WAR DEPARTMENT TECHNICAL MANUAL

TM 9-225

This manual supersedes TM 9-225, 15 December 1943, including C1, 24 May 1945

BROWNING MACHINE GUN CALIBER .50, AN-M2 AIRCRAFT, BASIC

WAR DEPARTMENT • JANUARY 1947

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PART ONE
INTRODUCTION

Section I. GENERAL

1. Scope

a. This Technical Manual is published for the information of the using arms and services. It contains information required for the identification, use, and operation of the basic aircraft Browning machine gun, cal..50, AN–M2 and the equipment and ammunition used therewith.

b. In all cases where the nature of the repair, modification, or adjustment is beyond the scope or facilities of the unit, the responsible ordnance service should be informed, so that trained personnel with suitable tools and equipment may be provided, or proper instructions issued.

2. Records

a. FIELD REPORT OF ACCIDENTS. When an accident involving ammunition occurs during practice, the incident will be reported as prescribed in AR 750–10 by the ordnance officer under whose supervision the ammunition is maintained or issued. Where practicable, reports covering malfunctions of ammunition in combat will be made to the Chief of Ordnance, giving the type of malfunction, the type of ammunition, the lot number of the complete rounds, and the condition under which fired.

b. UNSATISFACTORY REPORT. Suggestions for improvement in manufacture, design, maintenance, safety, and efficiency of operation prompted by chronic failure or malfunction of the weapon, spare parts, or equipment should be reported on WD AAF Form 54 (Unsatisfactory Report) with all pertinent information necessary to initiate corrective action. This form will also be used for reporting complaints on the application or effect of prescribed lubricants, and preserving materials and, when so used, will contain identifying details on both the products and the associated equip-

ment. The report should be forwarded to: Commanding General, Headquarters Air Matériel Service Command, Wright Field, Dayton, Ohio, with carbon copy direct to the Office, Chief of Ordnance, Field Service, Maintenance Division. If WD AAF Form 54 is not available, one may be improvised by referring to sample in TM 37–250.

Section II. DESCRIPTION AND DATA

3. General

The basic aircraft Browning machine gun, cal..50, AN–M2 (figs. 1, 2, 3, and 4) is an automatic, recoil-operated, belt-fed, air-cooled machine gun. The metallic link disintegrating belt is used in all firing of the gun. This gun is designed for all cal..50 aircraft machine gun installations. By properly repositioning some of the component parts, ammunition may be fed into the gun from either the right or the left side.

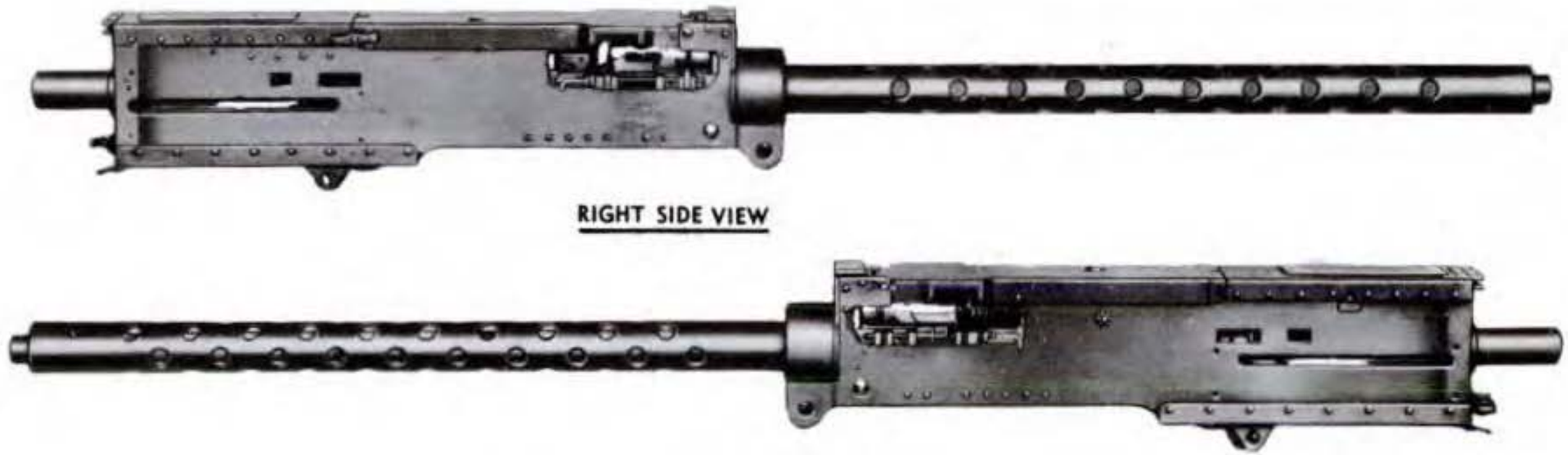
4. Current Modifications

a. Cocking lever B9718A has been installed in many guns for some time. This lever is similar to the old design lever B9718 but has a shoulder on the right side which prevents assembling the lever into the bolt backwards. A comparison of the two levers is shown in figure 5.

b. A new type belt feed slide assembly to assist in increasing the belt pull has been installed on a large number of these guns. This slide can be distinguished from the old slide by a 1/8-inch hole drilled through its face. When there is difficulty in feeding or when the gun will not lift the required ammunition load with the old type slide, the new slide B261110 should be used.

c. A split belt holding pawl (fig. 6) is now being installed which assists in increasing the belt pull. This pawl group consists of a right-hand belt holding pawl, left-hand belt holding pawl, belt holding pawl sleeve, and twin springs.

d. A positive accelerator stop group (fig. 7) is now being used to prevent the possibility of the tips of the accelerator jamming in the breech lock slot in the bolt during firing. The group is composed of an accelerator stop and an accelerator stop lock and is used in place of the sear stop assembly. A new type notched breech lock (fig. 8) must be used when the accelerator stop group is assembled.



RIGHT SIDE VIEW

LEFT SIDE VIEW

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Figure 1. Browning machine gun, cal..50, AN–M2, aircraft, basic.

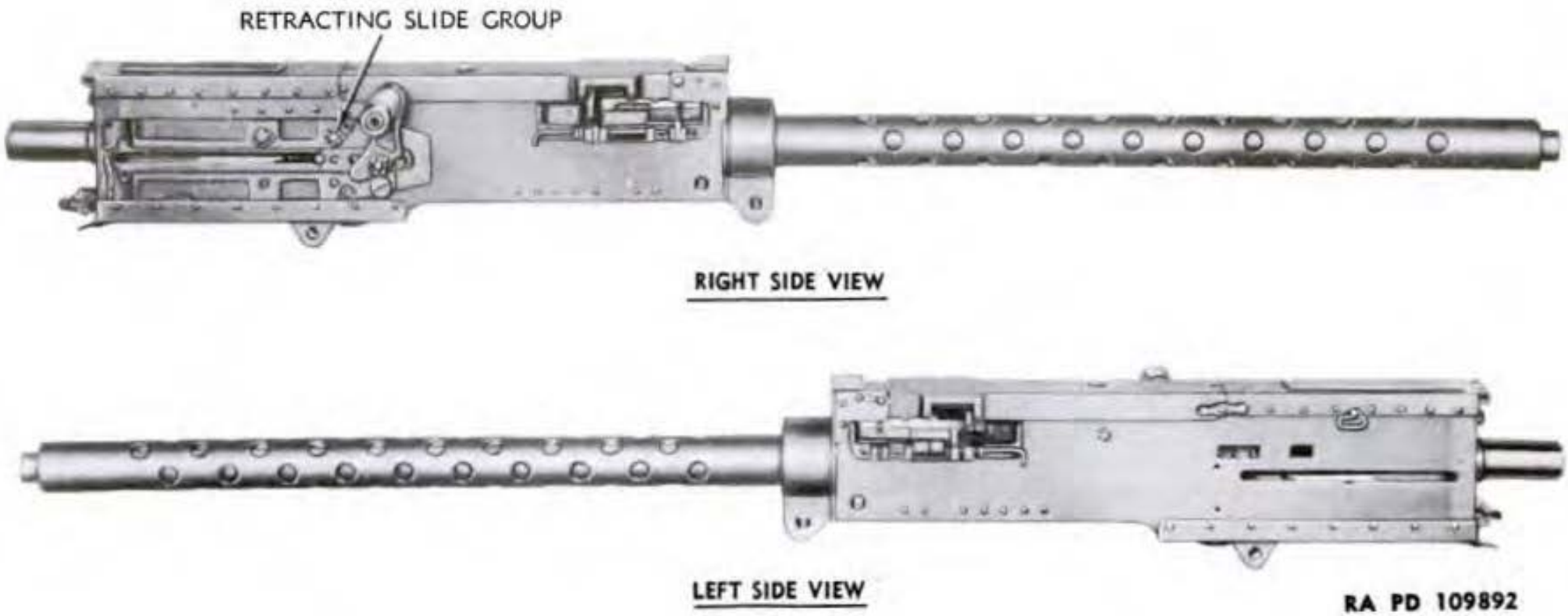

Figure 2. Browning machine gun, cal..50, AN–M2, aircraft, basic—with retracting slide group.

Figure 3. Browning machine gun, cal..50, AN–M2, aircraft, basic—with operating slide group.

Figure 4. Browning machine gun, cal..50, AN–M2, aircraft, basic—with retracting slide group and spade grip back plate.

e. A new type trigger bar pin assembly has been designed which can be removed without first having to remove the retracting slide, when it is assembled on the left side of the gun. The new type pin has a wire lock which is securely held against the re-

Figure 5. Comparison of cocking levers.

Figure 6. Split belt holding pawl group.

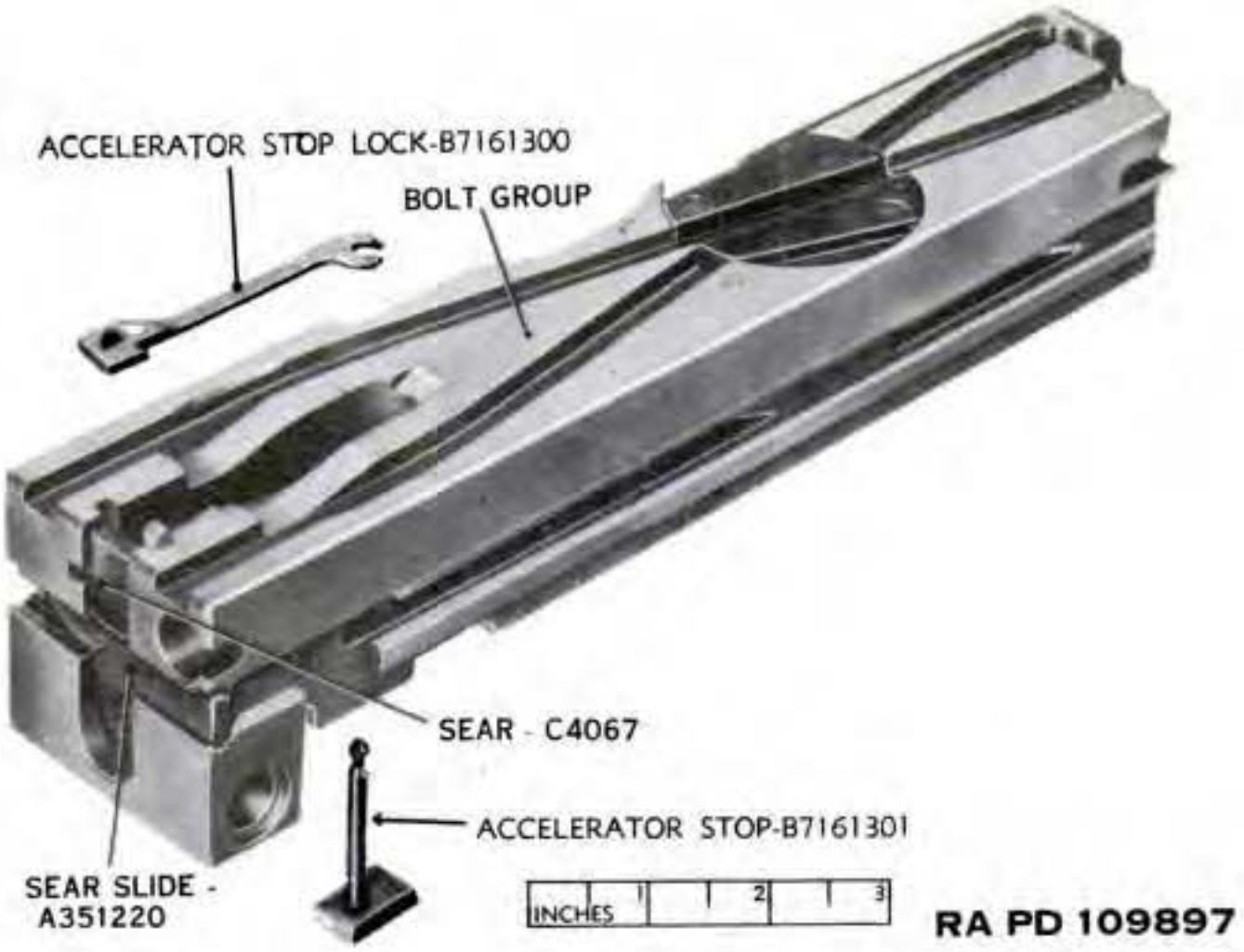

Figure 7. Accelerator stop and lock—exploded view.

Figure 8. New type notched breech lock.

ceiver. This design of pin is preferred to the type which has a leaf lock held against the receiver by a ball and spring within the body of the pin. Both pins are shown in figure 9.

f. The accelerator has been modified by extending its angular locking slot straight through the accelerator. (See fig. 10.) This modification prevents a misfit of the end of the oil buffer tube lock in the locking slot of the accelerator.

Figure 9. Comparison of trigger bar pins.

Figure 10. Accelerator with angular locking slot.

g. A special cover latch is used in some installations in addition to the standard latch. This latch protrudes through the top of the cover (fig. 11) and enables the operator to open the cover, when link jams, etc. occur, without removing his gloves.

h. A new type belt holding pawl pin B7313328 is now being used. This pin is similar to pin B7160030 but has a loop in the

retaining spring for more positive retention. A comparison of belt holding pawl pins B7160030 (standard and alternate manufacture) and B7313328 is shown in figure 12.

i. An adjustable trigger bar stop assembly is now being installed on some guns (fig. 13). It facilitates adjustment of timing where a trigger bar is used.

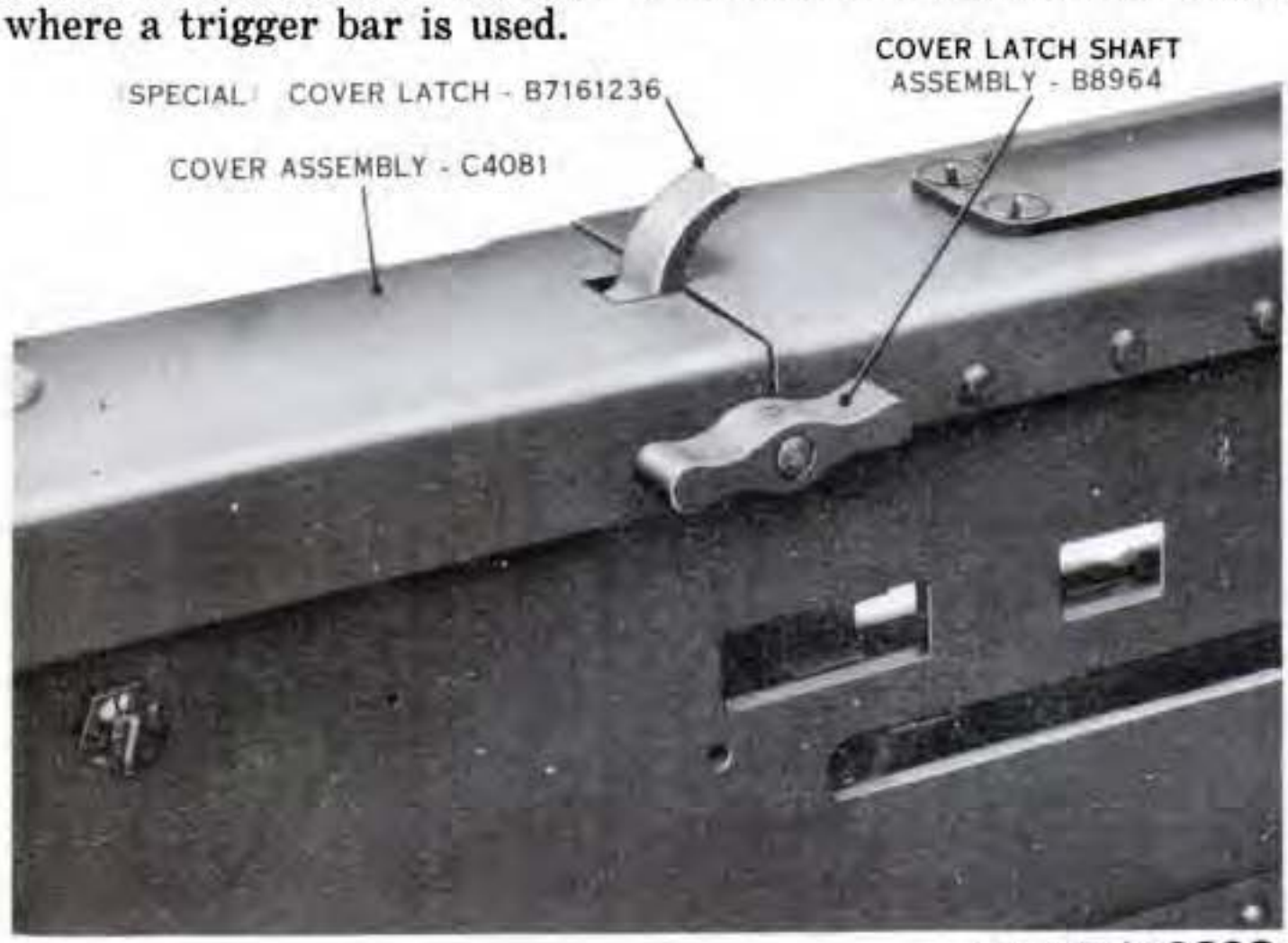

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Figure 11. Special cover latch assembled to gun.

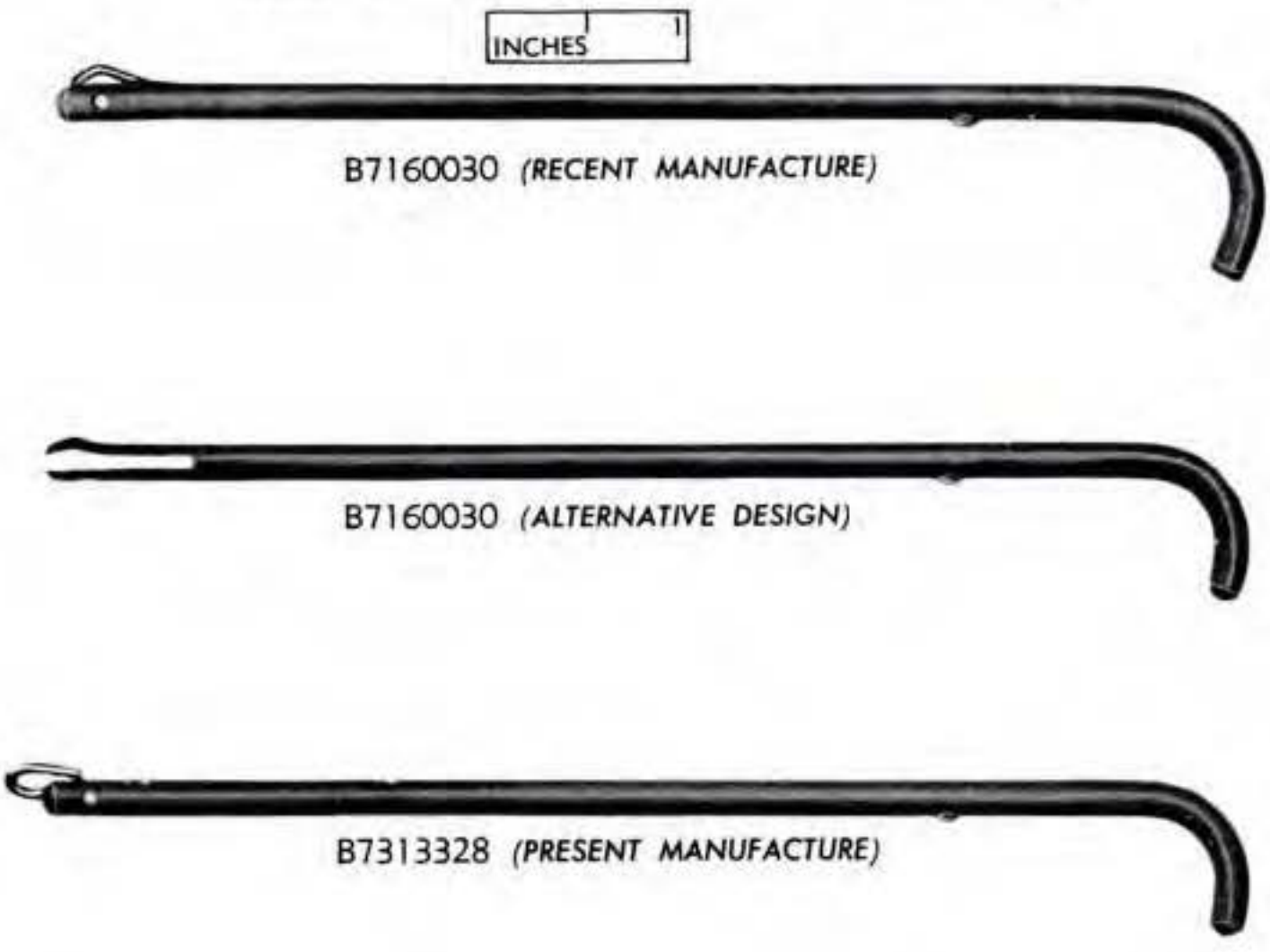

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Figure 12. Comparison of belt holding pawl pins.

Figure 13. Adjustable trigger bar stop assembly.

j. A new design trigger bar is being assembled in guns of recent manufacture. This bar has two principal points of improvement. It has a slight offset at the rear end which insures better contact with the back plate solenoid, and its stiffer construction eliminates the flexibility which often causes variation in timing and possible riding on top of the bolt. The early design trigger bar B8944, modified design B257592 (revisions 1 to 4), and recent design B257592 (revisions 5 and above) are shown for comparison in figure 14. The modified bar designated as B257592 (revisions 1 to 4) should not be confused with the recent (new) design bar

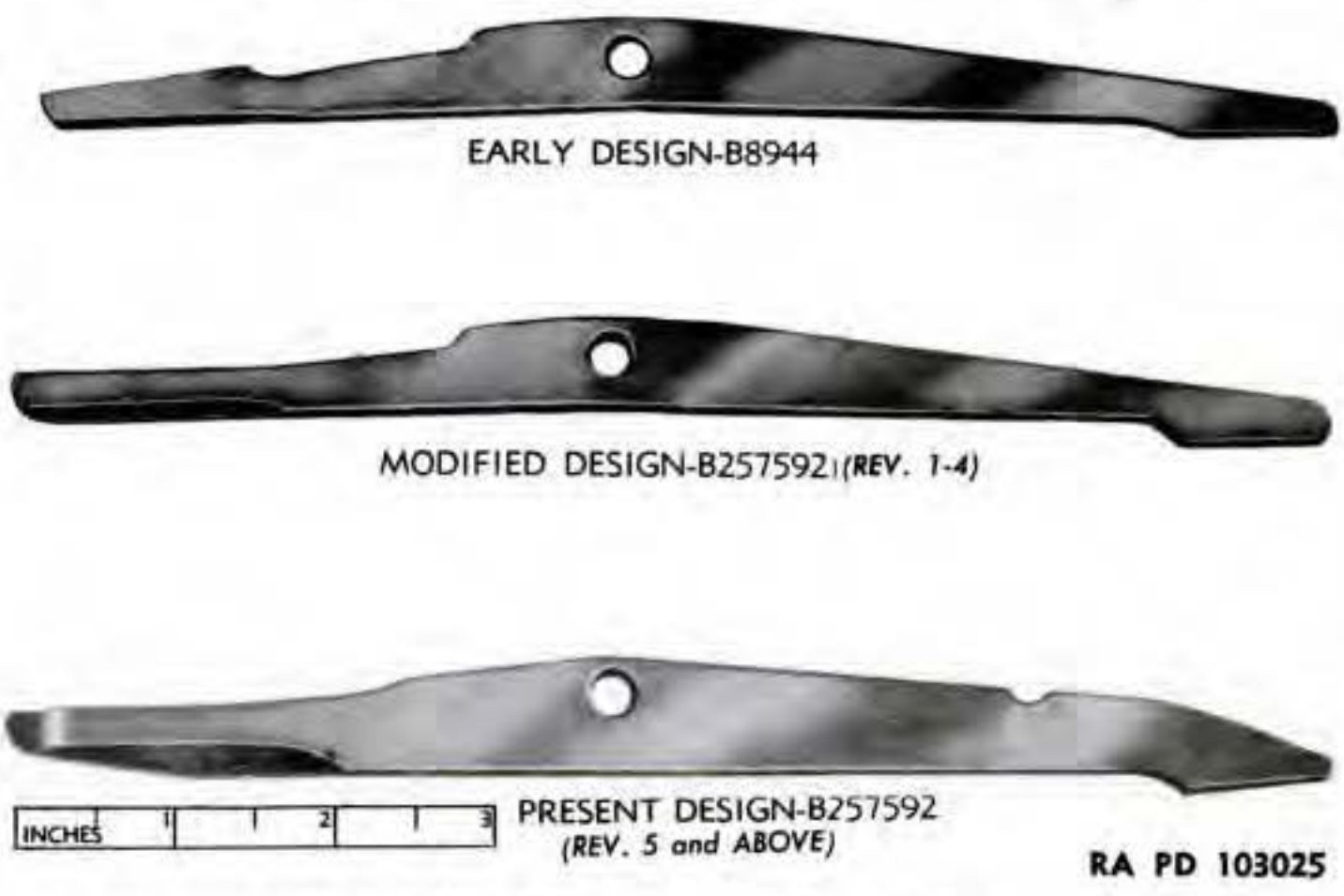

Figure 14. Comparison of trigger bars.

B257592 (revisions ɔ and above) which is easily identified by greater depth, the notch in the top forward edge, and the offset rear end.

k. A new design cocking lever pin is now being installed in all guns. This pin differs from the early design pin in that a spring is assembled in the flat of the head for the purpose of assisting retention in the bolt. Two alternative design pins have also been used. These pins do not have the spring but the shank is split to aid retention. The standard and first and second alternative design pins are shown in figure 15.

l. An auxiliary feedway device is now being provided to correct the following condition which occurs in some installations: The bases of the cartridges are tightly pushed together in the feedway of the gun compelling the ejector to force its way between the cases. This forcing action retards and jars the bolt momentarily, occasionally causing premature release of the firing pin. This, in turn, prevents the extraction of a new cartridge from the belt and results in stoppage of the gun. The auxiliary feedway device which is being provided for guns in these installations fits into the feedway of the gun and is secured by the belt holding pawl pin. It automatically separates the bases of the cartridges, permitting the ejector to pass between without difficulty.

Figure 15. Comparison of cocking lever pins.

5. Serial Number Information

One serial number is required for records concerning these weapons. The serial number is located on the right side plate just

below the feedway (fig. 16) and on the top plate (fig. 17). The size of the trunnion block shim used at manufacture is stamped on the side plate and trunnion adapter. (See fig. 16.)

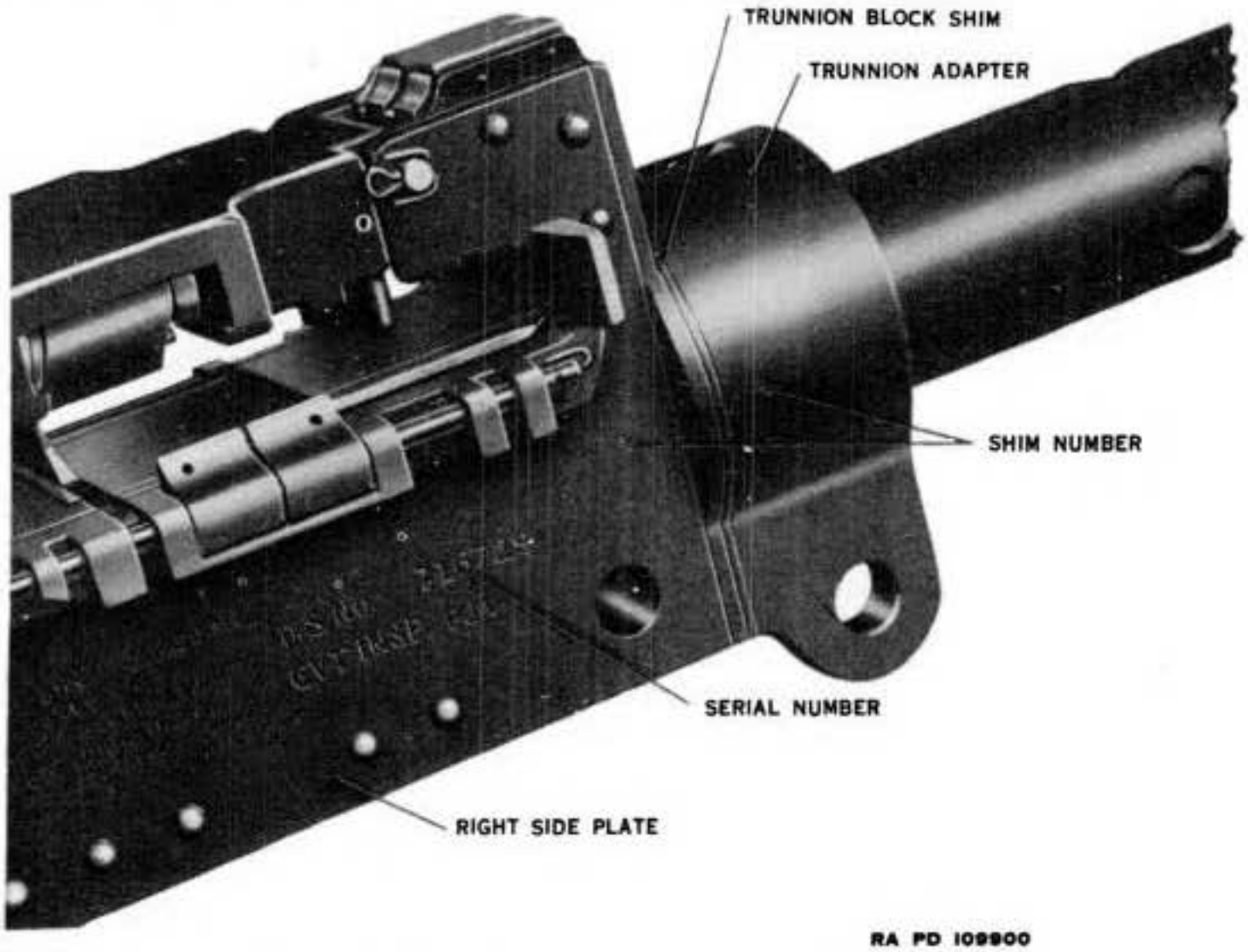

Figure 16. Location of serial and shim number on side plate.

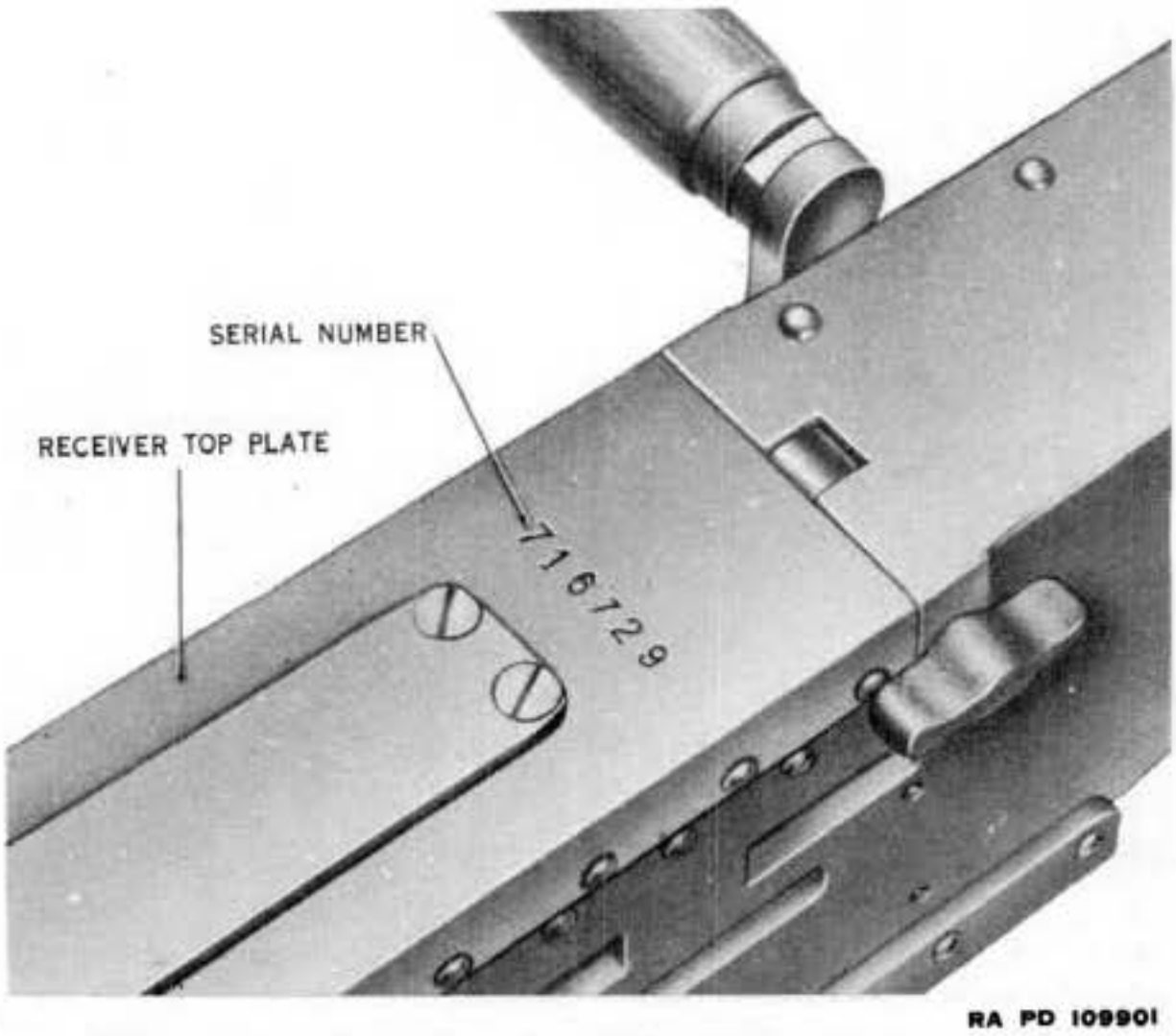

Figure 17. Location of serial number on top plate.

6. Tabulated Data

Data pertaining to basic aircraft Browning machine gun, cal. .50, AN-M2.

a. GENERAL.

Weight of basic gun	61.00 lb.
Weight of equipment:	
Operating slide group assembly	1.62 lb.
Retracting slide group assembly	3.13 lb.
Back plate with spade grips	3.88 lb.
Fixed back plate (included in weight of basic gun)	2.56 lb.
Weight of barrel	9.80 lb.
Length of barrel	36.00 in.
Length overall—basic gun	56.25 in.
Length overall—retracting slide mounted and extended	56.25 in.
Length overall—operating slide mounted and extended	64.50 in.
Length overall—operating slide mounted and forward	57.00 in.
Rifling:	
Length	31.92 in.
Number of grooves	8
Twist (direction)	right-hand
Twist (one turn in)	15.00 in.
Operation	Short recoil
Feed	Disintegrating link belt
Capacity of feeding device	As desired
Sights	Not furnished by Ordnance Department
Firing pin release:	
Pressure applied to sear	23 lb. max.
Pressure applied to sear slide	35 lb. max.
Cooling	Air

b. PERFORMANCE.

Rate of fire	750 to 850 rounds per minute

PART TWO
OPERATING INSTRUCTIONS

Section III. GENERAL

7. Scope

Part Two contains information for the guidance of the personnel responsible for the operation of this equipment. It contains information on the preliminary servicing of the gun, description and location of the controls, operation under usual (moderate) and under unusual atmospheric conditions, and demolition to prevent enemy use.

Section IV. SERVICE UPON RECEIPT OF EQUIPMENT

8. General

a. Upon receipt of new or used matériel, it is the responsibility of the officer in charge to ascertain whether it is complete and in sound operating condition. A record should be made of any missing parts and of any malfunctions, and any such conditions should be corrected as quickly as possible. Equipment should not be disassembled except under the supervision of trained personnel.

b. Attention should be given to small and minor parts, as these are the more likely to become lost and may seriously affect the proper functioning of the matériel.

c. The matériel should be cleaned and prepared for service in accordance with instructions given in paragraphs 9 or 10.

9. New Equipment

a. Guns received from storage are coated completely with a corrosion preventive and will be serviced as follows:

(1) Disassemble to the extent prescribed in paragraph 11.

(2) Clean by removing corrosion preventive or foreign matter as outlined in paragraphs 14 or 16.

(3) Apply a light film of oil to all parts and assemble. (See pars. 44 through 46 for lubrication instructions.)

(4) Check and adjust the head space as described in paragraph 24.

(5) Check and adjust timing as described in paragraph 25.

b. Check matériel with modification record and storage cards to make sure all modifications and repairs have been made. A list of current Modification Work Orders is published quarterly in FM 21–6.

c. Check general condition and appearance of matériel.

d. Make operational check of gun as described in paragraph 48*f*.

10. Used Equipment

Service used equipment in the same manner as new equipment as described in paragraph 9. In addition, check the following points:

a. Check matériel for worn, cracked, rusted, loose, and missing parts and correct any deficiencies.

b. Examine the oil buffer and fill if necessary. (See paragraph 88*d* for procedure.)

11. Disassembly of Gun Prior to Cleaning

a. Disassemble components. (See cover group, pars. 100 through 105.)

b. Remove the driving spring group. (See pars. 72 through 77.)

c. Remove the back plate group. (See par. 67.) (It is not necessary to disassemble.)

d. Remove and disassemble the bolt group. (See pars. 78 through 83.) It is not recommended that the ejector be removed from the extractor assembly.

e. Detach the oil buffer body from the barrel extension. (See par. 85.) Remove the oil buffer assembly from the body and remove the oil buffer spring and guide. (See par. 87.) Remove the accelerator from the oil buffer body. (See par. 87.)

f. Remove the barrel and barrel extension group (par. 91), unscrew the barrel extension from the barrel, and take out the breech lock (par. 93).

g. Remove the (extractor) switch and switch spring, the belt holding pawl, cartridge stops, and link stripper. (See par. 107.)

12. Cleaning and Preserving Materials

The following cleaners and preservatives are required for use with this matériel. See TM 9–850 for information additional to that contained in this manual on the use of these materials. See WD CAT ORD 3, SNL K–1, and WD CAT ORD 3, SNL K–2, for latest specifications.

BORAX, powdered.
CLEANER, rifle bore.
CLOTH, bore cleaning.
CLOTH, crocus.
CLOTH, wiping, cotton.
COMPOUND, cleaning, alkaline.
PATCHES, cut, cotton flannel.
SOAP, or issue.
SODA-ASH.
SOLVENT, dry cleaning.

13. Cleaning—General Instructions

a. Guns received from storage should be cleaned with dry cleaning solvent (par. 14), or, if solvent is not available, with hot water solution (par. 16).

b. Guns in use should be cleaned with rifle bore cleaner (par. 15), or, if bore cleaner is not available, with a hot water solution (par. 16). Dry cleaning solvent may be used to clean parts other than the bore and chamber if rifle bore cleaner or hot water solutions are not available.

c. Components of each gun should be cleaned separately, for while like parts are interchangeable, the parts originally assembled to the gun work best together.

d. Hot water solutions have certain limitations when used to clean component parts which have a phosphate finish such as "Parco-lubrite" or "Parkerized." A phosphote finish may be distinguished by its dull-gray or dull-black color. Strong alkaline solutions will deteriorate phosphate finishes to the extent that the corrosion-preventive quality will be reduced or removed. Mild soap solutions or weak alkaline solutions may be used without harmful results provided they are followed with a very thorough rinsing in clean, hot water to completely remove all traces of the alkaline materials.

e. Never use a solution of water and lye or any other caustic to clean gun parts.

f. Never use carbon tetrachloride or trichlorethylene, except in commercial degreasers as these solvents may cause rust. Gasoline and benzine are prohibited as they present a fire hazard.

g. Cleaned parts must be lubricated (pars. 44 through 46) immediately to prevent corrosion. Gloves should be worn when handling cleaned parts before lubrication as acid from the hands promotes quick rusting. This is particularly true when dry cleaning solvent is used. If rubber gloves are used they will be deteriorated by dry cleaning solvent.

14. Cleaning with Dry Cleaning Solvent

a. Refer to general instruction for cleaning covered in paragraph 13.

b. It is recommended that excess corrosion preventive be scraped from the parts prior to use of the dry cleaning solvent. The remaining compound should then be removed with the solvent. Apply solvent to large parts with cloth swabs and as a bath for small parts. (See fig. 18.) Suitable brushes may be used if available. Clean bore and chamber using patches assembled to the cleaning rod and saturated with dry cleaning solvent. Dry cleaning solvent must not be used to clean the barrel after firing because it will not readily dissolve the corrosive salts from the primer composition. These salts are readily dissolved by rifle bore cleaner.

RA PD 80250

Figure 18. Using a bath for cleaning small parts.

c. After cleaning with solvent, dry all parts thoroughly with a clean, lintless wiping cloth or compressed air. Dry bore and chamber using clean dry patches assembled to the cleaning rod. Immediately lubricate all parts by applying a light film of the oil prescribed in paragraphs 44 through 46 with a clean lintless cloth which has been dipped in the oil and then wrung out. Lubricate the bore and chamber using cleaning rod and clean patches which have been dipped in the oil and then wrung out. ***Caution.*** Unless special filters or moisture traps are used, compressed air will contain moisture and must not be used.

15. Cleaning with Rifle Bore Cleaner

a. Refer to general instructions for cleaning covered in paragraph 13.

b. Rifle bore cleaner is a water-in-oil emulsion which is used primarily for cleaning the bore and chamber. It contains volatile solvents which evaporate above +150° F., thus reducing the cleaning action. Therefore, after firing, the bore should not be cleaned until the barrel has cooled to the point where it can be touched with the bare hand. Maximum cleaning efficiency and protection against rusting will be obtained when rifle bore cleaner is used undiluted. When necessary to conserve the supply it may be diluted up to 50 percent with water without materially reducing the cleaning action, provided prevailing temperatures are above +32° F. The rust-preventive qualities will be reduced, however, and surfaces so cleaned must be immediately dried and coated with oil. Rifle bore cleaner will also be used in lieu of hot water solutions or dry cleaning solvent to clean other parts of the gun. The cleaner is not a lubricant. Parts requiring lubrication must be dried after cleaning, and the prescribed lubricant (pars. 44 through 46) applied.

c. To clean bore and chamber place two clean patches in the slot of the cleaning rod; saturate the patches with the cleaner, and move the rod back and forth through the barrel several times. If rust spots or foreign matter are not removed by the cleaner attach the cleaning brush M4 to the cleaning rod and scrub the lands and grooves. The chamber cleaning brush M6 is used to clean the chamber. Apply rifle bore cleaner to large parts with cloth swabs and as a bath for small parts. Suitable brushes may be used if available.

d. If it is anticipated that the weapon will be used or recleaned within approximately 24 to 48 hours, lubrication for rust prevention will not be necessary. If the weapon is not to be used or recleaned within 24 to 48 hours dry and lubricate as outlined in paragraphs 44 through 46.

16. Cleaning with Hot Water Solutions

a. GENERAL INSTRUCTIONS. See paragraph 13.

b. PREPARATION OF HOT WATER SOLUTIONS. (1) When it is desired to use hot water cleaning methods to clean phosphate finished guns or parts, any one of the materials in proportions indicated below can be used safely. No other materials will be used without approval of competent authority.

Borax—6 to 10 ounces to each gallon of water.
Issue soap—not more than 2 ounces to each gallon of water.

(2) For cleaning guns and parts not phosphate finished, any one of the following materials in proportions indicated below may be used.

Borax—½ to 1 pound to each gallon of water.

Soda-ash—½ to 1 pound to each gallon of water.

Issue Soap—¼ pound to each gallon of water.

Alkaline cleaning compound—1/3 pound to each gallon of water.

Note: Alkaline cleaning compound, or soda ash, will not be used in any proportion to clean guns with a phosphate finish.

(3) Practical experience indicates that increasing the temperature of a hot water solution provides greater cleaning efficiency than increasing the amount of materials used therein. Best results are obtained with a temperature of 180° to 200° F.

c. CLEANING GUNS RECEIVED FROM STORAGE. (1) Disassemble the gun as described in paragraph 11 and place all the small parts within a fine mesh wire basket. Lower the basket, as well as the barrel and receiver and barrel jacket, into the hot water solution until completely submerged. Skim the compound off the top of the water at frequent intervals to insure that particles of the compound will not adhere to the clean gun parts when they are removed from the bath. Remove the parts from the bath after approximately one-half hour and immediately rinse in clear warm water. Dry and lubricate for rust prevention as explained in paragraphs 44 through 46.

(2) Special care must be observed when cleaning the firing spring extension assembly, tunnel in the bolt, recesses around the ejector, coils of all springs, and recesses in which springs or plungers operate, to completely remove all traces of corrosion preventive or foreign matter.

d. CLEANING GUNS AFTER FIRING. (1) Remove barrel and barrel extension from the gun (par. 91) and unscrew barrel from extension (par 93).

(2) Place the barrel, muzzle down, in a vessel containing the hot water solution. Attach two patches to the cleaning rod, insert rod in the breech end of the barrel, and move it backward and forward for about one minute, pumping the solution in and out of the bore through its entire length. If this does not remove foreign matter, while bore is still wet, scrub the lands and grooves of the bore, as well as the chamber, with the cleaning brush M4 attached to the cleaning rod. The chamber cleaning brush M6 should be used to clean the chamber. Using clean patches, rinse by pumping clean warm water through the bore and chamber. Dry and lubricate bore and chamber as described in paragraphs 44 through 46.

(3) Rags, swabs, or suitable brushes saturated with the solution may be used to clean large parts, and a bath of the solution for small parts. Do not immerse the back plate or the oil buffer assembly in the solution. Immediately dry and lubricate as described in paragraphs 44 through 46.

17. Assembly of Gun After Cleaning

a. Assemble the (extractor) switch and switch spring, the belt holding pawl, cartridge stops, and link stripper to the receiver. (See par. 108.) Assemble the right-hand rear cartridge stop assembly. (See par. 108*l*.)

b. Assemble the breech lock to the barrel extension. (See par. 94*b*.) Assemble barrel extension to barrel. (See par. 94*c*.) Install barrel and barrel extension group into receiver. (See par. 92.)

c. Assemble the accelerator and tube lock assembly to the oil buffer body. (See par. 88*h* and *g*.) Assemble the oil buffer spring and guide to the oil buffer assembly (par 88*e*). Assemble the oil buffer assembly to the oil buffer body. (See par. 88 *i*.) Assemble the oil buffer group to the barrel extension group (par. 86*a*) and push the groups into the receiver (par. 86*b*).

d. Assemble bolt group. (See par. 82.) Install bolt group in receiver. (See par. 80.)

e. Assemble driving spring group. (See par. 76.) Install group into receiver. (See par. 74.)

f. Assemble cover group components. (See par. 104.)

g. Install back plate group in receiver. (See par. 68.)

Section V. CONTROLS

18. General

Controls for aircraft machine guns furnished by the Ordnance Department and covered in this section consists of the operating slide group, the retracting slide group, and the back plate assembly with spade grips and trigger. All other controls are furnished by the Air Forces and are covered by Air Force manuals.

19. Operating Slide Group (fig. 3)

a. The operating slide group is located on either the right or left side plate and is used to retract the bolt manually for loading, unloading, and clearing of stoppages, and to hold the bolt in the retracted position to facilitate cooling of the barrel. It consists of a rectangular steel bar having a hook fastened to its center for engaging the bolt stud, and an aluminum handle at the rear end for actuating the group.

b. To retract the bolt, pull the handle to the rear. To release the bolt, raise the handle and allow the bolt and operating slide group to go forward.

20. Retracting Slide Group (fig. 2)

a. The retracting slide group is located on either the right or left side plate and is used to retract the bolt manually for loading, unloading, or clearing of stoppages. It consists of a rectangular steel bracket having guideways for a slide which actuates the bolt through the medium of the bolt stud when the slide is pulled to the rear by means of the handle.

b. To retract the bolt, pull the handle to the rear. To allow the bolt to go forward, release the handle.

21. Spade Grip Back Plate Assembly (figs. 4 and 19)

a. The spade grip back plate assembly is located on the rear end of the receiver and is used to aim the gun manually and fire the ammunition. It differs from the regularly furnished basic back plate in that it has spade type handle grips, trigger, and trigger safety.

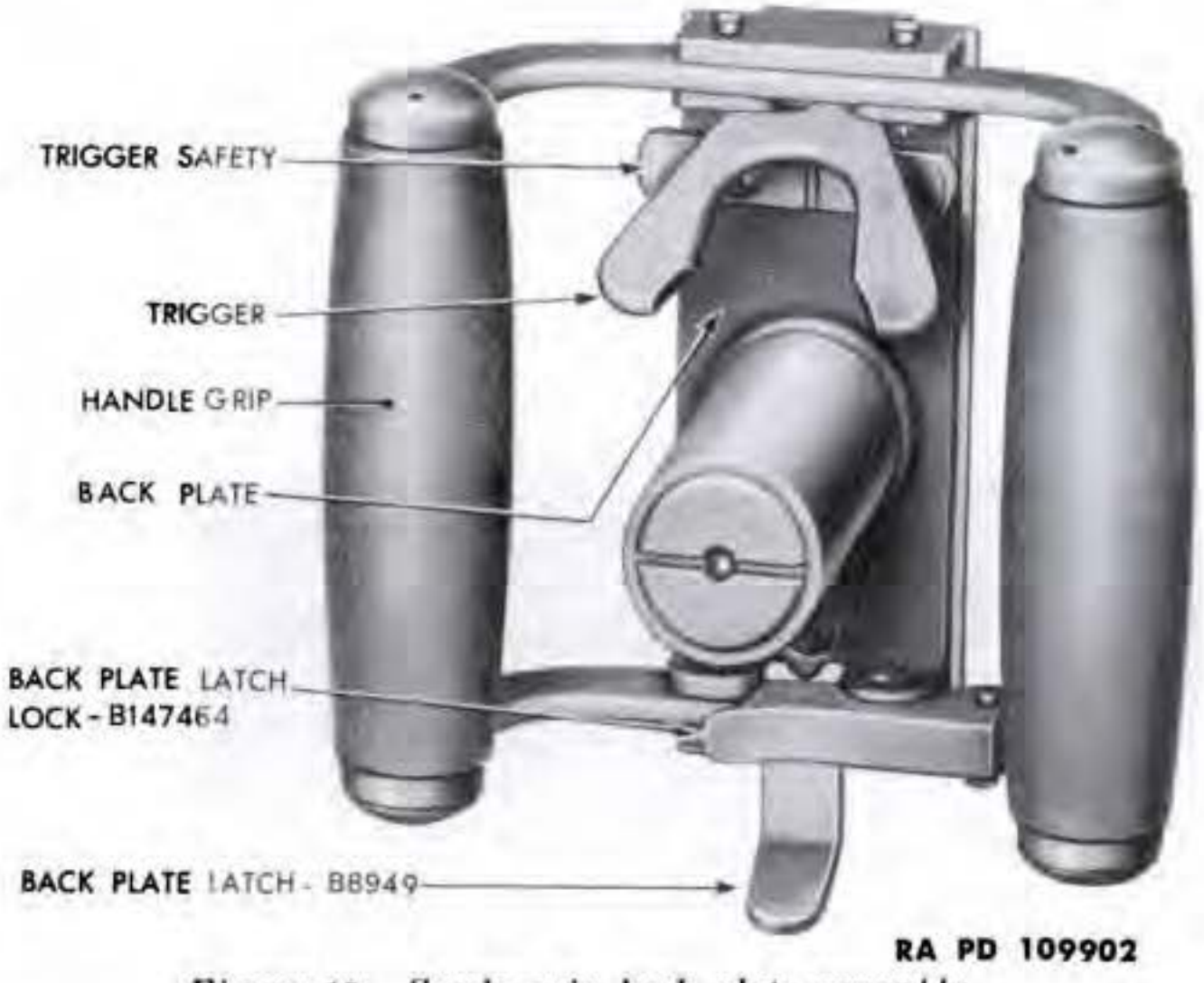

Figure 19. Spade grip back plate assembly.

b. The trigger safety is fastened to the rear of the back plate and operates laterally when manually moved. When moved to the right so that the letter "S" can be seen, it is in the safe position,

and when moved to the left so that the letter "F" can be seen, it is in the fire position.

c. The trigger is a butterfly shaped lever located in the back plate just above the safety. When depressed, if the safety is in the fire position, it actuates the trigger bar to release the firing mechanism and fire a round of ammunition. When released, it is automatically returned to the inoperative position by means of a spring.

Section VI. OPERATION UNDER USUAL CONDITIONS

22. General

Information in this section is concerned with the steps necessary to operate the gun under the atmospheric conditions ordinarily encountered while flying at moderate altitudes over a temperate zone. When high altitude flying over a temperate zone is anticipated, see paragraph 35.

23. Mounting

Aircraft machine gun mounts are furnished by the Air Forces and are covered in Air Force manuals.

24. Adjustment of Headspace

a. GENERAL. The headspace as measured on machine guns is the distance between the front face of the bolt and the rear end of the barrel. Headspace is correct when this distance is between 0.202 and 0.206 inches. Unless this distance is properly adjusted, the cartridge, when chambered, will not be properly seated against its sloping shoulder in the chamber. Headspace must be checked and adjusted (*c* and *d* below) each time the gun is assembled and at any other time when correctness is doubted due to the conditions outlined in *b* below.

b. IMPROPER HEADSPACE ADJUSTMENT. (1) With too little (tight) headspace, the chamber cartridge will prevent the bolt from going completely forward. This may cause the following:

(*a*) The breech lock will not fully enter the locking recess of the bolt (fig. 20) thereby preventing the recoiling parts from going completely into the battery position during counterrecoil.

(*b*) The bolt may not go forward far enough for the sear to be released, thereby causing failure to fire.

(*c*) Binding and excessive friction between the moving parts will cause sluggish fire (particularly noticeable when pulling a long ammunition belt).

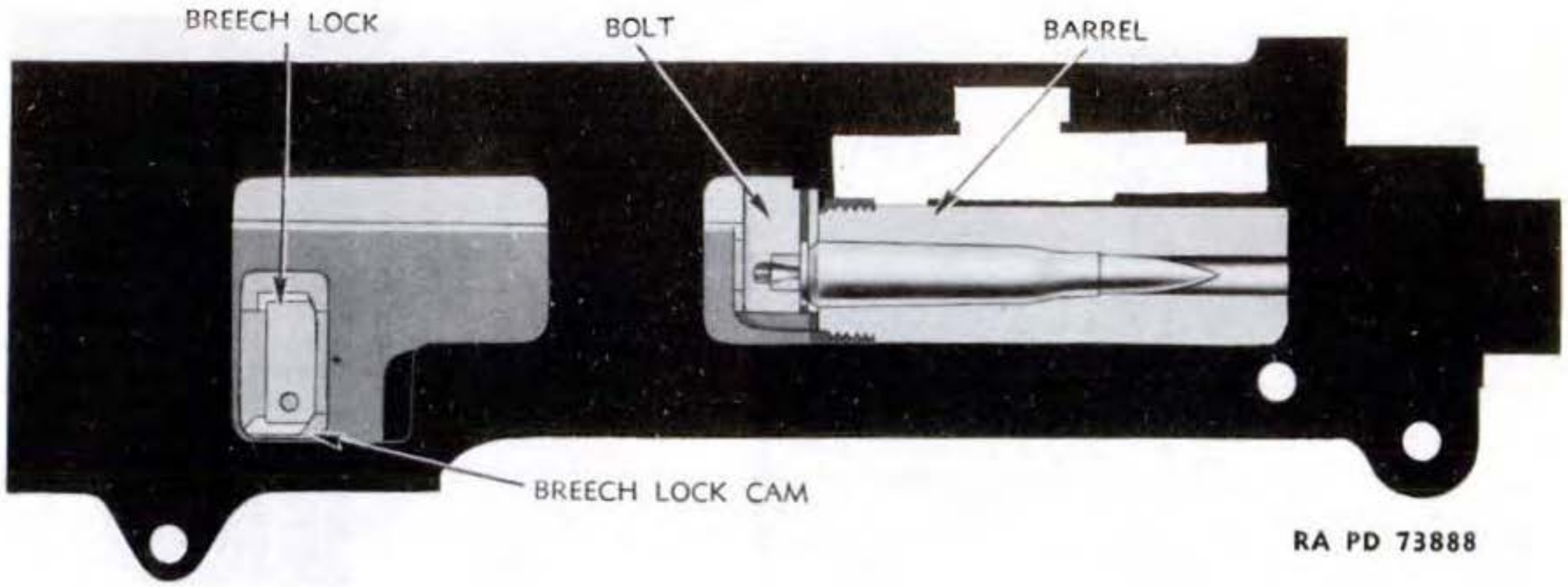

Figure 20. Tight headspace.

(2) Too much (loose) headspace will prevent the cartridge from being fully chambered. This may cause the following:

(*a*) The barrel will be adjusted too far forward so that the cartridge will not be adequately supported in the chamber (fig. 21), thereby causing rupture or separation of the cartridge case.

(*b*) Inability to obtain proper timing.

(*c*) Escape of powder gases at the breech, thereby causing poor shot patterns. In synchronized guns this may cause a fluctuation of the zero shot.

(*d*) The locking surfaces of the breech lock and bolt will not be in contact at the instant of firing thereby causing a battering of the breech lock, bolt, and barrel extension which will soon render these parts unfit for service.

c. ADJUSTMENT WITH HEADSPACE AND TIMING GAUGE 41-G-201-175 (fig. 32). (1) Open cover and inspect to make sure that the gun does not contain a round of ammunition.

(2) With the cover open, cock the gun by fully retracting the recoiling parts and allowing them to return to battery position.

(3) Retract the recoiling parts until the barrel extension is separated from the trunnion block by approximately 1/16 inch. This puts the locking surfaces of the breech lock and bolt in contact, which is the position they will assume when a cartridge is chambered.

(4) Insert the "GO" (0.202 inch) end of the headspace gauge in the T-slot between the face of the bolt and the end of the barrel. (See fig. 22.) If the gauge cannot be inserted the headspace is too tight. Correct the adjustment by retracting the bolt approximately 1 inch and unscrewing the barrel one notch by applying a screwdriver to the notches on its rear end. (See fig. 23.) Allow the barrel extension to return to within 1/16 inch of the trunnion block and check with the gauge. Continue this procedure until the gauge can be inserted.

