

CHAPTER 11

SMALL ARMS, LANDING PARTY EQUIPMENT AND DEMOLITION

Although ground force operations are secondary duties for naval personnel, each ship of cruiser size and larger maintains a state of readiness for such action. Fleet ships maintain an organized landing party, for limited ground force operations, military police duties, parades and ceremonies. The Navy might be asked to land an armed force in a foreign country when there is a political disturbance and local authorities are unable to give adequate protection to life and property; or a landing party might be called upon to perform riot duty when there is widespread disorder which the civil authorities cannot control. Landing parties frequently give assistance in civil disasters, such as fires, floods, and hurricanes.

Because someday you may be assigned to a landing party, now is the time to learn how to handle small arms. After studying this chapter you should know what safety precautions to observe while handling small arms, and how to field strip, clean, and reassemble them.

You will also study how to use landing party equipment, and how to assemble, issue, and maintain the equipment.

The information contained in this chapter on demolition is meant only to familiarize GMMs with the equipment, material, and safety precautions connected with demolition work. It is in no way intended to train GMMs to become demolition experts. Demolition work is a skill that is acquired only through intensive training and should not be attempted by untrained personnel.

This chapter also contains information on the procedures for using hand grenades including the types of hand grenades now in use, the various methods of throwing grenades, and safety precautions when using hand grenades.

SMALL ARMS

Small arms have been defined as guns with a bore of 0.60 or smaller. They include hand guns and shoulder weapons which are fired from the hand, such as the pistol and revolver; or from the shoulder, like the rifle, carbine, submachine gun or shotgun.

NOTE: Shotguns have bores somewhat larger than 0.60-inch, but they are considered small arms never the less.

Machine guns of small caliber, such as caliber .30 and caliber .50, technically may be classed as small arms on the basis of their bore diameter, though they usually are fired from a bipod or tripod, instead of from the shoulder. Often they are called light machine guns. Few of these machine guns are in use on ships, and they will be given only very brief treatment in this chapter.

The line-throwing gun is fired from the shoulder, but it is not a weapon. It is used to fire a projectile to carry a line when the distance is too great for the line to be thrown by hand.

Most small arms used by the Navy are basically standard Army weapons using Army ammunition. Therefore Army nomenclature and terminology are used with small arms. For example, instead of mark and mod numbers, the Army uses the letters M and A. Thus, "Carbine M1A2" would mean, in Navy language, "Carbine Mk 1 Mod 2." However, in discussing small arms we stick to the Army language; both the Army and the Navy call the weapon "Carbine, Cal. .30, M1A2."

Reference publications such as technical and training publications are issued by the Army in two principal series - Field Manuals (FMs) and Technical Manuals (TMs). Field manuals are intended for the man in the field; they cover basic operations, elementary maintenance, marksmanship, and tactics. Technical manuals, however, are more like OPs: they contain technical data

on maintenance and repair. An index of Army FM's and TM's is found in O.D. 39397 and Army Pamphlet 310-4 Title, Military Publications.

Much of the confusion surrounding small arms terminology lies in cartridge or round designations. For example, what is the difference between a .30-30 and a .30-06 round of ammunition? Actually, a .30-30 means that the cartridge has a caliber of .30 inch and contains 30 grains of propellant powder. The .30-06 cartridge, for which the M1 rifle is chambered, also has a caliber of .30 inch but the numbers -06 in this case mean the round was standardized in 1906.

The diameter of a shotgun's bore is referred to as the "gauge", which is not a measurement of inches or millimeters. Instead, it means the number of lead balls of that particular diameter required to make a pound. For example, if you measured the diameter of the bore of a 12-gauge shotgun, you would find it to be 0.729 inch. If you were to make a number of lead balls of this diameter and weigh them, you would find that 12 of them would make a pound. So, the larger the bore of a shotgun, the smaller the gauge number. A 16-gauge shotgun has a smaller bore than a 12-gauge.

AUTOMATIC AND SEMIAUTOMATIC FIRING SYSTEMS

Small arms weapons use fixed case ammunition. The ammunition may be loaded and the case ejected by operating the gun mechanism by hand, or the gun may perform these functions automatically.

Revolvers and some shotguns require manual ejection of empty cases. All other modern small arms weapons are loaded and their empty cases ejected by mechanical devices powered by the energy of the burning propelling charge. This mechanical action may be either automatic or semiautomatic.

A semiautomatic weapon unlocks, extracts, ejects, cocks, and reloads automatically. However, the trigger must be pulled each time to fire a round. The .45 cal. pistol is termed "automatic" but actually it is semiautomatic, as are the .30 cal. M1 rifle and M1 carbine. A fully automatic weapon continues firing as long as the trigger is kept pulled. Submachine guns and the BARs are automatic.

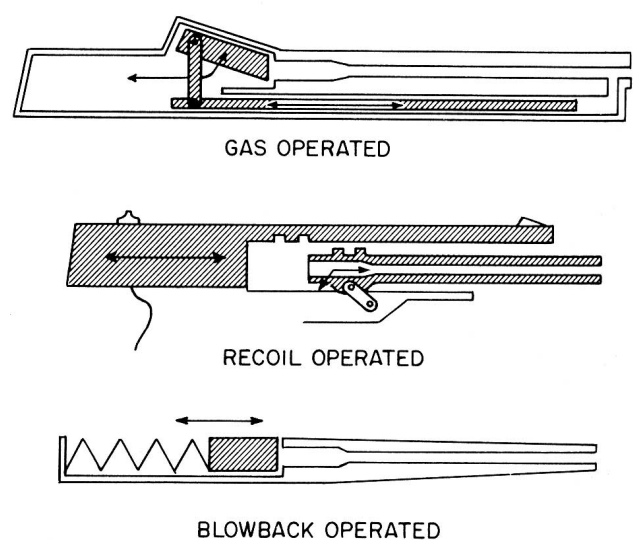
Weapons which are capable of both automatic and semiautomatic fire are the 7.62-mm M14 rifle, .30 cal. M2 carbine, and the .45 cal. submachine gun M1.

SMALL ARMS OPERATING PRINCIPLES

Automatic and semiautomatic weapons are classified on the basis of how they obtain the energy required for operation. Fundamentally, small arms obtain the energy from the forces that accompany the explosion created when a round of ammunition is fired. The use of these forces does not reduce the effectiveness of the weapon, but utilizes wasted energy that has been put to good use. There are three primary methods in which the wasted energy can be used to operate the weapon. Figure 11-1 shows the three methods in which the pressure from the exploding cartridge is used to operate a weapon, they are gas operated, recoil operated, and blowback operated.

Gas Operated

Gas operated weapons directly utilize the expanding gases produced by the burning propelling charge to actuate their mechanisms. A portion of the expanding powder gases behind the bullet is diverted into a gas cylinder located beneath the barrel. In this type weapon, there is a port opening just aft of the muzzle that connects the barrel to the cylinder. As the bullet passes this port opening, gases enter the cylinder behind a piston, and push the piston rearward.



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Figure 11-1. — Types of operating systems.

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The piston is connected by a rod to the operating mechanism of the weapon, such as the bolt. The piston carries the bolt aft with it, unlocking, extracting and ejecting the cartridge, and cocking the weapon. Examples of gas operated weapons are the .30 cal. M1 rifle, M1 carbine, and the BAR.

Recoil Operated

As a round is fired, high pressure is developed behind the bullet. This pressure serves a two-fold purpose, to force the bullet down the barrel and to force the breechblock (bolt) to the rear. If the barrel and bolt were secured together (as in the old time cannon), the entire force of recoil would be felt by the shooter's arm and shoulder. By designing the barrel and bolt so they slide in a frame or receiver, the rearward force of the pressure on the shooter is lessened, and the energy can be used to compress springs and move levers, etc., necessary to complete the cycle of operation.

In recoil operated weapons, the bolt and barrel move rearward together for a short distance. The barrel then stops and the bolt (now unlocked) continues to the rear against spring pressure until the empty case is ejected. The force of recoil is also used to cock the weapon and compress the spring which returns the bolt to its firing position, chambering a new round in the process. The .45 Cal. pistol and Browning machineguns are examples of recoil operated weapons.

Blowback Operated

There are similarities between the recoil and blowback operated weapons. There are, however, several major differences. In recoil operation, the bolt and barrel move to the rear as one unit until the bullet leaves the barrel and most of the recoil is spent. The combined thrust of the recoiling barrel, bolt, and other parts is used to operate the weapon. In blowback operation, the bolt moves to the rear against spring pressure just as the bullet leaves the muzzle. The barrel does not move in recoil. The bolt is held closed by spring pressure and the mass of the breechbolt. The force of the exploding cartridge starts the bolt moving rearward. However, the weight of the bolt prevents the chamber from opening entirely until the round has left the muzzle. The recoil spring stops the bolt and returns it to closed position, chambering a new round in the process.

The weight of the breechbolt is an important factor in the design and operation of a blowback operated weapon. When used with low powered ammunition, it is a suitable arrangement. The .45 cal. submachinegun is an example of a blowback operated weapon. A military rifle, however, using the standard .30 cal. cartridge and blowback action, would require a 27-pound breechblock.

HANDGUNS

In your basic training manuals you studied in some detail the .45 cal. pistol. In this portion of the chapter we will discuss in detail field stripping, maintenance, and safety precautions pertaining to hand guns.

There are two handguns in general use in the Navy at present, the .45 cal. automatic pistol, and the .38 cal. Smith and Wesson revolver. The .45 cal. automatic M1911A1 is the standard service pistol used by sentries, watchstanders, and some members of the landing party. The .38 cal. revolver, because of its lighter weight, frequently is issued to flight personnel, instead of the bulkier .45 cal. pistol.

.45 CALIBER AUTOMATIC PISTOL

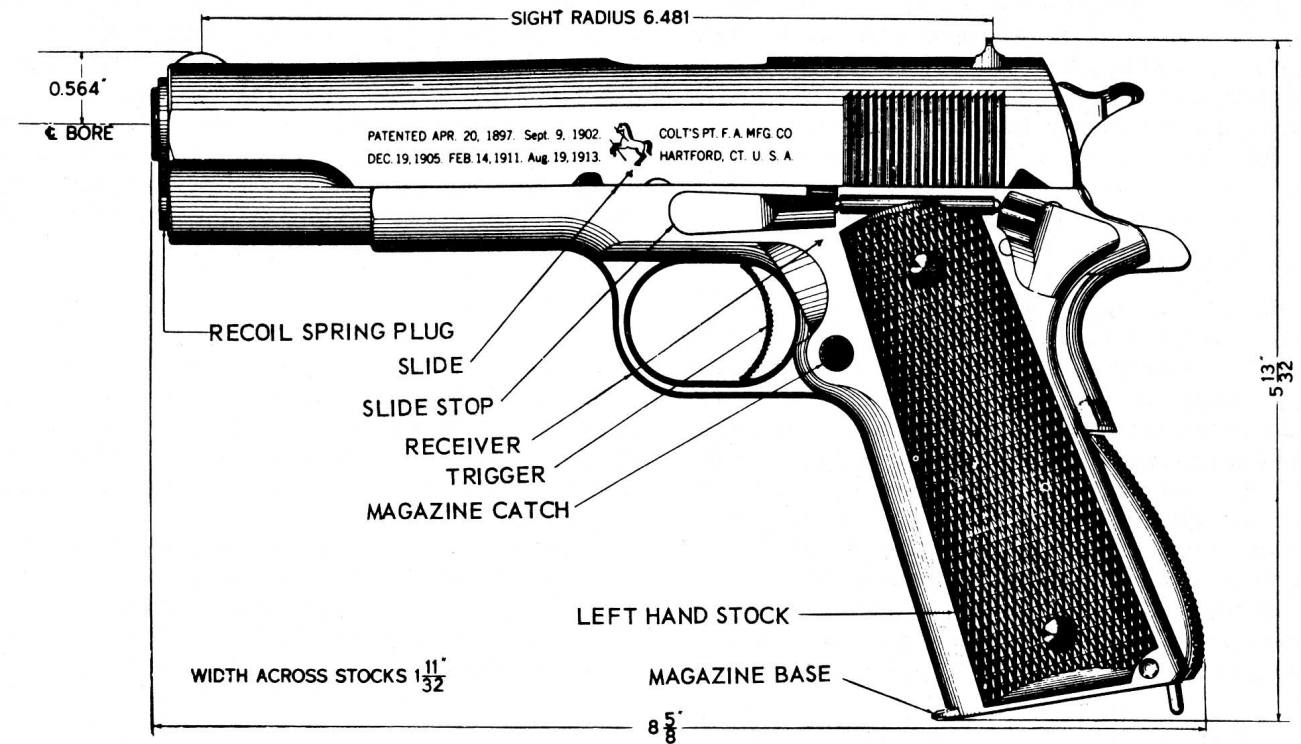
The .45 cal. automatic pistol, often called the "Colt", was designed and patented by John M. Browning who was probably the world's greatest inventor of automatic weapons. The original model 1911 differs only in minor detail from the current model 1911A1. Operation of the two models is identical. Figure 11-2 shows the pistol with nomenclature for some of the external parts.

The caliber .45 pistol M1911A1 is a recoil-operated, semiautomatic, magazine-fed, self-loading hand gun with fixed sights. It is often called an "automatic pistol," but, according to our previous definition, it is a true semiautomatic weapon. The magazine holds seven rounds when fully loaded; one round is fired with each squeeze of the trigger. Rifling in the barrel is left hand twist (the only Navy weapon with left hand rifling). Empty, the pistol weighs approximately 2-1/2 pounds. It has a maximum range of a little over 1600 yards, and an effective range (in the hands of troops) of about 50 yards.

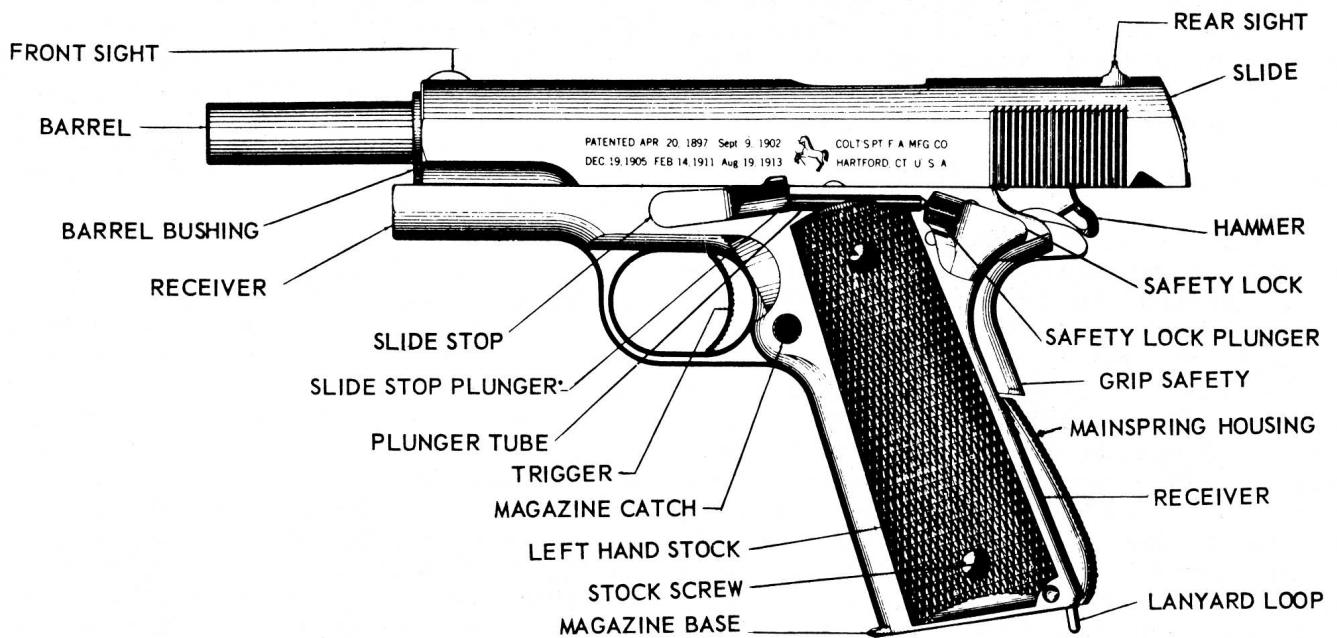
DISASSEMBLY

Care of the pistol includes daily preventive maintenance, prefiring cleaning, and postfiring

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A



B

Figure 11-2.—Automatic pistol, caliber .45, M1911A1. A. Slide closed. B. Slide open. 17,42

cleaning. For daily maintenance the pistol need not be disassembled but, for the prefiring and post-firing cleaning the pistol should be disassembled.

There are two phases of disassembly for the pistol, general disassembly (field stripping) and detailed disassembly. General disassembly (fig. 11-3) is the disassembly necessary for normal care and cleaning and after the weapon has been fired. This is the extent of disassembly that is generally explained to personnel such as watchstanders. The detailed disassembly of the receiver group (fig. 11-4) is the job of the Gunner's Mate during periodic cleaning and repair.

To do a good job of cleaning and repair, it is essential that you know the names of the parts of the weapon. The nomenclature of parts of the pistol should be learned while practicing disassembly and assembly. As each part is removed and replaced, the nomenclature is repeated until known. While studying the disassembly and assembly of the pistol, refer to illustrations showing the parts by name and description.

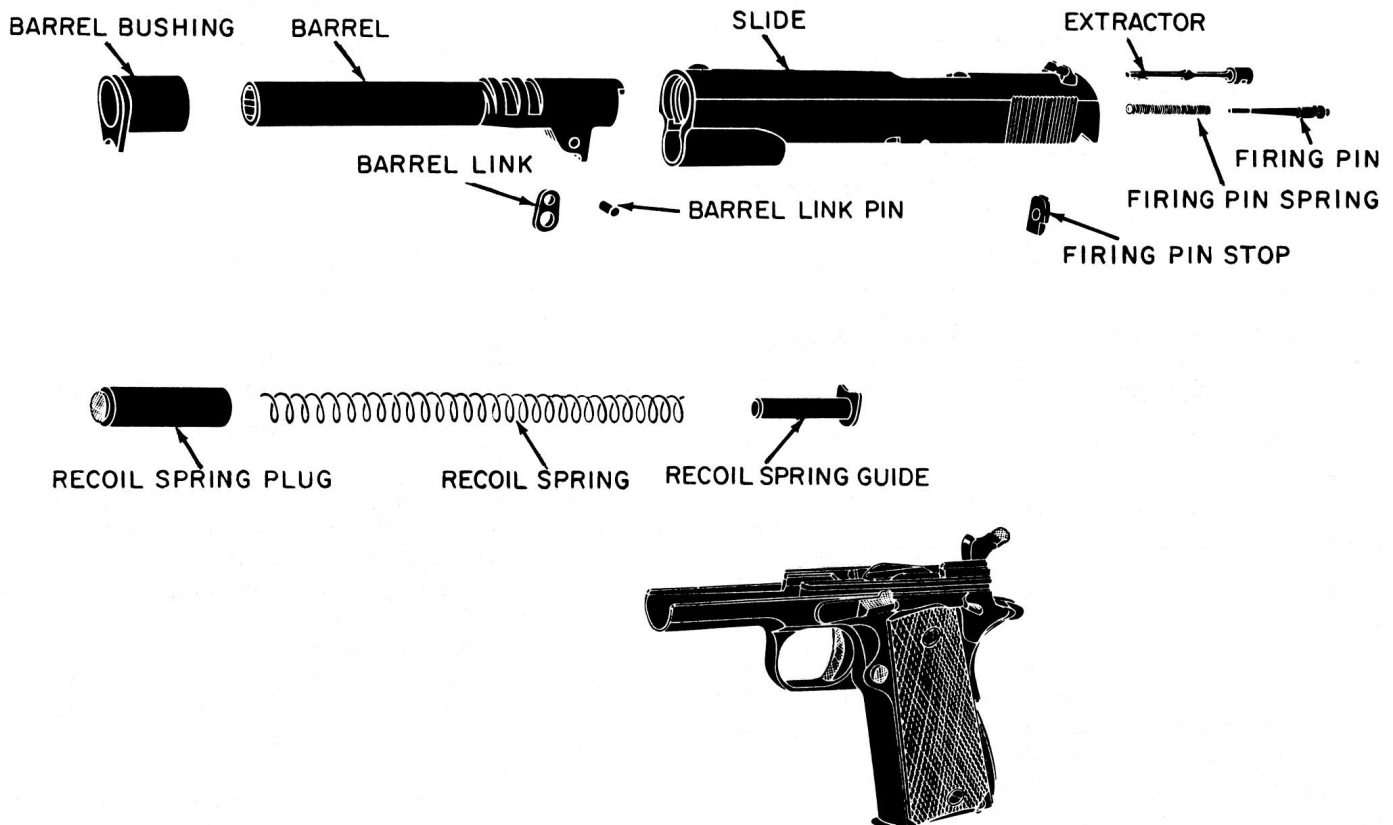
Become thoroughly familiar with them and their functions. Knowing the names of the parts also will help you understand the operation of the weapon.

General Disassembly

Prior to performing any work on the pistol, remove the magazine and pull the slide to the rear and inspect to see that the weapon is clear. Then perform the following steps:

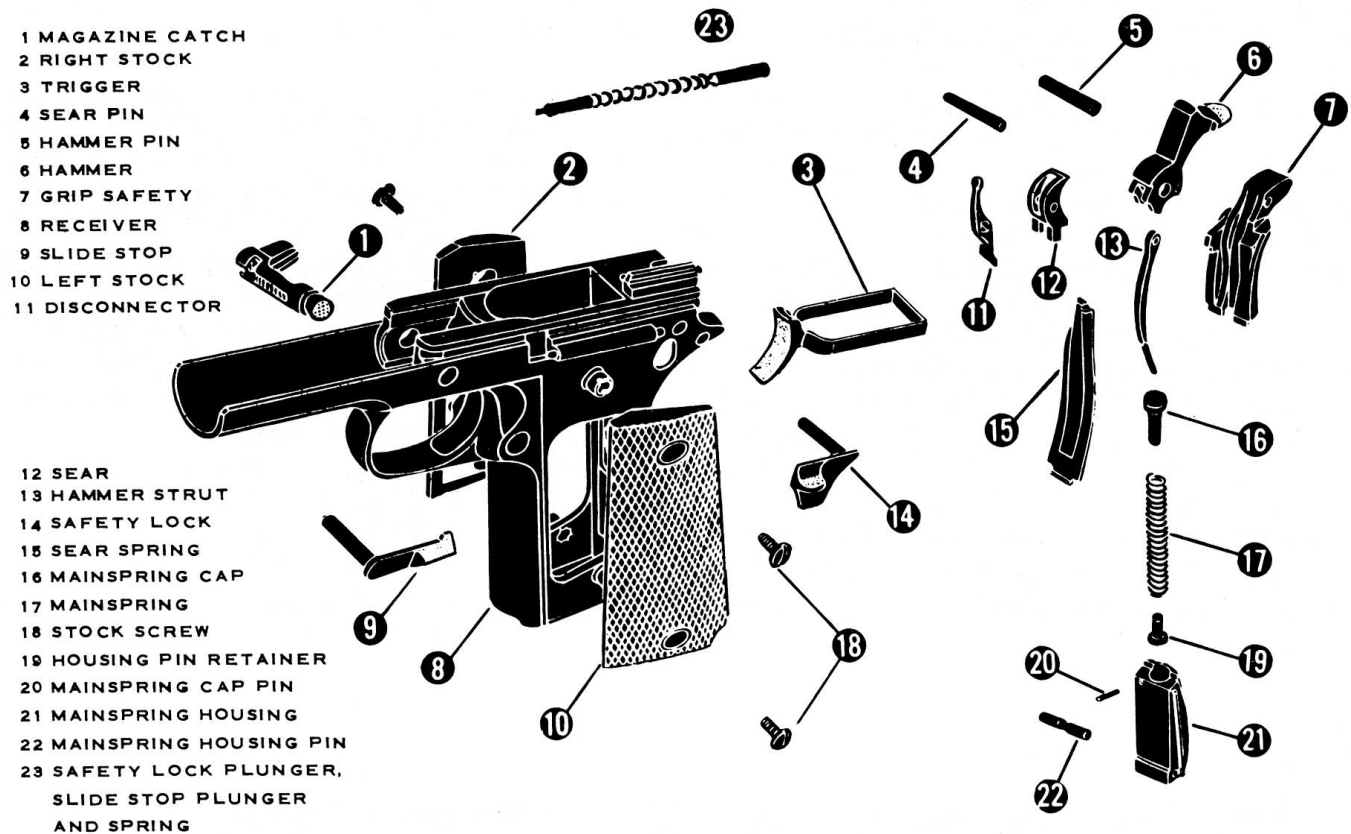
1. Cock the hammer and put the safety lock in the up, or SAFE, position. Depress the recoil spring plug and turn the barrel bushing about a quarter turn clockwise. Allow the recoil spring to expand slowly, under control, to prevent injury or loss of parts. Turn the recoil spring plug counterclockwise and remove it from the recoil spring. Move the safety lock back down to its FIRE position.

2. Push the slide to the rear until the half- moon recess (on the slide) is directly above the



17.42.1

Figure 11-3.— The pistol in a field stripped condition.



17.42.2

Figure 11-4.— The receiver group.

projection on the slide stop. Push out the slide stop from right to left.

3. Turn the pistol upside down and pull the receiver rearward to separate it from the slide. Lay the receiver down.

4. Pull the recoil spring and guide to the rear, free of the slide.

5. Remove the barrel bushing by turning it counterclockwise and pulling it from the slide.

6. Lay the barrel link forward and pull the barrel out of the muzzle end of the slide.

7. Take out the firing pin. Press in on the rear of the firing pin with any pointed object until you can slide out the firing pin stop. Keep your fingers over the firing pin, allowing the spring tension to ease; then lift both the firing pin and spring from the slide.

8. Pry the extractor out of the rear of the slide.

Detailed Disassembly Of The Receiver Group

Follow these procedures for the detailed disassembly of the receiver group. Individual parts in this group are shown in figure 11-4.

1. With the hammer in the cocked position, remove the safety lock by moving it up and down while exerting pressure outward. After removal of the safety lock, squeeze the trigger and allow the hammer to EASE forward.

2. Using the safety pin as a drift, press out the mainspring housing pin. This may require a good deal of pressure so place the receiver on a sturdy supporting surface while pressing out the pin.

3. To remove the grip safety, slide the mainspring housing down about 1/2 inch and lift out the grip safety. Remove the mainspring housing and sear spring.

4. Using the firing pin as a drift, punch out the hammer pin; then lift the hammer from the receiver.

5. Drift out the sear pin from right to left and let the sear and disconnecter drop out into your hand.

6. Press the magazine catch until it is flush with the left side of the receiver. Using the short leaf of the sear spring, turn the magazine catch lock one quarter turn counterclockwise, the lock should turn easily. Lift the magazine catch from the right side of the receiver.

7. Remove the trigger from the rear of the receiver.

ASSEMBLY

Assembly of the pistol also is accomplished in two phases: First the receiver group is assembled. After this phase, the weapon is in the field stripped condition. Then the field stripped weapon is assembled.

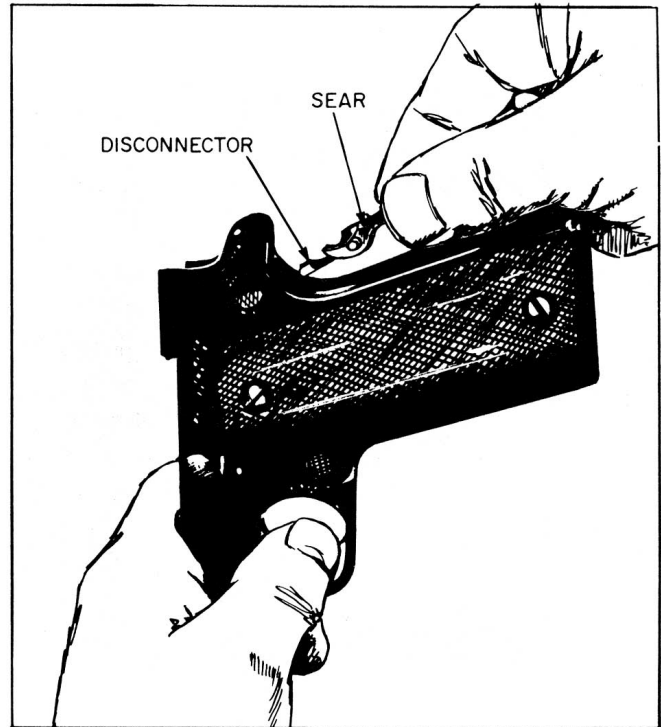
Both phases of assembly are accomplished by performing the disassembly procedures in reverse order. Here are four hints that should be helpful in assembling the pistol-

1. All pins are inserted from the left to right.
2. Place the sear and disconnecter in the receiver as one unit fitted together as shown in figure 11-5.
3. When you place the sear spring in position, have the mainspring housing ready to slide up about three quarters of the way into the receiver, to hold the spring in place.
4. Before sliding the mainspring into place, check to see that the hammer strut is resting in the well of the mainspring housing. It is possible for the strut to catch on top of the well instead of properly seating in the well recess.

SAFETIES

There are four safety devices on the pistol. The two manual safeties are the safety lock (sometimes called the thumb safe) and the half- cock notch. The two automatic safeties are the grip safety and the disconnecter. Although the disconnecter is classed as a safety, it is not considered a positive safety, as are the three safeties mentioned above, since it is designed to cause the pistol to fire semiautomatic fire and cannot be controlled by the shooter.

The safety lock positively locks the slide in the forward position. In addition, a stud on the safety lock (fig. 11-6A) blocks the shoulders



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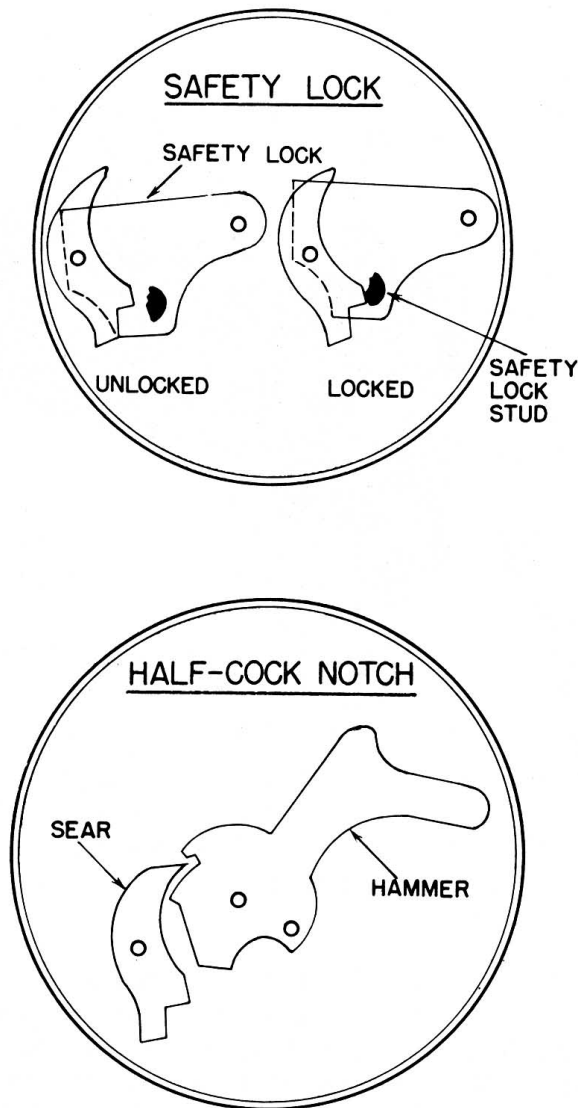
Figure 11-5.-Replacing the sear and disconnecter.

of the sear to prevent any movement of the sear out of the full-cock notch of the hammer.

The half-cock notch is the notch just above the full-notch. It has a lip which prevents movement of the sear from that notch when pressure is applied to the trigger. (See figure II-6B.)

The grip safety (fig. 11-7 A) indirectly stops any movement of the sear by blocking trigger movement. If the trigger cannot be actuated, the sear cannot move, and the hammer will not fall.

The disconnecter (fig. II-7B) prevents firing unless the slide is fully forward and locked. When the slide is forward, the disconnecter rides up into a recess on the underside of the slide. The spade of the disconnecter (dark area) bears against lugs on the sear. When the trigger is pulled, the trigger yoke pushes back against the disconnecter spade, which transmits the motion to the sear, rotating the sear nose out of the full-cock notch of the hammer, and the weapon fires. Any time the slide is not fully forward, the nose of the disconnecter is forced downward. In this condition the disconnecter spade does not contact the sear when the trigger is



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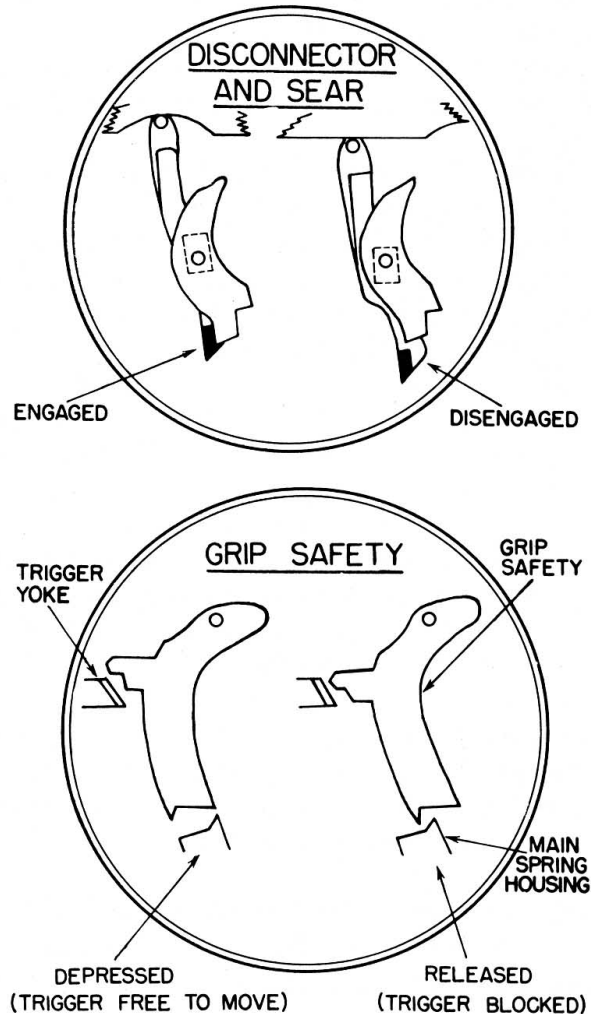
Figure 11-6.— Manual safeties.

pulled. When the trigger is pulled, the disconnecter will be pushed to the rear but the sear remains in position, holding the hammer to the rear.

CYCLE OF OPERATION

Refer to figure 11-2 as we explain the functions of the pistol. We will assume that a loaded magazine is in the weapon, a round is in the chamber, the grip safety is depressed, the trigger has been squeezed, and the round ignited. The cycle of operation now begins.

As the powder gases burn and expand, the bullet is forced down the barrel while the same force is directed rearward against the slide. The slide and barrel are locked together at this



17.42.5

Figure 11-7.— Automatic safeties.

point, and both are forced aft. The barrel link is attached to the stationary receiver so the barrel is moved downward as well as to the rear. As the barrel locking ribs are disengaged from the recesses in the slide, unlocking is completed.

As the slide moves aft in recoil, the extractor pulls the empty case along with it. Extraction is completed when the cartridge clears the chamber.

Ejection occurs when the cartridge strikes the stationary ejector, pivots on the extractor, and flips from the weapon through the ejection port.

Cocking began as soon as the slide started its recoil movement. The hammer is moved rearward and the hammer strut is pushed down against the mainspring, compressing it. When the slide strikes the recoil spring guide collar, its rearward movement is stopped. The recoil spring then causes the slide to begin its forward

movement. The hammer follows the slide for a short distance. Then the sear, which bears against the hammer through the action of the sear spring, enters the full-cock notch of the hammer and holds it in a cocked position.

Feeding starts as soon as the slide, moving to the rear, clears the top of the magazine. The magazine follower, under pressure from the magazine spring, forces the top round against the lips of the magazine. This places the top cartridge in position to be picked up by the face of the slide during its forward movement.

Chambering occurs when the forward moving slide pushes a new round into the chamber. As the bullet is pushed up the ramp into the chamber, the base of the cartridge slides up the face of the slide. As this happens, the groove on the base of the cartridge is engaged by the hooked extractor.

After chambering, the slide continues forward a small distance, pushing the barrel ahead of it. As the barrel moves, it pivots up and forward on the barrel link. The locking ribs on the barrel enter the locking recesses in the slide, thereby locking the two together.

Firing will start the cycle all over again. When the grip safety is depressed and the trigger is squeezed, the trigger yoke presses against the disconnecter, which pushes aft on the sear. The sear rotates on its pin, disengaging from the notch on the hammer. The mainspring pushes up on the hammer strut, rotating the hammer forward. The hammer strikes the firing pin, which in turn strikes the cartridge primer.

.38 CALIBER SMITH AND WESSON REVOLVER

The .38 cal. revolvers are found primarily in armories at shore activities. In this portion of the chapter we will discuss the .38 cal. Smith and Wesson Special (fig. 11-8). This weapon primarily is used by personnel assigned to guard duty or police work, but it is frequently issued to flight personnel. A revolver utilizing the caliber .38 special cartridge is considered a more practical close-quarters defense weapon than the bulky caliber .45 pistol. The .38 has about the same maximum and effective ranges as the .45 cal. automatic, 1600 and 50 yards, respectively.

The caliber .38 S&W revolver is a single-shot breech-loading hand weapon. The cylinder of the weapon has six chambers and revolves around a central axis. Six shots can be fired

without reloading. When the cylinder is closed the weapon is ready to fire. Fired cases are extracted manually.

This weapon is designed to fire the cartridge, ball, caliber .38 special. The action of cocking the hammer causes the cylinder to rotate counterclockwise and align the next chamber with the barrel. Squeezing the trigger all the way back cocks the hammer, or the hammer can be cocked with the thumb. Note that all these operations are manual. The revolver is not an automatic or semiautomatic weapon in the technical sense.

One other caliber .38 revolver that is also used in the Navy (but less commonly) is the Colt. This weapon is in structure almost identical with the S&W. One structural difference is that the Colt has a shorter barrel than the S&W. The main functional difference is that the Colt's cylinder rotates clockwise when being fired; the S&W cylinder rotates counterclockwise. Both use the same ammunition.

Figure 11-9 shows the parts of the revolver and the disassembly to the extent required for normal care.

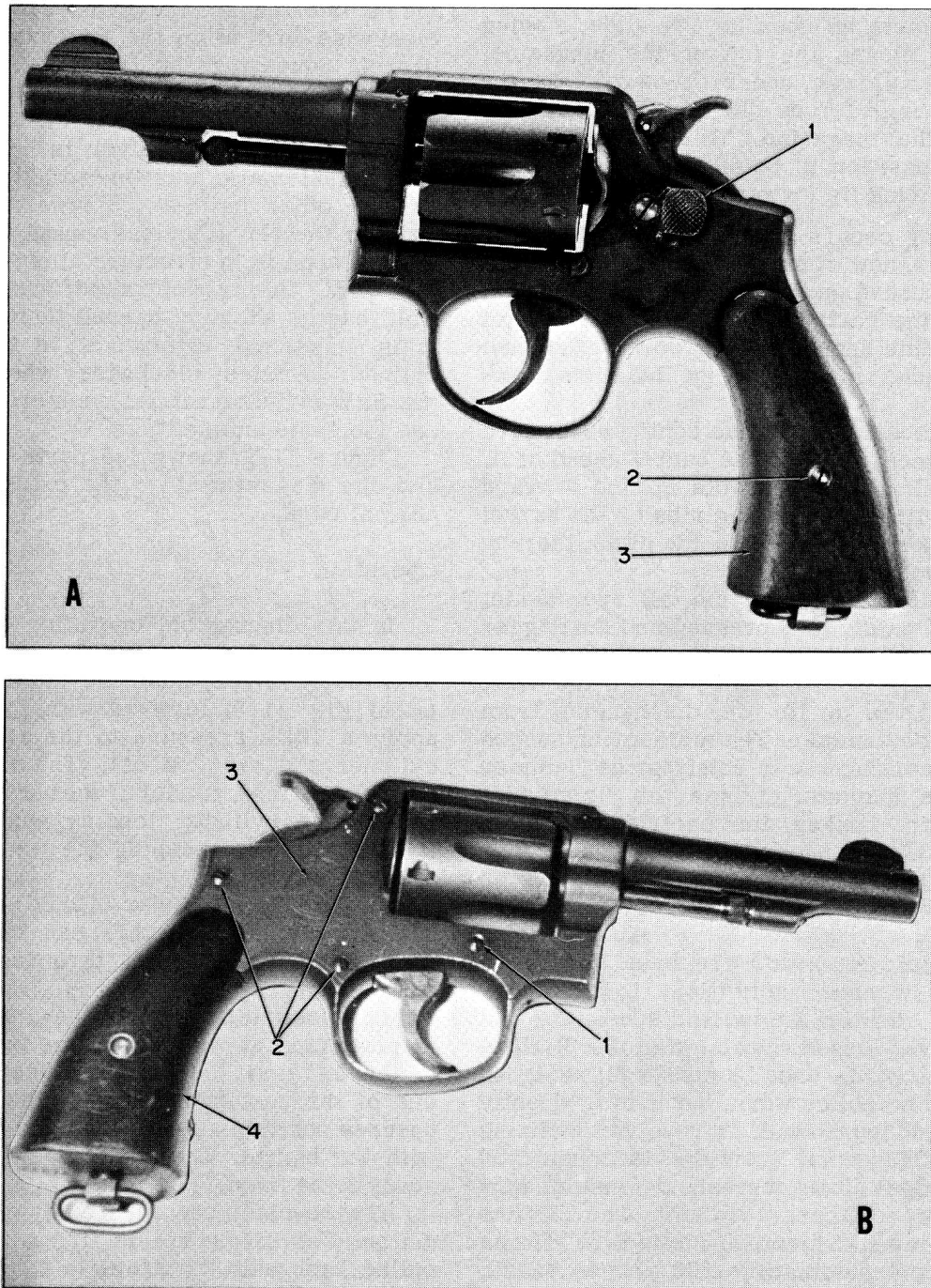
Operation

In this discussion, operation of the revolver is limited to loading, firing, and unloading. To load the revolver, push the thumb piece (thumb latch) (fig. 11-8) forward with the right thumb. apply a little pressure to the right side of the cylinder and swing it out. (The thumb piece will not release the cylinder if the hammer is cocked.) Rotate the cylinder loading each chamber as it comes on top, keeping the weapon pointed in a safe direction.

NOTE: The cylinder should not be flipped out sharply because this can cause the crane (fig. 11-9) to be bent, throwing the cylinder out of timing.

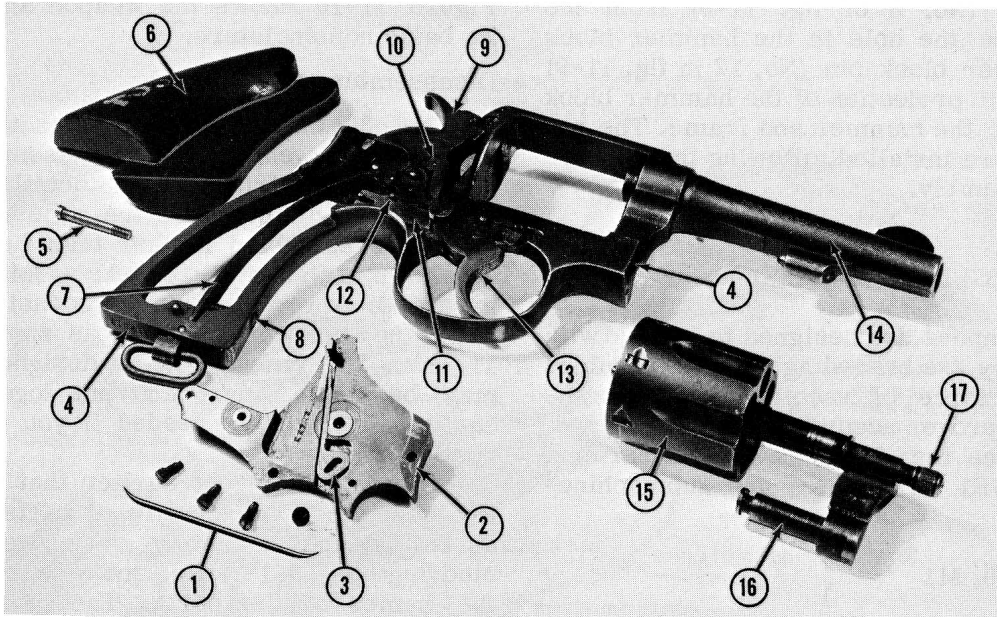
To close the revolver, swing the cylinder in place and at the same time turn the cylinder to the left until the ratchet in the frame engages one of the rectangular cuts in the cylinder. This ensures positive alignment of one of the chambers with the barrel. The weapon is now loaded and ready to be fired.

The revolver can be fired by single or double action. For single action firing, the hammer is pulled back with the thumb to the full-cock position for each round, this action also rotates the cylinder. The hammer is held in the cocked position by the sear until released by the trigger. In double action firing, pulling the trigger causes the hammer to be raised to nearly its full-cock



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Figure 11-8.— Smith and Wesson revolver, caliber .38 special. A. Left side: 1. Thumbpiece (cylinder release). 2. Stock screw. 3. Stock. B. Right side: 1 and 2. Sideplate screws. 3. Sideplate. 4. Stock.



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Figure 11-9.—Smith and Wesson revolver, caliber .38; right side view with cylinder and ejector group, side plate, and stocks removed. 1. Sideplate screws. 2. Sideplate. 3. Hammer block. 4. Frame. 5. Stock screw. 6. Stocks. 7. Mainspring. 8. Mainspring strain screw. 9. Hammer. 10. Sear. 11. Rebound slide. 12. Hammer block pin. 13. Trigger. 14. Barrel. 15. Cylinder. 16. Crane or yoke. 17. Ejector plunger.

position. The hammer strut will then escape the trigger, and the spring-loaded hammer will fall and strike the cartridge. In double action firing, the cylinder is rotated by pulling the trigger. Since it requires slightly less trigger pull for single action, this method should produce better accuracy.

The empty cartridges are ejected by swinging out the cylinder to the left and pushing the extractor plunger toward the rear of the cylinder.

There are two built-in safeties on this revolver - the hammer block and the rebound slide. The hammer block prevents the hammer from going far enough forward to strike the cartridge primer when both the hammer and trigger are in the forward or uncocked position. Thus, if the revolver were dropped or otherwise struck on the hammer, the round would not be fired. The rebound slide actuates the hammer block to prevent the hammer from traveling far enough to strike the primer should the hammer slip from the thumb while being manually cocked.

Disassembly and Assembly

The following steps should be followed in the disassembly and assembly of the revolver.

1. Push forward on the thumb piece (fig. 11-8A) which actuates the cylinder latch, and swing the cylinder out to the left. With a small screwdriver remove the sideplate screw (No. 1 in fig. 11-8B) located directly under the cylinder. This screw retains the crane (or yoke) of the cylinder and ejector group.

