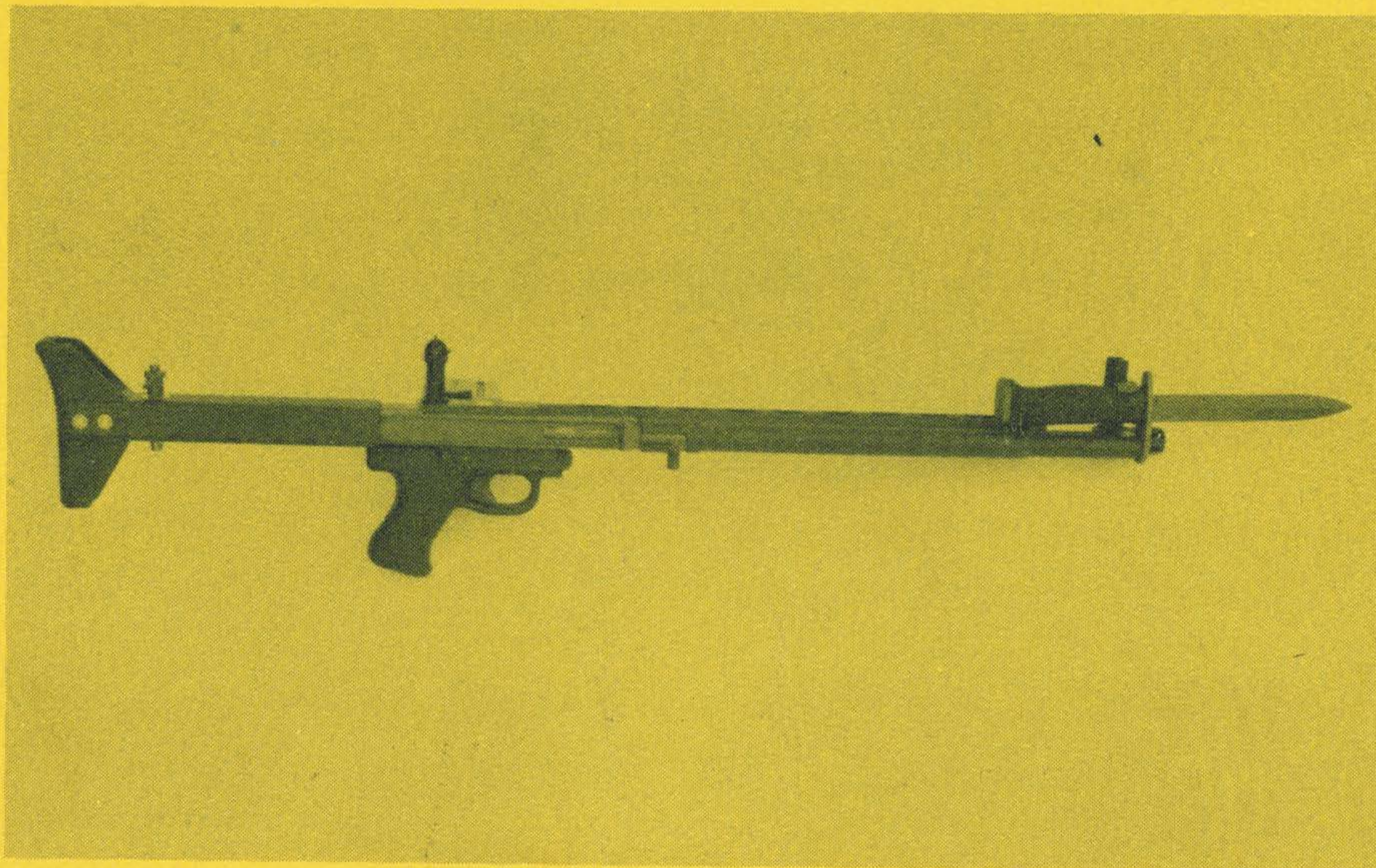


TECHNICAL MANUAL
OPERATION AND MAINTENANCE

5.56mm
LOW MAINTENANCE RIFLE

7 MARCH 1973
CONTRACT DAADO5-71-C-0260



TRW
SYSTEMS GROUP

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Prepared for
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and
U.S. Army Small Arms Systems Agency
by

TRW
SYSTEMS GROUP

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Technical Manual
Operation and Maintenance

5.56mm

LOW MAINTENANCE RIFLE

1.0 INTRODUCTION

This manual provides operation and maintenance instructions for the ARPA/TRW Low Maintenance Rifle, 5.56mm. It contains a detailed description of the rifle and its general characteristics, procedures for disassembly and assembly, operation and functioning of the rifle, types of ammunition and maintenance. Throughout the text the rifle will be referred to as LMR.

2.0 DESCRIPTION OF THE RIFLE

a) The rifle, LMR (Figures 1 and 2) is a 5.56mm magazine-fed, gas operated, air-cooled, shoulder weapon. It is designed for use only as an automatic weapon and functions from the open bolt position. It accepts the same 20 and 30 round magazines as the M-16 series rifles, but they are inserted from the left side rather than the bottom. The LMR is adapted to the Bayonet M6.

b) The LMR is equipped with a flash suppressor/compensator and a dust cover for the ejection port which is automatically positioned.

c) The rifle is fabricated from corrosion-resistant materials and is semi-permanently lubricated by the dry film process.



FIGURE 1. LOW MAINTENANCE RIFLE, RIGHT SIDE



FIGURE 2. LOW MAINTENANCE RIFLE, LEFT SIDE

3.0 GENERAL DATA

a) Weights

Rifle without magazine	7.26 lb
Empty magazine (30 round capacity)	.24 lb
Full magazine (30 rounds)	.74 lb
Firing weight (fully loaded)	8.0 lb
Bayonet, M6	.6 lb
Scabbard, M8A1	.3 lb

b) Lengths

Rifle and the bayonet, M6	40.0 in
Rifle overall with flash suppressor	34.3 in
Barrel (without flash suppressor)	19.4 in

c) Sights

Front - post adjustable \pm 5 mils for zero
Rear - dual range peep 0-300 meters, 300-500 meters
Sight Radius: 21 inches

d) Ammunition

Caliber 5.56mm (complete round)	182 grains
Projectile	55 grains
Types	Ball M193 Tracer M196

e) Performance Characteristics

Muzzle speed	3250 ft/sec
Muzzle energy	1290 ft-lb
Cyclic rate of fire	450 rounds/minute
Maximum rate of fire	~120 rounds/minute
Sustained rate of fire	~30 rounds/minute
Maximum range	2650 meters
Maximum effective range	460 meters

4.0 FUNCTIONAL SEQUENCE

Starting with rifle in the seared position, pulling the trigger rotates the sear nose downward out of engagement with the bolt face. This allows the spring wrapped around the operating rod to drive the operating slide, ejection port cover, and bolt assembly forward, stripping a round from the magazine and ramming it into the chamber. As the cartridge shoulders in the chamber, the extractor claw rides over the rim of the case and snaps into the extractor groove. At the same time the locking wedge forces the locking rollers partially out of the bolt up and down into recesses in the receiver to lock the bolt. Continued forward motion after locking causes the striker, located on the front of the locking wedge, to protrude through a hole in the bolt face and impact the primer of the chambered cartridge.

