
*** CHAPTER 3****OPERATION AND FUNCTIONING**

This chapter explains the operation of the MG. It discusses the loading, unloading, and clearing procedures, and the cycle of functioning of the weapon. When training the cycle of functioning using dummy ammunition, it is imperative that all safety procedures be followed.

*** 3-1. OPERATION**

The overall operation of the MG includes how to load, unload, and clear the weapon. During the weapon's operation, it is mandatory that all ammunition be free of dirt and corrosion, that the ammunition be properly linked, and that the double-linked end be at the top of the ammunition can.

*** 3-2. LOADING PROCEDURES**

Trainers must ensure that the weapon functions correctly and that proper headspace and timing have been set before loading. When loading in either mode, the ammunition is fed into the MG in the same manner (Figure 3-1). Ensure that the bolt is forward and the cover is closed. Insert the double-loop end of the ammunition belt into the feedway until the first round is engaged by the belt-holding pawl. Figure 3-2 shows the correct position of the bolt latch in the single-shot or automatic mode.

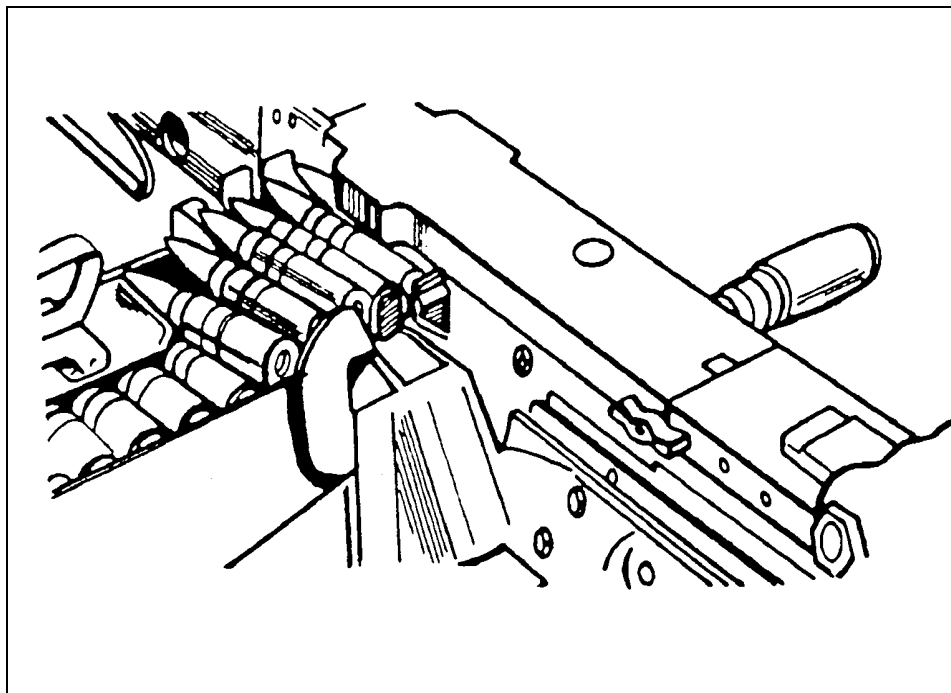


Figure 3-1. Inserting ammunition.

a. **Single-Shot Mode.** When engaging targets at ranges greater than 1,100 meters, using the single-shot mode (firing one round at a time) allows the gunner to deliver well-aimed fire on the target. To load in the single-shot mode--

(1) Keep the bolt-latch release unlocked in the up position and release it manually for each round.

(2) Jerk the retracting slide handle to the rear and lock it in position. Return the retracting slide handle to the forward position and then release the bolt by pressing the bolt latch release. The gun is now half-loaded.

(3) To complete loading, jerk the retracting slide handle to the rear and lock it in position. Return the retracting slide handle to the forward position. Press the bolt latch release. When the bolt goes forward for the second time, the gun is loaded.

b. **Automatic Mode.** To load in the automatic mode--

(1) Lock the bolt-latch release down with the bolt-latch release lock.

(2) Jerk the retracting slide handle to the rear and release it. The gun is now half-loaded.

(3) To complete loading, jerk the retracting slide handle to the rear a second time and release it. When the bolt goes forward for the second time, the gun is loaded.

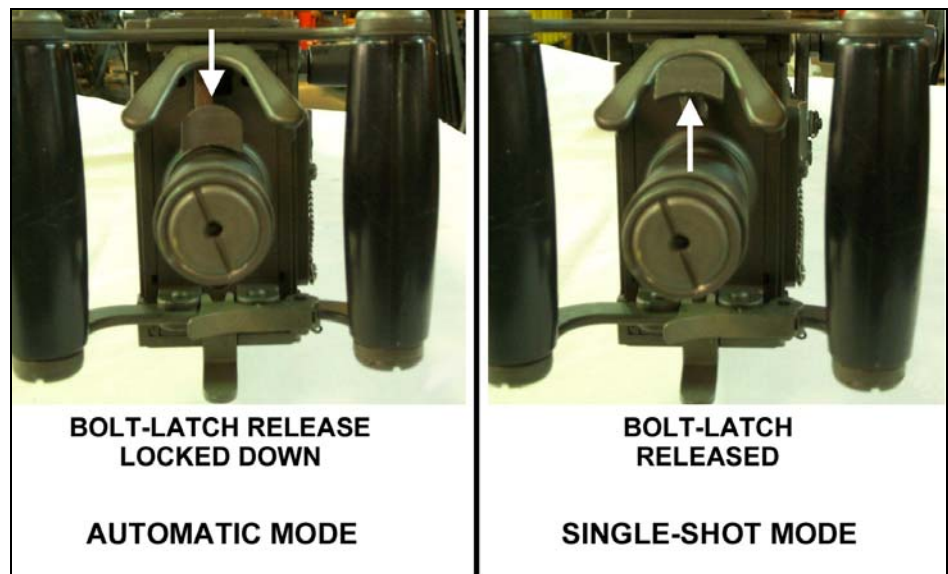


Figure 3-2. Firing modes.

* **3-3. UNLOADING PROCEDURES**

To unload the MG, the gunner must first ensure that the weapon is in the single-shot mode. The cover is then lifted and the assistant gunner removes the ammunition belt from the feedway. The bolt is then locked to the rear. If a round is chambered, it will release, unfired, when the bolt locks to the rear. Once the bolt is locked to the rear, the chamber and

T-slot are examined to ensure that they are not holding rounds. In darkness, this must be done by feeling the areas. After the examination has been done (during training), a wooden block is inserted in the receiver between the bolt and the rear of the barrel, extending above and below the receiver about one inch. Then a cleaning rod is inserted in the muzzle end of the barrel and pushed through the bore until it can be seen in the receiver. Remove the rod, the gun is now clear (Figure 3-3).