2. Remove the cylinder and extractor group by pulling the cylinder forward.

3. Remove the three remaining sideplate screws (No. 2 in fig. 11-8B).

4. Remove the sideplate. Do not pry the sideplate off. Use a wooden handle to tap the plate and frame until the sideplate loosens from its seating.

5. Remove the stock screws and lift off the stocks.

The disassembled weapon appears as shown in figure 11-9. The parts can be inspected and lubricated as necessary.

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To assemble the weapon, first remove the hammer block (No. 3 of fig. 11-9) from the sideplate. Place the hole in the hammer block over the hammer block pin (No. 12 in fig. 11-9) so that the "L" projection of the hammer block will fit between the hammer and frame. The remaining parts are installed following the reverse order of disassembly.

SHOULDER WEAPONS

Shoulder weapons are designed to be held with both hands; they are braced against the shoulder to absorb the force of recoil and steady the weapon to improve accuracy. This group of weapons includes the .30 cal. M1 rifle, carbine, M14 rifle, M16E1 rifle, BAR, and submachinegun.

RIFLE, CAL. 30, M1

This rifle is the basic weapon currently used by personnel assigned to the ship's landing party. Its effectiveness was proved in World War II and in Korea. It is a semiautomatic, gas-operated weapon with a maximum effective range of about 500 yards. When fitted with a

special launcher, it can fire rifle grenades. Figure 11-10 shows the weapon and points out its basic nomenclature.

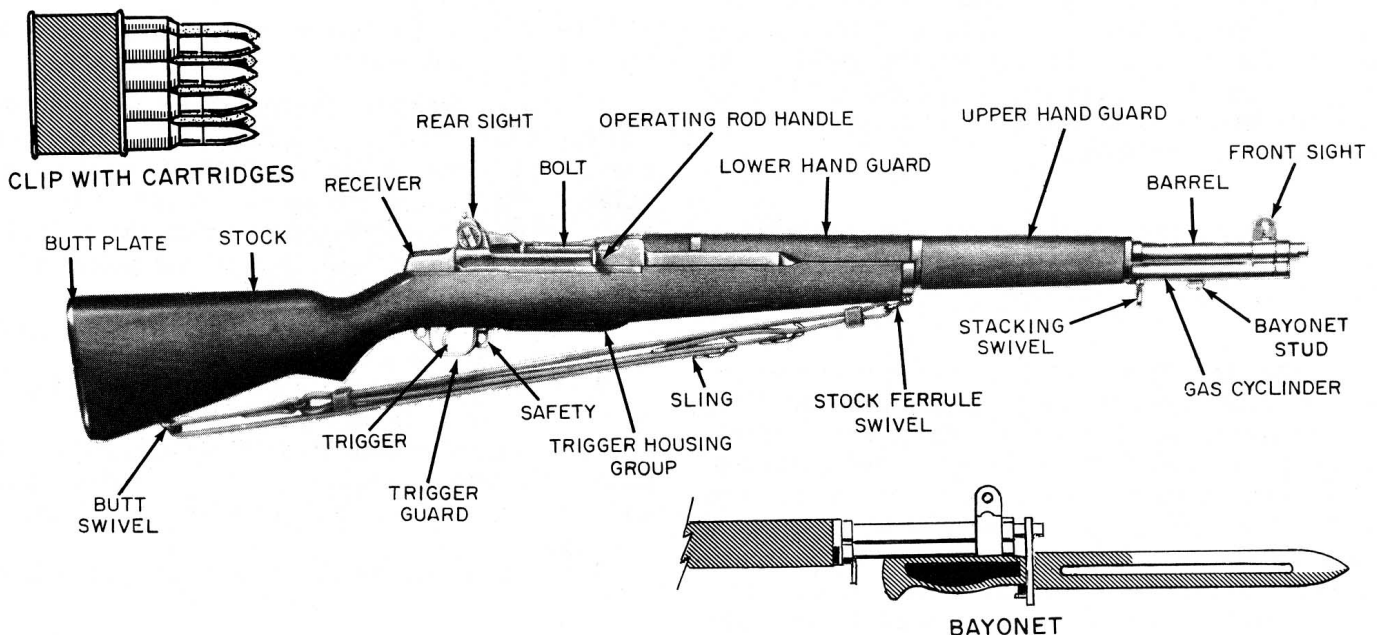
Disassembly and Assembly

The .30 cal. M1 rifle, as is the case with most other weapons, is disassembled in two phases - field stripping and detailed stripping. For normal maintenance the rifle will not have to be disassembled further than field stripping as shown in figure 11-11A. As a GM you must be prepared, however, when the occasion arises, to strip the weapon in detail as shown in figure 11-11B. The rifle has been designed so that it may be taken apart and put together rather easily. No force is needed if you strip it correctly.

It was pointed out earlier that it is helpful to know the nomenclature of parts in the disassembly and assembly of a weapon. While studying the M1 rifle, make sure you learn the names of the parts. The parts generally are named for the job they perform.

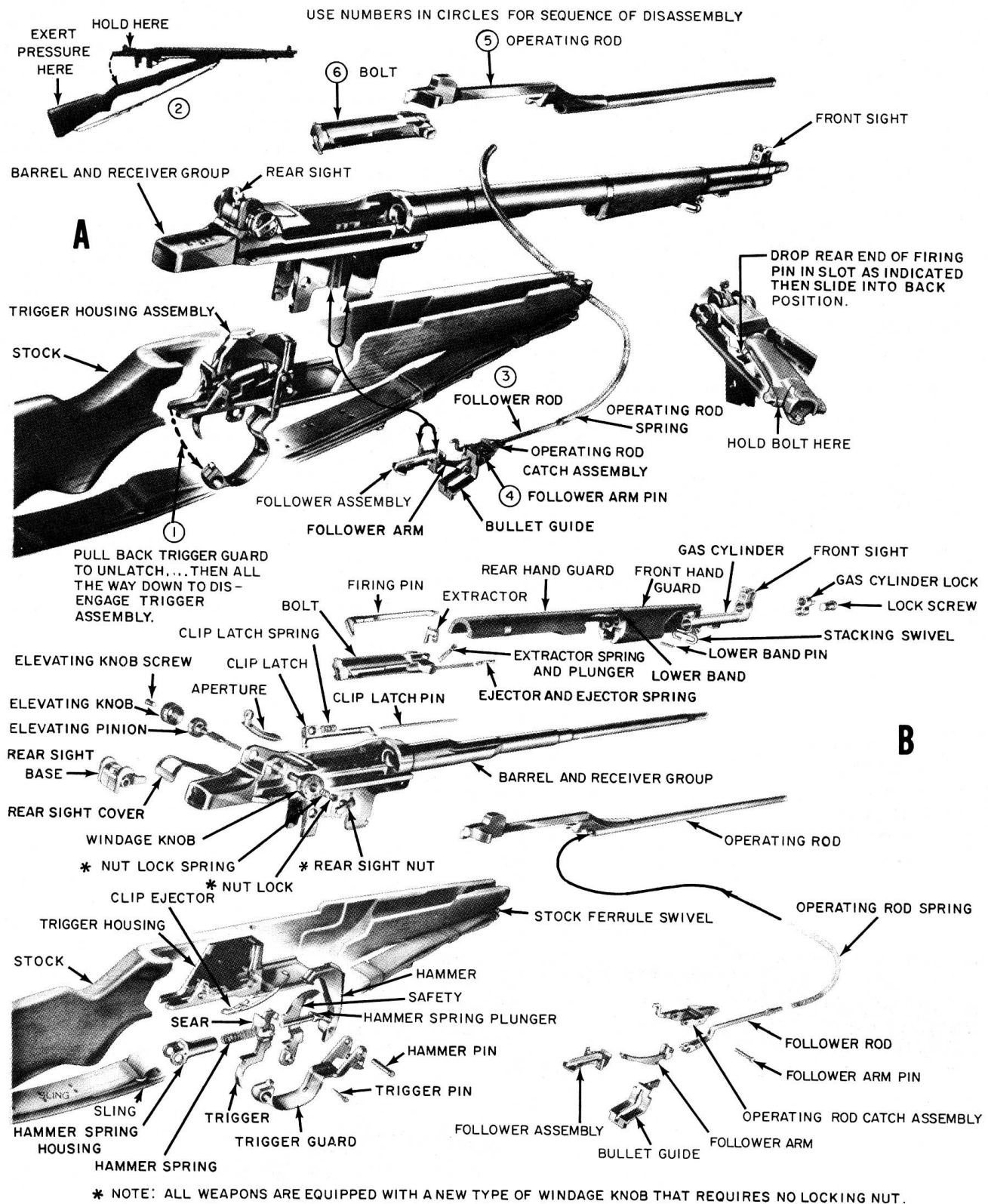
Field Stripping

There are three major groups in the field stripping of the M1 rifle - the trigger housing



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Figure 11-10.— Basic nomenclature, U. S. Rifle, caliber .30, M1.



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Figure 11-11.—Disassembly of .30 caliber rifle M1. A. Field stripped. B. Detail stripping.

group, the barrel and receiver group, and the stock group. To disassemble the rifle into these three groups, grasp it with the left hand so that the base of the trigger housing is included in your grip. Place the rifle butt against the left thigh, with the trigger group toward you. With your right hand pull the trigger guard downward and outward. Swing the guard out as far as it will go, then lift out the trigger group. Next, grasp the rifle at the rear of the receiver with your left hand, muzzle to the left. With your right hand palm, give a downward blow to the small of the stock, grasping it as you do. This separates the stock group from the barrel and receiver group.

Detailed Stripping

Place the barrel and receiver group so that the sights are down, muzzle pointing to the left. With the thumb and forefinger of your left hand, grasp the follower rod and disengage it from the follower arm. Remove the follower rod and operating rod spring by withdrawing them to the right. Push out the follower arm pin from its seat and remove it.

Grasp the bullet guide, follower arm, and operating catch rod catch assembly, and lift

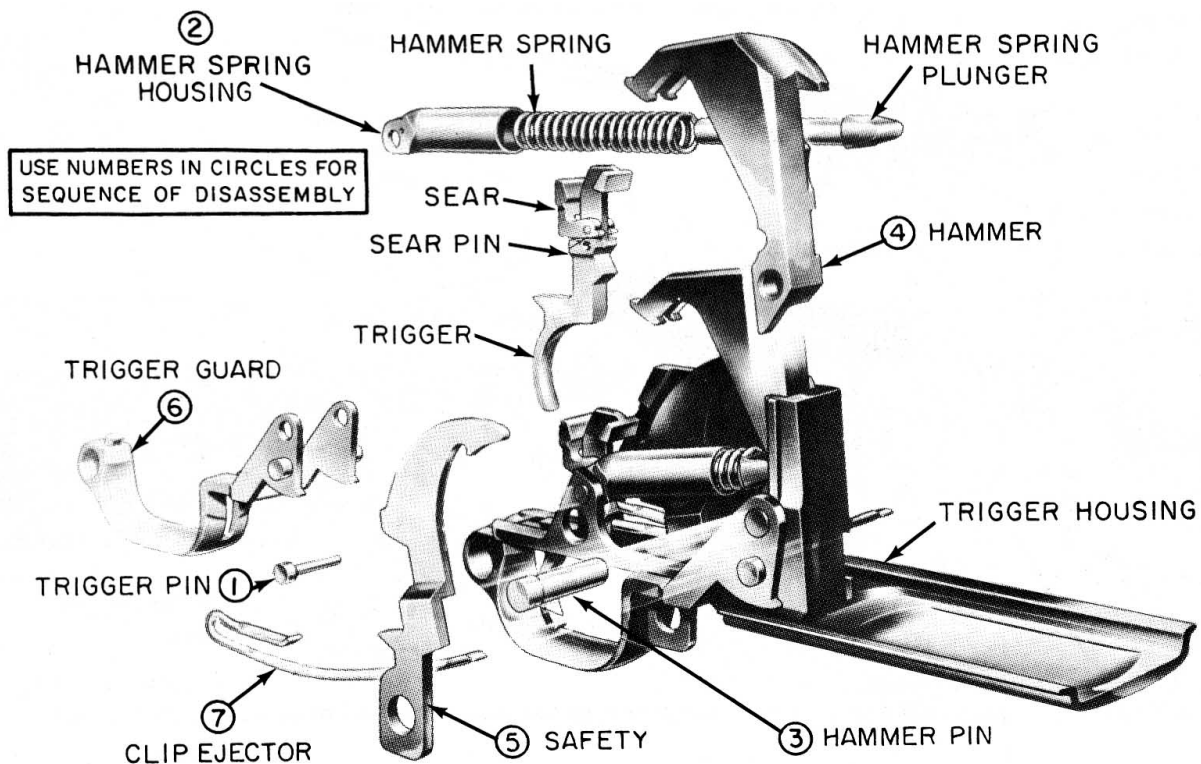
them out of the assembly together. Next, lift out the follower assembly. Do not separate the slide from the follower.

Turn the barrel and receiver group over so that the sights are up, muzzle pointing away from you. Pull the operating rod to the rear until the rear of the handle is directly under the forward edge of the windage knob. With an upward and outward pressure, disengage the guide lug of the operating rod through its dismount notch on the receiver. Remove the operating rod.

Grasp the bolt by the operating lug and, while sliding it forward, lift it upward and outward to the right front with a slight rotating motion.

Hold the bolt in your left hand with your thumb over the ejector. This is important because the ejector will fly out and possibly be lost while removing if you do not hold it with your thumb. Remove the extractor and the extractor spring and plunger. Lift out the ejector and its spring. Do not separate the ejector from its spring or the extractor from its spring.

To disassemble the trigger housing group (fig. 11-12), close and latch the trigger guard and release the hammer to the fired position. Hold the trigger housing group with the first finger of the right hand on the trigger and the



3.60.3

Figure 11-12.— Disassembly of trigger housing group.

thumb against the sear. Place the trigger housing against a firm surface, press on the sear with the right thumb, then push the trigger pin out from left to right. Slowly release the pressure with your thumb and finger allowing the hammer spring to expand.

Lift out the trigger assembly and separate the hammer spring plunger, hammer spring, and the hammer spring housing. Do not remove the sear pin or sear. Push out the hammer pin from left to right and remove the hammer.

Unlatch the trigger guard and lay the trigger housing on its right side. Push out the stud of the safety. Remove the safety by lifting it from its slot in the base of the trigger housing.

Holding the rear of the trigger housing in your left hand and the trigger guard with your right hand, swing the trigger guard to the open position. Slide the trigger guard to the rear until the wings of the trigger guard are aligned with the safety stud hole. Rotate the trigger guard to the right and upward with your right hand until the hammer stop inside of the right wing clears the base of the trigger housing. Remove the trigger guard.

Assembly

The rifle and its component groups are assembled in the reverse order of their disassembly. First, assemble the trigger housing group, then the barrel and receiver group. The rifle is now in the field stripped condition of three main groups as shown in figure 11-11A. The stock group and the barrel and receiver group are fitted together, then the trigger housing group is inserted. The assembly is completed by closing and latching the trigger guard.

To test the assembly of the rifle, pull the operating rod to its rearmost position. The bolt should stay open. Close the bolt and snap the safety to its locked position, and squeeze the trigger. The hammer should not fall. Push the safety forward and squeeze the trigger. The hammer should fall.

Operation

By studying the disassembly and assembly of the rifle, you now know the parts. It is important that you understand how the parts function. There are eight steps in a cycle of operation of the M1 rifle. You will better understand the operation of the M1 if we first look at the functioning of several individual parts. First, the trigger group will be discussed, then the actions that take place

upon loading a clip are shown. A complete cycle of operation will be explained, then we will see what happens when the last round of a clip is fired.

Trigger Housing Group

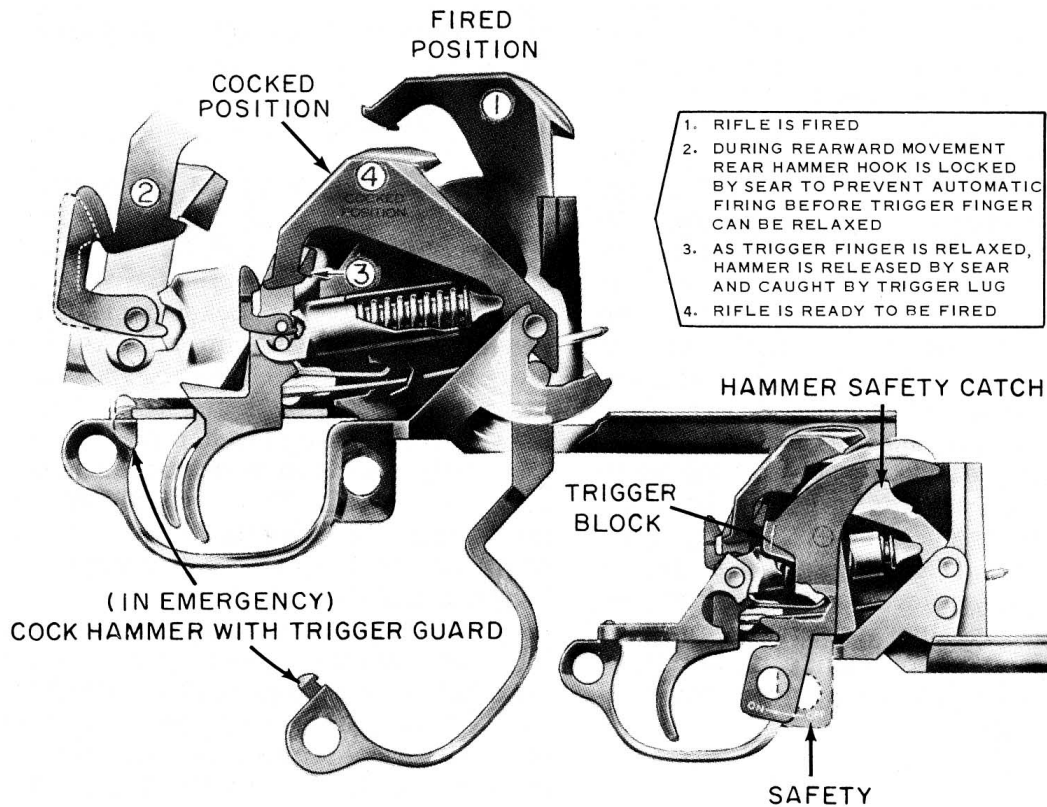
Refer to figure 11-13 as we explain how this group functions. Take the trigger housing out of the rifle (close and latch the trigger guard and cock the hammer). You can see that the hammer is held in a cocked position by the trigger lugs engaging the hammer hooks. Hold the hammer with your left thumb and slowly squeeze the trigger. You will see the trigger lugs move forward, releasing the hammer hooks. The hammer will rotate forward under pressure of the hammer spring. Now, release the pressure on the trigger and again cock the hammer, you will see the trigger lugs engaging the hammer hooks to hold it cocked.

However, there must be a way of preventing the hammer from going forward even if you keep pressure on the trigger after each shot. This is done by the sear, which catches on the rear hammer hooks. Now squeeze the trigger and hold it to the rear. Cock the hammer slowly and see how the sear catches on the rear hammer hooks and holds the hammer back. Slowly release the trigger and you will notice that the sear will release the hammer hooks. Now the hammer hooks catch on the trigger lugs and hold the hammer in the cocked position. This combination holds the hammer to the rear each time a round is fired.

Action on Loading a Full Clip

Before a clip can be loaded into the rifle, the operating rod and the bolt must be all the way to the rear. The follower is all the way up in the receiver, due to the pressure being exerted by the operating rod spring through the follower and follower arm, against the follower. The hump of the follower rod has contacted the 45° camming surface of the operating rod catch, pushing it toward the barrel and causing its undercut hook to engage with the hooks on the operating rod. This keeps the bolt and operating rod to the rear against pressure of the compressed operating rod spring. You can find the parts mentioned in figures 11-11, 11-14, and 11-15.

As a full clip is placed on the follower and pressed down, the follower arm moves down rotating around its pin. The follower arm being



3.60.4

Figure 11-13.— Trigger housing group functioning.

connected to the follower rod, pushes the rod towards the muzzle. This moves the hump of the follower rod away from the 45° camming surface of the operating rod catch.

As the follower reaches its lowest point in the receiver, the square shoulder on the follower arm contacts the rear lip of the accelerator, forcing it upward toward the barrel. Between its lip and the point where it is fastened by its pin to the operating rod catch, the accelerator bears on and pivots about the toe of the bullet guide. Since the guide is stationary, the accelerator forces the front end of the operating rod catch downward, separating its hook from the hooks of the operating rod. The operating rod and bolt are now free to move forward under the action of the operating rod spring.

NOTE: The accelerator functions only once during the cycle of operation - when loading a full clip.

As the forward end of the operating rod catch moves downward away from the barrel, the long rear arm of the catch moves upward and away from the front stud of the clip latch

(fig. 11-11B). This allows the clip latch spring to expand and force the rear stud of the clip latch into a notch on the clip. The stud holds the clip in the receiver against the action of the compressed clip ejector. The operating rod catch is held away from the hooks on the barrel by the front stud of the clip latch, which is continually pushing against the catch's long rear arm. This allows the bolt to move back and forth freely until the last round is fired.

An explanation will be given of the actions that occur upon firing the last round, after we go through a complete cycle of operation.

Operating Cycle

Feeding takes place when a cartridge is moved into the path of the bolt. With the bolt retracted and a full clip in the receiver, the follower exerts pressure on the bottom round in the clip. Pressure is exerted on the follower by the operating rod spring through the follower rod and follower arm.

Chambering is the action that takes place when moving a round into the chamber. As the

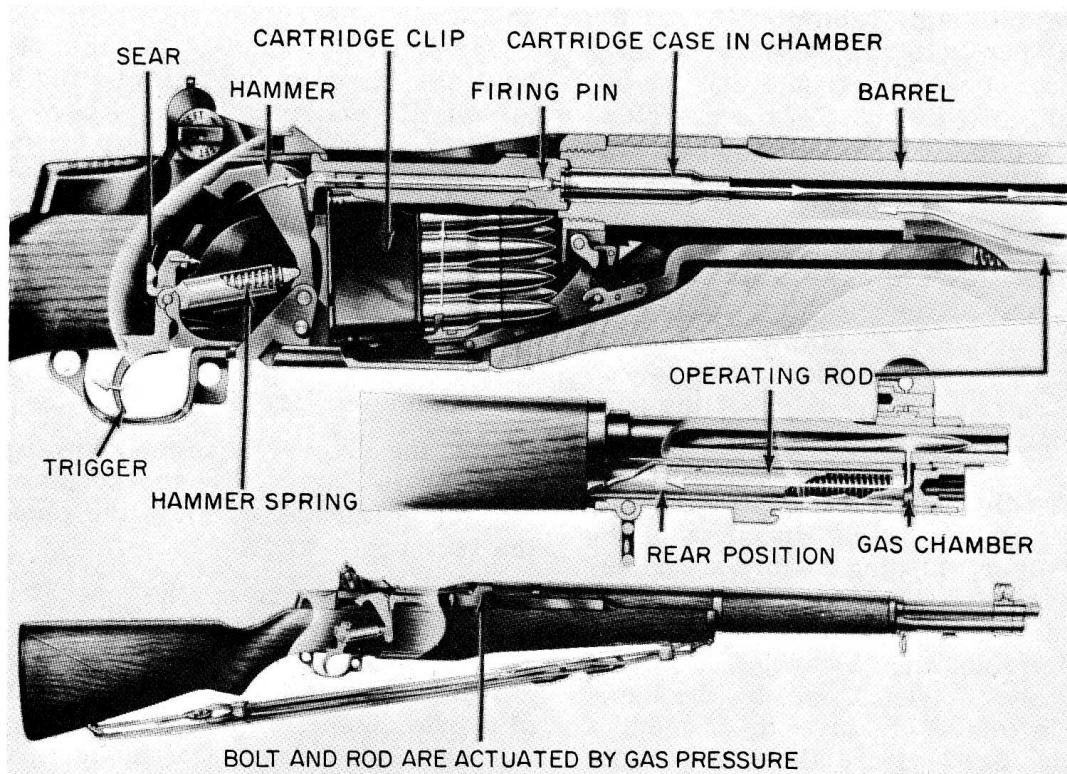


Figure 11-14.— Basic functioning

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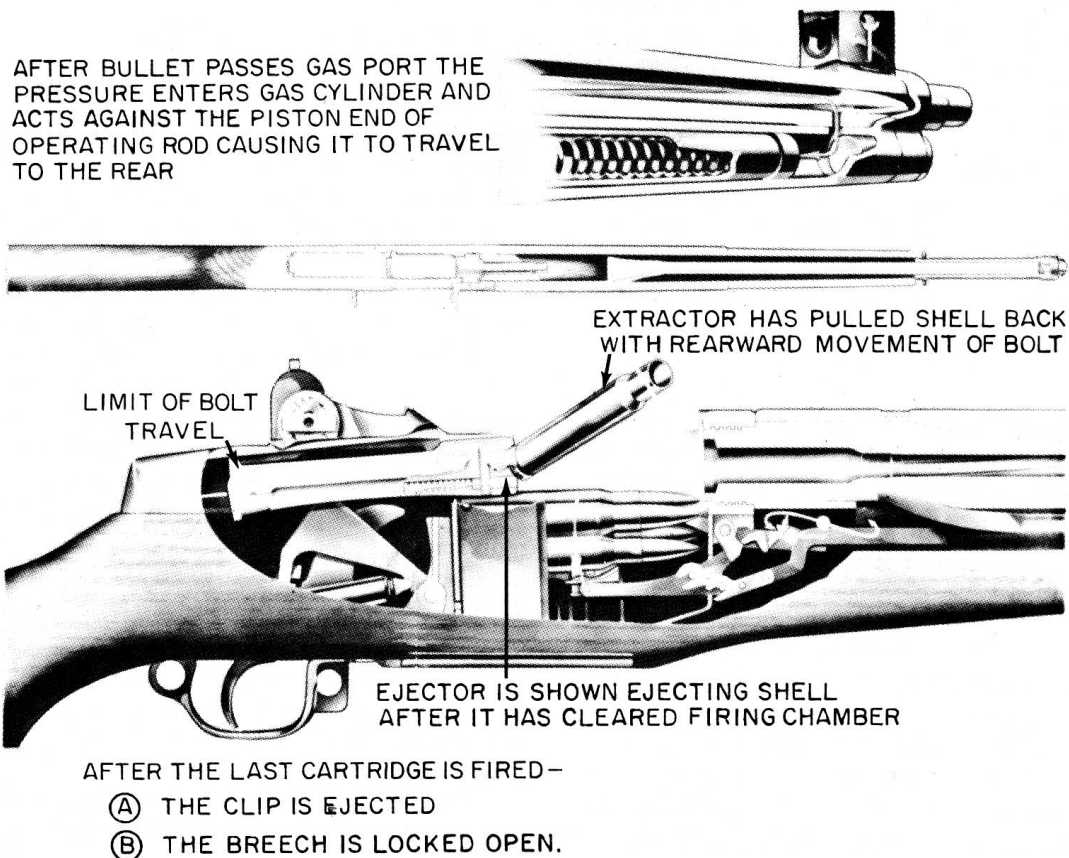


Figure 11-15.— Bolt and gas cylinder functioning.

84.245

bolt moves forward, it rotates and engages the top cartridge in the clip, ramming it into the chamber. When the bolt reaches its forward position, the rim of the cartridge is gripped by the extractor, and the base of the cartridge forces the ejector into the bolt, thus compressing the ejector spring.

Locking of the bolt is accomplished when the bolt is all the way forward. The rear camming surface in the hump of the operating rod forces the operating lug of the bolt downward, causing the bolt to rotate clockwise. The bolt is locked by the locking lugs on both sides of the bolt, engaging in the locking recesses in the receiver.

Slightly before the bolt reaches its foremost position, the tang of the firing pin contacts the bridge of the receiver, stopping the forward movement of the firing pin. When the bolt is turned and fully locked, the tang of the firing pin is lined up with the slot in the bridge of the receiver and may be driven home by the hammer. This is a safety feature to prevent a round from being fired before the bolt is fully locked.

As the round is fired and the bullet nears the muzzle, a portion of the gases produced by the burning powder expand through a gas port into the gas cylinder, striking the piston head and driving the operating rod to the rear. The camming surfaces of the operating rod force the operating lug on the bolt upward, disengaging the bolt from the receiver. As the bolt rotates counterclockwise, the firing pin tang contacts the bridge of the receiver, camming the firing pin to the rear into the face of the bolt.

You recall that the extractor gripped the rim of the cartridge as the bolt moved forward, it remains in this grip while it is in the chamber. As the bolt moves to the rear, the empty case is withdrawn from the chamber by the extractor.

When the empty case clears the chamber, the ejector (which has been continually pushing against the base of the case) ejects the empty case from the receiver by the action of the expanding ejector spring.

Cocking occurs as the bolt continues to the rear, riding over the hammer, forcing it rearward and down. The hammer is caught by the sear, if the trigger is still being pulled, or by the trigger hooks if the trigger has been released.

Action Following Last Round

As the last round is fed into the path of the bolt, the hump of the follower rod moves closer to the 45° camming surface between, the front arms of the operating rod catch.

While the last round is in the chamber, the follower is against the bottom of the bolt. When the last round is fired, the bolt comes to the rear and the follower is moved all the way up in the receiver. At the same time the hump of the follower rod contacts the 45° camming surface of the operating rod catch and pushes the catch up toward the barrel.

As the catch is cammed toward the barrel, its hook is engaged by the hooks of the operating rod. This action holds the operating rod to the rear and the bolt open.

When the front of the operating rod catch is cammed toward the barrel, the catch pivots on the follower arm pin and the long rear arm moves downward against the front stud of the clip latch. The clip latch rotates, withdrawing the rear stud from the notch in the clip. The empty clip is then ejected by the expanding clip ejector.

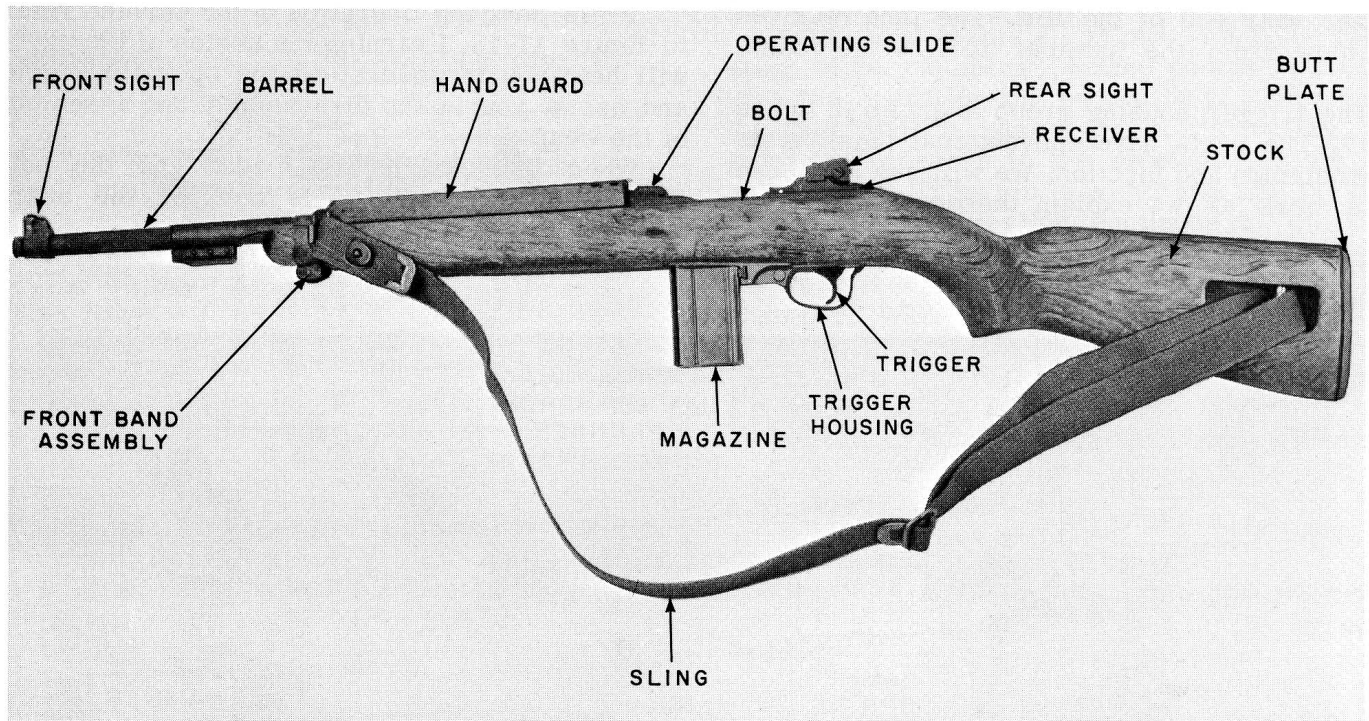
CARBINE. CALIBER .30 M1

The carbine cal. .30 M1 was developed during World War II and was used extensively by the Army and Marine Corps, and various units of the Navy. The carbine does not have the stopping power of a .45 cal. weapon but its 300 yard range makes it a much more useful weapon than the pistol in the hands of a man who has received normal marksmanship training.

Other models of the carbine include the M1A1, M2, and M3. The M1A1 is identical to the M1 except for a separate grip and a metal skeleton folding stock extension hinged to the grip and rear end of the stock. The M2 is the M1 with parts modifications and changes. These changes allow the M2 to be fired in automatic or semiautomatic fire by adjusting a selector. The M3 is identical to the M2 except that the top of the receiver is designed to accommodate special sighting equipment (sniperscope).

In this chapter we will discuss the carbine M1 because this is the model you are most likely to see on board ship.

The M1 carbine (fig. 11-16) is a gas-operated, self-loading, air-cooled shoulder weapon delivering semiautomatic fire, and is fed by a 15-round box type magazine. The carbine uses caliber .30



84.246

Figure 11-16.— Carbine, caliber .30, M1.

ammunition, which however, is NOT interchangeable with ammunition of other caliber .30 weapons.

The first M1 carbines (and there are probably still some around) were issued with an L-type sight. Both the long and short arm of the sight have a peephole. With the short arm raised into position, the sight is preset for 150 yards range. The longer arm is raised for shooting at targets 300 yards away. There is no in between and there is also no provision for windage. The later M1 has an adjustable sight graduated in 50-yard increments from 100 to 300 yards and it also can be adjusted for wind.

Nomenclature

The gas cylinder and piston are located under the barrel forward of the receiver. The gas cylinder and piston operate in the same way as for the M1 rifle in that they transmit the force developed by the fired round to operate the weapon. The after end of the piston extends out of the cylinder and rests against the forward end of the operating slide. Though the piston moves to the rear only $9/64$ inch, it

strikes the operating slide hard enough to drive it to its full recoil position.

The bolt is actuated by the operating slide which slides back and forth under the barrel. The rear portion of the operating slide projects back along the right side of the receiver, ending in a hook shaped projection (operating handle). A hump in the operating slide is cut out to form the bolt camming recess. The bolt operating lug rides in this recess and is cammed up or down to unlock or lock the bolt.

Power for counterrecoil action is provided by the operating slide spring which surrounds the spring guide. The after end of the guide fits into a well in the receiver. As the weapon is fired and recoils, the guide moves into the receiver. The spring being too large to fit in the well is compressed, storing energy to return the slide to its forward position after the force of recoil is spent.

The bolt contains the firing pin, extractor, and ejector. During its movement to the rear, the bolt cams the hammer back and down to its cocked position. As the bolt moves forward it forces the next round into the chamber.

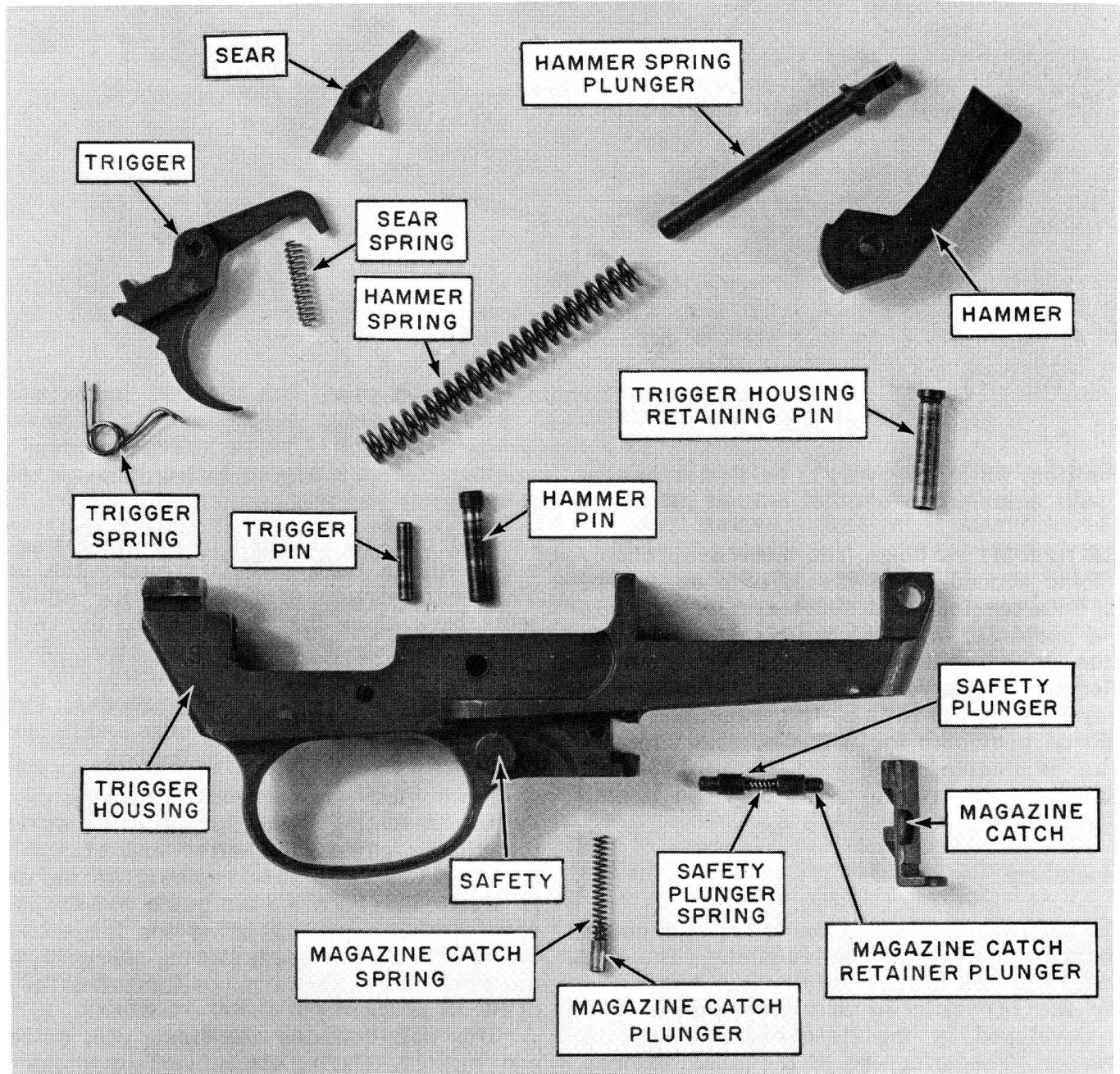
The firing pin fits in a hole drilled in the bolt. A tang on the end of the firing pin extends out the rear end of the bolt. The tang receives the blow from the hammer to fire the round.

The trigger housing group is shown in figure 11-17. The parts have conventional small arms nomenclature and function. We will see how these parts work as we explain the operating cycle.

Operating Cycle

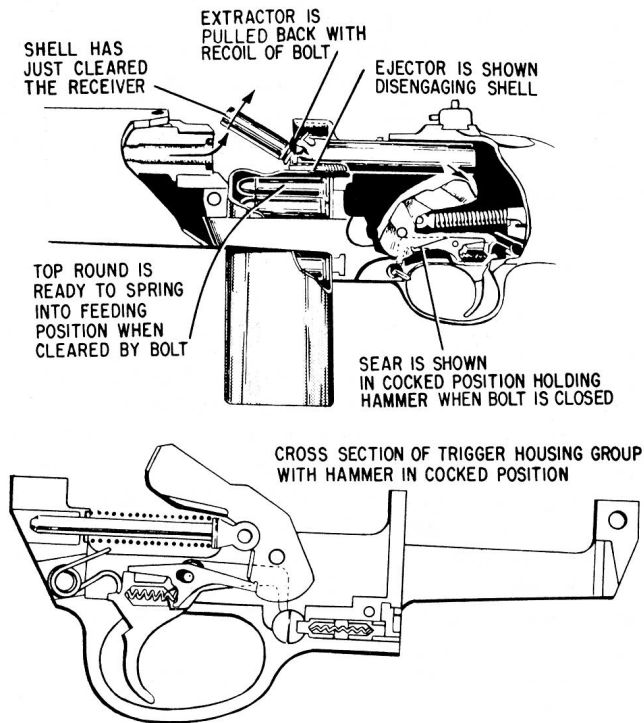
While studying operation of the carbine refer to figure 11-18. Learning the names of the parts will help you to understand the operating cycle and assist you in the disassembly and assembly of the weapon.

When the carbine is loaded and the bolt is closed, the hammer is held by the sear.



84.248

Figure 11-17. — Trigger housing group, M1 carbine.



84,249

Figure 11-18.— Trigger and bolt functioning, M1 carbine.

When the trigger is pulled, it pivots around its pin, raising at the rear and rotating the sear with it. As the sear pivots around the trigger pin its front end goes down, disengaging the sear notch of the hammer. This releases the spring-loaded hammer to move forward and strike the cartridge primer.

The bolt must be fully rotated into its locked position before the hammer can move forward. Unless the bolt is locked, the tang on the firing pin is blocked by the bridge of the receiver. When the bolt is locked, the tang is aligned with a slot in the bridge.

As the bullet is forced down the barrel, it passes a gas port. Some of the expanding gases go through this port to the gas cylinder and strikes the piston. The piston is driven to the rear approximately $\frac{3}{16}$ inch where it strikes the operating slide driving it to the rear in recoil. The operating slide moves to the rear independently of the bolt for the first fraction of an inch. The lug on the bolt merely rides in the straight section of the recess in the operating slide during this movement. This delay

in the unlocking process allows the projectile to leave the muzzle, relieving barrel pressure before the bolt is opened.

At the end of this slight movement, the operating slide camming surface comes in contact with the operating lug on the bolt. This rotates the bolt and disengages the bolt's locking lugs from the recesses in the receiver. As the bolt rotates, the firing pin is withdrawn into the bolt.

The operating slide continues to the rear carrying the bolt with it. As the bolt moves to the rear it withdraws the empty case from the chamber. When the cartridge mouth clears the breech, it is ejected from the weapon by the ejector which has been continually pressing on the base of the cartridge.

As the bolt rides over the hammer it forces it back. The sear comes into contact with the sear notch of the hammer, and is carried forward slightly. This causes the sear after end to ride off the lip of the trigger.

When the bolt completes its rearward movement, the operating slide spring being compressed, forces the bolt forward carrying a new round into the chamber. The hammer, under its spring pressure, rides on the bottom of the bolt and tends to follow it. The hammer only rotates a short distance before it is brought up by the sear. When pressure on the trigger is released, the hammer spring imparts a slight forward motion to the hammer. The hammer pivots enough to push the sear slightly backward, causing its rear end to ride up over the trigger lip. This completes the cocking action.

When the bolt reaches its forward position, the rim of the cartridge is gripped by the extractor. The base of the cartridge forces the ejector into the bolt, compressing the ejector spring. When the bolt is all the way forward, the rear camming surface in the hump of the operating slide forces the operating lug of the bolt down, making the bolt rotate clockwise. The bolt is locked as the locking lugs on both sides of the bolt engage the locking recesses in the receiver. The forward movement of the operating parts ends when the inside of the heavy portion of the operating slide has driven the piston into the gas cylinder. The carbine is now ready to be fired again.

Disassembly

For cleaning and inspection, the carbine is first disassembled into three main groups- barrel and receiver group, trigger housing group, and the stock and handguard. To do this, loosen

the front band screw and slide the band (fig. 11-16) off the stock. Remove the handguard. The barrel and receiver group and the trigger housing group can be lifted out of the stock as one unit.

Next, remove the slide spring and guide by disengaging the guide from its seat on the slide and withdrawing it to the left, out of its well in the receiver.

The trigger housing group is then separated from the barrel and receiver group. To do this, cock the hammer by pulling the operating slide to the rear and pushing it forward again. Take out the trigger housing pin and remove the trigger housing group by sliding it toward the muzzle. Next, take out the operating slide and bolt.

This is the extent of the disassembly for normal cleaning and inspection. For more detailed instructions refer to the Army Field Manuals for the .30 carbines. FM 23-7; TM-9- 1276 and TM-9-1005-210 (Series).

Assembly

The carbine is assembled in reverse order of its disassembly, following the additional procedures below.

Hold the bolt by its operating lug so that the tail of the firing pin is opposite its notch in the receiver. Then lower the bolt into position.

Now hold the forward end of the slide in the right hand, palm up. Slide the bolt forward until its forward end is about 1-1/2 inch from the chamber; hold it in this position with the left thumb. Engage the operating lug of the bolt in the operating cam groove of the slide.

Raise the forward end of the slide so that the dismounting lug on its left side is opposite the notch in the left groove on the under side of the barrel. Then, by slightly twisting the slide to the right, engage the operating lugs of the slide in the operating grooves of the barrel. Move the slide and bolt to the rear until the operating slide lug is seated in its groove in the receiver; then close the bolt.

Place the barrel and receiver on their left side, muzzle to the left. Replace the trigger group assembly by engaging its grooves with the corresponding grooves in the receiver, and then replace the retaining pin.

Insert the small end of the guide rod in the loosely coiled end of the operating slide spring. Insert the loosely coiled end of the spring into its well in the receiver. By pressing on the

shoulder of the guide rod, compress the spring until the end of the guide rod can be inserted into its seat in the slide.

Next, Make certain the safety is to the left. Place the barrel and assembled groups in the stock. Replace the handguard. Slide the front band down over the end of the handguard and stock until it is engaged by the restraining spring. Then tighten the front band screw.

THE M14 RIFLE

The M14 rifle (fig. 11-19) is a light-weight, air-cooled, gas-operated, magazine-fed shoulder weapon. It is designed primarily for semiautomatic fire, or full automatic fire at the cyclic rate of 750 rounds per minute. The rifle is chambered for 7.62 cartridges and is designed to accommodate a 20-round cartridge magazine, the M2 bipod, the M76 grenade launcher, and the M6 bayonet. At the time of this writing, the M14 is being used primarily by the Marines and Seabees. It is not a general issue rifle so will not be discussed at this time. Further information on the M14 may be found in TMs and FMs for the rifle.

THE M16E1 RIFLE

The rifle, M16E1 (fig. 11-20), is a 5.56-mm (about .22 caliber) magazine-fed, gas-operated, air-cooled shoulder weapon. It is designed for either semiautomatic or full automatic fire through the use of a selector lever. The rifle is equipped with a flash suppressor which also serves as a stationary piston permitting the launching of rifle grenades without the use of supplementary attachments.

