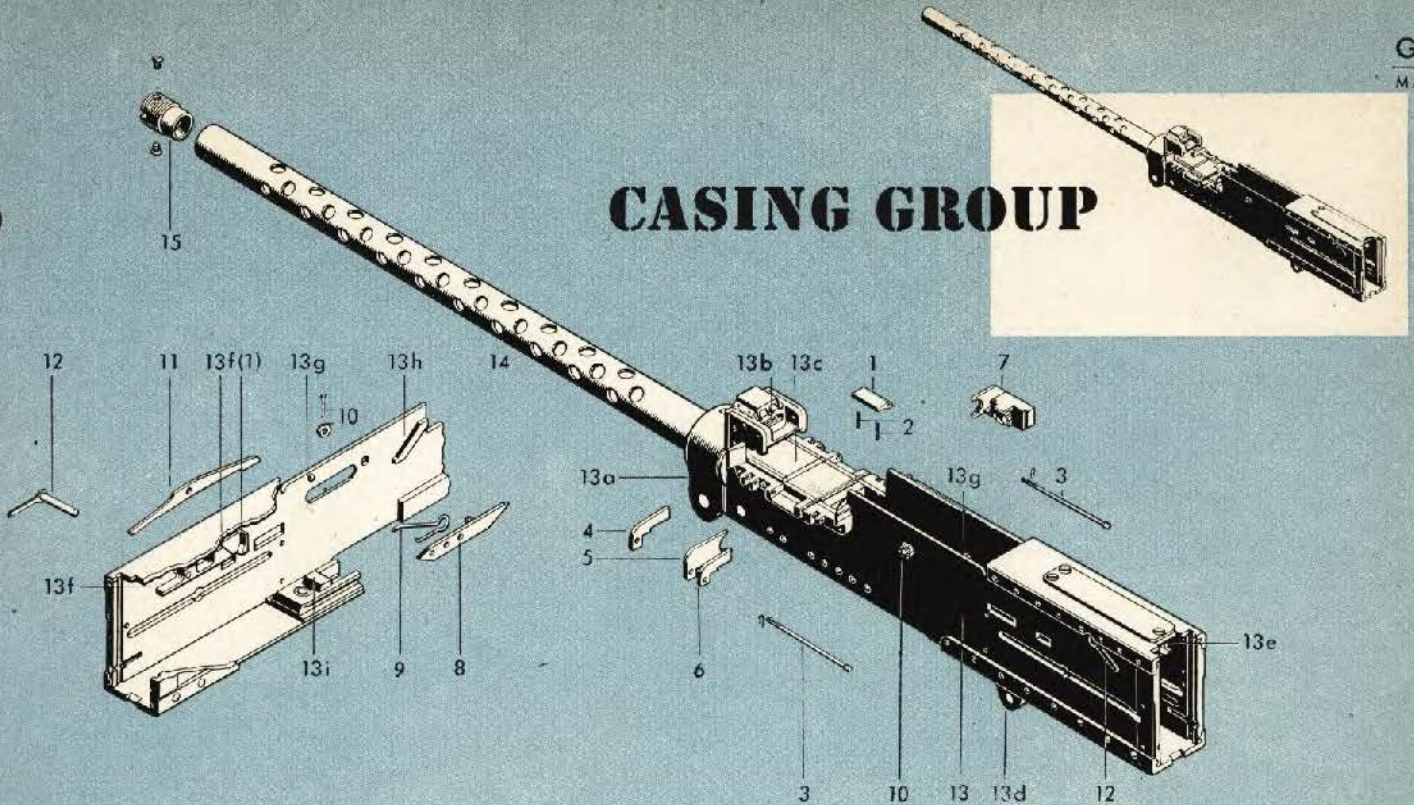


# CASING GROUP



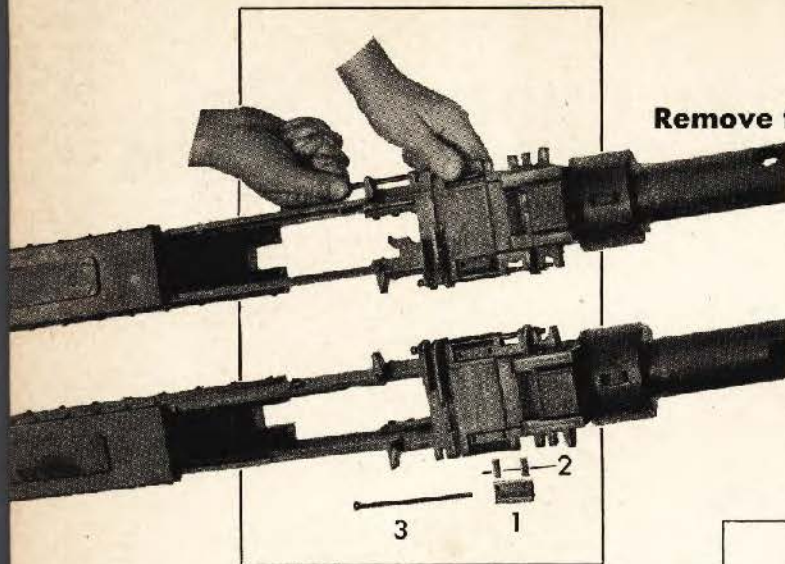
## Nomenclature

- 1 BELT HOLDING PAWL.....
- 2 BELT HOLDING PAWL SPRINGS (two).....
- 3 BELT HOLDING PAWL PINS (two).....
- 4 FRONT CARTRIDGE STOP.....
- 5 LINK STRIPPER.....
- 6 REAR CARTRIDGE STOP.....
- 7 RIGHT-HAND REAR CARTRIDGE STOP ASSEMBLY.....
- 8 EXTRACTOR SWITCH AND SWITCH PIVOT.....
- 9 EXTRACTOR SWITCH SPRING.....
- 10 EXTRACTOR SWITCH PIVOT NUT AND COTTER PIN.....
- 11 TRIGGER BAR.....
- 12 TRIGGER BAR PIN.....
- 13 RECEIVER.....
  - a TRUNNION ADAPTER.....
  - b DETENT PAWL.....
  - c TRUNNION BLOCK.....
  - d REAR MOUNTING HOLES.....
  - e REAR TRIGGER BAR STOP.....
  - f TOP PLATE BRACKET.....
    - (1) FRONT AND REAR COCKING LEVER CAMS (OR "V-SLOT").....
  - g BOLT STOP.....
  - h EXTRACTOR CAM.....
  - i BREECH LOCK CAM.....
- 14 BARREL JACKET.....
- 15 FRONT BARREL BEARING.....

## Function

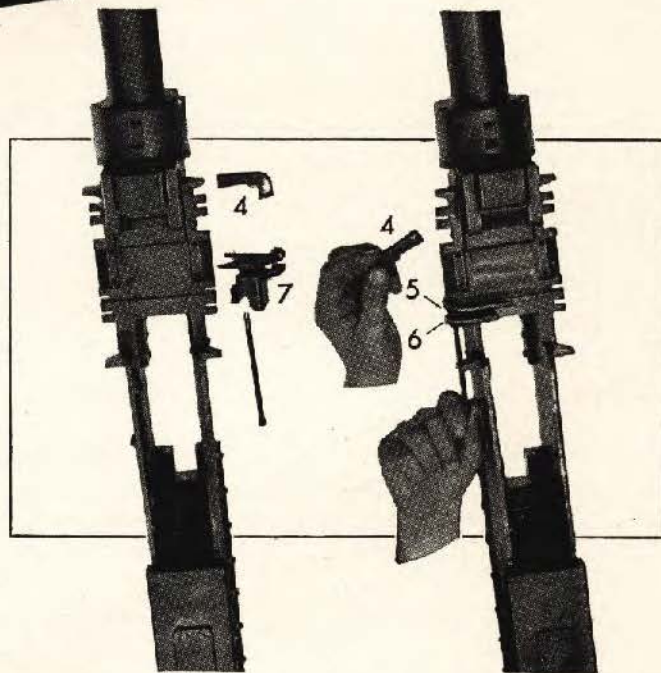
- Holds the ammunition belt in the feedway.
- Force the belt holding pawl up behind the next round.
- Hold the belt holding pawl and the cartridge stops.
- Holds the front of the cartridge in the correct position.
- Strips the links off the cartridge case.
- Holds the rear of the cartridge in the correct position.
- Serves as a combination rear cartridge stop, link stripper, and short round eliminator when the gun feeds from the left.
- The switch cams the extractor assembly down at the beginning of counter recoil to align the new round with the chamber.
- Returns the switch to its original position.
- Fasten the extractor switch to the receiver.
- Pushes down the sear when the trigger is pressed.
- Holds the trigger bar and provides a pivot for it.
- Houses the working parts of the gun.
- Serves as a front mounting for the gun.
- Holds the cover up by pushing into the detents in the cover.
- Provides a bearing for the breech end of the barrel; forms the bottom of the feedway; serves as a spacer for the sideplates.
- Serve as the rear mounting for the gun.
- Keeps the rear end of the trigger bar from going so high that the front end rides the top of the bolt.
- Holds the trigger bar.
- Cam the cocking lever backward and forward.
- Provides a means of locking the bolt to the rear.
- Cams the extractor assembly up on the last part of counter recoil.
- Cams the breech lock up on counter recoil; prevents forward movement of the oil buffer body; holds the barrel extension down.
- Houses the barrel and holds the front barrel bearing. Its holes insure uniform cooling of the barrel.
- Supports the front end of the barrel and prevents whip. In firing, the barrel slides through this bearing and the trunnion block.

## STRIPPING

**Remove the belt holding pawl (1) and springs (2).**

Keep the pawl pressed down with one hand while you pull out the belt holding pawl pin (3) with the other.

The belt holding pawl holds the ammunition belt in position while the belt feed pawl (in the cover group) moves out over the new round.

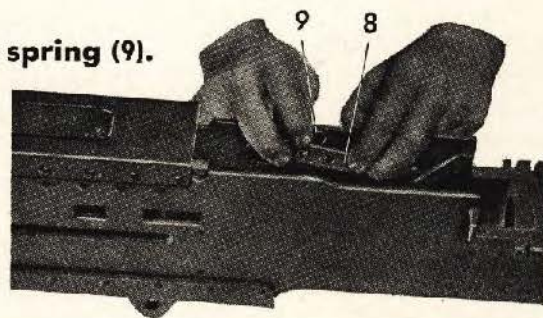
**Take off the cartridge stops**

by pulling out the other belt holding pawl pin. On a gun feeding from the right, this will release the front cartridge stop (4), link stripper (5), and rear cartridge stop (6). On a gun feeding from the left, it will release the front cartridge stop (4) and the right-hand rear cartridge stop assembly (7).

On a gun feeding from the right, the front and rear cartridge stops are installed on the left side to hold the new rounds in position. The link stripper, between them, pulls the links from the cartridges. On a gun feeding from the left, only a front cartridge stop is installed—this time on the right side. The right-hand rear cartridge stop acts as a combination link stripper, short round eliminator, and rear cartridge stop.

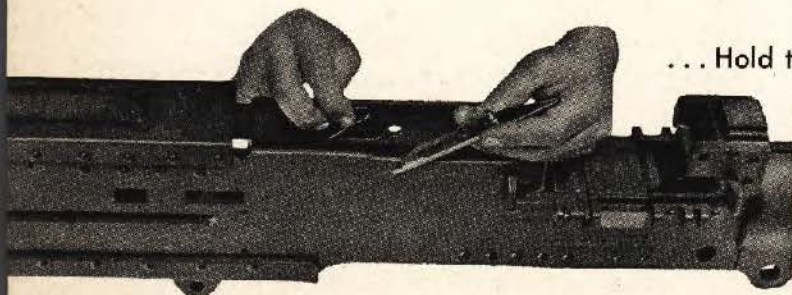
**Remove the extractor switch (8) and its spring (9).**

Take off the cotter pin and nut (10). Holding the rear of the switch against the receiver, push the switch pivot in until the looped end of the spring snaps up above the switch. Then . . .



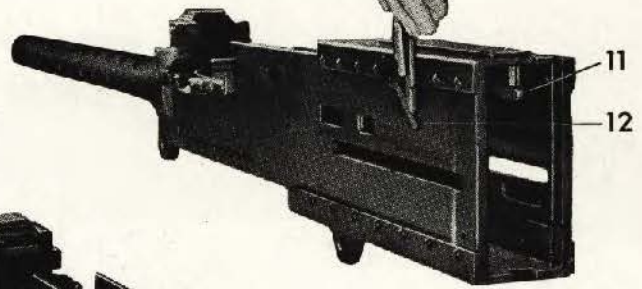
. . . Hold the looped end of the spring while you remove the switch. Lift the spring out of its recess.

On recoil, the rear of the extractor switch is pivoted downward by the lug on the extractor assembly. The switch is then forced back into position by its spring, and on counter recoil it cams the extractor assembly down to align the new round with the chamber.

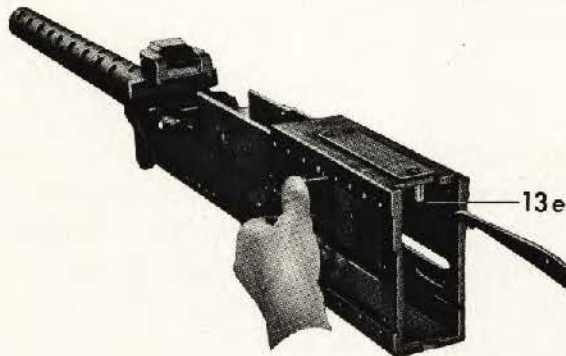
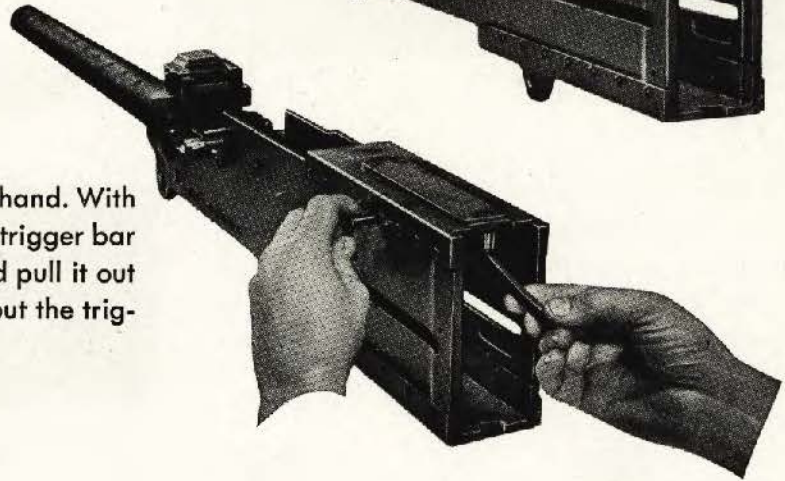


**Remove the trigger bar (11).**

Use a tool to pry the stud on the rear of the trigger bar pin (12) out of the hole in the receiver. Then . . .



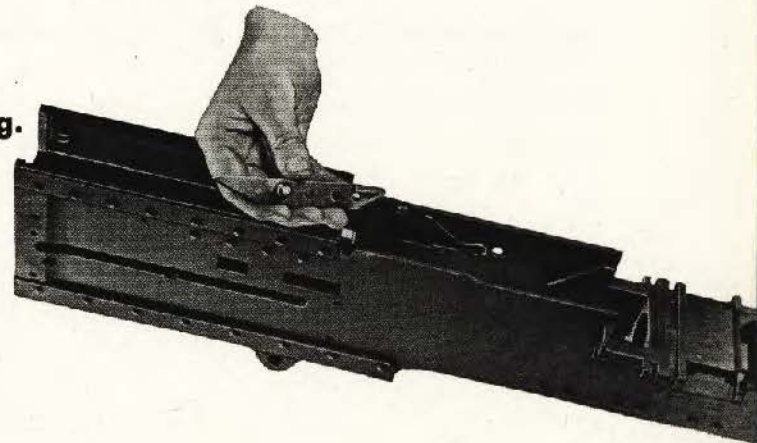
. . . Hold the trigger bar with your right hand. With your left hand, push the rear of the trigger bar pin down and slightly forward, and pull it out of the receiver. Now you can pull out the trigger bar.

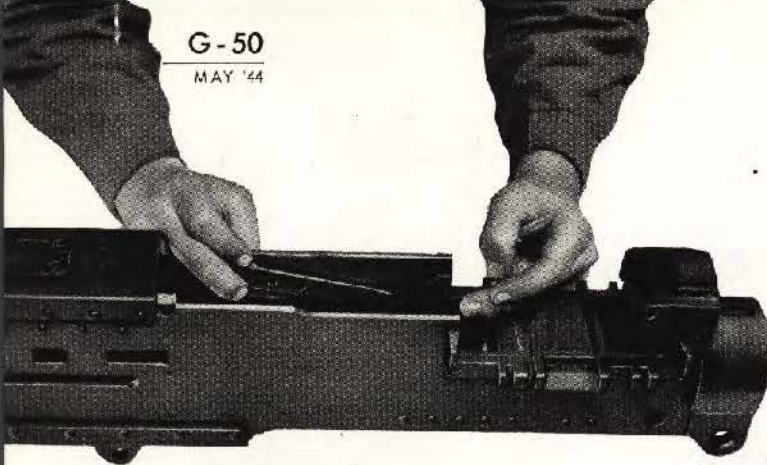
**Replace the trigger bar.****ASSEMBLY**

Hold the rear end of the trigger bar in your right hand—long end forward, bowed side up. Push it in place, just to the right of the top plate bracket, until the rear of the trigger bar is about a quarter inch behind the rear trigger bar stop (13e). Insert the trigger bar pin, holding the handle of the pin down and slightly forward so that the ridge along the pin fits through the keyway in the hole. Move the trigger bar backward or forward until the pin slips into its hole in the trigger. Then pivot the pin to the rear until its stud snaps into the hole in the receiver.

**Replace the extractor switch and its spring.**

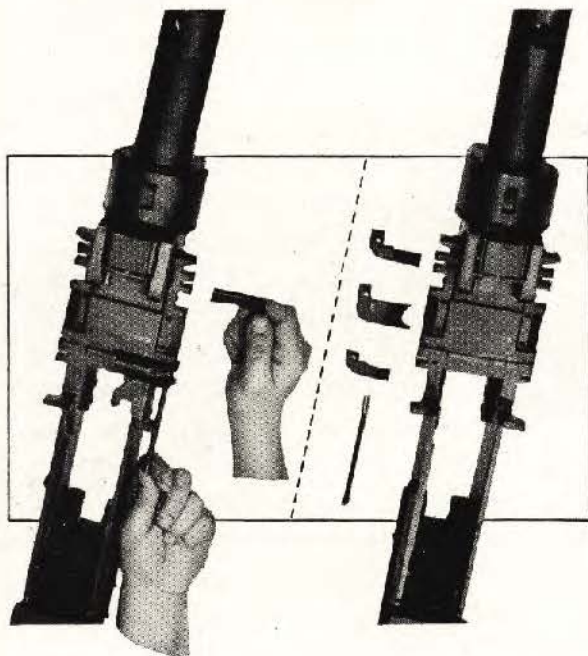
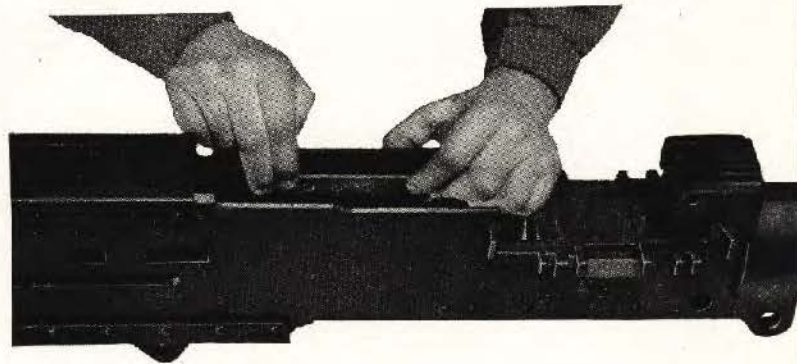
First, put the switch spring into its recess in the side of the receiver, loop end forward. Put the bent tip of the spring through the little hole in the side plate, letting the long end of the spring stick above the recess. Hold the extractor switch in your right hand. Then . . .





... Hold the bottom half of the spring in place with one finger while you put the switch pivot through the hole in the side of the receiver. Make sure that the front end of the switch is above the extractor cam, and that the lug at the rear of the switch is resting on the spring. Finally ...

... Hold the switch against the receiver with both fingers while you pivot its rear end down into place. The top of the spring will snap into the recess. Replace the nut, being careful not to screw it too tight. Make sure the switch operates properly.

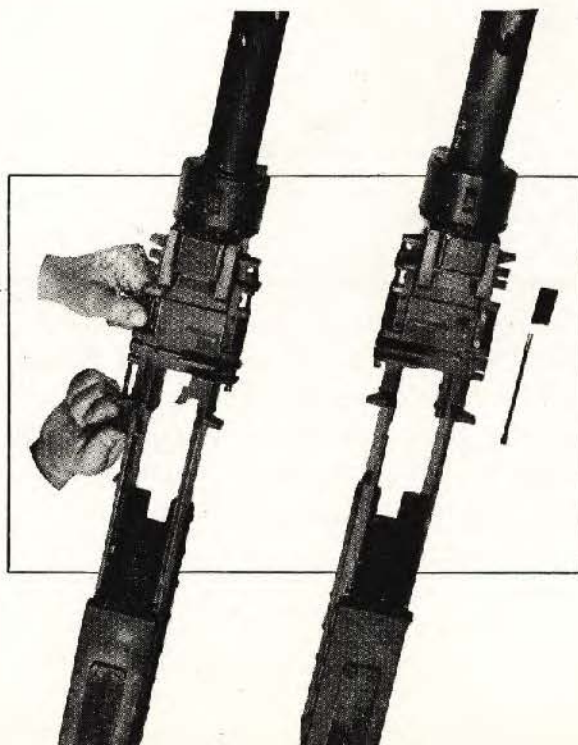


#### Replace the cartridge stops

and insert the belt holding pawl pin that holds them. If the gun is to feed from the right, install the front and rear cartridge stops on the left, with the link stripper in between. (The cartridge stops are stamped *FRONT* and *REAR*. The rear stop is always shorter.) If the gun is to feed from the left, install the front cartridge stop and right-hand rear cartridge stop assembly on the right.

#### Replace the belt holding pawl and springs

on the right side for right feed, or left side for left feed. Seat the springs in the two holes and place the pawl on top. Press the pawl down with one hand while you insert the pin with the other.



# THE GUN IS ITS OWN TOOL KIT

In an emergency, the gun can be stripped with nothing but its own parts as tools.

Use the point of a cartridge or the cocking lever pin to depress the oil buffer body spring lock.

Use the cocking lever pin to drift out the sear stop pin and accelerator pin.

Use the flat tip of the cocking lever as you would use a screw driver to remove and replace the sear stop, oil buffer tube lock, the

cover latch spring, and cover extractor spring. Use the oil buffer tube lock to pry the handle of the trigger bar pin out of its hole in the side of the receiver.

Use the sear stop pin to drift out the belt feed pawl pin.

But use these methods only when absolutely necessary and take care not to damage the parts used as tools. **Never use the driving spring rod assembly as a tool.**

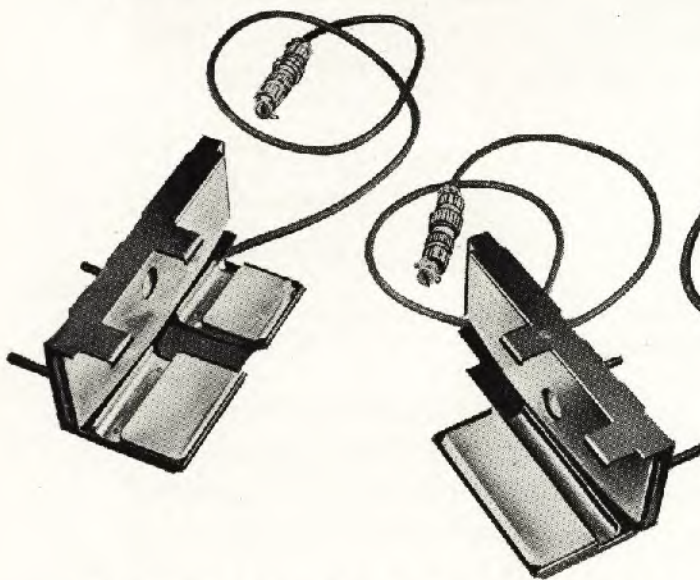
## HEATERS

In bombing missions at high altitude, where the temperature may drop to 50 degrees below zero, an electric heater is sometimes clamped over the cover of the gun to keep the parts from "freezing" together.

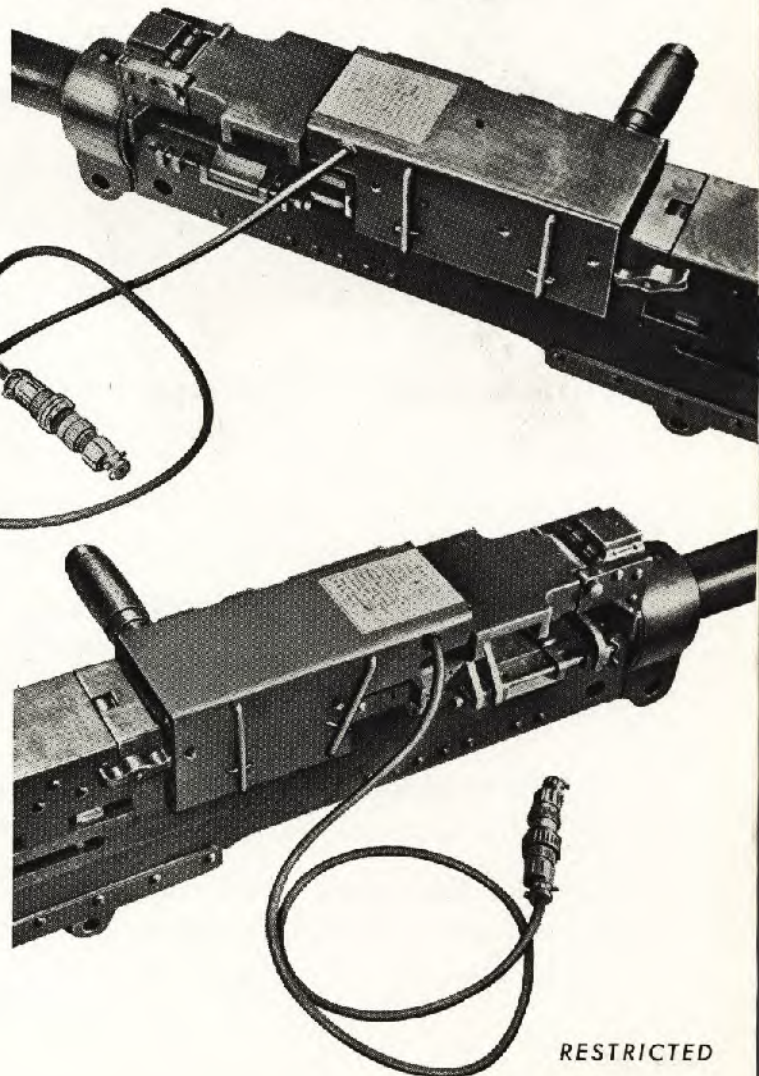
There are two models of the heater—one with a side plate extending down the left side of the gun, the other with the side plate on the right. The part that extends down must be **opposite the charging handle.**

the catch; turn the lower clamp up and back into the catch.

The heater turns on when you plug it into the bomber's electric output. Do not leave the heater connected when it is off the gun.



To install a heater, turn its two clamps straight up. Raise the cover of the gun, and slide the heater down on it as far as it will go. Turn the top clamp down and back until it snaps into



# CYCLE OF OPERATION

As the gun operates, each part must do its job at exactly the right time. This complicated teamwork of parts, as the gun feeds, fires, and ejects each round, is called the cycle of operation.

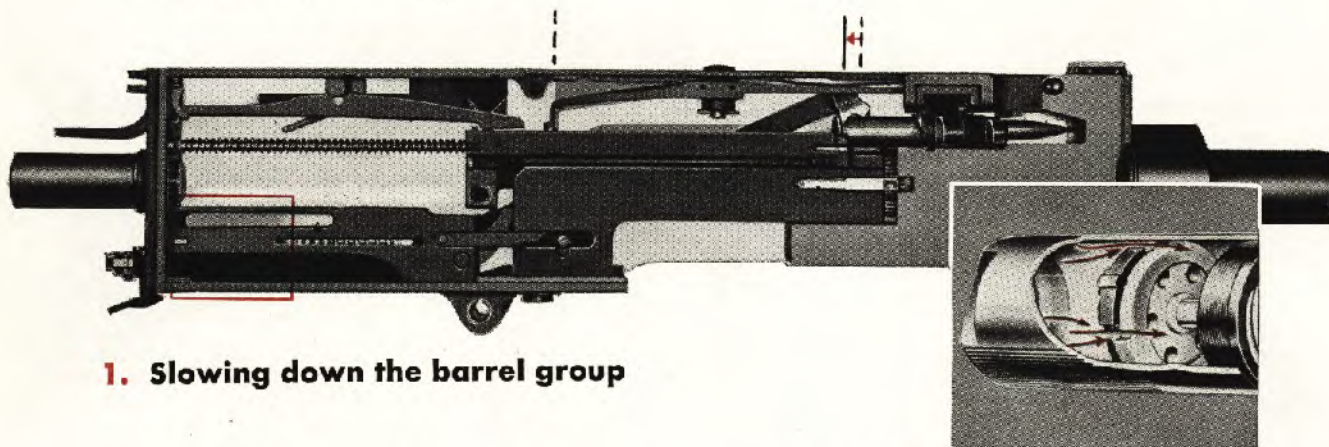
The cycle of operation is a picture of your gun in action when everything is in perfect working order. Unless you are familiar with it, you will have no way of knowing what is wrong when the gun does not work.

A gun with one whole side cut away will make it possible to watch the action of the parts as the gun recoils and counter recoils during automatic fire. Then, with this action as a background, we can follow one round through the gun and see what happens to it.

## RECOIL ACTION

The force of the propelling charge, which shoots the projectile forward, also kicks the bolt backward. The bolt is locked to the barrel extension by the breech lock. So the three recoiling parts—bolt, barrel, and barrel extension—start back together.

The barrel and barrel extension speed backward with as much momentum as a small truck. The gun's first job is to stop them.



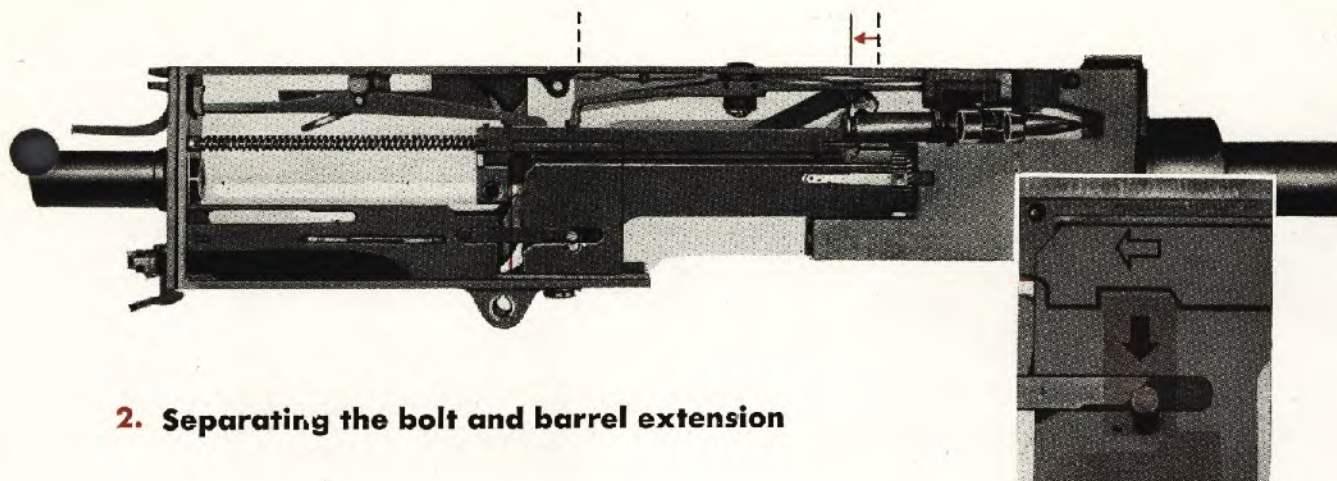
### 1. Slowing down the barrel group

The barrel extension shank, which is always hooked to the oil buffer piston rod, immediately begins forcing the piston rod back into the oil buffer tube.

