TM 9-1015-223-12

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DATED 2 February 1962
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TECHNICAL MANUAL

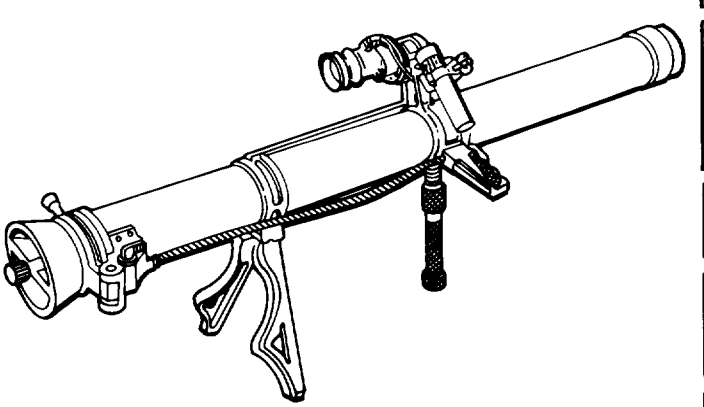
OPERATOR AND ORGANIZATIONAL
MAINTENANCE MANUAL

FOR

90-MM, RECOILLESS RIFLE:

M67 W/E

(1015-00-657-7534)



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HEADQUARTERS, DEPARTMENT OF THE ARMY

OCTOBER 1985

CHANGE

HEADQUARTERS
DEPARTMENT OF THE ARMY

No. 3

WASHINGTON, DC 25 SEPTEMBER 1992

**Operator and Organizational
Maintenance Manual**

for

**90-MM RECOILLESS RIFLE: M67 W/E
(1015-00-657-7534) (EIC: 4G2)**

TM 9-1015-223-12, 23 October 1985, is changed as follows:

1. Remove old pages and insert new pages as indicated below.

2. New or changed material is indicated by a vertical bar in the margin of the page,

Remove Pages	Insert Pages
2-9 and 2-10	2-9 and 2-10
B-5 and B-6	B-5 and B-6
C-1 through C-3/(C-4 blank)	C-1 through C-3/(C-4 blank)

3. File this change sheet in front of the publication for reference purposes.

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GeneraI, United States Army
Chief of Staff

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Secretary of the Army
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TO BE DISTRIBUTED IN ACCORDANCE WITH DA FORM 12-40-E, (BLOCK 0619), REQUIREMENTS FOR TM 9-1015-223-12.

CHANGE
No. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C., 12 May 1988

Operator and Organizational
Maintenance Manual

for

90-MM RECOILLESS RIFLE: M67 W/E
(1015-00-657-7534)

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5-27 and 5-28	5-27 and 5-28

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Brigadier General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-40, Operator and Unit Maintenance requirements for Rifle, Recoilless, 90-MM, M67.

CHANGE

No. 1

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D.C., 9 December 1987

Operator and Organizational
Maintenance Manual

for

90-MM RECOILLESS RIFLE: M67 W/E
(1015-00-657-7534)

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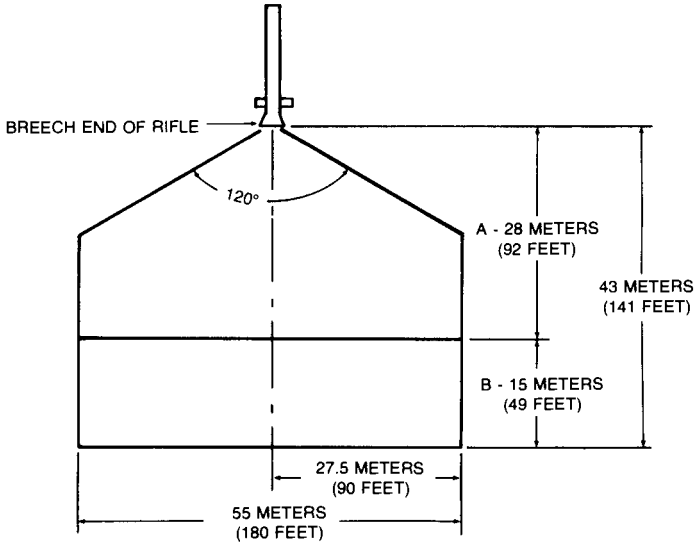
WARNING

Keep weapon trained on target and keep personnel clear of muzzle and breech back blast danger area.

The back blast of this rifle is extremely dangerous. All personnel and equipment must be kept out of the back blast danger area. Do not fire the rifle when obstructions to or confinement of back blast exists, as both of these conditions may cause death or injury to the crew. All personnel near the rifle should wear ear plugs or similar protective devices.

If a round in a hot rifle cannot be fired immediately, all personnel must leave the rifle and evacuate the area while the rifle cools.

Do not use a rifle after 2000 rounds have been fired through it.



For routine movement, do not move the weapon with a chambered round.

If the tactical situation prevents removing round from the weapon, attempt to keep muzzle pointed at the target. Observe breech back blast conditions. If barrel is hot and danger of a cook-off exists, refer to the misfire/checkfire procedures on page 2-40.

When a misfire occurs, keep all personnel clear of line of fire and of back blast area. Do not cock gun for at least 1 minute after a misfire occurs, because a misfire cannot immediately be distinguished from a hangfire.

M590 cartridge may not be fired over friendly troops.

Avoid striking fuze or primer of round when loading.

Alteration of loaded ammunition or components is prohibited.

Fuzes will not be disassembled.

All ammunition and components containing explosives must be handled carefully. Do not drop, throw, tumble, or strike packaged or unpackaged ammunition or related components. Explosive elements in primers and fuzes are sensitive to shock.

Do not store ammunition or ammunition components in direct sunlight, or near flame or other heat producing sources. Ammunition should be protected from excessive exposure to rain, high humidity, and ground moisture. Otherwise, short ranges may result.

Back blast from the subcaliber gun is dangerous. Do not fire weapon from a location where obstructions could deflect the back blast sufficiently to injure personnel. Use ear protectors. Do not allow gun to become overheated due to prolonged high rate of fire. Do not leave an unfired round in chamber of a hot gun because of danger of cook-off.

Do not remove the subcaliber gun if it has a cartridge chambered.

Do not chamber ammunition except immediately prior to firing.

When possible, fire or unload ammunition within 5 minutes after chambering.

Ammunition left too long in a hot rifle can result in cook-offs or inbore explosions which are hazardous to personnel.

Before performing maintenance procedures, inspect the cannon tube to make sure it is empty. Keep live ammunition out of the area during maintenance operations.

Observe all standard safety precautions governing the handling of live ammunition and operation of this rifle.

For information on first aid, see FM21-11.

TECHNICAL MANUAL
No. 9-1015-223-12

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, DC
23 October 1985

Operator and Organizational Maintenance Manual for 90-MM RECOILLESS RIFLE: M67 W/E (1015-00-657-7534)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS
You can help improve this manual. If you find any mistakes, or if you know of away to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Commander, US Army Armament, Munitions and Chemical Command, ATTN: AMSMC-MAS, Rock Island, IL 61299-6000. A reply will be furnished to you.

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*This manual supersedes TM 9-1015-223-12, 2 February 1962, including all changes, and TM 9-1015-223-ESC, 27 March 1973.

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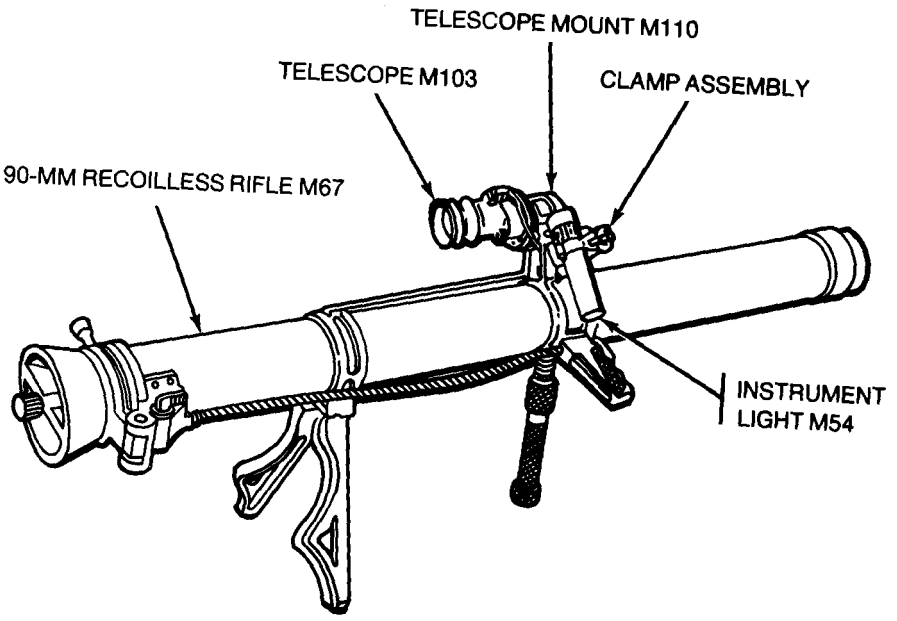
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90-MM RECOILLESS RIFLE M67 W/E

CHAPTER 1
INTRODUCTION

Section I. GENERAL INFORMATION

1-1. SCOPE.

a. *Type of manual.* Operator and organizational maintenance.

b. *Mode/Number and Equipment Name.* 90-mm Recoilless Rifle M67.

c. *Purpose of Equipment.* Provides antitank and antipersonnel fire to ground troops.

1-2. MAINTENANCE FORMS AND RECORDS. Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, The Army Maintenance Management System (TAMMS).

1-3. HAND RECEIPT (- HR) MANUALS. This manual has a companion document with a TM number followed by -HR (which stands for Hand Receipt). The TM 9-1015-223-12-HR consists of preprinted hand receipts (DA Form 2062) that list end item related equipment (i.e., COEI, BII, and AAL) you must account for. As an aid to property accountability, additional -HR manuals may be requisitioned from the following source in accordance with procedures in chapter 3, AR 310-2:

Commander US Army
Adjutant General Publications Center
2800 Eastern Boulevard
Baltimore, MD 21220

1-4. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE. Procedures and materials used for the destruction of the weapon to prevent enemy use will be found in TM 750-224-7.

1-5. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR). If your rifle needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Quality Deficiency Report). Mail it to us at Commander, US Army Armament, Munitions and Chemical Command, ATTN: AMSMC-QAD, Rock Island, IL 61299-6000. We'll send you a reply.

Section II. EQUIPMENT DESCRIPTION

1-6. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.

a. *Characteristics.*

(1) Provides infantry with direct fire artillery capability.
(2) Designed for antitank and antipersonnel mission.

b. *Capabilities and Features.*

(1) Designed to be fired from the ground or from the shoulder.
(2) Lightweight and air-cooled.
(3) Single shot weapon using fixed ammunition.
(4) Highly portable.

1-7. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.

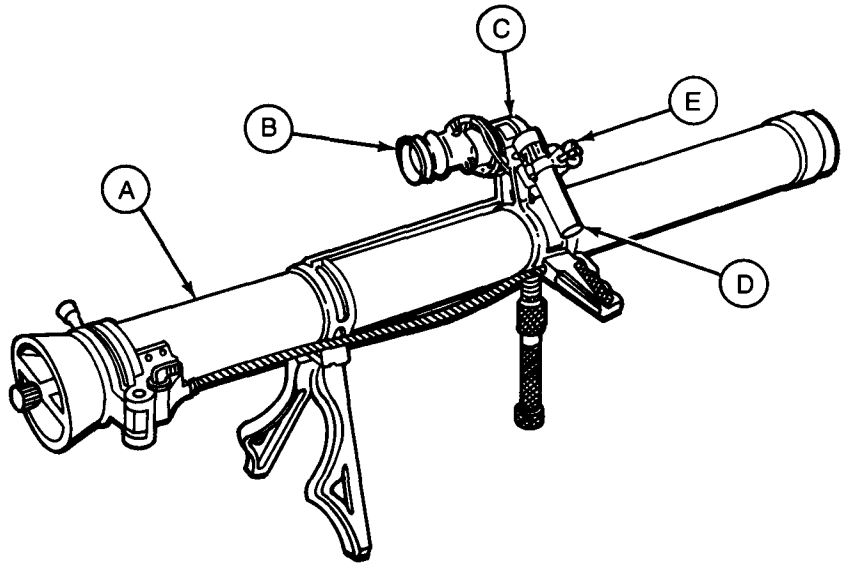
(A) 90-MM RECOILLESS RIFLE M67. Fires the 90-mm round.

(B) TELESCOPE M103. Provides optical line of sight for aiming rifle for direct fire.

(C) TELESCOPE MOUNT M110. Holds telescope and provides adjustment for ore-sighting the telescope.

(D) INSTRUMENT LIGHT M54. Illuminates telescope reticle for night operation.

(E) CLAMP ASSEMBLY. Used to hold the instrument light.



1-8. EQUIPMENT DATA.

Weight of complete system . . . . . 35 lb(15.9 kg)
Overall length . . . . . 53 in. (1.34 meters)
Twist of rifling . . . . . One right-hand turn in 18 meters
Type of breechblock . . . . . Interrupted thread
Type of firing mechanism . . . . Percussion
Ammunition . . . . . Fixed
Muzzle velocity . . . . . 213.4 mps (700 fps)
Range (effective) . . . . . 450 meters (1476 ft)
Tube life . . . . . 2000 rounds

Instrument light M54:
Lamp power 3v
Battery type BA-42
Length of lead cable (approx) . . . . . 8 in.
Type of case . . . . . Hermetically sealed

Telescope M103:
Magnification 3X
Field of view . . . . . 10 degrees
Exit pupil diameter . . . . . 0.250 in.
Eye piece focus fixed at . . . . . 1 diopter
Equivaient focal length. . . . . .. 0bjective 3.601 in.
Equivalent focal length . . . . . Eyepiece 1.202 in.

Telescope mount M110:
Boresight adjustment . . . . . (AZ or EL)

Section III. TECHNICAL PRINCIPLES OF OPERATION

1-9. CHARACTERISTICS. Recoilless rifles, as their name implies, are nonrecoilling weapons. Recoil mechanisms or sliding surfaces are not provided and heavy trails, spades, or other force-resisting or compensating mechanisms are not required. These weapons have the following features:

a. Can be easily transported
b. Simplified manufacture, assembly, and maintenance
c. Perforated cartridge case
d. Low weight which makes them valuable as infantry and airborne weapons
e. Lack of recoil to contribute to overall accuracy

1-10. PRINCIPLES OF OPERATION.

a. Vents and orifices are located in the rear of the chamber to carry off part of the propellant gases. Orifices are openings that pass through the breechblock. They provide an opening from the chamber to the atmosphere behind the weapon.

b. The inside diameter of the chamber is larger than the cartridge case. Thus the complete round is suspended in the center of the chamber. Cases used on these rounds are perforated and lined with heavy plastic-liner. The perforations allow gas to escape to sides of chamber and then to rear of weapon through the orifices.

c. The projectiles used in these rounds are preengraved, that is, the rotating bands are cut to engage the rifled bore.

d. When the rifle is fired, part of the gas propels the projectile forward in the normal manner. The rest of the gas escapes through the perforated cartridge case and through the orifices to the rear of the weapon. The momentum of gas escaping to the rear is controlled by the size of the orifices. They balance and counteract the forward momentum of the projectile and propelling gases leaving the muzzle.

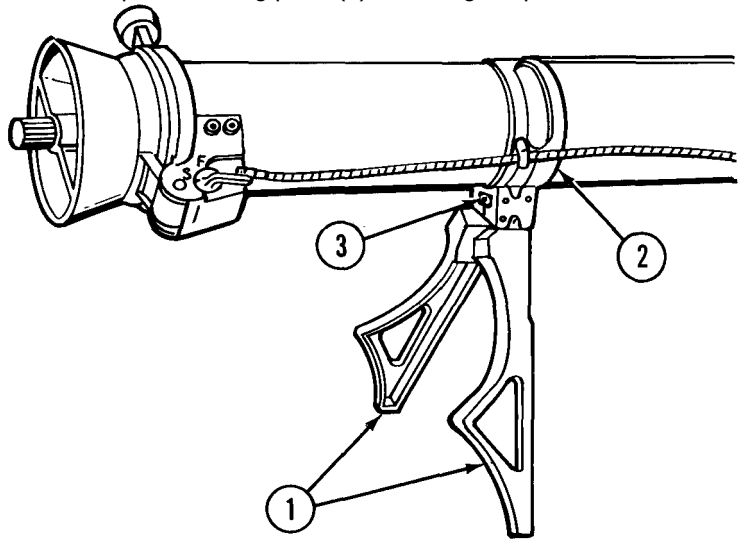
e. The design of vent and cartridge case and the quantity of propellant are important factors in maintaining this balance between forward and rearward momentums of the projectiles and gases.

CHAPTER 2
OPERATING INSTRUCTIONS

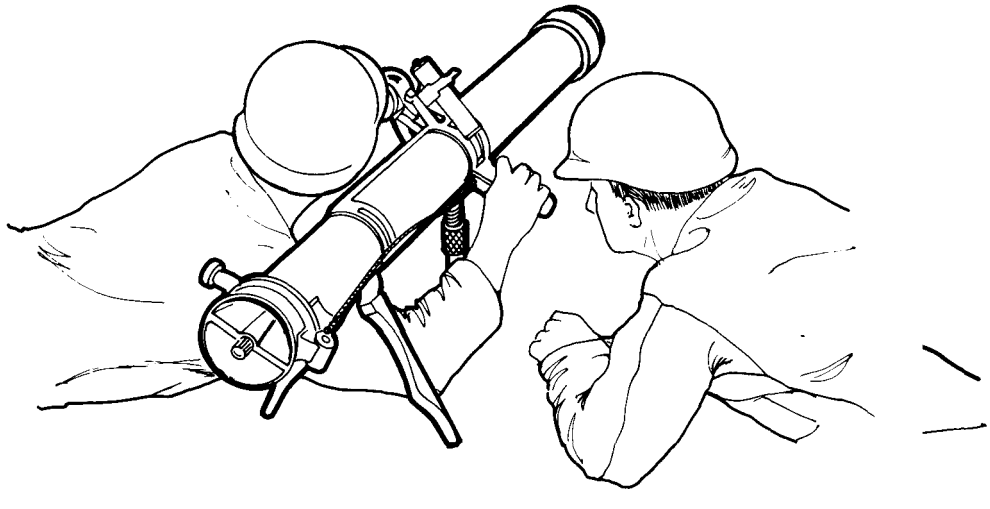
Section I. DESCRIPTION AND USE OF OPERATOR'S CONTROLS AND INDICATORS

2-1. 90-MM RECOILLESS RIFLE M67.

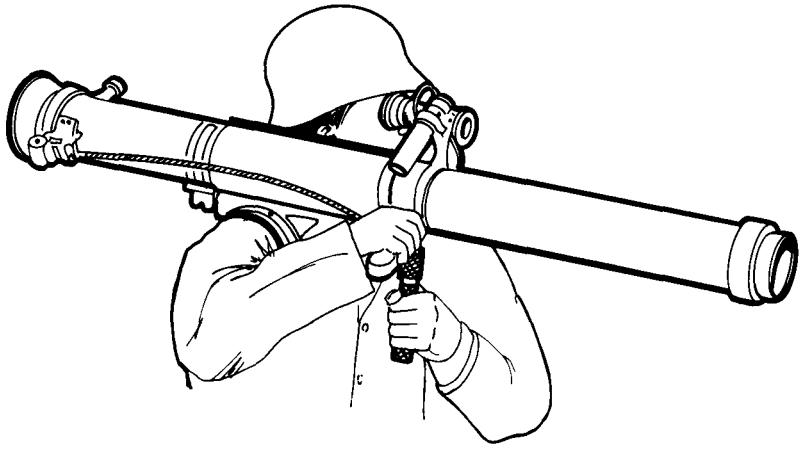
a. *Bipod Legs.* Bipod legs (1) are attached to rear bracket assembly (2) on underside of cannon tube. Bipod retaining plate (3) holds legs in position.



(1) Ground - fired position. When biped legs are spread apart, they form a base for ground-firing.

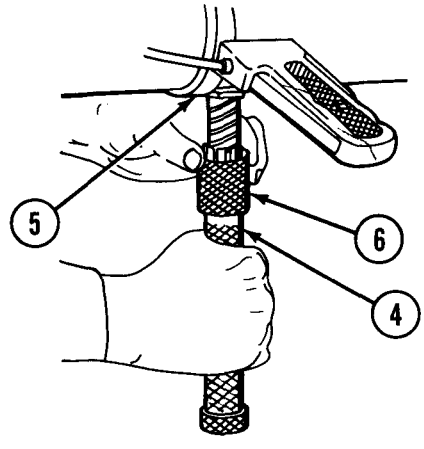


(2) Shoulder - fired position. When bipod legs are pressed together and folded up flush with underside of tube, they form a shoulder rest for shoulder-firing.

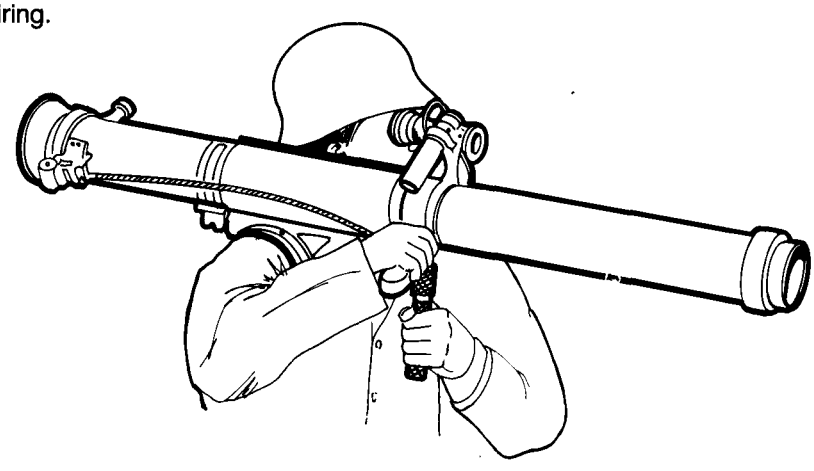


b. *Monopod Assembly.*

(1) Monopod assembly (4) is attached to front bracket assembly (5) on the underside of cannon tube. Rotating monopod sleeve (6) elevates or depresses the rifle for ground-firing.



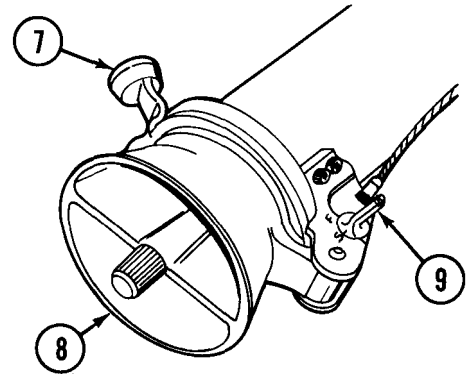
(2) Grasping monopod assembly with left hand steadies and adjusts rifle aim for shoulder-firing.



c. Lock Ring Assembly Knob and Safety Assembly.

(1) Lock ring assembly knob (7) is used to manually open and close breechblock (8). Opening, then closing breechblock cocks the rifle.

(2) Safety assembly (9) is used to manually place weapon in the safe(S) or fire (F) position. Safety assembly (9) is automatically caromed to safe (S) when breechblock (8) is opened.

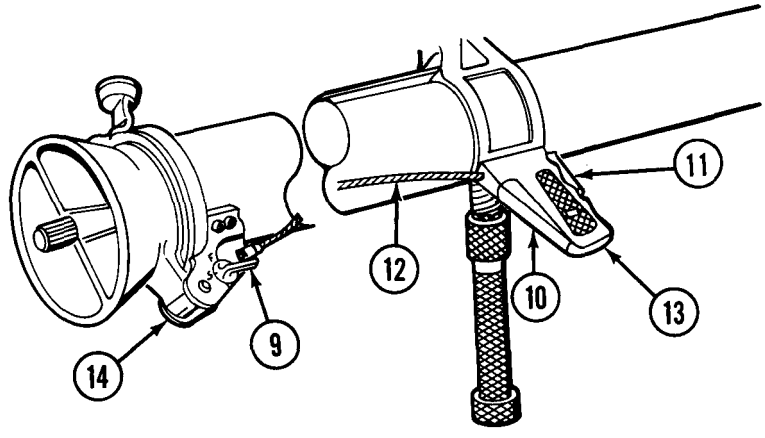


d. *Rifle Grip and Cable Assembly.*

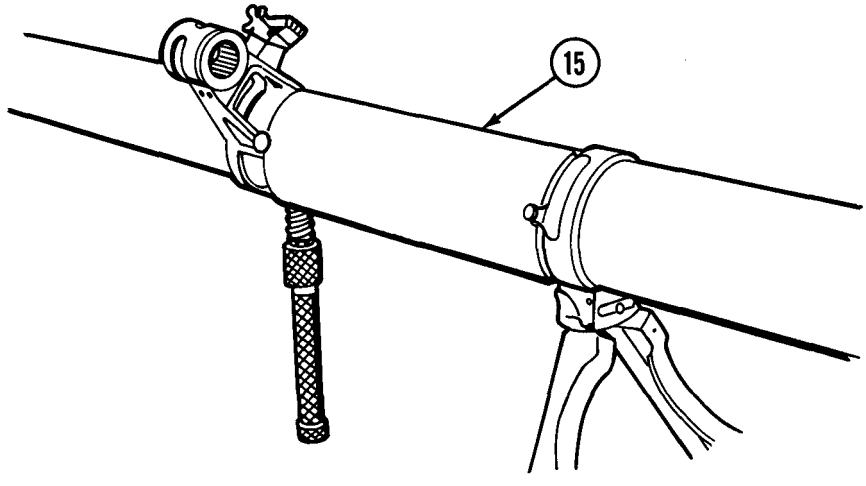
(1) The weapon is fired by placing safety assembly (9) in the fire (F) position, depressing gun grip safety (10), and squeezing trigger (11).

(2) Gun grip safety (10) locks trigger (11) and prevents it from accidently firing the weapon.

(3) Cable assembly (12) connects rifle grip (13) to sear in hinge block (14).



e. Shield Assembly. Shield assembly (15) protects gunner from heat of the tube.

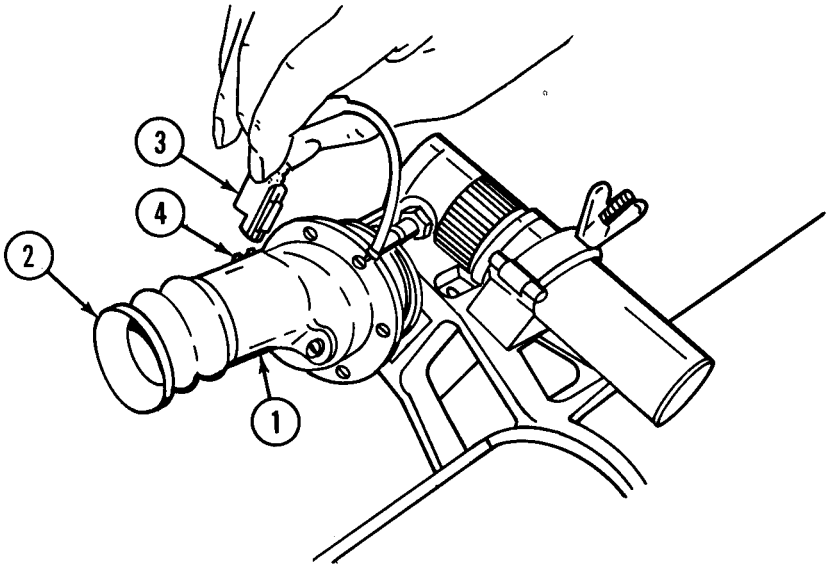


2-2. SIGHTING AND FIRE CONTROL INSTRUMENTS.

a. *Telescope M103.* Telescope (1) provides optical line of sight to aim rifle for direct fire. The three-power, fixed focus telescope has a 10-degree field of view.

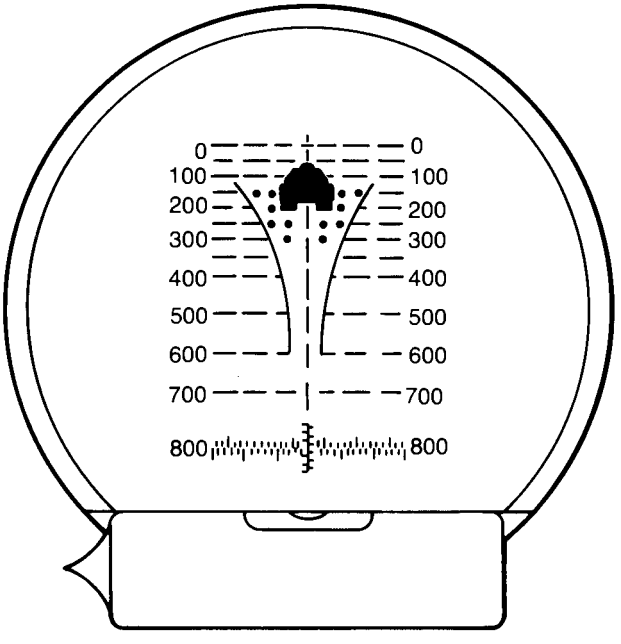
(1) Eyeshield (2) eliminates side glare.

(2) Instrument light bracket (3) inserts into dovetail slot (4).

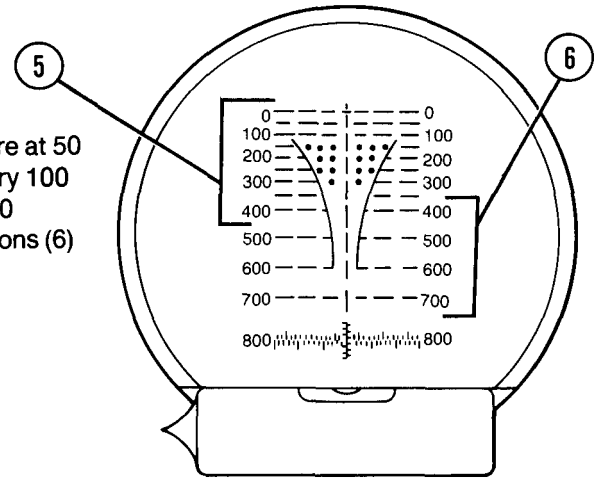


b. *Reticle Pattern and Level Vial.*

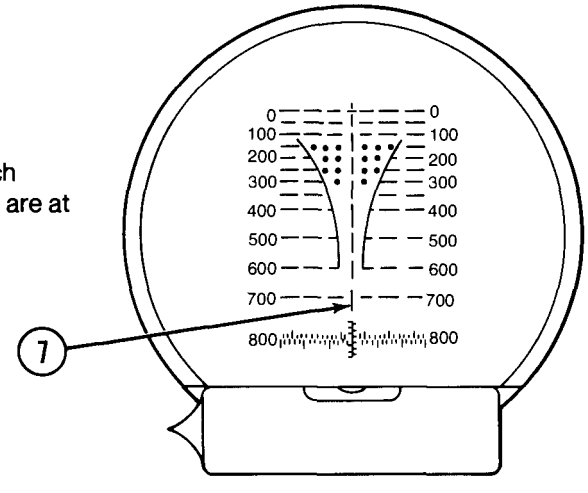
(1) The optical glass reticle for the telescope is etched with a metric scale.



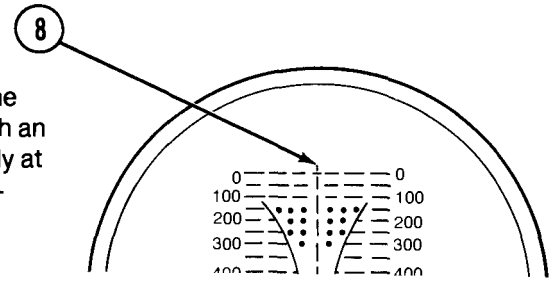
(a) Graduations (5) are at 50 meter intervals and numbered every 100 meters up to 400 meters. From 400 meters to 700 meters the graduations (6) are at 100 meter intervals.



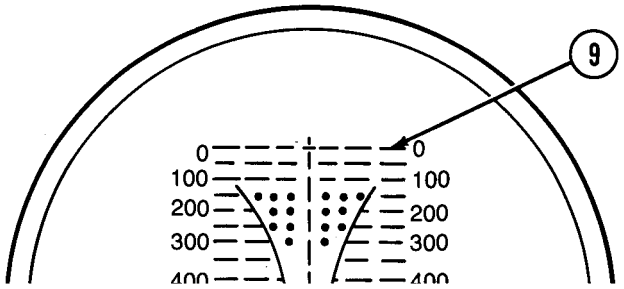
(b) Each line and each space (7) on the vertical centerline are at 50 meter increments.



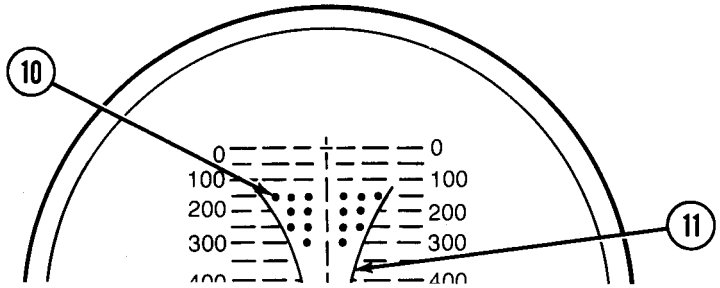
1 The top vertical line extends 2 1/2 mils from the 0 line, with an extra 5 mil line intersecting horizontally at 0 elevation and forms the reticle bore-sight cross (8).



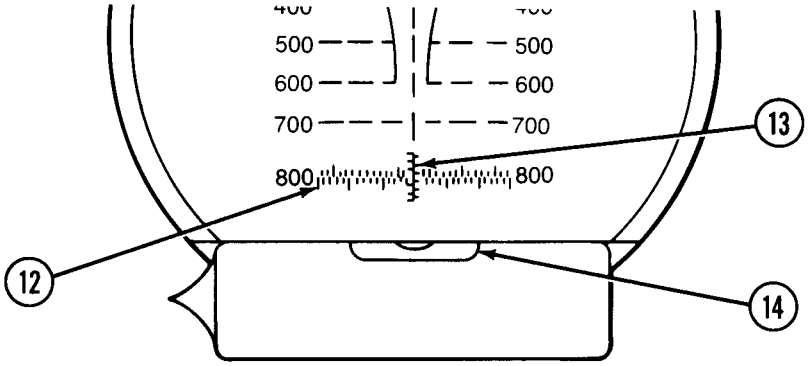
2 Each horizontal lead line and each space (9) represents 5 mils. This gives a total deflection of 60 mils with 30 mils on each side of the vertical centerline.



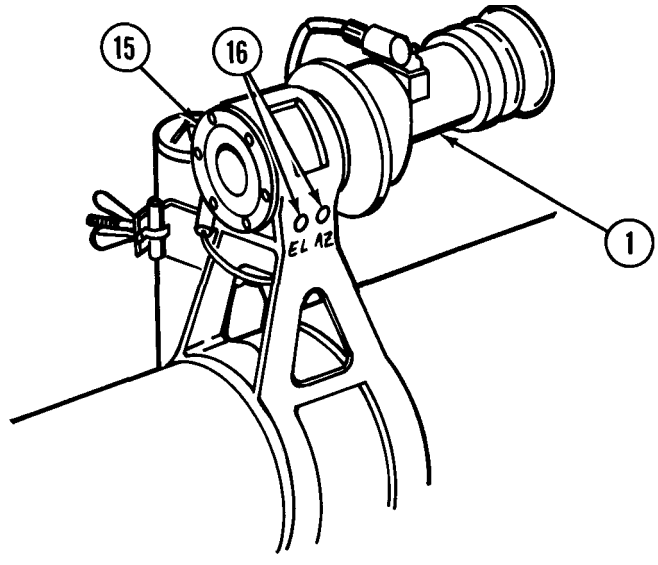
3 Small circles (10) are within stadia lines (11). The circles are spaced 5 mils apart horizontally and 50 meters apart vertically. They are used for ranging on a 6 meter broadside target or on a 3 meter head-on target.



