

**TECHNICAL MANUAL  
UNIT MAINTENANCE MANUAL**

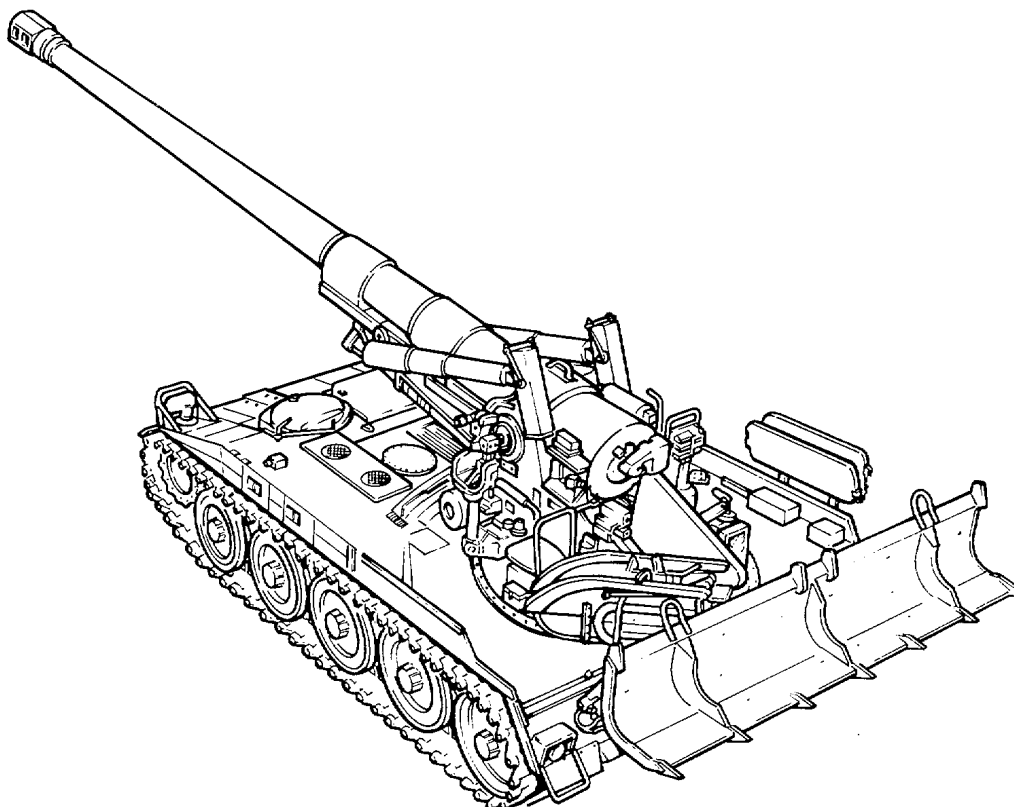
**ARMAMENT AND  
TURRET COMPONENTS  
HOWITZER, HEAVY,  
SELF-PROPELLED:  
8-INCH, M 11 OA2  
(2350-01-041-4590)(EIC:3E3)**

<b>UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) AND LUBRICATION INSTRUCTIONS</b>	<b>PAGE 2-8</b>
--	-----------------

<b>UNIT TROUBLESHOOTING</b>	<b>PAGE 2-13</b>
-----------------------------	------------------

<b>UNIT MAINTENANCE INSTRUCTIONS</b>	<b>PAGE 2-84</b>
--	------------------

<b>MAINTENANCE ALLOCATION CHART</b>	<b>PAGE B-1</b>
---	-----------------



**DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.**

**CHANGE**

**No. 2**

**HEADQUARTERS  
DEPARTMENT OF THE ARMY**  
Washington DC 17 September 1993

**UNIT MAINTENANCE MANUAL**

**ARMAMENT AND TURRET COMPONENTS  
HOWITZER, HEAVY, SELF-PROPELLED:  
8-INCH, M110A2  
(2350-01-041-4590) (EIC:3E3)**

TM 9-2350-304-20-2, January 1991, 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.
3. Added or revised illustrations are indicated by a miniature pointing hand, or vertical bar adjacent to the illustration number.

Remove Pages

B-7 and B-8

Inset Pages

B-7 and B-8

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

**By Order of the Secretary of the Army:**

GORDON R. SULLIVAN  
General, United States Army  
Chief of Staff

Official:

MILTON H. HAMILTON  
Administrative Assistant to the  
Secretary of the Army  
04974

**DISTRIBUTION: To be distributed in accordance with DA Form 12-37-E, Block 2262, requirements for TM 9-2350-304-20-2.**

CHANGE

No. 1

HEADQUARTERS  
DEPARTMENT OF THE ARMY  
Washington, DC 28 May 1993

UNIT MAINTENANCE MANUAL

ARMAMENT AND TURRET COMPONENTS  
HOWITZER, HEAVY, SELF-PROPELLED:  
8-INCH, M110A2  
(2350-01-041-4590) (EIC:3E3)

TM 9-2350-304-20-2, January 1991, 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.
3. Added or revised illustrations are indicated by a miniature pointing hand, or vertical bar adjacent to the illustration identification number.

Remove Pages	Insert Pages
i and ii	i and ii
1-1 and 1-2	1-1 and 1-2
2-1 through 2-4	2-1 through 2-4
2-7 through 2-12	2-7 through 2-12
None	2-12.1 through 2-12.15/(2-12.16 blank)
2-15 through 2-24	2-15 through 2-24
2-29 and 2-30	2-29 and 2-30
2-33 through 2-40	2-33 through 2-40
2-43 and 2-44	2-43 and 2-44
2-47 through 2-56	2-47 through 2-56
2-73 and 2-74	2-73 and 2-74
2-85 and 2-86	2-85 and 2-86
2-111 and 2-112	2-111 and 2-112
2-205 and 2-206	2-205 and 2-206
2-209 through 2-212	2-209 through 2-212
2-223 and 2-224	2-223 and 2-224
None	2-224.1 and 2-224.2
2-225 and 2-226	2-225 and 2-226
2-295 and 2-296	2-295 and 2-296
2-299 and 2-300	2-299 and 2-300
2-305 and 2-306	2-305 and 2-306
2-311 and 2-312	2-311 and 2-312
A-1 and A-2	A-1 and A-2
A-3/(A-4 blank)	A-3/(A-4 blank)
B-3 through B-14	B-3 through B-14
B-19 through B-24	B-19 through B-24
C-1 and C-2	C-1 and C-2
C-3/(C-4 blank)	C-3/(C-4 blank)
F-29 through F-46	F-29 through F-46
G-1 through G-4	G-1 through G-4
G-5/(G-6 blank)	G-5/(G-6 blank)
Index 5 through Index 12	Index 5 through Index 12
None	FP-7/(FP-8 blank)
Front Cover	Front Cover

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

By Order of the Secretary of the Army:

GORDON R. SULLIVAN  
General, United States Army  
Chief of Staff

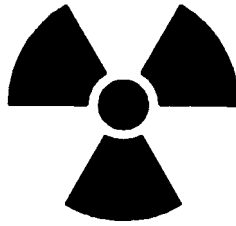
Official:

MILTON H. HAMILTON  
Administrative Assistant to the  
Secretary of the Army  
04113

**DISTRIBUTION:**

To be distributed in accordance with DA Form 12-37-E, Block 2262, requirements for TML 9-2350-304-20-2.