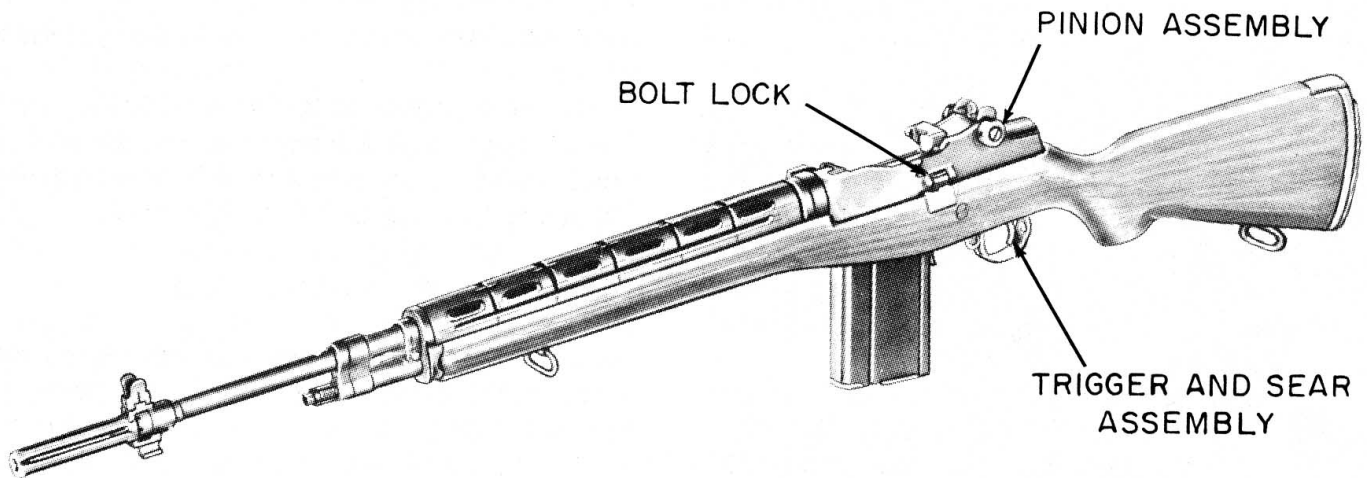
A "clothespin" type bipod, can be attached and be used in prone and foxhole positions.

Clearing the M16E1 Rifle

The first consideration in handling any weapon is to make it safe by clearing it. To clear the M16E1 rifle, place the butt against the right thigh and proceed as follows:

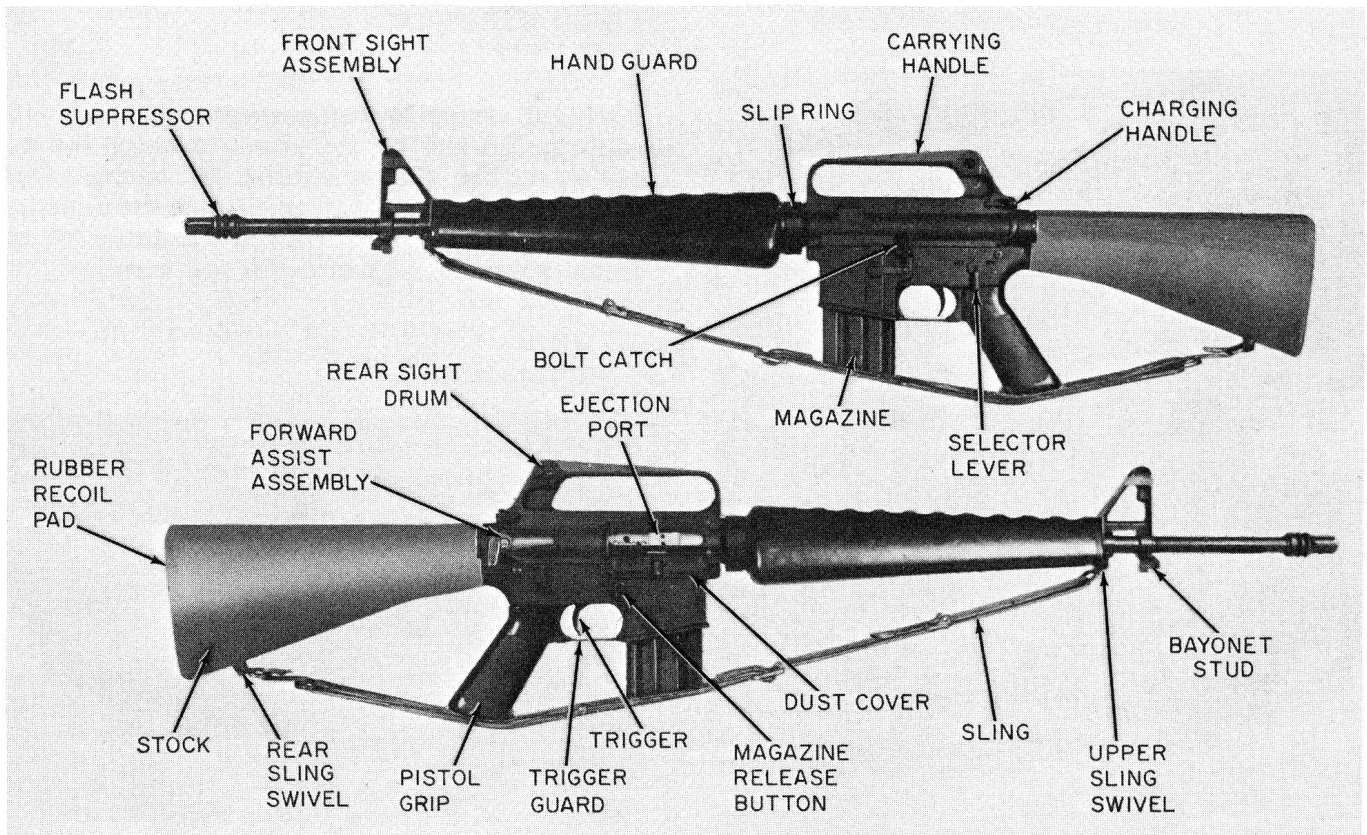
1. Attempt to point the selector lever toward SAFE, the position shown in figure 11-21. If the weapon is not cocked, the selector lever cannot be pointed toward SAFE. If this is the case, do not cock the weapon at this time; instead, go on to the next step in clearing.

2. Remove the magazine as shown in figure 11-22. Grasp it with the right hand (fingers



29.316

Figure 11-19.—7.62-mm rifle M14 and controls, left front view.



29.344

Figure 11-20.—Rifle, 5.56-mm, XM16E1, left and right side views.



29.346

Figure 11-21.— Selector lever pointing to SAFE.

curled around the front of the magazine, thumb placed on magazine catch button), apply pressure on the magazine catch button with the thumb, and pull the magazine straight out of the weapon.

3. Lock the bolt open as shown in figure 11-23 and 11-24. Grasp the charging handle with thumb and forefinger of right hand, depress the charging handle latch with right thumb, and pull to the rear (fig. 11- 23). When the bolt is fully rearward, press the bottom of the bolt catch with the thumb or forefinger of the left hand (fig. 11-24). Allow the bolt to move slowly forward until it engages the bolt catch, and return the charging handle to its forward position.

4. Inspect the receiver and chamber of the weapon by looking through the ejection port to ensure that these spaces contain no ammunition.

5. Check the selector lever to ensure that it points toward SAFE, and then allow the bolt to go forward by depressing the upper portion of the bolt catch.

CAUTION: The selector must be in the SAFE position to prevent damage to the automatic sear.

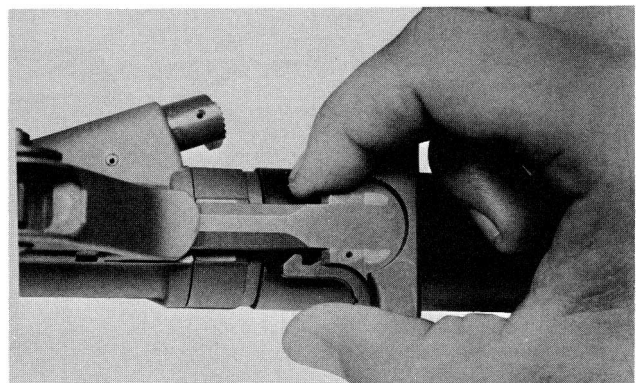
FIELD STRIPPING THE M16E1 RIFLE

Field stripping can be accomplished without supervision and is the extent to which the weapon should be disassembled for normal maintenance. As the weapon is disassembled, the parts should be laid out on a table or other clean surface in the order of removal. from



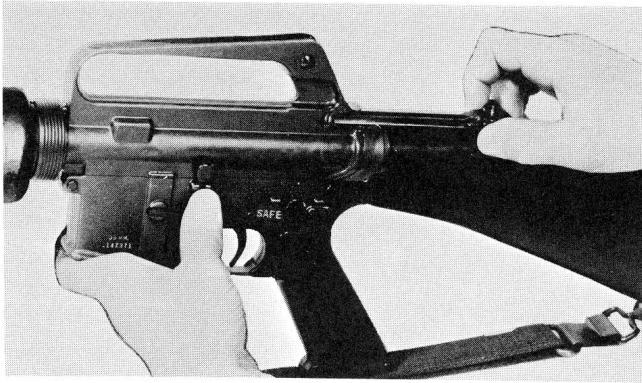
29.347

Figure 11-22.— Removing the magazine.



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Figure 11-23.— Pulling the charging handle rearward.



29,349
Figure 11-24. — Locking the bolt open.

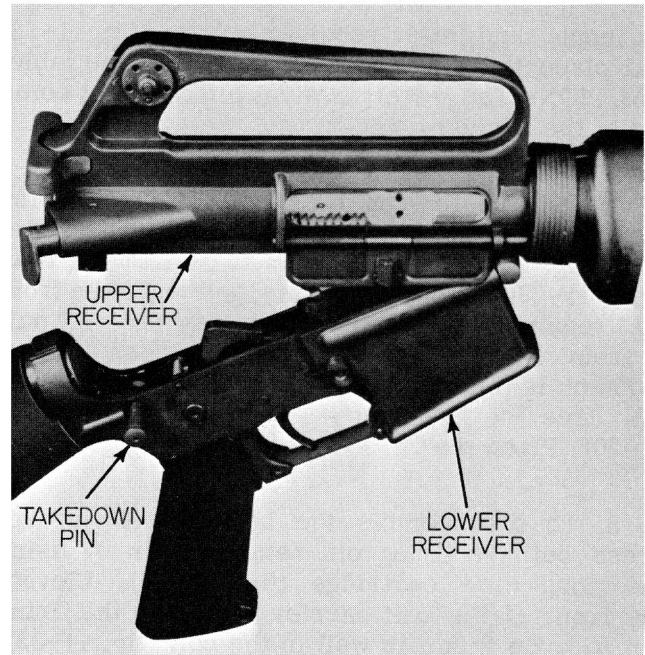
left to right. This makes assembly easier because the parts are assembled in the reverse order of assembly. Nomenclature should be learned as the weapon is disassembled and assembled to enable you to better understand the operation of the weapon.

The steps in field stripping are as follows:

1. Remove the sling and place the rifle on a table or flat surface, muzzle to the left.
2. Keeping the muzzle to the left, turn the weapon on its right side. Use the nose of a cartridge to press the takedown pin (fig. 11-25) until the upper receiver swings free of the lower receiver (fig. 11-26). CAUTION: The takedown pin does not come out of the receiver.



29,350
Figure 11-25. — Pressing takedown pin to the right.



29,351
Figure 11-26. — Breaking upper receiver away from lower receiver.

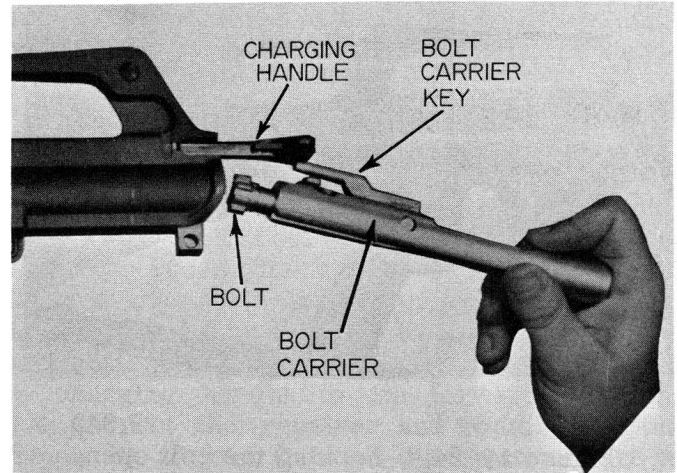


29,352
Figure 11-27. — Pressing out receiver pivot pin.

3. Again using the nose of a cartridge, press the receiver pivot pin (fig. 11-27). Separate the upper and lower receiver groups (fig. 11-28) and place the lower receiver group on the table. **CAUTION:** The receiver pivot pin does not come out of the receiver.

4. Pick up the upper receiver group; keeping the muzzle to the left. Grasp the charging handle, pressing in on the latch, and pull to the rear (fig. 11-23) to withdraw the bolt carrier from the receiver. Grasp the bolt carrier and pull it from the receiver (fig. 11-29). When the bolt carrier is removed, the charging handle will fall free of its groove in the receiver (fig. 11-30). Place the receiver on table.

5. To disassemble the bolt carrier group, press out the firing pin retaining pin by using the nose of a cartridge (fig. 11-31). Elevate the front of the bolt carrier and allow the firing pin to drop from its well in the bolt (fig. 11-32). Rotate the bolt until the cam pin is clear of the bolt carrier key and remove the cam pin by rotating it 90 degrees (1/4-turn) and lifting it out of the well in the bolt and bolt carrier (fig. 11-33). After the cam is removed, the bolt can be easily removed from its recess in the bolt carrier (fig. 11-34).

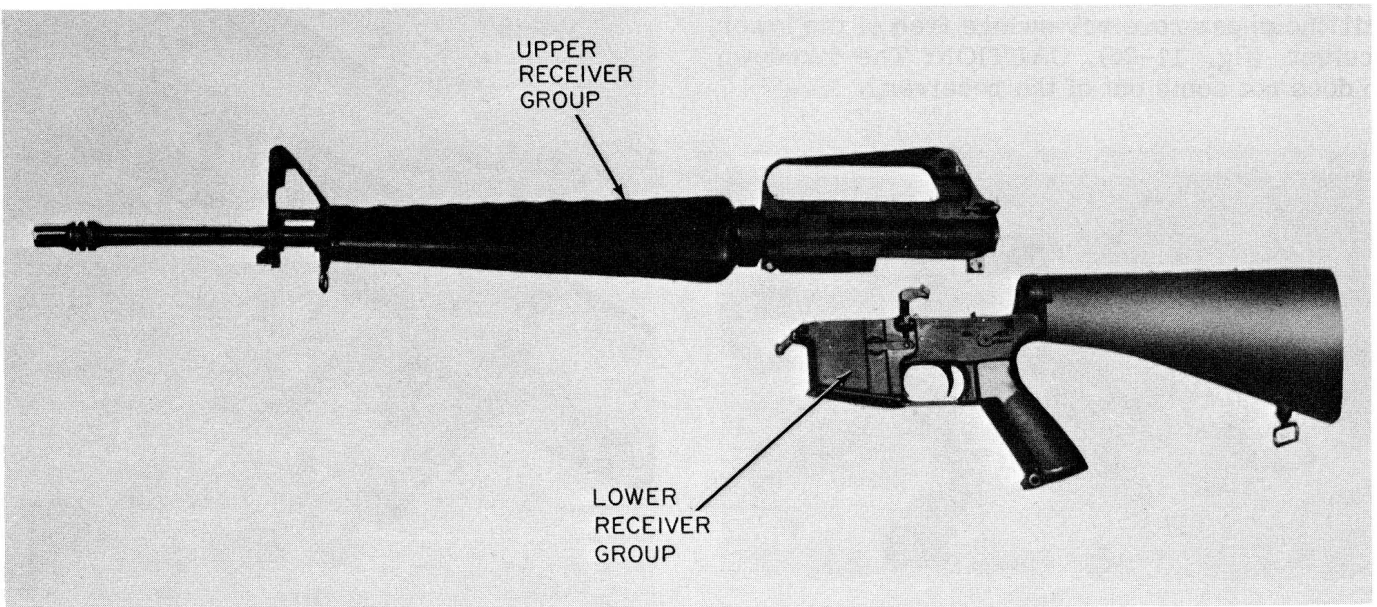


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Figure 11-29. — Removing bolt carrier from receiver.

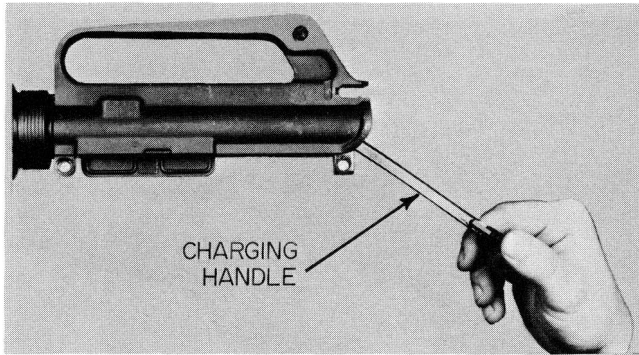
Operating the M16 Rifle

The magazine has a capacity of 20 rounds and may be loaded with any amount up to that capacity. The magazine follower has a raised portion generally resembling the outline of a cartridge. Cartridges are loaded into the magazine so that the tips of the bullets point in the



29.353

Figure 11-28. — Upper and lower receiver groups.



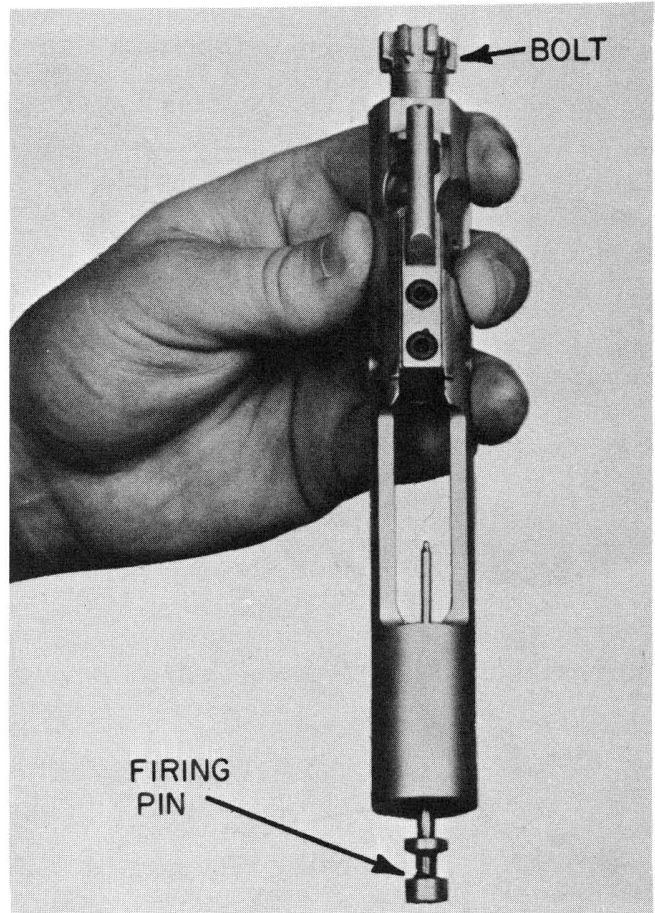
29.355

Figure 11-30.— Removing the charging handle.

same direction as the raised portion of the follower (fig. 11-35).

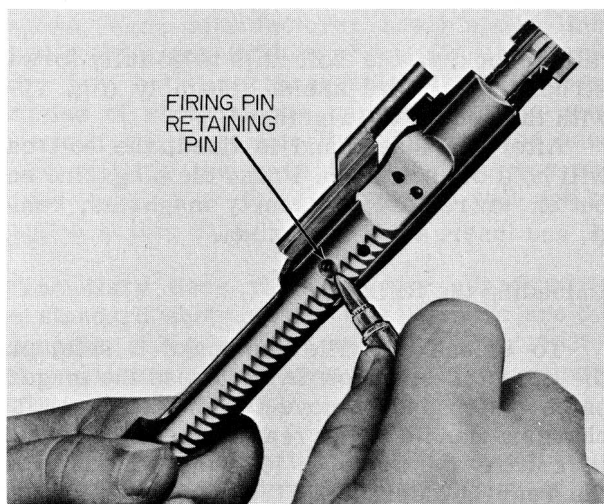
Loading the Rifle

With the hammer cocked, place the selector lever on SAFE. The magazine may be inserted with the bolt either open or closed. However, you should learn to load with the bolt open since this reduces the possibility of a first-round stoppage and saves the time required to



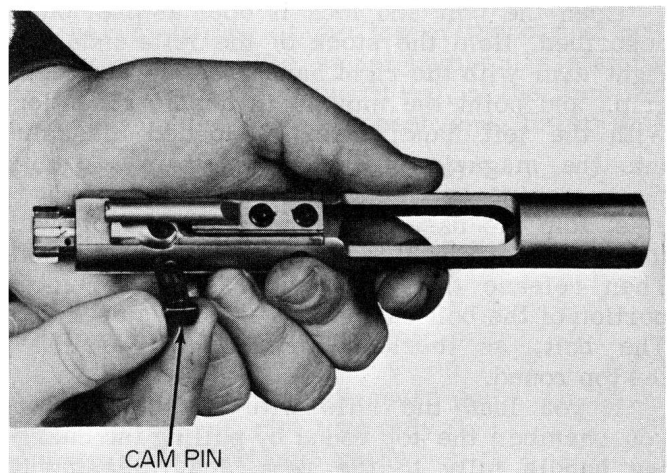
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Figure 11-32.— Removing the firing pin.



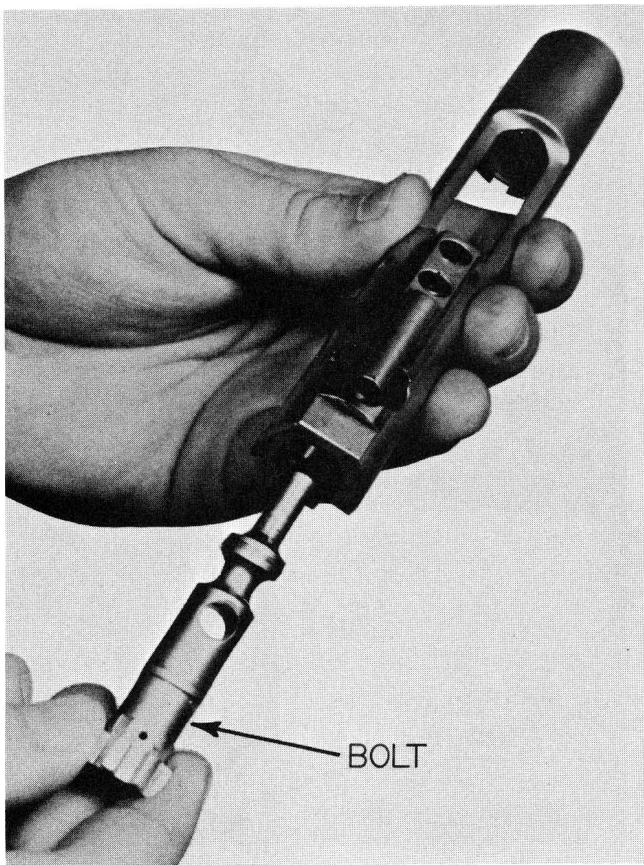
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Figure 11-31.— Pressing out firing pin retaining pin.



29.358

Figure 11-33.— Removing the cam pin.

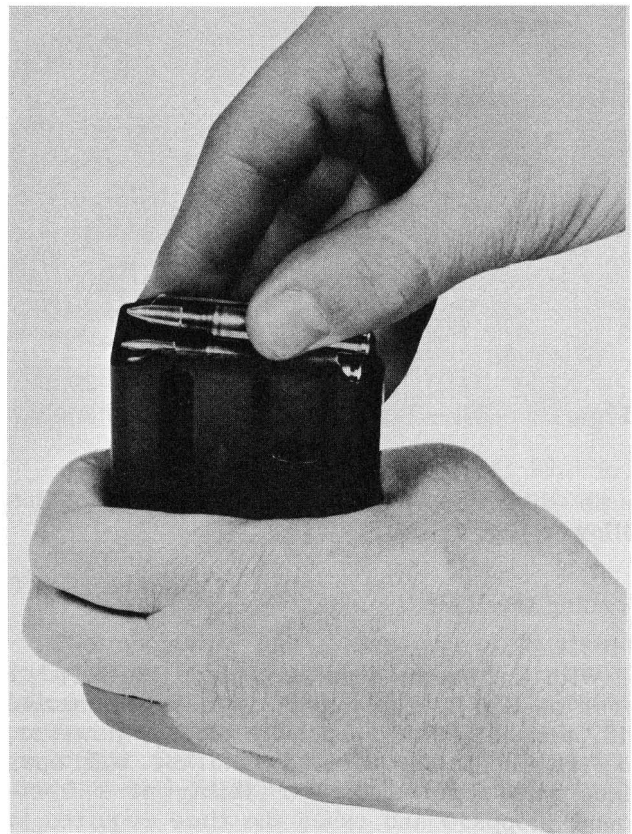


29,359
Figure 11-34. — Removing the bolt.

chamber the first round by pulling back the charging handle.

Open the bolt and lock it open as previously described. Hold the stock of the rifle under the right arm with the right hand grasping the pistol grip, and point the muzzle in a safe direction. With the left hand, insert a loaded magazine into the magazine feedway. Push upward until the magazine catch engages and holds the magazine. Rap the base of the magazine sharply with the heel of the hand to ensure positive retention. Then release the bolt by depressing the upper portion of the bolt catch as previously described. The bolt, as it rides forward, will chamber the top round.

If you load the rifle with the bolt closed, you chamber the top round by pulling the charging handle fully to the rear and releasing it. NOTE: Do not "ride" the charging handle forward with the right hand. If the handle is eased forward from the open position, the bolt may



29,360
Figure 11-35. — Loading cartridges into magazine.

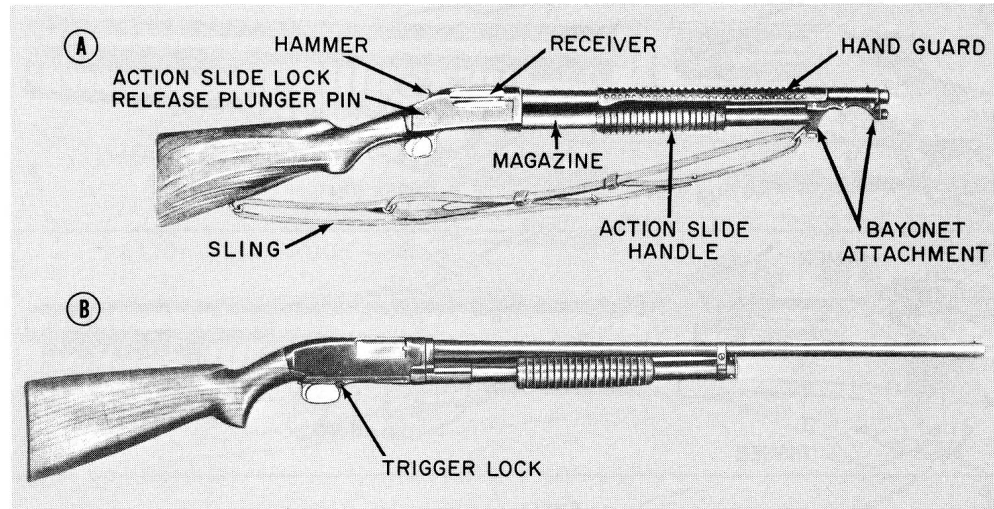
fail to lock. If the bolt fails to go fully forward, strike the forward assist assembly (fig. 11-20) with the heel of the righthand.

After the last round is fired, the bolt catch will hold the bolt open. Press the magazine catch button to release the empty magazine, remove it, and insert a full magazine.

Unloading the Rifle

To unload the rifle and make it safe, place the selector lever on SAFE, press the magazine catch button and remove the magazine, pull the charging handle to the rear, inspect the chamber to ensure it is clear, lock the bolt carrier to the rear by depressing the lower portion of the bolt catch, and return the charging handle forward.

The rifle is clear (and therefore safe) ONLY when no round is in the chamber, the magazine



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Figure 11-36. — Shotguns: A. Winchester 12-gauge M97, riot type; B. Winchester M12, sporting trap type.

is out, the bolt carrier is to the rear, and the selector lever is on the SAFE setting.

SHOTGUNS

Shotguns are not primarily designed as military weapons, but actually are intended for civilian use in sporting or police work.

Since shotguns are not standardized military weapons, each manufacturer has his own line, and the different models of weapons and their parts are not interchangeable. The different varieties of shotguns are named after the uses for which they are intended. The method used in determining the gage of a shotgun was explained earlier in this chapter so will not be repeated at this time.

The Navy uses riot guns for guard work. The standard shotguns for this purpose are the Winchester 12-gauge M97 and M12 (fig. 11-36). Riot guns normally are equipped with bayonets, handguards, and slings.

In this section we will take up the functioning, construction, and maintenance inspection of the two standard issue shotguns mentioned above, that you will most likely use in the fleet. For information on other shotguns that you may come across, see Army Technical Manual TM- 9-1005-206 (series).

WINCHESTER SHOTGUN M97

Now, let's go into a little detail on the Winchester 12-gauge M97, used in the Navy for guard work (fig. 11-37). This is a manually operated repeater, slide action hammer type shotgun with full-cylinder. 20-inch barrel. (Grades for skeet and trap use are available with other barrels.) It is available in either takedown or solid-frame construction, and normally comes equipped as a riot type with bayonet, handguard, and bayonet attachment. For positive identification of this shotgun, look for the maker's name, gage, model, and barrel boring at the top of the barrel near the breech end. The serial number is stamped on the lower face, forward end, of the receiver, and also on the barrel breech end, lower face.

Characteristics of the Winchester Shotgun M97 (Riot Type)

Length (in. overall) with 20-in. barrel (approx.)	39
Weight without bayonet (lb).	7.2
Maximum muzzle velocity, avg. over 40-yd range (fps)	1,070
Approximate chamber pressure (psi)	11,000
Length of barrel, riot type only (in.)	20
Approximate maximum range (#00 buckshot) (yd)	748
Patterns (percentage) of shot in a 30-in. diameter circle at 40 yds (#00 buckshot)	33-1/3

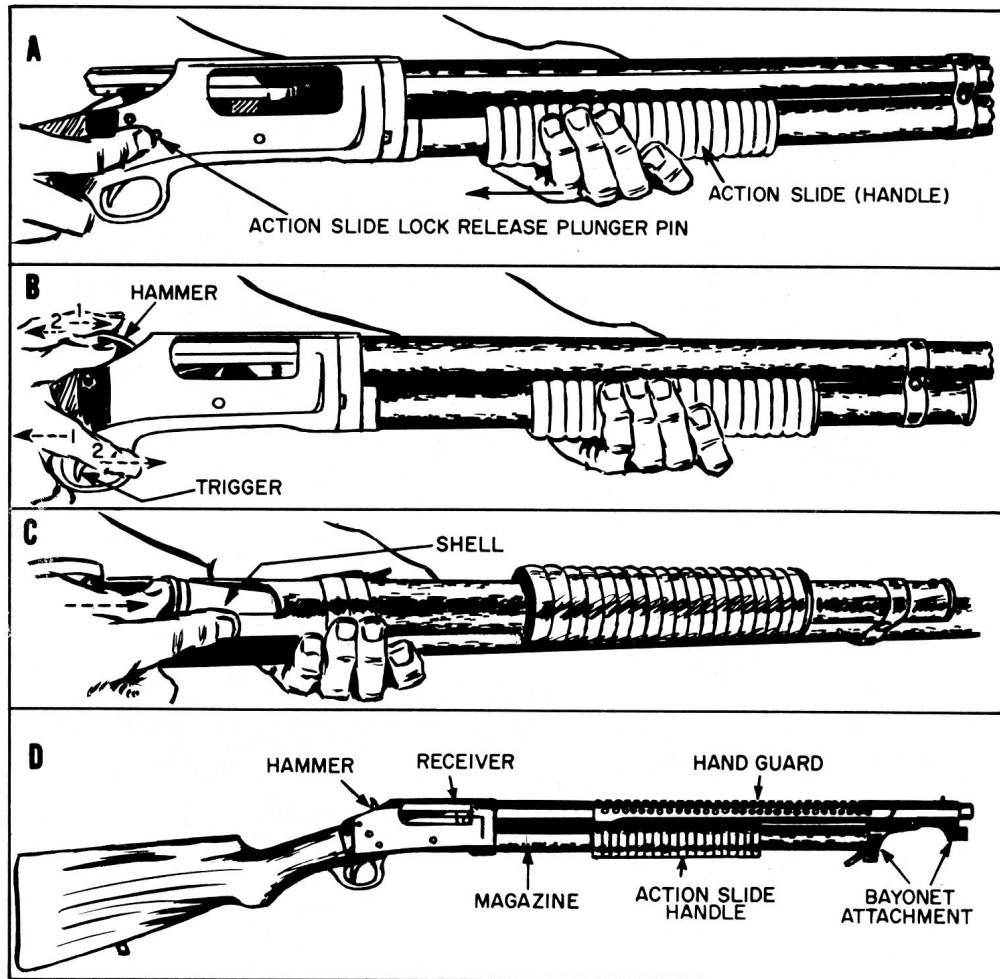


Figure 11-37.— Winchester shotgun M97, riot type. A. Depressing the action slide lock release plunger pin, and retracting action slide. B. Setting hammer at half cock. C. Loading the magazine. D. General view.

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Bore	12 gage
Trigger pull (lb)	4 to 8
Shell capacity	5 in magazine, 1 in chamber

cammed up and down. The carrier contains the hammer, sear, and action slide lock. Note the concave (hollowed-out) part of the carrier. A similar concavity is in the top side of the carrier.

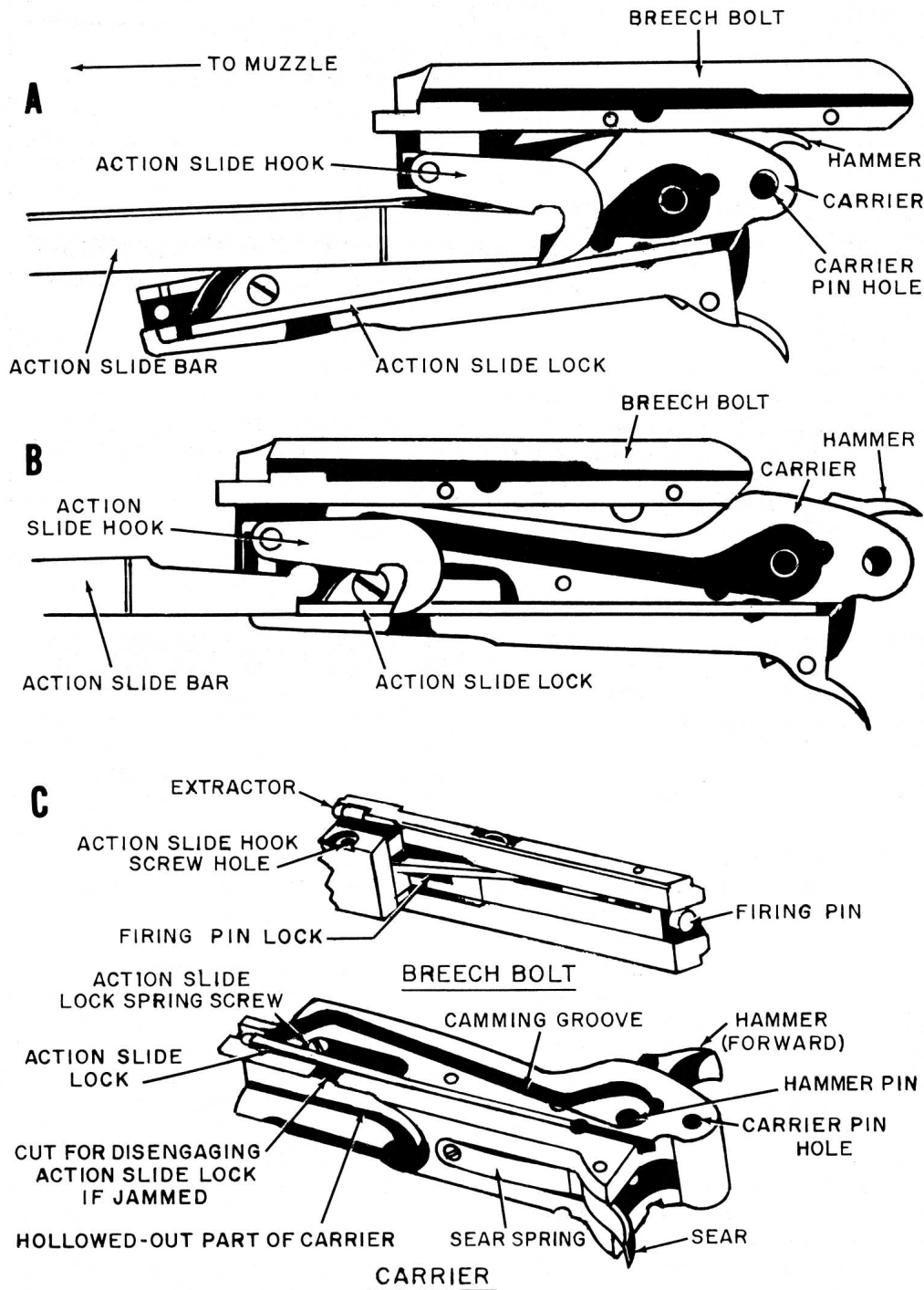
Functioning of the Winchester M97

The heart of the Winchester M97's mechanism is shown in figure 11-38. The important units, which are housed in the receiver, are the breech bolt, the carrier, the action slide bar, and the action slide hook.

The carrier (fig. 11-38C) is an irregularly shaped steel piece pivoted on a carrier pin running horizontally through its after end. Its forward end swings vertically as the carrier is

The rectangular breech bolt contains the firing pin, firing-pin lock, and extractors. The boxlike part of the bolt below the bolt's forward end contains the action slide hook screw hole.

Now look at figure 11-38 to see how the mechanism works. Part A shows the position of the mechanism with the action slide handle pulled aft. The action slide bar, which is connected to the handle, has on its extreme after end a lug that fits into the carrier's camming



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Figure 11-38.—Winchester 12-gage shotgun M97. Breech bolt, carrier, and slide bar groups. A. Position with action slide handle retracted. B. Position with action slide handle forward. C. Detail view of breech bolt and carrier.

groove, camming the carrier downward. Movement of the action slide handle also actuates a linkage (not shown) to draw a shell from the magazine and deposit it on the upper concave surface of the carrier.

In this position, the action slide bar's after end engages the action slide hook, which is pinned to the breech bolt, thus pulling the bolt to rearward position, opening the breech, and camming the hammer back to cocked position.

Figure 11-38B shows the mechanism with the action slide handle pushed forward. As the action slide bar cams the carrier upward, it pulls the action slide hook and bolt forward, so that they strip the shell from the upper surface of the carrier and drive it into the chamber. The hammer is left in the cocked position, engaged by the sear. The action slide lock on the carrier slips upward and locks the action slide bar so that the bar and action slide handle cannot be moved back. The shotgun is now ready to fire.

When the hammer falls in firing, the action slide lock is automatically disengaged so that the slide handle can be pumped for ejecting, reloading, and recocking.

There is no trigger safety on this shotgun. To set the gun at SAFE, you move the hammer to HALF COCK, which also locks the trigger and the action slide handle. Half cock is the hammer position midway between full-cock and hammer-released positions.

Loading and Firing The Winchester M97

To load the gun chamber from the magazine, first disengage the action slide lock so that the action slide handle can be operated. If the gun has just been fired, do this by moving the action slide handle slightly forward to unlock it. (When the gun is fired as a repeater, and the gunner holds the handle, gun recoil automatically acts to unlock it.) If the hammer is at full cock, press the action slide lock release plunger pin (fig. 11-37A) and push the handle forward to unlock. If the hammer is at half cock, pull back to full cock, and proceed as above to unlock.

With the action slide handle unlocked, move it smartly back, then forward. The shotgun now can be fired.

When the hammer falls in firing, the action slide lock disengages automatically. But if the chamber is to be opened or the gun unloaded without firing, the hammer must be set at SAFE and the slide-lock release plunger (which disengages the slide lock) depressed. Then the

action slide handle can be pulled back to eject the shell in the chamber (fig. 11-37 A). The procedure for setting the hammer at half cock (fig. 11-37B) is as follows:

1. Set the hammer at full-cock, either by pulling it back with your thumb or by operating the action slide handle.

2. Hold the hammer firmly with the thumb, press the trigger, and ease the hammer down slightly beyond half-cock position. Release pressure on the trigger as soon as the hammer is released from full cock.

3. Pull the hammer back until it clicks into position at half-cock.

The only safe way to carry the shotgun with chamber loaded is at half-cock. NEVER let the hammer down when there is a live shell in the chamber, except in the act of firing.

To set the hammer at full-cock again, simply pull it back with the thumb. The shotgun is then ready to fire.

To empty the chamber without firing, after the hammer has been set at half cock, pull the hammer back to full-cock, press the action slide lock release plunger pin, and retract the action slide handle.

To load the magazine (fig. 11-37C), press the shell, nose first, into the after end of the magazine against the magazine follower, until the spring loaded retainers or SHELL STOPS snap out behind it to hold it. Load another in the same way, and continue loading until all five are in. To transfer a shell from magazine to chamber, work the slide handle back and forth once.

To unload the magazine, press in the two shell-stop plungers on the magazine, and let the shells slide out. Retract the action slide handle to eject a chambered shell. Inspect receiver and chamber to be sure the gun is completely empty.

Loading and unloading the magazine should be done only with the hammer at half-cock.

To load the chamber only, with magazine empty, retract the action slide handle; place the shell directly in the chamber through the ejection opening in the receiver; close and lock the bolt by pushing the slide handle forward again; and set the hammer at half-cock.

SAFETY PRECAUTIONS WHEN LOADING. UNLOADING. AND FIRING. - In addition to the general safety precautions applicable to small arms, note the following specific precautions for this weapon.

CHAPTER 11 - SMALL ARMS, LANDING PARTY EQUIPMENT AND DEMOLITION

1. Keep the hammer at half cock (safe) when the gun is loaded unless you are about to fire.
2. Never let the hammer down on a loaded chamber except in firing.
3. When operating the action slide handle;
 - a. Keep fingers outside the trigger guard.
 - b. Keep the gun pointed in a safe direction.

Maintenance Inspection of Winchester M 97 Shotguns

VISUAL INSPECTION AND ELEMENTARY REPAIRS. - The most important parts to inspect visually are the barrel and bore. Look for looseness of the barrel in the receiver, for rust, pits, leading, cracks and bulges. If it's loose, tighten it. Remove leading (dull gray streaks) and rust (dark patches) from the bore. Bulges, cracks, or serious rust and pitting mean that the barrel should be replaced. Bulges may not be easy to detect. Look for a shadowy depression or dark ring in the bore, and for a raised ring or distortion on the barrel outer surface. Also check for loose wood screws and cracks in wood parts.

The simple maintenance and repair operations that will take care of many defects revealed by visual inspection can be performed easily by most small-arms repair personnel, even by those not necessarily shotgun experts. Such operations (other than routine cleaning and lubrication) include repair of cracks in wood parts, reseating wood screws, and tightening barrels in their receivers, and they apply both to M97 and M12 Winchester shotguns.

Rust or corrosion outside the bore can, if it's light, be removed with an oily rag or a rag moistened with rifle bore cleaner. More stubborn deposits may require careful rubbing with crocus cloth or even with fine steel wool. Be careful not to scratch metal surfaces any more than necessary. To remove corrosion or leading in the bore, push a wad of fine steel wool straight through it several times. Don't scrub or turn the wad in the bore.

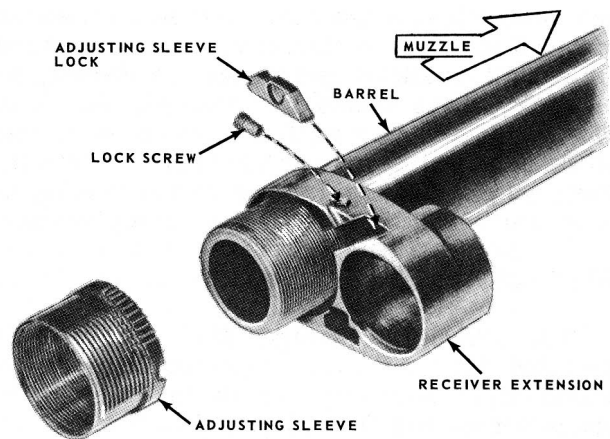
When wood screws strip out, you can reset them by boring out, plugging, reborer the stripped hole, and reseating the screw. You can often check small wood cracks by boring a small hole just ahead of the crack and plugging it with shellac or plastic wood (NOT with a wooden plug). But if the crack is extensive, replace the part.

In takedown type Winchesters, you can tighten a loose barrel and magazine where they mate with the receiver as follows:

1. Take down the gun. Remove lock screw from receiver extension. Slide back and disengage adjusting sleeve lock from adjusting sleeve (fig. 11-39).
2. Turn sleeve back one notch, engage lock with sleeve, and replace lock screw.
3. If barrel is still loose when reassembled, repeat until tight.

FUNCTIONING INSPECTION. - This is done with the gun completely assembled. Be sure it's not loaded and use dummy shells. If none are available, you can use fired shells if you bend inward the prongs at the open end so that the length of the shell is about the same as that of a live shell. NEVER use live shells for testing. Here is the testing procedure:

1. With breech bolt locked and hammer at full cock, press in the action slide lock release plunger pin. Push action slide handle forward slightly and pull smartly and fully to the rear; then push smartly and fully forward. Repeat several times to test smoothness of action. Do not slam the mechanism.
2. Let hammer down to half cock, press release plunger pin, and try to retract action slide as above. It should not be possible to do it.
3. Retract hammer slightly to clear sear, retract trigger, and ease hammer down to fired position. Repeat test as in 1 above-. The action slide should retract.



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Figure 11-39.— Winchester shotgun M97. Barrel adjusted sleeve (disassembled).

4. Retract slide as in 1. above, release plunger pin, and push slide smartly and fully forward to lock breech bolt. Then try to retract action slide. This should be impossible with hammer at full cock until action slide lock is disengaged.

5. With breech bolt locked and hammer at full cock, pull trigger to test firing mechanism. Set hammer at half cock and try to pull trigger. Since at half cock the firing mechanism is in SAFE position, pulling the trigger should NOT fire the gun.

6. With hammer at full-cock, close but do not lock breech bolt. Then try to fire. The gun should not fire until the breech bolt is locked.

7. Put two dummy or fired shells in the magazine. Work the action to test gun for feeding, loading, extraction, and ejection. The second shell should not leave the magazine until after the carrier drops as the first shell is ejected. NOTE: Fired shells may not work through the action as easily as live or dummy shells. Allow for this when testing.

8. Test for trigger pull, using the same general method as that described for carbines. Trigger pull should be between 5 and 8 pounds with the pressure to be applied about 1/4 inch from the lower end of the trigger and parallel with the barrel. When testing, the gun must be unloaded, action locked, and hammer at full cock.

The functioning inspection is extremely important. If a bolt fails to lock properly or a slide lock or similar part fails to function, the breech may blow open when the gun is fired, with a risk of serious injury to the firer. No gun is acceptable unless it passes ALL phases of functioning inspection. If repair parts, proper tools, and qualified personnel are aboard, defective weapons should be repaired. (See Army TM-9-1005-206 (Series) for information on troubleshooting and repair work.) Otherwise defective shotguns should be turned in to the issuing activity (or Naval Supply Center) for replacement.