Pushing against the oil, the piston head and valve are forced together, closing the six holes in the piston head. Now the only way the oil can escape to the other side of the head and valve is through two narrow slots, called **restricted openings**, on each side of the head and the valve—and the piston rod head can move only as fast as the oil escapes.

This **hydraulic action**, helped by the oil buffer spring, absorbs the recoil of the barrel and barrel extension. They are almost stopped by the time they hit the front of the oil buffer body.

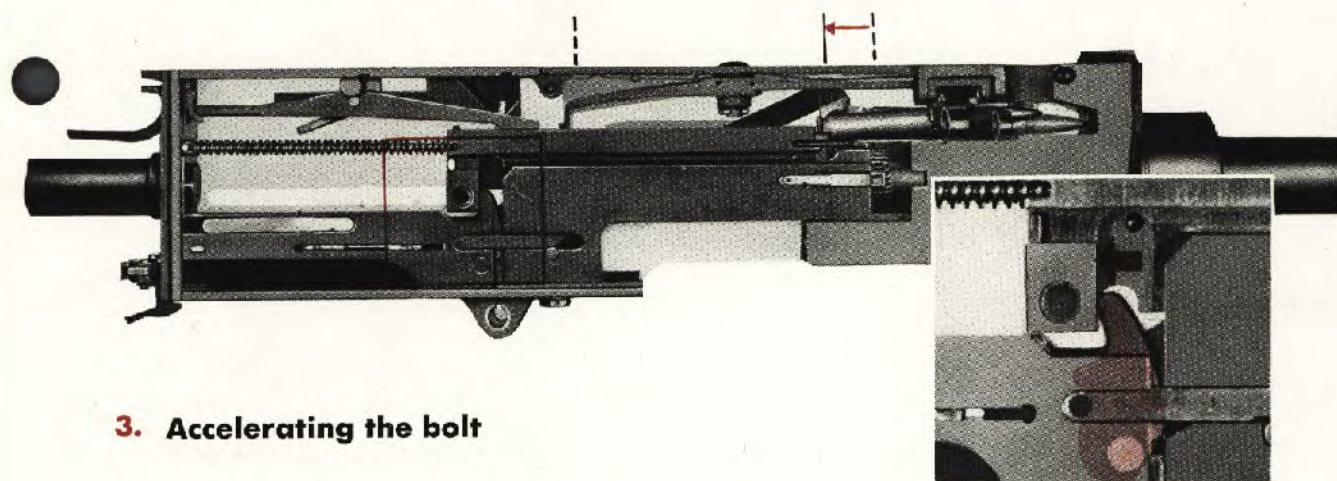
While this is going on, the next job is to unlock the bolt from the barrel extension so the bolt can pull the empty case from the chamber and leave space to feed the next round into the chamber.



## 2. Separating the bolt and barrel extension

As the barrel extension travels back, the breech lock pin hits the slanted surfaces of the breech lock depressors, forcing the breech lock down just as it moves off the breech lock cam. The bolt is completely unlocked from the barrel extension at about  $\frac{3}{4}$  inch of recoil, and begins pulling the empty case from the chamber.

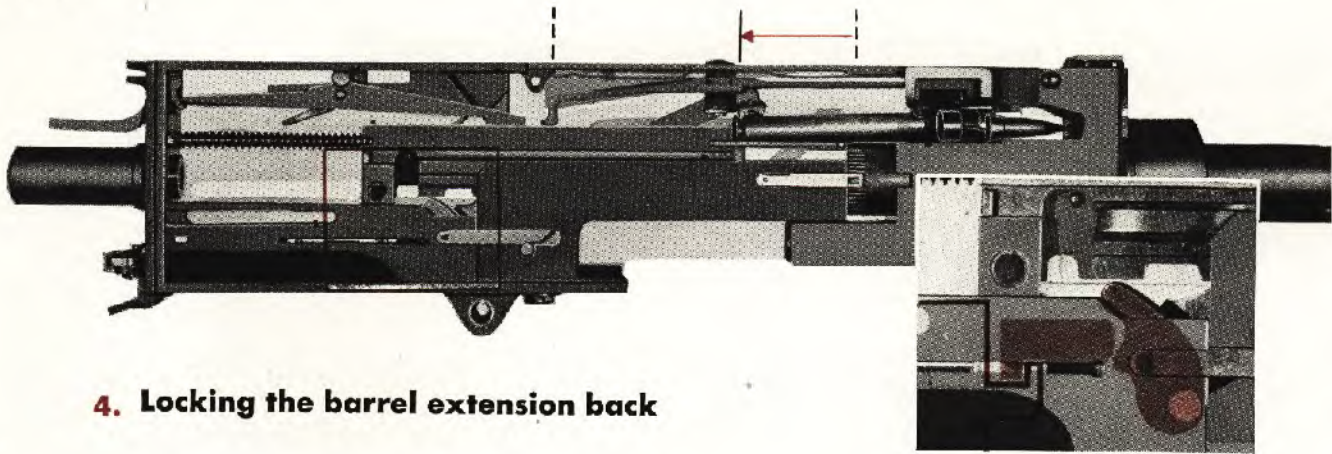
In order to complete the recoil and counter recoil action as rapidly as possible, the next job is to speed up the bolt.



## 3. Accelerating the bolt

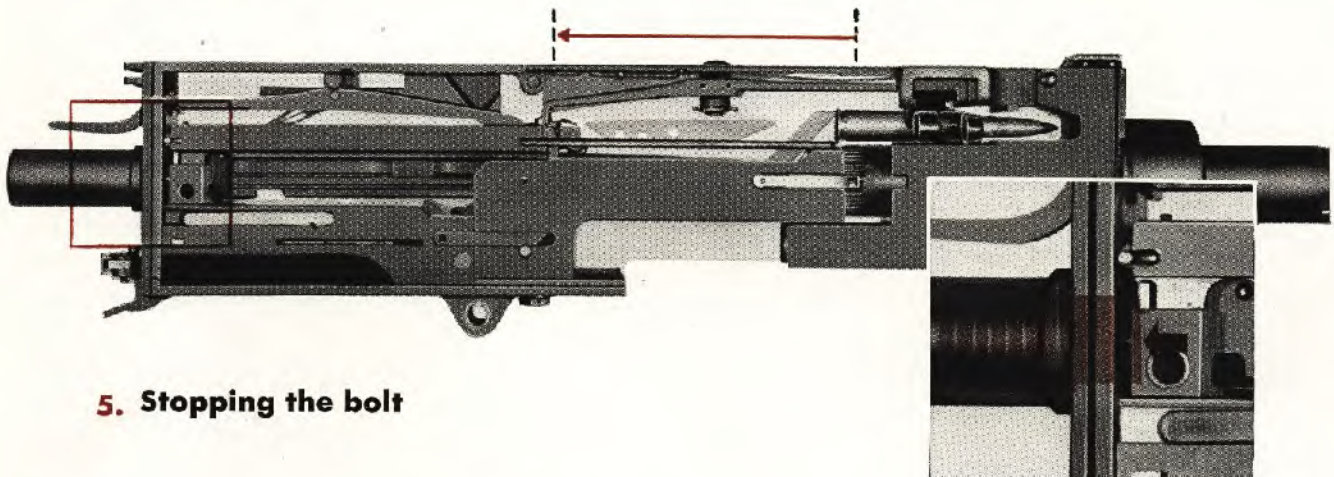
The barrel extension hits the rounded front of the accelerator, turning it backward. The accelerator tips hit the lower projection on the bolt, giving the bolt a powerful boost to the rear. In this way the accelerator serves as an **energy transmitter**. It also acts as a **timing device**, because the transfer of energy slows down the barrel extension and speeds up the bolt.

At this point the barrel and barrel extension have almost finished the  $1\frac{1}{8}$  inches of their recoil, but the bolt still has to go all the way to the back plate. The next job is to hold the barrel extension back at the end of its recoil and make it wait for the bolt, so that all the recoiling parts will return to battery position at the same time.



#### 4. Locking the barrel extension back

As the accelerator turns backward, its locking lugs move down until the shoulders of the barrel extension shank are clamped between the locking lugs and the underside of the accelerator. The accelerator thus acts as a **locking device**, holding the barrel extension against the oil buffer body at the end of its recoil stroke. The oil buffer spring is locked back in a compressed position.



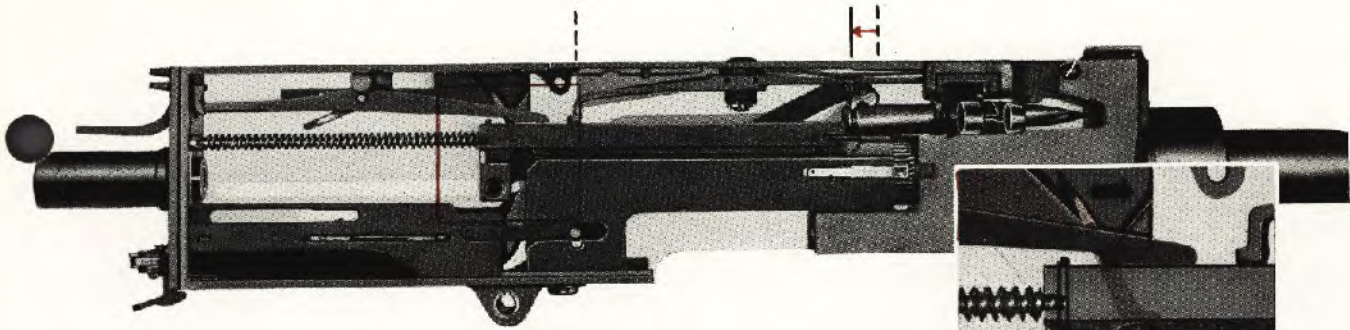
#### 5. Stopping the bolt

The bolt continues to travel to the rear, pushing against its double driving spring, which smooths out its action. At the end of the recoil stroke—after the bolt has traveled back about  $7\frac{1}{8}$  inches—it hits the buffer plate and jams it against the buffer disks, which absorb the force of the blow.

### COCKING ACTION

During the bolt's recoil, the gun is also being cocked. This involves two main steps: the firing pin must be drawn back against its spring, and the notch on the firing pin extension must be hooked to the sear notch to hold the firing pin back. In addition, there must be some way of preventing the gun from firing too soon if the firing pin notch should accidentally slip off the sear notch.

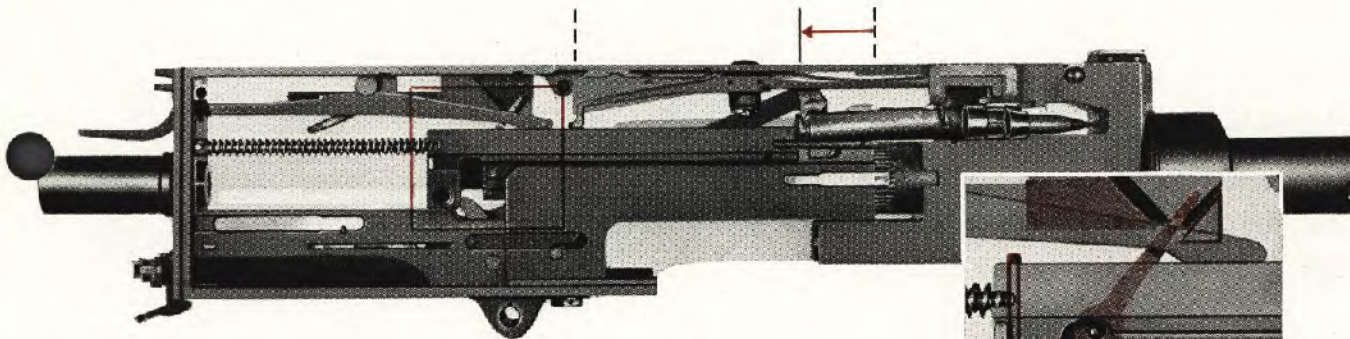




## 6. Pulling back the firing pin

When the gun is in battery position, the top of the cocking lever is resting on the rear cocking lever cam—the back half of the V-slot. As the bolt begins to move back, the top of the cocking lever is forced forward and its lower end is pivoted backward.

This lower end sticks through a slot in the firing pin extension. Its heel presses the firing pin extension backward, compressing the firing pin spring against the sear stop pin.



## 7. Locking the notches

A little farther back, the firing pin notch overrides the sear notch, forcing the sear down. The sear spring forces the sear back up, and the two notches are interlocked.

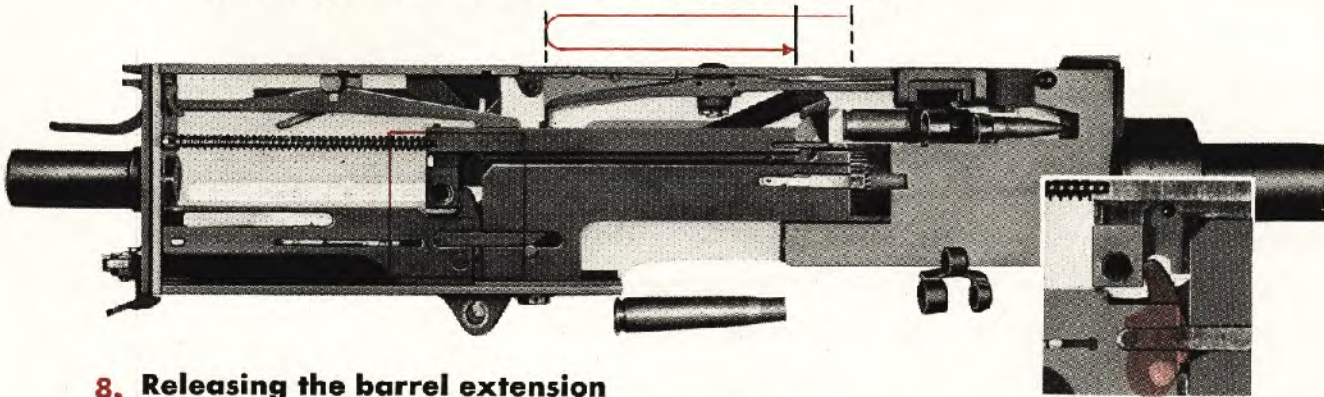
The cocking lever continues to push the firing pin extension back a little farther than is actually necessary, to make sure the two notches will engage even if the heel of the cocking lever or the camming surface of the firing pin extension is worn. This extra distance is called **overtravel**.

The cocking lever also makes it impossible for a round to be fired too soon, even if some defect in the gun should accidentally release the firing pin during recoil or counter recoil. As long as the heel of the cocking lever is in the path of the firing pin extension, the pin cannot go all the way forward even if it slips off the sear notch. This protection, called **fire control**, is in effect as soon as the bolt has moved back from battery position a short distance.

## COUNTER RECOIL ACTION

At the end of recoil, the bolt hits the buffer plate hard enough to bounce forward into battery position without help. Its driving spring serves chiefly to smooth out the counter recoil action.

As counter recoil starts, the barrel and barrel extension are still locked back, waiting for the bolt. The first job is to unlock them at exactly the right time.

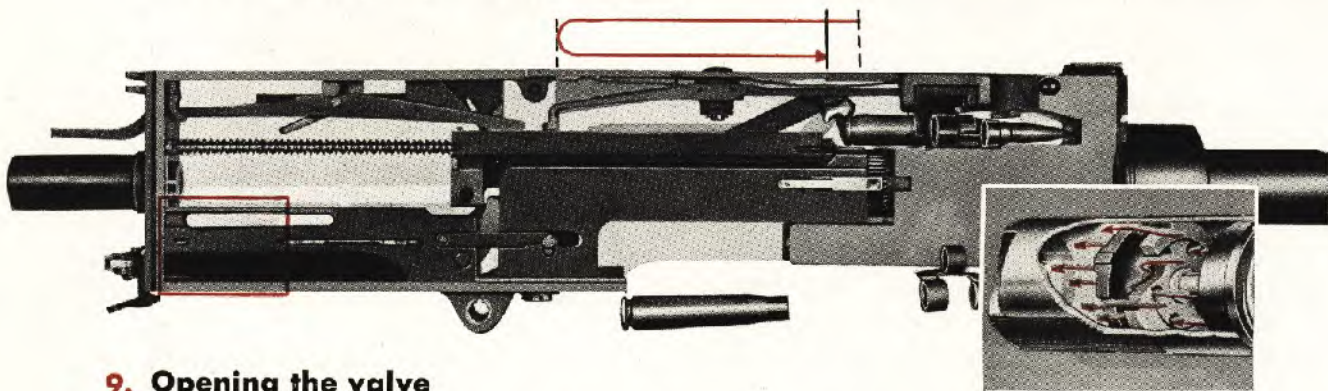


### 8. Releasing the barrel extension

At the start of recoil, the tube lock in the oil buffer body is keeping the accelerator tips from bouncing up too soon and catching in the breech lock recess of the bolt. But as the bolt speeds forward, its lower projection hits the tips and turns the accelerator forward.

This turns the locking lugs back out of the way and releases the barrel extension, which is pushed forward by the oil buffer spring and starts its own counter recoil.

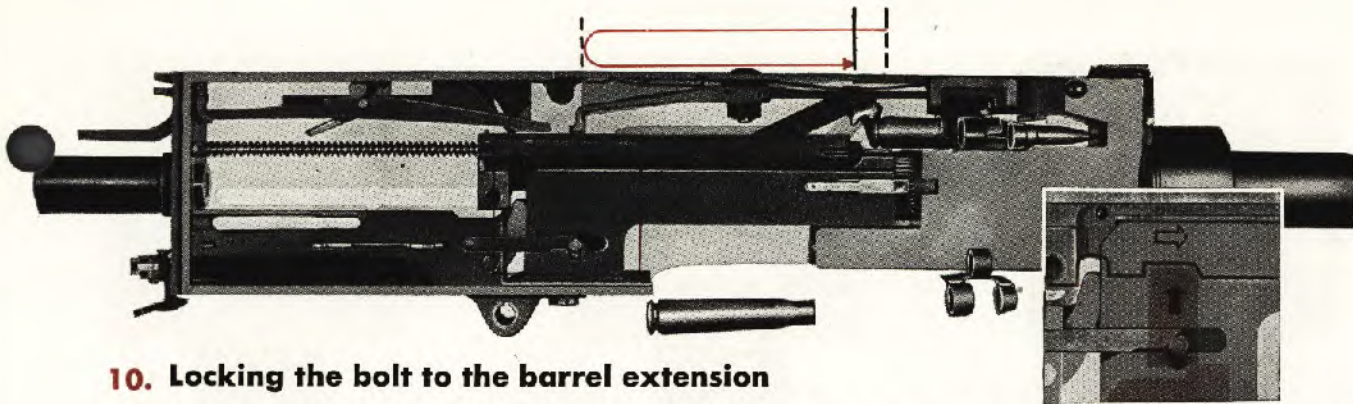
The front of the accelerator also pushes against the barrel extension and gives it an additional boost forward. This time the accelerator slows down the bolt and speeds up the barrel extension—just the opposite of its job on recoil.



### 9. Opening the valve

As the barrel extension starts forward, it pulls the piston rod head and valve through the oil buffer. But this time the valve drags behind the piston head. The oil can flow through the six holes—called **throttling ports**—in the piston rod head, and through the space at the center of the valve, as well as through the restricted openings at the sides. This permits faster forward movement of the barrel and barrel extension.

The bolt and barrel extension are now nearly together, with the bolt still traveling a little faster than the barrel extension. The next job is to lock them together.



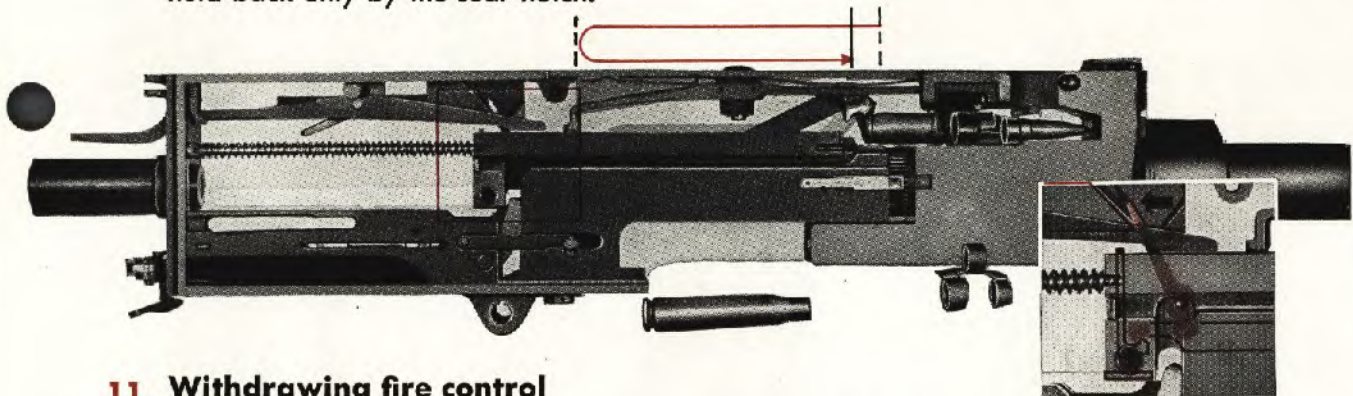
### 10. Locking the bolt to the barrel extension

The bottom of the breech lock hits the breech lock cam on the bottom of the receiver and is forced up into the breech lock recess of the bolt, which has moved over it just in time.

The bolt, barrel extension, and barrel are now locked together. They are approximately  $\frac{3}{4}$  inch away from battery position, and they travel the rest of the way together.

### COCKING ACTION

Cocking action continues all through counter recoil. The tip of the cocking lever hits the front cocking lever cam—the forward half of the V-slot—and starts pivoting backward. This moves the heel of the cocking lever forward until overtravel is eliminated and the firing pin notch is held back only by the sear notch.



### 11. Withdrawing fire control

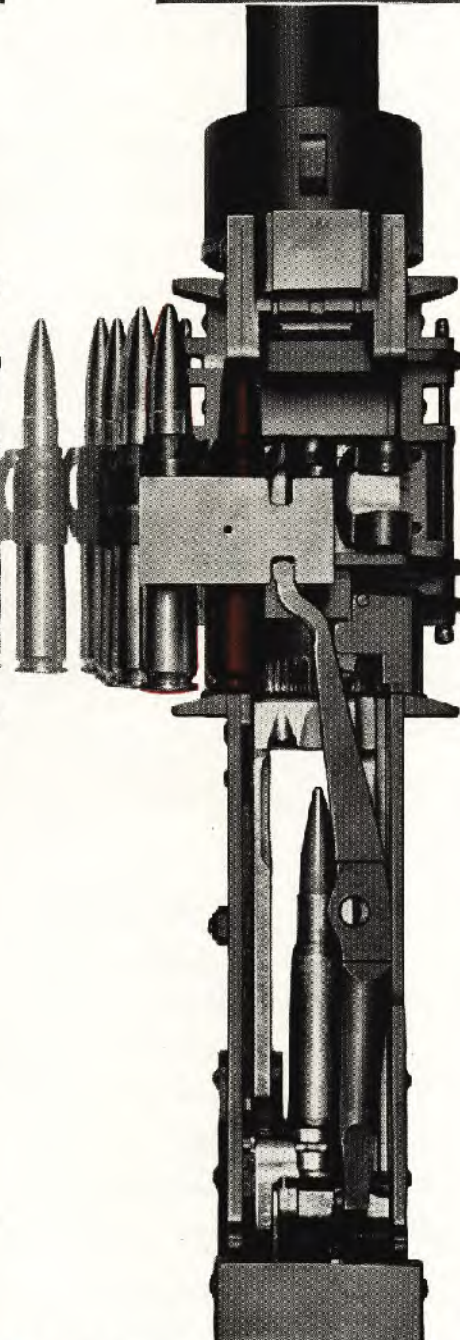
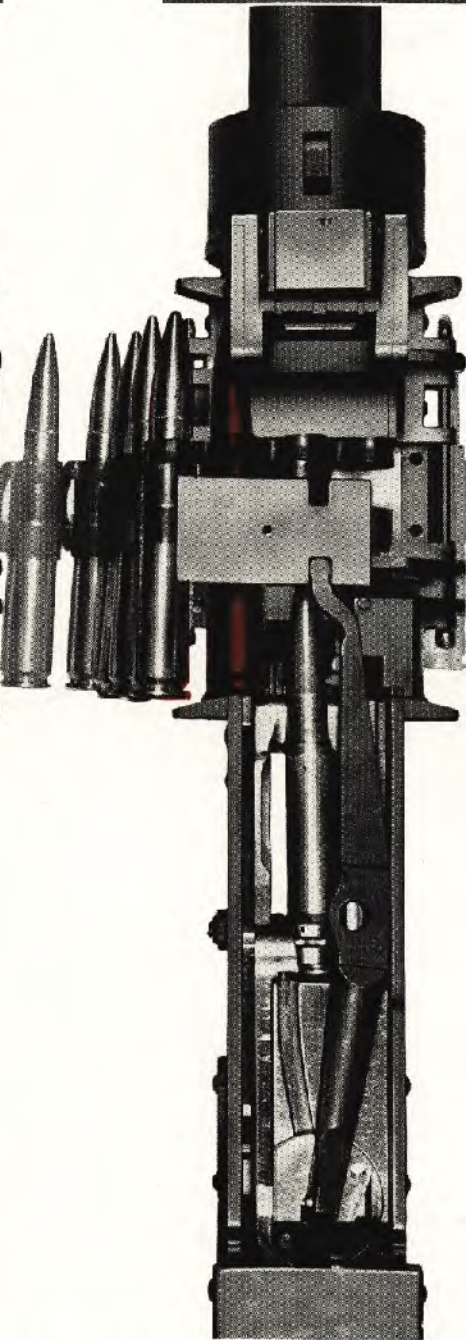
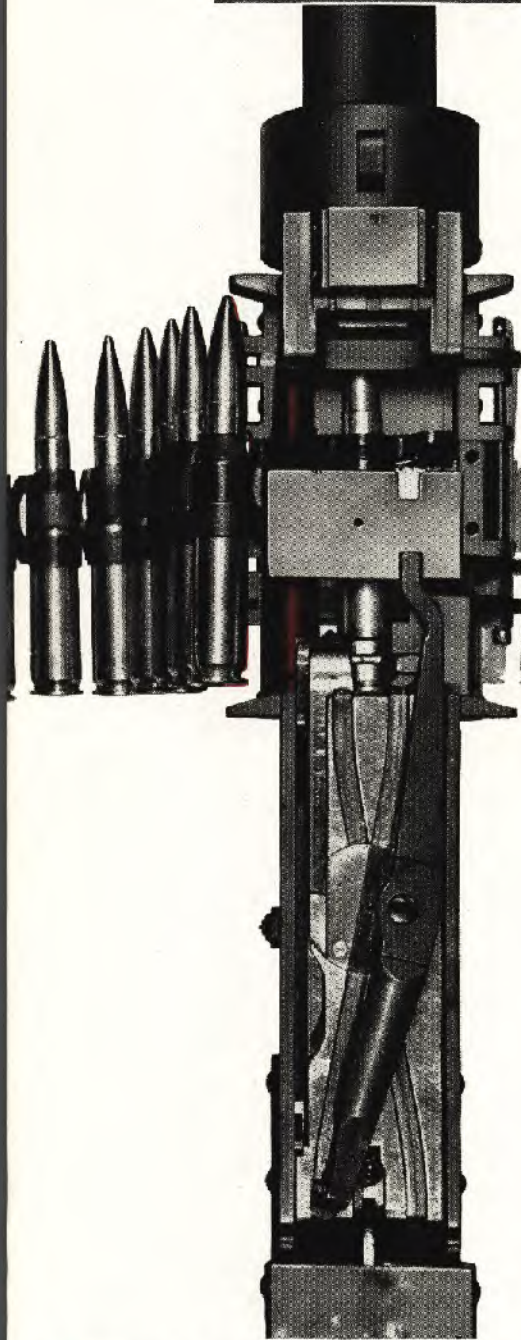
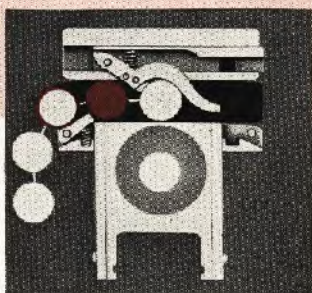
Fire control is even more important on counter recoil than on recoil, because a live round is now in the T-slot. To prevent the round from being accidentally discharged outside of the chamber, the heel of the cocking lever remains in the path of the firing pin as the bolt continues to travel forward. If the firing pin notch somehow slips out of the sear notch, the heel of the cocking lever stops the firing pin before it can spring forward to fire the round.

The cocking lever heel gradually moves forward out of the way. When the bolt is almost back in battery position, fire control ends. The gun is ready to fire again.

While all this recoil and counter recoil movement is going on, the gun is performing six **major functions** on each round:

1. Feeding it into the feedway.
2. Extracting it from the belt.
3. Feeding it into the chamber.
4. Firing it.
5. Extracting it from the chamber.
6. Ejecting it.

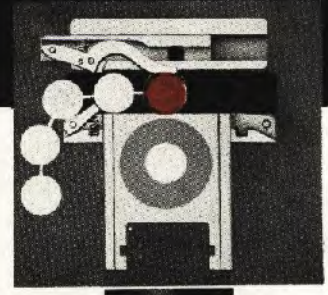
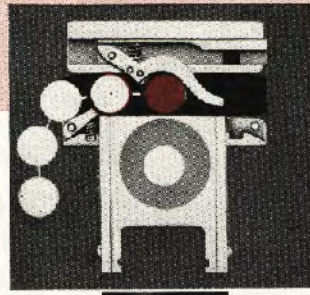
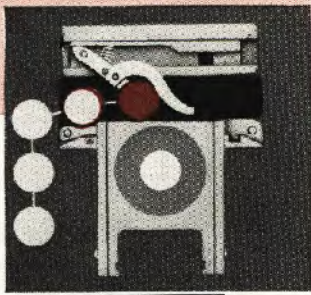
## FEEDING INTO THE FEEDWAY



**12.** When the bolt is forward in battery position, the belt feed slide is in the cover; the ammunition belt is held by the belt feed pawl and belt holding pawl.

**13.** As the bolt recoils, its cam grooves guide the belt feed lever lug, pivoting the lever and moving the slide out the side of cover. The belt is held stationary by the belt holding pawl while the belt feed pawl pivots, compressing its spring, and rides up over the link holding the next round.

**14.** At full recoil, the belt feed slide moves out enough to permit the belt feed pawl spring to snap the pawl down behind the new round.

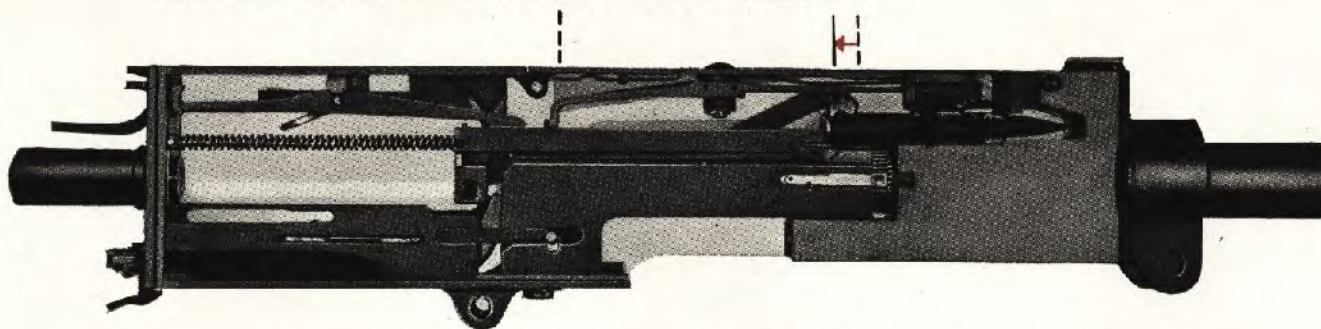


**15.** As counter recoil starts, the belt feed lever begins moving the slide back into the receiver. The belt is pushed in by the belt feed pawl. The next round rides over the belt holding pawl, forcing it down and compressing its spring.

**16.** When the bolt is back in battery position, the slide is all the way back in the gun. The belt holding pawl is snapped up behind the second round by its spring.

