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WAR DEPARTMENT

TECHNICAL MANUAL

ORDNANCE MAINTENANCE

37-MM GUN MATÉRIEL (TANK) M5 AND M6

March 10, 1942

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TECHNICAL MANUAL
No. 9–1250

WAR DEPARTMENT,
WASHINGTON, March 10, 1942.

ORDNANCE MAINTENANCE

37-MM GUN MATÉRIEL (TANK) M5 AND M6

Prepared under direction of the
Chief of Ordnance

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SECTION I

INTRODUCTION

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Scope	1

1. Scope.—This manual is published for the information and guidance of ordnance maintenance personnel. It contains detailed instructions for inspection, disassembly, assembly, maintenance, and repair of the 37-mm gun matériel (tank) M5 and M6, supplementary to those in the Field and Technical Manuals prepared for the using arm. Additional descriptive matter and illustrations are included to aid in providing a complete working knowledge of the matériel. For disassembly and assembly of the guns and filling of the recoil cylinder, see FM 23–80 and FM 23–81.

SECTION II

DESCRIPTION

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2. General.—*a. Guns.*—The 37-mm tank guns M5 and M6 are flat trajectory weapons of the field gun type, single shot, with drop type

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breechblocks. They fire projectiles which weigh about two pounds. The M6 gun has an automatic breechblock and is provided with a breech operating mechanism.

b. Recoil mechanisms.—Two types of recoil mechanisms are used, long and short. The mechanisms are substantially the same except for the following differences:

(1) Long recoil mechanism, drawing number D37256 (M5, early manufacture):

A163742: Recoil spring.
C66643: Piston and rod.
A163951: Separator.

(2) Short recoil mechanism, drawing number D37844 (M5):

A186410: Recoil spring.
C73865: Piston and rod.

(3) Short recoil mechanism, drawing number D47424 (M6):

A186410: Recoil spring.
C73865: Piston and rod.

3. Data.

		M5	M6
Length of tube, approx	inches	73	78
Weight of tube, assembly, approx	pounds	185	----
Weight of tube, assembly and breech operating mechanism	do	----	196
Muzzle velocity, approx	ft. per sec	----	----
Shell, fixed, AP, M51 and practice	do	2550	2550
Shell, fixed, HE, Mk. II	do	2700	2700
Shell, fixed, HE, M63	do	2650	2650

SECTION III

INSPECTION

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Cleaning and oiling	6
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4. General.—*a.* The purpose of inspection is to determine the condition of the matériel and the repairs or adjustments necessary to maintain the matériel in serviceable condition.

b. The procedure to be followed relative to inspection and maintenance is covered in TM 9–1100, "Ordnance Maintenance Procedure—Matériel Inspection and Repair."

5. Tools for inspection.—Such tools as may be needed for disassembling the gun for inspection may be obtained from the small arms repair truck. See the list of special repair tools listed in SNL A–35 and the tools listed in SNL G–72.

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6. Cleaning and oiling.—Before proceeding with the inspection, clean and oil the gun properly in accordance with instructions given in paragraphs 12 and 13. This is highly important because some malfunctions may be caused by improper lubrication and the presence of dirt, grit, or other extraneous matter on surfaces or in recesses of operating parts.

7. Inspection.—*a. General.*—Inspection of the various parts of the gun and recoil mechanism should be carried out in the order listed. Unless otherwise indicated, the instructions are applicable to both types of guns and recoil mechanisms.

b. Gun as a unit (figs. 1 and 2).—(1) Note general appearance and missing or broken parts on exterior of gun.

(2) Check if gun is properly secured to yoke by means of fixed collar and threaded nut. Note if keys engage mating keyways on sides of gun and prevent it from turning (fig. 3). Check tube for looseness, and check breech ring locking key and screw for wear or damage.

(3) Open and close breech several times and check for sluggish movement and incomplete opening or closing. In M6 gun note failure of breechblock to stay in open position.

(4) Load gun with an empty case, open breech smartly, and note any difficulty or failure to extract and eject.

c. Breechblock group (fig. 4).—(1) Remove breechblock and carefully examine all exterior surfaces for burs, scores, or excessive wear. Pay particular attention to the surfaces which cam the extractors. In M6 gun, check also for burs on shoulders which bear against the extractors when block is in open position. Note if firing spring retainer pin is flush with U-shaped top face of breechblock.

(2) Examine front face of breechblock bushing for erosion and wear and note condition of firing pin hole. Measure diameter of firing pin hole. Diameter of firing pin hole is $0.175 + 0.004$ inch. Note protrusion, if any, of firing pin from front face of breechblock bushing. Check if bushing is flush with front face of breechblock. Test for looseness of threaded joint between breechblock and bushing.

(3) Rotate upper arm of cocking lever forward and check for any sluggish movement or binding. Next, check if round end of cocking lever plunger bears against lower arm of cocking lever and holds it in most forward position possible. Note burs on cocking lever pivot and its recess. Examine plunger for burs and for obstructions of air channel. Test tension of plunger spring. Check for dirt and other extraneous matter in plunger recess.

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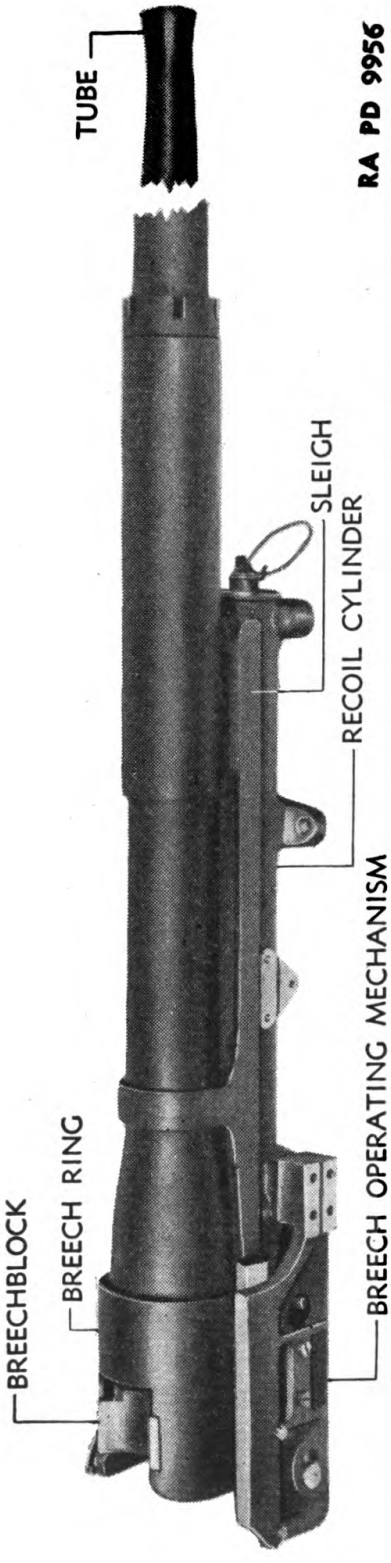


FIGURE 1.—37-mm gun (tank) M6—right side view with breech operating mechanism assembled.

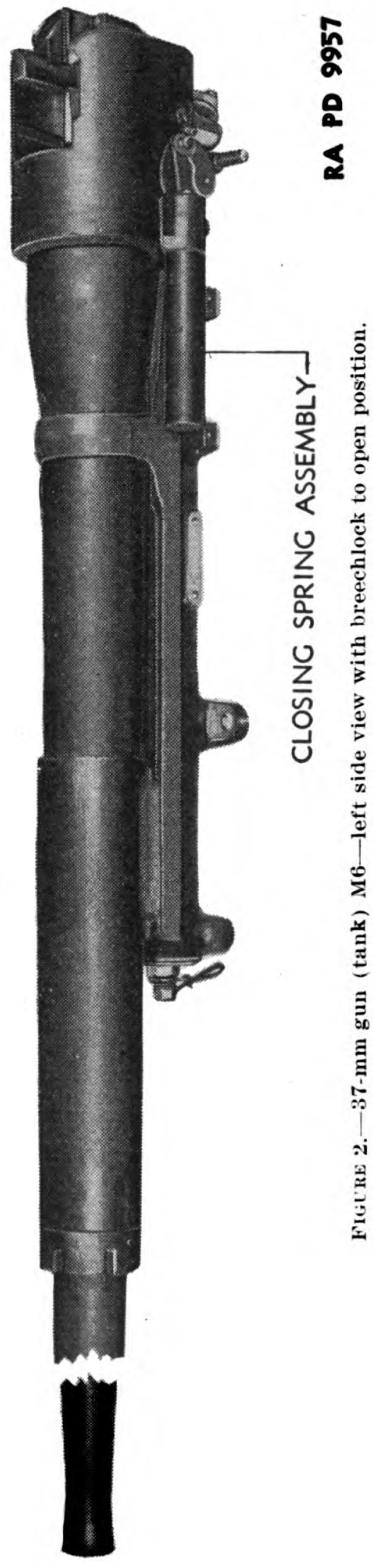


FIGURE 2.—37-mm gun (tank) M6—left side view with breechlock to open position.

