BASIC FIELD MANUAL

BROWNING MACHINE GUN, CALIBER .30, HB, M1919A4 GROUND

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(The matter contained herein supersedes chapter 1, part seven, Basic Field Manual, July 1, 1937.)

MECHANICAL TRAINING

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SECTION I

DESCRIPTION

■1. PRINCIPLE OF OPERATION. — The machine gun, caliber .30, M1919A4, is recoil operated, belt fed, and air cooled. In recoil operation the rearward force of the expanding powder gas (kick) furnishes the operating energy. The moving parts, while locked together at the moment of the explosion, are left free within the receiver to be forced to the rear by the recoil. This movement is controlled by means of various springs, cams, and levers, and is utilized to perform the necessary mechanical operations of unlocking the breech, extraction and ejection of the empty case, and feeding in of the new round, as well as cocking, locking, and firing the mechanism. (See fig. 1.) The receiver mechanism is for all practical purposes the receiver of the Browning machine gun, M1917.

■2. COOLING SYSTEM. — The machine gun, caliber .30 M1919A4, is provided with a heavy barrel which is exposed to the air. This factor serves to keep the gun at operating temperatures under normal conditions, i.e., at the rate of about 60 rounds per minute for about 30 minutes.

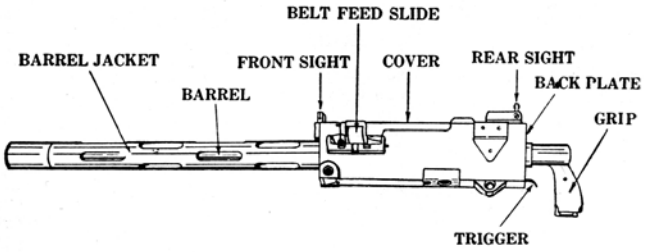


FIGURE 1.—Browning machine gun, M1919A4

■3. FEED BELT. — Woven fabric belts of a capacity of 150 rounds, equipped with brass strips at each end to facilitate loading, are normally used with the ground light machine gun.

■4. MOUNTINGS.

a. The ground light machine gun normally is mounted on the light machine gun tripod M2, a description of which is given in section VI.

b. In motorized or mechanized units, the light machine gun is mounted on vehicular mounts of several types, but a light machine gun tripod M2 is usually carried for each gun to be used when the gun is fired from the ground.

■5. GENERAL DATA. — General data for the light machine gun and mount are as follows:

■6. SIGHTS.

a. Front. — The front sight consists of a front sight blade, a front side body, a front sight post, and a plunger mechanism. The front sight post pivots on the front sight bearing screw when folded for convenience in packing. The plunger mechanism provides a locking device to keep the front sight post in its upright position when the gun is being fired. The front sight is attached to the front end of the receiver by means of a screw. The height of the front sight is such that when the rear sight slide is set at an elevation a bullet fired from the gun will strike a target at a distance corresponding to the elevation set on the rear sight.

b. Rear. —

(1) The rear sight (fig. 2) is of conventional type. It consists of a rear sight leaf, carrying a peep in the slide mounting, pivoted on the rear sight base, and adjustable for windage. The rear sight base mounts the rear sight leaf and rear sight leaf spring. It is secured to the left side plate of the receiver by three screws in the flange of the base.

(2) The rear sight leaf is graduated for elevation in 100yard divisions up to 2,400 yards. The peep of the rear sight slide is 0.081 inch in diameter. Motion of the rear sight slide is accomplished by rotation of the elevating screw knob.

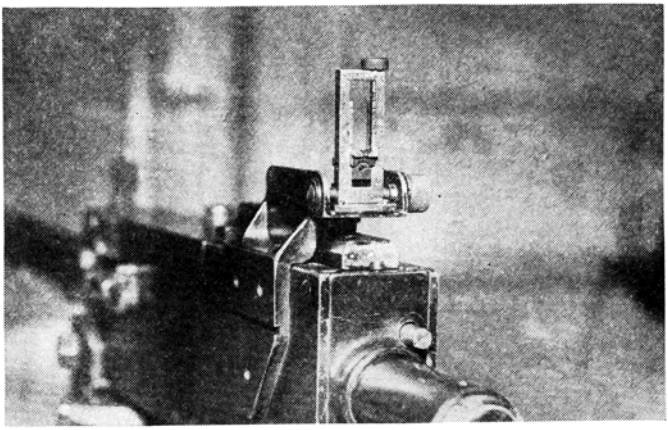


FIGURE 2.—Rear sight.

This elevating screw mechanism is equipped with a mil click device which may be used in conjunction with a mil scale engraved on the left side of the rear sight leaf to measure or establish angles of elevation in mils.

(3) The windage screw mechanism also incorporates a mil click device. Adjustment of the rear sight leaf in windage is accomplished by rotation of the windage screw knob. Amount of motion permitted is 10 mils right or left from zero.

(4) The sight radius is 13.94 inches.

■7. PINTLE. — The pintle of the light machine gun (ground), although technically not a part of the gun, is permanently assembled thereto by a bolt through the trunnions of the pintle and the trunnion hole of the receiver of the gun. Failure to keep this bolt tight will result in inaccuracy of fire. This pintle is tapered and mates with the corresponding tapered pintle bushing of the tripod mount M2 head. This tapered pintle thus serves as a tight wearing union between the receiver of the gun and its mounting. The pintle is secured in its mounting by the engagement of a spring actuated pintle latch of the mounting in a corresponding annular groove of the pintle.

■8. ELEVATING AND TRAVERSING MECHANISM.

a. As with the pintle, the elevating and traversing mechanism is not technically a part of the gun. However, the elevating and traversing mechanism is permanently secured to the receiver of the gun by a bolt through the head of this mechanism and the elevating bracket of the gun. In guns of new manufacture, the elevating bracket is integral with the bottom plate.

b. The elevating and traversing mechanism, when used with the tripod M2, consists of an upper elevating screw; a lower elevating screw; an elevating handwheel assembly secured to the head of the lower elevating screw; a housing mating with the lower elevating screw; a traversing block mounted by a swivel joint to the lower elevating screw housing.

(1) The upper elevating screw terminates at its upper end in an offset head which incorporates a recess for the bolt which assembles the entire elevating and traversing mechanism to the gun. The mechanism is properly assembled to the gun when the offset head points to the rear, thus permitting the mechanism to be folded to the rear and seated in its recess in the duralumin grip. The inner elevating screw is externally threaded to mate with the internal threads of the lower elevating screw. It is equipped

with a longitudinal slot in which is seated an engraved scale. This scale is utilized to indicate plus or minus increments of elevation given the mounted gun. It is subdivided into 50-mil graduations and is read by noting the position of the upper edge of the traversing bar and the traversing slide lock lever preferably engaged. (When firing on rapidly moving ground targets, the traversing clamp is not engaged, although the traversing block must be retained in firm contact with the traversing bar.)

(2) Movement of the light machine gun in traverse, when mounted on the tripod M2, is accomplished by moving the gun right or left as desired, the traversing clamp being disengaged from the traversing bar but the traversing block remaining in firm contact with the traversing bar.

SECTION II

DISASSEMBLING, ASSEMBLING, AND CHANGING PARTS

■9. GENERAL.

a. Disassembling may be considered under two general heads: first, removal of groups to the extent required for ordinary cleaning and minor repairs; and, second, detailed disassembling, involving removal of all components from each group.

b. A group is a number of parts, contained in a common housing, which function as a unit.

c. The removal of the different groups from the gun and complete disassembling of the groups to be disassembled by the using services can be accomplished with the tools provided.

■10. REMOVAL OF GROUPS FROM GUN.

a. Backplate.

(1) Pull back on latch and raise cover. With the left hand pull back bolt handle and hold it in the rearmost position.

(2) Insert rim of a cartridge in slit in end of driving spring rod. With slit horizontal, push in driving spring rod as far as it will go and turn it clockwise one-quarter turn until slit is vertical. In this position the lugs on it will engage in their recesses in the bolt.

(3) Push bolt handle forward about an inch to free the rear end of driving spring rod from backplate.

(4) Push latch forward and lift out backplate.

b. Bolt handle.—Pull bolt all the way back and remove bolt handle.

c. Bolt.—Remove bolt from rear end of receiver being careful not to handle driving spring rod.

d. Lock frame.—Insert nose of cartridge through hole in the right side of receiver and push in on trigger pin. Grasp trigger and pull lock frame, barrel extension, and barrel out of receiver. Hold barrel in one hand, lock frame in the other, and push forward on accelerator. This separates lock frame and barrel extension.

e. Barrel extension and barrel.—Unscrew barrel extension from barrel.

f. Latch.—With the left hand, palm up, against the rear of the receiver to prevent dropping the latch spring, pull latch to rear until it separates from the plate. Guns of recent manufacture have the latch spring riveted to the latch

g. Latch spring.—If not riveted lift the latch spring from its pin in the latch.

h. Cover.

(1) *Guns of early manufacture.*

(*a*) Turn cover pin spring up and remove pin,
(*b*) Remove cover.

(2) *Guns of new manufacture.*
(*a*) Remove cotter pin from cover bolt.
(*b*) Place screwdriver blade of combination tool in slot in cover bolt to prevent it from turning and with a wrench remove the nut.
(*c*) Remove cover bolt, cover catch spring, and fixed and movable plates.
(*d*) Remove cover.

NOTE.—To prevent undue wear, the cover and latch should not be removed except when necessary for cleaning or replacement of parts.

■11. REPLACING GROUPS IN GUN.—In general, the groups are replaced in the gun in reverse order.

a. (1) *Guns of early manufacture.*—Replace cover. Insert cover pin and lock it by turning cover pin spring forward into its seat in trunnion block. Some models have a cover pin which is locked by inserting and spreading a cotter pin through a hole in the cover pin.