Note: If the gun is set up for left-hand feed remove the right-hand rear cartridge stop assembly for ease in screwing the barrel into the barrel extension.

(5) Attempt to insert the "NO-GO" (0.206 inch) end of the headspace gauge in the T-slot. If the "NO-GO" end of the gauge can be inserted, the headspace is too loose. Correct the adjustment by screwing the barrel into the barrel extension, one notch at a time, until the "NO-GO" end of the gauge cannot be inserted.

(6) When the position is found where the "GO" end of the headspace gauge will enter the space between the face of the bolt and the end of the barrel, and the "NO-GO" end of the gauge will not enter, headspace is correct.

Note: The gauge may be inserted from either the top or bottom of the gun. In the event the gauge is inserted from the bottom, the locking

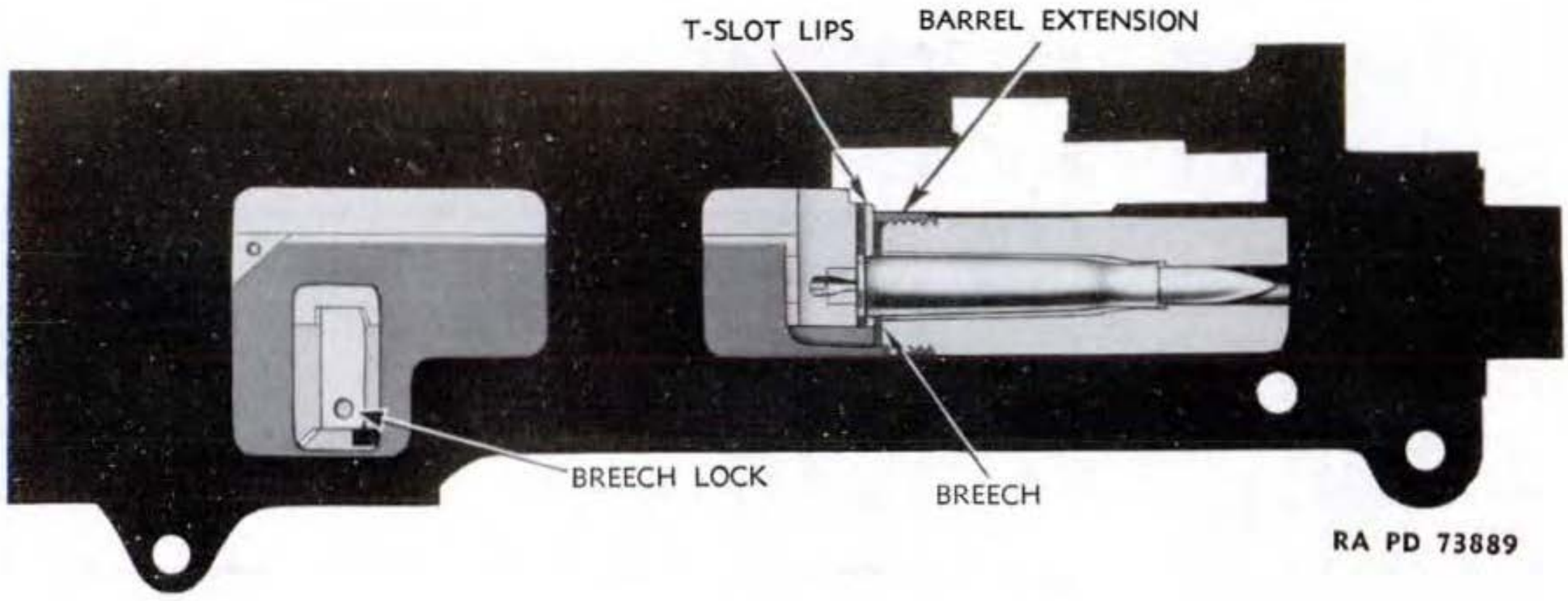

Figure 21. Loose headspace.

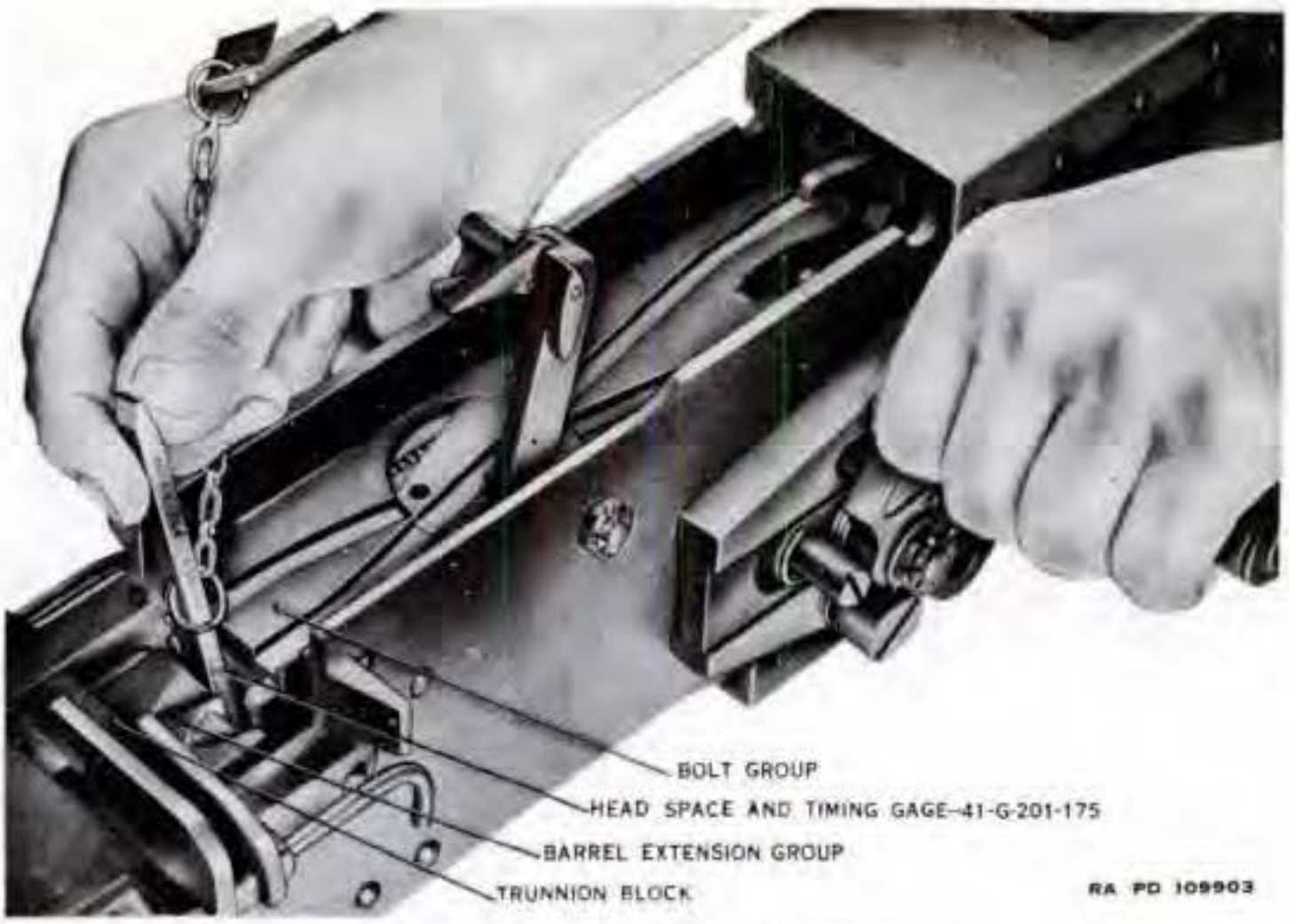

Figure 22. Checking headspace.

surfaces of the bolt and breech lock may be brought into contact by inserting a screwdriver in the T-slot between the face of the bolt and the end of the barrel.

(7) Remove the gauge and release the firing pin. ***Caution.*** Never release the firing pin with the gauge in place, as to do so will damage the pin.

d. ADJUSTMENT WITHOUT HEADSPACE AND TIMING GAUGE. (1) Open the cover and inspect to make sure that the gun does not contain a round of ammunition.

(2) Retract the bolt about 1 inch by means of the bolt handle or other retracting device.

(3) Screw the barrel into the barrel extension, by applying a screwdriver to the notches on the rear end of the barrel (fig. 23), until the recoiling parts will not go into battery position without being forced when the bolt is released from its position of 1 inch to the rear.

(4) Screw the barrel out of the barrel extension, one notch at a time, until the recoiling parts will just go into battery position when the bolt is released, but not forced forward, from its 1 inch retracted position.

(5) When this point is found, retract the bolt and unscrew the barrel two more notches. At this point headspace will be correct.

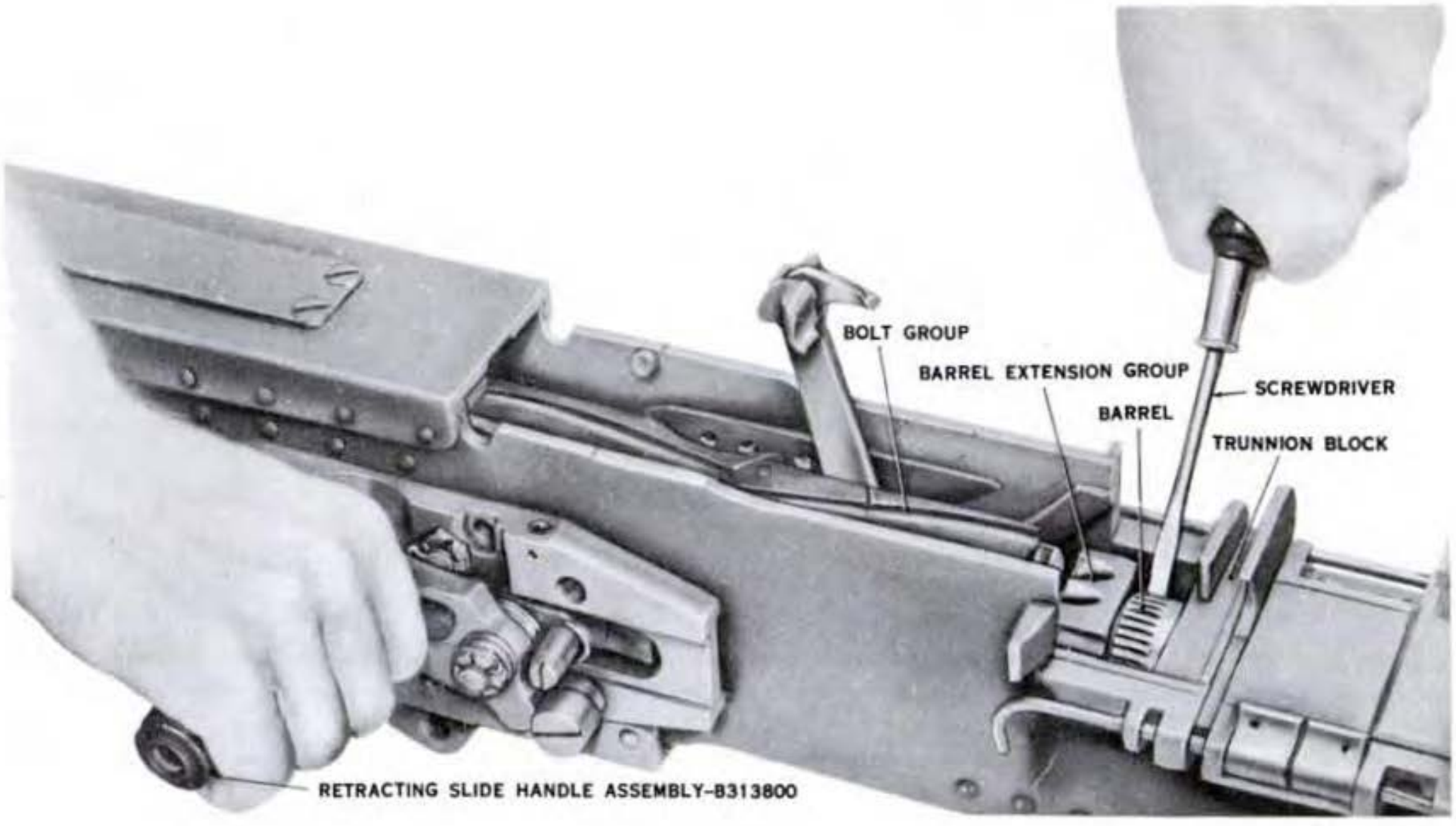

Figure 23. Turning barrel to adjust headspace.

25. Adjustment of Timing

a. GENERAL. The point at which the firing pin is released when the recoiling parts reach the battery position during counterrecoil is referred to as "timing." This point is determined by measuring the distance between the front face of the barrel extension and the rear face of the trunnion block. The gun must fire when this distance is between 0.020 inch and 0.116 inch. Timing must be checked and adjusted (*c* below) each time headspace is checked and adjusted (par. 24) and at any other time when correctness is doubted due to the conditions outlined in *b* below. Adjustment of timing as covered in *c* below is for guns fired by means of a trigger bar. Various aircraft machine gun installations require the use of a solenoid which is furnished by the Air Forces. Adjustment of the solenoid to obtain proper timing is covered in Air Force manuals.

b. IMPROPER TIMING ADJUSTMENT. (1) In cases of early timing, recoil will start before the extractor is far enough forward to engage the next cartridge in the belt. Under this condition, the gun will stop firing after having fired two rounds, the first round chambered by charging the gun, and the round in the belt which is grasped by the extractor as the first round is chambered.

(2) In cases of late timing, the barrel extension will strike the trunnion block as the recoiling parts reach the battery position during counterrecoil. The gun will continue to fire but the barrel extension will be damaged as it strikes the trunnion block.

c. ADJUSTMENT WHEN ADJUSTABLE TRIGGER BAR STOP ASSEMBLY IS INSTALLED. (1) Open cover and inspect to make sure that the gun does not contain a round of ammunition.

(2) With the cover open, cock the gun by fully retracting the recoiling parts and allowing them to return to battery position.

(3) Retract the recoiling parts until the barrel extension is separated from the trunnion block by approximately ¼ inch.

(4) Insert the "FIRE" (0.020 inch) timing gauge of gauge assembly 41–G–201–175 (fig. 32) between the barrel extension and trunnion block. (See fig. 24.)

(5) Allow the barrel extension to close slowly until stopped by contacting the gauge.

(6) Attempt to release the firing pin by operating the firing mechanism once. The firing pin should release with the gauge in place. If it is released a sharp click can be heard.

(7) If the firing pin does not release with the gauge in place, remove the back plate group (par. 67) and turn the adjusting nut on the adjustable trigger bar stop assembly to the *right* one notch. Then check again to see if the firing pin will release by operating

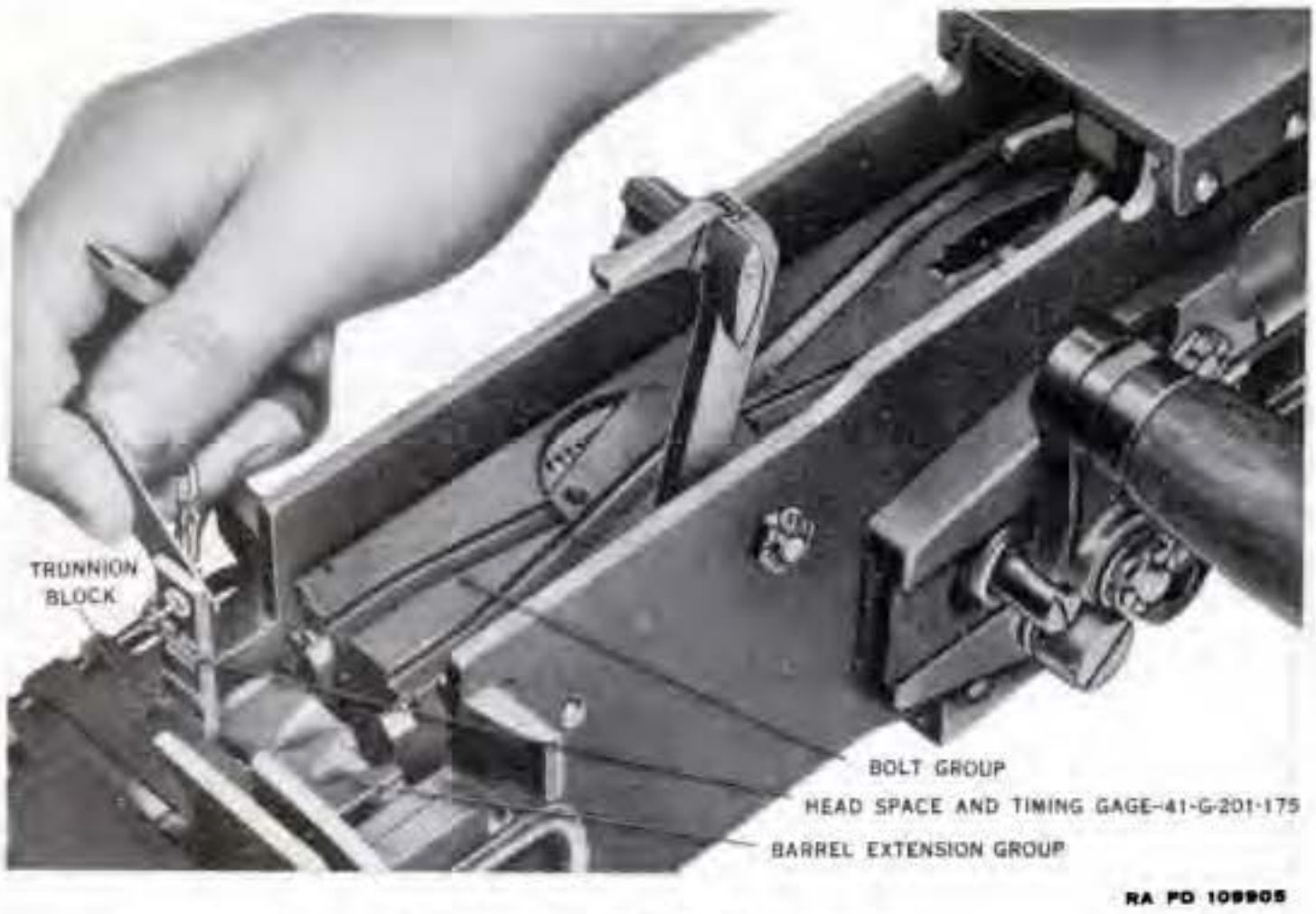

Figure 24. Checking timing.

the firing mechanism. If it does not release continue turning the adjusting nut to the right, one notch at a time, checking after each turn until the firing pin does release.

(8) After adjusting so that the firing pin does release with the "FIRE" gauge in place retract the recoiling parts, remove the gauge, and cock the gun.

(9) Retract the recoiling parts approximately ¼ inch and insert the "NO-FIRE" (0.116 inch) gauge between the barrel extension and trunnion block. (See fig. 24.)

(10) Allow the barrel extension to close slowly until stopped by contacting the gauge.

(11) Attempt to release the firing pin by operating the firing mechanism once. The firing pin should *not* release with the gauge in place.

(12) If the firing pin does release with the gauge in place, remove the back plate group (if not already removed) (par. 67) and turn the adjusting nut on the adjustable trigger bar stop assembly to the *left* one notch. Then check again to see if the firing pin will release by operating the firing mechanism. If it does release continue turning the adjusting nut to the left, one notch at a time, checking after each turn, until the firing pin does not release.

(13) Retract the recoiling parts, remove the gauge, and allow the recoiling parts to go forward to battery position.

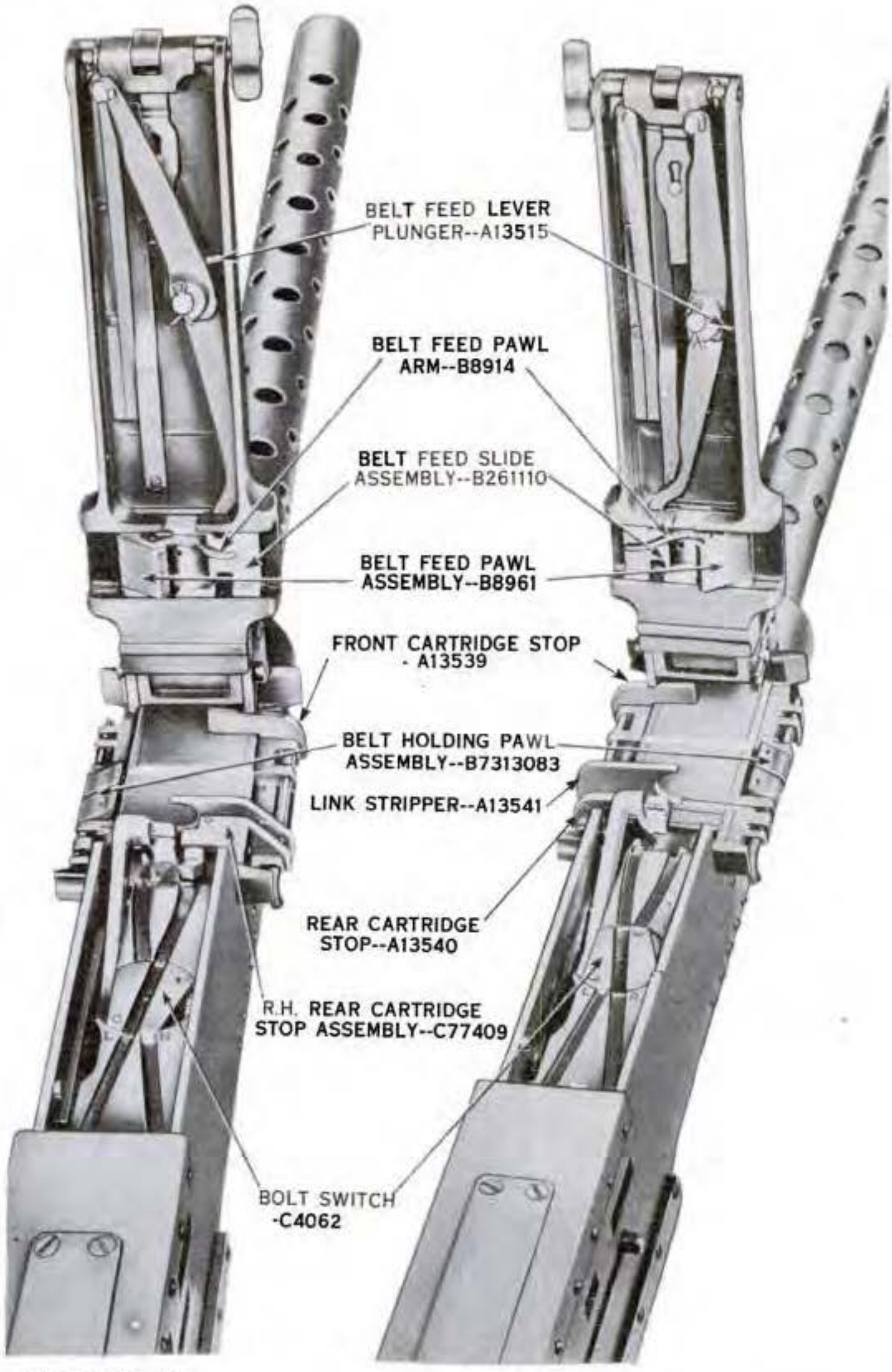

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Figure 25. Position of components for feeding ammunition from either left-hand or right-hand.

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26. Repositioning Components to Feed Ammunition from Opposite Side of Gun

a. GENERAL. In order to change the gun from left-hand feed to right-hand feed, or vice versa, repositioning of parts must be carried out in the bolt group, and cover group, and in certain parts in the receiver. The correct position of the various parts for both left-hand and right-hand feed is shown in figure 25. The change from left-hand feed to right-hand feed is described in general terms below. By reversing the process, the gun may be changed from right-hand feed to left-hand feed. After changing the gun from left-hand feed to right-hand feed, or vice versa, the gun should be inspected to determine that all parts have been properly assembled.

b. BOLT GROUP. (1) Remove the bolt group from the gun. (See par. 79.)

(2) Remove the extractor assembly from the bolt. (See par. 81*b*.)

(3) Lift up bolt switch high enough to clear bolt switch stud; rotate one-half turn so that bolt switch stud enters the opposite hole in bolt switch. The cam groove in the bolt switch will then line up to make the groove in the bolt marked "R" (right) continuous. In this position the wide part of the switch will be toward the rear of the bolt.

(4) Assemble the extractor assembly to the bolt (par. 82 *j*), and replace the bolt group in the receiver (par. 80).

Note. If the weapon is to be fired by a mechanism attached to the side plate the square end of the sear slide must face the side plate to which the mechanism is attachd. If necessary, reposition the sear slide. (See pars. 81 and 82.)

c. COVER GROUP. (1) Open the cover and remove the belt feed lever. (See par. 103*b*.) Transfer the belt feed lever plunger and spring from the upper hole (cover open) in the belt feed lever to the lower hole.

(2) Remove the assembled belt feed slide from the cover, reverse it, and replace it in the cover with the pawl end of the slide toward the right.

(3) Replace the belt feed lever and insert the cotter pin.

(4) Push the slide to the right, hold it so that the belt feed pawl pin can be pushed out of place, and remove the belt feed pawl pin, belt feed pawl, belt feed pawl arm, and spring from the belt feed slide. (See par. 103*e*.) Take care not to lose the spring.

(5) Move the belt feed pawl arm from its position at the bottom of the pawl (cover in raised position) and place it in position on the top of the pawl. The locating pins will locate the arm in the proper position.

(6) Reassemble the belt feed pawl, spring, and arm to the belt feed pawl by inserting the belt feed pawl pin. (See par. 104.) See figure 26 for correct positioning of belt feed pawl spring.

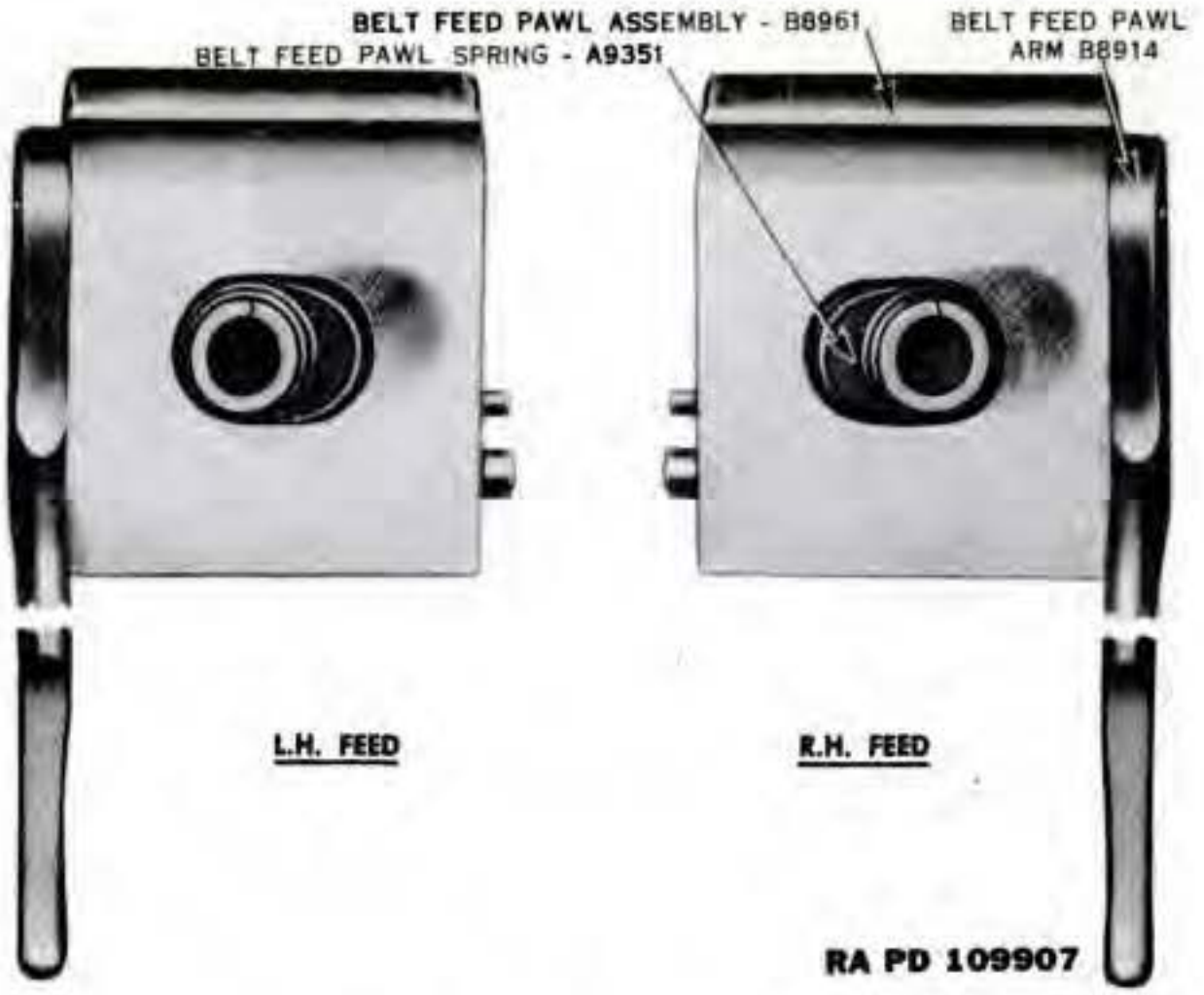


Figure 26. Position of belt feed pawl spring for left-hand and right-hand feed.

d. RECEIVER GROUP. (1) Remove the belt holding pawl pins from the right- and left-hand sides. (See par. 107*g*.)

(2) Take out the front cartridge stop and move it to the left-hand side. Remove the right-hand rear cartridge stop assembly (fig. 25) and store it with the spare parts for future use when changing feed. Obtain the rear cartridge stop and link stripper from the set of spare parts and assemble to the left side of the receiver. (See fig. 25.)

(3) Remove the belt holding pawls and springs from the left-hand side and assemble to the right-hand side.

(4) Reinstall the two belt holding pawl pins. (See par. 108*k* and *l*.)

27. Loading Ammunition Into Belts

In most cases belted ammunition is furnished with the proper proportion of various types of cartridges already loaded into the links as indicated on the ammunition containers. Where it is necessary to load the cartridges into the links to form belts, to join belts, or to reposition cartridges in belts, it may be done by means of the linking and delinking machine or hand linker-delinker. (See pars. 43*b* (6) and 43*b* (2).) Linking and delinking of belted ammunition by means of other type link loading and positioning machines is explained in TM 9–220.

28. Loading Ammunition Belts Into Gun

a. Check to see that ammunition is properly loaded in the belt, and that the belt and ammunition box are in proper alignment and secure. Figure 27 shows proper position of cartridges in the links of the belt.

b. Close the cover before the first round is loaded into the feedway. The cover should remain closed as long as ammunition is being fed. If the first round is fed with the cover open, the belt feed lever may be bent as the cover is closed, due to the fact that slight shifting of the belt in the feedway may cause misalignment of the lug on the end of the belt feed lever and its cam groove in the bolt.

c. Enter the *double-loop* end of the belt through the feed opening until the first cartridge is beyond the belt holding pawl.

d. Fully retract the bolt and *allow it to go forward freely.* This places the first cartridge in the belt in position in the feedway where it is gripped by the extractor.

e. Pull the bolt once again completely to the rear and *release it.* This action places a cartridge in the chamber, and the extractor grips the next cartridge in the belt.

f. The gun is now fully loaded, cocked, and ready to fire when the sear is depressed.

29. Firing

a. GUNS EQUIPPED WITH BACK PLATE HAVING A MANUAL TRIGGER (fig. 4), AND GUNS EQUIPPED WITH ADAPTERS HAVING TRIGGER SUPPLIED AS PART OF ADAPTER. Guns of this type are fired after moving the safety to the "fire" position by pressing the trigger forward.

b. GUNS EQUIPPED WITH FIRING DEVICES HAVING NO MANUAL TRIGGER (figs. 1, 2, and 3). Such guns are fired by means of firing devices furnished by the Air Forces and covered by Air Force manuals.

30. Permissible Bursts of Automatic Fire

a. GENERAL. Aircraft machine guns are air-cooled. Because of the absence of a mechanical cooling medium, the temperature of the barrel rises rapidly during firing. The longer the burst, the higher the temperature attained. The progressive heating of the barrel gives rise to several effects some of which are as follows:

(1) Accelerated wear of the bore.

(2) Expansion of the barrel leading to loss in bullet velocity and finally to tumbling of the projectile.

(3) Stoppage of gun caused by the expanded barrel seizing in the trunnion block or front barrel bearing.

Figure 27. Proper position of cartridges in links.

(4) Ignition (cook-off) of the propelling charge by the heat of the barrel.

b. MAXIMUM BURSTS OF AUTOMATIC FIRE. Table I indicates maximum bursts which may be fired in aircraft machine guns, cal..50, AN–M2 without danger of cook-off. Tests have shown that in all cases where cook-offs accurred, they were due to ignition of the powder. No premature functioning of tracer, incendiary, or armor-piercing-incendiary bullets in the barrel has been recorded. Combat firing is unrestricted, but bursts of longer duration than

150 rounds (11 second bursts) may lead to a stoppage due to overheating. Furthermore, a new unlined or unplated barrel (*c* below) may be ruined by a prolonged burst of about 15 seconds duration.

Caution. If an overheating burst is fired, the gun should be cleared within 10 seconds after completion of the burst. If the gun cannot be cleared within 10 seconds, the round should be allowed to remain in the chamber a minimum of 5 minutes, making sure the gun is aimed in the opposite direction from personnel and equipment. If an attempt is made to clear the gun between the 10-second and the 5-minute period, the extracted cartridge may explode outside the weapon causing serious injury to personnel or equipment.

Table I

Initial or primary burst (rounds)	Secondary burst (rounds)	Cooling interval between bursts (seconds)	Maximum number of secondary bursts which may be fired without danger of cook-off
10	10	30	21
15	15	30	10
15	15	60	14
25	25	60	6
50	50	30	2
50	50	60	2
75	20	60	5
75	15	60	10
75	10	60	40
100*	.....	.....	.....
150*	.....	.....	None

*The maximum single burst which may be fired without danger of cook-off is 150 rounds. Therefore, if firing 100-round bursts, only one such burst may be fired without danger of cook-off. Before firing another 100- or 150-round burst, the gun should be allowed to cool completely.

c. BARREL PERFORMANCE DATA. (1) At this time the following four types of barrels are manufactured for use with the machine guns covered in this manual: regular steel barrels, barrels containing a special liner, chromium plated barrels, and combination lined-plated barrels. (See par. 97.)

(2) The new type barrels (lined, plated, and lined-plated) give exceptional velocity and have exceptional accuracy life, but the cook-off point is approximately the same as for the regular steel barrel. These new barrels cannot be fired more than 300 rounds in a continuous burst without serious damage; however, the cook-off point for a continuous burst must be considered. Comparison performance of barrels (when previously unfired), irrespective of the cook-off point, is approximately as listed in table II.

31. Correction of Malfunctions and Stoppages by Immediate Action

a. STOPPAGES. (1) A stoppage is the result of a malfunction of the gun usually caused by an improper or incomplete action of

Table II

	Steel barrels	Lined barrels	Plated barrels	Lined-plated barrels
Maximum continuous burst without serious keyholing.*	165 rounds	300 rounds	300 rounds	300 rounds
Maximum rounds without serious keyholing, firing 100-round bursts with 2-minute air-cooling between bursts.	230 rounds	500 rounds	1,000 rounds	1,000 rounds
Velocity drop when firing 500 rounds in 100-round bursts with 2-minute air-cooling between bursts.	500 fps	Not appreciable	150 fps	Not appreciable
Number of rounds before reaching rejection point of 200 fps drop in velocity when firing 100-round bursts with complete cooling between bursts.	2,500 rounds	7,000 rounds	2,500 rounds	7,000 rounds

*By keyholing is meant tumbling of the bullet in flight, caused by failure of the bullet to receive sufficient spin from the rifling in the barrel. This is usually brought about by expansion of the barrel due to heat and/or by erosion of the barrel.

some part of the gun, or its equipment or ammunition. Malfunctions and their probable causes and remedies are covered in paragraphs 59 through 65.

(2) When a gun stops firing or fails to fire, the first concern of the gunner, when in combat, is to get the gun back into action in the shortest possible time.

(3) If the gun is equipped with a means of charging, wait 10 seconds, then charge the gun once more and attempt to fire. If firing cannot be resumed, and the cover is accessible, open the cover and inspect for link jammed in the link stripper or for a short round not engaged by the extractor. Correct, close cover, charge gun and attempt to resume firing. If firing still cannot be resumed, the trouble will have to be corrected when the plane is grounded.

(4) Stoppages which cannot be immediately corrected during flight, must be analyzed and corrected at the first opportunity. The ordnance officer, under whose supervision the material is maintained, must be informed promptly of all stoppages.

b. UNCONTROLLED FIRING. Uncontrolled firing of the gun, commonly known as a "runaway gun," may be caused by malfunction of worn or broken parts (pars. 60 *f* and *g*). If the cover is accessible, and it is known that firing is *not* caused by cook-offs, the best way to stop the gun from firing is to raise the cover and thus prevent further feeding of ammunition. If the cover is not accessible or if it is known that firing is caused by cook-offs, grasp and hold the ammunition belt to prevent further feeding. When it is necessary to use this method to stop firing, fully unload the gun after a 5-minute interval (*Caution*, par. 30*b*), carefully inspect the feed lever, feed and holding pawls, and other parts of feed mechanism for possible damage, and hand operate the gun as a check before resuming firing. Keep a "runaway gun" pointed away from personnel and matériel.

32. Unloading Ammunition from Gun

a. Lift the cover, raise extractor, and remove ammunition belt.

Caution. Before raising the cover, be sure the solenoid circuit or other flying devices are placed in the safe position so that the gun cannot be fired accidentally.

b. Lower extractor, retract the bolt sufficiently to remove the round in the chamber, and make visual inspection of the feedway, T-slot, and chamber to make sure that the gun is unloaded. Release the bolt and lower the cover.

c. If certain that the gun is completely unloaded, release the firing mechanism to allow the firing pin spring to drive the firing pin forward and relieve compression of the firing pin spring.

Section VII. OPERATION UNDER UNUSUAL CONDITIONS

33. General

Although the procedures for the mechanical operation of the gun are the same for operation under either usual or unusual climatic conditions, special care in cleaning and lubrication should be observed where extremes of temperature, humidity, and atmospheric conditions are present. Proper cleaning and lubrication not only insure proper operation and functioning but also guard against excessive wear of the moving parts and deterioration of the matériel.

34. Operation in Cold Climates

a. In temperatures below freezing, it is necessary that the moving parts of the machine gun be kept absolutely free from moisture. Excessive oil on the working parts will congeal to such an extent

as to cause sluggish operation and functioning, or complete failure. This applies, in particular, to the firing mechanism and small spring-operated parts. Special care should be taken to eliminate all excess oil and powder fouling from the following parts and assemblies:

Belt feed pawl and belt holding pawl springs and seats.
Bore and chamber of the barrel.
Driving spring group and its tunnel in the bolt.
Belt feed lever plunger, spring, and seat.
Firing pin group and its tunnel in the bolt.
(Extractor) switch, including pivot.

b. If guns are left mounted in the airplane, the exposed parts should be carefully covered for protection and to prevent frosting.

c. When guns are removed from the airplane and taken into heated buildings they should be allowed to come to the temperature of the building before cleaning. Immediately after they reach room temperature, they should be disassembled, and all moisture should be thoroughly wiped from the parts and bore with a dry cloth to prevent rusting. The guns should then be thoroughly cleaned by one of the methods outlined in paragraphs 15 and 16 and then lubricated as outlined in paragraphs 44 through 46.

35. Operation Under Conditions of High Altitude

When airplanes are operated in moderate climate at high altitudes where extremely low temperatures are encountered, condensation of moisture may occur on the guns when returned to ground temperature. In such cases guns should be inspected, disassembled, cleaned, and dried (pars. 15 and 16) and lubricated as prescribed in paragraphs 44 through 46. When high-altitude flights are anticipated, guns should be lubricated sparingly, irrespective of ground temperatures.

36. Operation in Hot Climates

a. In hot climates, the thin film of oil necessary for aircraft guns under combat conditions will be quickly dissipated. Guns should be inspected frequently and a film of the oil prescribed in paragraph 44 must be renewed as frequently as necessary to prevent rusting. Guns should be cleaned frequently to remove dust which will stick to oiled surfaces.

b. Guns should be kept covered as much as possible.

c. Perspiration from the hands is a contributing factor to rusting because it contains acid. After handling, guns should be wiped dry and oil film restored.

d. Where humidity is high, frequently inspect the gun paying particular attention to unexposed surfaces such as the bore and chamber, inside of barrel jacket, receiver, springs and spring seats, firing pin, and driving springs tunnel in bolt, and like places where rusting might occur and not be quickly noticed. Screws and pins should be kept lightly oiled to prevent rust attacking them and "freezing" them in place.

37. Operation Under Excessively Sandy or Dusty Conditions

a. In localities where dust and sand storms are prevalent, guns should be kept carefully covered at all times, whether mounted in the airplanes or not. Dust and sand will enter the mechanism and bore and stick on lubricated surfaces, forming a gummy paste which may clog the gun and cause malfunction. This paste will also act as an abrasive and will cause undue wear of the moving parts of the gun.

b. Under such conditions, guns should be removed from the airplane as often as practical, and thoroughly cleaned by one of the methods outlined in paragraphs 15 and 16. The lubricating oil specified in paragraph 44 should be confined to moving parts and contacting surfaces and should be as light as possible for proper functioning of the gun.

c. After a dust or sand storm, guns should be disassembled, thoroughly cleaned, inspected and lubricated as directed in *b* above.

38. Operation in Excessively Moist or Salty Atmosphere

a. Salt air is conducive to quick rusting as the salt has a tendency to destroy the rust-preventive qualities of the oil. When mounted in the airplane, guns should be kept lightly lubricated with the oil prescribed in paragraph 44 and inspected frequently and treated in a manner similar to that prescribed for operation in hot climates in paragraph 36.

b. If guns are dismounted, they should be thoroughly cleaned and lubricated with the oil prescribed in paragraph 44 followed by inspection intervals prescribed in paragraph 49 *c*, *d* and *e*. Inspection should be thorough, with particular attention to unexposed parts as prescribed in paragraph 45.

c. Before mounting guns in the airplane, they should be thoroughly cleaned by one of the methods outlined in paragraphs 15 and 16 and then lubricated as outlined in paragraphs 44 through 46.

Section VIII. DEMOLITION TO PREVENT ENEMY USE

39. General

a. The destruction of the matériel, when subject to capture or abandonment in the combat zone, will be undertaken by the using arm only on authority delegated by the division or higher commander as a command function, when such action is deemed necessary as a final resort to keep the matériel from reaching enemy hands.

b. Adequate destruction of matériel means damaging it in such a way that the enemy cannot restore it to usable condition in the combat zone, either by repair or cannibalization. Adequate destruction requires that—

(1) Enough parts essential to the operation of the matériel must be damaged.

(2) Parts must be damaged beyond repair in the combat zone.

(3) The same parts must be destroyed on all matériel, so that the enemy cannot make up one operating unit by assembling parts from several partly destroyed units.

40. Procedures for Demolition

a. Demolition of the plane normally will destroy any guns left in the plane.

b. Any guns removed from the plane will be destroyed as follows: Remove groups as outlined in Part Three. Use Barrel as a sledge. Raise cover; lay bolt in feedway; lower cover on bolt and smash cover down over bolt. Deform back plate. Lay barrel extension on its side, hold down with one foot, and break off the shank. Deform casing by striking side plates just back of feedway.

PART THREE
MAINTENANCE INSTRUCTIONS

Section IX. GENERAL

41. Scope

Part Three contains information for the guidance of the personnel of the using organizations responsible for the maintenance (first and second echelon) of this equipment. It contains information needed for the performance of the scheduled lubrication and preventive maintenance services, as well as description of the major groups and assemblies and their function.

Section X. ORGANIZATIONAL SPARE PARTS, TOOLS, AND EQUIPMENT

42. Spart Parts, Tools, and Equipment

a. SPARE PARTS. A set of organizational spare parts is supplied to the using arm for field replacement of those parts most likely to become worn, broken or otherwise unserviceable.

b. TOOLS AND EQUIPMENT. Tools and equipment include items of issue required by personnel for the disassembly, assembly and cleaning and preserving of the gun. Equipment should not be used for purposes other than prescribed and, when not in use, should be properly stored in the chest and/or roll provided for them.

c. LIST OF SPARE PARTS, TOOLS AND EQUIPMENT. Spare parts, tools and equipment mentioned above, supplied for caliber .50 machine gun M2, are listed in WD CAT ORD 7 SNL A–38, which is the authority for requisitioning replacements.

43. Specially Designed Tools and Equipment

a. LIST OF TOOLS. Certain tools and equipment listed in WD CAT ORD 7 SNL A–38 are specially designed for maintenance and repair operations on caliber .50 machine guns. These tools and equipment are listed below for information only. This list is not to be used for requisitioning replacements.

Item	Identifying number	References		Use*
		Figure	Paragraph	
EXTRACTOR, ruptured cartridge, cal. .50.	41-E-557-50	.....	.....	Remove ruptured cartridge cases.
GAUGE, headspace and timing, cal. .50.	41-G-201-175	.....	.....	Check headspace and timing of gun.
REFLECTOR, barrel.	41-R-2331-25	.....	.....	Inspect bore of gun.
LINKER - DELINKER, cartridge, hand, cal. .50, M12.	D7161200	.....	.....	To remove, insert or align cartridges.
MACHINE, link-delinking, cal. .50, M7.	D7160003	.....	.....	To link or delink cartridges.
MACHINE, powered linking cal. .50 M5, w/ATTACHMENT.	D7312417	.....	.....	To link or delink cartridges.
DELINKING, cal. .50, M7.				
MACHINE, repositioning, cal. .50 M5.	D7161940	.....	.....	To reposition cartridges.
TOOL, firing pin spring removing.	41-T-3098	.....	.....	To remove firing pin spring.
WRENCH, combination, open end screwdriver and front barrel bearing openings 3/8 x 3/4 in.	41-W-867-808	.....	.....	.....

*Where the item's use is not indicated, the nomenclature is self-explanatory or the item has general use.

b. USE OF EQUIPMENT. (1) *Combination wrench, cal. 50.* (fig. 34). This is a flat wrench having various openings marked with their use. It is used for removal and installation of the oil buffer cap (old and new types), oil buffer packing gland plug, front barrel bearing, back plate buffer adjusting screw, and as a gauge to check the over-all length of the oil buffer assembly. Spare pins are inserted in the wrench to replace broken ones in (old type) oil buffer cap socket opening.

Figure 28. Equipment for machine gun.

(2) *Hand linker-delinker, cal .50 M12* (fig. 29). The hand linker-delinker can be used to extract a defective round quickly and relink at any point in a cal. .50 metallic link belt. This tool will insert or extract a single cartridge and will align three cartridges. The linker-delinker, which works on the compound leverage principle, consists of a base, slide, and handle assembly and is operated as follows:

(a) Delinking. The extractor dog is positioned so that it is in front of the rear flange on the slide. The cartridge fits between the posts on the base and over the notch in the front flange. In this position, the curved surface of the dog engages the extractor groove of the cartridge case. Squeezing the handles together draws the rear flange away from the base. The round is withdrawn partially from the link belt and can be easily pulled out the rest of the way by hand.

(b) Linking. The linking is accomplished by holding the handles compressed and positioning the cartridge into the link loops, then spreading handles as far as possible. This moves the slide forward, with the flange acting as a buffer, to push the cartridge to the correct depth in the link loops.

(c) Link belt breaking (fig. 30.) Position extractor dog so that it is in front of rear flange. Place round, which is to be delinked, in middle to base so that cartridge extractor groove is engaged by the extractor dog on the slide. Insure that both the cartridge to be delinked and those on either side are seated in the notches of the front flange just above the metallic links. Squeeze handles together as far as possible. With handles together move linker-delinker clear of ammunition. Complete the removal of cartridge by hand.

(d) Link belt assembly (fig. 30.) Position extractor dog in slide so that it fits into slot in rear flange. Place round into its link loops as far as possible by hand. Draw handles together so that spring is under tension and slide is drawn away from base. With the handles compressed, place linker-delinker over or under the ammunition, making sure that the cartridges are seated in the front flange notches at a point above the metallic links. Spread handles as far as they will go. The cartridge is now in proper position and the linker-delinker should be removed.

(e) Aligning cartridges (fig. 31.) Position extractor dog in slide so that it fits into slot in rear flange. Draw handles together so that spring is under tension and slide is drawn away from base. With the handles compressed, place linker-delinker over or under the ammunition, making sure that the cartridges are seated in the front flange notches at a point above the metallic links. Spread handles as far as they will go. The cartridge or cartridges are now in proper position and the linker-delinker should be removed.

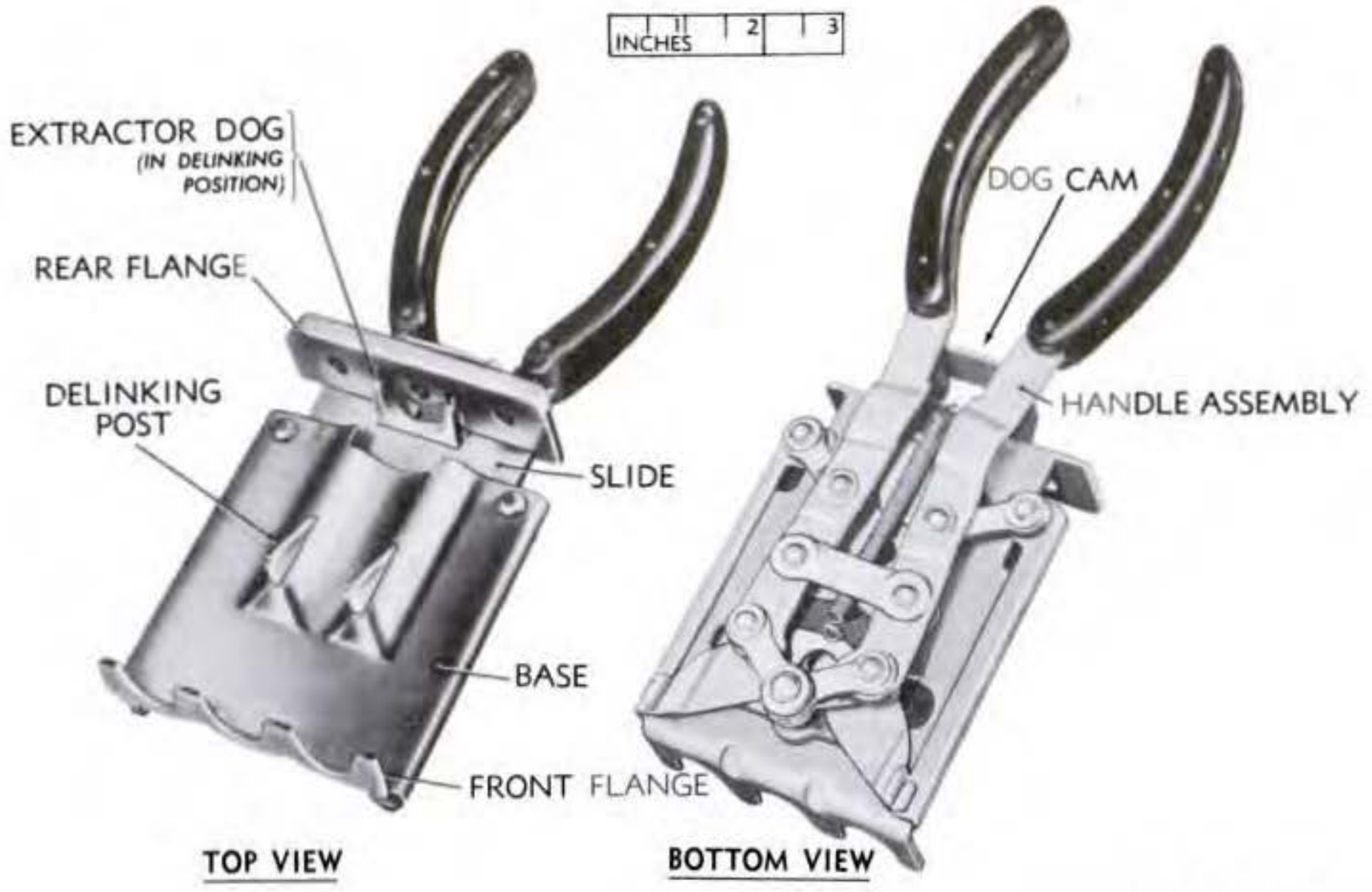


Figure 29. Hand linker-delinker, cal..50, M12.

(f) Lubrication. Weekly, work a few drops of special preservative lubricating oil into the linkage.

(3) *Ruptured cartridge case extractor, cal. .50* (fig. 35). This ruptured cartridge case extractor is for the purpose of extracting a ruptured cartridge case from the chamber of the barrel by utilizing the leverage of the charging device. The extractor consists of

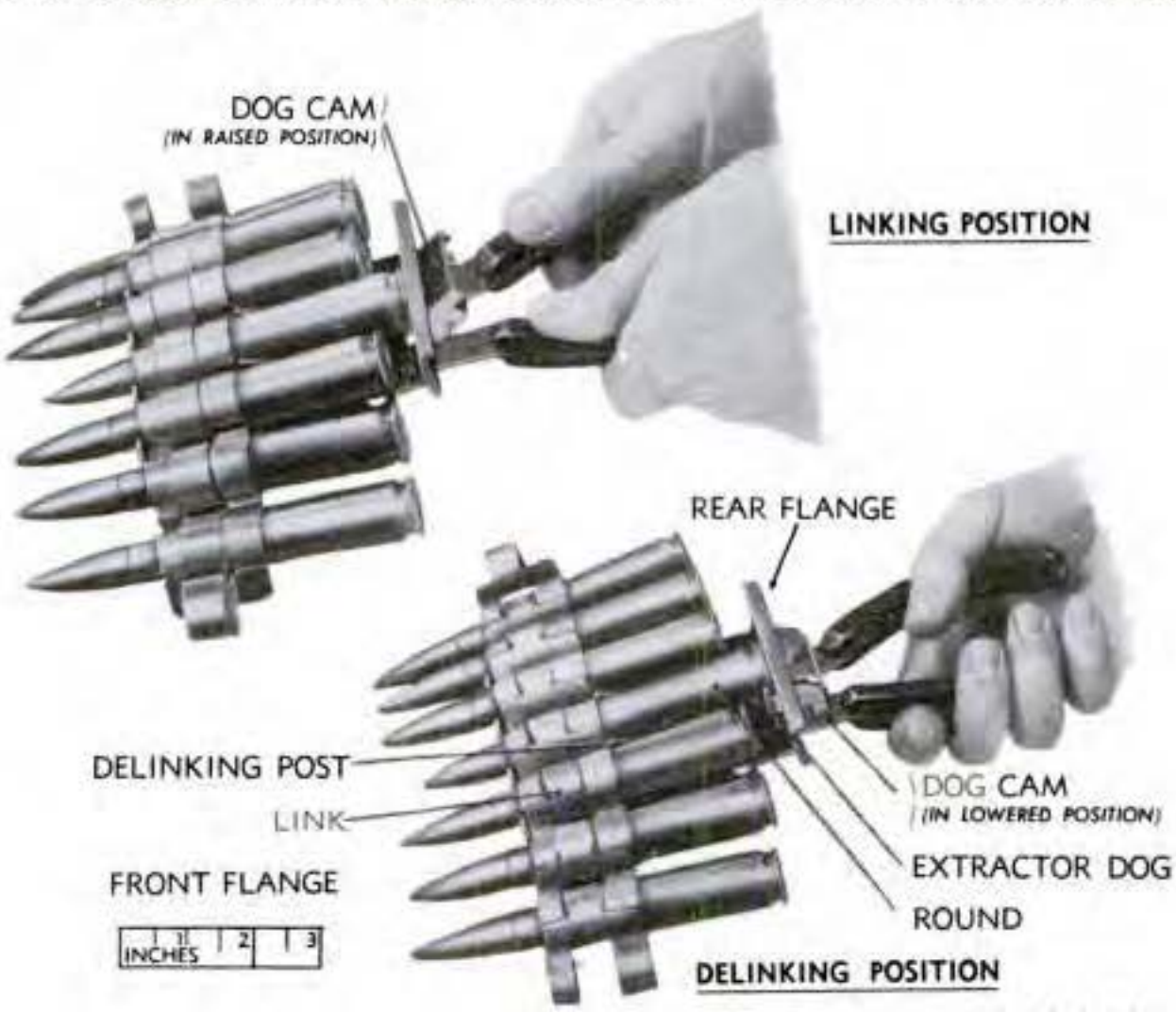


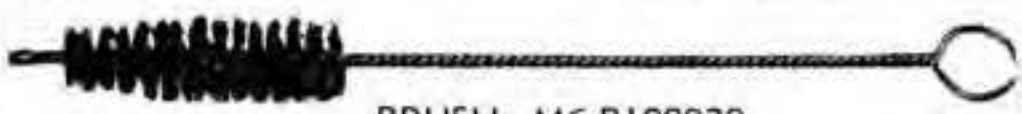
Figure 30. Linking and delinking cartridges.

Figure 31. Aligning cartridges.

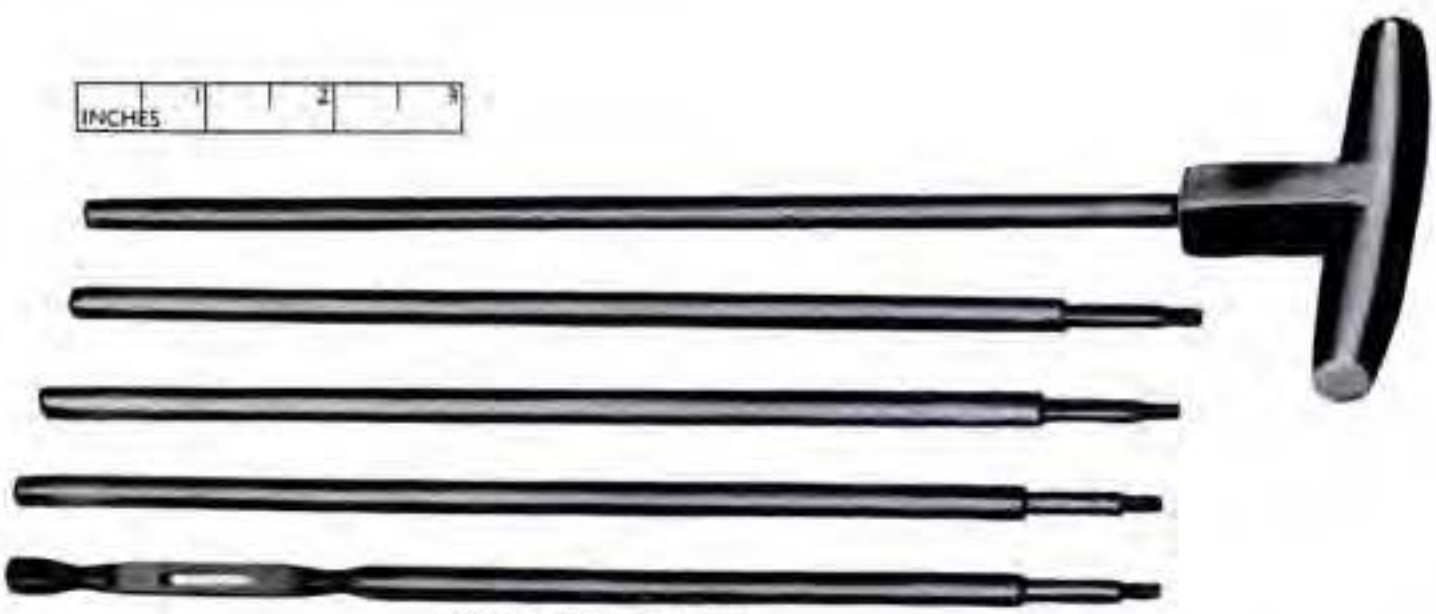
a single piece of steel, the rear end turned to fit the T-slot of the bolt, the front end machined and split to provide spring-type extracting shoulders. It is used by inserting in the T-slot of the bolt in the same manner as a cartridge. When the bolt is driven forward by the driving springs, the extracting shoulders of the extractor are forced through the ruptured case so that they engage and withdraw the ruptured case when the bolt is withdrawn to the rear. The lever action of the charging device provides the necessary force for initial extraction.