**WARNING  
RADIATION HAZARD**



**TRITIUM (H3)**

**Rules and Regulations**

Copies of the following rules and regulations are maintained at HQ, AMCCOM\*1 Rock Island, IL 61299-6000. Copies may be requested or information obtained by contacting the AMCCOM Radiological Protection Officer (RPO), AUTOVON 793-2964, Commercial (309) 782-2964.

10CFR Part 19-Notices, Instructions, and Reports to Workers; Inspections.

10CFR Part 20-Standards for Protection Against Radiation.

NRC license, license condition, and license application.

**Safety Precautions**

The radioactive material used in these instruments is tritium gas (H3) sealed in pyrex tubes. It poses no significant hazard to the repair person when intact. These sources illuminate the instrumentation for night operations. Tampering with or removal of the sources in the field is prohibited by Federal law. In the event there is no illumination, notify the local RPO. Do not attempt to repair or replace the instrument in the field! If skin contact is made with any area contaminated with tritium, immediately wash with nonabrasive soap and water.

**Identification**

Radioactive self-luminous sources are identified by means of radioactive warning labels (as above). These labels should not be defaced or removed and should be replaced immediately when necessary. Refer to the local RPO or the AMCCOM RPO for instructions on handling, storage, or disposal.

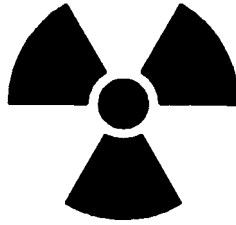
**Storage and Shipping**

All radioactively illuminated instruments or modules which are defective will be evacuated to a depot maintenance activity. These items must be placed in a plastic bag and packaged in the shipping container from which the replacement was taken before evacuation to a higher echelon is made. Spare equipment must be stored in the shipping container, as received, until installed on the weapon. Storage of these items is recommended to be in an outdoor shed-type storage or unoccupied building.

Radioactive material is used in the M140 alinement device. Radiation leakage may occur if M140 alinement device is broken or damaged. If exposed to a broken or damaged M140 alinement device, see medical personnel.

Radioactive material is used in M1A1 collimator. Radiation leakage may occur if M1A1 collimator is broken or damaged. If exposed to a broken or damaged M1A1 collimator, flush with water and see medical personnel.

Radioactive material is used in M1A2 gunner's quadrant. Radiation leakage may occur if level vial is broken or damaged. If exposed to a broken or damaged vial on the M1A2 quadrant, flush with water and see medical personnel.

**WARNING (CONT)**

Do not purge and charge any instrument containing tritium gas (H3) if there is no illumination in the assembly. The local RPO must be notified, and the defective unit will be replaced by a serviceable one.

**GENERAL**

Dry cleaning solvent (SD2) is toxic and flammable. Wear protective goggles and gloves and use only in well ventilated areas.

High-pressure nitrogen gas is used in this equipment. Keep face and body clear of release valves, filling plugs, and bleed valves. Failure to observe safety precautions may result in injury or death.

Handle assembly contains parts under spring tension. Use caution in removal to prevent injury.

Grip assembly contains parts under spring tension. Use care when removing to prevent injury. Parts of headlink assembly are under spring tension. Use caution in removal to prevent injury.

Unusable CARC mixtures may be considered hazardous waste and may require disposal in accordance with Federal, state, DOD, and DA hazardous waste regulations. Consult the installation environment office for proper disposal guidance. Mixed CARC has a flashpoint of approximately 38 F (30C) due to the incorporation of solvents and is highly flammable.

CARC paint contains isocyanate, a constituent that can cause respiratory effects during and after the application of the material. During the application of CARC paint, coughing, shortness of breath, pain on respiration, increased sputum, and chest tightness may occur. CARC paint also produces itching and reddening of the skin, a burning sensation of the throat and nose, and watering of the eyes. An allergic reaction may occur after initial exposure (ranging from a few days to a few months later), producing asthmatic symptoms including coughing, wheezing, tightness in the chest, or shortness of breath. The following precautions must be observed to insure the safety of personnel when CARC paint is applied.

- For brush/roller painting in confined spaces, an airline respirator is required, unless an air sampling shows exposure to be below standards. If the air sampling is below standards, either chemical cartridge or airline respirators are required.
- Spot painters applying CARC paint by brush or roller must wear clothing and gloves affording full coverage.
- Do not use water, alcohol, or amine based solvents to thin or remove CARC paints. Use of these solvents with CARC paints can produce chemical reactions resulting in nausea, disease, burns, or severe illness to personnel.
- Do not use paint solvents to remove paint/coating from your skin.
- Mix paint/coating in a well-ventilated mixing room or spraying area away from open flames. Personnel mixing paint/coating should wear eye protection.
- Use paint/coating with adequate ventilation.

**WARNING (CONT)**

**M35 FIRING MECHANISM**

M35 firing mechanism contains springs under high pressure. Be careful and hold parts securely throughout disassembly.

Block assembly contains springs under high pressure. Be careful and hold parts when removing retainer and firing pin.

**RECUPERATOR**

Recuperator chamber is under high pressure. Reduction of nitrogen pressure to zero must be done with safety shield in place. Refer to Testing procedures.

Do not stand directly in front of recuperator when operating valve. Failure to observe this warning may result in injury to personnel.

Closing your opener more than 3 turns may disengage valve opener from tube assembly, causing injury to personnel.

**ELECTRICAL COMPONENTS**

Make sure MASTER switch is OFF before repairing electrical components or circuits. Failure to observe this warning could result in injury to personnel.

Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

Do not connect battery cables before activating batteries with electrolyte to avoid battery blow-up.

**HYDRAULICS**

Hydraulic system is under high pressure. Make sure all hydraulic pressure is relieved before removal of any tubes or fittings. Follow safety procedures to prevent injury. Wipe up spilled hydraulic fluid.

Keep hands and body behind valve opener. Failure to do so may result in injury or death to personnel.

Before relieving hydraulic pressure, be sure travel lock is engaged and vehicle is on as level ground as possible. This will stop the cannon from sliding out of battery.

Gun tube must be in low travel lock position. Failure to observe this warning may result in injury to personnel.

**FIRST AID**

Refer to FM 21-11, First Aid for Soldiers.