(2) *Guns of new manufacture.*—Replace cover. Place cover latch spring on bolt and position the fixed and movable plates. Insert cover bolt into cover hole. Place screwdriver blade of combination tool in slot in cover bolt to prevent it from turning, and assemble nut to cover bolt using a wrench until the desired tension is obtained. Replace cotter pin.

b. Seat rounded end of latch spring in latch seat, placing hole in spring over pin, bent side of spring away from latch. Holding spring in place with the fingers, push latch onto top plate from the rear, free end of the spring to the front, then force the latch home. *If the spring is allowed to slip from its seat, the latch will not function, and the spring will jam the latch so that it cannot be removed without breaking.*

c. Screw barrel into barrel extension until barrel locking spring begins to engage in barrel notches.

d. Insert barrel and barrel extension into receiver until the forward end of barrel extension is opposite the rear end of receiver.

e. Holding barrel extension with one hand, take lock frame in other hand, with index finger beneath and supporting accelerator. Place claws of accelerator in front of and against T-lug. Insert front projections of lock frame into slots of barrel extension and push forward until accelerator turns backward, locking lock frame to barrel extension. Push down tips of accelerator to insure positive locking.

f. Push parts into gun, forcing trigger pin inward to clear it from right side plate, and push forward until a click is heard as trigger pin springs out into its seat in the right side plate. (If barrel hangs on front barrel bearing, reach forward under jacket and align it.)

g. Push cocking lever forward and insert bolt, pushing down on rear end of trigger to prevent ejector from tripping accelerator.

h. Insert bolt handle through large opening at rear of slot and push it forward about 1 inch, being sure that collar on handle is inside right side plate.

i. Push forward on latch and replace backplate.

j. Hold bolt handle fully back with left hand. Place rim of cartridge in slit in end of driving spring rod, and turn rod one-quarter turn counterclockwise until slit is horizontal. This releases driving spring. Allow bolt to go forward.

k. Make head space adjustment as follows:

(1) Pull bolt to rear about ¾ inch.

(2) Screw barrel into barrel extension (by using point of a cartridge or the combination tool in barrel notches) until the action will just close (recoiling parts will go fully forward) without being forced.

(3) Then unscrew barrel two notches.

CAUTION: Care must be exercised to avoid roughening the barrel surface during the adjustment. Also, the packing must not bind the barrel, as a false adjustment will result in such a case.

l. Position belt feed lever stud over Cam groove in bolt and close cover.

m. Pull trigger.

NOTES. —

1. HEAD SPACE.

a. The head space of a military weapon with a cartridge fully seated in the chamber is the distance between the base of the cartridge and the face of the bolt.

b. In Browning machine guns, the head space is adjusted by obtaining the proper distance between the forward part of the bolt and the rear end of the barrel. The head space adjustment must be checked before firing.

2. EFFECT OF HEAD SPACE. ADJUSTMENT.

a. General. — Probably the most important adjustment of the machine gun is the head space adjustment. Tests show that shot patterns are not adversely affected by the head space when the guns are adjusted as outlined above. In fact, better uniformity of shot patterns will be obtained when the guns are operated with the above adjustment which is based on the fundamental design of the weapon. Tests have also proved that guns may be damaged and in some cases put out of action by using unapproved methods of adjusting the head space. Many reports show that difficulties with improperly guided belts and with firing mechanisms have been attributed to undue concern over head space adjustment.

b. Insufficient head space. — When the head space adjustment is too tight, poor functioning will result, as the breech lock will' not fully enter its recess in the bolt. This condition may damage the barrel extension, bolt, or breech lock. Extraction trouble may also occur due to improper timing Or locking and unlocking. Further- with a tight head space adjustment the gun operates sluggishly because of the binding of the moving parts.

c. Excessive head space. — If the head space is too great, a separation Of the cartridge case may occur. Should there be any weakness in the head of the cartridge case, such as a split case, the possibility of a rupture is increased by excessive head space.

3. QUICK HEAD SPACE ADJUSTMENT. — After the head space adjustment has been determined by the method described in paragraph 11k, the notch in which the barrel locking spring is engaged may be marked with a center punch. Then to make the correct head space adjustment, during the assembly of the gun, screw the barrel all Of the way into the barrel extension and then unscrew the barrel until the barrel cocking spring is in the marked notch.

■12. DETAILED DISASSEMBLING OF BOLT.

a. Turn the extractor up and remove it to the left (fig. 5).

b. Great care should be exercised in removing the driving spring rod from the bolt as the force of the driving spring when released can easily cause the rod to slip away

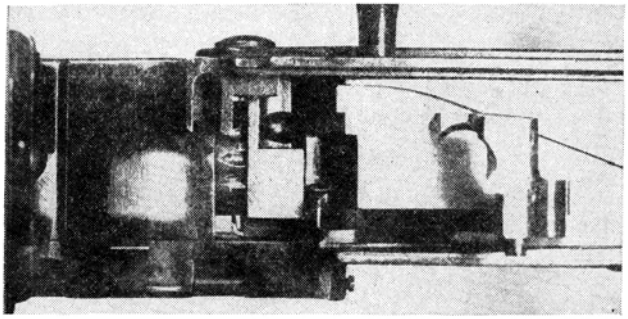


FIGURE 3. — Tight head space adjustment.

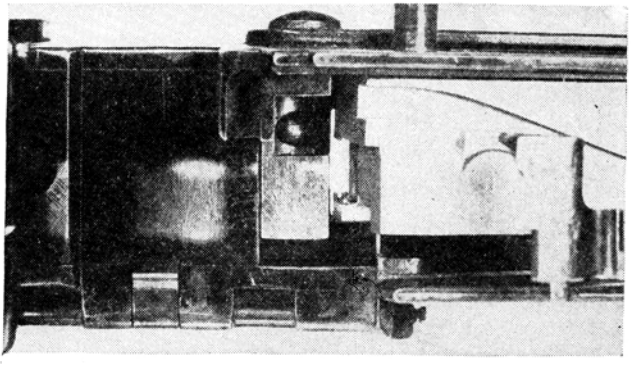


FIGURE 4. — Loose head space adjustment.

from the hand and possibly result in serious injury. To remove driving spring rod, place protruding end of rod on the table or a, block of wood. With bolt firmly grasped by the right hand (palm of the hand over face of bolt), press down and at the same time turn bolt one-fourth turn to the left until lugs on rod leave their recess in bolt. Slowly release pressure on bolt, allowing it to rise under the action of driving spring until about 3 inches of rod protrude. With the left hand grasp protruding portion of rod and spring; raise both hands and the bolt from the table, keeping rod and spring in their same position relative to bolt. Separate rod and spring from bolt with a quick jerk. The quick, separating jerk will not allow spring to kink. Separate driving spring rod and driving spring.

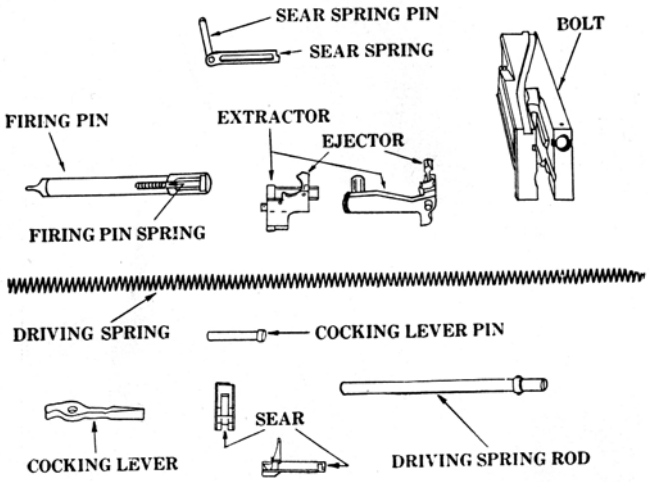


Figure 5. — Bolt group.

c. Turn the top of cocking lever to the rear of bolt and withdraw cocking lever pin to the left of bolt.

d. Lift out cocking lever.

e. Release firing pin by pushing down on sear. Hold bolt in the left hand, the front end toward the body, top up, with the index finger of the left hand beneath and supporting the sear. Use the nose of a cartridge, placed near the end of sear spring, to push downward and to the right on spring to seat it in cut in bolt. This releases sear which is removed at the bottom of bolt.

f. Turn sear spring back to the left to clear the cut. Push nose of a cartridge into the hole in the bottom of bolt to start sear spring pin moving. To complete the removing of sear spring, place the top end of cocking lever well under sear spring and pry down against the edge of bolt.

g. Place the palm of the right hand over the rear of bolt, tilt the rear end of bolt down, and firing pin will drop out.

■13. ASSEMBLING OF BOLT.

a. Place firing pin in bolt, striker downward and to the front, and tilt the front of bolt downward until striker projects through the small hole in the front of bolt.

b. Replace sear spring by pushing with a cartridge on top of pin, avoiding pressure on spring proper.

c. Hold bolt in the left hand, front end toward the body, top up. With point of a cartridge placed near the end of sear spring, push downward and to the right to seat it in cut in bolt.

d. Push sear upward from the bottom, notched projection toward the front of bolt, and hold with first finger of the left hand while pressing downward and to the left on sear spring with a cartridge to engage the end of sear spring in sear.

e. Replace cocking lever, making certain that the rounded nose on the lower end is to the rear of bolt so that it will properly engage in the recess in firing pin.

f. Insert cocking lever pin from the left side of bolt. The upper end of cocking lever should be to the rear of bolt before inserting pin, as this aligns cocking lever for the return of pin.

g. Cock by pressing forward on cocking lever. Turn cocking lever to the rear and press down on sear with a cartridge to release firing pin and test the correctness of the assembly. Recock the assembly.

h. The same care' should be exercised in assembling the driving spring rod to the bolt that is exercised in removing it. Place driving spring on driving spring rod. With the back end of the rod resting on a table or a block of wood, gather as much of the spring on the rod as can he held compressed by the thumb and fingers of the left hand. With bolt securely held in the right hand, the front end of bolt in the palm of the hand, slip bolt over the end of spring. Push downward to compress spring and allow lugs on rod to enter slot in bolt. Turn bolt slowly 90° clockwise until slit in rod is crosswise to slot in bolt.

i. Insert pin on extractor into the rear one of the two large holes in the left side of bolt, extractor pointing up. Turn extractor downward toward the front to engage collar on extractor under collar cut in bolt.

■14. DETAILED DISASSEMBLING OF LOCK FRAME (fig. 6).

a. Grasp head of trigger pin between the thumb and first finger of the right hand and remove it to the right. Lift out trigger. If pin is too tight to permit its removal in this manner, it must be drifted out. DO not remove trigger pin spring except when necessary.