RA PD 73891

Figure 32. Headspace and timing gauge assembly.



BRUSH, M6-B108828



ROD, M7-D35441

RA PD 92473

Figure 33. Chamber cleaning brush, M6 and jointed cleaning rod, cal..50, M7.

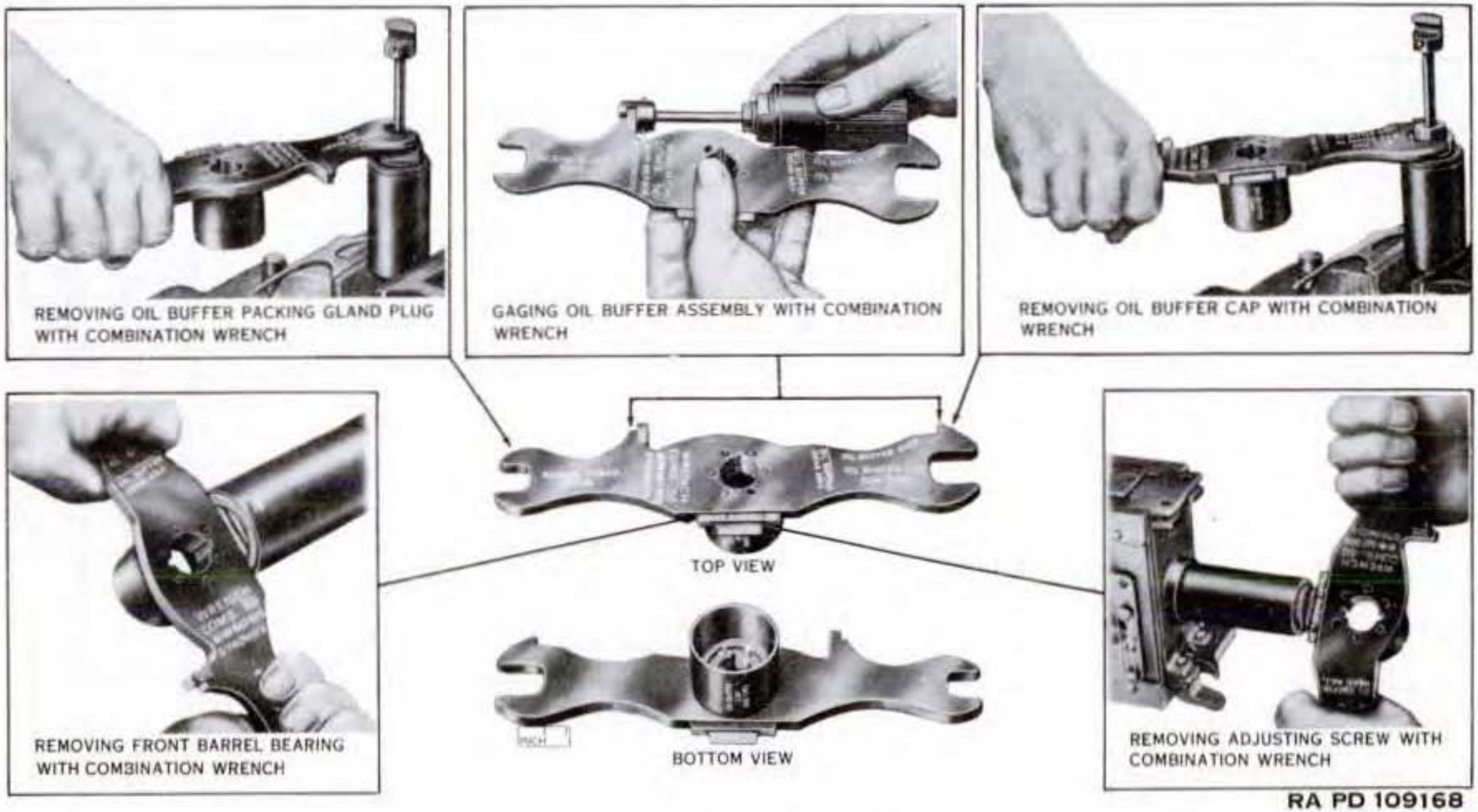


Figure 34. Combination wrench, cal..50.

(4) *Synthetic rubber muzzle cover, M337.* This expendable synthetic rubber muzzle cover effectively seals the bore of the gun during inactive periods against entrance of sand, dust, moisture, snow, and ice and is not subject to deterioration by oil, grease, or petroleum solvents. Use of this cover does not eliminate cleaning and oiling procedures as prescribed in this manual. Oiling of the bore will continue to be performed in order to prevent corrosion. However, it is no longer necessary to wipe the bore clean before firing, except where preservative lubricating oil (medium) has previously been applied under conditions of extremely high humidity. The cover fits snugly over the end of the barrel and requires no adhesive. It is not necessary to remove it before firing as the first rounds will either blow the cover off or rip it open. Upon receipt of this cover, use of the expendable muzzle cover M1 will be discontinued.

Figure 35. Ruptured cartridge case extractor.

(5) *Firing pin spring removing tool* (fig. 36). This tool is used for disassembling and assembling the firing pin extension assembly. It is used as follows:

(*a*) To disassemble firing pin extension, clamp the extension assembly lightly but firmly in a vice. Engage head of tool tube with end of extension, so that slot in rod straddles pin in extension. Press rod in to compress spring, push out stop pin, and, holding tube against extension, allow rod to move slowly rearward in the tube, and spring to expand into the tube. Figure 37 shows use of tool.

(b) To assemble firing pin extension, retract rod in tube of tool. Then place one end of spring in tube and the other end in the firing pin extension, hold head of tube over end of extension with slot of rod in position to straddle pin holes in extension. Then compress spring into extension with rod (fig. 37) and insert stop pin. Be sure pin is flush with extension on both sides.

Figure 36. Firing pin spring removing tool.

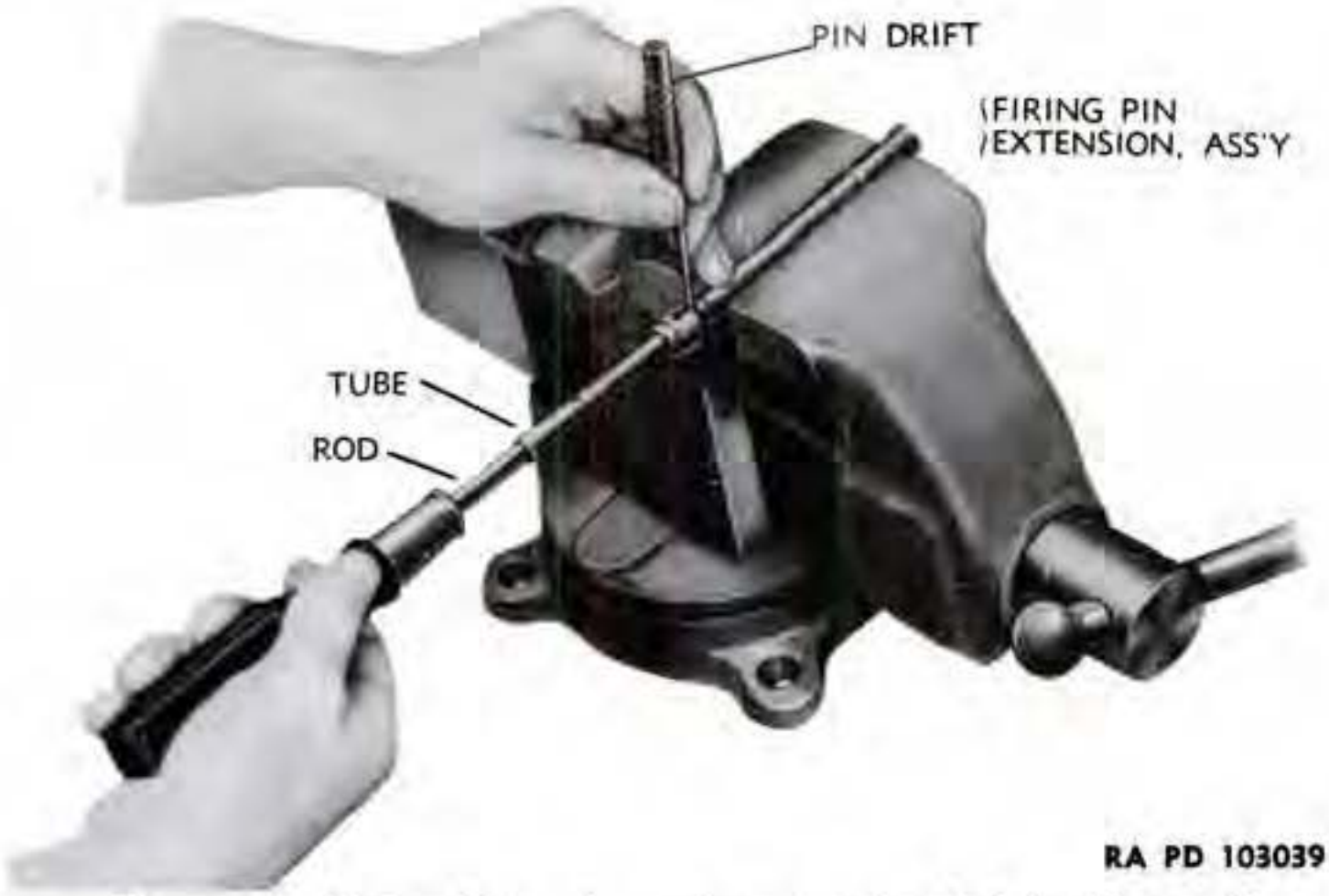


Figure 37. Using firing pin spring removing tool to disassemble firing pin extension assembly.

(6) *Link-delinking machine, cal. .50, M7* (fig. 38). This machine can be used to delink and link ammunition in a cal. .50 metallic link belt. In general the machine consists of a base, handle, slide (bar), and delinker (bar), and is operated as follows:

(a) To delink ammunition, partly raise the handle and lay the belted ammunition on the base with the separating pins between the cartridges and the links against the pins. Then lower the handle until the delinker engages the extractor grooves in the cartridges, hold the delinker in position and raise the handle. This will cause the delinker to move rearward and pull the cartridges from the links.

(b) To link ammunition, properly assemble links and place on base adjacent to the U-shaped link stops, then place cartridges in the grooves of the base, and start them into the links. With delinker raised, lower the handle until the slide presses against the base of the cartridges, and forces them forward into the links. Move handle down until slide is checked by the slide stops on the sides of the base. The cartridges will then be loaded to the correct depth in the links. Care should be taken to properly position that portion of the loaded belt that is adjacent to the section being loaded. Pivot pins should be cleaned and lubricated occasionally to insure smooth action. Wipe dry of excess oil.

(7) *Powered linking machine, cal. .50, M5, and attachment, delinking, cal. .50, M7.* The powered linking machine M5 (fig. 39) provides a power operated machine for linking cal. .50 ammunition, to form a metallic link belt, at a speed much greater than by hand

Figure 38. Link-delinking machine, cal..50, M7.

operated linking tools. Provision has been made so that in case of emergency a handcrank can be attached and linking continued at reduced speed. A delinking attachment M7 (fig. 40), has been provided, consisting of several units which may be quickly and easily attached to the powered linking machine to delink cartridges from cal. .50 metallic link belts.

(8) *Repositioning machine, cal. .50, M15* (fig. 41). The repositioning machine M15 is a small, light, portable, hand-operated machine for repositioning cartridges which have become misaligned or loose in link belts due to the shifting of links or the improper depth of cartridge insertion in links. (For detailed information, see TM 9-220.)

Figure 39. Powered linking machine, cal..50, M5.

RA PD 92461

Figure 40. Delinking attachment, cal..50, M7, assembled to powered linking machine, cal..50, M5.

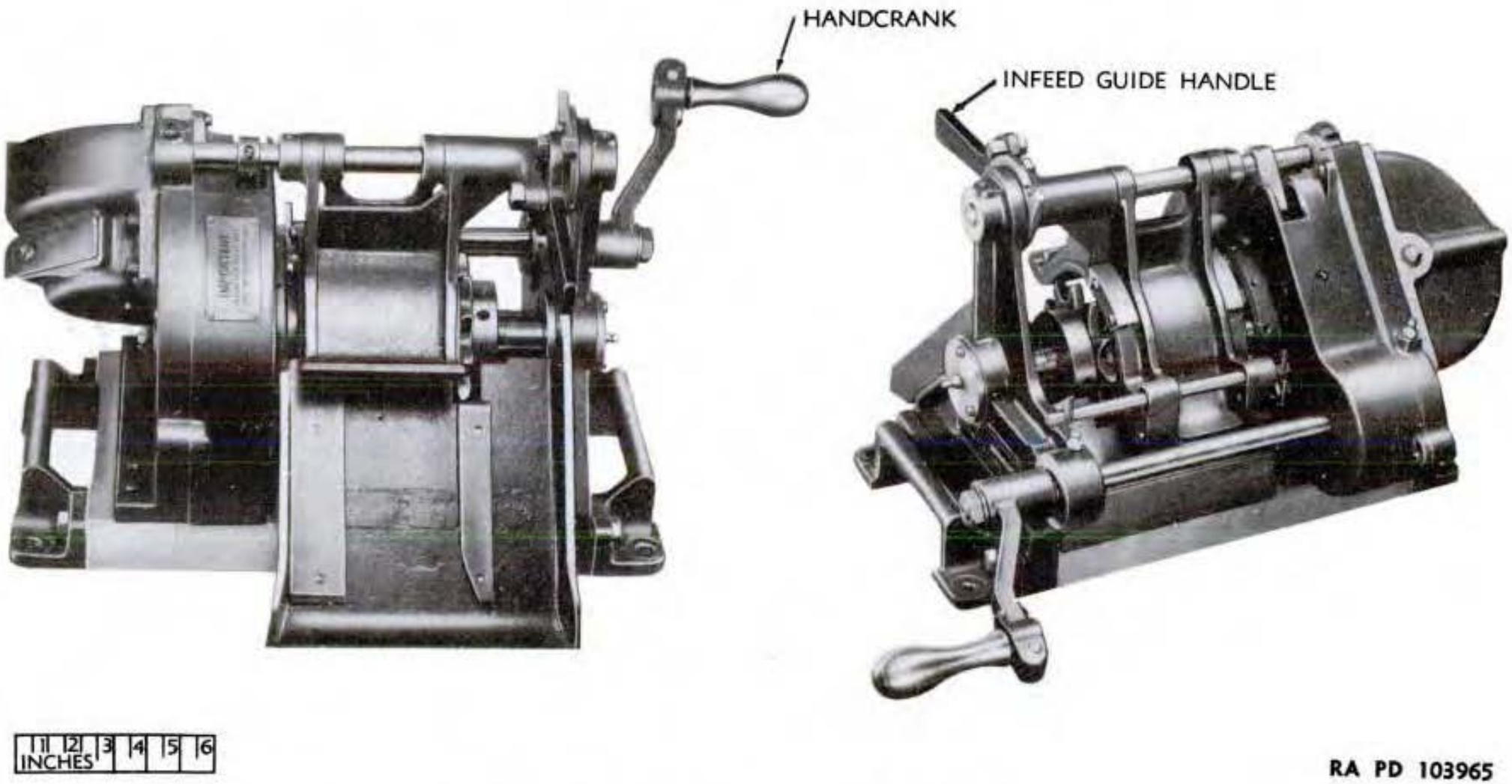


Figure 41. Repositioning machine, cal..50, M15.

Section XI. LUBRICATION

44. Lubrication Order

a. Reproduction of LO 9–225 (fig. 42) prescribes first and second echelon lubrication maintenance. In addition it prescribes the lubricating oil to be used under various conditions of temperature, humidity, and atmosphere.

b. In the event that the lubricants prescribed in LO 9–225 are not available lubricating oil (light) may be used as emergency substitute.

45. Points to be Lubricated

All bearing surfaces of moving parts should be lightly lubricated. In addition to the general lubrication of the gun as explained in paragraph 46 special attention should be given to the following points:

Belt feed lever grooves in the bolt.

Belt feed lever pivot stud.

Bore and chamber.

Breech lock.

Extractor pivot.

Guideways in the barrel extension for the bolt guides.

Oil buffer.

Breech lock cam guides and top.

Cocking lever.

Cover extractor cam.

Cover extractor spring.

Sear, sear slide, and the grooves in which they operate.

Slideway in cover for the belt feed slide.

Switch pivot.

46. General Lubrication Instructions

Note. In this manual the term "lubrication" is used to cover two functions. It applies equally to the lubricating of moving, contacting surfaces to minimize friction and to the covering of stationary parts with an oil film to prevent rusting.

a. SERVICE INTERVALS. Lubricants reduce friction between sliding or rolling surfaces and protect metal parts against corrosion and rust. Intervals specified on LO 9–225 (fig. 42) are based on the preservative qualities of the lubricant under normal operating conditions and continuous use of the matériel. Reduce these intervals under extreme ground conditions such as excessively high air temperatures, sandy or dusty areas, or exposure to moisture. The protective qualities of the lubricant will be lost more quickly under

these conditions, and more frequent servicing will be required in order to prevent malfunctioning or damage to the matériel.

b. CLEANING BEFORE LUBRICATION. Prior to lubrication, all guns should be cleaned by one of the methods outlined in paragraphs 8 through 17.

c. LUBRICATION. Lubrication should be careful and sparing and is best accomplished by the use of a clean, lintless cloth saturated in the proper lubricant and then wrung out. Excessive lubrication may often be noticed by the smoke caused by the burning oil when firing the gun. Excess oil should be wiped off for the following important reasons:

(1) Excess oil in the chamber of the barrel will raise the breech pressure to a hazardous point when the gun is fired and may result in a blown bolt, a ruined gun, and serious injury to the personnel. Removal of excess oil, therefore, is particularly important in respect to the bolt and rear end of the barrel of the gun.

(2) Excess oil attracts grit and foreign matter which may clog the mechanism and cause a malfunction or stoppage. In any case, it will be conducive to excessive wear of the moving parts.

d. DRY BORE AND CHAMBER BEFORE FIRING OR MOUNTING GUNS. Wipe the bore and chamber of the barrel completely dry of oil before firing or mounting guns for combat unless muzzle cover M337 (33–C–801) is used.

Section XII. PREVENTIVE MAINTENANCE SERVICE

47. Scope

Preventive maintenance service prescribed by Army Regulations is a function of using organization echelons of maintenance. This section contains important general preventive maintenance procedure, and specific maintenance procedure applying to the gun as a whole. In addition it contains schedules of preventive maintenance service allocated to crew (first echelon) and to organizational (second echelon) maintenance. Special maintenance of specific groups of the gun components is covered, when necessary, in sections pertaining to the groups.

48. Common Procedures

The following common general preventive maintenance will be observed in addition to that referred to in the maintenance schedules in paragraph 50.

a. The importance of a thorough knowledge of how to lubricate and clean the machine gun cannot be over emphasized. The kind

WAR DEPARTMENT LUBRICATION ORDER LO 9-225

1 APR 1946 (Supersedes 25 Jan 1945)

GUN, MACHINE, CAL. .50, BROWNING, AN-M2, AIRCRAFT, BASIC

References: TM 9-225, ORD 7 SNL A-38

FEEDING AND FIRING MECH.—Daily and after firing, clean with SD or CR, dry, reoil with PS. In humid and salt air areas, during inactive periods use PM above 0° F.

BORE—After firing, and on 3 consecutive days thereafter, clean with CR. After 4th. cleaning, dry, oil with PM above 0° F. PS below 0° F. and wipe dry before firing. When gun is not being fired, renew oil film every 5 days.

OIL BUFFER—Check weekly and before firing. Use PS at all temperatures.

PS—OIL, lubricating, preservative, special
PM—OIL, lubricating, preservative, medium
CR—CLEANER, rifle bore
SD—SOLVENT, dry cleaning

Requisition additional Lubrication Orders in conformance with instructions and lists in FM 21-6

This WDLO supersedes all conflicting lubrication instructions prior to 1 Apr 1946 [A. G. 300.8 (25 Jan 1945)]

BY ORDER OF THE SECRETARY OF WAR:
DWIGHT D. EISENHOWER Chief of Staff

OFFICIAL:
EDWARD F. WITSELL Major General
The Adjutant General

RA PD 101815

Figure 42. War Department Lubrication Order LO 9-225.

of attention given to this weapon largely determines whether the gun will shoot accurately and function properly when needed.

b. Rust, dirt, grit, gummed oil, and water cause rapid deterioration of internal mechanisms and outer surfaces. Particular care should be taken to keep all bearing surfaces and exposed parts clean and properly lubricated. Wiping cloths, rifle bore cleaner, dry cleaning solvents, and lubricants are furnished for this purpose. Rust is an enemy of iron and steel. All traces of rust should be removed with crocus cloth, which is the coarsest abrasive to be used by the using arm for this purpose. Care should be used not to change the shape or dimension of the part.

c. Loose parts will be kept tightened and unserviceable parts replaced.

d. Serious damage to weapons, in many cases requiring repair and replacement of component parts, has resulted from the use of water, steam, or air from a high-pressure hose for cleaning purposes. For this reason, all personnel are cautioned to prevent water, dirt, or grit from entering functioning parts and bearing surfaces. The prescribed methods of cleaning are outlined in paragraphs 8 through 17.

e. Each time the gun is disassembled for cleaning or repair all parts should be carefully inspected for cracks, excessive wear, rust and like defects which might cause or lead to malfunction of the gun. Worn, damaged or improperly adjusted parts which cause definite malfunctions are covered in paragraphs 59 through 65. These paragraphs should be used as a guide during inspection. All parts should be thoroughly cleaned and properly lubricated before assembly.

f. Each time a gun is assembled, after headspace and timing has been checked and adjusted, the gun should be given an operational check. This check consists of operating the gun by hand to see that it functions properly. When possible a belt of *dummy* cartridges should be fed through the gun to be sure feeding, extraction, chambering, and ejection are properly executed by the mechanism.

g. When matériel is not in use, the proper covers should be secured in place.

h. Spare parts, tools, and equipment will be inspected for completeness, serviceability, and interchangeability. Missing items will be replaced and damaged items will be turned in for repair. Use only tools that are provided and see that they fit properly. Tools that do not fit will cause damage to parts.

i. At least every 6 months a check-up will be made to see that all modifications have been applied. A list of current Modification Work Orders is published quarterly in FM 21–6. If a modification

has not been applied, the local ordnance officer will be promptly notified. No alteration or modification which will affect the moving parts will be made by the using personnel, except as authorized by the Ordnance Department.

49. Specific Procedures

a. BEFORE FIRING. (1) Thoroughly clean and dry the bore and chamber of all dirt or oil. (See par. 15.) The bolt should be removed from the gun when cleaning the barrel in order to prevent damage to the T-slot.

Note. If the bore and chamber are protected with a light film of preservative lubricating oil (special) and rubber muzzle cover M337 is used, it is not necessary to clean and dry the bore and chamber or to remove the muzzle cover before firing.

(2) Using clean, dry wiping cloth, wipe any surplus oil from the bolt, feedway, and cover assembly. Reassemble parts.

(3) Wipe outer surfaces of gun with clean, dry, wiping cloth.

(4) Examine oil buffer and refill if necessary as outlined in paragraph 88*d*.

b. AFTER FIRING. (1) Clean the barrel as outlined in paragraphs 15 or 16 immediately upon return from flight. Repeat this cleaning for 3 consecutive days thereafter or until there is no longer any evidence of sweating. The purpose of the repeated cleaning operations is to remove the effects of "sweating," a chemical reaction of the burned powder which cannot be removed by one cleaning.

(2) After the fourth cleaning following firing, and if no firing is anticipated within the next 24 hours, place clean dry patches in the slot of the cleaning rod and thoroughly dry bore and chamber. Using clean dry patches which have been dipped in the oil prescribed in paragraph 44 and then wrung out, apply a light film of oil to the bore and chamber by working the patches through the bore.

(3) Using one of the cleaning methods outlined in paragraphs 8 through 17 thoroughly clean the front face of the bolt and the front of the barrel extension as well as all the cover group components which have been exposed to powder gases. Dirt and foreign matter must be removed from all other parts.

Caution. Use special care to remove all fouling from the firing pin hole in the face of the bolt.

(4) During firing, hard carbon gradually accumulates in the T-slot of the bolt. This carbon deposit must be carefully removed, using a scraper or crocus cloth.

(5) Thoroughly dry all components and immediately apply a light coating of the oil prescribed in paragraph 44.

c. DAILY SERVICE. Inspect the bore and chamber. Clean component parts of feeding and firing mechanism, wipe thoroughly dry, and relubricate as prescribed in paragraphs 44 through 46.

d. SERVICE FOR PERIODS UP TO 1 WEEK. (1) If the gun has not been fired, renew oil film in the bore and chamber every 5 days as prescribed in paragraphs 44 through 46.

(2) Examine oil buffer and refill if necessary as outlined in paragraph 88*d*.

e. SERVICE FOR PERIODS UP TO 90 DAYS. If it is anticipated that guns will not be used for a period up to 90 days, and neither lubrication every 5 days nor placing the matériel in limited storage (par. 140) are desirable, the guns may be coated with preservative lubricating oil (medium). This is applied by dipping the gun components into a bath of the oil. Before returning guns to service, remove preservative by following one of the cleaning procedures outlined in paragraphs 8 through 17.

Note. When preservative lubricating oil (medium) is used for temporary storage, frequent inspections will be made to determine that the oil film is adequate to prevent rusting.

f. CARE OF SPARE PARTS AND EQUIPMENT. Complete sets of spare parts, tools, and equipment should be maintained at all times. They should be inspected frequently and a light film of the lubrication oil prescribed for feeding and firing mechanism in paragraph 44 should be maintained.

50. Maintenance Schedules

FIRST ECHELON

Point	Preventive maintenance	Detailed instructions
	PREFLIGHT OR BEFORE FIRING	
Adjusting screw (back plate buffer)	Check for adjustment	Paragraph 70*c*.
Gun as unit	Check for proper lubrication and cleanliness	Paragraphs 44 through 46.
Accessory equipment	Connect properly, adjust, and tighten	Paragraph 28.
Ammunition belt	See that belt is loaded properly and properly inserted in the feedway	Paragraphs 27 and 28.
Ammunition belt and ammunition boxes	Check for proper alignment	Paragraph 28.
Feedway	See that gun is partially or completely loaded as instructed	Paragraph 28.
	DURING FIRING	
Bursts of fire	Check for controlled bursts	Paragraph 30.
	POSTFLIGHT OR AFTER FIRING	
All malfunctions and stoppages	Report to armorer for correction	Paragraph 59*f*.

SECOND ECHELON

Point	Preventive maintenance	Detailed instructions
	PREFLIGHT OR BEFORE FIRING	
Adjusting screw (back plate buffer)	Check for adjustment	Paragraph 70*c*.
Chamber and bore	Clean and dry	Paragraph 15.
Ammunition	Check for dryness, cleanliness, short rounds, corrosion of ammunition or links, and defective rounds	Paragraph 134.
Gun as unit	Clean and properly lubricate	Paragraphs 8 through 17 and 44 through 46.
Accessory equipment	Connect properly, adjust and tighten	Paragraph 28.
Ammunition belt	Check for condition and see that it is properly loaded and properly inserted in feedway	Paragraphs 27 and 28.
Ammunition belt and ammunition boxes.	Check for proper alignment	Paragraph 28.

SECOND ECHELON (Continued)

Point	Preventive maintenance	Detailed instructions
Oil buffer	Check for leakage. Adjustment for rate of fire	Paragraph 88 *a* and *i*.
Breech lock cam	Check for adjustment and cleanliness	Paragraphs 109*b* and 110*b*.
Headspace	Check	Paragraph 24.
Timing	Check	Paragraph 25.
Trigger bar	Check clearance, if required	
Assembled gun	Check by hand functioning	Paragraph 48*f*.
Barrel jacket	Check front barrel bearing screws	Paragraph 108*e*.
Switch spring	Check tension	Should not bind.
Ejector spring	Check tension	Should snap back to normal position.
POSTFLIGHT OR AFTER FIRING		
Gun as unit	Unload completely	Paragraph 32.
Stoppages or malfunctions	Correct	Paragraphs 59 through 65.
Bore, chamber and all working parts	Inspect, clean, and oil. If gun is temporarily out of use, the bore and chamber must also be cleaned on each of the following 3 days	Paragraph 49*b*.
Front barrel bearing	Check for carbon	Paragraph 110*a*.
Headspace	Adjust	Paragraph 24.
Timing	Adjust	Paragraph 25.
Assembled gun	Check operation and adjustment	Paragraph 48*f*.

Section XIII. CYCLIC FUNCTIONING OF GUN

51. General

a. The basic aircraft Browning machine gun, cal. .50 AN–M2 may be fired by means of a manual trigger, or by a back plate solenoid acting upon the sear through the medium of a trigger bar, or by a side plate solenoid, trigger motor or other device acting upon the sear through the medium of the sear slide. In any case, the functional operation of the gun is the same. For clarity, the illustrations in this section show the sear operated by a manual trigger and a trigger bar.

b. Each time a cartridge is fired, the mechanical action within the gun involves many parts moving simultaneously or in their proper order. The action of these parts, and their relationship one to the other can be explained more clearly if each cycle of operation is divided into various phases. Familiarity with the construction of the gun and the function of its component parts and groups, as explained in sections pertaining to the groups, is necessary to a

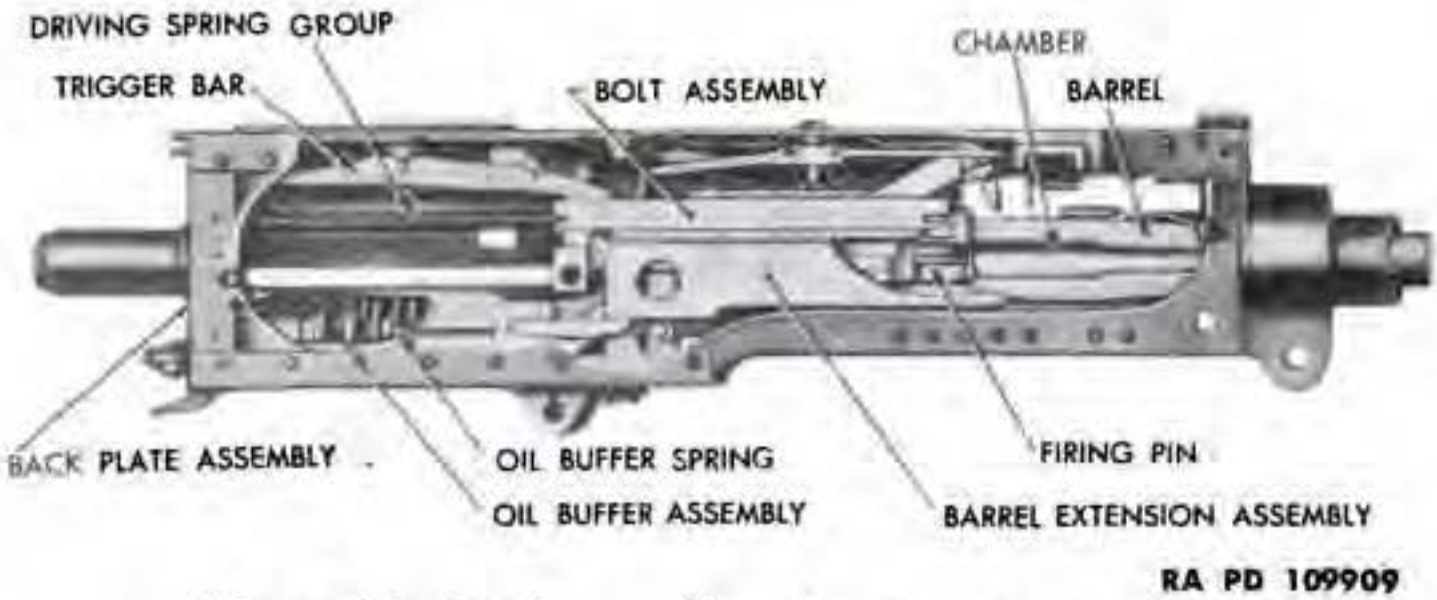


Figure 43. Receiver section of gun—cutaway view.

thorough understanding of the cyclic functioning of the gun as a whole. A clear understanding of the explanations may be gained, by hand operation of a gun, using dummy ammunition. Figure 43 below shows a cutaway view of the unloaded gun with the recoiling parts in the forward or "battery" position.

c. For convenience and clarity cycles of operation are divided into the following phases and explained in the order indicated.

(1) Firing the first round. (See par. 52.)
(2) Recoiling. (See par. 53.)
(3) Counterrecoiling. (See par. 54.)
(4) Cocking. (See par. 55.)
(5) Automatic firing of subsequent rounds. (See par. 56.)
(6) Feeding. (See par. 57.)
(7) Extracting and ejecting. (See par. 58.)

52. Firing First Round

a. In order to fire the first round the gun must be loaded and the firing mechanism manually cocked. Figure 44 shows the firing mechanism cocked and ready to fire. When the firing mechanism is cocked, the firing pin spring is compressed and the firing pin extension engages with the sear. When the trigger is operated, it contacts the rear end of the trigger bar and forces it upward. As the trigger bar is actuated, it rotates about its pin and forces the front end down to depress the sear, thereby disengaging the sear from the firing pin extension. This allows the compressed firing spring to force the firing pin and firing pin extension forward to fire the round of ammunition in the chamber.

b. If the gun is fired by means of a back plate solenoid and trigger bar, the firing pin extension and firing pin is released by actuating the solenoid. When the plunger of the solenoid moves forward it cams up the rear end of the trigger bar. The action of the trigger bar in releasing the sear and firing pin extension is then the same as in *a* above.

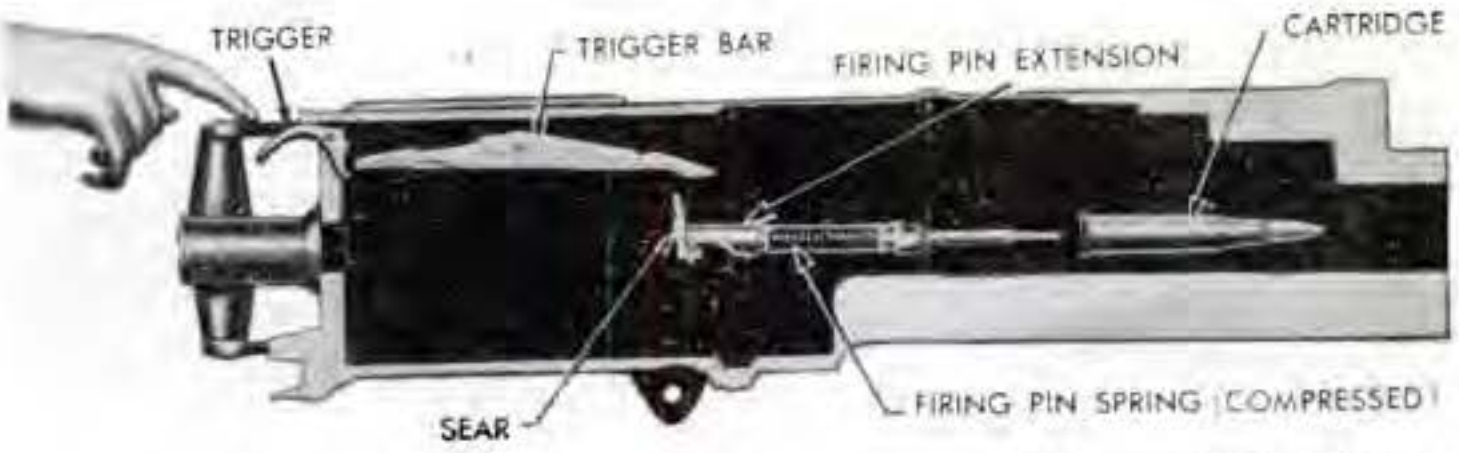


Figure 44. Firing mechanism in ready to fire position.

c. If the gun is fired by means of a side plate solenoid, trigger motor, or other device, the plunger of the solenoid, trigger motor or other device, when actuated, is forced against the sear slide. The sear slide, moving laterally, cams down the sear, and the firing pin is released to fire the cartridge as explained above.

d. For firing of subsequent rounds, see paragraph 56.

53. Recoiling

a. The complete cycle of the recoiling parts of the gun, which takes place as each cartridge is fired, consists of the recoil movement when certain parts move rearward, and the counterrecoil movement when the same parts move forward. At the instant of firing of the first shot, the barrel, barrel extension, and the bolt, known as the recoiling parts, are in the fully forward or "battery" position in the gun.

b. When the cartridge is fired, the burning powder immediately generates a chamber pressure of approximately 60,000 pounds per square inch. This pressure acts upon the base of the bullet, forcing the bullet out of the cartridge case and out of the barrel. At the same time this pressure acts upon the head of the cartridge case which is seated against the front face of the bolt, forcing the bolt to the rear. Since the bolt is locked to the barrel extension and barrel by the breech lock (A, fig. 45), these parts move to the rear as one unit for about ¾ inch, at which time the breech lock depressors disengage the breech lock from the bolt (B, fig. 45). By this time, the bullet is out of the barrel and the chamber pressure is relieved.

c. As the recoiling parts move toward the rear, the barrel extension bears against the accelerator, rotating it rearward about the accelerator pin, until the rearward movement of the barrel extension is stopped by the oil buffer. The tips of the accelerator strike the lower projection on the bolt, transferring kinetic energy from the barrel extension to the bolt, and thus accelerating the bolt to the rear.

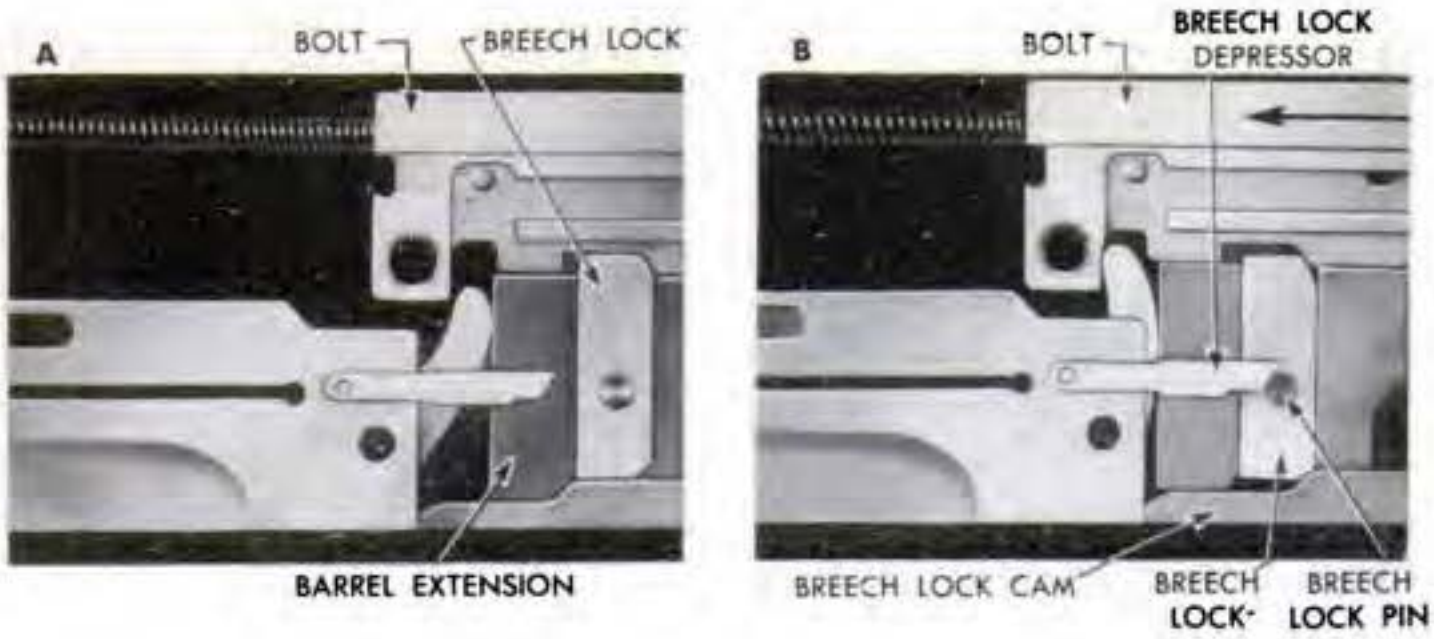


Figure 45. Bolt locked to barrel extension in A and unlocking in B.

d. The barrel and barrel extension have a total rearward travel of 1⅛ inches at which point they are completely stopped by the oil buffer.

e. During this recoil of 1⅛ inches, the oil buffer spring is compressed by the rearward momentum of the barrel extension, which is transmitted through the barrel extension shank to the oil buffer piston rod, with which it is engaged. The spring is held in the compressed position by the barrel extension shank which has been locked by the claws of the accelerator which were rotated rearward by the recoiling barrel extension (fig. 46). The oil buffer spring assists the oil buffer piston in bringing the barrel and barrel extension to rest during the recoil movement.

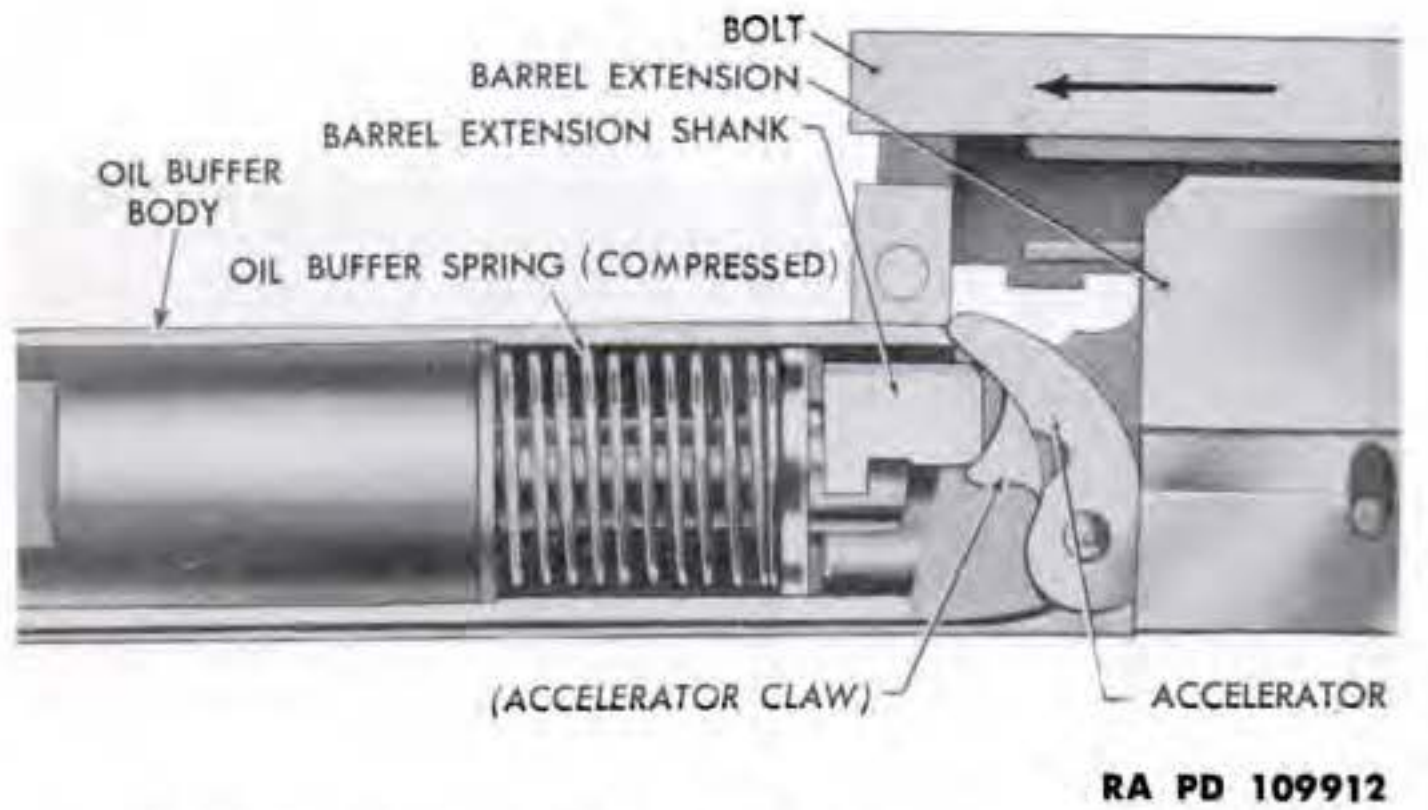


Figure 46. Oil buffer spring locked in compressed position by barrel extension shank and accelerator claw.

f. During recoil, the oil buffer piston rod head is forced from the forward end of oil buffer tube to the rear. (See fig. 47.) The oil at the rear of the tube, under pressure of the piston, escapes to the front side of the piston through the oil buffer piston valve. This valve regulates the flow of oil so that the barrel and barrel extension are decelerated gradually. This cushions the shock of the barrel and barrel extension as they are stopped

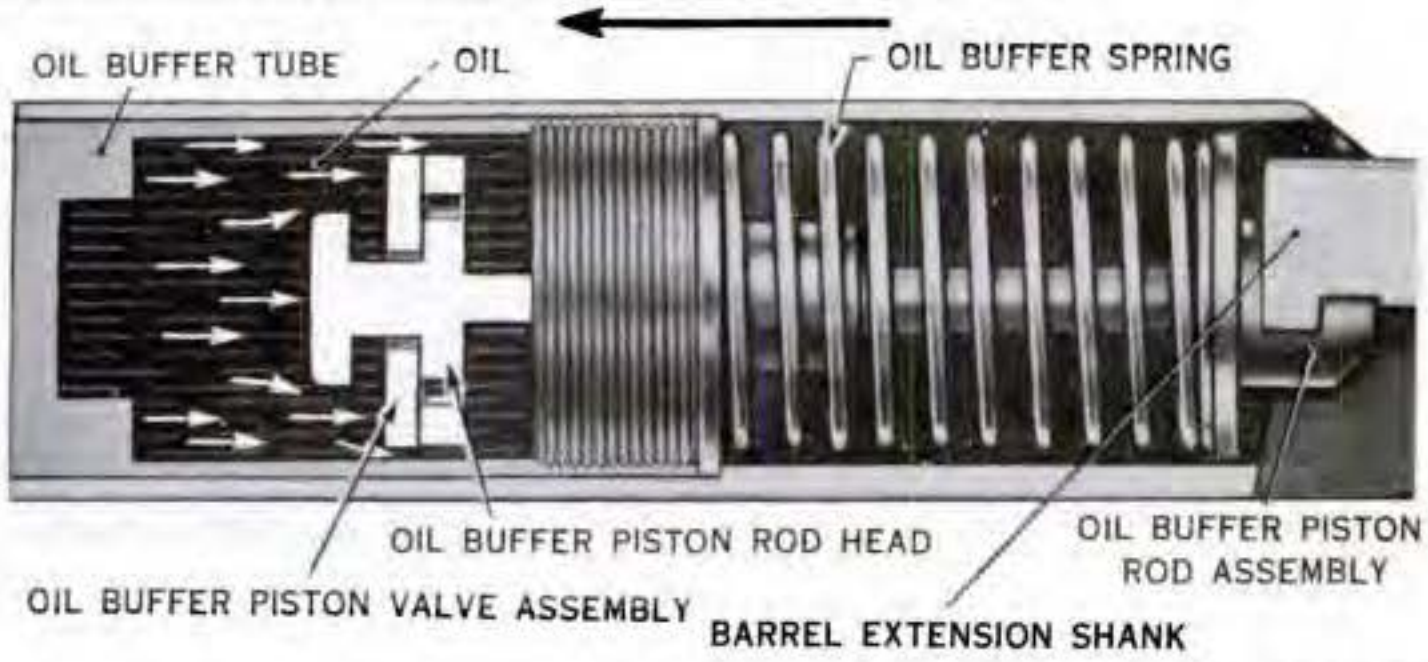


Figure 47. Action of oil buffer assembly during recoil.

g. The bolt travels rearward a total distance of 7 1/8 inches. During this travel, the driving strings are compressed. The rearward movement of the bolt is finally stopped as the bolt strikes the buffer plate in the back plate. Thus, part of the recoil energy of the bolt is stored in the driving springs, and part is absorbed and stored by the buffer disks upon which the buffer plate bears, in the back plate tube. Any remaining recoil energy is transmitted to the gun mountings and their recoil mechanisms. At the end of the recoil movement, the parts are in the position shown in figure 48.

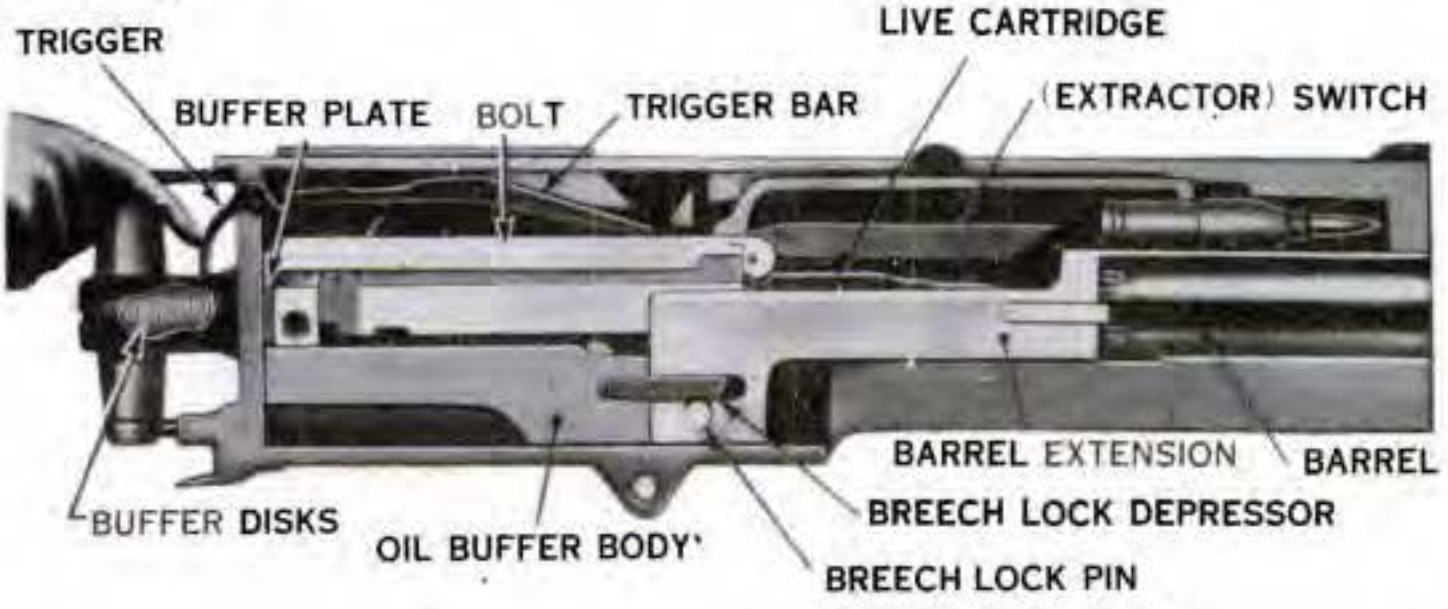


Figure 48. Recoil completed.

54. Counterrecoiling

a. After completion of the recoil movement, the bolt is forced forward by the energy stored in the compressed driving springs and the compressed back plate buffer disks. When the bolt has moved forward about 5 inches, the projection on the bottom of the bolt strikes the tips of the accelerator and rotates it forward. (See fig. 49.) This rotation moves the claws of the accelerator away from the shoulders of the barrel extension shank, thereby releasing the compressed oil buffer spring. The energy stored in the compressed oil buffer spring, supplemented by the counterrecoil energy of the driving springs, forces the bolt and the barrel and barrel extension forward into battery.

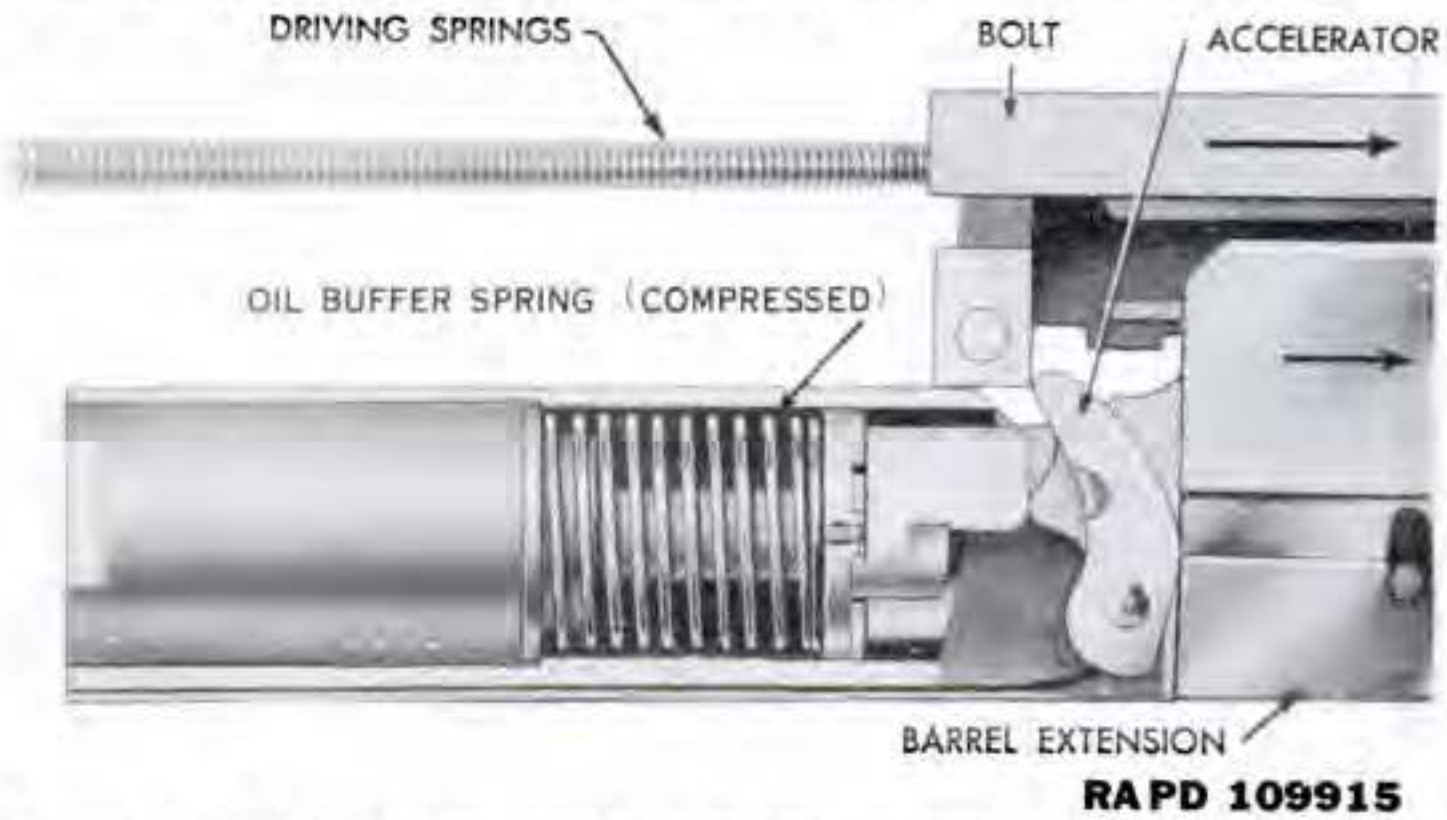


Figure 49. Bolt unlocking accelerator to release compressed oil buffer spring.

b. No restriction to the forward motion of the barrel and barrel extension is desired; therefore on the forward movement, additional openings for oil flow are provided in the piston rod head of the oil buffer assembly. The piston valve is forced away from the piston rod head as the parts move forward (fig. 50) uncovering six ports which provide an additional path for flow of the oil to the rear of the tube. The oil escapes freely at the opening in the center of the piston valve as well as at the edge of the piston valve next to the tube wall.

c. As the barrel extension moves forward, the breech lock engages the sloping ramp of the breech lock cam and is forced upward. The bolt, which has been continuing its forward motion since striking the accelerator, has at this instant reached a position where the notch in the under side of the bolt is directly above the breech lock, permitting the breech lock to enter the notch

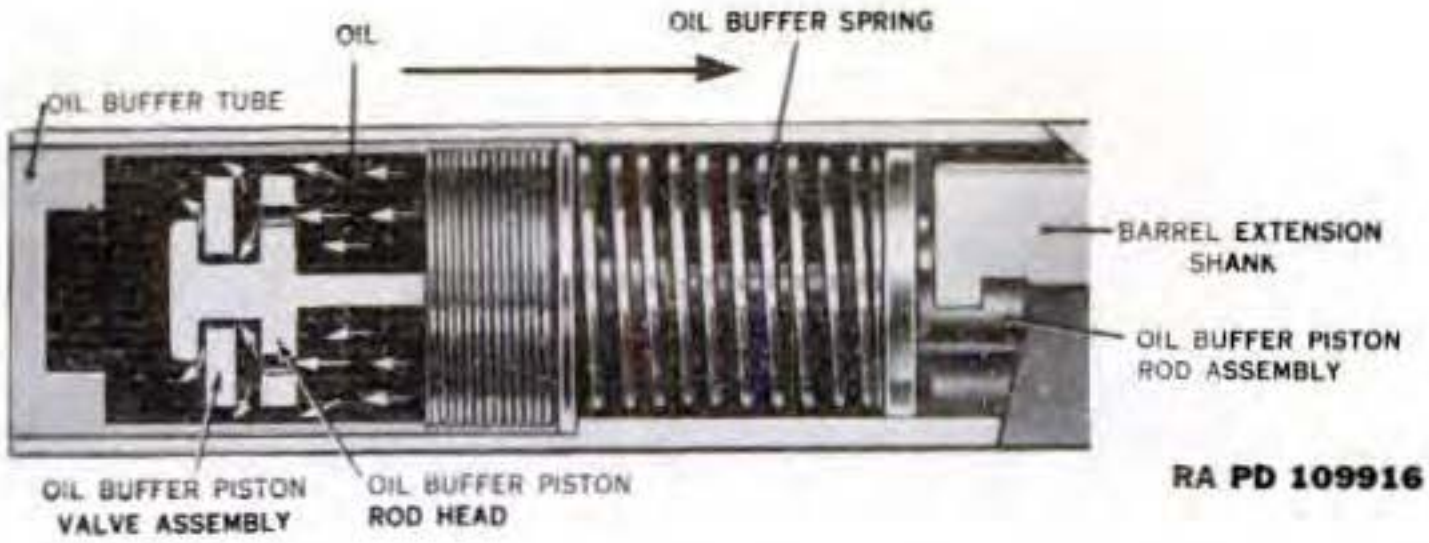


Figure 50. Action of oil buffer assembly during counterrecoil.

and engage the bolt. (See fig. 51.) Thus, the bolt is locked to the barrel extension before the recoiling parts reach the firing position.