**c/(d blank)**



**UNIT MAINTENANCE MANUAL  
ARMAMENT AND TURRET COMPONENTS  
HOWITZER, HEAVY,  
SELF-PROPELLED: 8-INCH, M110A2  
(2350-01-041-4590)**

DISTRIBUTION STATEMENT A. Approved for public release; distribution is unlimited.

**REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS**

You can help improve this manual. If you find any mistakes or if you know of a way 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, U.S. Army Armament, Munitions and Chemical Command, ATTN: AMSMC-MAS, Rock Island, IL 61299-6000. A reply will be furnished to you.

**Table of Contents**

			<b>Page</b>
<b>HOW TO USE THIS MANUAL .....</b>			ii
CHAPTER	1.	INTRODUCTION .....	
Section	I.	General Information .....	1-1
Section	II.	Equipment Description and Data.....	1-3
Section	III.	Principles of Operation .....	1-10
CHAPTER	2.	UNIT MAINTENANCE INSTRUCTIONS	
Section	I.	Repair Parts, Special Tools, TMDE, and Support Equipment.....	2-3
Section	II.	Service Upon Receipt.....	2-3
Section	III.	<b>Unit Preventive Maintenance Checks and Services (PMCS) and Lubrication Instructions .....</b>	2-8
Section	IV.	<b>Unit Troubleshooting .....</b>	2-13
Section	V.	Wiring Harness and Cable Repair.....	2-75
Section	VI.	Maintenance of Hydraulic Lines and Fittings.....	2-82
Section	VII.	<b>Unit Maintenance Instructions .....</b>	2-84
Section	VIII.	Preparation for Storage or Shipment .....	2-312

\*This manual supersedes armament and turret components portions of TM 9-2350-304-20, November 1979, including all changes.

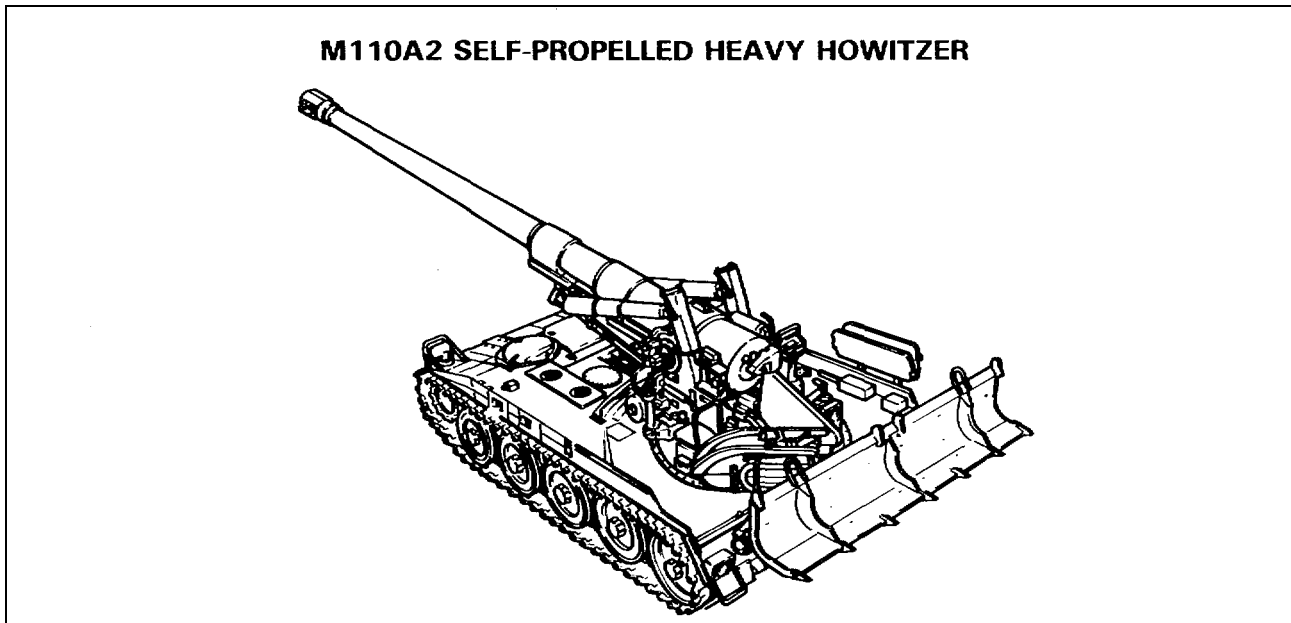
**TABLE OF CONTENTS (CONT)**

APPENDIX	A	REFERENCES .....	A-1
APPENDIX	B	MAINTENANCE ALLOCATION CHART .....	B-1
APPENDIX	C	EXPENDABLE/DURABLE SUPPLIES AND MATERIALS LIST.....	C-1
APPENDIX	D	ILLUSTRATED LIST OF MANUFACTURED ITEMS .....	D-1
APPENDIX	E	TORQUE VALUES .....	E-1
APPENDIX	F	HYDRAULIC SYSTEM DESCRIPTION AND SCHEMATIC DIAGRAMS.....	F-1
APPENDIX	G	SPECIAL TOOLS AND EQUIPMENT .....	G-1
ALPHABETICAL INDEX.....			Index-1

**HOW TO USE THIS MANUAL**

This manual (TM 9-2350-304-20-2) contains unit level maintenance procedures for the armament and turret components of the M110A2 Self-Propelled Heavy Howitzer. This manual is to be used in conjunction with TM 9-2350-304-10 and TM 9-2350-304-24P-2. Chapter 1 contains general information; equipment description and data; and principles of operation. Chapter 2 contains information concerning repair parts, special tools, TMDE, and support equipment; and unit level troubleshooting and maintenance procedures.

Be sure to read and understand maintenance instructions before beginning any maintenance task. Also, read and understand information in chapter 1 and general maintenance procedures on page 2-84 before beginning any maintenance task.



CHAPTER 1  
INTRODUCTION

CHAPTER INDEX

	Page
Armament.....	1-10
Corrosion Prevention and Control (CPC).....	1-2
Destruction of Army Materiel to Prevent Enemy Use.....	1-1
Equipment Characteristics, Capabilities, and Features.....	1-3
Equipment Data.....	1-9
General.....	1-10
Location and Description of Major Components.....	1-3
Maintenance Forms, Records, and Reports.....	1-1
Official Nomenclature, Names, and Designations.....	1-2
Preparation for Storage or Shipment.....	1-2
Reporting Equipment Improvement Recommendations (EIR).....	1-2
Scope.....	1-1

**Section I. GENERAL INFORMATION**

**1-1. SCOPE.**

a. *Type of Manual.* Unit level maintenance.

b. *Model Number and Equipment Name.* M 1 10A2, 8-inch, heavy, self-propelled howitzer.

c. *Purpose of Equipment.* Transports a long-barrel howitzer and its crew. Travels at convoy speed for artillery support in offensive and defensive combat operations.