4 Located on the 800 meter range line (12) are sixty 1 mil spaces, and on the vertical axis (13) are twelve 1 mil spaces. They are provided to make small adjustments to the line of fire. The level vial (14) is used for leveling the telescope.



c. *Telescope Mount M110.* The telescope (1) is held by mount (15). The elevation (EL) and azimuth (AZ) screws (16) adjust the telescope.

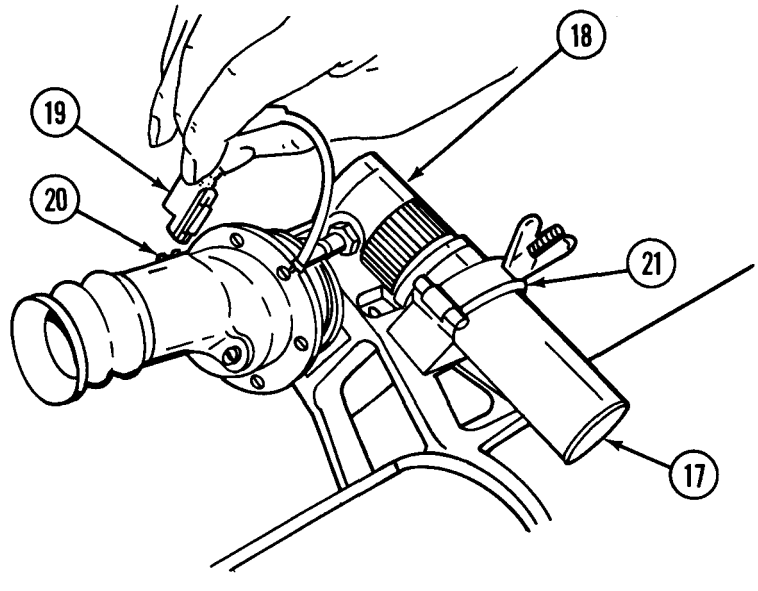


d. *Instrument Light M54 and Clamp Assembly.*

(1) The instrument light (17) illuminates the reticle for night operations.

(2) The instrument light has a combination rheostat switch (18) and bracket (19) that fits into the telescope's dovetail slot (20).

(3) The clamp assembly (21) is used to clamp and position instrument light.



Section II. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

2-3. GENERAL.

a. *Before You Operate.* Always keep in mind the CAUTIONS and WARNINGS. Perform your before (B) PMCS.

b. While *You Operate.* Always keep in mind the CAUTIONS and WARNINGS. Perform your during (D) PMCS.

c. *After You Operate.* Be sure to perform your after(A) PMCS.

d. *If Your Equipment Fails to Operate.* Troubleshoot with proper equipment. Report any deficiencies using the proper forms. See DA PAM 738-750.

2-4. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS).

a. *General.* The PMCS procedures are described in the table below. They are arranged in logical sequence requiring a minimum of time and motion on the part of the persons performing them and are arranged so there will be a minimum of interference between persons performing checks simultaneously on the same end item.

b. Item *Number Column.* Checks and services are numbered in chronological order regardless of interval. This column shall be used as a source of item numbers for the “TM Number” column on DA Form 2404, Equipment Inspection and Maintenance Worksheet, in recording results of PMCS.

c. *Interval Columns.* The columns headed “B, “D”, and “A contain a dot (.) opposite the appropriate check. Thus, if a given check is performed before operation, a dot is placed opposite the check in the “B” column; if the check is performed after operation, the dot is placed in the column headed” A, and if the same check is made in two or more periods, a dot is placed in each applicable column.

d. *Item to be Inspected and Procedure Column.* The items to be inspected are identified by as few words, usually the common name, as will clearly identify the item, e.g., ” Shield Assembly.” A brief description of the procedure by which the check is to be performed follows. It contains all the information required to accomplish the checks and services.

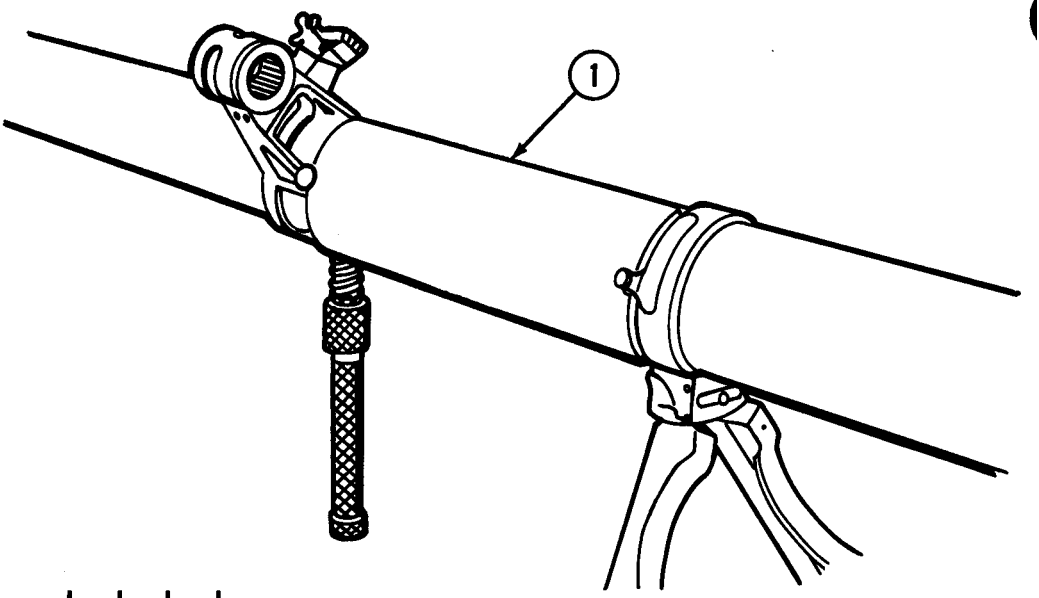
e. *Equipment is Not Ready/Available if: Column.* This column contains the criteria which will cause the equipment to be classified as not ready/available because of inability to perform its primary mission.

B-Before D-During A-After

Item No.	Interval B	Interval D	Interval A	Item To Be Inspected Procedure	Equipment Is Not Ready/ Available
1				EQUIPMENT RECORDS	
				M67 90-MM Tube	
	•			Check your DA Form 2408-4. It should be complete and in good condition. Check if weapon has been borescoped and pullover gaged within 90 days prior to firing IAW TM 9-1000-202-14.	
			•	Update DA Form 2408-4 to reflect day's firing. Tube life is 2000 rounds.	
				Missing DA Form 2408-4. Weapon not borescoped 90 days prior to firing.	←
				M149A1 Subcaliber Device	
	•			Check your DA Form 2408-4. It should be complete and in good condition. Check if weapon has been headspaced and bore condemnation checked at 4000 rounds initially and within 2000 rounds thereafter.	
			•	Update DA Form 2408-4 to reflect day's firing.	
				Headspace and bore condemnation check have not been completed within 4000 rounds initially and 2000 rounds thereafter.	←
				TOOLS AND EQUIPMENT	
	•			Make sure all required BII tools and equipment are serviceable and in safe operating condition. Canvas items must be free of tears, rot or mildew. Metal components will be free of cracks, bends, breaks, deformities, and rust or corrosion. See appendix C.	

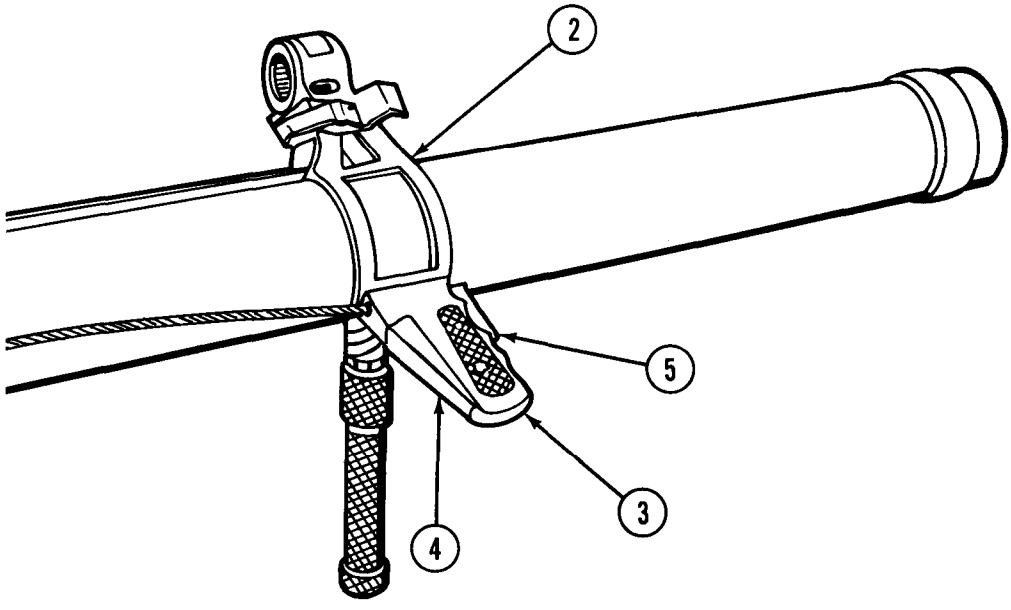
B-Before D-During A-After

Item No.	Interval B	Interval D	Interval A	Item To Be Inspected Procedure	Equipment Is Not Ready/ Available If:
3				SHIELD ASSEMBLY	
	●			Inspect shield assembly (1) for cracks, splits, breaks, and cleanliness.	Missing, cracked, or warped shield assembly interferes with firing or sighting.
				CAUTION Don't use solvents or CLP to clean shield assembly.	
	●		●	Clean shield assembly with a wiping rag (item 6, app E).	



B-Before D-During A-After

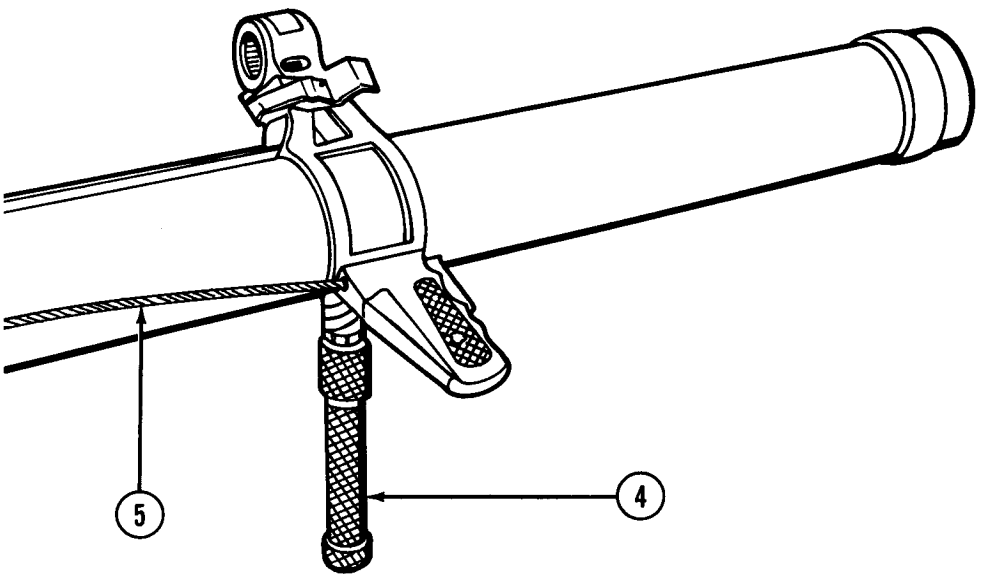
Item No.	Interval B	Interval D	Interval A	Item To Be Inspected Procedure	Equipment Is Not Ready/ Available If:
4				FRONT BRACKET ASSEMBLY	
	●			Wipe front bracket assembly (2) dry and inspect general condition. Make sure front bracket assembly is securely mounted into the tube, and lightly lubricate with CLP (item 2, app E).	
				Front bracket assembly is bent, broken, or loose.	←
	●		●	Clean, wipe dry, and lightly lubricate with CLP.	
5				RIFLE GRIP	
	●			Inspect general condition of rifle grip (3). Check that gun grip safety (4) and trigger (5) operate properly by dry firing.	
				Broken trigger and trigger safety spring; fails to fire.	←



OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (CONT)

B-Before D-During A-After

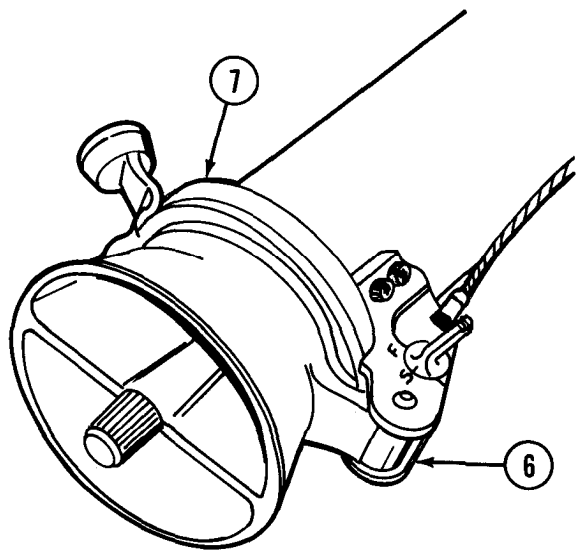
Item No.	Interval B	Interval D	Interval A	Item To Be Inspected Procedure	Equipment Is Not Ready/ Available If:
6				MONOPOD ASSEMBLY	
	●			Inspect monopod assembly (4) for smoothness of operation and functioning.	Monopod threads are burred, scored; will not lock when extended.
			●	Wipe dry and lightly coat threaded portions with CLP (item 2, app E).	



7				CABLE ASSEMBLY	
	●			Inspect cable assembly (5) for rust or fraying, and check for proper functioning.	Firing cable is frayed or corroded; fails to fire.

B-Before D-During A-After

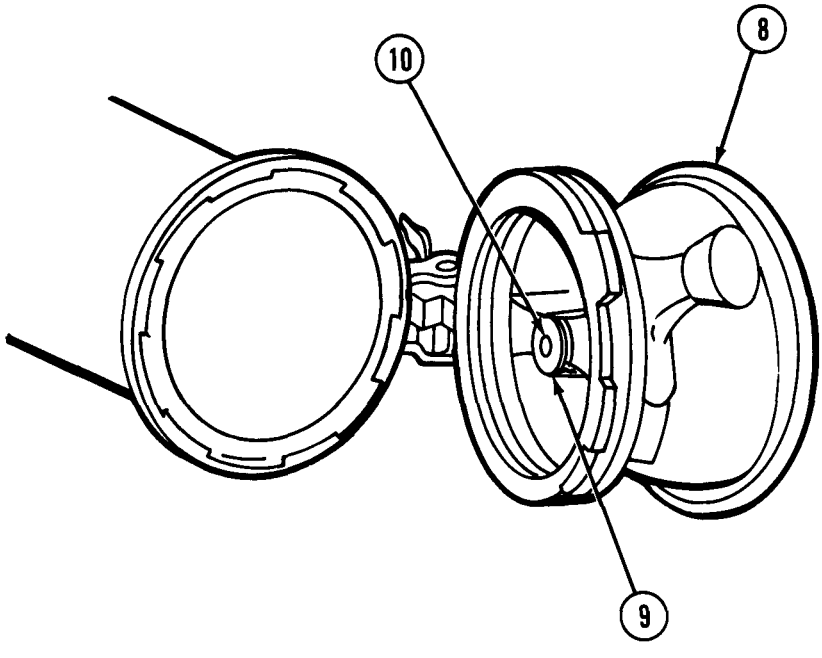
Item No.	Interval B	Interval D	Interval A	Item To Be Inspected Procedure	Equipment Is Not Ready/ Available If:
8	●			BREECHBLOCK AND HINGE Wipe breech and hinge mechanism (6) dry. Inspect for rust, cracks, breaks, or missing parts. Lightly lubricate all threaded portions of lock ring (7) and all other surfaces with CLP (item 2, app E). Check for smoothness of operation and proper functioning, cracked, broken, or missing parts.	Breechblock has cracked, broken, or missing parts.



OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (CONT)

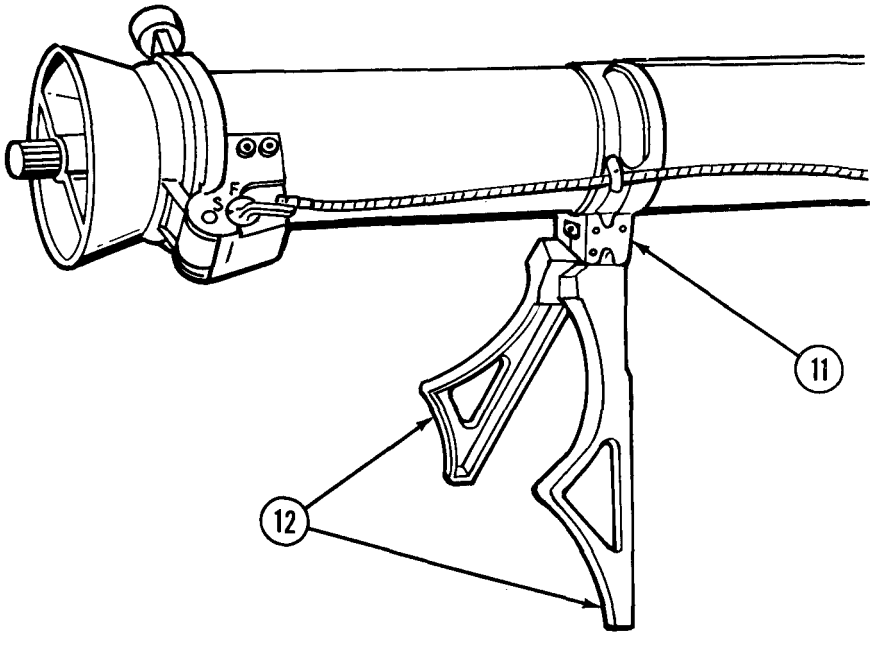
B-Before D-During A-After

Item No.	Interval B	Interval D	Interval A	Item To Be Inspected Procedure	Equipment Is Not Ready/ Available If:
	●			Check that rifle safety moves to safe (S) position when opening breech.	
					Rifle safety doesn't move to safe(S) position.
		●		Check breechblock (8) for cracks (9) in hammer bushing hole (10).	
					Hammer bushing will not remain in place. 4
			●	After firing, clean with CLP. Wipe dry and coat lightly with CLP.	



B-Before D-During A-After

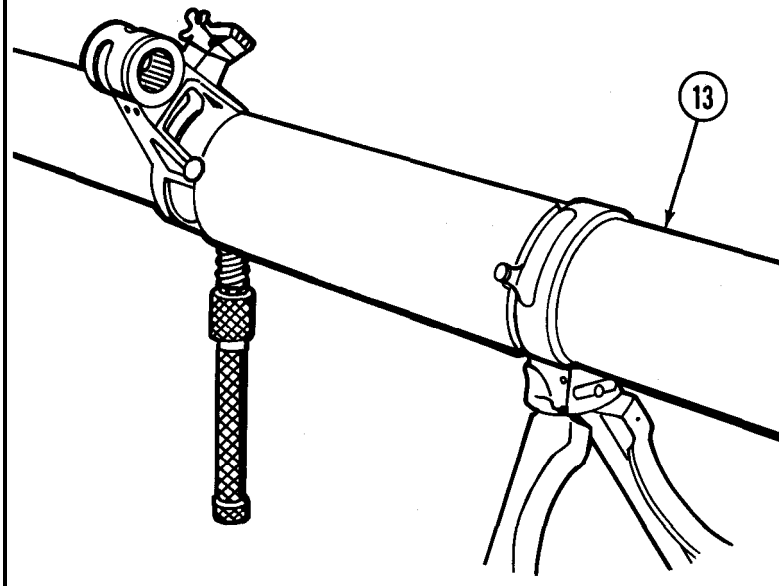
Item No.	Interval B	Interval D	Interval A	Item To Be Inspected Procedure	Equipment Is Not Ready/ Available If:
9				REAR BRACKET ASSEMBLY	
	●		●	Wipe rear bracket assembly (11) dry and inspect for cracked, missing, or damaged parts. Check for tightness and lightly lubricate with CLP (item 2, app E).	
				Components are missing, cracked, or damaged.	←
			●	Clean with CLP, wipe dry, inspect, and lightly lubricate with CLP.	
10				BIPOD LEGS	
	●		●	Wipe bipod legs (12) dry and inspect for missing, cracked, or damaged parts. Check functioning and lightly lubricate with CLP (item 2, app E).	
				Bipod legs are loose.	←
			●	Clean with CLP. Inspect and lubricate with CLP.	



OPERATOR/CREW PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) (CONT)

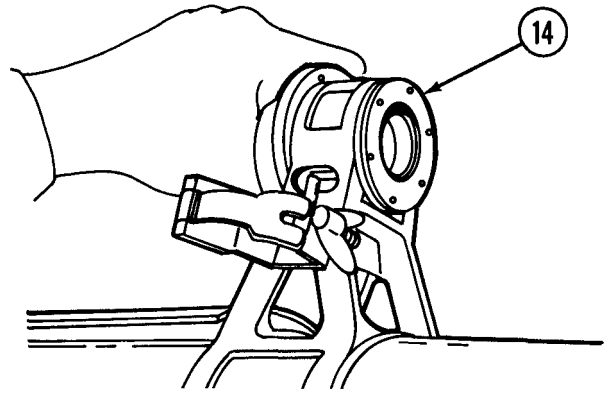
B-Before D-During A-After

Item No.	Interval B	Interval D	Interval A	Item To Be Inspected Procedure	Equipment Is Not Ready/ Available If
11				CANNON TUBE	
	●			Wipe cannon tube (13) dry. Inspect for cracks, bulges, dents or corrosion.	Bore is cracked, bulged, gouged, or dented.
			●	Immediately after firing, clean with CLP (item 2, app E) and wipe dry. Inspect tube for cracks, bulges, or other damage. Lubricate lightly with CLP. When weapon is not fired, clean it weekly with CLP and wipe dry. Lubricate with CLP.	

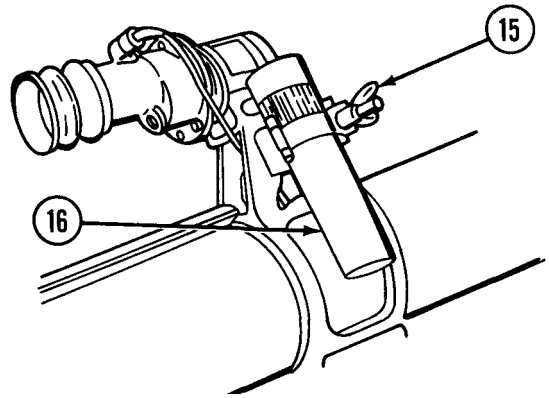


B-Before D-During A-After

Item No.	Interval B	Interval D	Interval A	Item To Be Inspected Procedure	Equipment is Not Ready/ Available If:
12				TELESCOPE MOUNT M110	
	●			Inspect that mount (14) is not loose in front bracket assembly, and that the telescope fits securely into mount.	Mount is loose; damaged mount prevents telescope from seating securely in the mount.
			●	Wipe dry and inspect for damage. Lubricate lightly with CLP (item 2, app E).	

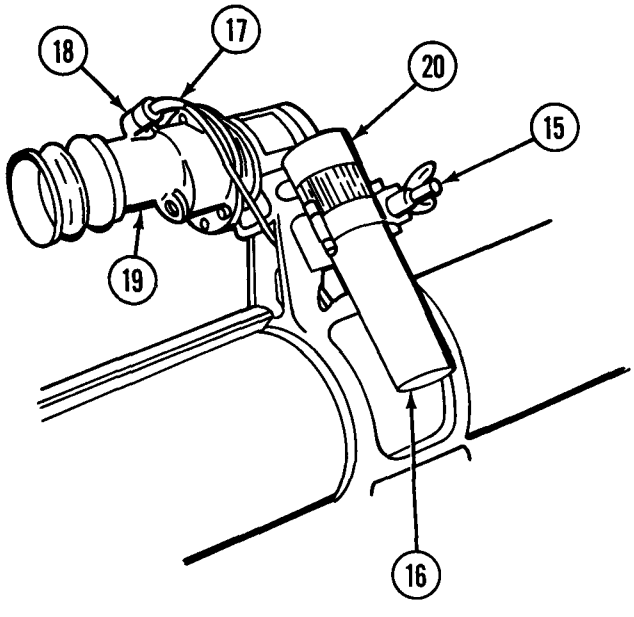


13				CLAMP ASSEMBLY	
	●			Inspect clamp assembly (15) for damaged or missing parts. Install instrument light M54 (16) and make sure clamp assembly securely holds the instrument light.	



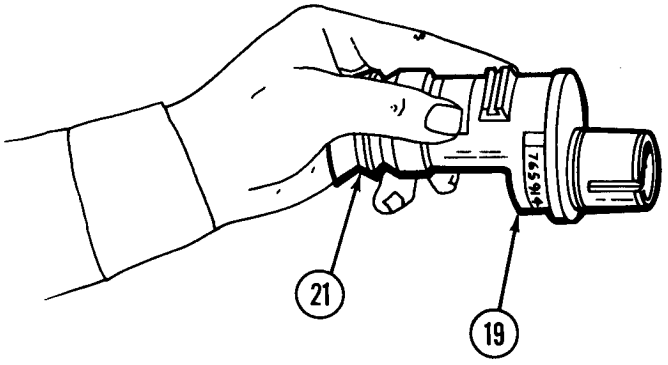
B-Before D-During A-After

Item No.	Interval B	Interval D	Interval A	Item To Be Inspected Procedure	Equipment is Not Ready/ Available If:
14				INSTRUMENT LIGHT M54	
	●			Inspect that instrument light (16) interior is clean and corrosion free, and that wire (17) insulation is not cracked or missing. The bracket (18) must fit properly on telescope (19). The lamp must light and rheostat (20) must control brightness.	
			●	Remove light from telescope and clamp assembly (15). Remove batteries, clean light, and store.	



B-Before D-During A-After

Item No.	Interval B	Interval D	Interval A	Item To Be Inspected Procedure	Equipment Is Not Ready/ Available If:
15				Telescope M103	
	●			Check that the level vial is not broken or loose in the housing. Reticle illumination window must be unbroken, securely sealed, and fastened to body of telescope (19). Reticle should not be tilted or contain moisture. Rubber eyeshield (21) should not be damaged or missing.	Level vial is broken or loose. Target image is totally obstructed. Reticle pattern is not visible.
			●	Remove telescope. Clean with wiping rag (item 6, app E) and store. Clean lens with lens paper (item 5, app E) only.	

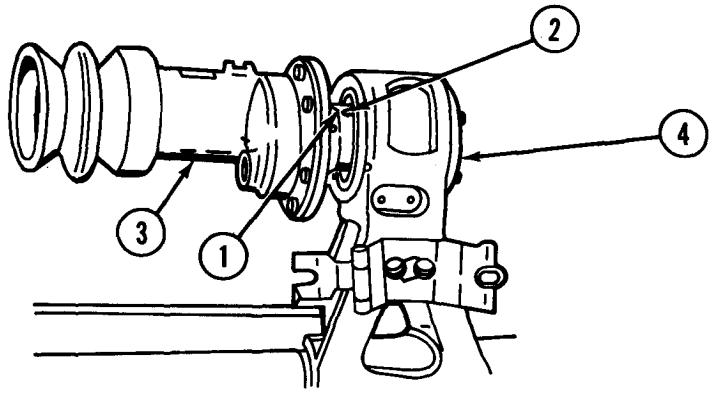


Section III. OPERATION UNDER USUAL CONDITIONS

2-5. GENERAL. This section contains instructions to operate the recoilless rifle under conditions of moderate temperatures and humidity. Instructions for operation under unusual conditions are given on page 2-46.

2-6. INSTALLATION AND REMOVAL OF FIRE CONTROL INSTRUMENTS.

Installation/Removal of Telescope M103



a. Aline adapter index line (1) with telescope mount index line (2). Insert telescope (3) into mount (4) until threads in telescope contact threads in mount.

b. Rotate telescope (3) clockwise with a slight inward pressure until threads disengage and telescope seats against mount (4).

c. Slowly rotate telescope (3) counterclockwise to engage threads and secure telescope in mount (4).

d. To remove, rotate telescope (3) clockwise until it stops, withdraw telescope approximately ¼ inch, and slowly rotate counterclockwise.

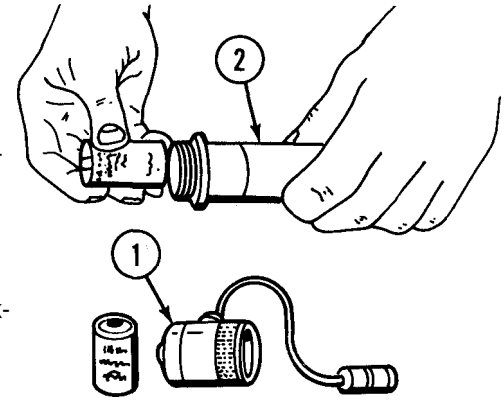
e. Withdraw telescope (3) from mount (4).

Installation of Instrument Light M54

1

a. Remove head (1) by turning counterclockwise.

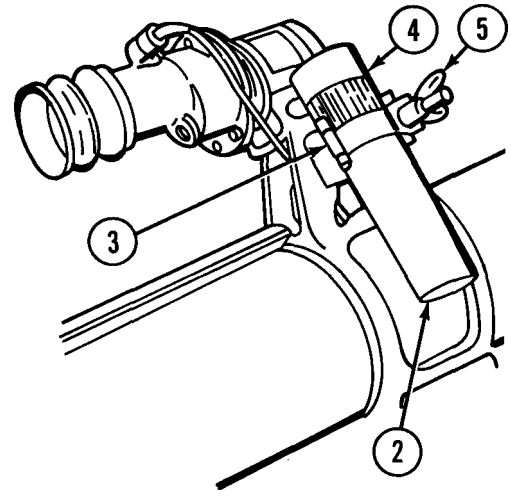
b. Install two BA-42 dry cell batteries (item 1, app E) in instrument light (2) and replace head (1) by turning clockwise.



2

a. Insert instrument light (2) in clamp assembly (3) with rheostat (4) end of light.

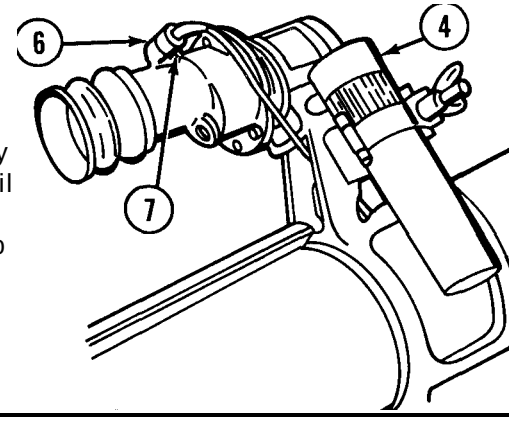
b. Tighten clamp assembly (3) by rotating wing nut (5) clockwise until tight.



3

a. Attach bracket (6) to telescope by engaging grooves in dovetail

b. Turn rheostat switch (4) clockwise to illuminate.



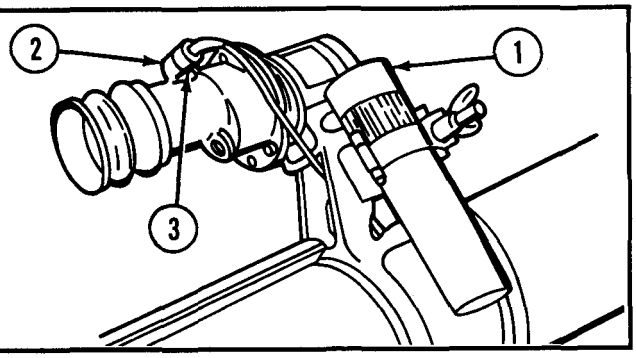
2-6. INSTALLATION AND REMOVAL OF FIRE CONTROL INSTRUMENTS (CONT).

Removal of Instrument Light M54

1

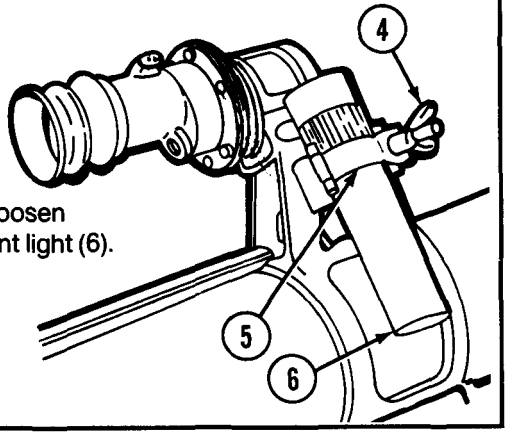
a. Turn rheostat switch (1) counterclockwise to off.

b. Disengage bracket (2) from telescope dovetail slot (3).



2

Rotate wing nut (4) counterclockwise to loosen clamp assembly (5) and remove instrument light (6).



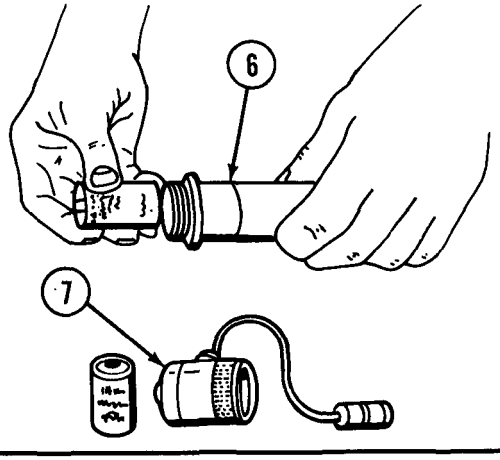
3

a. Remove head (7) by turning counterclockwise.

CAUTION

Do not leave batteries in instrument light when it is not in use.

b. Slide batteries out of instrument light (6) and replace head (7) by turning clockwise.



2-7. BORESIGHTING.

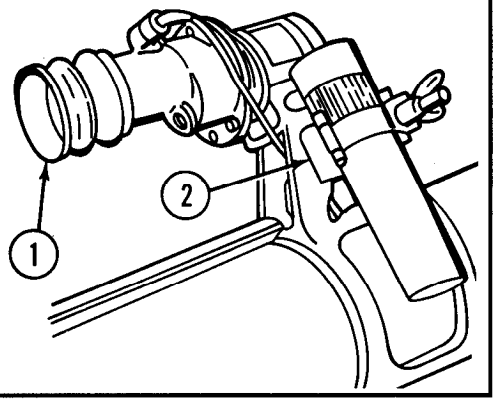
Distant Aiming Point Method

1

NOTE

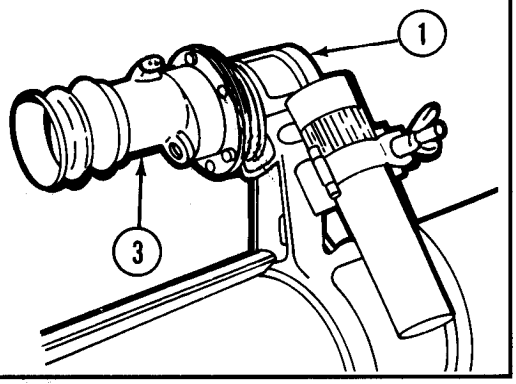
Boresighting adjusts the telescope line of sight parallel to the axis of the 90-mm rifle bore to ensure accuracy of fire. The distant aiming point and test target methods may be used to boresight rifle and telescope.

Place weapon on level ground. Make sure mount (1) is securely locked in front bracket assembly (2).