WINCHESTER SHOTGUN M12

The Winchester shotgun M12 is a manually operated "hammerless" repeater of the slide-action type generally issued in 12-gage (but you'll sometimes find 16-gage specimens). The barrel, magazine, and action slide group are similar in design to (though not interchangeable with) those of the M97, but the receiver and operating mechanism differ. The riot type gun

(the one most often issued in the Navy) is usually furnished with a 20-inch plain full-cylinder bore barre,. and may be equipped with a bayonet attachment and hand guard at the barrel's muzzle end. Figure 11-40A shows a sporting model. Identification marks are located in the same places as on the M 97.

Loading and Firing The M12 Winchester Shotgun

In general outline, the operations required for loading and firing the M12 Winchester are similar to those for the M97. Here are the main differences (concerned mostly with the concealed hammer of the "hammerless" M12, and the slightly different loading arrangements):

1. There is no hammer half-cock position. The shotgun trigger safety is a lock button in the trigger guard bow (fig. U-40B. In SAFE position (pushed to the right) it blocks trigger movement rearward. Pushing it to the left (to FIRE position) reveals a red band and unlocks the trigger. If there is a shell in the chamber, the safety should be at SAFE unless the gun is to be fired. Safety precautions when firing are similar to those for the M97. Keep fingers out of the trigger bow when operating the action slide handle, and release the trigger completely between shots.

2. As with the M97, the gunner disengages the action slide lock after each shot by moving the action slide handle slightly forward before retracting it. (When fired as a repeater. this happens automatically.) But. if the hammer is already cocked, he must first press up the rear end of the action slide lock (visible in the receiver just to the left of the trigger) to disengage it.

3. To load the magazine, press a shell, nose first, into the rear of the magazine against the magazine follower until it slips in front of, and is retained by, the carrier. Load other shells in the same way until five in all are loaded. Loading should be done with the breech bolt locked.

4. To unload magazine, press up the carrier with breech bolt locked, and allow the shells to slip out one by one.

5. To transfer a shell from magazine to chamber, slide trigger lock to SAFE, release action slide lock, and operate action slide handle. Test breech bolt for locking by trying to retract slide handle. (It should not retract.) Leave trigger lock on SAFE unless you intend to fire at once.

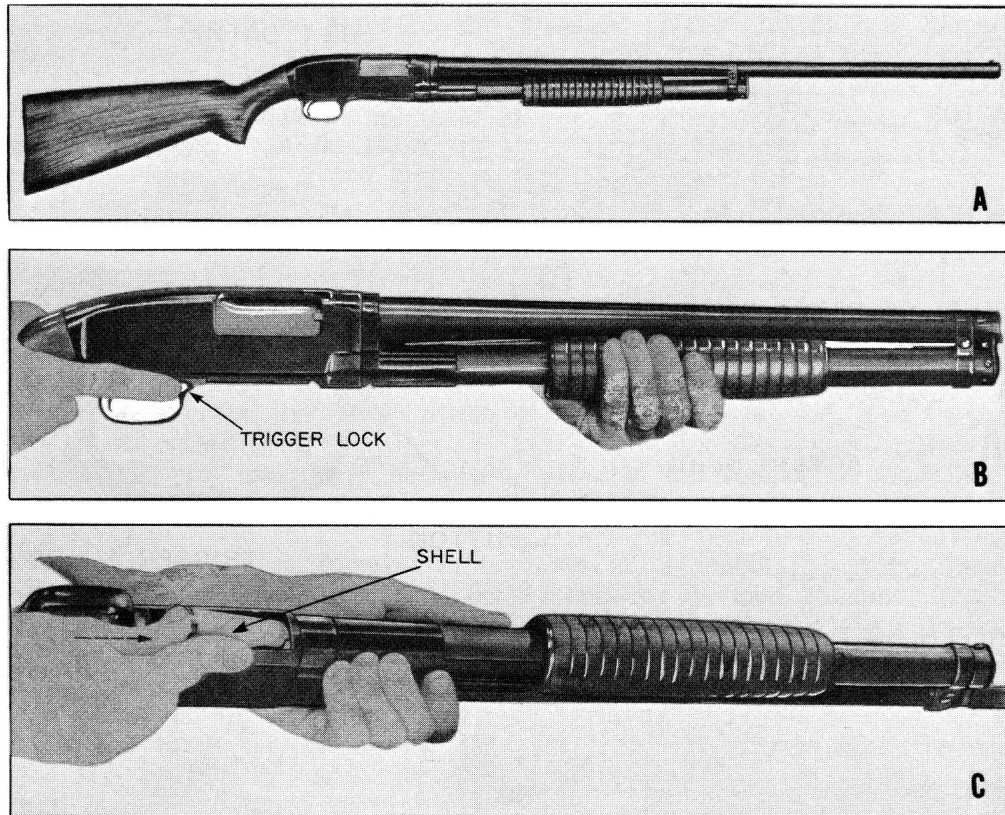


Figure 11-40.— Winchester shotgun M12. A. General view. B. Trigger (safety) lock. C. Loading the magazine. 84,257

6. To unload the gun, slide trigger lock to SAFE, and unload magazine. Disengage slide handle to extract and eject shell in chamber. Inspect magazine and chamber to be sure gun is empty.

7. Loading the chamber without loading the magazine is done exactly as with the M97, except that you set the M12 trigger safety button at SAFE.

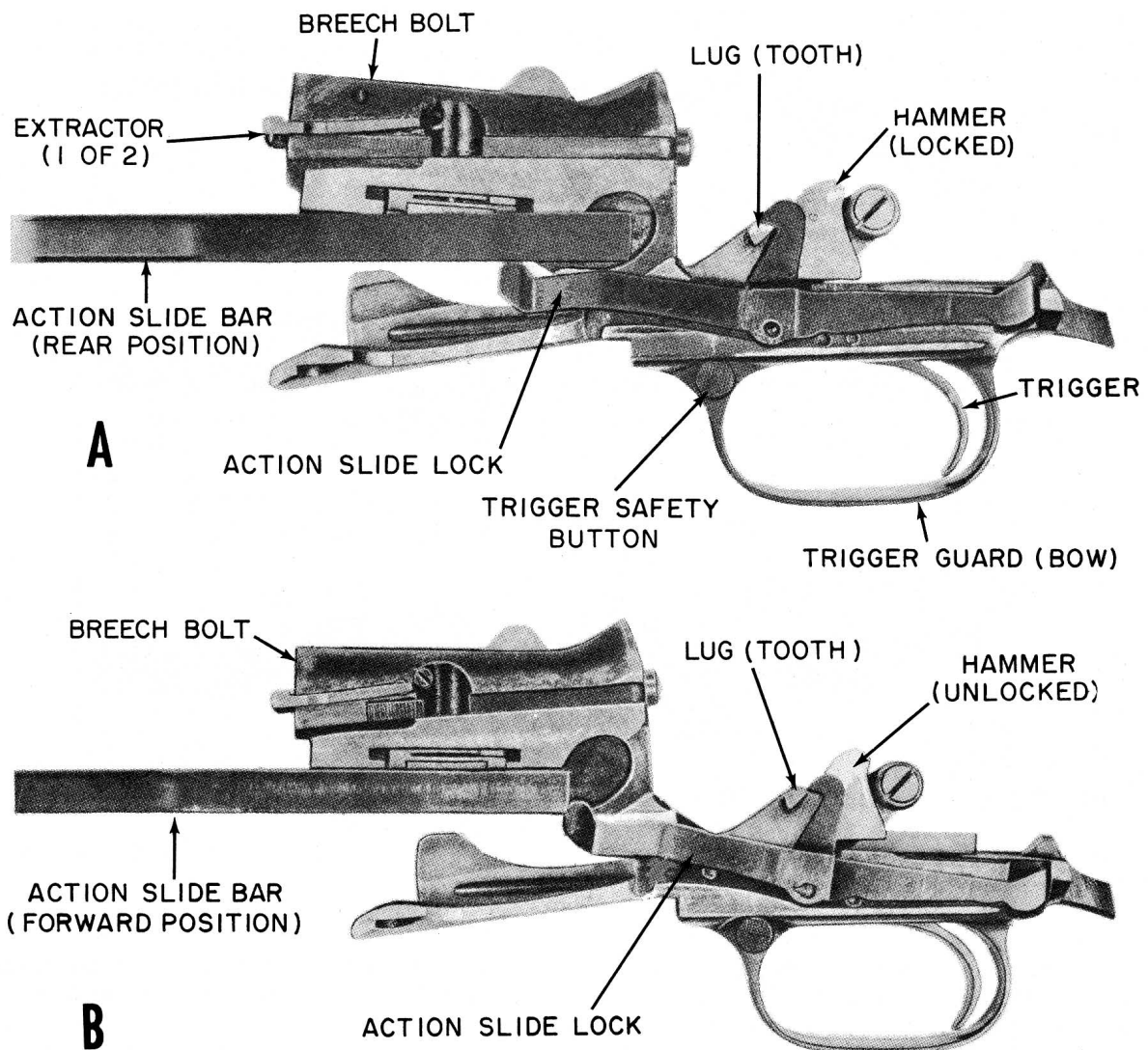
Functioning of the Winchester M12

As with the M97, the mechanism of the M12 is operated when you work the action slide handle back, then forward. A cam lug on the action slide bar after end engages a camming aperture in the left side of the breech bolt. As the slide moves aft, the breech bolt rear end is cammed down from in front of the locking shoulder in the top of the receiver and the bolt moves to the rear. As the slide moves forward, the breech

bolt also moves forward and its rear end is cammed up in front of the locking shoulder.

As the breech bolt moves aft it cams back the hammer which is caught and held by a hook (fig. 11-41A) on the action slide lock. As the breech bolt reaches forward position, the action slide lock, which has been held down by the action slide bar, is released and springs up behind the action slide bar to block its rearward movement (fig. 11-41B). At the same time, the lock releases the hammer, which is then held by the sear.

The M12 Winchester, much like the M97, uses a carrier (not illustrated) to transfer shells from the magazine to the chamber, but the timing of its operation is a little different from the M97. As the breech bolt starts forward it cams the carrier up and down rapidly. The shell resting on the carrier is lifted in line with the bore and the breech bolt pushes it into the



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Figure 11-41. — Winchester shotgun M12. Breech bolt and action slide bar groups. A. Action slide bar disengaged; hammer locked. B. Action slide lock engaged; hammer unlocked.

chamber. The carrier has immediately returned to the lower position and is in readiness to receive another shell. As the breech bolt closes, the action slide bar cams the shell cut-off to release a shell from the magazine. The magazine spring pushes it onto the carrier.

The fired shell is extracted from the chamber by the extractors in the breech bolt as the bolt moves to the rear, and is knocked out of the receiver by the ejector through the ejection opening.

Maintenance Inspection Of The M12 Winchester Shotgun

VISUAL INSPECTION AND ELEMENTARY REPAIRS. - These aspects are the same for the M12 as for the M97, discussed earlier, even the details of tightening the barrel.

FUNCTIONING INSPECTION. - As with the M97, you can use fired shells, even if somewhat deformed, for functioning tests if you turn in the open ends. But make allowances

for these deformations when judging smoothness of action. Be sure the gun has no live ammunition in it when performing these tests. Here are the testing operations:

1. With breech bolt locked and hammer cocked, press upward on the action slide lock rear end. Push action slide handle forward slightly, pull smartly and fully to the rear, then push smartly and fully forward. Do this several times to test smoothness of action. But don't slam the mechanism.

2. Retract action slide as in 1. above, release pressure on rear of action slide lock, and push slide smartly forward to lock breech bolt, then attempt to retract the action slide. The action slide should not retract.

3. Pull the trigger to make the hammer fall. Try to retract the action slide. It should retract.

4. Retract it fully, then push forward until the breech bolt is fully forward, but not raised to the locked position. Pull the trigger to release the hammer. The hammer should not descend until the breech bolt is fully locked.

5. Place two more dummy or fired shells in the magazine and work the action to test for feeding, loading, extraction, and ejection. The second shell should not leave the magazine until the breech bolt is locking behind the first shell in the chamber.

6. With breech bolt locked and hammer cocked, push the trigger safety lock all the way to the right. Pull the trigger. The trigger should not retract nor should the hammer descend.

7. Push trigger lock all the way left so that red band shows, and pull the trigger. The trigger should retract and release the hammer.

CALIBER .45 LINE-THROWING GUN

The line-throwing gun (fig. 11-42) is the only gun firing a projectile of small arms caliber that is not intended as a weapon. The gun is also unique among those we have taken up in this chapter in that it is not of Army origin. It is used only by the Navy, and the reference publication for it is OP 546.

The gun is designed to pass a small line from Slip to ship or from a ship to a pier. A projectile, with one end of the line attached, is fired from the gun by the impulse of a blank cartridge. This small line serves as a messenger for the larger running lines of refueling rigs, high lines, breeches-buoys, etc.

The gun is single shot with a smooth bore (.45 cal.), and a short barrel of tip-down action hinged to the frame. It is ruggedly constructed, and the breech has been heavily reinforced to withstand the relatively high chamber pressures.

The shot line is made of nylon with a minimum (when new) breaking strength of 125 pounds. It is wound on a wooden spindle in such a way that, when the spindle is removed for firing, it will payout without fouling. The ammunition is a blank 45-70 cartridge loaded through the breech of the gun and the projectile through the muzzle.

The projectile (fig. 11-42) is made up of three major units: a buoyancy chamber, an illuminating unit, and the rod. The buoyancy chamber is a plastic bottle-shaped cylinder fitted onto the front of the rod. It serves to keep the projectile afloat. The illumination unit is essentially a small flashlight which is enclosed in the buoyancy chamber. It is especially useful during night operations for obvious reasons. The rod is the part of the projectile that goes in the gun's muzzle. The nylon shot line is attached to a slide on the rod. If the rod gets scratched, burred, or slightly bent, use fine emery cloth to get it back into shape. Do NOT fire any projectile that fails to enter the bore freely.

FIRING THE GUN

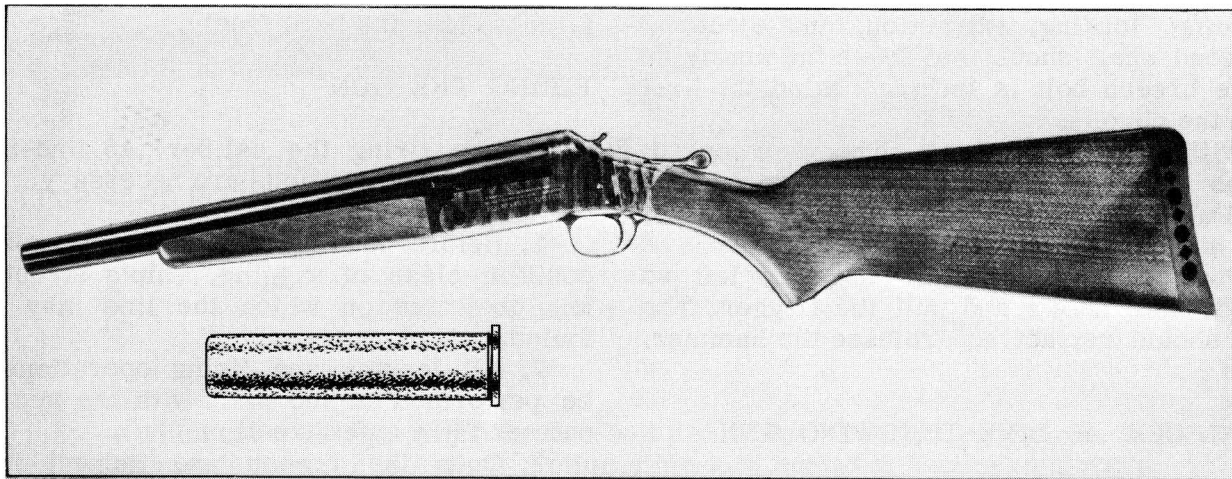
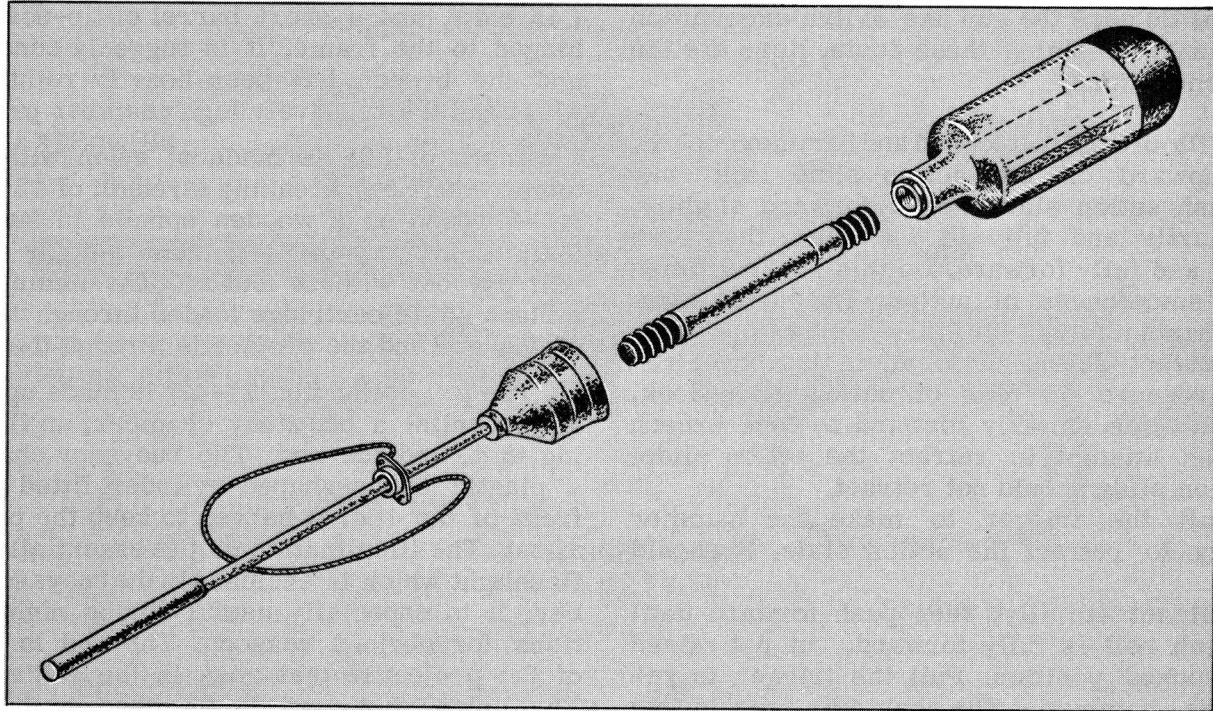
Before firing the caliber .45 line-throwing gun, certain precautions are necessary:

1. Before loading, select an outboard firing position clear of rigging, ship's structure, or any obstacles on which the line may become fouled.

2. All loading and firing operations are to be performed at the rail, with the gun pointed outboard in a safe direction.

3. Open the breech and inspect the bore to see that it is thoroughly clean and dry, and slip the projectile into the muzzle to see that it moves freely. The bore and the projectile must move freely its entire length of travel in the bore. Excessive friction produces dangerously high chamber pressure and reduces range.

It takes two men to safely fire the line-throwing gun unless the special canister is used. One man holds the coiled line and the other fires the gun. Assuming that the projectile has been properly prepared, follow this procedure:



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Figure 11-42.— Caliber .45 line-throwing gun and projectile.

Both men station themselves at the rail, the man holding the coiled line to leeward of the shooter. On a ship underway this precaution normally puts the man with the gun forward of the man holding the line.

If the line has not yet been attached to the projectile, do it now. Knock out the wooden spindle; pull enough line from the center of

the coil and tie it to the slide on the projectile. Don't pullout any more line than is necessary for this operation.

Try the projectile in the bore of the gun, it must pass through freely. Now take the projectile out of the bore.

Standing at the rail, open the breech by pressing the unlocking lever to one side.

Insert a cartridge into the breech.

Close the breech.

Insert the projectile rod into the bore as far as it will go.

Brace the gun firmly against the shoulder. Cock the gun by pulling back on the hammer until it reaches the full cock position.

Aim the gun. At short ranges the gun is fairly accurate. At long ranges, however, you will have to elevate your aim and use "Kentucky windage" to lead the target. The path of the projectile and line are seriously affected by wind. Also, the projectile is relatively slow moving, so target speed is a factor in aiming the gun. About the only firm guideline we can give you is that your shot should be placed well clear of personnel on the receiving ship.

Fire the gun.

When the man holding the coiled line sees that the projectile has definitely crossed the other ship, he squeezes the coil, halting any further paying out of the shot line.

Take a bight in the line and secure what is left in the coil with it. Bend your shot line to whatever running lines are going to be sent over to the receiving ship.

Your interest in the proceedings now is largely one of trying to get your shot line and projectile sent back with the rig.

Note 1: In the event of misfire, keep the gun braced against your shoulder and pointed in a safe direction. Recock and attempt to fire again. If repeated attempts to fire fail, wait one minute before opening the breech and removing the cartridge. Take a quick look at the primer to see if it has been struck by the firing pin; if so, deep six it.

The firing pin of the line-throwing gun is a short, free-floating type. It is a good idea before you shoot to elevate the gun and jiggle it to bring the firing pin out toward the hammer as far as it will go.

Note 2: When shooting the gun do NOT lay your thumb on top of the stock immediately behind the breech unlocking lever. Instead, lay it alongside the frame. The recoil of a line-throwing gun is such that, if you hold it incorrectly, the unlocking lever can pinch or even penetrate your hand. And there is the possibility that if your hand is placed so as to interfere with the unlocking lever's rearward movement, the lever may be cammed to one side, unlocking the breech. In this case, recoil may be accompanied by a rapid unintentional disassembly of the gun.

Maintenance

Authorized disassembly of the line-throwing gun is limited to the following steps:

1. Remove the foregrip by pulling it down firmly to release the spring snap which secures the grip to the barrel.
2. Remove the barrel by opening the breech and pushing back on the barrel, disengaging it from the frame.

The gun is reassembled by following these steps in reverse order.

When the gun is stored in the armory, it is kept lubricated with a light oil, as are all small arms. When it is to be fired, however, the bore must be completely cleaned and dried by running patches through it. Also, between consecutive firings a dry patch should be run through the bore to remove all powder residue from the previous shot. The line-throwing gun is known for its kick, and anything causing the projectile to bind in the bore adds dangerously to the gun's recoil.

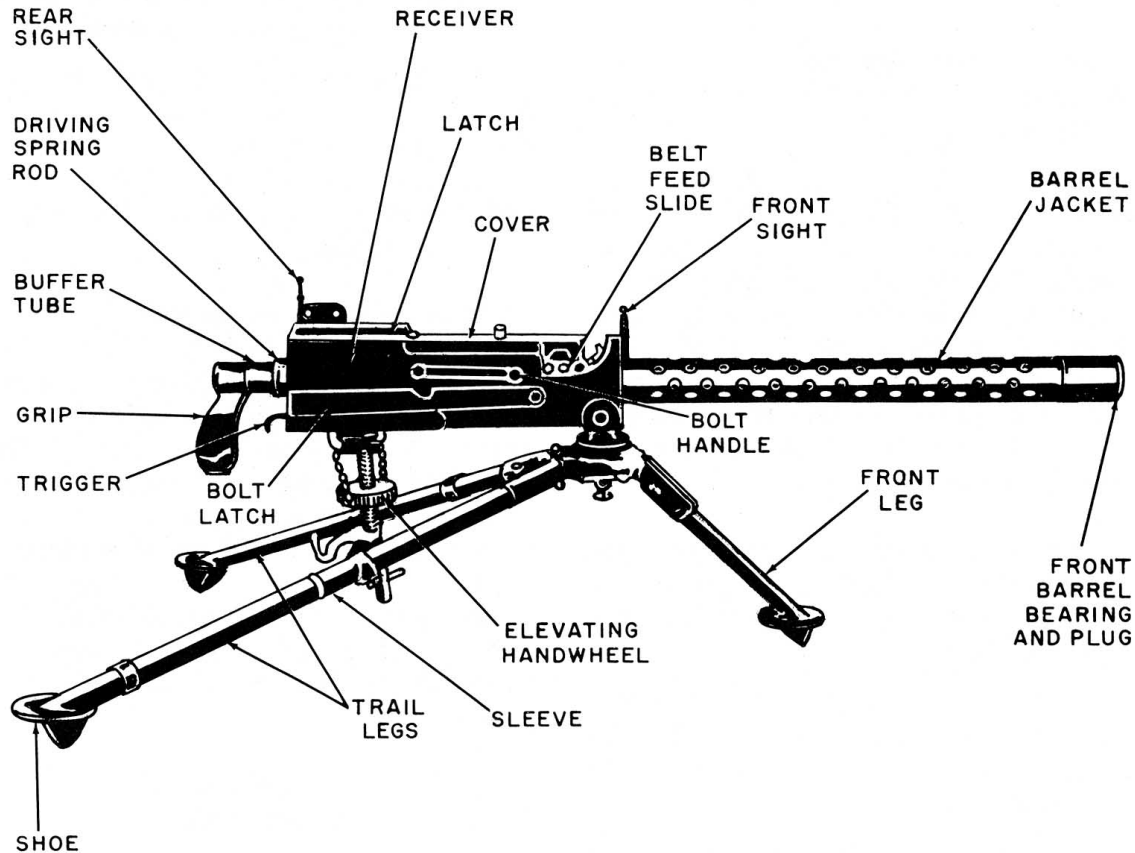
BROWNING MACHINEGUN, CALIBER .30, M1919A4

Browning machineguns (abbreviated BMG) are standard Army weapons used by the Navy afloat, ashore, and in aircraft. The two calibers - .30 and .50 - have basically similar mechanisms.

The caliber .30 BMG is issued to combat vessels and many auxiliaries as a landing-force weapon. Its general characteristics are listed below. In this section we'll take up its functioning, operation, and general (nonroutine) inspection and maintenance. For further details, see Army FM 23-55 and TM-9-1005-212 (Series).

General Description

The caliber .30 BMG is a recoil-operated, belt-fed, water- or air-cooled automatic weapon, various models of which are designed for use in aircraft or on ground mounts. The type we shall take up is the M1919A4, illustrated in figure 11-43 on the M2 ground mount. This is an air-cooled weapon designed for use with fabric belts. It has a heavy barrel surrounded with a perforated steel jacket to improve cooling. It uses a leaf-type sight. The .30 cal. BMG weighs approximately 31 pounds (less tripod) and has an extreme usable range of 2,000 yards. The rate of fire for the weapon is 400-500 rounds per minute.



29.322

Figure 11-43.—Browning machinegun, caliber .30, M1919A4, on M2 mount.

Construction and Functioning Of The Caliber .30 BMG M1919A4

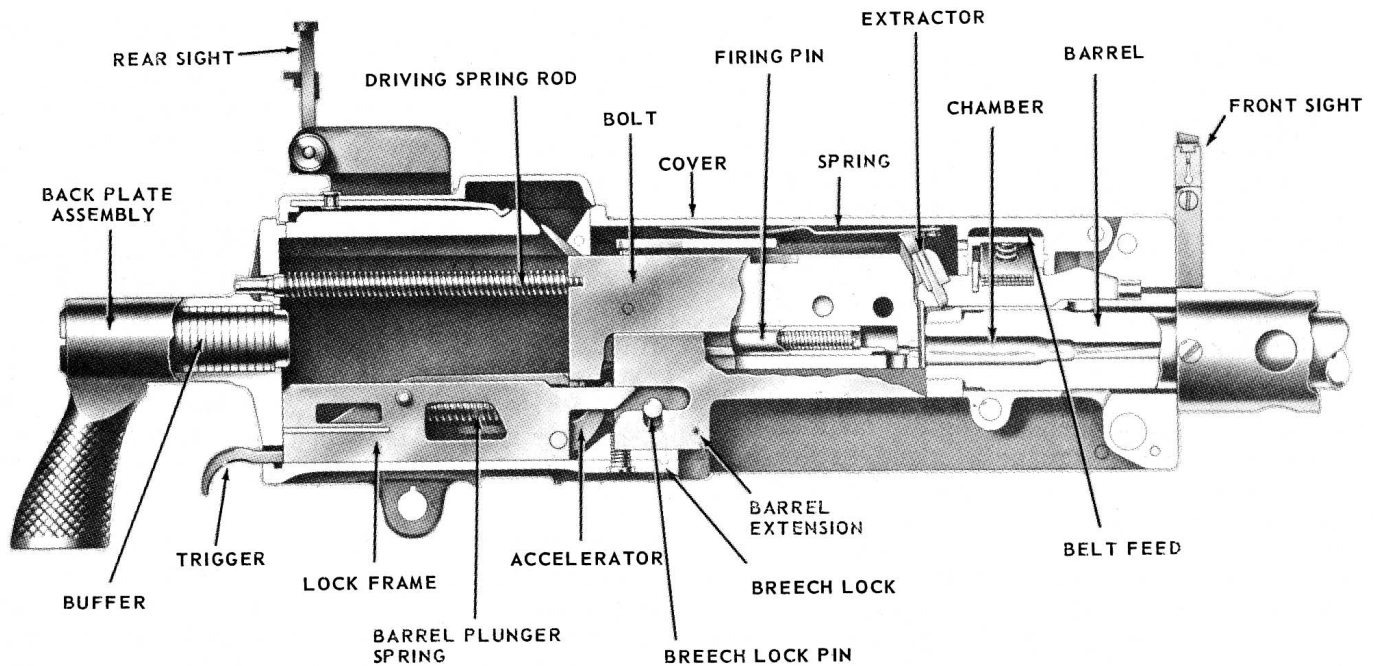
Figure 11-44 shows the BMG caliber .30 M1919A4 in cross section, with recoiling parts fully forward (in battery). The main exterior structure of the weapon is the receiver, which more or less corresponds in function to the slide of a naval gun. The major recoiling parts inside it are the barrel, barrel extension, and bolt.

The receiver is supported on pivots by the tripod mount M 2, which provides a stable mounting for the gun, is quickly collapsible for transport, and provides for elevation and train of the gun by hand as required (fig. 11-43). At the after end of the receiver is the back-plate assembly (fig. 11-44), which has a pistol grip for the gunner and a buffer to take up the shock of recoil of the bolt. Inside the after end of the receiver is the lock frame, which houses the trigger, the accelerator (which you'll learn more about very shortly), and the barrel plunger

spring and plunger (on which the barrel and barrel extension slide in recoil-counterrecoil movement). The sights are on top of the receiver (fig. 11-43); there is also a cover, hinged at its forward end, in which are the parts of the belt feed mechanism - in particular, the belt feed lever - that are cammed by the groove in the top of the bolt (fig. 11-45). The fabric ammunition belt passes under the cover, through the top of the receiver, from left to right.

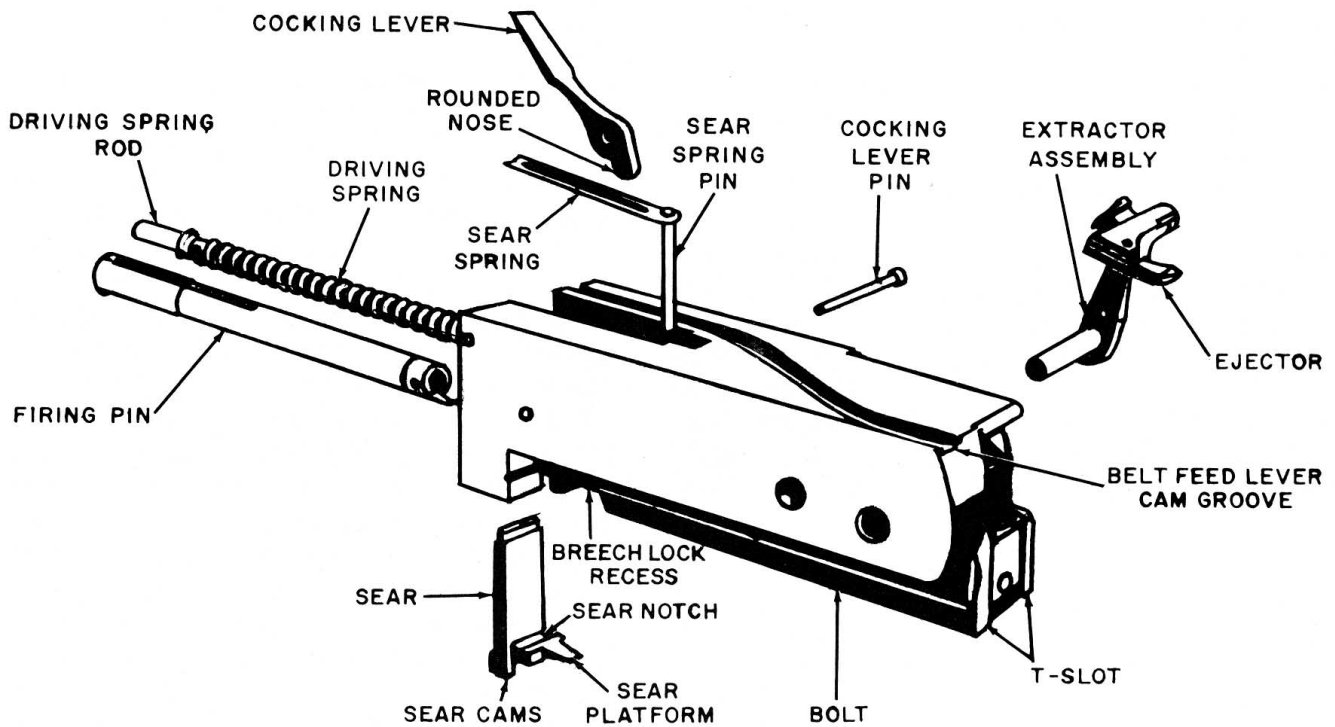
The barrel is secured to the front of the barrel extension, which incorporates a barrel locking spring to hold the barrel in place, and a breech locking device which locks the recoiling parts together at the beginning of the recoil movement. The bolt, shown in some detail in figure 11-45 incorporates the sear mechanism, cocking lever and associated parts, and firing pin and spring in its interior. On its face is the extractor (which incorporates also the ejector and a T-slot. In its sides are the recesses in which the breech locking mechanism functions.

Before we go through the functioning cycle of the BMG, notice how the moving parts move:



29.332.1

Figure 11-44.—Browning machinegun, caliber .30, M1919A4. Right side, sectional view.



84.265

Figure 11-45.—Browning machinegun, caliber .30, M1919A4. Bolt assembly.

1. The barrel and barrel extension move in recoil and counterrecoil. The total length of this movement is about 5/8 inch. For the first half of this movement in recoil these parts are locked to the bolt.

2. The bolt also moves in recoil and counterrecoil but, after unlocking from the barrel and barrel extension, it's kicked backward by the accelerator all the way against the buffer.

3. As the bolt moves aft in recoil, the extractor hauls a round out of the belt. As the bolt moves forward in counterrecoil, the extractor is cammed down, pushing the next round to be chambered down into the T-slot in line with the chamber, then up again so that with the ejector it grips the next round in the belt. The sides of the T-slot engage the cartridge base from the time the extractor forces it down into line with the chamber during counterrecoil until, after firing, it's kicked out by the ejector during the next counterrecoil.

4. The accelerator is pivoted on the lock frame. In recoil, its lower part is pushed back by the recoiling barrel extension; its upper end engages the bolt and kicks it back. In counterrecoil, the bolt turns the accelerator forward, unlocking the barrel extension so that it can counterrecoil too.

5. The cocking lever, which is pivoted in the bolt, is cammed by part of the top of the receiver so that its upper end swings forward during recoil and backward during counterrecoil. The lever's lower end pushes the firing pin aft during recoil.

6. The firing pin moves forward in the bolt to strike the cartridge primer when released by the sear, and is pushed backward in the bolt in cocking action during recoil.

We've traced what each major moving part does in the functioning cycle of the BMG. Now let's follow the cycle step by step. Remember that this cycle is practically the same in the caliber .30 BMG as its caliber .50 big brother; if you know one, you know the other. We assume the cycle starts with the gun fully loaded and cocked, and a loaded ammunition belt in the feedway.

1. **FIRING.** (See fig. 11-46A.) The gunner pulls the trigger. Its forward end lowers as its rear is raised, camming the sear down to release the firing pin's shoulder from the sear notch. The firing pin spring drives the pin into the cartridge primer, igniting the propelling charge.

2. **FIRST STAGE OF RECOIL.** The bolt, barrel, and barrel extension begin recoiling together. After 5/16-inch movement, the pins on either side of the breechlock contact the camming surfaces on the front of the lock frame, which pull the breechlock down into the barrel extension. This disengages the bolt from the barrel and barrel extension.

Figure 11-46 shows the unlocking. Figure 11-46C shows the caroming action and the action of the accelerator at the same time. In its final 5/16 inch of recoil movement, the barrel extension pushes the accelerator aft. The accelerator's tips kick the bolt back and then (as shown in figure 11-46D) it engages the T-shaped lug of the barrel extension and locks it in recoil position.

3. **SECOND STAGE OF RECOIL.** (See fig. 11-46E). As the bolt continues to recoil, the extractor hauls the next round out of the belt and the T-slot in the bolt face hauls the empty case out of the chamber. The extractor cam in the cover pushes the extractor down as the bolt moves to the rear. At the end of recoil, the bolt hits the buffer, which brings it to a stop. During recoil the following feeding and cocking operations also occur.

a. **Feeding.** (See fig. 11-47A and B.) Driven by the camming groove in the bolt, which engages its stud, the belt feed lever pushes the belt feed slide and pawl to the left (position 1). The belt-holding pawl keeps the belt from moving with them.

b. **Cocking.** (See fig. 11-47C.) As the bolt moves from position 1 (in battery) to position 2 (full recoil), the cocking lever is cammed as shown to retract the firing pin to a point where it can be engaged by the sear notch.

4. **COUNTERRECOIL.** (See fig. 11-46F.) As the bolt is driven forward by its driving spring, a spring-loaded plunger in the extractor engages cams in the receiver which push the extractor first down, then up, as shown by the arrows. In the downward movement, the extractor pushes the new round into the T-slot on the bolt, and the ejector tip knocks the empty case out of the T-slot. In the upward movement the extractor and ejector are positioned to engage the next round in the belt. As the bolt nears the end of counterrecoil, it pushes the accelerator tips forward, causing the accelerator to unlock the barrel extension, which is then driven forward by the barrel plunger spring. Next, the breechlock cam (fig. 11-46B) pushes the breechlock up to engage the breechlock recess in the bolt

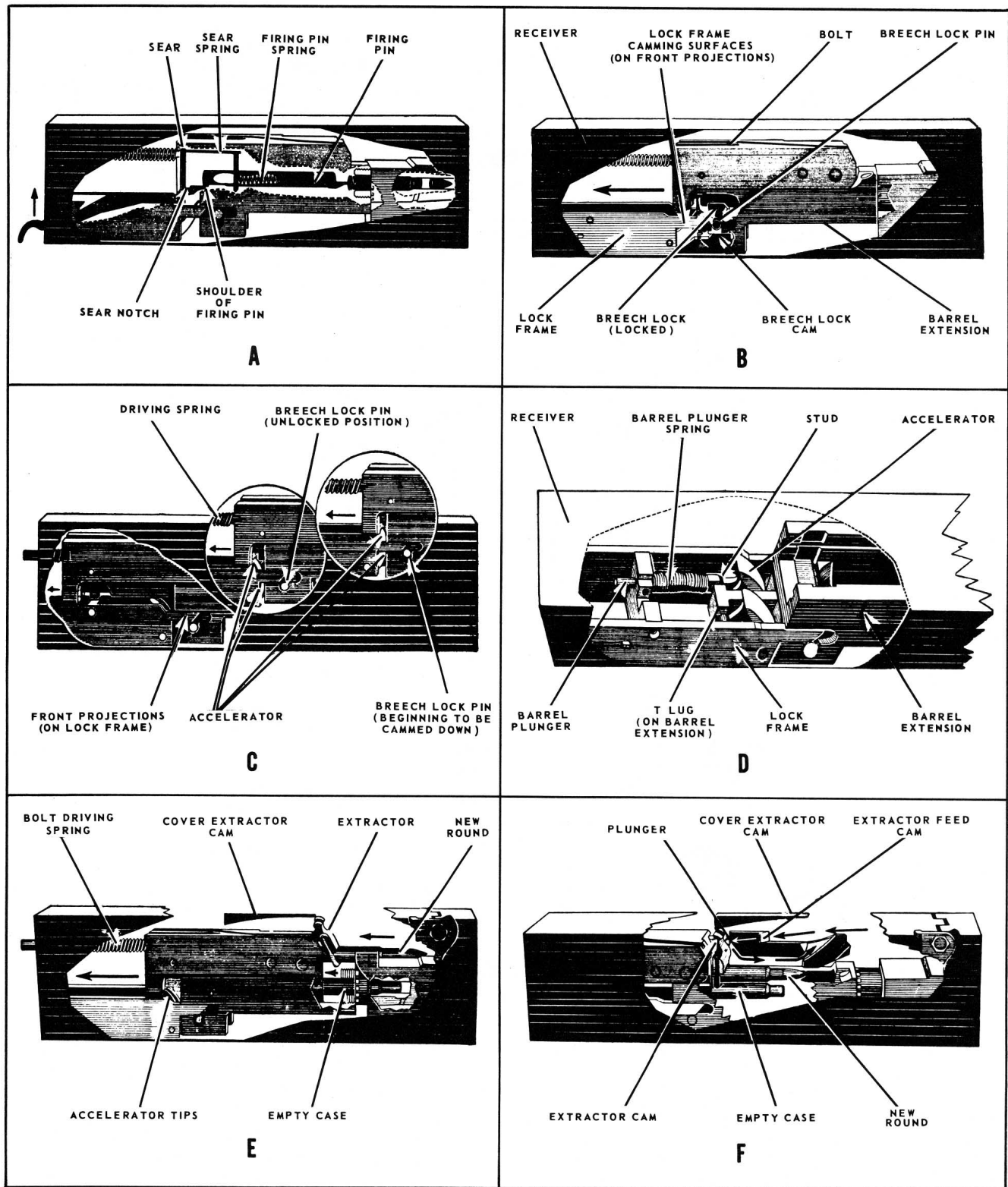
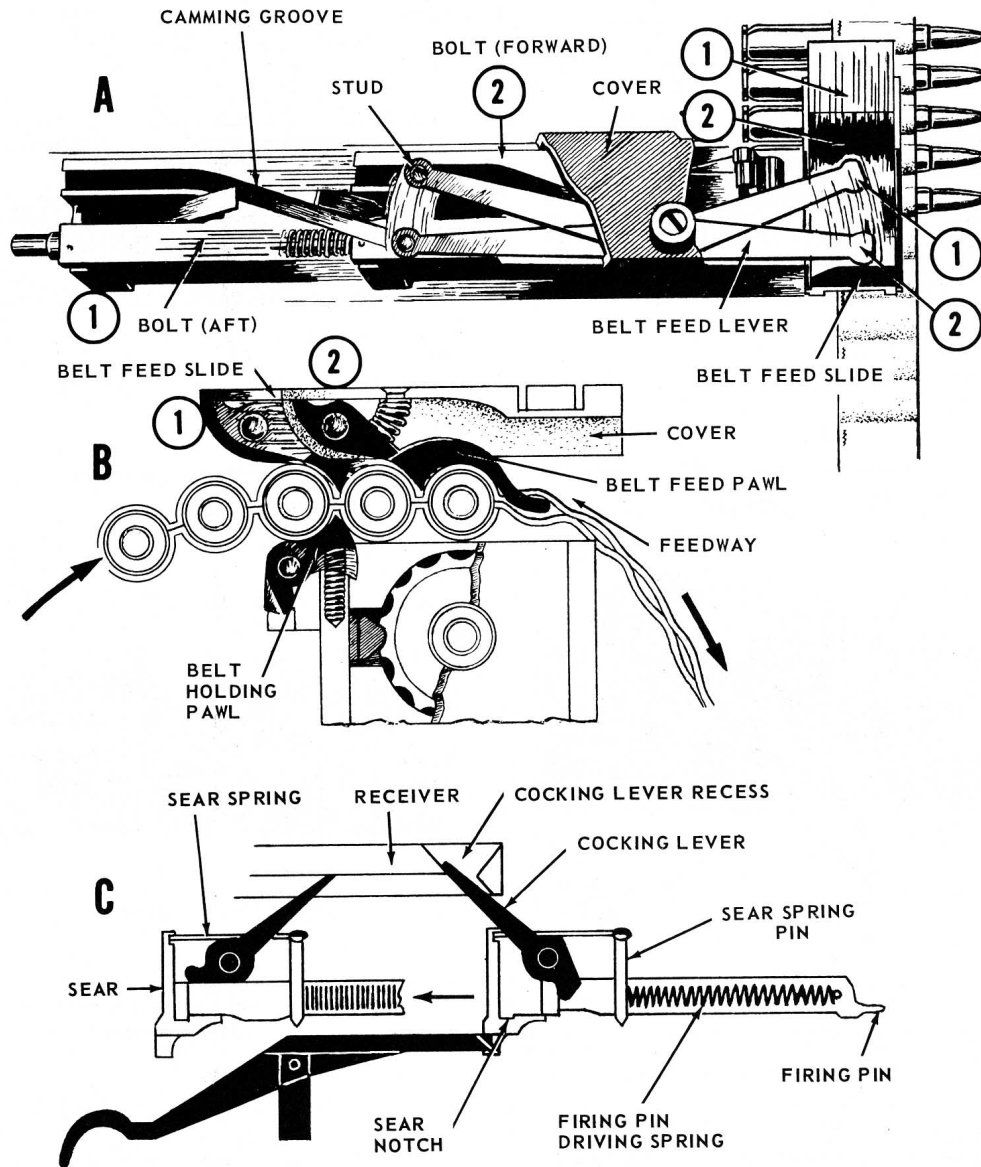


Figure 11-46. — Browning machinegun, caliber .30, M1919A4. Functioning cycle. (NOTE: Some parts are omitted for the sake of clarity.) 84.266



84,267

Figure 11-47.— Browning machinegun, caliber .30 M1919A4. A and B Feeding action. C. Cocking action. (NOTE: Some parts are omitted for the sake of clarity.)

so that the barrel extension and bolt reach the end of counterrecoil movement locked together. The bolt rams the cartridge home. If the gunner is pulling the trigger, the sear releases the firing pin to fire the next round and repeat the cycle. If the trigger is released, the sear holds the firing pin and the cycle comes to an end with the recoiling parts in battery and the firing pin retracted.

The feeding and cocking operations during counterrecoil are as follows:

a. Feeding. (See fig. 11-47A and B.) As the bolt moves forward, the belt feed lever is cammed forward to push the belt feed slide and pawl to the right (position 2). The pawl moves the belt to the right and positions the next round where the extractor can engage it when the

bolt has returned to battery. If, because of malfunction, the extractor fails to engage and load the cartridge case, the mechanism will go through the motions in the next cycle- but the belt feed pawl will ride on top of the round that should have been loaded, without moving the belt. Thus this arrangement prevents double loading and consequent jamming.

b. Cocking. (See fig. 11-47C.) In counterrecoil the cocking lever starts in position 2 and winds up in position 1, leaving the firing pin engaged by the sear, ready for the next cycle.

The functioning cycle continues as long as the trigger is pulled and the ammunition belt continues to supply fresh cartridges.

Operation Of The Caliber .30 BMG M1919A4

The basic operations for this weapon are half loading, loading, unloading, and clearing.