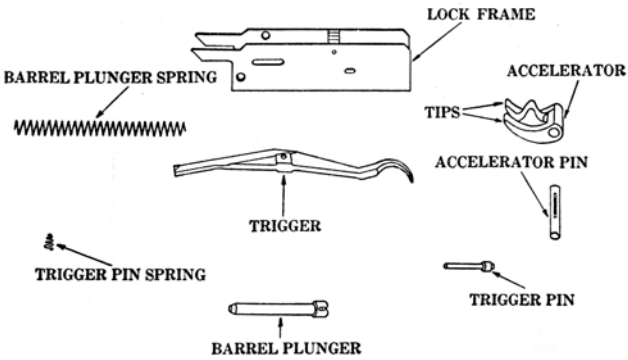


Figure 6. – Lock frame group.

b. Push out accelerator pin and remove accelerator.

c. Hold lock frame with the left hand, projections pointing upward, slot to the left, separator between the second and third fingers, first and second fingers gripping barrel plunger spring. With the thumb of the right hand, press down and out on barrel plunger to disengage plunger guide pin from slot. Allow spring, with plunger, to rise slowly Lift out spring and remove it from barrel plunger.

■15. ASSEMBLING LOCK FRAME.

a. Assemble barrel plunger spring to barrel plunger, being careful that the more tightly fitting end of barrel plunger spring is pushed up against the head of barrel plunger. Hold lock frame with the left hand, projections pointing upward, slot to the left, lock frame separator between the second and third fingers. Seat the end of barrel plunger spring in the recess in lock frame separator, barrel plunger guide pin facing the slot in lock frame. Using the first and second fingers of the left hand to prevent spring from buckling, press down with the thumb of the right hand on the end of barrel

plunger until barrel plunger guide pin can be seated in the slot. Care should be taken that the action of the spring does not cause the plunger to slip out of the hand.

b. Replace accelerator with the tips up and the rounded surface to the front. Insert accelerator pin, taking care that both ends of pin are flush with the sides of lock frame.

c. Push the front end of trigger up between separator and spacer, placing the center in its square seating. If trigger pin spring has been removed, seat spring on trigger pin, placing the small end of spring toward the head of pin. Replace pin from the right.

■16. DETAILED DISASSEMBLING OF BARREL EXTENSION (fig. 7).

a. Insert the rim of a cartridge under the front edge of barrel locking spring and pull it out to the front.

b. Push out breech lock pin and remove breech lock.

■17. ASSEMBLING BARREL EXTENSION.

a. Place breech lock in its slot, taking care that the double beveled surface is up and to the front. Insert breech lock pin and insure that both ends of pin are flush with the sides of barrel extension.

b. Insert barrel locking spring in the seating in the left side of barrel extension, hook inward, and force home as far as it will go.

■18. DETAILED DISASSEMBLING OF COVER (fig. 8).

a. Remove cotter pin or cap from belt feed lever pin. Remove belt feed lever pin.

b. Withdraw belt feed lever from belt feed slide and remove slide.

c. Insert the nose of a cartridge between cover extractor spring and the notch in cover extractor cam. With the thumb of the left hand over spring, pry out on spring to disengage from cut. Lift out spring from its seat against stud.

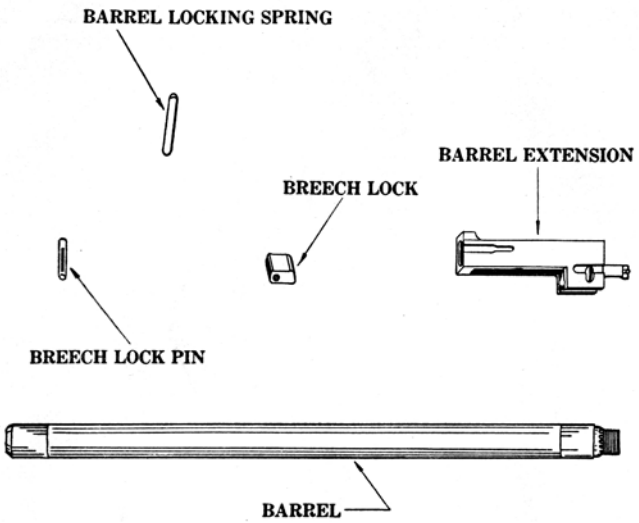


FIGURE 7. — Barrel and barrel extension group.

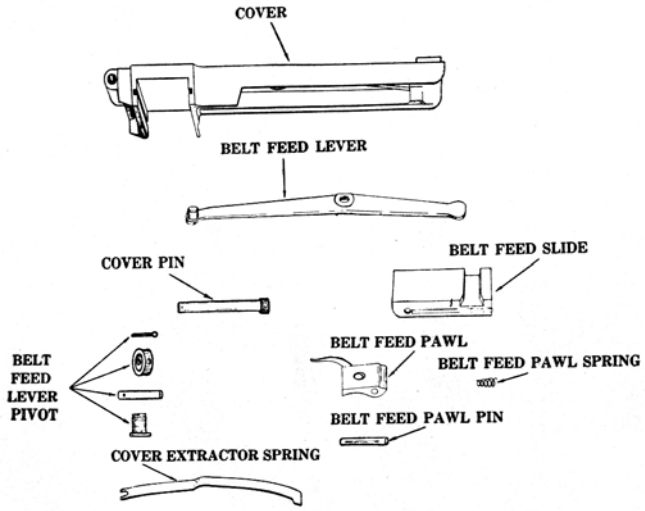


FIGURE 8. — Feed group.

■19. ASSEMBLING COVER.

a. Place the forked end of cover extractor spring under stud on cover. Press downward with the thumb on the other end of spring, at the same time pushing toward stud, and seat projection of spring in the notch of cover extractor cam.

b. Replace belt feed slide in its grooves in cover, taking care that pawl is pointing to the right as cover goes on the gun.

c. Place front end of belt feed lever in the cut, stud on lever away from cover and to the rear. Insert belt feed lever pivot pin. Replace cotter pin or cap.

■20. DISASSEMBLING OF PARTS DISMOUNTED ONLY FOR REPAIR.

a. Shock absorbing group. - Unscrew adjusting screw and remove adjusting screw plunger and spring. Remove buffer disks (in later guns these are replaced by heavy recoil spring), buffer plug, buffer ring, and buffer plate through the rear end of the grip. Replace in the reverse order.

b. Belt holding pawl.

(1) Hold down belt holding pawl and withdraw belt holding pawl split pin to the rear.

(2) Lift off belt holding pawl.

(3) Lift belt holding pawl spring from its seating.

(4) Replace in the reverse order.

■21. CHANGING PARTS. — If the time element is important, a broken minor part should be replaced by substituting a complete spare part which contains it. Thus a broken firing pin would be remedied by changing bolts. Replacement parts in the spare parts box should be repaired as soon as opportunity permits. In event the bolt, barrel, or barrel extension is changed, *adjust the head space*.

SECTION III

CARE AND CLEANING

■22. GENERAL. — It is essential that the gun be maintained in the best mechanical condition at all times. It must always be kept clean and covered with a light coating of oil. Particular attention must be paid to the bore. Care and cleaning will not be confined to the gun alone but will include the tripod and all accessories. Belts and ammunition must be kept clean and dry.

■23. GUN, TRIPOD, AND SPARE PARTS.

a. Bore. — When firing is completed the bore should be cleaned immediately as follows:

(1) Disassemble groups from gun.
(2) Place barrel with barrel extension attached, muzzle down, in a vessel containing hot water and soap or hot water alone.
(3) Use cleaning rod with flannel patch to pump water hack and forth through the bore for about 1 minute. (A soft wire brush may be used to remove particles which are stuck to the bore.)
(4) Dry and clean bore thoroughly then apply a light coat of lubricating oil.
(5) Inspect daily and repeat the above treatment until the bore shows no signs of corrosion.

b. Moving parts. — The moving parts should be kept clean and lubricated before, during, and after firing. In lubricating the parts during firing, care should be exercised to apply oil frequently but sparingly to those parts where actual friction exists. These include the cam groove and the cocking lever. Excess oil generates smoke which interferes with observation.

c. Front barrel bearing. — Carbon is deposited in the front barrel bearing during firing of the gun. If this deposit is not removed periodically, it will eventually cause the barrel to bind. To remove—

(1) Using a combination tool, unscrew front plug.

(2) Soften carbon with oil and scrape it out.

(3) Replace plug.

NOTE. — Before guns are stored, the front barrel bearing should be removed and the carbon deposits thoroughly removed from the bearing and barrel jacket.

d. Tripod.

(1) Keep all moving parts lightly oiled. Avoid leaving excessive oil in interior of tripod head as dirt and sand will collect and interfere with positive locking of legs. The pintle bushing should be cleaned and lightly oiled. Oil should not be placed in the seating of the traversing dial, as it will cause dirt to collect and interfere with easy dial adjustment.

(2) All steel parts of the M2 tripod are given special treatment to prevent rusting. This protection may eventually wear through where sliding parts are in contact and rust will then occur. In the removal of such rust only the finest crocus cloth should be used and this sparingly.

(3) AU parts of the M2 tripod are carried in local stock by the Ordnance Department. In case of dents or bending of parts that interfere with smooth operation in mounting and dismounting the tripod, temporary repair by either filing down dents or straightening the bent part may be necessary. However, the damaged part should be replaced at the earliest opportunity by Ordnance Department personnel.

e. Spare parts. — Spare parts must be kept free of dirt and moisture and be lightly coated with oil. When first received, all traces of rust-resisting compound should be removed.

■24. CARE DURING COLD WEATHER.

a. Use aircraft instrument and machine gun lubricating oil (U. S. A. Spec. 2-27D) for a lubricant.

b. Test the gun frequently to see that it functions properly.

■25. CARE DURING GAS ATTACK.

a Cover ammunition, if practicable.

b. Oil gun and mount to prevent corrosion (effective for about 12 hours). Cosmoline resists gas corrosion more than lighter oil.

c. Cover gun with a waterproof cover, if practicable.

d. As soon as possible after a gas attack, wash all of the parts of the gun in the neutralizing solution issued for the purpose, or in its absence boiling water containing soda. Dry them and then cover them with a light coat of oil.

e. Remove all traces of gas from the ammunition with the neutralizing solution issued for the purpose, then dry thoroughly.

■26. POINT TO BE OBSERVED BEFORE, DURING AND AFTER FIRING. — The following list of points to be observed before, during, and after firing will be found useful as a guide for the proper care of the gun. It will also serve as a guide for inspection.