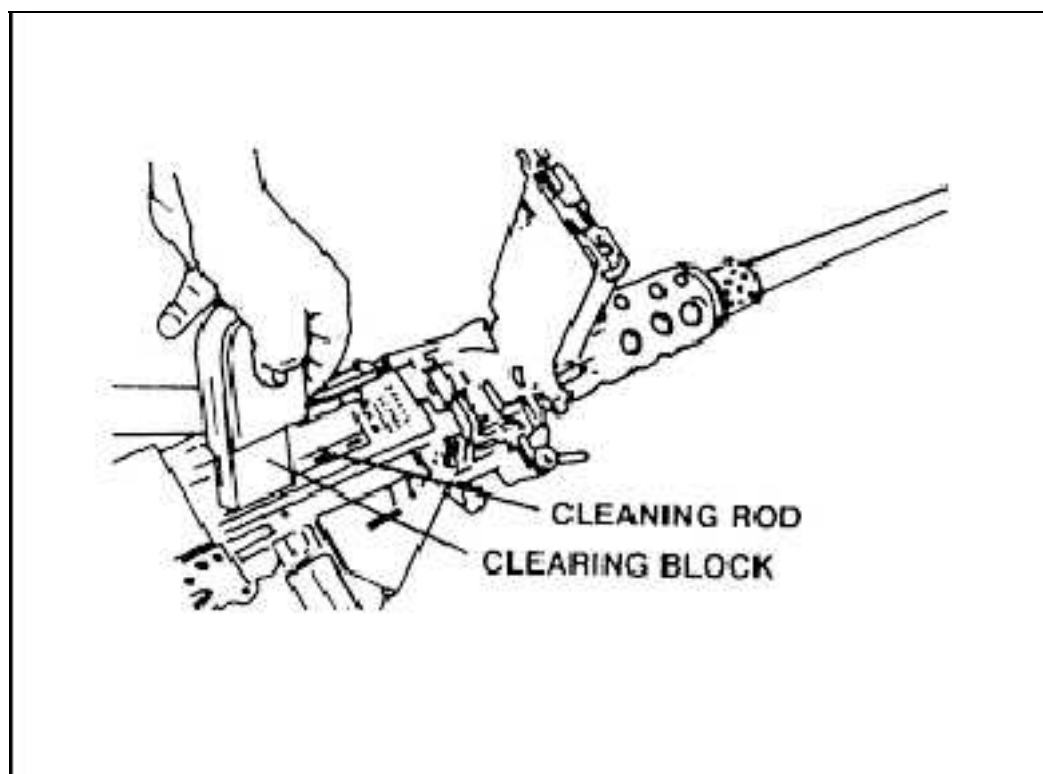


Figure 3-3. The clearing block.

* **3-4. CYCLE OF FUNCTIONING**

The cycle of functioning is broken down into basic steps: feeding, chambering, locking, firing, unlocking, extracting, ejecting, and cocking. Some of these steps may occur at the same time.

a. **Feeding.** Feeding is the act of placing a cartridge in the receiver, approximately in back of the barrel, ready for chambering. When the bolt is fully forward and the top is closed, the ammunition belt is held in the feedway by the belt-holding pawl (Figure 3-4).

(1) As the bolt is moved to the rear, the belted ammunition is moved over and then held in a stationary position by the belt-holding pawl. At the same time, the belt-feed pawl rides up and over the link, holding the first round in place. When the bolt is all the way to the rear, the belt-feed slide moves out far enough to allow the belt-feed pawl spring to force the pawl up between the first and second rounds (Figure 3-5).

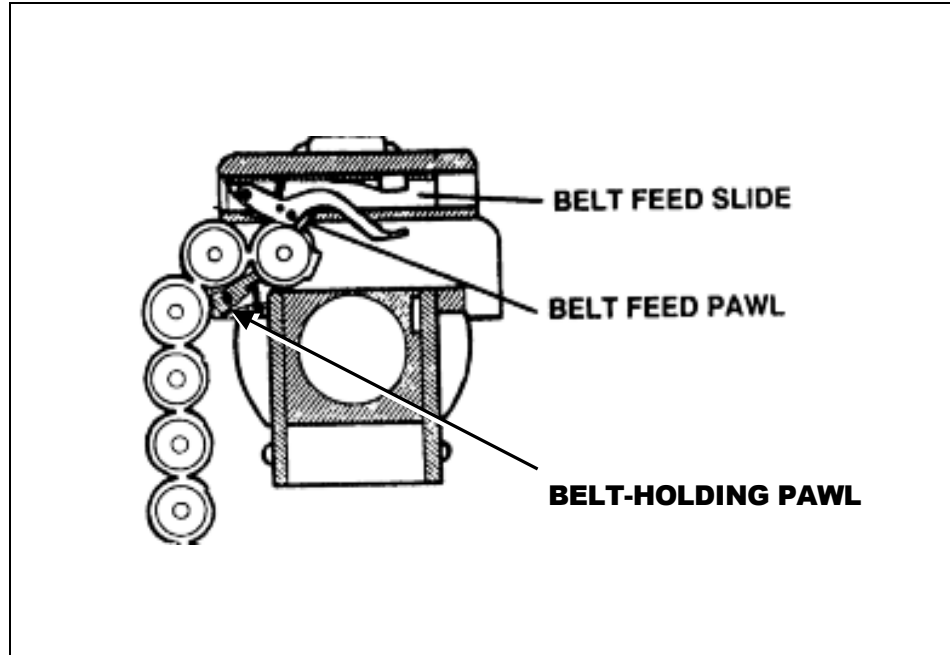


Figure 3-4. Feeding--step 1.

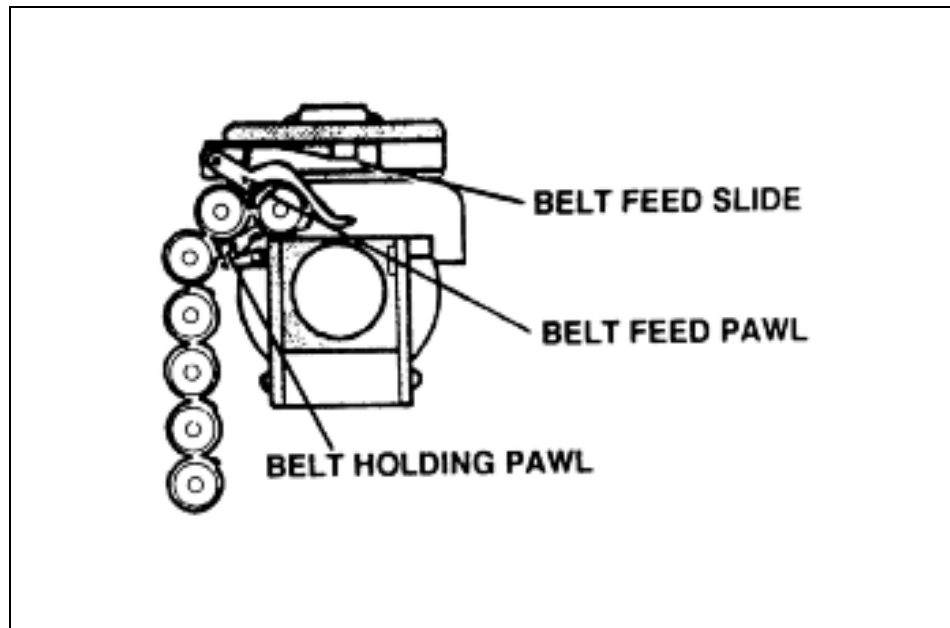


Figure 3-5. Feeding--step 2.

(2) As the bolt moves forward, the belt-feed slide is moved back into the receiver, pulling with it the next linked cartridge. When the bolt reaches the fully forward position, the belt-holding pawl will snap into place behind the second linked cartridge (Figure 3-7), holding it in place. The extractor will then grasp the rim of the first cartridge, preparing to release it from the belt on the next rearward motion (Figure 3-8).

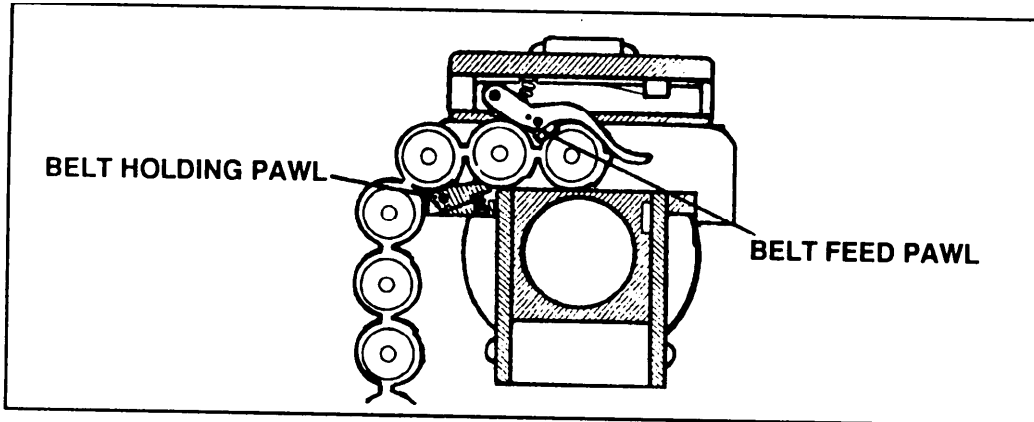


Figure 3-7. Feeding – step 3.