The cartridge fires and drives the bullet down the barrel. As it passes a port in the right side of the barrel near the muzzle, some of the powder gas is diverted into a cylinder on the right side. This drives a piston attached to the operating slide assembly rearward. For the first 1/4 inch of rearward travel the operating slide moves independently of the locking wedge. For the next 0.3 inch, the wedge is being withdrawn but continues to support the rollers holding the bolt locked. During this period the projectile exits the bore and the pressure decays. After 3/4 inch of slide travel the wedge no longer supports the rollers and the operating slide collides with and picks up the bolt. This cams the rollers into the bolt to unlock it. Continued motion opens the bolt to extract the cartridge. After 3-1/4 inches of bolt travel the fired case contacts a stud on the receiver and is ejected to the right through a port in the operating slide. After ejection the bolt and slide continue rearward, picking up the ejection port cover and carrying it rearward to close the port. Normally, the operating spring stores the moving parts energy and stops them just prior to slide contact with the buttstock, which acts as a buffer. If the trigger remains pulled, the spring relaxes and drives the mechanism forward to repeat the cycle until the magazine is empty. If released, the sear stops the bolt just to the rear of the ejection position and with the ejection port closed.

5.0 PREPARATION FOR USE

This section contains receiving inspection requirements and servicing procedure for the LMR.

5.1 Receiving Inspection

The rifle is provided with a rigid plastic foam-lined shipping and storage container (Figure 3) which contains the rifle, sling, bayonet with scabbard, a 20-round magazine, and a 30-round magazine. Upon receipt of the rifle and accessories, verify that nothing has been damaged during shipment. Report all damaged or missing items to responsible personnel.

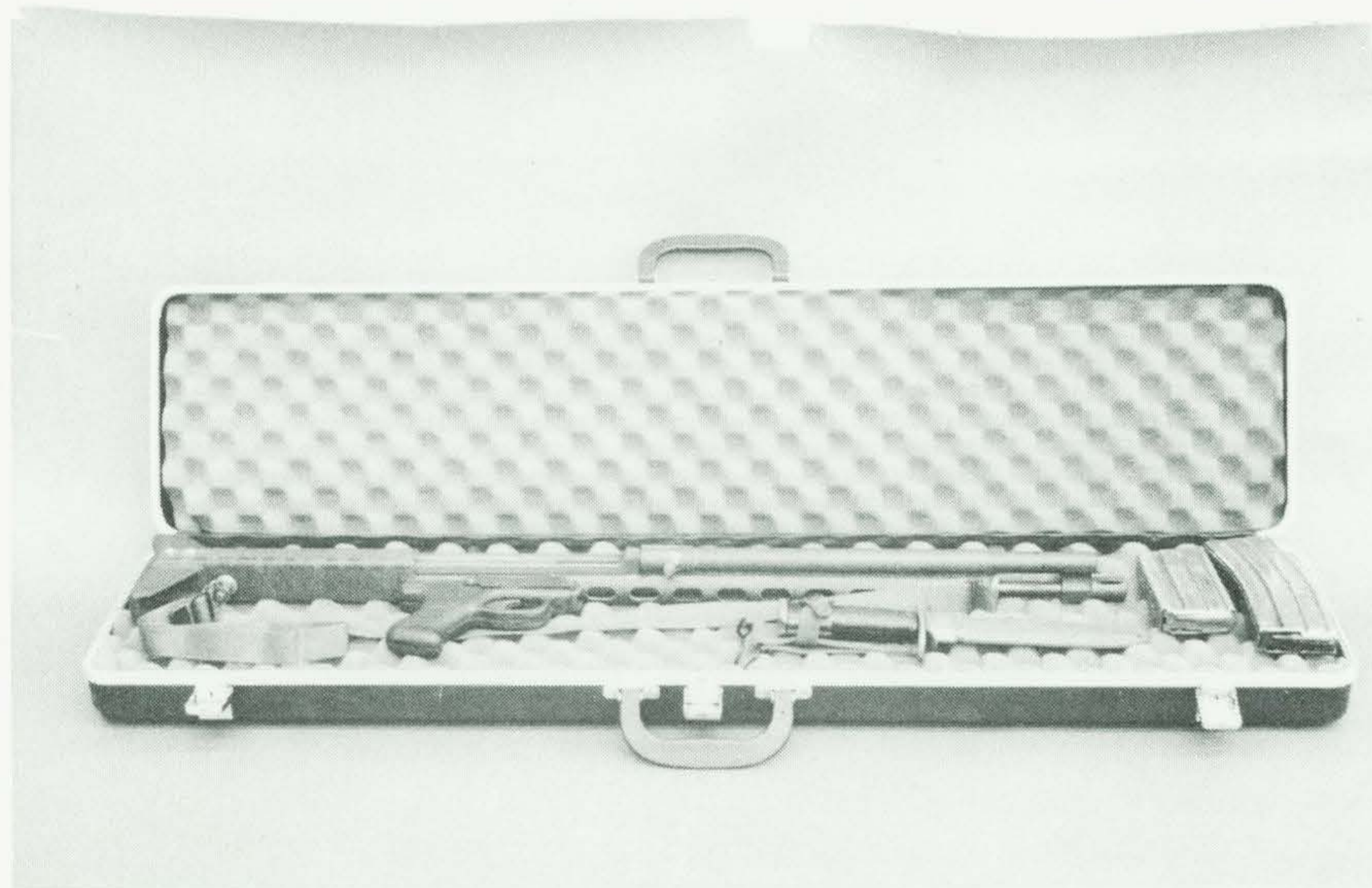


FIGURE 3. LMR AND ACCESSORIES IN STORAGE CONTAINER

5.2 Servicing Procedure

Perform the following servicing procedure after verifying that there are no damaged or missing items.

a) Remove any preservative, corrosion, or firing residue from the weapon and its accessories.

b) The rifle is designed to operate without oil under normal conditions. If necessary, retouch the dry film lube using the spray can of dry-lube in the tool kit.

6.0 OPERATING INSTRUCTIONS

This section contains instructions for firing the LMR, and adjusting and zeroing the sights.

6.1 Firing the Rifle

The mechanical arrangement of the rifle and its ejection pattern are such that it is normally intended for right hand firing. In case left hand firing is attempted, keep the face clear of the ejected cases. Perform the following steps to fire the LMR.

a) Examine bore and chamber to verify that the barrel is free from foreign material.

b) Check ammunition for corrosion or foreign matter.

c) Verify safety lever (located at left rear of pistol grip) is on safe (down) and the bolt is in the open position.

d) Insert loaded ammunition magazine until locked by magazine latch.

e) Position safety lever in the fire (up) position.

f) Align rifle on target and fire by depressing trigger.

WARNING

The LMR functions only in the automatic mode, i.e., it will continue to fire until the trigger is released or the magazine is empty.

6.2 Immediate Action in Case of Malfunction

The following sequential procedure should be observed by the shooter in case of malfunction:

- a) Keep the rifle pointed in a safe direction.
- b) Remove the magazine.
- c) Wait 5 seconds in case of hangfire.
- d) Retract the operating slide and verify sear engagement.
- e) If ejection is not observed, check chamber and action visually for possible presence of live cartridge or fired case. Remove or fire out if present.
- f) Replace magazine and resume fire.

6.3 Sight Adjustment and Zeroing

6.3.1 Range Adjustment

The rear sight consists of two peeps on a pivot so that one is raised as the other is lowered. The unmarked peep is intended for ranges to 300 yards; the one marked L is for ranges 300-500 yards.