To HALF LOAD the BMG M1919A4 with cover either open or closed- insert the belt into the left side of the feedway, and pull it through until the first round is positioned to the right of the belt-holding pawl. Close the cover, if open. Pull the bolt by its handle fully to the rear, and release. This cocks the firing pin and shifts the first round to the centerline of the gun so that the extractor grips it as the bolt slides into battery.

But the round is not yet chambered, and the gun cannot be fired. The cartridge does not go into the chamber until the bolt has been operated a SECOND time, for FULL LOAD. The caliber .30 M1919A4 BMG is unlike all other small-arms weapons we have studied so far in that after the ammunition-carrying device (in this case the belt) is loaded into the weapon- the bolt must be worked manually through TWO operating cycles before it can be fired.

The HALF-LOAD position therefore can be considered as a safe-but-loaded condition for the caliber .30 BMG. Actually, the weapon has no real safety of the type we have found so far on small-arms weapons and machine guns; it is ALWAYS ready to fire when a round is chambered. It is important to remember this when you're operating the gun; it must always be CLEARED if it is not to be fired.

For FULL LOAD, then, you pull the bolt handle back twice after inserting the ammunition belt. The gun can then be fired by pulling the trigger.

To UNLOAD, raise the cover, lift out the belt, pull the bolt to the rear and hold it, and look or feel to make sure there is no ammunition in the gun. Then lower the extractor, release the bolt, position the belt feed lever stud over its groove in the bolt, and lower the cover. Finally, pull the trigger to uncock the firing mechanism.

To CLEAR GUN, raise the cover, remove the belt, pull the bolt to the rear and secure it in its rearward position by engaging the extractor cam plunger in the rear of the extractor feed cam, and inspect gun to see that no ammunition is in the chamber.

Maintenance Inspection and Headspace Adjustment

Complete inspection of the M1919A4 BMG requires, because of the complexity of the weapon, fairly detailed instructions which we haven't space to go into here. Unless your job requires that you become a BMG specialist, don't go any further than field-stripping the weapon and making the other inspections and adjustments covered in this section. For further information on inspection, adjustment, and repair of the weapon, see ARMY FM 23-55 and TM-9-1005-212 (Series).

VISUAL INSPECTION. - Before going into detailed inspection, look the weapon over for damage and for missing parts. See that all rivets, screws, and so forth are in place and secure in the receiver group. Further details to look for are:

1. Check general alignment of sights.
2. Check the back plate to see that it fits snugly in the side plate grooves, and check the condition of the grooves.
3. Lift the cover and retract the bolt handle. See if the firing pin protrudes properly (there is a gage for this but in this preliminary inspection you needn't use it) and if the T-slot is smooth and free of brass and other residues. Look also to see if the recoil plate in the face of the bolt is free of corrosion and carbon.

Functional Inspection

1. Check headspace. No gage is used for this purpose. Retract the bolt about 1 inch, then ease it forward slowly. The moving parts should not bind and they should yield a solid metallic sound when they go into full battery.

The headspace adjustment is correct when, as the bolt closes: .

a. the breechlock rides smoothly up the breechlock cam into its fully locked position, in positive contact with the forward wall of the breechlock recess.

b. the forward end of the bolt is positioned against the rear of the barrel.

2. Pull the bolt back, but do not release. Allow the bolt to move slowly forward, and see if it binds at any point. If it moves freely, repeat with a dummy cartridge. If it binds, determine the exact points at which it binds.

3. Check trigger pull. It should be between 7 and 12 pounds. 4. Check the barrel and barrel extension to be sure they do not bind at any point. 5. Operate the bolt with cover open and closed, and check feeding action. The feed mechanism should move freely in its full travel in both directions.

HEADSPACE ADJUSTMENT. - The BMG 1919A4 headspace adjustment (distance between the face of the bolt and the rear of the barrel) is made **WITHOUT** using a gage. Here is the procedure (fig. 11-48):

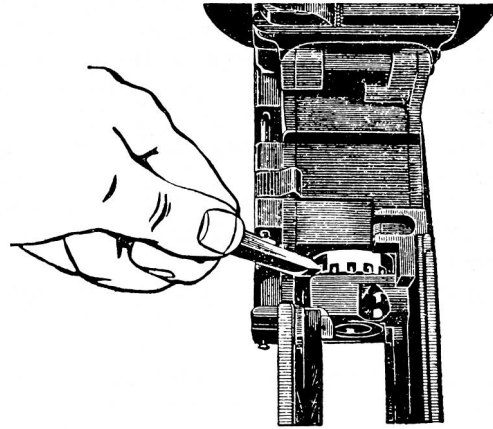
1. Pull the bolt to the rear approximately 3/4 inch, and disengage the barrel locking spring.

2. Using the proper combination tool, or the nose of a cartridge, in the barrel notches, screw the barrel into the barrel extension until the recoiling parts will not go into battery under pressure of the driving spring when the bolt handle is released.

3. Unscrew the barrel from the barrel extension one notch at a time (checking after each notch) until the barrel and barrel extension will just go fully forward into battery without being forced. (See item No. 1 under **FUNCTIONAL INSPECTION** above.)

4. Unscrew the barrel one additional notch, and engage the barrel locking spring.

5. After the correct headspace has been determined, mark the notch in the barrel in which the barrel locking spring is engaged. This will simplify making the heads pace adjustment if the gun is disassembled and reassembled in the future. The adjustment is important. Tight (insufficient) headspace will cause poor timing of locking and unlocking and consequent damage to the barrel extension, bolt, or breechlock. Excessive headspace leaves too much play between bolt and barrel, and may result in ruptured cartridge cases and possible injury to the gunner.



84.268

Figure 11-48. — Browning machinegun, caliber .30 M1919A4. Adjusting headspace.

BROWNING MACHINE GUN, CALIBER .50, M2

The caliber .50 BMG now used by the Navy and the Army is the M2, which may be equipped with either of two different kinds of barrel - air cooled (for aircraft use), or heavy barrel (HB). Although it is not used as widely in the Navy as it once was, you may still come across the HB . type on certain landing craft. (Caliber .50 MG's are still important as aircraft armament, but you're not likely to have to deal with such installations. And we 'shall not take up here the air-cooled caliber .50 BMG.)

The mechanisms of the weapon and the principles of operation are very much like those of the caliber .30 BMG that we studied earlier in this chapter. Rather than repeat the same material, we'll concentrate on the differences. without going into elaborate detail. If you need further details, see the Army's FM 23-65 and TM-9-1005-213 (Series).

The main characteristics of the caliber .50 BMG M2 are as follows:

Weight of gun with barrel (lb)	84
Length overall (in.) 65-1/8	
Length of barrel only (in.)	45
Rifling	
Uniform R.H. twist.	1 turn in 15 in.
Lands and grooves .00 0. 8 ea	
Rate of fire (cyclic, rd/min).	500 to 600
Muzzle velocity (approximate, fps)	2,900
Range (approximate, yd)	7,400

Construction Of The BMG Caliber .50 HB. M2

Figure 11-49 shows the caliber .50 BMG exterior and cutaway views. The cutaway view shows (dotted lines) the bolt latch release, but omits the bolt latch mechanism in the receiver. The construction in general is much like that of the caliber .30 BMG. The breechlock camming arrangements are different, as are the trigger linkage, location of the bolt handle, and other details, but the functioning is much the same. However, the ammunition feed mechanism can be arranged to feed from either side.

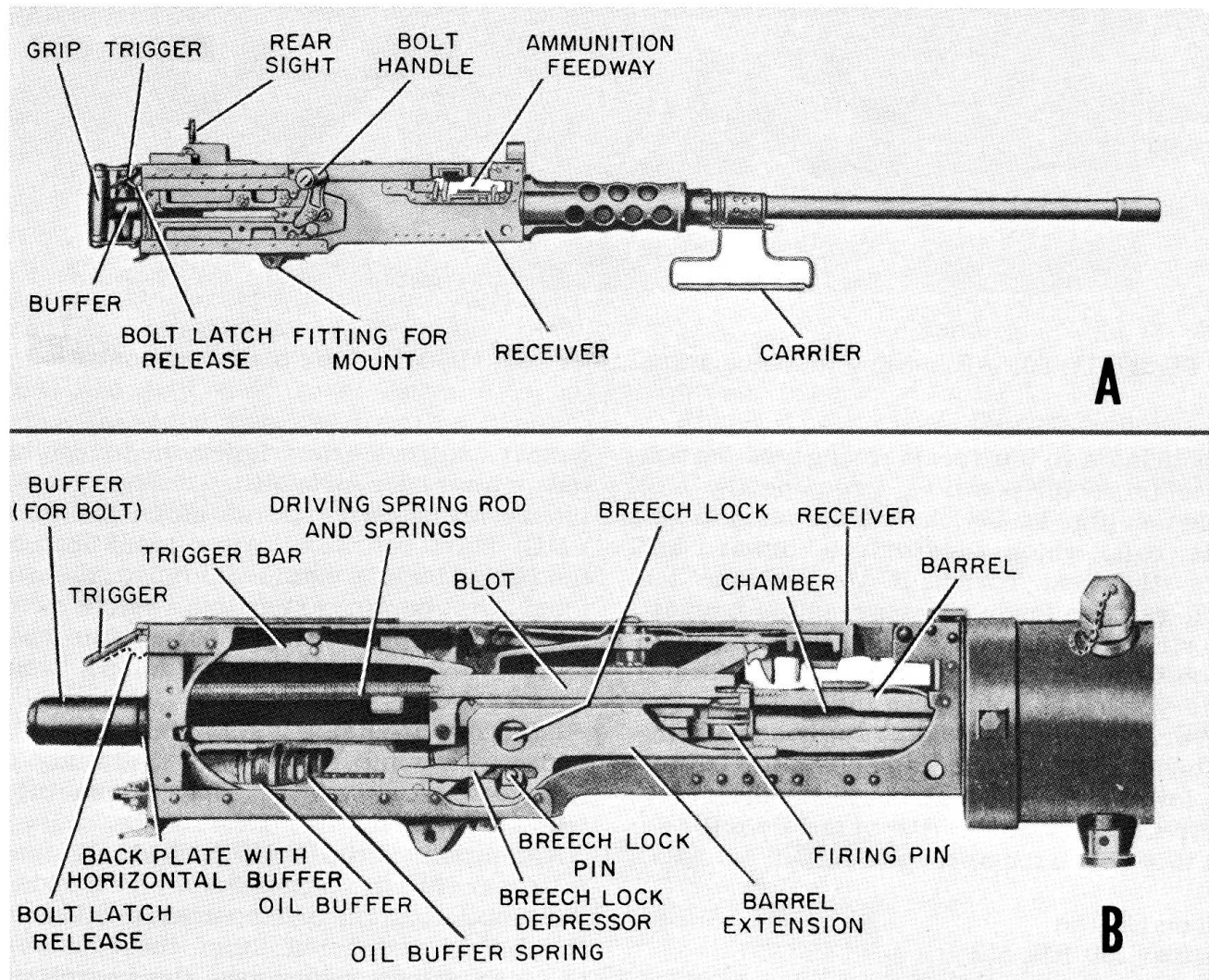
Note the two buffers. The upper one takes the recoil shock of the bolt, and the lower (oil)

buffer takes the recoil shock of the barrel and barrel extension. There is no look frame in the caliber .50 BMG.

Operating The BMG Caliber .50 HB, M2

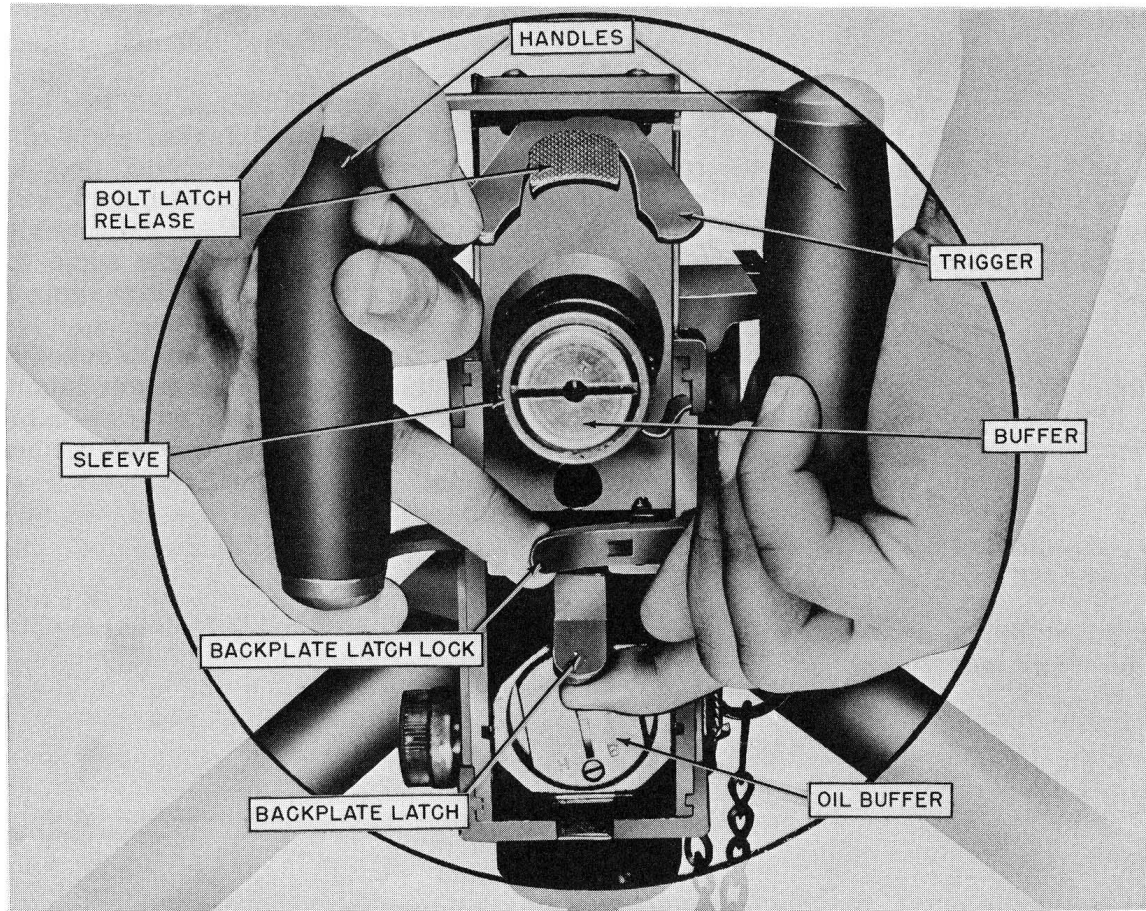
You load the belt, half load, load, clear, and unload the BMG caliber .50 much as you do the caliber .30. But there are some differences in the firing controls and how you use them, as can be seen in figure 11-50.

To fire the loaded and cocked gun, you depress the trigger. If the bolt latch is released, the gun will continue to fire automatically so long as the ammunition holds out and the trigger is down.



84.112

Figure 11-49.—Browning machinegun, caliber .50 HB, M2. A. Exterior. B. Cutaway view.



84.113

Figure 11-50.—Browning machinegun, caliber .50 HB, M2. Back plate and controls.

The bolt latch in the receiver engages the bolt when it is in recoil position. Pressing the bolt latch release (fig. 11-50) causes the latch to release the bolt, which then drives forward and chambers the next round. If you release the bolt latch release lever and depress the trigger, the gun will fire once, and stop with the bolt in recoil position again. For the gun to fire in full automatic you must hold down the bolt latch release lever. It can be locked down by depressing it, then twisting the knurled sleeve on the buffer, until the lever stays down when released.

NOTE: Caliber .50 BMG's other than HB do not have this bolt latch arrangement.

Functioning Of The BMG Caliber .50 HB, M2

You can follow most of the functioning cycle in figure 11-49B. Assume the chamber is loaded, the gun cocked, and the bolt latch released. The

gunner depresses the trigger, the firing pin strikes the primer, the propelling charge goes off, and the recoiling parts (same as in the caliber .30 BMG) start rearward. After 1-1/8 inch of travel the breechlock is cammed down to release the bolt from the barrel extension, which strikes the accelerator, is brought to a stop by the oil buffer, and is locked in recoil position by the accelerator.

(NOTE: In HB guns there is no oil in the buffer and some of the buffer parts are omitted. Air-cooled caliber .50 BMG's use oil buffers with oil in them.)

Meanwhile, the bolt, kicked all the way to the rear by the accelerator, rebounds against the upper buffer, and counterrecoils, unlocking the barrel extension from the receiver. When the breechlock reengages, the barrel extension locks to the bolt and both move forward together into battery. The cycle repeats when the firing pin sets off the next cartridge.

CHAPTER 11 - SMALL ARMS, LANDING PARTY EQUIPMENT AND DEMOLITION

The ammunition feeding, extraction, and ejection operations are much the same as in the caliber .30 BMG, though some of the mechanisms are somewhat different.

Ammunition Feed Arrangements Of The BMG Caliber .50 HB, M2

The main difference in the ammunition feed mechanism of the caliber .50 BMG from that of the caliber .30 is that the caliber .50 can be set up for feeding from either direction. Figure 11-51 shows both setups. Note that the caliber .50 BMG's bolt has in its top surface two camming grooves rather than one. In the place where they cross is a switch, something like a railroad switch, which must be set to select the proper camming groove for the direction of feed to be used. The other details of the mechanism setup for feeding in either direction are clearly shown in the figure.

INSPECTION AND GAGING OF BMG CALIBER .50 HB, M2

INSPECTION. Check the general appearance of the weapon. Pull the bolt to the rear, release, and check for smooth operation. Check the cover latch; be sure the spring has enough tension to keep the cover securely latched. Raise the cover and check the functioning of the cover detent pawl. Move the belt feed lever from side to side, and make sure the belt feed mechanism moves in its full travel in both directions. When you inspect the bolt, check the extractor and ejector, and look for corrosion. Check the back plate latch and lock.

After gaging, test the action of the gun mechanism by feeding several dummy cartridges assembled into a belt (with new belt links) through the gun, operating the gun mechanism by hand.

GAGING. In the caliber .50 Browning machinegun, as in the caliber .30, headspace is measured from the face of the bolt to the base of the chambered cartridge. Bad headspace adjustment in the BMG caliber .50 causes the same symptoms and malfunctions as in the caliber .30. But the procedure for gaging and adjustment of headspace is different in the bigger gun, chiefly in the use of a **HEADSPACE AND TIMING GAGE** (Army No. A196228). Headspace must be checked before firing, and adjusted, if necessary. Here is the procedure:

1. Retract fully, then release the recoiling parts. This cocks the firing pin.

2. Retract the bolt slightly (not more than 1/16 in.) to relieve the thrust of the driving spring between the bolt and the after end of the barrel. The forward face of the breech lock and the bolt should be in close contact, as in firing.

3. Pull up the extractor. Insert the gage in the T-slot between the face of the bolt and the after end of the barrel (fig. 11-52). If headspace is too tight, the gage won't go in. If headspace is correct or too great, the gage will slip in easily.

4. If the gage doesn't go in on the first try, unscrew the barrel ONE notch, and try the gage again. Repeat, if necessary, until it does go in. The adjustment is then correct.

5. If the gage doesn't go in the first time, screw the barrel IN one notch, and try again. If the gage no longer goes in, restore the first position of the barrel; this is the proper adjustment. If the gage still slips in, screw the barrel in another notch, and repeat. The proper adjustment is the one in which the barrel is screwed in as far as it can be without making the headspace too tight.

THE MACHINEGUN, 7.62-MM. M60

The 7.62-mm machinegun M60 is shown in figure 11-53. Major groups and assemblies are shown and indexed in figure 11-54.

Figure 11-53 shows the gun mounted on a bipod. It may also be mounted on tripod mount M122 (fig. 11-55). The method of installing the gun on the tripod mount is shown in figure 11-56.

Loading And Firing

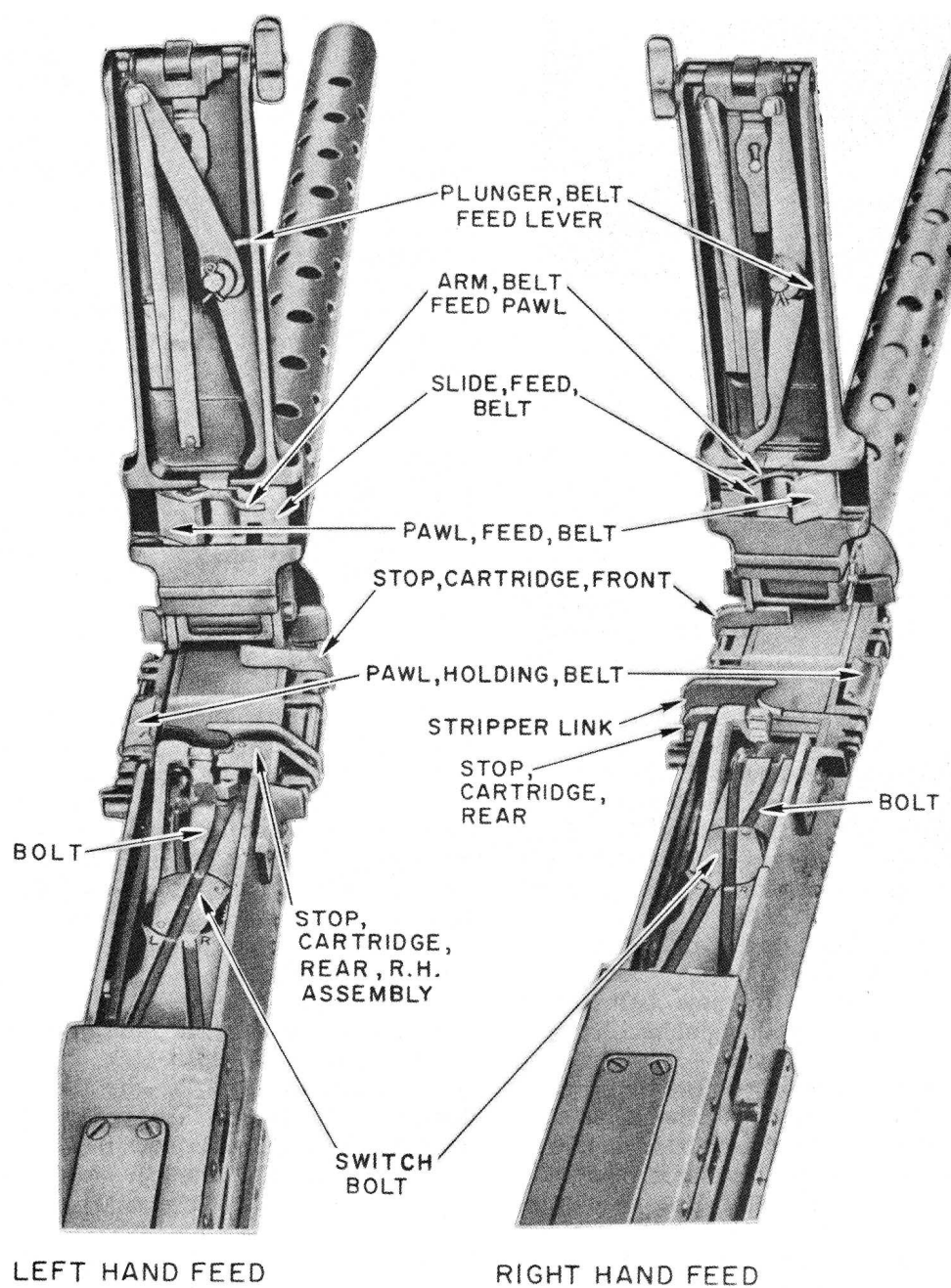
Ammunition for the M60 machinegun is fired from a metallic, split-link belt containing 100 rounds. At one end of the link belt there is a double link. It is this end, the one with the double link, that is started into the gun.

Figure 11-57 shows the steps in loading and firing the M60 machinegun.

CASUALTIES

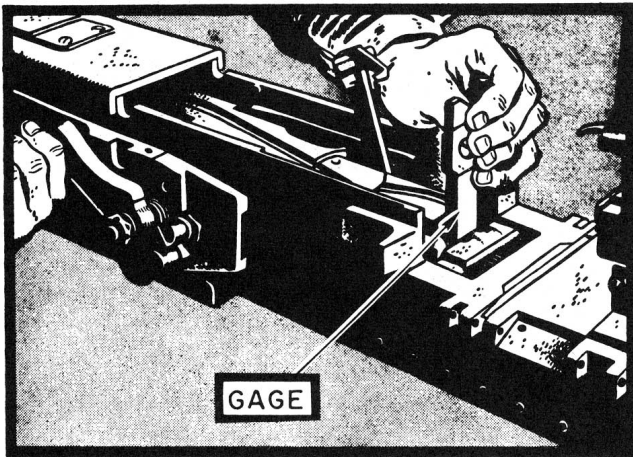
Runaway Gun

A broken or worn sear may cause the casualty "runaway gun," a situation in which the



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Figure 11-51.— Browning machinegun, caliber .50 HB, M2. Feeding mechanism parts set up for left-hand and right-hand feeding.



84.115
Figure 11-52.— Browning machinegun, caliber .50 HB, M2. Headspace gaging.

gun continues to fire after the trigger is released. When this casualty occurs, you hold the fire on the target until feeding stops or the ammunition is expended. You then notify maintenance personnel at once.

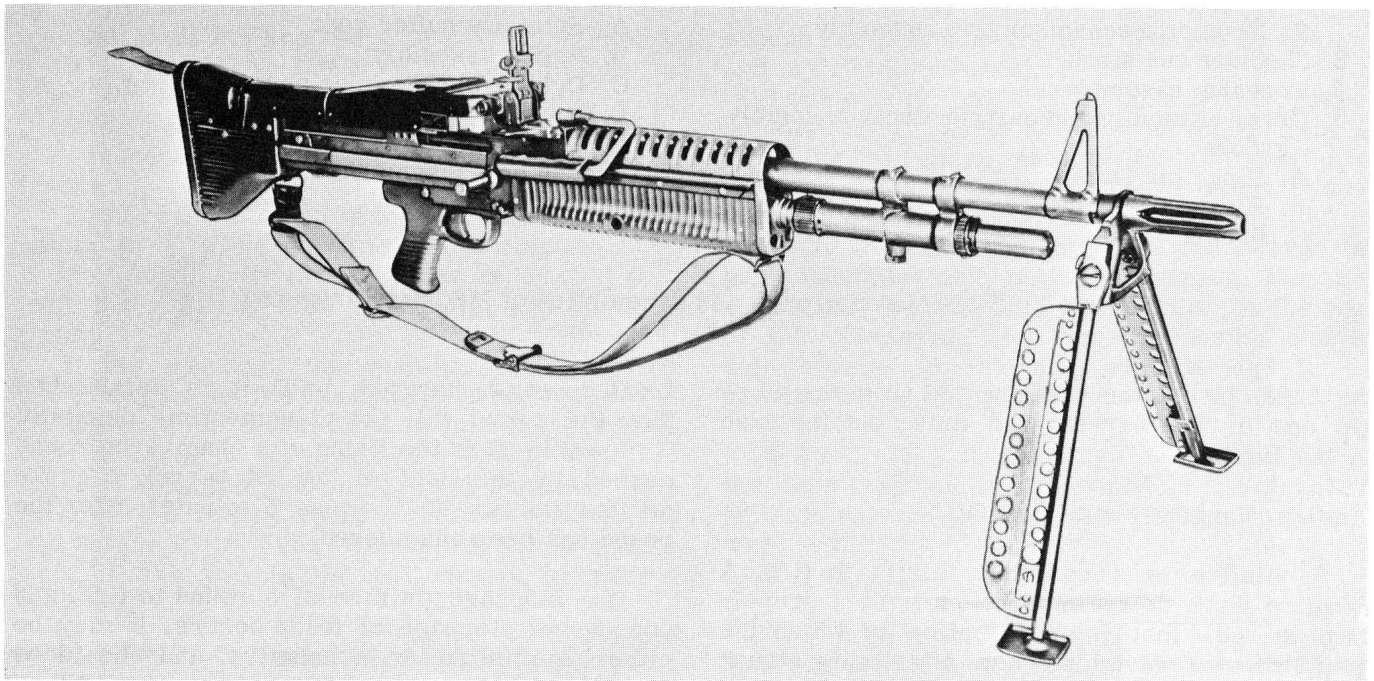
Ruptured Cartridge Case

A cartridge case may rupture so that the forward portion remains in the chamber and only the rear portion is extracted. When a rupture of this type occurs, a new round will be fed into the chamber, and the following may occur:

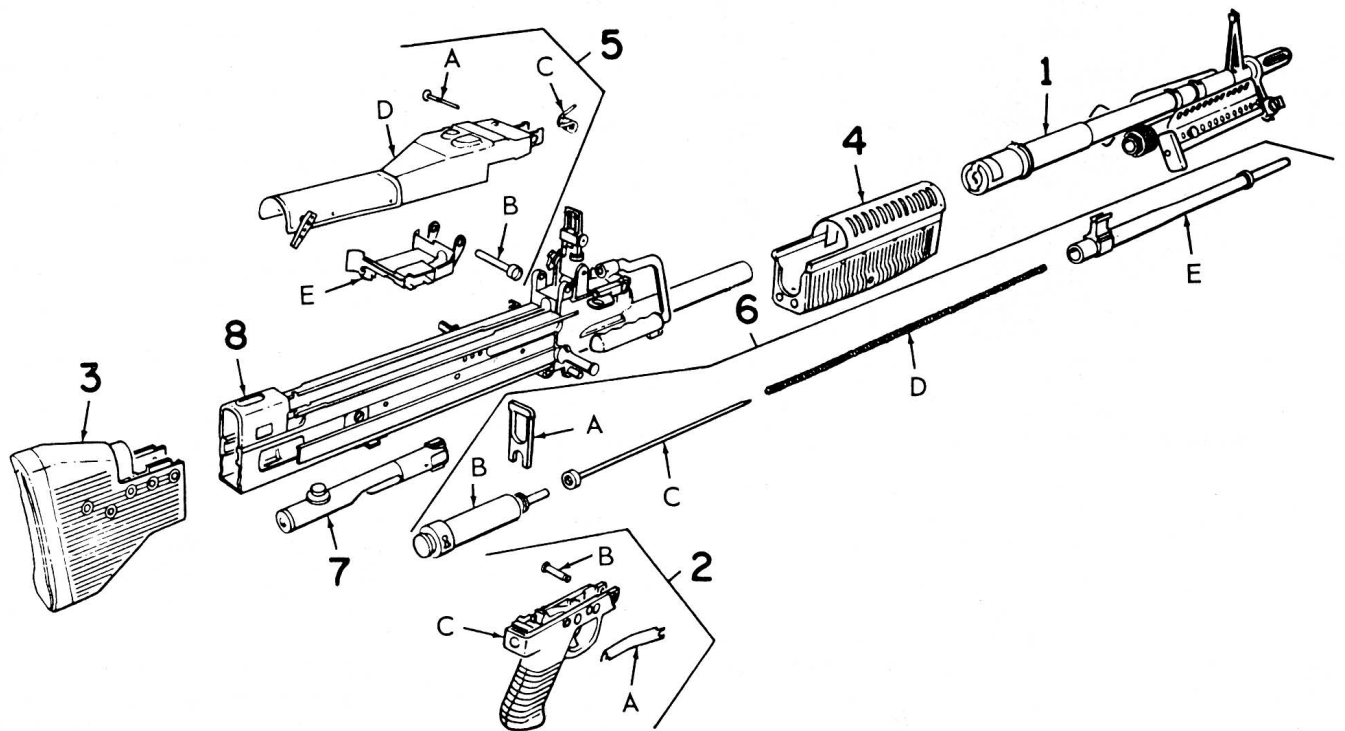
1. Incomplete chambering, because the live round cannot be seated fully. It may be compressed enough to cause detonation, with possible damage to the gun, injury to personnel, or both.

2. A round driven into the ruptured case without detonation. You remove this round by the following steps: (a) Retract bolt and move safety to S position. (b) Insert cleaning rod in muzzle end of barrel, set against nose of cartridge, and tap rod gently to eject cartridge from chamber.

To remove a ruptured cartridge case from the breech, you use the ruptured cartridge case extractor shown in figure 11-58. You insert the ruptured cartridge case extractor through



45.578
Figure 11-53.— 7.62-mm machinegun M60.



- | | |
|--|--|
| 1. Barrel assembly with bipod assembly | D. Cover assembly |
| 2. Trigger mechanism grip group | E. Cartridge tray assembly |
| A. Leaf spring | 6. Buffer assembly and operating rod assembly groups |
| B. Retaining pin | A. Retaining buffer yoke |
| C. Trigger mechanism grip assembly | B. Buffer assembly |
| 3. Shoulder gun stock | C. Driving spring guide assembly |
| 4. Forearm assembly | D. Spring |
| 5. Cover assembly and cartridge tray assembly groups | E. Operating rod assembly |
| A. Hinge pin latch | 7. Breech bolt assembly |
| B. Hinge cover pin | 8. Receiver group |
| C. Spring | |

29,373

Figure 11-54.—Major groups and assemblies of M60 machineguns.

the case, insert the cleaning rod from the muzzle end of the barrel, and drive out the case by tapping the rod lightly.

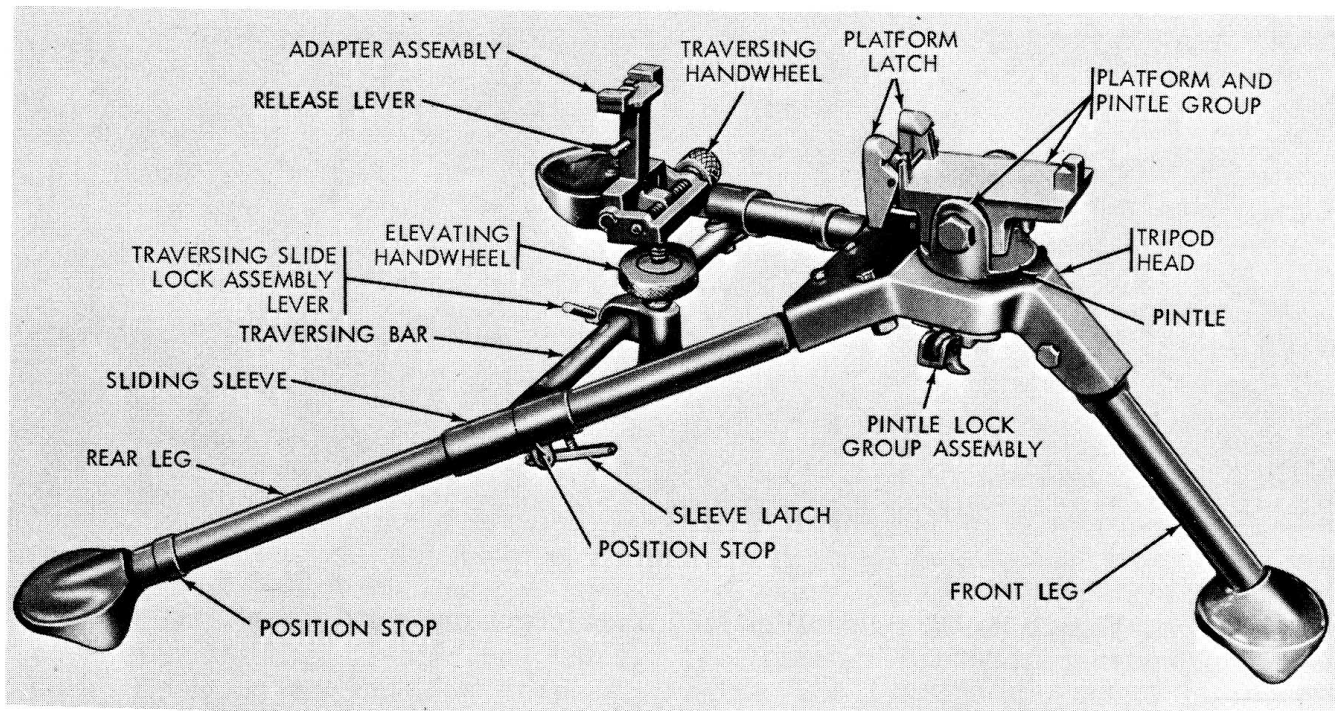
Misfire, Hangfire, and Cook-Off

A misfire is a complete failure to fire. A hangfire is a delay in functioning of a propelling charge - that is, a situation in which the primer in the cartridge case, after being struck by the firing pin, does not detonate the propelling charge immediately, but does detonate it after an interval. NOTE: A misfire must be

treated as a hangfire until it is established that the round will not at some time detonate.

A cook-off is the firing of a chambered round caused by the heat of the hot barrel. A cook-off may occur as long as 5 minutes after the round has been chambered.

If a stoppage (failure of a round to fire, and consequent stoppage of feed) occurs, it may be either a misfire or a hangfire, and should be treated as a hangfire. Wait 5 seconds, and then pull the cocking handle all the way back, ensuring that it stays back.



29.374

Figure 11-55. — Machinegun tripod mount M122.

If this procedure ejects the chambered round, relay the gun on the target and attempt to fire. If the weapon does not fire, it must be cleared by qualified personnel and the ammunition inspected to determine the cause of the stoppage.

If pulling back the cocking handle fails to eject the chambered round, move the safety to S (safe) position, remove ammunition and links, and inspect the receiver, chamber, and extractor.

If there is a round in the chamber, move the safety to F (fire) position and attempt to fire. If the round fires and the case is ejected reload the gun, relay on the target, and continue firing.

If the round in the chamber does not fire and the gun is hot enough to cause a cook-off (if 200 rounds were fired within the previous two minutes, it may be hot enough), wait five minutes with the bolt in forward position. Then remove the round, reload, relay on the target, and attempt to fire. Disregard the 5-minute wait if the gun is not hot enough to cause a cook-off.

Double Feed

"Double feed" is a situation in which a live round is fed into a chambered spent case or chambered live round.

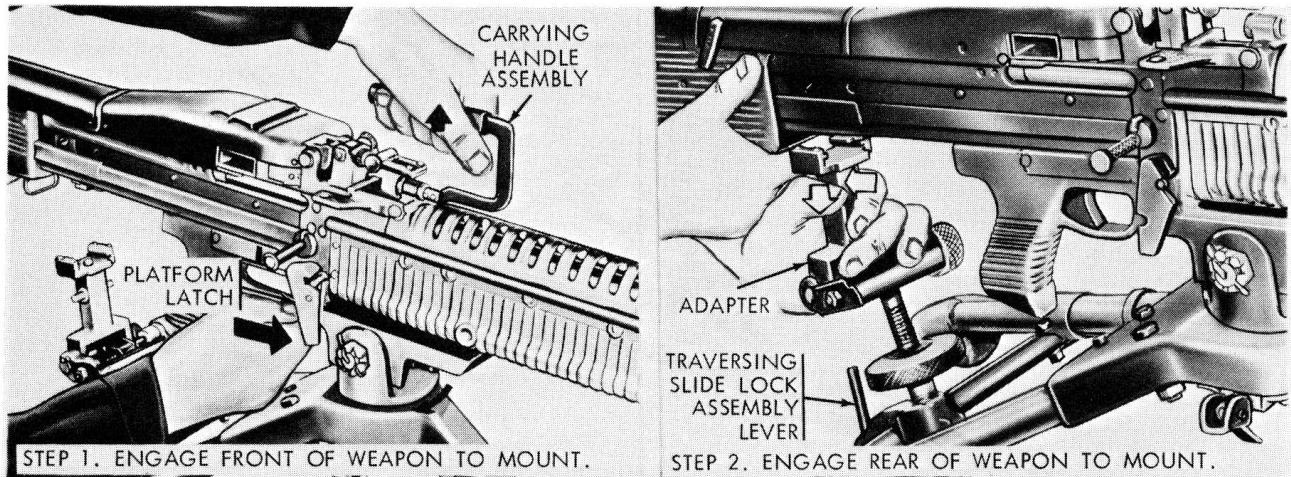
When the gun fails to extract a spent case, the bolt automatically recoils, picks up the next (live) round, and feeds it into the chambered case. The force may compress the live round enough to detonate it, with damage to the gun and injury to personnel.

Double feed into a live round will not occur automatically because, when a round fails to fire, the bolt does not recoil, but remains in forward, closed position. The correct procedure here is to proceed as described for a hang-fire. If, instead of doing this, you charge the gun manually and pull the trigger, the next round will be fed into the primer in the base of the chambered live round, causing one or both rounds to detonate, with damage to the gun and injury to personnel.

WARNING: If there is belted ammunition on the feed tray and a live round in the chamber, NEVER retract the bolt and allow it to go forward.

FIELD STRIPPING

The steps in field stripping the M60 machinegun are shown in figures 11-59 through 11-65. White arrows shown on illustrations indicate disassembly, black arrows indicate assembly.



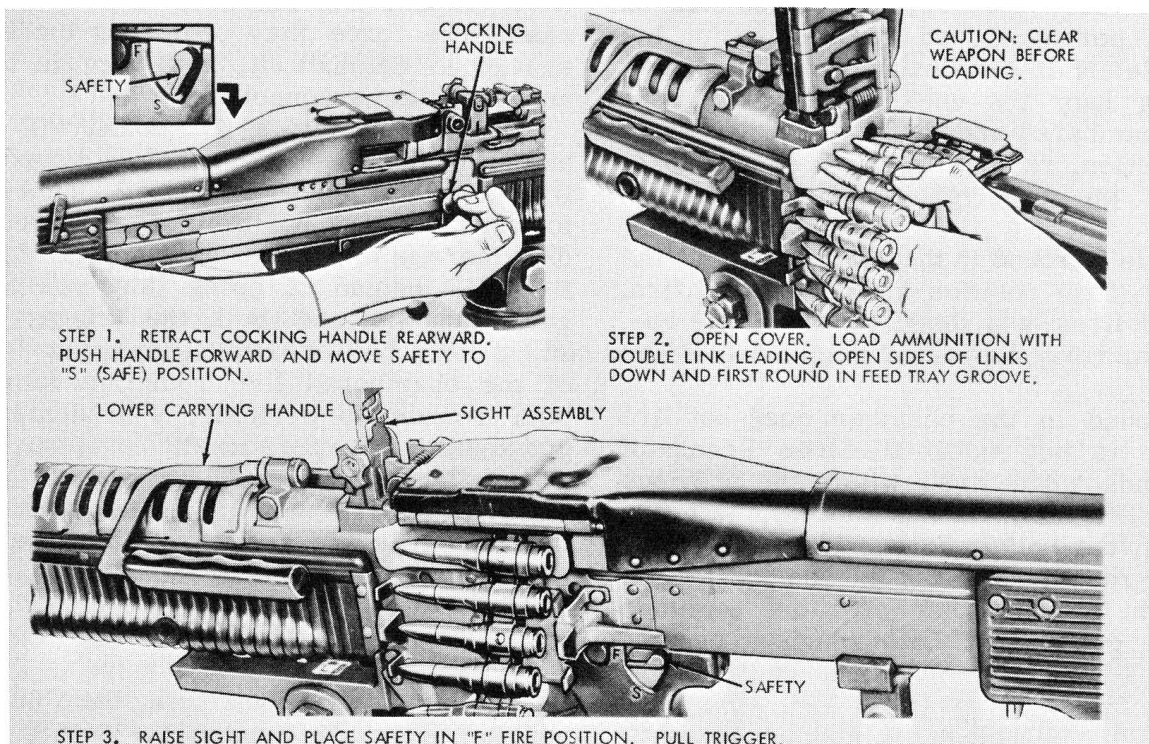
29.375

Figure 11-56.—Installing M60 machinegun on tripod mount.

SUBMACHINEGUNS

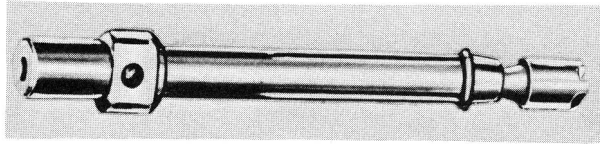
These weapons were designed to provide a large volume of fire against personnel at

short range. Development work since 1942 has consisted largely of simplifying the mechanism, reducing the maintenance requirements, and perfecting a new type of construction that is cheaper



29.376

Figure 11-57.—Steps in loading and firing the M60 machinegun.



29,377

Figure 11-58. — Ruptured cartridge case extractor.

to manufacture. All of this was done, of course, without any adverse effect on the weapon's reliability.

Because of the low power of the pistol type cartridge used, complicated operating mechanisms are not required. All submachineguns now are of the simple blowback (inertia) type.

The submachineguns we will examine here are the .45 caliber M1 (fig. 11-66A) and M3A1 (fig. 11-66B). Designed as shoulder weapons, they can also be fired from the hip, if properly braced against it. The M1 (tommygun) has a maximum effective range of 150 yards, can be fired either in single or automatic fire, and has a rate of fire of 700 to 800 rounds per minute. The M3A1 has a slightly longer maximum effective range (200 yards), and is fired in automatic only, with a rate of fire about half that of the M1.

Operating The M1 Submachinegun

LOADING. - To load the M1 submachinegun, first retract the bolt handle (fig. 11-67) to cock the weapon. Turn the safety (fig. 11-66) to SAFE. Push the loaded magazine up into the groove of the trigger frame until the magazine catch snaps into position.

The weapon can be fired either in semiautomatic or in automatic.

SINGLE FIRE (SEMIAUTOMATIC). - Turn the rocker pivot aft to SINGLE and the safety to FIRE. Squeeze the trigger to fire each round, and release the trigger quickly.

FULL AUTOMATIC FIRE. - Turn the rocker pivot forward to FULL AUTO and the safety to FIRE. Squeeze the trigger to fire a burst. The gun will continue to fire automatically as long as the trigger is held and there is ammunition in the magazine.

UNLOADING. - When the magazine has been emptied, the bolt is automatically held in open

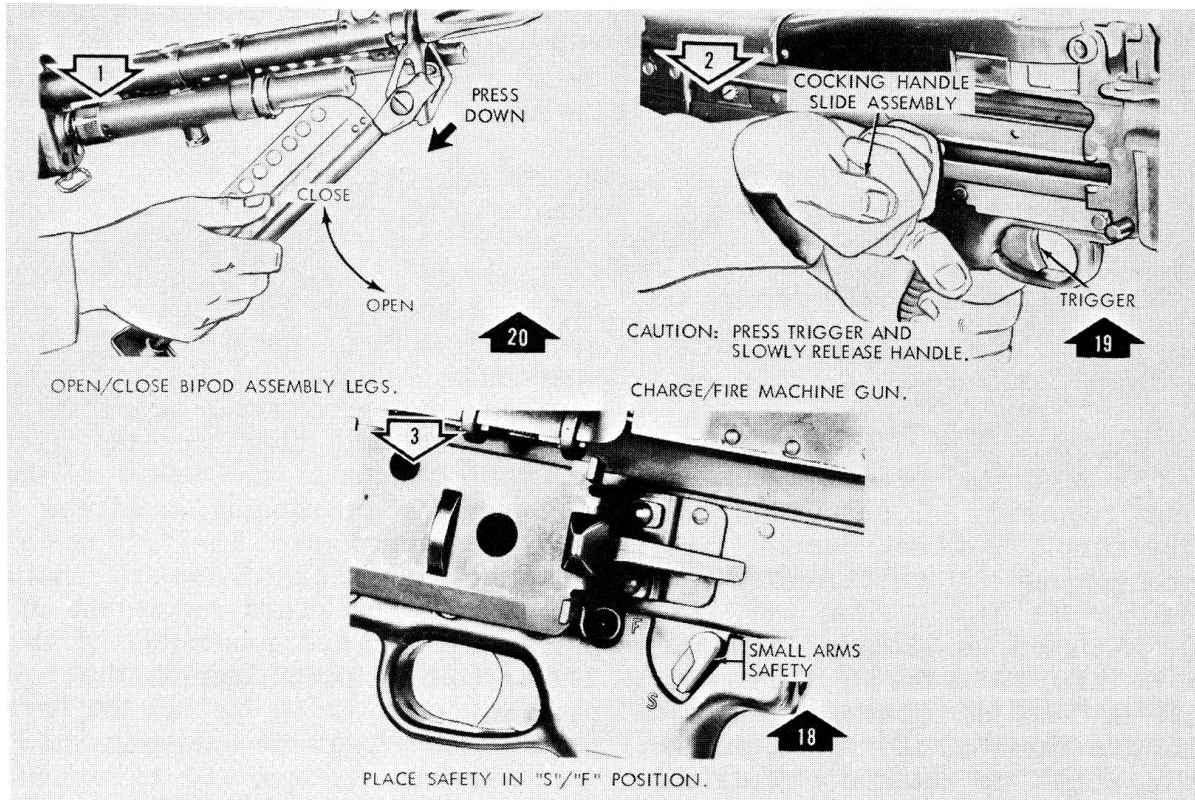
position. To close the bolt on an empty chamber, rotate the magazine catch counterclockwise to remove the magazine, then grasp the bolt handle in retracted position, and squeeze the trigger. Let the bolt go slowly forward on the empty chamber.