	Before	During	During temporary cessation	After
Bore	Look through and clean		Clean bore	Clean and lightly oil bore with a patch.
Moving Parts	Oil and test for worn or broken parts. See that parts function without excessive friction	Keep oiled	Inspect and oil; clean dirt from belt holding pawl.	Remove bolt, lock frame, barrel extension, and barrel. Clean, oil, and release firing pin.
Head Space	Make correct adjustment and test (note, par. 11). Examine barrel locking spring	Tighten if several separated cases occur.	Test	Adjust correctly and test. Examine barrel locking spring.
Rear sight and wind gage	Clean and free from grease. See that sight is in good mechanical condition. Set sight at 500 and wind gage at zero	Keep properly set	Keep properly set	Clean and oil. Set sight at 500 and wind gage at zero.

Tripod	Set tripod firmly with no lost motion. Verify that traversing bar sleeve latch is properly seated.	Keep firmly set.	Examine	Clean and oil.
Belts and ammunition	Secure sufficient supply of ammunition. Inspect ammunition. Keep belts dry	Keep belt in line with feed opening. Watch ammunition supply		Clean, repair, and refill all belts. Separate live rounds from empty cases. Inspect ammunition.
Oil	See that oilcan is full		Refill oilcan.	Refill oilcan.
Spare parts and tools	Keep clean and oiled. See that kits are complete	Keep within reach	Make repairs. Replace broken or worn parts.	Check, replace broken or missing parts, clean, and oil.

SECTION IV

MECHANICAL FUNCTIONING

■27. GENERAL. — The soldier should have a practical working knowledge of the mechanical operation of the machine gun so that he will be able to keep it in action during combat. Although many parts of the gun operate simultaneously, the subject of functioning is divided into phases to facilitate instruction. The explanation of mechanical functioning begins with the gun assumed to be loaded and ready to fire.

a. To half load. — With cover open or closed, enter belt through feedway from left to right. Pull belt through feedway until the first round is in place on the right of beltholding pawl. Close cover if open. Pull bolt fully to the rear and release it.

b. To load. — Load is executed the same as half load except that bolt is pulled to the rear and released twice.

c. To unload. — Raise cover, remove belt, pull bolt to the rear and hold it, look or feel to see that there is no ammunition in the gun, lower extractor, release bolt, lower cover, and then pull trigger.

d. To clear gun. — Raise cover, remove belt, pull bolt to the rear and hang it in its rearmost position by engaging extractor cam plunger in rear of extractor feed cam, and inspect the gun to see that there is no ammunition in it. As an additional precaution, a wooden clearing block will be inserted between the face of the bolt and the rear end of the barrel.

■28. TRIGGER ACTION. — As the trigger is pivoted, its rear end is raised if its forward end is lowered. The trigger cams on the front end of trigger, through their engagement with cams on sear, force sear down against the action of sear spring until the shoulder of firing pin is released by sear notch. The firing pin spring then forces firing pin forward to strike primer.

■29. BACKWARD MOVEMENT OF RECOILING PARTS (figs. 9 and 10). — The explosion forces the recoiling parts (barrel, barrel extension, and bolt) backward about 5/8 inch. During the first half of this movement the parts are locked together.

When the breech lock clears the breech lock cam, it is forced down by the front projections of the lock frame acting on the breech lock pin. This unlocks the bolt from the barrel extension, permitting the bolt to continue to the rear. AS the barrel extension comes to the rear, the barrel plunger spring is compressed, and the rear of the barrel extension strikes the accelerator and turns it backward.

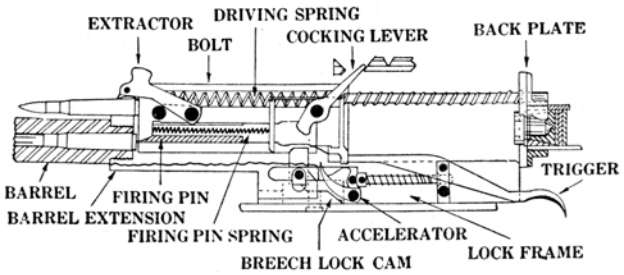


FIGURE 9.—Relation of parts in forward position.

■30. BACKWARD ACTION OF ACCELERATOR (figs. 9 and 10).— AS the accelerator turns backward its tips strike the bottom projections on the bolt and accelerate it to the rear.

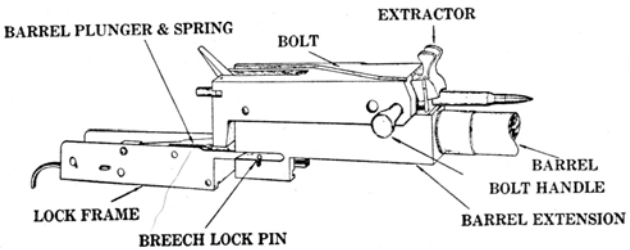


FIGURE 10.—Barrel, bolt, lock frame, and barrel extension in firing position.

The claws of the accelerator engage the shoulder of the T-lug and lock the barrel extension to the lock frame. The barrel plunger spring is thus held compressed. The accelerator stop prevents the accelerator from turning backward too far.

■31. BACKWARD MOVEMENT OF BOLT (figs. 9 and 11).—As the bolt moves backward the driving spring is compressed. The bolt brings with it a cartridge from the belt, held by the extractor, and an empty case from the chamber, held in the T-slot. The extractor cam plunger rides along the top

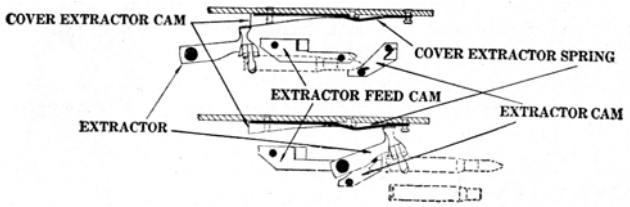


FIGURE 11.—Extracting and loading mechanism.

of the extractor cam and extractor feed cam until forced in by the beveled part of the extractor feed cam. This permits the extractor to be forced down by the cover extractor cam, and the plunger springs out behind the extractor feed cam.

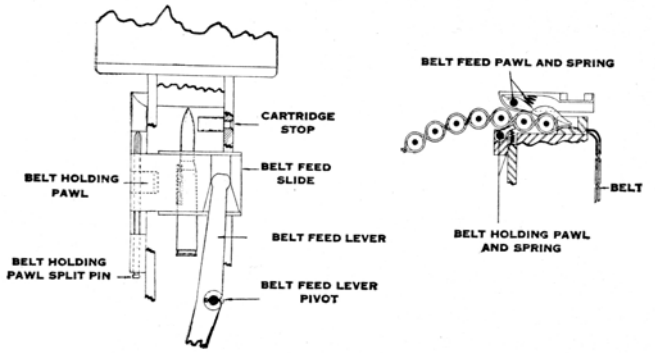


FIGURE 12.—Belt feed mechanism.

■32. FIRST ACT OF FEEDING (fig. 12).—As the bolt moves backward, the stud on the pivoted belt feed lever moves to the right in the cam groove, thus forcing the belt feed slide to the left. The belt feed pawl engages on the left of the first cartridge which is held in position by the belt holding pawl. In the event the extractor fails to, withdraw the leading round from the belt, the finger of the belt feed pawl, riding on the top of this unextracted round, will hold the feed pawl raised in a position where it cannot engage on the left of the next cartridge. It thus prevents double feeding.

■33. COCKING ACTION (fig. 13).—AS the bolt moves backward, the upper end of the cocking lever is forced forward in the cocking lever recess, bringing the lower end to the rear. The lower end brings with it the firing pin, thus compressing the firing pin spring against the sear spring pin.

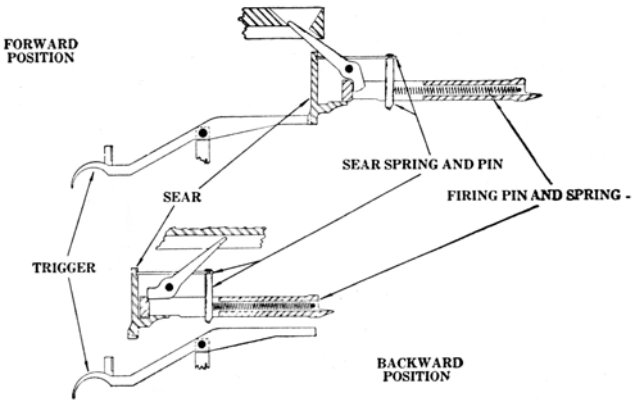


FIGURE 13.Cocking mechanism.

The shoulder of the firing pin engages the notch in the sear, which is pulled upward by the action of the sear spring, the trigger cams now being disengaged from the sear.

■34. ACTION OF DRIVING SPRING (fig. 14).—When the rear of the bolt strikes the buffer plate, its remaining force is absorbed in the coiled spiral spring and the buffer disks. The force of the rearward motion of the bolt being absorbed by the buffer mechanism, the driving spring then forces the bolt forward.

■35. FORWARD MOVEMENT OF BOLT (fig. 11).—When the bolt starts forward, the extractor is guided downward by the action of the extractor feed cam on the extractor cam plunger. This causes the extractor to force the cartridge down the T-slot in line with the chamber. The ejector knocks the empty case from the T-slot and holds the cartridge in line with the chamber. The upper end of the cocking lever is forced backward, causing the lower end to move forward away from the rear of the firing If the the pin is prematurely released, it is reengaged by the cocking lever and eased forward so that the striker cannot contact the cartridge primer until after the breach has been locked.

■36. RELEASE OF RECOILING PARTS (fig. 14) —AS the bolt goes forward its bottom projections strike the accelerator and turn it forward. This unlocks the barrel extension from the lock frame and releases the barrel plunger spring. When the accelerator has

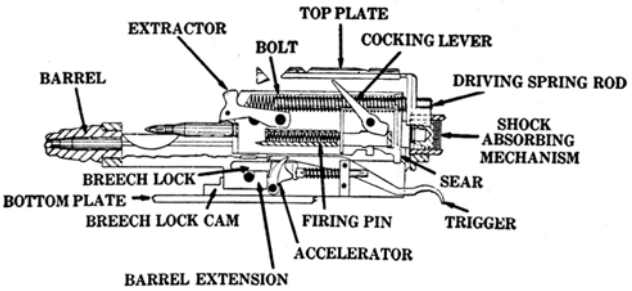


FIGURE 14.— Relation of parts in backward position.

been tripped, the barrel extension and the barrel are moved forward by the forward force of the bolt acting through the accelerator and the expansion of the barrel plunger spring.