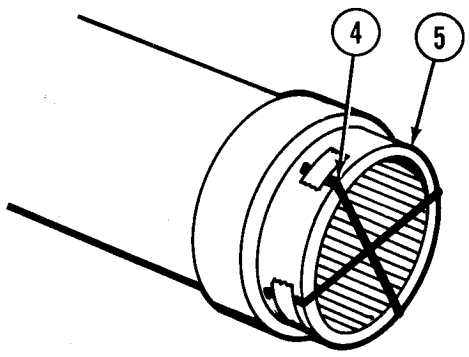
2

Make sure telescope (3) is firmly seated in mount (1).



3

Stretch two pieces of twine (4) (item 9, app E) tightly across muzzle (5) of tube. Make sure pieces are alined with four notches crossed at center of barrel axis. Secure with tape (item 8, app E). String, strapping, or rubber bands may also be used.

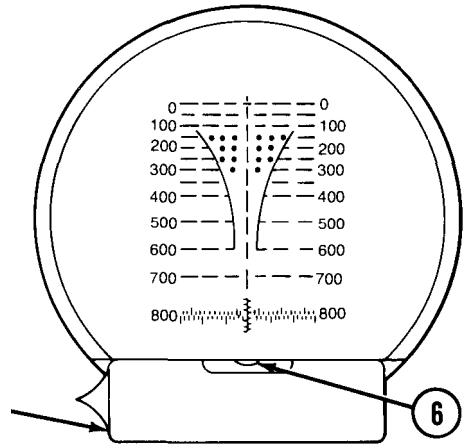


2-7. BORESIGHTING (CONT).

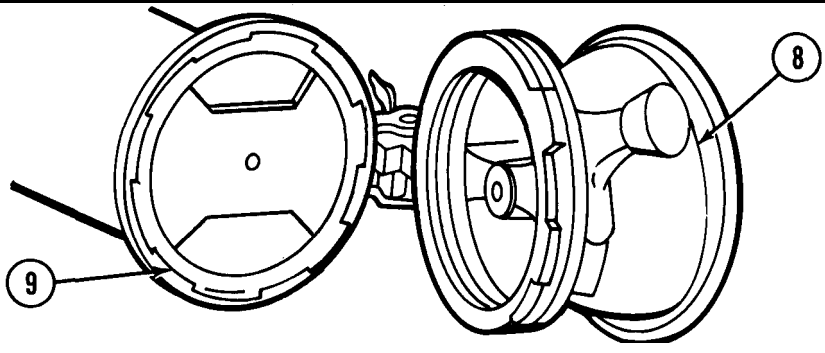
Distant Aiming Point Method (Cont)

4

Cross-level rifle by centering bubble (6) in the telescope level vial (7).



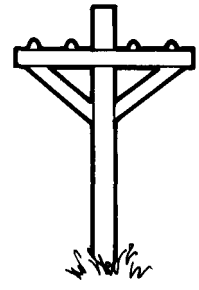
5



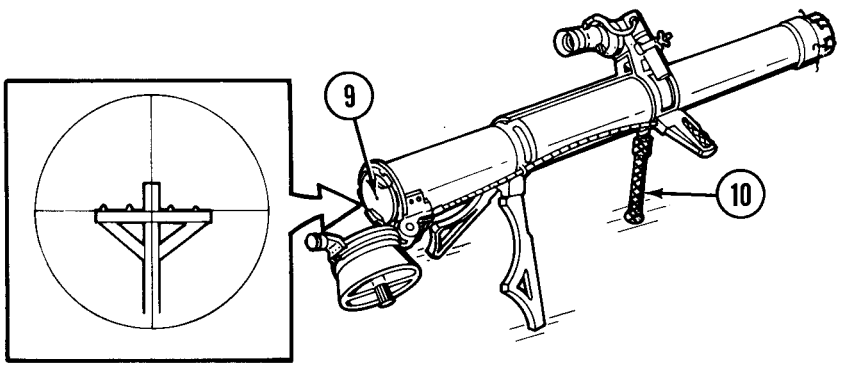
Open breechblock (8) and insert breech boresight (9) in chamber to sight through tube.

6

Select an aiming point approximately 500 meters away. The target should have clearly defined horizontal and vertical lines so that a definite aiming point can be established.



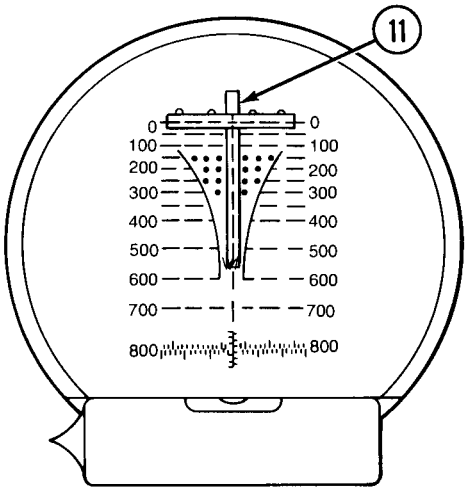
7



Sight through breech boresight (9) and aline cross threads on aiming point. Adjust monopod assembly (10) to correct elevation and move rifle back and forth horizontally to adjust traverse.

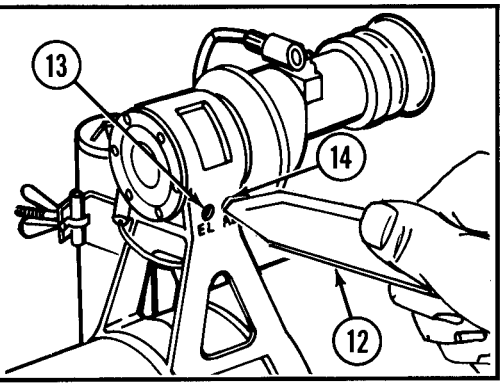
8

Sight through telescope to check if boresight cross on reticle is alined on aiming point (11). If not alined, do not move rifle, but proceed as follows.



9

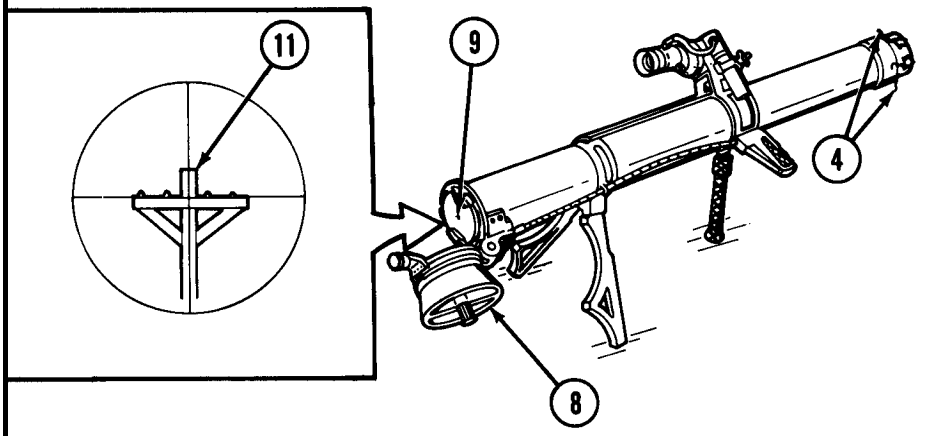
With screwdriver end of extractor and screwdriver combination tool (12), rotate EL (elevation) and AZ (azimuth) boresight screws (13 and 14) until boresight cross on reticle is alined on aiming point.



2-7. BORESIGHTING (CONT).

Distant Aiming Point Method (Cont)

10



a. Check alinement of rifle bore and telescope on aiming point (11) to make sure that they coincide. If shifting did occur, repeat steps 7 through 9 above until proper alinement is achieved.

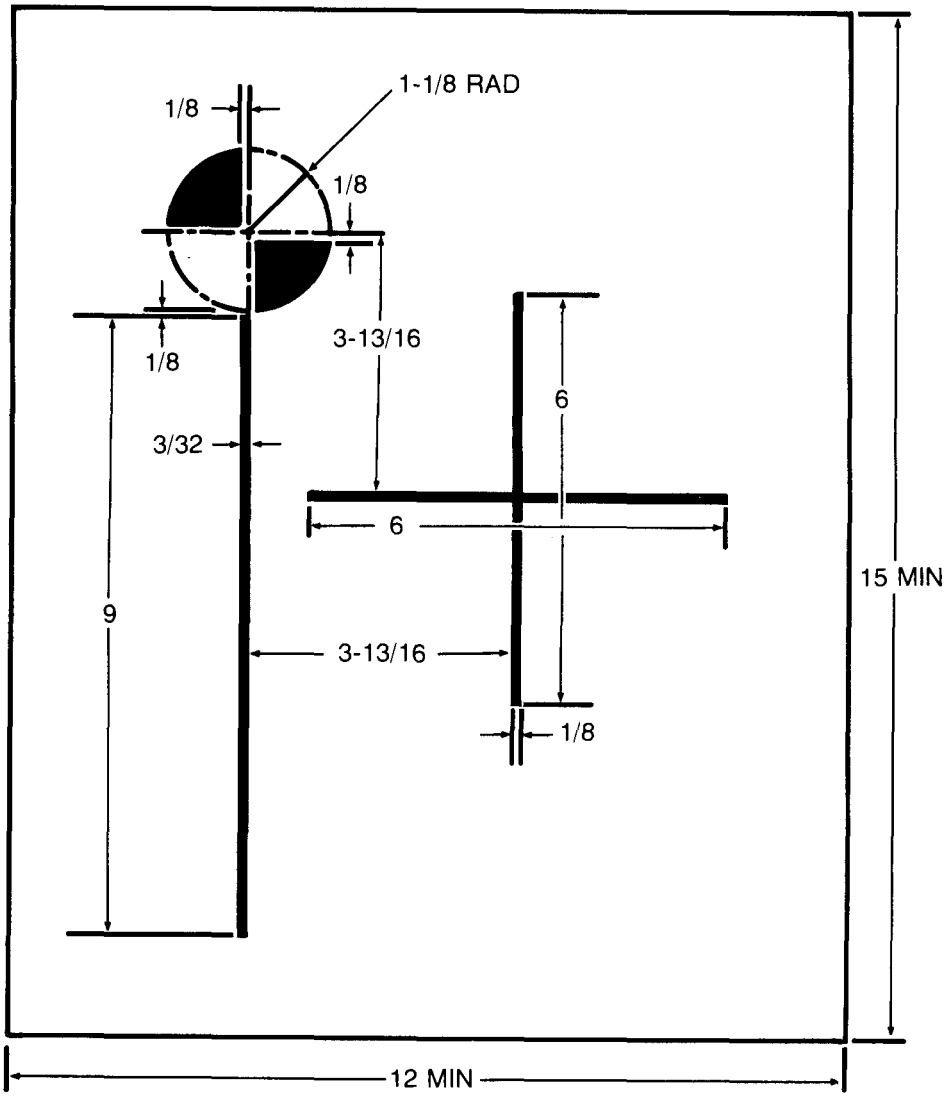
b. Remove breech boresight (9) from breech and threads (4) from rifle muzzle. Close breechblock (8).

Test Target Method

1

NOTE

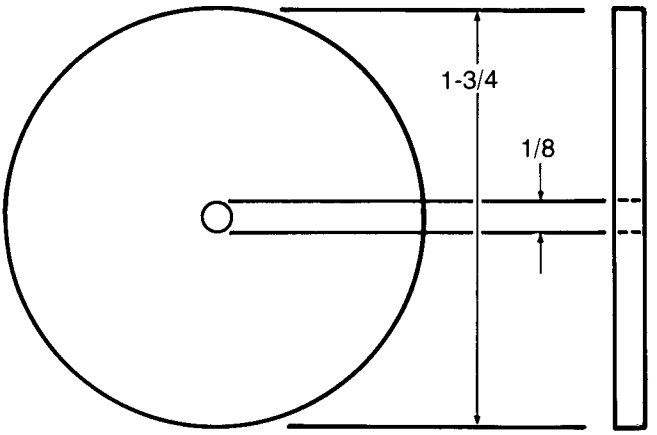
Where conditions of terrain or prohibit use of distant aiming point method, rifle may be boresighted by using a test target. If necessary, a test target and a parallax shield can be fabricated as illustrated.



2-7. BORESIGHTING (CONT).

Test Target Method (Cont)

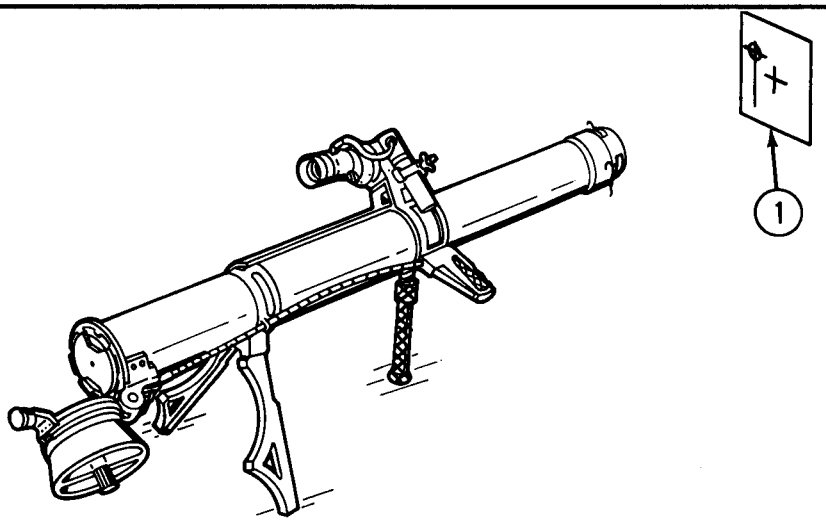
2



NOTE: ALL DIMENSIONS SHOWN ARE IN INCHES.

NOTE: THE PARALLAX SHIELD, WHEN REQUIRED, WILL BE FABRICATED FROM CARDBOARD OR OTHER SUITABLE MATERIAL BY ORGANIZATIONAL MAINTENANCE.

3

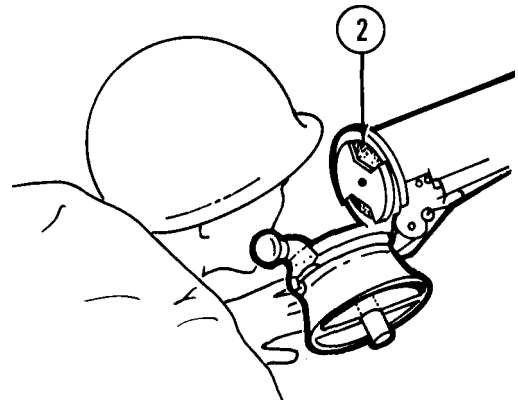


a. Follow steps 1 through 5 of the distant aiming point method and then proceed to step b.

b. Place test target (1) in a vertical position directly in front of rifle at a distance of 12.19 meters (40 feet).

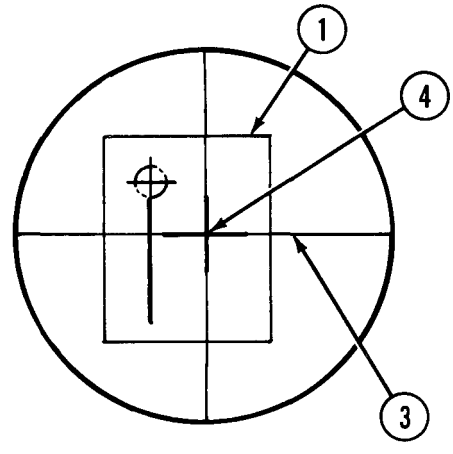
4

Sight through breech boresight (2).



5

Aline muzzle cross threads (3) with image (4) on test target (1).

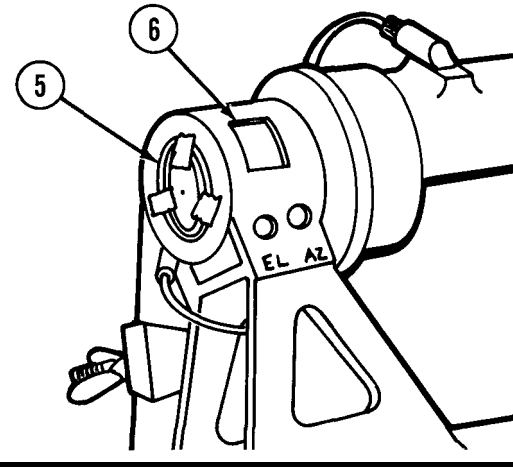


6

Install a parallax shield (5) on front of mount (6) and secure with tape.

NOTE

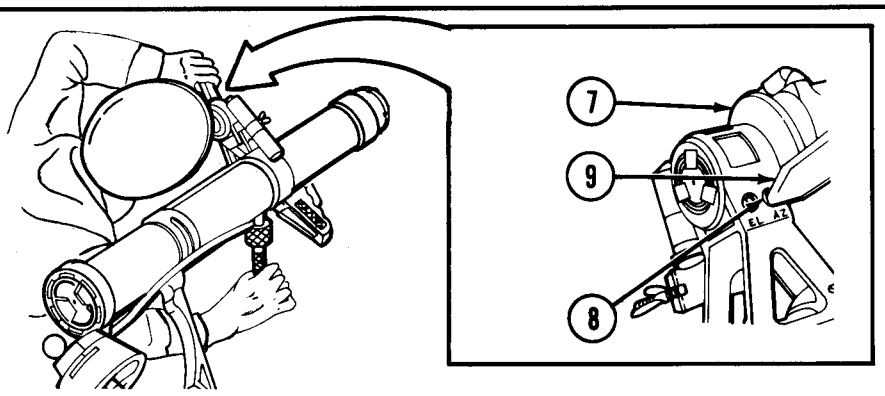
The parallax shield minimizes the effects of parallax when viewing the test target.



2-7. BORESIGHTING (CONT).

Test Target Method (Cont)

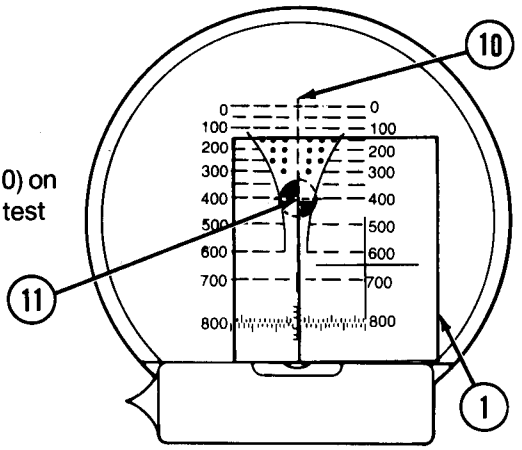
7



While sighting through telescope (7), adjust AZ boresight screw (8) with extractor and screwdriver combination tool (9).

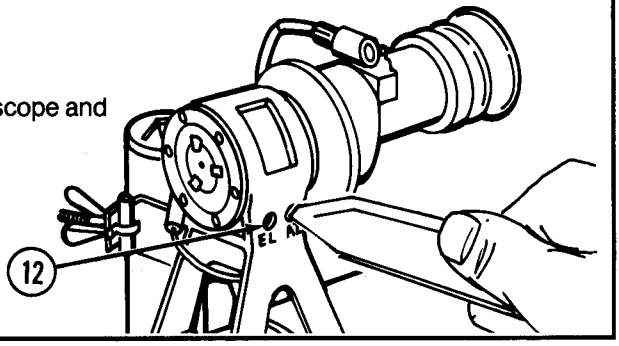
8

Aline vertical centerline of reticle (10) on vertical centerline of image (11) on test target (1).



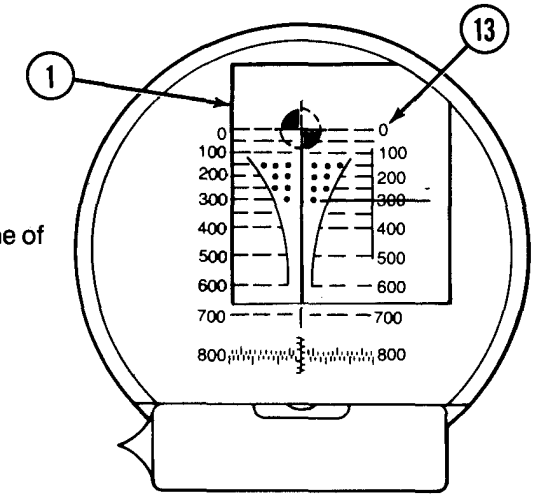
9

Continue sighting through telescope and adjust EL boresight screw (12).



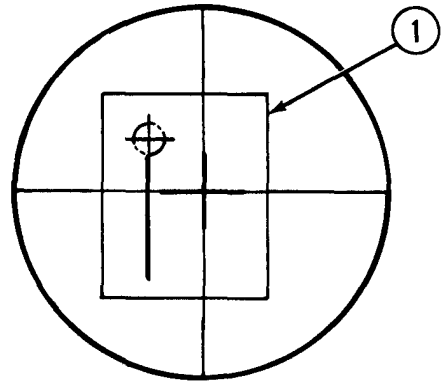
10

Aline the zero (0) range horizontal line of reticle (13) on test target (1).



11

Check alinement of rifle bore and telescope on test target (1) to ensure that shifting of the weapon or telescope did not occur. If shifting did occur, repeat steps 4 through 10 above until proper alinement is achieved.

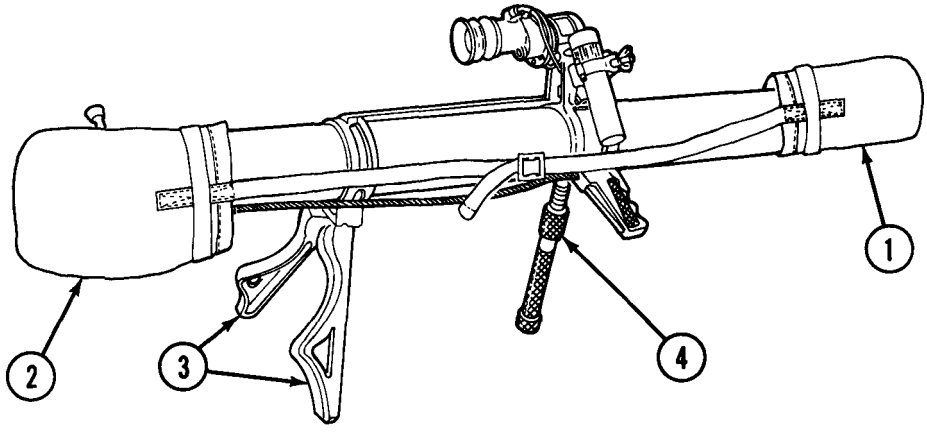


12

Remove breech boresight, muzzle cross threads, and parallax shield from mount. Close breechblock.

2-8. PREPARATION FOR FIRING.

Ground-Firing

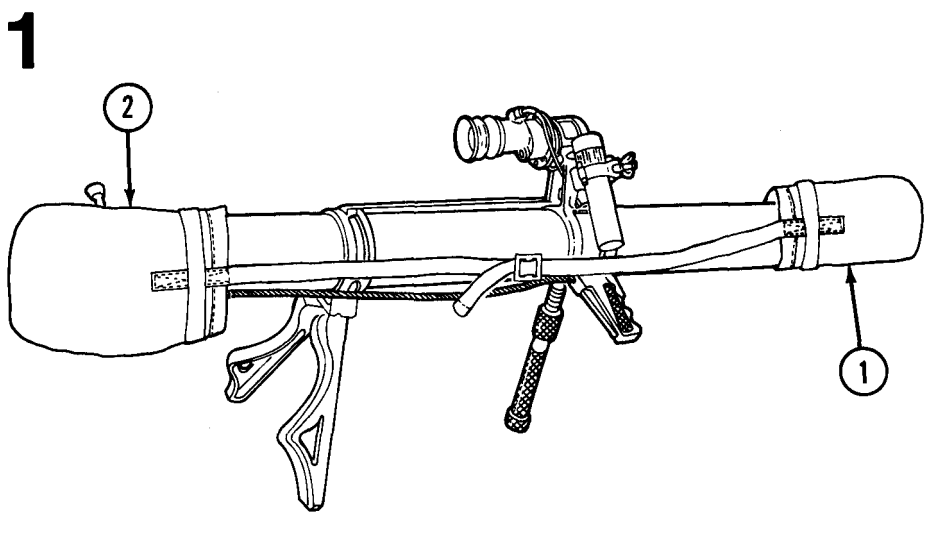


a. Remove covers from muzzle (1) and breech (2).

b. Spread biped legs (3) and place weapon on ground,

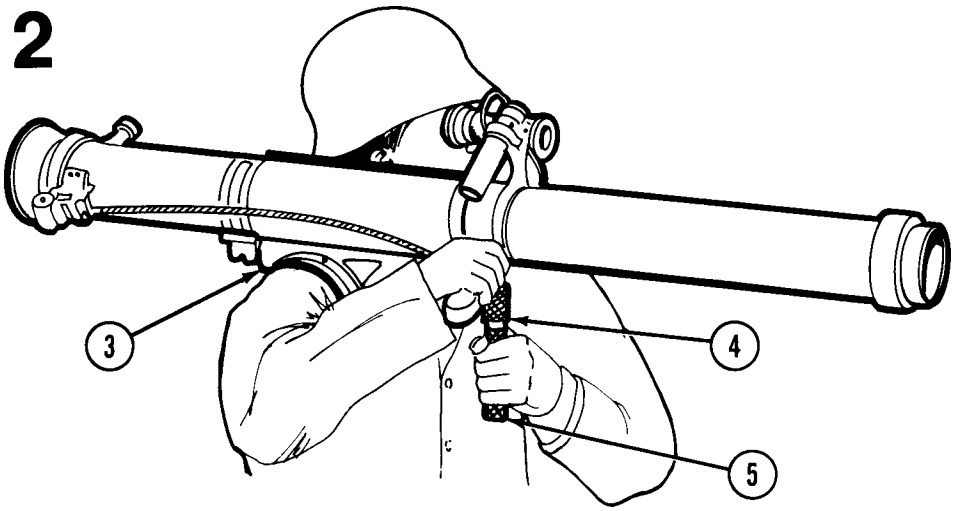
c. Rotate monopod sleeve (4) to elevate weapon.

Shoulder-Firing



a. Remove covers from muzzle (1) and breech (2).

2



a. Press bipod legs (3) together and fold up until flush with underside of tube.

b. Grasping monopod assembly (4) with left hand, place weapon on shoulder and hold rifle grip (5) with right hand.

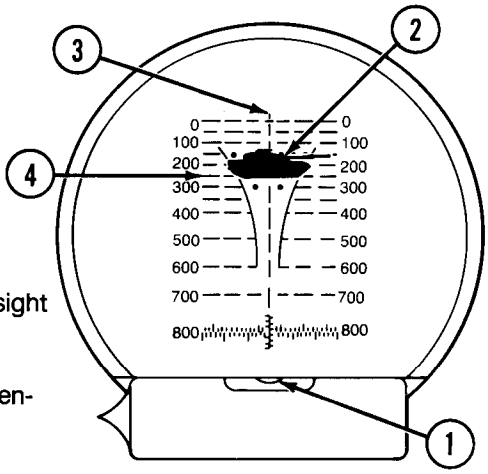
2-9. OPERATING PROCEDURES.

Operation When Range is Known or Estimated

1

NOTE

The sighting and fire control instruments can be used for direct fire sighting only.



a. Point weapon toward target and sight through telescope.

b. Move weapon until bubble (1) is centered in level vial.

c. To achieve the estimated range, elevate, depress, or traverse weapon until target (2) image is superimposed on the reticle. The image of the target shall be placed at the vertical centerline (3) and at the estimated horizontal lead line (4) (in this case, 250 meters).

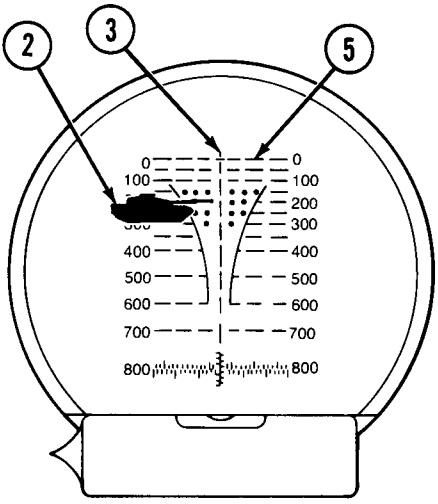
2-9. OPERATING PROCEDURES (CONT).

Operation When Range is Known or Estimated (Cont).

2

a. If target is moving perpendicular to the direction of fire, lead target (2), while keeping the vertical centerline (3) ahead of the targets image. Use lead lines (5) as an aid in maintaining proper lead. The actual lead must be estimated based on the target's speed.

b. Fire the rifle.

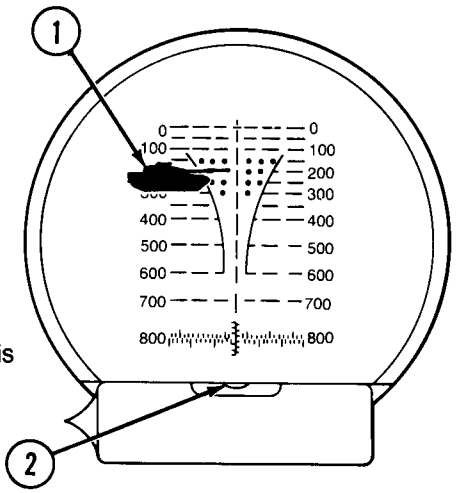


Operation When Ranging with Stadia Lines

1

a. Point weapon toward target (1) and sight through telescope.

b. Move weapon until bubble (2) is centered in level vial. Elevate or depress and traverse weapon until target (1) is positioned on reticle.

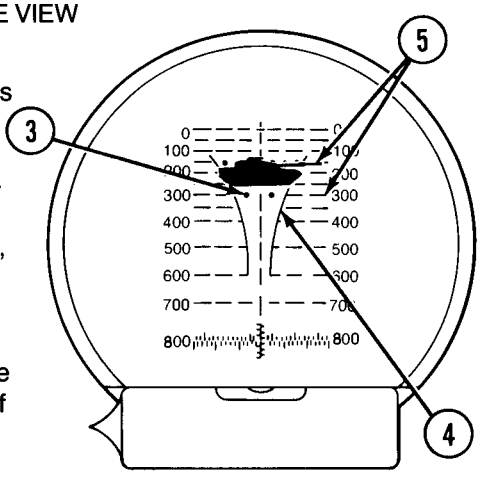


2

SIDE VIEW

a. The small circles (3) within stadia lines (4) are spaced horizontally 5 mils apart between the 150-300 mil vertical range (5). They are used for ranging targets with known dimensions, such as tanks, self-propelled artillery, or trucks (6 meters side view or 3 meters head-on view).

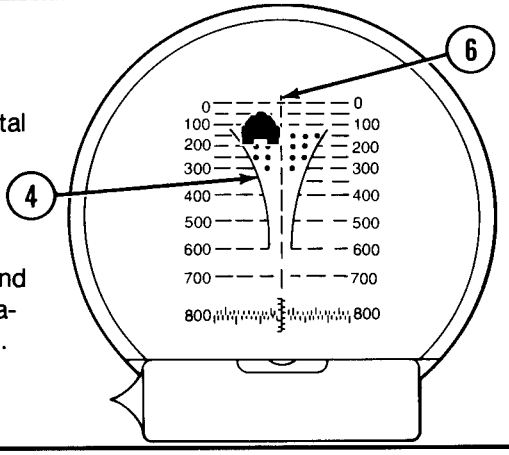
b. If target is a side view of a tank, move and elevate rifle until front and rear of tank touch stadia lines (4) on reticle.



3

a. Lead a moving target using horizontal lines to maintain elevation adjustment.

b. If a target faces directly toward or away from weapon, position right and left side of target between either stadia line (4) and vertical centerline (6). Read the range at the center of target, 150 meters in this case.

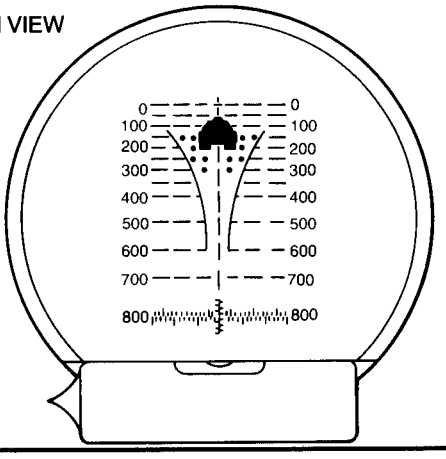


4

HEAD-ON VIEW

a. After obtaining range, place target on centerline and maintain elevation adjustment.

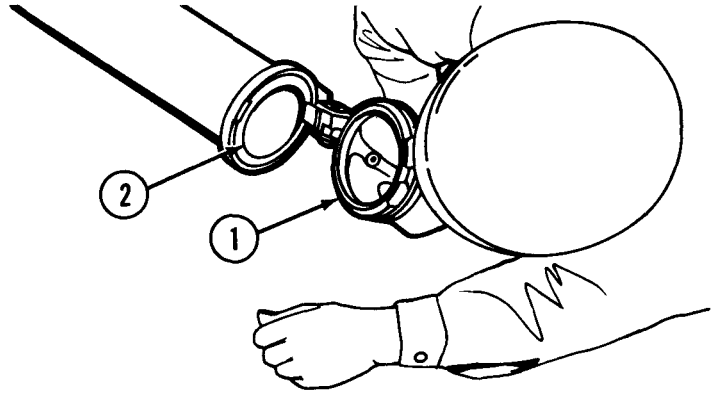
b. Fire the rifle.



2-9. OPERATING PROCEDURES (CONT).

Loading Procedures

1



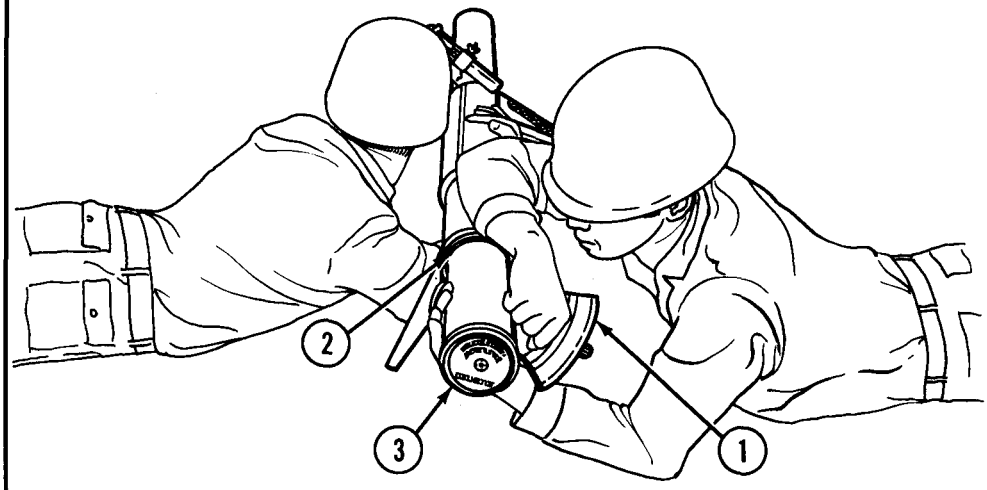
a. Open breechblock (1).

b. Check for and remove any foreign matter in bore or chamber (2).

2

WARNING

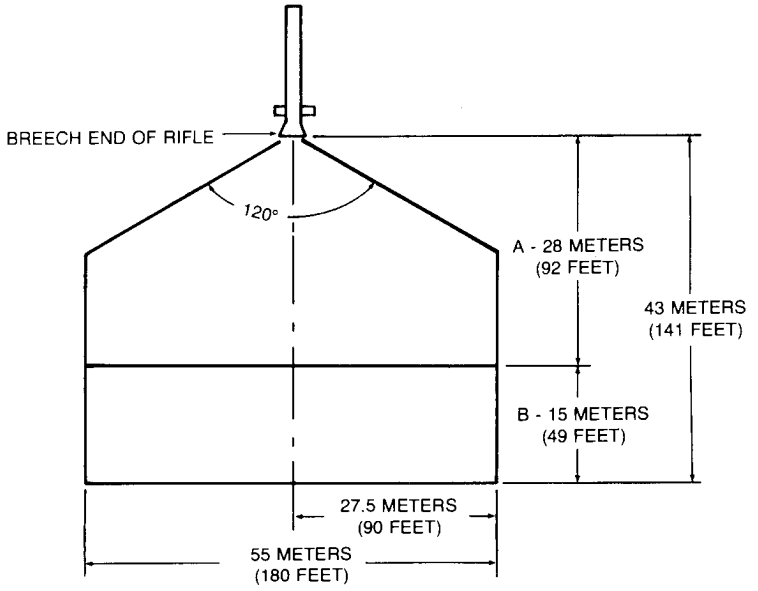
Avoid striking fuze or primer of round when loading.



a. Insert a round (3) into chamber (2) so that lip of cartridge case contacts cartridge extractor.

b. Close breechblock (1) to the closed and locked position.