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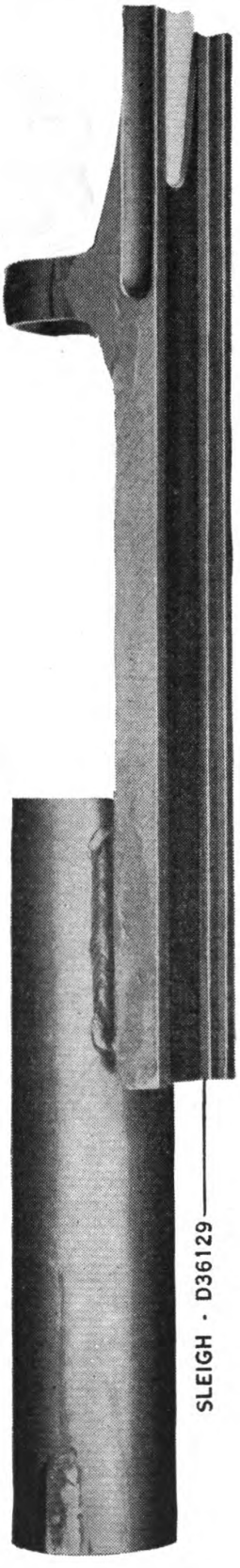


FIGURE 3.—37-mm gun (tank) M6—sleigh.

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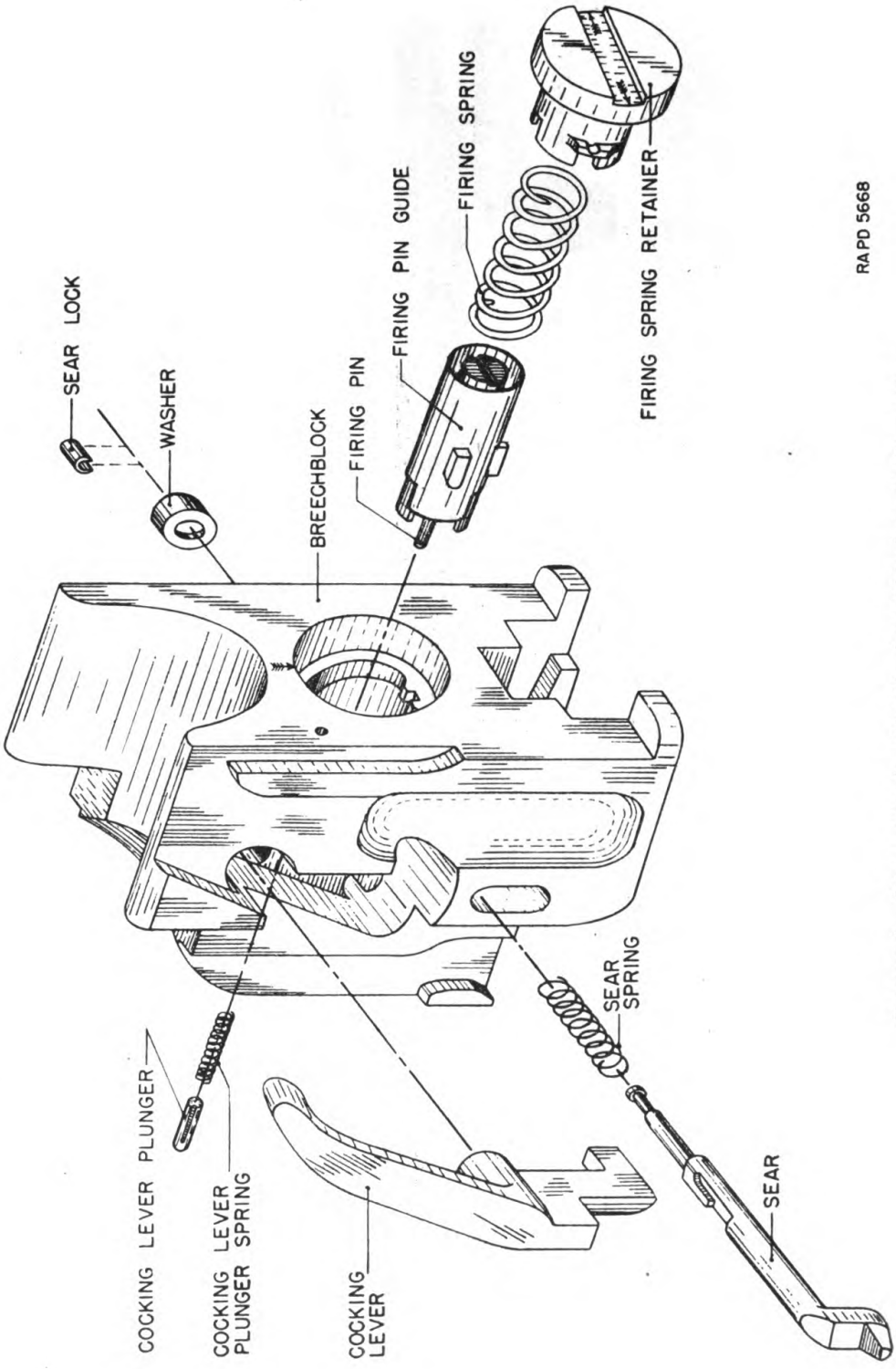


FIGURE 4.—37-mm gun (tank) M6—breechblock assembly—parts.

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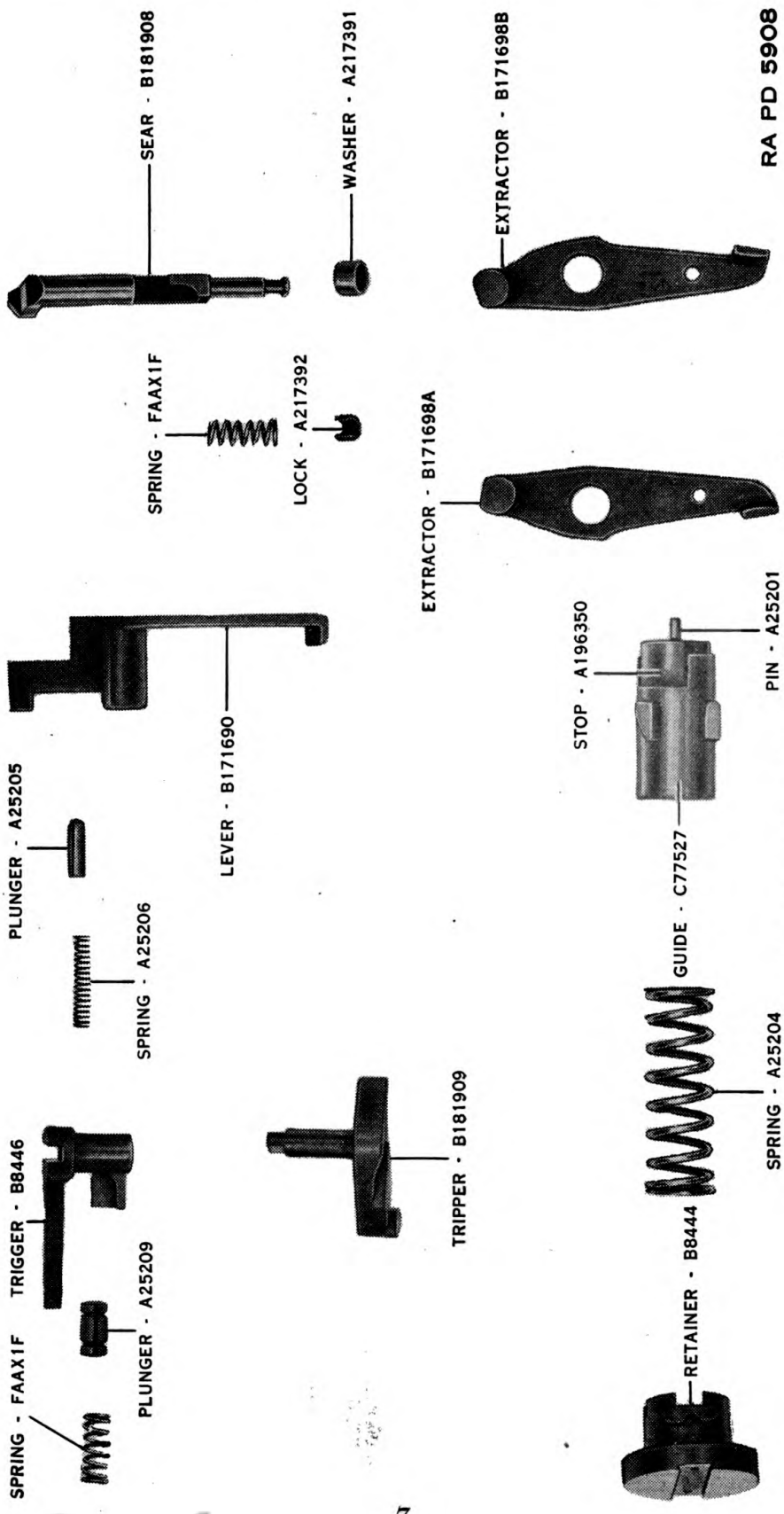