■37. LOADING AND LOCKING ACTION (figs. 11 and 14) .—During the latter part of the forward movement of the bolt, the extractor rises as the plunger moves along the top of the extractor cam. When the extractor rises, the ejector is cammed outward, leaving the cartridge in the chamber gripped by the T-slot. The extractor grips the first round in the belt and is held down firmly by the cover extractor spring, ready to extract the round. The breech lock is forced upward by the breech lock cam and locks the breech just before the recoiling parts reach the firing position. The breech lock engages in a recess cut in the bottom of the bolt and thus locks the bolt firmly to the barrel extension and against the rear end of the barrel.

■38. SECOND ACT OF FEEDING (fig. 12) .—AS the bolt goes forward the stud on the pivoted belt feed lever moves to the left in the cam groove, forcing the slide to the right. The belt feed pawl carries the first cartridge to the right against the cartridge stops, ready to be gripped by the extractor. The next cartridge is carried over the belt holding pawl which rises behind it and holds it in position to be engaged by the belt feed pawl on its next movement to the left.

■39. TRIGGER ACTION IN AUTOMATIC FIRE (figs. 9, 13, and 14).—If the trigger is

held raised, as the sear moves forward with the bolt the trigger cams engage the sear cams and force the sear down, releasing the firing pin. The gun thus fires automatically, repeating the operations of functioning already described. The release of the firing pin actually takes place about 1/16 inch before the recoiling parts reach the forward position but after the breech is locked.

SECTION V

STOPPAGES AND IMMEDIATE ACTION

■40. DEFINITIONS.—

a. A "stoppage" is any unintentional cessation of fire.
b. "Immediate action" is the procedure used for the prompt reduction of usual stoppages.

■41. STOPPAGES.—

a. Prevention.—Stoppages will be reduced to the minimum if the gunner has a practical working knowledge of his weapon and applies the points which should be observed before firing Prevention is the best remedy for all stoppages.
b. Causes.—

(1) A stoppage will occur if the gun fails to feed, fails to load, or fails to fire.

(*a*) If the gun fails to feed, the cause for the stoppage will be found in the ammunition belt or in the feed mechanism.
(*b*) If the gun feeds but falls to load, the cause will be found in the receiver. A broken part or an obstruction on the T-slot or in the chamber is the usual cause.
(c) If the gun feeds and loads but fails to fire, the cause will be found in the firing mechanism unless the primer of the cartridge is defective.

(2) The table following includes a comprehensive list of possible stoppages. It will serve as a guide during instruction in stoppages or immediate action.

TABLE OF STOPPAGES

Stoppages	Method of preparing for instruction in immediate action and stoppages
1. Misfire due to defective primer.	1. Place a dummy cartridge in belt.
2. Short round.	2. Place a short round in belt.
3. Bulged round.	3. Insert bulged round in belt.
4. Tight loop in belt. [1]	4. Do not prepare
5. Empty loop in belt.	5. Leave an empty loop in belt.
6. Stretched or torn belt. [1]	6. Do not prepare.
7. Thin rim, permitting nose of bullet to drop below chamber. [1]	7. Do not prepare
8. Belt improperly loaded.	8. Pull cartridge partially out of belt
9. Battered or thick rim of cartridge.	9. Place a battered or thick rimmed cartridge in belt.
10. Failure to remove round from chamber	10. Place a dummy cartridge with rim filed off in the chamber.
11. Set back primer. [1]	11. Do not prepare.
12. Separated case which is removed from chamber by new round when bolt is pulled to the rear.	12. Drive the front portion of a cartridge securely on a dummy cartridge. Pull bolt to the rear and place cartridge properly on the face

	of bolt. Ease bolt forward.
13. Separated case, which stays in chamber when bolt is pulled to the rear (Do not set up loose head space.)	13. Insert the front end of a separated case in chamber and load
14. Bullet loose in cartridge case. Cartridge case extracted from belt but bullet remains in belt. [1]	14. Do not prepare.
15. Short of broken firing pin.	15. Assemble bolt with a defective firing pin or place 5 or 6 successive range dummy cartridges in belt for instruction in immediate action.
16. Weak or broken firing pin spring.	16. Same as 15.
17. Faulty engagement of firing pin and sear notch	17. Assemble bolt with defective parts.
18. Broken sear spring.	18. Same as 17.
19. Belt feed lever pivot out, worn, or broken	19. Assemble cover with defective part.
20. Bent or worn belt feed lever.	20. Same as 19.
21. Belt feed pawl spring out or weak.	21. Remove belt feed pawl spring.
22. Felt feed pawl pin out or partially out.	22. Remove belt feed pawl pin.
23. Cover extractor spring out or weak.	23. Remove cover extractor spring.
24. Belt feed lever bent up (stud on lever jumps out of cam groove.	24. Assemble with defective part.
25. Damaged extractor.	25. Same as 24.
26. Belt holding pawl out or spring weak.	26. Remove belt holding pawl.
27. Broken extractor or ejector.	27. Assemble bolt with defective part.
28. Broken or damaged T-slot, causing misalignment and buckling of cartridge as bolt moves forward or failure to extract. [1]	28. Do not prepare.
29. Weak ejector spring causing misalignment and buckling of cartridge as bolt goes forward.	29. Assemble with defective part.
30. Broken barrel extension or lock frame.	30. Assemble with defective part.
31. Defective trigger mechanism. [2]	31. Do not prepare

[1] Not prepared for instruction in immediate action.
[2] Defective trigger mechanism may cause the gun to begin firing as soon as it is loaded or continue to fire when the trigger is released. To remedy, unlatch the cover or twist the belt, unload, disassemble the gun, and replace the defective part or parts.

c. Tools used in reduction of stoppages.—The tools commonly used in the application of immediate action are the ruptured cartridge extractor, the combination tool, and the cleaning rod.

(1) (*a*) A ruptured cartridge case in the chamber prohibits the entrance of the succeeding round. The ruptured cartridge extractor, commonly called "clearing plug," is used to remove the ruptured case. This tool is furnished in two types, the cartridge form and the Mk. IV.

1. To use the cartridge form, open cover, place ruptured cartridge extractor on feedway against cartridge stops, and engage it with extractor on bolt. Holding down on extractor, load it slowly and smoothly into chamber, being careful to see that the

shoulder does not strike and bur the edge of chamber. Strike forward on bolt handle to be sure that ruptured cartridge extractor is seated in ruptured case. Pull bolt to the rear and catch ruptured cartridge extractor in the left hand as it is ejected.

2. To use the Mk. IV, draw bolt handle to the rear and latch it. Insert nose of ruptured cartridge extractor in chamber, handle up, push it forward to seat it firmly in the separated case, then pull backward on handle.

(b) Separated cases should be removed from the ruptured cartridge extractor so that it will again be ready for use. To do this, the end of the ruptured cartridge extractor must be unscrewed, the separated case taken off, and the end screwed on again.

(2) The use of the combination tool facilitates the removal of a round which is stuck on the T-slot. To remove a round from the T-slot, pull bolt fully to the rear and raise extractor. If the round does not fall out, remove it with the combination tool. If the round is above the bolt handle slot, insert screw driver end of tool through slot and under the rear end of cartridge and pry it up. If the round is below the slot, place screw driver end of tool through top of receiver into cannelure of cartridge and drive it down.

(3) The cleaning rod is used to remove a case from the chamber which has not been extracted by the bolt. To remove the case from the chamber, pull bolt fully to the rear and hold it. Remove the following round from the T-slot. Grasp cleaning rod about 6 inches from the end, insert it into muzzle, and force case from chamber. Care should be used not to damage the face of the bolt by striking it as the rod is shoved through the bore.

d. Inspection of feed mechanism.—In event of recurrent or permanent failure to feed, the feed mechanism must be inspected and the defective part replaced. This inspection should include the following:

(1) Belt feed lever and slide.—

(a) With the bolt forward, lower cover, making sure that stud on feed lever is in cam groove in the top of bolt.

(b)Press to the left on heft feed slide to remove the play and note whether or not the slide protrudes to the right of the cover about 1/32 inch.

1. If it does not, change belt feed lever and pivot.

2. If it does, and the gun has occasionally failed to feed, examine belt feed lever for excessive wear at the pivot and stud. Also see that stud projects a sufficient distance from cover to insure that it is positively positioned in cam groove in the top of bolt when cover is closed. Replace defective parts.

(2) Other parts.—If the slide positions properly and no excessive play exists, examine cover extractor spring; belt feed pawl, spring, and pin; belt holding pawl and spring; extractor including ejector; spring and cam plunger; and T-slot, to see that these parts are there, in good condition, and that springs are sufficiently strong to actuate the parts properly.

■42. IMMEDIATE ACTION.—

a. General.—The procedure prescribed in immediate action for the reduction of stoppages is based on the frequency with which the various types of stoppages occur. Execution of this procedure by the gunner will enable him to remedy the majority of

stoppages immediately without attempting to analyze the cause. Immediate action is performed by the gunner. All personnel required to fire the machine gun will be proficient in immediate action.

*b.*Procedure.—The procedure for immediate action is shown in the following diagram:

IMMEDIATE ACTION

The gun fails to rife

Pull the bolt to the rear, release it, and attempt to fire

If gun still fails to fire

Tap the cover, pull the belt to the right, hold the left hand on the belt at the point where the cartridge enters the feedway, and pull the bolt to the rear and release it.

If the belt feeds	If the belt does not feed
Attempt to fire	Raise the cover, remove the first round from the belt,
If the gun still Fails to fire	and look or feel for a cartridge in the gun
Charge the bolt	If the cartridge is:

In the gun	Not in the gun
Remove it	Reload, relay and fire

Reload, relay and fire

NOTES.—1. If the procedure outlined above does not place the gun in action, the gunner must inspect the feed mechanism and the working parts of the gun to include inspecting the chamber for a ruptured case in order to locate and reduce the stoppage.

2. II the bolt stops just short of home, frequently it can be pushed fully forward and firing continued without application of immediate action. Caution: Release the trigger before pushing the bolt forward.