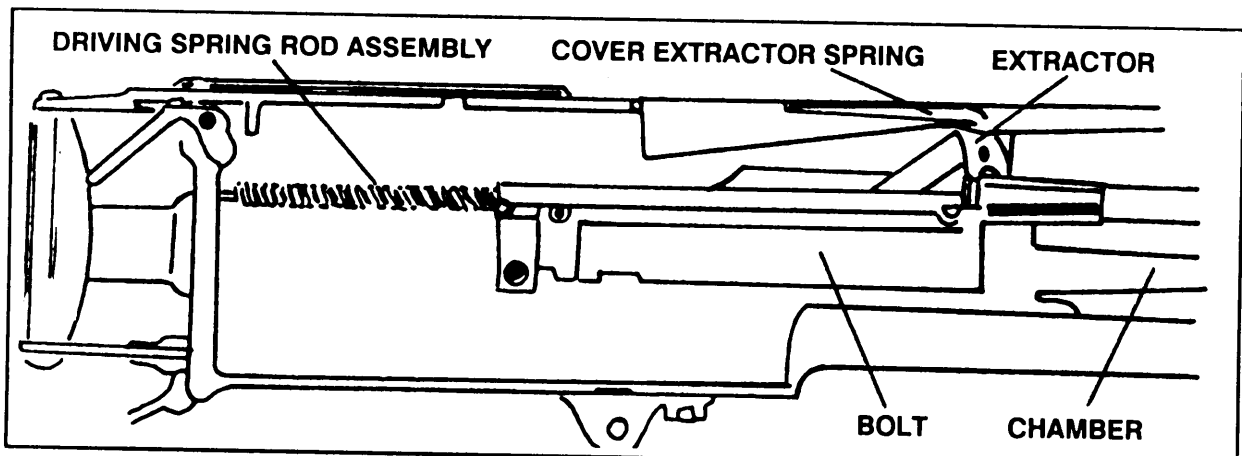


Figure 3-8. Feeding – withdrawing the first round from the feedway.

(3) As the bolt then moves to the rear, the extractor will pull the cartridge with it, releasing it from the belt. As it moves to the rear, the extractor is forced down by the extractor cam, causing the cartridge to be moved into the T-slot in the bolt face, preparing the cartridge to be chambered (Figure 3-9, page 3-6). It is connected under the extractor switch on the side of the receiver until it is repositioned by the forward movement of the bolt, and pressure of the cover extractor spring forces it over the next round.

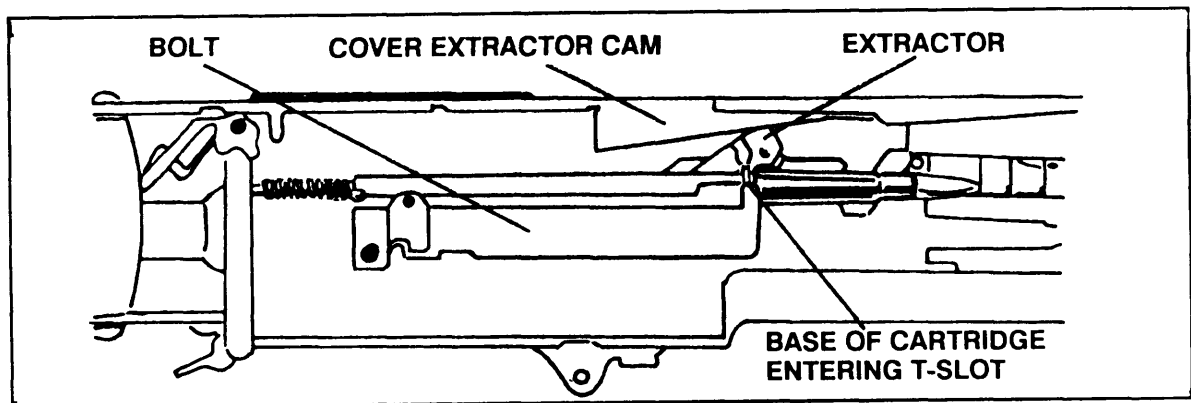


Figure 3-9. Feeding - cartridge entering the T-slot in the bolt.

b. **Cambering.** Cambering is placing the cartridge into the chamber of the weapon. During this cycle, the bolt moves forward, carrying the cartridge in the T-slot in a direct route to the chamber of the weapon. At the same time, the extractor rides up the extractor cam and when the bolt is fully forward, the extractor grasps the next linked cartridge (Figure 3-10).

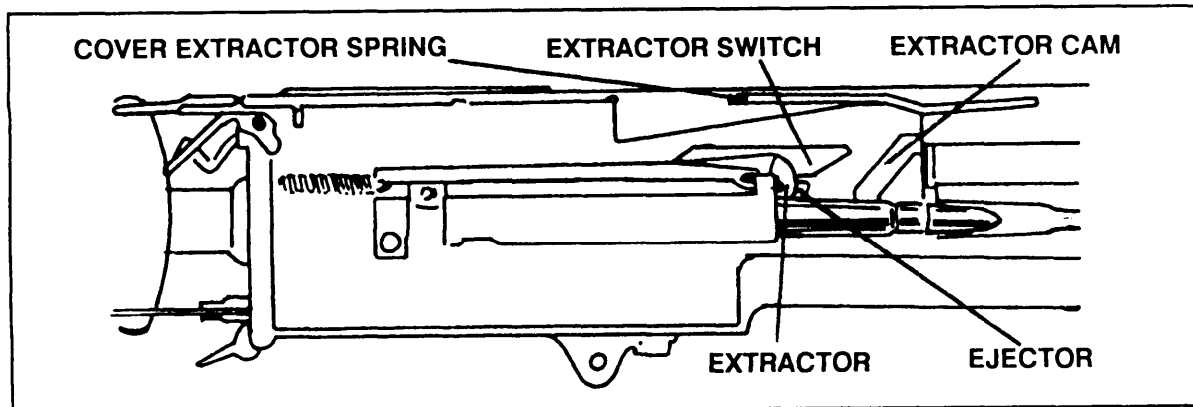


Figure 3-10. Cambering - new round aligned with the chamber.

c. **Locking.** The bolt is locked to the barrel and barrel extension.

(1) Initially, the bolt is forced forward in counter-recoil by the energy stored in the driving spring assembly and the compressed buffer disks. At the start of counter-recoil, the barrel buffer body tube lock keeps the accelerator tips from bounding up too soon and catching in the breech lock recess in the bolt. After the bolt travels forward about 5 inches, the lower rear projection of the bolt strikes the tips of the accelerator, turning the accelerator forward. This unlocks the barrel extension from the barrel buffer body group and releases the barrel buffer spring. The barrel buffer spring expands, forcing the piston rod forward.

(2) Since the cross groove in the piston rod engages the notch on the barrel extension shank, the barrel extension and barrel are also forced forward by the action of the barrel buffer spring. Some of the forward motion of the bolt is transmitted to the barrel extension through the accelerator. As the accelerator rotates forward, the front of the accelerator speeds up the barrel extension; at the same time, the accelerator tips slow down the bolt.