FIGURE 5.—37-mm gun (tank) M6—breech mechanism—parts.

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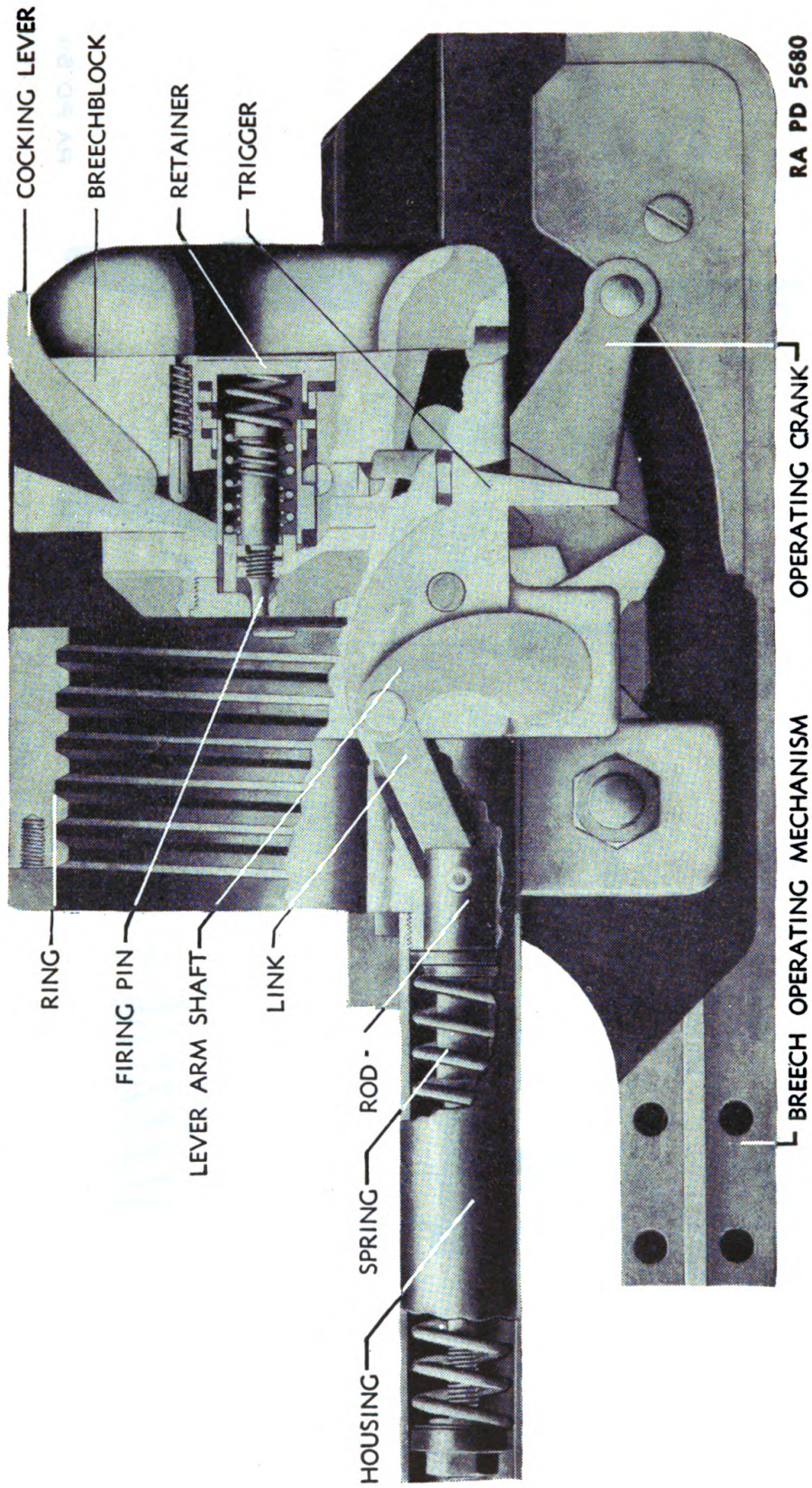


FIGURE 6.—37-mm gun (tank) M6—sectional view of breech mechanism.

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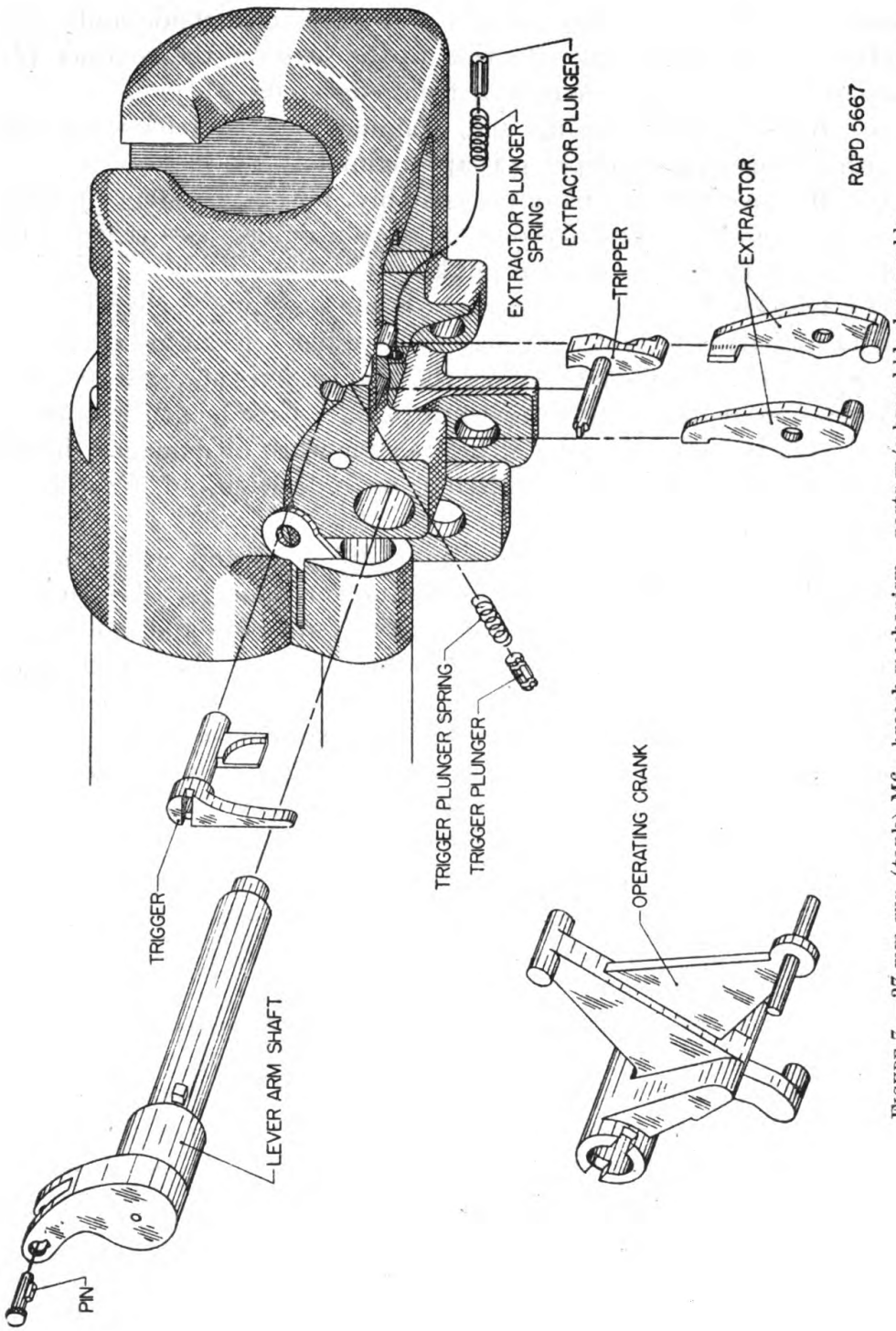


FIGURE 7.—37-mm gun (tank) M6—breech mechanism—parts w/o breechblock assembly.