3. Stoppages caused by defective feed' mechanism can sometimes be remedied temporarily by pulling the belt to the right with just sufficient force to assist the feed mechanism in positioning the leading round.

SECTION VI

TRIPOD MOUNTING

■43. LIGHT MACHINE GUN TRIPOD MOUNT M2.—

a. This tripod (fig. 15) is a simple mount for the light machine gun and is designed to furnish the gun with a stable mount embodying the maximum strength and rigidity consistent with desired light weight. It is portable, easily packed, and may be used for the delivery of accurate fire on ground targets.

b. The tripod consists of three tubular steel legs articulating in a tripod head, the two trail legs being joined and additionally supported by a traversing bar, forming a simple Atruss, and serving as a rear support for the mounted gun. The tripod head furnishes a front support for the mounted gun, it being in turn supported by the short front leg.

c. Incorporated in the tripod head (fig. 16) is a bronze bushing, mating with the tapered steel pintle permanently secured to the receiver of the light machine gun. The pintle is secured in its union with the bushing by engagement of the pintle latch of the tripod in its corresponding annular groove

of the pintle (upper groove). The pintle latch is spring actuated and is seated in its housing on the lower right surface of the tripod head.

d. A traversing dial graduated in major divisions of 100 mils and minor subdivisions of 25 mils, from zero to 6,400 mils in a clockwise direction, is fitted to the tripod head by the flange of the bronze pintle bushing. This dial is free to rotate but may be clamped in any desired position by the traversing dial clamp. This clamp is actuated by the knurled head of the traversing dial clamp which is located under the left lower surface of the tripod head. A zero index engraved on the left rear quadrant of the pintle is utilized in conjunction with the traversing dial to establish or measure horizontal angles.

e. The traversing bar provides a rear support for the mounted gun, the traversing block of the elevating and traversing mechanism mating with the bar. An additional device for measuring or establishing horizontal angles is incorporated in the scale engraved on the traversing bar. This scale is divided into 100-mil major divisions and 5-mil minor subdivisions. It has a range of 444.5 mils to the right and left.

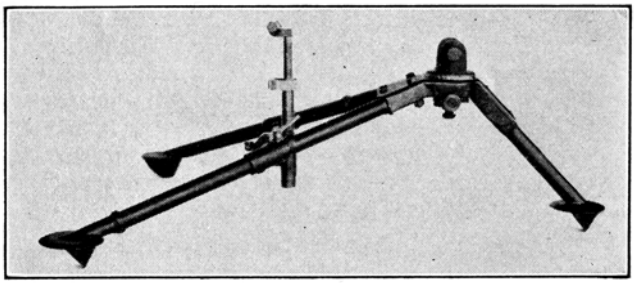


Fig. 15.—Machine gun tripod M2.

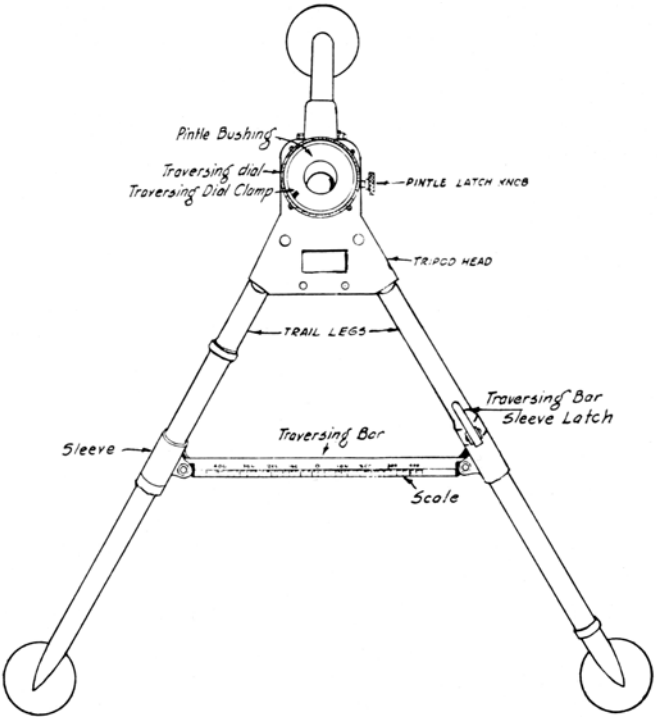


Fig 16.—Machine gun tripod M2 (schematic)

f. The traversing bar articulates in sliding sleeve devices at each end, the sleeves moving along the trail legs in mounting and dismounting the tripod. Positioning stops are incorporated on the trail legs, positively positioning the traversing bar in both the mounted and dismounted positions of the tripod. The traversing bar sleeve latch, mounted on the right trail leg, secures the traversing bar in its proper position when the tripod is mounted.

■44. DIASASSEMBLING AND ASSEMBLING OF LIGHT MACHINE GUN TRIPOD M2.—
a, The disassembly and assembly of the parts of the light machine gun tripod are not essential except to replace broken or damaged parts.

b. The front leg articulation with the tripod head, the rear leg articulations with the tripod head, and the articulations of the traversing bar with its sleeves are standard commercial bolts with lock washers and nuts to fit. Spare bolts, nuts, and washers are carried in the spare parts chest. All these unions must be kept tight to insure accurate firing.

c. The pintle latch housing is secured to the tripod head by standard commercial cap screws and suitable lock washers. Spare cap screw and washer and pintle latch spring are carried in spare parts chest.

d. The traversing bar-sleeve latch is pivoted on the right trail leg by rivet assembly.

e. The pintle bushing is of bronze and is a pressed fit into the tripod head. It may be removed by pressing it out and may be replaced by new bushing. Removal of the pintle bushing frees the traversing dial. This disassembly is preferably done by Ordnance Department personnel.

f. The traversing dial clamping mechanism, seated in its recess in the tripod head, may be removed by first removing the small hexagonal lock nut on the foot of the clamp, then the knurled clamp nut. This permits the clamp being removed from the top of the tripod head. This disassembly is preferably done by Ordnance Department personnel.

SECTION VII

ACCESSORIES

■45. PACK EQUIPMENT.—Sepcial pack equipment for use with the light machine gun consists of –

1 tripod and gun hanger
1 ammunition hanger
3 ammunition chests
1 spare parts chest
1 gun cover, canvas
1 spare barrel canvas case.

■46. HANGERS.—

a. Tripod and gun hanger.—

(1) This pack hanger is a light duralumin and steel hanger, accommodating the tripod, the light machine gun, and the spare parts chest. It fits the standard Phillips cavalry pack saddle and is carried on the right side, hung on the horizontal supporting member of the saddle by steel reinforced hooks of the main supporting members of the hanger and secured by to hold-down straps.

(2) The spare barrel canvas case with contents is habitually carried strapped to the lower horizontal member of the hanger to balance the pack load laterally. The case should be carried with the opening to the rear. When ammunition has been expended, the case with contents may be strapped to the lower horizontal member of the ammunition hanger on the left side to retain lateral balance of the pack load.

b. Ammunition hanger.—This hanger is of duralumin and steel construction, accommodating three ammunition chests, and is habitually carried on the left side of the standard Phillips cavalry pack saddle. The hanger is symmetrical longitudinally

and may be used on either side of the Phillips cavalry pack saddle in case an extra ammunition pack horse is utilized to transport ammunition for the light machine guns of a horse cavalry organization.

■47. CHESTS.—

a. Ammunition chests.—The ground light machine gun is provided with ammunition chest M1 which is constructed of light duralumin, lined with leather, equipped with a leather carrying handle; normal capacity, two 150-round fabric belts (300 rounds).

b. Spare parts chest.—The light machine-gun spare parts chest is modified from an M1 ammunition chest by the insertion of a partition accommodating one 150-round fabric belt in one side and spare parts and accessories in the other. The authorized contents of the spare parts chest are listed in SNL No. A-6.

■48. COVERS.—

a. The gun cover is s small canvas cover provided to protect the working parts of the gun in pack. It is removable without taking the gun out of pack and when so removed may be placed in an ammunition chest.

b. The spare barrel canvas cover is designed to accommodate an assembled barrel and barrel extension.

■49. BELT LOADING MACHINE (fig. 17).—

a. General.—This machine is for the rapid loading of fabric (web) belts. It is normally fastened to a table or bench while in use.

b. To fill a web feed belt with cartridges.—

(1) Fasten machine to a table or bench and turn crank (10) to the *right* until it is straight down.

(2) Release tension spring hook (28) and raise upper feed wheel (18) as far as it will go.

(3) Turn belt guide cover (56) to the right far enough to admit belt into belt guide (53) and raise upper needle bar (45) as far as it will go.

(4) A black thread running along the side of the belt indicates the side for the entrance of the cartridge. Put two cartridges by hand into the two loops of the belt nearest the end with the brass tip, and place belt in machine with first cartridge resting in top groove of lower feed wheel (22), belt passing out at back through belt guide.

(5) Return belt guide cover to place over belt (being careful to see that the belt is free to pass under it), and lower the needle bar.

(6) Turn upper feed wheel down upon belt and secure tension spring under hook.

(7) Fill feed guide with cartridges by stripping ten at a time from the paper boxes in which they are packed.

(8) Turn crank to the right and the cartridges will be fed into the belt ready for use in the gun.

(9) Place a feed box ready to receive the filled belt and at such a height that not more than 2 feet of filled belt will be suspended from the feed wheels of the machine.

c. Precautions for using the belt loading machine for web belts.—(1) Before using the machine, see that it is well oiled, all screws are tight, and that the needles are properly set. See that the points of the upper needles are about 0.01 inch vertically above the points of the lower needles.