**1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS.** 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. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE.**

a. *Tactical Situations.* Situations may arise in which it is necessary to abandon equipment in the

combat zone. All abandoned equipment must be destroyed to prevent its use by the enemy. The destruction of equipment subject to capture or abandonment in the combat zone will be undertaken only upon authority delegated by a division or higher commander.

b. *Plans.*

(1) Plans for destruction of equipment must be adequate, uniform, and easily carried out in the field.

(2) Destruction must be as complete as the available time, equipment, and personnel will permit. Since complete destruction requires considerable time, priorities must be established so the more essential parts are destroyed first.

(3) The same essential parts must be destroyed on all like units to prevent the enemy from constructing a complete unit from undamaged parts.

**1-3. DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE (CONT).**

(4) Spare parts and accessories must be given the same priority as parts installed on the equipment.

c. *Methods.* To destroy equipment adequately and uniformly, all personnel of the unit must know the plan and priority of destruction and be trained in the methods of destruction.

d. *References.* Read TM 750-244-6 for information on destruction of mechanical equipment. Read TM 750-244-5-1 for information on destruction of ammunition.

**1-4. PREPARATION FOR STORAGE OR SHIPMENT.** Administrative storage is restricted to 90 days and must not be extended. Refer to page 2-312 for detailed instructions on administrative storage.

**1-5. OFFICIAL NOMENCLATURE, NAMES, AND DESIGNATIONS.**

Nomenclature Cross-Reference List.

<i>Common Name</i>	<i>Official Nomenclature</i>
Dial pressure gage assembly	Pressure gage dial
LOADER control handle	Loader and traversing valve control handle
Lockwire	Nonelectrical wire
M1 15 Pantel Telescope	MI 1 5 Panoramic
Nitrogen cylinder	Technical nitrogen
RAMMER control handle	Manual control handle
SWING control handle	Loader and traversing valve control handle

**1-6. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR).** If your MI 1 0A2 Howitzer 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. Put it on an SF Form 368 (Product Quality Deficiency Report). Mail it to us at Commander, U.S. Army Armament, Munitions and Chemical Command, ATTN: AMSMC-QAD, Rock Island, IL 61299-6000. We will send you a reply.

**1-7. CORROSION PREVENTION AND CONTROL (CPC).**

a. Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in the future.

b. While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.

c. If a corrosion problem is identified, it can be reported using SF Form 368, Product Quality Deficiency Report. Use of key words such as "corrosion," "rust," "deterioration," or "cracking" will assure that the information is identified as a CPC problem.

d. The form should be submitted to: Commander, U.S. Army Armament, Munitions and Chemical Command, ATTN: AMSMC-QAS/ Customer Feedback Center, Rock Island, IL 61299-6000.

**Section II. EQUIPMENT DESCRIPTION AND DATA**

**1-8. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES.**

a. Purpose. The M1 10A2 Howitzer is a weapon that defends against close-in or long-range ground targets.

b. *Capabilities and Features.*

**CAUTION**

**Do not ford water which exceeds 42 in. (106.7 cm) in depth. Check for soft mud or sandy bottoms.**

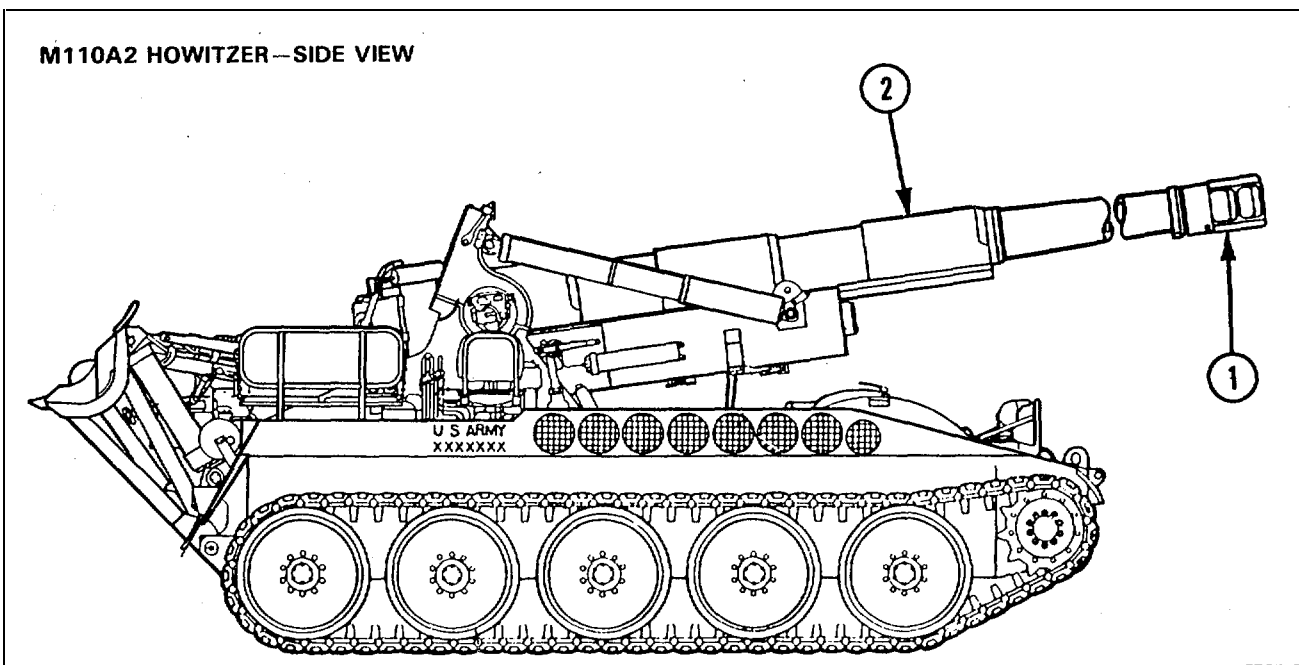
(1) The M1 10A2 Howitzer is an unarmored, full-tracked, heavy, self-propelled, 8-inch (203-mm) howitzer. This diesel-powered artillery piece is highly mobile, maneuverable, and may be air transported. The

vehicle is capable of long-range, high-speed operation on improved roads. It can traverse rough terrain, muddy or marshy ground, sand, and snow or ice. The M1 10A2 Howitzer can ford streams up to 42 in. (106.7 cm) deep.

(2) A hydraulic suspension lockout system and spade assembly help provide a stable platform for firing the cannon. The cannon elevating and traversing mechanisms and the projectile loader and rammer are also hydraulically powered. However, they may be manually operated in case of a power failure.