6.3.2 Zeroing Adjustments

The front sight is adjustable to zero the sights only, using the adjustment tool (Figure 4) in the spares and tool kit. Figure 5 shows the tool installed on the front sight for adjustment. The instruction card accompanying the tool provides detailed data on how to adjust the impact pattern, first for vertical and finally for lateral position. It is reproduced as Figure 6.

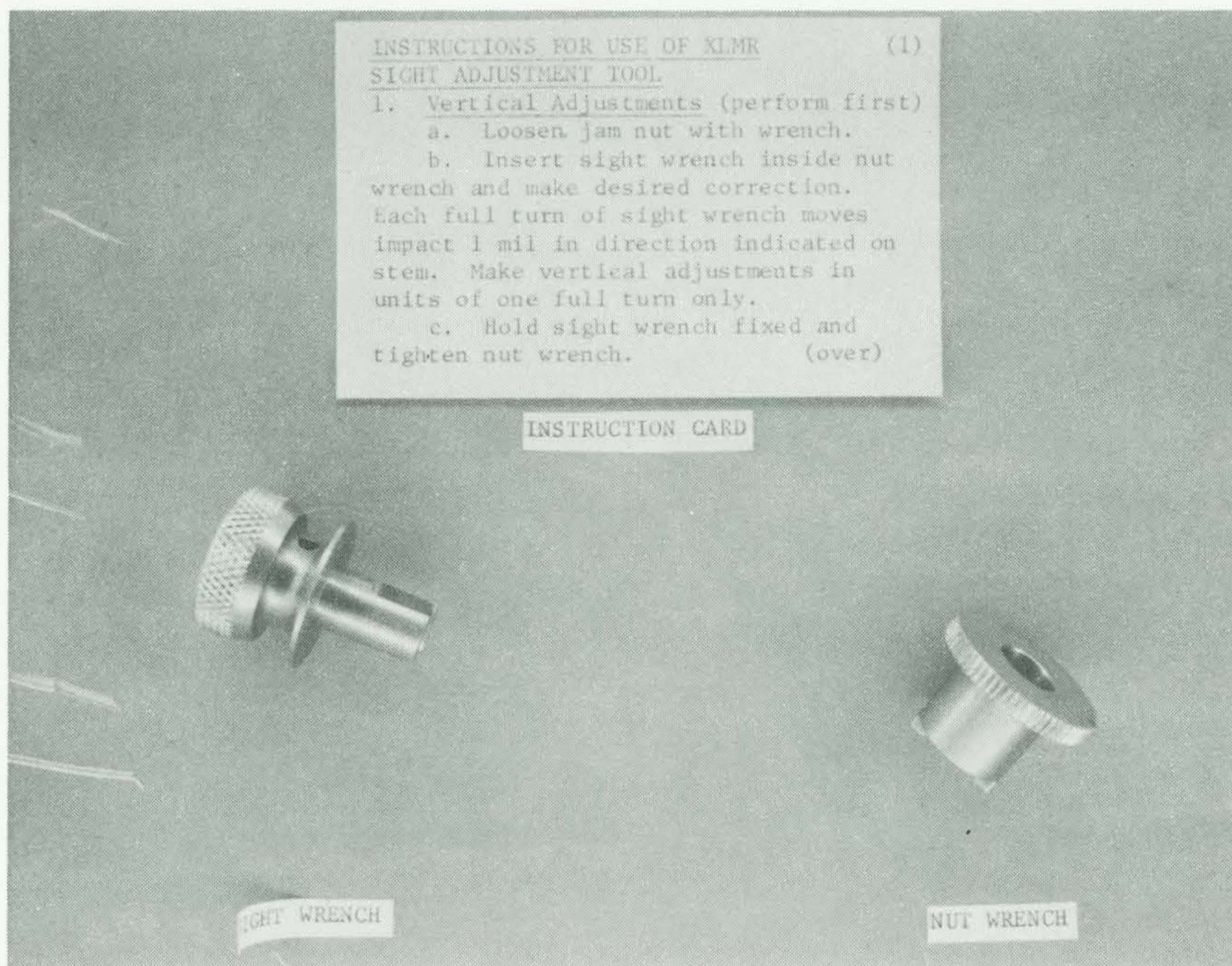


FIGURE 4. FRONT SIGHT ADJUSTMENT TOOL

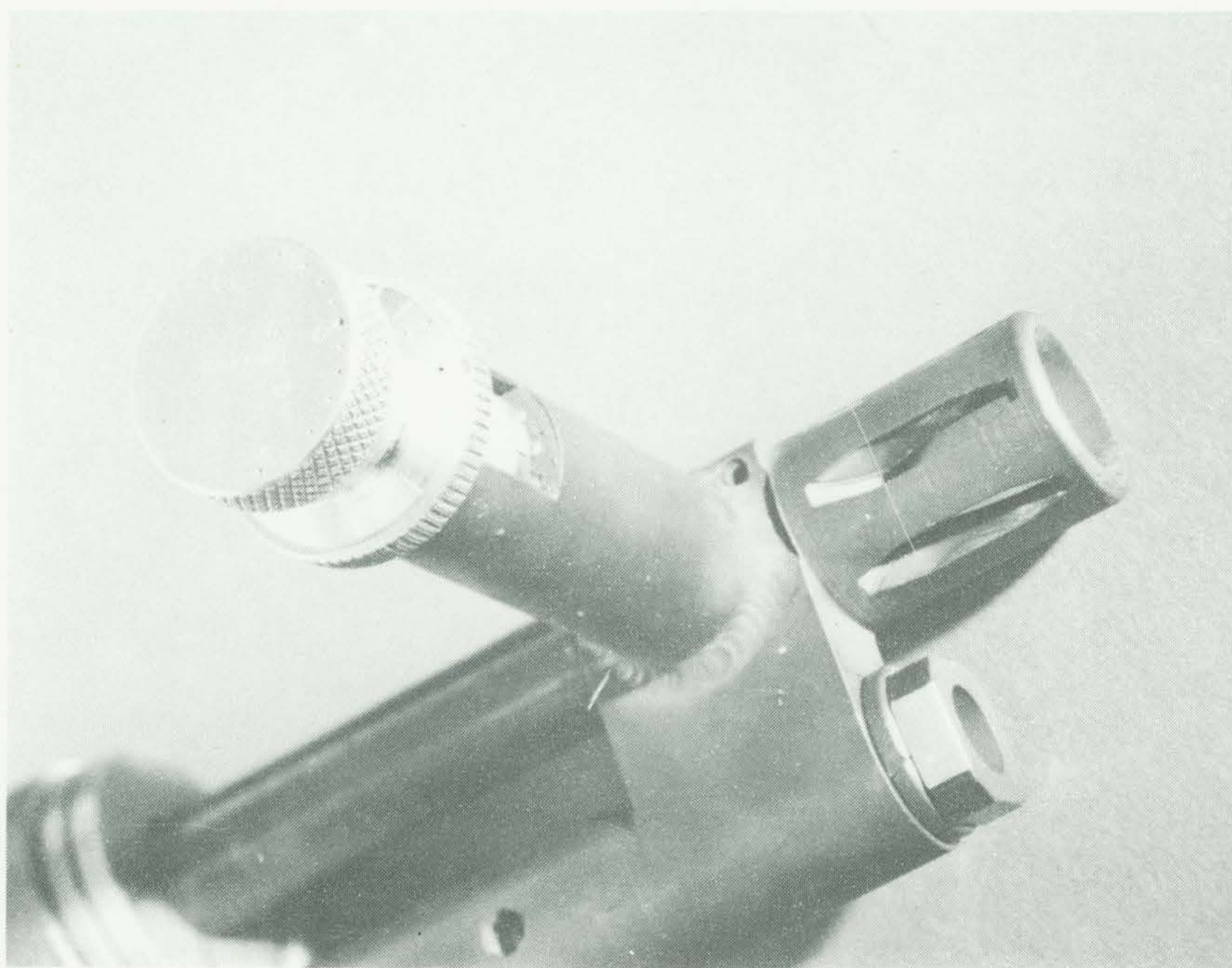


FIGURE 5. SIGHT TOOL INSTALLED FOR ZEROING

INSTRUCTIONS FOR USE OF LMR (1)
SIGHT ADJUSTMENT TOOL

1. Vertical Adjustment (perform first)

- a. Loosen jam nut with wrench.
- b. Insert sight wrench inside nut wrench and make desired correction. Each full turn of sight wrench moves impact 1 mil in direction indicated on stem. Make vertical adjustments in units of one full turn only.