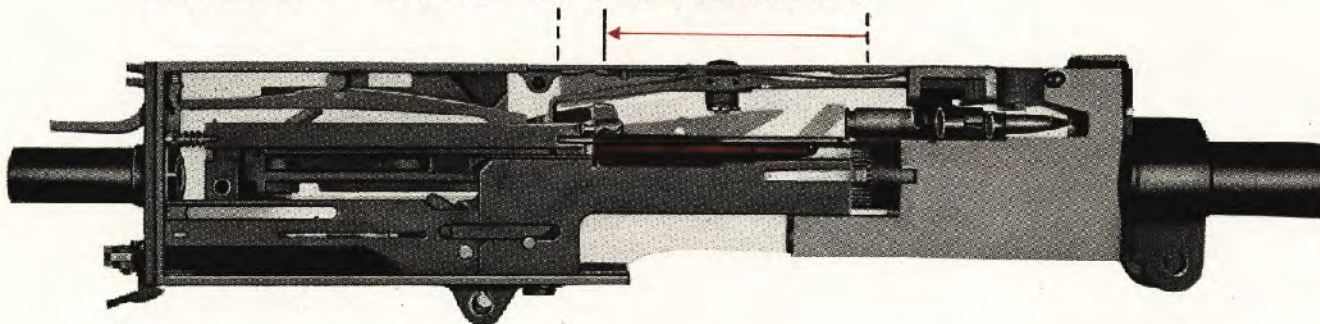
**17.** If for any reason the round that was in the feedway was not extracted from the belt, the belt feed pawl arm rides over it, holding up the belt feed pawl to prevent double feeding.

## EXTRACTING FROM THE BELT

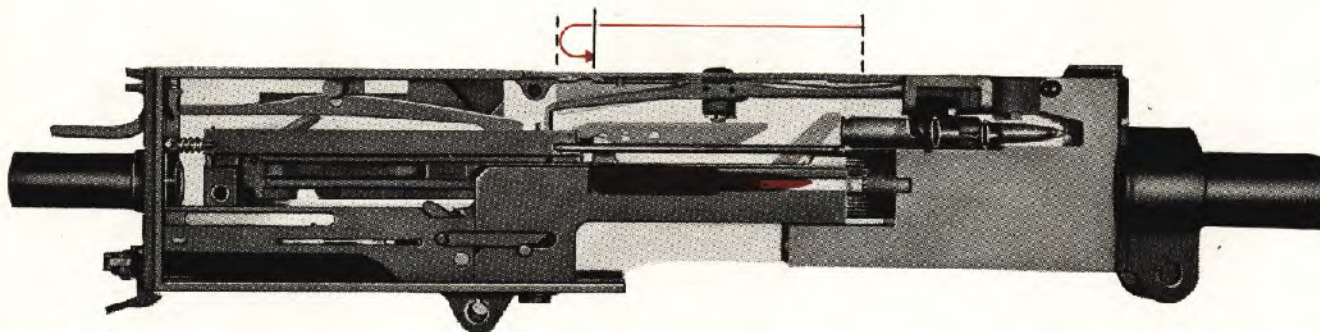


18. In battery position, the cover extractor spring holds the extractor hook firmly in the extracting groove of the new round. The ejector presses against the side of the round. When the bolt begins to recoil, the extractor hook pulls the new round from the ammunition belt.

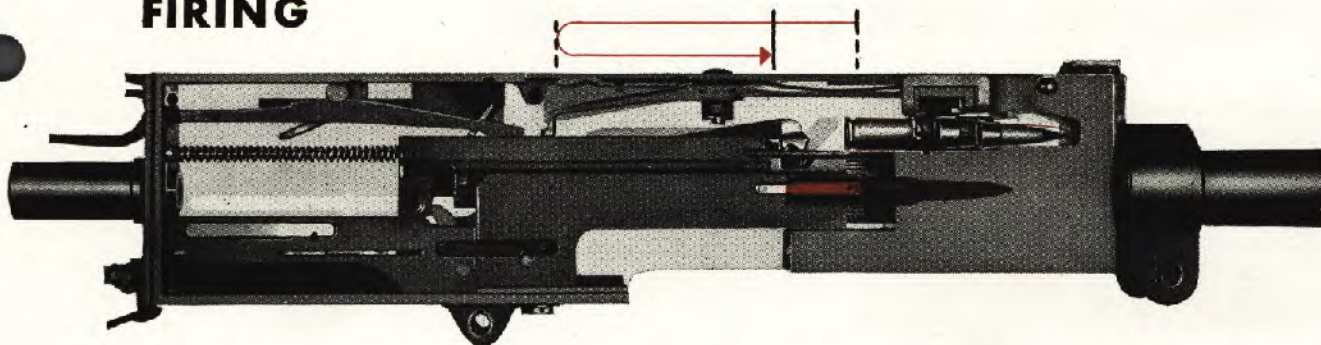
## FEEDING INTO THE CHAMBER



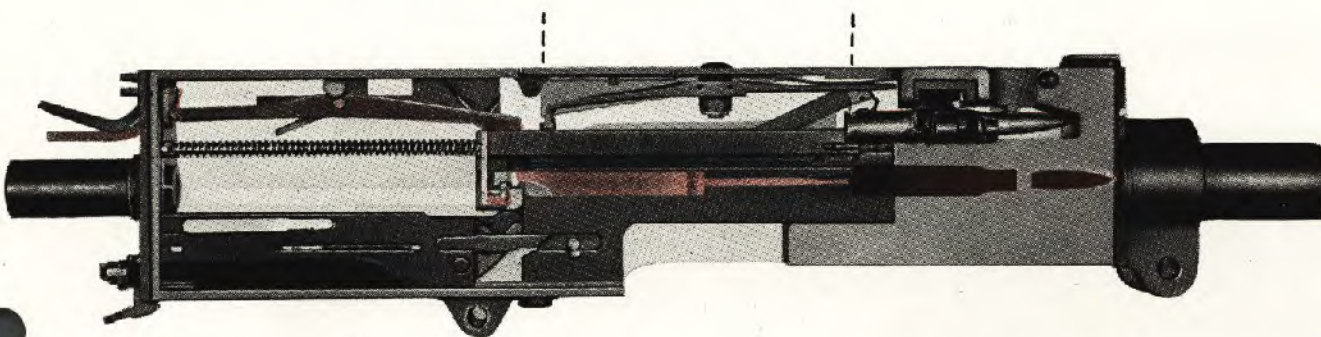
19. As the bolt moves farther back, the cover extractor cam forces the extractor assembly downward, pushing the new round down into the T-slot. The ejector supports the side of the round to keep it from falling through the slot. The extractor lug rides along the top of the extractor switch, forcing the rear of the switch downward. Near the end of recoil, the lug moves off the end of the switch, which snaps back up into position.



20. At the start of counter recoil, the camming surface on the bottom of the extractor switch forces the extractor assembly farther down. The extractor stop pin on the left side of the bolt keeps the assembly from going too far down, and the new round thus is lined up with the chamber.

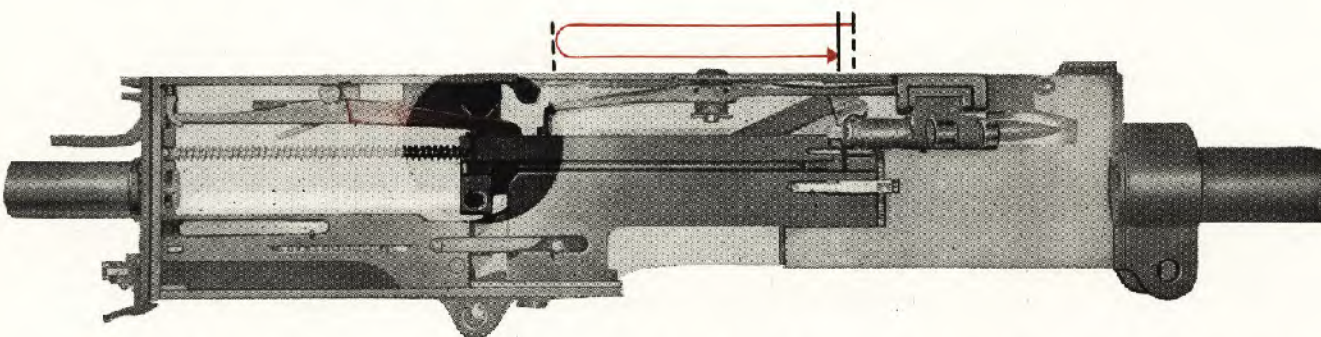
**FIRING**

- 21.** When the new round is part way in the chamber, the extractor lug hits the extractor cam, forcing the extractor assembly up over the next round in the feedway. The face of the bolt, ending its counter recoil stroke, pushes the round all the way into the chamber.



- 22.** When the trigger is pressed, it raises the rear of the trigger bar, pivoting the front end down against the sear tip.

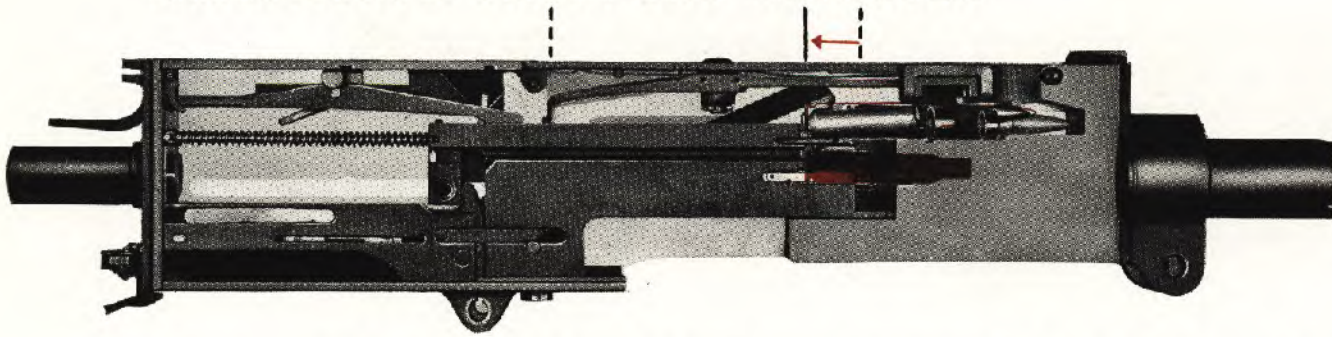
The sear notch releases the firing pin notch and the firing pin snaps forward. The sear spring forces the sear back up into position.



- 23.** The front end of the trigger bar remains down as long as the trigger is pressed. In automatic fire, when the bolt is almost back in battery position, the sear tip rides under the forward tip of the trigger bar and is cammed down to fire the gun.

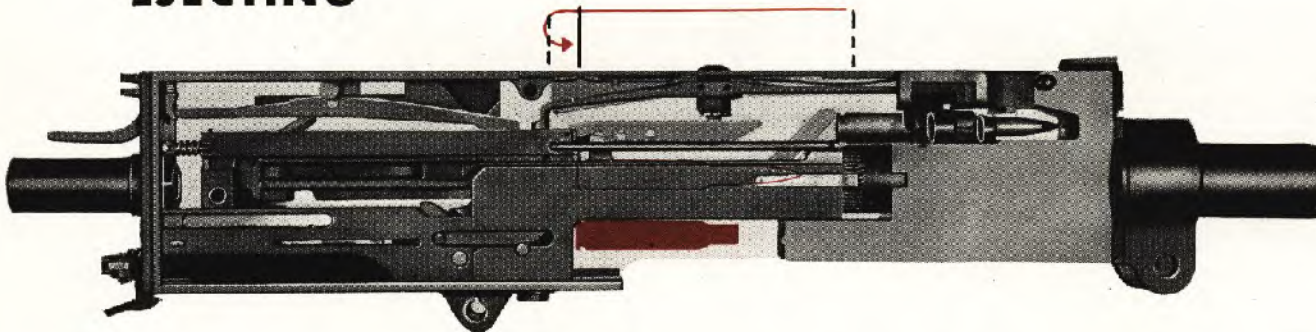
Automatic firing continues as long as the trigger is held down, and stops when the trigger is released. Any number of rounds, from one shot up to long bursts, can be fired.

## EXTRACTING FROM THE CHAMBER



- 24.** As soon as the bolt is unlocked from the barrel extension on recoil, the T-slot begins pulling the empty case out of the chamber. The case is free of the chamber before the end of recoil.

## EJECTING



- 25.** As the new round is forced down toward the center of the T-slot at the start of counter recoil, it pushes the empty case out the bottom of the gun. The last empty case in an ammunition belt is pushed out by the ejector.

Some of these six functions are being performed on different rounds during each recoil and counter recoil stroke.

**In battery position** (Diagram 22, Page G-61):

The red round is fired.

**On recoil** (Diagram 24):

The round outlined in red is being extracted from the belt.

The empty case of the red round is being extracted from the chamber.

**On counter recoil** (Diagram 25):

The empty case of the red round is being ejected.

The round outlined in red is being fed into the chamber.

The gray round is being fed into the feedway, against the cartridge stops.



# ADJUSTMENTS

To keep the caliber .50 working properly, four adjustments must be kept accurate. The gun must be adjusted for **headspace** and **timing**. The **oil buffer** and the **buffer adjusting screw** must be set properly.

The purpose and method of these adjustments are described in the next ten pages. Also shown here is another set of adjustments which must be made in **changing the direction of feed**. In most cases, diagrams in this section are exaggerated for the sake of clarity.

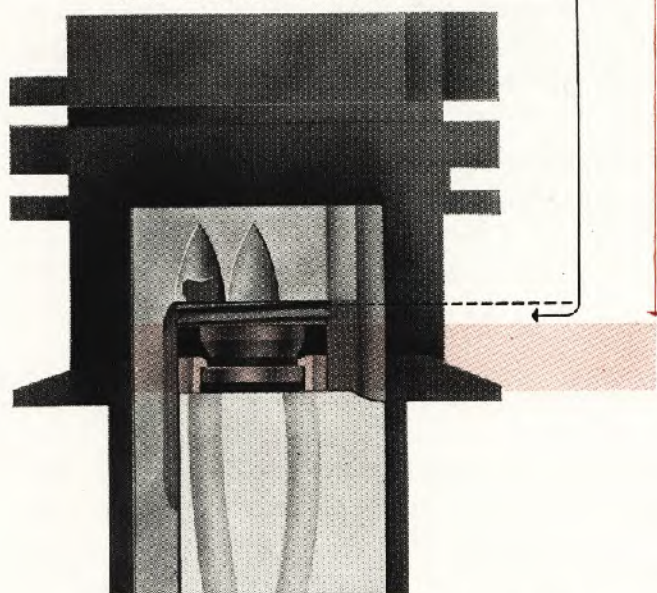
## HEADSPACE ADJUSTMENT

Although there are other more technical definitions of headspace, for all practical purposes it is simplest to think of the headspace of the caliber .50 machine gun as **the distance between the face of the bolt and the breech end of the barrel, when the bolt has been pulled back enough to prevent any play at the breech lock.**

This distance, which can be measured with a headspace gage, **is regulated by the distance the barrel is screwed through the barrel extension.**

THIS DISTANCE IS THE HEADSPACE

IT IS REGULATED BY THE AMOUNT  
THE BARREL IS SCREWED THROUGH  
THE BARREL EXTENSION



When headspace is too tight, the bolt cannot operate efficiently, the action becomes sluggish, and the gun may stop—or it may not even go into battery position at all.

When headspace is correct, the gun can go into battery, the round is properly supported in the chamber, and the bolt operates efficiently.

When headspace is too loose, the parts are battered and the round is so improperly supported in the chamber that the case may be blown apart when the gun is fired.

Your machine gun is such a precision-built instrument that it cannot work properly unless headspace is correct to within thousandths of an inch. The next six diagrams, showing top and side views of the gun with varying headspace adjustments, explain why.

## RESULTS OF HEADSPACE ADJUSTMENT

### **Excessively tight headspace**

occurs when the breech end of the barrel projects so far back that the bolt's forward movement is stopped before its breech lock recess has moved over the breech lock. As a result, the breech lock cannot move up all the way into its recess, and the bottom of the breech lock cannot get up over the breech lock cam. This prevents the barrel extension from going forward into battery—when the cover is raised, you will see a space between the front of the barrel extension and the trunnion block.

The bolt may be so far back that the gun will not fire at all. At best, the gun will fire one shot and stop, because the extractor assembly cannot reach the ammunition belt to pull out a new round.

---

### **Tight headspace**

occurs when the bolt goes forward barely enough to permit the breech lock to enter the recess.

The front of the breech lock is held tightly against the front of the breech lock recess. The bolt, which can operate smoothly only when there is a little play between lock and recess, gets off to a slow start on recoil. The action of the gun is sluggish; it may fire a few rounds and then stop. It is unable to pull a heavy ammunition belt.

The headspace gage cannot be inserted between the face of the bolt and the breech end of the barrel, showing that headspace is too tight.

---

### **Correct headspace**

allows just a little play between the breech lock and the front of the breech lock recess.

The bolt gets off to a head start before the recess hits the breech lock, and the gun works efficiently. The round is firmly supported by the face of the bolt and the shoulders of the chamber.

Before measuring headspace with a gage, the bolt is drawn back just enough to take up the play between the breech lock and the breech lock recess. The distance between the face of the bolt and the breech of the barrel is then just large enough for the headspace gage to enter, showing that headspace is correct.

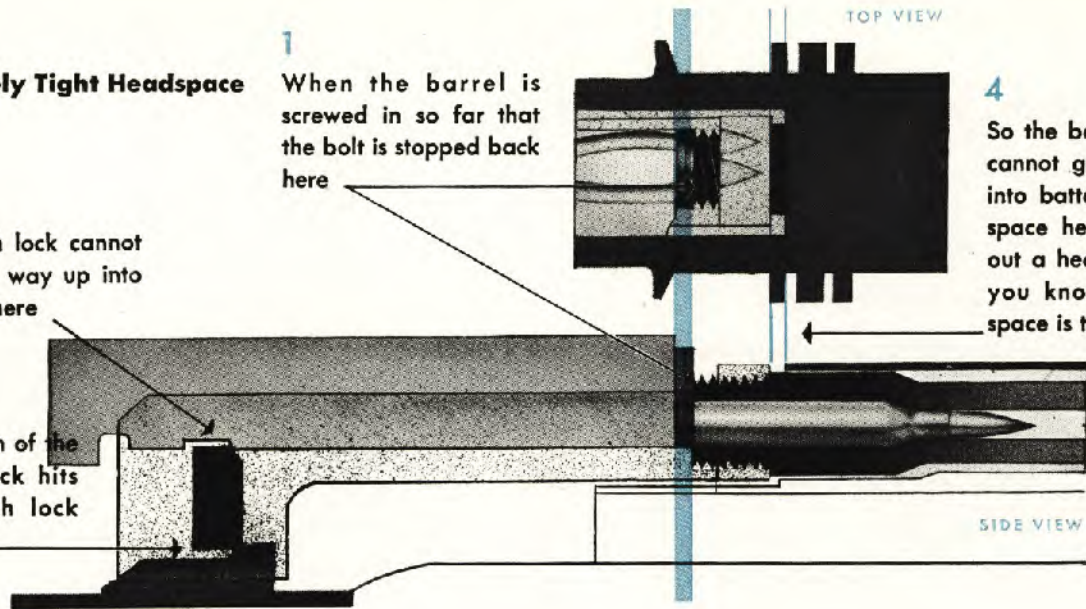
### Excessively Tight Headspace

2 The breech lock cannot go all the way up into its recess here

3 The bottom of the breech lock hits the breech lock cam here

1 When the barrel is screwed in so far that the bolt is stopped back here

4 So the barrel extension cannot go all the way into battery—there is a space here. Even without a headspace gage, you know that headspace is too tight.

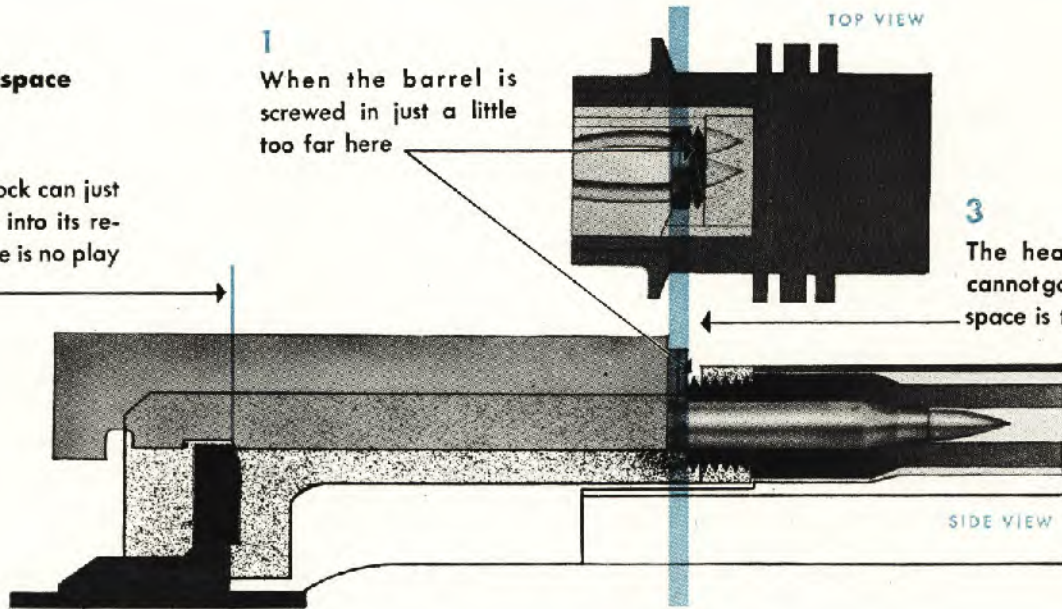


### Tight Headspace

2 The breech lock can just barely move into its recess and there is no play here

1 When the barrel is screwed in just a little too far here

3 The headspace gage cannot go in here—headspace is too tight.

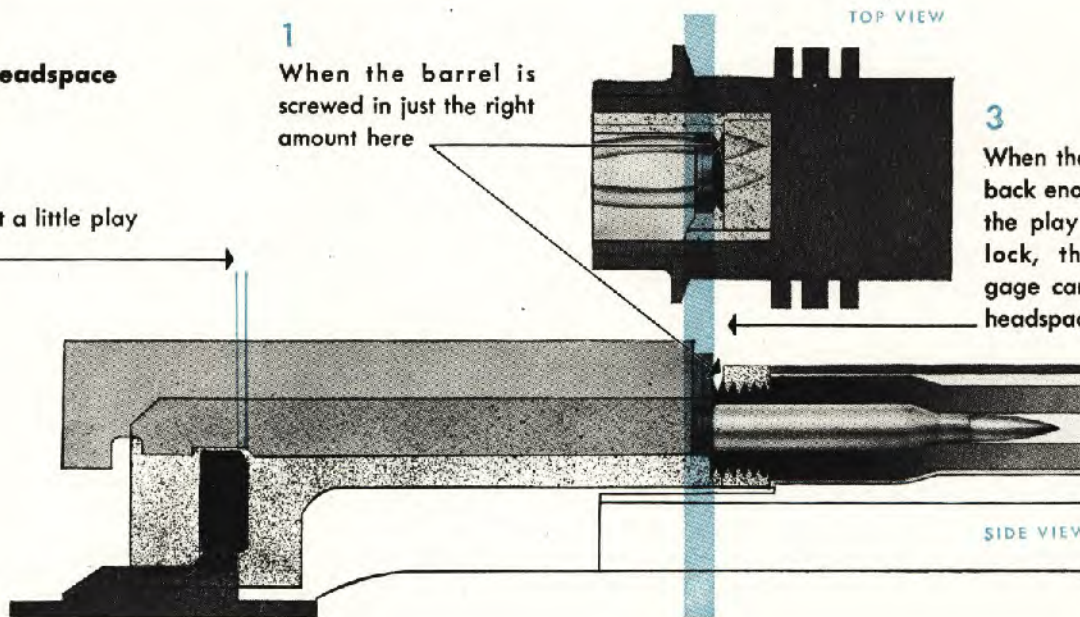


### Correct Headspace

2 There is just a little play here

1 When the barrel is screwed in just the right amount here

3 When the bolt is drawn back enough to take up the play at the breech lock, the headspace gage can go in here—headspace is correct.



**Loose headspace**

allows too much play between the breech lock and the breech lock recess. As a result, these two parts and the breech lock cam take such a battering that they are soon unfit for service.

When the bolt is drawn back far enough to take up this play at the breech lock, a headspace gage reveals that the distance between the face of the bolt and the breech end of the barrel is now too large.

**Excessively loose headspace**

occurs when the breech end of the barrel is not screwed completely through the barrel extension. As a result, there is too much space between the face of the bolt and the barrel, and the bolt is unable to hold the round firmly against the shoulders of the chamber. This has three damaging effects:

One: Often the cartridge case, unsupported by the shoulders of the chamber, is blown apart by the exploding charge. This may result in a separated case, with the tip blown off and left in the chamber after the rest of the case is extracted, or a split case, cracked along the sides. In combat it is difficult and sometimes impossible to clear a separated case from the chamber.

Two: Since some of the expanding gases which should drive the bullet out of the barrel escape around the breech, the range of the gun is cut down and the flight of the bullet becomes inaccurate, resulting in a less concentrated shot pattern.

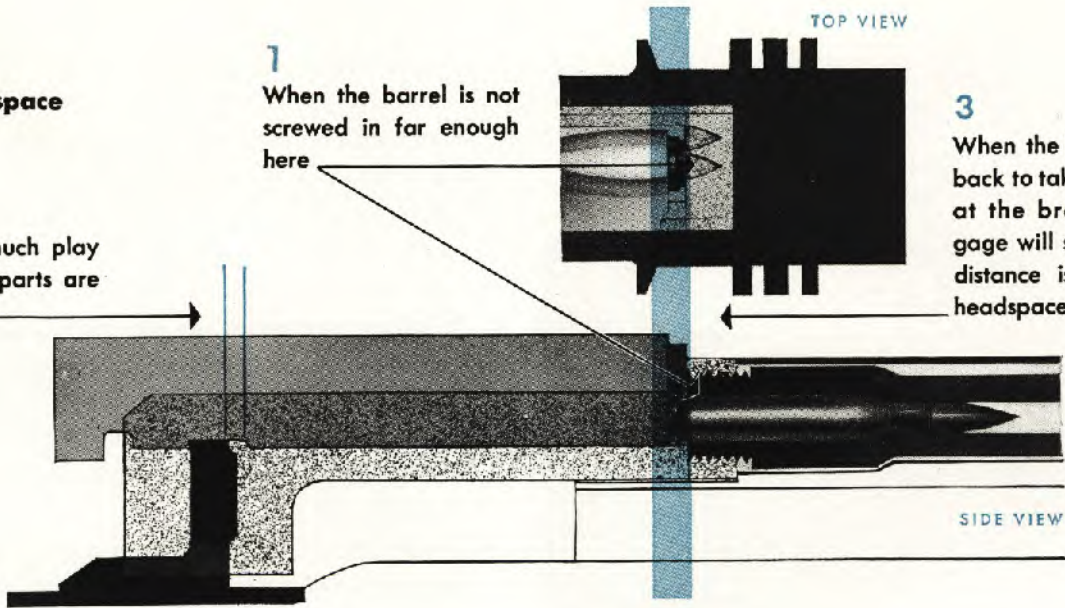
Three: As the bolt slams forward into battery, it hits the barrel extension. The T-slot is battered, and frequently the barrel extension is broken about halfway back. Broken barrel extensions caused by loose headspace are one of the most frequent combat breakdowns.

### Loose Headspace

2 There is too much play here and the parts are battered.

1 When the barrel is not screwed in far enough here

3 When the bolt is drawn back to take up the play at the breech lock, a gage will show that this distance is too large—headspace is too loose.

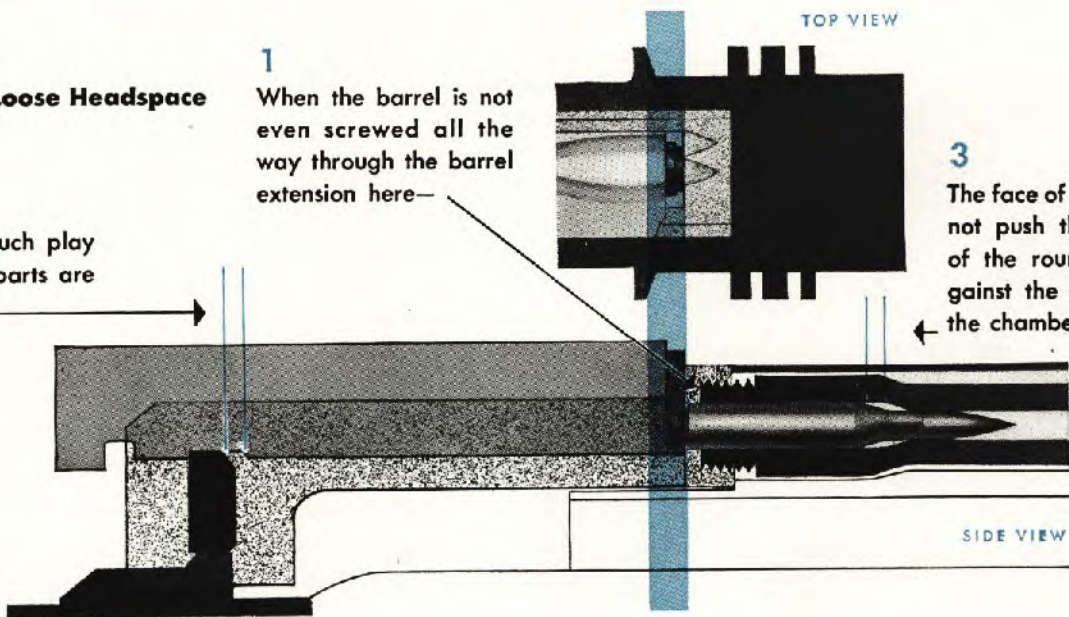


### Excessively Loose Headspace

2 There is too much play here and the parts are battered.

1 When the barrel is not even screwed all the way through the barrel extension here—

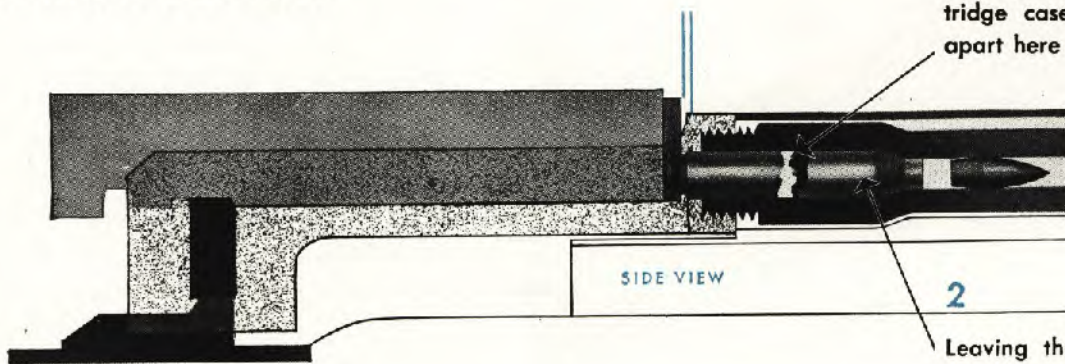
3 The face of the bolt cannot push the shoulders of the round firmly against the shoulders of the chamber here.