(3) Locking begins 1 1/8 inches before the recoiling groups (bolt, barrel extension, and barrel) are fully forward. The breech lock in the barrel extension rides up the breech lock cam in the bottom of the receiver into the breech lock recess in the bottom of the bolt, locking the recoiling groups together. The recoiling groups are completely locked together three-fourths of an inch before the groups are fully forward (Figure 3-11).

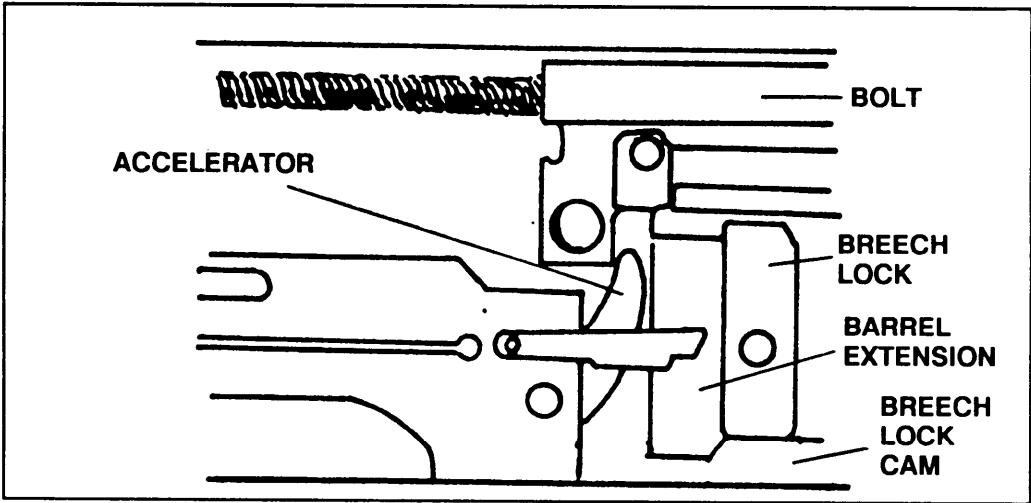


Figure 3-11. Locking – recoiling groups locked together.

d. **Firing.** The firing pin is released, igniting the primer of the cartridge.

(1) As the trigger is pressed down, it pivots on the trigger pin, so that the trigger cam on the inside of the backplate engages and raises the rear end of the trigger lever. This in turn pivots on the trigger lever pin assembly, causing the front end of the trigger lever to press down on the top of the sear stud. The sear is forced down until the hooked notch of the firing pin extension is disengaged from the sear notch. The firing pin and firing pin extension are driven forward by the firing pin spring; the striker of the firing pin hits the primer of the cartridge, firing the round (Figures 3-12 and 3-13, page 3-8).

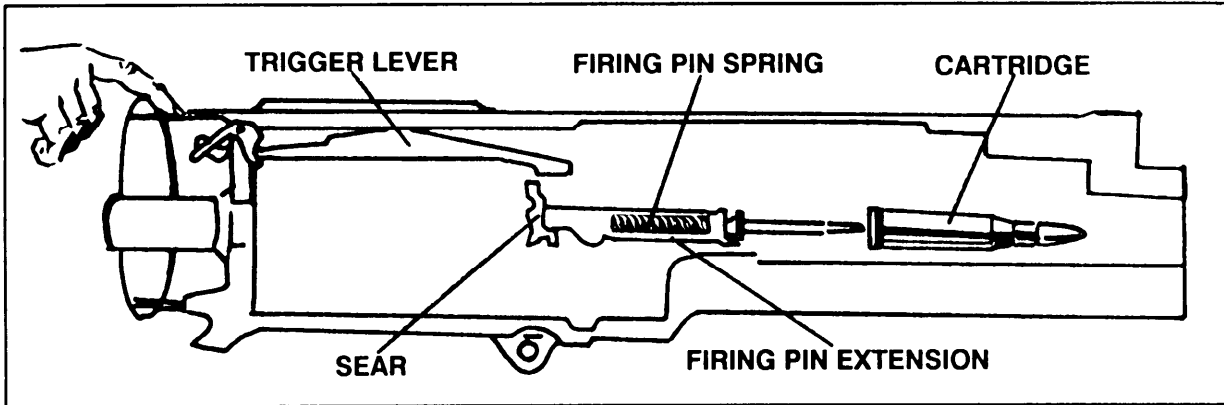


Figure 3-12. Firing - ready to fire.

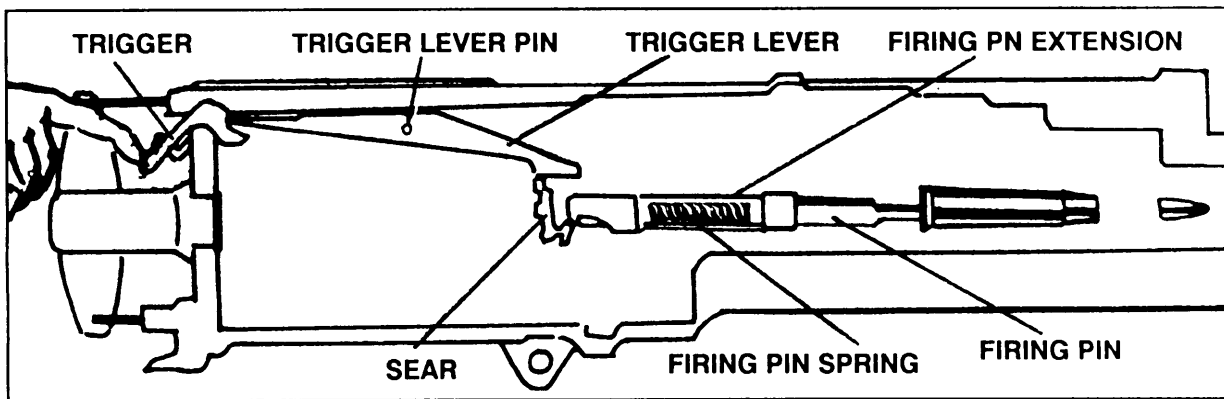


Figure 3-13. Firing - round ignited.

(2) For automatic firing, the bolt-latch release must be locked or held depressed, so that the bolt latch will not engage the notches in top of the bolt, holding the bolt to the rear as in single-shot firing. The trigger is pressed and held down. Each time the bolt travels forward in counter-recoil, the trigger lever depresses the sear, releasing the firing pin extension assembly and the firing pin. This automatically fires the next round when the forward movement of the recoiling groups is nearly completed. The gun should fire about one-sixteenth of an inch before the recoiling groups are fully forward. Only the first round should be fired with the parts fully forward. The gun fires automatically as long as the trigger and bolt latch are held down and ammunition is fed into the gun.

e. **Unlocking.** The bolt is unlocked from the barrel and barrel extension.

(1) At the instant of firing, the bolt is locked to the barrel extension and against the rear end of the barrel by the breech lock, which is on top

of the breech lock cam and in the breech lock recess in the bottom of the bolt. When the cartridge explodes, the bullet travels out of the barrel; the force of recoil drives the recoiling groups rearward. During the first three-fourths of an inch, the recoiling groups are locked together. As this movement takes place, the breech lock is moved off the breech lock cam stop, allowing the breech lock depressors (acting on the breech lock pin) to force the breech lock down, out of its recess from the bottom of the bolt. At the end of the first three-fourths of an inch of recoil, the bolt is unlocked, free to move to the rear independent of the barrel and barrel extension.

(2) As the recoiling groups move to the rear, the barrel extension causes the tips of the accelerator to rotate rearward. The accelerator tips strike the lower rear projection of the bolt, accelerating the movement of the bolt to the rear. The barrel and barrel extension continue to travel to the rear an additional three-eighths of an inch, or an approximate total distance of 1 1/8 inches until they are stopped by the barrel buffer assembly (Figure 3-14).