c. Hold sight wrench fixed and tighten nut wrench. (over)

INSTRUCTIONS FOR USE OF LMR (2)
SIGHT ADJUSTMENT TOOL (CONTINUED)

2. Lateral Adjustments (perform after vertical adjustment described on reverse).

- a. Loosen jam nut until red dot lines up with zero on dial of sight wrench.
- b. Make desired correction using dot as reference, by turning sight wrench as indicated on dial.
- c. Hold sight wrench fixed and tighten nut wrench. (over)

FIGURE 6. FACSIMILE OF INSTRUCTION CARD FOR SIGHT TOOL

6.4 Bayonet Installation

The bayonet M6 may be attached to the rifle as shown in Figure 7. The ring on the guard engages the gas cylinder plug and the latch in the bayonet handle engages the lug on the rear of the gas cylinder.

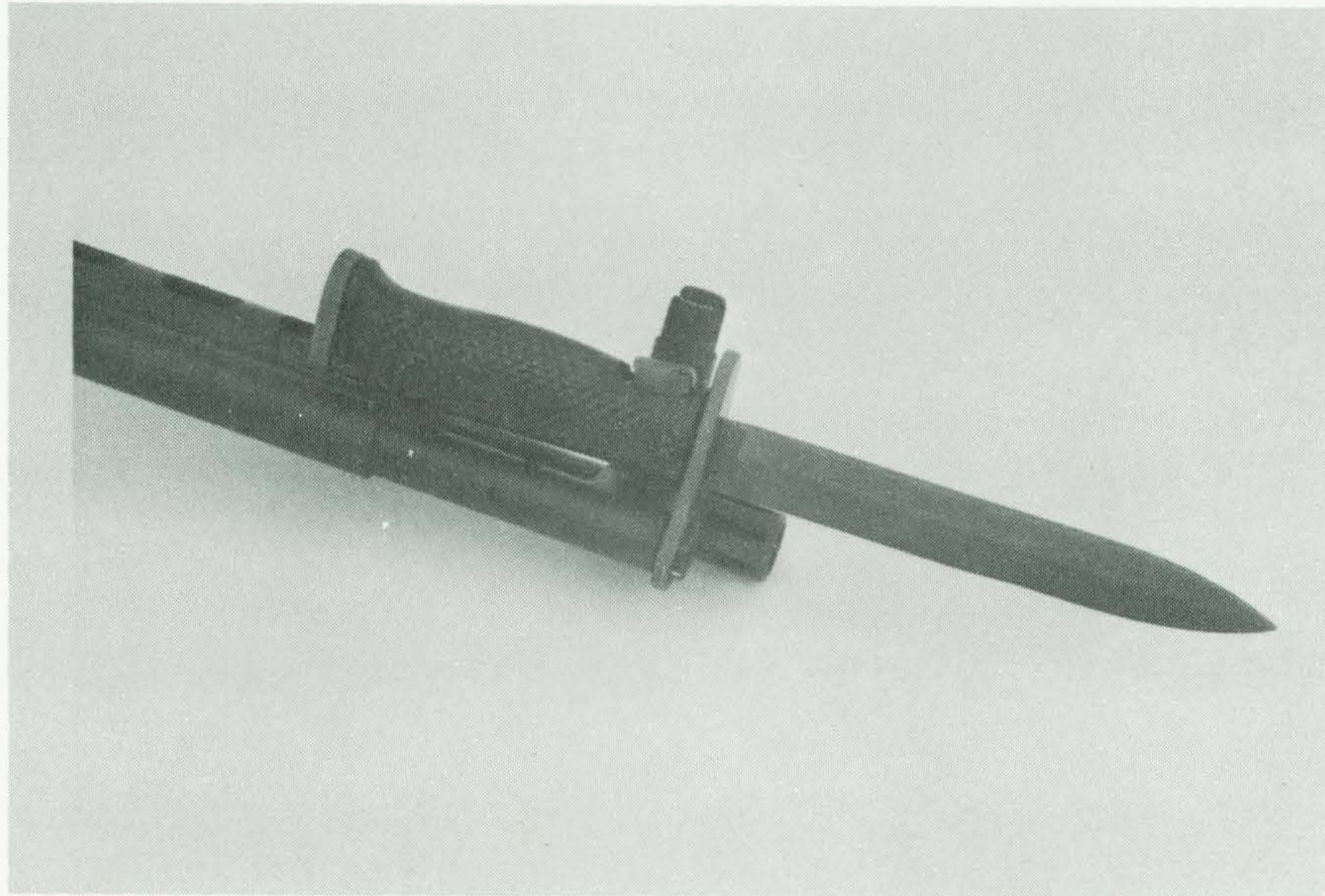


FIGURE 7. BAYONET ATTACHED TO GAS CYLINDER

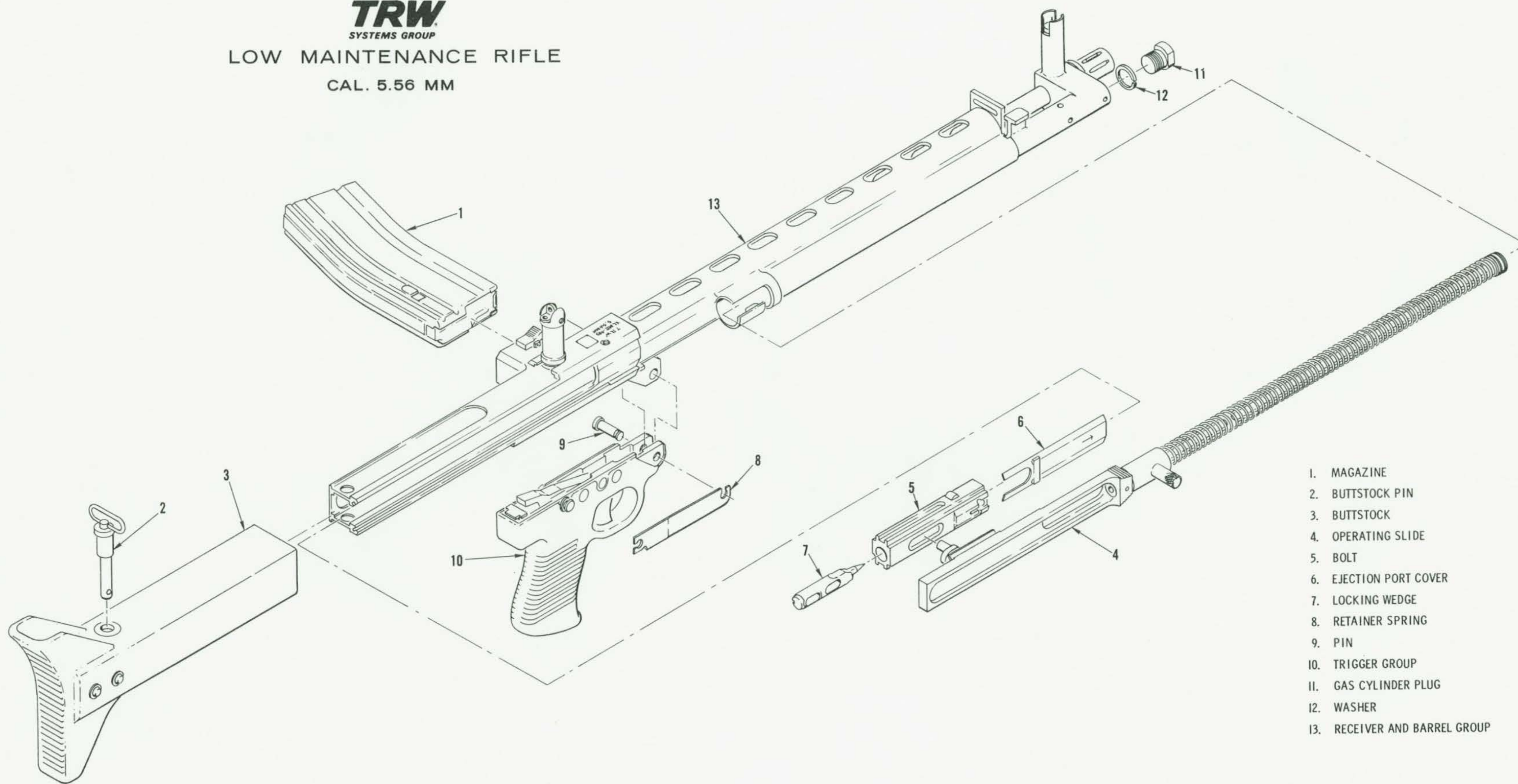
7.0 MAINTENANCE INSTRUCTIONS

This section provides instructions for disassembly and assembly of the LMR and maintenance requirements and procedures.

7.1 Disassembly Instructions