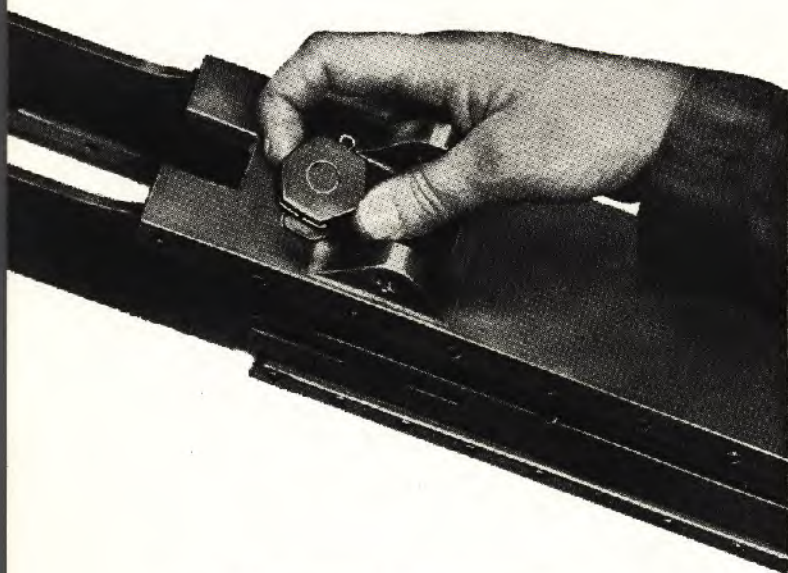
### Results of Excessively Loose Headspace

1 When the gun is fired with excessively loose headspace, the cartridge case may blow apart here

2 Leaving the tip in the chamber when the bolt recoils



## ADJUSTING HEADSPACE



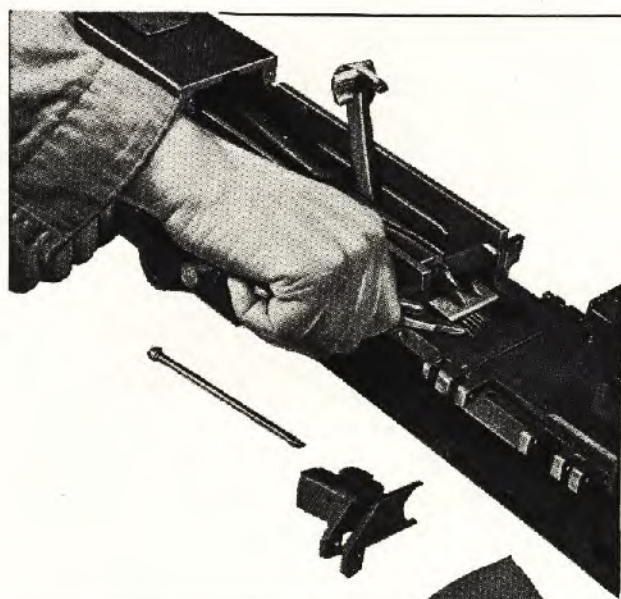
To be absolutely sure that headspace is correct, two operations are necessary: the headspace must be carefully adjusted, and the adjustment must then be checked with a gage.

As a preliminary step, check the breech lock cam nut on the bottom of the receiver. You should be able to turn the nut slightly with your fingers, and its cotter pin should be in place. If the breech lock cam is not correctly installed, have the ordnance or armament shop check it at once.

There are two different ways of adjusting headspace.

One method of making the adjustment **while assembling the gun** was described on page G-34.

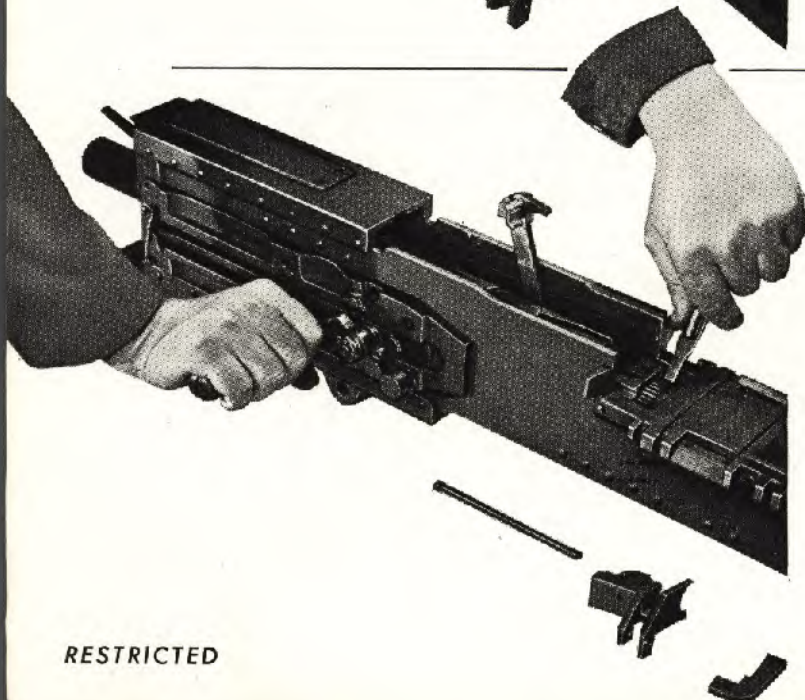
It is also possible to adjust headspace **after the gun is assembled**.



### To use this method:

(If the gun is set up for left feed, remove the right-hand rear cartridge stop assembly while making this adjustment.)

**1** Pull the bolt back about an inch and let it go. If the parts do not return fully to battery position, proceed with Step 2. If they do return fully to battery position, screw the barrel in until the parts no longer return to battery without being forced. To turn the barrel, retract the bolt slightly and pry the barrel locking notches to the left with a tool or the point of a cartridge. Then . . .



**2** Unscrew the barrel **one notch at a time** until the recoiling parts will go into battery when you pull the bolt back **one inch** and let it go. Pry the locking notches to the right to unscrew the barrel.

**3** Then **unscrew the barrel two more notches**. This will allow just enough play at the breech lock to prevent sluggish action.

## CHECKING HEADSPACE

After adjusting headspace by either of the two methods, check the adjustment with a gage before firing the gun. Two gages for checking headspace are now in use:

The old gage (A196228) is a one-piece combination headspace and timing gage. The end marked *HEADSPACE—.200* is a *GO* gage for checking headspace. The end marked *TIMING—.116* is a *NO FIRE* gage for checking timing. The new gage (A351211) is a double-ended *GO—NO GO* headspace gage. It comes attached to two timing gages, *FIRE* (A351214) and *NO FIRE* (A351213), to make up headspace and timing gage assembly A351217. One advantage of the new gage is that it can be inserted through the bottom of the receiver to check headspace in turrets where the cover of the gun cannot be raised all the way.

### WITH THE OLD GAGE

**3 Check for tight headspace** by inserting the headspace end of the gage into the T-slot, between the face of the bolt and the breech end of the barrel.

**4** If the gage does **not** go in, headspace is too tight; unscrew the barrel one notch at a time until the gage just goes in without being forced.

**5** If the gage **does** go in easily the first time, **check for loose headspace** by screwing the barrel in, one notch at a time, until the gage will not enter. Then unscrew the barrel **one** notch so the gage can enter.

**6** Remove the gage and release the firing pin.

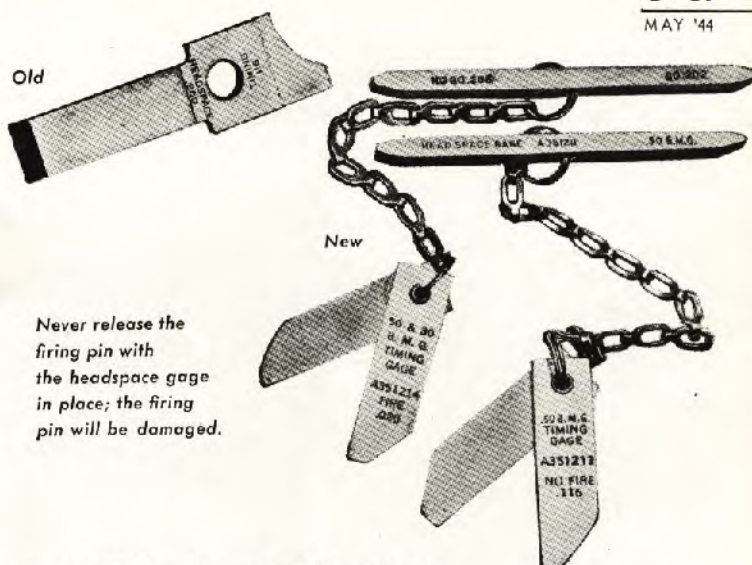
### WITHOUT A GAGE

No method of setting headspace will always give correct headspace adjustment. The adjustment should always be checked. A fairly accurate check can be made without a gage.

**1** Charge a dummy round into the chamber. Raise extractor and pull back on it. There should be an extremely small amount of rearward motion of the bolt before the barrel extension starts rearward. This independent rearward movement of the bolt should not be more than the slightest possible movement.

**2** If no dummy is available follow the same procedure. The independent rearward movement of the bolt should be slightly greater than when a dummy is used but it should be very slight.

**3** With practice these methods of checking headspace are very accurate.



To check headspace with a gage:

- 1** Cock the firing pin by charging the gun and letting the parts go fully into battery.
- 2** Back off the bolt slightly—not more than 1/16th of an inch—to relieve the pressure of the driving spring and take up play between the breech lock and breech lock recess. Then...

### WITH THE NEW GAGE

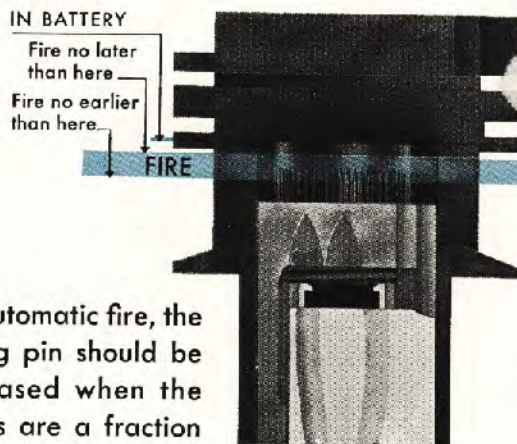
**3 Check for tight headspace** by inserting the *GO* end of the headspace gage into the T-slot, between the face of the bolt and the breech end of the barrel.

**4** If the gage does **not** go in, headspace is too tight; unscrew the barrel one notch at a time until the gage just goes in without being forced.

**5** If the gage **does** go in easily the first time, **check for loose headspace** by trying to insert the *NO GO* end of the gage into the T-slot. If this end of the gage does **not** go in, headspace is correct. If it **does** go in, tighten the barrel one notch at a time until the *NO GO* end will not enter. When headspace is correct the *GO* end of the gage must **just** go in and the *NO GO* end of the gage must **not** go in.

**6** Remove the gage and release the firing pin.

## TIMING ADJUSTMENT



In automatic fire, the firing pin should be released when the parts are a fraction

of an inch out of battery position. To be exact, the gun should be less than 0.116 ( $\frac{116}{1000}$ ) of an inch out of battery, but not less than 0.020 ( $\frac{20}{1000}$ ) of an inch out of battery, when it fires.

### Results of incorrect adjustment

If the gun is 0.116 of an inch or more out of battery when it fires, it fires too early. It will fire two shots and then stop, because the recoil from the second shot starts before the extractor hook can reach the cartridge in the feedway. If the gun is less than 0.020 of an inch out of battery when it fires, it fires too late. The rate of fire is slowed down. The barrel extension batters the trunnion block as the parts slam into battery position.

### Checking the timing

- 1 Adjust and check headspace.
- 2 Cock the firing pin by charging the gun and letting the parts go fully into battery.
- 3 Retract the recoiling parts about a quarter inch. Then . . .



#### With the Old Gage

**4 Check for early timing** by inserting the timing end between the front of the barrel extension and the trunnion block, with the curved part of the gage resting over the barrel. Let the barrel extension close slowly on the gage. Then press the trigger. If the firing pin is released, firing is too early.

**5** If the firing pin is not released, **check for late timing** by obtaining a 0.020-inch feeler gage and inserting it between the barrel extension and trunnion block. If the firing pin does not release, firing is too late.

If you find that the timing is too early or too late, try installing different trigger bars until you find the one that works. If you are unable to obtain the correct timing this way, don't try to file or bend a trigger bar—take the gun to ordnance for the necessary repairs.



#### With the New Gage

**4 Check for early timing** by inserting the *NO FIRE* leaf of the gage assembly between the front of the barrel extension and the trunnion block. Let the barrel extension close slowly on the gage. Then press the trigger. If the firing pin is released, firing is too early.

**5** If the firing pin is not released, **check for late timing** by inserting the *FIRE* leaf between the barrel extension and trunnion block. If the firing pin does not release, firing is too late.



## OIL BUFFER ADJUSTMENT

When you turn the oil buffer tube, the valve inside the tube also turns because the valve key is held in a slot in the side of the tube. Turning the valve changes the size of the restricted openings. Increasing the size of the openings lets the piston push back through the oil more rapidly on recoil. Decreasing them slows up the piston.

The openings are largest, and the rate of fire is most rapid, when the slots in the side of the valve are in line with the slots in the side of the piston head. This is the proper adjustment for aircraft machine guns, regardless of temperature and altitude, in all cases where the buffer tube has been filled with the correct oil (Recoil Oil 2-36, latest issue).

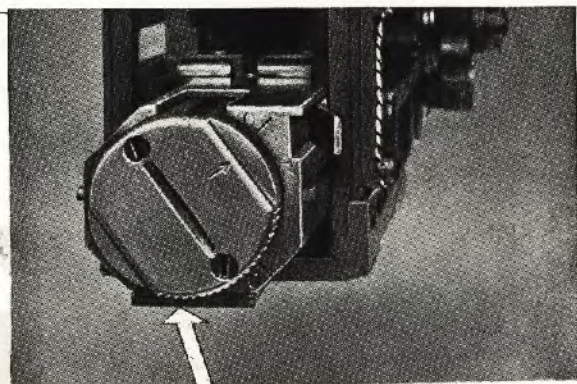
### Results of improper adjustment

If the restricted openings are too small, the rate of fire will be too slow. The gun's action may stop part way back on recoil.

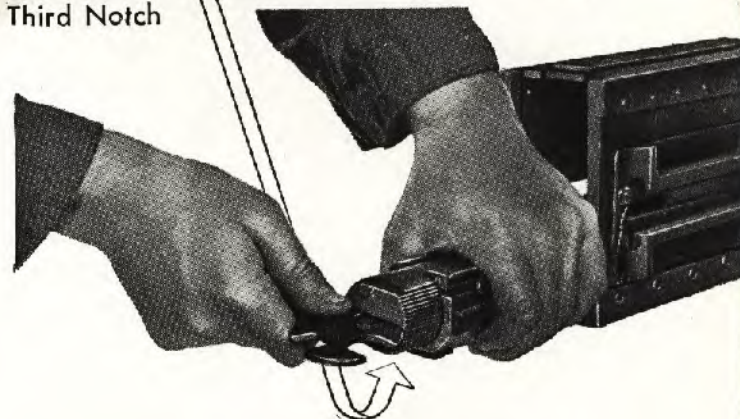
### Making the adjustment

Because of differences in the manufacture of machine guns, the openings are not necessarily at their widest when the arrow on the buffer tube points to the O (for OPEN). The only way to be sure the adjustment is correct is to see that the tube lock protrusion is in the **third notch from the left** at the bottom of the tube.

Because it is difficult, if not impossible, to make this adjustment when the gun is assembled, remove the oil buffer group and put it on the table. Then, even if you are blindfolded or working in the dark, it is easy to turn the tube to the left (counterclockwise) until the clicking stops, then turn it to the right (clockwise) until you hear three clicks.



Third Notch



### Emergency check

The oil buffer can be roughly checked in combat without removing the back plate of the gun or its adapter. Simply squint through the hole in the back plate and check the angle of

the slot on the rear of the oil buffer tube. If the slot is in the same position as the two hands of a clock at 5 minutes to 5, the setting is approximately correct.

## BUFFER ADJUSTING SCREW ADJUSTMENT

Tightening the buffer adjusting screw increases the pressure on the buffer disks; loosening the screw decreases the pressure.

There are usually 22 disks in the tube. If they

are too worn, or if there are too few of them, the adjusting screw will go in too far. If there are too many disks, or if they are not seated properly, the screw will not go in far enough.

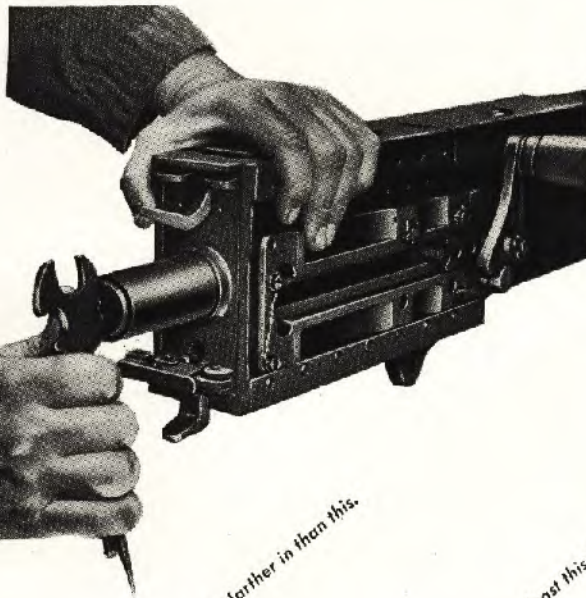
### Results of improper adjustment

If the screw is too tight, or if the disks are too worn, they are unable to cushion the shock of the recoiling bolt. The pounding of the bolt may strip the threads off the adjusting screw and drive it out the rear of the buffer tube, or shear off the sides of the back plate and force

it off the back of the receiver.

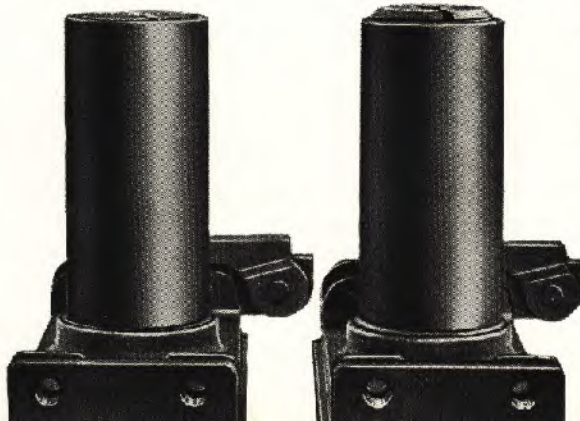
If the adjusting screw is too loose, or if there are too few disks, the bolt will batter against the back plate instead of the buffer plate, and may break the back plate and drive it off the receiver.

### Making the adjustment



*No farther in than this.*

*At least this far in.*



Tighten the buffer adjusting screw as tight as you can, using a caliber .50 combination wrench if one is available. Remove the back plate and press on the buffer plate to make sure it is held firmly in position.

The adjustment is correct when the end of the screw does not go inside the tube, nor stick out more than one thread.

If the adjusting screw goes in so far that its end is inside the buffer tube, the disks have become worn and flattened, or too few disks have been inserted. Instead of adding one new disk yourself, have ordnance check the condition of the disks and replace them all if necessary.

If, after the screw is tightened as much as possible, you can see more than one thread, make sure that the disks and buffer plate are properly seated, and that you have not inserted too many disks. If the screw still sticks out too far, have ordnance make the necessary repairs.

## CHANGING THE DIRECTION OF FEED

### IN THE BOLT GROUP

**Change the bolt switch.** Lift out the extractor assembly and turn the bolt switch. For left hand feed, the narrow end of the switch goes to the rear, providing a clear track along the cam groove marked L. For right hand feed, the wide end of the switch goes to the rear, providing a clear track along the groove marked R.

### IN THE RECEIVER

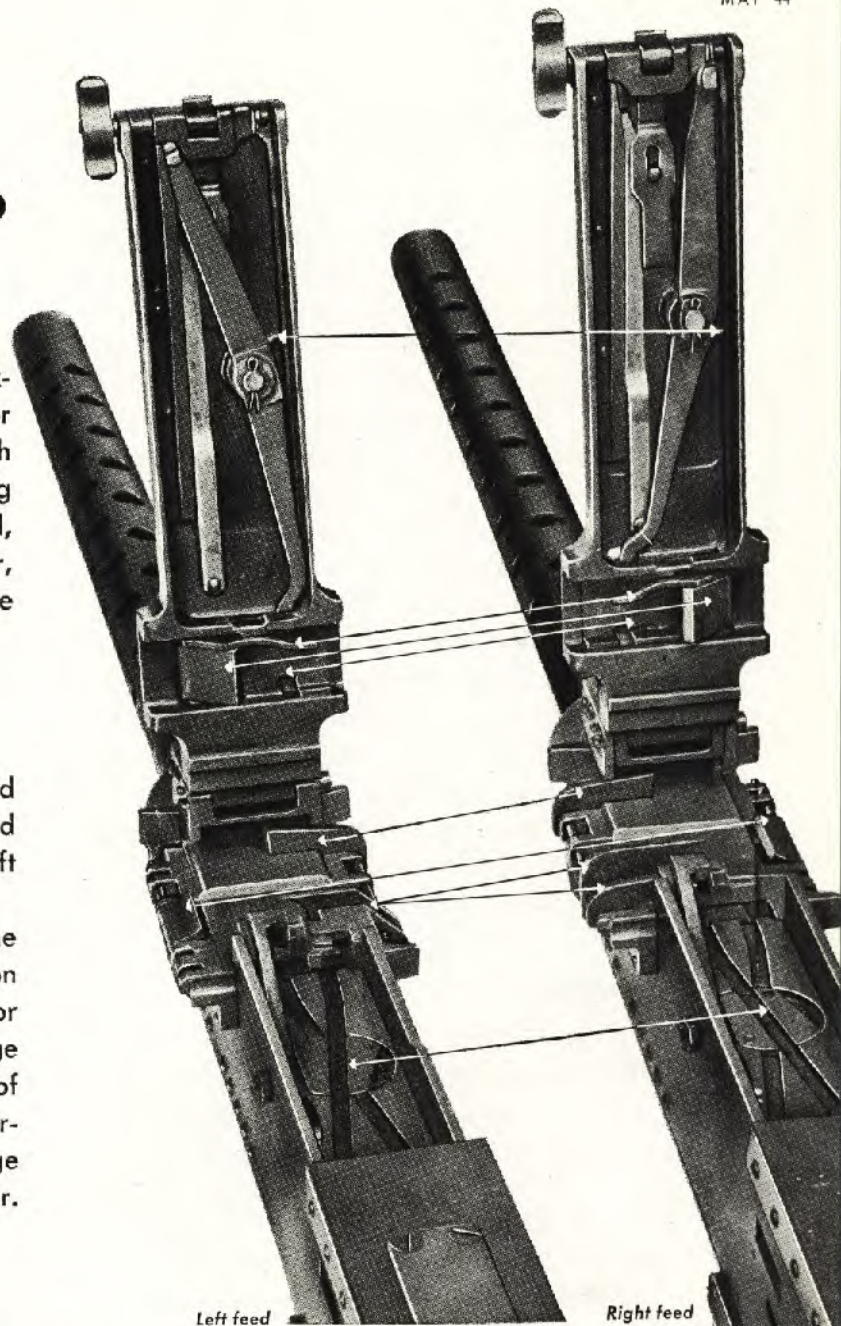
**Change the belt holding pawl.** It should go on the same side as the direction of feed—right side of the receiver for right feed, left side for left feed.

**Change the cartridge stops.** Since the rounds are fed in against them, they go on the side opposite the direction of feed. For right feed, put the front and rear cartridge stops and the link stripper on the left side of the receiver. For left feed, put the front cartridge stop and the right-hand rear cartridge stop assembly on the right side of the receiver.

### IN THE COVER GROUP

Change the { **belt feed lever plunger and plunger spring.**  
**belt feed pawl and pawl arm.**  
**belt feed slide.**

1. Remove the belt feed lever and belt feed slide. Take the belt feed pawl and pawl spring off the slide by drifting out the pawl pin.
2. Take the pawl arm off one side of the pawl, turn it over, and place it on the other side. When you hold the pawl with the smooth side toward you and the pointed end facing the direction of feed, the pawl arm should be on top.
3. Turn the pawl around, put the pawl spring on its stud, and replace the pawl in the slide, with the pointed end of the pawl at the rounded end of the slide. Insert the slide in the cover with the pawl arm on top.
4. Replace the belt feed lever plunger and plunger spring—in the upper hole for left hand feed, or lower hole for right hand feed. Replace the belt feed lever on its stud, and make sure the plunger and spring hold the slide in the cover.



# CARE AND CLEANING

The parts of an aircraft machine gun are precision built to fit as closely as possible, yet they must work together at high speeds and in extreme ranges of temperature. Dirt, moisture, or grease between the moving parts—even in very small quantities—causes sluggish guns, stoppages, and broken parts. Small burrs—scratches or gouges in the metal—also can interfere with the gun's operation.

Inside the barrel, heat, pressure, and friction produce tiny cracks—only a twelfth as deep as the thickness of a hair and almost impossible to see—in the surface of the bore. Although a carelessly cleaned bore may look all right, the cracks will retain moisture, the waste left by the exploding gases, and smears of metal from the jackets of the bullets. The result: rust.

Explosion of the propelling charge leaves only an almost harmless ash. But the exploding primer mixture leaves a salt—potassium chlo-

ride—similar to ordinary table salt. This primer salt, which quickly absorbs moisture from the air, is deposited in the chamber and bore, in the recesses of the bolt, and around the front part of the receiver.

These parts will rust very quickly if primer salt is left on them. The salt is not affected by oil; if a gun is oiled without being carefully cleaned, the salt continues to absorb moisture even when covered with oil.

**Therefore the gun must be cleaned, and cleaned thoroughly, immediately after every mission.**

Since aircraft guns are only lightly oiled, condensation of moisture will cause rusting even of a perfectly clean gun.

**Therefore every gun of every aircraft should be cleaned every day, whether it has been used or not.**

## Cleaning

Field strip the gun and detail strip the bolt, oil buffer, barrel, and cover groups. Remove the extractor switch, switch spring, belt holding pawl, and pawl springs from the receiver.

For the bore of the barrel, the best cleaning agent is rifle bore cleaner (Spec. No. RIXS205)—a combination solvent and preservative issued for combat use. If that is not available, other good cleaning solutions are hot water and G.I. soap, or hot water and soda ash (1½ tablespoonfuls of soda ash to a pint of water). Lacking any of these, use hot water alone—or, if necessary, even cold water. "White spirits" and kerosene are frequently used in combat theaters.

With any of these solutions, put the muzzle into a bucket or vat of the fluid. Attach a clean flannel patch to a cleaning rod and move the rod back and forth through the barrel from the breech end for about a minute, pumping the cleaner in and out.

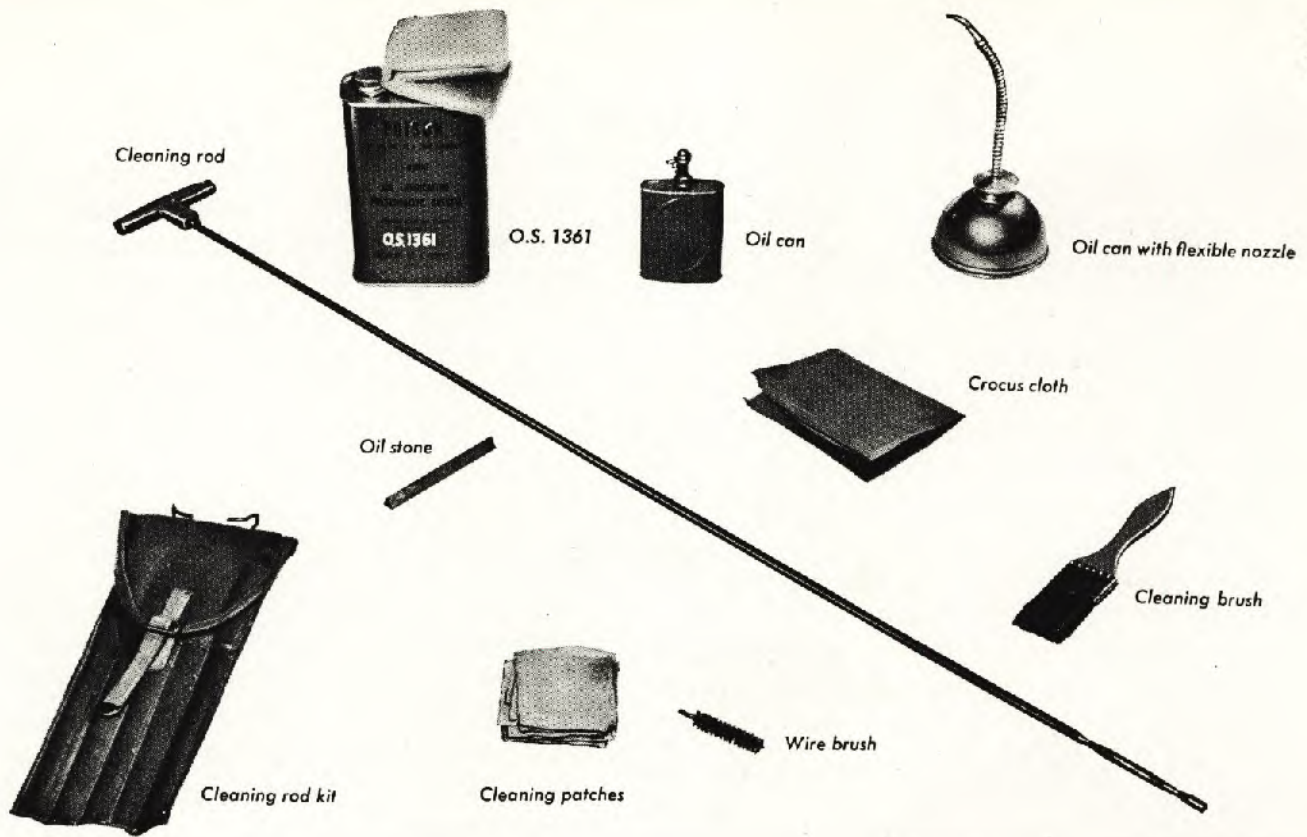
If a brass or bronze wire brush is available, run it through the barrel three or four times while

the bore is still wet. Pump the cleaning fluid through the barrel again to clean it. Dry the cleaning rod and use clean, dry flannel patches to swab the bore until it is perfectly dry and clean. Dry and clean the chamber, using a patch on a pointed stick if necessary. Finally, pull a clean patch smoothly through the bore and chamber, letting the cleaning rod and patch turn with the rifling.

The bearing surface of the barrel—the flat part that slides in the front barrel bearing—should be cleaned and shined with crocus cloth to remove deposits and prevent binding. In an emergency, a fine oil stone can be used instead of crocus cloth.

Clean other parts of the gun with rifle bore cleaner, dry cleaning solvent (Spec. No. RIA-ES12), "white spirits" or kerosene. Thoroughly clean every part with a brush or rag to remove all dirt, moisture, and primer salts.

Clean and flush the recesses in the bolt, using a long brush or a rag on a pointed stick. Dirt, moisture, or primer salts left in the firing pin



port will result in "light struck primers"—the firing pin will be slowed down and will not dent the primers enough to fire.

Other parts of the bolt requiring special attention are the hole for the driving spring, the T-slot, the breech lock recess, and the recesses at the rear of the bolt.

Wash the back plate group and oil buffer tube assembly with the cleaning solution but do not soak them, since the fluid will damage the buffer disks and the oil buffer packing.

Wipe off the casing, being careful to remove all deposits from the extractor switch recess, the area around the breech lock cam, and the front barrel bearing.

After the parts have been cleaned, dry them with a clean, lintless rag. Don't touch them with your bare hands until they have been oiled—fingerprints contain an acid which causes corrosion. If cloth gloves are available, wear them while oiling the gun. If gloves are not available, keep your hands covered with oil while handling the parts.

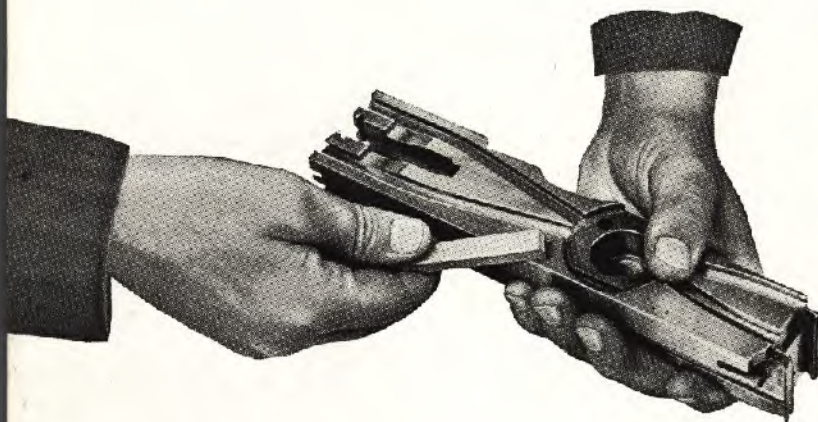
When a new part is issued, examine it carefully for any traces of cosmoline, a heavy grayish-brown rust-preventive compound occasionally used in shipping guns and parts. Have ordnance remove any cosmoline you find.