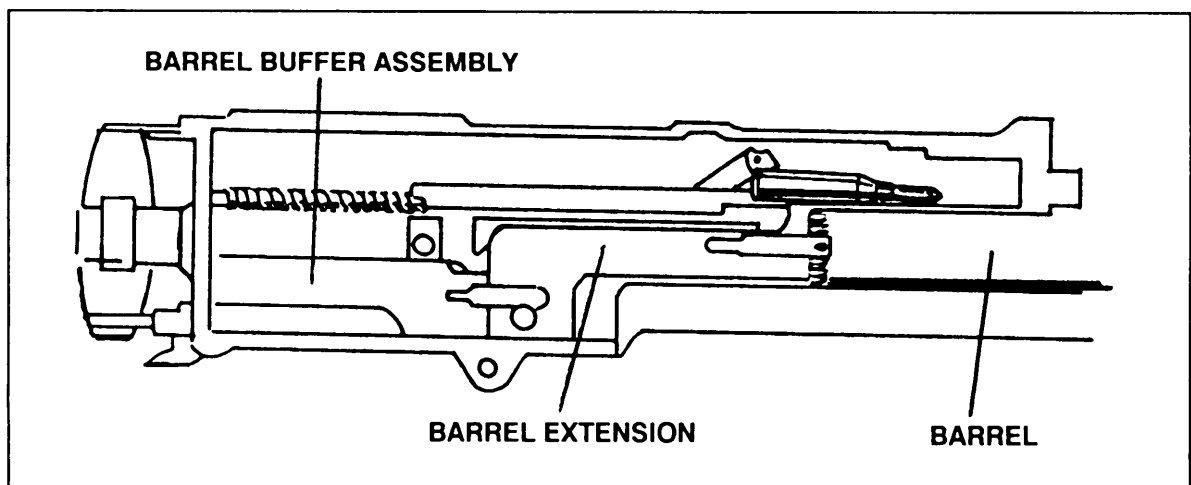


Figure 3-14. Unlocking – barrel and barrel extension stopped by the barrel buffer assembly.

(3) During the recoil of 1 1/8 inches, the barrel buffer spring is compressed by the barrel extension shank, since the notch on the shank is engaged in the cross groove in the piston rod head. The spring is locked in the compressed position by the claws of the accelerator, which engage the shoulders of the barrel extension shank. After its initial travel of three-fourths of an inch, the bolt travels an additional 6 3/8 inches to the rear, after it is unlocked from the barrel and barrel extension, for a total of

7 1/8 inches. During this movement, the driving springs are compressed. The rearward movement of the bolt is stopped as the bolt strikes the buffer plate. Part of the recoil energy of the bolt is stored by the driving spring rod assembly, and part is absorbed by the buffer disks in the backplate (Figure 3-15).

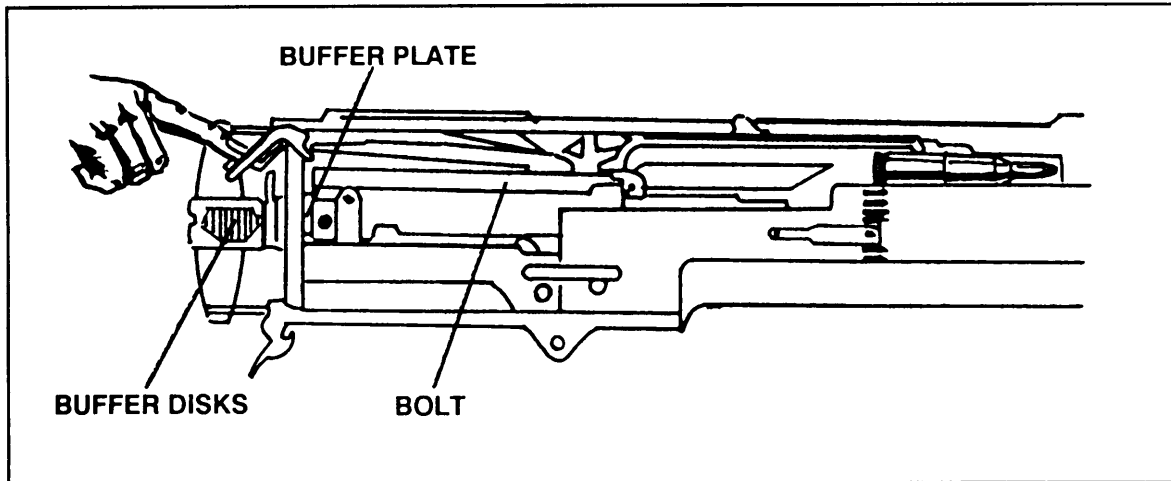


Figure 3-15. Unlocking – recoil movement completed.

f. **Extracting.** The empty cartridge case is pulled from the chamber.

(1) The empty case, held by the T-slot, has been expanded by the force of the explosion; therefore, it fits snugly in the chamber. If the case is withdrawn from the chamber too rapidly, it may be torn. To prevent this, and to ensure slow initial extraction of the case, the top forward edge of the breech lock and the forward edge of the lock recess in the bolt are beveled. As the breech lock is unlocked, the initial movement of the bolt away from the barrel and barrel extension is gradual.

(2) The slope of the locking faces facilitates locking and unlocking and prevents sticking. The leverage of the accelerator tips on the bolt speeds extraction after it is started by kicking the bolt to the rear to extract the empty case from the chamber.

g. **Ejecting.** The empty cartridge case is expelled from the receiver.

(1) As the bolt starts its forward movement (counter-recoil), the extractor lug rides below the extractor switch, forcing the extractor assembly farther down until the round is in the center of the T-slot of the bolt.

(2) The round, still gripped by the extractor, ejects the empty case from the T-slot. The last empty case of an ammunition belt is pushed out by the ejector.

h. Cocking. The firing pin is withdrawn into the cocked position.

(1) When the recoiling groups are fully forward, the top of the cocking lever rests on the rear half of the V-slot in the top plate bracket. As the bolt moves to the rear, the top of the cocking lever is forced forward. The lower end pivots to the rear on the cocking lever pin. The rounded nose of the cocking lever, which fits through the slot in the firing pin extension, forces the extension to the rear, compressing the firing pin spring against the sear stop pin (accelerator stop). As the firing pin extension is pressed to the rear, the hooked notch of the extension rides over the sear notch, forcing the sear down. The sear spring forces the sear back up after the hooked notch of the firing pin extension has entered the sear notch.

(2) The pressure of the sear and firing pin springs holds the two notches locked together. There is a slight overtravel of the firing pin extension in its movement to the rear to ensure proper engagement with the sear. As the bolt starts forward, the overtravel is taken up and completed when the cocking lever enters the V-slot of the top plate bracket, and is caromed toward the rear; pressure on the cocking lever is relieved as the bolt starts forward.

3-5. LEFT-HAND FEED

By repositioning some of the components, the MG is capable of alternate feed. Ammunition can be fed into the weapon from the right or left side of the receiver; however the Army uses only left-hand feed. (See Table 3-1).

PART	POSITION
Belt-feed lever, shoulder headless pin, and spring.	Upper (rear) hole; lug of feed lever is on left side of cover.
Belt-feed slide.	Feed pawl is on left side of cover.
Belt-feed pawl arm.	Arm toward latch end of cover, pointing right.
Cover latch shaft lever	Left side of cover.
Cartridge stops and link stripper.	Right-hand rear cartridge stop assembly and front cartridge stop on right side of feedway.
Retracting slide with handle.	Right sideplate.
Belt-holding pawl.	Left side of feedway.
Bolt switch.	Cam grove in line with "L" on bolt.

Table 3-1. Position of parts for left-hand feed.

DANGER

Clear the gun of ammunition before setting headspace.