(3) The turret can traverse 30 degrees (533 mils) right or left of vehicle centerline and the cannon can elevate to 65 degrees (1156 mils) above horizontal position.

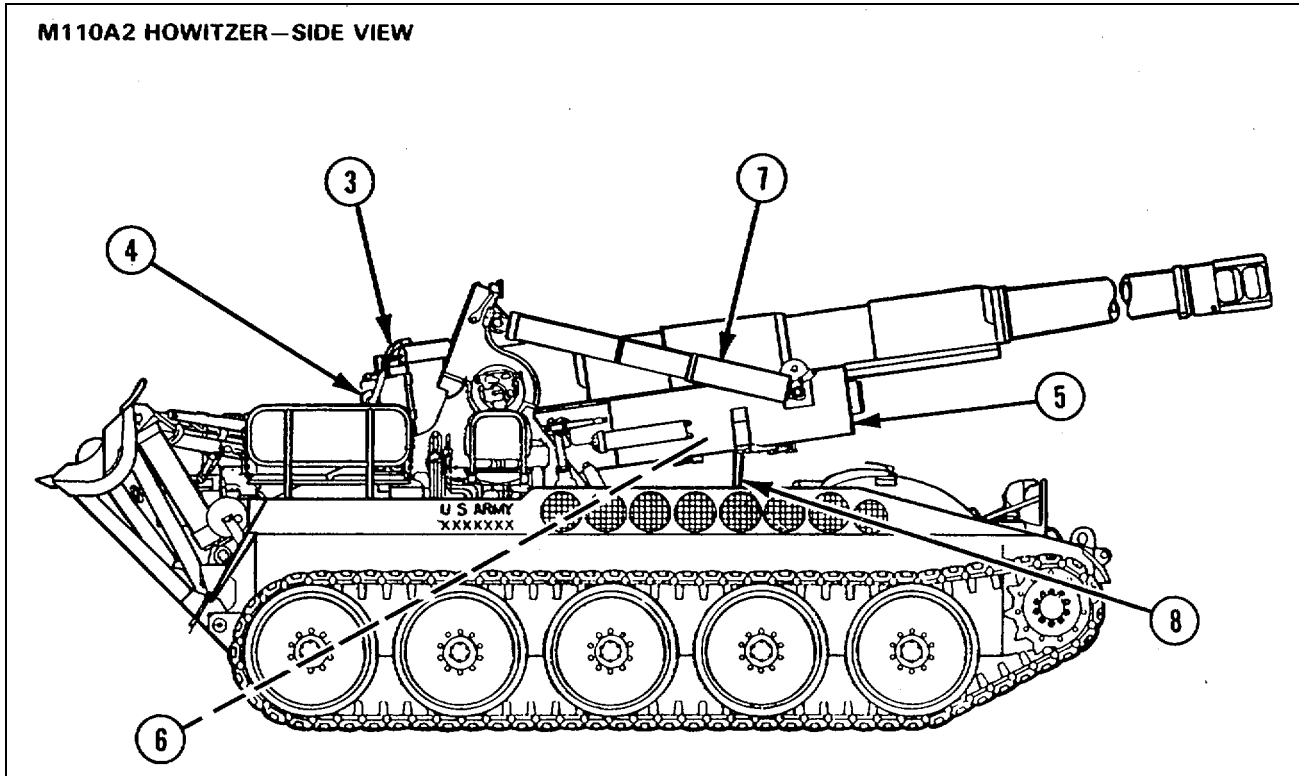
**1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS.** Refer to TM 9-2350-304-10 for location and description of major components not listed below.



1 *Muzzle Brake.* The muzzle brake helps reduce cannon recoil by diverting the blast forces of the escaping gases.

2 *Cannon Tube Assembly.* Rails secured to three hoops maintain alignment of the cannon tube assembly in the gun mount.

1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT).

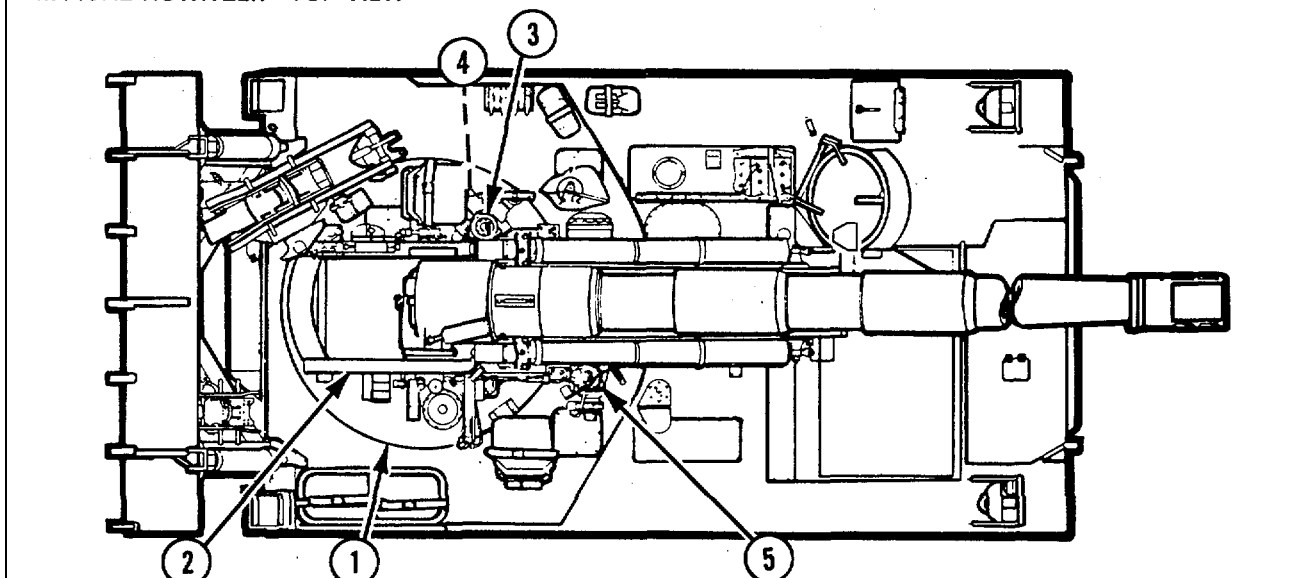


- 3 *Breech Mechanism.* Internal threads in the breech ring secure the breech mechanism to the cannon tube. The breech mechanism consists of the breech ring, breechblock group, counterbalance assembly, firing block, obturator spindle, and operating lever.
- 4 *M35 Firing Mechanism.* The M35 firing mechanism is a percussion type with spring-loaded firing pin.
- 5 *Gun Mount M174.* The gun mount supports the cannon and contains the recoil mechanism.
- 6 *Recoil Mechanism.* The recoil mechanism is a hydropneumatic variable, recoil type. It slows

and cushions the recoil of the cannon. It also returns the cannon to battery position.