The LMR can be easily and quickly disassembled into 6 major groups, namely: magazine, buttstock, operating slide group, trigger group, gas cylinder plug and barrel-receiver group. The disassembly can be accomplished in a number of different sequences but will be outlined in the above order. Refer to exploded view Figure 8 for parts and nomenclature.

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 LOW MAINTENANCE RIFLE
 CAL. 5.56 MM



1. MAGAZINE
2. BUTTSTOCK PIN
3. BUTTSTOCK
4. OPERATING SLIDE
5. BOLT
6. EJECTION PORT COVER
7. LOCKING WEDGE
8. RETAINER SPRING
9. PIN
10. TRIGGER GROUP
11. GAS CYLINDER PLUG
12. WASHER
13. RECEIVER AND BARREL GROUP

FIGURE 8. LMR - PARTIALLY EXPLODED VIEW

Magazine Removal

- a) Depress magazine release catch and simultaneously withdraw magazine (Figure 9).



FIGURE 9. MAGAZINE REMOVED

Buttstock Removal

- a) Depress center lock post of buttstock pin and simultaneously withdraw buttstock pin from buttstock (Figure 10).

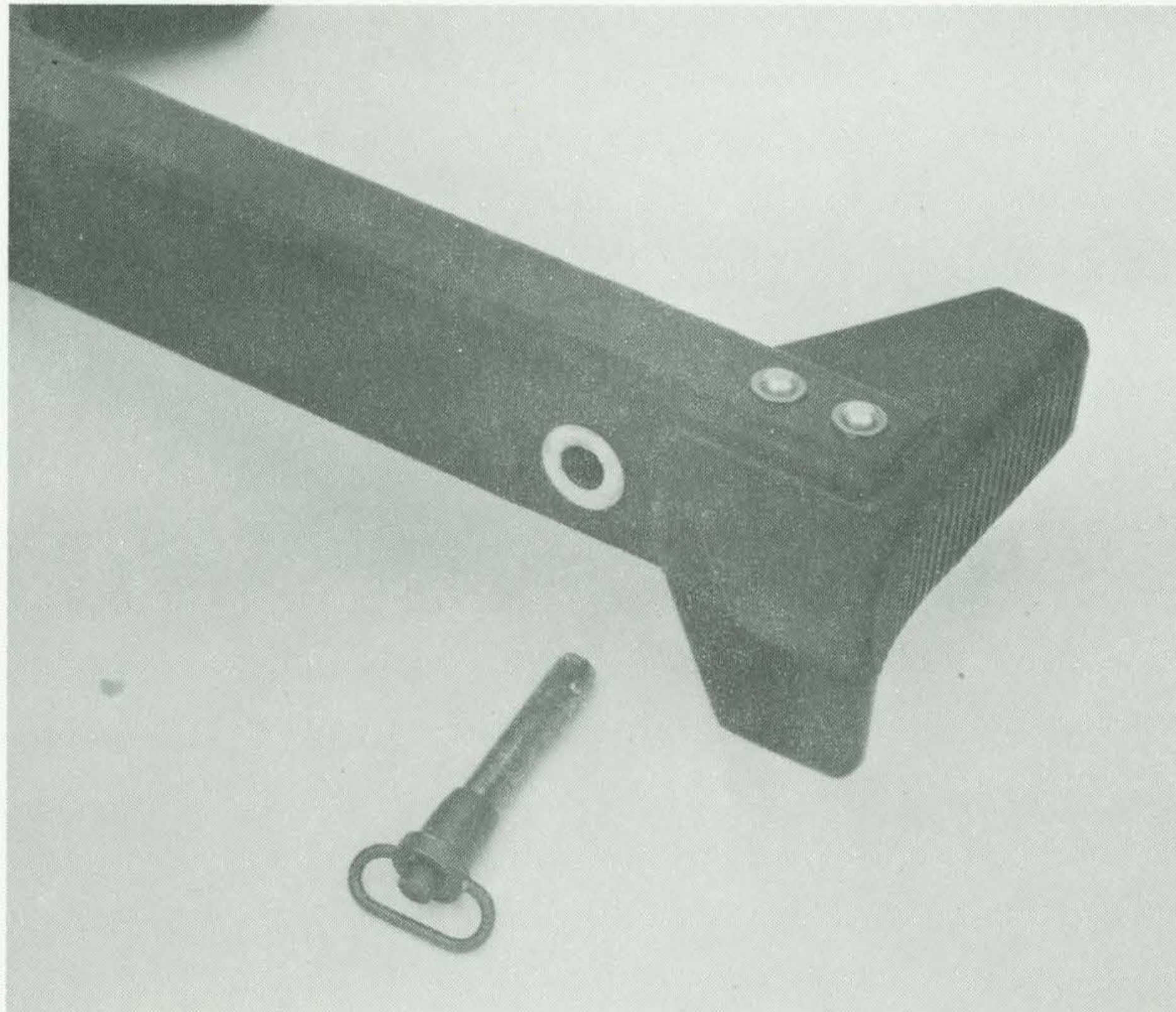


FIGURE 10. BUTTSTOCK PIN WITHDRAWN

b) Pull buttstock rearward to complete removal (Figure 11).