55. Cocking

a. The act of cocking the gun begins as the bolt starts to recoil immediately after firing. As the bolt moves rearward, the tip of the cocking lever, which is in the V-slot in the top plate bracket,

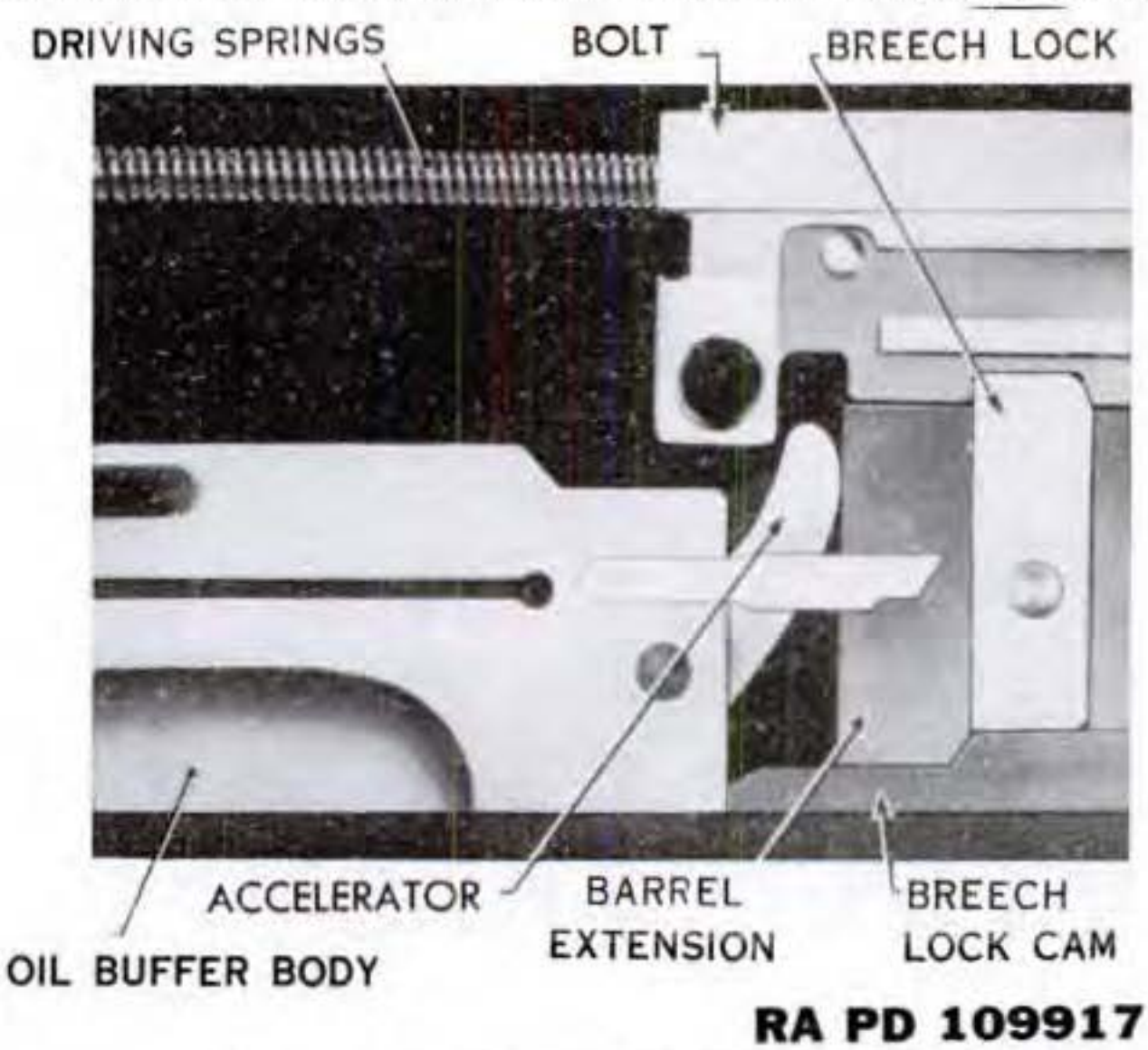


Figure 51. Breech lock engaged with bolt.

is forced forward. Since the cocking lever pivots on the cocking lever pin, the lower end, which engages in a slot in the firing pin extension, is forced rearward, thereby pulling the firing pin exten-

sion and firing pin rearward and compressing the firing pin spring against the accelerator stop. The shoulder on the rear end of the firing pin extension forces the sear downward, compressing the sear spring, and continues to travel rearward until immediately beyond the front face of the notch in the sear. The sear is then forced upward by the compressed sear spring to be in position to engage the shoulder on the firing pin extension when it starts moving forward again. Figure 52 shows cocking action of the bolt and its components during recoil.

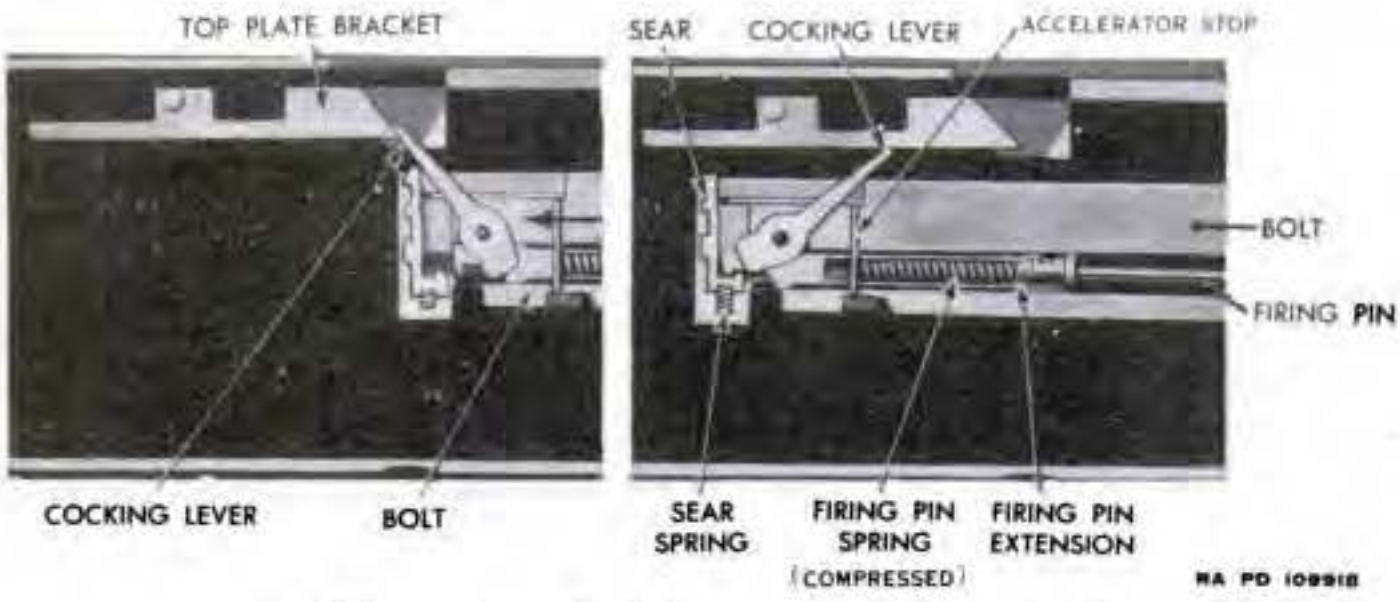


Figure 52. Cocking action during recoil.

b. During the forward movement of the bolt, in counterrecoil, the tip of the cocking lever again enters the V-slot in the top plate bracket and is forced rearward. This action swings the lower end of the cocking lever forward out of engagement with the firing pin extension which moves forward so that its shoulder is engaged and held by the sear. The cocking lever acts as a safety device to prevent the firing pin extension and firing pin, if released prematurely, from moving fully forward to fire the cartridge before the bolt has gone forward sufficiently for the breech lock to be engaged, and thus lock the bolt to the barrel extension. When the recoiling parts are approximately

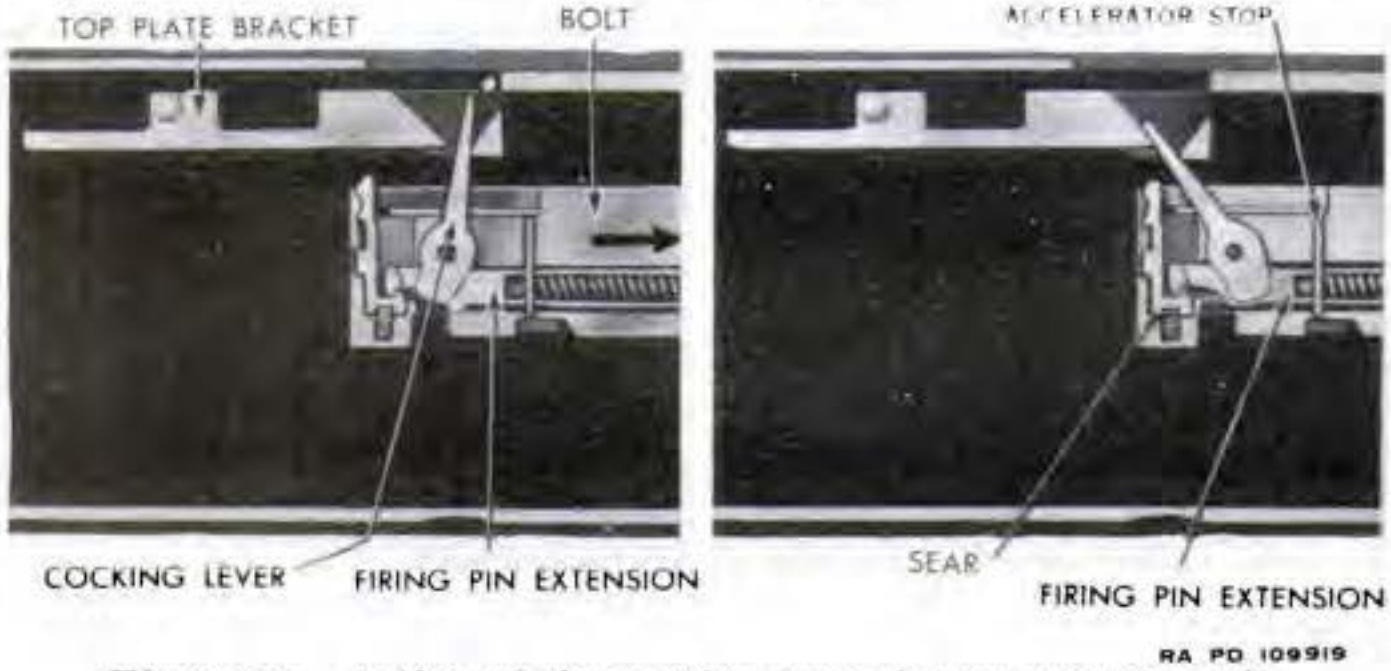


Figure 53. Action of the cocking lever during counterrecoil.

1/16 inch from the fully forward "battery" position, the gun is ready to fire. If, at this instant, the sear is not depressed, the recoiling parts will assume their fully forward "battery" position and the gun ceases to fire. Figure 53 shows the action of the cocking lever during counterrecoil.

56. Automatic Firing of Subsequent Rounds

a. The gun fires automatically, as long as the trigger action is maintained, until the ammunition supply is exhausted. The trigger cams up the rear end of the trigger bar and holds it in that position which holds the front end of the trigger bar depressed. The sear is depressed as its tip is carried against the cammed surface of the depressed trigger bar by the forward movement of the bolt near the end of the couterrecoil stroke. (See fig. 54.) The sear releases the firing pin extension and the firing pin, thus automatically firing the next cartridge. This action is timed so that the recoil starts just before the recoiling parts reach the fully forward "battery" position. The barrel extension is thus prevented from striking the trunnion block.

b. When firing by means of a back plate solenoid, the gun fires automatically as long as the solenoid plunger remains in contact with and cams up the rear end of the trigger bar and holds it in that position. The action in maintaining automatic firing from this point is the same as in *a*, above.

c. Firing by means of a side plate solenoid is accomplished in a similar manner. As the bolt nears the end of its counterrecoil movement, the end of the sear slide is engaged by the cam surface of the projecting solenoid plunger and is forced laterally. This lat-

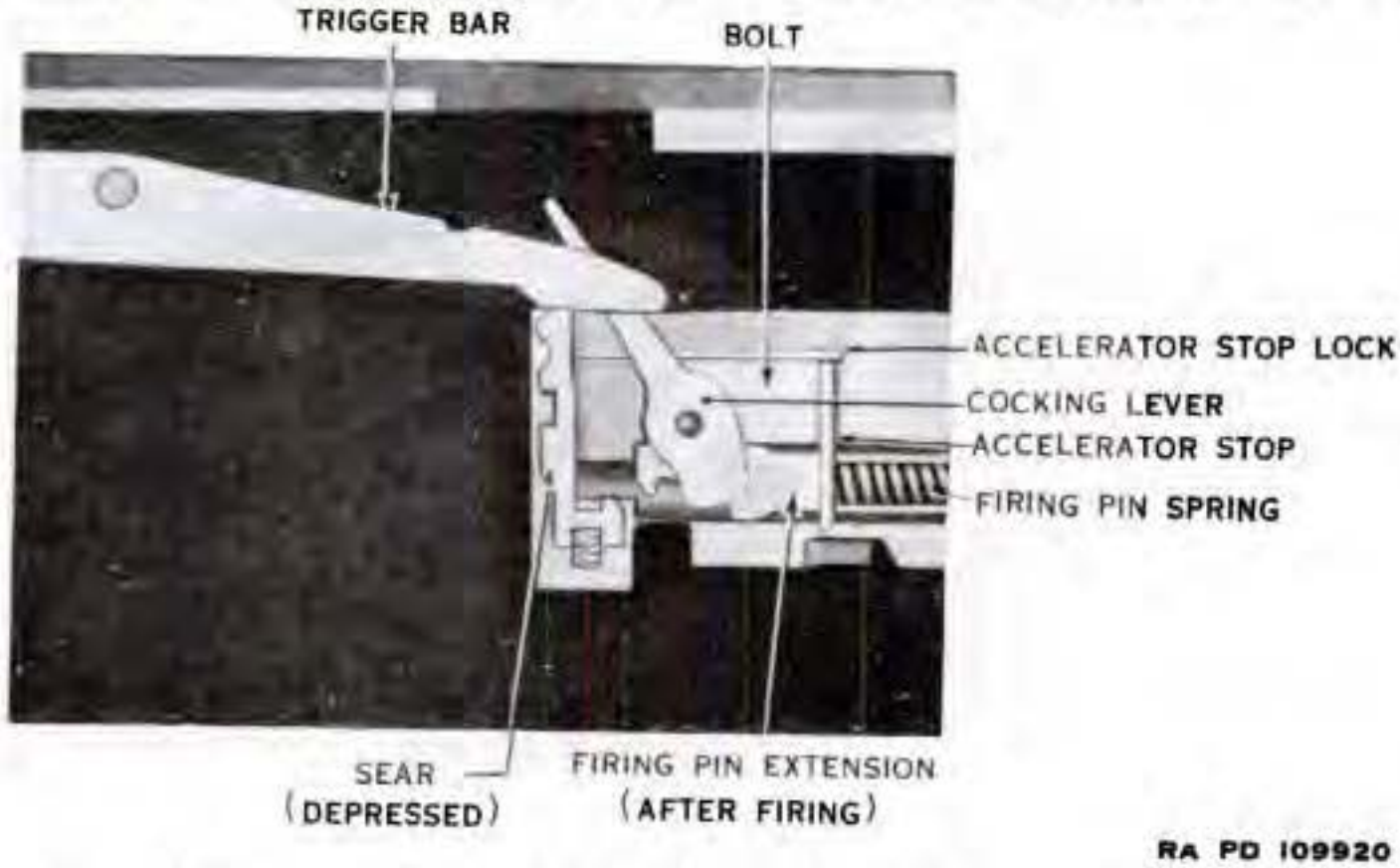


Figure 54. Sear depressed by trigger bar during automatic firing.

eral movement of the sear slide cams the sear downward, thus releasing the firing pin extension and firing pin to fire the gun as outlined above.

57. Feeding

a. The belt feed mechanism is actuated by the bolt. When the bolt is in the forward position, the belt feed slide is entirely within the gun. A lug on the rear end of the belt feed lever rides in one of the two diagonal cam grooves in the top of the bolt. The forward end of the belt feed lever engages in a slot in the belt feed slide to which the belt feed pawl and belt feed pawl arm are attached.

b. When the bolt is moved rearward, the belt feed lever is pivoted about the belt feed lever pivot stud and the forward end of the lever moves the slide out of the side of the gun over the ammunition belt which is held in the gun by the belt holding pawl.

c. When the bolt moves forward, the belt feed lever is again pivoted and moves the belt feed slide into the gun. The belt feed pawl attached to the slide engages a link of the ammunition belt and pulls the belt into the gun. By the time the bolt has reached its forward position, the belt feed pawl has pulled a cartridge into the feedway to a central point directly above the chamber. This cartridge is then positioned against the cartridge stops and is gripped by the extractor. The belt holding pawl has assumed a raised position behind a link of the ammunition belt to prevent the belt from falling out of the gun. Feeding during recoil and counterrecoil is as follows:

(1) As the bolt recoils, the extractor withdraws the centered cartridge from the belt, the belt feed slide is moved out over the belt, and the belt feed pawl pivots so as to ride over the link holding the next cartridge in the belt.

(2) At the end of the recoil movement, the travel of the belt feed slide is sufficient to permit the belt feed pawl to snap down behind the link holding the next cartridge in order to pull the belt into the gun.

(3) As the bolt moves forward in counterrecoil, the belt is pulled into the gun by the belt feed pawl. The belt holding pawl is forced downward as the belt is pulled over it. As the cartridge is positioned in the feedway, the belt holding pawl snaps up behind the link holding the next cartridge, to keep the belt from falling out of the gun.

(4) In the event that the cartridge in the feedway awaiting extraction from the belt fails to be extracted as the belt feed slide

starts moving out to engage and pull the belt into the gun, the belt feed pawl arm, attached to the pawl, rides over this unextracted cartridge and lifts the pawl so that it cannot engage the belt. This prevents double feeding and consequent stoppage of the gun due to jamming.

d. The belt pull of a gun is an expression used to indicate the maximum belt load that can be imposed on the gun without obtaining misfeeds. The belt load is the cumulative effect of the following factors:

(1) Weight of the ammunition belt hanging from the feedway.

(2) Effect of "G's" on the weight of the ammunition belt hanging from the feedway during maneuvering of the plane.

(3) Frictional force created by the ammunition belt moving through the ammunition feed chutes.

(4) Resistance to motion of the ammunition belt because the ammunition or links catch on sharp corners, because the chutes are out of line with the gun feedway, or because the ammunition boxes, or the ammunition, are not guided properly to the feedway of the gun.

58. Extracting and Ejecting

a. As recoil starts, a live cartridge is drawn from the ammunition belt by the extractor and the empty case is withdrawn from the chamber by the T-slot in the front face of the bolt. (See fig. 55.)

b. The matching camming surfaces on the top front face of the breech lock and on the lateral groove in the bottom of the bolt permit a gradual separation of the bolt and barrel extension at the start of unlocking during the recoil movement. (See fig. 45.) The

Figure 55. Extracting cartridge case at start of recoil.

separation of the bolt and barrel extension is relatively slow, and the empty case is slowly started out of the chamber, prior to being completely extracted by the bolt. This reduces the possibility of rupturing the cartridge case.

c. As the bolt moves to the rear, the cover extractor cam forces the extractor down, causing the cartridge to enter the T-slot in the bolt.

d. As the extractor is forced down, a lug on the side of the extractor rides against the top of the (extractor) switch on the side plate, causing the switch to pivot downward to the rear. Near the end of the rearward movement of the bolt, the lug on the extractor rides over the end of the switch, and the switch snaps up to its normal position.

e. On the counterrecoil movement, the extractor is forced farther down by the extractor lug riding under the (extractor) switch. This pushes and holds the live cartridge into its correct position in the T-slot. At the same time, the live cartridge moving into place expels the empty cartridge case which has been withdrawn from the chamber. The extractor stop lug on the side of the bolt limits the downward travel of the extractor so that the cartridge, guided by the ejector, enters the chamber of the barrel. When the cartridge is partly chambered, the extractor rides up the extractor cam on the left side plate where it contacts and compresses the cover extractor spring which forces it down into the extractor groove of the next cartridge in the belt. The partly chambered cartridge has meanwhile been completely chambered by the bolt as it comes into battery. When the final round of ammunition is extracted from the chamber, the empty case is expelled from the T-slot by the ejector.

Section XIV. MALFUNCTIONS AND CORRECTIONS

59. General

a. It is important that the gun and all its equipment be properly installed and maintained. Proper care of the gun and attention to the preventive maintenance schedules (par. 50) will greatly reduce the possibility of gun stoppages due to malfunctions. Malfunctions or stoppages which can be corrected by immediate action are covered in paragraph 31.

b. The first step in analyzing a malfunction is to observe carefully the position of the recoiling parts of the gun as an indication of the probable cause of the stoppage.

c. Before raising the cover, inspect the feedway, whenever possible, by looking in at the side. In this manner it can be determined if the stoppage is caused by misalignment due to improper loading of cartridges in the belt, to short rounds, to link caught in link stripper or to other causes.

d. When possible, hold the bolt in the position at which the stoppage occurred, raise the cover (*Caution*, par. 30*b*), and inspect the gun carefully. Unless the bolt is held in position when the cover is raised, the recoiling parts may spring forward into battery position and the evidence as to the cause of the stoppage may be destroyed.

e. Fully unload the gun (par. 32) and move the recoiling parts forward and backward slowly by hand, watching for any binding or unusual friction which might have caused the stoppage.

f. Since most of the common malfunctions fall in one of five general categories, indicated by the position of the recoiling parts of the gun at the time of stoppage, these five categories with probable causes and remedies of the stoppages are covered in the following paragraphs of this section. On the basis of the report given by the gunner or pilot, carefully analyze the evidence available, position of the recoiling parts when the stoppage occurred, points of friction between moving parts, etc., and decide in which of the categories the stoppage belongs. This procedure may save much time in finding the cause of the stoppage.

60. Gun Stops Firing in Battery Position with Live Cartridge in Chamber

This condition is probably caused by one of the following:

a. FIRING PIN EXTENSION BINDING IN ITS TUNNEL IN BOLT. Remove the bolt from the gun (par. 79) and take out the firing pin extension and firing pin. (See par. 81.) Drop the firing pin into its tunnel in the bolt; the striker should project approximately 1/16 inch from the face of the bolt. Then invert the bolt; the firing pin should fall out freely. Repeat these operations with the firing pin extension attached to the firing pin. The same freedom of movement mentioned above should be obtained. If any binding or unusual friction is discovered, clean the tunnel thoroughly and, using crocus cloth, remove any burs or roughness on the firing pin extension or firing pin. Lubricate the parts lightly as instructed in paragraphs 44 through 46.

b. FIRING PIN SPRING WEAK OR BROKEN. The spring may fail to drive the firing pin with sufficient force to fire the cartridge. This is indicated by light indent in the primer. (See fig. 56.)

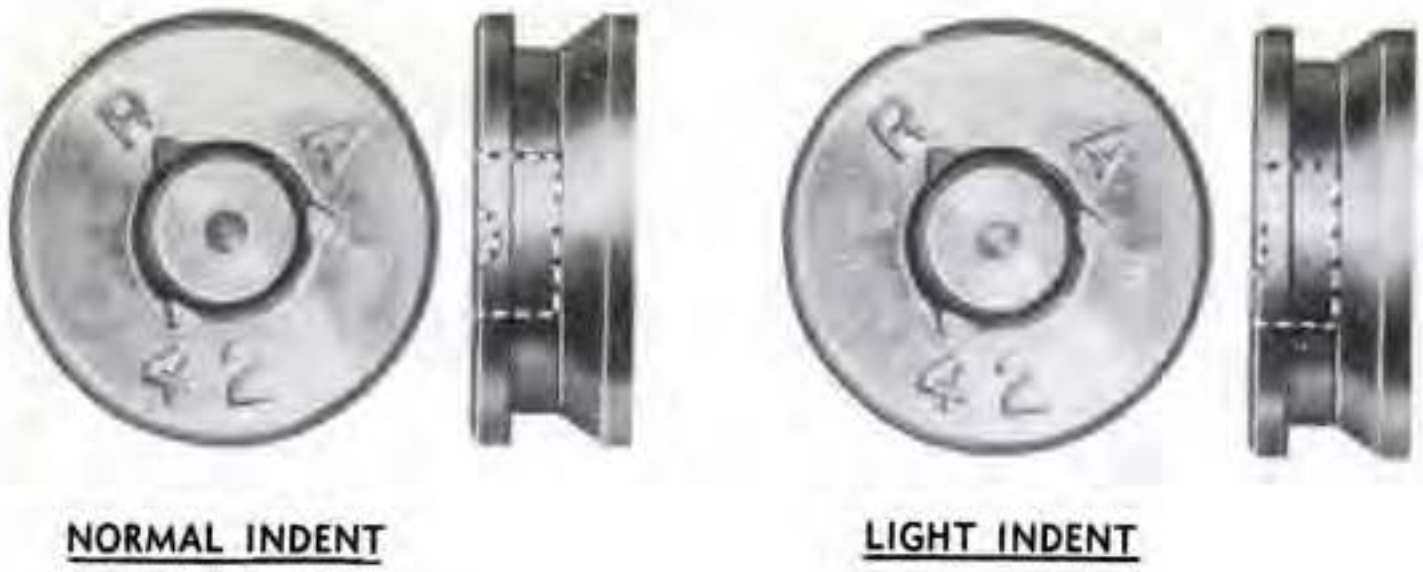


Figure 56. Normal and light indent in primer.

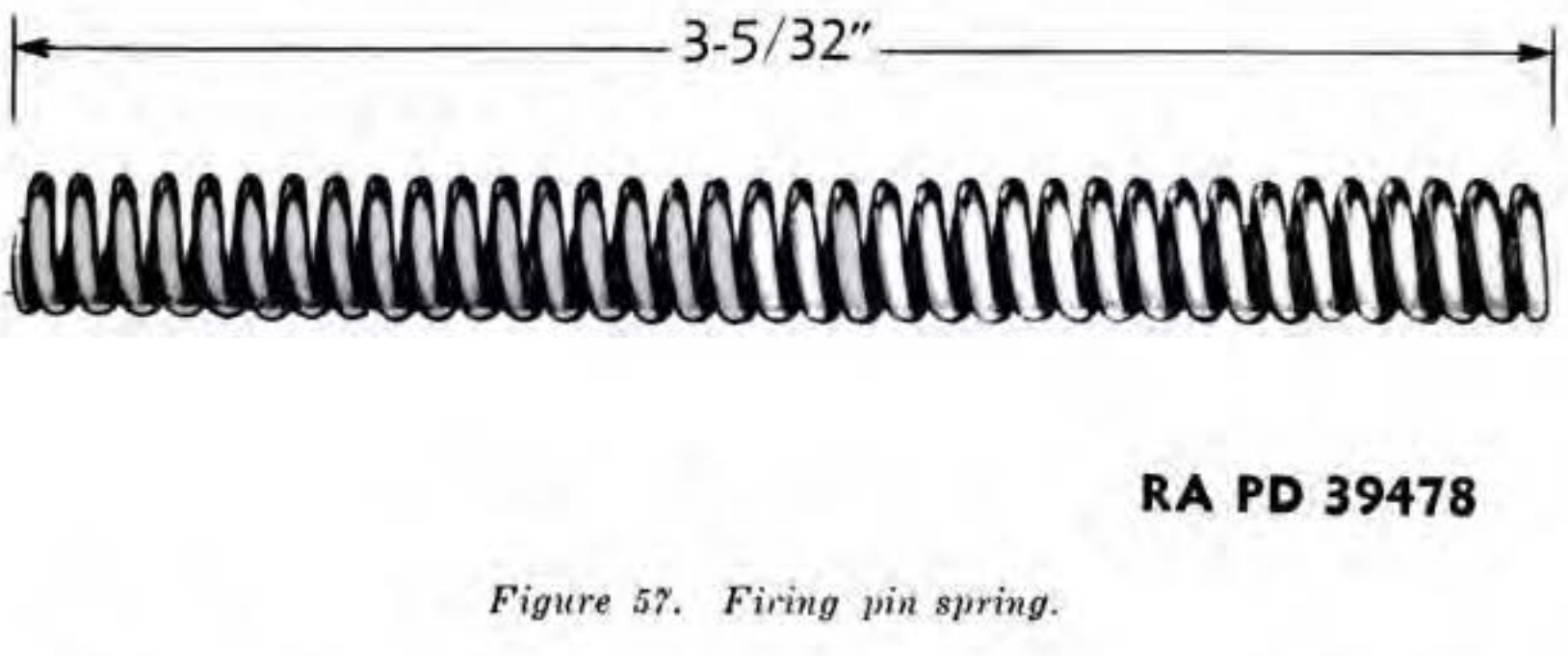


Figure 57. Firing pin spring.

Remove spring as outlined in paragraph 81, and check the free length of the spring against that shown in figure 57. Replace a spring that is short, broken or damaged.

c. EXCESS OIL OR FOREIGN MATTER IN FIRING PIN SPRING. This condition is indicated by a light indent in the primer. (See fig. 56.) Excess oil in the firing pin spring may congeal at low temperatures and cause failure to fire. Foreign matter must be thoroughly removed from the firing pin spring, firing pin, firing pin extension, and firing pin tunnel in the bolt. Remove spring as outlined in paragraph 81, clean, and then lightly lubricate as described in paragraphs 44 through 46.

d. DEFECTIVE AMMUNITION. Defective ammunition will cause a misfire. If a normal firing pin indent appears in the primer (fig. 56) and the cartridge is still unfired, it is an indication of a defective cartridge.

e. FIRING PIN POINT ERODED OR BROKEN. This condition is usually indicated by no indent or a very light indent in the primer.

The tip of the firing pin may be broken off or eroded and deformed by blow back of hot gases due to a punctured primer, as shown in the illustration at the right in figure 58. Illustration on the left in figure 58 shows proper shape of the firing pin point. Punctured primers are usually caused by a firing pin with excessive protrusion, or a sharp point or by hard brass in the primer. An enlarged firing pin hole in the face of the bolt may also lead to pierced primers. Replace defective firing pin or defective bolt. (See par. 81.)

Figure 58. Firing pin (striker end).

f. SEAR NOTCH WORN. Wear on the sear notch, as shown in the right-hand illustration on figure 59, may cause the sear to fail to engage the shoulder of the firing pin extension properly. This may result in "failure to fire" or possible "uncontrolled fire." The proper shape of the sear notch is shown at the left in figure 59. If badly worn, the notch will permit the firing pin extension to ride forward with the cocking lever and result in failure to fire. If slightly worn, the sear may momentarily hold the firing pin extension rearward but not hold it securely. This may result in a "run-away gun." A worn notch can also be the cause of light primer indents. Replace defective sear. (See par. 81.)

g. FIRING PIN EXTENSION SHOULDER WORN. If the shoulder of the firing pin extension is worn as shown in figure 60, it may result in failure to fire or possibly "uncontrolled fire," because the shoulder may fail to engage the sear notch properly. The correct shape of the engaging shoulder of the firing pin extension is indicated by dotted line in figure 60. A worn shoulder can also be the cause of light primer indents. Replace defective firing pin extension. (See par. 81.)

h. SEAR SPRING WEAK. If the sear spring is weak or broken, it may fail to force the sear upward in time to engage the shoulder of the firing pin extension thereby resulting in "failure to fire." If weakness of the spring is suspected or if the spring is broken, it should be replaced. (See par. 81.)

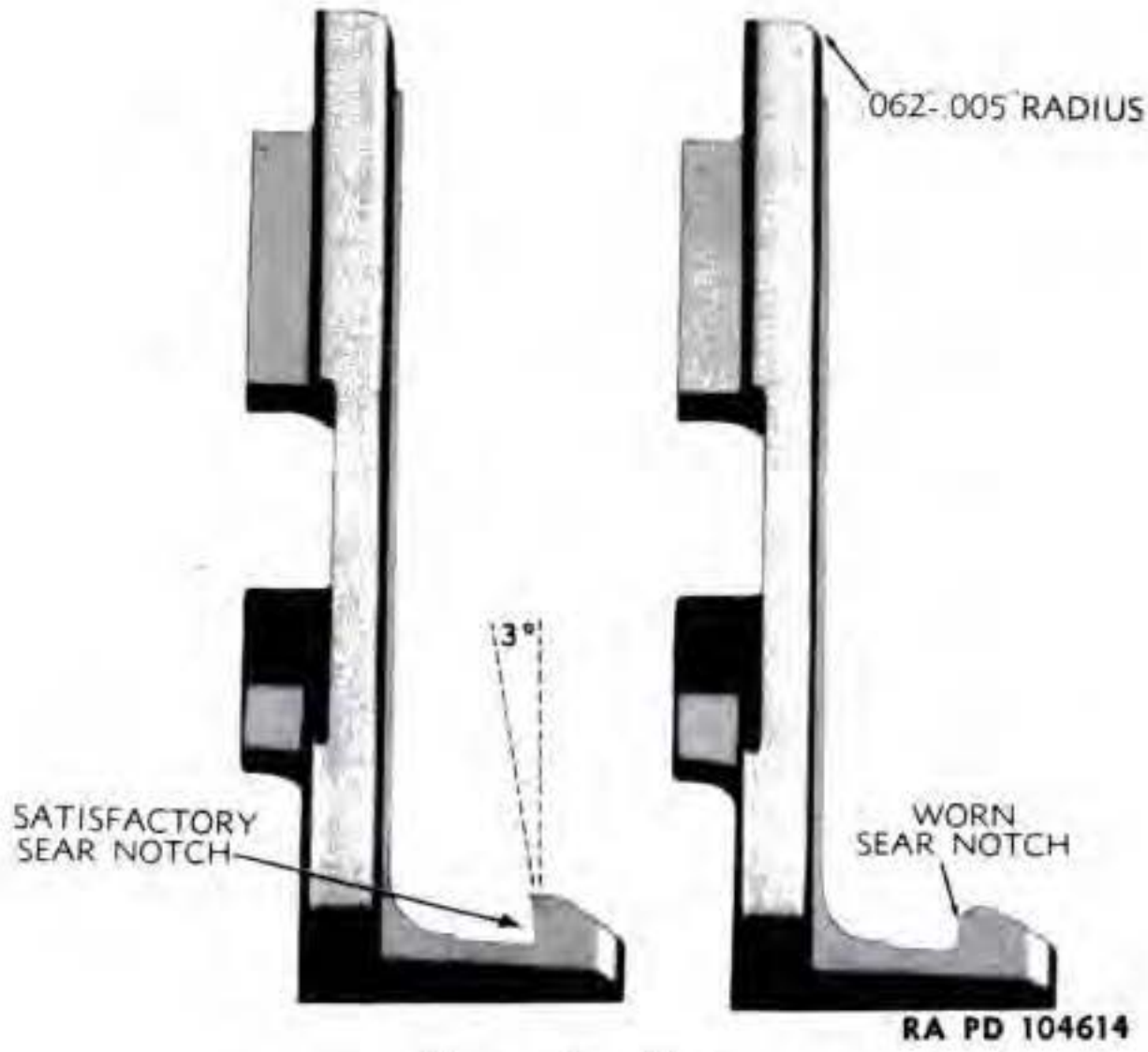


Figure 59. Sear.

Figure 60. Firing pin extension (shoulder end).

i. COCKING LEVER BROKEN OR WORN. If the cocking lever is broken, it will fail to cock the gun. If the cocking lever is worn at the area indicated at A on figure 61, it may fail to force the firing pin far enough rearward to engage the sear. Either condition will cause "failure to fire." Replace defective cocking lever. (See par. 81.)

61. Gun Stops Firing in Battery Position with No Cartridge in Chamber

This condition is probably caused by one of the following:

a. BELT FEED LEVER BENT OR BROKEN. This is usually caused by the ammunition belt catching due to misalignment of the ammunition box and chutes with the gun. Check carefully for such misalignment, particularly at the points where the base of the cartridge could catch and stop movement of the belt. The belt

RA PD 73901

Figure 61. Cocking lever.

feed lever may also be bent or broken if the belt feed pawl arm has been broken and has thus permitted attempted double feeding when a cartridge has not been extracted from the belt. A belt feed lever with insufficient throw due to wear, warpage, or mechanical interference with the cover or side plate may cause this malfunction. Replace defective components. (See par. 104.)

b. LONG AMMUNITION BELT IMPOSES TOO HEAVY FEEDING LOAD. The force required to pull the belt into the gun must not be greater than 20 pounds. Check for twisted belt, chutes out of line, or other factors as listed in paragraph 57*d*.

c. BELT HOLDING PAWL SPRINGS WEAK OR BROKEN. If these springs are weak or broken, the belt links will slip back over the belt holding pawl and the belt will not be properly positioned in the feedway. Excessive oil or dirt in the spring recesses may also cause improper operation of the pawls.

d. BELT FEED PAWL SPRING WEAK OR BROKEN. If this spring is weak or broken, the pawl will fail to engage the belt link firmly and a failure to feed may result. Replace the spring if it is weak or broken. (See par. 104.)

e. EXTRACTOR BENT, BROKEN, OR DEFORMED. This condition may prevent the extractor from securely engaging the extractor groove of the next cartridge when the gun is firing. Wear at the area indicated in figure 62 may cause failure to extract the next cartridge from the belt. If the extractor is defective the complete extractor assembly should be replaced. (See par. 82.)

f. SHORT ROUNDS. Cartridges may be too short for the extractor to reach and engage the extractor groove. Examine the round in the feedway to see if it is short. Ammunition should be carefully checked for short rounds before loading in the belt, and before placing the belt in the ammunition boxes. Short rounds are sometimes the result of the ejector or the front of the bolt strik-

Figure 62. Extractor.

ing the end of the cartridge not properly centered in the feedway and driving the case forward over the bullet. Remove defective round.

g. DEFECTIVE BELT FEED SLIDE ASSEMBLY. A new type belt feed slide assembly, (installed on a large number of the guns) identified by a 1/8-inch hole in the face of the slide, improves feeding operations. The outward throw of the new slide in feeding is less than the old slide but, on the inward movement, the belt feed pawl is pulled farther into the center of the feedway, thereby centering the cartridge more firmly against the cartridge stops. If unsatisfactory feeding is encountered and an old type slide is being used, replace the slide with one of the new type. (See *Note*, par. 104*d*.)

h. DEFECTIVE BELT LINKS. Stretched or deformed belt links may also cause this condition. Replace defective links. (See par. 43 *b* (2).)

62. Gun Stops Firing with Recoiling Parts Out of Battery Position

This condition may be caused by any of the following:

a. DRIVING SPRINGS WEAK OR BROKEN. Springs in such condition provide insufficient force during counterrecoil to return the recoiling parts to battery position. This is especially noticeable when the gun is elevated and when it is pulling a long ammunition belt. The minimum free length of both the inner and outer springs is 21 inches. Springs shorter than this will be replaced. (See par. 76.) There should be a 60° countersink at the opening of the driving spring rod hole on the rear of the bolt. The omission of this countersink will not prevent the gun from firing but will affect the rate of fire and also cause the outer driving spring to wear

because of binding as it enters the hole. Bolts encountered with this defect should be turned in to ordnance personnel for correction.

b. ADJUSTING SCREW IN BACK PLATE LOOSE, OR BUFFER DISKS DEFECTIVE. Either of these conditions may cause the gun to fail to complete counterrecoil stroke when operating under full belt load or when the gun is elevated. Correct as outlined in paragraphs 70*c* and 71*d*.

c. OIL BUFFER SHORT. If it has been necessary to disassemble the oil buffer, the piston rod head may have been screwed on to the piston rod too far when reassembled. In this event, the over-all operating length of the oil buffer will be too short, with the result that the piston rod may not permit the barrel extension to go fully forward into battery position. This will be particularly noticeable when the gun is operating under full belt load or when the gun is elevated. In order to detect a short oil buffer, remove the driving spring group from the gun and open the cover. Elevate the gun to a vertical position and notice if there is a gap between the barrel extension and the trunnion block. There should be no gap between these components. Guns should be fully unloaded and headspace checked before testing. See paragraph 88 for assembly of the oil buffer group.

d. HEADSPACE TOO TIGHT. Headspace may become tighter as the gun is fired due to expansion of the parts as the temperature rises. A damaged or weak barrel locking spring will allow the barrel to turn during firing thereby causing the headspace to change. Check headspace in accordance with instructions in paragraph 24. If the headspace is not correct check barrel locking spring for fracture, weakness, and worn detent. Replace any defective components and readjust headspace.

e. BOLT BINDS BETWEEN SIDE PLATES. If the gun is improperly mounted, the side plates may be twisted to such an extent that the bolt or barrel extension will bind and cause a stoppage. In such cases, check mounting of the gun.

f. BELT LINK CATCHES IN LINK STRIPPER. With this malfunction, the action stops out of battery position; the parts can be drawn rearward by hand, but cannot be forced forward beyond the point of the stoppage. Inspect the feedway before raising the cover by looking in at the side where the empty belt links are ejected; the link will be jammed in the U-shaped opening of the link stripper. (See fig. 63.) In the event that the gun attachment make it impossible to look into the feedway, raise the cover. (See *Caution*, par. 30*b*). A distinct click will be heard when the link springs out from the opening in the link stripper. This malfunction may be caused by the following:

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Figure 63. Link caught in link stripper.

(1) Ammunition loaded incorrectly in the links. If the cartridges are not inserted in the proper position in the links, the links may be forced *into* the opening in the link stripper instead of riding in front of it. The correct placement of ammunition in the links is shown in figure 27.

(2) The aperture of the U-shaped opening in the link stripper may be too large. Replace defective or worn link stripper. (See par. 108*m*.)

(3) Ammunition chutes and boxes may be out of position relative to the gun.

(4) Insufficient throw of the belt feed lever due to bending or warpage of the lever. Replace defective belt feed lever. (See par. 104.)

g. BOLT STUD BINDING IN SLOT OF SIDE PLATE. If such binding occurs, the bolt is likely to stop all the way to the rear when operating under full load. Stone the edge of the side plate slot or the bolt stud slightly to eliminate interference.

h. BREECH LOCK CAM TOO TIGHT. This will cause a binding between the guides of the breech lock cam and the barrel extension. See paragraph 109*b* for proper adjustment of the breech lock cam.

i. FIRING PIN HOLE ENLARGED OR RECOIL PLATE NOT FLUSH WITH FACE OF BOLT. If the firing pin hole in the recoil plate is enlarged, the firing pin will not be properly supported and the firing pin will be deformed. If the recoil plate is not flush with the

face of the bolt, the primer will not be properly supported at the time of the explosion and the metal of the primer may be forced backward beyond the base of the cartridge forming what is known as an "extruded primer." The projecting surface of the primer will cause the empty case to bind in the T-slot so that ejection cannot take place. On counterrecoil, the front end of the case will strike the barrel or barrel extension and cause the recoiling parts to stop out of battery position. Replacement of the bolt assembly will correct this condition.

j. RUPTURED CARTRIDGE CASE IN CHAMBER. A ruptured cartridge case which has not been extracted will stick in the chamber and prevent chambering of the following live cartridge. Remove ruptured cartridge case, using the ruptured cartridge extractor. (See par. 43*b* (3), and fig. 35.) Chamber and bore should then be thoroughly cleaned, and headspace and timing of the gun checked.

63. Gun Fires One Shot and Stops

If this continues after repeated chargings, it is probably because the oil buffer is set in the closed position. When the oil buffer is set in the position shown in figure 64, there is insufficient recoil to complete the feeding, extracting, and ejecting operations; therefore, the gun stops with the parts out of battery position after the cartridge which was charged into the chamber is fired. Be sure the oil buffer is completely filled (par. 88*d*) and that it is properly adjusted for maximum rate of fire (par. 88*i*). For leaking oil buffers and new type packing, see paragraph 88*a*.

64. Gun Fires Two Shots and Stops in Battery Position with No Cartridge in Chamber

If this condition continues after repeated chargings, it is probably due to early timing. With early timing, the gun is fired and recoil starts before the extractor has gone forward far enough to engage the cartridge in the feedway; therefore, the gun fires only the cartridge which was charged into the chamber and that cartridge engaged by the extractor before firing started. Check the timing in accordance with instructions in paragraph 25.

65. Decrease in Rate of Fire

A decrease in rate of fire of the gun may be due to several causes, such as type of mounting, improper adjustment of oil buffer, improper recoil oil, or a dirty front barrel bearing. Correct as outlined below:

a. Adjust oil buffer as outlined in paragraph 88*i*.

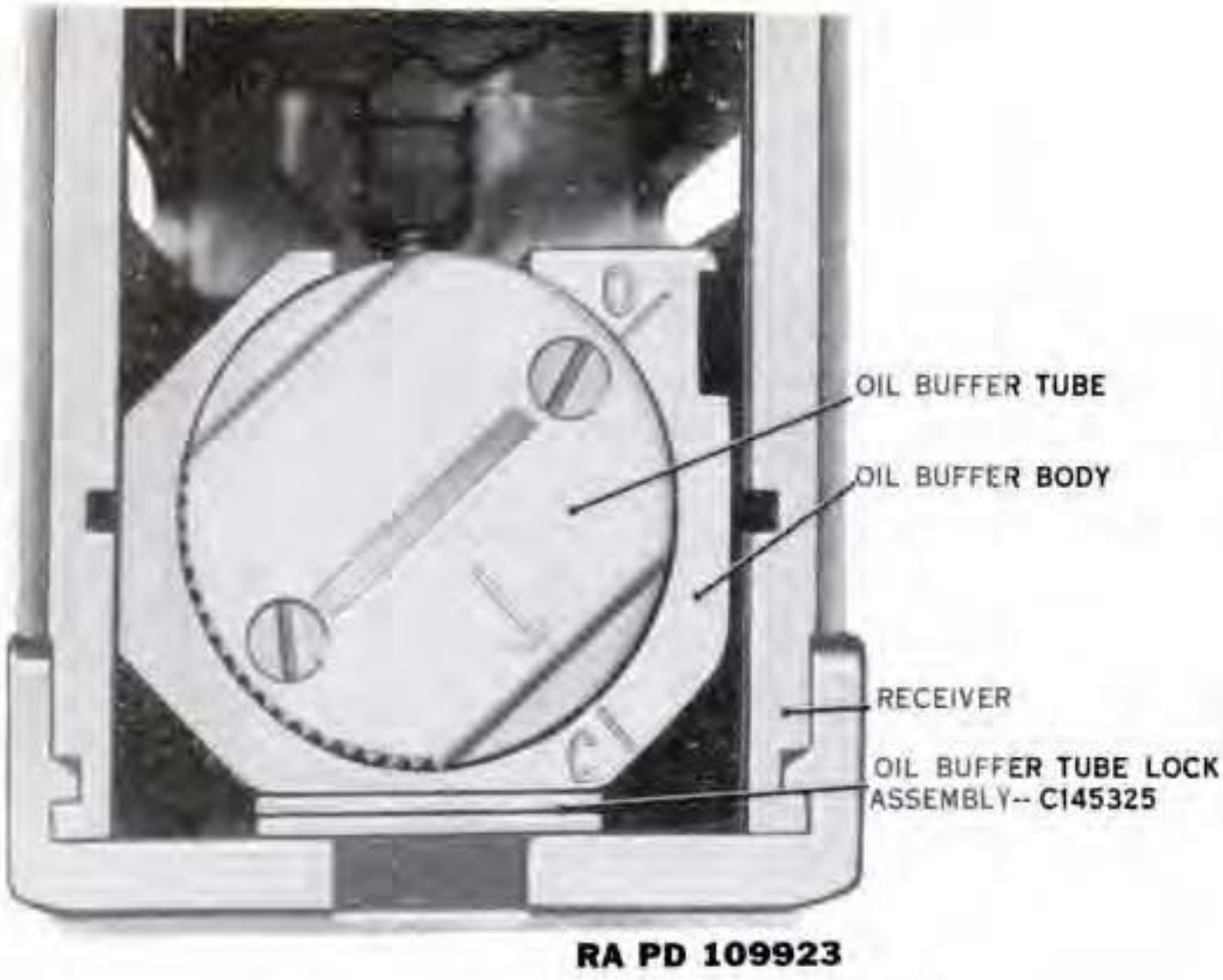


Figure 64. Oil buffer in closed position.

b. Drain and refill the oil buffer with preservative lubricating oil (special) as outlined in paragraph 88*d*.

c. Remove dirt or foreign matter from front barrel bearing, using crocus cloth. (See par. 110*a*.)

Section XV. BACK PLATE GROUP

66. General

a. The back plate group is attached to the rear end of the receiver assembly. For fixed installations, the group is primarily composed of the back plate, latch, latch lock, and buffer components. For flexible installations, spade grips, trigger and trigger safety are added. The back plate is installed downward into grooves inside the receiver side plates. It is held in position, when assembled, by the latch engaging the bottom plate of the receiver. The latch is prevented from disengaging by the latch lock. Both latch and lock are spring operated.

b. An integral tube projecting rearward from the back plate houses a buffer plate and 22 fiber disks. The disks are held in place by an adjusting screw threaded into the rear end of the tube and

by the buffer plate projecting through the front face of the back plate. A spring-loaded plunger seating in the adjusting screw prevents the screw from backing out.

c. The main function of the back plate is to stop the bolt on the recoil movement. The bolt strikes the projecting buffer plate which bears upon the fiber disks. These disks cushion the blow and store up part of the recoil energy to return it to the bolt to start the counterrecoil movement. The back plate also acts as a stop for the oil buffer group, and the rear end of the driving spring group which bears in a groove in the back plate when assembled. Detailed functioning of the back plate is explained in paragraphs 51 through 58.

67. Removal of Back Plate Group

a. Make sure that the bolt is fully forward in the battery position.

b. Disengage the back plate lock by pulling away from the back plate. While holding the latch lock disengaged, pull up on the back plate latch and slide the back plate up out of the receiver. (See figs. 65 and 66.)

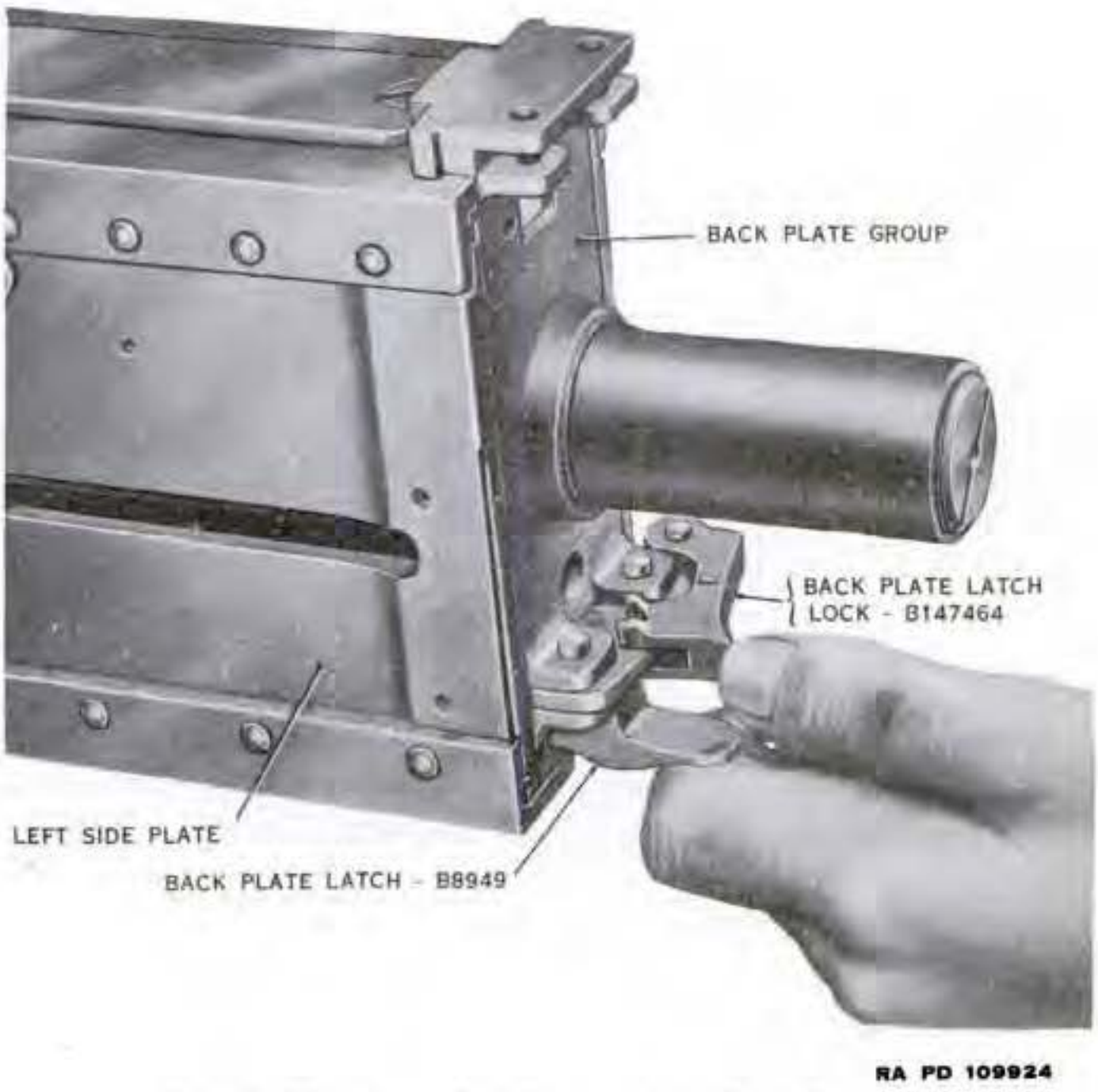


Figure 65. Removing fixed type back plate.

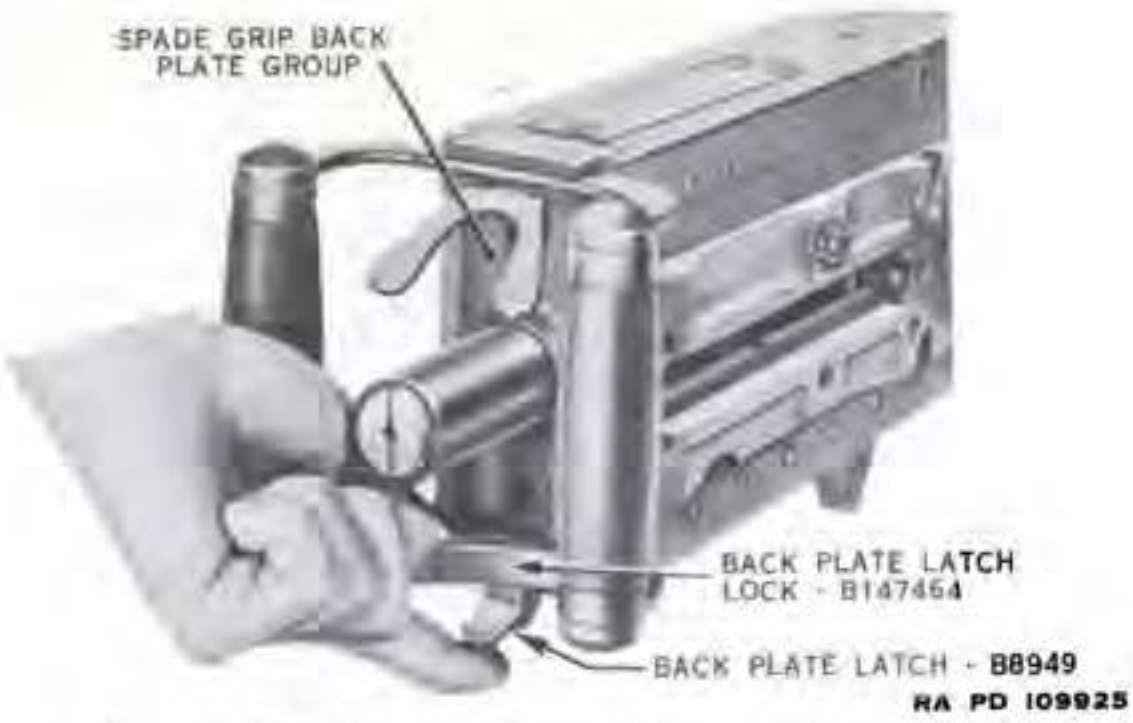


Figure 66. Removing flexible type back plate.

68. Installation of Back Plate Group

a. Make sure that the bolt is fully forward in the battery position.

b. Start the back plate into its grooves in the rear end of the receiver, latch end leading and buffer tube to the rear. Disengage the latch lock, lift the latch, and push the back plate assembly all the way down. Release latch and lock. Make sure that the latch fully engages its seat under the bottom plate and is locked by the latch lock.

69. Disassembly of Back Plate Group (fig. 67)

a. Before removing the back plate from the receiver, loosen the adjusting screw, using the combination wrench 41–W–867–808. (See fig 34.) Remove back plate and then remove the adjusting screw, taking care not to lose the plunger and spring. The disks and buffer plate can then be pushed out to the rear.

b. With a small drift, force out the back plate latch pin. Holding latch in position, withdraw drift and remove the back plate latch, taking care not to lose the spring. Unless restrained, the latch will spring out when free.

c. Remove the back plate latch lock by taking out the cotter pin and removing the back plate latch lock pin. Then remove back plate latch lock spring from the lock by bending one end of the back plate latch lock spring pin straight, withdrawing pin and then removing spring.

d. If the back plate is equipped with a manual trigger, remove the trigger and trigger spacer by driving out the trigger pin. Take care not to lose the trigger spring when the pin is removed. If it is necessary to remove the trigger safety assembly, it can be taken off by removing the two staked screws.