### Removing rust

Any rust, especially at points where metal parts rub against each other, will prevent smooth operation. Remove it with crocus cloth or similar material. If the rust is pitted, remove it with a fine oil stone obtained from your crew chief or from armament or ordnance. Don't use sandpaper, carborundum, or a coarse stone.



### Removing burrs

Any burrs or scratches must be polished off, especially where metal surfaces are in contact. First use a medium oil stone to remove the burr. Always rub in the direction the part has been worn, instead of working crosswise. Then use a finer stone to smooth out the surface and give it a polish.

### Oiling

Oil must be applied carefully to avoid any "freezing" in the extremely cold temperatures of high altitudes.

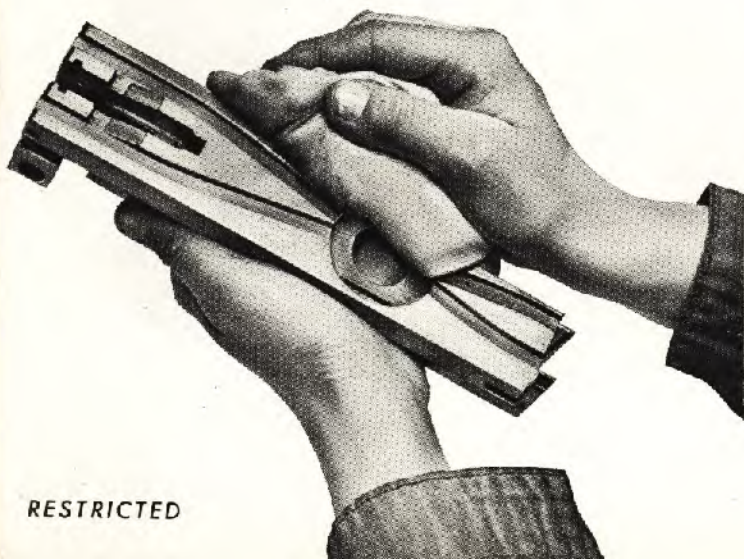
If the gun is assembled dry, sub-zero temperatures will produce a metal-to-metal freeze almost impossible to break apart. Too much oil is just as bad, for it picks up moisture which

freezes inside the oil and locks the moving parts together.

When oil is applied properly, there is just a film over each part. Even if particles of moisture freeze inside the gun, the oiled parts will slide over the ice like skates.

Regardless of weather conditions at ground level, **oil the gun with O.S. 1361**, a special lubricating oil for aircraft instruments and machine guns. To get the right amount of oil on the gun, wipe each part with a rag that has been well-oiled with O.S. 1361. Oil the barrel bore and chamber by swabbing them with a well-oiled patch.

If the gun is to be out of service for a few days, use engine oil SAE 30 to protect the barrel. For longer storage, use a light rust preventive compound instead of oil. The gun must be thoroughly cleaned and re-oiled with O.S. 1361 before being used again.



### Desert Precautions

In theaters where airfields are dusty and sandy, special care must be taken to keep sand and dirt out of the cleaned guns.

Your gun should never be left in the bomber between missions. If it is necessary to leave it in, be sure it is well covered.

As soon as the gun is mounted in the plane, put tape over the muzzle end of the barrel and

leave it there until after the take-off; the first shot will get rid of it. If possible, take a little kerosene along on a mission. If your gun gets so dusty during the take-off that it will not operate correctly, pour a little kerosene on the working parts to clean them. This method must not be used, however, in any theater where extremely cold temperatures may be encountered.

### Filling the Oil Buffer Tube

Although ordnance is responsible for the maintenance of oil buffers in most combat theaters, refilling is a simple operation if you should ever have to do it yourself.

**The only correct oil is A/C Spec. Recoil Oil 2-36**, latest issue. In an emergency use hydraulic fluid (A/C Spec. 3580), but don't take chances with O.S. 1361 or any other oil. Remove both filler screws. If they are tight, insert a screwdriver in the slot and tap it with a mallet.

#### Two methods can be used for filling the tube.

**1.** Use a small oil can filled with 2-36 oil. To avoid getting air bubbles in the buffer tube, turn the can upside down and press the bottom to start the oil flowing before you insert the nozzle. Remove the nozzle before you release the bottom of the can, then press it again to start the oil flowing and reinsert the nozzle in the tube. Repeat the operation until the buffer tube overflows.



or



**2.** Insert a clean wire through one of the holes and let oil run down the wire from a container until the tube overflows.

In either case, tap the side of the oil buffer tube with a screwdriver several times to dislodge any air bubbles.

Before you replace the filler screws, look at the tips of the screws to see if they have been grooved all the way around where they press against the oil buffer tube. If the groove is not worn completely around the screw, it will allow oil to leak—replace the screw.

# GUN MOUNT ADAPTERS

An adapter is a framework or cradle that holds a hand-held gun. When attached to a gun mount by means of a yoke, the adapter permits the gun to be swung from side to side and up and down.

Most gun mount adapters act as shock absorbers. The entire gun recoils a short distance inside the framework of the adapter against a cushion of springs and fluid or compressed air. This shock absorber keeps the gun steadier and makes it possible to fire it more accurately. Also, the cushioning effect of the adapter increases the life of the gun and mount by softening the shock of the explosions when the gun fires.

There are various gun mount adapters used in the Navy. Three adapters commonly used at present will be discussed in the following pages.

## Parts of the Mark 6 Mod 3

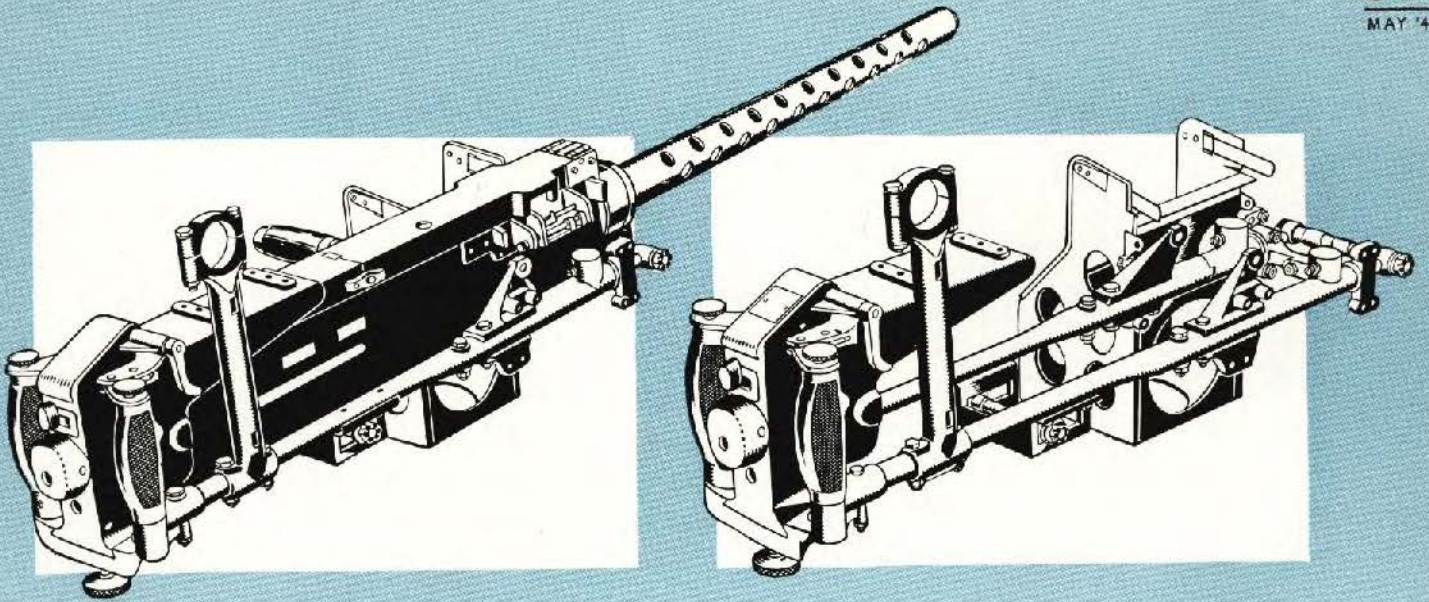
- |                                  |                                  |
|----------------------------------|----------------------------------|
| 1 FRONT MOUNTING BOLT            | 13 REAR MOUNTING BRACKET         |
| 2 PISTON RODS AND EYELETS        | 14 NUT AND COTTER PIN            |
| 3 SPACERS                        | 15 SPADE GRIPS                   |
| 4 WASHER, NUT AND COTTER PIN     | 16 KNURLED SCREWS                |
| 5 HYDRAULIC SHOCK ABSORBER UNITS | 17 SIGHT MOUNTING HOLES          |
| 6 FILLER PLUGS                   | 18 SIGHT MOUNTING BRACKET        |
| 7 FRONT FRAME SEPARATORS         | 19 BACK GUARD ASSEMBLY           |
| 8 FRONT FRAME SEPARATOR BOLTS    | 20 TRIGGER                       |
| 9 BEARER BARS                    | 21 SAFETY                        |
| 10 YOKE FITTINGS                 | 22 TRIGGER BAR                   |
| 11 REAR MOUNTING BOLT            | 23 TRIGGER BAR SPACER AND SPRING |
| 12 REAR MOUNTING SLIDES          |                                  |

## General Description of the Mk 6 Mod 3 Gun Mount Adapter

This adapter is designed to hold a single caliber .50 BAM gun. The frame assembly has two built-in hydraulic shock absorber units that work somewhat like the oil buffer in the gun. A removable back guard assembly houses the trigger and trigger safety mechanism. Only the pistons and rear mounting slides recoil with the gun. The bearer bars and back guard assembly do not recoil. A bracket is provided for mounting the Mk 9 or the Mk 9 Mod 1 reflector sight.

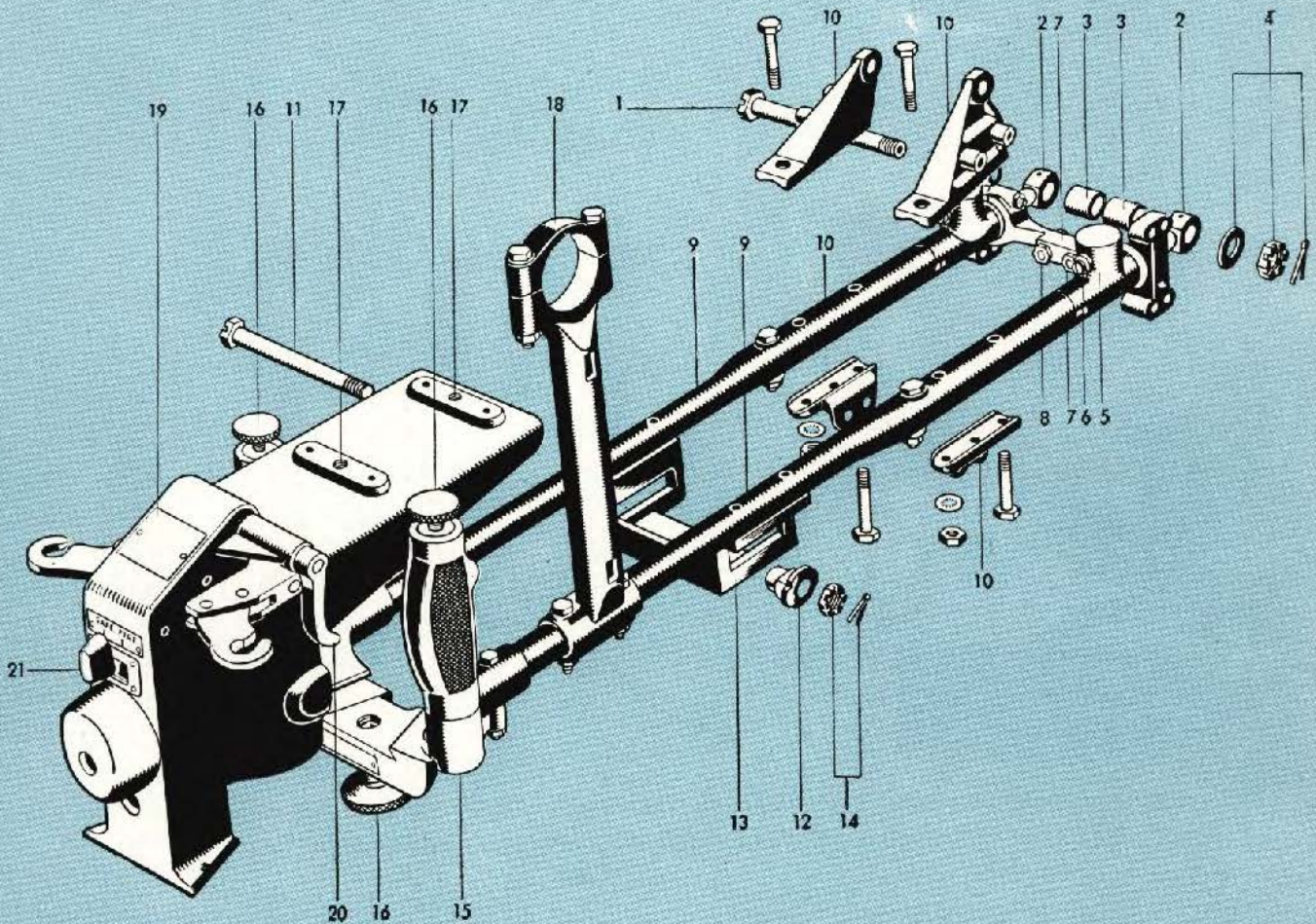
The yoke for this adapter is supplied by the airplane manufacturer in order that the required angles of fire may be obtained in each particular installation.

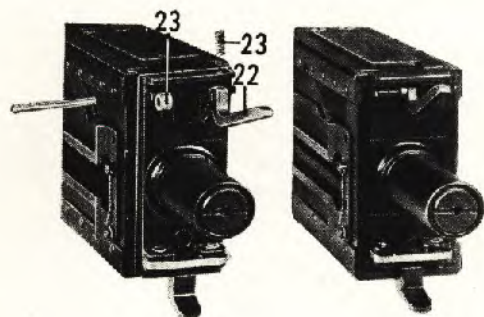




# GUN MOUNT ADAPTER

## MARK 6 MOD 3

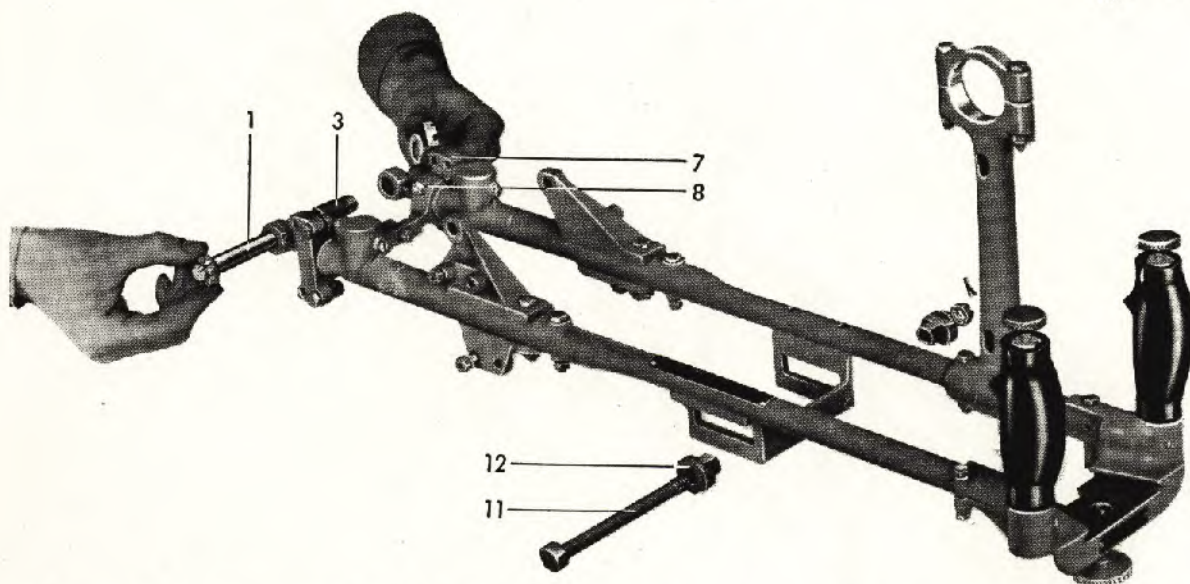
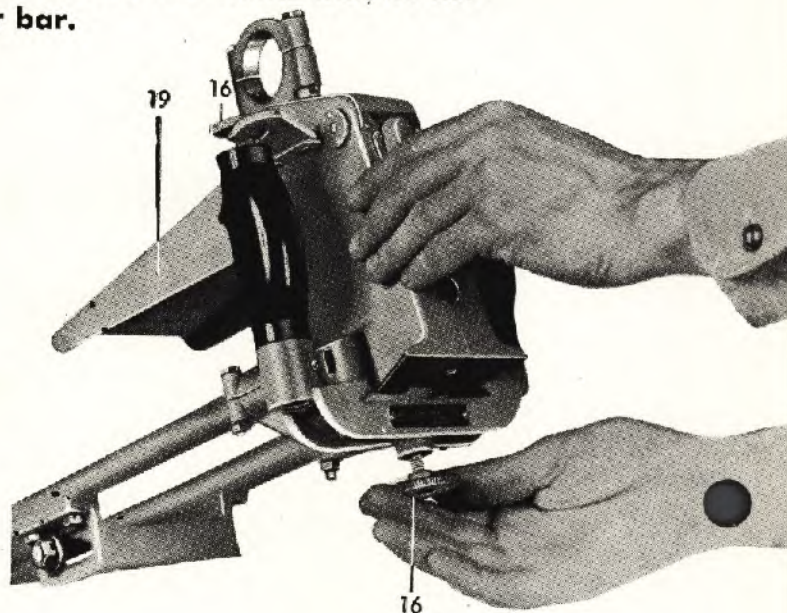




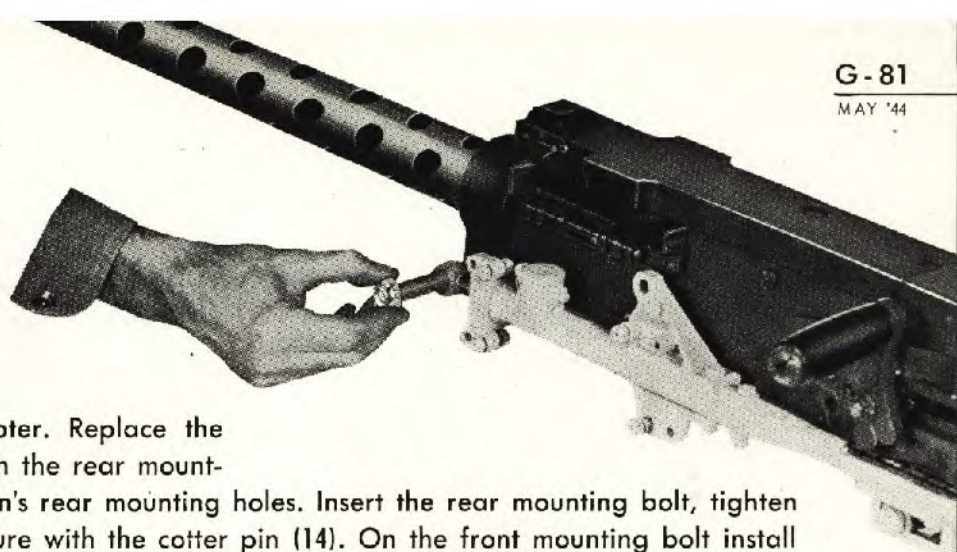
### Mounting the Mk 6 Mod 3

Remove the back plate filler piece and pin from the back plate group of the gun. Install the trigger bar spacer and spring (23) and trigger bar (22), supplied with the adapter to provide a linkage between the trigger in the back guard assembly (19) of the adapter and the trigger bar of the gun. **The spacer must be on the left hand side of the trigger bar.**

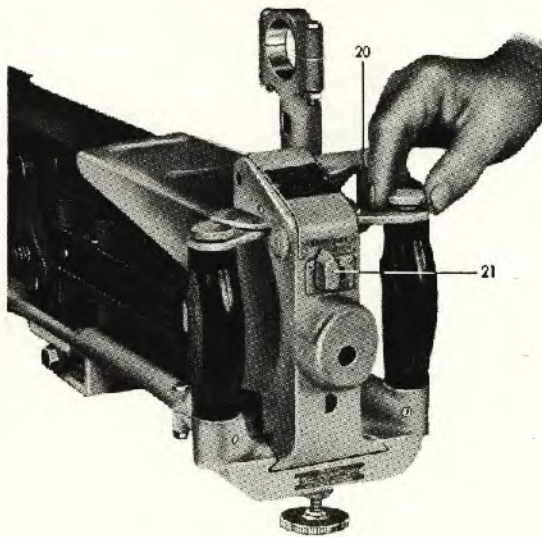
Remove the back guard assembly (19) by unscrewing the three knurled screws (16). The easiest way is to loosen the lower screw first; then, remove the back guard assembly.



Remove the rear mounting bolt (11) and rear mounting slides (12). Remove the front mounting bolt (1) and spacers (3). Loosen the front frame separator bolts (8) on the front frame separators (7).



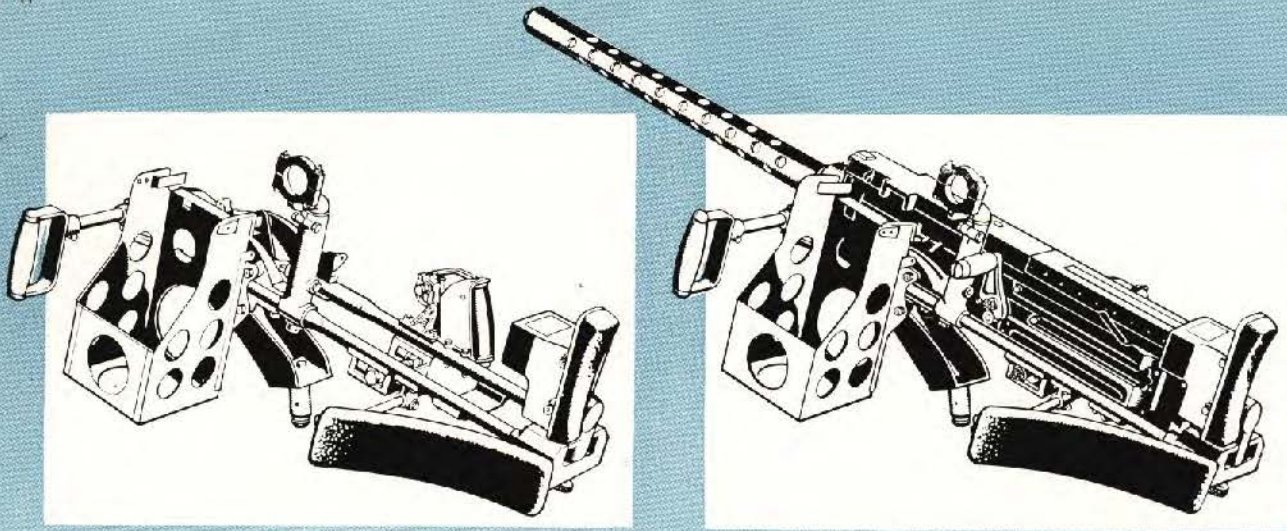
Place the gun in the adapter. Replace the rear mounting slides through the rear mounting bracket (13) and the gun's rear mounting holes. Insert the rear mounting bolt, tighten the castellated nut, and secure with the cotter pin (14). On the front mounting bolt install the spacers (3) between the piston rod eyelets (2) and the front gun trunnion. The washer goes between the nut and the eyelet. Tighten the nut and secure with a cotter pin (4). Do not tighten the two nuts mentioned enough to hamper the recoil characteristics of the adapter. Tighten the front frame separator bolts (8).



Place the back guard trigger (20) in the forward position and put safety (21) on SAFE. Install the back guard assembly by placing it on the rear of the adapter and sliding it forward. Tighten the two upper knurled screws and then the lower one. Check the installation by charging the gun and pulling the trigger of the adapter. The firing pin should snap forward.

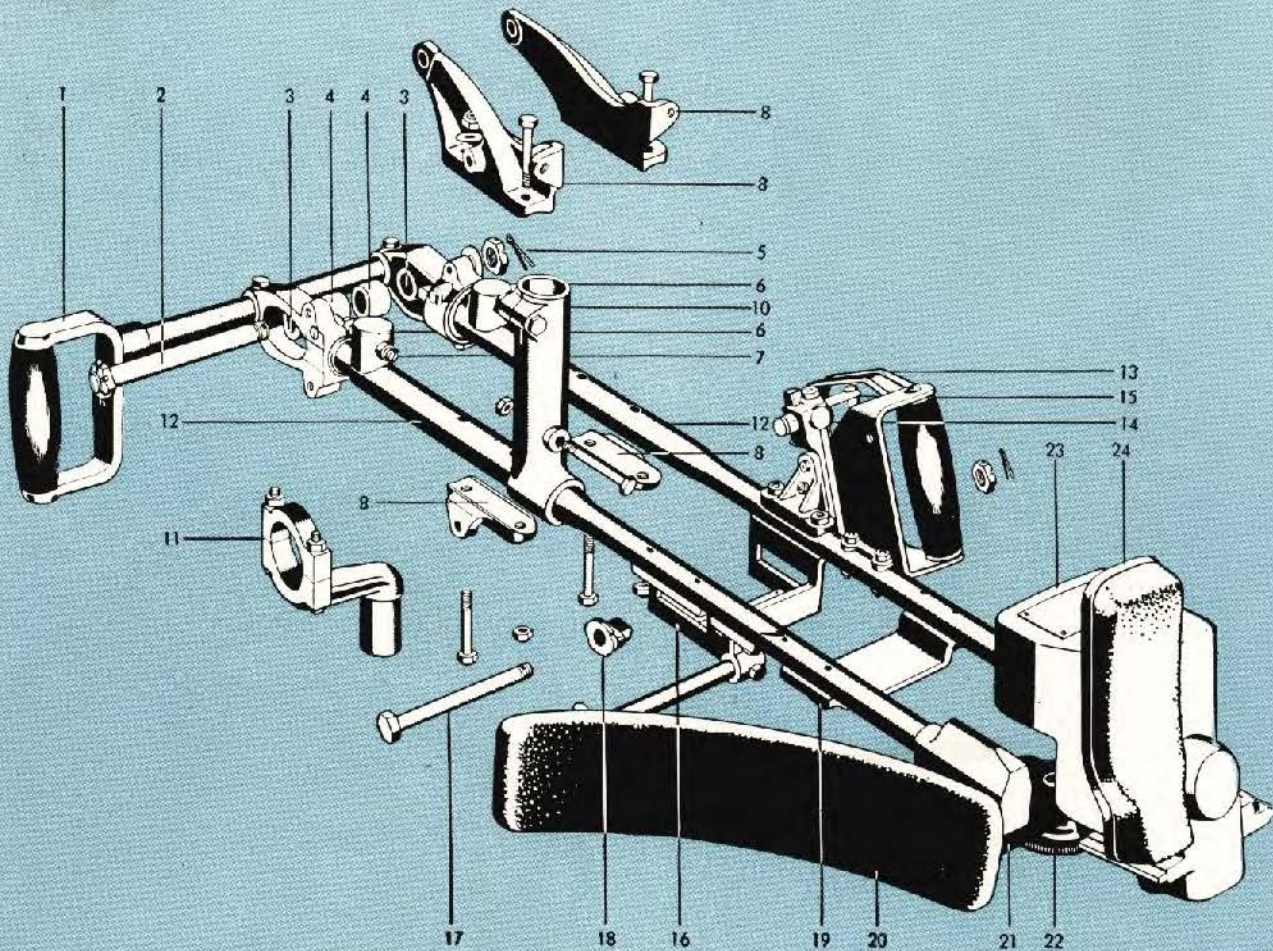
Install the magazine holder by placing it on the left side of the adapter so that the tongues are inside the guides of the gun feedway. Secure the magazine holder with the four bolts and three nuts supplied with the adapter. Install the Mk 9 or Mk 9 Mod 1 reflector sight in the sight mounting bracket (18).





# GUN MOUNT ADAPTER

## MARK 10 MOD 3



### Parts of the Mark 10 Mod 3

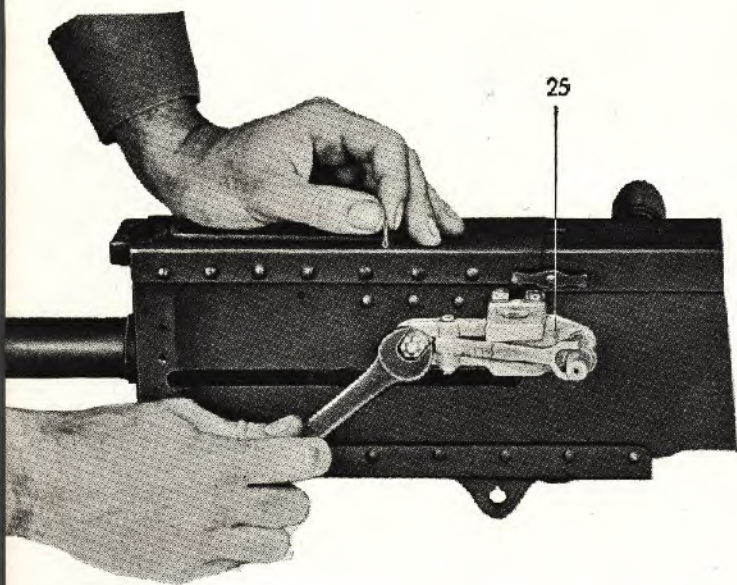
|    |                                |    |                         |
|----|--------------------------------|----|-------------------------|
| 1  | FRONT HAND GRIP                | 13 | REAR HAND GRIP ASSEMBLY |
| 2  | FRONT MOUNTING BOLT            | 14 | TRIGGER ASSEMBLY        |
| 3  | PISTON RODS AND EYELETS        | 15 | TRIGGER                 |
| 4  | SPACERS                        | 16 | REAR MOUNTING BRACKET   |
| 5  | WASHER, NUT AND COTTER PIN     | 17 | REAR MOUNTING BOLT      |
| 6  | HYDRAULIC SHOCK ABSORBER UNITS | 18 | REAR MOUNTING SLIDES    |
| 7  | FILLER PLUGS                   | 19 | BEARER BAR SEPARATOR    |
| 8  | YOKE FITTINGS                  | 20 | CHEST PAD               |
| 9  | YOKE                           | 21 | BACK GUARD SUPPORT      |
| 10 | SIGHT MOUNTING BRACKET POST    | 22 | KNURLED SET SCREW       |
| 11 | SIGHT MOUNTING BRACKET         | 23 | BACK GUARD              |
| 12 | BEARER BARS                    | 24 | SHOULDER PAD            |

### General Description of the Mk 10 Series Gun Mount Adapters

All Mk 10 adapters are basically the same and, with a few exceptions, parts may be interchanged. The Mk 10 is designed for the gunner to stand on the right side of the adapter; with the Mk 10 Mod 1 the gunner stands on the left side. Telescopic sight brackets were provided for these two adapters. The Mk 10 Mod 2 is designed for the gunner to stand on the right side of the adapter; with the Mk 10 Mod 3 the gunner stands on the left side. The Mk 10 Mod 2 and Mod 3 have a sight mounting bracket for mounting the Mk 9 or Mk 9 Mod 1 reflector sight.

The Mk 10 type adapter is for a single caliber .50, handheld gun. This is a side firing mount equipped with a spring and hydraulic shock absorbing device. The gun recoils within the mount which has necessitated the design of a sliding trigger in the housing plate assembly and special feed tongues on the magazine holder. This adapter has shoulder and chest pads designed to give maximum control and leverage. Since the gunner moves with the adapter as the gun is trained, the tendency of the eye to move away from the sight is reduced to a minimum.

The following text and illustrations show the assembly of a caliber .50 BAM gun to a Mk 10 Mod 3 gun mount adapter. These instructions will serve as a general guide for the Mk 10 series.

