CHECK BORE OF WEAPON TO ASSURE IT IS CLEAR OF OBSTRUCTION BEFORE FIRING.

Other uses for Fixture,
Barrel Removal

All Weapons Cleaning
Front Sight Removal,
AR-15/M-16
Barrel Removal
for many rifles