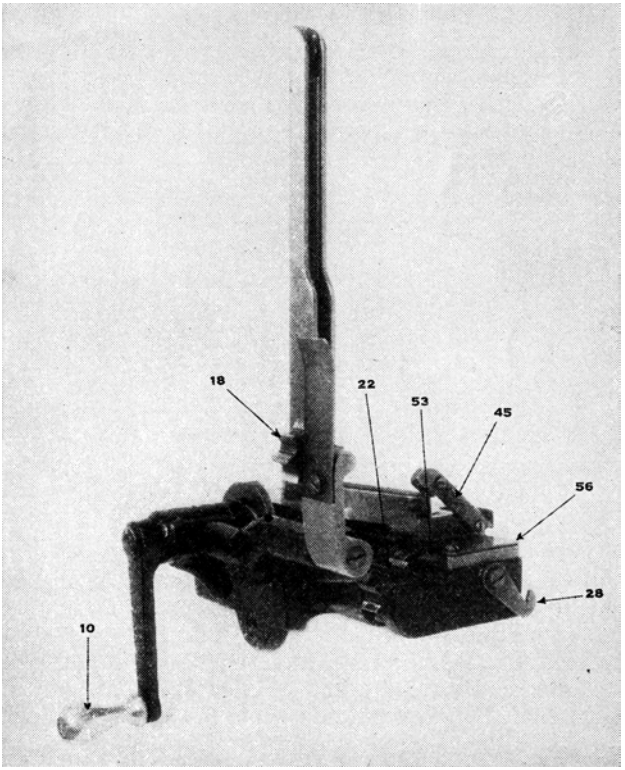


FIGURE 17.—Belt loading machine (web belts)

(2) In case of a miss in loading the belt, stop and open up machine and remove belt. Turn crank to the right until straight down, as in starting, and replace belt in machine with the *next to the last* cartridge in top groove of lower feed wheel. Close machine and proceed as before.

(3) After use, the machine should be cleaned, oiled, adjusted, and replaced in its wooden box.

■50. BLANK AMMUNITION ATTACHMENT (fig.18).—*a. General.*—The blank ammunition attachments for use with the machine gun have been developed in order to simulate fire. The attachments are designed to fire M1909 blank ammunition.

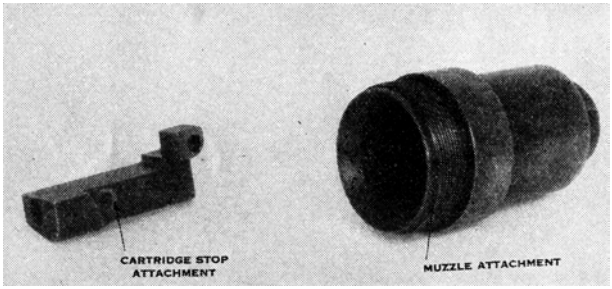


FIGURE 18.—Blank firing attachments

(1) The *cartridge stop attachment* is inserted by withdrawing the belt holding pawl split pin about ½ inch and sliding the attachment over the cartridge stop, lining up the small hole with the belt holding pawl split pin and replacing this pin. The cartridge stop attachment acts as a guide for the blank cartridge and also as a cartridge stop. Its chief use is to hold the cartridge in position in feedway so that the extractor may engage its cannelure; it also prevents the entrance of a live round into the feedway.

(2) The *muzzle attachment* is assembled to the gun by removing the front barrel bearing, sliding the threaded end of the attachment over the barrel, and screwing it into the barrel jacket.

b. Precautions.—

(1) Never attempt to use the muzzle attachment unless the cartridge stop attachment is in its proper place in the feedway.

(2) Always remove the muzzle attachment before removing the cartridge stop attachment in order to eliminate the possibility of firing ball ammunition with the muzzle attachment still in position.

(3) See that the muzzle attachment is clean inside before using.

(4) After firing blank ammunition, clean the barrel and muzzle attachment. It is absolutely essential that this be done before firing any other type of ammunition.

■51. SPARE BARREL.—A spare barrel is issued for each light machine gun. In pack, this barrel is carried on the gun and tripod hanger.

■52. ASBESTOS MITTENS.—One pare of asbestos mittens (carried by the gunner) is issued for use with each machine gun to facilitate the handling of the gun when hot, particularly when moving to a new position by hand, and in changing barrels.

Section VIII

FIRE CONTROL INSTRUMENTS

■53. FIELD GLASS, TYPE EE.—

a. Description.—

(1) The field glass, type EE (fig. 19), is an observation instrument of 6-power with an 8^0 field of view. It contains a graduated mil scale for the measurement of small horizontal and vertical angles. In field glasses of older manufacture there is also provided an inverted sight leaf scale for the rapid computation of certain fire data. The field glass complete consists of the glass and its carrying case and neck strap.

(2) The field glass proper consists of two compact prismatic telescopes pivoted about a common hinge which permits adjustment for interpupillary distances. A scale graduated every 2 millimeters from 56 to 74 permits the observer to set the telescopes to suite his eye distance when the spacing of his eyes is know. The eyepiece can be focused independently for each eye by screwing in or out. Each is provided with a diopter scale for rapid setting when the observer knows the correction for his eye. The zero graduations indicate the setting for normal eyes.

(3) The left telescope is fitted with a glass reticle (fig. 20) upon which are etched a vertical mil scale, a horizontal mil scale, and on field glasses of over manufacture, a stadia scale graduated similar to the sight leaf graduation on the service rifle, but inverted.

b. Use.—The field glass is used for observations and the measurement of small horizontal and vertical angles in mils. The inverted sight leaf, when provided, is used to pick up auxiliary aiming points in direct layering.

c. Adjustments.—

(1) *Interpupillary distance.*—To adjust the glass so that the eyepieces are the same distance apart as the pupils of the observer's eye, point the glass at the sky and open or close the hinged joint until the field of view ceases to be two overlapping circles and appears to be one sharply defined circle, then note the reading on the scale, which indicates the spacing of the observers eyes. The similar setting of any other field glass will then accommodate his eyes.

(2) *Focus of the eyepiece.*—Look through the glasses, both eyes open, at an object several hundred yards away. Place the hand over the front of one telescope and screw the eyepiece of the other in or out until the object is sharply defined. Repeat this operation for the other eye, then not the reading on each diopter scale. A similar reading on any other field glass will accommodate the same eyes.

d. Operation.—

(1) In using the glass it should be held in both hands, lightly pressed to the eyes so as to keep the relation with the eyes constant but not so as to transmit tremors of the body. The bent thumbs may cover the corners of the eyes to exclude light except that which enters the glass through the lenses. When possible, it is best to use a rest for the glass or to rest the elbows on some solid object.

(2) The mil scales are seen when looking through the glass, and by superimposing them on any objects the horizontal and vertical angles between those objects may be read.

(3) The inverted sight leaf scale is used to secure range settings on sharply defined auxiliary aiming points when the target is not clear enough for direct aiming.

e. Care.—The field glass is a rugged, serviceable instrument but it should not be abused or roughly handles. Care should be taken not to scratch or mar the lenses.

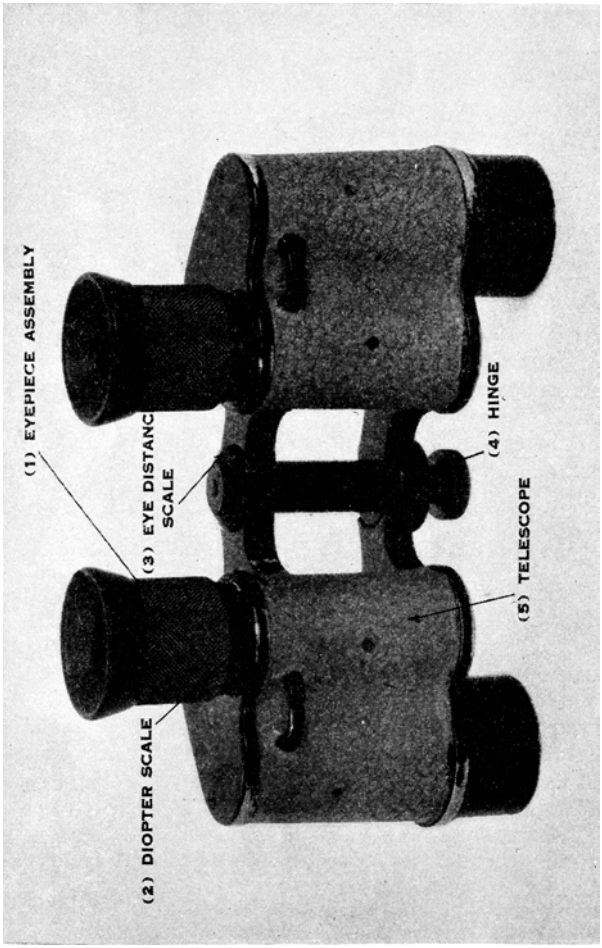
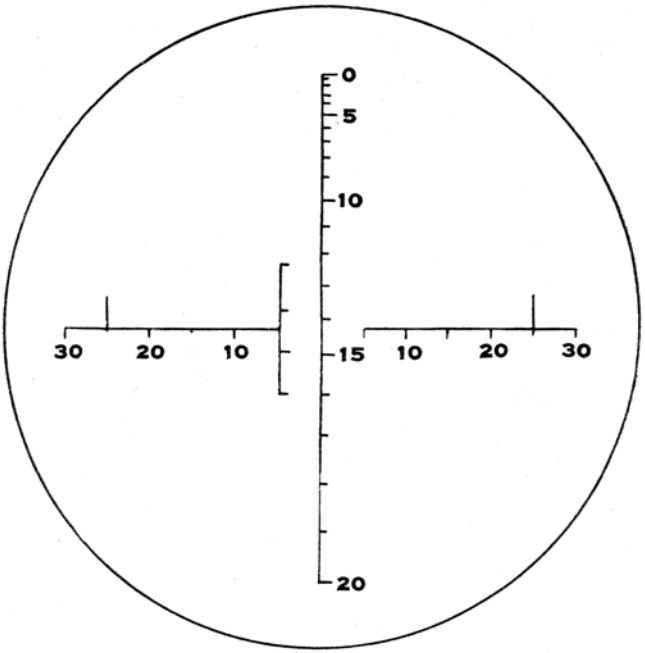
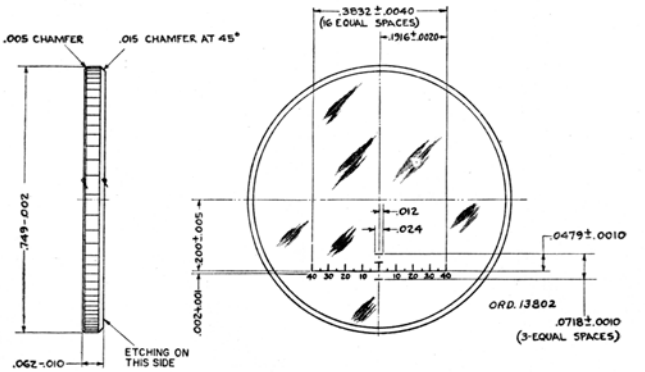


FIGURE 19.—Field glass, type EE.