Firing Procedures



A - DANGER AREA
B - CAUTION AREA

WARNING

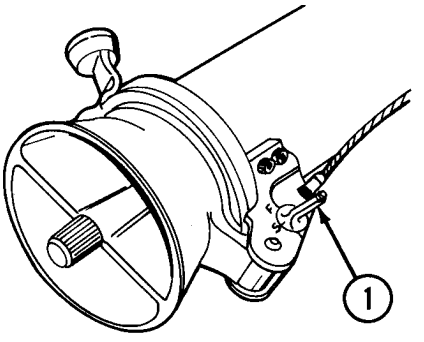
The back blast of this weapon is extremely dangerous. Keep all personnel and equipment out of the back blast danger area.

Do not fire the weapon from locations where the back blast will strike trees, heavy brush, cliffs, or buildings. Deflected back blast and flying debris can kill or injure personnel.

All personnel in immediate area of weapon should wear ear plugs or similar protective equipment.

1

Rotate safety assembly (1) from the safe (S) to fire (F) position.

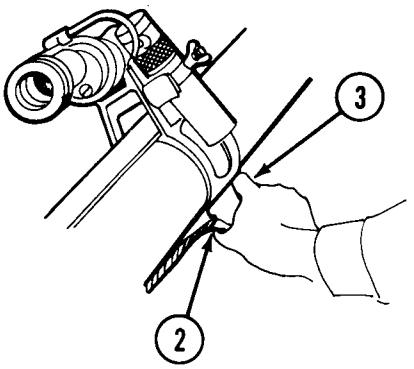


2-9. OPERATING PROCEDURES (CONT).

Firing Procedures (Cont)

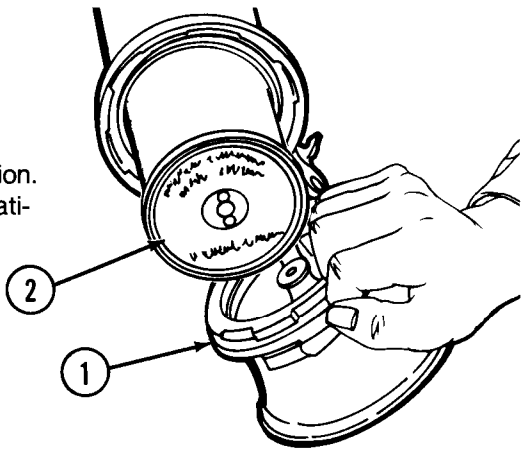
2

Depress gun grip safety (2) and trigger (3).



2-10. EXTRACTING A FIRED CARTRIDGE CASE FROM RIFLE.

Open breechblock (1) with a quick action. The cartridge extractor should automatically eject cartridge case (2) out of breech.

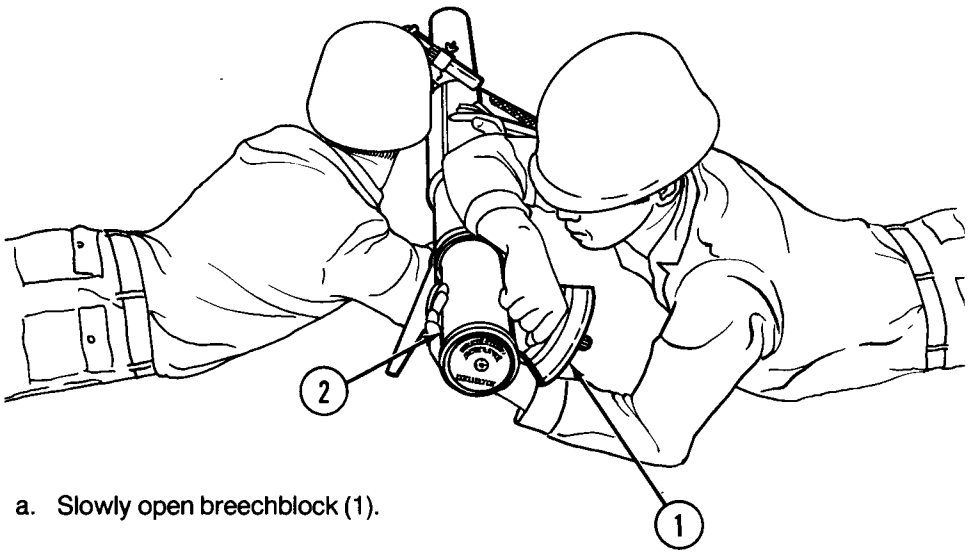


2-11. UNLOADING AN UNFIRED ROUND FROM RIFLE.

a. In case of misfires, refer to misfire/checkfire procedures (p 2-40).

b. If a loaded 90-mm round is not to be fired, it can be removed by the following procedure.

Cartridge Removal Procedures



a. Slowly open breechblock (1).

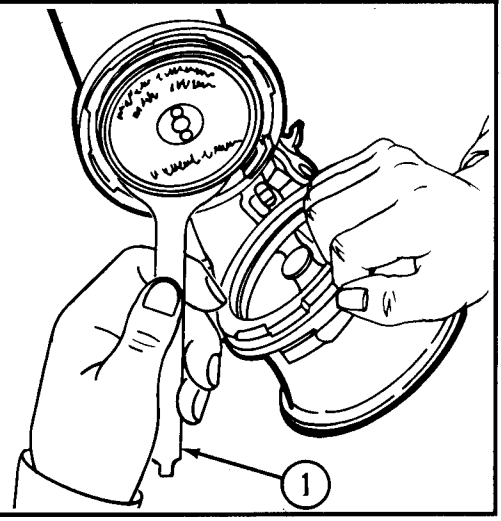
b. Catch and remove round (2) as it slides out of breech. Be careful not to drop round.

c. If extractor fails to extract round when breechblock is opened, do the following emergency unloading procedures.

Emergency Unloading Procedures

1

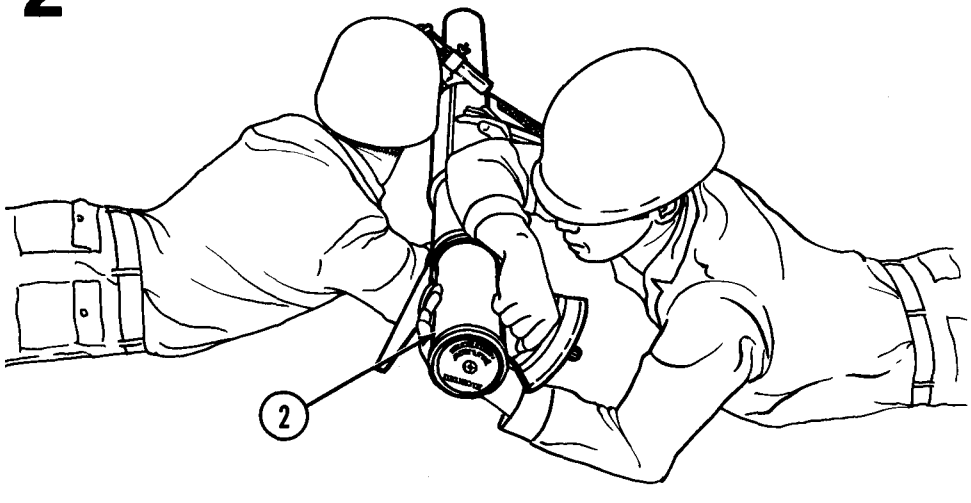
Using extractor and screwdriver combination tool (1), slide curved portion over cartridge between breech end of tube and lip of cartridge. Gently pry round partway out of breech.



2-11. UNLOADING AN UNFIRED ROUND FROM RIFLE (CONT).

Emergency Unloading Procedures (Cont)

2



Remove the round (2) from breech. Be careful not to drop round,

2-12. MISFIRE/CHECKFIRE PROCEDURES.

a. *General.* Malfunctions described below rarely occur when weapon and ammunition are properly maintained and when authorized ammunition is used. To avoid injury to personnel and damage to equipment, all personnel should understand the nature of each kind of malfunction and the proper preventive and corrective procedures. The following warnings should be observed.

WARNING

Do not chamber a round in a hot weapon until ready to fire immediately.

b. *Definitions.*

(1) Misfire. When the weapon does not fire after an attempt to fire has been made. This failure may be due to the failure of the primer, the propelling charge, or firing mechanism to function wholly or in part. A misfire in itself is not dangerous; however, it cannot be immediately distinguished from a hangfire. Misfires must be treated as hangfires until determined otherwise.

(2) Checkfire. A command normally given by the executive officer. But, in an emergency, may be given by anyone present. On this command, regardless of its source, firing will cease immediately and the unloading operation will be initiated.

(3) Hangfire. A delay in functioning of the primer or propelling charge. This delay is unpredictable and may range from a fraction of a second to ten minutes.

(4) Cook-off. The functioning of the propelling charge or projectile when initiated by the heat of the weapon.

(5) Hot tube. Any tube that causes water from a wet swab (or spit) to boil, fry, or steam off when placed on the chamber.

(6) Cold tube. Any tube that does not cause water from a wet swab (or spit) to boil, fry, or steam off when placed on the chamber.

c. *Failure to Fire With a Cold Tube.*

WARNING

Keep weapon trained on target and keep personnel clear of muzzle and breech back blast danger area.

(1) Follow misfire/checkfire procedures on page 2-42.

(2) There is no danger of a cook-off in a cold tube.

d. *Failure to Fire or Interrupted Fire With a Hot Tube.*

WARNING

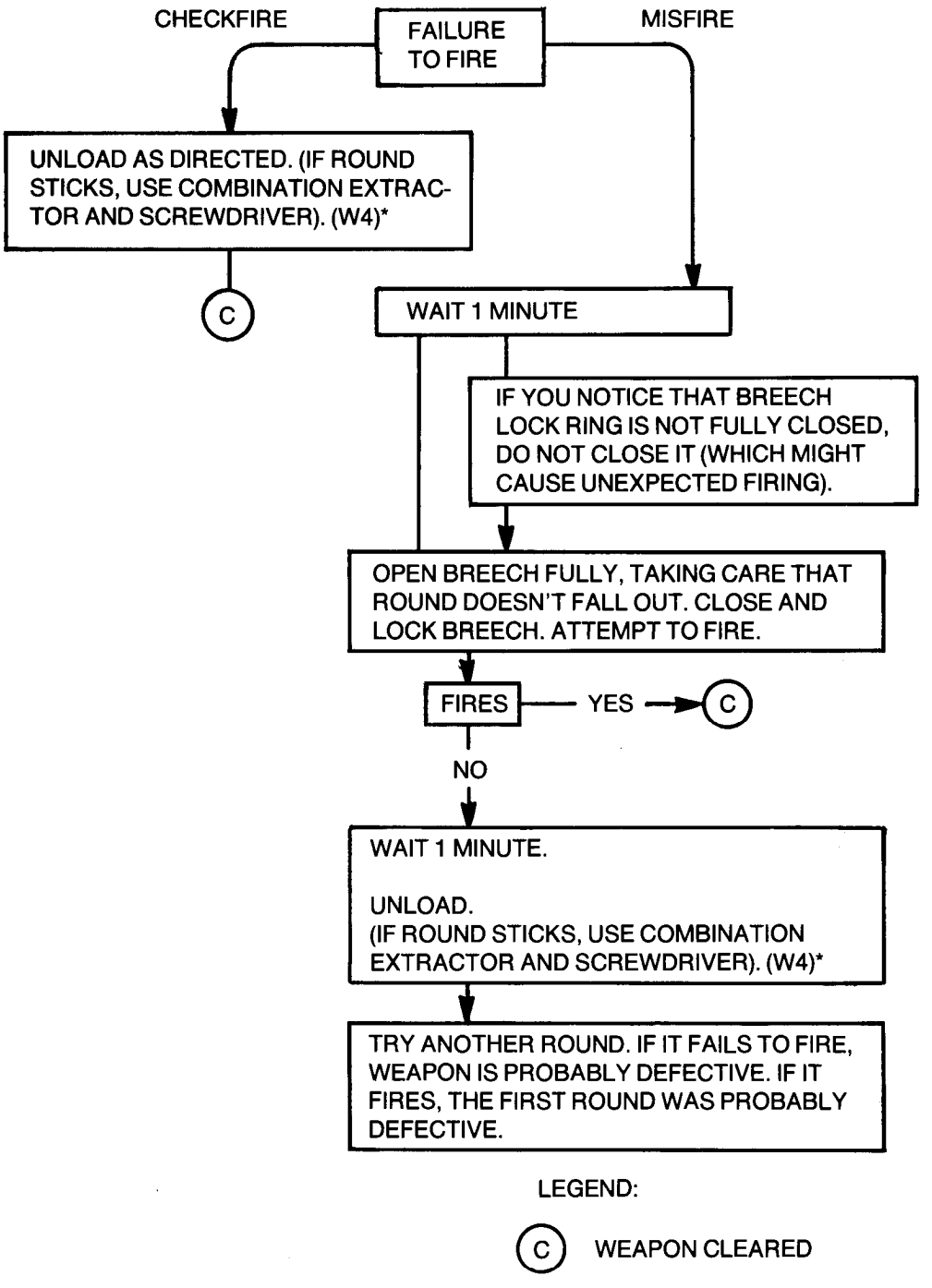
A hot tube can cause an unexpected cook-off or explosion.

Keep weapon trained on target and keep personnel clear of muzzle and breech back blast danger area.

(1) Follow hot tube misfire or checkfire procedures on page 2-43.

(2) If you get a failure-to-fire, follow the procedure on page 2-43 to clear weapon.

COLD TUBES (W1)*

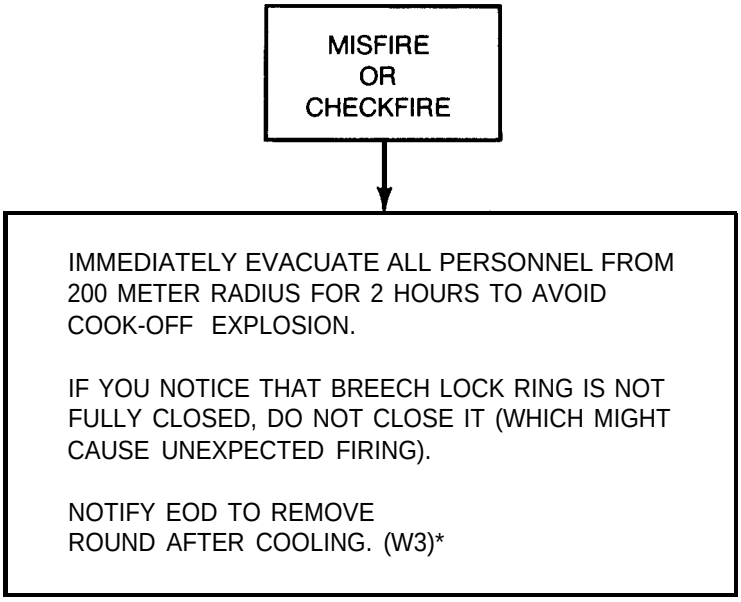


LEGEND:

(C) WEAPON CLEARED

HOT TUBES (W1.2)*

DON'T LOAD UNTIL READY TO FIRE IMMEDIATELY



***WARNINGS**

1 KEEP WEAPON TRAINED ON TARGET AND KEEP PERSONNEL CLEAR OF MUZZLE AND BREECH BACK BLAST DANGER AREA.

2 A HOT TUBE CAN CAUSE AN UNEXPECTED COOK-OFF OR EXPLOSION.

3 NEVER FIRE AMMUNITION WHICH HAS BEEN ALLOWED TO COOL IN A HOT TUBE.

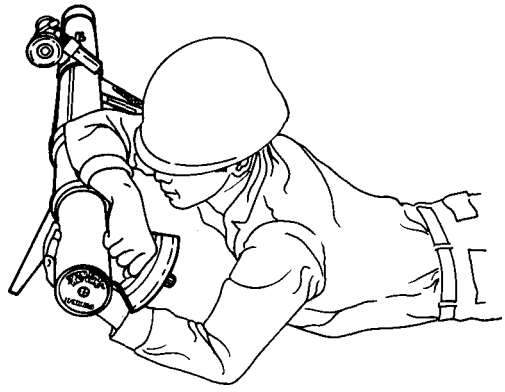
4 KEEP HAND OUT OF BACK BLAST DANGER AREA WHEN USING EXTRACTOR TOOL.

2-13. INSPECTION AFTER FIRING. Perform the preventive maintenance checks and services indicated in the after firing column (p 2-9).

2-14. PREPARATION FOR MOVEMENT OF 90-MM RECOILLESS RIFLE M67.

Routine Procedures

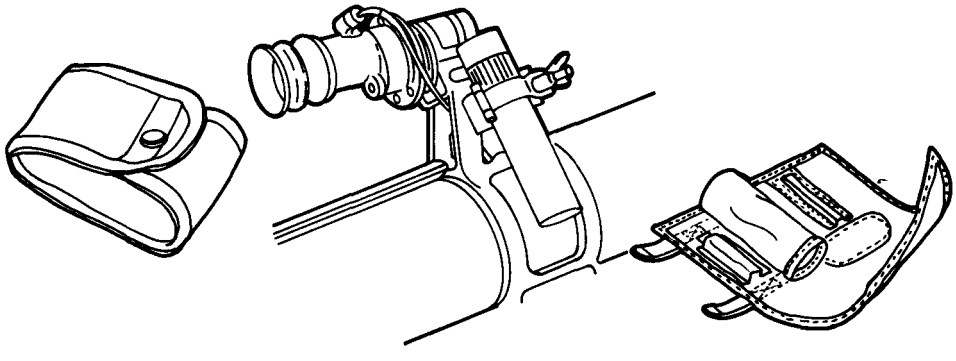
1



WARNING

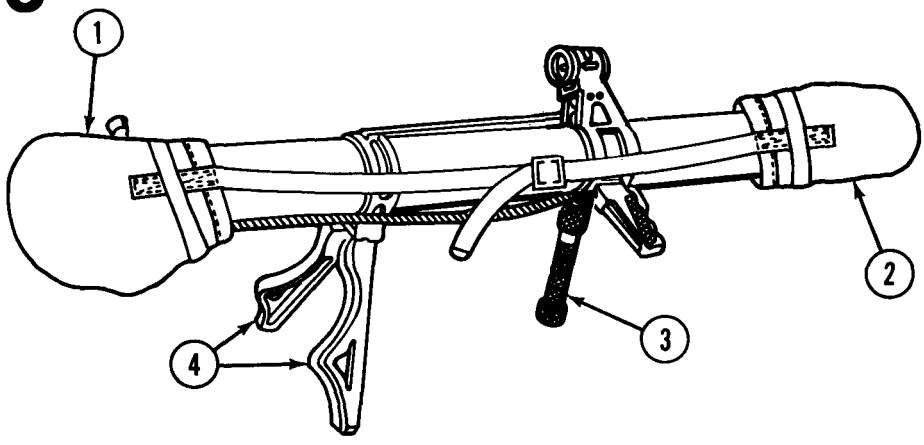
For routine movements, do not move the weapon with a chambered round.

Remove round from chamber.



Remove sighting and fire control instruments (p 2-20), then pack in telescope carrying case and special equipment pouch.

3

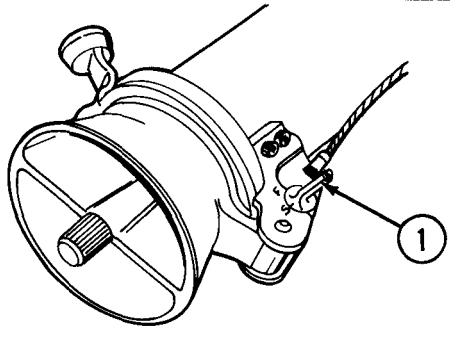


a. Install breechblock cover (1) and muzzle cover (2).

b. Adjust monopod assembly (3) to its shortest length.

c. Fold bipod legs (4) up under tube and you're ready to move weapon.

Emergency Procedures



WARNING

If the tactical situation prevents removing round from the weapon, attempt to keep muzzle pointed at the target. Observe breech back blast conditions. If barrel is hot and danger of a cook-off exists, refer to the misfire/checkfire procedures on page 2-40.

a. Place safety assembly (1) in safe (S) position.

b. If practical, remove round from chamber.

Section IV. OPERATION UNDER UNUSUAL CONDITIONS

2-15. GENERAL CONDITIONS. This section contains special instructions for operating and servicing the weapon under unusual conditions. Special care in cleaning and lubrication must be used when extremes of temperature, humidity, and terrain conditions are present or expected. Proper cleaning, lubrication, and storage and handling of the weapon ensure proper operation and functioning. This guards against excessive wear of working parts and deterioration of materiel.

2-16. EXTREME COLD WEATHER CONDITIONS.

a. *General Problems.*

(1) Extensive preparation of materiel scheduled for operation in extreme cold weather is necessary. Generally, extreme cold will cause lubricants to thicken.

(2) For description of operations in extreme cold, refer to FM 31-70, FM 31-71, and FM 9-207.

NOTE

Approved practices and precautions must be followed. FM 9-207 contains information which is specifically applicable to this materiel as well as to all ordnance materiel. It must be considered an essential part of this technical manual, not merely an explanatory supplement to it.

b. *Handling and Storage of Lubricants and Special Oils.*

(1) The operation of equipment at arctic temperatures will depend on the condition of the oils and lubricants used in the equipment. Immediate effects of careless handling of oils and lubricants are not always visible, but any departure from proper handling of these products is likely to cause trouble.

(2) In arctic operations, contamination with moisture causes many difficulties. Moisture can be the result of snow getting into the product, condensation due to "breathing" of a partially filled container, or moisture condensed in a partially filled container when a product is brought outdoors from room temperature or indoors from storage in extreme cold.

c. *Sighting and Fire Control Materiel.* Avoid breathing on lens of Telescope M103. This may produce condensation which could freeze. Ensure that Telescope M103 is removed from telescope mount and placed in carrying case after each use of the weapon. Avoid sudden temperature changes from warm room to low outdoor temperatures or vice versa. This may cause clouding of optical elements, corrosion of internal parts, and forcing of instruments out of adjustment by internal expansion and contraction.

2-17. EXTREME HOT WEATHER CONDITIONS.

a. In hot climates, the film of oil necessary for operation and preservation will be quickly dissipated. Inspect the rifle frequently, paying particular attention to hidden surfaces such as bores and chambers, springs and spring seats, and places where rusting might occur and not be noticed.

b. Perspiration from the hands is a contributing factor to rusting because it contains acid. After handling, clean, wipe dry, and restore oil film.

c. Ammunition must be protected from sources of high temperatures, including the direct rays of the sun. Elements in primers and fuzes are particularly sensitive to high temperatures.

d. All sighting and fire control materiel should be shielded as much as possible from the direct rays of the sun.

2-18. OPERATION IN HOT, DRY CLIMATE. When operating in hot climates, the bore of the rifle should be cleaned and oiled frequently. Temperature changes may cause condensation of moisture in the air on metal and cause rusting. If condensation occurs on parts of the weapon, wipe them dry and lubricate in accordance with lubricating instructions (p 3-1).

2-19. OPERATION IN HOT, DAMP, AND SALTY ATMOSPHERE.

a. Materiel should be inspected frequently when operated in hot, moist areas.

b. Moist and salty atmospheres have a tendency to emulsify oils and greases, and destroy their rust-preventive qualities. Inspect parts frequently for rusting. Keep covers in place as much of the time as firing conditions permit.

CAUTION

At no time is gasoline or any solvent to be used to remove oil or grease spots from canvas.

Wet canvas should be dried thoroughly before folding.

c. Proper care of canvas requires frequent inspection. To prevent formation of damaging mildew, shake out and air the canvas cover and leather straps for several hours. Repair any loose grommets or rips in the canvas. Mildewed canvas is best cleaned by scrubbing with a dry brush. If water is necessary to remove dirt, it must not be used until mildew has been removed. If mildew is present, examine fabric carefully for evidence of rotting or weakening of fabric by stretching and pulling. If fabric shows indication of loss of strength, it is probably not worth retreatment. If not damaged, retreat the canvas. Oil and grease can be removed by scrubbing with issue soap and warm water. Rinse well with clear water and dry.

d. When the materiel is inactive, all exposed surfaces should be covered with a heavy film of rust-preventive compound.

e. Do not break moisture-resistant seals of ammunition containers until ammunition is to be used.

f. Keep ammunition dry and free from mud, rust, corrosion, and foreign matter. Provide proper drainage around the emplacement to keep it as dry as possible.

g. In the tropics, many optical instruments are protected against fungus growth by the installation of fungicidal capsules. Notify support maintenance personnel if there are indications of fungus growth in optical instruments.

2-20. UNUSUAL TERRAIN CONDITIONS.

a. *Mud* Avoid placing weapon on very soft or swampy ground.

b. *Snow or Ice.* When operating in areas where snow or ice is present, be careful to protect the weapon from accumulation of snow and ice that could prevent proper functioning of moving parts.

c. *Sand.* Inspect and lubricate the materiel more frequently when operating in sandy areas. Exercise particular care to keep sand out of the mechanisms when carrying out inspecting, lubricating or repair operations. Keep all covers in place as much of the time as firing conditions permit. Shield parts from flying sand with canvas covering during disassembly and assembly operations. When beginning an action in sandy areas, remove lubricants from exposed lubricated parts (situation permitting), as they will pickup sand, forming an abrasive which will cause rapid wear. After the action is over, clean and lightly lubricate all exposed parts.

Section V. OPERATION OF AUXILIARY EQUIPMENT

2-21. OPERATION OF 7.62-MM SUBCALIBER GUN M149A1 .

a. *General.* The subcaliber gun permits realistic training and eliminates the use of expensive service ammunition. The use of smaller bore ammunition prevents wear on the weapon and reduces wear on the target. The sighting and fire control equipment for the major weapon will be used with the gun.

b. *Description.* The subcaliber gun is the same approximate size and weight as a 90-mm service cartridge. It consists of a long cylindrical sleeve with detachable ends, a housing, and a bushing that internally supports a 7.62-mm caliber special gun barrel. The hinge, with firing pin, is assembled into the bushing which permits loading, firing, and extracting a 7.62-mm cartridge.

c. Performance Data.

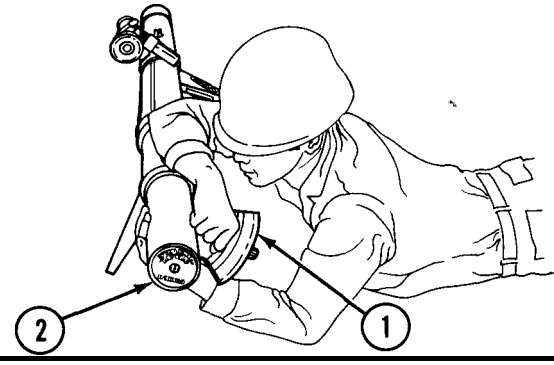
Overall length	16 in. (406 mm)
Weight	11 lb (5 kg)
Ammunition	Fixed type, 7.62-mm, M62 tracer, M80 ball
Estimated barrel life	5000 rounds

2-22. OPERATING INSTRUCTIONS FOR 7.62-MM SUBCALIBER GUN M149A1.

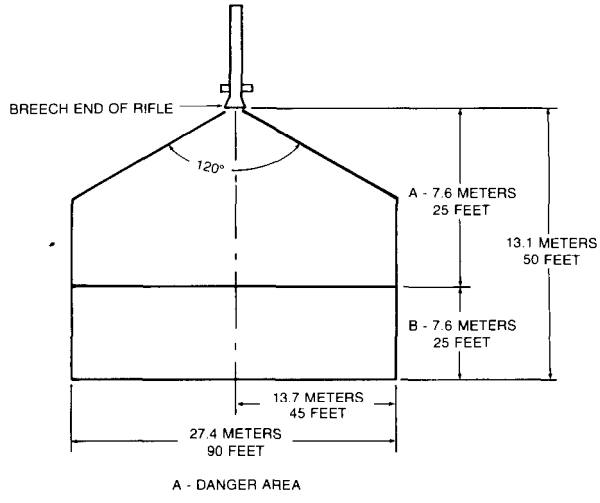
Installation Procedures

a. Wipe all subcaliber gun surfaces dry.

b. Open 90-mm rifle breechblock (1) and insert subcaliber gun (2) into chamber. Make sure pinned end of hinge alines with hinge block.



Firing Procedures



A - DANGER AREA

WARNING

Back blast from the subcaliber gun is dangerous. Do not fire weapon from a location where obstructions could deflect the back blast sufficiently to injure personnel. Use ear protectors. Do not allow gun to become overheated due to prolonged high rate of fire. Do not leave an unfired round in chamber of a hot gun because of danger of cook-off.

NOTE

Realistic training is provided by observing the back blast danger area of the major weapon. See page 2-37.

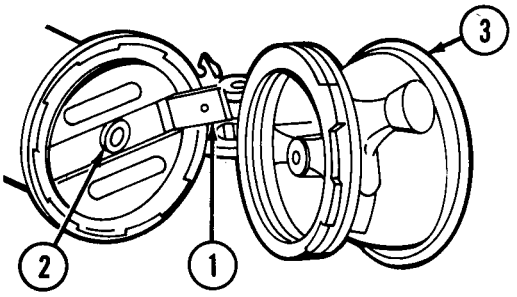
2-22. OPERATING INSTRUCTIONS FOR 7.62-MM SUBCALIBER GUN M149A1 (CONT).

FIRING PROCEDURES (CONT)

1

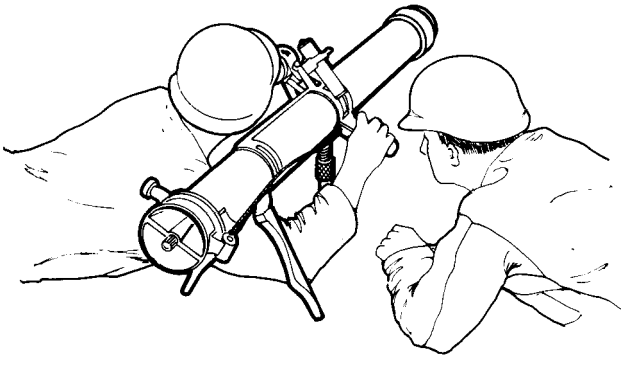
a. Open hinge (1), insert 7.62-mm cartridge (2) into chamber and close hinge (1).

b. Close and lock breechblock (3).



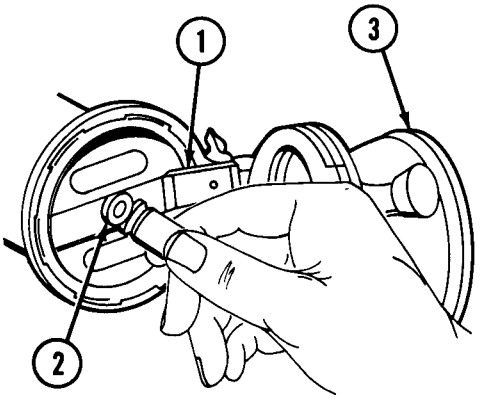
2

Fire 90-mm rifle.



3

After the round is fired, open the breechblock (3), hinge (1), and pry the cartridge (2) from the chamber with a spent cartridge case or screwdriver and extractor combination tool.



Misfire Procedures

WARNING

When a misfire occurs, keep all personnel clear of line of fire and of back blast area. Do not cock gun for at least 1 minute after a misfire occurs, because a misfire cannot immediately be distinguished from a hangfire.

a When gun fails to fire, wait 1 minute, cock, and attempt to fire gun. To cock, open and close breech block.

b If gun fails to fire again, wait 1 minute then remove 7.62-mm cartridge from chamber, and separate it from other rounds for authorized disposition.

Removal Procedures

WARNING

Do not remove the subcaliber gun if it has a cartridge chambered.

Open 90-mm rifle breechblock and pull subcaliber gun from chamber.

CHAPTER 3
OPERATOR MAINTENANCE INSTRUCTIONS

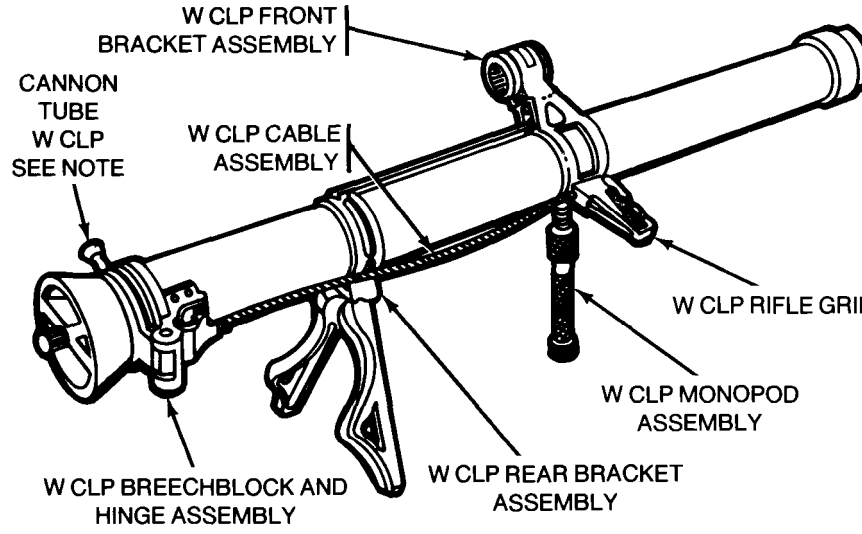
Section I. LUBRICATION INSTRUCTIONS

3-1. GENERAL. Lubrication instructions and their prescribed service intervals are contained in this section.

3-2. SERVICE INTERVALS FOR NORMAL CONDITIONS. For application of materials and proper service intervals, see lubrication instructions below and TM 9-247.

3-3. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST. Essential lubricants and cleaning materials are listed in appendix E.

3-4. LUBRICATION INSTRUCTIONS. The following lubricating instructions are given for normal conditions. Reduce or increase lubrication intervals as required to adjust for abnormal operation and extreme conditions (p 2-46).



NOTE

THESE LUBRICATION INSTRUCTIONS ARE MANDATORY. ANY REFERENCES TO DISASSEMBLY AND DAILY OR WEEKLY PROCEDURES APPLY TO ORGANIZATIONAL PERSONNEL.

a. *Rifle Grip.* After firing or weekly when weapon is not fired, disassemble and clean with CLP (item 2, app E). Wipe dry and lubricate with CLP.

b. *Monopod Assembly.* After firing or weekly when weapon is not fired, wipe dry and coat threaded portion with light film of CLP.

c. *Front Bracket Assembly.* Before firing, wipe dry and lightly lubricate with CLP. After firing or weekly when weapon is not fired, clean with CLP and wipe dry. Lubricate lightly with CLP.

d. Cable *Assembly.* Before firing, wipe dry and lightly lubricate with CLP. After firing or weekly when weapon is not fired, wipe dry and lightly lubricate with CLP.

e. Breechblock and *Hinge Mechanism Group.* Before firing, wipe dry and lightly lubricate tooth on inner hinge portion of breechblock and all threaded portions of the lock ring with CLP. Apply a light coat of CLP to all other surfaces. Wipe external surfaces dry before firing. After firing, disassemble and clean with CLP. Wipe dry and coat lightly with CLP. When weapon is not fired, disassemble and clean with CLP weekly. Wipe dry and coat lightly with CLP.

f. Rear Bracket Assembly. Before firing, wipe dry and lightly lubricate with CLP. After firing or weekly when weapon is not fired, clean with CLP. Wipe dry all parts and lightly lubricate with CLP weekly.

g. Cannon Tube. Immediately after firing, clean with CLP. Wipe dry and coat lightly with CLP. Weekly when weapon is not fired, clean with CLP, wipe dry and lubricate with CLP.