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(4) Press firing spring retainer about ⅛ of an inch into breechblock and rotate left or right, noting any sluggish movement or binding. Remove retainer and look for burs and scores on outside and inside surfaces. Pay particular attention to the seat for the retainer pin. Note any dents or deformation of front edges (fig. 5).

(5) Remove firing spring and examine for distortions and free length. Free length of spring is approximately 2⅝ inches.

(6) Remove firing pin guide assembly, noting freedom of guide in guide chamber. Test freedom of stop in guide. See if firing pin guide pin is flush with sides of guide.

(7) Disassemble guide assembly. Examine guide for straightness and burs, particularly on surfaces of sear lug. Examine threads in guide for wear or damage. Check the stop for burs and deformations. Test tension of firing pin retracting spring. Free length is approximately 1⅜ inches. Examine firing pin for worn or damaged threads and for burs, deformations, pitting, or indications of fracture on striker end.

(8) Remove the sear retaining pin (M5 gun) and sear retaining lock and washer (M6 gun) and examine for damage. Test tension of sear spring. Examine the sear carefully for burs and scores, particularly on flat surfaces and edges which contact the sear lug and guide.

(9) Note any burs or irregularities in guide chamber in breechblock. Check the protrusion of retainer pin into guide chamber. Lower end of retainer pin should be about 0.002 to 0.004 inch above that of the interrupted shoulder in guide chamber.

d. Breech ring group (figs. 6 and 7).—(1) Actuate the trigger and note functioning of trigger plunger. Remove tripper, noting freedom in hub of trigger. Examine tripper for burs or rough surfaces and indications of fracture.

(2) Remove trigger, and trigger plunger and spring. Examine trigger for burs and signs of fracture. Test tension of trigger plunger spring. Check trigger plunger for burs and obstructions in vents.

(3) Remove extractors and examine for burs and wear on camming surfaces, lips of upper arms, and in pivoting holes. Look for signs of fracture. In M6 gun, look for burs on lower flat ends of extractors and at edges.

(4) Check for burs and rough surfaces on extractor pivots. Test if pivots are firmly pressed into ring.

(5) Test functioning of extractor plungers (M6 gun). See if air channels in plungers are clear.

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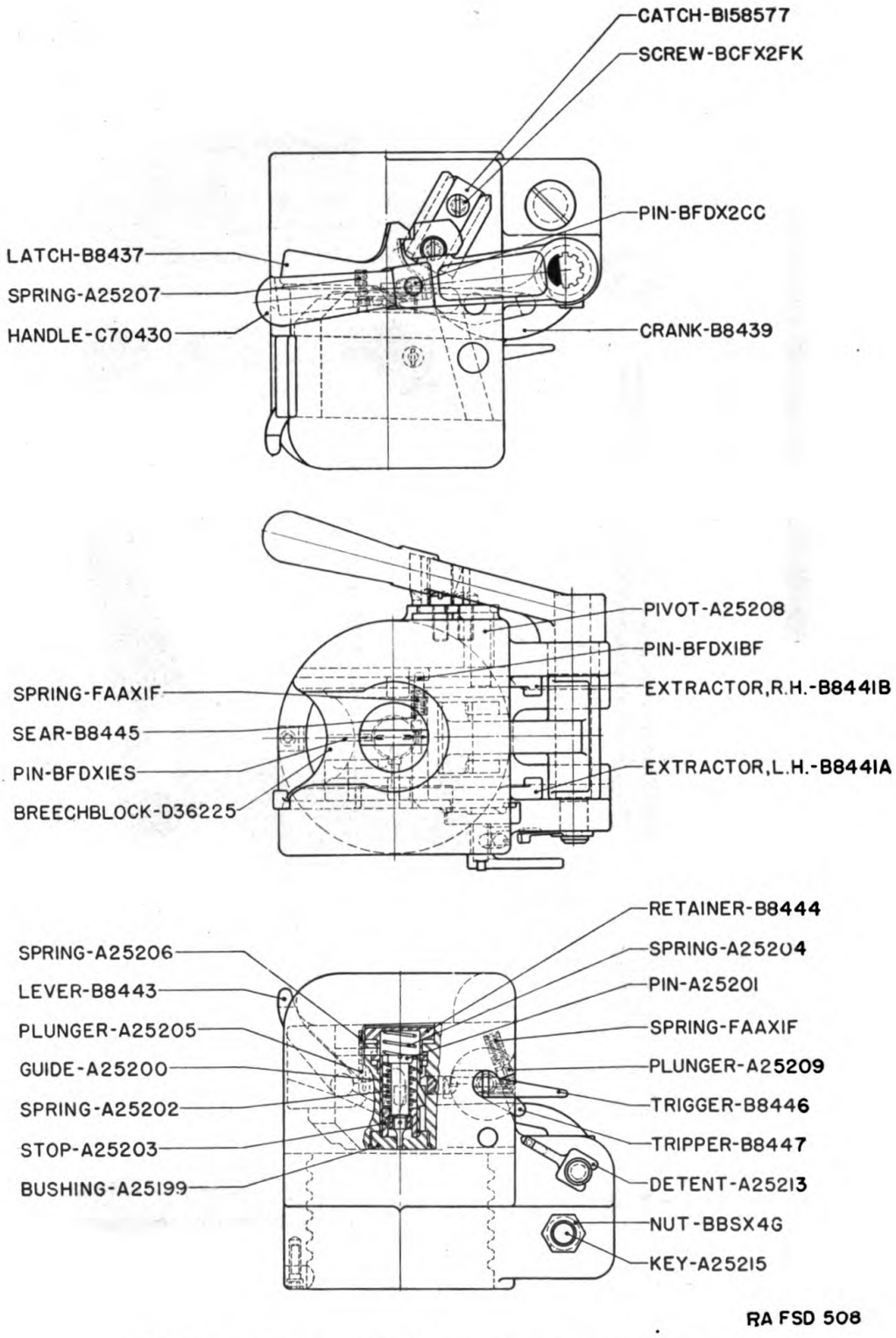


FIGURE 8.—37-mm gun (tank) M5—breech mechanism assembly.