① On glasses of older manufacture.



On glasses of recent manufacture.

FIGURE 20.—Reticle on field glasses.

■54. WRIST WATCH.—The wrist watch is a timepiece of the usual construction supplied with a strap for fastening to the wrist.

SECTION IX

INDIVIDUAL SAFETY PRECAUTIONS

■55. PRECAUTIONS FOR DISASSEMBLING AND ASSEMBLING GUN.—Paragraphs 12 and 13 outline the procedure for disassembly and assembly of the diring spring rod to the bolt.

In order to avoid serious injury to personnel, the precautions outlined should be carefully observed.

■56. Blank Firing Attachment.—

a. Never attempt to use the muzzle attachment unless the cartridge stop attachment is in its proper place in the feedway.

b. Always remove the muzzle attachment before removing the cartridge stop attachment in order to eliminate the possibility of firing ball ammunition with the muzzle attachment still in position.

c. See that the muzzle attachment is cleaned inside before using.

■57. HOT GUN.—

a. To avoid serious burns, care must be exercised that the barrel and jacket are not touched with bare hands. For moving the gun or disassembling a hot barrel, the asbestos mittens should be used.

b. If the barrel becomes overheated after protracted periods of firing, the gun should be cleared immediately on suspending or ceasing fire. The heat of the barrel will cause the gun to fire without pulling the trigger, if a round is left a short time in the chamber of an overheated barrel.

■58. SAFETY PRECAUTIONS ON THE RANGE.—Safety precautions for range firing are included elsewhere in this manual and are not repeated here.

SECTION X

AMMUNITION

■59. General.—The information in this section pertaining to the several types of cartridges authorized for use in the Browning machine gun, caliber .30, M1919A4, includes a description of the cartridges, means of identification, care, use, and ballistic data.

■60. CLASSIFICATION.—

a. Based upon use, the principal classification of the ammunition for this machine gun is—

(1) Ball, for use against personnel and light materiel targets.

(2) Tracer, for observation of fire and incendiary purposes.

(3) Armor piercing, for use against armored vehicles, concrete shelters, and similar bullet resistant targets.

b. Other types provided for special purposes are—

(1) Blank, for simulated fire.

(2) Dummy, for training (cartridges are inert).

■61. LOT NUMBERS.—When ammunition is manufactured, an ammunition lot number which becomes an essential part of the marking is assigned in accordance with pertinent specifications. This lot number is marked on all packing containers and on the identification card enclosed in each packing box. It is required for all purposes of record, including grading and use, reports on condition, functioning, and accidents in which the ammunition might be involved. Only those lots of grades appropriate for the weapon will be fired. Since it is impractical to mark the ammunition lot number on each individual cartridge, every effort will be made to maintain the ammunition lot number with the cartridges once they are removed from their original packing. Cartridges which have been removed from the original packing and for which the ammunition lot number has been lost are placed in grade 3. It is therefore obvious that when cartridges are removed from their original packings they should be so marked that the ammunition lot number is preserved.

■62. Grade.—AR 775-10 explains the meaning of grading for caliber .30 ammunition. Ordnance Field Service Bulletin No. 3-5 lists numerically every lot of ammunition with its correct grade as established by the office of the Chief of Ordnance. Only lots of proper grade will be fire. *Grade 3 indicates unserviceable ammunition and will not be fired.*

■63. IDENTIFICATION.—

a. Markings.—The contents of original boxes are readily identified by the markins on the box. Similar markings on the carton label identify the contents of each carton.

b. Color bands.—Color bands painted on the sides and ends of the packing boxes further identify the various types of ammunition. The following color bands are used:

Cartridge, ball	Red.
Cartridge, ball , and cartridge tracer, In metallic link belts.[1]	Composite band of yellow, red, and green stripes (yellow on left, red in center, green on right).
Cartridge, tracer	Green on yellow.
Cartridge, armor piercing	Blue on yellow.
Cartridge blank	Blue
Cartridge, dummy	Green.

[1]Special packing for Air Corps, not for use in the Browning machine gun, caliber .30, M1919A4

c. Types and models of caliber .30 cartridges.—When removed from their original packing containers, the cartridges may be identified, except as to ammunition lot number and grade, by physical characteristics described below:

(1) *Ball.*—All models of caliber .30 ball ammunition, except the M1906, have bullets with gilding metal jackets. The jacket of the M1906 bullet is cupronickel which has a silvery appearance. The gilding metal jacket of the M2 ammunition is tin coated and hence resembles the M1906 bullet in appearance. The gilding metal jacket of the M1 bullet is copper colored.

(2) *Tracer.*—Caliber .30 tracer ammunition may be identified by the nose of the bullet which is painted red for a distance of approximately ¼ inch from the tip.

(3) *Armor Piercing.*—All models of caliber .30 armor piercing ammunition may be distinguished by the nose of the bullet which is painted black for a distance of approximately ¼ inch from the tip. The bullets have gilding metal jackets.

(4) *Blank.*—Blank ammunition may be identified by the absence of a bullet in the cartridge case.

(5) *Dummy.*—The caliber .30 corrugated dummy cartridge may be identified by six longitudinal corrugations and a hole in the cartridge case.

■64. Care, Handling and Preservation.—

a. Small arms ammunition as compared with other types is not dangerous to handle. Care, however, must be observed to keep the boxes from becoming broken or damaged. All broken boxes must be immediately repaired and careful attention given so that all markings are transferred to the new parts of the box. The metal liner should be air-tested and sealed if equipment for this work is available.

b. Ammunition boxes should not be opened until the ammunition is required for use. Ammunition removed from the airtight container, particularly in damp climates, is apt to corrode, thereby causing the ammunition to become unserviceable.

c. Protect the ammunition carefully from mud, sand, dirt, and water. If it gets wet or dirty, wipe it off at once. Verdigris or light corrosion, if it forms on cartridges, should be wiped off. However, cartridges should not be polished to make them look better or brighter.

d. The use of oil or grease on cartridges is dangerous and is prohibited.

e. Do not fire dented cartridges, cartridges with loose bullets, or otherwise defective rounds.

f. Do not allow the ammunition to be exposed to the direct rays of the sun for any length of time. This is liable to effect its firing qualities seriously.

g. No caliber .30 ammunition will be fired until it has been positively identified by ammunition lot number and grade as published in the latest revision or change to Ordnance Field Service Bulletin no. 3-5.

■65. Storage.—

a. Whenever practicable, small arms ammunition should be stored under cover. This applies particularly to tracer ammunition which is subject to rapid deterioration if it becomes damp. It may even ignite spontaneously. Should it become necessary to leave small arms ammunition in the open, it should be raised on dunnage at least 6 inches from the ground and the pile covered with a double thickness of paulin. Suitable trenches should be dug to prevent water flowing under the pile.

b. If practicable, tracer ammunition should be stored separately from other ammunition.

c. If fired into or placed in a fire, small arms ammunition does not explode violently. There are small individual explosions of each cartridge, the case flying in one direction and the bullet in another. In case of fire it is advisable to keep those not engaged in fighting the fire at least 200 yards from the fire and have them lie on the ground. It is unlikely that the bullets and cases will fly over 200 yards.

■66. BALLISTIC DATA.—The approximate maximum ranges and average velocities and the several types of models of caliber .30 ammunition authorized for use in the machine gun, caliber .30, Browning, M1919A4, are shown below:

Type and model of caliber .30 cartridges	Average velocity 78 feet from muzzle (feet per second)	Approximate maximum range (yards)
Ball, M2	2,630	3,450
Ball, M1	2,600	5,500
Ball, M1906	2,640	3,450
Tracer, M1	[1]2,650	3,450
Armor piercing, M2	[2]2,730	4,500
Armor piercing, M1	[1]3,260	4,000
Armor piercing, M1922	2,600	4,400
Blank, M1909		20
Dummy, M1906 (Corrugated)		

[1] Approximate.

[2] At 53 feet from muzzle

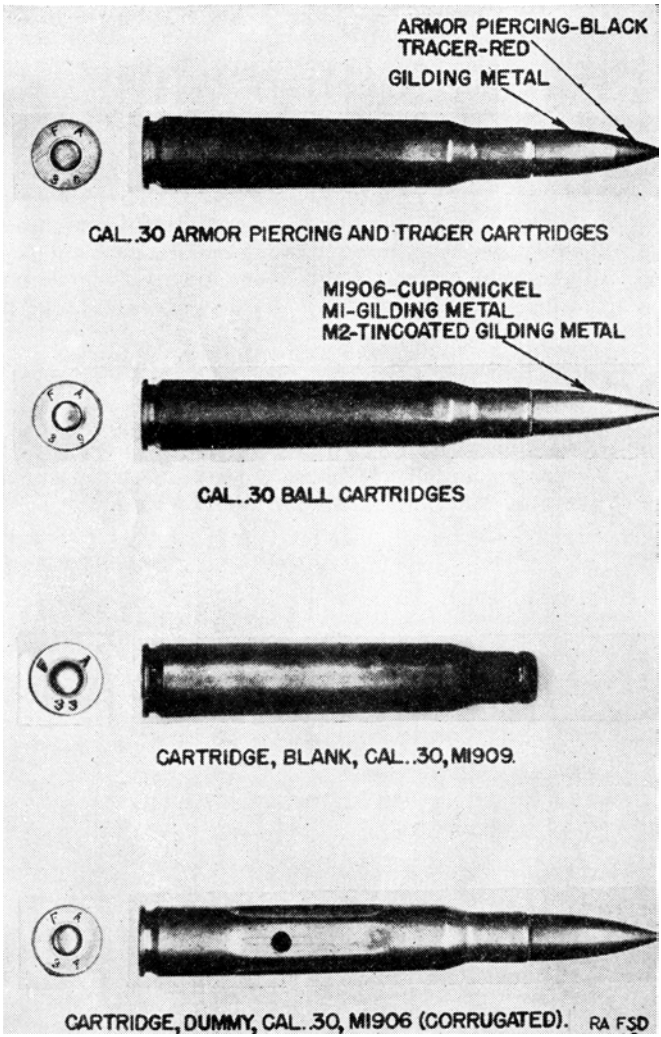


FIGURE 21.—Caliber .30 cartridges.

Document Prepared by James Jones (Teps71)