Functioning Of M1 Submachineguns

Like the 20-mm AA gun, which is also blowback-operated, the M1 and M3 submachineguns fire from an open bolt - that is, the trigger mechanism releases the bolt which, as it moves forward, strips a round from the magazine, rams it into the chamber, and fires it. You can follow most of the details of the M1 submachinegun's functioning from the disassembled view of figure 11-67. For the sake of convenience, we can divide its functioning into two phases - backward movement of recoiling parts, and forward movement of those parts. The recoiling parts include the bolt and the parts attached to it, but not the barrel or any parts of the trigger mechanism.

BACKWARD MOVEMENT. - As the cartridge fires, the pressure of the powder gases forces the bolt to the rear against the recoil spring. The extractor holds the empty case against the face of the bolt. After the bolt has traveled to the rear about 2 inches, the ejector throws the case through the ejector opening. The bolt still has about 1-3/4 inch to go aft before the back of the bolt contacts the buffer. During rearward movement, the bolt compresses the recoil spring and the buffer absorbs the remaining shock. On the bolt underside are two sear notches. If the bolt strikes the buffer, the rear sear notch will pass over the sear and the sear will engage the front notch. If the bolt fails to strike the buffer, the sear will engage the rear notch.

FORWARD MOVEMENT. - When the trigger is squeezed, the sear released the bolt, which is forced forward by the recoil spring. After moving about 1 inch, the front of the bolt contacts the topmost cartridge in the magazine and pushes it forward and along the bullet ramp in the receiver into the chamber. When the cartridge is seated in the chamber, the extractor engages the rim of the cartridge. Just before the bolt reaches its forwardmost position, the lowest point of the hammer on the underside of the bolt strikes the receiver, much as in the 20-mm AA gun, causing the hammer to pivot



29.378

Figure 11-59.— Field stripping the M60 machinegun.

around the hammer pin and strike the head of the firing pin with its upper end. This fires the cartridge.

Disassembly

Usually, disassembly of the M1 submachinegun need go no further than the steps outlined here.

First, place the rocker pivot on FULL AUTOMATIC and the safety on FIRE. Depress the frame latch and slide the frame group from the barrel and receiver group.

Press inward on the buffer pilot and lift out the buffer. Let the buffer pilot out slowly. Remove the buffer pilot and recoil spring.

Next, with the receiver upside down, slide the bolt aft and tip the rear end up until the bolt handle rests in the semicircular cut on the right hand side of the receiver. Press the bottom of the hammer rearward to disengage the bolt handle, and remove the handle.

Remove the bolt by sliding it rearward and lifting it out of the receiver.

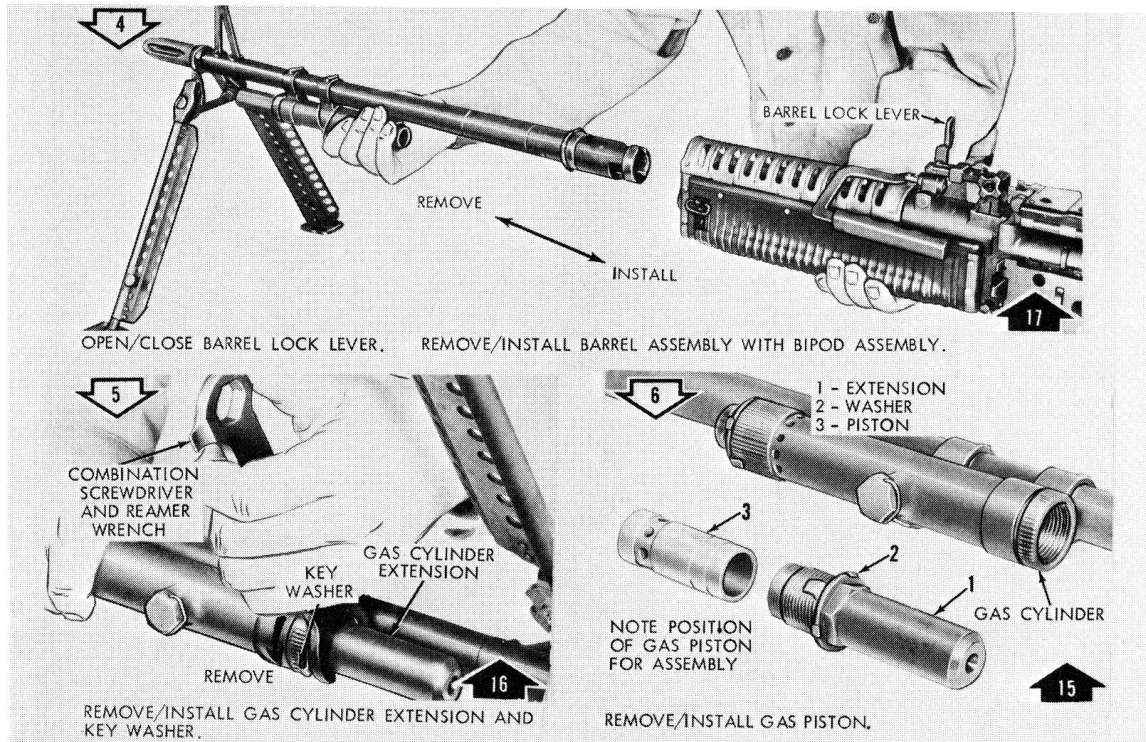
Drifting the hammer pin out of the bolt will release the hammer, the firing pin, and the firing pin spring. To reassemble the weapon, proceed in the reverse order of disassembly.

SUBMACHINEGUN CALIBER .45 M3A1

Though crude in appearance, the M3A1 (fig. 11-66B) is compact, rugged, low in cost, and simple to manufacture. The weapon is entirely metal, with a telescoping stock made of a single piece of steel rod. The stock serves double duty as it also is a cleaning rod. The weapon has no provision for semiautomatic fire, but the very low cycling rate permits a gunner to fire single shots after a little practice.

An unusual feature of this gun is the hinged cover over the ejection port. This cover must be open to fire since it acts as the safety. When the cover is down, it locks the bolt in either its open or closed position.

The M3A1 cannot be cocked unless the cover is open because cocking is done by placing a



29,379

Figure 11-60.— Field stripping the M60 machinegun— Continued.

finger in the cocking hole and drawing the bolt aft until it is caught by the sear.

Operation

The weapon is loaded by drawing the bolt back to the cocked position, closing the cover to lock the bolt, and then inserting the magazine. To fire, lift the cover to unlock the bolt, and squeeze the trigger.

When the trigger is pulled, the sear is moved downward. This releases the bolt which is driven forward by the two compressed driving springs. As the bolt goes forward it picks up a round from the magazine and pushes it into the chamber. When the round is fully seated, its base sticks out slightly from the chamber. As the bolt continues forward, the round is completely enclosed by the round recess of the bolt and the chamber, and the fixed firing pin strikes the primer.

When the round is fired, the chamber pressure will reach its maximum almost immediately but because of the inertia of the heavy bolt and the resistance of the driving springs, extraction will not be completed until the pressure has declined. The bolt moves to the rear,

bringing the empty cartridge with it. As the empty cartridge strikes the ejector it is thrown through the open port in the top of the receiver.

The bolt continues to the rear, compressing the driving springs. Then, if the sear is still held depressed, the bolt moves forward again to repeat the cycle. If the trigger has been released, the sear will engage the bolt and hold it in a cocked position.

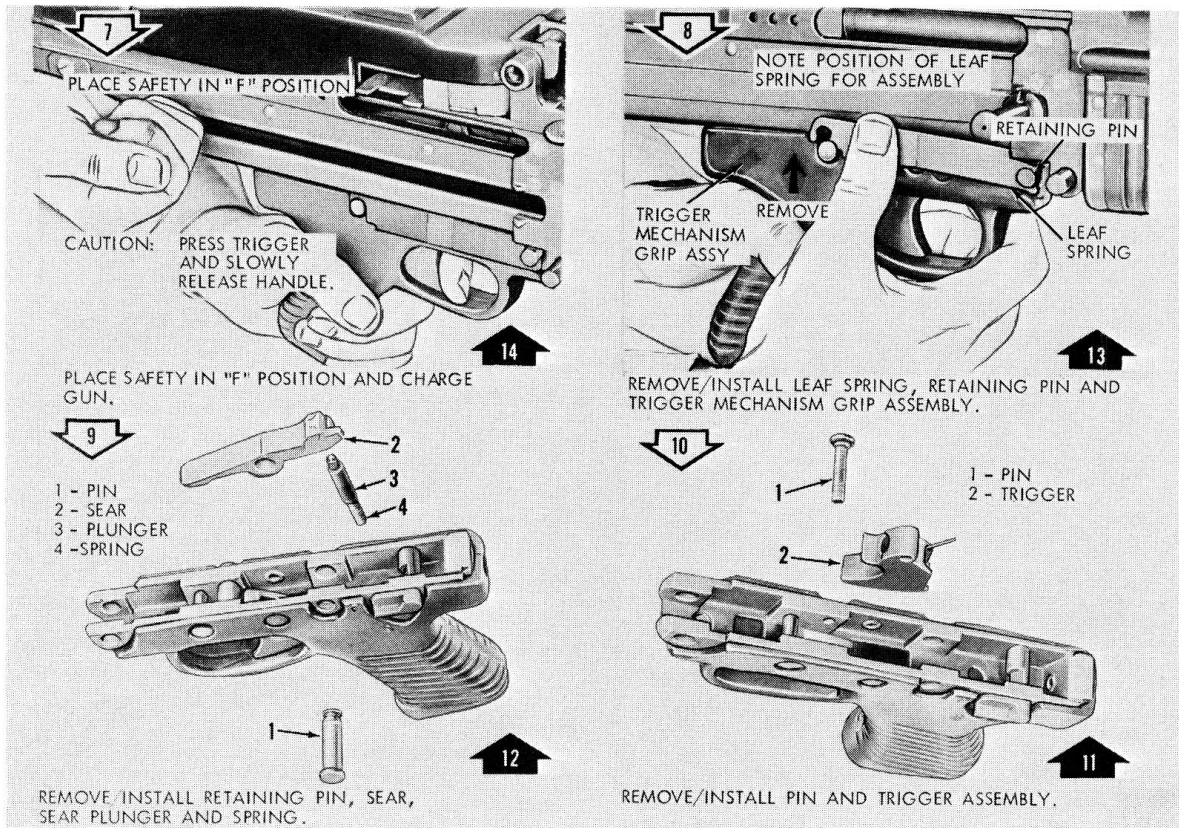
CAUTION: Because of its simplicity, the M3A1 lacks several safety features of the other small arms. The weapon is safe only when the magazine is out and the bolt is forward. Do not load the weapon until ready to use it, and don't unlock it until it is raised to be fired.

Disassembly

To disassemble the M3A1, first press the magazine catch (fig. 11-68), and slide out the magazine. Then squeeze the trigger and allow the bolt to go forward on an empty chamber.

Press in on the stock catch and remove the stock by pulling it directly to the rear.

To remove the trigger guard, place one side of the shoulder rest of the stock against the



29.380

Figure 11-61. — Field stripping the M60 machinegun — Continued.

housing assembly and pry out the rear end of the trigger guard. Unhook the trigger guard by rotating it toward the front of the weapon.

To remove the housing assembly, pull down on its after end slightly and pull it to the rear. Now the magazine catch and spring can be removed.

Remove the barrel by lifting the ratchet, and unscrewing the barrel collar counterclockwise from the front.

The bolt can now be taken out through the front of the receiver. Press out the sear pin and withdraw the trigger pin from the assembly. Take the trigger assembly out the opening in front of the sear. No further disassembly is permitted.

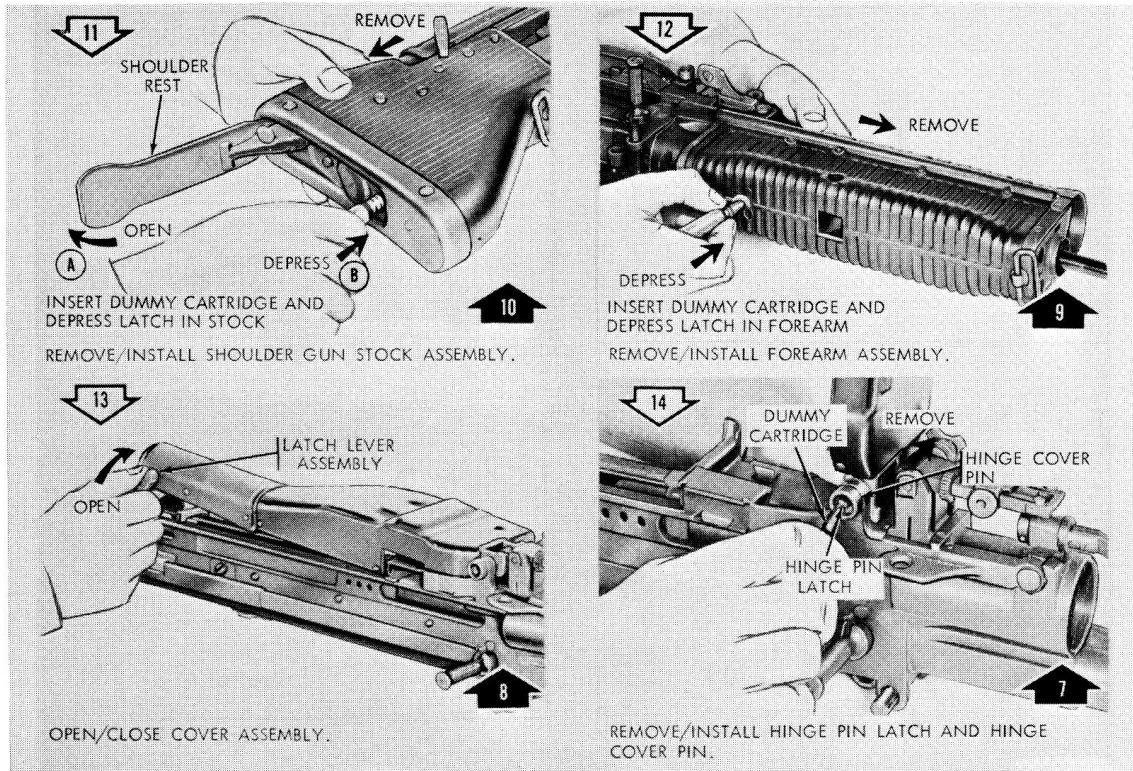
Assembly

To assemble the weapon, start by placing the trigger assembly in the receiver. Insert the trigger pin far enough to hold the assembly in place. Manipulate the sear into position by pressing the trigger while pushing upward on

the sear. Insert the sear pin, then press both ends of the trigger pin home. Place the bolt group in the receiver with the retaining plate to the rear, and the grooved side of the bolt down. Replace the barrel, screwing the collar down (but not too tight). Replace the magazine catch. With the receiver upside down, insert the ejector, and fit the forward end of the housing into its slot in the magazine guide. Drop the rear end of the housing, making sure it is properly seated. Put the forward end of the trigger guard into its slot in the housing. Press the rear end of the trigger guard until it snaps into its slot in the pistol grip.

BROWNING AUTOMATIC RIFLE M1918A2

The automatic rifle differs from the other rifles we have taken up in this chapter in that it is not fired as often from the hand or shoulder as it is from a bipod. In combat ashore, in fact, it is employed as a light machinegun more than as a rifle.



29.381

Figure 11-62. — Field stripping the M60 machinegun — Continued.

The Browning automatic rifle has one standard model the M1918A2 (fig. 11-69.) It is a caliber .30, gas-operated, magazine-fed, air-cooled weapon, capable of automatic fire only, though you can fire it single shot if you have a quick expert trigger finger. The rate of fire can be varied between fast (550 rounds per minute) and slow (350 rounds per minute) by a selector. Its box-type magazine contains 20 rounds of the same type ammunition as that used in the M1 rifle.

Since the BAR is a gas-operated weapon, its operating cycle bears a certain resemblance to that of the M1 semiautomatic rifle. However, the two weapons have quite different designs and the BAR requires separate study. The remaining portion of this chapter on small arms will cover the BAR main assemblies, how they function, and the overall operation and maintenance of the rifle.

General Characteristics of the BAR

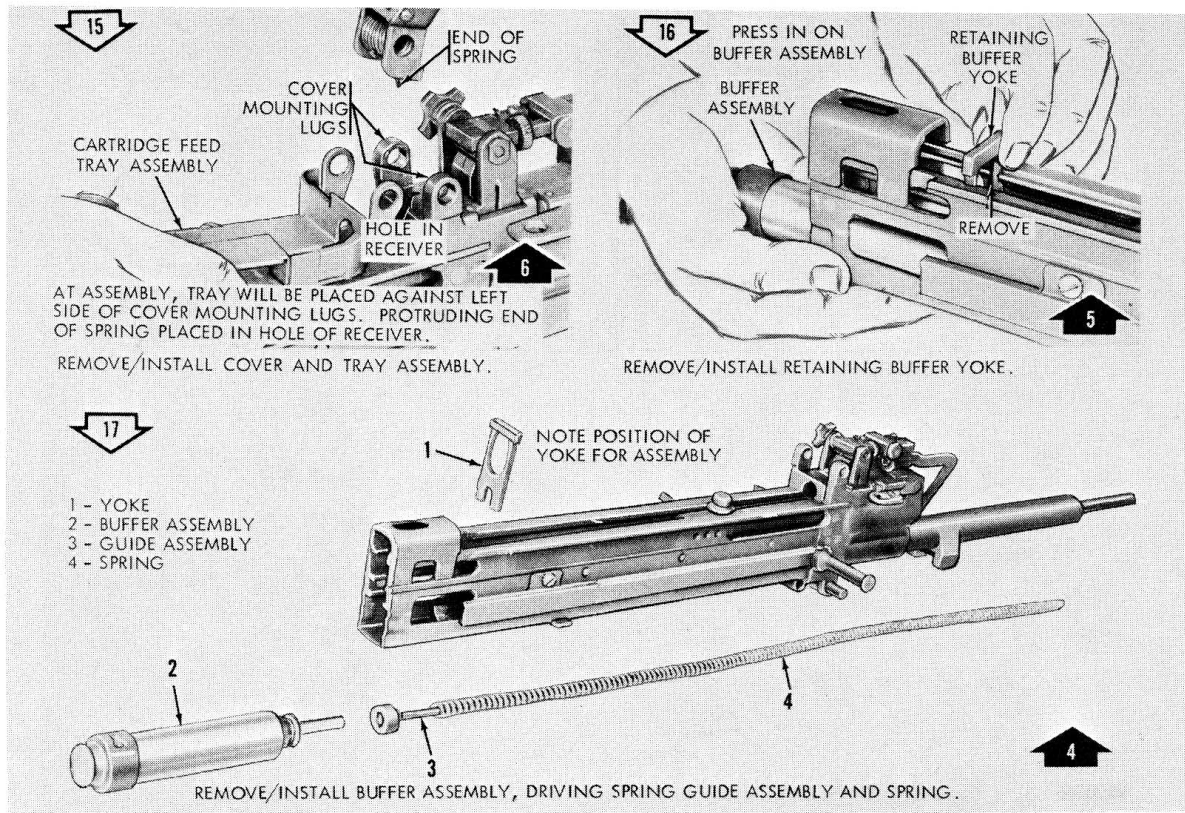
Length (in.).	47.8
Weight, without bipod and magazine (lb).	16.5
Length of barrel (in.)	24.07

Maximum range (yd)	3,000
Maximum effective range (yd)	500
Rifling.	1 turn (RH) in 10 in.
Trigger pull (lb)	6 to 10
Rate of fire (rd/min)	
Normal cyclic rate.	550
Slow cyclic rate.	350

How to Load and Fire the BAR

LOADING THE BAR MAGAZINE. - Hold the magazine in the left hand, top up. Insert the cartridges singly in the top of the magazine, with the cartridges pointing toward the short side of the magazine. With the thumb of your right hand press each cartridge downward until it is held firmly by the lips at the top of the magazine. The magazine holds 20 rounds.

LOADING THE MAGAZINE INTO THE BAR. - Press the magazine release and withdraw the empty magazine. Hold a loaded magazine with its base in the palm of your right hand; cartridges point to the front. Insert the magazine between the magazine guides in front of the



29.382

Figure 11-63.— Field stripping the M60 machinegun— Continued.

trigger guard to push it home. Tap the bottom of the magazine to ensure that it is seated. The magazine can be inserted with the operating parts either aft or forward. It is ordinarily inserted after the rifle has been cocked.

SETTING THE CHANGE LEVER. - Set the lever to "F" for slow fire or to "A" for normal. To set it at SAFE ("S"), depress the change lever stop and push the change lever into position (fig. 11-72).

FIRING THE BAR. - To fire, squeeze the trigger. To fire single shots, set the change at "F" and quickly squeeze and release the trigger for each shot.

Main Assemblies and Functioning of the BAR

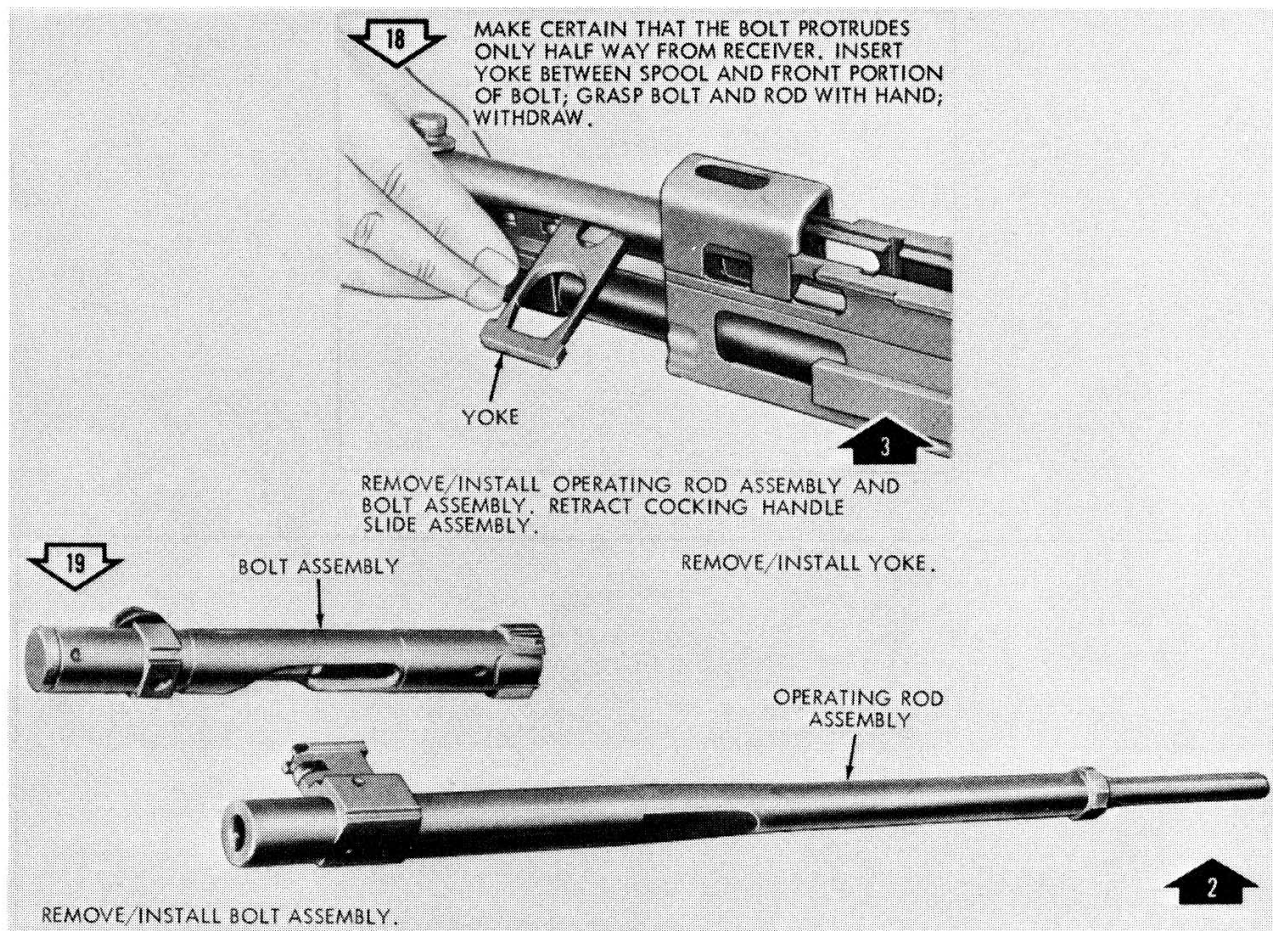
The principal groups of the BAR are the operating group, trigger group, and the buffer and rate-reducing group. Other groups are the forearm, bipod, rear sight, and receiver groups.

The functioning of the BAR is divided into two phases - rearward movement and forward movement of the operating group, which together, make up one cycle. The cycle begins with ignition of the next cartridge. We'll first take up this cycle, and then the rate-reducing and trigger groups.

REARWARD MOVEMENT. - (See fig. 11-70.) The operations that occur in rearward movement are gas action, slide movement to the rear, unlocking, firing pin withdraws, extraction, ejection, and termination of movement. Let us examine each of these in turn.

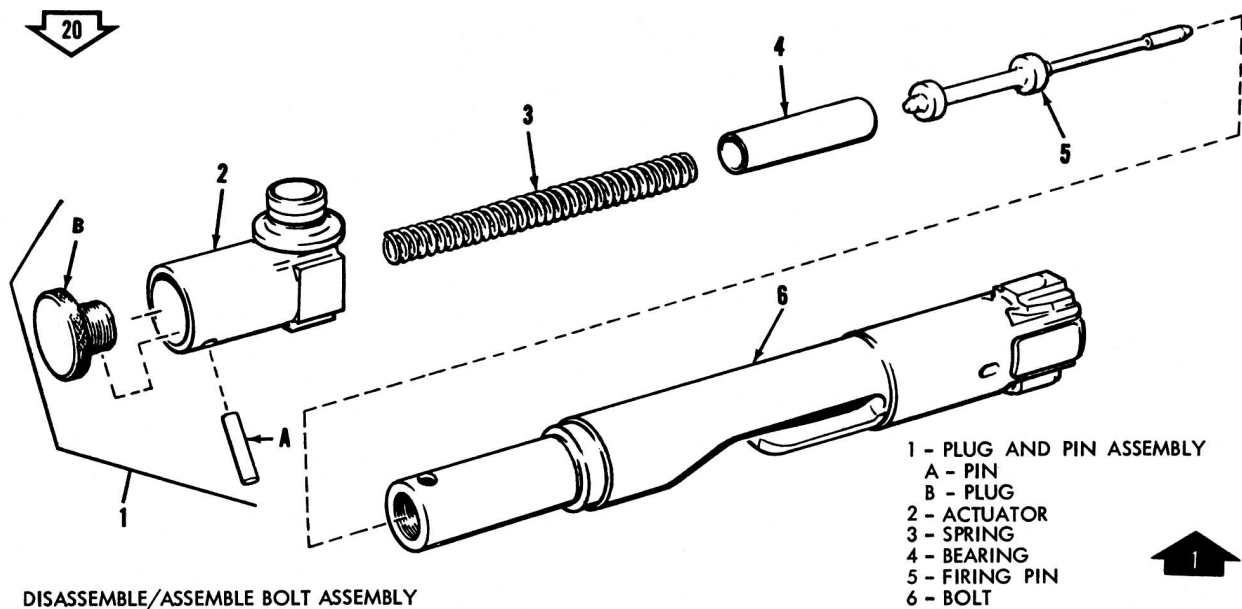
1. Gas action. (See fig. 11-70A, inset at right.) When a cartridge is ignited the expanding powder gas drives the bullet through the barrel. As the bullet passes a port in the barrel six inches from the muzzle, part of the high-pressure gas passes into the gas cylinder where it acts on the gas piston while the bullet travels the last six inches of the barrel.

The effect is a sudden blow on the piston which drives it to the rear, carrying the slide



29.383

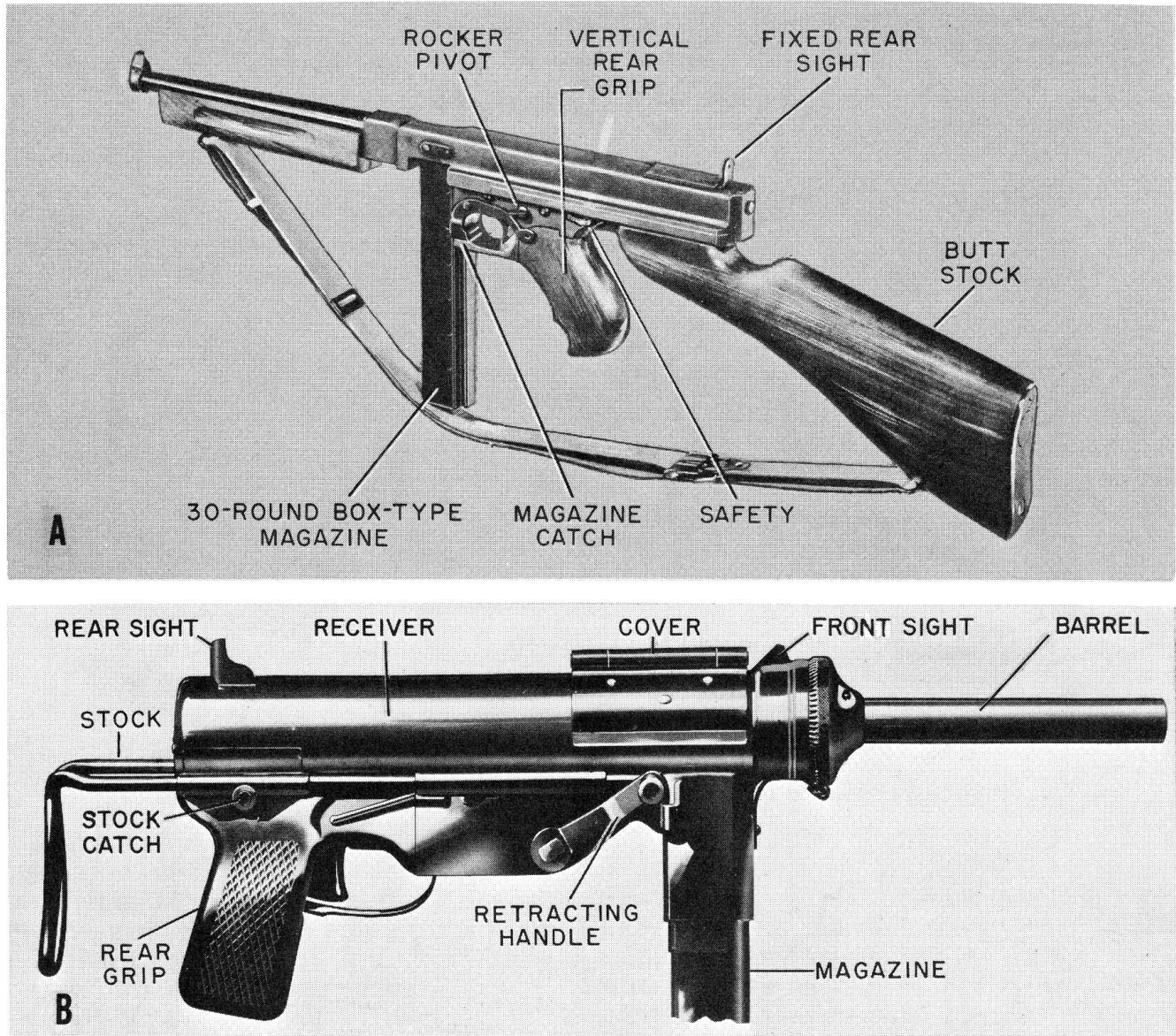
Figure 11-64.— Field stripping the M60 machinegun— Continued.



29.384

Figure 11-65.— Field stripping the M60 machinegun— Continued.

GUNNER'S MATE M 3 & 2



84,251

Figure 11-66.— Caliber .45 submachineguns.

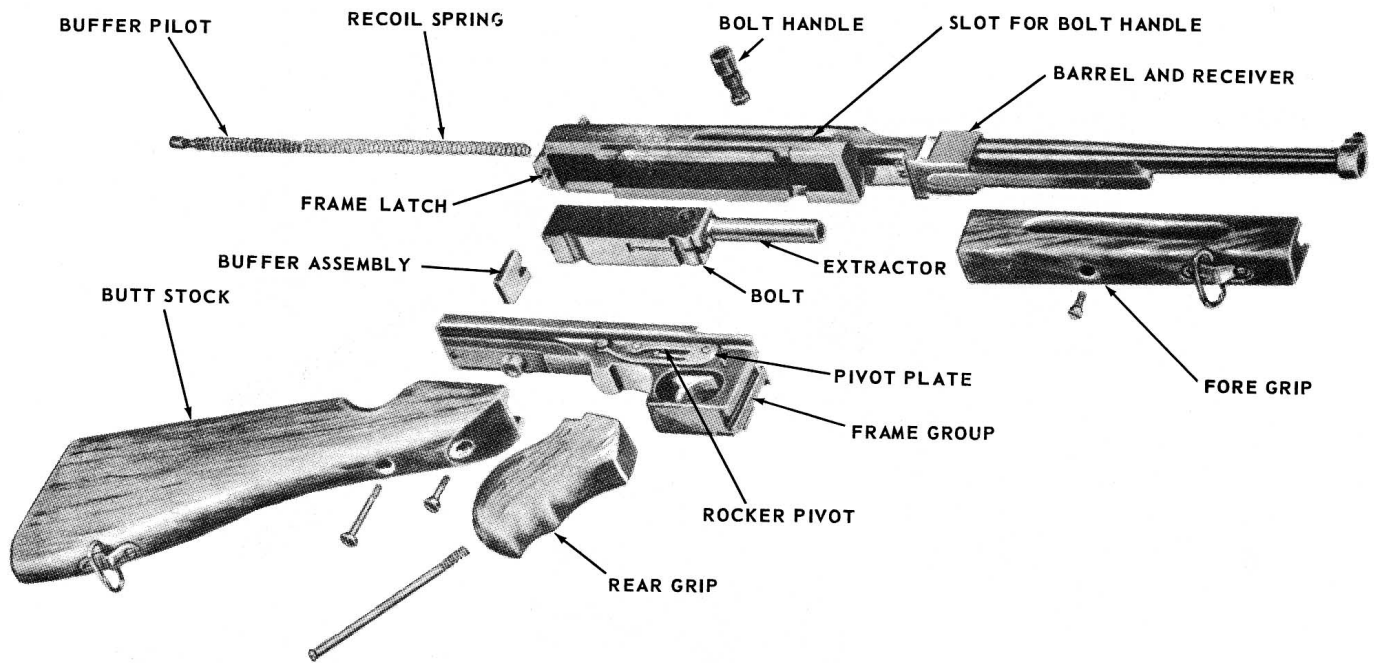
with it. When the piston head passes out of the gas cylinder, the gas expands around it and exhausts through portholes in the gas cylinder tube.

2. Movement of slide. (See fig. 11-70A.) As the slide moves to the rear, it compresses the recoil spring. (This stores energy for the forward action.) Before the slide begins to move aft, the hammer pin is about 0.19 inch forward of the bolt link pin. As it moves this 0.19 inch aft, it moves the hammer from the firing pin but does not unlock the bolt.

3. Unlocking. (See fig. 11-70A and left inset.) Unlocking begins as the hammer pin passes

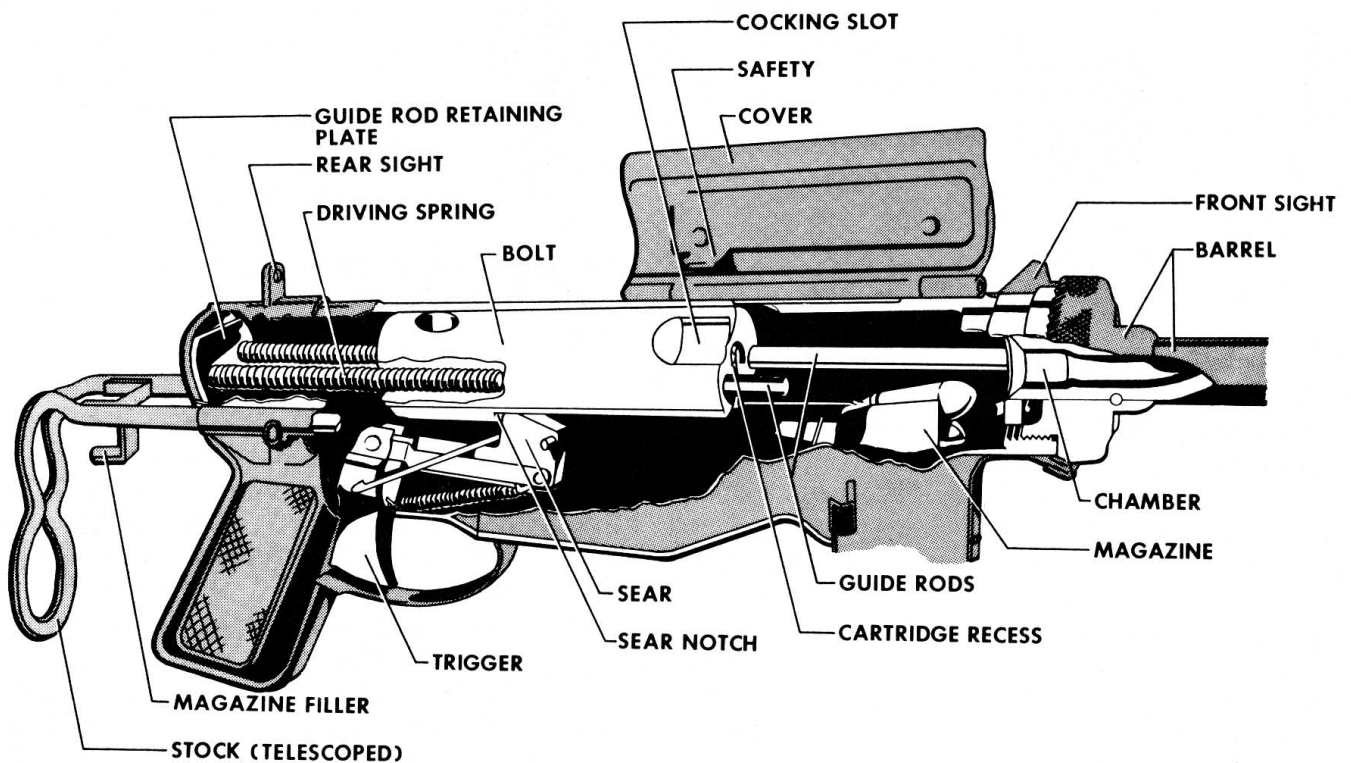
under the bolt link pin. The bolt link revolves forward about the hammer pin, drawing the bolt lock down and to the rear. The lock and bolt accelerate until the slide has traveled about 1.2 inch when the bolt lock is completely down, out of the locking recess. It is now supported in front on the bolt supports.

The bolt mechanism begins moving slowly at first and does not reach the speed of the slide until the slide has traveled about 1.2 inch aft. This avoids the shock of a sudden start at the instant the gas strikes the piston, and allows the bullet to clear the muzzle, preventing blowback.



84.252

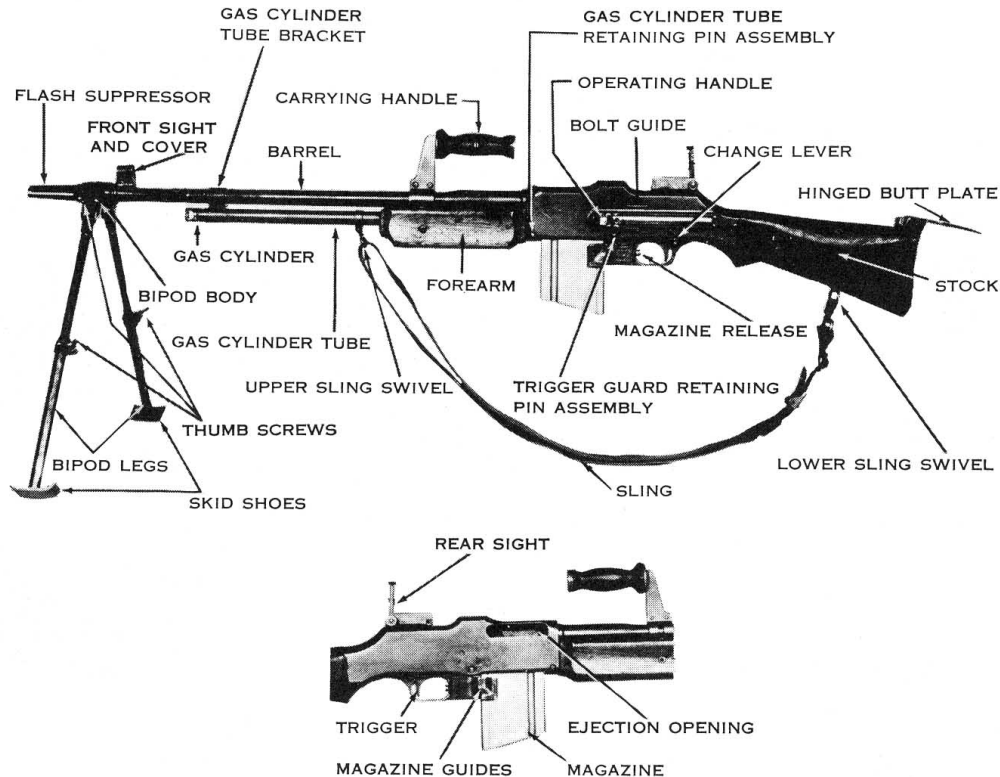
Figure 11-67.— Submachinegun M1, disassembled.



84.253

Figure 11-68.— Cutaway view of submachinegun.

GUNNER'S MATE M 3 & 2



29,278

Figure 11-69.— Browning automatic rifle M1918A2. General view.

4. Withdrawal of firing pin. (See fig. 11-70A and left inset.) As the bolt lock revolves down from locked position, a cam surface in the bottom contacts the firing pin lug, retracting the firing pin from the face of the bolt.

5. Extraction. (See fig. 11-70A. inset. and fig. 11-70B.) The bolt begins to retract when the circular cam surface on the descending bolt lock's underside cams the rear shoulder of the bolt supports. This action loosens the cartridge case. The bolt has traveled aft about $\frac{5}{32}$ inch when the firing pin is withdrawn, and about $\frac{11}{32}$ inch when the bolt lock is completely down. From this point the bolt is drawn to the rear by the bolt lock and bolt link, along with the slide, and carries with it the empty cartridge case which is held firmly on the bolt face by the extractor.

6. Ejection. (See fig. 11-70B.) When the slide is about $\frac{1}{4}$ inch from the end of its rearward travel, the base of the case strikes the ejector, which kicks the case through the ejection opening in the receiver and out.

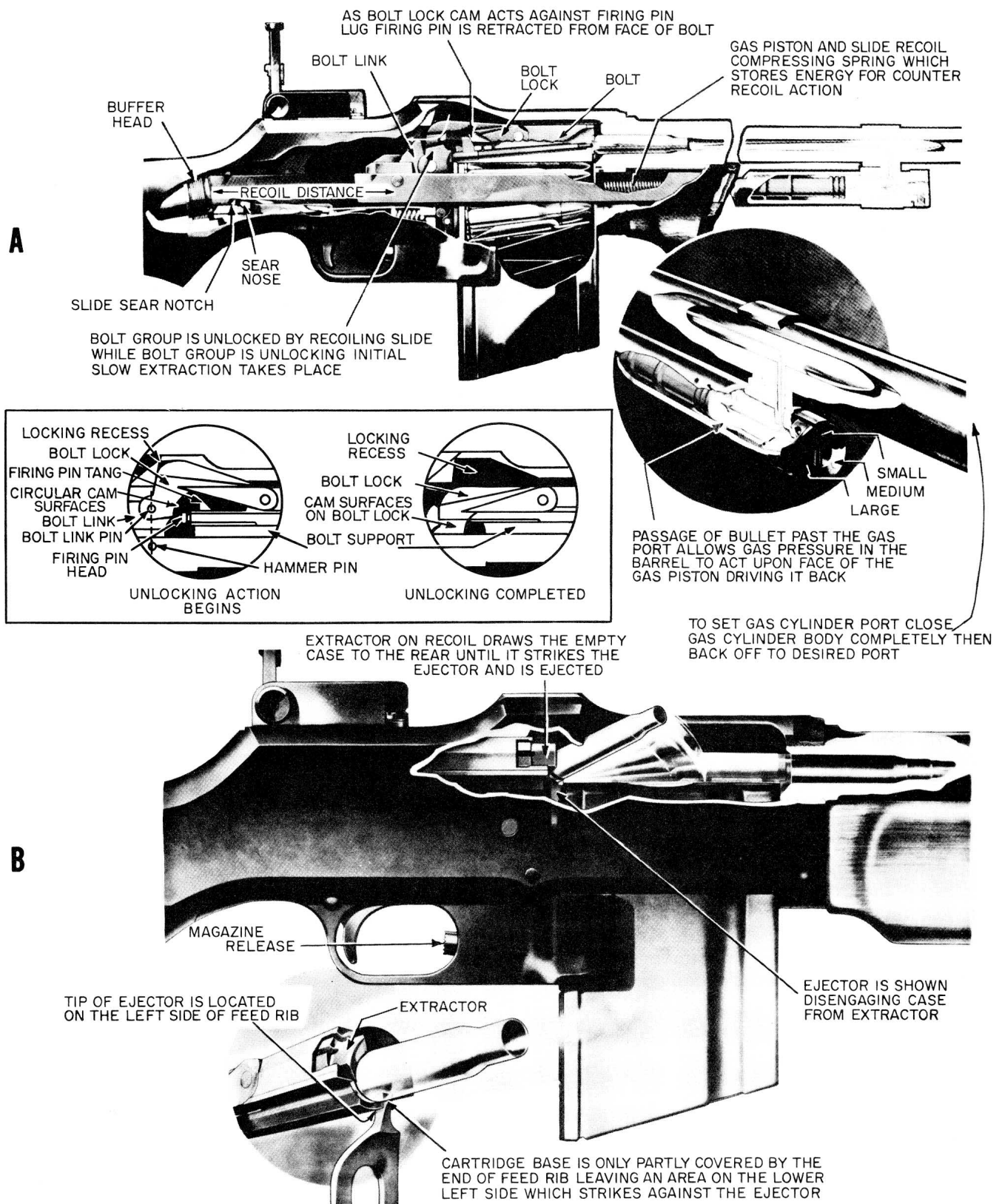
7. End or rearward movement. This phase ends when the rear end of the slide strikes

the buffer head and sear release (not illustrated). The recoil spring then pushes the slide forward $\frac{1}{10}$ inch. The sear nose (if not depressed) engages the sear notch on the slide and the piece is cocked for the next burst or shot.