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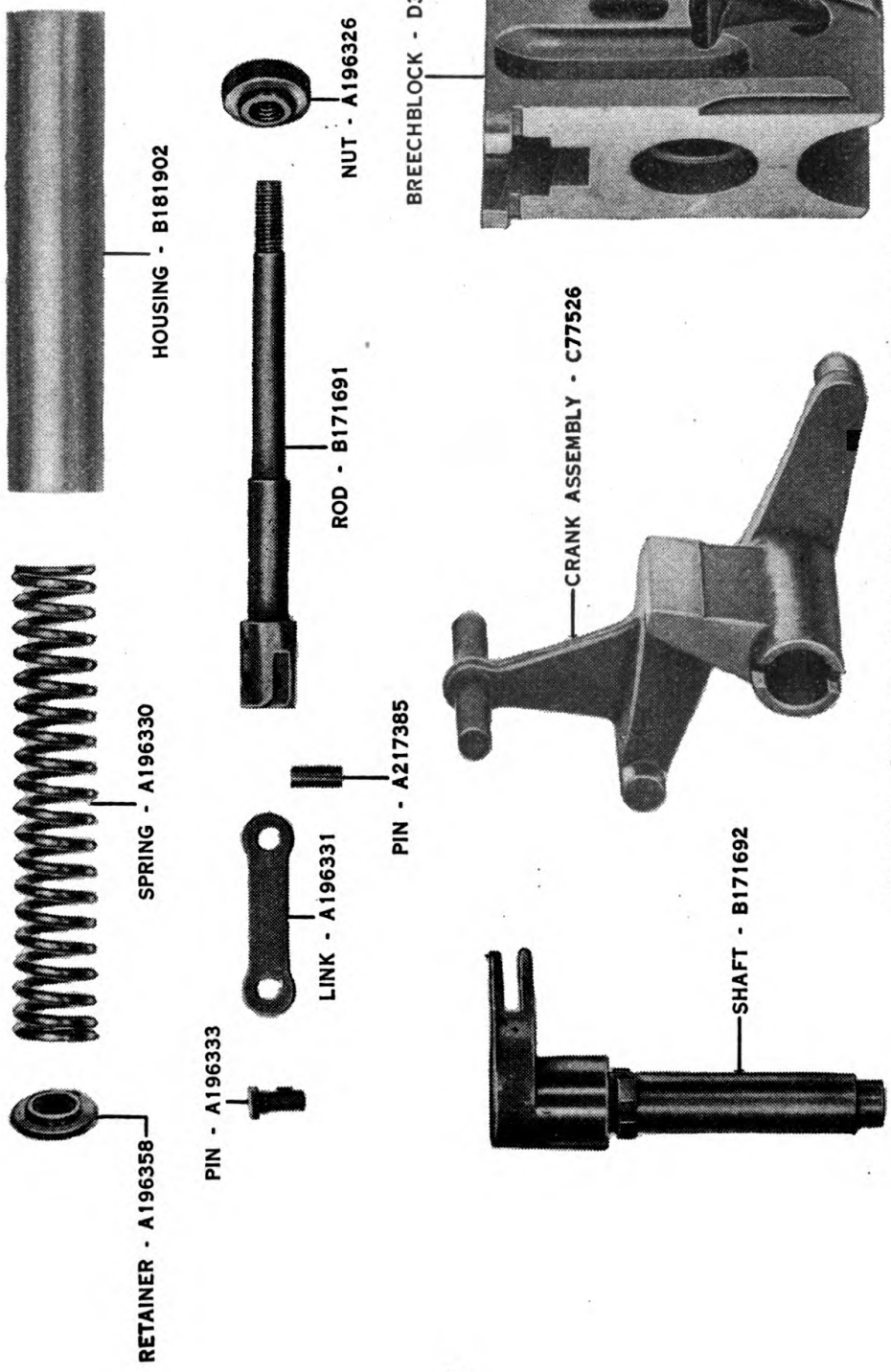


FIGURE 9.—37-mm gun (tank) M6—breech mechanism—parts.

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(6) Examine breech recess for burs, scores, dirt, and other extraneous matter on bearing surfaces.

(7) Note if cocking pin is damaged and cocking pin screw is flush with rear face of breech ring (M6 gun).

e. Breechblock operating group (M5 gun) (fig. 8).—(1) Rotate operating handle to most forward position and see if operating handle lever latches.

(2) Test tension of operating handle latch spring. Free height of spring is approximately 1⅛ inches.

(3) Check if operating handle lever and shaft are firmly welded together. Examine splines of shaft for damage and test firmness of spot weld on left end of splined hub.

(4) Examine crank for burs on trunnions and damage to splines.

(5) Examine operating handle detent for deformations or signs of fracture.

f. Crank assembly (M6 gun).—Examine crank assembly for signs of fracture and defective welding between crank pin, handle web, and crank. Check for burs in pivoting hole and on crank lug and trunnions.

g. Closing spring and housing group (M6 gun) (fig. 9).—(1) Note if housing body is firmly attached to breech ring. Housing body screw should be tight, with the cut end alined with circumference of breech ring.

(2) Unscrew the housing, noting any binding between housing and closing spring rod nut. Examine housing for dents or irregularities inside.

(3) Note if closing spring retainer is positioned properly. Flanged end of retainer should bear against spring. Test tension of spring. Free length of spring is approximately 6.86 inches.

(4) Examine closing spring rod for straightness. Note any binding between rod and lever arm shaft link. Dirt may enter through slot in housing body and cause binding. Link pin should be staked. Note wear of locking slot in link.

(5) Remove housing body and see if housing body pin is in position.

(6) Check closing spring locking pin for excessive wear and signs of fracture.

(7) Examine lever arm shaft for rust or rough surfaces, particularly on lugs which fit into mating slots in hub of crank assembly.

h. Tube.—(1) Check for burs in extractor pockets, in chamber, and on bearing surfaces on exterior of tube.

(2) Examine the bore visually from both ends and note sharpness of lands, carbon deposits, powder fouling, rust, and coppering.

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i. Breech operating mechanism (M6 gun) (fig. 10).—(1) Note general condition of mechanism. Examine for rust and scale on camming surfaces of the crank cam and guide. Examine mating guideway for breech ring guide for scale and irregularities.

(2) Test functioning of cam retaining plunger. With a tapered pin, depress the plunger as far as it will go and, at the same time, push the cam slightly forward. Release the pressure and push the cam forward until cam retaining screw is in the adjacent screw hole. Remove the cam and note if plunger bushing is staked. Remove the bushing and plunger. Examine plunger for straightness. Test tension of plunger spring.

j. Recoil mechanism (fig. 11).—(1) Examine recoil cylinder carefully for indications of oil leakage.

(2) Uncouple the gun. Drain the recoil cylinder. Disassemble the recoil mechanism as follows: remove the front head with buffer attached. Insert the spacer on the buffer between head and piston and reassemble the head. Remove the pin which secures the coupler to the piston rod, then remove the coupler, washer, and follower. Attach the puller and place a bar through the eye on the puller. With a man on each end of the bar, keep the springs under compression while the front head is removed. Gradually release the spring pressure. Unscrew the eye of the puller and remove the piston and rod and the springs. Remove end of puller from piston rod (fig. 12).

(3) Examine the recoil cylinder and piston and rod for corrosion (fig. 13).

(4) Test tension of valve and recoil springs. Free height of recoil spring in short cylinder is approximately 29.9 inches. Free height of each recoil spring in long cylinder is approximately 26.45 inches. Free height of valve spring is approximately 3.74 inches.

(5) Test valve nut for looseness and measure the valve lift. Valve lift is 0.022 inch. Measure thickness of valve collar. Normal thickness is 0.187 inch and is determined by trial.

(6) Examine leather packing for distortion, wear, and hardness. Packing is of chrome leather and paraffin dipped, but it should be inspected carefully and frequently.

(7) Remove the copper gaskets at each end of recoil cylinder and examine for hardness.

(8) Test for looseness of threaded joint between housing and gland follower. Gland follower should be staked to housing. Housing washer should be secured tightly to the coupler.

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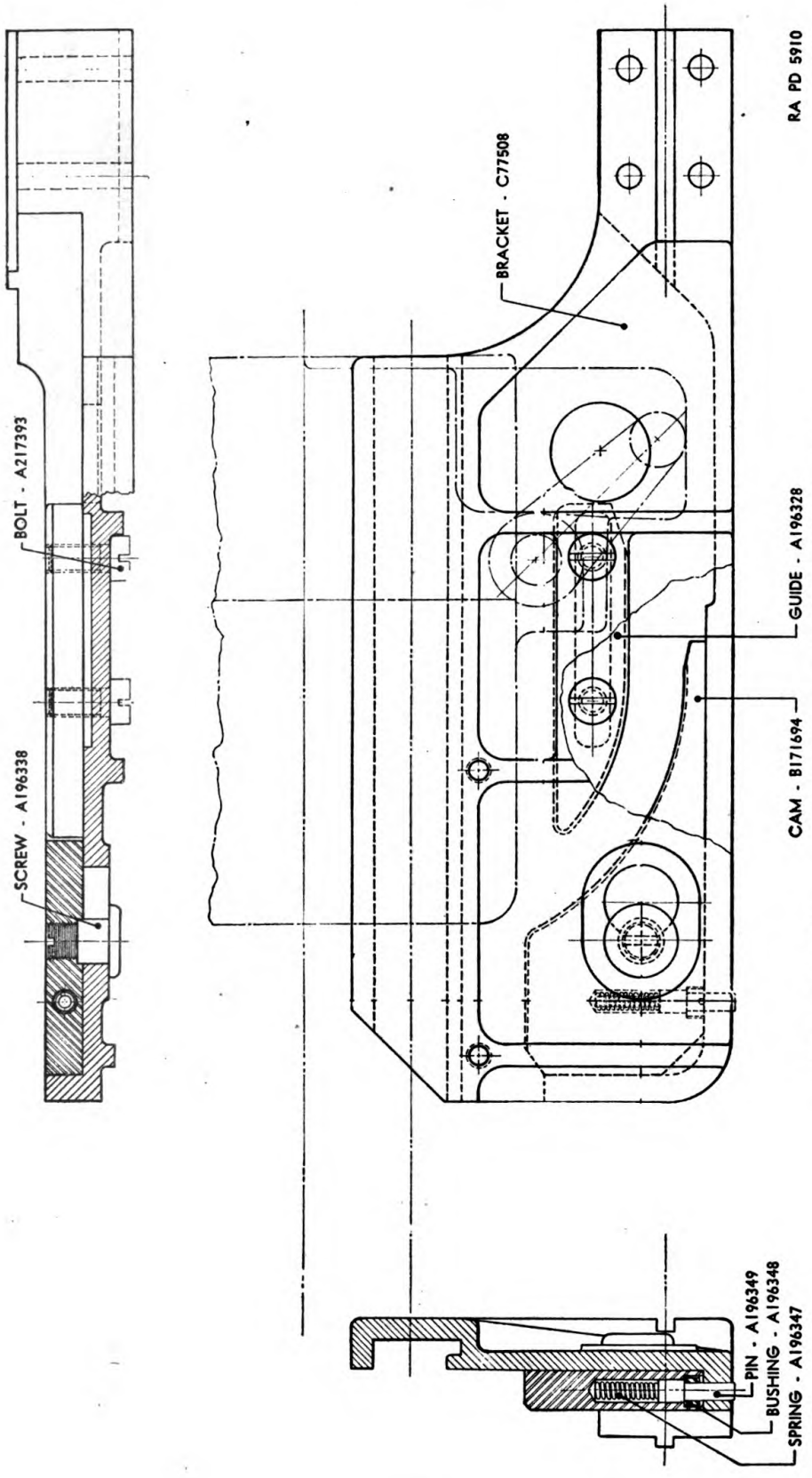