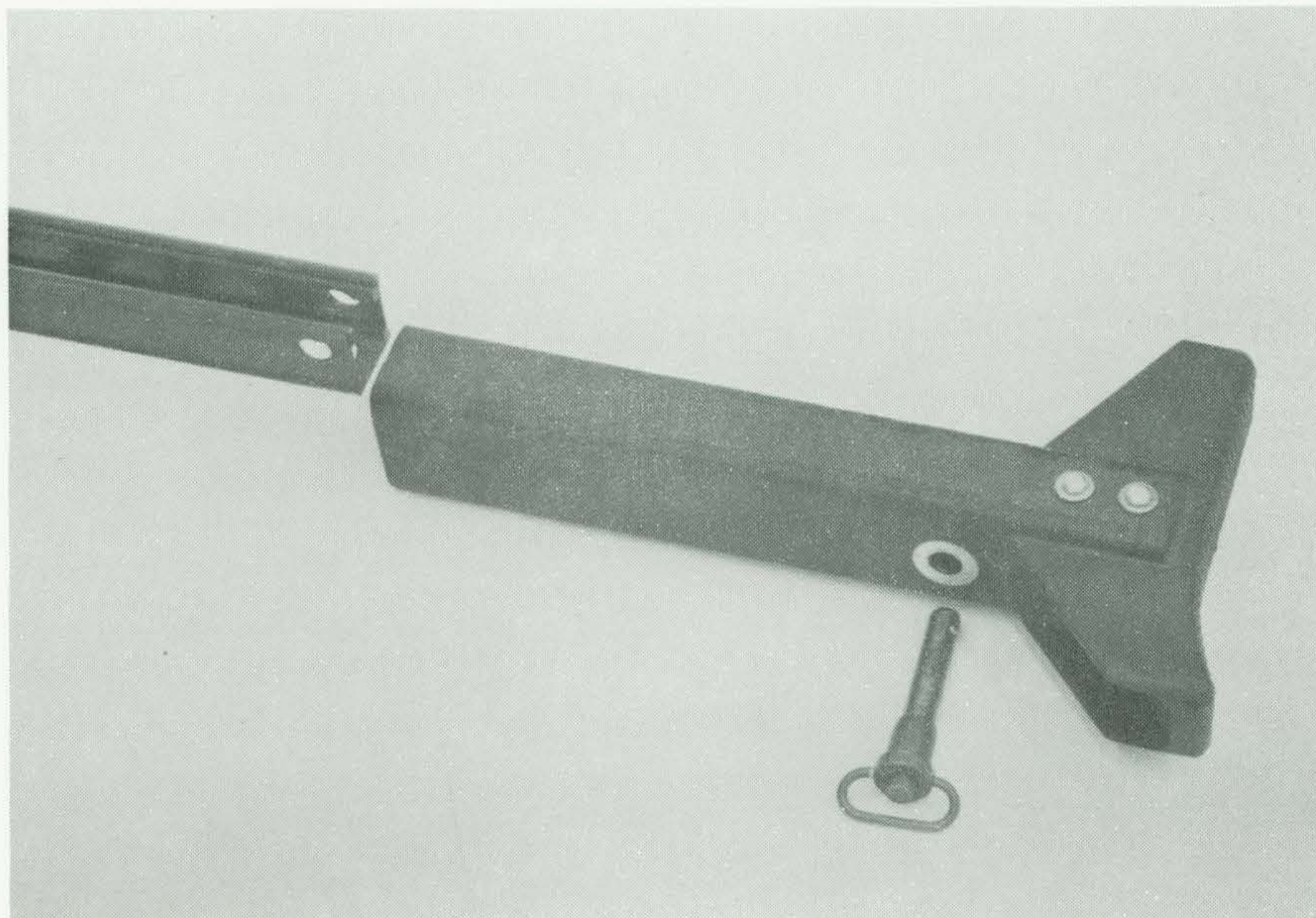


FIGURE 11. BUTTSTOCK REMOVED

Operating Slide Group Removal and Disassembly

- a) Push forward and rotate take down latch on operating slide 1/4 turn counterclockwise (Figures 12 and 13).



FIGURE 12. TAKEDOWN LATCH - LATCHED



FIGURE 13. TAKEDOWN LATCH - UNLATCHED

b) Withdraw operating slide assembly, bolt and locking wedge by sliding rearward (Figure 14).

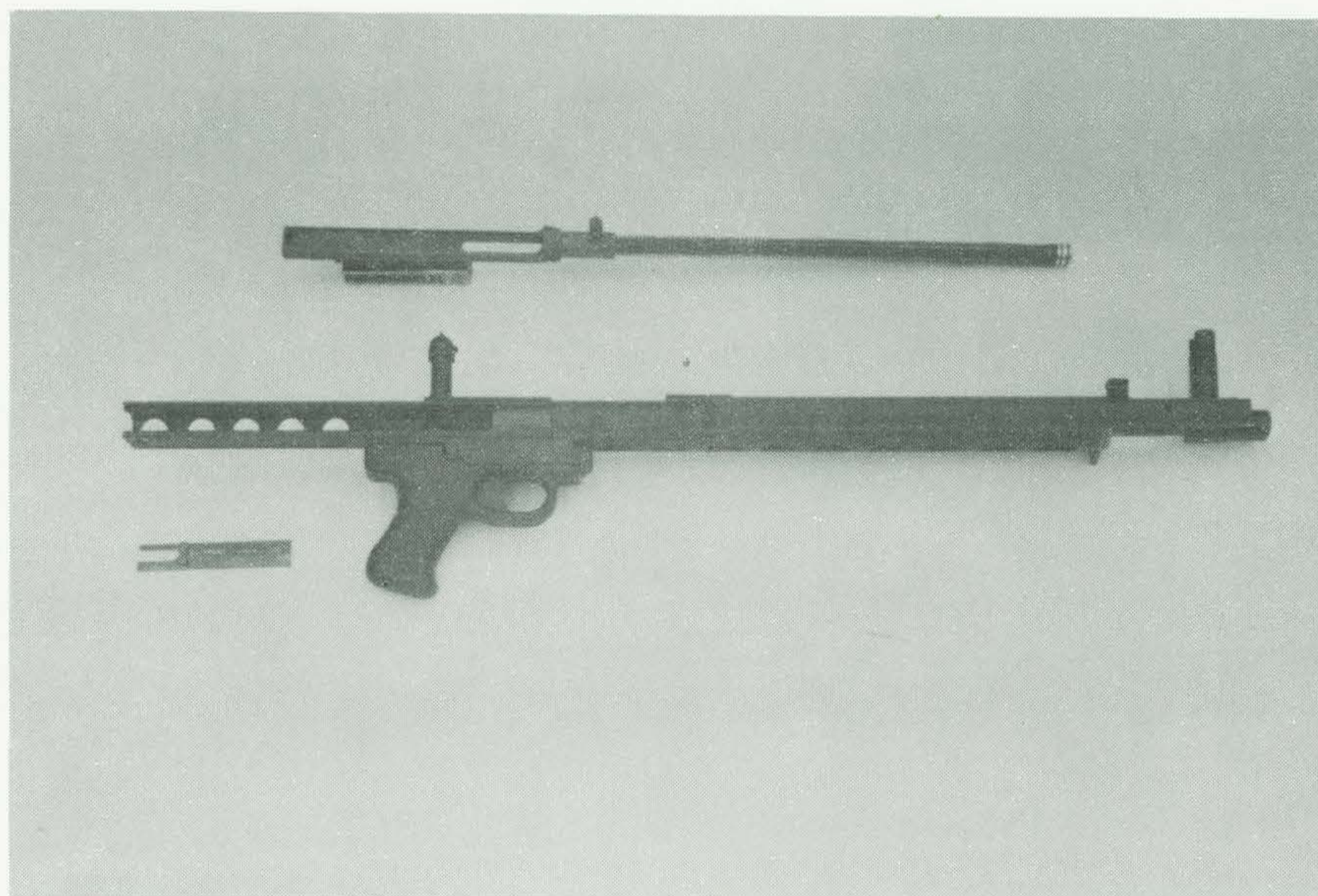


FIGURE 14. OPERATING SLIDE GROUP WITHDRAWN

- c) Separate bolt from operating slide drive stud.
- d) Remove locking wedge from bolt by sliding to rear (Figure 15).