FORWARD MOVEMENT. - (See fig. 11-71.) Now the BAR begins the second phase of its functioning - forward movement. The steps in this movement are action of the recoil spring, feeding, locking, and ignition.

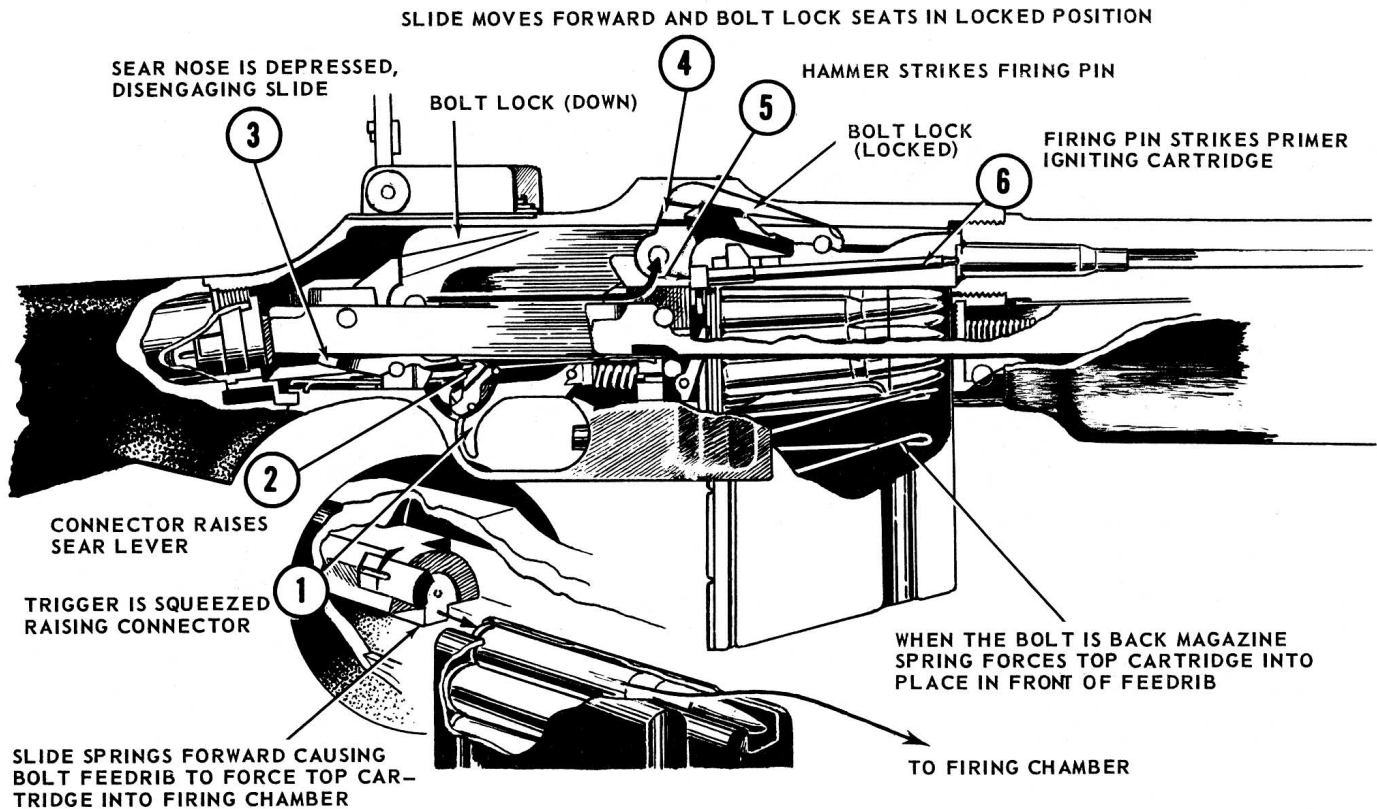
1. Action of recoil spring. (See fig. 11-71.) When the gunner squeezes the trigger, the connector depresses the sear nose to release the slide which is driven forward by the recoil spring, carrying with it the bolt assembly. After about $\frac{1}{4}$ inch of travel, the feed rib front end contacts the top cartridge, which is forced up by the magazine spring.

2. Feeding. This action carries the cartridge forward and the bullet ramp on the breech deflects it upward toward the chamber. The base of the cartridge slides across the face of the bolt and under the extractor.



84.259X

Figure 11-70.—Browning automatic rifle M1918A2. Functioning during rearward movement.



29,281X

Figure 11-71.—Browning automatic rifle M1918A2. Functioning during forward movement.

3. Locking. As the slide approaches its forwardmost position, the rear end of the bolt is cammed upward about the bolt lock pin into the locking recess, and a rounded surface on the bolt lock slips over the locking shoulder in the receiver. This lock lever action forces the bolt home to its final position. The two locking surfaces on the bolt lock and receiver register as the hammer pin passes under the bolt link pin (reverse of unlocking action previously described). The slide and hammer move forward about 1/10 inch farther to complete the action.

4. Ignition. If the sear is down (see below), the hammer strikes the firing pin head, igniting the cartridge.

FUNCTIONING OF THE TRIGGER GROUP. - The trigger group is set for SAFE when the change lever is on S. For a fast or normal cyclic rate the lever is moved to A and for a slow cyclic rate the lever is moved to F. Figure 11-72 shows in detail how the trigger group and change lever work.

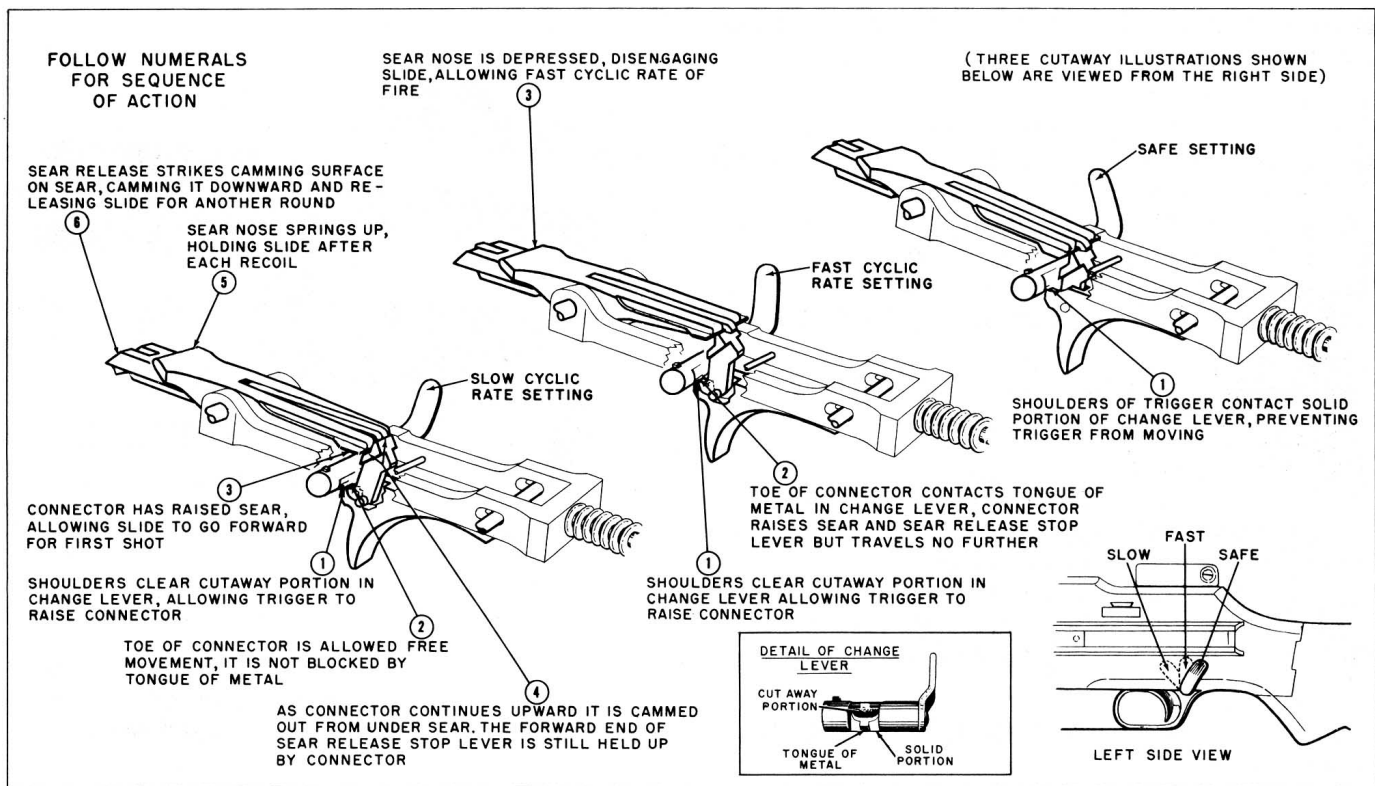
When the trigger group is set for normal cyclic rate, the lever on A. the sear nose stays down as long as the trigger is held back, and the rifle continues firing at a cyclic rate of about 550 rounds per minute until the magazine is emptied or the trigger is released.

When the trigger group is set on F, the sear nose is only momentarily depressed when the trigger is held back. At the end of every cycle, the sear nose reengages the slide sear notch, and remains engaged until the sear release in the buffer cams the sear down. This reduces the cyclic rate to 350 rounds per minute, or single shots may be fired for each press and quick release of the trigger.

When the trigger group is set at SAFE, the sear cannot be released from the sear notch by pressing the trigger.

Maintenance and Inspection of the BAR

As with the other small arms taken up in this chapter, your main concern with regard to



29.307X

Figure 11-72. — Browning automatic rifle M1918A2. Change lever and trigger group functioning.

maintenance of the BAR (other than routine cleaning and care) is careful periodic gaging, inspection (both visual and functional), and gas port adjustment. For details on other adjustments and repair, and information on tools and gages required see the Army's Maintenance Manual, TM 9-1211.

PRELIMINARIES TO INSPECTION. -

1. Before inspection, hold each rifle with the muzzle pointed at the floor, clear it, and inspect the chamber for a live round. Be certain that there are no obstructions in the bore of the chamber. Do not touch the trigger until the rifle has been cleared.

2. Before inspection, properly clean the rifle to remove grease, dirt, or foreign matter which might interfere with proper functioning or obscure the condition of the parts. Use a serviceable magazine and dummy cartridges in functioning inspection. Test fire only if it can be done safely where such fire is authorized.

VISUAL INSPECTION. - Look at the exterior of the rifle for general appearance, rust, corrosion, and presence of all parts. Then check the details below:

1. Check the following for looseness: butt stock on receiver, butt plate on butt stock and hinge, swivel bracket on gas cylinder tube, near sight base on receiver, leaf group on base, front sight base on barrel, blade in base, and flash hider on barrel.
2. Check bipod for proper fit on flash hider, and outer butt plate for proper locking action. If necessary, assemble friction washer assembly with spring to front.
3. See if the butt swivel is free on the bracket.
4. Inspect the bore and chamber for pits, corrosion, and mechanical damage.

FUNCTIONAL INSPECTION.-

1. Hand operate to check for functioning and smoothness of operation.

2. Check fit. of magazine in receiver, and function of magazine catch and catch release with magazine.

3. Using magazine and dummy cartridges, test the loading function of bolt, and the function of the extractor and the ejector. If neck of ejected case is dented, it indicates that ejection is weak (casing striking side of receiver). This may be caused by bent cartridge neck, worn ejector head, or ejector scraping on bolt.

4. Inspect locking action of bolt lock and bolt.

5. Fire several rounds of service ammunition and examine primers of fired casings. If primer shows indications of being set back in firing pin hole of bolt, due to an enlarged firing pin hole or recessive wear of bolt face, it will be necessary to replace the bolt.

6. Check trigger pull. It should be between 6 and 10 pounds.

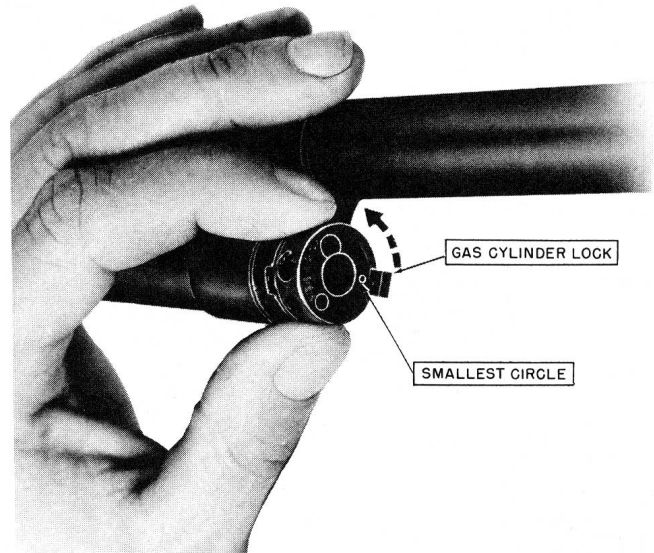
GAS CYLINDER PORT ADJUSTMENT. - The gas cylinder adjustment should be made only if the rifle needs it - for example, if failure to recoil or to eject properly is caused by insufficient gas. Only the gas cylinder parts are to be adjusted using this procedure (fig. 11-73):

1. First, unlock the gas cylinder assembly by forcing out the lock, screw the assembly all the way in until it is finger tight, and back off the assembly one complete turn.

2. Turn the cylinder so that the smallest circle passes through the shortest arc to a position under the barrel. Lock the cylinder in place.

3. If the weapon still recoils or ejects poorly when fired, rotate the gas cylinder one turn in or out to improve alignment. If such adjustments do not help, turn the cylinder to the next largest circle.

Insufficient gas indicates a clogged or poorly aligned gas port - evidenced by slamming in operation, overheating, and excessive firing rate.



29,280
Figure 11-73. — Browning automatic rifle M1918A2. Gas cylinder adjustment.

In rare cases poor gas adjustment may permit the gun to fire uncontrolled. So its important to check this adjustment.

HEADSPACE GAGING. - Every BAR should be headspaced before it is issued to personnel for firing, and after firing exercises. Minimum headspace should be 1.940 inch; maximum should be 1.950 inch. Use gages Z021-7319944 (1.940 in.) and Z021-7314454 (1.950 in.).

SAFETY PRECAUTIONS

Small-arms safety precautions, like all safety precautions, largely are a matter of common sense. Every gun should be considered loaded until proven otherwise by examination; never trust your memory or anyone else's memory in this respect. **TO THINK** a gun is unloaded can be fatal. Be positive.

NEVER point a firearm at anyone or anything you do not intend to shoot, or in any direction where accidental discharge might do harm. When checking operation or releasing spring tension, point the weapon upwards or

in some safe direction before pressing the trigger. Never place the finger inside the trigger guard unless ready to fire.

Do not work on a weapon you do not thoroughly understand. Ask a senior ordnanceman or other qualified personnel to instruct you if possible; otherwise refer to the proper technical publication. Never use force in disassembling and assembling small arms. They are all so constructed that undue force is unnecessary if parts are properly assembled or removed.

Safety features should be frequently tested for proper functioning. For obvious reasons, an inoperative safety device is more dangerous than no safety device at all.

In weapons with detachable magazines, always remove the magazine as the first step in unloading or clearing a stoppage. It should be noted that, in ALL magazine-fed weapons, the shape, position, and condition of the magazine lips are extremely critical and, if dented, will interfere with proper feeding of the cartridge into the chamber. The majority of stoppages in magazine-fed weapons is due to faulty magazines and consequently care must be taken when handling them not to cause damage.

Before loading ammunition into the weapon, check for dirt, oil, grease, malformation, loose bullets, or other defects.

Check the bore prior to firing to be sure it is free of foreign matter or obstructions. If, during firing, there is any indication of misfire or weak charge, make sure a bullet is not lodged in the bore. An obstructed bore will cause a serious accident when the next round is fired.

To minimize danger from hangfire, wait 10 seconds after a misfire, then clear the weapon quickly. If the weapon cannot be cleared quickly and the barrel is hot, DANGER OF COOKOFF EXISTS. Leave the round in the chamber, point the weapon in a safe direction, and allow it to cool before removing the misfired round.

SPECIAL PRECAUTIONS FOR PISTOLS AND REVOLVERS

Automatic pistols in the hands of inexperienced or careless persons are largely responsible for the saying "It's always the unloaded gun that kills." It is a fact that many accidental deaths and injuries are due to a mistaken belief that removing the magazine of a pistol (or other magazine-fed weapon) is all that is necessary to unload it. Nothing could be further from the

truth. To completely unload a pistol or other magazine-fed weapon and render it safe to handle, it is necessary to not only remove or empty the magazine, but also to **MAKE ABSOLUTELY CERTAIN THE CHAMBER IS EMPTY**. The only way this can be done when handling the caliber .45 pistol is to pull back the slide and inspect the chamber either visually or by feel if it is dark. This should be done **AFTER** the magazine is removed, and with the muzzle pointed upward. Of course, if the chamber is loaded, the round will be extracted and ejected when the slide is operated. "I didn't know it was loaded" is never an excuse for the accidental discharge of a weapon - especially for the ordnanceman.

When handling revolvers, a simple visual inspection is sufficient to determine if any chambers in the cylinder are loaded.

Keep hammer fully down when pistol or revolver is not loaded.

When the pistol is cocked, keep the safety lock in the ON position until ready to fire.

Let's review briefly some of the safety precautions that apply to the handling of ALL small arms:

1. Never point a weapon at anyone unless you intend to kill him.
2. Unless the weapon is to be used immediately, never carry it with a round in the chamber.
3. Unless you are about to fire it, the safety of every small-arms weapon must always be ON.
4. Consider a gun loaded until you yourself have opened the chamber and verified that it is empty. It isn't enough to wail, afterward. "I didn't know it was loaded." The "empty" weapon is the dangerous one.
5. Before firing any weapon, be sure that there are no obstructions in the bore.
6. Before firing any weapon, be sure the ammunition you are using is the right ammunition. For example, the caliber .30 carbine cannot use standard rifle ammunition. Nor should you try to use Very signals with shotguns, even though they look much like shotgun shells.
7. Before firing, be sure there is no grease or oil on the ammunition or in the bore or chamber. Although lead bullets may be lightly waxed or greased, there must **NEVER** be any lubricant on the cartridge case. (This does not apply to aviation ammunition.) Lubricant on the case or chamber is particularly bad because, upon firing, the case slips backward, causing a dangerously heavy thrust against the bolt.

8. Keep ammunition dry and cool. Keep it out of the direct rays of the sun. Keep ammunition clean, but do NOT polish it or use abrasives on it. Do not attempt to use dented cartridges, cartridges with loose bullets, or cartridges eaten away by corrosion. Be particularly careful with tracer ammunition which can ignite spontaneously if damp.

9. Misfires and hangfires can occur with small-arms ammunition as well as with other types. On some weapons like the automatic pistol, the line-throwing gun, the Springfield rifle, the hammer-type shotgun, and a few others, you can recock and attempt to fire again without opening the breech. If, after a couple of tries, this proves unsuccessful or, if the weapon cannot be recocked without opening the bolt, wait at least 10 seconds, then open the bolt and eject the defective round.

Defective small-arms ammunition should be disposed of in accordance with current regulations. It is prohibited to force out a bullet by firing another bullet.

A misfire with blank cartridges may leave unburned powder deposited in the bore; always check the bore after any misfire and clean if necessary.

10. Guard against BLOWBACK. In this connection, blowback refers to leakage of high-pressure gases to the rear around the closed bolt. It can be caused either by excessive wear of the bolt or chamber, by obstructions that foul the bore, or by both. Blowback can be avoided by gaging and checking your weapons regularly and replacing worn parts as indicated, and by checking (see No. 5 above) to be sure that there are no obstructions in the bore.

THE LANDING PARTY

As a Gunner's Mate, you must know how to issue, assemble, and demonstrate the use of landing party (infantry) equipment. To help you learn this, the Navy has issued a publication called the Landing Party Manual, OPNAV P34-03. It covers nearly all aspects of the naval landing party. It is interesting reading, and is recommended for all Gunner's Mates.

In scope, this chapter falls somewhere between the simple requirements of the Third Class GM and the complete coverage of the Landing Party Manual. Here we will discuss the following:

The EQUIPMENT - what it is, how to make it up, and how to wear it.

LANDING PARTY ASSIGNMENTS - what you might expect to be doing if you are assigned to a landing party.

LIVING ASHORE - some factors to be considered when your living spaces and galley are miles away. Let's start the chapter by finding out what a landing party is.

THE SHIP'S LANDING PARTY

To most sailors, the term landing party might bring to mind one of two things. First, a peaceful, if dull, march down main street in a parade or, second, mortal hand-to-hand combat with enemy troops ashore. While both situations are true functions of the landing party, they represent the extremes. The landing party may also be called away to help after a national disaster, to quell riots and other serious disorders, and to perform police functions such as the imposition of martial law.

ORGANIZATION OF THE LANDING PARTY

The size of a landing party varies, depending on the type of ship that lands it. A destroyer is required to maintain a 13-man rifle squad. A cruiser will furnish a rifle company of about 200 men. The common denominator of all landing parties, regardless of size, is the rifle squad, and our discussion here is based on this squad.

Figure 11-74A shows an organization chart of a rifle squad. It is made up of the squad leader and three fire teams. Each of the fire teams consists of 3 riflemen and the individual fire team leader; thus there is a total number of 13 men in the squad. As a Gunner's Mate you will be the logical man to lead either a fire team or the entire squad.

Figure 11-74B shows the result of combining the landing parties of three destroyers. This is the rifle platoon. Notice that, with the exception of the six people at the platoon headquarters, the major unit of the platoon is the rifle squad.

You will find that the larger size landing parties employ some machine guns as well as rifles. A machine gun can deliver a heavy concentration of fire, but its crew is capable of

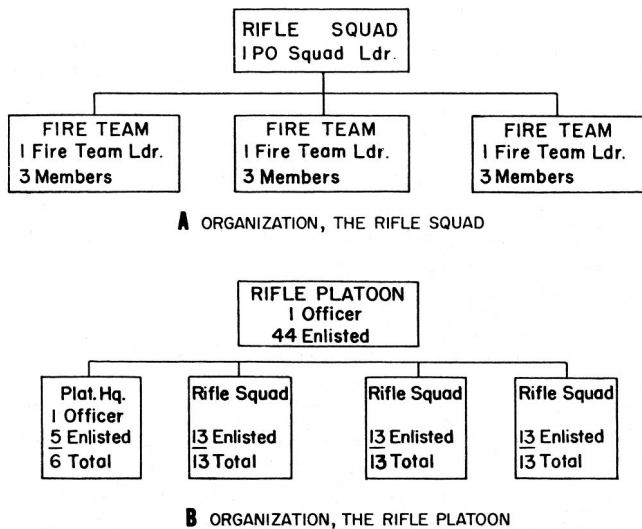


Figure 11-74. — Organization chart of a ship's landing party.

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little independent action. Machine guns are used only as supporting weapons.

LANDING PARTY EQUIPMENT

The type and amount of equipment carried ashore by the men of the landing party depends upon the nature of the operation. We can skip operations such as the parade mentioned earlier, where your only equipment will be a smart looking dress uniform. The equipment we will discuss is that taken ashore and used in emergency field operations.

Figure 11-75 shows what is known as the basic individual combat equipment. This is the minimum equipment, other than weapons, to be carried by each member of the squad. A man's position in the squad - fire team leader, rifleman, etc. - will determine what supplementary equipment he will be issued. For example, the supplementary equipment carried by a rifle squad leader is shown in figure 11-76.

A complete list of basic and supplementary infantry equipment can be found in the Landing Party Manual. The manual also lists all members of a landing party, and shows the equipment each will be issued.

How to Assemble and Carry Equipment

A pack, Marine Corps M1941, is carried by each member of the landing party. It is made up of a haversack, a knapsack, belt and suspenders, blanket roll, bayonet, and scabbard.

The haversack (fig. 11-77 A) is carried when you expect to enter a combat zone. In it you carry your personal articles:

Poncho	Towel
Eating Utensils	Toilet articles
1 pair of socks	Extra pair of shoe laces
1 set of underwear	1 day's rations

The knapsack (fig. 11-77B) is used to carry extra clothing when you do not have your seabag with you or it is not easily accessible. The following articles are usually carried in the knapsack.

Pair of shoes	2 shirts
Pair of trousers	2 pairs of socks
2 sets of underwear	

The belt and suspenders are shown in figure 11-77C. As you would imagine, the belt can become pretty heavy when it is loaded down with ammunition, canteens, and sometimes the bayonet and knapsack. This makes the suspenders a necessary part of this arrangement.

The blanket roll (fig. 11-77D) can be made up as either a short or long roll. The short roll is as wide as the length of an extended tent pole. The long blanket roll is the width of the blanket. To assemble either, lay the gear out as in the illustration, roll it up from the bottom, and secure with the straps.

Pack Assemblies

Several types of packs can be made from the Marine Corps pack M1941. They fall into two categories - the marching packs and transport packs.

The light marching pack (fig. 11-78A) is made up of the haversack, supported by its own suspender straps. To assemble it, you need only to bring the free ends of the haversack suspender straps through the pack strap loops and back up to the "M" buckle. The pack can be adjusted to fit at the "M" buckle.

The marching pack (fig. 11-78B) requires the use of the belt and belt suspenders. In figure



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Figure 11-75.— Basic individual combat equipment.



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Figure 11-76.— Supplementary equipment of a rifle squad leader.

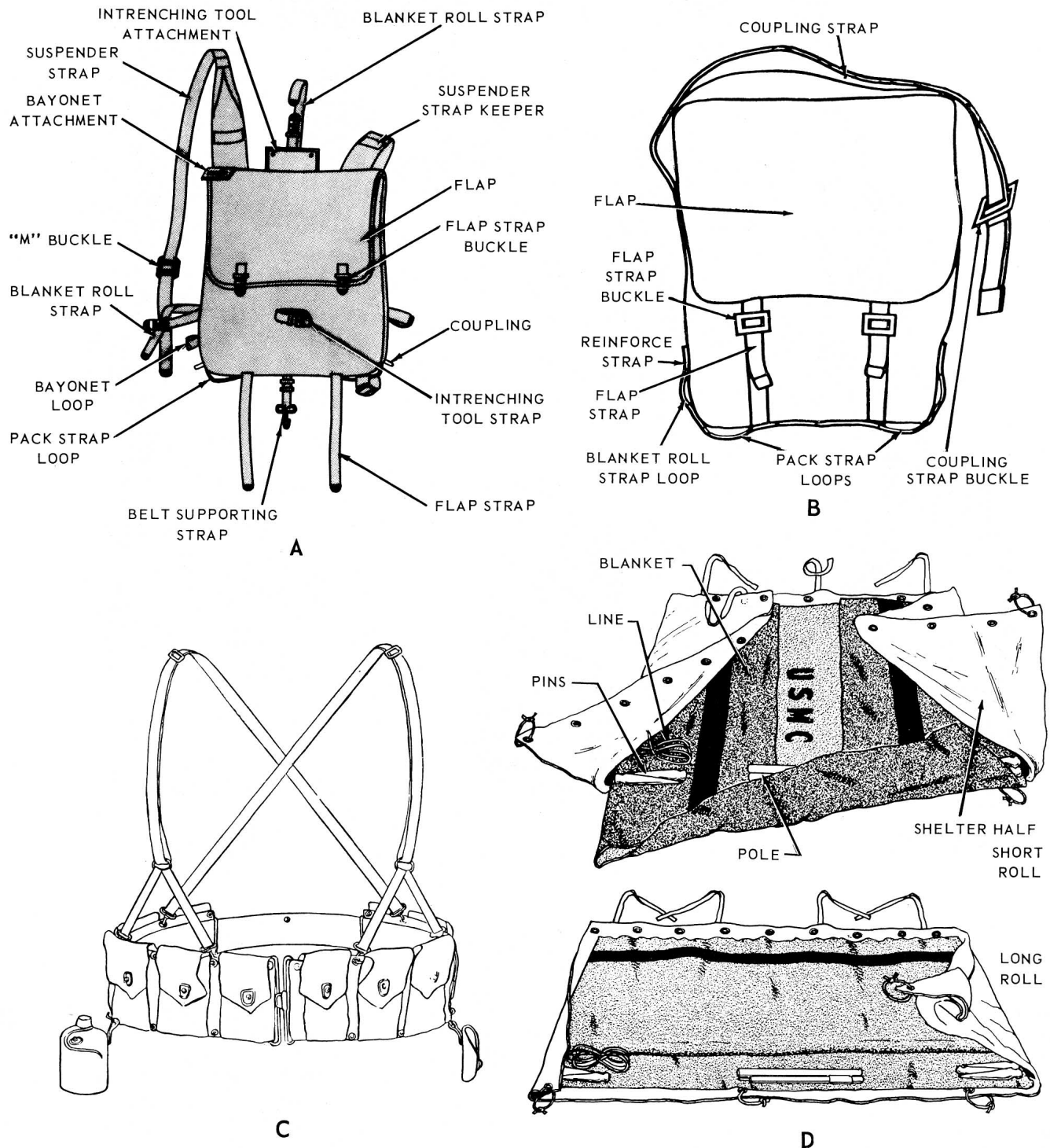
11-79 you can see how it is assembled. The haversack suspender straps are passed down through the belt suspender rings, then double back on themselves. They are brought back up and passed through the keepers on the broad part of the suspenders. The belt suspender pack straps go back under the haversack through the pack strap loops, and then cross in the back of the haversack. (Note that the belt suspenders do NOT pass over the shoulders. They pass under

the haversack and help support it.) The belt suspenders then snap into the haversack "M" buckles.

When the short blanket roll is bent around the haversack and secured to it with the blanket roll straps, the assembly is called the field marching pack (fig. 11-78C).

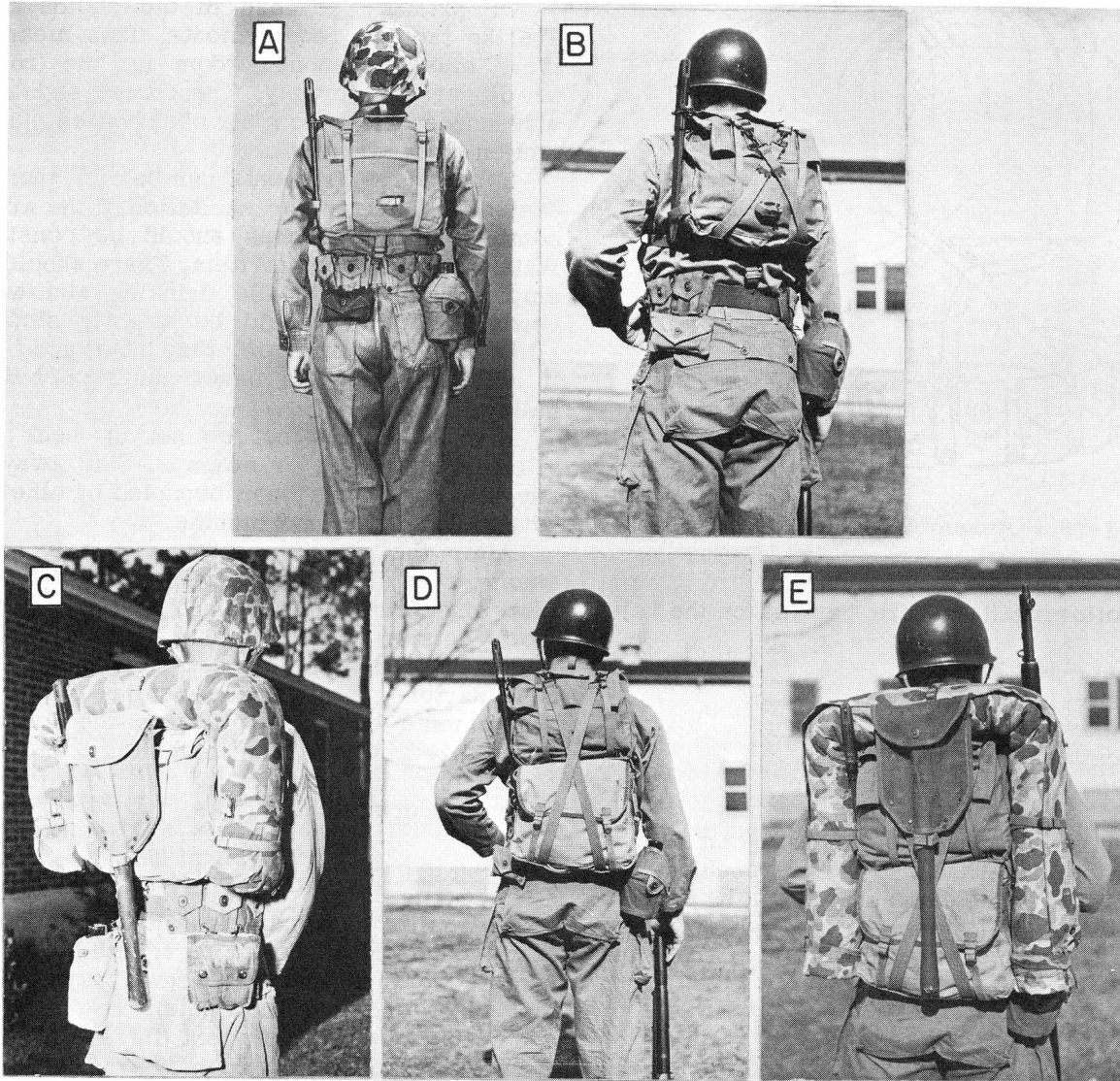
The transport pack (fig. 11-78D) consists of all the items mentioned so far, plus the knapsack. It is used for field exercises when

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Figure 11-77.— The Marine Corps pack-A. Haversack, B. Knapsack. C. Belt and suspenders. D. Blanket roll.



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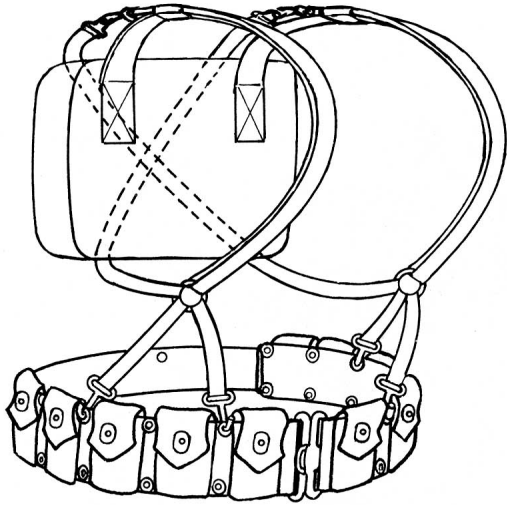
Figure 11-78. — Pack assemblies—A. Light marching pack. B. Marching pack. C. Field marching pack. D. Transport pack. E. Field transport pack.

slow movement due to the extra weight is no problem. It is made up similarly to the marching pack. The knapsack coupling strap is passed through the two haversack couplings, drawn up snugly, and buckled. Then the belt suspender pack straps pass under the knapsack (through loops) and cross in the back as before. They are then snapped to the haversack "M" buckle.

When the long blanket roll is added to a transport pack, the assembly is called the field transport pack (fig. 11-78E).

Other Individual Items of Equipment

The helmet, with its liner, is always worn in combat. On special occasions (police and guard duties, or parades and ceremonies), the liner alone may be worn if prescribed by the officer in charge of the landing party. This helmet is exactly like the one used aboard ship, and the same regulations apply to wearing it.



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Figure 11-79. — Assembling the marching pack.

The following items are carried on the belt:

Bayonet - left hip
 Canteen - left buttock
 Pistol - right hip
 Wire cutters - right front
 BAR spares - front of right hip

The entrenching tool is carried by an attachment on the haversack. If no entrenching tool is issued, the machete and sheath can be carried in its place. If field glasses, gun mask, or map case are carried, they can be slung from the shoulder.

SHELTER

Depending upon the tactical situation, the landing party may be sheltered in bivouac, camps, or billets. Troops are in bivouac when provided with shelter tents or other hastily improvised shelter. Troops are in camp when sheltered by tentage other than shelter tents, or by huts or other temporary structures especially constructed for military purposes. Billets are private or public buildings not especially designed for military purposes.

Billets (and most likely camps) will be chosen and prepared in advance of the landing party arrival. The choice is made by the landing party officer. For this reason we discuss some factors of choosing a site and living in bivouac.

Choice of Site

Of primary concern in the choice of site are the tactical requirements. This means that there must be enough room for the troops to be dispersed properly. The choice should provide concealment from air observation, and protection from air attack.

If these requirements can be met, then other desirable features for sanitation of the area and comfort of the troops should be considered. Water is an important item. There should be an ample supply to handle drinking and washing needs. The site should be slightly sloping to allow water to drain off. Stay near good roads; if nothing else, this eases the supply to your galley.

Bivouac should not be set up near native villages, marshes, or swamps. Stay away from any site which has been occupied by other units within the preceding 2 months.

After the site is selected, it may be necessary to establish outposts, guards, and patrols. (See chapter 8 of the Landing Party Manual.) Work details are then assigned to arrange for waste disposal, and to set up the galley, the headquarters, etc. It is preferred that these assignments be made prior to the arrival on site to prevent delay and confusion.

All men not assigned to other details should be put to work pitching tents.

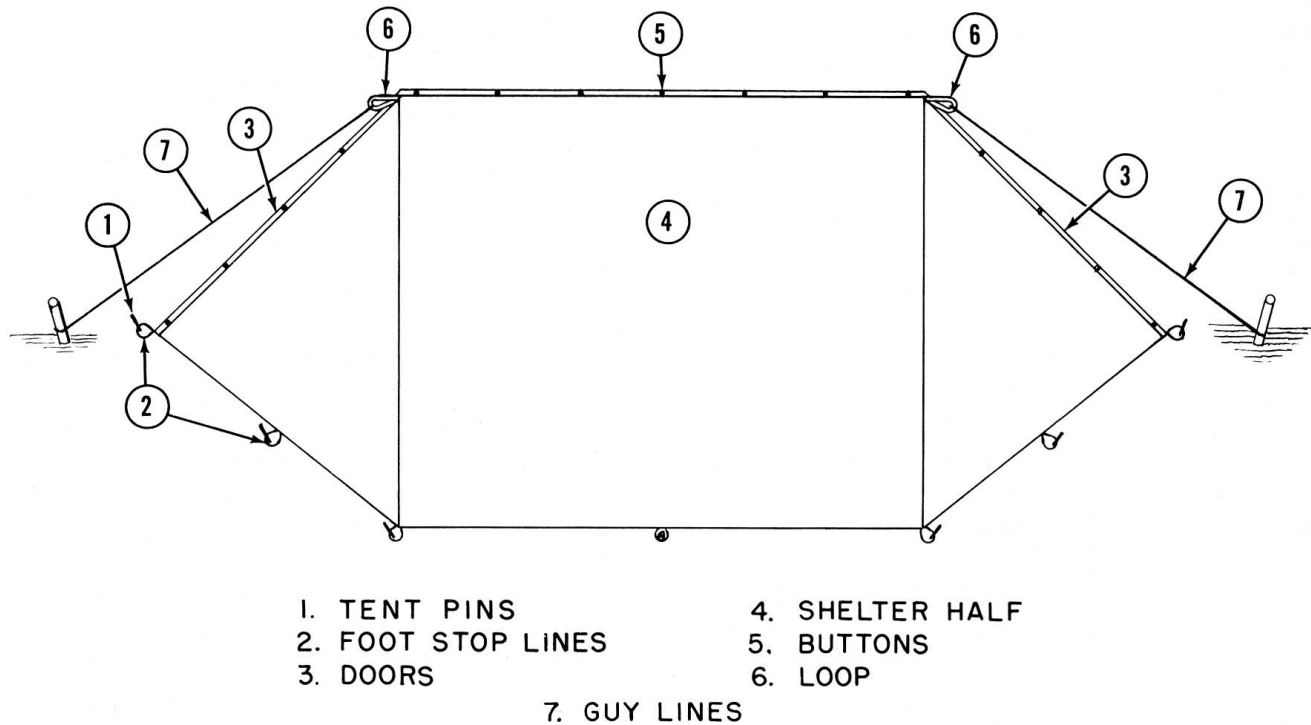
Pitching the Tent

Normally, each individual in the landing party carries half of a shelter tent, with the required number of pins and poles (one guy line, five tent pins, and one tent pole). Two men carry and occupy one complete tent (fig. 11-80).

When properly instructed, two men should be able to erect a shelter tent (also called a "pup" tent) in five minutes. Here is the basic method:

Pairs of men pitch tents together. Each man spreads his shelter half. The shelter halves are then buttoned together. One man slips the pole into the eyelets in the front of the tent and holds the pole upright.

The other man pins down the front corners of the tent in line with the pole, then pins down the front corners of the tent, and drives the guy pin two-and-a-half pin lengths in front of the front triangle. He places the loop of the guy over this pin, runs the other end of the line through the loops of the shelter halves, and ties it, making sure that the pole is vertical when



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Figure 11-80.—Erecting a shelter tent.

the line is taut. He then adjusts the rear tent pole through the eyelets in the rear of the tent. The first man pins down the rear corners of the tent, drives in the rear guy pin so that it is two-and-a-half tent pin lengths from the rear pin of the triangle, then adjusts the guy line. Then they pin down the sides.

The tent should be trenched immediately after it is erected. This should be done even if the bivouac is for one night.

Remember that this is only a basic method. The Landing Party Manual describes a drill method that is performed "by the numbers," but is similar to the one above.

To strike pup tents, first unbutton enough buttons so that each man can grasp a tent pole and pull it to the left or right. When the tent is flat on the ground, pull the pins, finish unbuttoning the halves, and roll the packs.

Hygiene and Sanitation

Field sanitation is a term applied to the sanitary practices and principles which must be observed to maintain the health of the group when permanent type facilities are not available. In general they are the same common sense rules which apply to shipboard living.

In the field, however, they take on added importance. Improvisation is a necessity and, if it conforms to the correct principles, it should be encouraged. Basically, sanitation is concerned with food and water, and with waste disposal.

Food should be obtained through your supply system. Emphasis must be placed on the proper preparation and handling of foods and the sanitizing of mess gear. A model field dishwashing unit can be set up by using a line of four GI cans. The first can in line is for garbage and waste; the second is a pre-wash can and has the soap in it; the third contains the hot water for quick and adequate washing of the mess gear; and the final can contains actively boiling water for rinsing.

All water in the field should be regarded as unsafe for drinking until a medical officer or his representative has approved it. If it ever becomes necessary to use water from an unapproved source, it must be chemically treated or boiled. Boiling in this case means boiling for 20 minutes, not just heating it up.

Water can be chemically treated by using the Lyster bag and kit, or by water purification tablets. Both are issued with instructions for their use. Chemically treated water may not taste so good but it is safe.

Waste disposal is important. Proper disposal is necessary to eliminate places where rodents and insects can live and breed. Human waste especially must be disposed of correctly since a careless unit may so contaminate a site that it will be unfit for further use for months.

Kitchen waste and human waste are deposited in trenches which are dug according to the instructions in chapter 7 of the Landing Party Manual.

Personal hygiene deals with the efforts you must put forth to keep in good physical, mental, and moral health, and to protect yourself from disease. Obeying the following rules of field sanitation is a matter of hygiene.

1. In the case of a suspected illness or disease, see the corpsman. It has been said, "A person who treats himself has a fool for a patient." By postponing proper treatment, you may not only harm yourself but be a source of danger to your shipmates.

2. Eat your meals slowly. Don't eat to excess, and never have a big meal before a long march or other strenuous exercise.

3. Drink plenty of water, but not all at one time. Drink only from your own cup or canteen.

4. The entire body should be bathed at least three times a week. Feet should be washed daily and dusted with powder. Care of feet is a primary factor in marching ability.

5. While it is comparatively easy to destroy vermin with DDT, every effort must be made to keep them from getting a start amongst your group. Body lice (which actually live in the clothing rather than on the body) can transmit serious diseases. The best way to prevent lice is to keep a clean body, and to change frequently to clean clothes.

The information in this section of the chapter is, of course, just as important aboard ship as shore, and you have been drilled in these matters many times. Aboard ship, compliance with sanitation and personal hygiene rules is well supervised, with immediate penalties for the wrongdoer. Ashore, however, it becomes a matter of self-discipline. There is no compartment cleaner, scullery men, master-at-arms, etc. Ashore, the duties of these individuals are wrapped up in one man - you.

STOWING, ISSUING, AND MAINTAINING LANDING PARTY EQUIPMENT

Most ships have a landing force locker or at least a space designated especially for the stowage of landing party equipment. You will be responsible for the security of this equipment. Much of the equipment, and all weapons, are highly pilferable items. The rule is to keep the space locked, and impose strict accountability for the key.

All small arms are considered equipage, and a signature of subcustody is required before they are issued from their normal place of stowage. Signatures of custody may also be required (at the weapons officer's discretion) before issuing other items of landing party equipment such as knives, canteens, and ponchos. It is important to get the signature of the man receiving the equipment, any type of signed custody record can be used. The important thing is to keep the equipment locked up and, when it is issued, get a signature.

While some pieces of landing party equipment (such as tents and ponchos) are water resistant, they should not be folded and stowed while wet. This will cause mildew to attack the fabric. When tents are erected, they should be slackened. A tent will shrink when drying out after a rain. On occasion, tents whose lines have not been slackened have split down the middle upon drying.

When the contents of a canteen have been used, empty it entirely. Even a small amount of water left in it will cause slight corrosion, and a disagreeable odor and taste.

Leather shoes and boots can be treated with saddle soap. The application should be thorough in order to clean and soften the footwear, and to replace some of the oil in the leather.

Mess gear should be clean and dry before you pack it away. After the final rinse in boiling water, dry these items by shaking them in the air. Do not use a cloth to dry them. Upon being issued a weapon, the receiving individual becomes responsible for its proper care and use. This requires training, which is the job of the Gunner's Mate. Instructions for the operation, maintenance, and repair of infantry weapons were covered earlier in this chapter.

When operating with a landing party, there is a good possibility that the hand grenade will be used. The following section briefly discusses types of hand grenades and steps required for their safe and proper use.

HAND GRENADES

A hand grenade is a small bomb with the user's arm providing the motive power to get it to the target. Hand grenades may be filled with explosives, explosives and chemicals, or (for practice purposes) may be empty or contain inert filler. Hand grenades come in many sizes, shapes, and types and are designed to fulfill a wide variety of purposes. They can be used for providing material and personnel casualties; for screening, signaling, and illuminating; for demolition and harassing; and for incendiary action.