Section II. TROUBLESHOOTING PROCEDURES

3-5. GENERAL.

a. The table below lists the common malfunctions which you may find during the operation or maintenance of the 90-mm recoilless rifle or its components. You should perform the tests/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests/inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

90-MM RECOILLESS RIFLE M67 W/E

1. FAILURE TO FIRE.

Step 1. Check that safety (1) is in the fire(F) position.

Rotate safety to the fire (F) position.

Step 2. Check for defective round.

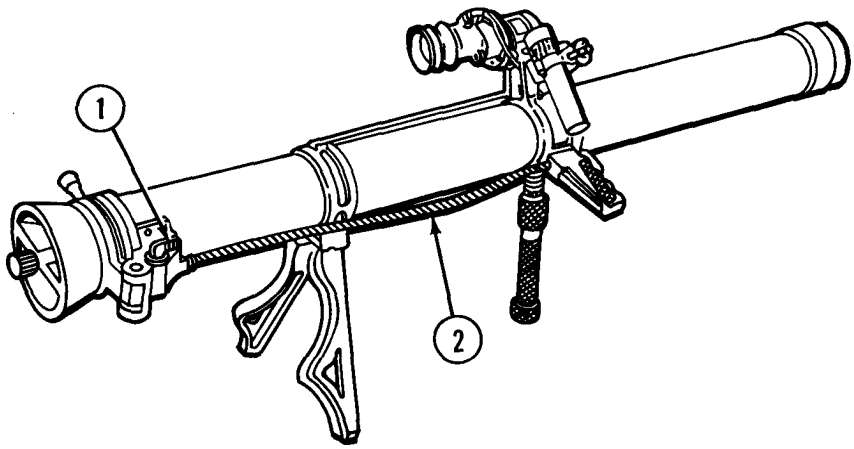
Follow failure to fire procedure (p 2-41), set aside defective round.

Step 3. Check for improperly adjusted, broken, or defective cable assembly (2).

Notify organizational maintenance.

Step 4. Check for broken or damaged firing pin.

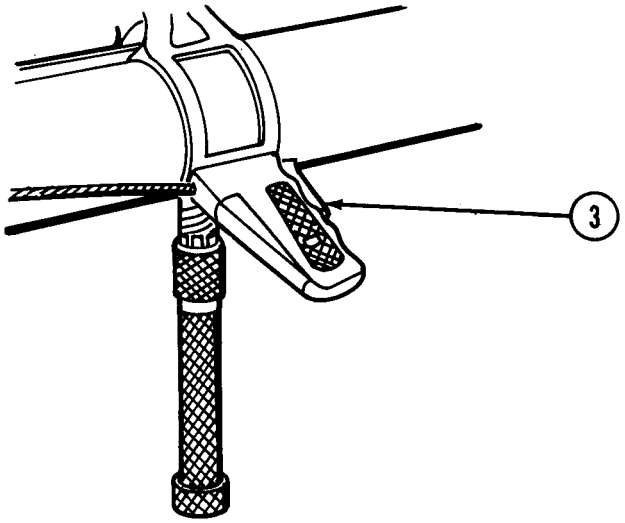
Notify organizational maintenance.



TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

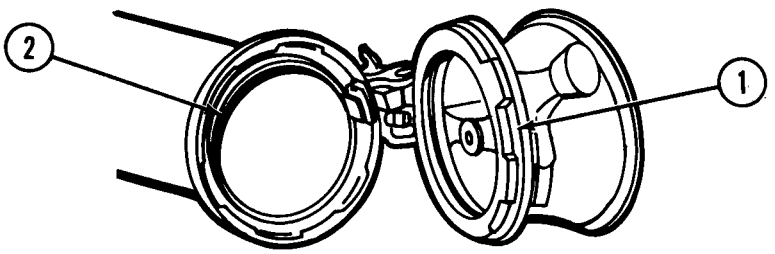
Step 5. Check for broken or defective trigger (3).
Notify organizational maintenance.



2. FAILURE OF BREECHBLOCK TO LOCK OR UNLOCK.

Step 1. Check interrupted threads on lock ring assembly (1) and cannon tube (2) for dirt and foreign matter.
Clean and lightly lubricate with CLP (item 2, app E).

Step 2. Check for damaged interrupted threads (1 and 2).
Notify organizational maintenance.

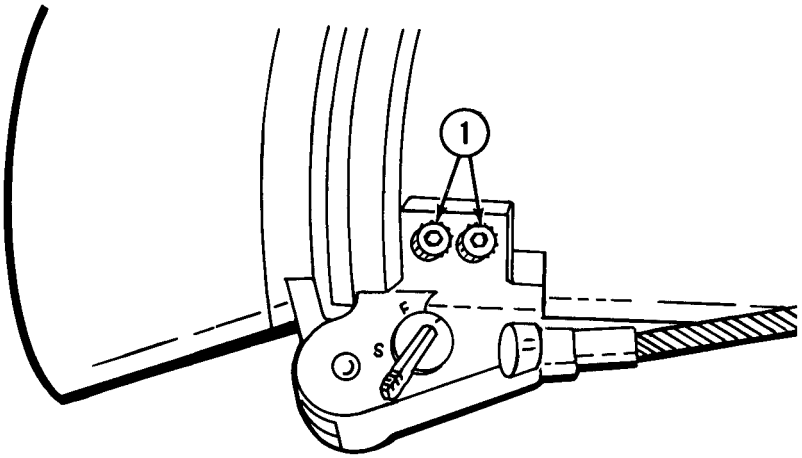


MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

3. FAILURE OF BREECHBLOCK TO OPEN OR CLOSE.

Step 1. Check for loose hinge block bolts (1).

Notify organizational maintenance.

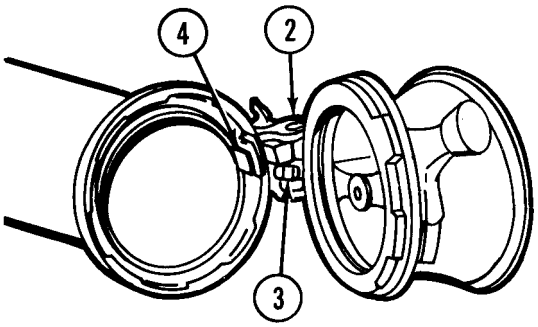


Step 2. Check for worn or chafed hinge pin (2).

Notify organizational maintenance.

Step 3. Check for worn or chafed breechblock hinge (3).

Notify organizational maintenance.



Step 4. Check for worn or damaged cartridge extractor (4).

Notify organizational maintenance.

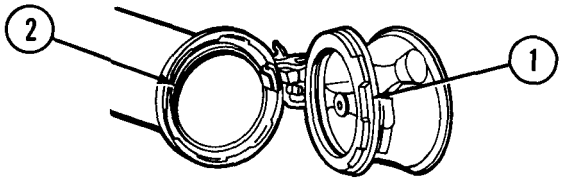
TROUBLESHOOTING (CONT)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

4. FAILURE TO COCK.

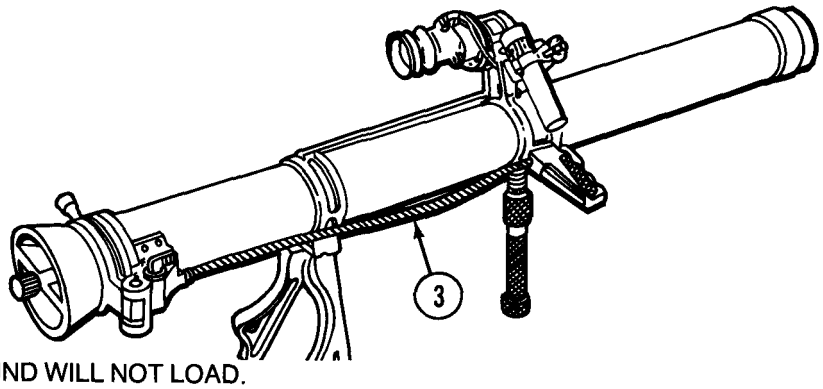
Step 1. Check for dirty breech mechanism.

Clean and lightly lubricate interrupted threads on lock ring assembly (1) and cannon tube (2) with CLP (item 2, app E). Apply a light coat of CLP to all other surfaces.



Step 2. Check for broken or damaged cable assembly (3).

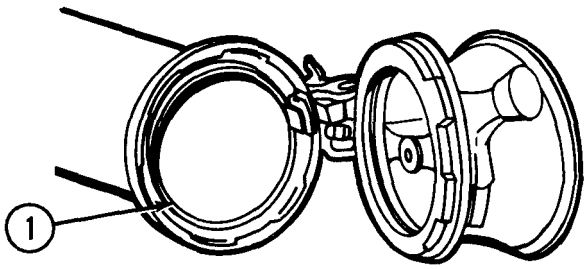
Notify organizational maintenance.



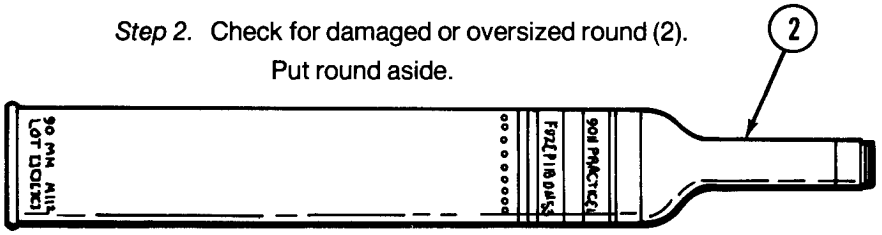
5. ROUND WILL NOT LOAD.

Step 1. Check chamber (1) for dirt or foreign matter.

Clean chamber with CLP (item 2, app E) using artillery cleaning brush or remove foreign matter.

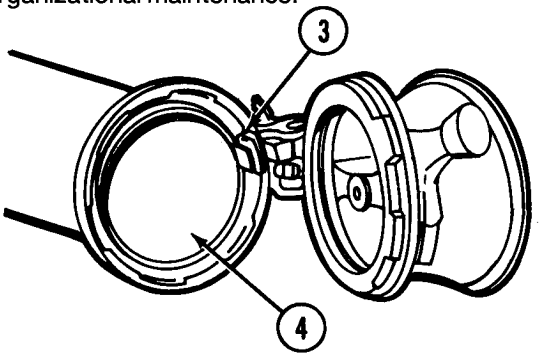


Step 2. Check for damaged or oversized round (2).
Put round aside.



Step 3. Check for bent or damaged cartridge extractor (3) that will not retract into chamber.
Notify organizational maintenance.

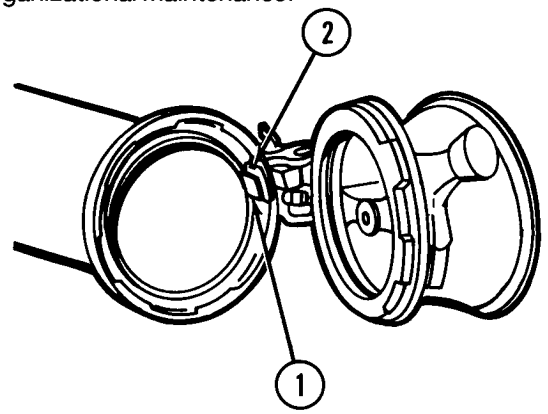
Step 4. Check for damaged lands in the cannon tube (4).
Notify organizational maintenance.



6. FAILURE TO EXTRACT.

Step 1. Check for broken or damaged cartridge extractor (1).
Notify organizational maintenance.

Step 2. Check for broken or damaged extractor link (2).
Notify organizational maintenance.

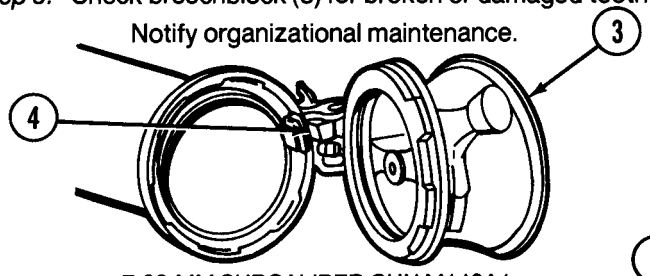


TROUBLESHOOTING (CONT)

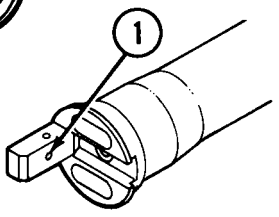
MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION

Step 3. Check breechblock (3) for broken or damaged tooth (4).

Notify organizational maintenance.



7.62-MM SUBCALIBER GUN M149A1



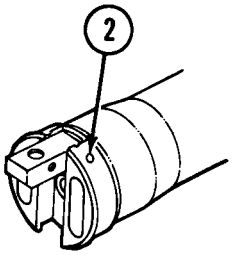
1. FAILURE TO FIRE.

Step 1. Check for broken firing pin (1).

Notify organizational maintenance.

Step 2. Check for defective firing mechanism of major weapon. See FUNCTIONAL CHECK OF RIFLE (p 3-10).

Notify organizational maintenance.



2. HINGE BINDS.

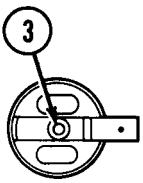
Check for bent straight pin (2).

Notify organizational maintenance.

3. CARTRIDGE DIFFICULT TO EXTRACT.

Check for dirty or worn chamber (3).

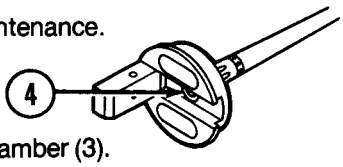
Clean chamber. If chamber is worn, notify organizational maintenance.



4. BULLET VISIBLY WOBBLES.

Check for worn bore (4).

Notify organizational maintenance.



5. UNABLE TO LOAD.

Check for ruptured cartridge case in chamber (3).

Remove ruptured cartridge case using ruptured cartridge case extractor.

Section III. OPERATOR MAINTENANCE PROCEDURES

3-6. M67 RECOILLESS RIFLE W/E.

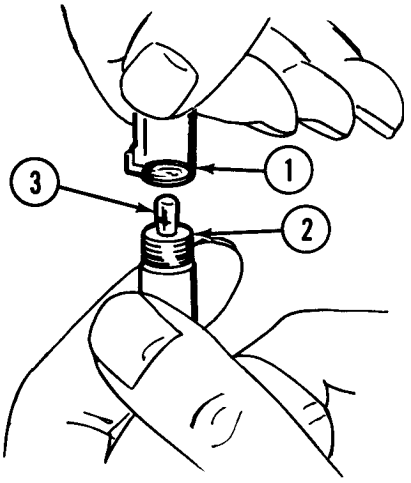
This task covers:

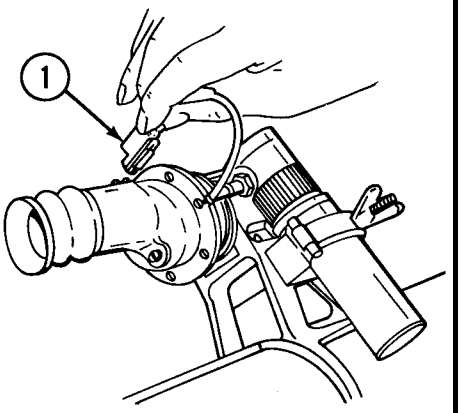
a. Disassembly
b. Repair
c. Reassembly

INITIAL SETUP

Materials/Parts
Incandescent lamp (item 3, app E)

DISASSEMBLY/REPAIR/REASSEMBLY





a. Slide bracket (1) from telescope dovetail slot.

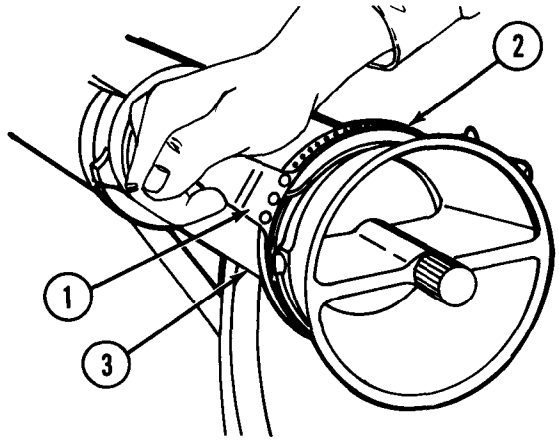
b. Unscrew bracket (1) from lead wire body (2).

c. Remove lamp (3) and replace with new lamp.

d. Install bracket (1) into telescope.

3-7. M67 RECOILLESS RIFLE: FUNCTIONAL CHECK.

1

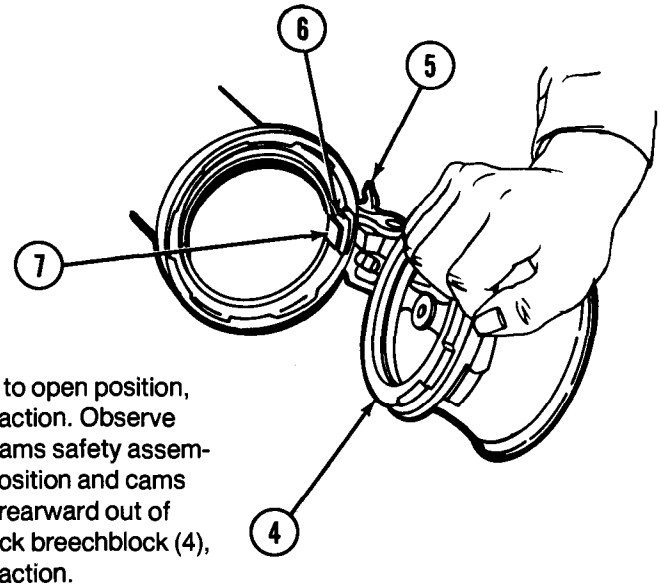


NOTE

The following procedures are given to assure proper functioning of the working components of the weapon. These operations should be performed by the operator immediately following operator maintenance.

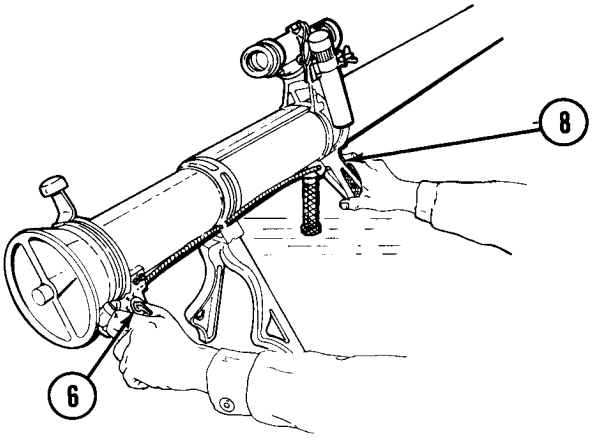
Rotate lock ring assembly knob (1) clockwise, noting smoothness of movement. Check that lock ring assembly (2) disengages from cannon tube (3) smoothly and without binding.

2



Swing breechblock (4) to open position, noting smoothness of action. Observe that extractor link (5) cams safety assembly (6) to the safe (S) position and cams cartridge extractor (7) rearward out of chamber. Close and lock breechblock (4), noting smoothness of action.

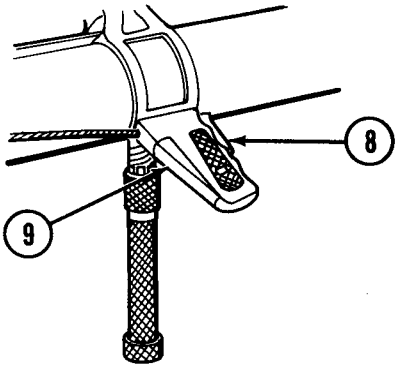
3



Rotate safety assembly (6) to the fire(F) position. Attempt to fire weapon by depressing trigger (8), rifle should not fire. If rifle fires, perform cable assembly adjustment.

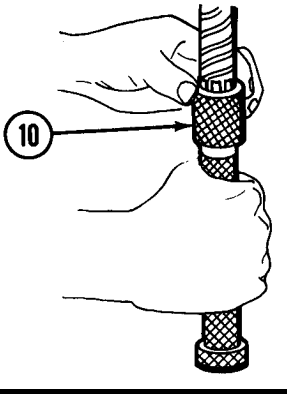
4

Depress gun grip safety (9) and trigger (8), rifle should fire. If rifle does not fire, perform cable assembly adjustment.



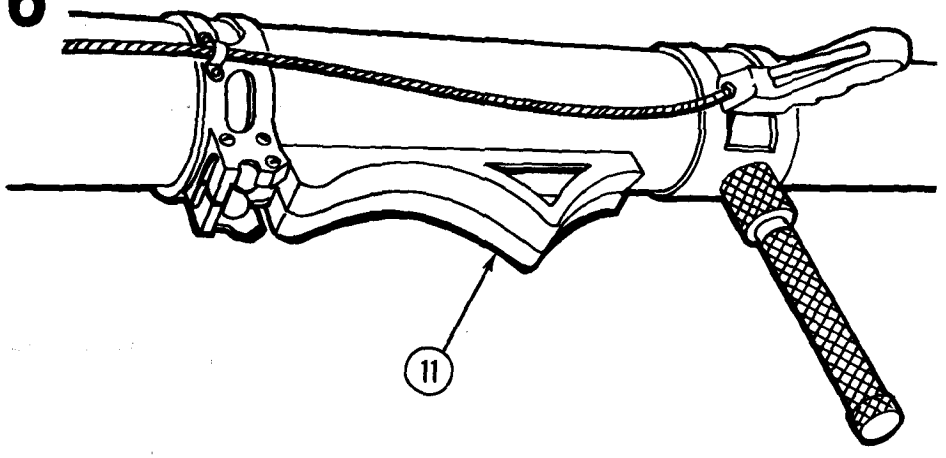
5

Rotate monopod sleeve (10) to elevate and depress rifle. Operation should be smooth.



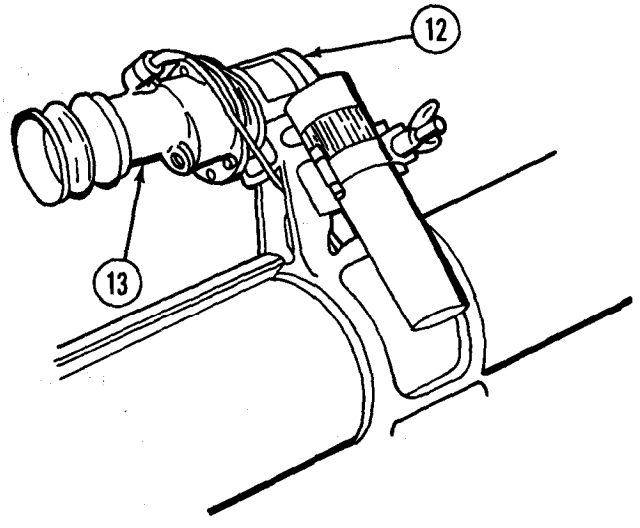
3-7. M67 RECOILLESS RIFLE: FUNCTIONAL CHECK (CONT).

6



Check that bipod legs (11) are free of binding and fold easily to shoulder-firing position.

7



a. Check that mount (12) is securely fastened in front bracket assembly.

b. Check that telescope (13) is firmly seated in mount (12).

Section IV. MAINTENANCE OF AUXILIARY EQUIPMENT

3-8. 7.62-MM SUBCALIBER GUN M149A1.

This task covers cleaning, lubrication, and inspection.

INITIAL SETUP

Materials/Parts
Cleaner, lubricant and preservative (item 2, app E)
Swab, small arms cleaning (item 7, app E)
Wiping rag item 6, app E)

NOTE
Maintenance is limited to cleaning, lubrication, and inspection.

CLEANING/LUBRICATION/INSPECTION

a. Immediately after firing, clean rifle bore, cartridge chamber, hinge slot, and firing pin hole with bore and chamber brushes and swabs dipped in CLP. Clean all exterior surfaces plus two nozzle openings and four forward holes with a cloth saturated with CLP, and wipe dry. Lubricate with CLP.

b. Weekly, when subcaliber gun is not fired, clean with CLP and wipe dry with wiping rag. Lubricate with CLP.

c. Before firing, wipe all surfaces dry.

d. In addition, the 90-mm rifle must be cleaned and lubricated (p 3-1) after the subcaliber gun has been fired in it. Be sure to remove carbon buildup in the area of the rifling where muzzle of subcaliber gun was located.

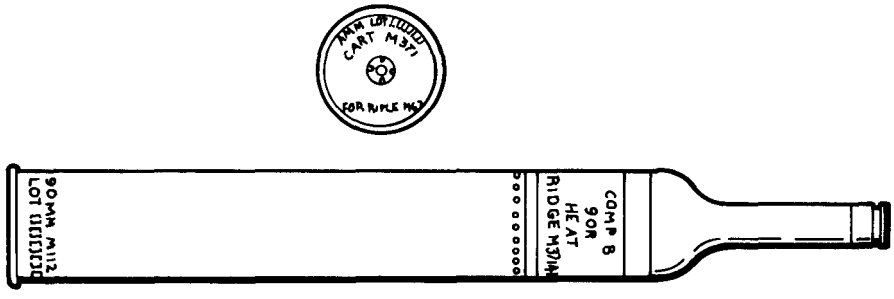
e. Inspect for cracks, burrs, or gouges in firing pin, hinge, and bushing. Notify organizational maintenance if replacement of parts is necessary.

CHAPTER 4
AMMUNITION

Section I. INTRODUCTION

4-1. GENERAL. Fixed ammunition is used in the recoilless rifle. A fixed amount of propellant is contained in a cartridge case crimped to a fin-stabilized projectile. The rounds, issued with a fuze, are loaded into the weapon as a unit. Important information is stenciled on each round (see below). Knowing the meaning of this information will aid in the rapid selection of the round required when firing.

4-2. CARTRIDGE MARKINGS. The following illustration gives the standard markings on 90-mm recoilless rifle cartridges.



4-3. AUTHORIZED CARTRIDGE CASE. Cartridge case M112 is common to all 90-mm recoilless rifle ammunition. It is an unperforated aluminum cylinder fitted at the base with a plastic rupture disk. Cartridge case M112 is attached to the projectile by a series of equally spaced ball crimps.

4-4. AUTHORIZED AMMUNITION. The ammunition used in the 90-mm recoilless rifle is listed in the following table.

AUTHORIZED AMMUNITION FOR THE 90-MM RECOILLESS RIFLE M67

Authorized Rounds	Classification	Identification	Fuzes	Remarks
Practice, M371	Pellet MOX 2B	Blue with white markings	PIBD M530A1	Practice
HEAT, M371A1	High explosive, comp B	Black with yellow markings	PIBD M530A1	Armored targets and personnel
M590	Flechette-loaded	Black with white markings	None	Antipersonnel

TEMPERATURE LIMITS, EFFECTIVE RANGE, AND LIMITATIONS

Round	Firing Temperature	Storage Temperature	Effective Range	Limitations
Practice, M371	Low − 40°F	− 80°F (for periods not more than 3 days)	400 M	None
	High + 125°F	+ 160°F (for periods not more than 4 hrs/day)		
Heat M371A1	Low − 40°F	− 80°F (for periods not more than 3 days)	400 M	None
	High + 125°F	+ 160°F (for periods not more than 4 hrs/day)		
M590 (XM590E1)	Low − 40°F	− 80°F (for period not more than 3 days)	200 M	Canister may not be fired overhead of friendly troops.
	High + 125°F	+ 160°F (for periods not more than 4 hrs/day)		

4-5. DESCRIPTION AND FUNCTIONING OF AUTHORIZED AMMUNITION.

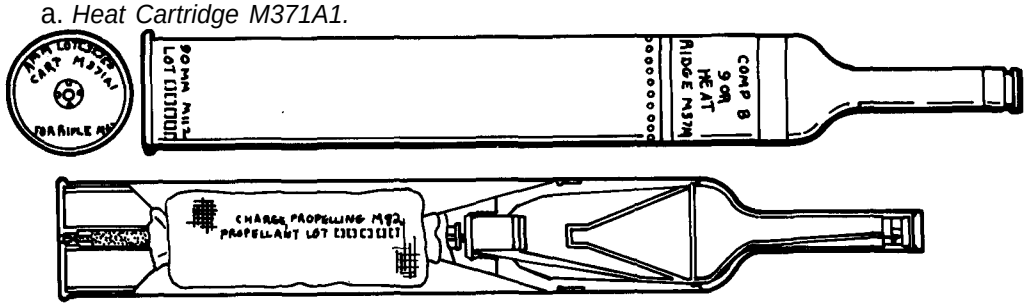
NOTE

HEAT rounds are black with markings in yellow.

HEAT rounds of older manufacture are olive drab with markings in yellow.

Practice cartridges are blue with markings in white.

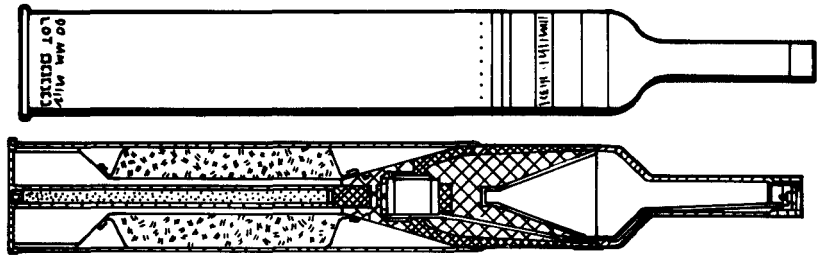
a. *Heat Cartridge M371A1.*



(1) The cartridge consists of an aluminum cartridge case and a steel projectile containing a shaped charge of high explosive. A percussion primer with a black powder ignition cartridge is assembled to the base of the round. A rupture disk is held in place in the base of the cartridge case by the primer. The propelling charge is contained in a bag installed around the fin assembly which contains the primer ignition cartridge. The projectile has a stand-off spike, containing a piezoelectric element and a paper insulating cup, which is threaded to the body. An internal copper cone shapes the charge. The point-initiating, base-detonating fuze is contained in an adapter threaded to the base. The adapter is threaded to the fin assembly. The fins provide in-flight stability.

(2) The primer ignites the propelling charge when struck by the firing pin of the weapon. The burning propellant generates rapidly expanding gases to propel the projectile out of the barrel and to the required velocity. Recoil is minimized by blowout of the rupture disk and controlled pressure relief through apertures in the breechblock. The projectile is stabilized in flight by the tail fins. On impact, crushing of the piezoelectric unit triggers the fuze. The standoff spike provides the optimum distance from the target surface for explosion of the shaped charge. The detonation collapses the copper cone and creates a focused, high velocity shockwave. The intensity of the shock wave causes failure of the target armor, and a jet of metal particles penetrates the interior.

b. *Practice Cartridge M371.*



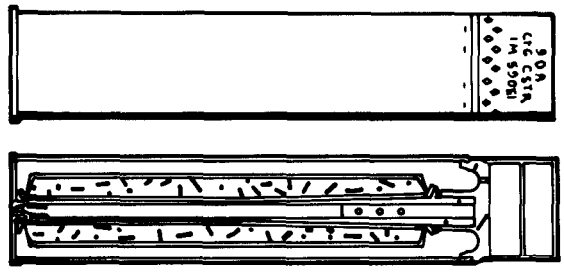
(1) The cartridge resembles 90-mm HEAT round M371A1 and has similar ballistic characteristics, except that the high explosive filler is replaced with inert material of the same weight. A standoff spike with piezoelectric element in the nose cap is threaded to the nose of the projectile, and an adapter and fin are threaded to the base. The point-initiating, base-detonating fuze is housed in the adapter and a smoke pellet is installed immediately ahead of the fuze. A copper cone in the projectile shapes the inert filler to maintain a ballistic match with the service round. The bagged propellant in the cartridge case surrounds the fin. The base of the cartridge case holds a percussion primer and a rupture disk. The black powder ignition charge of the primer is contained within the fin.

(2) When the firing pin of the weapon strikes the primer, it ignites the propelling charge. The burning propellant generates rapidly expanding gases to propel the projectile out of the barrel and to the target. The fin stabilizes the projectile in flight. On impact, distortion of the piezoelectric element induces an electric current to function the PIBD fuze and ignite the smoke pellet for marking.

c. Cartridge M590.

WARNING

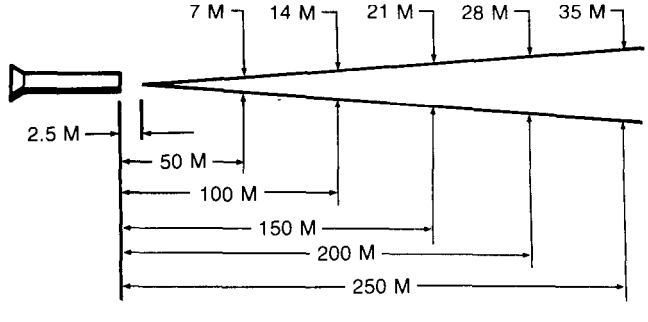
Canister may not be fired overhead of friendly troops.



(1) The cartridge consists of an aluminum cartridge case crimped to an aluminum canister filled with steel flechettes. The cartridge case is unperforated and the base contains a rupture disk. A percussion primer is assembled through the rupture disk into a perforated flash tube that is threaded into the base of the canister. The cartridge case is filled with double-base propellant in a silk bag arranged around the primer tube. The canister projectile has a blunt forward end and a heavy aluminum base with three bleed holes to the cartridge case. The sides are scored to facilitate splitting when the round is fired.

(2) The primer ignites the propellant when struck by the firing pin of the weapon. The burning propellant generates rapidly expanding gases to propel the canister out of the barrel. Recoil is minimized by blowout of the rupture disk in the base and controlled pressure release through apertures in the breechblock. At the same time, the bleed holes in the canister base permit gas pressure to build up inside the canister. When the projectile leaves the muzzle, the pressure ruptures the canister along the score marks to release the flechettes.

NOTE
Approximately 7 meter increase in arc width results for each additional 50 meters of range.



PAYLOAD DISPERSION PATTERN FOR CARTRIDGE M590

4-6. AUTHORIZED FUZES.

WARNING

Fuzes will not be disassembled

a. *Fuze, PIBD: M530.* The point- initiating, base-detonating fuze M530 series includes an inertia-operated graze system. The fuze is armed by setback through a delay system. On impact, a piezoelectric crystal in nose of projectile generates electrical energy that is transmitted by wire to the fuze. When HEAT cartridge M371 series is used against troops, the fuze is inertia-actuated by a stab primer when it strikes the ground or any other object. The fuze is fitted with a booster, a component of the fuze assembled to it at time of manufacture. Due to location in projectile, the fuze is not visible in complete round.

b. *Fuze, PIBD: M530A1.* The fuzes M530 and M530A1 are essentially alike, differing only in a mechanical escapement device which slows the action of arming rotor thus providing a longer arming delay.

Section II. PREPARATION FOR FIRING

4-7. PACKING AND UNPACKING.

a. *Packing.* Ammunition for the 90-mm recoilless rifle is packed one complete round per fiber container (two containers per wooden box). The wooden box weighs approximately 47 pounds.

b. *Unpacking Procedure.*

NOTE

Retain packing materials for repacking as required.

(1) Examine ammunition box marking to determine identification.

CAUTION

Do not use axes or similar tools to open boxes. This may damage the inner pack or the ammunition.

(2) Open outer box and remove fiber container.

(3) Open fiber container and remove cartridge.

(4) Inspect round and assure correctness of nomenclature. Check that round is free of damage, corrosion, and foreign matter.

NOTE

Slight amount of rust does not make the projectile unserviceable.

Section III. MAINTENANCE OF AMMUNITION

4-8. CARE.

WARNING

Do not store ammunition or ammunition components in direct sunlight, or near flame or other heat producing sources. Ammunition should be protected from excessive exposure to rain, high humidity, and ground moisture. Otherwise, short ranges may result.

a. Ammunition is packed to withstand conditions ordinarily encountered in the field. Ammunition observed in damaged packing containers should be inspected for possible damage to contents. Damaged containers should be repaired or replaced. Remark correctly if required.

b. Since ammunition is impaired by moisture, frost, extreme temperatures, and foreign matter (mud, oil, etc), observe the following:

(1) Unpack only enough ammunition for immediate needs.