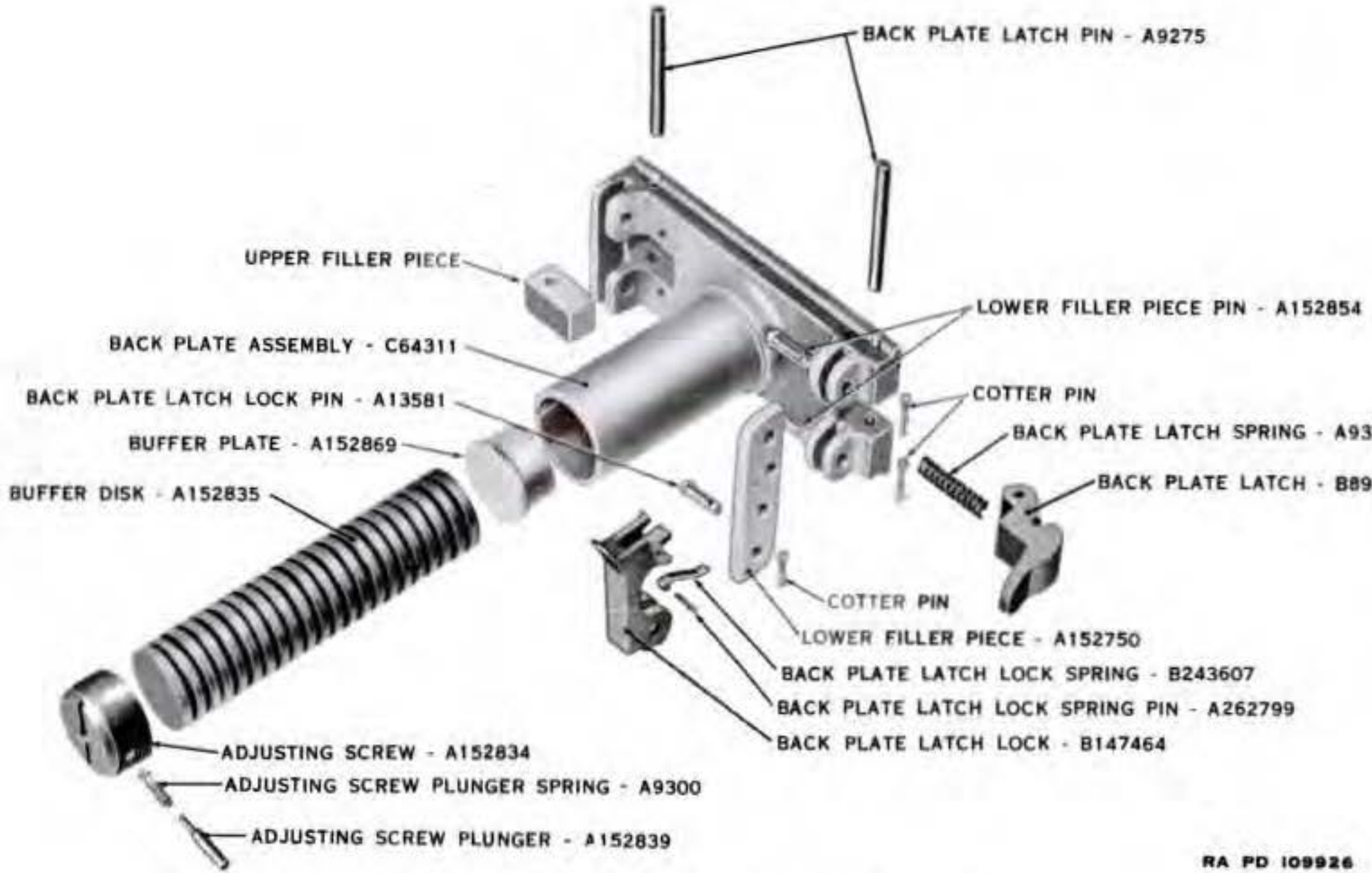


Figure 67. Back plate group—exploded view.

70. Assembly of the Back Plate Group (fig. 67)

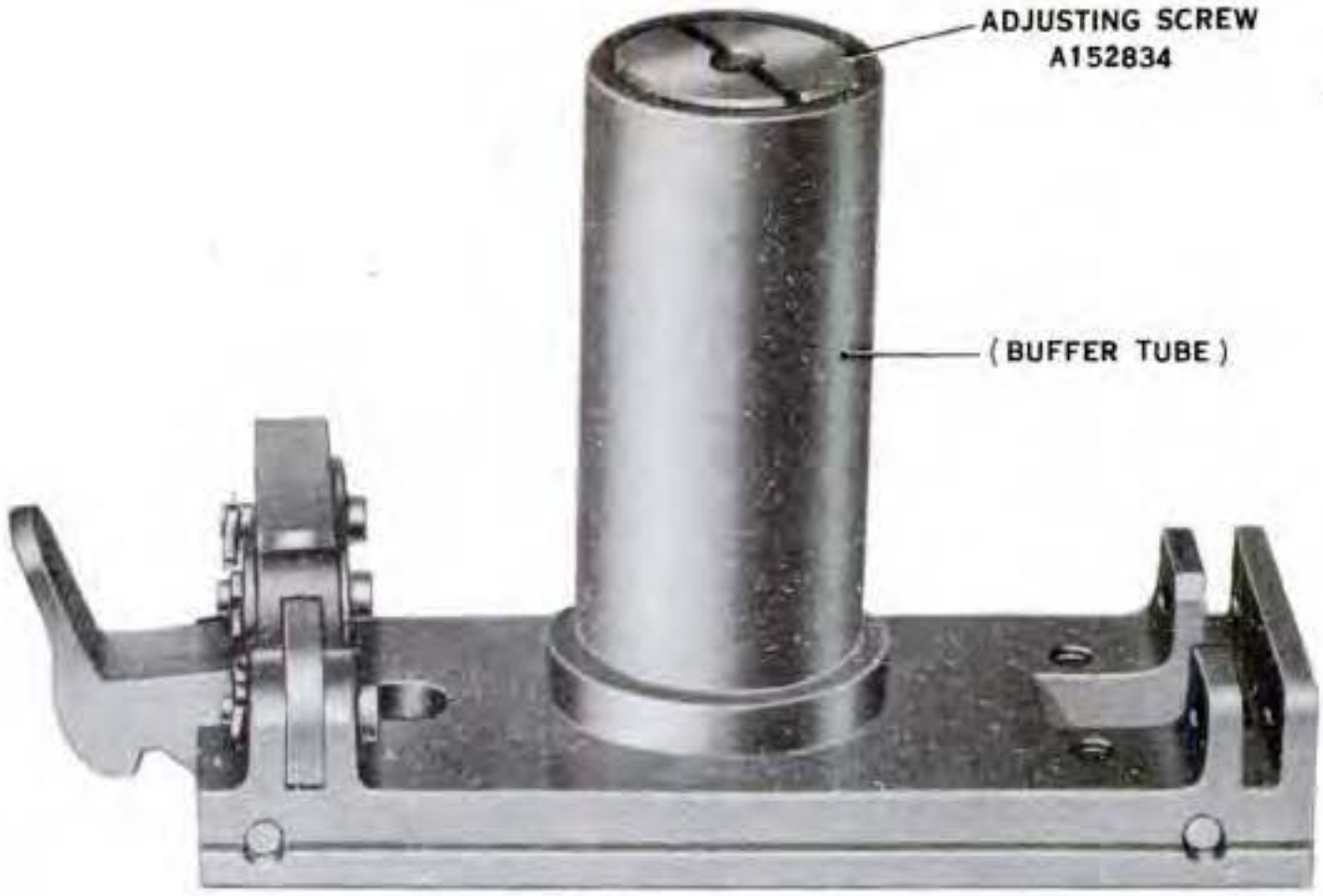
a. Place latch spring in its seat in the latch. Insert latch into back plate so that the free end of spring seats level in the recess in lower filler piece. Then move latch so as to compress the spring until the hole for the latch pin in the latch and the back plate are aligned. Insert latch pin through back plate and latch until flush with sides of back plate.

b. Insert latch lock spring in its recess in latch lock so that the eye on the end of the spring is aligned with the hole for the latch lock spring pin. The bowed side of the spring must be facing the lock and the end opposite the eye must be facing toward the hole for the latch lock pin. Insert the latch lock spring pin through the holes in the side of the latch and the eye of the spring. Carefully bend the ends of the spring against the lock making sure that each end is equally long. Attach the latch lock to the filler piece by inserting the pin from the top and securing in place with the cotter pin. When assembled, operate latch and latch lock to make sure they function properly.

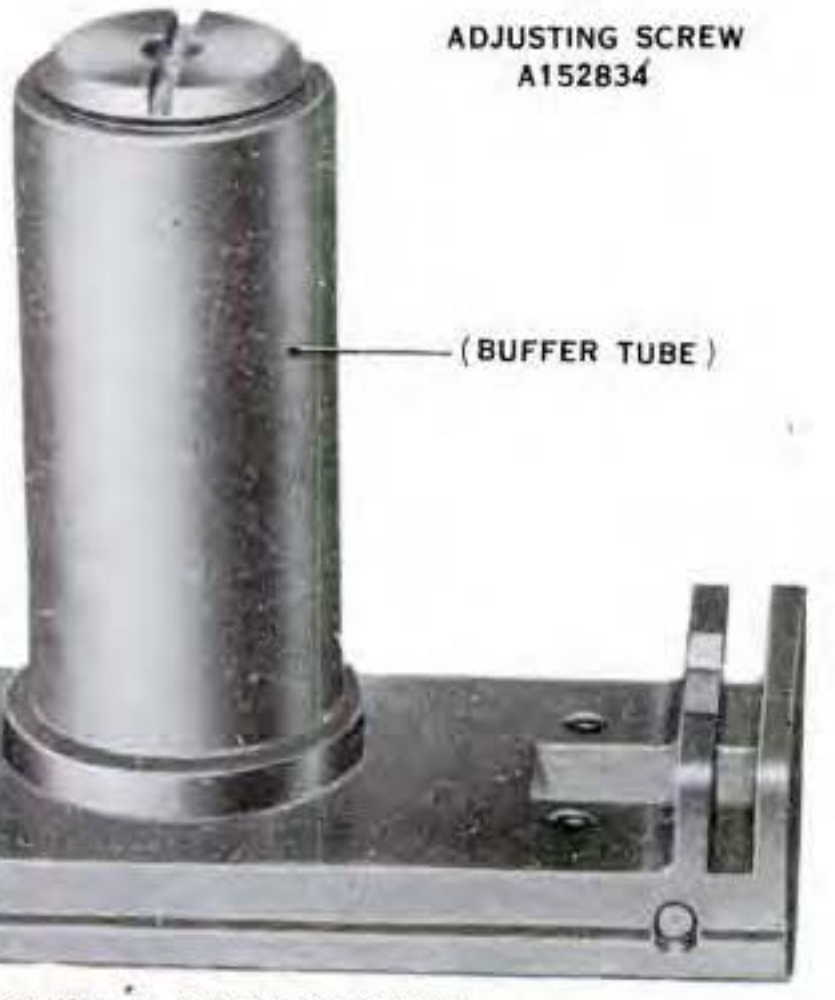
Note. The latch is normally attached to the back plate with the pin on the right side; however, if an operating slide is to be attached to the right side of the receiver, the latch lock should be assembled with the pin on the left by reversing the lower filler piece.

c. Insert the buffer plate in the tube of the back plate, putting it in from the back with the small diameter forward and projecting through the front of the back plate. Insert the 22 buffer disks into the tube making sure they are seated properly. Start the adjusting screw into the tube and insert the spring and plunger into their recess in the screw. Depress plunger and spring while turning screw to allow plunger to enter tube. Tighten adjusting screw, using the combination wrench 41–W–867–808 (fig. 34), until the end of the screw projects approximately 1/16 inch beyond the end of the tube. Not more than one full thread of the adjusting screw should be exposed. (See fig. 68.) It may be necessary to remove or add a buffer disk to secure tight adjustment and at the same time meet these requirements.

d. If the back plate is equipped with a manual trigger, insert the trigger and trigger spacer into their recess with the trigger spacer to the left. Seat the trigger spring in its recess in the back plate and trigger, align the hole in the trigger with the hole in the back plate, and insert the pin. Replace the trigger safety assembly by inserting the two screws, drawing them tight, and then staking the screw.



MINIMUM *(FLUSH)*



MAXIMUM *(1 THREAD SHOWING)*

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Figure 68. Proper adjustment of adjusting screw.

71. Maintenance of Back Plate Group

a. Replace the latch spring, latch lock spring, or latch lock spring pin if weak, broken, or deformed.

b. Replace latch, latch lock, or latch pin if worn or damaged.

c. The back plate must slide freely into the receiver, guides must

not be burred or broken, and latch and latch lock must function properly. Burs or rough surfaces should be removed with crocus cloth.

d. Normally 22 disks are assembled in the buffer tube. If adjustment outlined in paragraph 70*c* can be made with 21 disks, examine disks to see if they are swollen or improperly seated. Swollen disks should be replaced with new ones. A light film of the oil prescribed in paragraph 44 will be applied to each disk when assembling. Under no circumstances should adjusting screw lie below flush with respect to tube. In such a case, add one disk.

e. Replace broken or deformed adjusting screw plunger or adjusting screw plunger spring if weak, broken, or deformed.

f. Replace the adjusting screw if deformed or damaged.

g. The buffer plate should seat freely in back plate and project through plate approximately 3/16 inch. Remove any burs or roughness. Keep front face of buffer plate smooth and level to prevent damage to the bolt in recoil.

h. Keep all components covered with a light film of the oil described in paragraph 44.

Section XVI. DRIVING SPRING GROUP

72. General

a. The driving spring group is attached to the inner side of the right side plate and extends forward into the longitudinal hole in the bolt. The group is primarily composed of the outer driving spring, inner driving spring, and driving spring rod assembly.

b. The group is held in position, before the back plate is installed, by a pin on the driving spring rod head which is engaged in an elongated hole at the rear end of the right side plate. The front end rests in the bolt. When the back plate is installed, the group is supported at the rear end by the head on the driving spring rod which rests in a slot in the front face of the back plate.

c. The driving springs are compressed as the bolt moves to the rear in recoil, thereby absorbing part of the bolt energy before it strikes the buffer plate. After the rearward movement of the bolt has been stopped, the driving springs drive it forward in counter-recoil assisted by the buffer disks.

73. Removal of Driving Spring Group

a. Remove back plate group. (See par. 67.)

b. Push forward on the end of the driving spring rod and at the same time push it away from the right side plate to disengage

the retaining pin from its hole. When the pin is disengaged from the side plate withdraw group from the bolt and out of the receiver. (See fig. 69.)

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Figure 69. Removing driving spring group.

74. Installation of Driving Spring Group

a. Insert the driving spring group into its hole in the bolt. Push the rod forward, slightly compressing the spring, until the pin on the driving spring rod head is aligned with the elongated hole in the side plate. When aligned, push the rod to the right, seating the pin in the hole and making sure that the head is against the side plate.

b. Install back plate group (par. 68), making sure that the head of the driving spring rod seats in the groove in the back plate.

75. Disassembly of Driving Spring Group (fig. 70)

The driving spring group should not be disassembled except to check for spring tension. To disassemble, drive out the stop pin from the collar on the front end of the rod with a punch, allowing the punch to hold the collar in position. Then, holding collar against the pressure of the expanding driving springs, withdraw

punch and ease collar and springs from the rod. Observe care that collar does not spring off rod when punch is removed as it may cause injury to personnel.

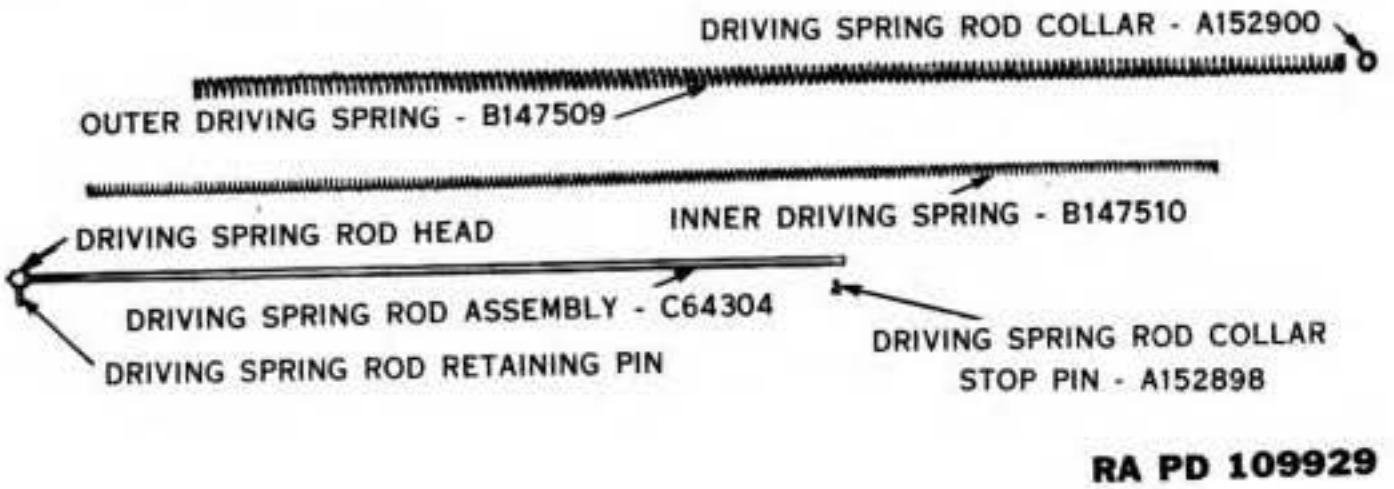


Figure 70. Driving spring group—exploded view.

76. Assembly of Driving Spring Group (fig 70)

a. Slide the inner and outer springs onto the rod, compress on rod, and hold in position with small punch or nail inserted through hole in rod. The rod must be straight and there must be no binding between inner and outer spring, or between inner spring and rod.

b. Slide collar on rod and, holding firmly, withdraw punch, align holes in collar and rod, and replace punch temporarily.

c. Insert stop pin so that head will be on the same side of rod as the retaining pin in the rod head, and drive through until flush, pushing punch out in process. Upset end of pin to hold in place. Observe care that collar does not slip and fly off during process, as injury to personnel may result. (If old pin is damaged by removal, replace with new one.)

77. Maintenance of Driving Spring Group

a. Make sure that the driving spring rod is not bent. Examine the rod, head, and pin for burs, removing any present with crocus cloth.

b. Check to make sure that the outer and inner driving springs are not fractured and that they operate freely when assembled over the rod.

c. Examine the driving spring rod retaining pin to make sure that it is tight in the head. If it is not tight, peen headed end slightly.

d. Apply a light film of the oil prescribed in paragraph 44 to the springs and rod.

Section XVII. ALTERNATE FEED BOLT GROUP

78. General

a. The alternate feed bolt group contains the firing and extracting mechanisms of the gun and actuates the belt feed mechanism in the cover. The principal components are the bolt assembly, sear, sear slide, cocking lever, firing pin group, and the extractor assembly. It houses the front end of the driving spring group, when assembled. The bolt slides in ways cut in the barrel extension, and when in battery position, is locked to the barrel extension by the breech lock. The empty cartridge case is withdrawn from the chamber by means of the T-slot in the front end of the bolt.

b. The sear operates vertically in grooves in the rear end of the bolt, is forced into engagement with the firing pin extension by a spring, one end of which seats in the sear and the other end in a seat in the bolt, and is retained in the bolt by the sear slide. The sear slide is assembled in lateral grooves in the rear face of the bolt and acts upon a lug on the sear. The purpose of the sear is to hold the firing pin group in the cocked position when cocked by the cocking lever.

c. The cocking lever is retained in a slot in the top rear part of the bolt by the cocking lever pin. The upper end of the lever projects above the bolt and the lower end engages in a slot in the firing pin extension. The cocking lever cocks the firing pin group when its upper end is cammed forward by the top plate bracket on the top plate of the receiver, during recoil of the bolt.

d. The firing pin extension, with the firing pin assembled to its forward end, is housed in a longitudinal tunnel in the bolt. The extension houses the firing pin spring, which is held in place by a pin in the front end of the extension.

e. The extractor assembly contains the extractor and ejector and is pivoted in a hole in the left side of the bolt. A stop lug on the bolt limits the downward movement of the extractor assembly. The extractor assembly extracts a cartridge from the belt, and guides it into the T-slot in the bolt and thence into the chamber of the barrel.

f. The rear end of the belt feed lever, which is assembled to the cover, seats in one of two diagonal grooves or ways in the top of the bolt when the cover is closed. The bolt switch seats in a circular recess in the top of the bolt and is furnished with a groove identical with the bolt grooves. The switch is positioned on a stud and can be adjusted so as to make either of the bolt grooves continuous depending upon whether left or right-hand feed is desired. The

switch is retained in the bolt by an undercut in its seating recess being engaged by the shank of the extractor.

g. A longitudinal tunnel in the bolt houses the forward end of the driving spring group. The driving spring rod collar seats against a shoulder at the forward end of the tunnel. As the bolt moves in recoil the springs are compressed. When the recoil movement of the bolt is stopped the springs expand and force the bolt forward in counterrecoil.

h. The accelerator stop eliminates the possibility of the accelerator claws entering the transverse breech lock notch in the bolt, thus preventing jamming of the bolt.

i. A bolt stud is assembled in a hole in the side of the bolt, when the bolt is assembled to the gun. This stud is used for retracting the bolt. One end of the stud projects through a slot in the side plate and is retained by its collar which bears upon the inside of the side plate.

j. The general function of the bolt group is to withdraw ammunition from the belt, to chamber and fire the ammunition, to extract and eject the empty cartridge cases, and to actuate the belt feed mechanism of the gun through the medium of the belt feed lever in the cover group. The driving springs act to return the bolt to the forward position at the end of the recoil movement. Detailed functioning of the components of the bolt group is explained in paragraphs 51 through 58.

79. Removal of Bolt Group

a. Remove the back plate group. (See par. 67.)

b. Remove the driving spring group. (See par. 73.)

c. Raise the extractor assembly, and using it as a handle pull the bolt to the rear until the bolt stud is in line with enlarged assembly hole in the center of the slot in the side plate. Remove the bolt stud by pulling it out to the side. (See fig. 71.) The bolt may then be removed by sliding it to the rear. (See fig. 72.)

80. Installation of Bolt Group

a. With the cocking lever rotated *fully forward* insert the bolt group into the receiver and engage it with its ways in the barrel extension. Push forward until the hole for the bolt stud is in line with the enlarged opening in the center of the slot in the side plate, and insert the bolt stud. Take care when inserting the bolt not to trip the accelerator forward, and be sure the tip of the cocking lever is under the top plate bracket. The front end of the bolt should be lifted over the tips of the accelerator for easy assembly. After the bolt stud is inserted push the bolt completely forward.

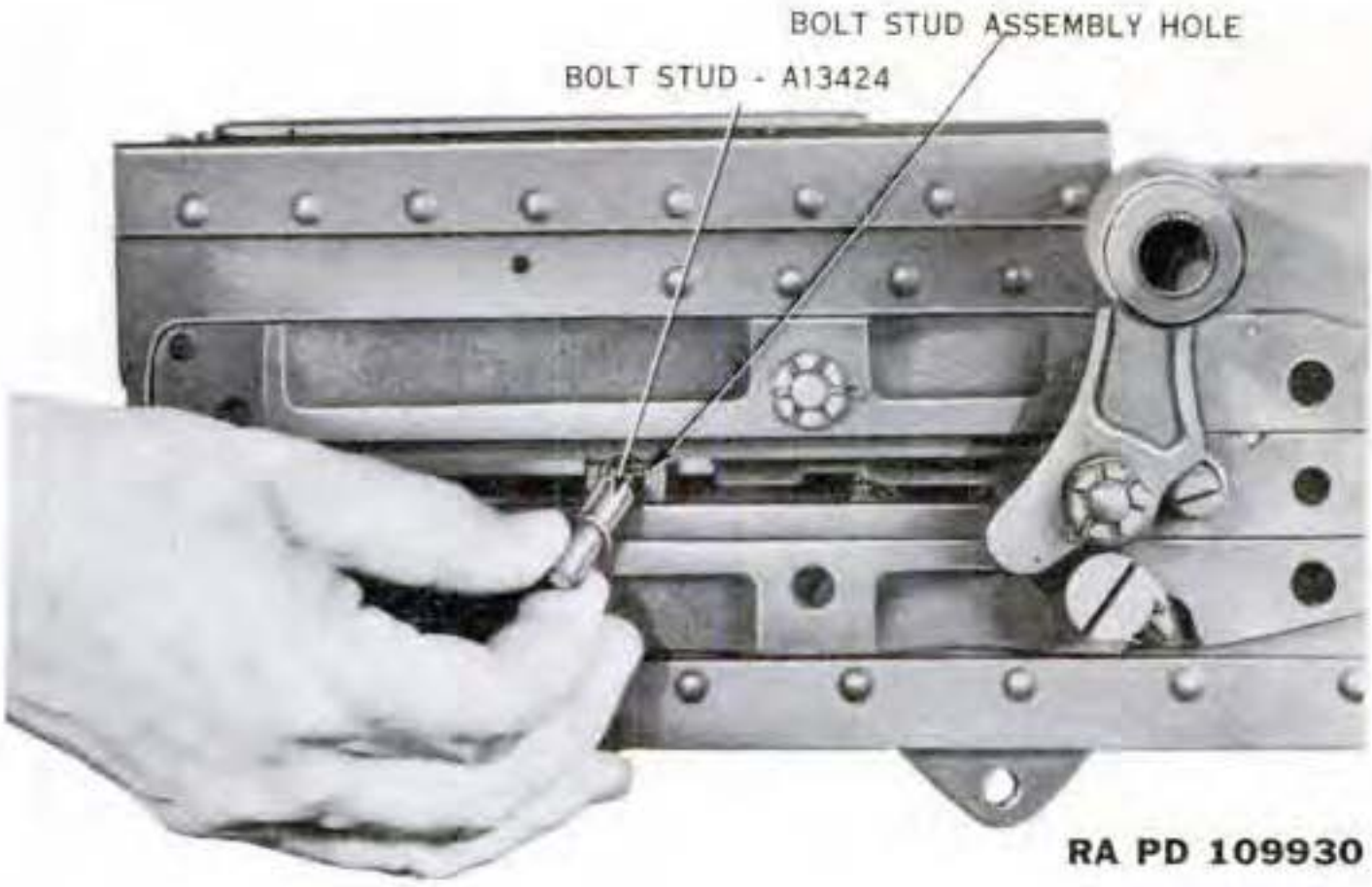


Figure 71. Removing bolt stud.

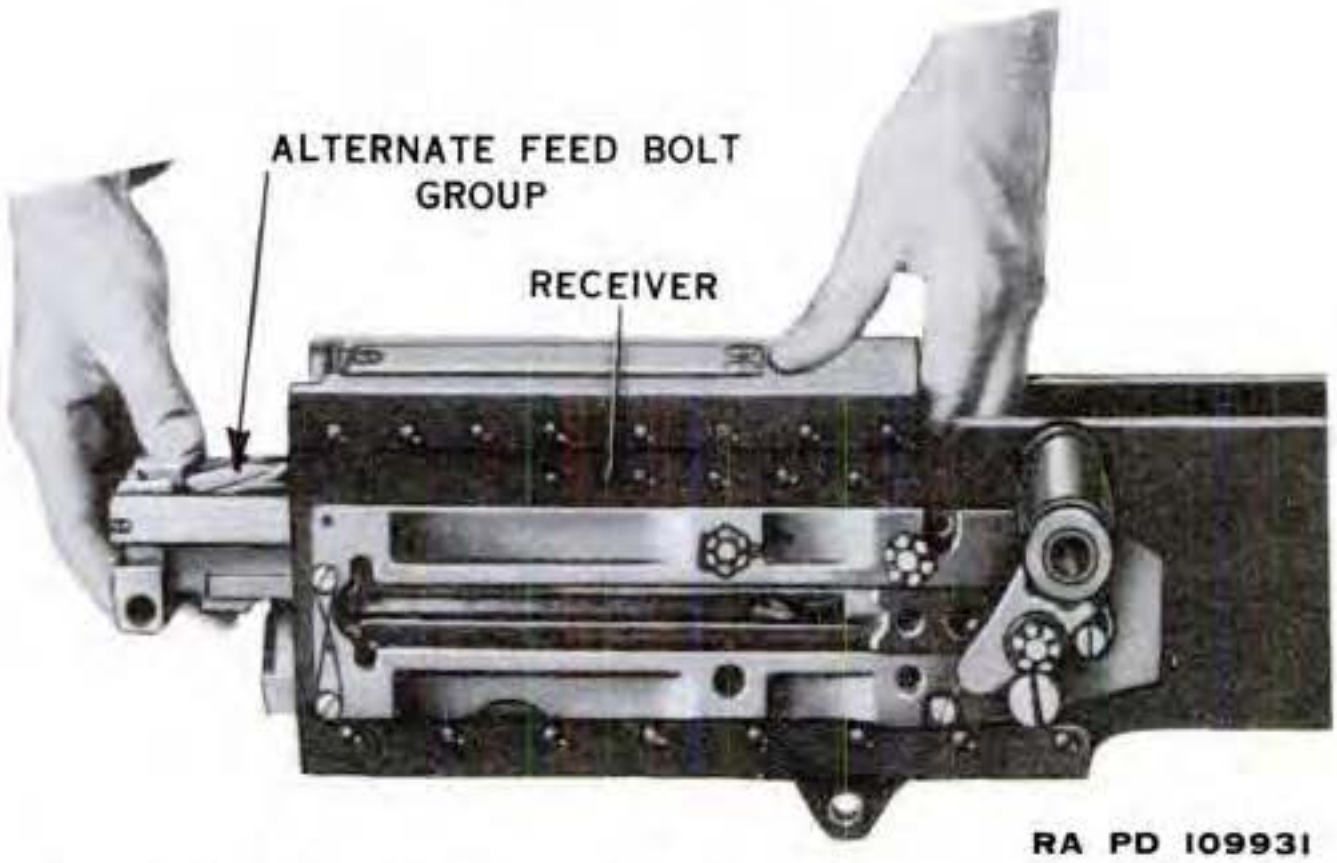


Figure 72. Removing alternate feed bolt group from receiver.

b. Install driving spring group. (See par. 74.)

Caution. Do not use the driving spring group as a lever or guide for the bolt when inserting the bolt in the receiver as this may bend the rod. Be sure that the rod is straight and the outer driving spring does not rub excessively or bind in the bolt hole.

c. Install back plate group. (See par. 68.)

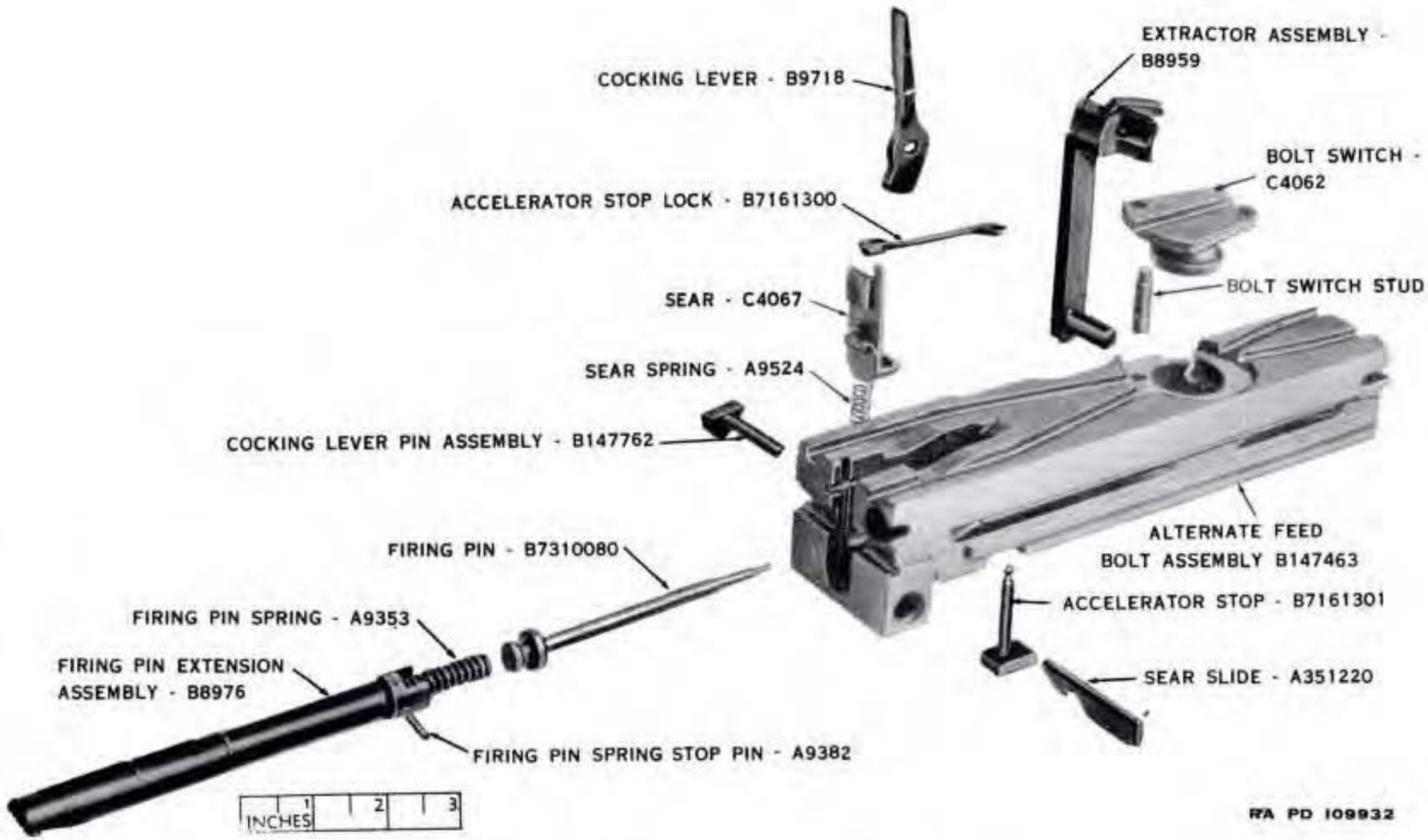


Figure 73. Alternate feed bolt group—exploded view.

81. Disassembly of Bolt Group (fig. 73)

a. Remove bolt from gun. (See par. 79.)

b. Remove the extractor assembly by rotating it upward to a vertical position (fig. 74) and pulling it out from the bolt. When necessary, remove the ejector or the ejector spring by driving out the ejector pin with a hammer and a suitable drift. (See fig. 75.) Be careful the ejector and spring do not fly out when pin is removed.

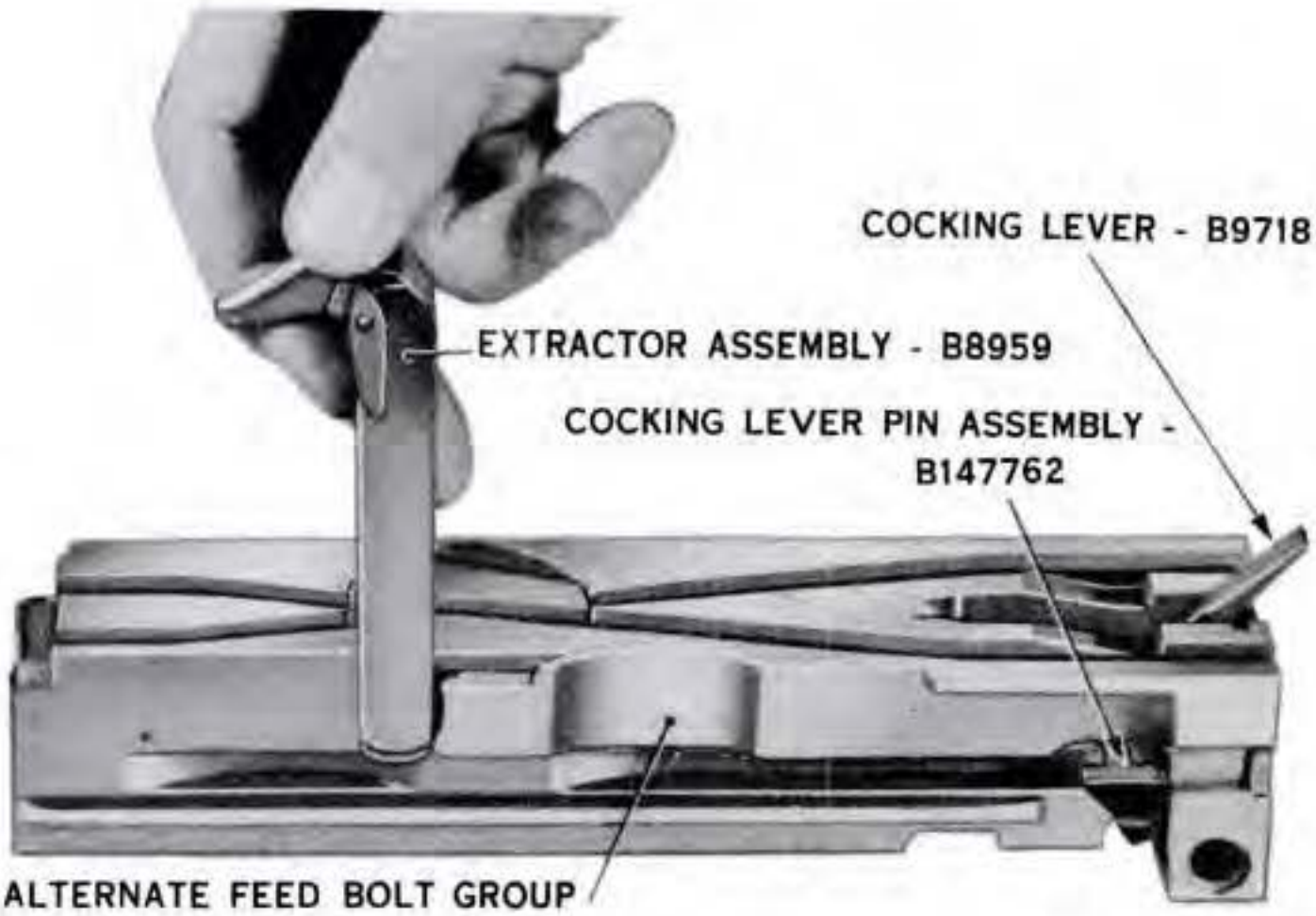


Figure 74. Removing extractor assembly.

c. Rotate the cocking lever *fully backward* and release the firing pin by pushing in on the sear slide. Push out the cocking lever pin and lift the cocking lever out of the bolt.

Caution. Do not attempt to release the firing pin with cocking lever forward, as it will spring back forcibly and may cause serious injury to the hand.

d. Press down on the sear and withdraw the sear slide from the bolt. (See fig. 76.)

Figure 75. Extractor assembly—exploded view.

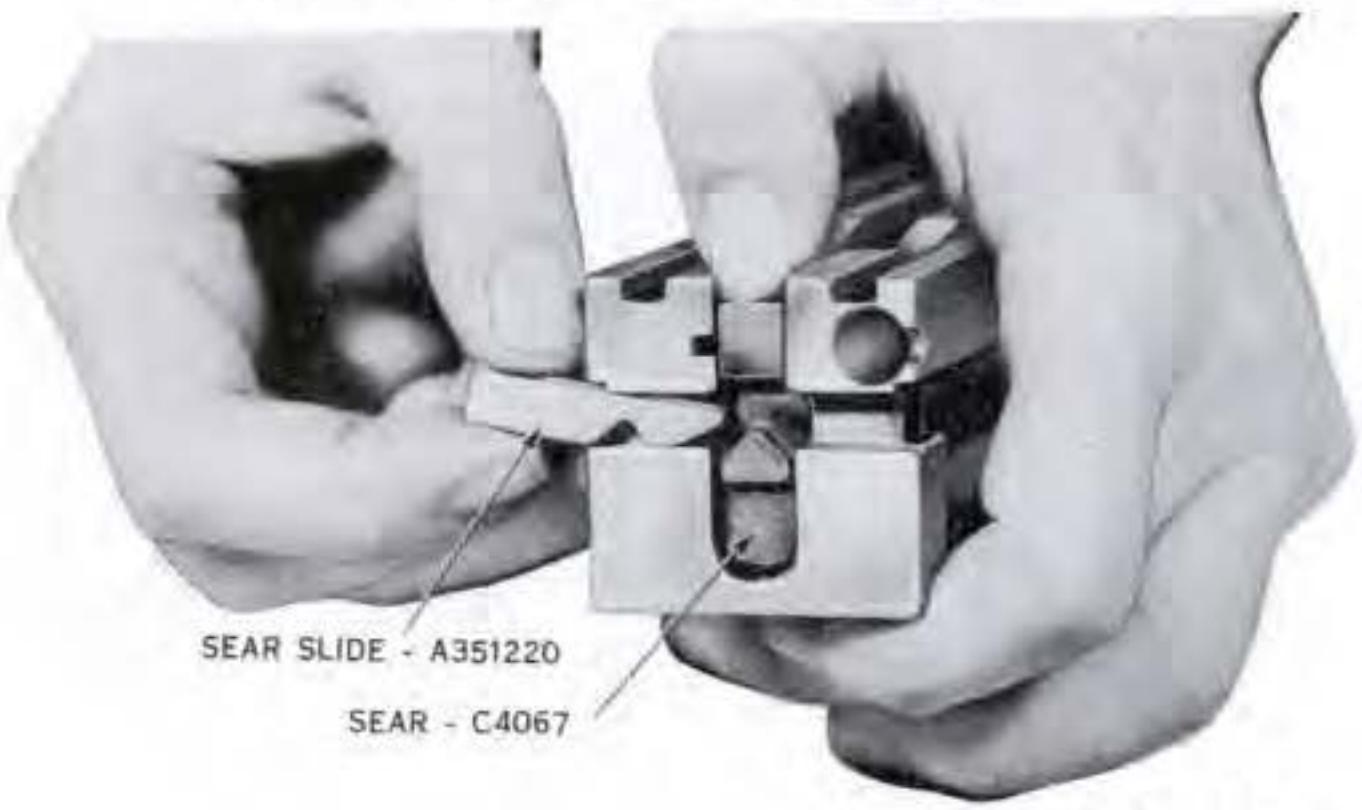


Figure 76. Removing sear slide.

e. Using the thin end of the cocking lever, swing the accelerator stop lock laterally out of its seating groove in the bolt (fig. 77) and then raise, slightly rotate, and pull to the rear to disengage lock from the groove in the accelerator stop. The stop can then be removed by pushing it down out of the bolt.

f. Remove sear by pulling it up and out of the bolt, and remove the sear spring.

g. Elevate the front end of the bolt and allow the firing pin extension and firing pin to slide out. (See fig. 78.) Then disengage the firing pin from the extension by sliding it laterally from the engagement groove in the extension.

Figure 77. Removing accelerator stop lock.

h. Lift the bolt switch out of the bolt and remove the bolt switch stud. If the bolt switch stud fits tightly, it can be removed by inserting a drift in the hole on the under side of the bolt directly under the stud and driving it out.

Figure 78. Removing firing pin extension and firing pin.

i. Do not disassemble firing pin extension assembly unless necessary to check tension of firing pin spring. To disassemble, use the firing pin spring removing tool. (See par. 43 *b* (5) and figs. 36 and 37.) If tool is not available, drive out the firing pin spring stop pin and remove the spring. (See figs. 79 and 80.) Observe care to prevent the spring from flying out during the operation.

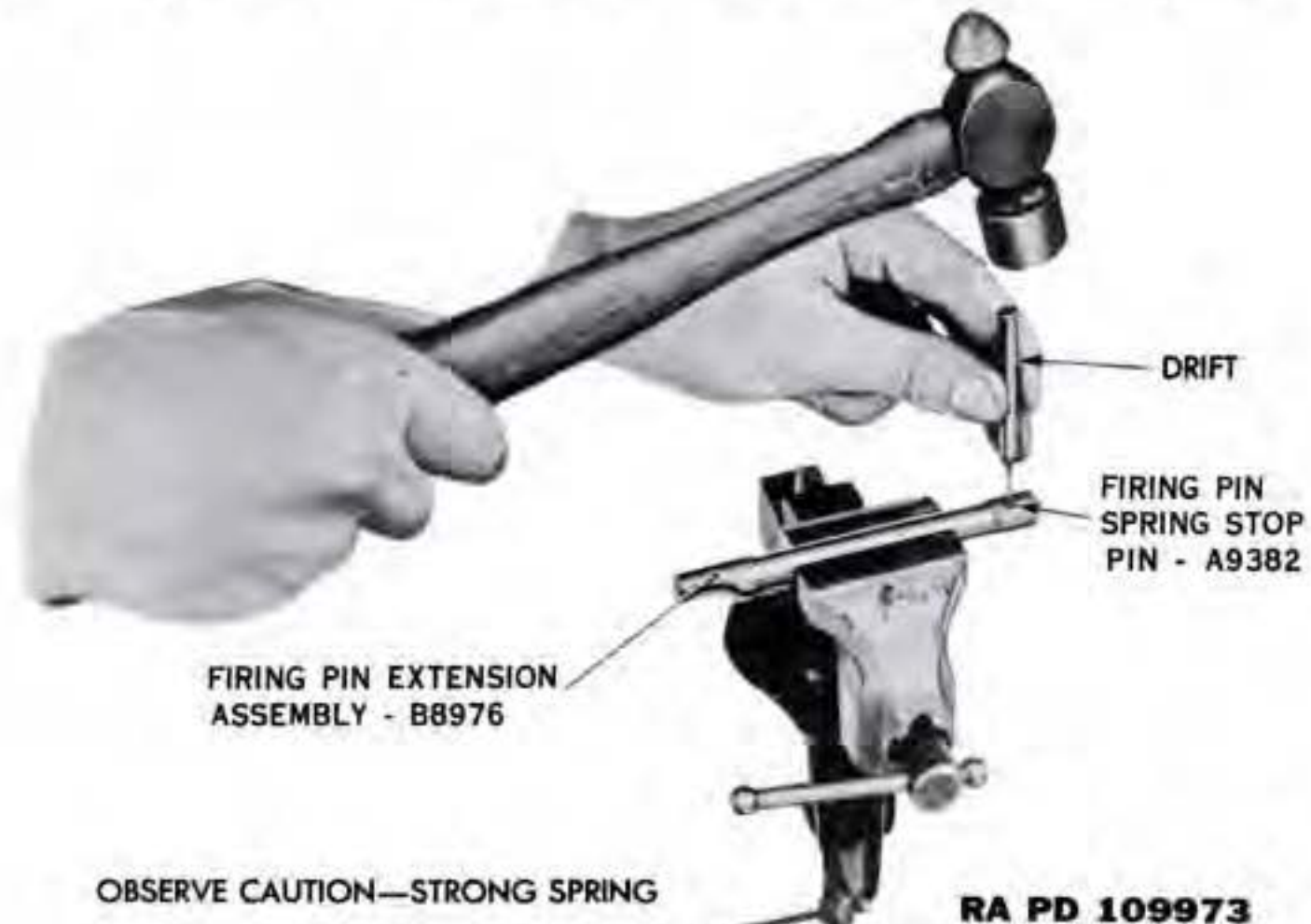


Figure 79. Disassembling firing pin extension assembly.

Figure 80. Firing pin extension assembly—exploded view.

82. Assembly of Bolt Group (fig. 76)

a. Insert the bolt switch stud, large end leading, in the bolt switch stud hole until fully seated.

b. Insert the bolt switch in its recess and align hole in switch with stud so that the groove marked "L" is continuous if left-hand feed is desired ("R" for right-hand).

c. If the firing pin spring has been removed from the firing pin extension, replace the spring using the firing pin spring removing tool if available. (See par. 43 *b* (5).) If the tool is not available in-

sert spring into extension, and, after compressing it, secure it in place by inserting the firing pin spring stop pin. Be sure pin is flush with extension on both sides.

d. Engage the firing pin and firing pin extension assembly and insert them in the tunnel of the bolt with the notch at the rear of the firing pin extension down. Push the extension all the way forward so that the tip of the firing pin protrudes from the face of the bolt.

e. Seat the sear spring squarely in its seat in the bottom of the sear. Then insert the sear and spring in the vertical grooves in the rear of the bolt with the wedge-shaped lug facing outward and pointing upward. Press the sear down making sure that the spring is seated level both in its seat in the bolt and in the sear.

f. Insert the sear slide into its lateral guideway in the rear end of the bolt, V-shaped notch down and with the pointed end leading. Depress sear and push slide until the notch engages the wedge shaped lug on the sear. (See fig. 76.)

Note. If the weapon is to be fired by means of a mechanism attached to the side plate, the sear slide must be assembled to the bolt so that its square end is facing the side plate to which the mechanism is attached. If the weapon is to be fired by means of the trigger bar, the square end of the sear slide may face either side plate.

g. Insert the pin end of the accelerator stop through the bolt from the bottom so the base of the stop fits in the breech lock slot in the bolt, with long end forward. Insert the accelerator stop lock

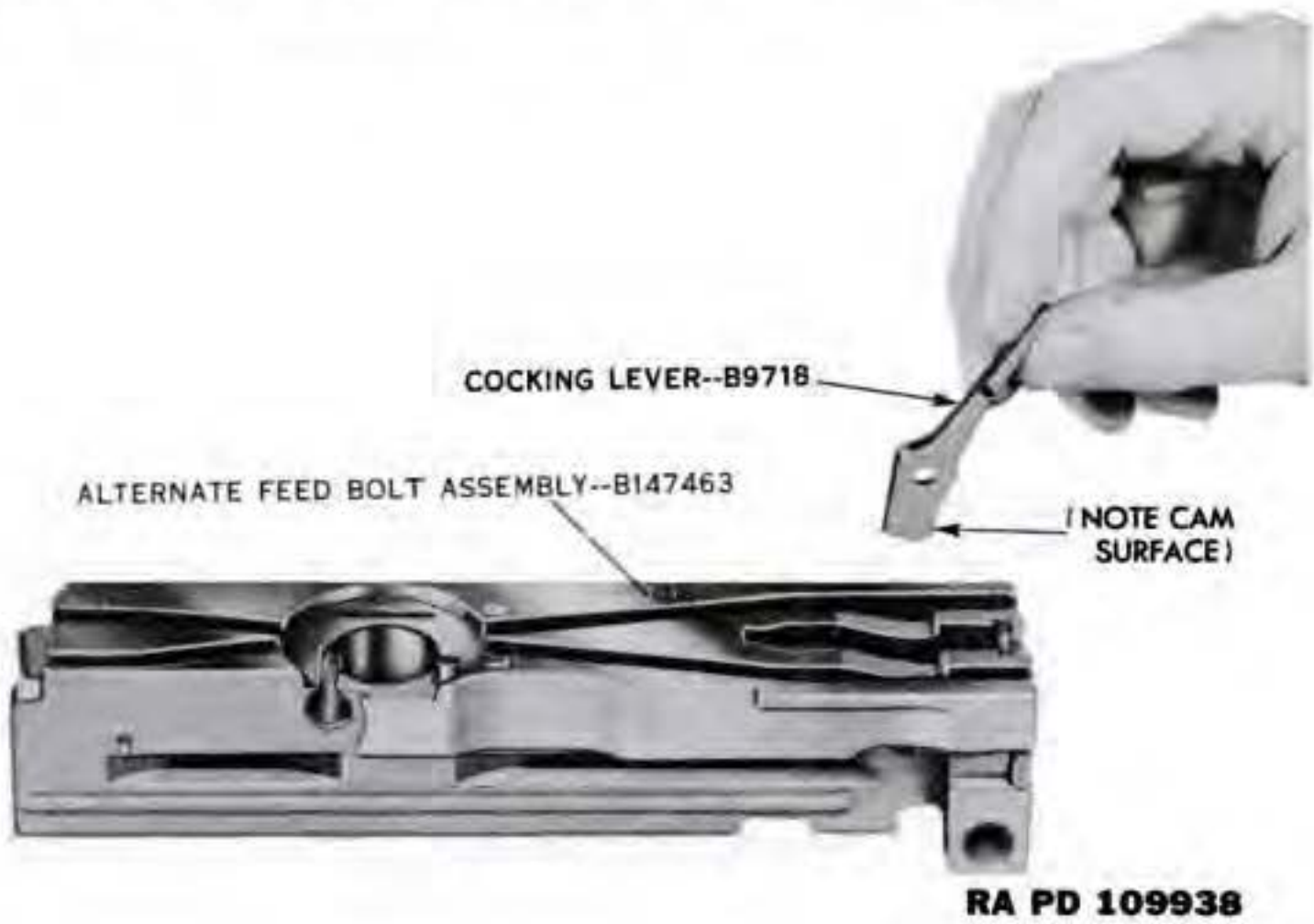


Figure 81. Installing cocking lever in bolt.

in its recess in the top of the bolt and engage the forked end in the groove in the pin end of the accelerator stop. Using wedge shaped end of the cocking lever as a tool, swing the lock into its groove in the left side of the bolt. Be sure the pin end of the accelerator stop lies behind the firing pin spring and not through a coil.

h. Insert the cocking lever (fig. 81) into the slot in the top of the bolt with the rounded nose on the lower end of the lever to the rear and the shoulder on the side of the lever to the right. Align the hole in the lever with the holes in the sides of the bolt and insert the cocking lever pin from the left side.

i. Push the cocking lever all the way forward, *return it fully to its rear position,* and press in on the sear slide. A sharp metallic sound heard when the firing pin is released will indicate that the firing pin spring and other components are in good working order. Again push the cocking lever all the way forward for proper preparation of the bolt before assembly in the gun. (See *Caution* in par. 81*c.*)

j. Assemble the ejector to the extractor by inserting the ejector spring in its recess and then positioning the ejector in its working slot with the straight extension of the ejector spring bearing against the straight side of the ejector. The ejector pin is then inserted *from the right-hand side of the extractor,* the side toward the center of the gun, and secured by carefully expanding the drilled end of the pin on the left side with a center punch. Hold the extractor assembly in a vertical position and insert the shank in the bolt as shown in figure 74. Rotate the extractor assembly forward making sure the flange on the bottom engages behind the shoulder on the bolt, thus locking it in position.

83. Maintenance of Bolt Group

a. Remove any rust or burs from the bolt, using crocus cloth. Clean all recesses of foreign matter or excess oil, paying particular attention to the tunnels for the firing pin and driving spring groups. Scrape any accumulated carbon from the T-slot.

b. Check frequently the sear spring, ejector spring, and the firing pin spring for weakness, rust, or fracture. The free length of the firing pin spring must be not less than $3\frac{5}{32}$ inches. Replace if defective.

c. See that the bolt stud does not bind in slot in side plate when assembled (par. 62 *g*).

d. Check to see that extractor stop lug on left side of bolt is not worn sufficiently to throw cartridge out of line with chamber when being chambered.

e. Keep all parts covered with a light film of the oil prescribed in paragraph 46.

Section XVIII. OIL BUFFER GROUP

84. General

a. The oil buffer group is composed of two main group assemblies: the oil buffer body group assembly, which includes the accelerator; and the oil buffer group assembly which includes the spring and guide. When assembled, the oil buffer group assembly is housed in the oil buffer body group assembly which is locked in the rear lower end of the receiver by a leaf spring lock staked in the body and bearing in a recess in the side plate. Guides fastened to the sides of the body at the rear end seat in grooves in the side plates of the receiver hold it in position. Longitudinal grooves in the sides of the body, at the front end, seat the rear ends of the breech lock depressors. The depressors act as anchors for the front end of the body in addition to their function of unlocking the bolt. A longitudinal slot in the right side of the buffer body acts as a guideway for a key on the spring guide of the oil buffer assembly, when assembled, to prevent the piston rod from turning.

b. The accelerator is pivoted in the front end of the body on a transverse pin. The accelerator is acted upon by the barrel extension and the bolt during recoil, and locks the barrel extension shank to the buffer body thereby holding the oil buffer spring in compression until released by the bolt on the counterrecoil movement. A tube lock assembled in the body bears against the bottom of the accelerator to hold it in the locked position until released by the bolt.

c. The oil buffer assembly is in general composed of a buffer tube, buffer tube cap, piston rod, piston rod head, piston head nut, and piston valve. The piston rod is assembled through a hole in the cap. Fastened at the rear end of the rod is the piston rod head and piston valve which are retained in place by the piston head nut. The front end of the rod engages with the barrel extension shank when assembled. A relief valve and spring are assembled to the cap and retained in place by a screw. The piston rod group is assembled into the buffer tube and retained in place by the threaded buffer tube cap.

d. A large coil spring is assembled over the piston rod and is held under compression by the tube cap and the buffer spring guide. This guide is in the form of a washer and has two notches which are engaged by a cross pin through the forward end of the piston rod. A key in the side of the guide engages in a slot in the buffer body and prevents the piston from turning during operation.

e. The oil buffer group has four main functions. It cushions the shock of the barrel and barrel extension as they come to rest on

the recoil movement. It locks the barrel and barrel extension in its rearward position until counterrecoil begins. It returns the barrel and barrel extension to the forward "battery" position by means of the expanding oil buffer spring which is unlocked by the accelerator when acted upon by the bolt. And through the medium of the accelerator, it times the forward movement of the barrel and barrel extension thereby allowing the locking of the bolt to the barrel extension just before the recoiling parts go into battery and the cartridge is fired. Detailed functioning of the components of the oil buffer group is explained in paragraphs 51 through 58.

85. Removal of Oil Buffer Group

a. Remove back plate group, driving spring group, and the bolt group. (See pars. 67, 73 and 79.)

b. Insert a drift pin in the hole near the rear of the right side plate (figs. 82 and 83) and depress the oil buffer body spring lock. At the same time, push the barrel, barrel extension, and oil buffer group to the rear. As the oil buffer group emerges from the rear of the receiver disconnect it from the barrel extension by pushing forward on the tips of the accelerator. (See fig. 83.)

Figure 82. Depressing oil buffer body spring lock.

86. Installation of Oil Buffer Group

a. If removed, insert the barrel and barrel extension into the receiver until the lower projection on the barrel extension contacts the bottom plate. Make sure that the oil buffer assembly is pushed all the way forward in the oil buffer body. Hold the oil

buffer body in the right hand with the index finger holding up the accelerator. Holding the oil buffer body at an angle, as shown in figure 84, start the breech lock depressors into the guideways of the barrel extension. Raise the oil buffer body to a horizontal position and engage notch in the piston rod with the barrel extension shank. Engage the claws of the accelerator with the shoulders of the barrel extension shank, and push the oil buffer group forward as far as it will go, thus rotating the accelerator about the accelerator pin and locking the barrel extension to the oil buffer group. Press down on the tips of the accelerator to insure complete locking.