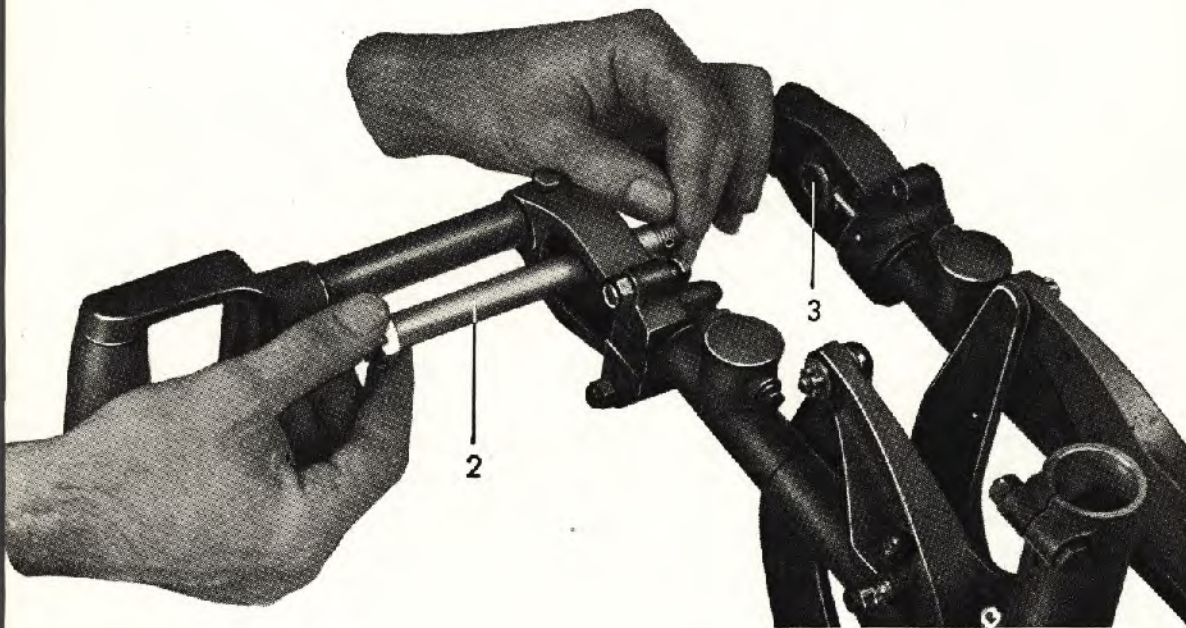


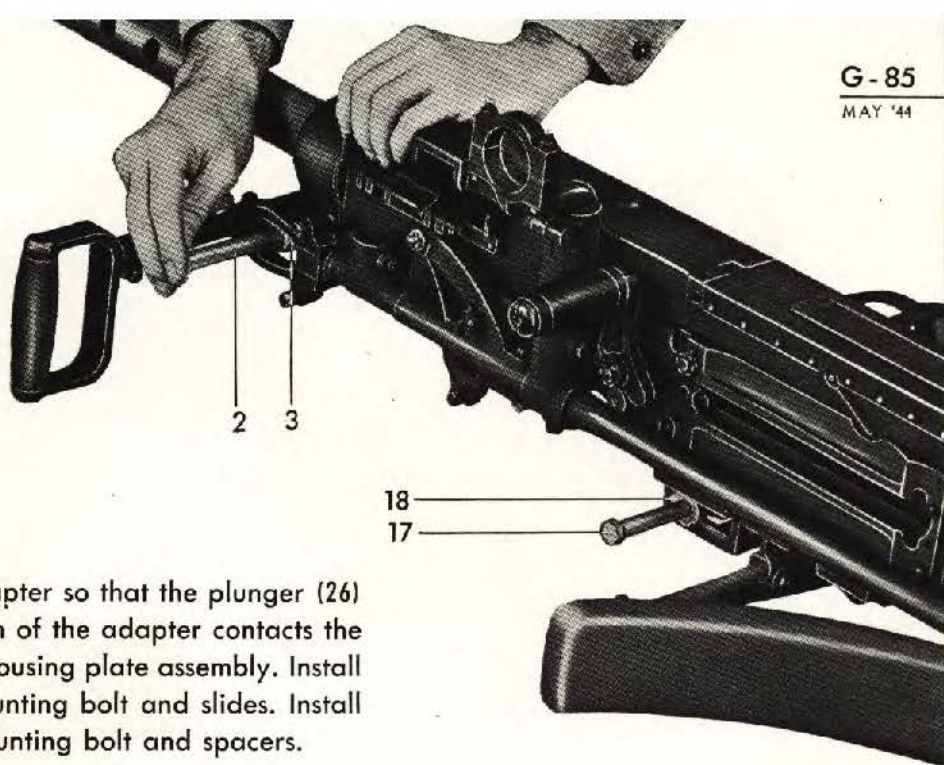
Loosen the knurled set screw (22) and remove the back guard (23) from the adapter.

Remove the front mounting bolt (2) and spacers (4) from the piston rod eyelets (3) of the hydraulic shock absorber units (6). Remove the rear mounting bolt (17) and rear mounting slides (18) from the rear mounting bracket (16).

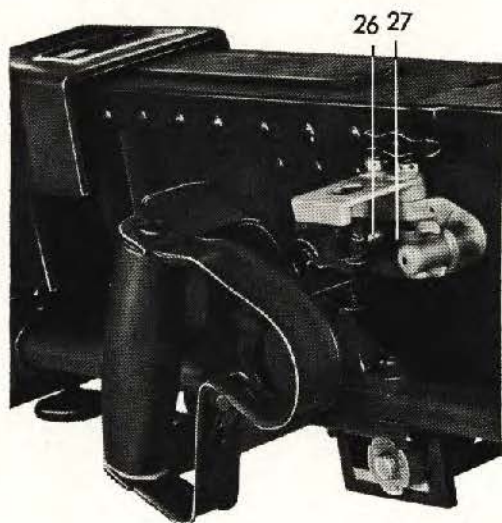
### Mounting the Mk 10 Mod 3

Install the housing plate assembly (25) on the right side plate of the gun. Install the retracting slide assembly of the gun on the left side plate. (Reverse this procedure if the Mk 10 Mod 2 is used.)



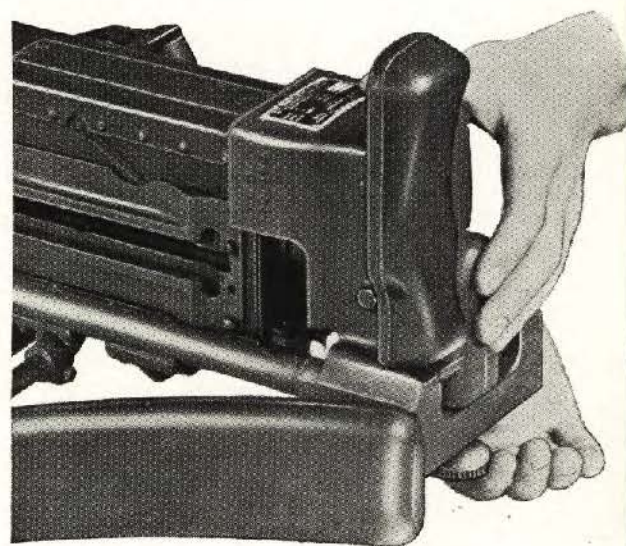


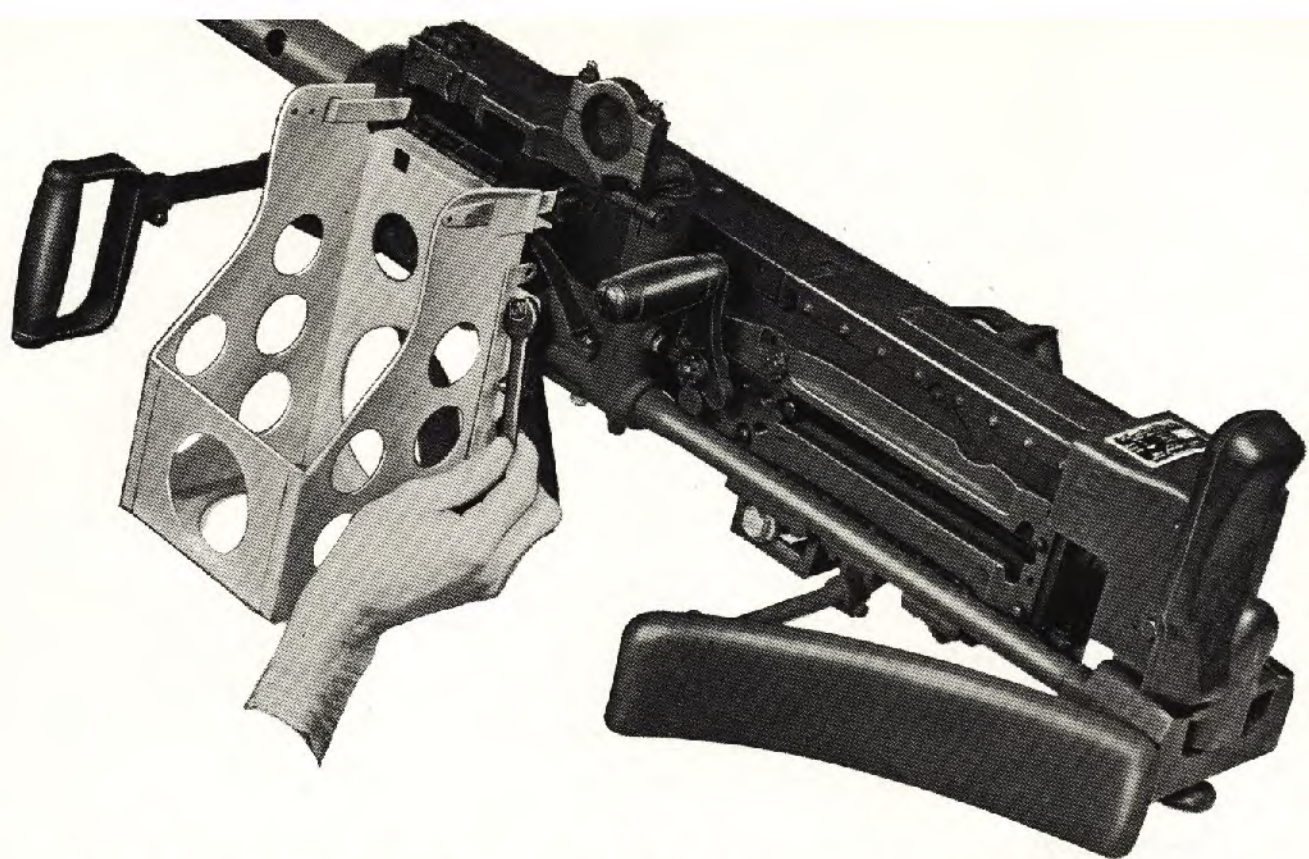
Place the gun in the adapter so that the plunger (26) of the trigger mechanism of the adapter contacts the spring lever (27) of the housing plate assembly. Install and secure the rear mounting bolt and slides. Install and secure the front mounting bolt and spacers.



Install the back guard by sliding it all the way forward in the grooves at the rear of the mount. Screw the knurled set screw located under the mount to lock the back guard in place.

Install the magazine holder by placing it on the mount so that the feed tongues are inside the feedway guides of the gun feedway. Secure the magazine holder to the adapter with the three bolts and four nuts supplied with the adapter.



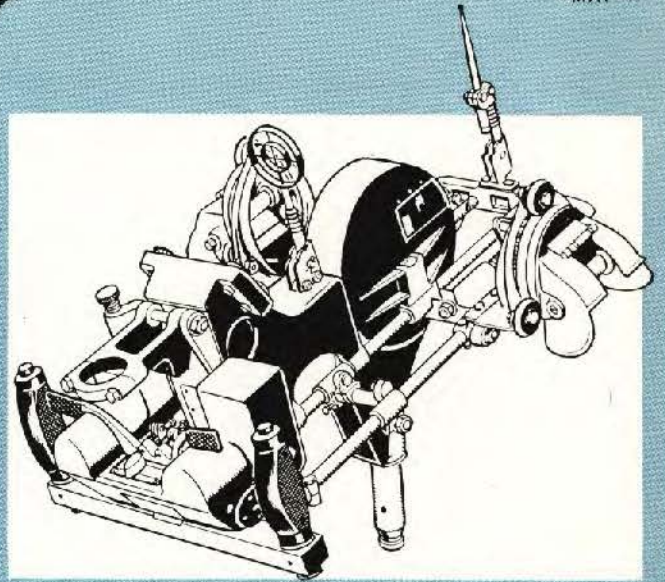
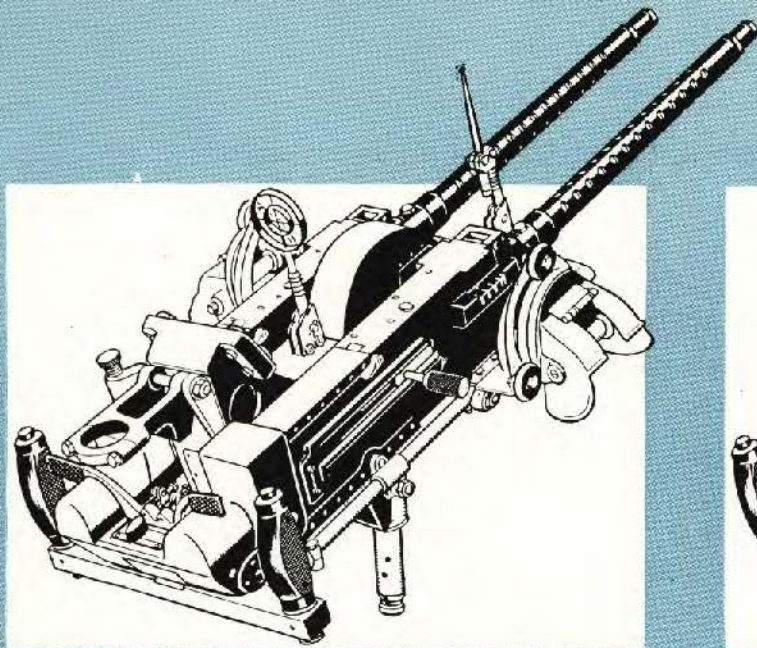


Install the Mk 9 or Mk 9 Mod 1 reflector sight in the sight mounting bracket (11).

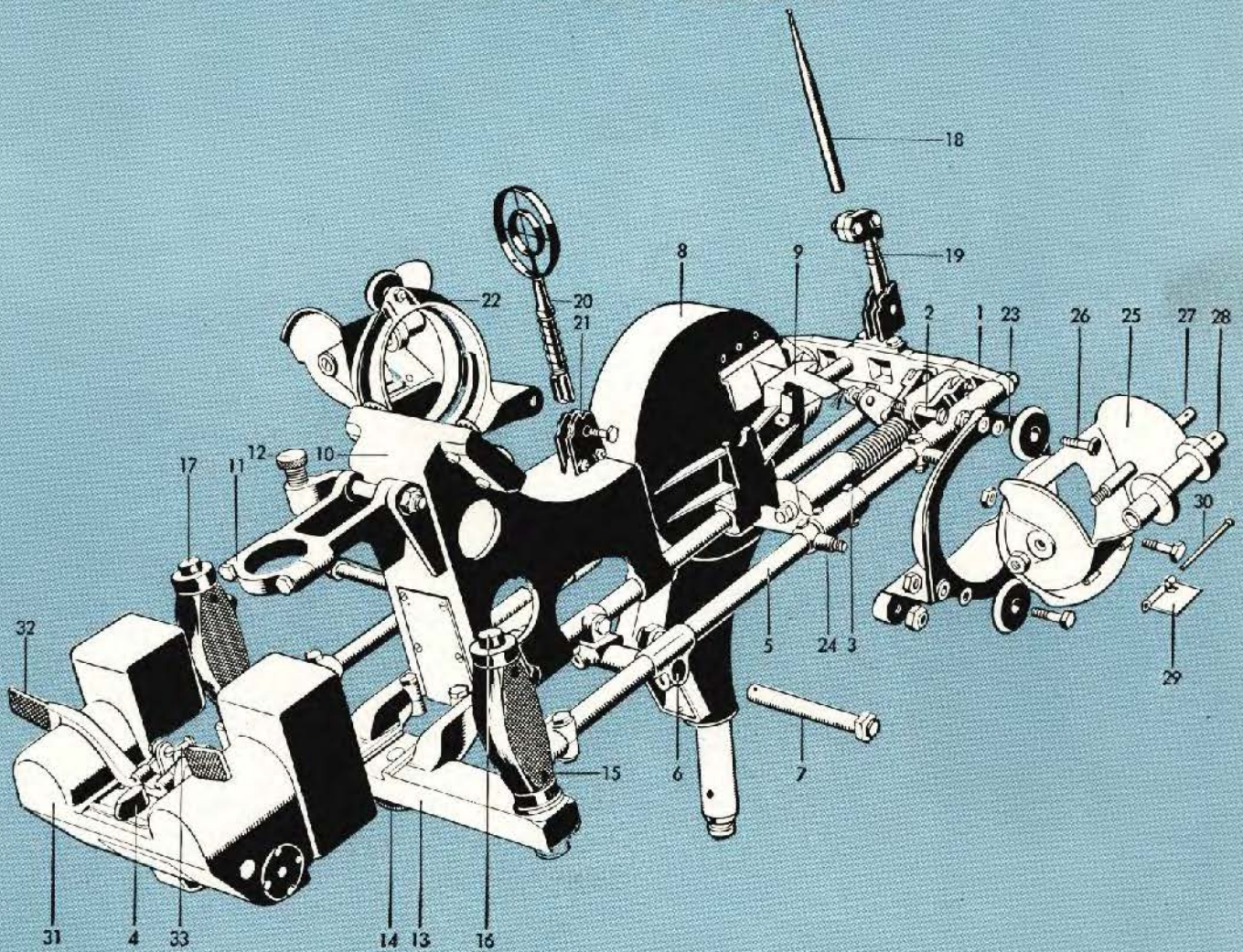
### Parts of the Mark 11 Mod 3

- |  |                                       |
|--|---------------------------------------|
| 1 FRONT SUPPORT                                | 18 FORE POST                          |
| 2 FRONT MOUNTING BOLT                          | 19 FORE POST BRACKET ASSEMBLY         |
| 3 PNEUMATIC SHOCK ABSORBER UNITS               | 20 RINGSIGHT                          |
| 4 PISTON RODS                                  | 21 RINGSIGHT BRACKET ASSEMBLY         |
| 5 BEARER BARS                                  | 22 CONTINUOUS FEED UNIT               |
| 6 REAR MOUNTING SLIDE                          | 23 CONTINUOUS FEED UNIT GUIDE         |
| 7 REAR MOUNTING BOLT                           | 24 CONTINUOUS FEED UNIT MOUNTING STUD |
| 8 LINK EJECTION CHUTE                          | 25 CHUTE AND ROLLER UNIT              |
| 9 LINK DEFLECTORS                              | 26 ECCENTRIC BOLT                     |
| 10 ARMOR PLATE BRACKET                         | 27 AMMUNITION ROLLER SHAFT            |
| 11 REFLECTOR SIGHT BRACKET                     | 28 AMMUNITION ROLLER                  |
| 12 REFLECTOR SIGHT SUPPORT ADJUSTMENT ASSEMBLY | 29 CONTINUOUS FEED PAWL               |
| 13 BACK GUARD SUPPORT                          | 30 CONTINUOUS FEED PAWL PIN           |
| 14 KNURLED SET SCREW                           | 31 BACK GUARD                         |
| 15 HAND GRIPS                                  | 32 TRIGGER                            |
| 16 CAMERA SWITCH                               | 33 TRIGGER ADJUSTING SCREW            |
| 17 MICROPHONE SWITCH                           | 34 SAFETY                             |





# GUN MOUNT ADAPTER MARK II MOD 3



## General Description of the Mk 11 Mod 3 Gun Mount Adapter

The Mk 11 Mod 3 is a twin, caliber .30, flexible gun mount adapter. It is an improvement over its predecessors—the Mk 11 Mod 1 and Mod 2—in that it has a better positioned bracket for mounting the Mk 9 or Mk 9 Mod 1 reflector sight. The Mk 11 rear ring and Mk 1 Mod 1 front post sights may also be installed as standby sights.

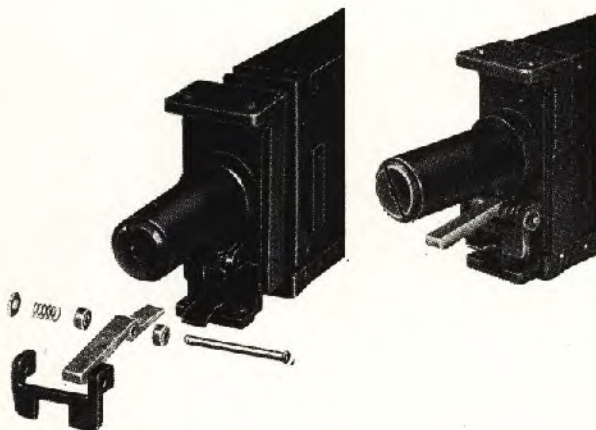
The Mk 11 Mod 3 gun mount adapter is designed to absorb the recoil of two caliber .30, BAM guns by means of pneumatic shock absorber units. During firing the piston rods and rear mounting slides recoil with the gun while the bearer bars and back guard unit remain stationary. This adapter has provisions for mounting face, side and shoulder armor.

A continuous feed unit on the outboard side of each gun insures the straight feeding of the ammunition belt into the gun feedway at all angles of fire. Each continuous feed unit is equipped with a continuous feed pawl, which prevents the ammunition belt from sliding out of the feedway when the cover of the gun is raised. The guns are assembled so that feeding is from the left side for the port gun, and from the right for the starboard gun. The retracting slide assembly must be installed on the feeding side of each gun.

On the top of each hand grip of the adapter is a push button. The button on the left hand grip is a switch for the gunner's microphone. The right hand grip switch operates the gun camera which is installed on the starboard gun.

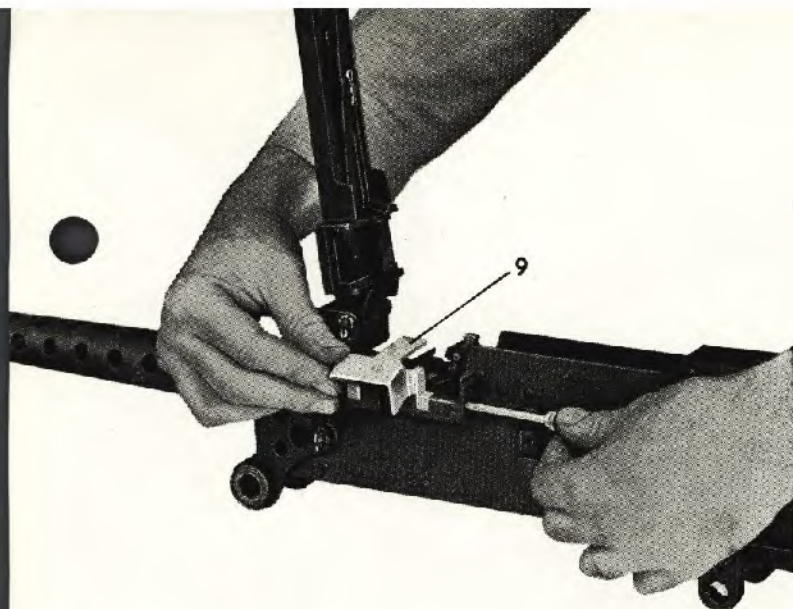
Right and left link deflectors are installed to cause the ejection of belt links into the centrally located link ejection chute. No provision is made for collecting the expended links or cartridge cases.

The Mk 14 is another twin, caliber .30 gun mount adapter. It is very similar to the Mk 11 Mod 3. It was developed to fit in the nose of PBV-5 and PBV-5a airplanes. The Mk 14 differs from the Mk 11 Mod 3 in that the continuous feed units are closer to the centerline to fulfill clearance requirements. The face armor bracket has been removed and a somewhat different bracket provided to mount a Mk 9 or Mk 9 Mod 1 reflector sight.



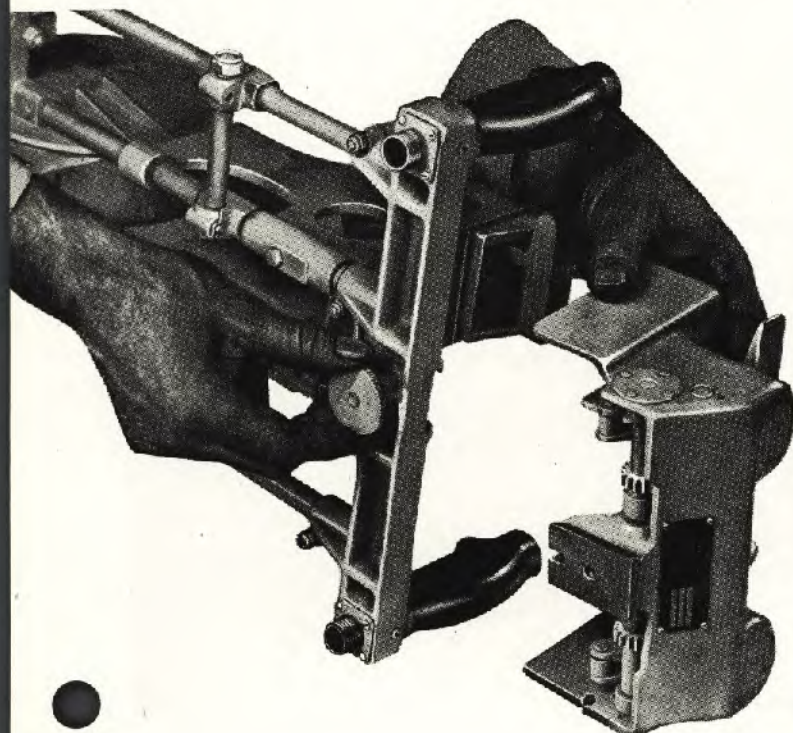
### Mounting the Mk 11 Mod 3

Remove the latch lock pin, latch lock spring, and latch lock from the back plate group of the gun. Insert the bell crank and spacers supplied with the adapter. The bell crank fits over the latch spring. Reassemble the back plate group of the gun.



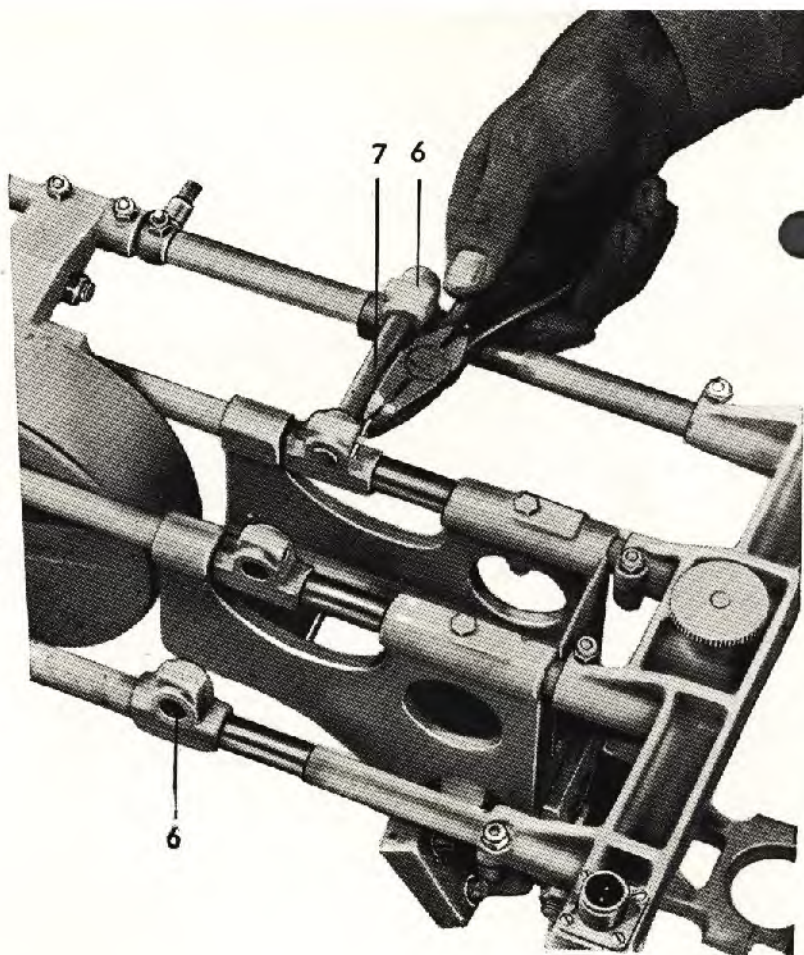
Remove the belt holding pawl pin from the gun and install the link deflectors (9) which are provided with the adapter. Replace the belt holding pawl pin.

Remove the front and rear mount adapters from the gun. Install the rear mount adapters provided with the adapter. The gun is now ready to be installed.

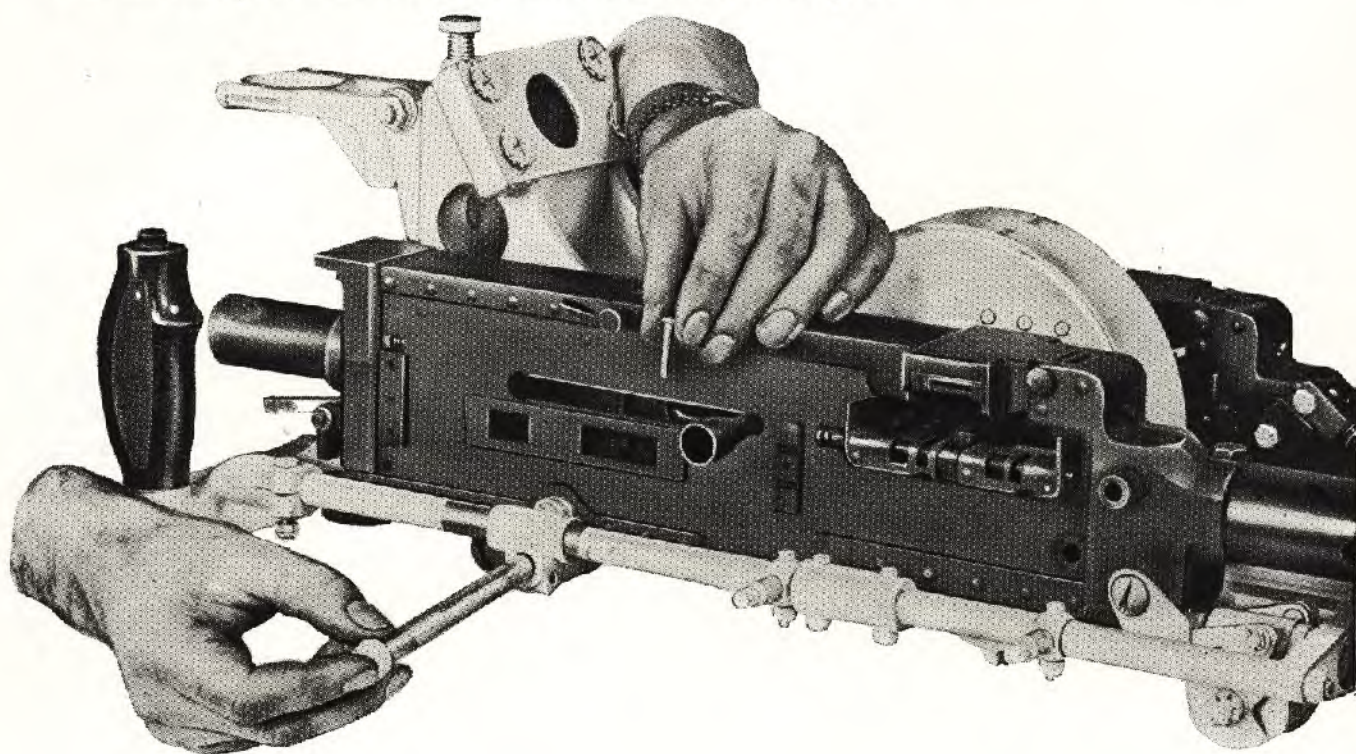


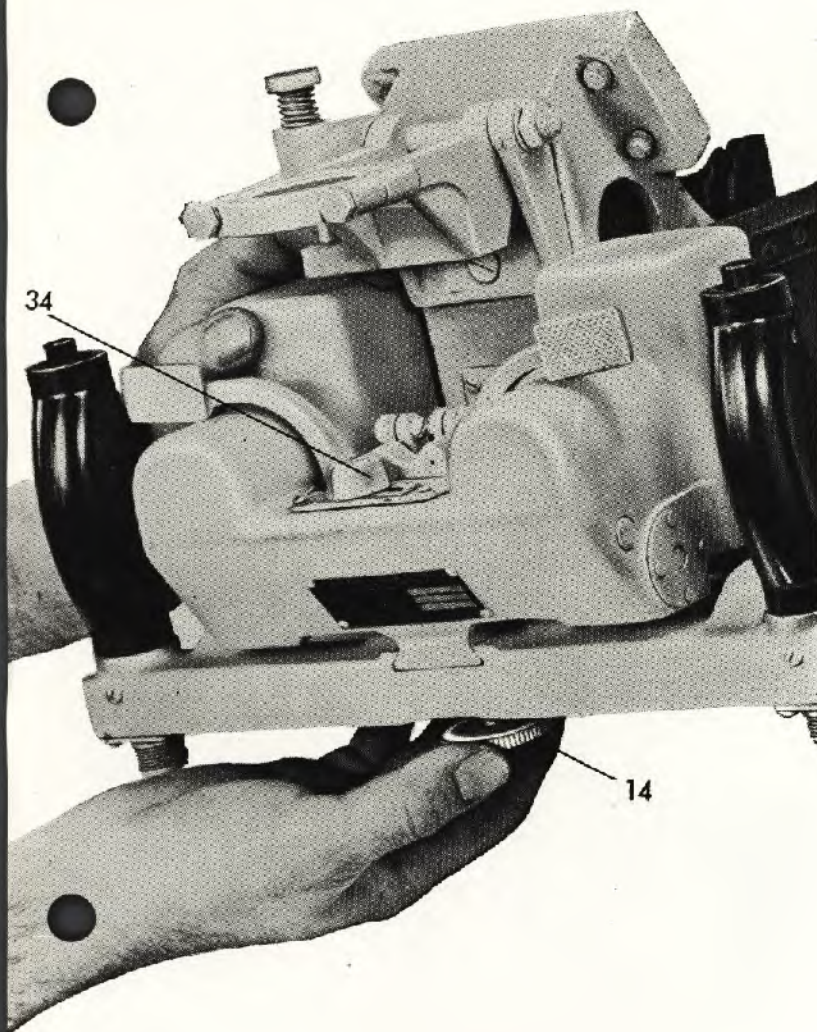
Remove the back guard (31) by unscrewing the large knurled set screw (14) on the under side of the back guard and sliding the assembly rearward until free.