- 7 *Equilibrator.* Two pneumatic-type equilibrators balance the weight of the cannon. The equilibrators are filled with nitrogen gas under pressure.
- 8 *Recoil Mechanism Supports.* A short shipping support secures the gun mount to the hull during shipment and during removal of gun tube. A long travel support secures the cannon and gun mount to the hull during travel.

M110A2 HOWITZER—TOP VIEW



- 1 *Turret.* The turret is a steel weldment reinforced with stiffeners to make it rigid.
- 2 *Trunnions.* Two trunnion supports for the gun mount are located on top of the turret. A hydraulic reservoir is part of the right trunnion support and extends under the turret. A turret ring at the bottom of the turret provides for mounting the turret to the turret bearing.

**NOTE**

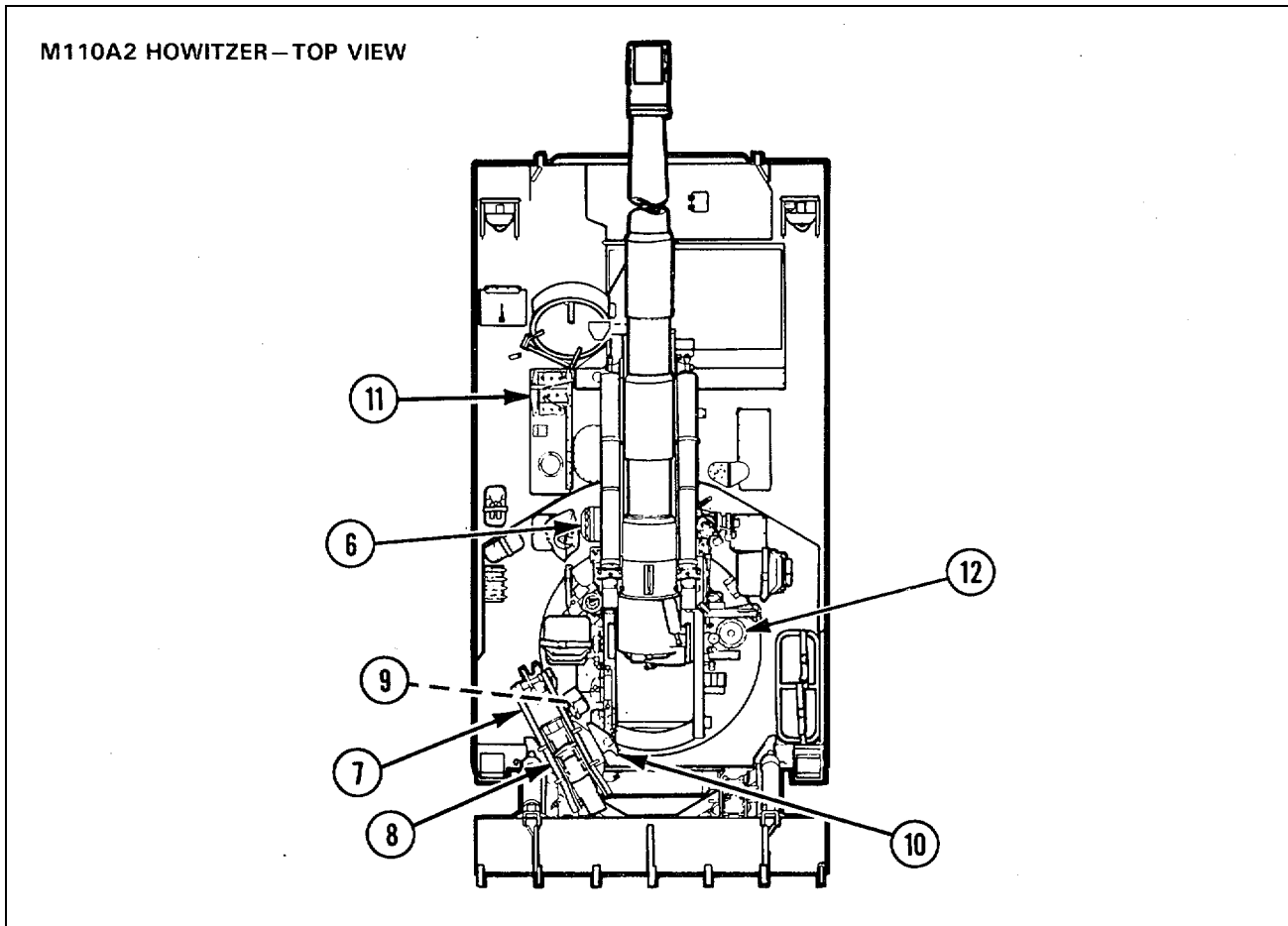
**For detailed description and function of each hydraulic subsystem, refer to Appendix F.**

- 3 *Traversing Drive Assembly.* The traversing drive assembly includes a handcrank, a torque lock drive, and a motor and brake assembly.
  - a. The handcrank on the left of the turret transfers manual power through the torque lock drive to the traversing drive assembly.
  - b. The torque lock drive drives a shaft in the housing of the traversing drive assembly with manual power from the handcrank.
  - c. Control handles on the left side of the turret regulate hydraulic

pressure to the motor and brake assembly. The motor and brake assembly transfers power to the traversing drive assembly.

- 4 *Traversing Final Drive Assembly.* Power is transferred by the traversing drive assembly to the traversing final drive assembly. The final drive assembly engages the turret bearing gear to traverse the turret.
- 5 *Elevating Drive Assembly.* The elevating drive assembly includes a handcrank, a torque lock drive, and a motor and brake assembly.
  - a. The handcrank on the right of the turret transfers manual power through the torque lock drive to the elevating drive assembly.
  - b. The torque lock drive transfers manual power from the hand to the elevating drive assembly.
  - c. Control handles on the left and right side of the turret regulate hydraulic pressure to the motor and brake assembly. The motor and brake assembly transfers power to the elevating drive assembly.

## 1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT).



**6** *Assembly.* Power is transferred Elevating Final Drive by the elevating drive assembly to the elevating final drive assembly. The final drive assembly engages the gun mount gear to raise or lower the gun mount and cannon.

**7** *Loader and Rammer.* The loader and rammer is a hydraulically powered assembly that lifts, positions, and rams a projectile into the cannon chamber.

**8** *Traversing Cylinder Assembly.* The loader and rammer assembly is bolted to a support arm and traversing cylinder assembly. This arrangement allows the loader and rammer to be traversed for the loading operation.