FIGURE 15. BOLT AND LOCKING WEDGE SEPARATED

e) Slide ejection port cover rearward out of its weapon track in the receiver if it did not come free with operating slide.

Trigger Group Removal

a) Depress front end, rotate, and remove retainer spring (Figure 16).



FIGURE 16. RETAINER SPRING REMOVAL

b) Remove pin from trigger assembly body.
c) Pull trigger and slide trigger assembly rearward and remove (Figure 17).

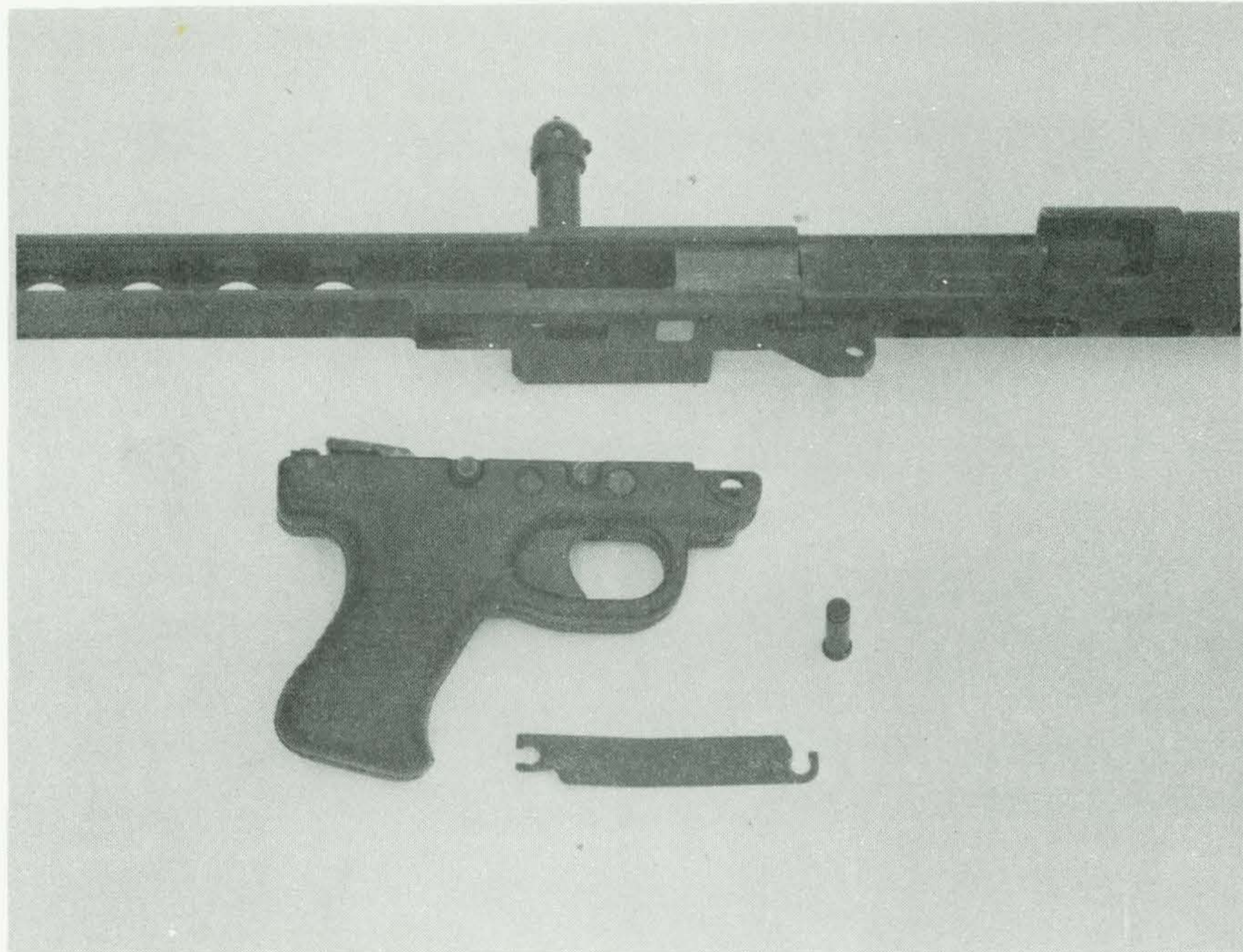


FIGURE 17. TRIGGER GROUP REMOVED

Gas Cylinder Plug Removal

- a) Unscrew and remove gas cylinder plug and washer using 5/8" open-end wrench (Figure 18).