Remove the front mounting bolt (2). Remove the rear mounting bolt (7) by removing the cotter pin and clevis pin from the inboard end of the bolt and withdrawing it from the rear mounting slides (6). The adapter is now ready to receive the guns.



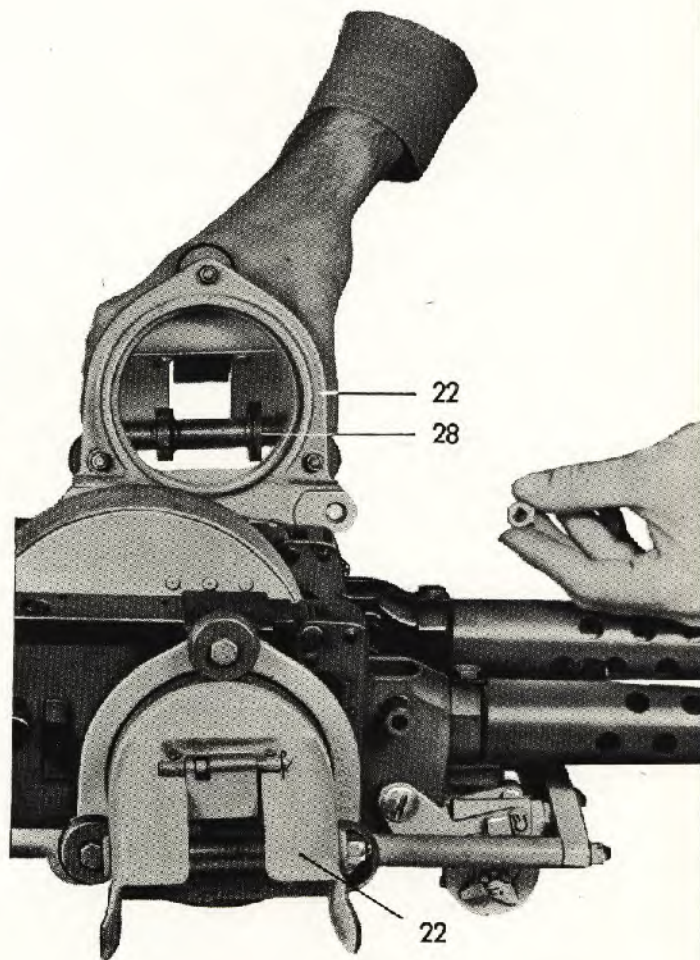
Place the guns in the mount adapter making certain that the link deflectors enter the centrally located link ejection chute (8). Insert the rear mounting bolt from the outboard side of the adapter and secure it with the clevis and cotter pins.

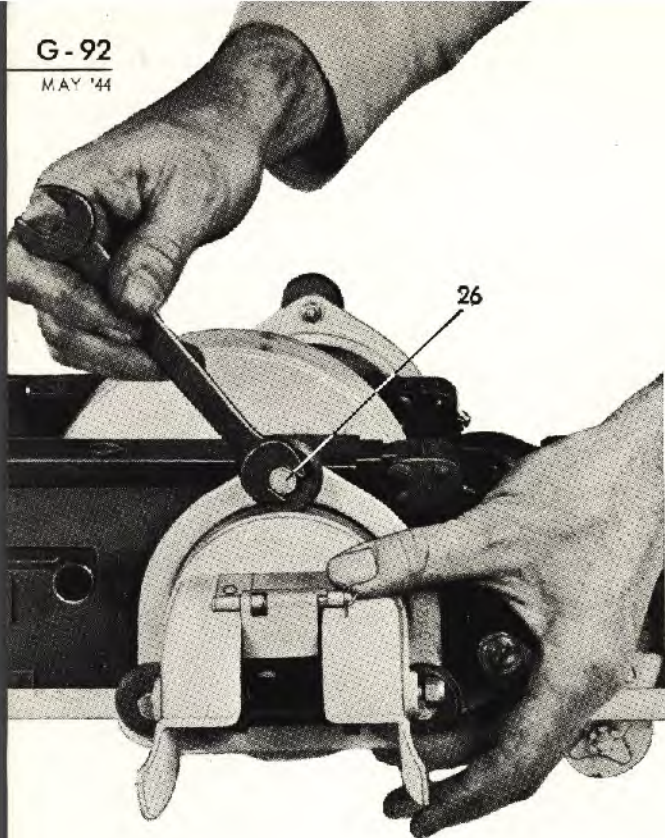




Place the trigger safety (34) on "SAFE." Install the back guard by sliding it into the grooves at the rear end of the adapter. Screw the knurled screw underneath the adapter to lock the back guard in place. Check to be sure that the rollers are below the trigger bell cranks.

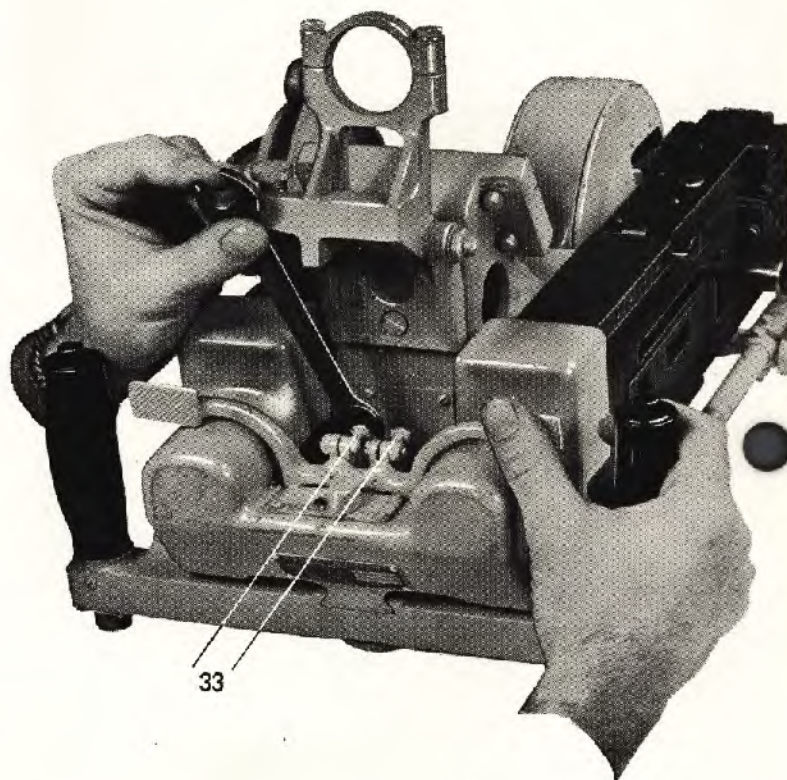
Install the right and left hand continuous feed units (22) and secure them to the mount adapter by means of the two fiber lock nuts supplied for each unit. The large diameter of the ammunition roller (28) in the continuous feed unit must always be forward.





Remove the slack from the continuous feed units by loosening the eccentric bolt nut and rotating the eccentric bolt (26). Hold this bolt with a wrench and tighten the nut again. The continuous feed units should rotate smoothly and easily.

Loosen the lock nuts and adjust the trigger adjusting screws (33) until both guns fire together when the trigger is pushed. Tighten the lock nuts and check the operation. This adjustment must be made each time the guns are removed from the adapter.



Install the Mk 9 or Mk 9 Mod 1 reflector sight in the sight bracket (11). Also install the Mk 11 rear ring sight and the Mk 1 Mod 1 fore post as standby sights.



**AMMUNITION & LOADING**

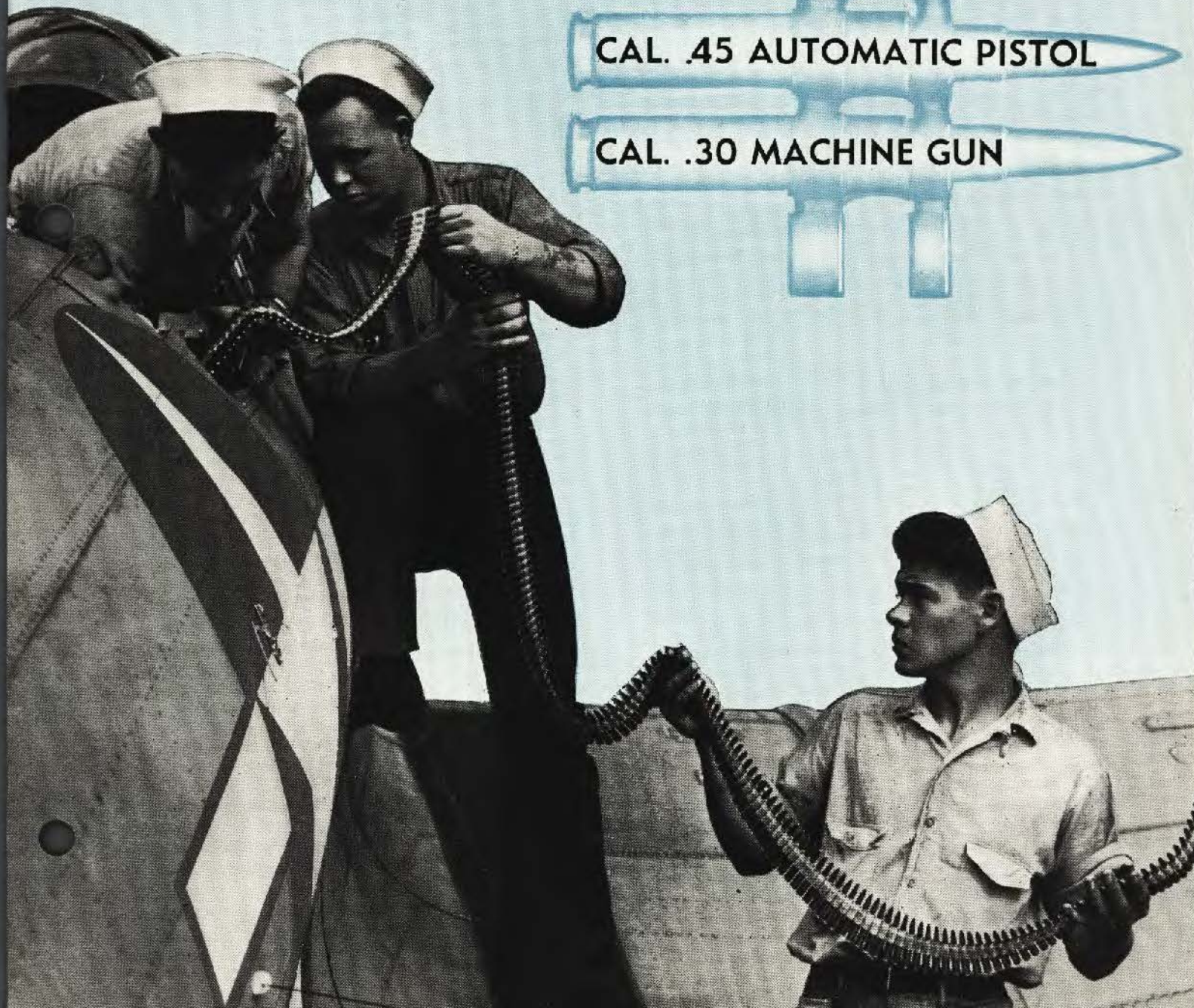
**PRE-FLIGHT CHECKS**

**POST-FLIGHT CHECKS**

**TROUBLE SHOOTING**

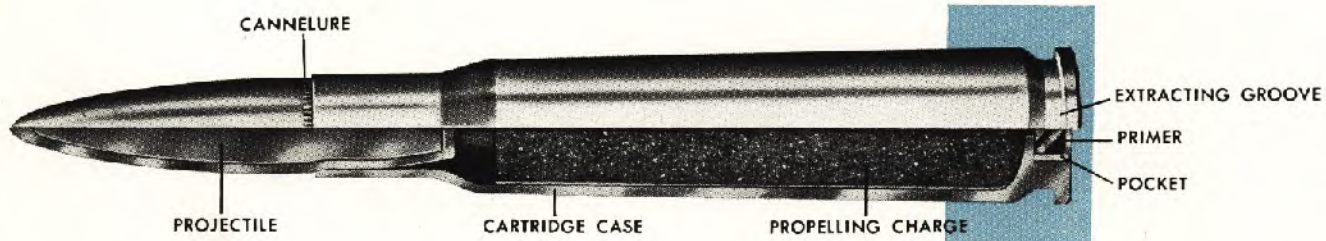
**CAL. .45 AUTOMATIC PISTOL**

**CAL. .30 MACHINE GUN**



# YOUR AMMUNITION

Depending on the job to be done, several types of projectiles can be fired from the caliber .50 machine gun. But the method of firing the round is the same in all cases.

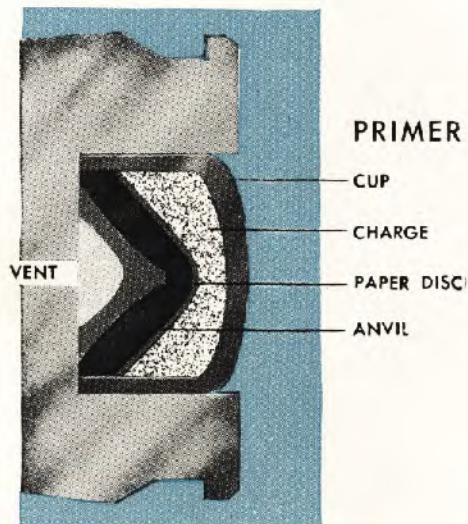


The **primer** consists of a brass **cup**, a highly explosive **primer charge**, a shellacked **paper disk** to keep out moisture, and a brass **anvil** with a pointed end.

The primer fits into a circular **primer pocket** in the base of the cartridge case. The front edge of the case is bent into a groove, or **cannelure**, in the side of the bullet to hold it in place.

When the gun's firing pin dents the primer cup, the primer charge, squeezed between the cup and anvil, explodes.

Flame flashes around the anvil and through a **vent** in the cartridge case, setting fire to the **propelling charge**, a quantity of black, smokeless powder loosely packed in the case. The propelling charge does not explode all at once, but burns steadily from back to front in a fraction of a second. Gases given off by this



burning create the chamber pressure of about 50,000 pounds to a square inch.

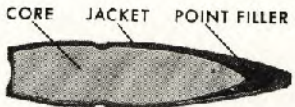
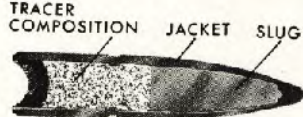
The case is forced against the sides of the chamber, and the projectile is blown forward out of the case and through the barrel.

## Types of Ammunition

The types of ammunition used by aerial gunners can be identified by colors painted on the tips of the bullets.

The chart on the next page shows the kinds of ammunition, and the use, identification, and construction of each type.



| TYPE   | USE  | COLOR OF TIPS                                    | HOW IT WORKS   |
|--|--|--|--|
| <p><b>Ball</b><br/>(Cartridge, ball, caliber .50, M2)</p>  | <p>Used against personnel and light material targets.</p>  | <p>Unpainted; plain copper color</p>             |  <p>A <b>jacket</b> of copper-colored gilding metal encloses the steel <b>core</b>. A lead and antimony <b>point filler</b> fills up the space between the point of the core and the jacket.</p> <p>When the projectile hits a target, the soft jacket smears, giving the steel core a grip. The core penetrates the surface instead of being turned aside.</p> |
| <p><b>Armor-piercing</b><br/>(Cartridge, armor-piercing, caliber .50, M2)</p>                    | <p>Used against armored aircraft and vehicles, concrete shelters, and other bullet-resisting targets.</p>        | <p>Black</p>                                     | <p>The projectile is the same as a ball cartridge, except that the core is made of a very hard tungsten chrome steel to give it greater penetrating power.</p>   |
| <p><b>Tracer</b><br/>Cartridge, tracer, caliber .50, M2 or M10</p>                               | <p>Used for observing fire—it makes a streak of light easily seen at night, and usually visible in daylight.</p> | <p>Red</p>                                       |  <p>Inside the gilding metal jacket is a <b>slug</b> of lead and antimony. Behind it is a pocket of <b>tracer composition</b> which is set afire by the propelling charge as the projectile leaves the cartridge case.</p>   |
| <p><b>Incendiary</b><br/>(Cartridge, incendiary, caliber .50, M1)</p>                            | <p>Used to set fire to explosive or very inflammable targets, like gasoline tanks and balloons.</p>              | <p>Light blue</p>                                | <p>In the front of the jacket is an <b>incendiary composition</b>. It is sealed by <b>plugs</b> of an alloy, which melts easily. As the bullet goes through the barrel, the heat melts the plugs. The incendiary composition is set on fire when the air touches it.</p>   |
| <p><b>Dummy</b><br/>(Cartridge, dummy, caliber .50, M1 or M2)</p>                                | <p>Used in training.</p>   | <p>Unpainted<br/>(Hole in side of case)</p>      | <p>A round with no priming charge and no propelling charge. A hole is drilled in the side of the case.</p>   |
| <p><b>Armor-piercing Incendiary</b><br/>(Cartridge, armor-piercing incendiary, cal. .50, M8)</p> | <p>To set fire to armor-plated inflammable objects, such as the gas tanks of fighter planes.</p>                 | <p>Black, with a small blue tip on the nose.</p> | <p>Similar in construction to armor-piercing projectile, except that there is incendiary compound behind the steel core.</p>   |

### Colored ink marking

Another kind of marking sometimes is used in target practice. The tips of the bullets are painted in lithographic ink, which leaves colored smears when the bullet hits the target.

When several gunners fire at the same target, a different color is assigned to each gunner. The scores can be determined by counting the colored smears on the target.

### Care and Handling

Ammunition which is carelessly stored or handled soon develops defects which may stop your gun in the midst of an attack. These tips are worth remembering:

Since small arms ammunition deteriorates quickly when exposed to the direct rays of the sun, it should be stored indoors whenever possible.

If it must be stored in the open, the boxes should be raised on blocks at least six inches above the ground, and covered with a double thickness of tarpaulin draped in such a manner that air can circulate freely through the pile. Dig a trench around the pile to keep water out. Don't remove ammunition from its air-tight packing boxes until it is needed—it corrodes rapidly, especially in damp climates.

These storage precautions apply especially to tracer ammunition, which deteriorates quickly when it becomes damp, and may go off spon-

taneously if it gets too warm. Tracer should be stored separately from other ammunition if possible.

Keep the cartridges free of mud, sand, dirt, and water. If they do get dirty, wipe them off at once.

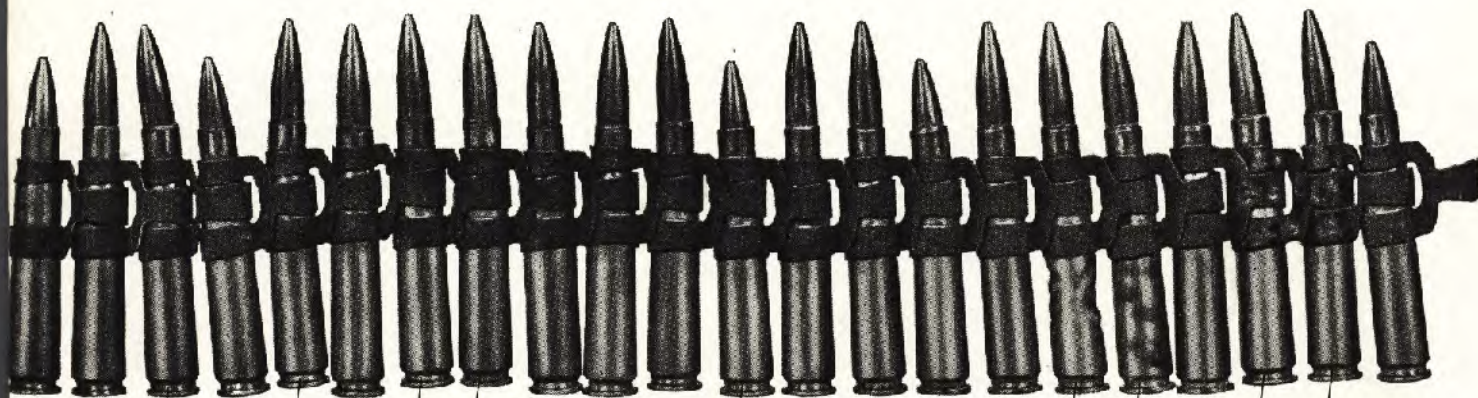
Never use grease or oil on ammunition.

Small arms ammunition will not explode violently if it is in a fire. But each cartridge will explode individually, sending the case flying in one direction and the projectile in another. Unless you are engaged in fighting the fire, don't stand near it.

### Checking Ammunition

To avoid stoppages in combat, check your ammunition carefully before loading it into the ammunition can of your bomber, unless you are absolutely sure it has already been checked by ordnance.

If a clean, dry floor is available, lay the belt out in a long row and examine it carefully. If the only space available is muddy or greasy, check your ammunition by loading it, double-end first, into a box. Then load it into your ammunition can, single-end first, watching for defective rounds as you pull the belt toward you. You will probably never see a belt of ammunition this bad, but the picture shows what you should watch for while checking ammunition. Remove any defective rounds.



LOOSE PROJECTILE

BENT ROUND

UNEVEN LINKING

The base of these rounds are out of line with the others, and the extractor hook might not reach them.

SHORT ROUND

As the belt feeds into the gun, this round might be pushed forward so far that the extractor hook could not reach it.

DENTED CASE

CORRODED CASE

CORRODED LINKS

# LOADING YOUR AMMUNITION

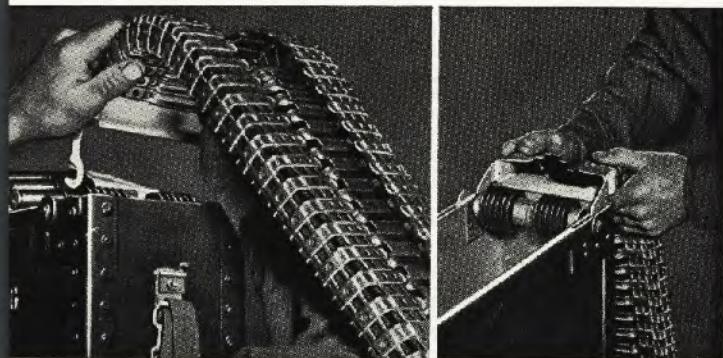
In the bomber, ammunition for hand-held guns is carried in steel or wooden containers, usually mounted above or to the side of the gun position. The ammunition belt feeds out the top of the container, over a roller, and through a flexible feed chute attached to the gun.



## Load the ammunition into the container

with the single end of the links going in first, so that the double end will go into the gun. Put the rounds in the container in even layers, checking for defective cartridges as you go.

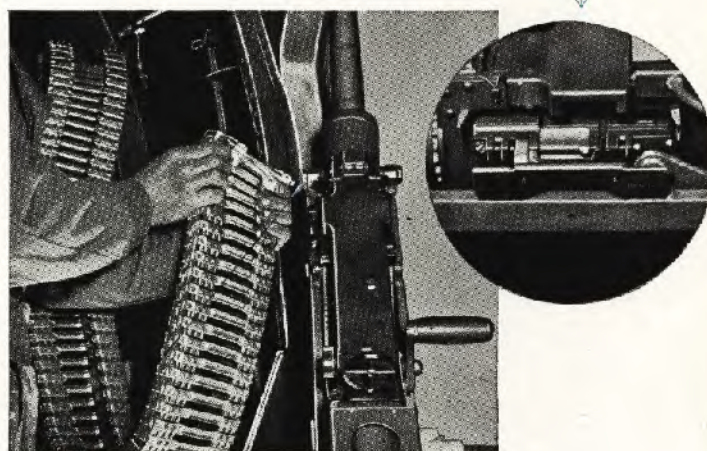
Mount the container in the bomber, with its roller toward the gun. Methods of mounting the container vary in different planes and different combat theaters—it may sit on the floor, or be fastened into a rack with clamps, pins, or straps.



Attach the feed chute to the container, open side up, by pushing its two hooks into the slots in the sides of the container and pull-

ing them under the pin that holds the roller. (In some cases, pins or clamps are used to fasten the chute.)

Mount a feed chute adapter on the gun on the same side as the belt holding pawl. Remove the belt holding pawl pin, straddle the belt holding pawl with the projections of the feed chute adapter, and replace the pin.



Attach the feed chute to the adapter. Squeeze the two handles on the bottom of the flexible feed chute—this will open a slot in the front of the chute.



Push the slot down over the T-shaped wings of the adapter and release the handles.

Feed the end of the ammunition belt over the roller and into the top of the chute, and pull it down to the gun. Load the end of the belt into the feed-way in the usual manner.

# PRE-FLIGHT AND POST-FLIGHT CHECKS

Thorough care and inspection of your gun before and after every mission are your insurance that the gun will always start firing when you want it to, and keep on firing.

The inspections take time, and they are worth every minute of it. Gunnery officers in some theaters, for example, try to allow a full hour for the pre-flight check and two hours for post-flight.

Follow this check list. Never omit a single step. Leaving out a single check, just one time, may cause the loss of an airplane—plus the crew.

## PRE-FLIGHT CHECK LIST

### Before assembling the gun . . .

- 1 Check the T-slot for burrs.
- 2 Check the recesses in back of the bolt, firing pin port, and driving spring hole for dirt, excessive oil, or fouling.
- 3 Check the oil level in the oil buffer tube.
- 4 Check the bore and chamber for dirt or excess oil. Pull a clean, dry rag through the barrel.
- 5 Check the receiver to see that the extractor switch and its spring, the belt holding pawl, and cartridge stops are clean and correctly assembled.

### After assembling the gun . . .

- 6 Check the bolt switch, belt feed slide, and cartridge stops for direction of feed.
- 7 Check the operation of the cover latch and detent pawl.
- 8 Check all cotter pins (especially those on the extractor switch and belt feed lever).
- 9 Check the safety wiring on the retracting slide.
- 10 Check the four adjustments: buffer adjusting screw, oil buffer, headspace, timing.
- 11 Hand-charge the gun, testing it for smooth operation and correct action of the firing mechanism.

### On the adapter . . .

- 12 For the Mk 6 Mod 3 and the Mk 10 adapters check the oil level in the hydraulic units.

- 13 Mount the gun in the adapter and check for proper mounting and safety wiring.
- 14 Before loading the gun, hand-charge the gun in the adapter, testing for smooth operation and firing.
- 15 Charge three or four rounds through the gun to check the feeding mechanism. (Be sure the safety is in the SAFE position. Don't feed ammunition into the gun while it is in stowed position, pointed at any part of the ship, or aimed in any direction that might endanger personnel or equipment on the field.)
- 16 Clear the gun, raising the cover to make sure the feedway and chamber are empty.
- 17 Check the sights to make sure they are not loose or damaged. (The pre-flight checks for optical and computing sights are listed in the sights section.)
- 18 If ordnance does not do it, check your ammunition for corroded, dented, or bulged cases; short rounds; incorrect linking, and bent or rusty links.

### And finally . . .

- 19 If operating policy permits, take along a screwdriver and combination tool, one complete spare bolt group, and as many other spare parts as possible.
- 20 When a new gun is issued to you, test-fire at least 75 rounds before using it on a mission.

**POST-FLIGHT CHECK LIST**

- 1 First, make sure the chamber is empty.
- 2 Before leaving the ship, check for any damage to the feed chute or ammunition box.
- 3 Report all malfunctions, give the cause if possible, and make sure they are corrected.
- 4 Thoroughly clean and oil the gun. As you reassemble the gun, check it part by part, group by group, always in the same order. Usually there will be a spring chart available. Compare the springs with the chart. If you find a spring shorter than the chart shows, it is weak—replace it. To check parts such as the sear notch for wear, compare them with new parts. After cleaning, as you assemble the gun, make the following checks:

**In the receiver . . .**

- 5 Check for adjustment of the breech lock cam, burrs on the cam, or dirt under the cam.
- 6 Check for burrs at the rear end of the extractor switch, rust or primer salts on the switch spring, dirt or deposits in the switch recess in the side plate, new cotter pin, operation of the switch after installing it.
- 7 Check for weak belt holding pawl spring and worn belt holding pawl.
- 8 Check for condition of the cartridge stops.

**In the barrel group . . .**

- 9 Check bearing surface for dirt or corrosion.
- 10 Check the bore and chamber for wear or damage.
- 11 Check for burrs on the barrel extension shank.
- 12 Check for burrs or wear at the top and bottom front edges of the breech lock.

**In the oil buffer group . . .**

- 13 Check for burrs where the front end of the oil buffer body hits the breech lock cam.
- 14 Check for looseness or wear of the breech lock depressors.
- 15 Check action of the tube lock on accelerator.
- 16 Check for wear of the accelerator tips.
- 17 Refill oil buffer tube. If it takes a large amount of oil, have ordnance check it for leakage.
- 18 Check for adjustment of the oil buffer.
- 19 At regular intervals, as specified by your group ordnance officer, have ordnance change the

oil in the oil buffer tube and check the oil buffer spring, relief valve, and packing gland.

**In the bolt group . . .**

- 20 Check for scoring or burring of the bottom of the bolt body caused by a jittery accelerator.
- 21 Check for burrs on the T-slot.
- 22 Check for burrs at the front of the breech lock recess.
- 23 Check for wear on the guides that run in the slots inside the barrel extension.
- 24 Check for burred or worn cam grooves or bolt switch grooves.
- 25 Check the extractor stop pin for wear and looseness.
- 26 Check for dirt or primer salts in the T-slot, firing pin port, driving spring hole, breech lock recess and the recesses in back of the bolt.
- 27 Check for worn or burred notches on firing pin and sear.
- 28 Check for weak sear spring.
- 29 Check for bent, worn, or broken cocking lever.
- 30 Check for worn hook or lug on the extractor and bent or broken extractor or ejector.
- 31 Check for weak ejector spring. (If the ejector pin is staked, test the operation of the ejector with your fingers without stripping it.)
- 32 Check for worn or bent bolt stud.
- 33 At regular intervals, as specified by your group ordnance officer, have ordnance replace the driving spring and firing pin spring. Manufacturers suggest this be done every 1,000 rounds.

**In the cover group . . .**

- 34 Check for burred extractor cam.
- 35 Check for weak belt feed pawl spring.
- 36 Check for burred or worn belt feed pawl, pawl arm, or belt feed slide.
- 37 Check for bent or worn belt feed lever, especially the lug, and for worn pivot stud.
- 38 Check operation of the lever plunger spring.
- 39 Check operation of the cover latch and detent pawl.