FIGURE V0.—37-mm gun (tank) M6—breech operating mechanism.

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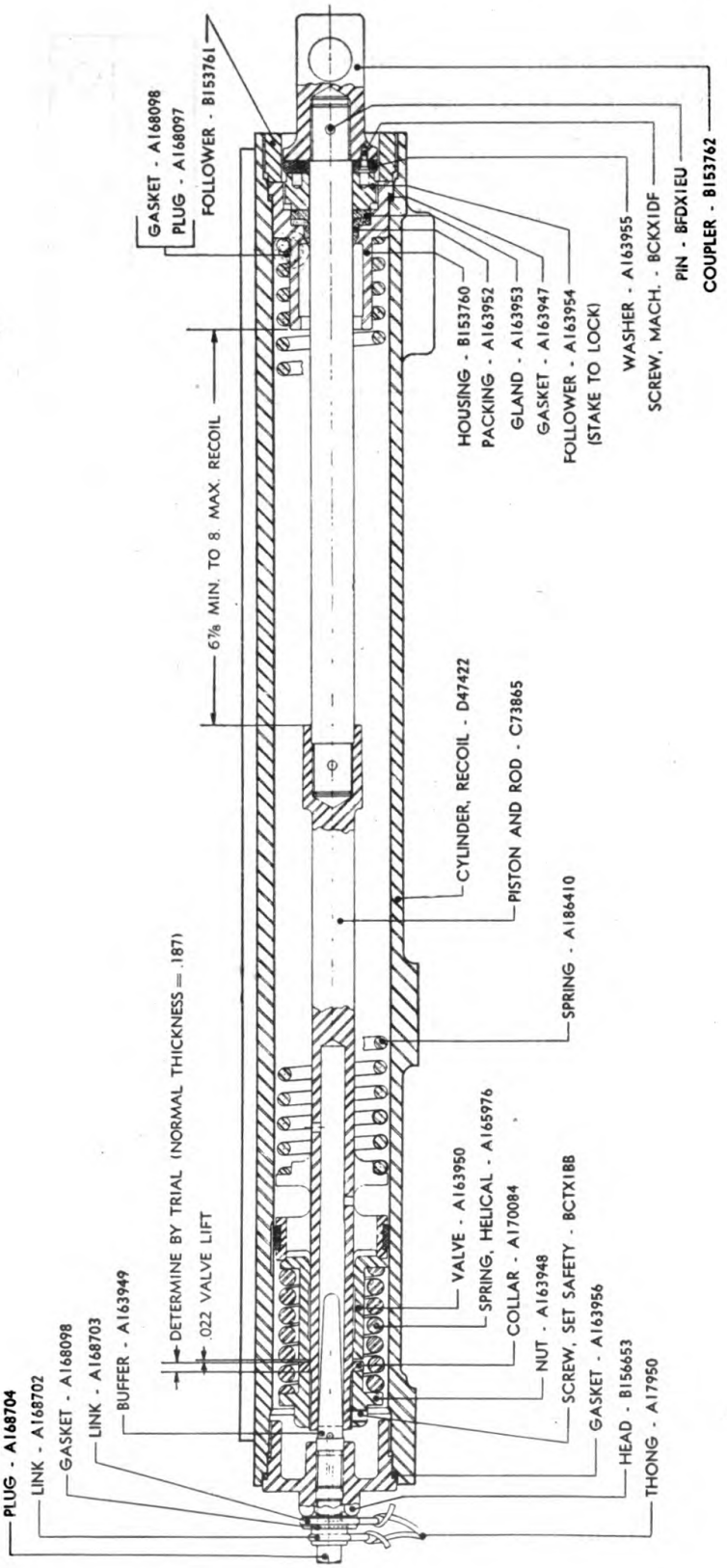


FIGURE 11.—37-mm gun (tank) M6—recoil mechanism.

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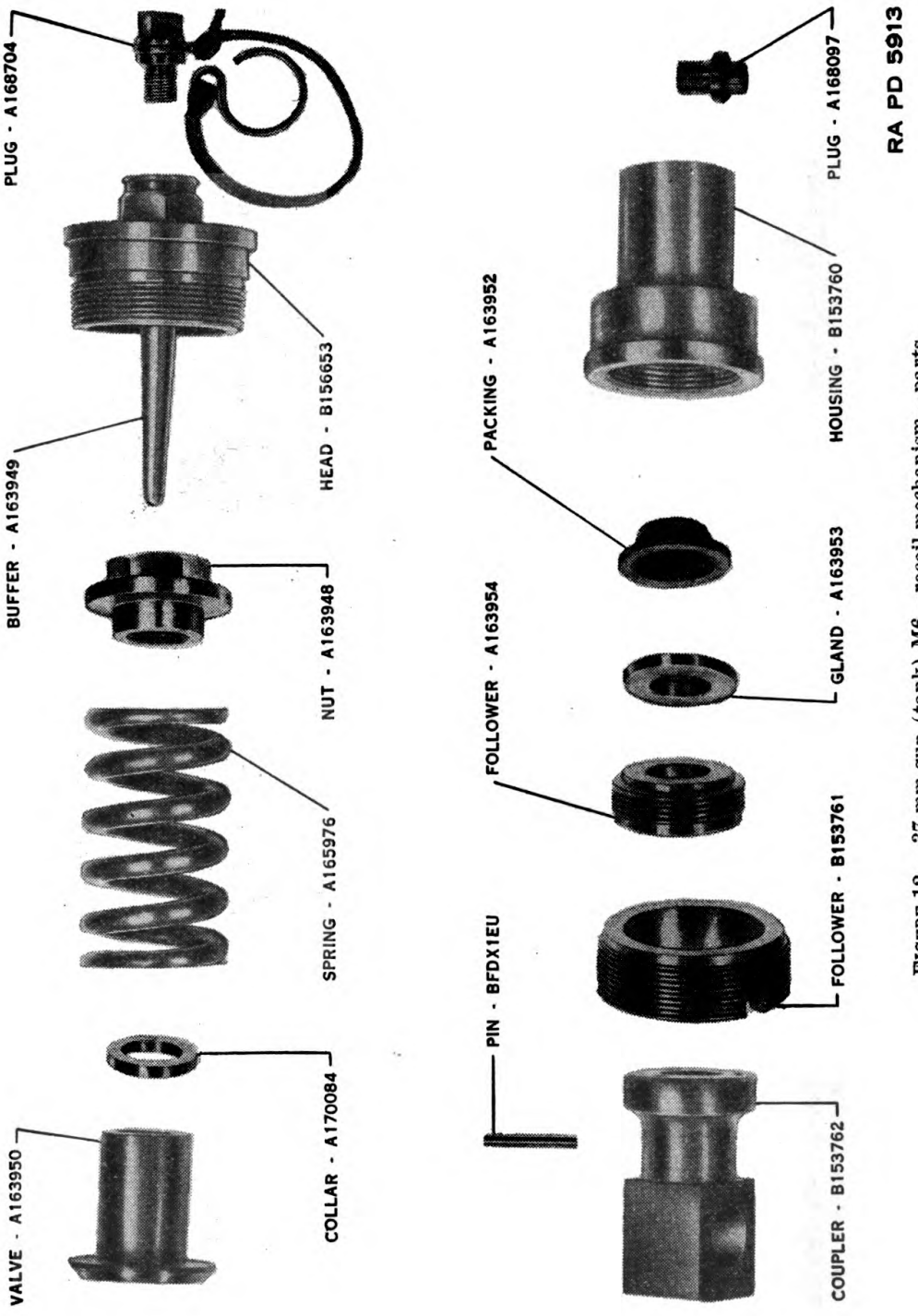


FIGURE 12.—37-mm gun (tank) M6—recoil mechanism—parts.