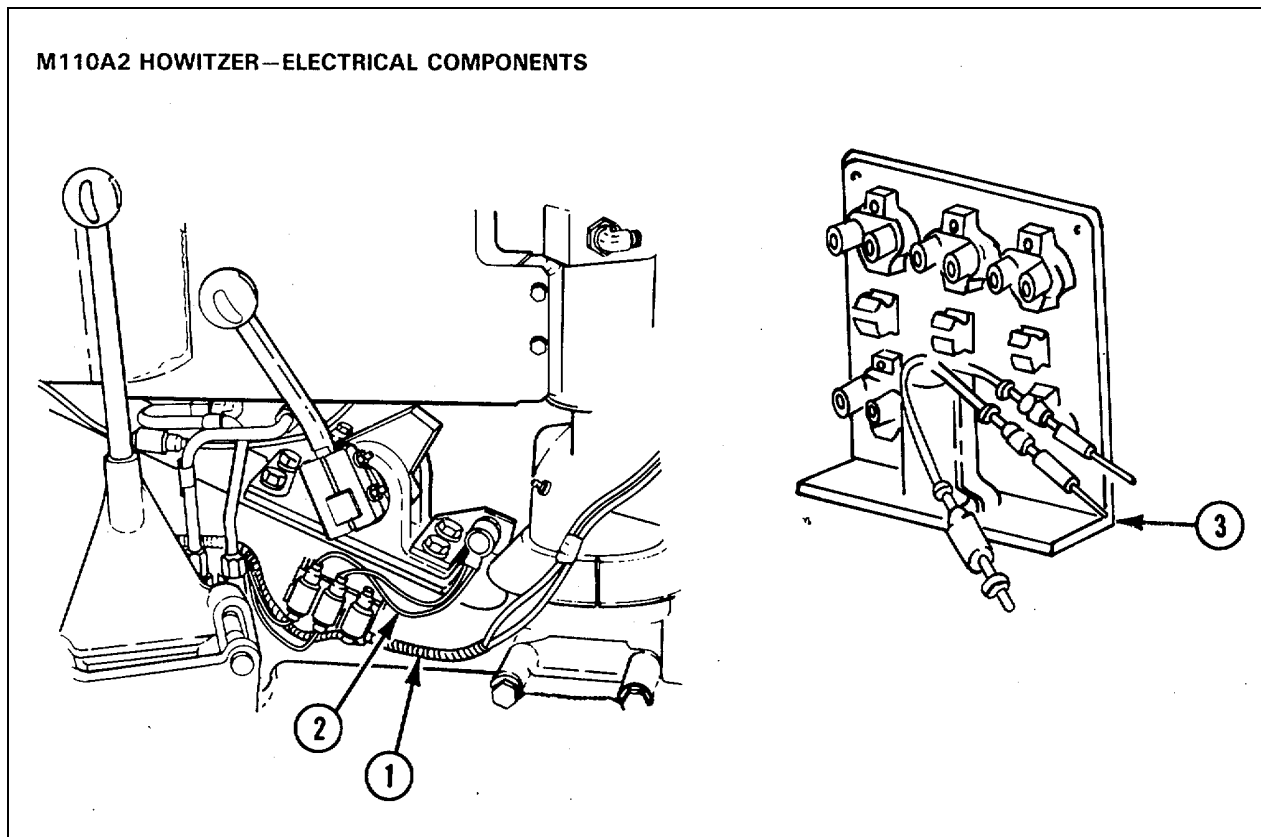
**9** *Stow Position Lock.* A stow position lock secures the loader and rammer in stow position.

**10** *Ram Position Lock.* A ram position lock secures the loader and rammer in ram position.

**11** *Batteries.* Electrical power is provided by a 24 volt direct current (V dc), 300 ampere (A) generator and four series-parallel connected 12-V batteries. For complete vehicle schematic diagrams, refer to Figures FO-1 thru FO-3.

**12** *Electric Pump and Hand Pump.* Hydraulic pressure can also be provided by an electric pump or a hand pump on the turret.



**NOTE**

This illustration cannot show all wiring on the M 110A2 Howitzer. For complete vehicle schematic diagrams, refer to figures FO-1 thru FO-3.

- 1 *Wiring.* Vehicle components are connected with single wire leads or multiple lead wiring harnesses. All wiring is standard ordinance waterproof cable. Connections are made by waterproof, rubber, single wire quick-disconnect connectors, plug-receptacle connectors, or solderless waterproof terminals.

**NOTE**

This illustration cannot show all electrical leads on M1 10A2 Howitzer, for complete vehicle schematic diagrams, refer to figures FO-1 thru FO-3.

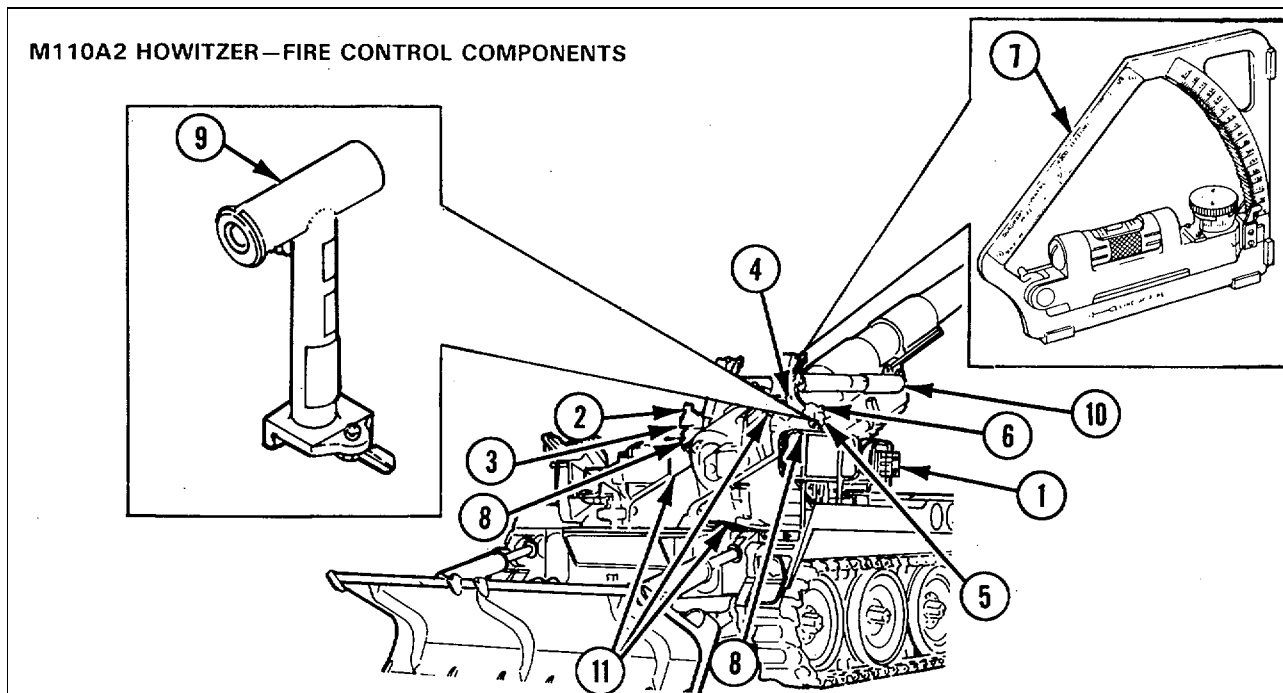
- 2 *Leads.* All leads are identified by a marker band attached to the wire and stamped with a circuit number. The socket and pin contacts of the connectors are identified by upper case letters of the alphabet, stamped on the connector insert.