(2) Shield ammunition from sources of high temperatures, such as the direct rays of the sun.

4-9. HANDLING.

WARNING

All ammunition and components containing explosives must be handled carefully. Do not drop, throw, tumble, or strike packaged or unpackaged ammunition or related components. Explosive elements in primers and fuzes are sensitive to shock.

a. Cartridge cases are dented easily and should be protected from bumps and blows. A dented cartridge case may prevent cambering or result in loss of obturation, jamming in the chamber, and difficulties in extraction.

b. Protect primers at all times from impact and foreign matter.

4-10. MAINTENANCE.

WARNING

Alteration of loaded ammunition or components is prohibited.

a. *Procedures.*

(1) Inspect ammunition outer pack monthly in storage location or daily whenever moved in a non-static environment. Boxes and/or containers which show damage, to the extent that the contents may be damaged, should be opened and contents inspected. Contents should then be repacked in serviceable packaging material and remarked as required. Do not open undamaged sealed boxes or containers for inspection purposes only.

(2) Wipe off wet or dirty ammunition at once.

CAUTION

Do not polish ammunition to make it look better.

(3) Ammunition should be considered unserviceable when it exhibits corrosion to the point of surface pitting or propellant contamination, particularly moisture. Do not use except in emergencies.

(4) Repackage serviceable ammunition in original containers. Containers or packing materials must be serviceable. If original container is unsuitable, use expended packing material and transfer all markings.

b. *Ammunition or Components of Ammunition Prepared for Firing But Not Fired.* Return such ammunition to the original condition and packing. Mark appropriately and use first in subsequent firings to keep stocks of open packings to a minimum.

c. *Unserviceable Ammunition.*

(1) Conspicuously mark unserviceable ammunition or explosive components UNSERVICEABLE, and return them to ammunition supply personnel for disposition.

(2) Repackage the ammunition in original containers. If original container is unsuitable, use expended packing material and transfer all markings. All layers of packing must be conspicuously marked UNSERVICEABLE.

4-11. STORAGE.

WARNING

Ammunition exposed directly to sunlight or in unventilated containers, enclosures, shelters, freight cars, closed vehicles, and similar structures may reach temperatures exceeding upper storage limits.

Do not store ammunition under trees or adjacent to towers or other structures that attract lightning. When ammunition must be stored in the open, select a storage site free of power lines, electric cables, and readily ignitable and flammable materials. Site should not be adjacent to reservoirs, water mains, etc. Do not store ammunition near large concentration of personnel.

a. *Sites.* Store ammunition in firing area to protect against accidental explosions. Sites should be level and well drained.

b. *Provisions.*

(1) Use heavy, well-supported dunnage to keep bottom tier of stack off the ground and prevent it from sinking into the ground.

NOTE

A hardstand of blacktop or gravel and sand is preferable to excessive use of dunnage.

(2) Allow at least 3 inches of space beneath the pile for air circulation. Dig trenches to prevent water from flowing under pile.

(3) Provide nonflammable covers (such as tarpaulin) for all ammunition. Maintain air space of approximately 18 inches between cover and ammunition. Keep cover at last 6 inches from pile on ends and sides to permit circulation of air.

(4) Store ammunition top side up. Labels and markings on boxes and containers indicate which side should be up.

CHAPTER 5
ORGANIZATIONAL MAINTENANCE INSTRUCTIONS

Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

5-1. COMMON TOOLS AND EQUIPMENT. For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

5-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT. Special tools are listed in TM 9-1015-223-23P.

5-3. REPAIR PARTS. Spares and repair parts are listed and illustrated in TM 9-1015-223-23P.

Section II. SERVICE UPON RECEIPT

5-4. GENERAL.

a. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 364, Report of Discrepancy (ROD).

b. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with the instructions of DA PAM 738-750.

c. Check to see whether the equipment has been modified.

5-5. SERVICE UPON RECEIPT OF MATERIEL. Upon receipt of a new or reconditioned weapon, perform Operator's Preventive Maintenance Checks and Services on page 2-8 and functional check on page 3-10.

Section III. ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS)

5-6. GENERAL. Preventive maintenance is the systematic care, inspection, and service of equipment for the following reasons:

a. To maintain in a serviceable condition.
b. To prevent breakdown.
c. To assure maximum operational readiness.

5-7. SPECIAL INSTRUCTIONS. Organizational maintenance mechanic (unit armorer), assisted by crew, performs quarterly preventive maintenance checks and services.

5-8. QUARTERLY Preventive Maintenance CHECKS AND SERVICES (PMCS).

a. General. Operator/crew preventive maintenance which is required before you operate the weapon is on page 2-8. The quarterly checks are listed below.

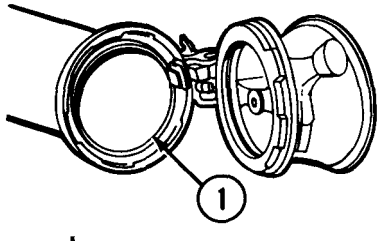
b. Item Number Column. Checks and services are numbered in logical order regardless of interval. This column shall be used as a source of item numbers for the "TM Number" column on DA Form 2404, Equipment Inspection and Maintenance Work Sheet, in recording results of PMCS.

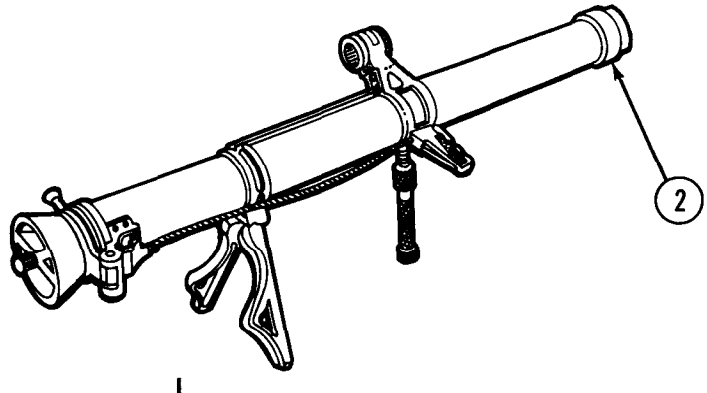
c. *Item To Be Inspected Column.* The items to be inspected are identified by as few words, usually the common name, as will clearly identify the item, e.g., "tube."

d. *Procedures Column.* This column contains a brief description of the procedure by which the check is to be performed. It contains all information required to accomplish the checks and services.

ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES QUARTERLY SCHEDULE

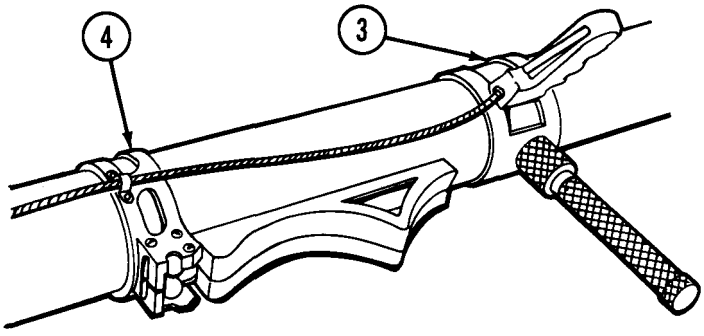
Item No.	Item To Be Inspected	Procedures
1	Weapon Records	Insure that all required forms, especially DA Form 2408-4, are present, legible, and up to date.
2	Lubrication and External Finish	Inspect for evidence of inadequate cleaning and unauthorized cleaning methods and materials. Check to determine that the lubrication schedule has been maintained. Clean and touch up bare surfaces with dry lube.
3	Tools and Equipment	Make sure all required Bll tools and equipment are serviceable and in safe operating condition. Canvas items must be free of tears, rot, or mildew. Metal components will be free of cracks, bends, breaks, deformities, and rust or corrosion. See appendix C.
4	Tube	Visually inspect chamber and bore (1) for cracks, bulges, unusual wear, corrosion, damage, or obstructions. Clean and lubricate (p 3-1) as required. Check sound suppressor ring (2) for snug fit, cracks, and tears. Replace if damaged or missing.



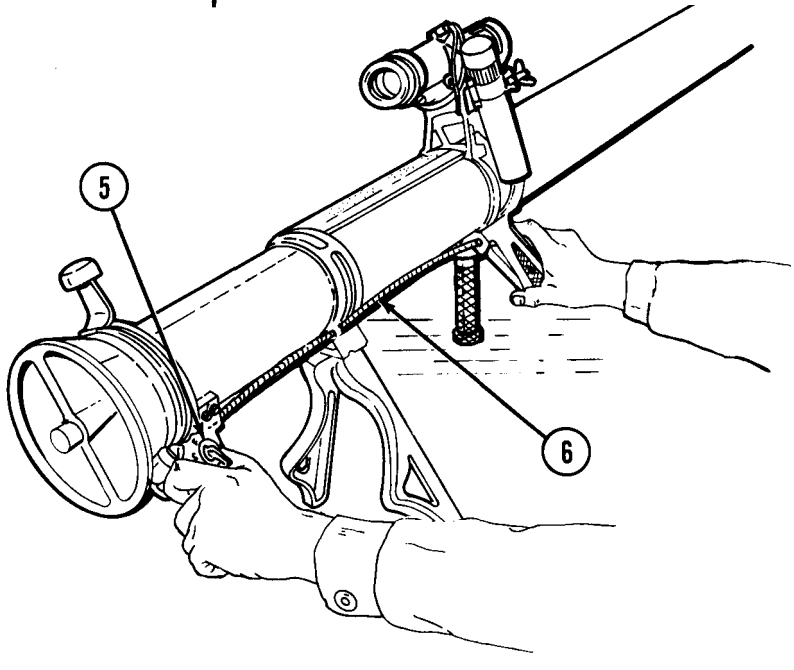


ORGANIZATIONAL PREVENTIVE MAINTENANCE CHECKS AND SERVICES QUARTERLY SCHEDULE (CONT)

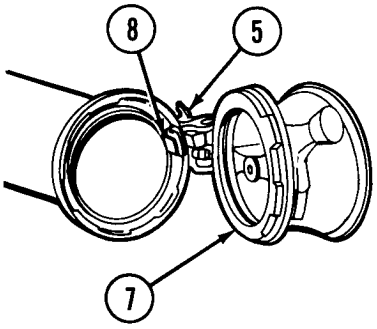
Item No.	Item To Be Inspected	Procedures
5	Front and rear bracket assemblies	Inspect that front and rear bracket assemblies (3 and 4) are tight.

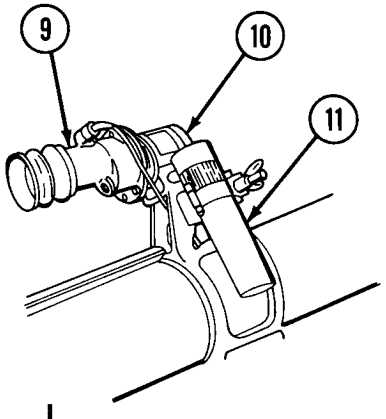


6	Firing Mechanism	Check for proper operation by dry firing. The action produced by the firing must be very clear and distinct. Check spring tension on safety assembly (5). Check cable assembly (6) for proper adjustment.



Item No.	Item To Be Inspected	Procedures
7	Breechblock and Hinge	Inspect for smoothness of operation by opening and closing breechblock (7) several times. Be sure safety assembly (5) goes to safe(S) position upon opening breechblock. Inspect breechblock and cartridge extractor (8) for cracks, burrs, or chipping. Inspect for missing components and replace. Lubricate as required.
8	Sighting and Fire Control Item	Visually check telescope (9) for clean lenses and make sure level vial is not broken or loose. Check eyepiece for scratches, cracks, fungus growth, or chips. Inspect rubber eyeshield for cracks, splits, fungus growth, and deterioration. Inspect mount (10); inside must be smooth to accept telescope. Inspect instrument light (11); it must not be dented or twisted and must be free of corrosion inside and out. Wire insulation must not be cracked, broken, or deteriorated.





Section IV. ORGANIZATIONAL TROUBLESHOOTING

5-9. GENERAL.

a. This section contains troubleshooting information for locating and correcting most of the operating troubles which may develop. Each malfunction for an individual component, unit, or system is followed by a list of test/inspections which will help you to determine the corrective actions to take. You should perform the test/inspections and corrective actions in the order listed.

b. This manual cannot list all malfunctions that may occur, nor all tests/inspections and corrective actions. If a malfunction is not listed, except when malfunction and cause are obvious, or is not corrected by listed corrective actions, notify your supervisor.

c. After organizational maintenance has been performed on the rifle, make a complete functional check on the firing mechanism (p 3-10).

TROUBLESHOOTING

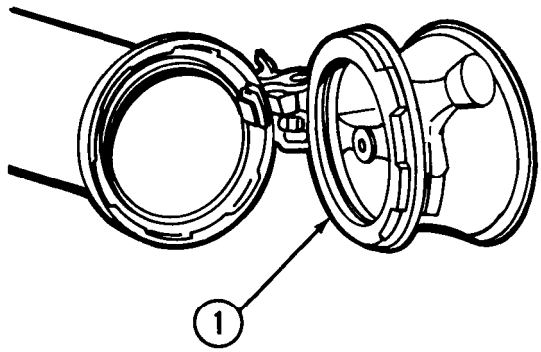
MALFUNCTION	*TEST OR INSPECTION*	*CORRECTIVE ACTION*

90-MM RECOILLESS RIFLE M67 W/E

1. FAILURE OF BREECHBLOCK TO LOCK OR UNLOCK.

Step 1. Check for burred or damaged interrupted threads (1) on lock ring assembly.

Remove burrs from thread. If threads are damaged beyond removal of burrs, notify direct support.

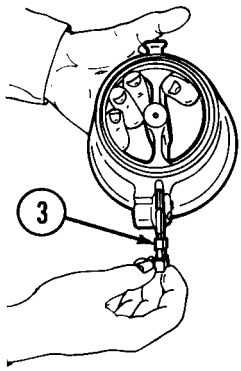


Step 2. Check for burred or damaged interrupted threads (2) on breech end of tube.

Remove burrs from threads. If threads are damaged beyond removal of burrs, evacuate to direct support.

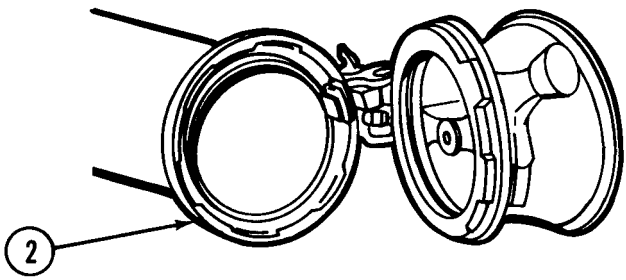
Step 3. Inspect for bent or chafed sear (3).

Replace sear (p 5-15).



Step 4. Check for dirt and foreign matter.

Clean and lubricate.



2. FAILURE OF BREECHBLOCK TO OPEN OR CLOSE.

Step 1. Check for loose hinge block bolts (1).

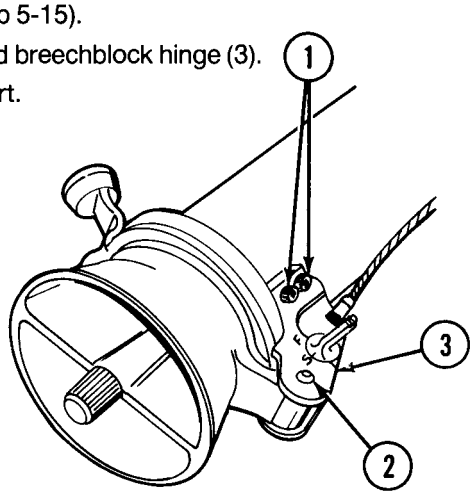
Notify direct support.

Step 2. Check for worn or chafed hinge pin (2).

Replace hinge pin (p 5-15).

Step 3. Check for worn or chafed breechblock hinge (3).

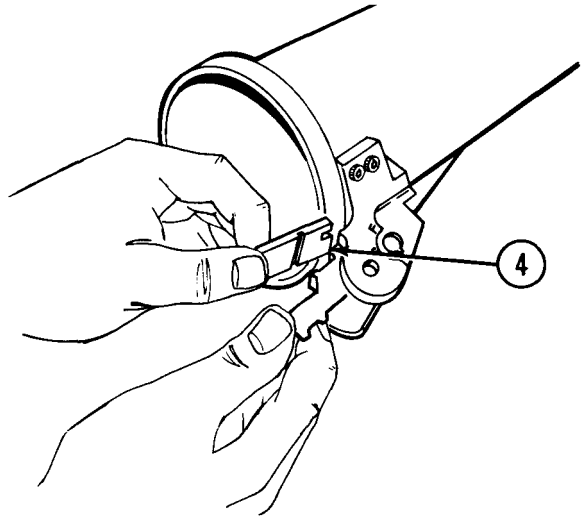
Notify direct support.



MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

Step 4. Check for worn or damaged cartridge extractor (4) that will not retract into chamber.

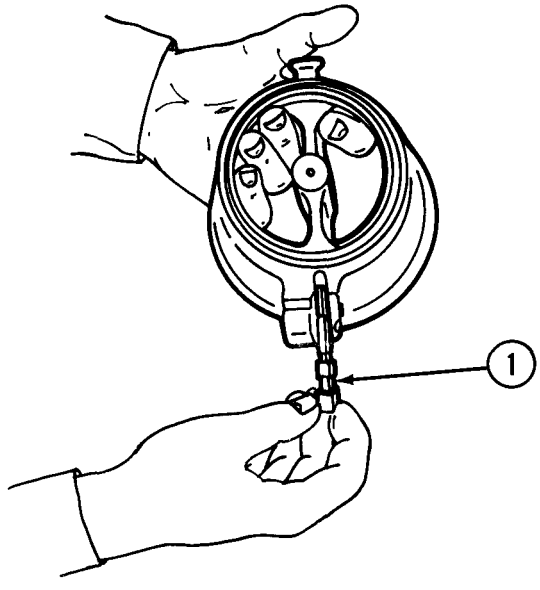
Replace cartridge extractor (p 5-15).



3. FAILURE TO COCK.

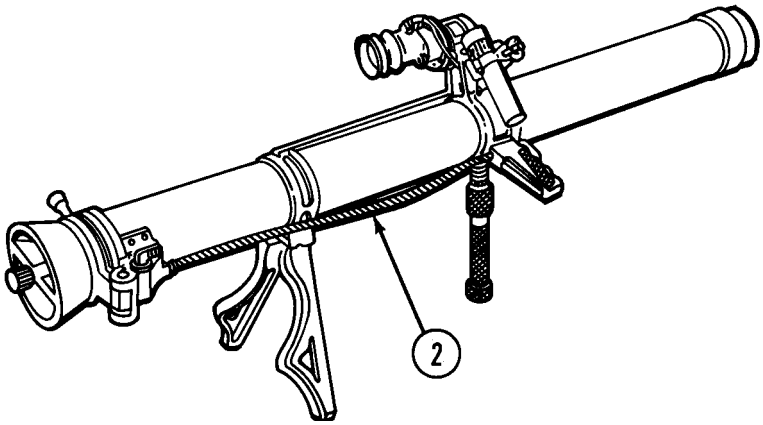
Step 1. Inspect for broken or damaged sear (1).

Replace sear (p 5-15).



Step 2. Check for broken or damaged cable assembly (2).
Replace cable assembly (p 5-15).

Step 3. Check for dirt and foreign matter in breech area.
Clean and lubricate.

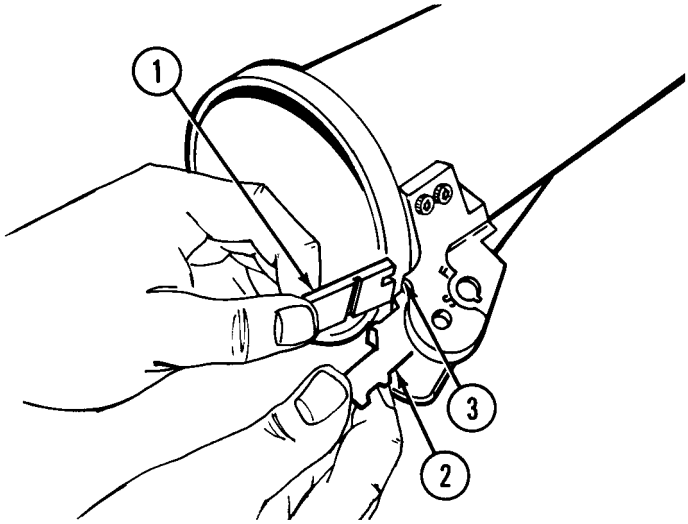


4. FAILURE TO EXTRACT.

Step 1. Inspect for broken or damaged cartridge extractor (1).
Replace cartridge extractor (p 5-15).

Step 2. Check for broken or damaged extractor link (2).
Replace extractor link (p 5-15).

Step 3. Check for broken or damaged tooth on breechblock hinge (3).
Notify direct support.

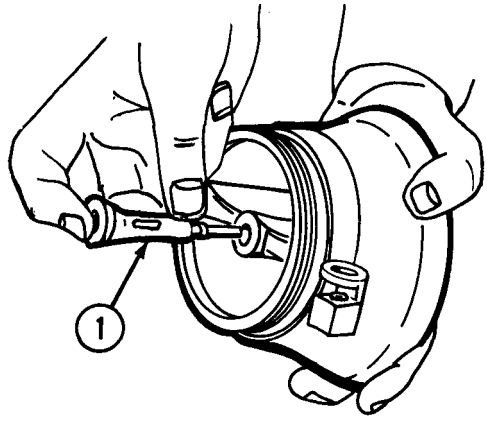


TROUBLESHOOTING (CONT)

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION

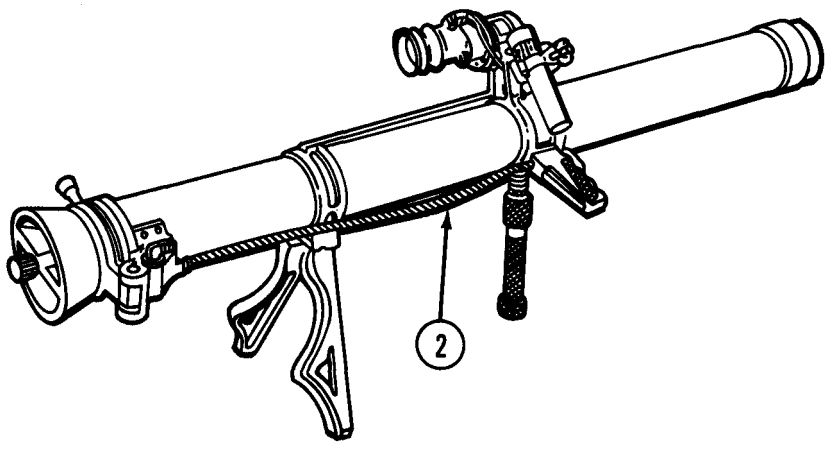
5. FAILURE TO FIRE.

Step 1. Check for broken or damaged firing pin (1).
Replace firing pin.



Step 2. Check for improperly adjusted cable assembly (2).
Adjust cable assembly (p 5-31).

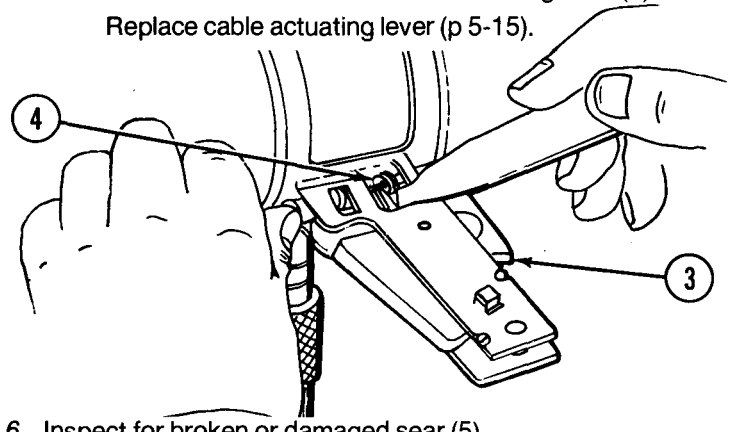
Step 3. Check for broken or defective cable assembly (2).
Replace cable assembly (p 5-15).



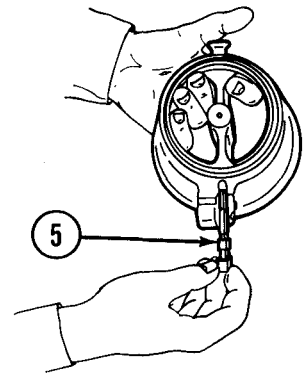
MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

Step 4. Inspect for broken or defective trigger (3).
Replace trigger (p 5-15).

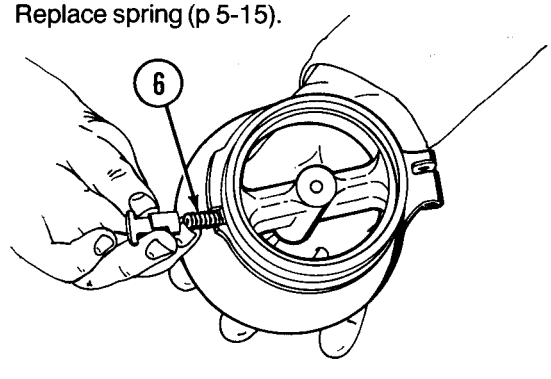
Step 5. Check for broken or defective cable actuating lever (4).
Replace cable actuating lever (p 5-15).



Step 6. Inspect for broken or damaged sear (5).
Replace sear (p 5-15).



Step 7. Check for broken or defective detent spring (6).
Replace spring (p 5-15).



TROUBLESHOOTING (CONT)

MALFUNCTION
TEST OR INSPECTION
CORRECTIVE ACTION

6. FAILURE TO LOAD.

Step 1. Inspect for raised lands in cannon tube (2).

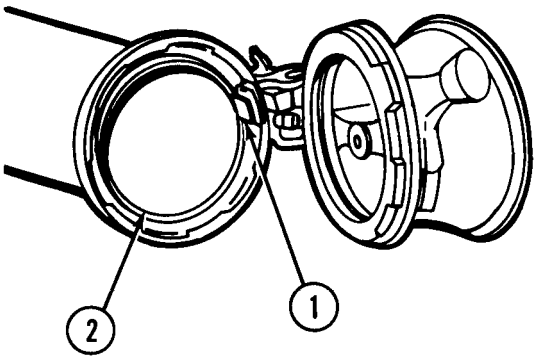
Notify direct support.

Step 2. Check for foreign matter in chamber.

Remove foreign matter.

Step 3. Check for bent or damaged cartridge extractor (1) that will not retract into chamber.

Replace cartridge extractor (p 5-15).



7.62-MM SUBCALIBER GUN M149A1

Organizational maintenance does not do any troubleshooting or repair on the subcaliber gun. It is passed to direct support maintenance for repair.

Section V. ORGANIZATIONAL MAINTENANCE PROCEDURES

WARNING

Before performing maintenance procedures, inspect the cannon tube to make sure it is empty. Keep live ammunition out of the area during maintenance operations.

5-10. M103 TELESCOPE.

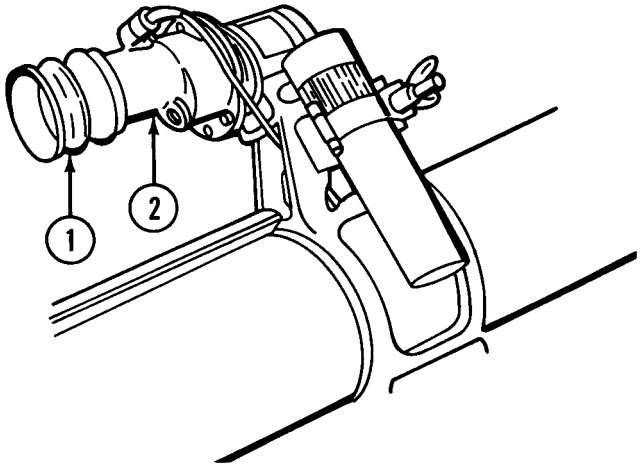
This task covers:
a. Disassembly
b. Repair
c. Reassembly

INITIAL SETUP

References
TM 9-1015-223-23P

Equipment Condition
Telescope M103 may be on or off 90-mm recoilless rifle M67 (p 2-20).

DISASSEMBLY/REPAIR/REASSEMBLY



a. If damaged, remove rubber eyeshield (1) from telescope (2).

b. Replace defective eye shield. See TM 9-1015-223-23P.

c. Engage groove inside new rubber eyeshield (1) with flange of telescope (2) eyepiece. Stretch rubber as necessary.

5-11. TELESCOPE MOUNT M110.

This task covers:
a. Disassembly
b. Repair
c. Reassembly

INITIAL SETUP

Tools and Special Tools
Spanner wrench 8213920

Equipment Condition
Telescope M103 is removed (p 2-20).

References
TM 9-1015-223-23P

DISASSEMBLY/REPAIR/REASSEMBLY

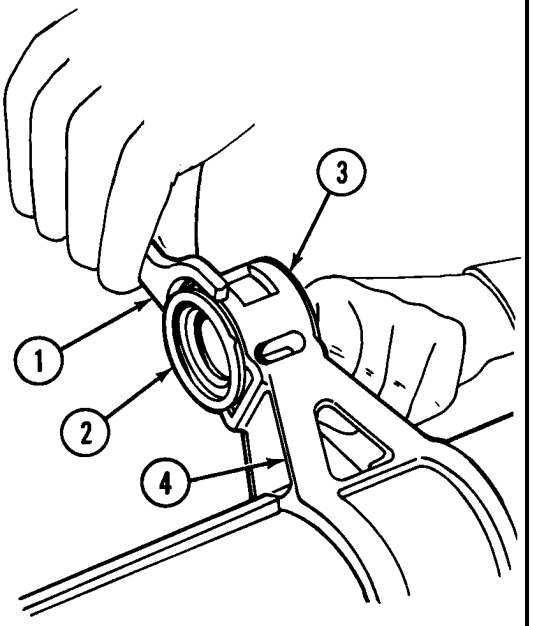
a. Using spanner wrench (1), remove retaining ring (2).

b. Slide mount (3) from front bracket assembly (4).

c. Replace defective mount. See TM 9-1015-223-23P.

d. Place mount (3) in front bracket assembly (4).

e. Install retaining ring (2) and secure using spanner wrench (1).



5-12. M67 RECOILLESS RIFLE.

This task covers:
a. Disassembly
b. Cleaning
c. Inspection/repair/lubrication
d. Reassembly
e. Adjustment

INITIAL SETUP

Tools and Special Tools
Extractor and screwdriver combination tool 8767921
Small Arms Repairman Tool Kit *(SC* 5180-95-CL-A07)

Materials/Parts
CLP (item *2,* app E)
Wiping rags (item 6, app E)
Lubricant, solid film (item 4, app E)

References
TM 9-1013-223-23P

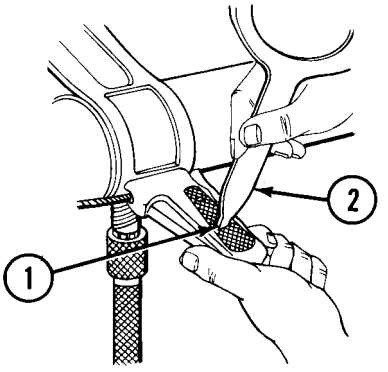
Equipment Condition
Telescope mount, clamp assembly, and instrument light removed (p 2-20).

DISSASSEMBLY

1

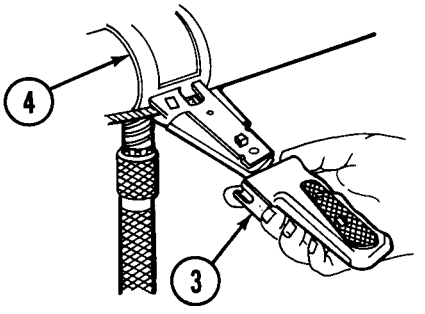
CAUTION
Release firing pin spring pressure by firing weapon before starting disassembly.

Depress spring tension clip (1) using screwdriver end of extractor and screwdriver combination tool (2).



2

Remove rifle grip (3) from front bracket assembly (4).

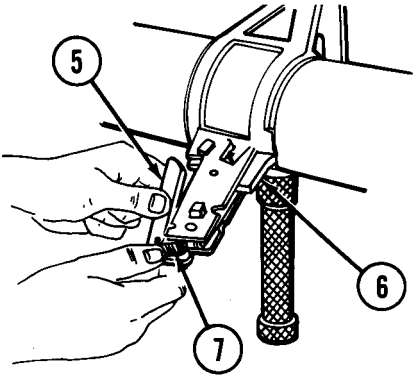


5-12. M67 RECOILLESS RIFLE (CONT).

DISASSEMBLY (CONT)

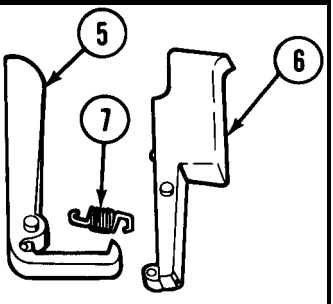
3

Pull gun grip safety (5) out and down. Remove with trigger (6) and helical extension spring (7) attached.



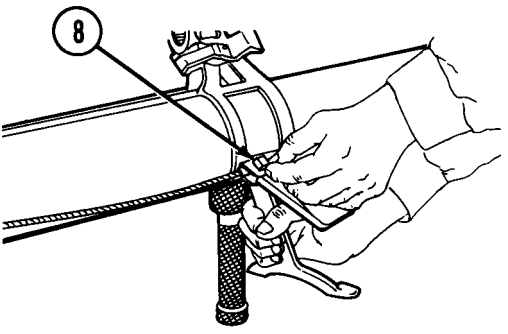
4

Disengage gun grip safety (5) and trigger (6) from helical extension spring (7).



5

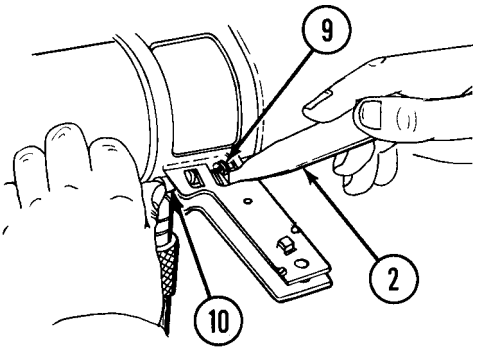
Push up and remove cable actuating lock (8).



6

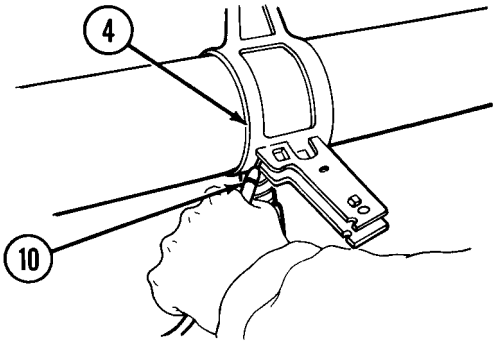
a. Note the number of washers on each side of cable actuating lever (9) for installation purposes.

b. Press cable actuating lever (9) down and rearward using screwdriver end of extractor and screwdriver combination tool (2) to disengage cable assembly (10) from cable actuating lever (9).



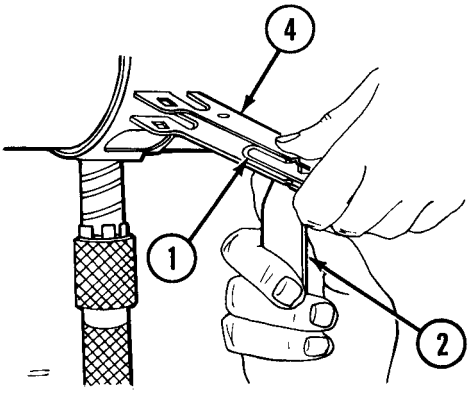
7

Remove cable assembly (10) from front bracket assembly (4).