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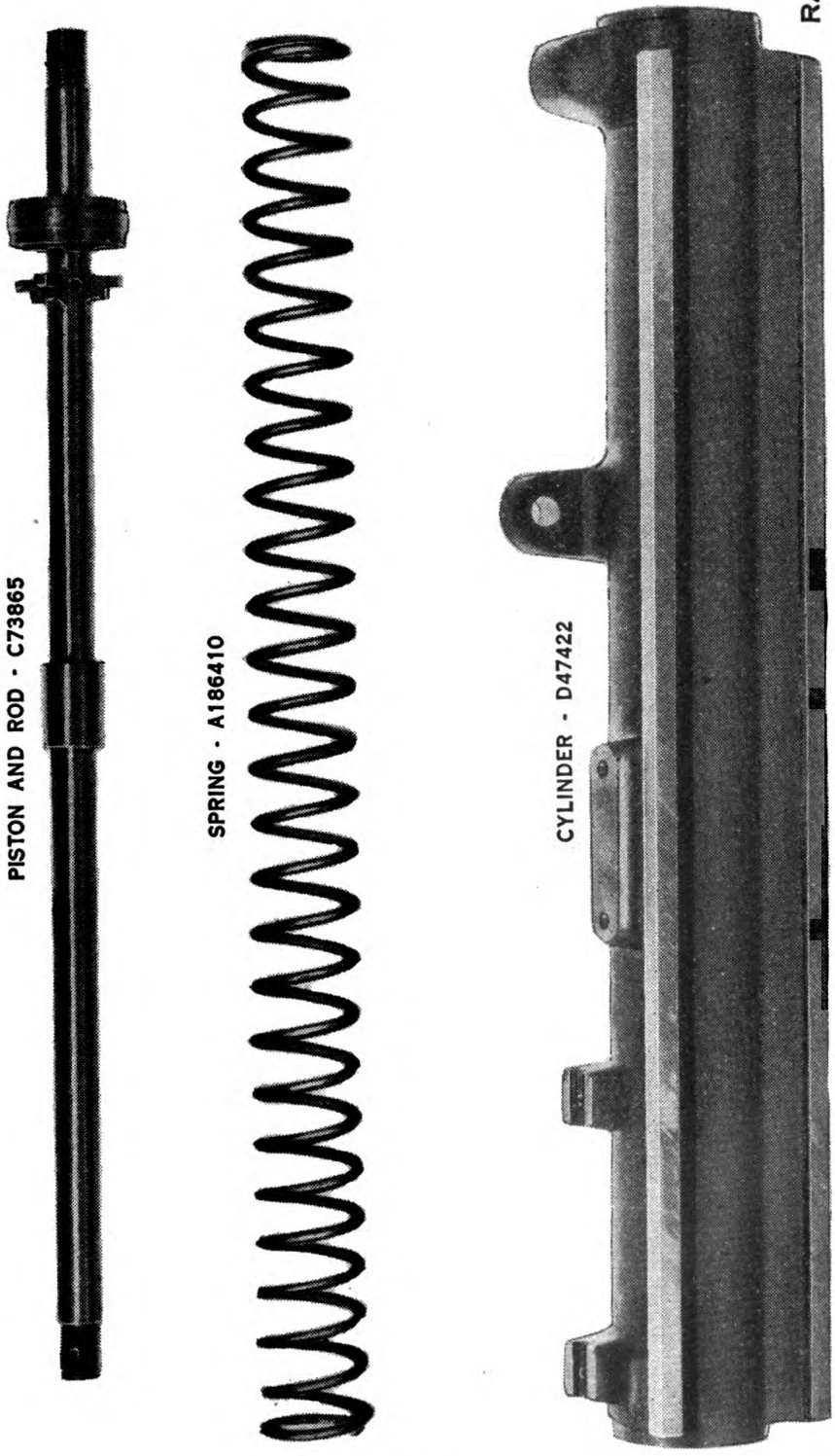


FIGURE 13.—37-mm gun (tank) M6—recoil mechanism—parts.

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SECTION IV

MAINTENANCE AND REPAIR

	Paragraph
General	8
Special tools	9
Maintenance and repair	10

8. General.—The maintenance and repair of the 37-mm tank guns M5 and M6 as covered in this manual is primarily a replacement of worn or broken parts. General assembly and disassembly of the guns are covered in FM 23–80 and FM 23–81.

9. Special tools.—Items comprising a set of special repair tools for the 37-mm tank guns M5 and M6, are listed in Section X of SNL A–35. Common tools are listed in SNL G–72. It is essential that only oilstones or very fine files be used in removing burs or rough surfaces.

10. Maintenance and repair.—*a. Gun as a unit.*—(1) *Failure to extract.*—Remove all burs and irregularities in chamber and deformations at edge of chamber. Replace broken extractors.

(2) *Weak ejection.*—Proceed as above and also remove any burs on camming surfaces of extractors and on breechblock. If the extractors bind on the pivots, lift off the extractors, remove all burs and rough spots on pivots and in extractor hubs, and then refit. In the case of the M6 gun, remove any burs from the round and flat surfaces on lower ends of extractors. Burs should also be removed from the shoulders on the sides of the breechblock (M6 gun) which support the extractors when breech is open.

(3) *Sluggish movement of block or failure to open or close fully.*—

(*a*) Remove all burs and rough spots from breechblock and extractors and from bearing surfaces in breech recess.

(*b*) In the case of the M6 gun, remove any rust or scale from crank cam and guide. Remove any dents on housing and straighten it if bent. If closing spring is distorted and binds the housing, replace the spring. If the breechblock fails to stay in open position, remove all burs on lower ends of extractors and on shoulders on which the extractors bear when breech is open.

b. Breechblock group (fig. 4).—(1) If breechblock bushing is not flush with front face of block, if threads between bushing and block are loose, or if firing pin hole is enlarged, replace the bushing. Drill two holes about 0.2 inch deep and about 1 inch apart on a center line of

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front face of bushing. Insert a spanner wrench into the holes and unscrew the bushing. Chase out the threads in the block, if necessary. The threads are 1½–16N–3. Screw in a new bushing and machine it flush with front face of breechblock. An alternate method of removing the bushing is to drive a cross-cut chisel or heavy center punch into the bushing face so as to rotate it counterclockwise.

(2) If cocking lever is rotated with difficulty, withdraw; remove all burs from its hub and recess, and refit. If the cocking lever plunger binds, withdraw it; clean the air channel, remove all rough spots, and refit. If the plunger does not bind but fails to retain the lower arm of cocking lever in most forward position possible, replace the plunger spring.

(3) Malfunctions of the firing mechanism may be due to a number of causes, such as damaged firing pin, binding between parts, and weak or broken springs. Remove and disassemble the mechanism. If the firing pin point is deformed, broken, or pitted, replace the firing pin. Remove all burs from the walls of the guide chamber in the breechblock and clean the chamber, being careful not to leave any foreign matter in the grooves. Remove all burs and irregularities from the guide, stop, and retainer. Pay particular attention to the sear lug on the guide and the seats for the retainer pin on the retainer. Replace the firing and retracting springs if they are broken, weak, or short of free length. The firing pin should never protrude beyond the breechblock face. If it does, replace the retracting spring.

(4) The threads in the guide and on the firing pin may be chased out, if necessary. The threads are ⅜–24NF–3. If the threaded joint is too lose, replace the firing pin and/or guide.