**In the back plate group . . .**

- 40 Check the buffer adjusting screw adjustment.
- 41 Check operation of the latch and latch lock.

**With the gun assembled . . .**

- 42 Check the headspace and timing.

# TROUBLE SHOOTING

If a gun is carefully cleaned, inspected, and oiled every day, there is hardly one chance in a thousand that anything will go wrong with it in combat.

Reports on gun breakdowns in combat theaters show that nine-tenths are caused by dirty guns, bad adjustments, or other varieties of pure carelessness. Most of the remaining one-tenth could have been prevented by a good pre-flight check.

But if something should go wrong with your gun, the trouble-shooting charts on these two pages show the most practical way of finding out what is wrong and the possible causes of the trouble.

To complete your working knowledge of malfunctions—failures—the charts on the following two pages tell exactly what happens inside the gun in each case.

If the Rate of Fire is **too rapid**  
And there is excessive vibration  
the trouble probably is:  
Insufficient oil in the oil buffer.

If the Rate of Fire is **too slow**  
Or if the gun fires a few rounds and stops, the trouble probably is:  
Tight headspace  
Oil buffer adjustment too far toward the closed position, or  
Too much weight on the ammunition belt.

If the gun **won't start**  
firing in extremely cold temperatures, pull the charging handle back, **hold the trigger down**, and release the charging handle.

## If your gun won't stop firing

### Symptoms:

The gun may start firing as soon as the first round is chambered, or once the gun is firing it may fail to stop when you release the trigger.

### Malfunction:

#### Runaway gun

### Probable causes:

Worn notch on the sear  
or firing pin extension.  
A defective solenoid.  
Trigger on adapter sticking.

### What to do:

On a hand-held gun, pull the charging handle down but not all the way back to hold the action out of battery. On a turret gun, pull the charging cable a short distance. To start firing again, simply charge the gun.

Do not lift the cover—this will stop the runaway firing, but will make it difficult to reload the gun.

# If your gun stops firing

## In battery position:

1. Hand charge twice, keeping your eye on the ammunition belt, and try to fire after each charging.
2. If the gun still does not fire, raise the cover; make sure the extractor hook is engaged in the extracting groove of the round, and that the round is against the cartridge stops.
3. Charge again and try to fire. By now you will have eliminated any defective cartridge or short round. If the gun still does not fire, look through the slot in the side of the receiver, if possible, and see if the sear goes down when you pull the trigger.

## Out of battery position:

1. Try to charge it and see if the parts will return to battery position.
2. If not, raise the cover and see if you can pull the belt over against the cartridge stops. If the belt is stuck, check for binding in the container or chute.
3. If the belt is free, retract the bolt and see if a live round or empty case in the T-slot is holding the bolt out of battery.

### **Symptoms:**

You could not move the next round over to the cartridge stops easily

### **Malfunction:**

### **Binding of the belt**

### **Probable causes:**

Improperly linked belt,  
Belt out of position,  
Belt incorrectly loaded into the container,  
Burrs or binding in the feed chute.

### **Symptoms:**

The belt moved against the stops easily  
A live round was in the T-slot

### **Malfunction:**

### **Failure to feed into the chamber**

### **Probable causes:**

Separated case in the chamber,  
Worn or broken extractor switch spring,  
Broken ejector,  
Weak ejector spring,  
Weak driving spring.

### **Symptoms:**

There was no more ammunition in the feedway and an empty case was in the T-slot

### **Malfunction:**

### **Failure to eject (the last empty case)**

### **Probable causes:**

Broken ejector,  
Weak ejector spring.

### **Symptoms:**

The belt did not feed when you charged the gun, and The next round was **not** against the cartridge stops

### **Malfunction:**

### **Failure to feed into the feedway**

### **Probable causes:**

Worn or broken belt feed lever lug,  
Weak or broken belt holding pawl spring,  
Weak or broken belt feed pawl spring.

### **Symptoms:**

The belt did not feed when you charged the gun, and The next round was against the cartridge stops

### **Malfunction:**

### **Failure to extract from the belt**

### **Probable causes:**

Worn or broken extractor hook,  
Weak or broken cover extractor spring.

### **Symptoms:**

The belt fed correctly when you charged, but the gun still would not fire

### **Malfunction: Failure to fire**

### **Probable causes:**

Sear does **not** go down:  
Defective solenoid,  
Defective trigger mechanism on the adapter,  
Bent or worn trigger bar,  
Weak or broken sear spring.

Sear **does** go down:  
Dirt, cosmoline, or moisture in the firing pin port,  
Broken notch on the sear or firing pin extension,  
Weak or broken firing pin spring,  
Broken firing pin.

**Symptoms**

that tell you what the malfunction is:

- a. Gun stops in battery position
- b. Ammunition belt does not feed into the gun when you hand charge it
- c. Next round is not against the cartridge stops

The malfunction is:

## FAILURE TO FEED INTO THE FEEDWAY

| POSSIBLE CAUSES                         | WHAT HAPPENS   |
|---|--|
| Broken belt feed lever lug              | <b>If the slide does not move at all when you hand charge the gun, this additional symptom tells you immediately that the belt feed lever lug is broken.</b> The lever is not pivoted by the cam grooves, so there is nothing to move the belt feed slide in and out.  |
| Worn belt feed lever lug                | The slide is not pushed out far enough to engage firmly behind the next round—it may pull a short, light belt but cannot pull a long, heavy belt.  |
| Weak or broken belt holding pawl spring | <b>If the belt moves in and out of the feedway on hand charging, this additional symptom tells you immediately that the belt holding pawl spring is weak or broken.</b> The spring fails to force the belt holding pawl up behind the next round to hold it in place while the belt feed pawl moves out over the belt. |
| Weak or broken belt feed pawl spring    | The belt feed pawl is not snapped down firmly behind the next round. The belt will usually feed on hand charging, but may not always feed in automatic fire.   |

**Symptoms**

that tell you what the malfunction is:

- a. Gun stops in battery position
- b. Belt does not feed into the gun when you hand charge it
- c. Next round is against the cartridge stops

The malfunction is:

## FAILURE TO EXTRACT FROM THE BELT

| POSSIBLE CAUSES                       | WHAT HAPPENS  |
|---------------------------------------|---|
| Broken or worn extractor hook         | The extractor hook slips out of the extracting groove of the round.                           |
| Broken or weak cover extractor spring | The spring does not hold the extractor hook firmly in the extracting groove of the cartridge. |

**Symptoms**

that tell you what the malfunction is:

- a. Gun stops out of battery
- b. There is ammunition left in the feedway

The malfunction is:

## FAILURE TO FEED INTO THE CHAMBER

| POSSIBLE CAUSES                        | WHAT HAPPENS   |
|--|--|
| Separated case                         | The tip of the case breaks off (usually the result of loose head-space) and remains in the chamber, preventing the next round from entering all the way.   |
| Weak or broken extractor switch spring | The switch does not return to its horizontal position at the end of recoil, and fails to guide the extractor assembly downward on counter recoil.  |
| Broken ejector                         | The round is not supported and does not line up with the chamber. (On hand charging, the round may fall through the T-slot; the bolt will return to battery without feeding a round into the chamber. If the gun is hand charged rapidly enough, the round may be fed into the chamber.) |
| Weak ejector spring                    | The round is not supported and does not line up with the chamber.  |
| Weak driving spring                    | The bolt action becomes rough and sluggish; the gun's action may slow down, or may actually stop out of battery when pulling a long ammunition belt.   |



**Symptoms**

that tell you what the malfunction is:

- a. Gun stops in battery position
- b. Belt feeds into the feedway on hand charging
- c. Gun does not fire when you pull the trigger

The malfunction is:

**FAILURE TO FIRE\***

| POSSIBLE CAUSES                                     | WHAT HAPPENS  |
|---|---|
| Dirt, cosmoline, or moisture in the firing pin port | The firing pin does not go forward hard enough to fire the round.   |
| Defective solenoid                                  | The solenoid does not operate the gun's firing mechanism.   |
| Defective trigger mechanism on the adapter          | The trigger on the adapter fails to operate the trigger on the gun.                                       |
| Bent or worn trigger bar                            | The front of the trigger bar does not push the sear tip down.   |
| Weak or broken sear spring                          | The sear notch does not hold the firing pin to the rear; the firing pin rides the cocking lever forward.  |
| Broken notch on the sear or firing pin extension    | There is nothing to hold the firing pin to the rear, and it rides the cocking lever forward.              |
| Weak or broken firing pin spring                    | The firing pin is not forced forward at all, or else is not forced forward hard enough to fire the round. |
| Broken firing pin                                   | The firing pin is too short to hit the round.   |

- In cases of Failure to Fire, there are certain additional symptoms which help locate the cause of the trouble when you are on a malfunction range, although they usually cannot be observed in combat. By examining the primers of the ejected live rounds, you can tell whether they have been dented only slightly—called "light struck primers"—or not at all. You can also listen closely when you pull the trigger and hear whether the firing mechanism makes a loud click, a faint click, or no click at all.

**Symptoms**

that tell you what the malfunction is:

- a. Gun starts firing as soon as the first round is chambered, or
- b. Once the gun is firing it may fail to stop when you release the trigger

The malfunction is:

**RUNAWAY GUN**

| POSSIBLE CAUSES                                | WHAT HAPPENS  |
|--|---|
| Worn notch on the sear or firing pin extension | After the firing pin is cocked, the jar of the bolt going into battery releases it. |
| Defective solenoid                             | The solenoid jams in the fire position.   |
| Defective adapter trigger                      | The trigger sticks in the fire position.  |

**Symptoms**

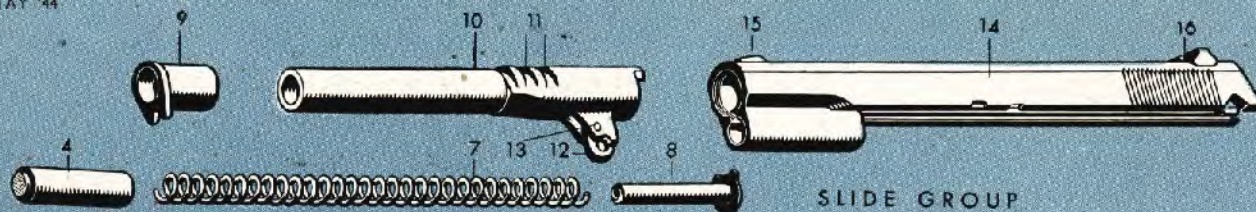
that tell you what the malfunction is:

- a. Gun stops out of battery
- b. There is no more ammunition in the feedway
- c. The last spent case is still in the T-slot

The malfunction is:

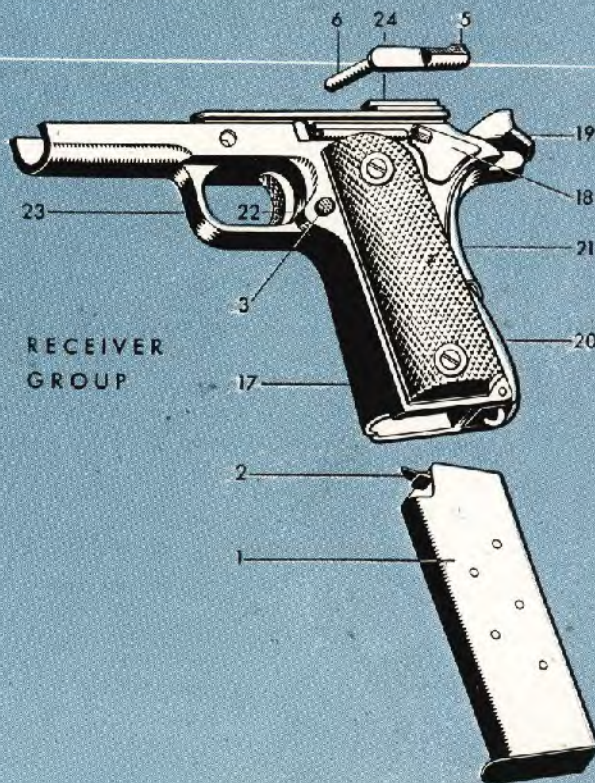
**FAILURE TO EJECT  
THE LAST EMPTY CASE**

| POSSIBLE CAUSES     | WHAT HAPPENS  |
|---------------------|---|
| Broken ejector      | Since there is no new round coming down the T-slot to push the last case out, it is not ejected; the case jams partly in the chamber, or against the breech end of the barrel or the barrel extension.  |
| Weak ejector spring | Instead of ejecting the last case, the ejector pivots around it and tries to align it with the chamber again but is too weak to do it. As a result, the case jams partly in the chamber, or against the breech end of the barrel or the barrel extension. |



SLIDE GROUP

## CALIBER .45 AUTOMATIC PISTOL

RECEIVER  
GROUP

### Nomenclature

|                       |                           |                       |
|-----------------------|---------------------------|-----------------------|
| 1 MAGAZINE            | 9 BARREL BUSHING          | 17 RECEIVER           |
| 2 MAGAZINE FOLLOWER   | 10 BARREL                 | 18 SAFETY LOCK        |
| 3 MAGAZINE CATCH      | 11 BARREL LOCKING NOTCHES | 19 HAMMER             |
| 4 RECOIL SPRING PLUG  | 12 BARREL LINK            | 20 MAINSPRING HOUSING |
| 5 SLIDE STOP          | 13 BARREL LINK PIN        | 21 GRIP SAFETY        |
| 6 SLIDE STOP PIN      | 14 SLIDE                  | 22 TRIGGER            |
| 7 RECOIL SPRING       | 15 FRONT SIGHT            | 23 TRIGGER GUARD      |
| 8 RECOIL SPRING GUIDE | 16 REAR SIGHT             | 24 EJECTOR            |

The caliber .45 automatic pistol is a sidearm often issued to Navy aircrewmembers. It is actually a semi-automatic weapon; it loads and cocks itself, but the trigger must be squeezed for each shot. It is simply constructed and light in weight; it can be stripped very quickly without a tool under combat conditions. Yet it will drop a man if the bullet hits any part of his body. At 250 yards, it will penetrate four inches of white pine—and a one-inch penetration is equivalent to a dangerous wound. Its maximum range is about 1,600 yards, its muzzle velocity about 800 feet a second. However, its maximum accurate range is within 100 yards; hits beyond that range are usually more luck than skill.

There are two models, the M1911 and M1911A1. On the M1911A1, which is newer, there are slight changes in the shape of the grip safety, trigger, mainspring housing, front sight, and hammer tip.

**STRIPPING****Remove the magazine (1)**

by pressing the magazine catch (3) just behind the trigger on the left side.

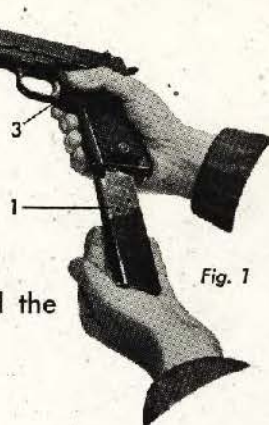


Fig. 1

**Remove the recoil spring plug (4).**

Push in the checkered front of the plug. Then, holding your thumb in front of the plug to keep it from springing out, give the barrel bushing (9) a quarter turn in a clockwise direction. Let the plug come out slowly against your thumb.

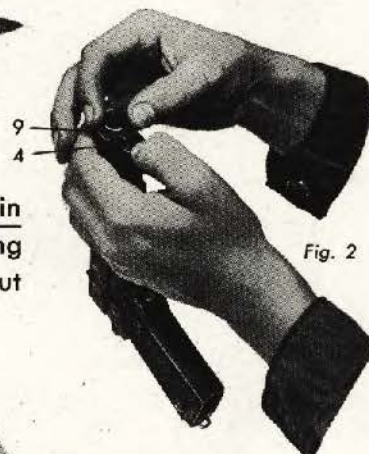


Fig. 2

**Take plug off recoil spring (7),**

turning it slightly in a clockwise direction if it sticks.



Fig. 3

**Remove the slide stop (5).**

Cock the hammer and hold the gun with the left side up. Press in on the slide stop pin (6) with your right forefinger and pull the slide back with your left hand. The slide stop will disengage as the small notch on the slide passes over it. Lift it out the left side of the gun.

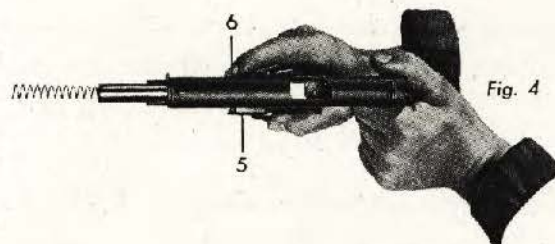


Fig. 4

**Remove the slide group**

by turning the pistol upside down and pulling the slide forward off receiver.



Fig. 5

**Remove recoil spring (7) and spring guide (8).**

Hold the slide upside down and pull the spring back and out.

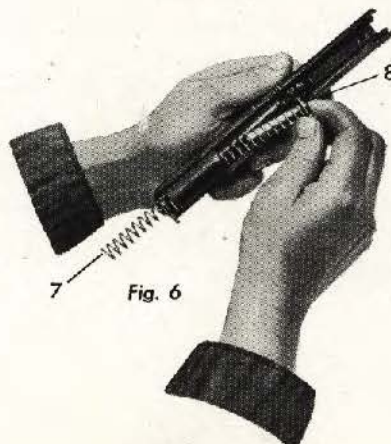


Fig. 6

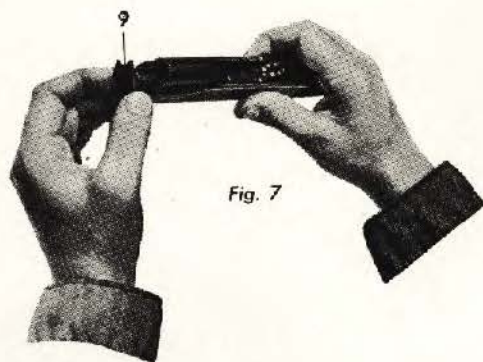


Fig. 7

### Remove the barrel bushing (9).

Turn it in a counterclockwise direction and pull it out the front.

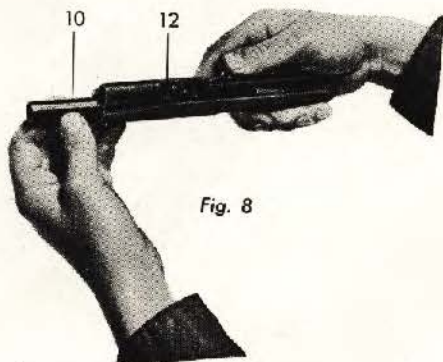


Fig. 8

### Remove the barrel (10) and barrel link (12)

by pulling them forward out of the slide after turning the link forward. The barrel link can be separated from the barrel by drifting out the barrel link pin.

## ASSEMBLY

**Replace the barrel.** Hold the slide upside down. Insert the barrel from the front with the barrel link going in first. The link must be turned forward. (See fig. 8)

**Replace the barrel bushing.** Line up the ridge on the side of the bushing with the space between the barrel and recoil spring housing. Push the bushing all the way in and turn it clockwise as far as it will go. (See fig. 7)

**Replace the recoil spring and spring guide.** Keeping the slide upside down, push the spring into its housing from the rear. The spring guide goes toward the rear with the rounded slot resting over the barrel. (See fig. 6)

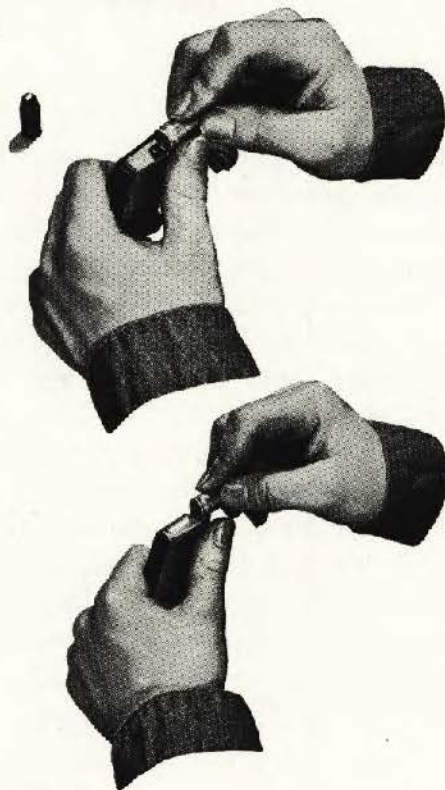
**Assemble the slide and the receiver.** With the slide still upside down, cock the hammer of the receiver, then turn the receiver upside down and push it forward on the slide as far as it will go. Make such the barrel link is tilted forward. (See fig. 5)

**Insert the slide stop pin.** Hold the gun with the muzzle end of the barrel tilted up and push the slide back until its rear end is just over the hammer. Move the barrel in or out until the hole in the barrel link lines up with the hole for the slide stop pin. Push in the pin as far as it will go. Move the slide farther back, pushing the rear of the slide stop inward and upward to force it in place.

**Insert the recoil spring plug.** Move the slide all the way forward, leaving the hammer cocked and locking the safety lock. Set the recoil spring plug over the end of the spring (see fig. 3) and push the plug in until it is flush with the slide. Then turn the barrel bushing down until the plug snaps forward between the lips of the barrel bushing. (See fig. 2)

**Insert the magazine** and push it in until it catches. (See fig. 1)

## LOADING THE MAGAZINE



To load the first round into the magazine, press the rear of the round down against the front of the magazine follower—the flat metal surface under spring tension—and push the round all the way to the rear.

To load the remaining rounds, hold one thumb beside the magazine as a guide. With your other thumb, press the base of the next round down against the front of the cartridge case of the round already in the magazine and slide it all the way back.

## LOADING THE PISTOL

After seven cartridges have been placed in the magazine, insert the magazine in the receiver. Pull the slide to the rear and let it go forward. (If the slide was already at the rear when the magazine was inserted, press down the slide stop to let it snap forward.)

The pistol is now cocked. Unless you plan to start firing immediately, **put the safety lock**

**in safety position** as far up as it can be moved.

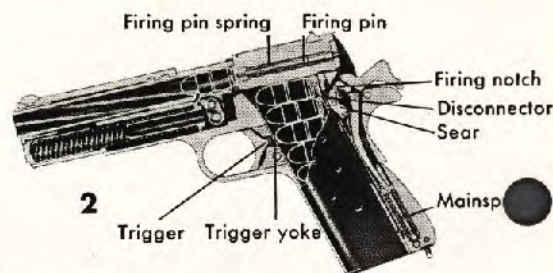
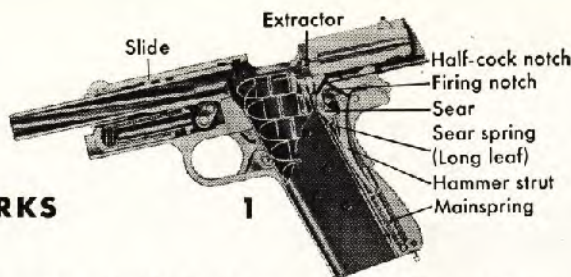
Eight cartridges can be loaded in the pistol when desired.

Before inserting the magazine draw back the slide, place an extra round in the chamber, release the slide, and **put the safety lock on safety**. Then insert the loaded magazine.

## SAFETY DEVICES

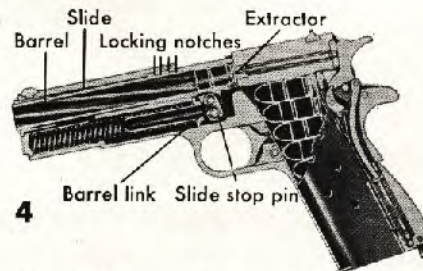
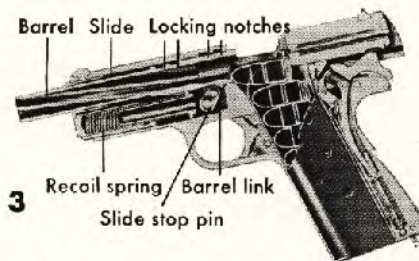
Four safety devices prevent accidental discharge of the pistol.

- 1 The safety lock. The trigger cannot be pulled when the safety lock is in safety position. Before firing, the safety lock must be moved down.
- 2 The grip safety. The trigger cannot be pulled unless the grip safety is squeezed forward.
- 3 The disconnector. This is a moving part inside the receiver that prevents the pistol from firing unless the slide is fully forward in battery position.
- 4 The half-cock notch. If the hammer is not forced back far enough to engage its firing notch, it is stopped by the half-cock notch, which prevents it from slipping forward and firing the round. The trigger cannot be pulled when the hammer is on half-cock. To release the hammer without firing the round, pull it all the way back and allow it to go slowly forward to the uncocked position while squeezing the trigger and grip safety.

**HOW IT WORKS****RECOIL**

1. When the pistol is in battery, the slide and barrel are locked together by the locking notches. As the round is fired, the explosion drives the bullet forward, and also starts recoil. Shortly after recoil starts, the barrel link pivots downward around the slide stop pin. This pulls the rear of the barrel down, separating the locking notches and leaving the slide free to travel farther back. The barrel cannot travel farther back because the barrel link is held by the slide stop pin. As the slide moves back, the extractor—near the rear of the slide group—pulls the empty case from the chamber. The case hits the fixed ejector on the upper left side of the receiver, which flips the case up and out to the right.

2. As the chamber moves over the magazine, the magazine follower, pressed upward by the magazine spring, forces the next round partly up into the chamber. (If the magazine is empty, the magazine follower forces the slide stop upward, locking the slide back at full recoil.) The recoiling slide turns the hammer backward, forcing the hammer strut down and compressing the mainspring. Since the bottom of the sear is always being pressed forward by the long leaf of the sear spring, the upper tip is pivoted backward and sticks into the firing notch on the hammer. This locks the hammer back in cocked position against the pressure of the mainspring.

**COUNTER RECOIL**

3. The recoil spring, which is compressed as the slide recoils, now forces the slide forward. The slide hits the new round, which is guided into the chamber by the lips of the magazine and the loading ramp at the breech end of the barrel. Farther forward, the slide hits the rear of the barrel and forces it forward. The barrel link pivots upward around the slide stop pin, forcing the rear of the barrel up into the locking notches of the slide to lock the slide and barrel together.

**FIRING**

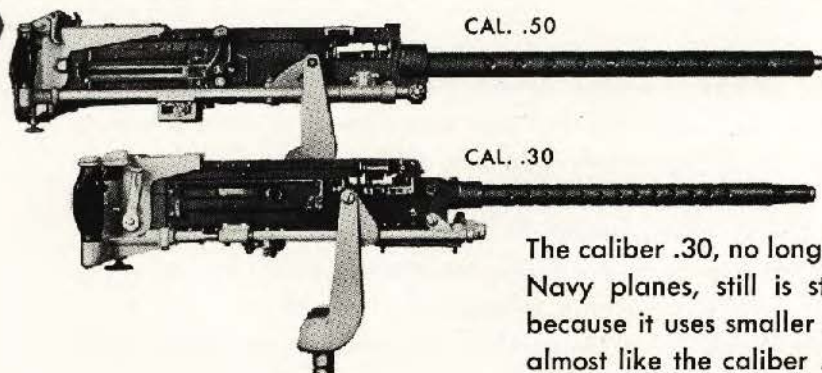
4. When the trigger is squeezed, the trigger yoke presses the disconnector back against the bottom of the sear, pivoting the upper tip of the sear forward out of the firing notch on the hammer. The hammer, forced forward by the mainspring, drives the firing pin into the primer. The firing pin spring forces the pin back into position.

**CARE AND CLEANING**

After a pistol has been fired, it must be field stripped for proper cleaning. With a cleaning rod and cloth patches, clean the bore and chamber in the same way a caliber .50 barrel is cleaned. Then saturate a clean flannel patch with light lubricating oil and swab the bore and chamber. Wipe the exposed working surfaces with an oily rag. Put a few drops of oil into the openings around the hammer and trigger—it will work into the mechanism.

To clean a pistol which has not been fired, rub the outside with a lightly oiled rag and then with a perfectly dry one. Swab the bore and chamber with an oily flannel patch and wipe off the oil with a perfectly dry patch. Use a small, clean brush to dust out all crevices. If the pistol is to be stored, do not use a cover or place plugs in the chamber and bore—they will cause sweating and promote rust. Because leather absorbs moisture even when it looks dry, pistols should not be stored in holsters.

# THE CALIBER .30 MACHINE GUN



... You Will Use It in Practice

The caliber .30, no longer used in aerial combat except on some Navy planes, still is standard equipment for range practice because it uses smaller ammunition. Its operation and care are almost like the caliber .50. The only differences which must be known to use, clean, and adjust the gun are illustrated on the next pages.

## DIFFERENCES IN PERFORMANCE

Weight  
Rate of fire per minute  
Muzzle velocity (at 78 feet from muzzle, with A.P. M2)  
Chamber pressure per sq. in.  
Maximum range A.P. M2

| CALIBER .50             | CALIBER .30             |
|-------------------------|-------------------------|
| 64 pounds               | 20 pounds               |
| 750-850 rounds          | 1,350 rounds (approx.)  |
| 2,900 feet per sec.     | 2,715 feet per sec.     |
| 50,000 to 52,000 pounds | 48,000 to 50,000 pounds |
| 7,200 yards             | 4,500 yards             |

## DIFFERENCES IN CONSTRUCTION

### CALIBER .50

### CALIBER .30

#### Back Plate Group

Trigger always near the top of the back plate.

Trigger below the buffer tube with Mk 12 Adapter.

#### Bolt Group

Ejector pivots to the rear as well as sideways.

Ejector pivots sideways only. In changing the direction of feed, the ejector must be placed on the side of the extractor assembly where it will be on the same side of the ammunition as the cartridge stops.

Extractor assembly guided by a lug which rides over the extractor switch on recoil and under it on counter recoil.

Extractor assembly guided by a plunger and spring which ride along the side of the extractor feed cam on recoil, then spring out and ride under it on counter recoil.

Both ends of the bolt stud same length. Two-piece firing pin assembly—one notch. Vertical sear held by a sear slide.

Long end of the bolt stud goes into the bolt. One-piece firing pin—two notches. Horizontal sear held by a sear holder, with a plunger and plunger spring.

Double driving spring.

Single driving spring.

## CALIBER .50

## CALIBER .30

**Oil Buffer Group — Lockframe Group**

Removable breech lock depressors.

Shoulders of the oil buffer body stop the accelerator.

Barrel's recoil absorbed by the oil buffer and oil buffer spring.

Trigger bar and trigger bar pin are in the casing group.

Breech lock depressors are a fixed part of the lockframe body.

An accelerator stop pin stops the accelerator.

Barrel's recoil absorbed only by the barrel plunger spring.

Trigger bar, trigger bar pin, and trigger bar spring are in the lockframe group.

**Barrel Group**

Eight lands and eight grooves. Barrel has narrow, V-shaped locking notches; head of the barrel locking spring is pointed.

Barrel extension shank and hook connect the barrel group with the oil buffer.

Four lands and four grooves. Barrel has square locking notches; the barrel locking spring is square-headed.

The barrel plunger stud compresses the barrel plunger spring. The barrel extension T-lug is a locking surface for the accelerator.

**Cover Group**

Same as caliber .50

**Retracting Slide Group**

Grip and lever to provide leverage.

Handle, but no lever.

**Casing Group**

One-piece front barrel bearing.

For right feed, front and rear cartridge stops and a link stripper are used; for left feed, a front cartridge stop and a right-hand rear cartridge stop assembly.

Extractor switch guides the lug on the extractor assembly.

Front barrel bearing assembly, which increases the recoil force by letting some of the expanding gases push back on the muzzle of the barrel.

For either right or left feed, only front and rear cartridge stops are used; rear stop acts as a link stripper.

Extractor feed cam guides the plunger and plunger spring on the extractor assembly.

**DIFFERENCE IN HEADSPACE ADJUSTMENT**

After field stripping the caliber .30, remove the nose of the barrel locking spring from the barrel locking notch and move it to one side, letting it rest on the barrel extension.

Put the bolt, with the extractor assembly removed, on the barrel extension, push it all the way forward, turn the parts upside down, and hold the breech lock down in its recess with your thumb. Screw the barrel in until you feel the breech end hits the lips of T-slot. **Unscrew the barrel just enough to seat the barrel locking spring in the nearest notch.**



# NOTES

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