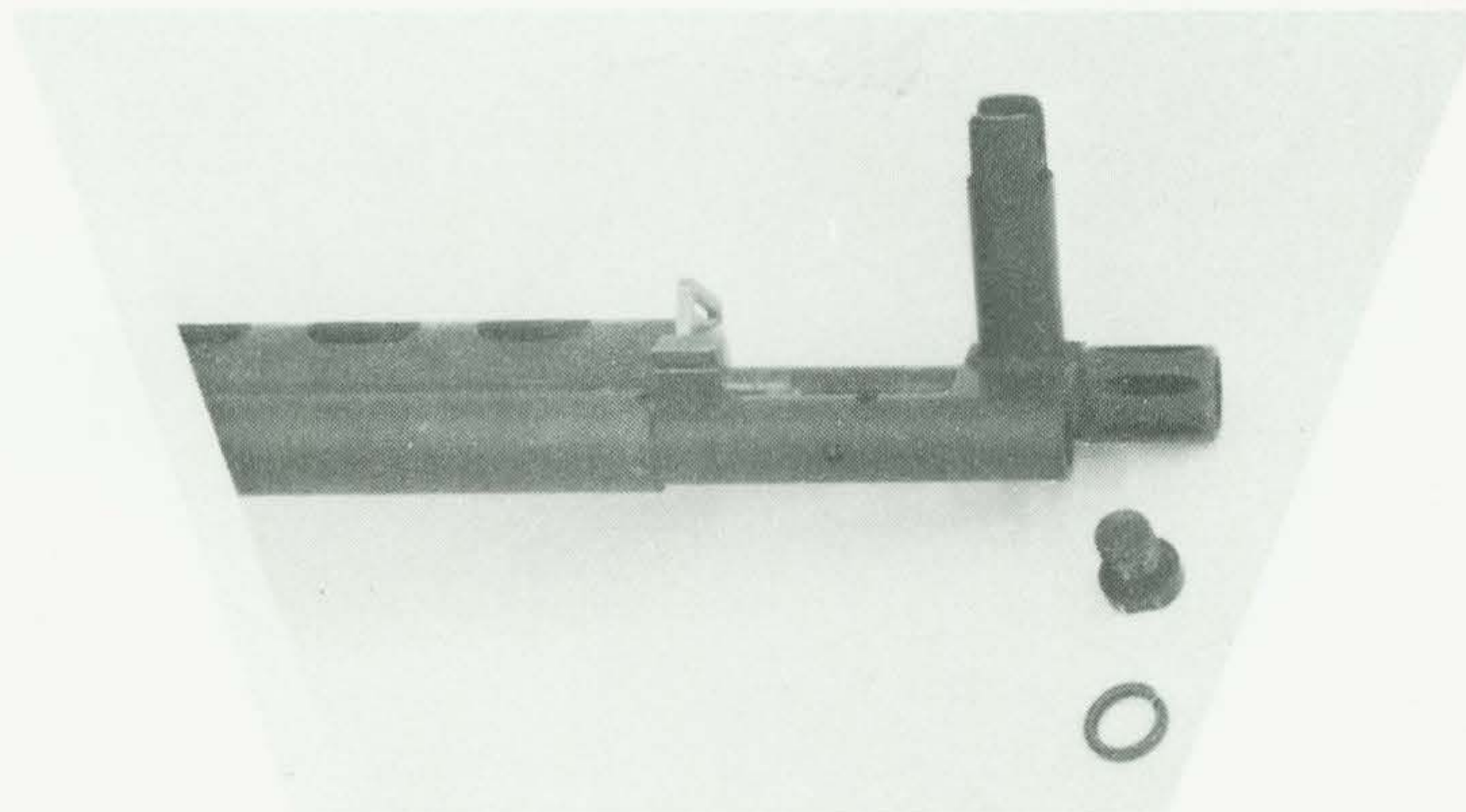


FIGURE 18. GAS CYLINDER PLUG REMOVED

DISASSEMBLY COMPLETED. This completes field disassembly of the LMR (Figure 19).

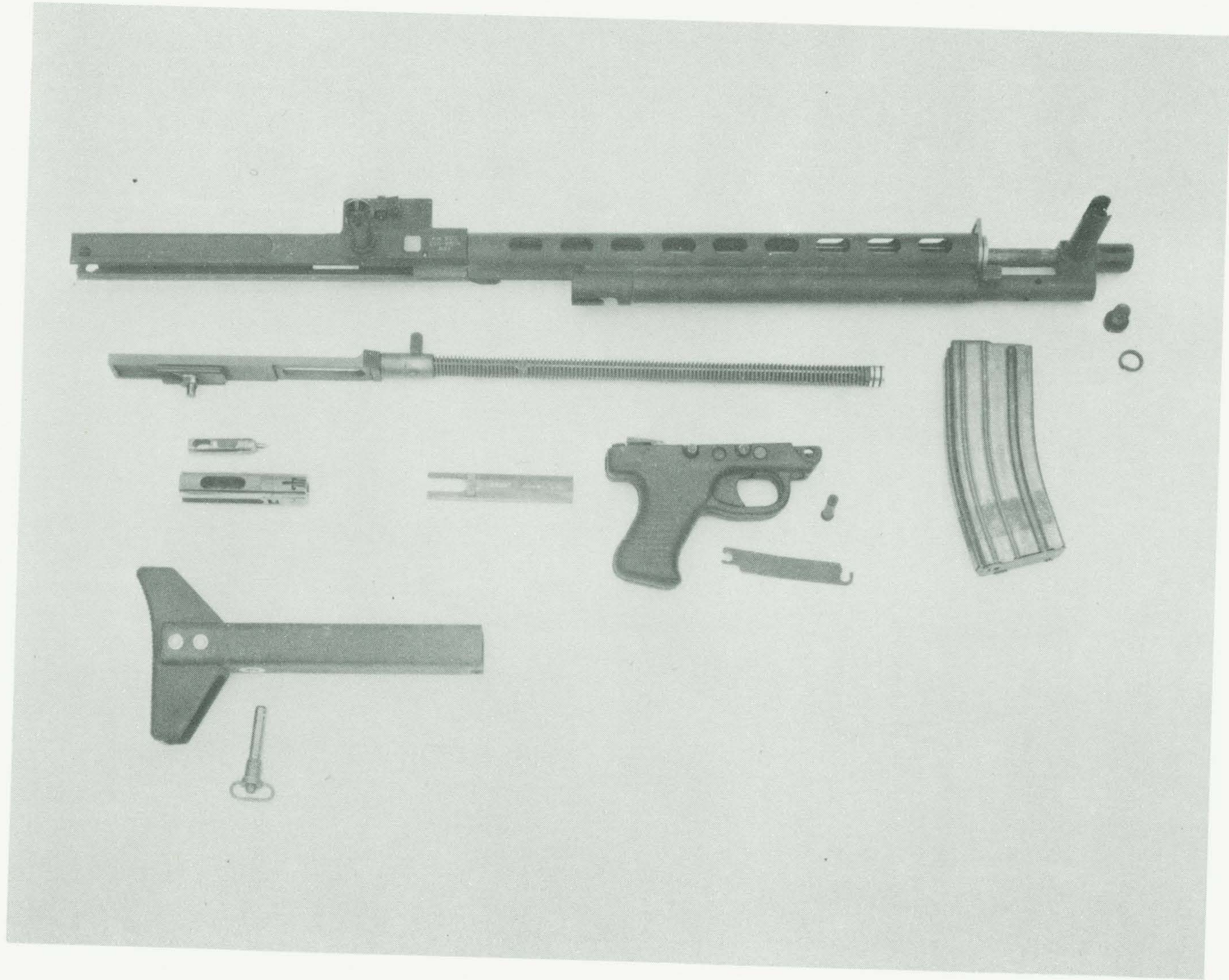


FIGURE 19. LMR FIELD STRIPPED

Further disassembly is not normally required except for repair or parts replacement, which should be normally accomplished by ordnance personnel.

7.2 Assembly Instructions

To assemble the weapon the above procedure is reversed, taking care to install the ejection port cover as indicated thereon and with its drive lug trapped between the driving lugs on the operating slide.

7.3 Maintenance Instructions

The LMR, as the name implies, requires only minimal maintenance to insure reliable functioning. Components are either corrosion resistant or provided with protective coatings against normal corrosive environments. The barrel bore and chamber are hard chrome plated to minimize not only corrosion but erosion from automatic fire and buildup of powder fouling.

7.3.1 Cleaning

Occasional cleaning of the moving parts is necessary to remove accumulated powder fouling, brass shavings from the cartridge cases, and foreign matter such as dust. Fresh water and a toothbrush or lint-free rag are recommended cleaning implements. Particular attention should be given to the gas piston and cylinder, where powder and metal fouling can build up, especially when firing tracer rounds. Use of a wire bore brush or metal scraper, inserted through the access hole on the front of the cylinder, is recommended. Snapping the mechanism several times with the rifle unloaded will also help to clean this buildup of fouling in the cylinder.

7.3.2 Lubrication

The rifle has a semi-permanent dry film lubricant applied to wearing surfaces. It is superior to oil because it does not tend to collect dirt. At approximate 2000 round intervals this should be inspected and touched up in high wear areas using the spray can of dry film lubricant contained in the spares and tool kit. In lieu of the above, a very small amount of LSA or other light small arms oil may be applied to the bolt, rollers, locking wedge, and slide area, except in extremely cold environments where the oil might freeze. As with other rifles, the LMR will not operate when clogged with dust, sand or mud. Keep it clean!