(5) If sear fails to engage sear lug of guide, replace the sear spring. Remove any burs on contacting surfaces of sear. If gun fails to fire and there is no percussion mark on primer, replace the sear spring, firing spring, or firing pin.

c. Breech ring group (fig. 6).—(1) Remove any irregularities on breech ring guide. Remove all burs and rough spots and any extraneous matter from bearing surfaces in breech recess. If the trigger plunger binds or functions sluggishly, withdraw it, clean the vents on the plunger, remove any burs, and refit. If plunger spring is weak or broken, replace it. If trigger and tripper show signs of fracture, replace them.

(2) Failure of extractor plungers to function properly may be due to weak springs or plugged air channels. Remove the plungers, clean

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the air channels, and refit. If necessary, replace the plunger springs.

(3) If extractor pivots are loose, new pivots should be pressed into the breech ring. In the M5 gun, each pivot is 1.66 inches long. In the M6 gun, the left-hand pivot is 1.31 inches long and the right-hand pivot is 1.66 inches long.

(4) If the cocking pin is broken, it should be replaced. Drill the cocking pin screw to a depth of about 0.5 inch, using a 5/32 drill. Remove the cocking pin screw with a screw remover. Insert a new cocking pin, flat end to the rear and wider shoulder to the left. Screw in the cocking pin screw, cut it off, and file it flush.

(5) Replace breech ring locking key and screw if loose or damaged.

d. Closing spring and housing group (M6 gun) (fig. 6).—(1) This group will ordinarily require very little repair. If the closing spring is weak, broken, or sufficiently distorted to bind in the housing, it should be replaced. Any dents in the housing should be removed and the housing straightened. If necessary, chase out the threads in the housing and housing body. The threads are 1.35–20NS–3. If the housing body screw is loose and damaged, replace it. The screw should be cut at assembly to clear the 4.75 inch diameter in the breech ring.

(2) Clean the housing body of all extraneous matter which might enter through the slot in the body and cause binding. If the lug on the closing spring locking pin is excessively worn or sheared off, replace the pin.

e. Tube.—There are no available data on gaging the tube, and all corrective measures must therefore be based on visual inspection. The bore should be cleaned and oiled in accordance with instructions given in paragraphs 12 and 13. The tube should be replaced if there are large pits and torn lands or excessive erosion at origin of rifling.

f. Breech operating machanism (M6 gun) (fig. 10).—Remove all dirt and scale from the camming surfaces of the crank cam and guide. If cam retaining plunger does not function properly, replace the plunger spring and stake the plunger bushing. Remove any scale or irregularities from the mating guideway for the breech ring guide.

g. Breechblock operating group (M5 gun) (fig. 8).—Clean the splines on the hub of the operating handle shaft and in the crank. If operating handle lever does not latch, replace the latch spring. If operating handle detent shows signs of fracture, replace it.

h. Recoil mechanism (fig. 11).—(1) If there is leakage of oil from cylinder, tighten all threaded parts and plugs. If leakage continues,

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replace gaskets. In removing gaskets, great care should be exercised to avoid damage to the gasket seat. If the soft copper gaskets at each end of the cylinder become hardened, they should be replaced. In an emergency, the hardened gaskets may be softened sufficiently for reuse by heating them to red heat and cooling in air or quenching. If the leather packing becomes hardened, replace it.

(2) The ring of antifriction metal on the piston forms an integral part of the piston. It may require occasional dressing, but if it is excessively worn or damaged beyond repair, replace the piston and rod.

(3) Slow and short recoil accompanied by excessive shock on the entire mechanism may be remedied by any of the following measures. Adjust (reduce) the amount of oil in the recoil cylinder to create a "void" which will compensate for expansion of the oil during firing. This procedure is also applicable if the gun fails to return completely into battery. Clean the valve and increase the valve lift to 0.022 inch by replacing the valve spring. A less desirable method is to back off the valve nut sufficiently to give a valve lift of 0.022 inch. If it is necessary to replace the valve collar, determine its thickness by trial (normal thickness is 0.187 inch). If recoil spring is short of free length, replace it.

(4) Fast and long recoil and excessive shock on mechanism may usually be remedied by refilling the cylinder with proper amount of oil. If necessary, reduce the valve lift to 0.022 inch by adjusting the valve nut on the piston. Replace the piston and rod if the antifriction piston ring is damaged beyond repair.

Section V

CARE AND PRESERVATION

	Paragraph
General	11
Cleaning	12
Lubrication	13

11. General.—*a.* This section contains instructions for care and preservation of the weapon by ordnance maintenance companies and all other personnel charged with the maintenance of this matériel. Detailed information pertaining to cleaning, preserving, and lubricating materials will be found in TM 9–850. The use of materials other than those authorized for the purpose mentioned is strictly forbidden.

b. Dirt and grit which accumulate on gun and in operating mechanism settle on bearing surfaces. This dirt and grit in combination with

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lubricant form a grinding compound. Powder fouling attracts moisture and hastens formation of rust. Therefore, the gun should be cleaned and lubricated before and after inspection and repair in order to eliminate malfunctions due to improper cleaning and oiling.

12. Cleaning.—*a. General cleaning.*—Dirt on nonbearing surfaces can usually be removed by water. Lubricated or other greasy parts must be cleaned with SOLVENT, dry-cleaning, applied with a rag.

b. Detailed cleaning.—(1) *Bore and breech recess.*—Remove breechblock and firing mechanism in breech ring. Thoroughly sluice and sponge bore and chamber with a solution of ½ pound of SODA ASH in 1 gallon of water, hot water and issue soap, or hot water alone. In the absence of these, use cold water. Then swab the bore and chamber with dry waste or rags until they are perfectly dry. Inspect the bore and chamber for any remaining residue. If they are not clean, repeat rinsing and drying. A small piece of burlap used as a patch over the end of brush on rammer is effective for cleaning the bore. When all powder fouling has been removed, dry the bore and chamber thoroughly and cover with a light coat of lubricating oil. Whenever soda ash solution is used for cleaning, all parts cleaned should be swabbed or rinsed with clear water, and dried, before oiling. All parts, surfaces, and recesses should be thoroughly dried before they are oiled. The parts of the firing mechanism removed from the breech ring should be cleaned with a dry rag and then wiped with an oily rag.

(2) *Breechblock.*—With a dry rag, clean dirt and oil from the breechblock and all its parts. Lubricate all recesses for moving parts with light oil. Wipe with an oily rag, leaving a thin coating of oil.

(3) *Outer surfaces of gun.*—Clean outer surfaces, using a damp rag or dry-cleaning solvent when necessary. Dry and wipe all exposed metal parts with an oily rag. Do not apply oil to painted surfaces.

13. Lubrication.—*a.* Excessive wear and resulting malfunctions can be prevented by keeping the matériel clean and well lubricated. Apply sufficient lubrication but avoid excessive and wasteful use of lubricants. Lubricate all recesses of moving parts with light oil and maneuver moving parts to cause even distribution of lubricant. For temperatures below 32° F. use SAE 10W oil; for temperatures above 32° F. use SAE 20 oil.

b. In temperatures below freezing, it is necessary that moving parts be kept absolutely free from moisture. It has also been found that excess oil on working parts will solidify to such an extent as to cause sluggish operation or complete failure.

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14. Standard Nomenclature Lists.

a. Ammunition.

Ammunition, fixed, all types, for pack, light, and medium field artillery ..... SNL R–1

b. Cleaning, preserving and lubricating materials, recoil fluids, special oils, and similar items of issue ..... SNL K–1

Soldering, brazing, and welding material, gases and related items ..... SNL K–2

c. Gun matériel.

Gun, 37-mm, M5 and M6 ..... SNL A–45

d. Repair.

Tools, maintenance, for repair of automatic guns, etc .. SNL A–35

Truck, small arms, repair, M1 ..... SNL G–72

15. Explanatory publications.

a. Ammunition, general ..... TM 9–1900

b. Cleaning, preserving, lubricating and welding materials and similar items ..... TM 9–850

c. Gun matériel.

37-mm gun, tank, M5 ..... FM 23–80

37-mm gun, tank, M6 ..... FM 23–81

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Ordnance maintenance procedure, matériel inspection and repair ..... TM 9–1100

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[A. G. 062.11 (12–5–41) PC–C]

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DISTRIBUTION: D17(2) IBn 9(2); IC 9(4).

(For explanation of symbols see FM 21–6.)

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