3-6. HEADSPACE AND TIMING

Headspace is the distance between the face of the bolt and the base of the cartridge case, fully seated in the chamber. Timing is the adjustment of the gun so that firing takes place when the recoiling parts are in the correct position for firing. Because the cartridge is held by the T-slot of the bolt, headspace with the MG is measured as the distance between the rear of the barrel and the face of the bolt. This occurs when the recoiling parts are forward and there is positive contact between the breech lock recess in the bolt and the lock in the barrel extensions. Periodic calibration checks should be made of the gauge by direct support personnel at least annually.

WARNING

Firing a weapon that has improperly set headspace and timing could result in damage to the machine gun, or injury to the gunner. Damage may also occur in the trunnion block, base of the barrel, or face of the bolt. This warning applies whether the gun is firing service ammunition or M1E1 blanks. (The weapon has improper early timing when two rounds are fired – and firing stops.)

a. **Gauges.** The headspace and timing gauge consists of a headspace gauge and two timing gauges (Figure 3-16). These gauges provide an accurate means of checking the adjustment of headspace and timing.

NOTE: The headspace and timing gauge should be kept with the gun at all times.

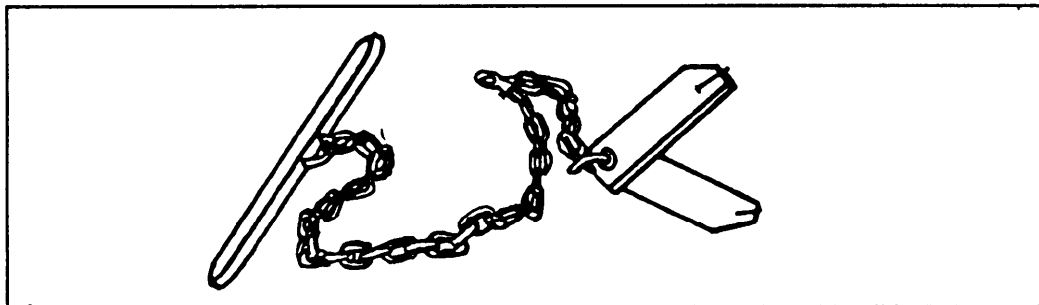


Figure 3-16. Headspace and timing gauge.

b. **Headspace.** Check and set headspace before firing, after assembling the gun, and after replacing the barrel or receiver group. Use the following procedures to set headspace.

(1) Raise the cover all the way up. Grasp the retracting slide handle (Figure 3-17). Using the retracting slide handle, retract the bolt until the barrel-locking-spring lug is centered in the 3/8-inch hole on the right side of the receiver (Figure 3-18).

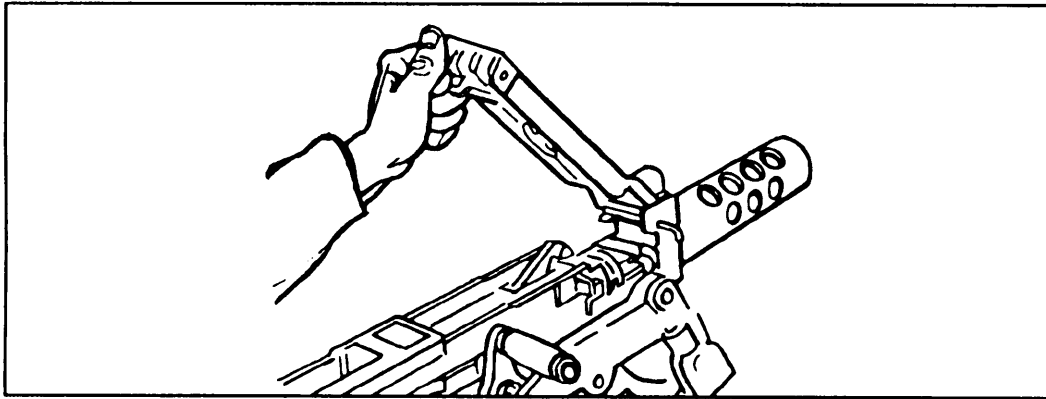


Figure 3-17. Raising the cover.

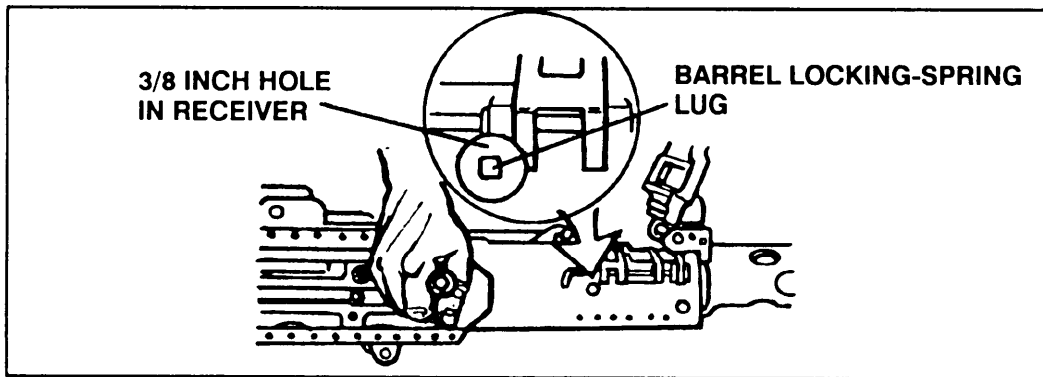


Figure 3-18. Retracting the bolt.

(2) Hold the bolt in this position and screw the barrel fully into the barrel extension (Figure 3-19).

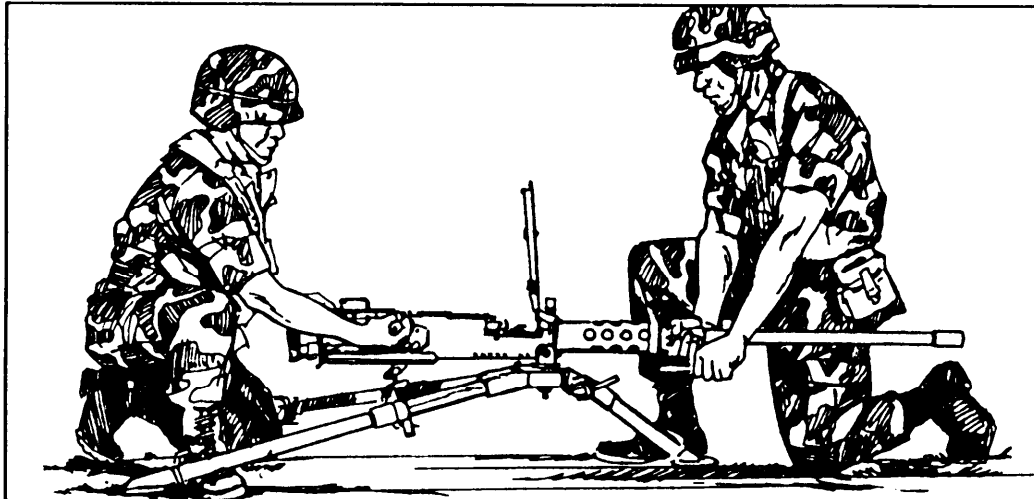


Figure 3-19. Screwing in the barrel.

WARNING

When resetting the headspace and timing of a gun that has been fired, use an asbestos mitt to avoid burns.

(3) With the bolt still retracted, unscrew the barrel two notches (clicks). Release the retracting slide handle and allow the bolt to go forward.

NOTE: At this point, check the barrel for rotation. Attempt to turn the barrel in either direction. The barrel should not turn. If the barrel does turn, stop here and check barrel notches and the barrel-locking spring for damage.

(4) Pull the bolt to the rear with the retracting slide handle and hold. This cocks the weapon. Otherwise, the headspace gauge will not fit.