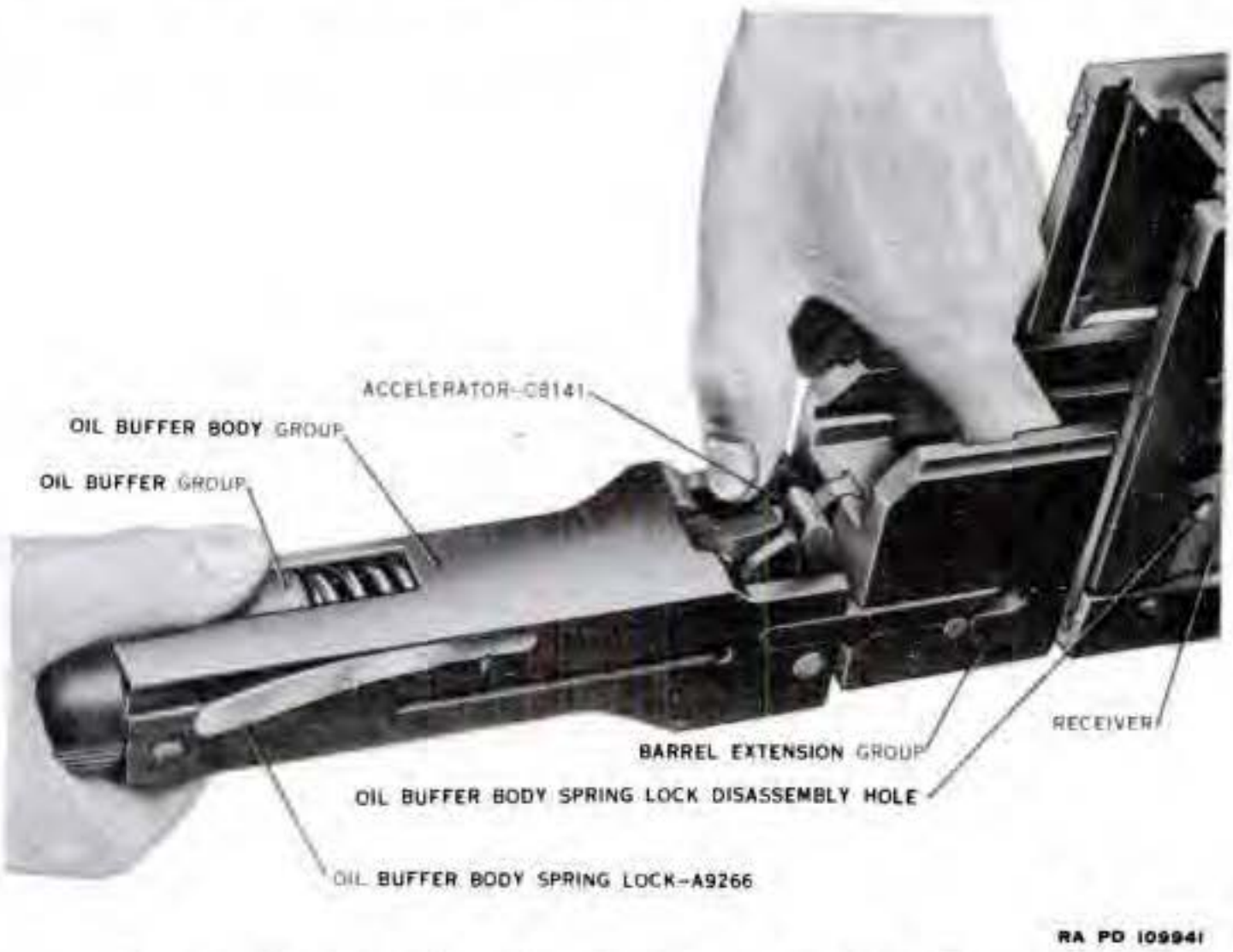


Figure 83. Removing oil buffer group from barrel extension.

b. With the oil buffer, and barrel and barrel extension groups thus locked together, raise the rear end until the barrel extension is clear of the bottom plate. Then push the groups forward until locked in position by the oil buffer body spring lock snapping into its recess in the receiver. If the groups do not move forward readily, check to make sure the oil buffer tube lock assembly is properly positioned in the bottom of the oil buffer body. Be sure oil buffer guides (on rear sides of body) enter grooves in receiver. Do not force assembly.

c. Install bolt group, driving spring group and back plate group. (See pars. 68, 74 and 80.)

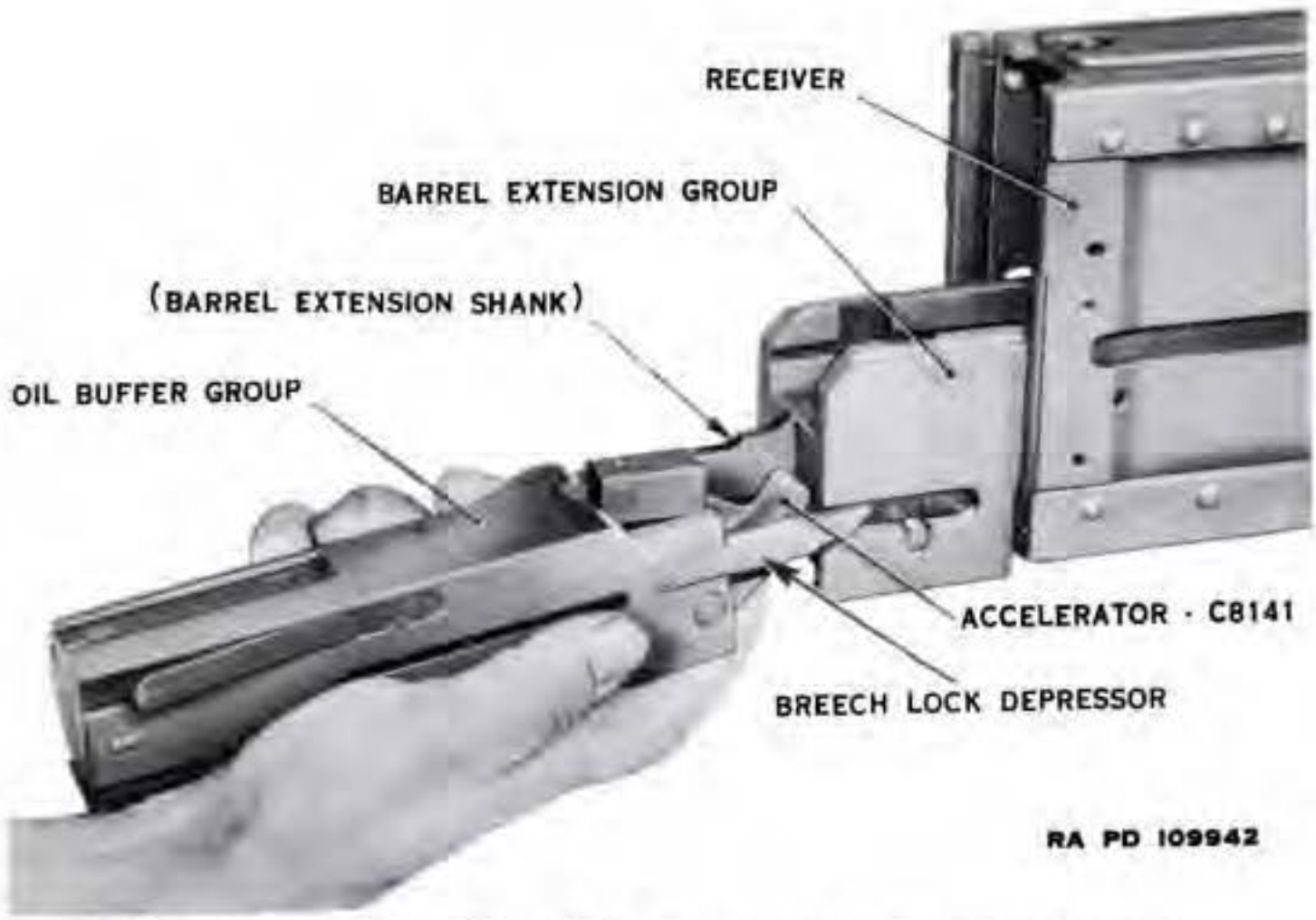


Figure 84. Assembling oil buffer group to barrel extension.

87. Disassembly of Oil Buffer Group (fig. 85)

a. Push the oil buffer group assembly out of the rear end of the oil buffer body group assembly by pressing on the end of the piston rod.

b. Turn the body over and place upside down on a bench. Insert a screw driver under the rear end of the tube lock latch, raise it out of its locking recess in the body, and at the same time push the latch forward slightly. (See fig. 86.) Raise the front end of the oil buffer tube lock assembly high enough to remove the projection out of the body. Rotate the accelerator upward and the tube lock assembly will be pushed out of its recess in the body. Press on the rear end of the lock to keep it from springing out suddenly. (See fig. 87.)

c. The oil buffer body spring lock is staked in position and should not be removed unless necessary. To remove, drive out to the rear.

d. Using a drift pin, push out the accelerator pin and remove the accelerator. Figure 88 shows oil buffer body group with parts removed.

e. If a vise is available, set the jaws about 1⅛ inches apart; then, holding the oil buffer group assembly firmly in both hands, place the edges of the oil buffer spring guide assembly against the separated jaws of the vise. (See fig. 89.) Press forward on the

Figure 85. Oil buffer group assembly removed from oil buffer body group assembly.

Figure 86. Disengaging tube lock latch from oil buffer body.

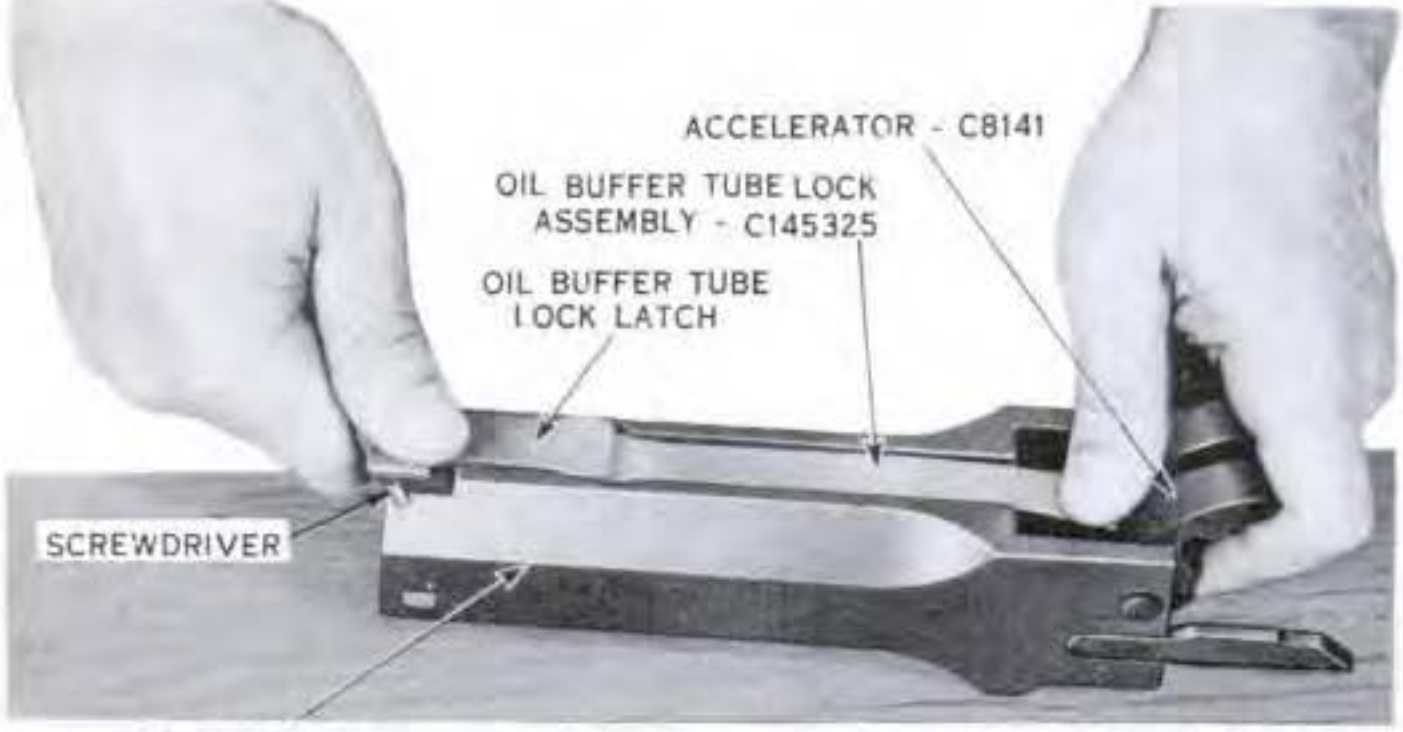


Figure 87. Removing oil buffer tube lock assembly from oil buffer body.

oil buffer tube to compress the oil buffer spring; then turn the oil buffer tube one-quarter turn in either direction to align the piston rod pin with the slots in the spring guide. Release the pressure on the tube slowly and remove the spring guide and spring (fig.

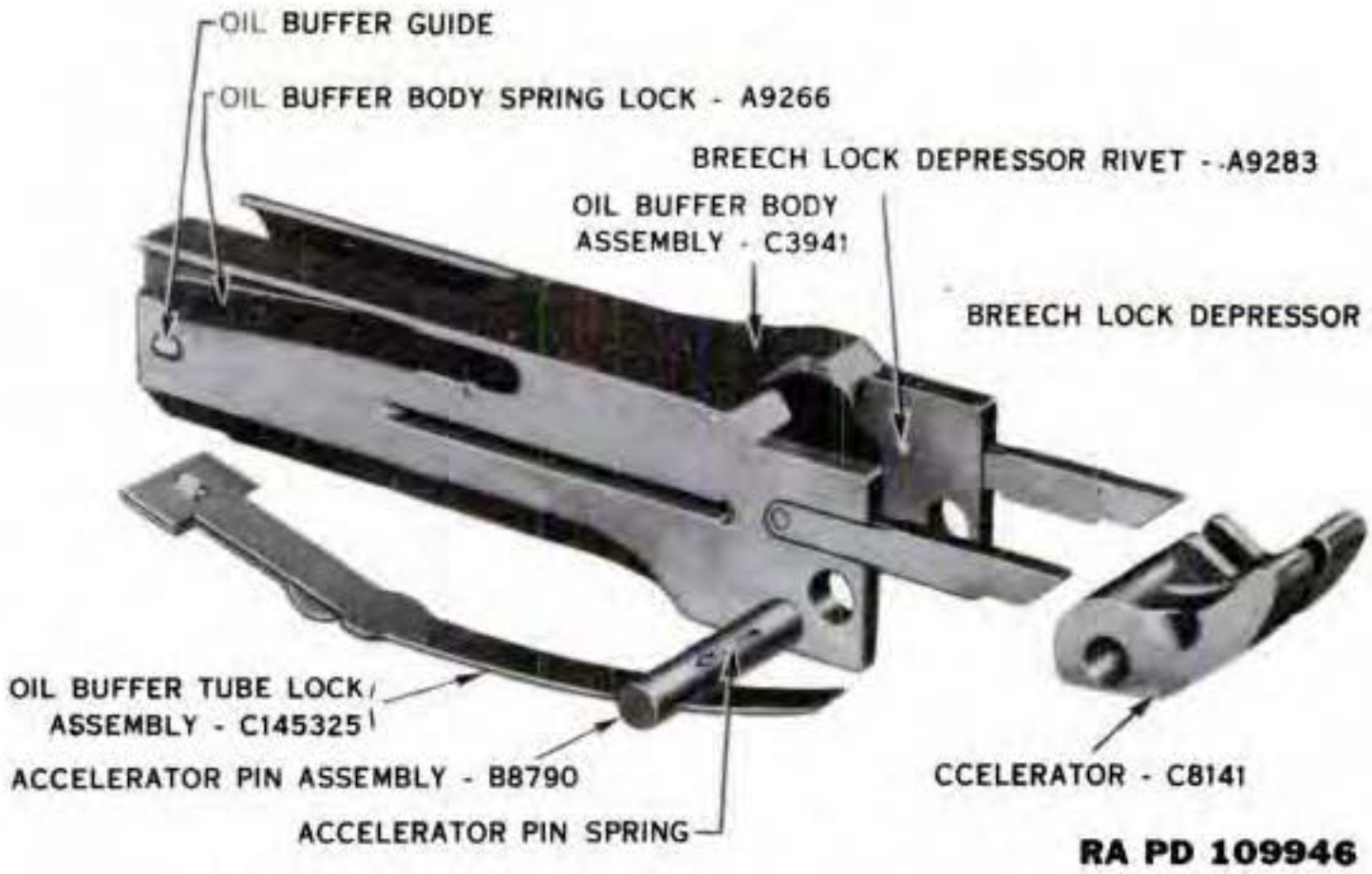


Figure 88. Oil buffer body group—exploded view.

90). If no vise or other suitable support for the spring guide is available, it is possible to perform the operation as indicated in figure 91.

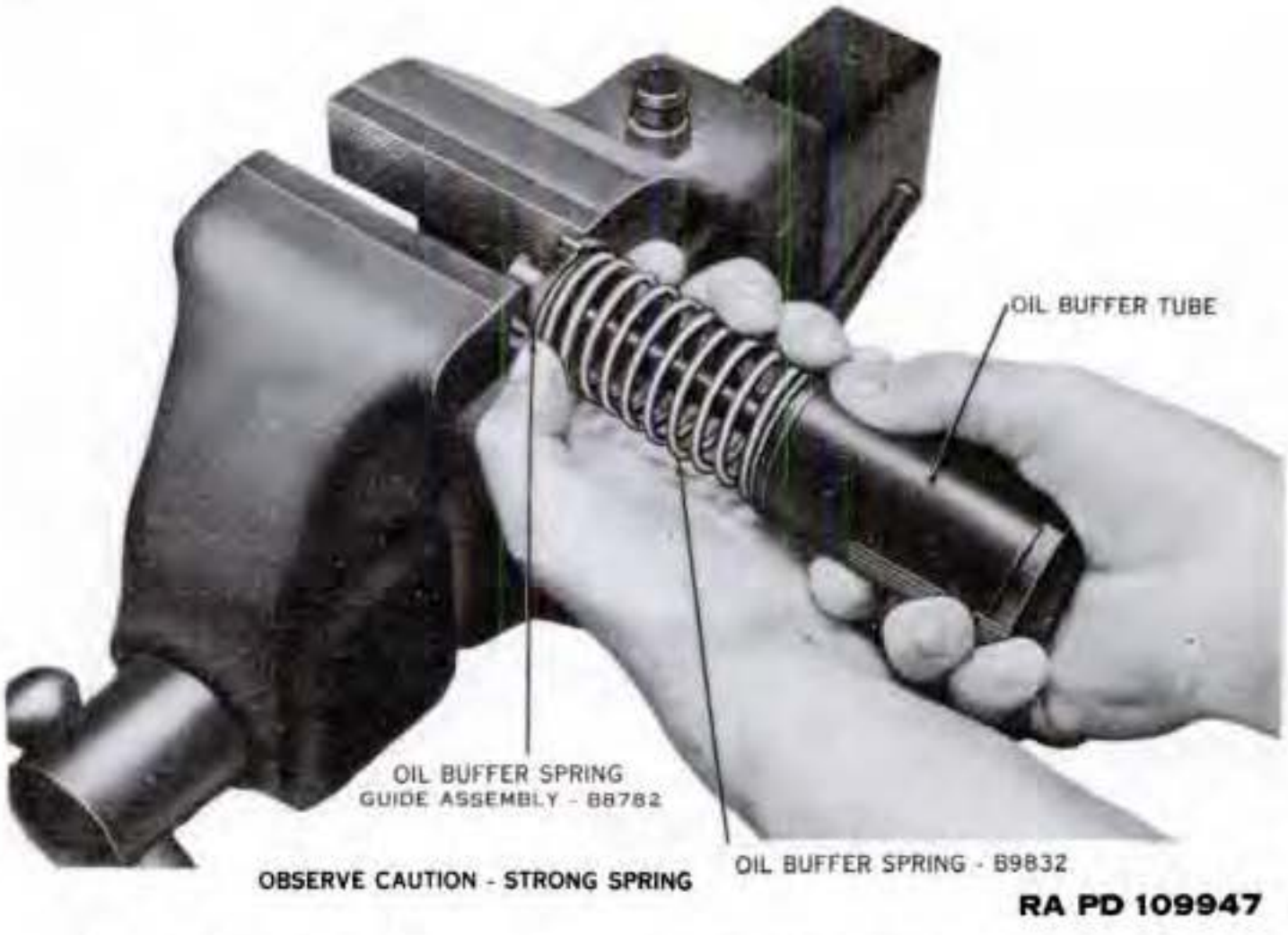


Figure 89. Using vise to remove oil buffer spring and guide.

Caution. Use great care in removing the buffer spring, as it is under strong compression.

f. Remove the filler screws, *using a screw driver which fits the slots exactly*, and drain out the oil. Take special care not to damage

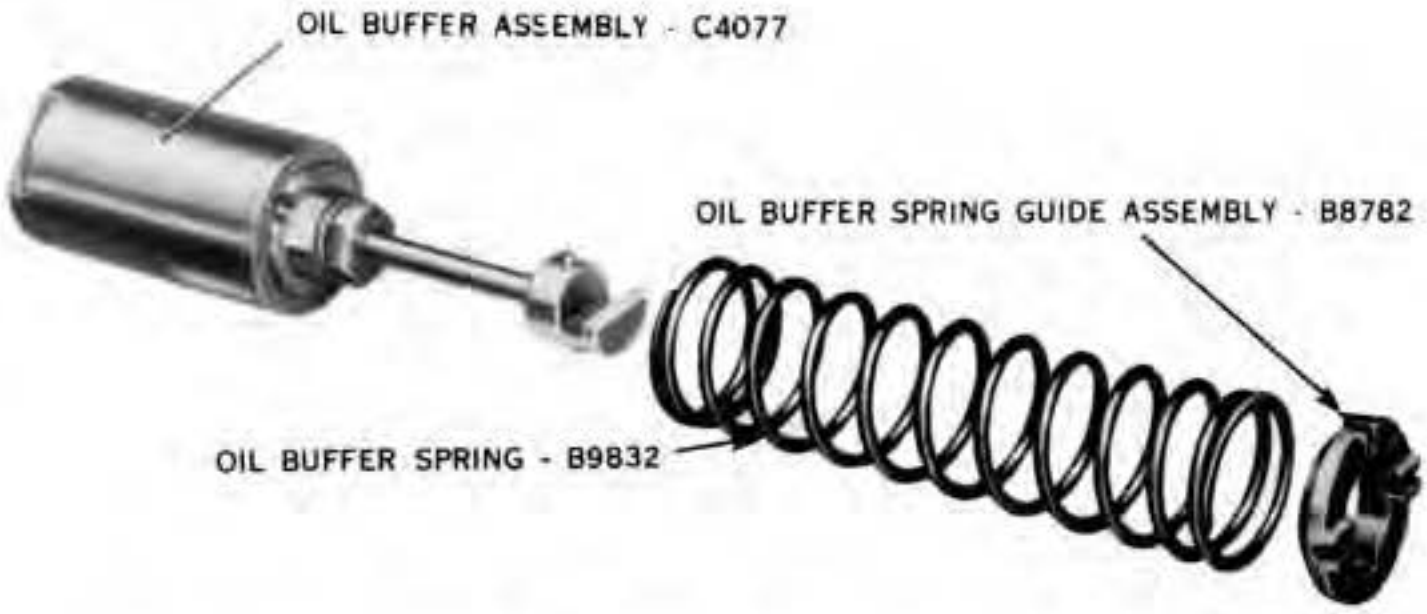


Figure 90. Oil buffer group assembly—exploded view.

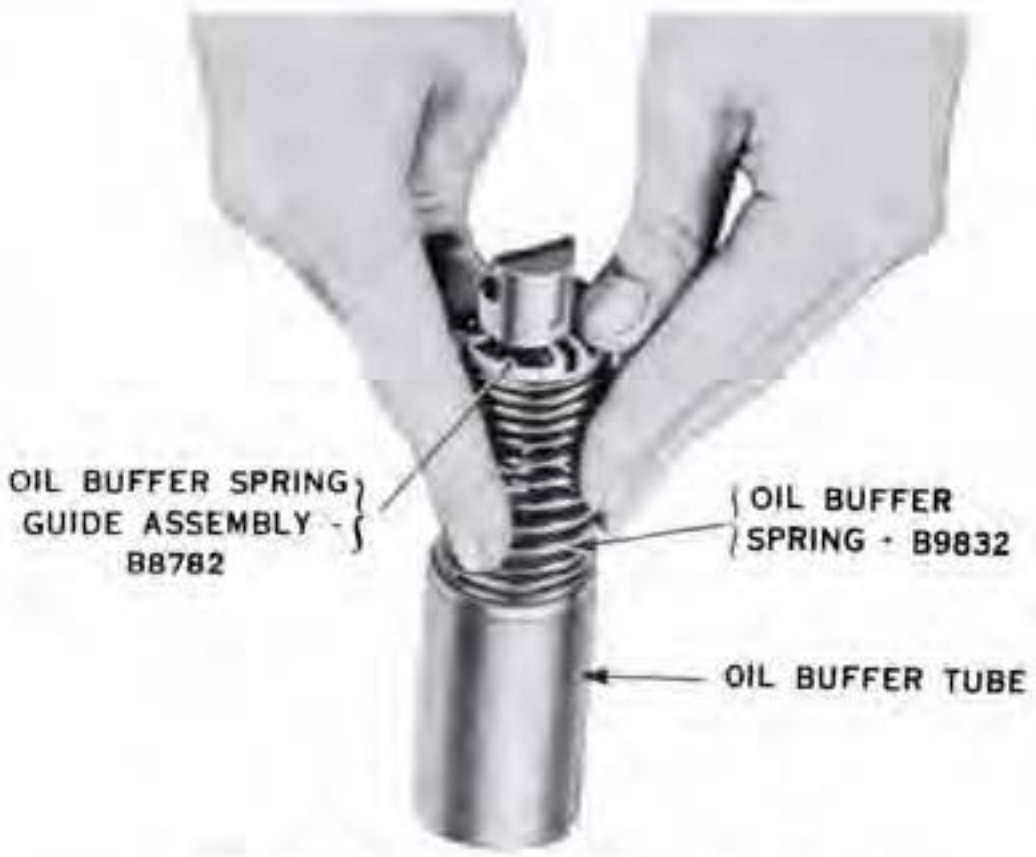


Figure 91. Removing oil buffer spring and guide without use of a vise.

the threads in the tube with the blade of the screw driver. Place the squared shoulders of the oil buffer tube in a vise and, using combination wrench 41–W–867–808, loosen the packing gland plug. (See fig. 34.)

g. Remove from the vise and, with a rawhide or lead hammer, lightly tap all around the end of the tube into which the cap threads to break the seal of these parts. Replace the squared shoulders in the vise and, using combination wrench 41–W–867–808 on the two flat surfaces of the tube cap, unscrew the cap.

Note. The old type tube cap B9731 does not have these two flat surfaces. The old type cap is unscrewed by engaging the projections marked "OIL BUFFER CAP" on the combination wrench (fig. 34) in the holes in the top of the cap.

h. Take out the piston head nut pin and unscrew the piston head nut. Remove the piston valve assembly and unscrew the piston rod head from the rod. Unscrew the loosened gland plug from the cap, and remove the packing gland spring, packing gland washer, and gland packing from the piston rod. Figure 92 shows the oil buffer assembly completely disassembled.

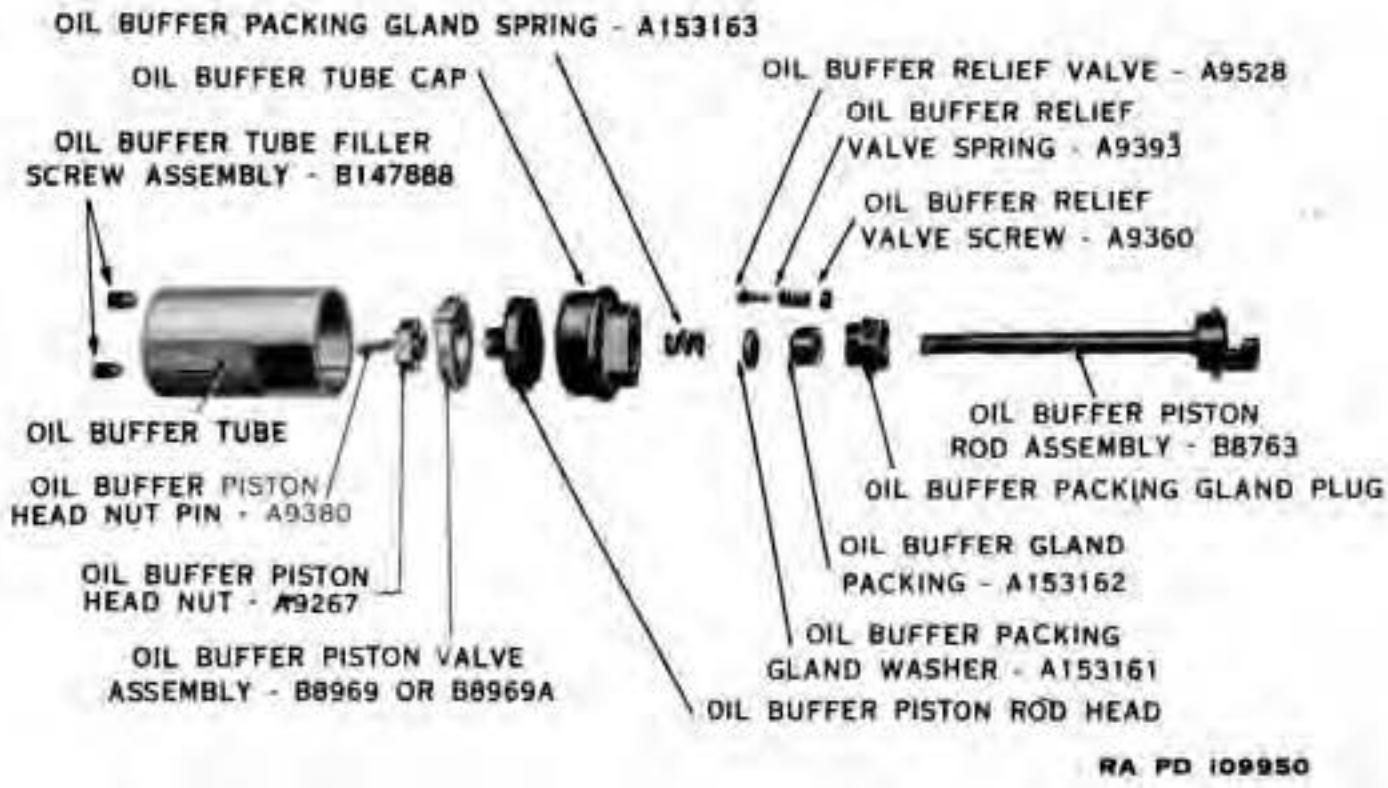


Figure 92. Oil buffer assembly—exploded view.

88. Assembly of Oil Buffer Group (figs. 88 and 92)

a. Place the packing gland plug, gland packing, gland washer, gland spring, and tube cap on the piston rod in the order named. Screw the gland plug into the tube cap and hand tighten. Guns of earlier manufacture used a conically shaped leather packing and packing gland ring in place of the present cylindrically shaped synthetic packing and gland washer. (See fig. 92.) Cases where leakage around the piston rod is experienced should be reported through channels to the Office, Chief of Ordnance, Field Service, Maintenance Division, Small Arms Branch.

b. Screw the piston rod head onto the piston rod, with the shoulder away from the tube cap until the distance from the forward face of the rod head to the forward face of the notch in the piston rod is 3.975 inches + 0.014 inch. (See fig. 93.) Line up the slot in threaded shoulder of the rod head with the hole in the piston rod. Place the piston valve assembly on the shoulder of the piston rod head, with the flat face toward the rod head, and screw the piston head nut onto the shoulder, with the four castellations to the rear. Screw the nut up until the clearance between the valve and rod head is between 0.045 inch and 0.055 inch, as shown in figure 93, and insert the piston head nut pin. The gun will not operate properly, as outlined in paragraph 62 *c*, if assembly di-

rections are not accurately followed. If no means of measuring assembly dimensions is available, the assembly will be approximately correct if the shoulder of the piston rod head and the piston head nut are adjusted to be approximately flush with the end of the piston rod. In an emergency, a new dime or the thin end of an oil buffer tube lock assembly may be used to check the clearance between the piston rod head and valve.

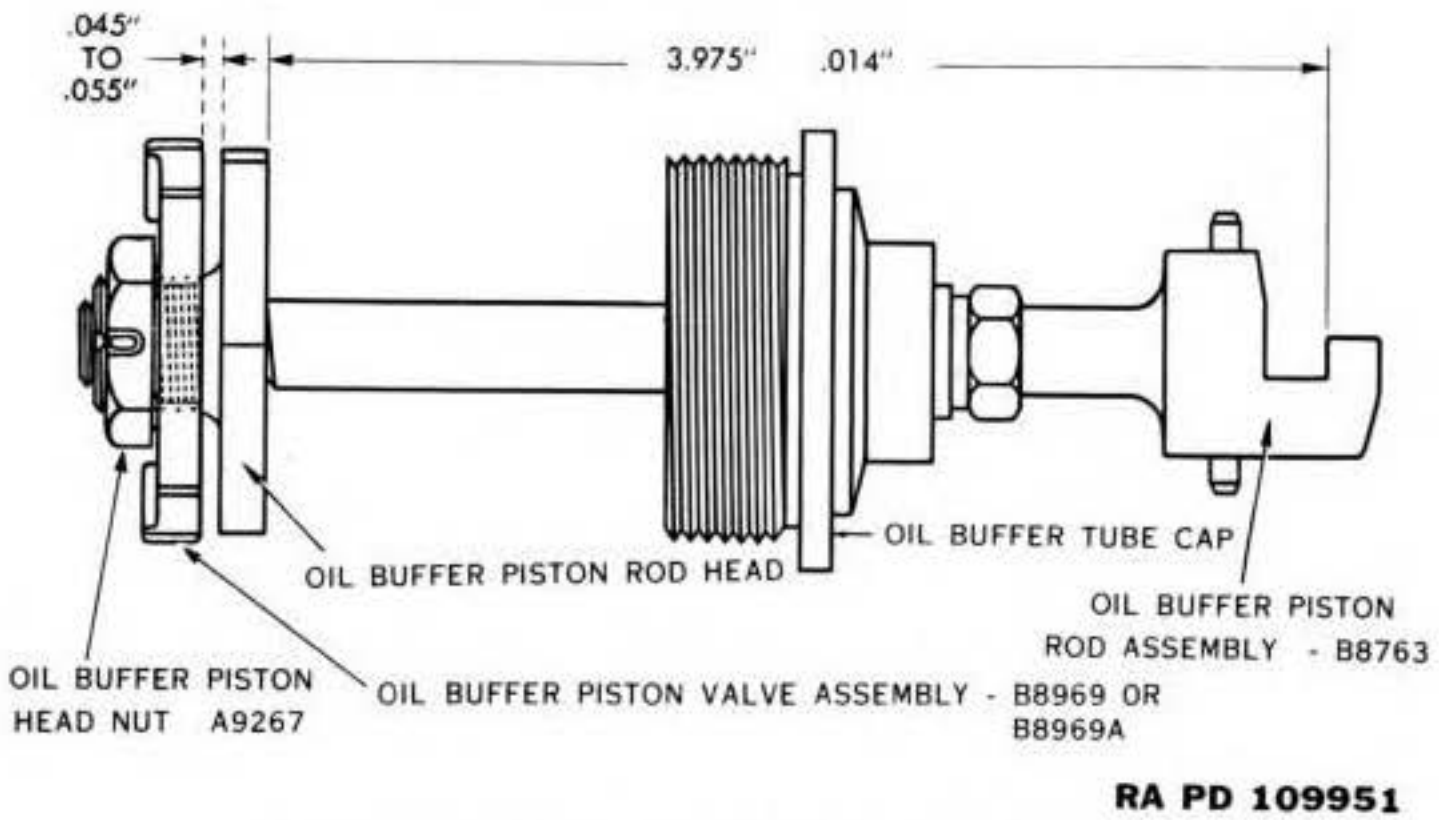


Figure 93. Assembly dimensions of oil buffer.

c. Insert the assembled internal parts of the oil buffer into the oil buffer tube, making sure the guides on the piston valve engage in the grooves on the inside of the tube. Place the square shoulder at the rear end of the tube in a vise and screw the tube cap down firmly and then tighten the packing gland plug.

d. Pull the piston rod fully forward and fill the oil buffer completely full of preservative lubricating oil (special). Press the bottom of the oil can, and when the oil is flowing in a steady stream, insert the spout in one of the filler holes. Maintain pressure on the oiler, and remove the spout from the hole while the oil is still flowing. Repeat this operation, as necessary, until the oil flows from the other filler hole. This procedure must be followed to avoid getting air bubbles in the tube. Install both filler screws If the slots or seats of the filler screws appear damaged, use new screws. If filler screws A9361 are being used, tighten securely with a screw driver which fits the slot exactly. If oil buffer tube filler screw assembly B147888 with assembled washer is being used, tighten only sufficiently to seat firmly. The washer is assembled to the screw for the purpose of preventing oil leakage. The washer is seated in a groove in the screw and should be free to rotate.

e. Place the oil buffer spring over the piston rod, seat it on the tube cap, and place the flat surface of the spring guide on top of the spring with the guide key in line with the pin on the notched side of the piston rod. (See fig. 90.) Following the procedure outlined in paragraph 87 *e*, compress the oil buffer spring until the ends of the pin in the piston rod pass through the slots in the guide. Then give the piston rod one-quarter turn and allow the pin to seat in its recesses in the guide. Make sure that the spring guide key is in line with, and to the right of, the notch in the piston rod when viewed from the rear with the notch up.

f. If the oil buffer body spring lock has been removed, replace it in its seat, push it forward, and stake in position.

g. Position the tube lock assembly over the slot in the bottom of the oil buffer body with the bowed side away from the buffer body. With the flanges of the spring over the enlarged cut in the slot, depress the spring into the cut and slide into position, raising the projecting end of the lock slightly so that the lug on the tube lock clears the oil buffer body. The lug should engage in the hole in the bottom of the oil buffer body and the tube lock latch should be depressed into the circular opening in the tube lock slot.

Note. If the tube lock assembly is to be replaced, some fitting by ordnance personnel with respect to the slot in the oil buffer body and accelerator may be necessary.

h. Place the accelerator, with the tips up and rounded surfaces to the front, between the depressors on the oil buffer body and insert the accelerator pin, taking care that both ends of the pin are flush with the sides of the oil buffer body.

i. Insert the oil buffer group assembly in the oil buffer body group assembly making sure that the key on the guide enters the key slot in the side of the body. (See fig. 85.) Before pushing it all the way forward, adjust the oil buffer for maximum rate of fire. To do this, grasp the oil buffer body in the left hand and the projecting end of the oil buffer tube in the right. Turn the tube in either direction until the projecting lug on the tube lock engages in the serrations on the tube (indicated by a clicking sound as the tube is turned). Then turn the tube counterclockwise until the clicking just stops; the lug will now be just out of engagement with the serrations. Now turn the tube clockwise three clicks, and the oil buffer will be adjusted for maximum rate of fire. This procedure must be followed when the new type tube lock assembly is used, since the adjustment cannot be changed when the parts are assembled in the receiver. Furthermore, the oil buffer group cannot be pushed forward in the receiver unless the projection on the tube lock is engaged in the serration on the tube.

89. Maintenance of Oil Buffer Group

a. Make sure that the spring lock is staked securely in the body and has sufficient spring to properly seat in side plate locking recess.

b. Remove any burs on guide lugs on sides of body and key slot in body. The oil buffer spring guide key should move freely in slot when assembled. If slot or key appear battered or worn it indicates the slot is too short, and group should be turned over to ordnance personnel for check and repair.

c. Remove any burs on the accelerator or accelerator pin. Check the accelerator for shipping or wear. Replace if necessary. (See par. 88.)

d. Check the oil buffer tube for rust or burs. If present, remove using crocus cloth.

e. Check the piston valve assembly for deformation, wear, rust, and burs. Check buffer spring for cracks or rust, and key on spring guide for looseness, wear, or burs. Replace any defective parts.

f. Inspect to make sure that the oil buffer is completely full of oil. If it is not known what type of oil is in the buffer, drain and refill with preservative lubricating oil (special).

g. Check the slots and seats of filler screws. If damaged, replace with new screws.

h. Check the breech lock depressors for loose rivets, deformation, or burs. Remove burs, using crocus cloth, and replace any damaged rivets.

i. Check piston rod for wear or burs. Remove burs with crocus cloth or replace a worn or defective rod.

j. Apply a light film of the oil prescribed in paragraph 44 to all parts.

Section XIX. BARREL AND BARREL EXTENSION GROUP

90. General

a. The barrel is cylindrical, and threaded at the rear end to screw into the barrel extension loosely enough for easy adjustment. Just forward of this thread, serrations are cut around the periphery for engagement of the barrel locking spring which holds the barrel in adjustment, with regard to headspace, when assembled to the barrel extension. A cylindrical sleeve is fastened to the muzzle end of the barrel for engagement in the front barrel bearing in the barrel jacket of the receiver group when assembled. Various types of barrels are used with this machine gun and are completely covered in paragraph 97.

b. The barrel extension extends to the rear of the barrel, when assembled to it. Its forward end is a formed lug, drilled and threaded, into which the barrel is screwed. Integral side members extend rearward, terminating in lugs pointing downward and carrying the breech lock. At the rear end is the barrel extension shank, pinned in position between the side members. The shank terminates in a hook and extends rearward to engage a similar hook on the piston rod of the oil buffer, when assembled. Grooves cut in the side members of the barrel extension support and form a slideway for the bolt, when assembled. A cut in the upper inside edge of the left side member and the top of the forward portion into which the barrel is screwed, provides clearance for the extractor assembly of the bolt.

c. The breech lock slides vertically in grooves in the rear part of the barrel extension and is retained by a pin passing laterally through the breech lock and elongated holes in the side members of the extension. The barrel locking spring is staked in an undercut groove in the right side of the extension, at the forward end.

d. The function of the barrel is to house the cartridge and direct the bullet when fired. The barrel is rifled to rotate the bullet, which helps to maintain direction and prevent tumbling.

e. The function of the barrel extension group is to support the rear end of the barrel and maintain its adjustment, with regard to headspace, by means of the barrel locking spring. The extension is, in turn, supported by the breech lock cam in the receiver. The extension also supports the bolt, forms a slideway for it during operation, and provides a means for locking the bolt to the barrel during firing of the cartridge. The extension shank engaging with the piston rod of the oil buffer, operates the piston and compresses the oil buffer spring on the recoil movement, and is, in turn, forced forward by the expanding spring on the counterrecoil movement. The breech lock, acted upon by the breech lock cam on the forward movement of the extension and by the breech lock depressors on the rearward movement, locks and unlocks the bolt with respect to the barrel extension. The extension also acts upon the accelerator in the oil buffer body to lock the oil buffer spring in compression until counterrecoil occurs. Detailed functioning of the components of the barrel and barrel extension group is explained in paragraphs 51 through 58.

91. Removal of Barrel and Barrel Extension Group

a. Remove back plate group. (See par. 67.)
b. Remove the driving spring group. (See par. 73.)
c. Remove bolt group. (See par. 79.)
d. Remove oil buffer group. (See par. 85.)

Figure 94. Barrel and barrel extension group—exploded view.

e. Remove barrel and barrel extension group by pulling it out through the rear of the receiver taking care not to let the muzzle end of the barrel strike and damage the breech lock cam.

92. Installation of Barrel and Barrel Extension Group

a. Insert the assembled barrel and barrel extension group into the rear end of the receiver until the lower projection on the barrel extension contacts the bottom plate. Assemble oil buffer group to barrel extension as outlined in paragraph 86. These parts are then raised to clear the bottom plate, and pushed forward in the receiver until locked in position by the oil buffer body spring lock. Use care to prevent the muzzle end of the barrel from striking and damaging the breech lock cam.

b. Install bolt group. (See par. 80.)

c. Install driving spring group. (See par. 74.)

d. Install back plate group. (See par. 68.)

93. Disassembly of Barrel and Barrel Extension Group (figs. 94 and 95)

a. Remove the barrel by unscrewing from the barrel extension. It is best to slightly raise the barrel locking spring to minimize wear of notches and spring when turning barrel. Do not strain.

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

c. The barrel locking spring is staked in position and should not be removed unless replacement of the spring is necessary. When necessary, it is driven out by using a drift pin inserted in the small hole near the rear of the spring.

Figure 95. Barrel extension group—exploded view.

94. Assembly of Barrel and Barrel Extension Group
(figs. 94 and 95)

a. If the barrel locking spring has been removed, insert it in its recess with small end leading and the protrusion on the opposite end facing the inside. Push back as far as it will go, and stake in position.

b. Slide the breech lock into its slot in the barrel extension with the beveled faces to the front and the notch on top. Insert the pin, making sure that both ends are flush with the sides of the barrel extension. Be sure the spring is firmly seated in the pin, and retains the pin, when assembled.

c. Screw the barrel into the barrel extension (par. 93 *a*) and then back out 8 or 10 notches to facilitate assembly of the group into the gun. With the barrel screwed all the way into the extension, the recoiling parts will not go fully into battery, and difficulty may be encountered when installing the barrel, barrel extension, and oil buffer group. No attempt should be made to operate the gun until headspace has been adjusted and checked. (See pars. 24 and 25.)

95. Adjustment of Barrel and Barrel Extension Group

Adjustment of the barrel and barrel extension group is made when the weapon is fully assembled and is referred to as adjustment of headspace and timing. This adjustment is covered in paragraphs 24 and 25.

96. Maintenance of Barrel and Barrel Extension Group

a. Worn or damaged locking notches on a barrel may permit the barrel to turn during firing, thus allowing headspace to change; therefore, if this condition exists the barrel should be replaced.

b. The bore and chamber of the barrel must be kept clean of all metal and other fouling.

c. If the barrel extension shank is crooked, loose, or broken, the barrel extension assembly should be replaced.

d. If the barrel locking spring is worn or broken, it should be replaced. The locking projection should be sharp enough and spring action strong enough to positively hold the barrel in position, and the spring should be tightly staked in the extension.

e. Any burs in the bolt guides or the breech lock slot in the barrel extension should be removed, using crocus cloth.

f. Remove all burs from the breech lock and pin, using crocus cloth. The breech lock should slide smoothly in its ways.

g. If the breech lock pin assembly is badly worn by action of the depressors, or the spring is missing or damaged, the pin assembly should be replaced.

97. Comparison of Various Types of Barrels

a. The various types of barrels are listed below. Each barrel has a piece mark stamped approximately 5 inches from the breech end. This piece mark affords positive identification.

(1) *Barrel D28272.* This is the standard two-piece steel barrel assembly which has a removable sleeve for a bearing at the muzzle end.

(2) *Barrel D35348A.* This is a one-piece steel barrel with the bearing at the muzzle end machined on the barrel itself, eliminating the sleeve.

(3) *Barrel D7161580.* This barrel assembly has a rifled liner, made of special steel, inserted in the breech end. It extends forward approximately 12 inches at which point it abuts and joins the rifling of the barrel. In other respects this barrel assembly is similar to barrel assembly D28272 as described in (1) above.

(4) *Barrel D7162079.* This barrel assembly has the special steel liner described in (3) above. In other respects it is similar to barrel D35348A described in (2) above.

(5) *Barrel D7162011.* This barrel assembly is the same as barrel assembly D28272 described in (1) above, except that the barrel is nitrided and the bore is chromium plated. The chamber is not plated. The bore can be recognized by a characteristic frosty appearance.

Note. A mottled appearance on the sleeve or bearing surface at the muzzle end of the barrel, caused by plating and finishing, does not affect gun functioning.

(6) *Barrel D7162012.* This barrel assembly is nitrided and plated the same as barrel D7162011 in (5) above. In other respects it is similar to barrel D35348A described in (2) above.

(7) *Barrel D7162095.* This barrel assembly is lined the same as barrel assembly D7161580 in (3) above, plated the same as barrel D7162011 in (5) above, and in other respects is the same as barrel assembly D28272 in (1) above.

(8) *Barrel D7162179.* This barrel assembly is lined and plated the same as barrel assembly D7162095 in (7) above, and in other respects is the same as barrel D35348A in (2) above.

(9) *Barrel D7162259.* This barrel assembly is lined and plated the same as barrel assembly D7162095 in (7) above. In addition,

it has a reenforcing sleeve around the outside. This sleeve is 6 inches long and its rear end is located 8 inches from the breech.

b. In addition to the above identification, the top and end of each barrel box is marked as follows:

(1) Lined barrels have piece mark and words "Special Lined."

(2) Plated barrels have piece mark and words "Chromium Plated."

(3) Combination lined-plated barrels have piece mark and words "Lined and Plated."

98. Barrel Inspection

a. Due to the various field conditions under which guns are fired, suitable gauges which will determine serviceability of barrels are not yet available. Tests are being conducted to correlate all firing data in an attempt to design and furnish field gauges for determining the rejection point of each of these barrels. Further information on these gauges will be furnished when available.

b. Until gauges are available, barrels will be visually inspected to determine their serviceability as follows:

(1) Hold the barrel so that its interior is illuminated, and examine the bore from both the muzzle and breech ends. If the barrel is not bent or otherwise deformed, if the bore appears free from bulges, constrictions, and large pits, and if the lands are sharp and uniformly distinct, it is serviceable. Small pits will not render the barrel unserviceable, provided it is in good condition otherwise.

(2) Examine the breech end of the bore. If the lands are worn away so that the first 6 or 8 inches of the bore are smooth, the barrel is unserviceable and should be scrapped.

(3) If the barrel contains a bulge or constriction it should be scrapped. A bulge is indicated by a shadowy depression or ring in the bore. It may also be detected by a bulge or raised ring on the exterior surface. A constriction is indicated by a decreased diameter at a point in the bore or by a depression on the exterior surface.

(4) If the barrel is pitted to the extent that the sharpness of the lands is affected, or if it has a pit or pits in the lands or grooves large enough to permit passage of gas around the bullet (pits approximately ½ to ¾ inch long and the width of one land), the barrel is, or soon will be, too inaccurate for serviceability and should be scrapped.

(5) Proper care and cleaning of the barrel usually will prevent pitting of the lands and grooves.

(6) If an inspector's barrel reflector is used (fig. 28), insert the short tube of the reflector into the chamber of the gun barrel. The reflector has a mirror and an opening through which the reflection of the bore is obtained.

99. Special Disposition of Unserviceable Lined Barrels

Barrels containing liners (par. 97) have substantial quantities of valuable material which can be reused by the manufacturing arsenal in the manufacture of new liners. Special disposition of unserviceable lined barrels is therefore desirable in order that these liners may be salvaged. For convenience, barrels may be cut in two just ahead of the liner, and only that section containing the liner returned through supply channels to Rock Island Ordnance Depot, Rock Island, Ill. Barrels which are not lined will be salvaged in accordance with existing regulations.

Section XX. COVER GROUP

100. General

a. The cover group carries the feeding mechanism of the gun, which is operated by the bolt through the medium of the belt feed lever. The principal components of the cover group are the cover, belt feed slide group, cover extractor cam, cover extractor spring, belt feed lever, and cover latch.

b. The cover hinges in the trunnion block, pivoting on the cover pin. It is held open by a spring loaded cover detent seated in the trunnion block, and latched by the cover latch engaging under the top plate when the cover is closed. The cover extractor cam is fastened to the left inner side of the cover. The cover extractor spring is secured beside the cam by means of a headed stud engaging in a slot in the spring, and by an undercut in the cam. The cover latch spring, assembled to the right of the cover extractor spring by means of a headed stud and slot, holds the cover extractor spring in position, and places spring pressure on the latch.

c. The belt feed lever is pivoted at the middle on a stud in the cover. The forward end engages in a slot in the belt feed slide, and a lug on the rear end engages in one of the two camming grooves in the top of the bolt when the cover is closed. A spring loaded plunger is housed in one of two wells in the side of the lever and bears on the right-hand side of the cover. This plunger

positions the lever so that the lug on the rear end will properly engage one of the two camming grooves in the bolt, for right- or left-hand feed, when the cover is closed.

d. The belt feed slide group contains the feed pawl and pawl arm pivoted in the slide, which moves laterally in guideways in the forward section of the cover and is held in place by the forward end of the belt feed lever. The pawl is operated by a spring seating between the slide and pawl. The pawl arm is pivoted on the pawl by a spring loaded pawl pin and positioned on the pawl by the belt feed pawl arm pin and the arm locating pin, when assembled. The slide group and lever may be assembled for either right- or left-hand feed by positioning of parts as explained in paragraph 26.

e. The function of the cover group is to pull the ammunition belt into the gun, position a cartridge in the feedway and assist the extractor of the bolt group to withdraw a cartridge from the belt, position it in the T-slot of the bolt, and guide it into the chamber of the barrel. The belt feed slide is operated laterally by the belt feed lever which is in turn operated by the bolt during recoil and counterrecoil. The rear end of the lever engaging in one of the two diagonal camming grooves in the bolt is moved from side to side as the bolt moves backward and forward. This causes the slide, which is engaged with the front end of the lever, to move laterally. The cover extractor spring bears upon the extractor to force it into the extractor groove of the cartridge awaiting extraction in the feedway. The cover extractor cam forces the extractor downward against the (extractor) switch in the receiver, to guide the cartridge into the T-slot in the bolt when extracted from the belt, during the recoil movement of the bolt. The belt feed pawl arm prevents the feed pawl from engaging the ammunition belt to pull it into the feedway should the cartridge awaiting extraction fail to be extracted, thus preventing jamming. Detailed functioning of the components of the cover group is explained in paragraphs 51 through 58.

101. Removal of Cover Group

a. Withdraw the cotter pin from the hole in the end of the cover pin and remove the cover pin.

b. Open cover by turning cover latch shaft lever and lifting cover.

Note. On some installations a special cover latch (par. 4*g*) is used. To open the cover when this latch is used, push forward on the latch and lift cover.

c. Rotate the cover forward against the trunnion block to remove it from its seat between the side plates.

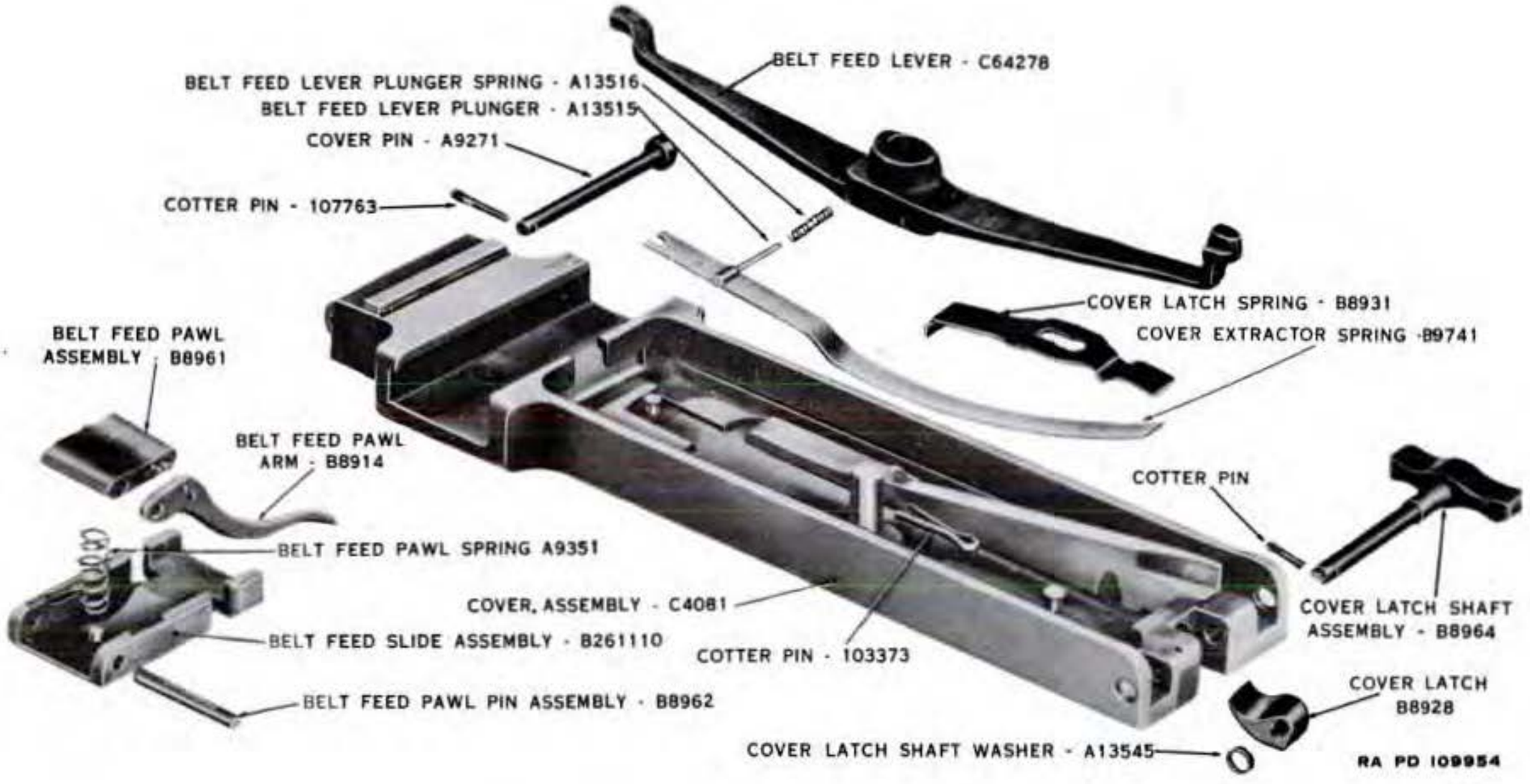


Figure 96. Cover group—exploded view.

102. Installation of Cover Group

a. Place the latch end of the cover in position so that the latch engages the top plate. Then force the hinge end downward into position over the detent pawl, in the trunnion block, to compress the pawl spring. Align hole in cover with holes in side plates, using a drift to secure alignment if necessary.

b. Insert cover pin and secure it in place with the cotter pin. Bend prongs of cotter pin snugly around cover pin to prevent interference.

103. Disassembly of Cover Group (fig. 96)

a. Remove cover group. (See par. 101.)

b. Remove the belt feed lever cotter pin and belt feed lever, taking care that the plunger and spring do not fly out. The front end of the lever must be in line with the slot in the cover; otherwise it cannot be removed.

c. Remove the belt feed lever plunger and spring from the hole in the side of the lever.

d. Withdraw the belt feed slide, complete, from its guides in the cover.

e. Push out the belt feed pawl pin and remove the belt feed pawl, pawl spring, and belt feed pawl arm.

f. Lift end of cover latch spring out of the groove in the cover as shown in figure 97 and turn this lifted end slightly so that it rests on the cover extractor spring. The cover latch spring is then compressed by firm pressure of the thumb, and the spring is slid away from the latch and removed.

Figure 97. Removing cover latch spring.

g. The latch is taken out by removing the shaft cotter pin and washer, *turning the latch shaft to the latch position,* and withdrawing the shaft from the cover.

Note. If the special cover latch is used it is removed in the same manner.

h. Hold the cover extractor spring with the thumb to keep it from flying out, and pry the rear end of the spring out of its recess in the cover extractor cam. Remove the spring by disengaging it from the holding stud at the opposite end. (See fig. 98.)