TYPES AND CHARACTERISTICS

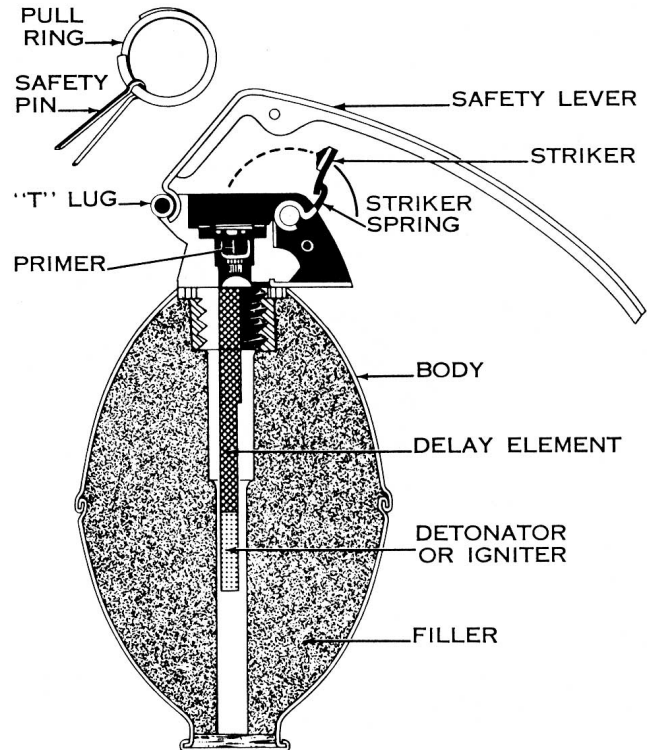
The general types of hand grenades issued by ordnance are: (1) training, (2) practice, (3) fragmentation, (4) offensive, and (5) chemical. Each type is designed to do a special job. For a summary of the characteristics and capabilities of each hand grenade refer to Army Field Manual FM 23-30.

Certain characteristics, common to all hand grenades, are:

1. The range of a hand grenade is relatively short. The range depends on the ability of the individual and the weight and shape of the grenade. A well trained sailor should be able to throw the fragmentation hand grenade an average of about 44 yards. He may average only about 27 yards with the heavier white phosphorous smoke grenade.

2. The effective casualty radius of a hand grenade is relatively small when compared to that of other weapons. Effective casualty radius is defined as the radius of a circular area around the point of detonation within which at least 50 percent of the exposed personnel will become casualties. The effective casualty radius varies with the type of hand grenade used, so the casualties can and do occur at distances greater than this radius.

3. Delay type fuzes are used in all standard hand grenades. Detonation of the grenade is not on impact, but after the delay element in the fuze has burned. The fuze assembly (fig. 11- 81) consists of a fuze body, safety lever, safety pin, striker spring, a primer, a delay element, and detonator or igniter. For further information about the operation of the fuze assembly, refer to FM 23-30. All casualty-producing grenades (fragmentation, offensive, and while phosphorous) have a 4- to 5-second delay. Because



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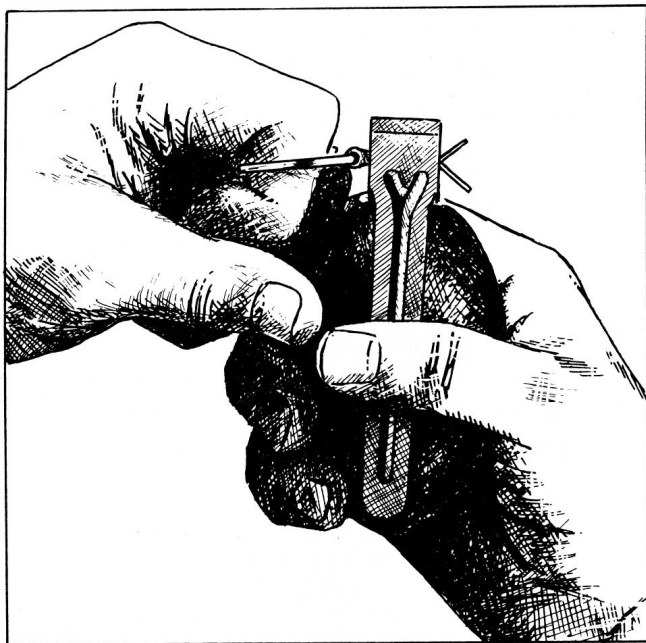
Figure 11-81.—Functioning of the fuze.

of this short delay, personnel must stay alert when arming and throwing hand grenades.

PROCEDURES FOR THROWING

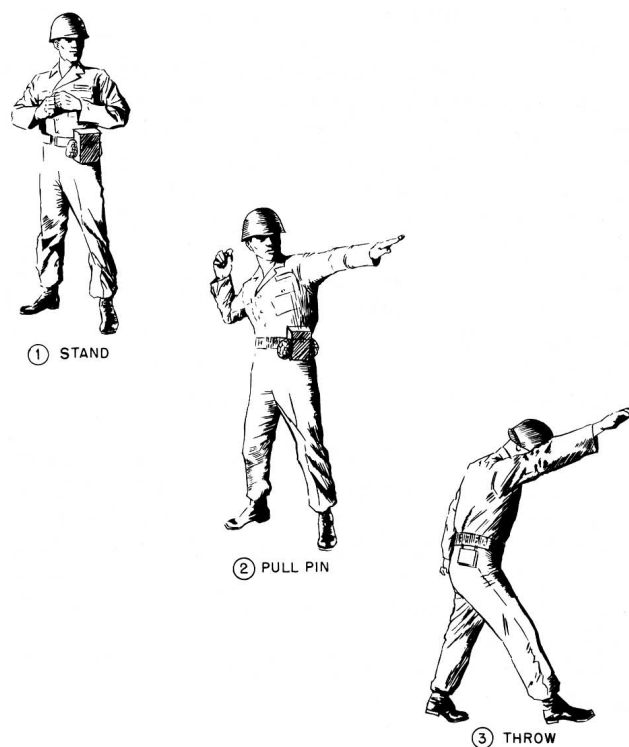
For greater accuracy and range, the grenade should be thrown like a baseball, using the throwing motion most natural to the individual. It is important to grip the grenade properly. Figure 11-82 shows the proper position of the grenade prior to pulling the safety pin. First cradle the grenade in the fingers of the throwing hand. Hold the safety lever down firmly under the thumb, between the tip and first finger joint. In this way, the grenade fits snugly into the curved palm of your hand, giving you a firm, comfortable grip, but don't relax your thumb pressure on the safety lever until you throw the grenade.

The first steps in grenade throwing are to develop good throwing habits, and several throwing positions. Four throwing positions are recommended: (1) standing, (2) kneeling, (3) prone, and (4) crouch.



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Figure 11-82. — Proper way to grip the hand grenade.



84.19

Figure 11-83. — To throw from the standing position.

The procedures for throwing from the standing position are as follows:

1. Stand half-facing the target, with your weight balanced equally on both feet. Hold grenade chest high, using the correct grip (view 1 fig. 11-83).
2. Pull pin with a twisting, pulling motion. Cock your throwing arm to the rear (view 2).
3. Throw the grenade with a free and natural motion. As it leaves your hand, follow through by stepping forward with your rear foot (view 3). Observe the point for probable strike, then duck your head to avoid fragments or other effects.
4. Recover, then resume the original standing position.

Field Manual 23-30 explains the proper steps to be taken when using any of the other positions.

SAFETY

The following safety precautions must be observed when handling or using hand grenades:

1. Do not take any grenade apart unless ordered to do so by competent authority.

2. Do not tamper with grenades and do not recover or tamper with live grenades that fail to explode (duds). These duds are recovered and destroyed only by qualified personnel.

3. Do not pull the safety pin until you are ready to throw the grenade. If the safety pin will not pull out easily with a pulling-twisting motion, straighten its ends. In the majority of cases, this will not be necessary. Maintain a firm grip on the safety lever when removing the safety pin.

4. After you pull the safety pin, throw the grenade. Do not attempt to replace the pin in order to return it to a safe condition.

5. When throwing a fragmentation grenade without protective cover, drop immediately to a prone position, face down, with your helmet toward the grenade. Keep your arms and legs flat against the ground. Other men in the area who are exposed must be warned to drop to a similar position. Steel helmets must be worn at all times when using grenades.

6. Although little danger is involved in using practice hand grenades, they require some degree of care in handling and throwing. You can throw the practice grenade a safe distance but, for the purpose of training and to preclude injury from an improperly loaded grenade, take cover. Wear the steel helmet, and keep all other personnel at a safe distance. Practice grenades that fail to function (duds) are not recovered for at least 10 minutes, and then only by trained personnel.

7. Grenades are issued in the "with fuze and without fuze" condition. They are not necessarily shipped in separate containers. The detonator of a fuze is very sensitive to heat, shock or friction. Army Field Manual FM 23-30 explains the safety precautions and steps taken when fuzing hand grenades.

DEMOLITION

If you are assigned to the Seabees, your job as a GM will have a lot to do with handling of explosives and demolition materials. Demolition equipment also is issued to ships for use in eliminating hazards to navigation, and the Gunner's Mates aboard are responsible for handling it.

A subject like this is not, of course, to be covered in a single section of one chapter. The use of explosives and associated blasting equipment for construction projects or large-scale demolition involves highly developed skills. These skills are developed through intensive training and a great deal of experience. It was pointed out at the beginning of this chapter that the information on demolition contained in this chapter is to familiarize the GM with the explosives and equipment used in demolition work. It is NOT intended as a self-teaching text to train GMs to become experts in demolition.

The discussion in this section will give you some idea of the tools used, and the names and uses of some of the more important explosives and other materials involved in this work. We will not try to cover the specific practical application of demolition explosives. For a much more detailed discussion, which includes other demolition equipment and techniques, you should read OP 2212, Vol. 1, Demolition Materials.

DEMOLITION CHARGES

The demolition explosive usually issued to ships is most often TNT, in cast or pressed form, but it may be Tetrytol. The explosives come in half-pound and 1-pound blocks (fig. 11-84). TNT is also the main component of the 55-pound demolition charge.

The half-pound and 1-pound blocks are issued in cardboard boxes, and can be used either by themselves or as boosters to set off larger charges. Both sizes are made with cap wells (or activator wells) into which you can insert blasting caps (which we will presently explain).

The Mk 2 demolition charges (fig. 11-85) now issued to ships have rectangular rust-resisting steel cases a little over 9 inches square and a little over 14 inches high. Mods 2 and 3 (earlier mods are obsolete) are similar except that the Mod 2 has handling lugs. The 1-pound TNT block that is used as a booster to detonate the charge fits into a cavity in the main cast charge; the blasting cap that sets off the 1-pound block is screwed into the block's activator well. Figure 11-85 shows the charge as set up for blasting. The blasting cap is not inserted until just before the charge is set off.

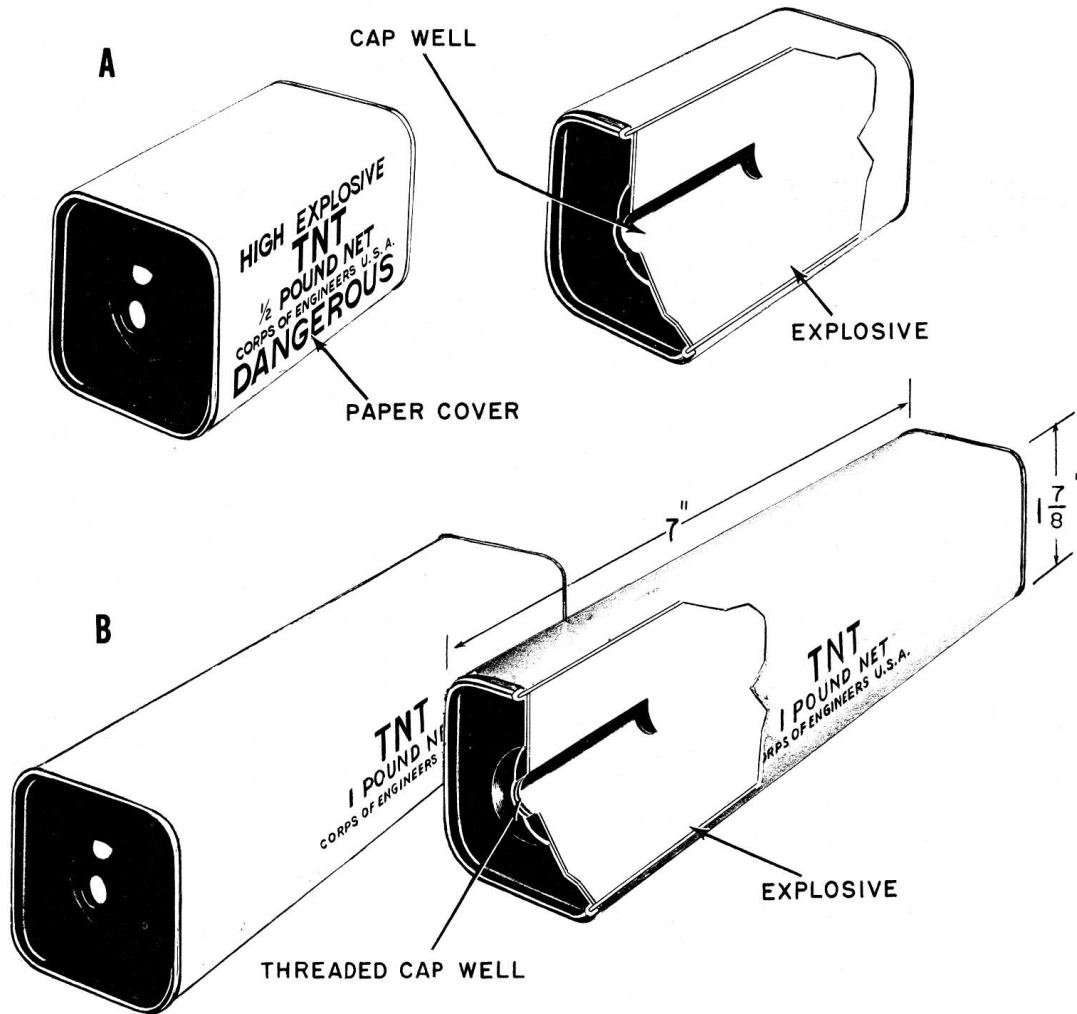
BLASTING CAPS

Blasting caps are used for initiating high explosives. They are designed to be inserted in cap wells of demolition charges, and are also the detonating element in certain land mine firing devices. Special military blasting caps are designed to detonate the less sensitive explosives like TNT, military dynamite, and tetrytol. Blasting caps are extremely sensitive and may explode unless handled carefully. They must be protected from shock and extreme heat and not tampered with. Blasting caps must never be stored with other explosives. Two types, electric and nonelectric, are used in military operations.

Nonelectric Blasting Cap

The Cap, Blasting Special, Nonelectric (fig. 11-86) is capable of detonating all standard types of demolition material that has been properly primed with the blasting cap for nonelectric firing.

The nonelectric blasting cap is contained in a clear-lacquered copper or aluminum tube. Three small explosive charges; the ignition



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Figure 11-84. — TNT blocks-A. 1/2-pound block. B. 1-pound block.

charge, priming charge, and base charge are assembled in layers in the partially filled tube. A portion of the tube remains empty so the blasting cap can be fitted over and crimped to a time blasting fuse or the snout of a coupling base.

A flame from either a time blasting fuse, detonating cord, or special firing device will ignite the ignition (flash) charge. This ignites the priming charge which, in turn, detonates the base charge.

This blasting cap, along with time blasting fuse, is used for firing demolition charges nonelectrically. This method, while not the preferred one (electrical firing is safer), is used under many conditions because of the light weight of the material and speed of placement and use.

NOTE: Fuse. A fuse is a slow-burning powder-filled cord that carries flame to an explosive or combustible mass after burning for a predetermined time. Fuze (Not to be confused with Fuse). The term fuze is a general one applying to any device that causes detonation, expulsion, or ignition upon the fulfillment of certain conditions, such as completion of a time delay, certain disturbances, impact, or inertia. The term is usually used in connection with bombs, pyrotechnics, or rocket heads. In demolition work, the term fuze is sometimes used interchangeably with the term firing device.

For all the details on the use of nonelectric blasting caps and their methods of ignition.

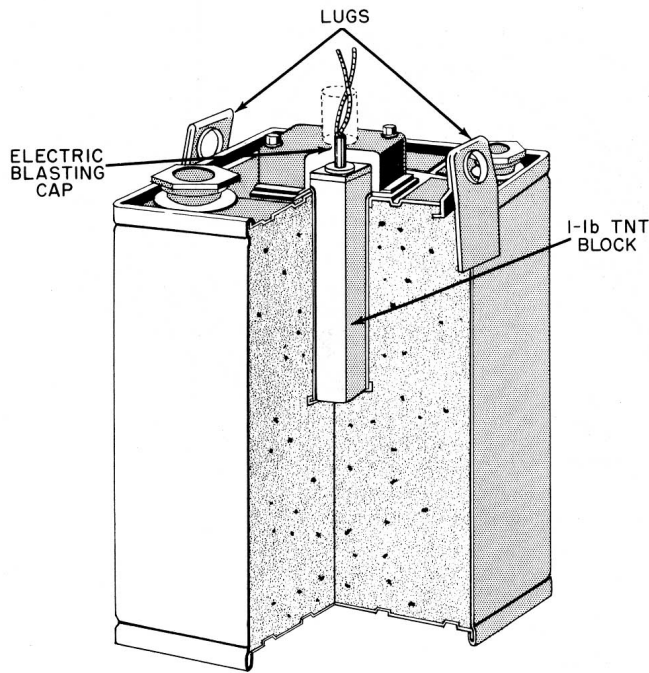


Figure 11-85. — Demolition Charge Mk 2 Mod 2 (prepared for electrical firing).

it is recommended that you read FM 5-25. Explosives and Demolitions and OP 2212; Vol. 1. Demolition Materials. Figure 11-87 illustrates the method used in setting up a cap and fuse for nonelectric firing of a demolition charge.

The burning rate of time fuse will vary by the way it is handled and the conditions under which it is burned. So testing of the burning rate is essential before setting up a charge for demolition with a nonelectric blasting cap. The burning rate of fuses issued by the NavOrdSysCom varies between 30 and 45 seconds per foot.

Refer to figure 11-87 while we briefly go through the procedure of setting up a charge.

STEP 1. Cut off and discard a 6 to 12 inch portion of the exposed end of the blasting time fuse. A test must be made of the burning rate by burning a 6-foot sample length of time fuse. The 6-foot sample length should be tested from the same coil that will be utilized for the shot. The sample length should be initiated by an M60 Time Blasting Fuze Igniter if available.

STEP 2. Cut off the desired length of time fuse and push it through the hole in the unthreaded end of the priming adapter.

STEP 3. Remove one nonelectric blasting cap from its box. Check inside the cap to ensure it is clear of obstructions. Check the end of

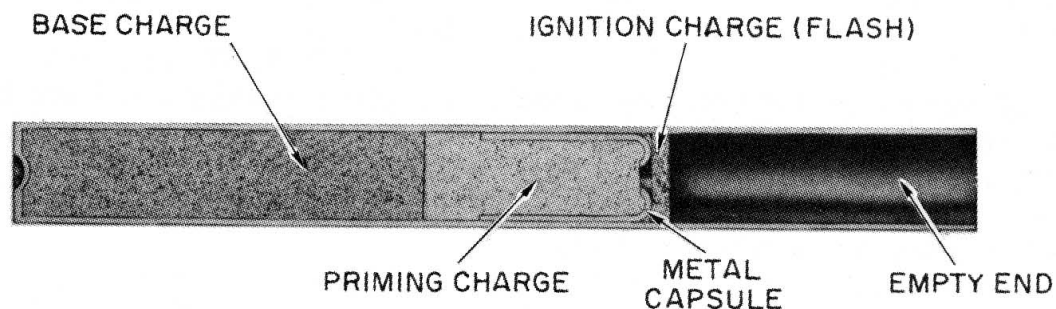
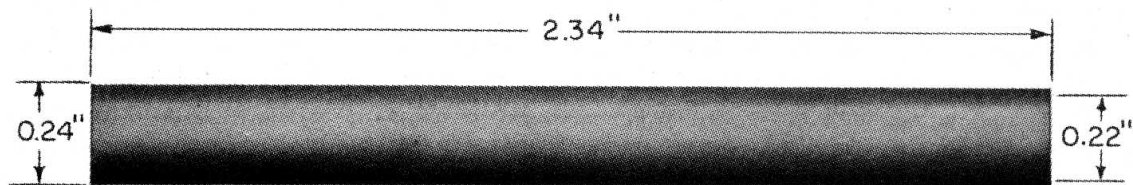
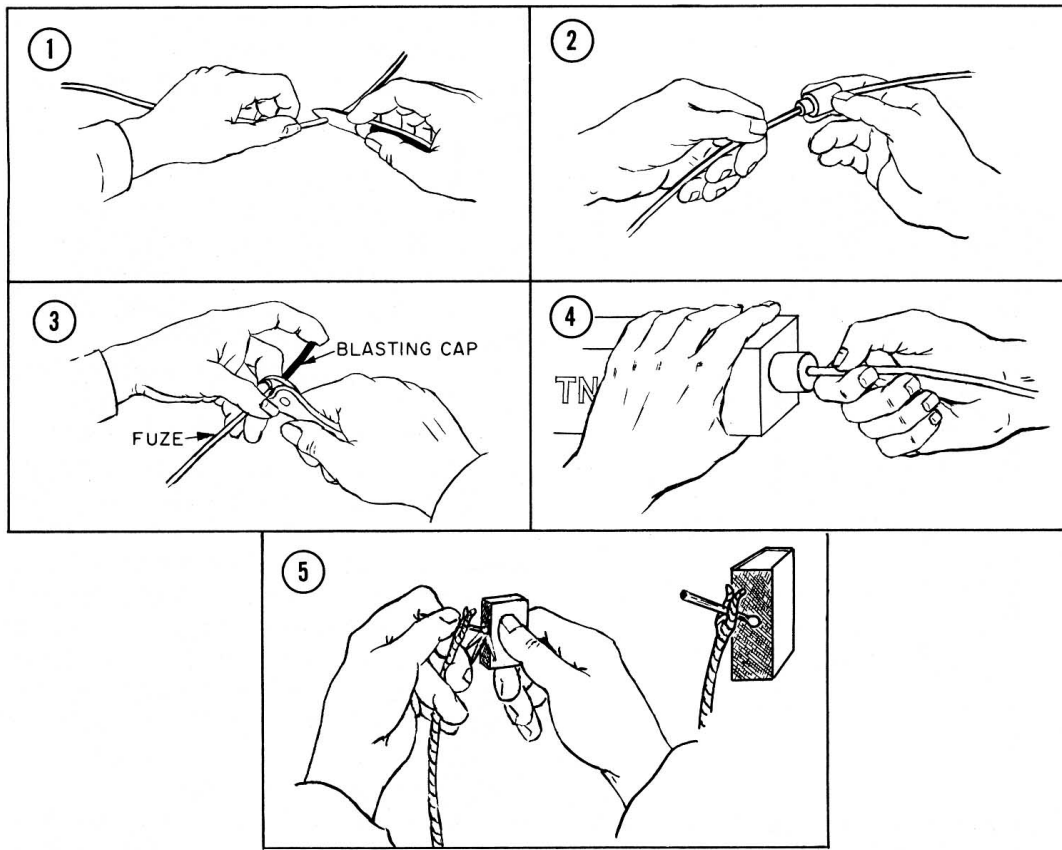


Figure 11-86. — Cap, Blasting, Special, Nonelectric.



53.168

Figure 11-87.— Using cap and fuze for nonelectric firing of demolition charge (TNT block).

the time fuse to ensure a square cut. Insert the time fuse into the cap (DO NOT TWIST OR TAP). Crimp the cap onto the time fuse 1/8 inch from the open end of cap. Use only the crimping tool to crimp caps. (DO NOT CRIMP NEAR FACE).

STEP 4. Insert the cap into the activator well of the demolition charge. Screw the adapter into the charge to hold the blasting cap in place. If screw adapters are not available, some means should be taken to prevent the cap from coming loose from the charge, such as wrapping a string tightly around the block a few times and tying it securely over the well as shown in fig. 11-88.

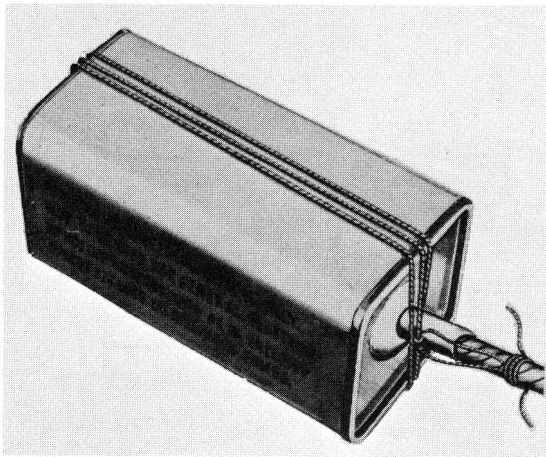
STEP 5. The blasting time fuse may be lighted two ways. The first, which should always be used if available, is the M60 Time Blasting Fuze Igniter. Since it is the safest and surest method. If the M60 fuze igniter is used, it should be installed on the time fuse, prior to the installation of the blasting cap. The second way is by a wooden match. Slit the time fuse longitudinally and insert a match in the slit so that the

head of the match protrudes slightly from the side of the time fuse. Hold the match and match box as shown in illustration No. 5 of figure 11-87 and draw the abrasive side of the match box against the match head. Do not attempt to light the match unless you are prepared to do it successfully the first time. After you have struck the match, depart vicinity and take cover - even though the attempt appears to be unsuccessful. Walk calmly but smartly to a safe area - NEVER RUN. If a long distance is necessary to reach the safe area, then additional length should be allowed on the blasting time fuse. STEP

6. If a misfire is encountered, wait 30 minutes plus time for the blasting time fuse to burn.

Electric Blasting Caps

Figure 11-89 shows Cap. Blasting. Special. Electric Type. Nos. 1-10 Delay. The cap comes in 10 delay types, with each delay type differing in length as well as delay time. The delay



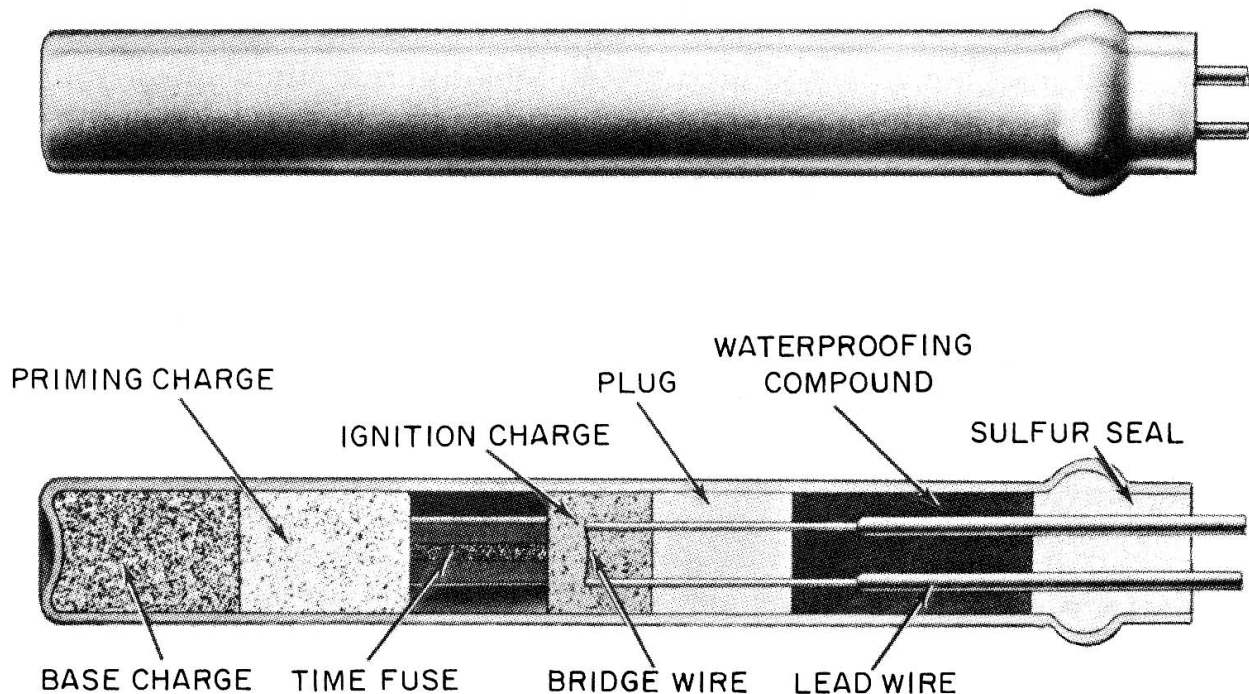
53.163(83B)
Figure 11-88. —Half-Pound Block of TNT Primed Nonelectrically.

time and consequently the length of a particular cap is dependent on the amount of delay charge contained in the delay element.

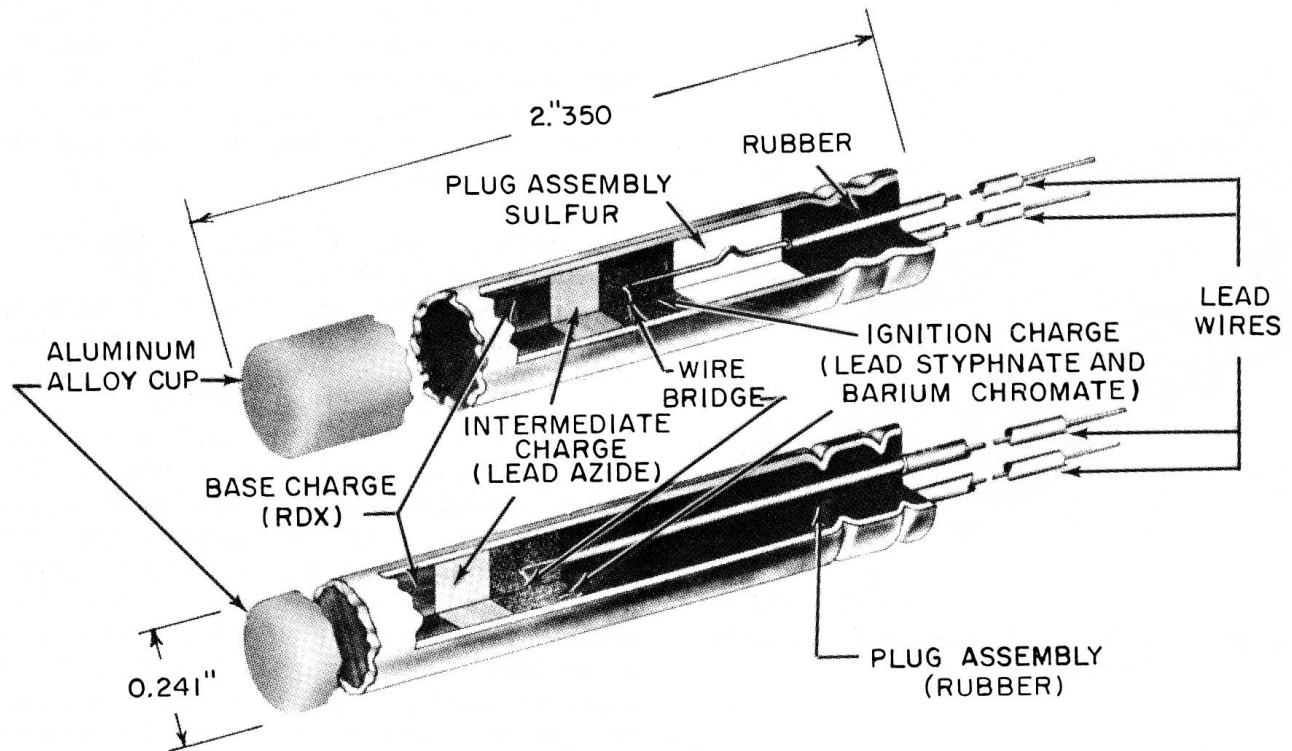
It can be seen in the figure that the construction of an electric blasting cap is simplicity

in itself. An electric current heats a wire bridge, setting off the heat-sensitive priming charge which, in turn, sets off the PETN base charge. This detonates the TNT block into which the cap has been inserted; if the block is the booster to a larger main charge, the train of explosions comes to an end with the detonation of the main charge.

Another type of electric blasting cap is shown in figure 11-90. This is the Cap, Blasting, Electric. M6 and is used as the previously mentioned caps, to initiate high explosives. The cap consists of an aluminum alloy cup containing a base charge of RDX, intermediate charge of lead azide and an ignition charge of lead styphnate and barium chromate. The lead wires are 12 feet long and extend through a rubber plug assembly or a cast sulphur and rubber assembly into the ignition charge where they are connected to a wire bridge. The electrical characteristics of the M6 are so closely controlled that caps of this model, of different manufacturers, may be mixed in a firing circuit without causing misfires. A short-circuiting tab or shunt, as in other electric blasting caps, fastens the leads together to prevent accidental electric firing of the cap. These must NOT be removed until just before the cap is wired into the firing circuit.



53.157(83B)B
Figure 11-89. — Cap, Blasting, Special, Electric Type, Nos. 1-10 Delay.



53.157.2(53C)

Figure 11-90.—Cap, Blasting, Electric, M6.

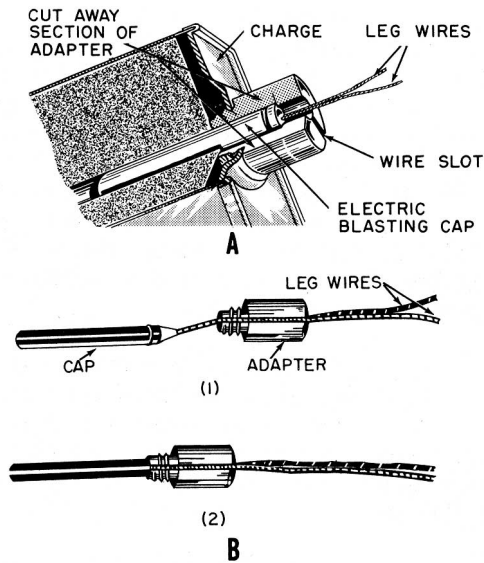
The electric blasting cap fits into the activator well of the demolition charge. But it doesn't fit tightly and can easily slip out. To hold the cap in the charge you use a primer adapter, a small plastic cylinder that screws into the threaded end of the TNT block and holds the cap in place. Figure 11-91A shows the adapter assembled in the block, with part of the adapter cut away to show how it holds the cap in place. Figure 11-91B illustrates the two steps in assembling the adapter and cap before they go into the charge. These steps are described in the next section of this chapter.

The other equipment used for electrical firing of demolition charges include a blasting machine for supplying current to the blasting cap (fig. 11-92), wire or cable of required length (the cable may be on a special reel like the one shown in figure 11-93 for connecting the machine to the charge, insulating tape for protecting the splices which connect the cable to the caps, and a blasting galvanometer for testing the circuit before you fire the charge.

BASIC PROCEDURES FOR SETTING UP AN ELECTRICAL CIRCUIT AND BLASTING

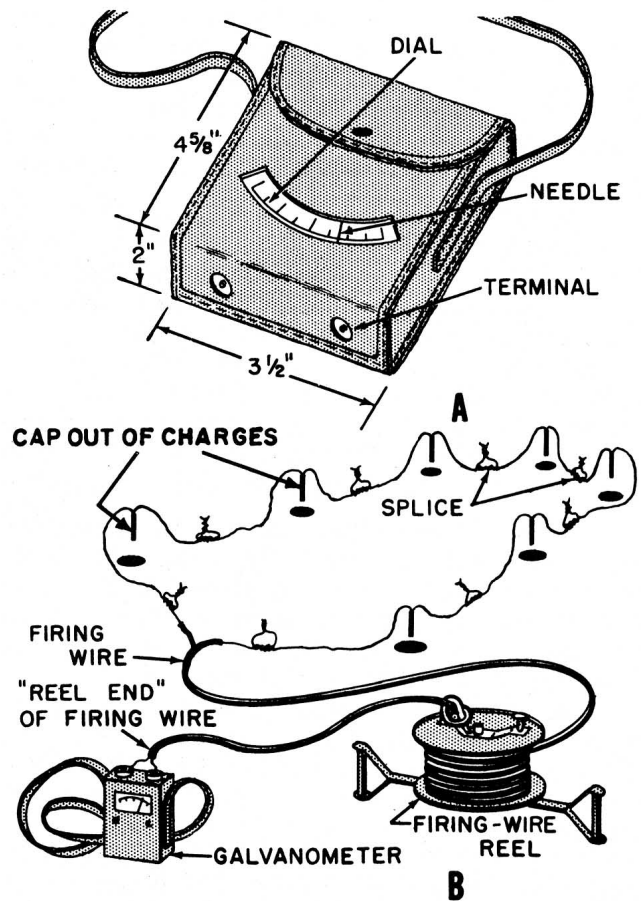
As a second class Gunner's Mate, you must be able to demonstrate your ability to work with the demolition equipment on your own ship. In general, this will most likely mean that you will have to show that you can work with the equipment we have discussed so far in this section. Of course, nothing you read here or elsewhere will make you a genuine expert with demolitions. You need real training and experience with the gear for that. But, so that you can see how all the equipment we have described is used together, let's take up, step by step, the procedure for preparing and setting off a demolition setup, using demolition charges Mk 2 Mods 2 or 3 and electric blasting caps.

1. Determine where the charges are to be placed. This, of course, depends on what is being demolished and the purpose of demolition. If you're sinking a floating hulk that's a menace to navigation, place the charges so that the hulk will go down promptly in water deep enough so



53.158
Figure 11-91. — The priming adapter-A. Priming adapter and electric blasting cap assembled into charge. B. How to assemble the priming adapter and cap before assembly into charge.

that it will be out of the way. Make sure that all WT (water tight) doors are open. If you're scuttling your own ship (this sad possibility is fortunately not frequent, but it might be necessary in the event of imminent capture by the



84.3
Figure 11-93. — A. Blasting galvanometer. B. Testing the firing circuit.

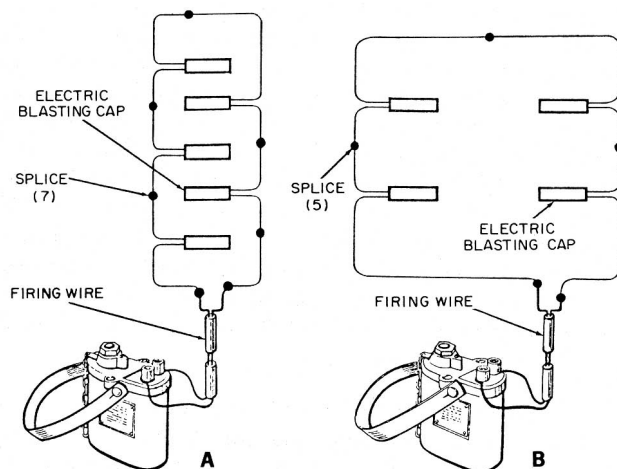


Figure 11-92. — A. Leapfrog Series Circuit. B. Common Series Circuit. 83.206

enemy), you must, in addition, make it as difficult as possible for anybody ever to use the ship again. Or you may be wiring up small charges to be used in destroying secret or confidential equipment against the possibility of capture. You'll be guided by orders from competent authority, but you must know something about demolition techniques.

2. Usually you will set off several charges at once. To do this, you place the charges and make up a circuit which includes the blasting machine and all the charges in series. First you wire in all the caps, then connect them to the cable, and then test the circuit. Here are these steps in more detail:

a. Make sure your caps are all of the same manufacturer. Except for the M6 which was described earlier, caps of different make should

NEVER be used together in one circuit. Be sure not to use more caps than your blasting machine is designed to handle; it's better to use fewer. When you take caps out of their box, don't try to pry them loose with a sharp instrument; use your fingers, and slide them out carefully. Examine the caps before wiring them up; reject any that show signs of moisture or corrosion.

b. Grasp the wire above the cap and straighten the coils from the wire leads, being careful not to put tension between cap and wire leads. Place caps behind a suitable barrier or in a heavy gauge bucket. Test each cap individually as far away from the bucket or barrier as the leads will allow with the galvanometer. After test of cap, shunt the cap by twisting the two wire legs together. Do this until you have tested the number of blasting caps you will use.

c. You make electrical tests for demolition setups with only one instrument- the blasting galvanometer. (See fig. 11-93A.) You must NEVER use any other instrument. The blasting galvanometer is in a box, usually protected by a leather case, with a dial face on which you can see the galvanometer needle. It contains its own small battery as a source of current. At the base of the box are two terminals - flat metal discs. You test by touching the wires you are testing to the terminals. If current flows (and the currents indicated by the galvanometer are very tiny ones that will not set off a blasting cap), the needle deflects.

d. First you test both cable conductors BEFORE they are connected to anything. (Make sure their ends are not twisted together.) You should get NO steady indication on the galvanometer. (But it's O.K. for the needle to flick, then return to zero.) If you DO get a steady galvanometer needle deflection, there is a current leak or short circuit in the cable (caused by defective insulation or conductors touching each other). If the trouble cannot be rectified, use other cable that will test O.K.

e. Next, you wire the cable to the caps (but do NOT connect the blasting machine). Test the complete circuit by touching the cable terminals at the "reel end" (where the blasting machine will be connected) to the galvanometer. (See fig. 11-93B). This time you should get a definite steady needle deflection. If you don't, go over your circuit and repair it where it's broken. Test each splice and cap individually, if necessary. Or you may use the procedure described in the next section of this chapter for locating breaks in the circuit.

f. After testing the circuit, the next step is to set each blasting cap in its charge. Open the top of the charge shipping box. (The charge need not be removed from the shipping box to be used, however.) Break the paper seal protecting the activator well in the booster but don't use the blasting cap as a tool. Make sure there is no dirt in the well. Then slip the leg wires of the cap through the priming adapter's wire slot with the threaded end of the adapter pointing toward the cap (fig. 11-91).

If the leg wires don't slide readily through the slot, don't try to force them by pulling on the cap. Grasp the wires about 6 inches from the blasting cap and slide the adapter slot along the wires away from the cap. Tilt the adapter as you do this, to make the entry of the wires easier.

Now insert the cap gently all the way into the activator well; hold the adapter away from cap until it's all the way in. Then work the adapter down the wires until it reaches the well, and screw it in gently but firmly as far as it will go. Last, tie the wires so that the cable doesn't strain them at the cap. The Mk2 Mods 2 and 3 charges have cable anchors under the bolts in the booster covers that can be used to secure the cable.

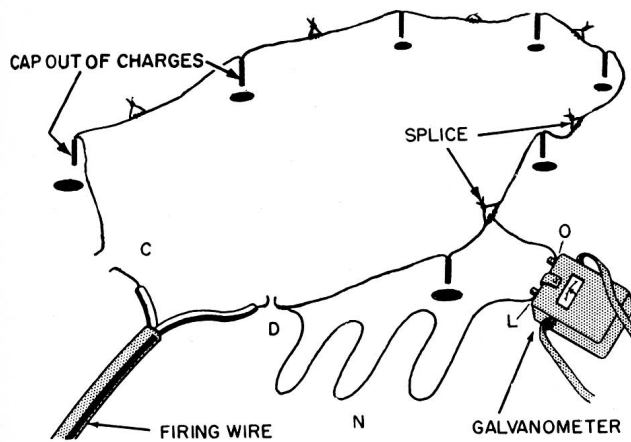
If you haven't tested the circuit, do it now. If time permits, it may be a good idea to do it again even if you tested it before assembling the caps into their charges.

3. The last step is to connect the blasting machine. Make sure everything else is in readiness, and that all personnel have cleared the danger area. Connect the cable to the blasting machine. Most blasting machines have removable handles; don't put the handle on until after the machine is connected, and just before you blast. To operate the machine, twist the handle smartly through its full range.

4. If the blast does not occur, remove the handle of the machine (and put it into your pocket to make sure nobody operates the machine inadvertently) and DISCONNECT the machine. Then, after 30 minutes and only then, is it safe to investigate the trouble further.

PROCEDURE FOR LOCATING BREAKS IN THE FIRING CIRCUIT

Here is a way (illustrated in fig. 11-94) in which a break in the firing circuit may be located if the circuit test from the reel end indicates an open circuit, or if you have a misfire.



84.4

Figure 11-94. — Locating breaks in the firing circuit.

1. First disconnect the blasting machine. Make sure the two wires at the reel end of the firing cable are separated and not touching any conductor.

2. Connect the two spliced wires at the far end of the firing cable (C and D in fig. 11-94) with the blasting galvanometer. (Don't break the splices; just touch them to the galvanometer's terminals.) If the instrument now shows a complete circuit, these connections (C and D) or the cable are faulty.

3. If the galvanometer still shows an open circuit, connect splice D to one terminal (L) of galvanometer, using a wire (N) long enough to reach all connections in the circuit. Move around the circuit with the galvanometer, touching the other terminal (O) to all splices in succession. At the first point where the instrument shows an open circuit, you know that there is a break between that point and the previous one.

If the break is accessible, splice the broken wire. If you can't handle it as a misfire; use additional priming, or set up another charge close by. After this repair, continue the test to locate additional breaks. When all are repaired, test the circuit again from the reel end.

SAFETY

Here is a brief summary of precautions to ensure both reliability and safety, which you should bear in mind when blasting with electric caps:

1. Use only Army Engineer Special blasting caps of the types described previously for military demolitions. Other caps are weaker and may cause misfires.

2. Use only one brand of cap in anyone circuit.

3. Before using a blasting cap, inspect it for moisture. If you see any sign of dampness, use another cap. Never use a sharp instrument to pry a cap out of its box, and never take a cap out of its box unless you intend to use it.

4. All the firing in an electric blasting circuit must be the responsibility of one person only, and that man must know his job. He should keep the blasting machine, or its operating handle, on his person while the circuit is being wired to avoid accidental firing.

5. Before firing or testing, be sure the safety shunts are removed from all caps, but don't remove the shunts until you are actually wiring the caps into the circuit. If shunts are missing, keep the cap wires twisted together.

6. Never fail to use the blasting galvanometer to test your complete circuit before the blasting machine is connected. Don't depend on visual inspection only. Use no other device to test the circuit. Dry-cell powered ohmmeters, for instance, may set off the blasting caps.

7. Never yank the leg wires of an electric cap, or subject them to any steady pull. This is important to remember when you're installing the priming-adaptor. Secure the leg wires and firing cable with strong twine or other fastenings so that pulls on the cable will not be transmitted through the splice or to the cap.

8. Don't connect the cable to the blasting machine until you're ready to fire and the danger area is clear. Unless you are actually testing the circuit or you are actually making ready to blast, it's a good idea to keep the free ends of the cable twisted together.

9. Avoid setting up an electric blasting circuit when there is a thunderstorm brewing. In general, protect electric blasting caps, whether in circuit or not, from any stray electric currents.

10. When you use the blasting machine, twist the handle sharply to be sure you get enough output to fire. If the machine has a thong, wrap it about your wrist to prevent the machine from slipping when you twist. Immediately after the blast, disconnect the machine and twist the cable

GUNNER'S MATE M 3 & 2

conductors together. If your circuit misfires, try once more. If it misfires again, disconnect the blasting machine, put the handle in your pocket, and twist the cable conductors together before you try to investigate the cause of misfire.