8

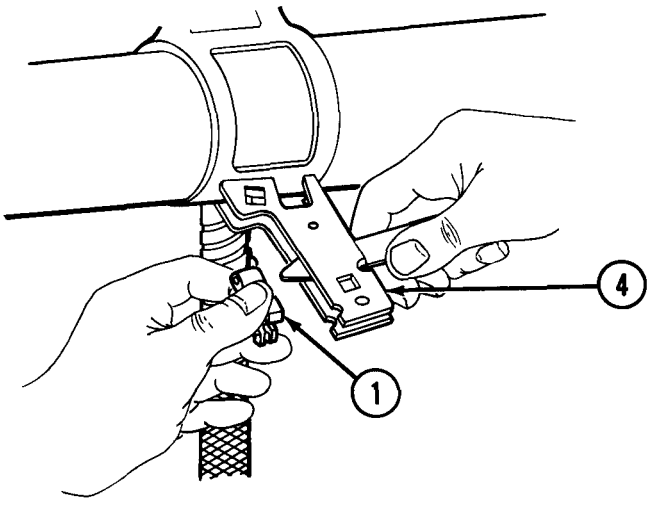
Push upon position lugs of spring tension clip (1) in front bracket assembly (4) using blade end of extractor and screwdriver combination tool (2). At the same time, press down grip-retaining portion of spring tension clip in opposite side of front bracket assembly (4) housing.



5-12. M67 RECOILLESS RIFLE (CONT).

DISASSEMBLY (CONT)

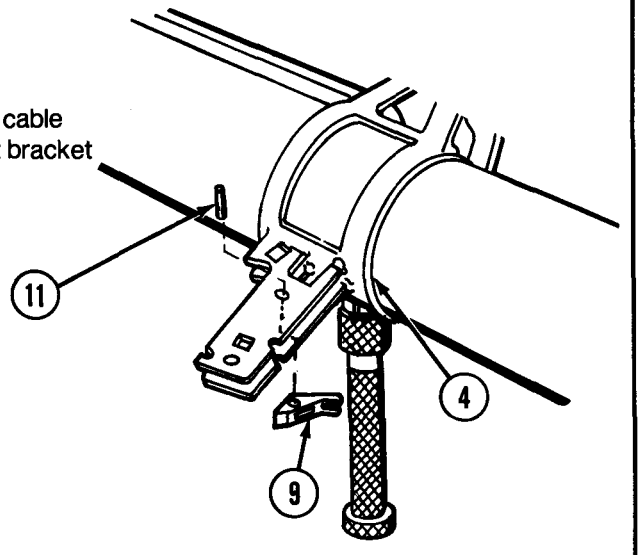
9



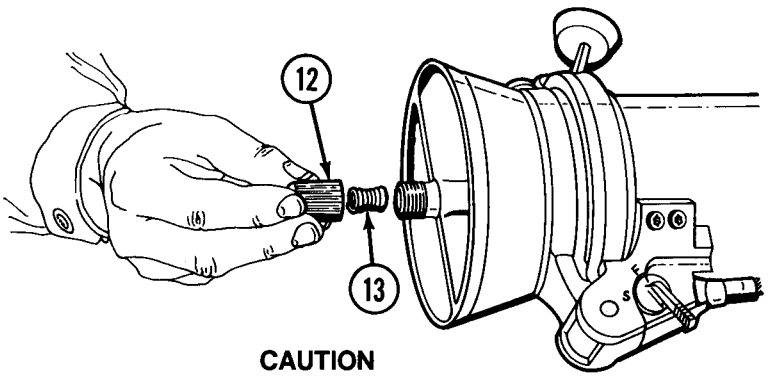
Remove spring tension clip (1) from front bracket assembly (4).

10

Remove spring pin (11). Slide cable actuating lever (9) out of front bracket assembly (4).



11



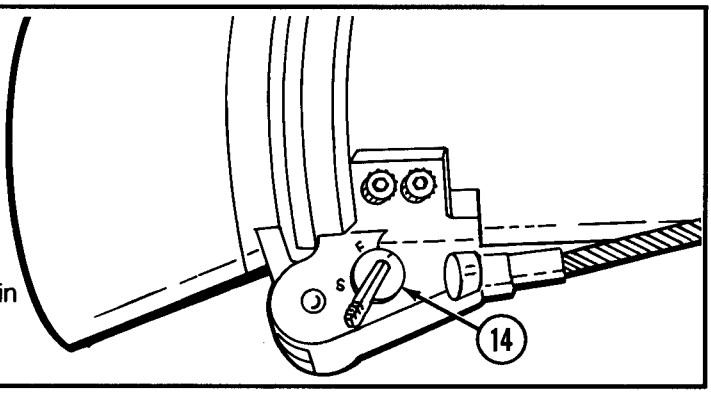
CAUTION

Release firing pin spring pressure by firing weapon before starting disassembly.

Close and lock breechblock. Release firing pin pressure by pulling cable assembly. Unscrew firing pin spring cap (12). Remove cap (12) and helical compression spring (13).

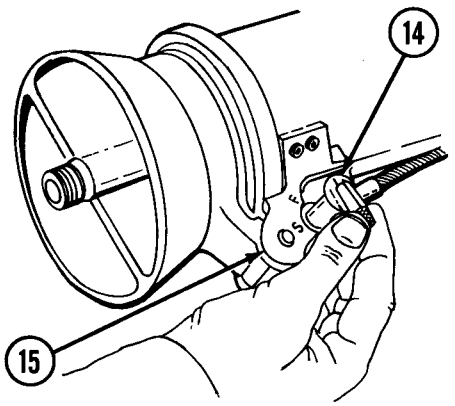
12

Rotate safety assembly (14) counter-clockwise from the fire (F) position until spring pin alines with keyway.



13

Pull up and remove safety assembly (14) from hinge block (15).

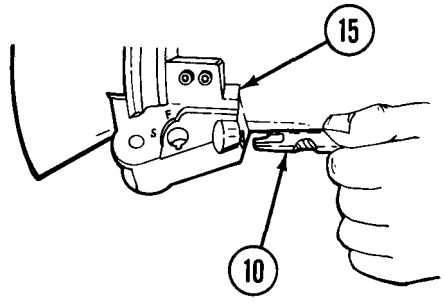


5-12. M67 RECOILLESS RIFLE (CONT).

DISASSEMBLY (CONT)

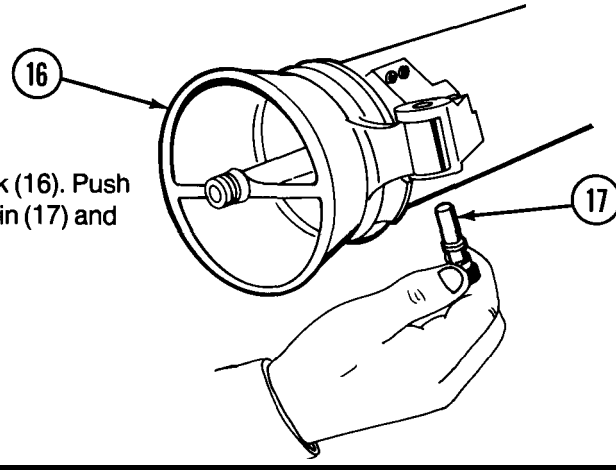
14

Pull hinge block end of cable assembly (10) forward and remove from hinge block (15).



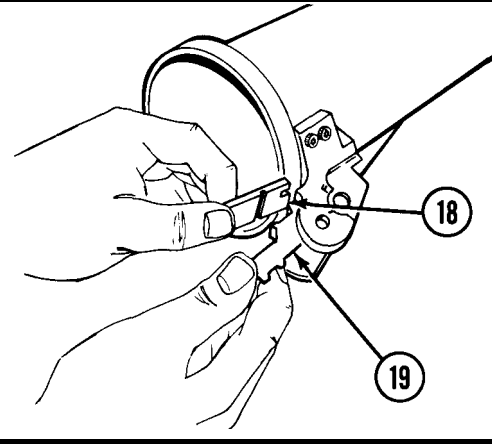
15

Unlock and open breechblock (16). Push down on and remove hinge pin (17) and pull out breechblock (16).



16

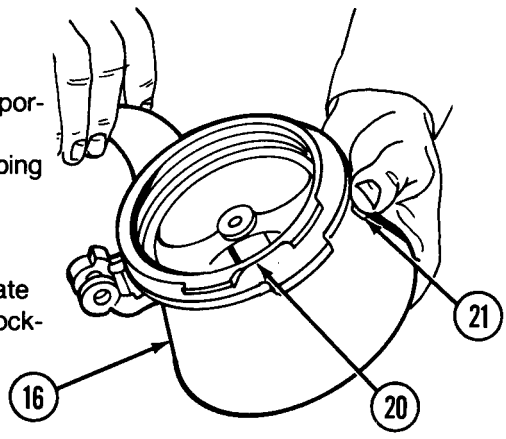
Remove cartridge extractor (18) and extractor link (19).



17

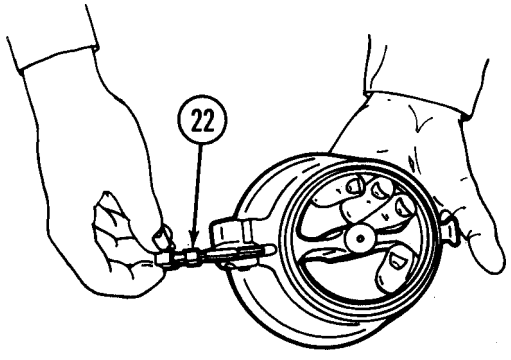
a. Hold breechblock (16) with hinge portion up. This will prevent the sear (which is free to move) from dropping down and blocking the lock ring assembly (20).

b. Depress detent plunger (21). Rotate lock ring assembly (20) counterclockwise and remove.



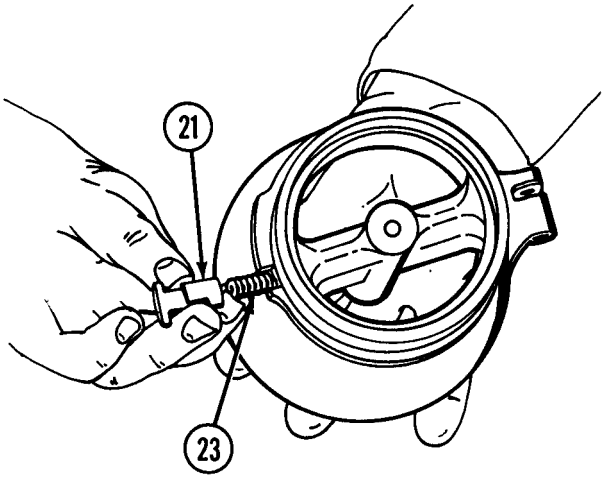
18

Remove sear (22).



19

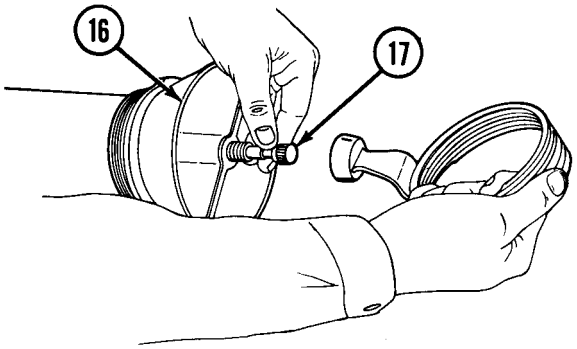
Remove and separate detent plunger (21) and detent spring (23).



5-12. M67 RECOILLESS RIFLE (CONT).

DISASSEMBLY (CONT)

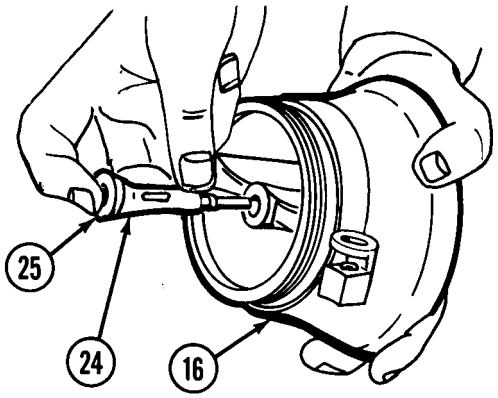
20



Insert small end of hinge pin (17) into rearward end of breechblock (16) and tap firing pin and sleeve bushing forward until free of breechblock.

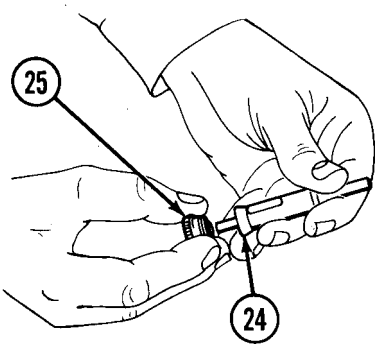
21

Remove firing pin (24) and sleeve bushing (25) from front of breechblock (16).

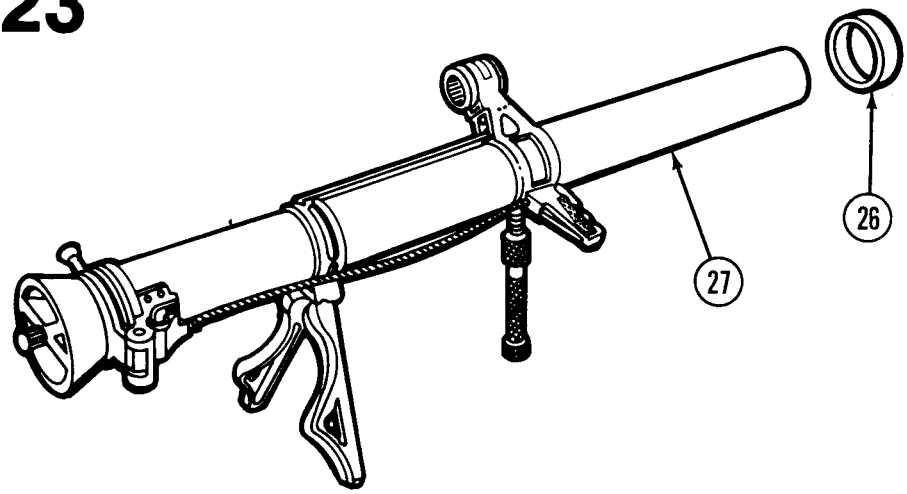


22

Separate sleeve bushing (25) from firing pin (24).

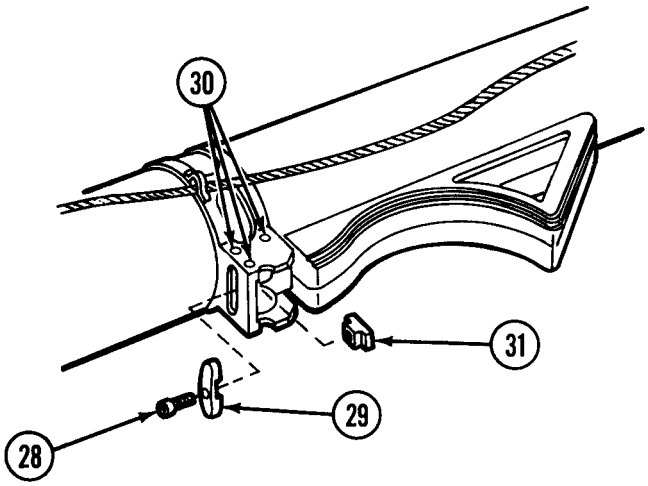


23



Slide sound suppressor ring (26) from cannon tube (27).

24



a. Remove self-locking screw (28) and bipod retaining plate (29).

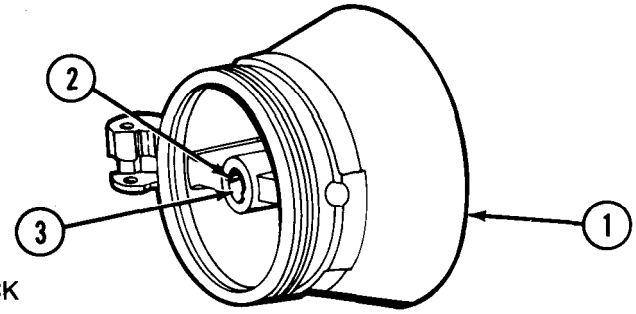
b. Loosen three screws (30) while holding rear bracket assembly to the cannon tube, and loosen biped legs to remove biped retaining nut (31).

5-12. M67 RECOILLESS RIFLE (CONT).

CLEANING

Clean all parts with CLP. Remove dirt, rust, or corrosion, and wipe dry.

INSPECTION/REPAIR/LUBRICATION



BREECHBLOCK

a. Check breechblock (1) for cracking (2) in the hammer bushing hole (3). Cracking must not extend more than 1/4 inch into the hammer bushing hole.

b. A breechblock with cracking extending 1/4 inch or less into the hammer bushing hole is usable in this condition if, within specified tube life, the original hammer bushing remains in place, or a replacement can be found that will be retained by the breechblock. Notify direct support if replacement is necessary.

c. A breechblock with cracking extending more than 1/4 inch into the hammer bushing hole is unserviceable and must be replaced by direct support maintenance.

ALL OTHER AUTHORIZED PARTS

a. Inspect cable assembly for rust or fraying.

b. Inspect remaining parts for cracks, wear, breaks, or distortion.

c. Replace parts that are unserviceable or missing. See TM 9-1015-223-23P.

d. Spray exposed portions of the weapon's finish with solid film lubricant.

e. Lightly lubricate tooth on inner hinge portion of breechblock and all threaded portions of lock ring assembly with CLP. Lightly lubricate remaining parts with CLP before reassembly.

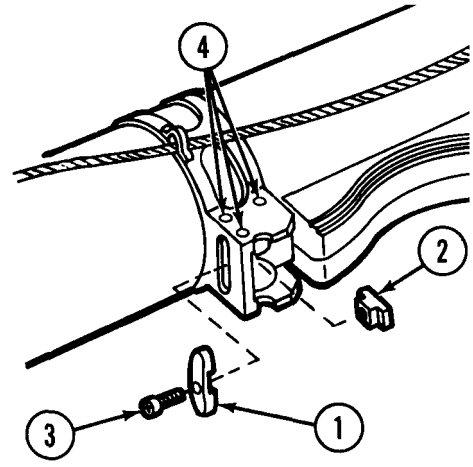
REASSEMBLY

1

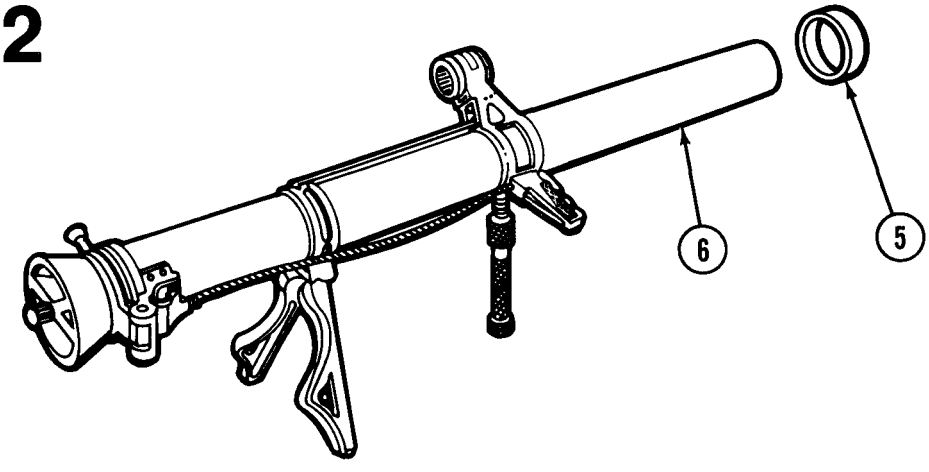
a. Position biped retaining plate (1) into rear bracket assembly slot.

b. Install biped retaining nut (2) in bipod retaining plate slot from the inside and secure with self-locking screw (3).

c. Tighten three screws (4) to secure rear bracket assembly to the cannon tube and to secure biped legs so they remain in position but can be moved by hand.



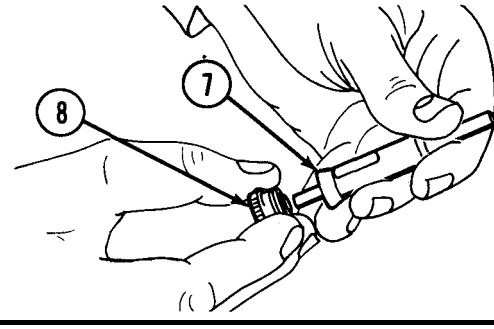
2



Slide sound suppressor ring (5) on cannon tube (6).

3

Assemble firing pin (7) to sleeve bushing (8).

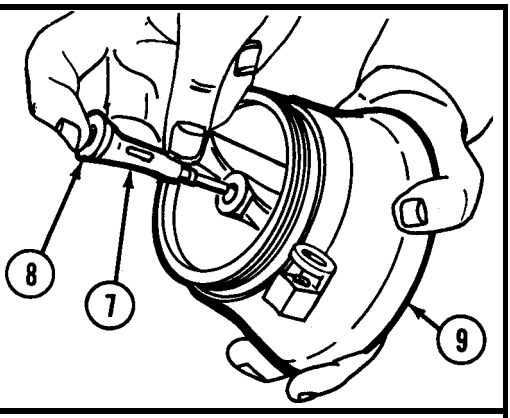


5-12. M67 RECOILLESS RIFLE (CONT).

REASSEMBLY (CONT)

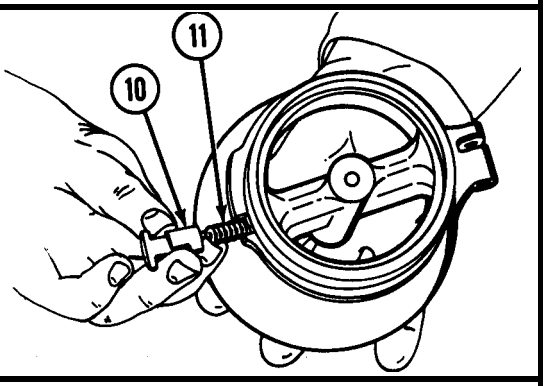
4

Holding breechblock (9) with hinge portion up, install firing pin (7) and sleeve bushing (8) in forward end of breechblock. Line up large opening in firing pin to face hinge portion. Using hammer, lightly tap sleeve bushing (8) until flush against breechblock (9).



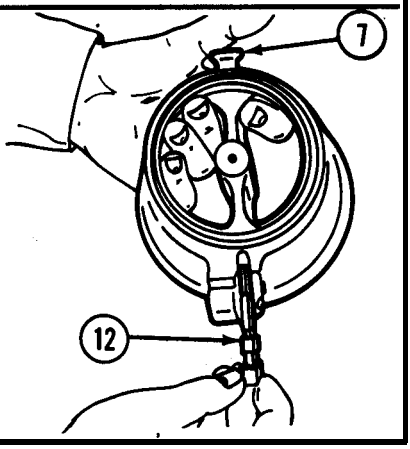
5

Install detent spring (10) and detent plunger (11).



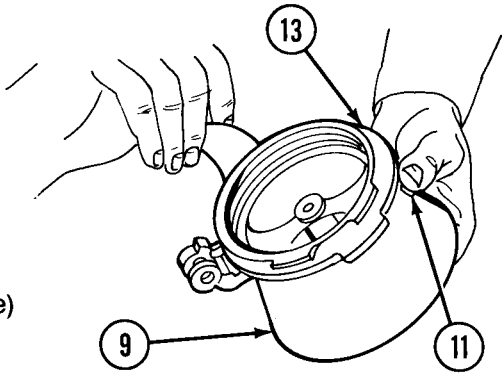
6

Aline large opening in firing pin (7) with sear channel and install sear (12).



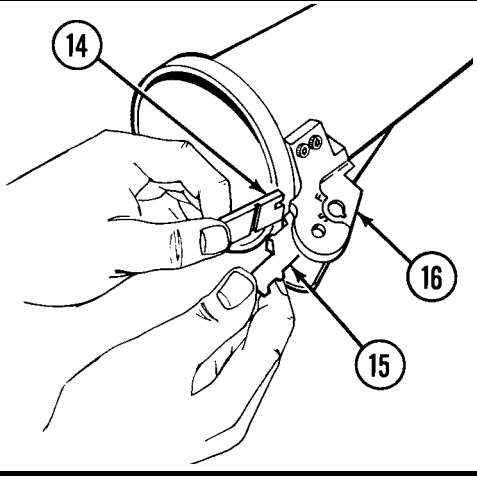
7

While still holding breechblock (9) with hinge portion up, depress detent plunger (11) and install lock ring assembly (13). Give it 1/4 turn counterclockwise to aline the threads; then turn clockwise until tight. Release detent plunger and turn back (counterclockwise) two clicks (approximately 1/3 turn).



8

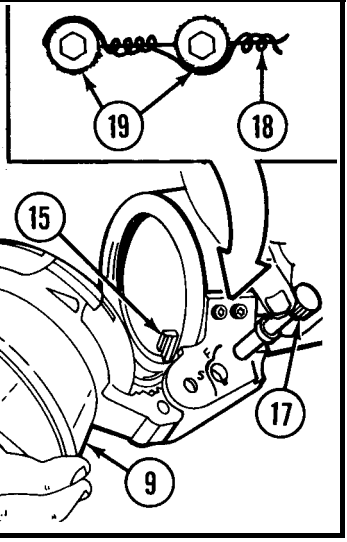
Install cartridge extractor (14) and extractor link (15) into hinge block (16).



9

a. With extractor link (15) in fully extracted position, install hinge pin (17) in safety shaft hole to hold extractor link(15) in place. Then install breechblock (9).

b. If lock wire (18) is broken, install new lock wire to four bolts (19) as illustrated

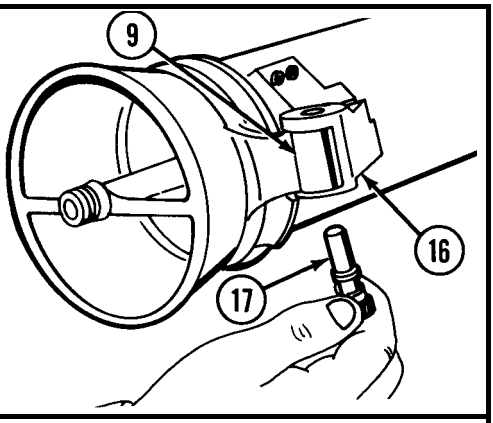


5-12. M67 RECOILLESS RIFLE (CONT).

REASSEMBLY (CONT)

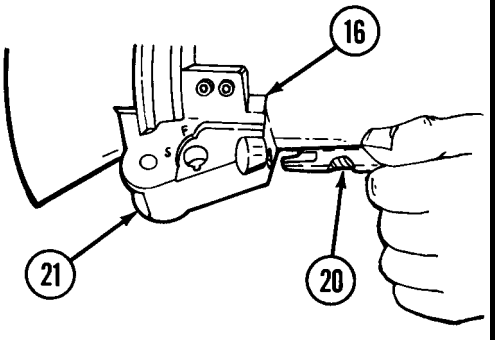
1 0

Aline hinge pin holes in breechblock (9) and hinge block (16). Remove hinge pin (17) from safety shaft hole and install it in alined hinge pin holes.



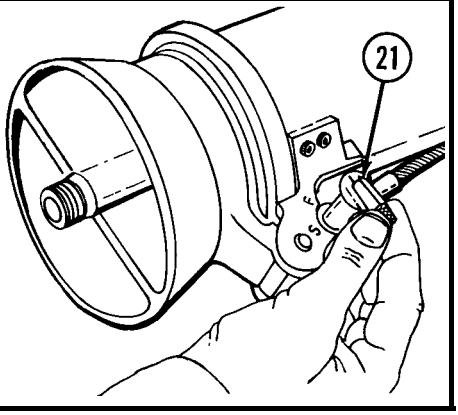
11

Install cable assembly (20) in hinge block (16) with the notched portion that will mate with safety assembly (21) facing away from cannon tube.



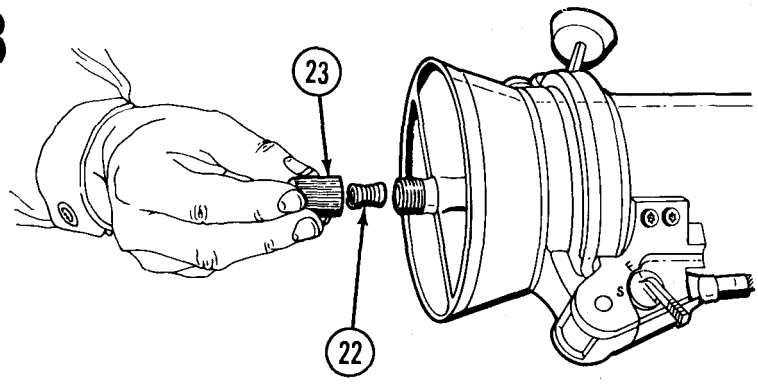
1 2

Position safety assembly (21) 45 degrees counterclockwise from the fire (F) position. Push downward and rotate clockwise to the fire(F) position to install.



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13

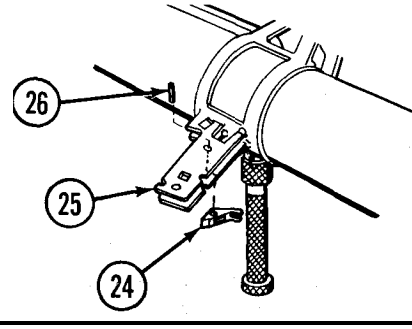


Install helical compression spring (22) and firing pin spring cap (23).

14

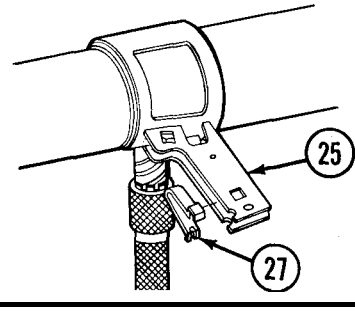
a. Position cable actuating lever (24) in the front bracket assembly (25).

b. Aline spring pin hole in cable actuating lever with hole in front bracket assembly and install spring pin (26).



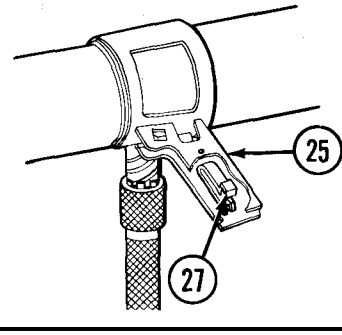
15

Compress spring tension clip (27) and insert in front bracket assembly (25).



16

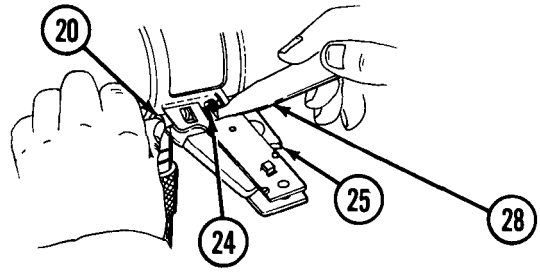
Move spring tension clip (27) using blade end of extractor and screwdriver combination tool until lugs on clip are positioned in mating holes in front bracket assembly (25), and grip-retaining portion of clip protrudes through square hole in front bracket assembly (25).



5-12. M67 RECOILLESS RIFLE (CONT).

REASSEMBLY (CONT)

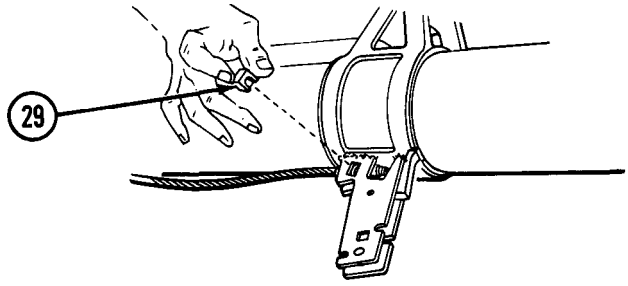
17



a. Depress cable actuating lever (24) rearward and down, using screwdriver end of extractor and screwdriver combination tool (28). Insert forward end of cable assembly (20) into front bracket assembly (25) housing over depressed cable actuating lever (24).

b. Push upon cable actuating lever (24) to position notched end on cable assembly (20), using screwdriver end of extractor and screwdriver combination tool (28). Ensure that the correct number of washers are before and behind cable actuating lever (24).

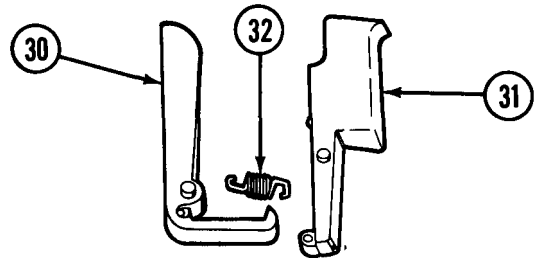
18



Install cable actuating lock (29). Top of lock must be flush or below front bracket assembly outer surface.

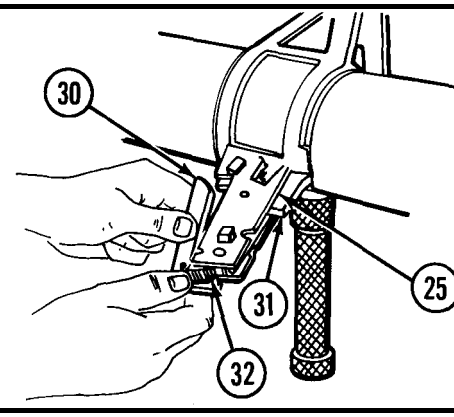
19

Assemble gun grip safety (30) and trigger (31) to helical extension spring (32).



20

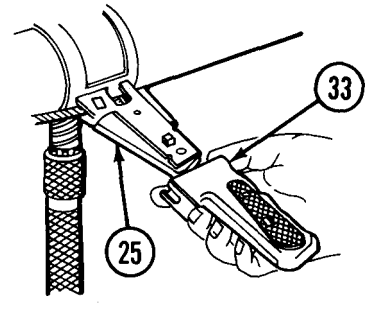
Position trigger (31) in recess. Stretch spring (32) below base of front bracket asssembly (25) and press gun grip safety (30) into the recess.



2 1

a. Install rifle grip (33) on front bracket assembly (25).

b. Check cable assembly adjustment by function testing rifle (p 3-11). If adjustment is required, proceed as follows.



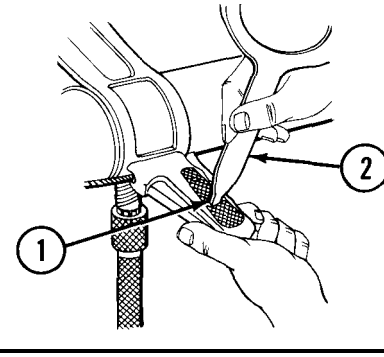
ADJUSTMENT OF CABLE ASSEMBLY

NOTE

Trigger pull, specified by poundage, is not provided for the 90-mm recoilless rifle M67. The method below provides the correct adjustment for trigger pull and assures proper functioning of the gun grip safety and trigger.

1

Depress spring tension clip (1), using screwdriver end of extractor and screwdriver combination tool (2).

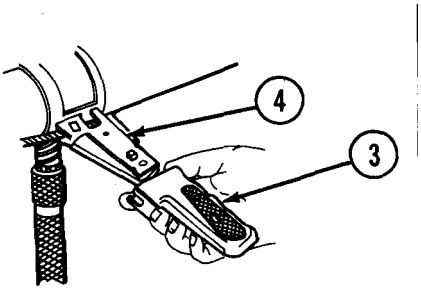


5-12. M67 RECOILLESS RIFLE (CONT).