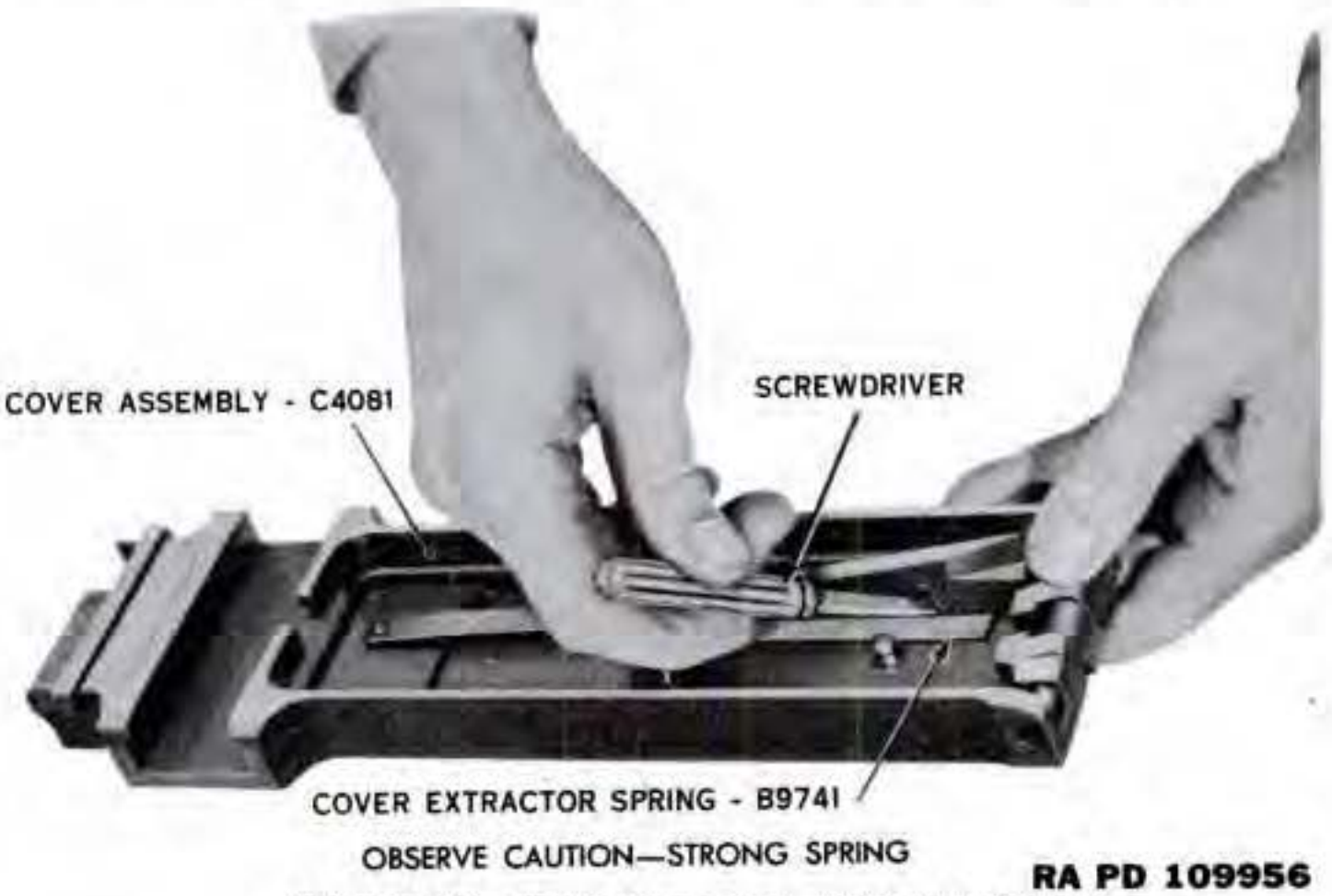


Figure 98. Removing cover extractor spring.

104. Assembly of Cover Group (fig. 96)

a. The latch is assembled to the cover by placing the latch between the pin bosses on the under side of the cover with the keyway toward the top of the cover and with the projecting wing of the latch against the under side of the cover. The shaft can be installed from either side, but if a retracting slide is used, the shaft lever must be on the opposite side from the slide to provide hand clearance. Insert the latch shaft assembly through the cover, align key on shaft with keyway in latch and push shaft through latch. Place the washer on the shaft and secure by inserting the cotter pin with the head toward the hinged end of the cover. Bend the ends of the pin closely against shaft to avoid interference when latching the cover.

Note. If the special cover latch B7161236 (*Note,* par. 101 *a*) is to be installed, a slight amount of fitting may be required. When necessary, stone excess metal from latch, as shown in figure 99. No metal should be removed from the top plate. A minimum amount of metal should be removed so that looseness does not exceed approximately 1/64 inch. The same fitting should be done to a new, standard latch, when assembled.

b. Install the cover extractor spring by hooking the slotted end under the extractor spring stud, with the curved end away from the cover. Hold the spring firmly against the stud, depress the curved end, and engage projecting end of spring in the recess in the cover extractor cam.

c. Place the cover latch spring inside the cover with the bent end against the cover and the enlarged hole meshing with the extractor spring stud. Making sure that the latch end of the spring rides over the projecting wing of the latch, depress the spring and, at the same time, slide the spring toward the latch. Snap the bent end of the spring into the groove in the cover.

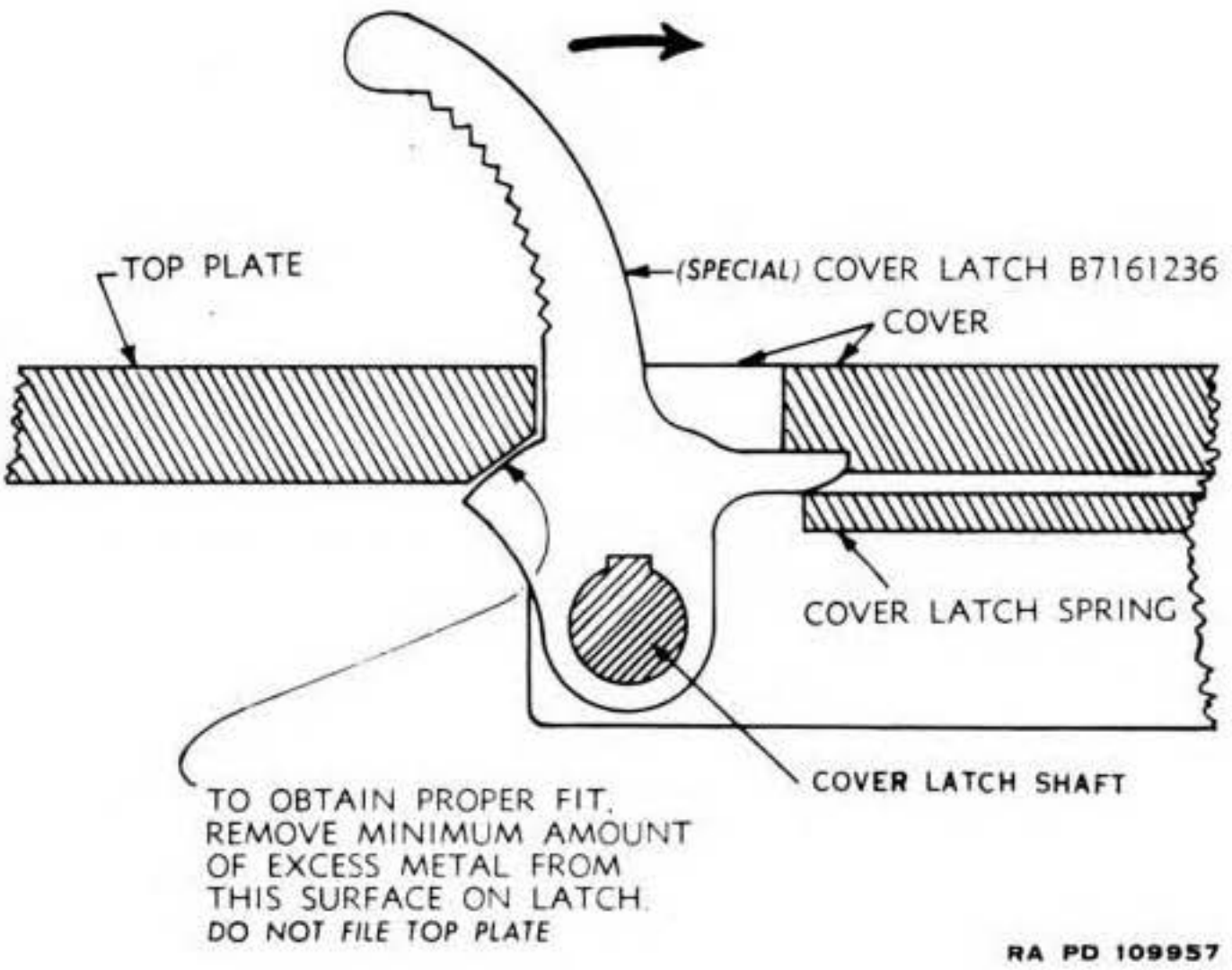


Figure 99. Cover and top plate with special cover latch in position—sectional view.

d. Hold the belt feed pawl with the recess for the belt feed pawl spring up and the pins to the right of the spring recess. Place the belt feed pawl arm on the pawl arm pin and locating pin on the side of the pawl *toward* the operator for left-hand feed (side *away* from the operator for right-hand feed). Place the large end of the belt feed pawl in the recess in the pawl with the projecting oval either to the right or left (fig. 26) depending on side from which ammunition is to be fed into the gun. The spring should always be placed in the pawl with projecting oval *away from* the belt feed pawl arm. Assemble the pawl and arm into the slide with the small end of the spring placed over the

spring stud in the slide. Insert the belt feed pawl pin, making sure that both ends of the pin are flush with the sides of the slide.

Note. Belt feed slide B261110 has a ⅛-inch hole drilled through its face for identification. (See par. 61 *g*.)

e. Place the assembled belt feed slide in its groove in the cover, with the pawl end of the slide toward the side from which the gun is to be fed. Correct assembly of cover group parts for both left- and right-hand feed is shown in figure 25.

f. Place the belt feed lever spring and plunger in the rear hole of the belt feed lever for left-hand feed (forward hole for right-hand feed), as shown in figure 25. Insert the toe of the belt feed lever through the slot in the front of the cover and engage the belt feed slide. At the same time, position the belt feed lever plunger and spring to clear the side of the cover and seat the lever on the stud. Insert the cotter pin in the stud.

g. Install cover group. (See par. 102.)

105. Maintenance of Cover Group

a. Any burs on the cover latch, cover extractor cam, belt feed lever, pivot stud, belt feed slide, or belt feed pawl should be removed, using crocus cloth.

b. If the cover extractor spring or cover latch spring is weak or broken, it should be replaced.

c. The belt feed lever must have free movement. Any binding due to burs, rust, or broken parts should be corrected. If lever is bent or the diamond-shaped cam which engages in the grooves in the top of the bolt is badly worn the lever should be replaced.

d. Be sure cover latches positively.

e. A light film of the oil prescribed in paragraph 44 should be applied to all parts.

Section XXI. RECEIVER AND BARREL JACKET GROUP

106. General

a. The receiver and barrel jacket group consists of the receiver assembly, barrel jacket assembly, and other parts assembled to them. The receiver assembly consists of the trunnion block, two side plates, a bottom plate, top plate, and other parts assembled permanently to them. The trunnion block forms the basic part of the receiver assembly. The side plates are attached to the trunnion block and extend rearward. The top and bottom plates are attached to the side plates.

b. The barrel jacket assembly contains the breech bearing permanently fastened to the rear end. The breech bearing threads into the trunnion block to support the jacket when assembled. A front barrel bearing is threaded into the front end of the jacket. The breech bearing acts only as a guide for the barrel which is supported at the rear by the barrel extension into which it threads. The barrel extension is in turn supported by the breech lock cam in the receiver. Holes in the barrel jacket provide ventilation to dissipate heat from the barrel caused by firing.

c. A lateral feedway for the ammunition belt is cut into the top of the trunnion block and the front top of the side plates. At the lower edge of the feedway, right- and left-hand belt holding pawl brackets are riveted to the side plates to support the belt holding pawls, which are secured in the brackets by belt holding pawl pins. A hole bored through the side plates and trunnion block acts as a bearing for the front gun trunnion pin when mounting the gun in some installations. Two drilled lugs on the bottom plate act as bearings for the rear gun trunnion pin. A lateral hole bored through the trunnion block at the top forward end acts as a bearing for the cover pin.

d. A trunnion adapter, with a lug drilled to form a bearing for the front gun trunnion pin in some installations, is threaded onto the front end of the trunnion block, and is held in place by a spring loaded trunnion block lock housed in the trunnion block. A recoil adapter, which may be used in place of the trunnion adapter in some installations, is assembled to the trunnion block in a similar manner.

e. The breech lock cam is fastened to the inner face of the bottom plate by means of a lug on the cam passing through a hole in the plate and secured by a bolt and nut. The cam is grooved at the sides to form a slideway for the barrel extension which it supports. A ramp on the rear end of the cam forces the breech lock upward to lock the bolt to the barrel extension just before the recoiling parts go into "battery" position on the counterrecoil stroke.

f. The top plate bracket is fastened to the under side of the top plate and forms a bearing surface which engages the upper end of the cocking lever to operate it during recoil and counterrecoil movements of the bolt. A lateral hole through the bracket and left-hand side plate forms a bearing for the trigger bar pin which acts as a pivot for the trigger bar. A bolt latch bracket, fastened to the top plate, is located to the right of the top plate bracket. In this gun it serves only to position the trigger bar. On some guns of later manufacture, an adjustable trigger bar

stop assembly is fastened to the under side of the top plate to the rear of the bracket, for the purpose of adjusting the upward movement of the trigger bar when acted upon by a back plate solenoid or trigger. The adjustable stop is positioned on the rear trigger bar stop riveted into the top plate, and is retained by a screw extending through the top plate cover and top plate, and threaded into the body of the adjustable stop. On guns of earlier manufacture only the rear trigger bar stop, which is not adjustable, is used.

g. The (extractor) switch is pivoted to the inside of the left-hand side plate and positioned by a threaded stud, nut, and spring. The switch, in conjunction with the cover extractor cam in the cover group, assists the extractor to position the cartridge in the T-slot of the bolt. The extractor cam riveted to the side plate, just ahead of the switch, raises the extractor near the end of the counterrecoil movement of the bolt, after the cartridge has been started into the chamber.

h. The purpose of the receiver group is to house the working mechanism of the gun, as well as to act as a support for the fixed parts which contribute to operation. It also acts, through the barrel jacket, to support and protect the barrel. Detailed functioning of the components of the receiver group is explained in paragraphs 51 through 58.

107. Disassembly of Receiver and Barrel Jacket Group

a. Remove back plate group. (See par. 67.)

b. Remove driving spring group. (See par. 73.)

c. Remove bolt group. (See par. 79.)

d. Remove oil buffer group. (See par. 85.)

e. Remove barrel and barrel extension group. (See par. 91.)

f. Remove cover group. (See par. 101.)

g. Remove the two belt holding pawls, sleeve, and springs from the feedway by withdrawing the belt holding pawl pin, being careful not to lose the springs. (See fig. 100.) If the spring in end of pin does not cam down freely, depress before withdrawing pin. Do not force.

h. If the gun has been set up for left-hand feed, the right-hand rear cartridge stop assembly is detached by removing the remaining belt holding pawl pin. This also frees the front cartridge stop. The right-hand rear cartridge stop assembly is disassembled by driving out the cartridge aligning pawl pin, and removing the cartridge aligning pawl, the aligning pawl plunger, and spring. (See fig. 101.) If the gun has been set up for right-

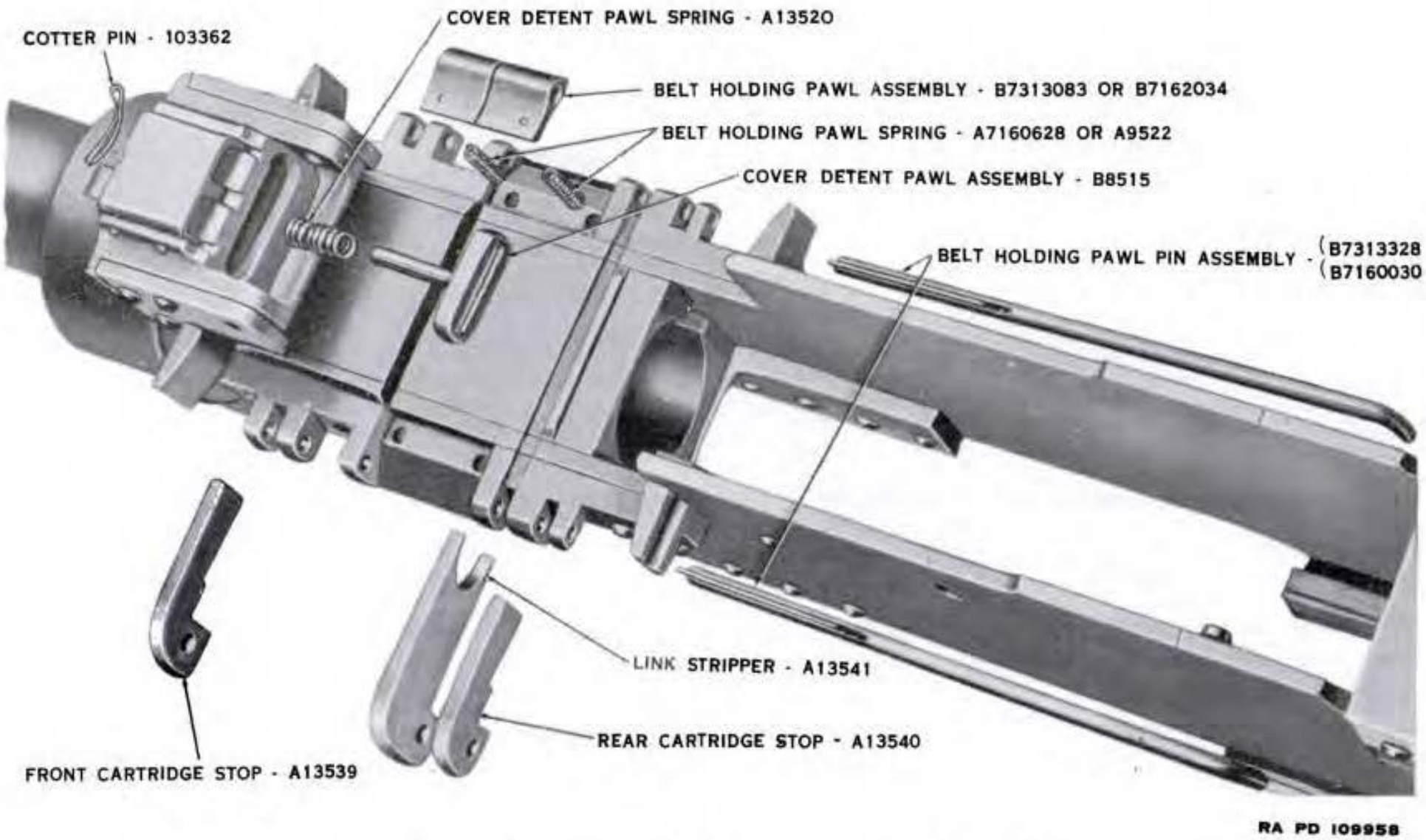


Figure 100. Feedway section of receiver group—exploded view.

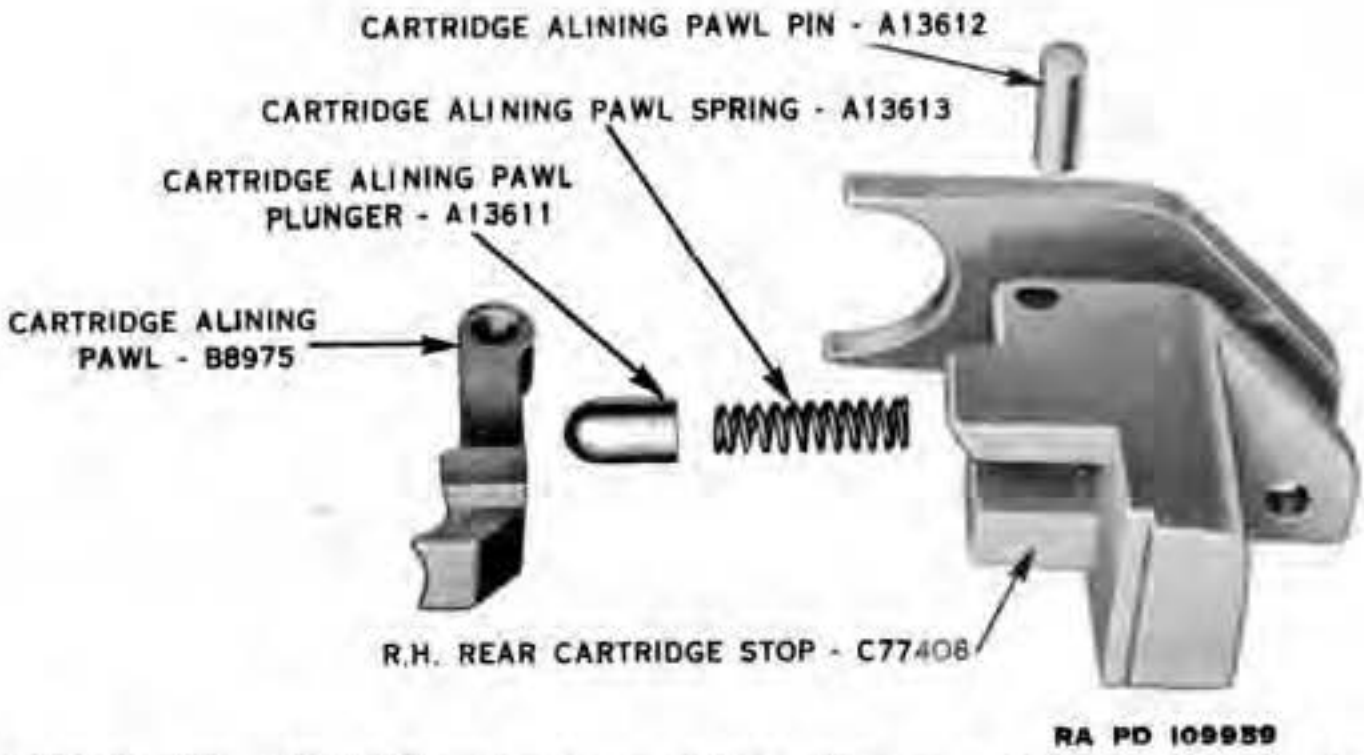


Figure 101. Right-hand rear cartridge stop assembly—exploded view.

hand feed, the rear and front cartridge stops and link stripper are removed by taking out the remaining belt holding pawl pin. (See fig. 100.)

i. Remove cover detent pawl assembly by withdrawing it to the rear, out of its hole in the top rear part of the trunnion block. The early type cover detent pawl assembly is retained in the trunnion block by a cotter pin assembled through the shank of the pawl. To remove the early type pawl assembly push the pawl forward until its shank protrudes far enough forward through the front of the trunnion so that the cotter pin can be removed. Remove cotter pin and withdraw pawl and spring, to the rear, out of its seat. (See fig. 100.)

j. Remove the cotter pin from the (extractor) switch pivot nut. Unscrew switch pivot nut and remove the switch and switch spring. (See fig. 102.)

k. The present breech lock cam is removed by taking out the cotter pin on the bottom of the receiver and removing the nut. Take out the breech lock cam bolt and cam from the inside of the receiver. (See fig. 103.) On guns of earlier manufacture the breech lock cam was assembled to the receiver by means of a screw introduced from the bottom side of the receiver and staked to the breech lock cam. In cases of this type, the breech lock cam is removed by backing off the breech lock screw.

Note. The breech lock cam should not be removed except for replacement or when cleaning is imperative.

l. Remove the trigger bar pin assembly by lifting the lock until perpendicular to the side plate and rotating the pin about 90°. (See fig. 104.) The projection of the pin which forms a key will then pass through the keyhole in the side plate and the pin can be removed by pulling it out from the gun. (See fig. 103.) When

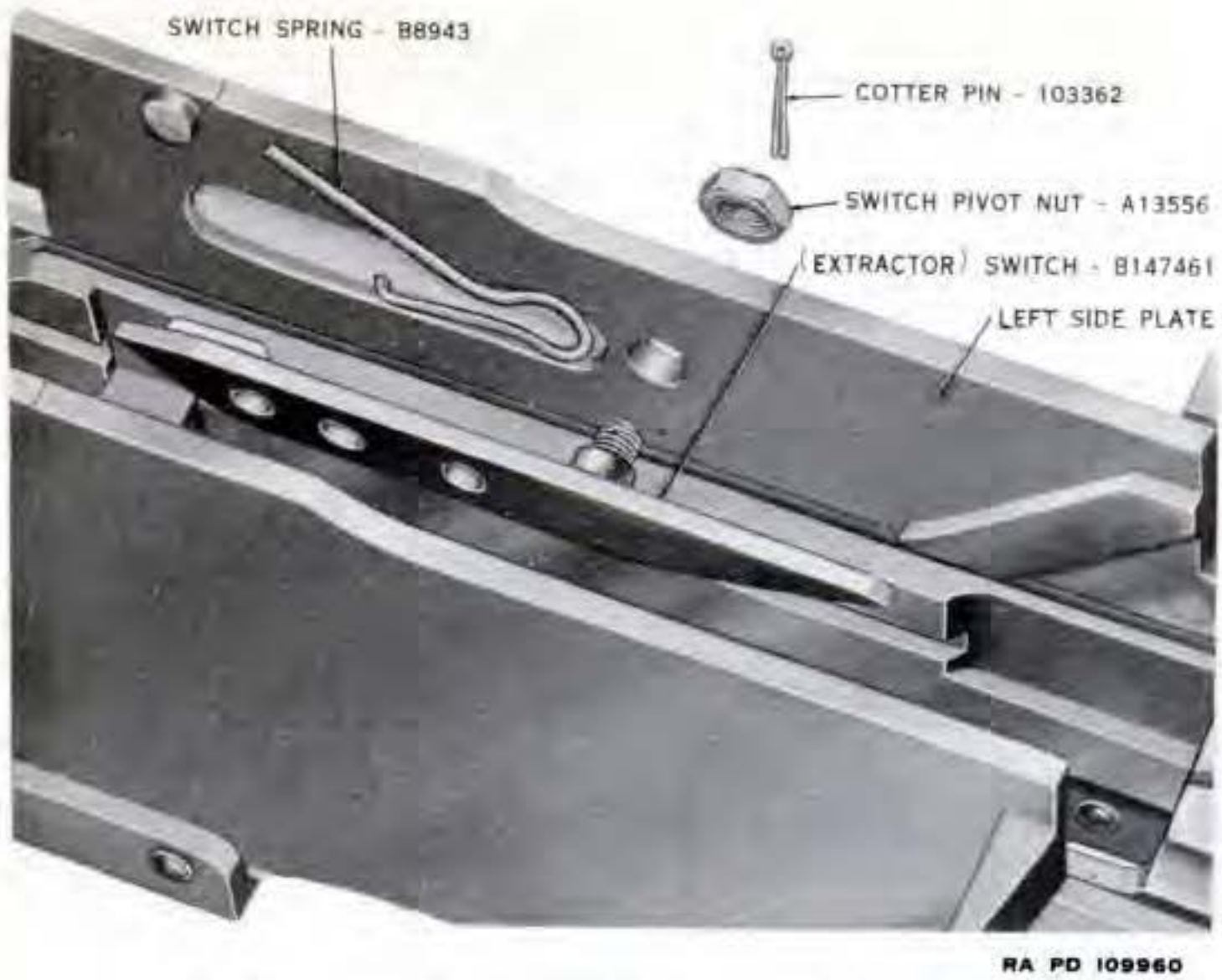


Figure 102. (Extractor) Switch—exploded view.

the pin is removed, the trigger bar is free. Remove the trigger bar from the inside of the receiver. (See fig. 103.) On guns of early manufacture, the trigger bar pin was retained in position by a flat spring, attached to the end of the pin, which acted as a lock. It is removed by lifting the end of the lock spring out of the small hole in the left side plate (fig. 105) and rotating it downward about 90°. This pin assembly can then be removed in the same manner as for the new pin.

m. To remove the adjustable trigger bar stop assembly (fig. 103) from the rear of receiver, remove the retaining screw from rear of top plate and pull assembly down off the rear trigger bar stop which serves as a positioning pin. To disassemble the adjustable trigger bar stop assembly, unscrew adjusting nut and remove spring from the stop body. (See fig. 106.) The rear trigger bar stop used on guns of early manufacture will not be removed by the using arm.

n. Remove front barrel bearing by unscrewing the two screws locking the bearing to the barrel jacket and unscrew the bearing from the jacket, using combination wrench 41–W–867–808. (See figs. 34 and 107.)

o. When assembled, the trunnion adapter may be removed by pulling the trunnion block lock, located in the under side of the trunnion block, to the rear and giving it a one-quarter turn so

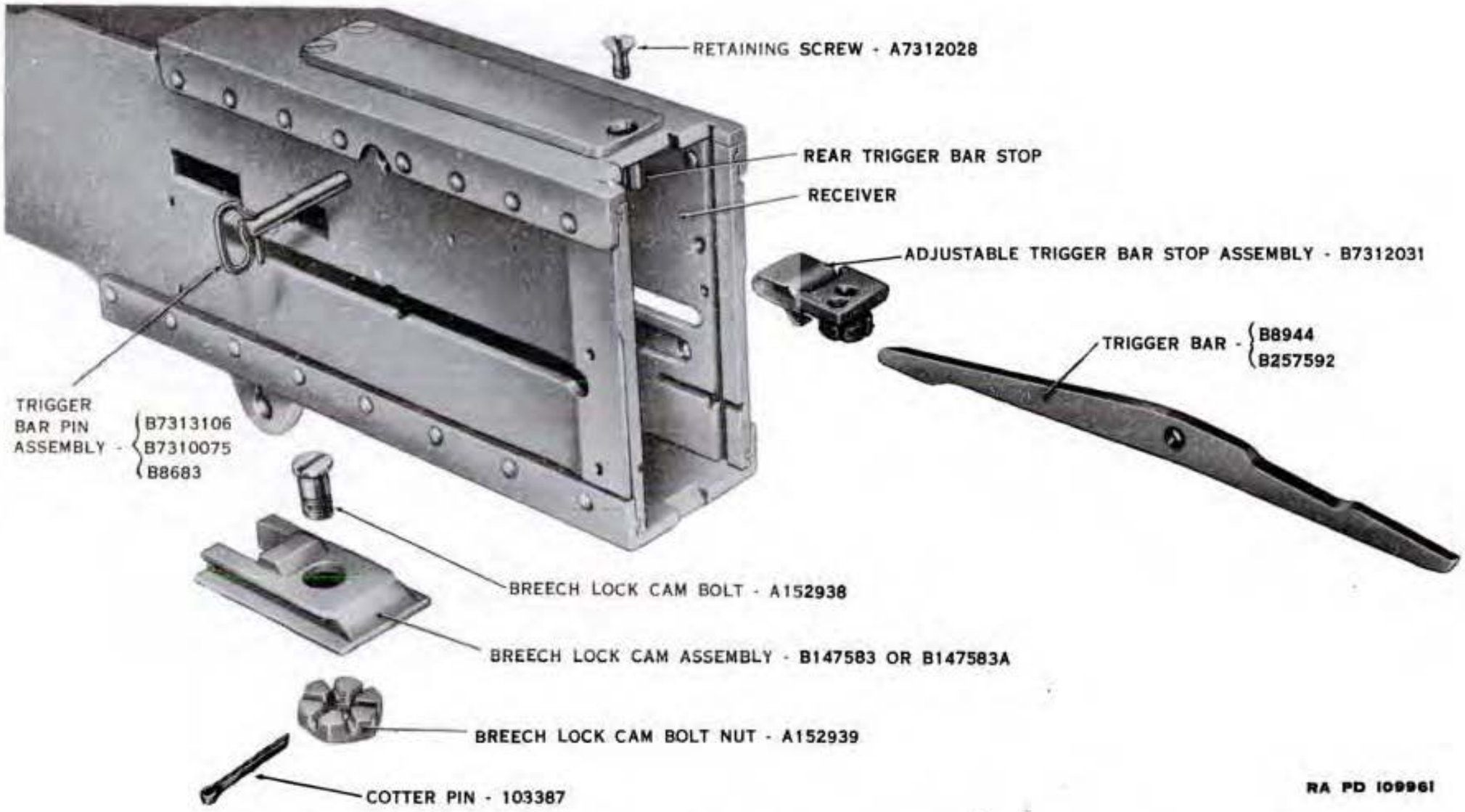


Figure 103. Rear end of receiver group—exploded view.

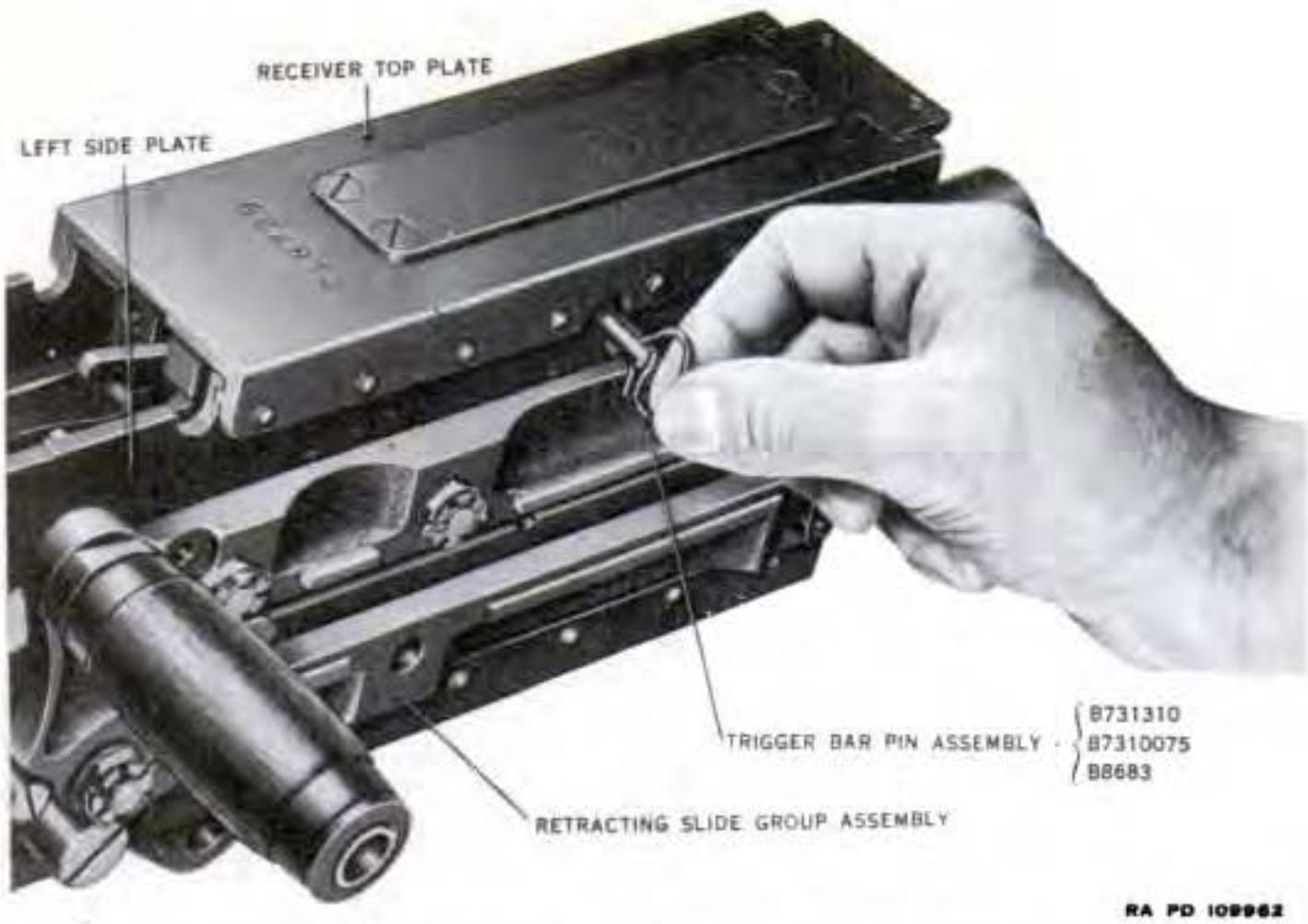


Figure 104. Removing trigger bar pin assembly.

Figure 105. Removing early design trigger bar pin assembly.

that the projecting cotter pin will hold it out of engagement with the adapter. Then unscrew adapter and remove together with shim. Be sure cotter pin in lock does not become bent or loose, else lock cannot be retracted to hold in disengaged position. (See fig. 108.)

Figure 106. Adjustable trigger bar stop assembly—exploded view.

p. The trunnion block lock is removed after the trunnion adapter has been removed by removing the cotter pin and withdrawing the lock and spring from its seat in the front face of the trunnion block. (See fig. 108.)

q. Remove barrel jacket assembly from trunnion block by removing the breech bearing lock screw and then unscrewing the jacket from the trunnion. (See fig. 107.)

r. If it is desired to remove the trunnion block cover for the installation of a sight, it can be detached by driving out the two pins.

108. Assembly of Receiver and Barrel Jacket Group

a. Assemble the trunnion block lock spring over the shank of the trunnion block lock and assemble the spring and lock, spring end leading, into its recess in the front face of the trunnion block. Push in on lock, thereby compressing the spring, until the rear end of the lock protrudes through the rear of trunnion block. Insert cotter pin through hole in lock and spread the pin enough to retain it in the lock. (See fig. 108.) Then push the lock to the rear and give it a one-quarter turn so that the cotter pin will hold the lock in its rearmost position.

b. Screw the barrel jacket into the trunnion block until the hole in the bearing at the rear of the jacket aligns with the hole in the threaded portion of the trunnion block. Insert and tighten the breech bearing lock screw. (See fig. 107.)

c. Place the trunnion shim over the barrel jacket and seat it against the front face of the trunnion block, making sure that the beveled edge is toward the receiver and the small hole in the bottom of the shim is aligned with the hole for the trunnion block lock (fig. 108).

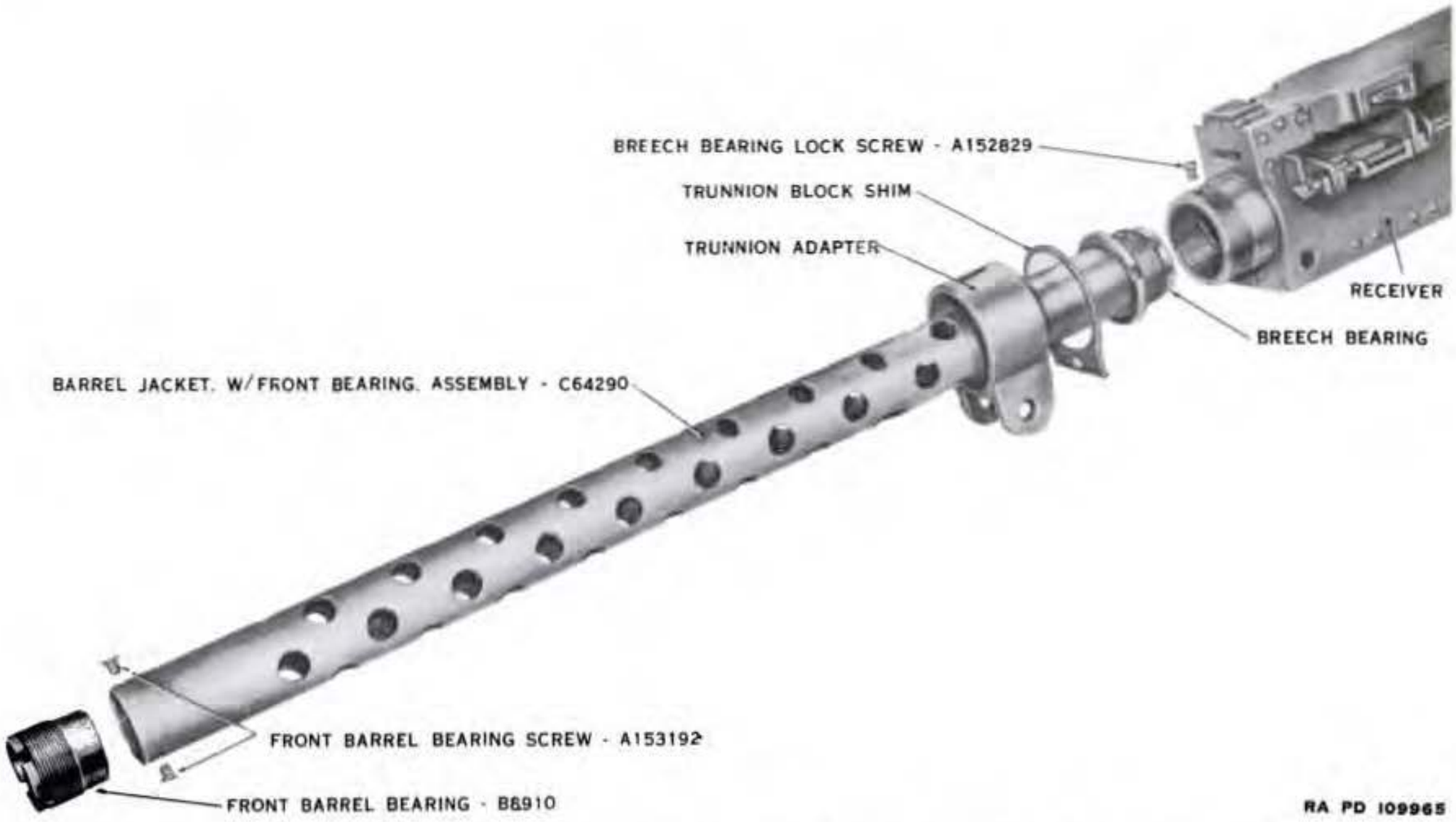


Figure 107. Barrel jacket group and trunnion adapter removed from receiver.

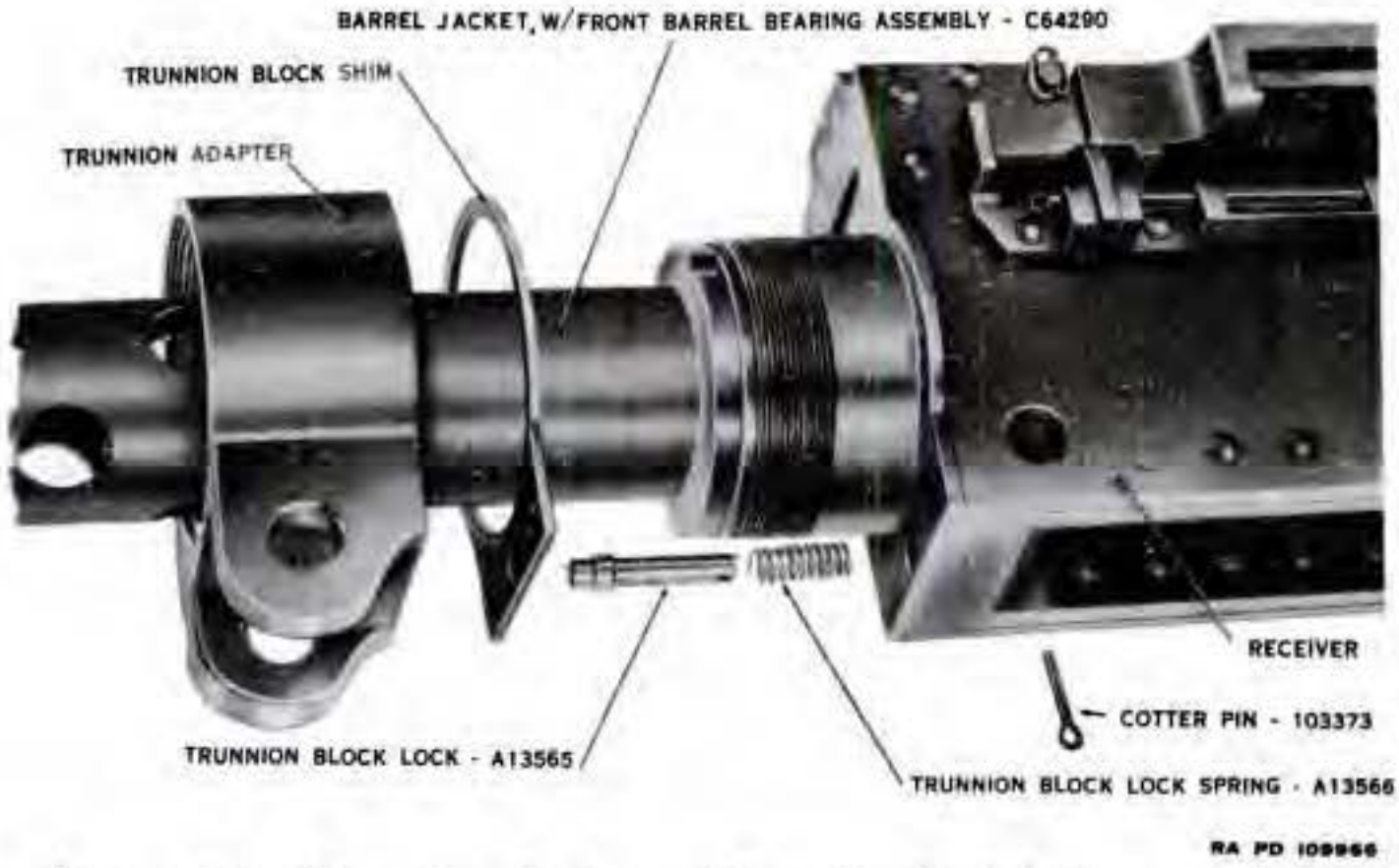


Figure 108. Trunnion adapter and trunnion block lock removed from receiver.

d. Place the trunnion adapter over the barrel jacket and screw it onto the trunnion block. (See fig. 108.) Make sure that shim maintains its alignment with lock hole. Tighten adapter until the small hole in the bottom is aligned with the hole for the lock. When aligned, turn trunnion block lock one-quarter turn allowing it to seat in hole in adapter. Make sure lock passes through shim and fully seats in adapter.

e. Screw the front barrel bearing into the barrel jacket until the holes in the jacket and bearing are in alignment. Insert, tighten, and stake the two screws.

f. If the adjustable trigger bar stop assembly is used, it is installed by positioning the stop body on the rear trigger bar stop, and fastened by inserting the retaining screw through the top plate cover and threading it into the top plate and stop body. (See fig. 103.) Stake the screw. Seat adjusting nut spring in body with prongs forward and down, and screw nut onto body with notches up. (See fig. 106.) For adjustment of nut, see paragraph 25*c*. When assembled, be sure end of screw does not interfere with level seating of the spring in the body, and that prong of spring, which cushions the trigger bar, is not distorted.

g. Place the trigger bar with the long end forward and the bowed surface upward, between the top plate bracket and the bolt latch bracket (fig. 103), and hold up firmly. When positioned, the trigger bar should project approximately $\frac{5}{16}$ inch to the rear beyond the trigger bar stop. With the trigger bar held in that position, insert trigger bar pin through the left side plate,

taking care to match the key on the pin with the keyhole in the side plate. (See figs. 103 and 104.) After insertion, rotate the lock 90° until stopped by the flange of the top plate, and push the lock down flat against the side plate. If the early type trigger bar pin is used, it is inserted in same manner. After insertion, rotate the lock 90° until the projection on the lock spring seats in the small hole in the side plate. (See fig. 105.)

h. If the breech lock cam has been removed or has to be replaced, it should be placed in the receiver with the cam surface up and sloping to the rear. (See fig. 103.) Place the lower projection of the cam through the hole in the bottom plate and insert the breech lock cam bolt from the top. Screw the castellated nut on the bolt *with the notches (castellations) toward the bottom surface of the bottom plate* (fig. 103), and draw it tight (par. 109*b*). Line up the nearest castellation in the nut with the cotter pin hole in the bolt and insert the cotter pin. Spread prongs of pin and bend snugly around nut. Be sure head of cam bolt does not project above cam. If the early type breech lock cam is used, it is replaced in the same manner and is secured to the receiver with the screw assembled from the bottom side of the receiver and staked to the breech lock cam.

i. To install the (extractor) switch, first insert the bent end of the switch spring into the small hole in the switch recess in the inner face of the left side plate, with long end of spring outside and above recess. Then start the switch pivot into its hole in the side plate, so that the lug on the switch is above the spring. Then, making sure the lug on the switch rides on top of the spring, rotate the switch downward and press against side plate until spring and switch snap into the recess. Thread the nut onto the projecting pivot and draw up snugly, but do not force. Loosen nut slightly if necessary to line up the notches (castellations) in the nut with the hole, in the pivot. Insert the cotter pin and bend prongs snugly around nut to prevent interference. Try the switch to see that it pivots freely, snaps back into position, and there is no unecessary side play. Figure 102 shows switch and spring in assembling position in receiver.

j. Insert the cover detent pawl spring into its recess in the pawl and insert the assembly, spring first, into its hole in the top rear part of the trunnion block. If the early type cover detent pawl assembly is used place the spring over the shank on the pawl and insert the assembly, spring first, into its hole in the top rear part of the trunnion block. Press in on pawl, compressing spring until the shank on the pawl protrudes through the front of the trunnion block far enough so that the cotter pin can

be inserted through the hole in the shank of tne pawl. Insert and spread cotter pin. (See fig. 100.)

k. For left-hand feed, the belt holding pawl assembly is placed in position on the left side of the receiver and for right-hand feed on the right side. Place the right-hand and left-hand pawls on the belt holding pawl sleeve. Seat the springs in their seats in the holding pawl bracket and place the assembled pawls and sleeve in position over the springs so that springs seat in their recesses in the pawls. Secure with a belt holding pawl pin (fig. 100) and turn handle down.

l. If the gun is to be equipped for left-hand feed, install the right-hand rear cartridge stop assembly and front cartridge stop on the right side of the receiver. These are secured by inserting the belt holding pawl pin assembly. If the right-hand rear cartridge stop assembly has been disassembled, it is reassembled by inserting the spring and plunger in their recess, placing the cartridge aligning pawl in position, and then inserting the cartridge aligning pawl pin. (See fig. 101.) After testing to insure that the pawl moves freely, the pin should be staked. To equip the gun for right-hand feed, the front cartridge stop, link stripper, and rear cartridge stop are installed on the left side of the receiver, and the belt holding pawl is installed on the right side. (See fig. 25.)

m. If the trunnion block lock cover has been removed, place it in position on top of the trunnion block and secure in place by inserting the two pins.

n. Figure 25 shows the proper position of parts for both left-hand and right-hand feed.

o. Install cover group. (See par. 102.)

p. Install barrel and barrel extension group. (See par. 92.)

q. Install oil buffer group. (See par. 86.)

r. Install bolt group. (See par. 80.)

s. Install driving spring group. (See par. 74.)

t. Install back plate group. (See par. 68.)

109. Adjustments of Receiver and Barrel Jacket Group

a. With the gun fully assembled and when the trigger bar is depressed, there should be a clearance of from 0.005 inch to 0.008 inch between the forward end of the trigger bar and the top of the bolt. The bar should not drag on the top of the bolt. If the bar does drag on the top of the bolt and the adjustable trigger bar stop is used, adjust as outlined in paragraph 25*c*.

b. When the breech lock cam is properly assembled, it should float slightly to avoid any binding of the barrel extension in its guides in the cam. The clearance between the cam and the bottom plate should be between 0.001 inch and 0.012 inch, and should be measured with a feeler gauge at the point indicated by the arrow in figure 109. If proper clearance cannot be provided with the nut drawn tight and the cotter pin inserted, try other nuts, bolts, or cams until such are found to give this clearance.

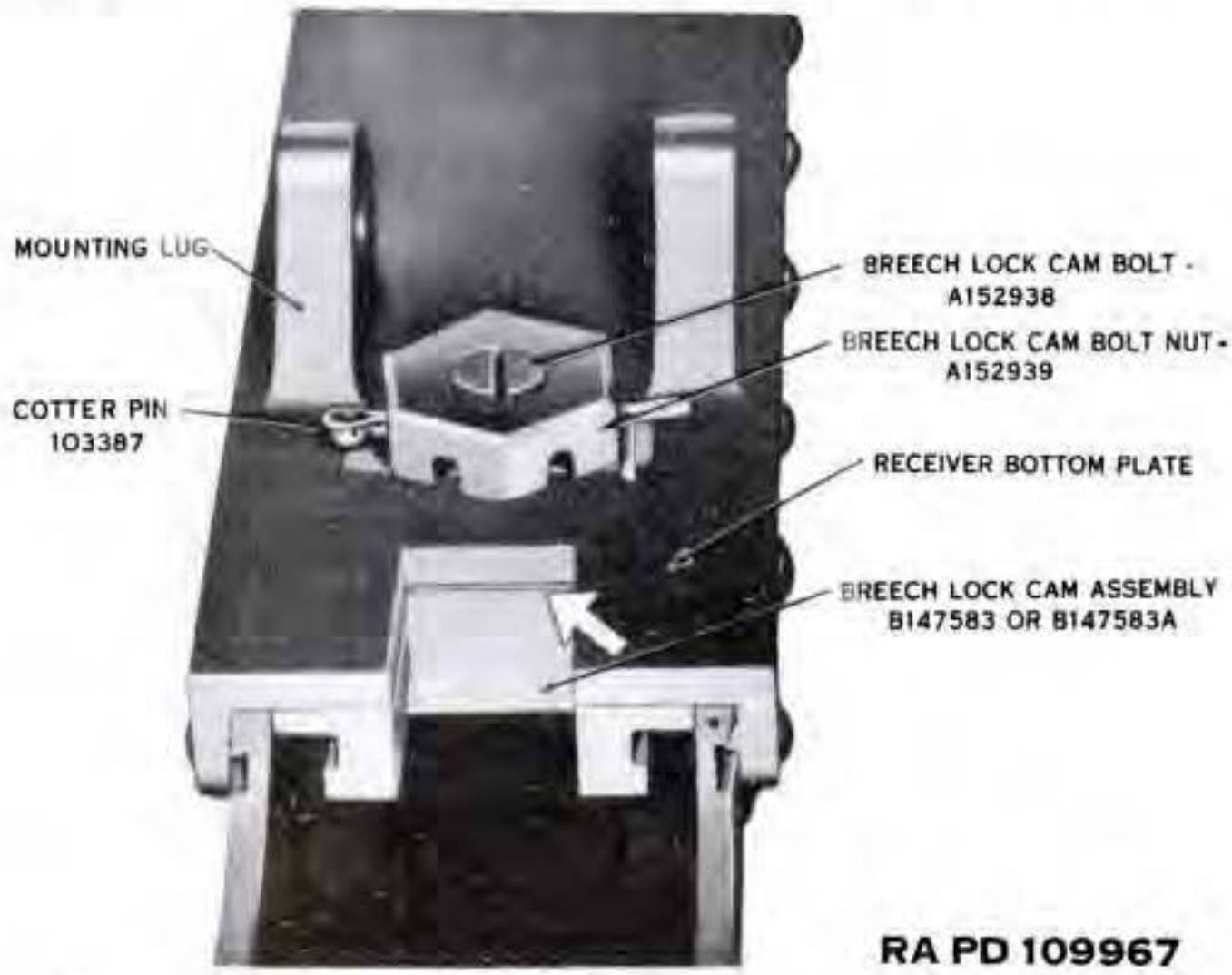


Figure 109. Measuring point for clearance of breech lock cam.

110. Maintenance of Receiver and Barrel Jacket Group

a. Any carbon deposit on the bearing surface of the front barrel bearing should be removed by using crocus cloth or carefully scraping. Check front barrel bearing screws for tightness and staking. Check for carbon deposits after each flight in which the gun has been fired.

b. All dirt, burs, or foreign matter should be removed from under the breech lock cam.

c. The belt holding pawl springs must be replaced if weak or broken.

d. The barrel jacket assembly should be replaced if bent so that it binds against the barrel.

e. The (extractor) switch spring must be replaced if broken or weak.

f. If the belt holding pawl pins do not fit snugly or are broken or if positive retention is doubtful, they will be replaced.

g. Be sure extractor cam is tightly riveted to the left side plate and is not burred or unduly worn.

h. The trunnion block lock spring will be replaced if weak or broken.

i. The cover detent pawl spring will be replaced if weak or broken.

j. Keep a light film of the oil prescribed in paragraph 44 applied to all parts.

Section XXII. OPERATING SLIDE GROUP

111. General

The operating slide group assembly is used when the gun is mounted in a rigid installation. It is composed, in general, of a handle, bar, and front and rear guides. The operating slide bar operates horizontally in the front and rear slide guides which are attached to either the right or left side plate by screws. The bar is operated by the handle and engages the bolt stud which is inserted in the bolt and projects through a slot in the side plate. The bottom of the operating slide bar has two notches which may be engaged against the rear guide to hold the bolt in one of two positions—either entirely to the rear, or slightly out of the battery position.

112. Functioning

The function of the operating slide is to retract the recoiling parts of the gun for the purpose of loading, unloading, clearing of stoppages in firing, and to hold the bolt in its rearward position to facilitate cooling the barrel. The operating slide handle and roller furnishes additional power for the initial movement in retraction through the leverage obtained as the roller bears upon the rear operating slide guide. When the gun is firing, the bolt stud moves with the bolt; however, the operating slide remains stationary and forward, so there are no hazardous moving parts outside of the receiver.

113. Removal of Operating Slide Group

Remove the locking wires from the operating slide guide screws. Remove the two front operating slide guide screws and the two rear operating slide guide screws and withdraw front and rear guides from the side plate. Remove the operating slide group from the side plate, taking care not to lose the operating slide guide back piece.

114. Installation of Operating Slide Group

Align the operating slide guide back piece with the front guide screw holes. Place the operating slide bar in position on the receiver side plate and assemble the front guide over the slide bar making sure that the holes align with the holes in the back piece. Insert the two front guide screws and partially tighten. Both of these screws are the same length and both are shorter than either rear screw. Assemble the rear guide over the slide bar and align holes in guide with holes in receiver. Insert and tighten the two rear guide screws. The longer screw must be inserted in the top hole and the other screw in the bottom hole. Tighten the two front guide screws. Insert wire through the holes drilled in the heads of the two front guide screws and twist ends of wire together to lock the screws in place. Similarly lock the two rear guide screws.

115. Disassembly of Operating Slide Group (fig. 110)

a. Remove slide from the gun (par. 113).

b. Withdraw cotter pin from the operating slide roller pin, push out the pin, and remove the roller.

c. Withdraw cotter pin from the operating slide handle hinge pin, push out the hinge pin, and remove the handle from the bar.

d. Remove the handle plunger and plunger spring from its recess in the front face of the handle.

e. The operating slide springs are staked in place and are not removed except when necessary to replace them. To remove, insert a suitable drift through the small drilled hole in the under side of the bar and drive the end of the spring out of the hole. Then slide the spring from under the staking.

116. Assembly of Operating Slide Group (fig. 110)

a. If the operating slide springs have been removed, insert them in their recesses in the top of the bar so that the straight ends slide under the staking and the bent ends enter the vertical holes in the bar. Seat fully and stake if necessary.

b. Replace the operating slide handle plunger spring and plunger in their recess in the front face of the handle.

c. Assemble the handle to the slide bar, with hook on bar up, and insert the handle hinge pin in the lower hole in the handle. Insert the cotter pin and spread. Be careful to see that plunger is seated.

d. Place the operating slide roller in position and insert the roller pin in the upper hole in the handle. Insert the cotter pin and spread.

e. Assemble the slide group to the gun. (See par. 114.)