(5) Holding the retracting slide handle, release the bolt, and slowly return the bolt fully forward (Figure 3-20). Do not press the trigger or let the bolt slam forward.

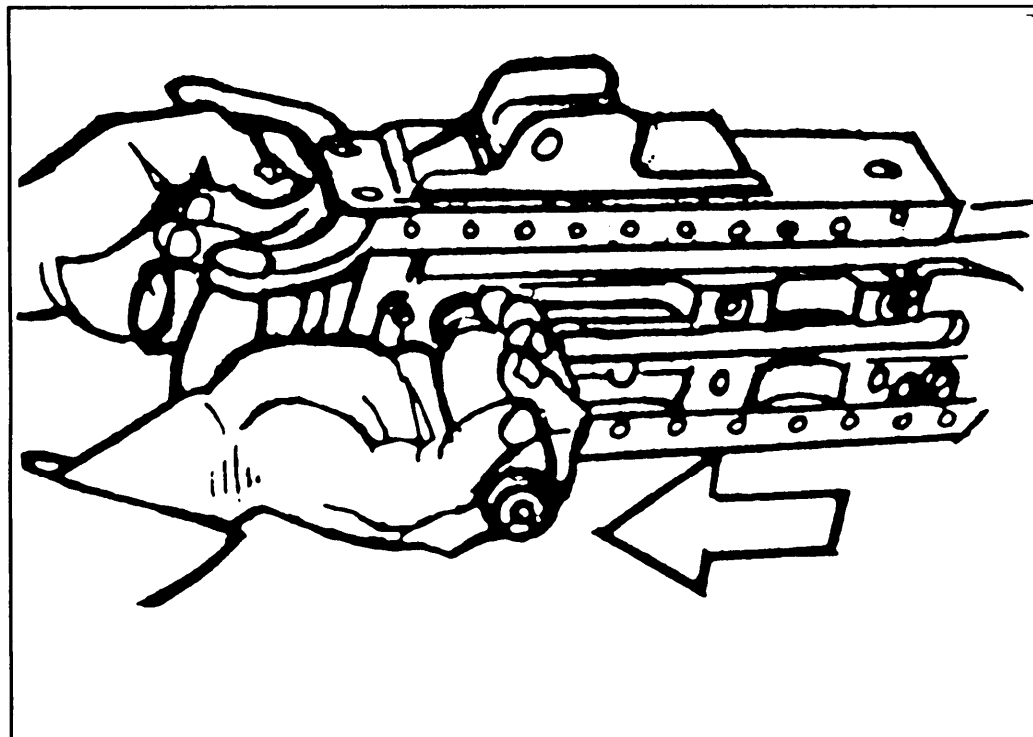


Figure 3-20. Releasing the bolt.

(6) Retract the retracting slide handle and separate the barrel extension from the trunnion block by a 1/16-inch gap (Figure 3-21).

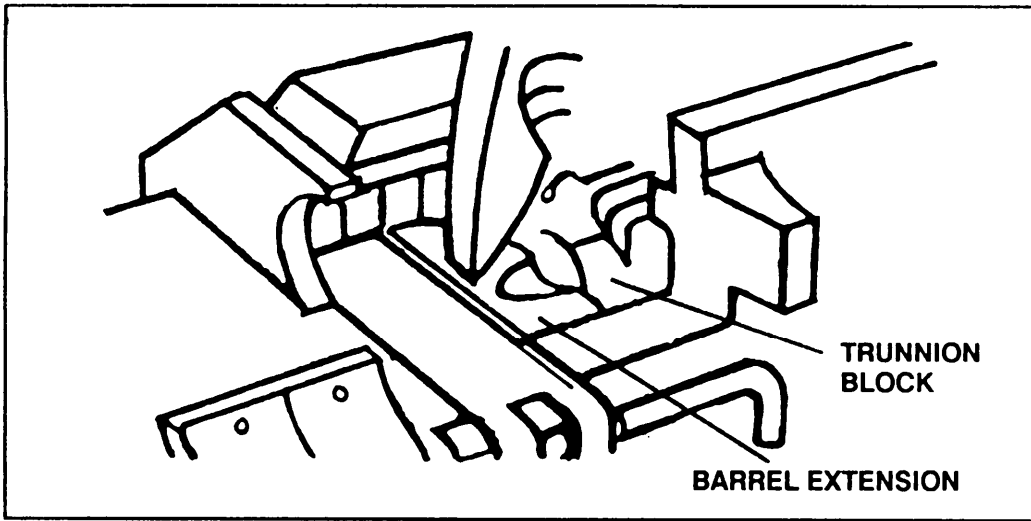


Figure 3-21. Setting the gap.

(7) Raise the extractor out of the way to clear the top of the T-slot and try both ends of the go/no-go gauge as shown in Figure 3-22.

NOTE: Insert the go end of the gauge between the face of the bolt and the end of the barrel all the way up to the ring.

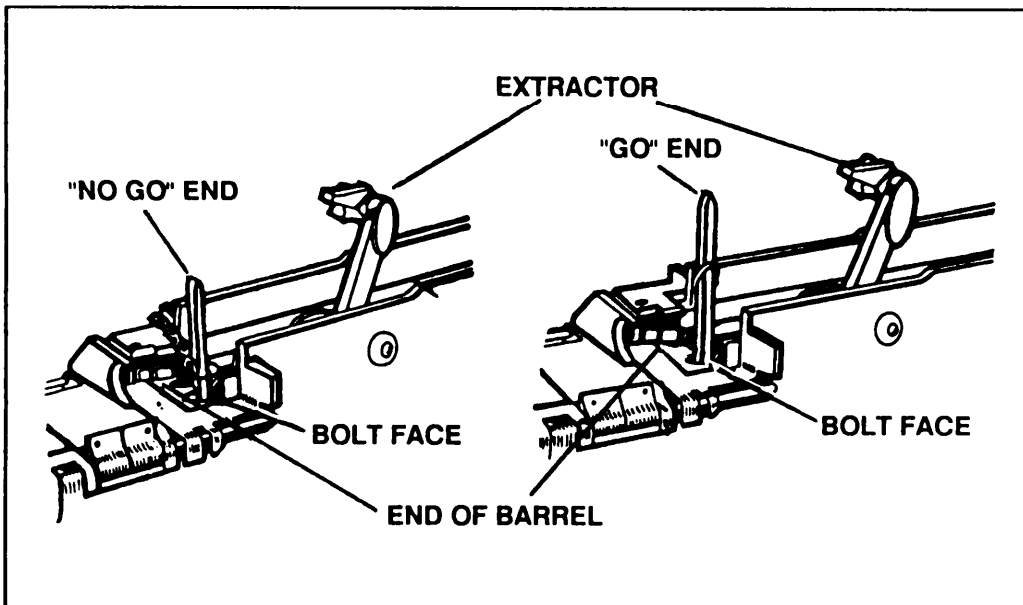


Figure 3-22. Using the gauge.

(8) If the go end of the gauge enters the T-slot freely to the center ring of the gauge, and the no-go end will not enter, headspace is correct. Remove gauge. Headspace setting is now complete. If the go end of the gauge will not enter the T-slot freely, headspace is too tight. Continue as follows.

(9) Retract the bolt so you can see the barrel-locking lug in the center of the 3/8th-inch alignment hole on the right side of the receiver.

(10) Unscrew the barrel one notch (click).

(11) Return the bolt fully forward.

(12) Recheck headspace (step 9).

(13) Repeat steps 10 through 13 until the go gauge fits but the no-go gauge does not fit.

NOTE: You should not have to unscrew the barrel more than five notches (clicks) beyond the first setting of two clicks. If this condition does occur, turn in the machine gun to your unit armorer for inspection.