ADJUSTMENT OF CABLE ASSEMBLY (CONT)

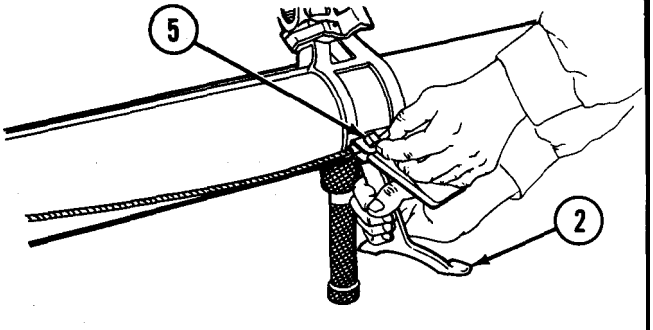
2

Remove rifle grip (3) from front bracket assembly (4).



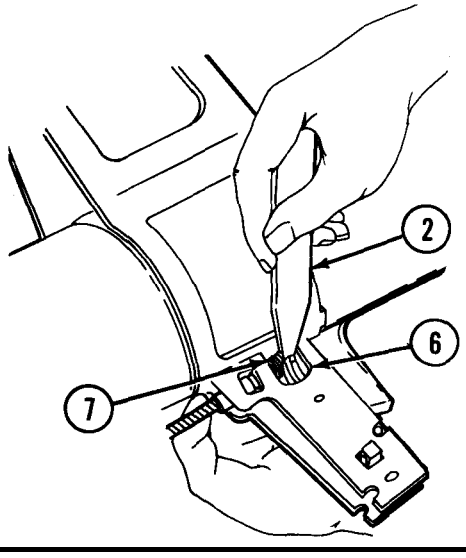
3

Push up and remove cable actuating lock (5) using extractor and screwdriver combination tool (2).



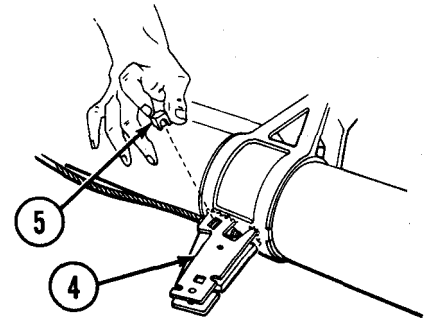
4

Press cable actuating lever (6) down and rearward, using screwdriver end of extractor and screwdriver combination tool (2). Position all washers (7) behind cable actuating lever (6) on the breech side.



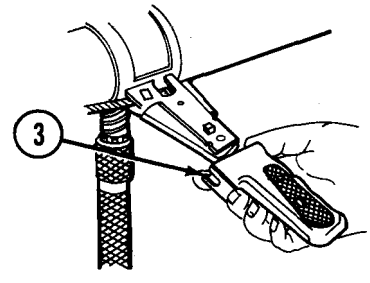
5

Install cable actuating lock (5). Top of cable actuating lock must be flush or below front bracket assembly (4) outer surface.



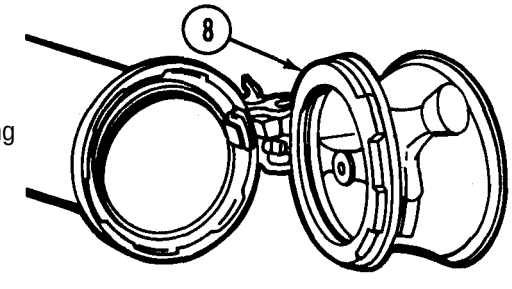
6

Install rifle grip (3).



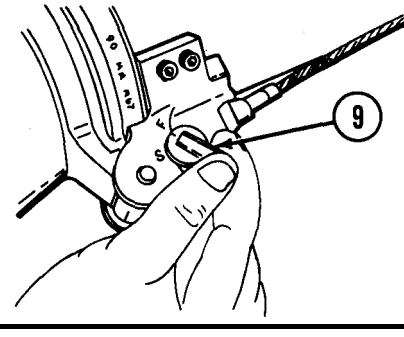
7

Cock the weapon by opening and closing breechblock (8).



8

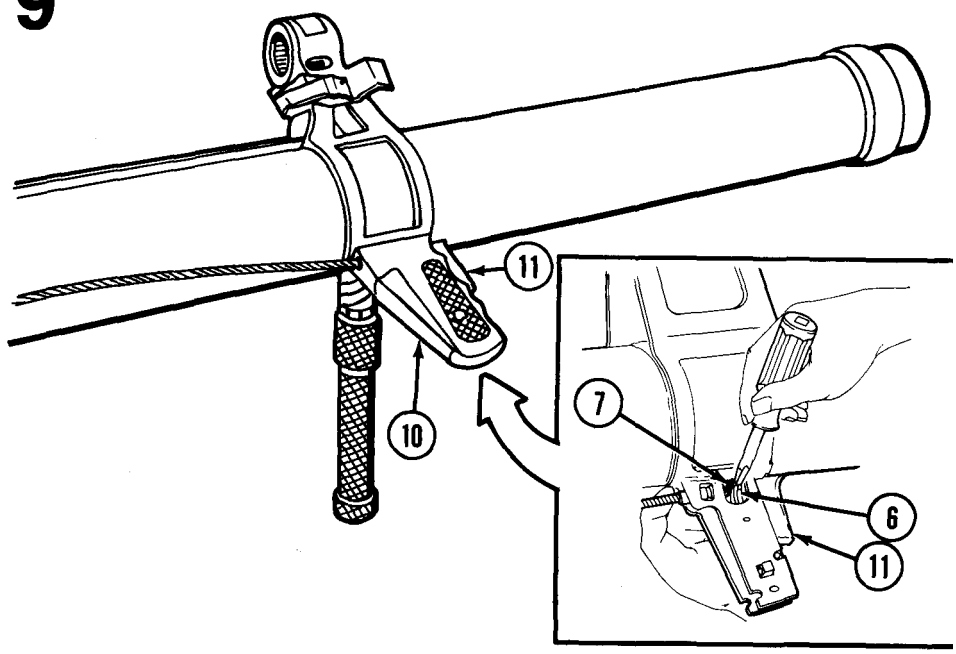
Switch safety assembly (9) from the safe (S) to fire (F) position.



5-12. M67 RECOILLESS RIFLE (CONT).

ADJUSTMENT OF CABLE ASSEMBLY (CONT)

9



a. Attempt to fire weapon by depressing gun grip safety (10) and trigger (11). Rifle should not fire.

b. Repeat steps 1 through 9a, except in step 4 move one washer (7) at a time to the forward side of the cable actuating lever (6).

c. Repeat procedure until weapon fires when gun grip safety (10) and trigger (11) are depressed.

d. Counting each washer (7), continue moving washers, one at a time, to the muzzle side of the cable actuating lever (6) until the weapon fires when only the trigger (11) is depressed.

e. Return half of the counted washers (7) to the breech side of cable actuating lever (6).

f. If the counted washers are odd numbered, put the extra washer on the breech side of cable actuating lever (6).

g. The cable assembly is now properly adjusted.

5-13. SAFETY ASSEMBLY.

This task covers:
a. Disassembly
b. Repair
c. Reassembly

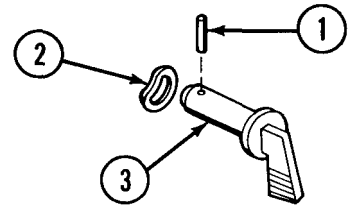
INITIAL SETUP

References
TM 9-1015-223-23P

Equipment Conditions
Safety assembly is removed from rifle (p 5-15).

DISASSEMBLY/REPAIR/REASSEMBLY

a. Remove spring pin (1) and washer (2) from safety (3).
b. Replace unserviceable components. See TM 9-1015-223-23P. If safety is damaged, replace entire safety assembly.
c. Place washer (2) on safety (3) and install spring pin (1).



5-14. LOCK RING ASSEMBLY.

This task covers:
a. Disassembly
b. Repair
c. Reassembly

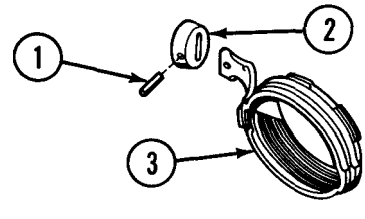
INITIAL SETUP

References
TM 9-1015-223-23P

Equipment Condition
Lock ring assembly is removed from rifle (p 5-15).

DISASSEMBLY/REPAIR/REASSEMBLY

a. Remove spring pin (1) and knob (2) from breech lock ring (3).
b. Replace unserviceable components. See TM 9-1015-223-23P.
c. Place knob (2) on breech lock ring (3) and secure with spring pin (1).



5-15. INSTRUMENT LIGHT M54.

This task covers:
a. Disassembly
b. Repair
c. Reassembly

INITIAL SETUP

Materials/Parts
Incandescent lamp (item 3, app E)

Equipment Condition
Instrument light is removed from 90-mm recoilless rifle M67 (p 2-22).

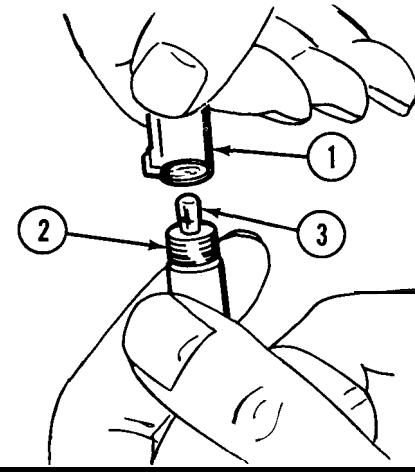
DISASSEMBLY/REPAIR/REASSEMBLY

a. Unscrew bracket (1) from lead wire body (2) and unscrew 3-volt lamp (3).

b. Replace unserviceable 3-volt lamp.

c. Insert new 3-volt lamp (3) in lead wire body (2).

d. Screw bracket (1) onto lead wire body (2).



5-16. CLAMP ASSEMBLY.

This task covers:
a. Disassembly
b. Repair
c. Reassembly

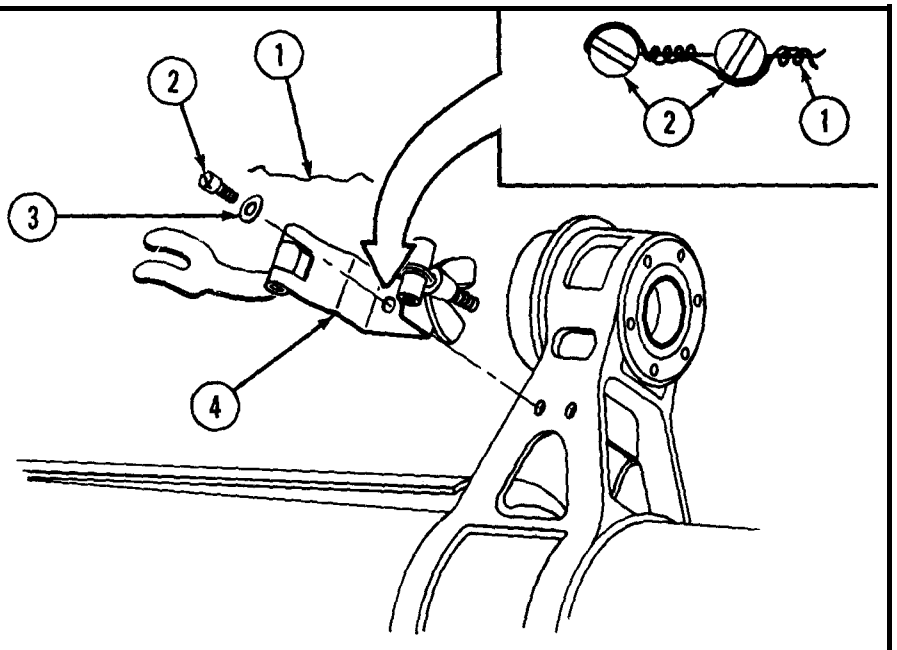
INITIAL SETUP

Tools and Special Tools
Small Arms Repairman Tool Kit (SC 5180-95-CL-A07)

Equipment Condition
Telescope M103 is removed (p 2-20).

References
TM 9-1015-223-23P

DISASSEMBLY/REPAIR/REASSEMBLY



a. Cut and remove safety wire (1).

b. Remove screws (2), washers (3), and clamp assembly (4).

c. Replace defective components.

d.. Secure clamp assembly (4) using screw (2) and washers (3).

e. Install safety wire (1) to screw (2) as illustrated.

APPENDIX A
REFERENCES

A-1. TECHNICAL MANUALS.

TM 9-247 . . . . . Materials Used for Cleaning, Preserving, Abrading and Cementing Ordnance Materiel and Related Materials Including Chemicals
TM 9-1000-202-14 . . . . . Evaluation of Cannon Tubes
TM 9-1015-223-12-HR . . . Hand Receipt Manual Covering Basic Issue Items (Bll) and Additional Authorization List (AAL) for Rifle, Recoilless, 90-MM: M67 (NSN 1015-00-657-7534)
TM 9-1015-223-23P . . . . . Organizational and Direct Support Repair Parts and Special Tools List for Rifle, Recoilless, 90-MM: M67
TM 750-244-7 . . . . . Procedures for Destruction of Equipment in Federal Supply Classifications 1000, 1005, 1010, 1015, 1020,1025, 1030, 1055, 1090, and 1095 to Prevent Enemy Use

A-2. FIELD MANUALS.

FM 9-207 . . . . . Operation and Maintenance of Ordnance Materiel in Cold Weather (0 to 65°F)
FM 21-11 . . . . . First Aid for Soldiers
FM 23-11 . . . . . 90-MM Recoilless Rifle, M67
FM 31-70 . . . . . Basic Cold Weather Manual
FM 31-71 . . . . . Northern Operations

A-3. MISCELLANEOUS PUBLICATIONS.

DA PAM 738-750 . . . . . The Army Maintenance Management System (TAMMS)
SC 5180-95-CL-A07 . . . . . Small Arms Repairman Tool Kit

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APPENDIX B
MAINTENANCE ALLOCATION CHART

Section I. INTRODUCTION

B-1. GENERAL.

a. This section provides a general explanation of all maintenance and repair functions authorized at various maintenance categories.

b. The Maintenance Allocation Chart (MAC) in section II designates overall authority and responsibility for the performance of maintenance functions on the identified end item or component. The application of the maintenance functions to the end item or component will be consistent with the capacities and capabilities of the designated maintenance categories.

c. Section III lists the tools and test equipment (both special tools and common tool sets) required for each maintenance function as referenced from section II.

d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

B-2. MAINTENANCE FUNCTIONS. Maintenance functions will be limited to and defined as follows: (except for ammunition MAC[1]).

a. *Inspect.* To determine the serviceability of an item by comparing its physical, mechanical, and/or electrical characteristics with established standards through examination (e.g., by sight, sound, or feel).

b. *Test.* To verify serviceability by measuring the mechanical, pneumatic, hydraulic, or electrical characteristics of an item and comparing those characteristics with prescribed standards.

c. *Service.* Operations required periodically to keep an item in proper operating condition, i.e., to clean (includes decontaminate, when required), to preserve, to drain, to paint, or to replenish fuel, lubricants, chemical fluids, or gases.

d. Adjust. To maintain or regulate, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.

e. *Aline.* To adjust specified variable elements of an item to bring about optimum or desired performance.

f. *Calibrate.* To determine and cause corrections to be made or to be adjusted on instruments or test, measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.

[1]Exception is authorized for ammunition MAC to permit the redesignation/redefinition of maintenance function headings to more adequately identify ammunition maintenance functions. The heading designations and definitions will be included in the appropriate technical manual for each category of ammunition.

g. *Remove/Install.* To remove and install the same item when required to perform service or other maintenance functions. Install maybe the act of emplacing, seating, or fixing into position a spare, repair part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.

h. *Replace.* To remove an unserviceable item and install a serviceable counterpart in its place. "Replace" is authorized by the MAC and is shown as the 3d position code of the SMR code.

i. *Repair.* The application of maintenance services, including fault location/troubleshooting, removal/installation, and disassembly/assembly procedures and maintenance actions to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component of assembly), end item, or system.

j. *Overhaul.* That maintenance effort (service/action) prescribed to restore an item to a completely serviceable/operational condition as required by maintenance standards in appropriate technical publications (i.e., DMWR). Overhaul is normally the highest degree of maintenance performed by the Army. Overhaul does not normally return an item to like new condition.

k. *Rebuild* Consists of those services/actions necessary for the restoration of unserviceable equipment to a like new condition in accordance with original manufacturing standards. Rebuild is the highest degree of materiel maintenance applied to Army equipment. The rebuild operation includes the act of returning to zero those age measurements (hours/miles, etc) considered in classifying Army equipment/components.

B-3. EXPLANATION OF COLUMNS IN THE MAC, SECTION II.

a. *Column 1, Group Number.* Column 1 lists functional group code numbers, the purpose of which is to identify maintenance significant components, assemblies, subassemblies, and modules with the next higher assembly. End item group number shall be "00."

b. *Column 2, Component/Assembly.* Column 2 contains the names of components, assemblies, subassemblies, and modules for which maintenance is authorized.

c. *Column 3, Maintenance Function.* Column 3 lists the functions to be performed on the item listed in Column 2. (For detailed explanation of these functions, see paragraph B-2.)

---

[2]Services - inspect, test, service, adjust, aline, calibrate, and/or replace.

[3]Fault locate/troubleshoot - the process of investigating and detecting the cause of equipment malfunctioning; the act of isolating a fault within a system or unit under test (UUT).

[4]Disassemble/assemble - encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componency identified as maintenance significant (i.e., assigned as SMR code) for the category of maintenance under consideration.

[5]Actions - welding, grinding, riveting, straightening, facing, remachinery, and/or resurfacing.

d. Column 4, *Maintenance Category.* Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the category of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate work time figures will be shown for each category. The work time figure represents the average time required to restore an item (assembly, subassembly, component, module, end item, or system) to a serviceable condition under typical field operating conditions. This time includes preparation time (including any necessary disassembly/assembly time), troubleshooting/fault location time, and quality assurance/quality control time in addition to the time required to perform the specific tasks identified for the maintenance functions authorized in the maintenance allocation chart. The symbol designations for the various maintenance categories are as follows:

C . . . . . Operator or Crew
O . . . . . Organizational Maintenance
F . . . . . Direct Support Maintenance
H . . . . . General Support Maintenance
L . . . . . Specialized Repair Activity (SRA)[6]
D . . . . . Depot Maintenance

e. Column 5, Tools *and Equipment.* Column 5 specifies, by code, those common tool sets (not individual tools) and special tools, TMDE, and support equipment required to perform the designated function.

f. *Column* 6, *Remarks.* This column shall, when applicable, contain a letter code, in alphabetic order, which shall be keyed to the remarks contained in Section IV.

B-4. EXPLANATION OF COLUMNS IN TOOL AND TEST EQUIPMENT REQUIREMENTS, SECTION III.

a. *Column 7, Reference Code.* The tool and test equipment reference code correlates with a code used in the MAC, Section II, Column 5.

b. *Column 2, Maintenance Category.* The lowest category of maintenance authorized to use the tool or test equipment.

c. Column 3, Nomenclature. Name or identification of the tool or test equipment.

d. *Column 4, National Stock Number.* The National stock number of the tool or test equipment.

e. Column 5, Tool Number. The manufacturer's part number.

[6]This maintenance category is not included in Section II, column (4) (4) of the Maintenance Allocation Chart. To identify functions to this category of maintenance, enter a work time figure in the "H" column of Section II column (4), and use an associated reference code in the Remarks column (6). Key the code to Section IV, Remarks, and explain the SRA complete repair application there. The explanatory remark(s) shall reference the specific Repair Parts and Special Tools List (RPSTL) TM which contains additional SRA criteria and the authorized spare/repair parts.

B-5. EXPLANATION OF COLUMNS IN REMARKS, SECTION IV.

a. *Column 1, Reference Code.* The code recorded in column 6. Section II.

b. *Columm 2, Remarks.* This column lists information pertinent to the maintenance function being performed as indicated in the MAC, Section II.

Section II. MAINTENANCE ALLOCATION CHART

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIP	(6) REMARKS
			C	O	F	H	D		
00	90-MM	Inspect	0.2	0.5					
	RECOILLESS	Service	0.2	0.2					
	RIFLE: M67	Replace		0.1					
	W/E	Adjust	0.1	0.1					
		Repair	0.5	0.5	0.5			8, 9	
01	STRAIGHT	Inspect	0.1	0.1	0.1				
	TELESCOPE	Service	0.2	0.2					
	M103	Replace	0.2						
		Repair		0.1		1.0			B
		Overhaul					3.0		
02	TELESCOPE	Inspect	0.1	0.2	0.5				
	MOUNT	Replace		0.1				6	
	M110	Repair				1.0			C
		Overhaul					3.0		
03	90-MM	Inspect	0.5	0.5	0.5			1, 2, 3	A
	RECOILLESS	Service	0.5	0.5					
	RIFLE M67	Repair		1.0	2.0			8, 9	
		Overhaul					4.0		
0301	Monopod	Inspect	0.1	0.1					
	Assembly	Service	0.1	0.1				8	
		Replace			0.2				
		Repair			0.1			8	
0302	Front Bracket	Inspect	0.1	0.1					
	Assembly	Service	0.1	0.1					
		Replace			0.5				
		Repair			0.1			8	

(1) GROUP NUMBER	(2) COMPONENT/ ASSEMBLY	(3) MAINTENANCE FUNCTION	(4) MAINTENANCE CATEGORY					(5) TOOLS AND EQUIP	(6) REMARKS
			C	O	F	H	D		
0303	Safety Assembly	Inspect	0.1	0.1					
		Service	0.1	0.1					
		Replace		0.2					
		Repair		0.1				8	
0304	Lock Ring Assembly	Service	0.1	0.1					
		Replace		0.2					
		Repair		0.1	0.2			8	
		Adjust			0.5				
04	BASIC ISSUE ITEMS (REPAIR PARTS)								
0401	Instrument Light M54	Inspect	0.1	0.1					
		Install	0.1						
		Replace		0.1					
		Repair	0.1	0.1					B
0402	Clamp Assembly	Inspect	0.1	0.1					
		Service	0.2	0.2				8	
		Replace		0.1					
		Repair		0.1					
05	7.62-MM SUBCALIBER GUN M149A1	Inspect	0.1	0.1	0.3				
		Repair			0.5			4,5	
		Service	0.1	0.1				7,9	
		Replace			0.1				
		Adjust			0.3				

Section III. TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) TOOL OR TEST EQUIP REF CODE	(2) MAI NTE-NANCE CATE-GORY	(3) NOMENCLATURE	(4) NATIONAL/ NATO STOCK NUMBER	(5) TOOL NUMBER
1		Deleted		
2	F	Borescope M3	6650-01-063-0035	TM 9-6650-235-13&P
3	F	Gage, Fillet and Radius	5210-00-476-8801	279
4	F	Gauge Headspace, Rifle	6695-00-724-1535	11577756
4.1	F	Pullover Gage Kit	4933-00-348-8652	TM 9-4933-258-13&P
5	F	Wrench, Spanner	5120-00-800-7535	11578009
6	O	Wrench, Spanner	5120-00-893-1736	8213920
7	F	Gage, Breech Bore M14	5220-00-647-3697	7274761
8	O	Tool Kit, Small Arms	5180-00-357-7770	SC 5180-95-CL-A07
9	F	Shop Set, Small Arms: Field Maintenance, Basic, Less Power	4933-00-754-0664	SC 4933-95-CL-A11

Section IV. REMARKS

REFERENCE CODE	REMARKS
A	See TM 9-1000-202-14
B	See TM 9-1240-259-35
C	See TM 9-1240-297-35

APPENDIX C
COMPONENTS OF END ITEM AND BASIC ISSUE ITEMS

Section I. INTRODUCTION

C-1. SCOPE. This appendix lists components of end item and basic issue items for the 90-mm Recoilless Rifle: M67 to help you inventory items required for safe and efficient operation.

C-2. GENERAL. The Components of End Item and Basic Issue Items Lists are divided into the following sections:

a. *Section II. Components of End Item.* This listing is for informational purposes only, and is not authority to requisition replacements. These items are part of the end item, but are removed and separately packaged for transportation or shipment. As part of the end item, these items must be with the end item whenever it is issued or transferred between property accounts. Illustrations are furnished to assist you in identifying the items.

b. *Section III. Basic Issue Items.* These are the minimum essential items required to place the rifle in operation, to operate it, and to perform emergency repairs. Although shipped separately packaged, BII must be with the rifle during operation and whenever it is transferred between property accounts. The illustrations will assist you with hard-to-identify items. This manual is your authority to request/requisition replacement BII, based on TOE/MTOE authorization of the end item.

C-3. EXPLANATION OF COLUMNS. The following provides an explanation of columns found in the tabular listings:

a. *Column (1) - Illustration Number (Illus Number).* This column indicates the number of the illustration in which the item is shown.

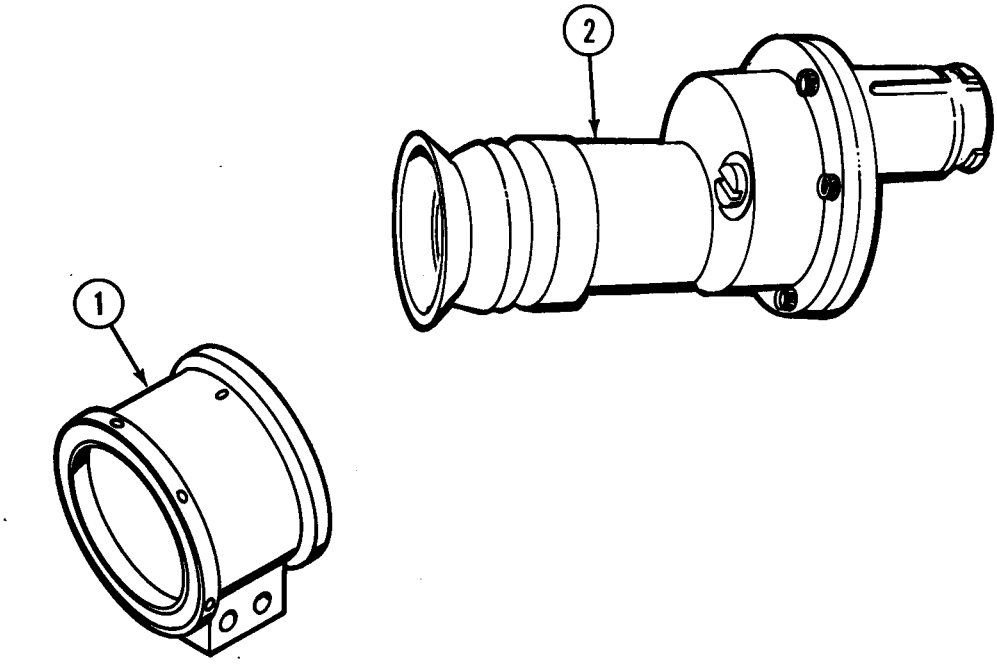
b. *Column* (2) - *National Stock Number.* Indicates the National stock number assigned to the item and will be used for requisitioning purposes.

c. *Column* (3) - *Description.* Indicates the Federal item name and, if required, a minimum description to identify and locate the item. The last line for each item indicates the FSCM (in parentheses) followed by the part number.

d. *Column* (4) - *Unit of Measure (U/M).* Indicates the measure used in performing the actual operational/maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr).

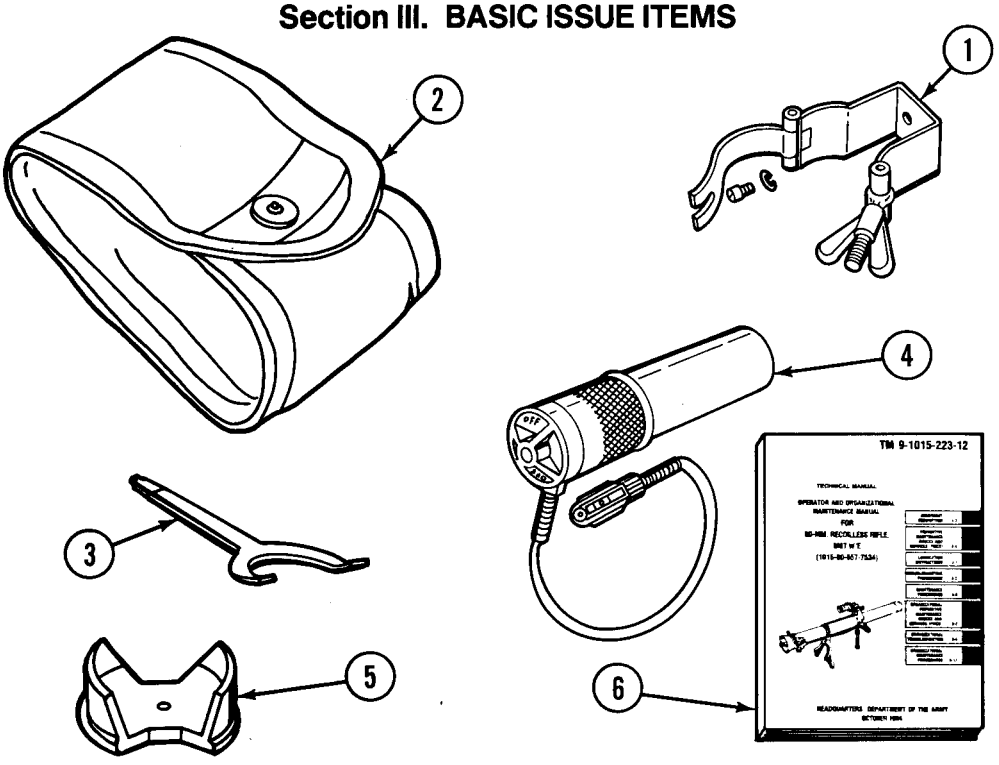
e. *Column (5) - Quantity Required (Qty Rqr).*
Indicates the quantity of the item authorized to be used with/on the equipment.

Section II. COMPONENTS OF END ITEM



(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
1	6650-00-788-1234	MOUNT, TELESCOPE: M110 7659765 (19200)		EA	1
2	1240-00-788-1236	TELESCOPE: M103 7659740 (19200)		EA	1

Section III. BASIC ISSUE ITEMS



(1) Illus Number	(2) National Stock Number	(3) Description FSCM and Part Number	Usable On Code	(4) U/M	(5) Qty Rqr
		90-MM RECOILLESS RIFLE M67			
1	5340-00-796-4175	CLAMP ASSEMBLY: 7659949 (19200)		EA	1
2	1240-00-441-0471	COVER, FIRE CONTROL: 8575980 (19200)		EA	1
3	4933-00-897-9362	EXTRACTOR AND SCREWDRIVER COMBINATION: 8767921 (19206)		EA	1
4	66951-00-346-8701	LIGHT, INSTRUMENT: 8246214 (19200)		EA	1
5	4933-00-225-4905	SIGHT, BORE, BREECH: rifle 90-mm 8769066 (19206)		EA	1
6		TM 9-1015-223-12		EA	1

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APPENDIX D
ADDITIONAL AUTHORIZATION LIST

Section I. INTRODUCTION

D-1. SCOPE. This appendix lists additional items you are authorized for the support of the 90-mm Recoilless Rifle: M67.

D-2. GENERAL. This list identifies items that do not have to accompany the rifle and that do not have to be turned in with it. These items are all authorized to you by CTA, MTOE, TDA, or JTA.

D-3. EXPLANATION OF LISTING. National stock numbers, descriptions, and quantities are provided to help you identify and request the additional items you require to support this equipment. The items are listed in alphabetical sequence by item name.

Section II. ADDITIONAL AUTHORIZATION LIST

(1) National Stock Number	(2) Description Part Number and FSCM Usable on Code	(3) U/M	(4) Qty Auth
1015-00-534-1938	BRUSH, CLEANING, ARTILLERY: 7309271 (19206)	EA	1
1015-00-859-4516	BRUSH, CLEANING, ARTILLERY: 8767959 (19206)	EA	1
1015-00-862-4760	POUCH, SPECIAL EQUIPMENT: 8768454 (19206)	EA	1
1015-00-859-4514	COVER, BREECH: 8767947 (19206)	EA	1
1015-00-376-0120	COVER, GUN MUZZLE: 11578561 (19206)	EA	1
8465-00-753-3257	SLING, UNIVERSAL, INDIVIDUAL LOAD CARRYING: MIL-S-43013 (81349)	EA	1

(1) National Stock Number	(2) Description Part Number and FSCM Usable on Code	(3) U/M	(4) Qty Auth
1005-00-702-8159	7.62-MM SUBCALIBER RIFLE Ml 49A1 W/E 8445079 (19206) CONSISTING OF:	EA	1
	GUN, SUBCALIBER, 7.62-MM M149A1 11577670(19206)	EA	1
1005-00-556-4174	BRUSH, BORE CLEANING, SMALL ARMS: 5564174(19206)	EA	1
1005-00-610-8828	BRUSH, CLEANING, SMALL ARMS M6 CHAMBER: 6108828 (19206)	EA	1
1005-00-694-1662	BUFFER, CLEANING ROD: 7268275 (19204)	EA	1
1005-00-650-4510	CASE, SMALL ARMS CLEANING ROD: 7267754 (19206)	EA	1
4933-00-652-9950	EXTRACTOR, RUPTURED CARTRIDGE CASE: 7790352 (19206)	EA	1
1005-00-793-6761	HANDLE ASSEMBLY: cleaning rod 7266116 (19204)	EA	1
1005-00-726-6109	ROD SECTION, CLEANING, SMALL ARMS: 7266109 (19204)	EA	4
1005-00-726-6110	SWAB, HOLDER, SECTION SMALL ARMS: 7266110 (19206)	EA	1

APPENDIX E
EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

Section I. INTRODUCTION

E-1. SCOPE. This appendix lists expendable/durable supplies and materials you will need to operate and maintain the 90-mm Recoilless Rifle: M67. This listing is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/ Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/ Durable Items.

E-2. EXPLANATION OF COLUMNS.

a. *Column (1) - Item Number.* This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use CLP, item 2, app E").

b. *Column* (2) - *Level* This column identifies the lowest level of maintenance that requires the listed item.

C - Operator/Crew

0- Organizational Maintenance

c. *Column (3) - National Stock Number.* This is the National stock number assigned to the item; use it to request or requisition the item.

d. *Column (4) - Description.* Indicates the Federal item name and, if required, a description to identify the item. The last line for each item indicates the Federal Supply Code for Manufacturer (FSCM) in parentheses followed by the part number.

e. *Column (5) - Unit of Measure (U/M).* Indicates the measure used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical abbreviation (e.g., ea, in., pr). If the unit of measure differs from the unit of issue, requisition the lowest unit of issue that will satisfy your requirements.

Section II. EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	C		BATTERY, DRY: 1.5V, BA-42 (81349) MIL-B-18	
		6135-00-120-1010	24 per package	EA
2			CLEANER, LUBRICANT, and PRESERVATIVE: (27412)	
	C	9150-01-079-6124	CLP-44 oz btl	Oz
	O	9150-01-054-6453	CLP-5 pt btl	PT
	O	9150-01-053-6688	CLP-7 gal btl	GL
3	O	6240-00-635-9800	LAMP, INCANDESCENT: 3 volts 0.19 amperes, special base, T-1-¼ bulk, clear, white light (96906) MS51608-3	EA
4	O		LUBRICANT, SOLID FILM (81349) MIL-L-46147	
		9150-00-168-2000	16 oz aerosol can	OZ
5	C		PAPER, LENS: tissue, sheet form (81348) NNN-P-40, type I or II	
		6640-00-663-0832	50 shts/bl	EA
6	C		RAG, WIPING: cotton, general purpose (58536) A-A-531	
		7920-00-205-1711	50 lb bale	LB
7			SWAB, SMALL ARMS CLEANING: cotton, 2 ½ in. square (19204) 5019316	
		1005-00-288-3565	1000 per package	EA
8	C		TAPE, PRESSURE SENSITIVE: (81348) PPP-T-42	YD
		7510-00-266-6712	1 in. wide, 60 yd roll	YD
9	C	4020-00-241-8875	TWINE, FIBROUS fine India finish (81348) T-T-911	FT

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