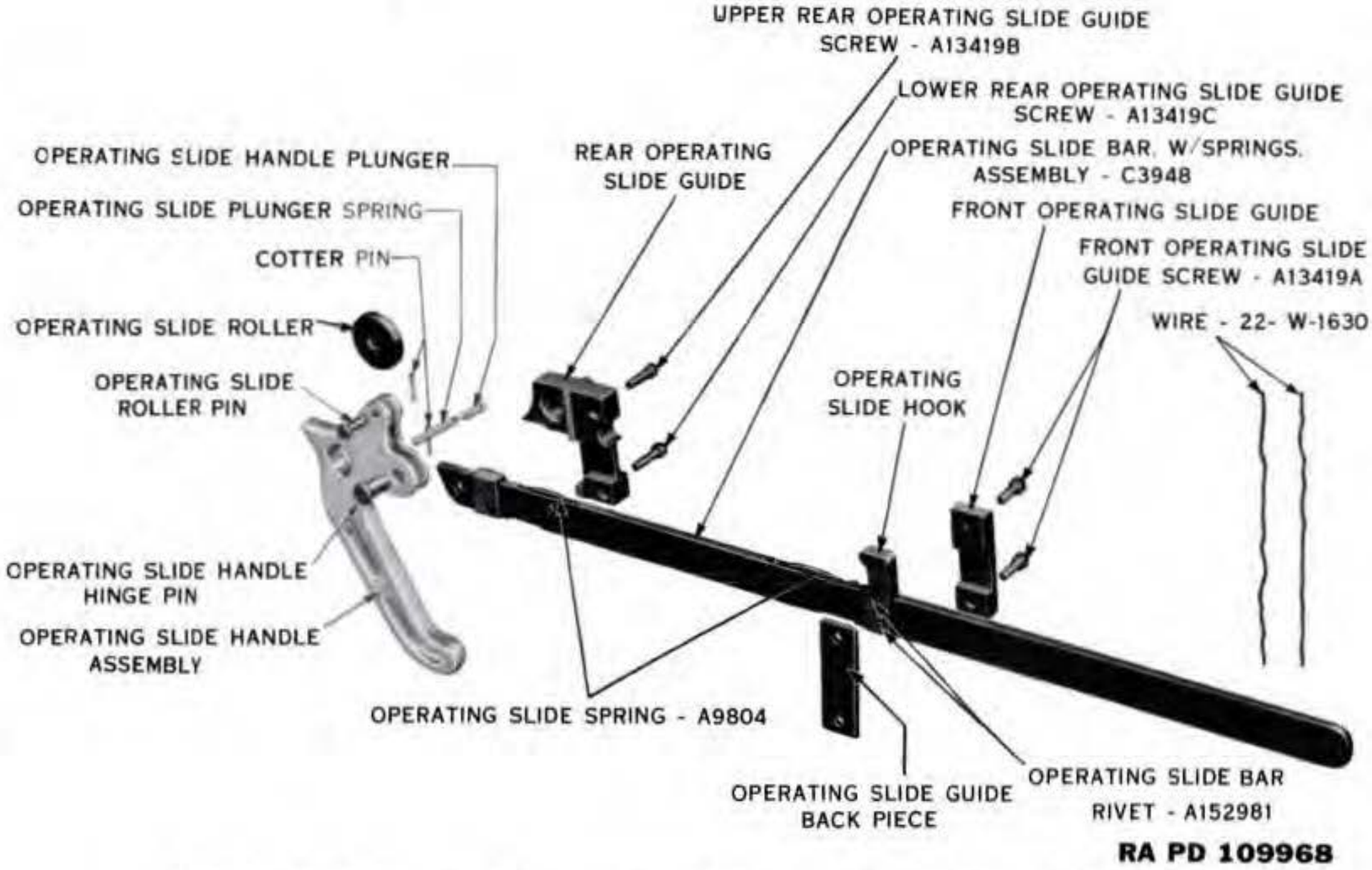


Figure 110. Operating slide group—exploded view when assembled to left side of gun.

117. Maintenance of Operating Slide Group

a. If the operating slide bar is bent, it should be straightened or replaced.

b. If operating slide bar hook is loose, it should be tightened by replacing the rivets or by replacing the bar assembly.

c. Replace slide springs if weak or broken.

d. Replace plunger spring if weak or broken.

e. Remove all burs, rough spots, or rust, using crocus cloth.

f. When slide is assembled to gun, make certain that the operating slide guide screws are kept tightened.

g. Keep a light film of the oil prescribed in paragraph 44 applied to all parts.

Section XXIII. RETRACTING SLIDE GROUP

118. General

The retracting slide group assembly is used in many types of installations. It is composed, in general, of a slide, slide bracket, slide lever, and slide handle. The retracting slide operates horizontally in guides of the slide bracket which is attached to the side plate (right or left) of the receiver. The slide is operated by the slide handle attached to the slide lever, and engages the bolt stud which is inserted in the bolt and projects through a slot in the side plate and engages with the slide bracket.

119. Functioning

The function of the retracting slide is to retract the recoiling parts of the gun for the purpose of loading, unloading, and clearing of stoppages in firing. The slide lever furnishes additional power for the initial unlocking movement in retraction through the leverage obtained by the cam action as the lower end bears upon a stud in the bracket. When the gun is firing, the bolt stud moves with the bolt; however, the retracting slide remains stationary and forward, so there are no hazardous moving parts outside of the receiver.

120. Removal of Retracting Slide Group

a. Remove the locking wire from the front bracket screw and slide stud and remove screw from the bracket.

b. Remove the locking wire from the rear bracket screws and remove screws from the bracket.

c. Remove cotter pin from the front retracting slide bracket bolt and remove nut. While pushing the front slide bracket bolt

Figure 111. Removing retracting slide group from receiver.

RA PD 109969

toward the receiver, withdraw the front end of the bracket slightly away from the side plate. Then grasp the rear end of the bracket and remove the group from the side plate. (See fig. 111.)

121. Installation of Retracting Slide Group

a. Insert the front slide bracket bolt in its hole in the bracket making sure that the beveled end is toward the front (narrow end) of the bracket.

b. Place the bracket against the receiver side plate (par. 123*a*) so that front and rear bracket bolts align with the rectangular slots in the side plate. Move the bracket slightly to the rear until the bolt stud contacts the slide. Push the front bracket bolt completely into its slot in the side plate. Move the bracket forward until the rear bracket bolt is aligned with its slot. While holding in this position, press and hold the front end of the bracket against the receiver, and then press the rear end of the bracket against the receiver, seating both the front and rear bolts in their slots. Assemble and tighten front bracket bolt nut and insert cotter pin and spread end. Insert and start bracket screw into its hole in the bottom side of the bracket. Insert locking wire through hole in screw and tighten screw. Thread the locking wire through the slide stud, draw tight, twist ends, and fold in. Insert and tighten the two remaining bracket screws in their holes in the rear of the bracket and lock in place with wire.

122. Disassembly of Retracting Slide Group (fig. 112)

a. Remove the slide group from the receiver side plate. (See par. 120.)

b. Remove the cotter pin from the slide nut and unscrew and remove nut and washer. Withdraw the slide lever and handle assembly and slide lever spring from the slide lever stud. Observe caution as the spring is under tension.

c. The handle assembly may be unscrewed from the lever by using a double end tappet wrench 15°, "¾x⅞." (41–W–3584)

d. Remove the slide assembly from the slide bracket. Unstake and remove the retracting slide lever stop from the slide assembly. The lever stud in the slide and the slide stud in the lower member of the bracket should not be removed unless necessary for replacement or repositioning.

e. The retracting slide plunger and spring are pinned in the bracket and should not be removed unless necessary. To remove, drive out pin and remove plunger and spring. Hold thumb over plunger to prevent loss of spring when removing pin.

f. Remove rear bracket bolt by removing cotter pin and nut.

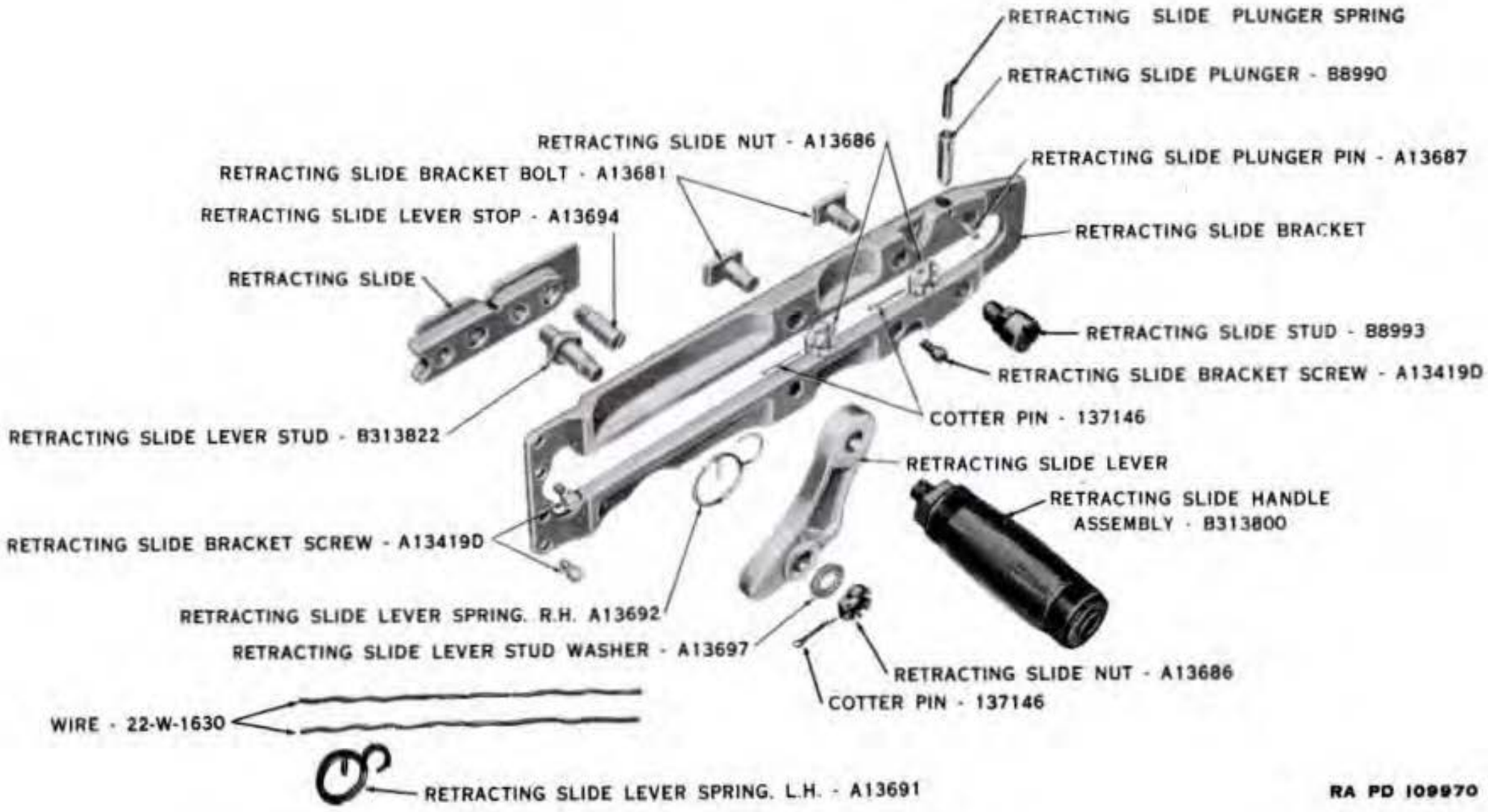


Figure 112. Retracting slide group—exploded view.

123. Assembly of Retracting Slide Group (fig. 112)

a. The retracting slide group is generally assembled to the right side of the receiver but may be assembled to the left side. If the weapon is to be fired by a mechanism attached to the side plate, the retracting slide group must be assembled to the side plate opposite the mechanism. The following assembly is explained for the retracting slide group when assembled to the right side of the receiver. Variations in assembly when assembled to the left side are explained in *k* below.

Note. A right- and left-hand retracting slide lever spring is furnished with each group assembly. When assembling to the right side of the receiver, the right hand spring must be used, and when assembling to the left side, the left hand spring must be used. The right hand spring is distinguished from the left hand spring by laying both springs on a bench with the projection which fits into the lever pointing up and the small loop toward the operator. The right hand spring has the opening in the small loop facing right, whereas the opening in the small loop on the left hand spring will be facing left.

b. If the retracting slide plunger has been removed from the bracket, insert plunger, point leading, in hole in front top of bracket. Insert spring in plunger, align pin slots in plunger with pinholes in bracket, and insert pin so that it bears on top of the spring. Depress spring with drift while inserting pin.

c. Place the slide assembly in the forward portion of the slideway in the inner side of the bracket so that the plunger in the bracket is on the same side as the V-notch in the slide and the lever stud is toward the front (narrow end) of the bracket. Push the slide forward until it contacts the plunger.

d. Place the lever on the lever stud so that the camming lug on the lever points toward the slide stud. In this position the threaded hole for the handle will point toward the rear of the bracket. (See fig. 113.) Screw the handle assembly into the lever and tighten with wrench 41–W–3584. Remove handle and lever from lever stud and stake handle to the lever.

e. With the slide in place in the bracket, place the bracket on a flat bench or table with the front (narrow) end toward the right of the assembler. The stop should not be assembled, but the lever stud should be in place. A cleat should be nailed to the bench on each side of the bracket to prevent its rotating while in the process of assembly.

f. Grasp the lever and handle group in the left hand, handle pointing up, and insert the bent right-angle end of the retracting slide lever spring into the hole in the lever from the under side. (See fig. 114.)

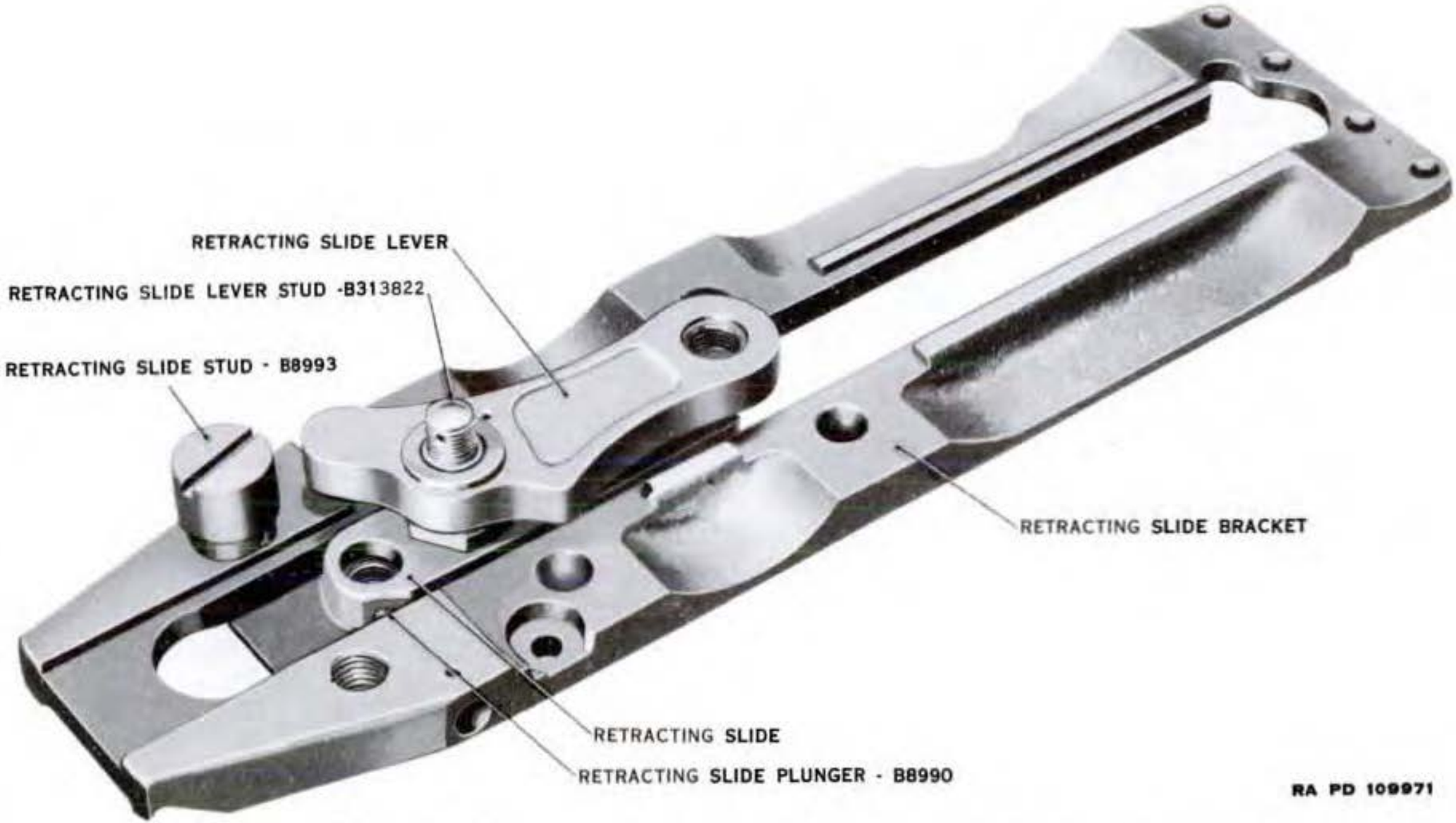


Figure 113. Lever in position on lever stud prior to assembling handle.

Figure 114. Retracting slide lever spring assembled to lever.

g. Place the lever down over the slide lever stud and then assemble the washer and nut, tightening the nut in place by hand. (See fig. 115.) Rotate the lever in a direction to wind the spring, catching the loop end of the spring on the shoulder of the bracket which constitutes the inner edge of the relief cut. Hook the end of the loop over the edge by pressing it down with a finger of the right hand. (See fig. 116.) Hold loop down while continuing to rotate the lever until the tang of the lever passes the tapped hole in the slide for the stop; then, with the left hand holding the lever and handle, and the thumb of the left hand holding the loop of the spring, assemble the stop and screw it in place. (See fig. 117.)

Figure 115. Retracting slide lever and handle group assembled to slide lever stud.

h. Release the lever against the stop and raise the loop of the spring (fig. 118) until it snaps off the rib of the bracket and

snaps around the stop. The loop may become slightly enlarged by this method of assembly, but this will not affect the functioning of the spring. Tighten the stop and stake in place. Tighten the retracting slide nut and insert cotter pin.

RA PD 61009

Figure 116. Rotating lever with loop end of spring caught and held over shoulder on bracket.

Figure 117. Lever rotated to clear stop hole in slide, and lever and spring held preparatory to screwing stop into slide.

i. Assemble the rear bracket bolt to the bracket so that the beveled end is pointing toward the rear, and secure in place with nut and cotter pin.

j. Assemble retracting slide group to receiver side plate. (See par. 121.)

RA PD 61011

Figure 118. Releasing loop of spring from shoulder of bracket.

k. The retracting slide group is generally mounted on the right side of the gun. However, when mounted on the left side of the gun, the handle assembly is assembled to the opposite side of the lever. The retracting slide bracket is vertically reversed so that the plunger is on the bottom instead of on the top, and the retracting slide stud is assembled to the lower member of the slide bracket. A left-hand retracting slide lever spring (*Note, a* above) is used in place of a right-hand spring. Otherwise, the assembly is the same as when mounted on the right side. However, when mounted to the left side, the cover latch shaft assembly is best assembled to the right side to avoid interference. The retracting slide stud should be staked in place when assembled.

l. In flexible installations where a spade-grip-type back plate is used, the slide stud, the slide lever stud, and the lever stop must be assembled in the forward holes in the bracket and slide to prevent interference with the spade grips. When using a fixed back plate, the two studs and stop can be assembled in either the front or in the rear hole. However, their location is determined by the installation. To move the studs and stop to the other location, unstake and remove. When moved to the new location, they must be securely restaked.

124. Maintenance of Retracting Slide Group

a. Make sure that the retracting slide lever stop, retracting slide lever stud, retracting slide stud, and the lever handle bolt are firmly staked in place.

b. Be sure that the handle bolt is tight and firmly staked to the lever and that the handle grip is free from cracks which may cause injury to the hand.

c. Be sure that locking wires and cotter pins are not broken, and that the ends are folded in to prevent any interference. If damaged, replace.

d. Be sure that the bracket is tight on the receiver, and that bracket bolts and screws are tight.

e. Make sure that the group is free from burs paying particular attention to the guideways for the slide in the bracket.

f. Make sure that the threads of the studs, stop, and handle bolt are not damaged by removing the staking.

g. Keep a light film of the oil prescribed in paragraph 44 applied to all parts.

PART FOUR

AUXILIARY EQUIPMENT

Section XXIV. GENERAL

125. Scope

Part four contains information pertaining to the installation, functioning, and preventive maintenance of the blank ammunition firing attachment. In addition this part contains information on ammunition for the guidance of the personnel responsible for the operation of this equipment. It contains only such information as is necessary to using personnel. Detailed information pertaining to ammunition is contained in TM's of the 9–1900 series.

Section XXV. BLANK AMMUNITION FIRING ATTACHMENT

126. General

The blank ammunition firing attachment permits automatic firing of belted blank cal. .50 cartridges in the basic aircraft Browning machine gun, cal. .50, AN–M2. The attachment consists of a muzzle adapter and a cartridge stop. (See fig. 119.) Belts of regular cal. .50 cartridges cannot be fired with the attachment in place because the cartridge stop prevents them from being drawn into the feedway.

127. Functioning of Blank Ammunition Firing Attachment

a. The cartridge stop is assembled into the feedway and obstructs the portion of the feedway that accommodates the bullet part of the cartridge.

b. The muzzle adapter replaces the front barrel bearing in the barrel jacket. After the blank cartridge is fired the powder gases are trapped by the adapter and act upon the front face of the barrel to assist the recoil action of the gun.

Figure 119. Blank ammunition firing attachment.

128. Installation of Blank Ammunition Firing Attachment

a. The front cartridge stop is assembled in the feedway on the same side as the belt holding pawls.

b. Open cover and then withdraw belt holding pawl pin until its end is in the belt holding pawl.

c. Insert cartridge stop in feedway so that its angular surface is facing the front of the gun. (See fig. 120.) Align holes in stop with holes in belt holding pawl bracket and secure in place with the belt holding pawl pin. Close cover.

d. Remove the front barrel bearing (par. 107*n*).

e. Screw the muzzle adapter into the barrel jacket (fig. 120) until the holes in the jacket and adapter are in alignment. Insert, tighten, and stake the two front barrel bearing screws.

129. Maintenance of Blank Ammunition Firing Attachment

a. The muzzle adapter should be removed at frequent intervals and cleaned of carbon or foreign matter, paying particular attention to the ports.

b. When not in use the adapter and stop will be covered with a light film of the oil prescribed in paragraph 44.

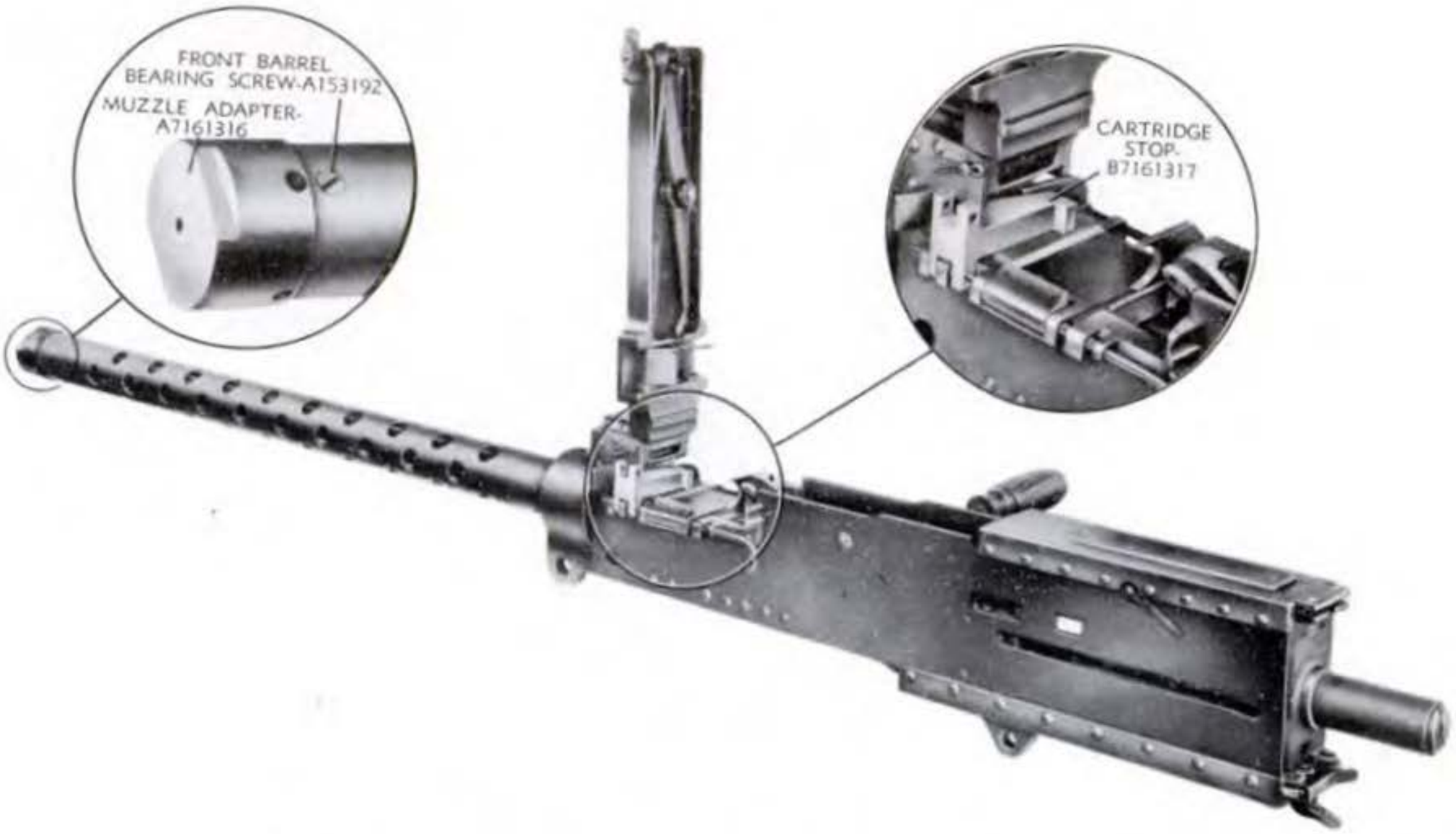


Figure 120. Blank ammunition firing attachment assembled to gun.

RA PD 103042

Section XXVI. AMMUNITION

130. General

The information in this section pertaining to the several types of cartridges authorized for use in this gun includes a description of the cartridges, means of identification, care, use, and ballistic data.

131. Classification

Based upon use, the principal classifications of ammunition for this machine gun are: ball, armor-piercing, armor-piercing-incendiary, armor-piercing-incendiary-tracer, incendiary, tracer, and headlight tracer. Other types provided for special purposes are blank and dummy.

132. Identification

a. GENERAL. Even though the cal. .50 cartridges are not marked or stamped to indicate the type or model, each type may be identified as follows:

Table III

Type	Distinguishing characteristics
Ball	Copper-colored gilding metal jacket on bullet (no markings).
Armor-piercing	Tip of bullet painted black.
Armor-piercing-incendiary M8	Tip of bullet painted aluminum color.*
Armor-piercing-incendiary T49	Tip of bullet painted aluminum color with light blue annulus to the rear.
Armor-piercing-incendiary-tracer	Tip of bullet painted red with aluminum color annulus to the rear.
Incendiary M1	Tip of bullet painted blue.
Incendiary M23 (T48)	Tip of bullet painted blue with light blue annulus to the rear.
Tracer M1 and headlight tracer M21	Tip of bullet painted red.
Tracer M10	Tip of bullet painted orange.
Tracer M17	Tip of bullet painted maroon.
Black	No bullet is present.
Dummy	Three (or two in some cases) holes are drilled in the body of case and no primer is present in the base. In addition, older lots may have tinned cases.

*Early lots of CARTRIDGE armor-piercing-incendiary, cal..50, T16, which has been standardized as the CARTRIDGE, armor-piercing-incendiary, cal..50, M8, were blue-tipped with a black annulus to the rear. Later lots were aluminum color tipped.

(1) The only stamping on the cartridge is that of the manufacturer's initials and the year of loading which appear on the base of the cartridge case.

(2) The marking on all original packing containers, both boxes and cartons, clearly and fully identifies the ammunition except as to grade. (See *f* below.)

(3) The code symbol stenciled on boxes indicates the grade.

(4) In addition to the marking, stenciled figure symbols on the ammunition boxes indicate the type of packing.

(5) Color bands were formerly painted on boxes and printed on carton labels to provide a ready means of identification as to type; their use has been discontinued.

b. TYPES. When removed from their original packing containers, the cartridges may be identified, except as to ammunition lot number and grade, by physical characteristics described in table III and illustrated in figures, 27, 121, 122, 123, 124, and 125. Care should be taken not to confuse these original markings with any subsequent markings made with lithographic marking ink, which is used to identify lots during target practice. (See *h* below.)

c. MODEL. To identify a particular design, a model designation is assigned at the time it is classified as an adopted type. The model designation becomes an essential part of the standard nomenclature of the item and one of the means of identification. The present system of model designation is the use of letter "M" followed by an arabic number; for example, CARTRIDGE, ball, cal. .50, M2.

d. AMMUNITION LOT NUMBER. 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, or the repacked lot number (*e* below), is marked on all packing containers. 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. No lot other than that of current grade appropriate for the weapon will be fired (*f* below). Since it is impractical to mark the ammunition lot number on each individual cartridge, every effort should be made to maintain the ammunition lot number of cartridges that are removed from their original packings. Cartridges for which the ammunition lot number has been lost are placed in grade 3 (unserviceable ammunition which will not be issued or fired); therefore when cartridges are removed from the original packings they should be marked or tagged so that the ammunition lot number may be preserved. The letter "S" preceding the serial number of an ammunition lot indicates that the cartridge case is made of steel.

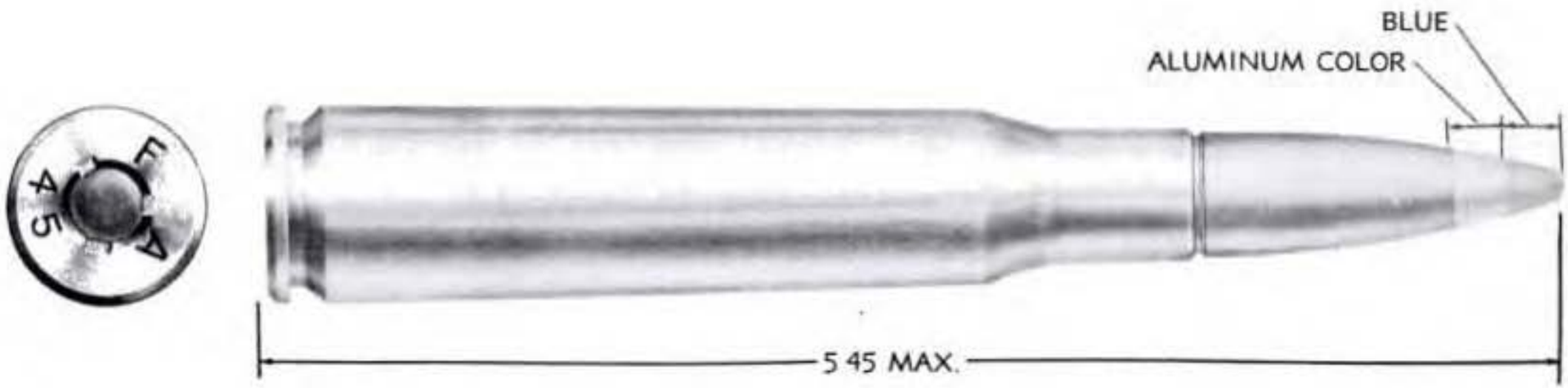
Figure 121. Cal..50 cartridges.

Figure 122. Cal..50 cartridges.

A — CARTRIDGE, TRACER, CAL. .50, M17
B — CARTRIDGE, TRACER, CAL. .50, M1, AND CARTRIDGE, TRACER, HEADLIGHT, CAL. .50, M21
C — CARTRIDGE, TRACER, CAL. .50, M10

RA PD 108636

Figure 123. Cal..50 cartridges.



CARTRIDGE, ARMOR-PIERCING-INCENDIARY, CAL. .50, T49

RA PD 108637

Figure 124. Cal..50 cartridges.

e. REPACKED LOT NUMBER. (1) Since ammunition in metallic link belts may consist of more than one type of cartridge and hence would require two or more lot numbers marked on each packing box and in records, a single repacked lot number is assigned by the repacker to replace the original ammunition lot numbers. This repacked lot number is marked on one side and one end and on the top of each packing box. The ammunition lot numbers of the cartridges comprising a repacked lot are listed on the reference card placed inside the packing box.

(2) The repacked lot number consists of the words "REPACKED LOT," the initials of the repacker, letter "L" for linked cartridges, and the lot number assigned by the repacker.

f. GRADES. Small arms ammunition is graded primarily on the qualities which make the lot especially suited for use in a particular class of small arms weapons; for example, a lot of ammunition assigned grade AC is especially suited for use in aircraft weapons. Current grades of all existing lots of small arms ammunition are established by the Chief of Ordnance and are published in SB 9–AMM 4. Only those lots of appropriate grade will be fired. Grade 3 indicates unserviceable ammunition which will not be issued or fired; however, ammunition placed in grade 3 due to loss of lot number, but which can be identified as having been in serviceable lots issued to a specific organization, may be reissued after visual inspection, but only for local training purposes in ground machine guns.

g. MARKING. In addition to markings on packing boxes required for shipping purposes, the following are also stenciled or marked on the boxes (figs. 126, 127, and 128):

(1) Ammunition lot number or repacked lot number.

(2) Markings stenciled on the box indicate the type, or types and ratio, of the cartridges within the box; for example, "4 BALL M2, 1 TR M1."

(3) Stenciled figure symbols on one side and one end of packing boxes containing cartridges in web belts and linked belts indicate the type of inner packing; for example, for cartridges packed in metallic link belts, the symbol indicated in figure 126 is used. The absence of stenciled figure symbols indicates that the ammunition is packed in cartons. For caliber .30 cartridges the symbols are vertical; for caliber .50 cartridges they are diagonal.

(4) Code symbols (ammunition identification code), as published in WD CAT ORD 11 SNL T–1, are also stenciled on packing boxes. These code symbols indicate a specific cartridge, or combination of cartridges, having a specific grade and packing.

h. LITHOGRAPHIC MARKING INK. The number of hits made upon a target by a certain machine gun or group of machine guns

A — CARTRIDGE, BLANK, CAL. .50, M1 (T40)
B — CARTRIDGE, DUMMY, CAL. .50, M2

RA PD 97676

Figure 125. Cal..50 cartridges.

when others are firing upon the same target is sometimes determined by coating the tips of the bullets with lithographic ink. The bullets from each weapon or group of weapons are coated with a distinctive color of ink, which upon striking the target leaves a smear indicating the source of fire. (For method of application, see TM 9–855.) Cartridges which have been so coated must have the ink removed before return to storage.

133. Packing

a. Recent lots of caliber .50 service cartridges are packed as indicated in table IV. The data indicated may vary, dependent upon the particular lot. For additional packing data, see WD Catalogs ORD 11 SNL T–1 and ORD 11 SNL T–5. (See figs. 126, 127, and 128.)

Figure 126. Packing box M1917 containing 265 cal..50 linked cartridges.

b. A wire carrying handle with metal hand ferrule is provided to facilitate handling and transporting certain ammunition packing boxes. The handle is positioned below the end cross cleat and between the vertical cleats on each end of the box.

134. Care, Handling, and Preservation

a. Small-arms ammunition, as compared with other types of ammunition, is not dangerous to handle. Care, however, must be observed to keep packing cases from becoming broken or damaged. All broken cases must be immediately repaired and

Table IV

Packing	Volume (cu. ft.)	Weight (lb.)
10 cartridges per carton, 6 cartons per metal can, M10, 2 cans (120 cartridges) per wooden box, M12. Dimensions of box: 14¼ by 10⅛ by 7⅞-inches.	0.7	44
10 cartridges per carton, 12 cartons per waxed container, 2 containers (240 cartridges) per box, T2*. Dimensions of box: 15¼ by 14 by 9⅛-inches.	1.1	79
10 cartridges per carton, 35 cartons (350 cartridges) per metal-lined box, M1917. Dimensions of box: 18½ by 9½ by 14⅞-inches.....	1.5	112
60 cartridges in metallic link belt, 1 belt per waxed container, 4 containers (240 cartridges) per metal-lined box, M1917*. Dimensions of box: 18½ by 9½ by 14⅞-inches.....	1.5	96
265 cartridges in metallic link belt, 1 belt per metal-lined box, M1917. Dimensions of box: 18½ by 9½ by 14⅞-inches.....	1.5	99
55 cartridges in metallic link belt, 1 belt per metal can, M10, 2 cans (110 cartridges) per wooden box, M12. Dimensions of box: 14¼ by 10⅛ by 7⅞-inches.....	0.7	43

*Some packings exist which have unwaxed containers, boxes without metal liners, or both.

careful attention given to the transfer of all markings to the new parts of the box. If the box contains a metal liner, it should be air-tested and sealed provided that equipment for this work is available.

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

c. The ammunition should be protected from mud, sand, dirt, and water. If it gets wet or dirty, it should be wiped off at once. If verdigris or light corrosion forms on cartridges, they should be wiped off with a clean, dry wiping cloth; however, cartridges should not be polished to make them look better or brighter.

d. The use of oil or grease on cal. .50 cartridges is prohibited.

e. Ammunition should not be exposed to the direct rays of the sun for any length of time. Such exposure may seriously affect its firing qualities.

Figure 127. M12 box containing cal..50 cartridges in cartons in M10 metal cans.

Figure 128. M12 box containing linked cal..50 cartridges in M10 metal cans.

f. Whenever cartridges are taken from original packing containers, they will be tagged or otherwise marked so that the ammunition may be identified as to lot number. Such indentification is necessary to prevent otherwise serviceable ammunition from being placed in grade 3, through loss of lot number.

135. Precautions in Firing

a. Ammunition which is seriously corroded should not be fired.

b. Do not fire cartridges having nonpermissable dents or scratches, cartridges with loose bullets, or otherwise defective rounds.

c. No cal. .50 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 SB 9–AMM 4.

d. Do not fire cartridges with oil or grease on them without first removing the oil or grease with a clean, dry wiping cloth, nor those which have become overheated due to exposure to the direct rays of the sun or other sources of high temperature. Such cartridges, if fired, may develop hazardous chamber pressures.

136. Precautions in Firing Blank Ammunition

a. It is dangerous to fire machine guns loaded with bland cartridges at personnel representing an enemy at distances of less than 20 yards, as the wad or paper cup may fail to break up.

b. Only blank ammunition closed with a thin paper cup or wad will be used in the machine gun.

c. Misfires in which the primer explodes but fails to ignite the powder charge may prove dangerous when blank ammunition is being fired. In misfires of this kind some of the powder may be blown into the bore of the weapon. A series of such rounds in which the powder fails to ignite due to moisture or other causes will result in an accumulation of powder sufficient to cause serious damage when ignited by a normal cartridge. When misfires are encountered in blank ammunition in excess of 5 percent, the firing of the lot will be suspended and the matter reported to the Office, Chief of Ordnance, through channels in accordance with existing regulations.

137. 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, and may even ignite spontaneously. When necessary to leave small arms ammunition in the open, raise it on dunnage at least

Table V

Authorized rounds and components	Average muzzle velocity (ft. per sec.) (36-in. bbl.)	Time of flight to 1,000 yards (sec.)	Elevation (deg.)	Maximum range (yd.)	Weight of rounds (lb.)
CARTRIDGE, armor-piercing, cal..50, M2.	2,840	1.38	35	7,275	0.26
CARTRIDGE, armor-piercing-incendiary, cal..50, M8.	2,950	1.40	30	6,375	0.25
CARTRIDGE, armor-piercing-incendiary-cal..50, T49.	3,450	?	30	5,500	0.23
CARTRIDGE, armor-piercing-incendiary-tracer, cal..50, M20[1].	2,950	1.40	30	6,375	0.24
CARTRIDGE, ball, cal..50, M2.	2,840	1.38	35	7,275	0.26
CARTRIDGE, incendiary, cal..50, M1.	2,990	1.362	35	5,960	0.24
CARTRIDGE, incendiary, cal..50, M23.	3,450	?	30	5,500	0.23
CARTRIDGE, tracer, cal..50, M1[2, 3].	2,730	1.366	30	5,470	0.25
M1 alternative[2, 3].....	2,900	1.366 (?)	35	5,350	0.25
CARTRIDGE, tracer, cal..50, M10[4].	2,900	?	35	5,350	0.25
CARTRIDGE, tracer, cal..50, M17[5].	2,900	?	35	5,350	0.25
CARTRIDGE, tracer, headlight, cal..50, M21[6].	2,730	?	30	5,470	0.25
M21 alternative[6].....	2,900	?	35	5,350	0.25
CARTRIDGE, blank, cal..50, M1 (T40).	.....	.....	.....	.....	.....
CARTRIDGE, dummy, cal..50, M2.	.....	.....	.....	.....	.....
LINK, metallic belt, cal..50, M1.	.....	.....	.....	.....	.....
LINK, metallic belt, cal..50, M2.	.....	.....	.....	.....	.....
LINK, metallic belt, cal..50, T31E2.	.....	.....	.....	.....	.....

1. Dim trace to 300 yards and bright trace to 1,750 yards.
2. Trace to 1,800 yards.
3. Limited to use in ground machine guns in continental United States and for training purposes only.
4. Dim trace to 150 yards and bright to 1,900 yards.
5. Trace to 2,450 yards.
6. Brilliant trace to 550 yards, visible from the target.

6 inches from the ground cover it with a double thickness of tarpaulin. The tarpaulin shall be so positioned as to offer the maximum protection to the ammunition and to allow free circulation of air. Suitable trenches should be dug to prevent water flowing under the pile.

b. If practicable, ammunition should be stored separately by type and caliber from other ammunition.

c. 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. It is unlikely that the bullets and cases will fly over 200 yards.

d. Small-arms ammunition in storage should be protected from extreme heat in order to avoid decomposition of the propellant powder and tracer mixture, if such is present. The combination of high temperatures and a damp atmosphere is particularly detrimental to the stability of the powder and the tracer mixture.

e. When only a part of a box is used, the remaining ammunition in the box should be protected against unauthorized handling and use by firmly fastening the cover in place.

138. Authorized Rounds and Ballistic Data

a. ROUNDS. The ammunition listed in table V, of appropriate grade (par. 132*f*), is authorized for use in this gun (figs. 27, 121, 122, 123, 124, and 125). It will be noted that the nomenclature (standard nomenclature) completely identifies the cartridge and link as to type, caliber, and model. Links which may be issued as separate components are also listed in table V.

b. BALLISTIC DATA. The maximum ranges, muzzle velocities, weights of rounds, and times of flight to 1,000 yards of the service types of cal. .50 ammunition authorized for use in this machine gun are given in table V. The trajectories of these cartridges cross at 1,000 yards. Terminal ballistic data appears in TM 9–1907.

c. PENETRATION. Armor-piercing and armor-piercing-incendiary bullets will perforate 7/8-inch homogenous armor plate at 100 yards at normal impact and 5/8-inch face hardened armor plate at 100 yards at 30° impact.

APPENDIX I

LIMITED STORAGE AND DOMESTIC SHIPMENT

1. General

a. Preparation of the matériel for shipment will be the same as that prescribed for limited storage. (See par. 140.)

b. Instructions for limited storage include receiving inspection, preferred storage, preparation of matériel for storage, necessary inspections, servicing to insure safe storage, and methods of removal from limited storage.

c. Instructions for shipment include preparation of matériel for shipment, construction of shipping container, packing procedure, and loading matériel in railroad cars or trucks.

d. In addition to those cleaning materials listed in paragraph 15, the following are required for preparation of matériel for storage and shipment as specified throughout this section. (See WD CAT ORD 3, SNL K–1, and SB 10–8 for latest specifications.)

COMPOUND, rust-preventive, light.
WRAPPING, greaseproof (type II, grade A or C).

2. Instructions for Limited Storage

a. GENERAL. When matériel is out of use, it must be turned over to ordnance personnel, or placed in a limited storage status for periods not to exceed 90 days.

Note. Storage of matérial for periods in excess of 90 days will normally be handled by *ordnance personnel only* in accordance with instructions in SB 9–OSSC–A.

b. RECEIVING INSPECTION. Immediately upon receipt of matériel for storage, it must be inspected for missing or broken parts. If missing or broken parts cannot be replaced or repaired prior to placing the matériel in storage, a tag must be attached specifying the repairs needed and a written report of these items must be made to the officer-in-charge of the matériel.

c. PREFERRED STORAGE. The preferred type of storage is in closed dry warehouses or sheds. When outdoor storage is necessary, matériel will be boxed and the storage site selected and arranged as described in SB 9–47.

d. PREPARATION OF MATERIEL FOR LIMITED STORAGE. (1) Matériel which has already been processed for domestic or oversea shipment will not be processed for limited storage unless the inspections preparatory to or during storage reveal it to be necessary.

(2) Matériel to be processed will be cleaned and dried, but not oiled, by one of the methods outlined in paragraphs 8 through 17, observing all the cautions as directed.

(3) All outside metal surfaces that have become pitted or rusted should be refinished.

e. APPLICATION OF PRESERVATIVE. (1) Immediately after cleaning and drying, dip the gun in a hot bath of rust-preventive compound (light). Immerse gun at a 45° angle to prevent air bubbles from forming in the barrel and receiver. Allow gun to remain in the bath until it reaches the same temperature as the bath. Remove the gun, drain off surplus compound, and allow the compound to set.

(2) Wrap the gun with type II, grade A or C, greaseproof, wrapping at all places where it contacts the shipping box, bracing, or cushioning.

(3) The prepared gun will then be placed into the shipping box as described in paragraph 14*d*.

f. INSPECTIONS. A visual inspection must be made periodically to determine general condition. If corrosion is found on any part, remove the corrosion with crocus cloth, refinish if necessary (*d* (3) above), and apply the prescribed preservative (*e* (1) above).

g. REMOVAL FROM LIMITED STORAGE. (1) If the matériel is is not shipped or issued upon expiration of the limited storage period, the matériel must be further treated for stand-by storage (matériel out of use for periods in excess of 90 days up to 3 years. (See *Note*, *a* above.)

(2) Matériel to be shipped will not be reprocessed unless inspection reveals it necessary to reprocess the matériel for shipment. (See par. 2, app. I.)

(3) When it has been ascertained that matériel is to be placed into immediate service, any item noted by a tag attached to ma-

tériel as still needing repairs must be repaired and matériel will be given complete inspection, plus any repairs which are indicated by this inspection. Matériel will be reprocessed as prescribed in paragraphs 14 or 16 and lubricated as prescribed in paragraphs 44 through 46.

3. Instructions for Domestic Shipment

a. GENERAL. If matériel to be shipped will reach its destination within the scope of the limited storage period, it need not be reprocessed upon removal from storage, unless inspection reveals it necessary.

b. PREPARATION. For the preparation of matériel for domestic shipment, see *d* and *e* below.

c. SHIPPING CONTAINER. The shipping container will be double-end, nailed, wooden box, constructed and marked in accordance with TM 9–2854.

(1) *Data.* See table VI.

Table VI

	Dimensions (in.)		Volume or weight
	Inside	Outside	
Length	57 1/8	60 1/8	
Width	4 5/16	5 5/16	
Height	7 5/16	8 5/16	
Cubic displacement			1.9 cu. ft.
Ship tons (40 cu. ft.)			0.047 ton.
Item weight			62 lb.
Tare weight			16 lb.
Gross weight			78 lb.

(2) *Bill of material.* The bill of material listed in table VII is required to construct one complete double-end, nailed, wooden box (fig. 129) for one basic aircraft Browning machine gun, cal. .50, AN–M2.

(3) *Nailing schedule.* The nailing schedule (table VIII) applies to group I woods only. (See TM 9–2854.) If woods of other groups are used, the nailing must be adjusted accordingly as described in TM 9–2854.

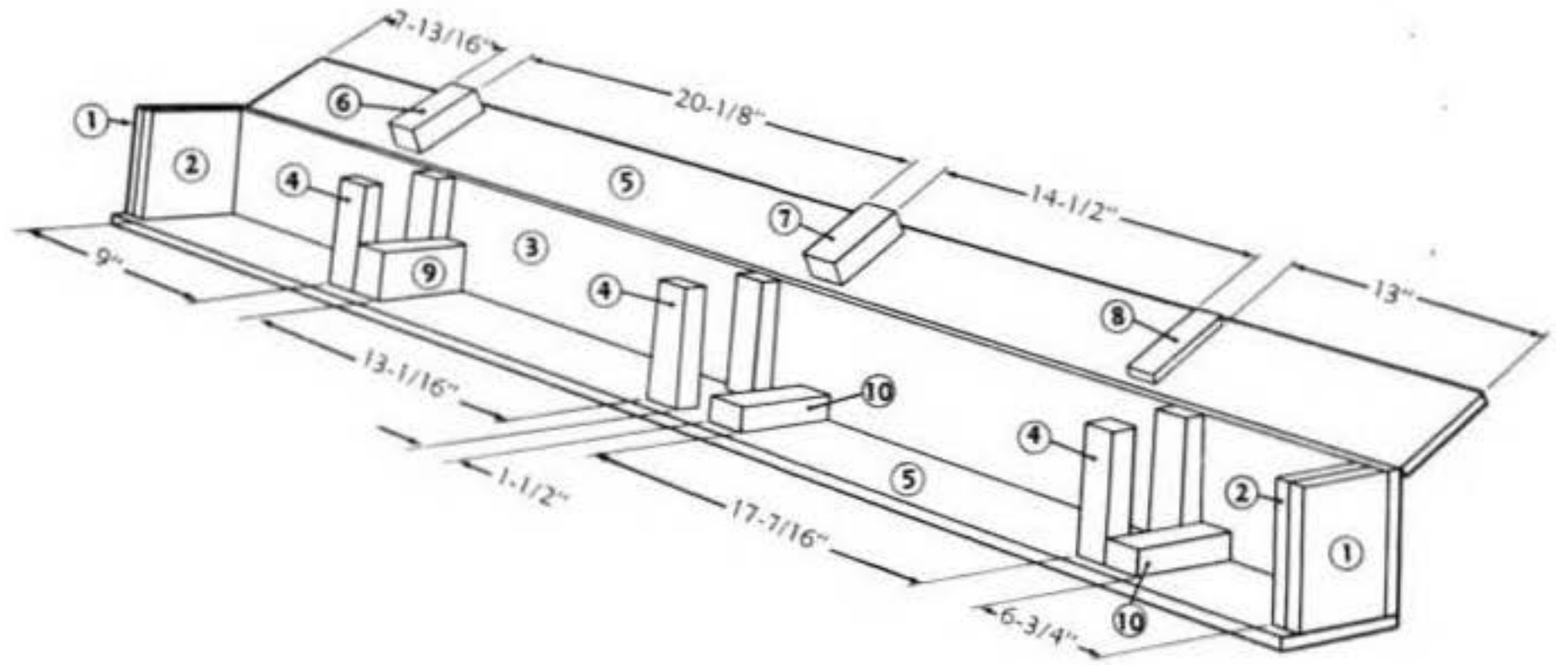
*Table VII. Bill of Material**

Indicating number	Quantity required	Part name	Actual size—inches		
			Length	Width	Thickness
1	2	End panels	4 3/16	7 5/16	3/4
2	2	End panels	7 5/16	4 1/2	3/4
3	2	Side panels	60 1/8	7 5/16	5/8
4	6	Cleats	7 1/4	1 3/16	1 3/16
5	2	Top and bottom panels	60 1/8	5 11/16	5/8
6	1	Top cleat	4 1/4	1 3/16	1 7/8
7	1	Top cleat	4 1/4	1 3/16	1 3/8
8	1	Top cleat	4 1/4	1 3/16	3/8
9	1	Bottom block	4 1/2	3	1 3/16
10	2	Bottom blocks	4 1/2	1 3/16	1 3/16
.....	1 pc.	Felt cushioning	60	1 1/2	1/4
.....	3	Steel straps with seals (or equivalent steel wire).	33	3/8	0.020
.....	0.01 lb.	Threepenny cement-coated nails.	.....	.....	.....
.....	0.05 lb.	Fivpenny box nails	.....	.....	.....
.....	0.10 lb.	Sixpenny box nails	.....	.....	.....
.....	0.10 lb.	Sevenpenny cement-coated nails.	.....	.....	.....

*All lumber specified herein is from groups I or II, as given in TM 9-2854. If wood of other groups is used, the thickness of lumber must be adjusted accordingly.

Table VIII

Fasten		Nail (size and type)	Notes
Part	To part		
Ends (1)	Ends (2)	Fivepenny box	Around edges, stagger and clinch 1¾ inches apart.
Sides (3)	Cleats (4)	Sixpenny box	Stagger and clinch 2 inches apart.
Top (5)	Cleat (6)	Sevenpenny cement-coated.	Three nails, stagger.
Top (5)	Cleat (7)	Sevenpenny cement-coated.	Three nails, stagger and clinch.
Top (5)	Cleat (8)	Threepenny cement-coated.	Three nails, stagger and clinch.
Bottom (5)	Bottom block (9).	Sevenpenny cement-coated.	Three nails, stagger.
Bottom (5)	Bottom blocks (10).	Sixpenny box	Three nails each, stagger and clinch.
Sides (3)	Ends (1) and (2).	Sevenpenny cement-coated.	Seven nails per joint, stagger.
Top and bottom (5)	Ends (1) and (2).	Sevenpenny cement-coated.	Five nails per joint, stagger.



NOTES 1 – NUMBERS IN CIRCLES CORRESPOND TO THE INDICATING NUMBERS AS LISTED IN THE BILL OF MATERIAL.

2 – FELT CUSHIONING (NOT SHOWN ON ILLUSTRATION) TO BE APPLIED TO ALL BLOCKING WHICH COMES IN CONTACT WITH GUN.

3 – ALL BLOCKING WILL HAVE THE 1-9/16 INCH FACE NAILED TO THE RESPECTIVE SIDE, TOP OR BOTTOM.

RA PD 104980

Figure 129. Packing box for the Browning machine gun, cal..50, AN—M2, aircraft, basic.

d. PACKING PROCEDURE.

Note. The indicating numbers are those listed in table VII and shown in figure 129.

(1) Prior to placing gun in the shipping container, cover all parts of the blocking which will contact the gun, with felt cushioning.

(2) Place the gun in the box in an inverted position so that the top of the receiver rests on the bottom blocks (10) and the barrel jacket on the bottom block (9).

(3) Place the top on the box so that cleats (7) and (8) bear upon the receiver and cleat (6) bears upon the barrel jacket.

(4) Reinforce the box with three tensional steel straps or wires. Two of the straps will be spaced 10 inches from each end of the box and one strap will be placed around the center of the box.

e. MARKING. For marking of exterior of shipping container, see TM 9–2854.

f. LOADING MATERIAL IN BOX CARS OR TRUCKS. For the methods used in loading and bracing boxed items for rail shipment, see TM 9–2854.

APPENDIX II

REFERENCES

1. Publications Indexes

The following publications indexes should be consulted frequently for latest changes or revisions of references given in this section and for new publications relating to matériel covered in this manual:

a. Current Ordnance OFSB's and FSMWO's ..... SB 9–9

b. List and index of administrative and supply publications. FM 21–6

c. List of War Department films, film strips, and recognition film slides. FM 21–7

d. List and index of War Department publications ..... FM 21–6

e. Military training aids ..... FM 21–8

f. Ordnance major items and combinations, and pertinent publications. SB 9–1

g. Ordnance supply catalog index ..... WD CAT ORD 2

2. Standard Nomenclature Lists

a. AMMUNITION.

Ammunition, rifle, carbine, and automatic gun. WD CAT ORD 11 SNL T–1

Packing materials used by field service for small-arms service ammunition. WD CAT ORD 11 SNL T–5

b. CLEANING, PRESERVING, AND REPAIR.

Cleaning, preserving and lubricating materials; recoil fluids, special oils, and miscellaneous related items. WD CAT ORD 3 SNL K–1

Lubricating equipment, accessories, and related dispensers.	WD CAT ORD 5 SNL K–3
Soldering, brazing, and welding materials, gases and related items.	WD CAT ORD 3 SNL K–2

c. GUN MATERIAL.

Gun, machine, cal. .50, Browning, AN–M2, and M2A1, aircraft, basic.	WD CAT ORD 7, 8, and 9 SNL A–38

d. MISCELLANEOUS STANDARD NOMENCLATURE LISTS.

Tool-sets for maintenance of small and intermediate caliber ground, aircraft, and antiaircraft matériel, cannon and mortars, and of the 37-mm and 40-mm antiaircraft matériel.	WD CAT ORD 6 SNL A–35
Truck, 2½-ton, 6x6, small-arms repair, M7, M7A1, and M7A2.	WD CAT ORD SNL G–138

3. Explanatory Publications

a. AMMUNITION.

Ammunition, general	TM 9–1900
Ammunition, identification code (A.I.C.)	SB 9–AMM 5
Ammunition inspection guide	TM 9–1904
Ballistic data, performance of ammunition	TM 9–1907
Qualifications in arms and ammunition training allowances.	AR 775–10
Range regulations for firing ammunition for training and target practice.	AR 750–10
Small-arms ammunition	TM 9–1990
Small-arms ammunition	SB 9–AMM 4

b. CLEANING LUBRICATION, PRESERVATION, AND REPAIR.

Basic maintenance manual	TM 37–250
Cleaning, preserving, sealing, lubricating and related materials issued for ordnance matériel.	TM 9–850
Inspection of ordnance matériel	TM 9–1100
Ordnance maintenance—Browning machine gun, cal. .50, M2 all types, and ground mounts.	TM 9–1225

c. GAS ATTACK.

Decontamination	TM 3–220
Defense against chemical attack	FM 21–40
Military chemistry and chemical agents	TM 3–215

d. MISCELLANEOUS.

Basic aircraft machine gun, cal..50, M3	TM 9–219
Dictionary of United States Army terms	TM 20–205
Distribution and issue of ordnance general supplies	SB 9–3
Instruction guides: small-arms accidents, malfunctions, and their causes.	TM 9–2210
Powered linking machine M5 and delinking attachment M7 (for cal. .50 cartridges).	TM 9–218
Small-arms, light field mortars and 20-mm aircraft guns.	TM 9–2200
Synchronizing	TM 1–510
Targets, target material, and training course lay-outs.	TM 9–855

e. SHIPMENT AND STORAGE.

Army-Navy general specifications for packaging and packing for oversea shipment (latest revision).	U.S.A. No. 100–14A
Catalog of approved packaging instructions for major items and spare parts for ordnance general supplies.	PS No. 1000
Instruction guide: ordnance packaging and shipping (posts, camps, and stations).	TM 9–2854

Ordnance packaging instructions for cleaning, preserving, wrapping, and packaging of tools and equipment. — P.S. 502

Procurement of paper and paper products ..... SB 10–8

Protection of ordnance matériel in open storage ..... SB 9–47

4. Training Films

a. Aircraft machine guns and cannon—.50 caliber machine gun—stripping and assembly. — TF 1–260

b. Aircraft machine guns and cannon—.50 caliber machine gun—operation. — TF 1–261

5. Film Strips

a. The Browning machine gun, cal. .50, M2. Part I—disassembly and assembly (third and fourth echelon). — FS 9–24

b. Browning machine gun, cal. .50, M2 inspection and gauging. Part I. — FS 9–152

c. Browning machine gun, cal. .50, M2 inspection and gauging. Part II—barrel extension group. — FS 9–153

d. Browning machine gun, cal. .50, M2, inspection and gauging. Part III. — FS 9–154