(14) If the no-go end of the gauge enters the T-slot, headspace is too loose. Adjust it using the same procedures as above, screwing the barrel into the barrel extension rather than out.

(15) Repeat steps 10 through 13, one click at a time, until the no-go gauge does not fit but the go gauge does fit.

c. **Timing.** Timing is the adjustment of the weapon so that firing takes place when the recoiling parts are between .020 and .116 inch out of battery to prevent contact between the front end of the barrel extension and the trunnion block. Use the following procedures to set timing.

WARNING

Make sure the gun is clear of ammunition before starting.

(1) Check headspace first as previously described.

(2) Pull the bolt to the rear with the retracting slide handle and then ease bolt fully forward to cock the machine gun.

(3) Grasp the retracting slide handle and retract the bolt just enough (1/16 inch) to insert the no-fire gauge between the barrel extension and the trunnion block. Release the retracting slide handle (Figure 3-23).

(4) Depress the trigger. Gun should not fire.

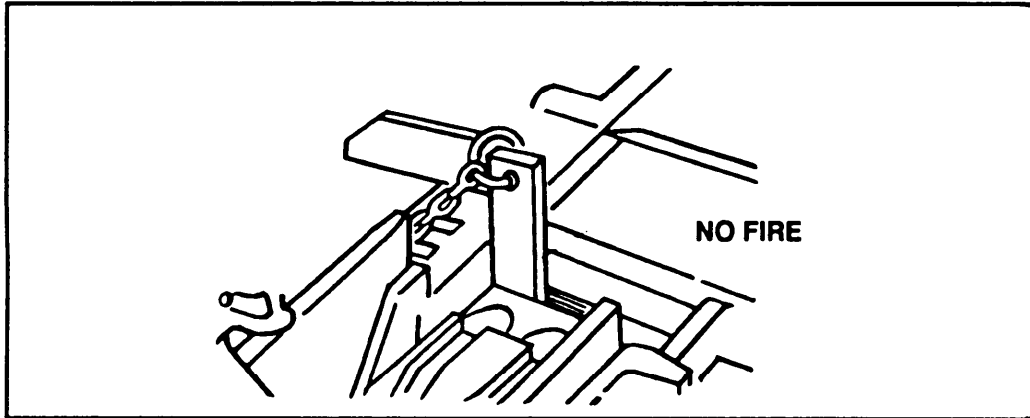


Figure 3-23. Inserting the no-fire gauge.

NOTE: Insert timing gauge with bevel against barrel notches.

NOTE: If the gun does not fire, go to step 5. If the gun does fire, you have early timing. Go on to steps 7 through 14.

(5) Grasp the retracting slide handle and retract the bolt just enough to remove the no-fire gauge and insert the fire gauge in the same place (Figure 3-24). Release the retracting slide handle.

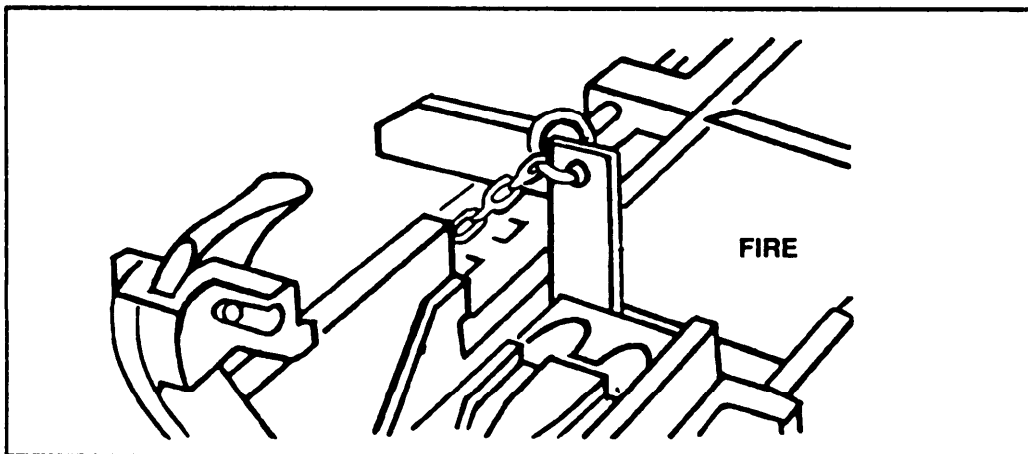


Figure 3-24. Inserting the fire gauge.

(6) Depress the trigger. Gun should fire. If it does, timing adjustment is now complete.

NOTE: If the gun does not fire, you have late timing. Go to steps 7 through 14.

(7) Remove the gauge, cock the gun, and return the bolt forward

(8) Insert the fire gauge.

- (9) Remove the backplate.
- (10) Screw the timing adjustment nut all the way down until it touches the trigger lever (Figure 3-25).

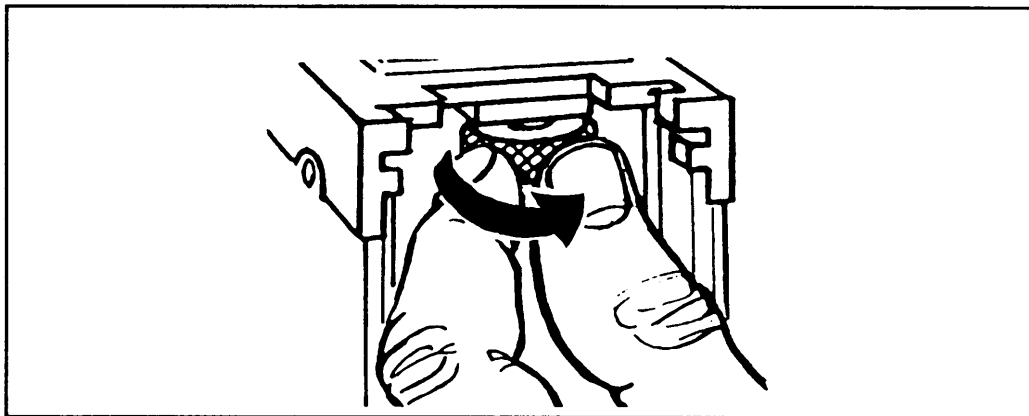


Figure 3-25. Adjusting the timing nut.

WARNING

Never cock the gun with the backplate off.

(11) Try to fire the MG by pushing up on the rear of the trigger lever. Gun should not fire.

(12) Screw the timing adjustment nut up (to the right) one click at a time. Push up on the trigger lever after each click. Keep doing this until the gun fires.

(13) Turn the timing adjustment nut no more than two more clicks up (to the right).

(14) Remove the gauge, replace the backplate, and pull the bolt to the rear to cock the machine gun. Ease the bolt forward with the charging handle. Do not allow the bolt to slam forward.

(15) Recheck the timing with the fire/no-fire gauge twice after the backplate is installed to ensure that the setting is correct.

d. **Field Expedient Methods.** When a go/no-go gauge is not available, you can still set the headspace and timing using field expedient methods. However, this method should be used only in combat.

(1) *To set headspace:*

(a) Raise the cover and retract the bolt in the normal manner until the barrel-locking-spring lug is centered in the 3/8-inch hole on the right side of the receiver.

(b) Hold the bolt in this position and screw the barrel fully into the barrel extension; then unscrew the barrel two clicks or notches.

(2) *To set timing:*

(a) Use a dog tag or a dime as a fire gauge.

(b) Use a nickel and a dime or four dog tags as a no-fire gauge.

(c) Set the timing using the normal procedure.

(3) *To check for correct settings:*

(a) Attempt to fire the weapon. If it fires sluggishly, clear the weapon then unscrew the barrel one more notch.

(b) Recheck the rate of fire. Repeat the procedures in paragraph (1); however, do not exceed two more clicks.

(c) Do not unscrew the barrel more than one notch between test firings.