**NOTE**

This illustration cannot show all circuit breakers on M1 10A2 Howitzer. For complete schematic diagrams, refer to figures FO-1 thru FO-3.

- 3 *Circuit Breakers.* Thermal break, automatic reset, 15 A and 20 A circuit breakers protect the vehicle components and circuits.

## 1-9. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS (CONT).

**NOTE**

Detailed descriptions of communications equipment are found in TM 11-5830-203-14P and TM 11-206.

- 1 *Vehicular Applique System.* The vehicular applique system, mounted on the rear of the assistant gunner's seat, enables the radio set to be operated with the data display group. For a detailed description of the vehicular applique system, refer to TM 11-5820-882-23.
- 2 *M 115 Pantel.* The M 115 pantel is a 4-power, fixed focus telescope with a 10 degree field of view.
- 3 *M137 Telescope Mount.* The M137 telescope mount provides an adjustable base for leveling the M115 panoramic telescope.
- 4 *M15 Elevation Quadrant.* The M15 elevation quadrant is used to adjust the weapon elevation.
- 5 *M138 Telescope Mount.* The M138 telescope mount provides an adjustable base for the M15 elevation quadrant and elbow telescope.
- 6 *M139 Elbow Telescope.* The M139 elbow telescope is a fixed focus, 3-power instrument used for direct firing of the weapon.
- 7 *M1A1/M1A2 Gunner's Quadrant.* The M1A1/M1A2 gunner's quadrant is used for leveling the cannon tube, boresighting, and leveling the telescope mounts.
- 8 *M140 Alinement Device Mount.* The M140 alinement device mount provides bases for mounting M140 alinement device.
- 9 *M140 Alinement Device.* The M140 alinement device provides an onboard boresight check of the cannon.

- 10 M90 Radar-Chronograph and Mount. The M90 Radar-chronograph and mount provide an onboard check and measurement of muzzle velocity.
- 11 Data Display Group. The data display group provides components used for computer

assisted cannon laying and firing. For detailed description of data display group, refer to TM 11-7440-283- 12-2.

**1-10. EQUIPMENT DATA.** The following tabulated data is for guidance of unit maintenance. Refer to TM 9-2350-304-10 for information concerning the general characteristics and performance of the M110A2 howitzer.

**a Crew.**

Number..... 9

**b Electrical System.**

Circuit breakers

Type..... Thermal-break automatic reset  
 Rating (quantity) ..... 15 A (8)  
 ..... 20 A (1)  
 ..... 200 A (1)

Wiring

Type ..... Standard ordnance waterproof cabling  
 Circuits ..... Standard ordnance single wire, ground return

**c Oil Pumps.**

Number..... 2

Type..... Spur gear, positive displacement

**d Vehicle Hydraulic System.**

System pressure ..... 1600-2400 psi (11,032-16,548 kPa)

Rotary pump

Type..... Gear  
 Maximum operating rpm ..... 2500  
 Output..... 23.5 gpm at 2000 psi (88 l/min at 13,790 kPa)  
 Displacement..... 3.02 cu in./rev (49.5 cc/rev)

**e 8-Inch Howitzer, M201A 7.**

Weight

Cannon (complete) ..... 14,635 lb (6638 kg)  
 Breech mechanism ..... 1750 lb (794 kg)  
 Barrel assembly ..... 12,450 lb (5647 kg)

Length

Cannon ..... 343 in. (871 cm)  
 Bore ..... 40 calibers  
 Rifling ..... 274 in. (696 cm)

**1-10. EQUIPMENT DATA (CONT).**

**e** *8-Inch Howitzer, M201A 1 (Cont).*

Chamber

Volume..... 1950 cu in. (31,955 cu cm)  
 Operating pressure ..... 39,600 psi (273,042 kPa)

**f** *Mount, M174.*

Weight with equilibrators ..... 4806 lb (2180 kg)

**g** *Loader and Rammer.*

Weight ..... 500 lb (227 kg)

**h** *Traversing System.*

Traversing range (right and left of vehicle centerline) ..... 30° (533 mils)

**i** *Elevating System.*

Elevating range.....2 ° to 650 (35 to 11 56 mils)

**j** *Turret Hydraulic System.*

Electric motor and pump

Electrical power requirements (motor)..... + 24 V  
 Pump type..... Fixed displacement  
 Operating rpm ..... 1 gpm at 3000 psi (3.8 l/min at 20,685 kPa)

Hydraulic handpump

Working pressure .....3000 psi (20,685 kPa)

**Section III. PRINCIPLES OF OPERATION**

**1-11. GENERAL.**

**a** *M110A2 Howitzer.* The M110A2 Howitzer is a fully-tracked, self-propelled artillery weapon consisting of a low, all welded steel hull and an independently operated turret and cannon. The turret and cannon are mounted on the hull, making them mobile. Power is supplied to the vehicle by a V-8 diesel engine and a gear-steer type transmission. The vehicle can be transported in a large cargo air- craft.

**b** *Hydraulic Power.* Separate power and manual elevating and traversing systems work

with a hydraulic power subsystem to position the cannon vertically and horizontally. A loader and rammer assembly loads a projectile into the cannon. The manual traversing and elevating systems consist of only mechanical components, while the power systems include mechanical, hydraulic, and electrical components.

**1-12. ARMAMENT.**

**a** *General.* The turret has an 8-in. (203 mm) howitzer on a recoil mount suspended in trunnions. The mount absorbs recoil energy during firing, and a hydraulic system retracts

the howitzer for traveling. The hydraulic system also provides periodic exercise for the recoil system and provides proper oil reserves to the replenisher and recuperator cylinders.

**b Cannon.** The 8-in. (203 mm) howitzer has an M201A1 cannon assembly capable of propelling a 200 lb (91 kg) projectile approximately 33,000 m. It can fire all existing 8-in. (203 mm) ammunition. The full range of power charges (1 thru 9) permits fine adjustments in the fire control system which increases the accuracy of the system. The M110A2 howitzer uses the M139 direct fire elbow telescope for its direct fire mission capability.

**c. Gun Mount.**

**(1)** The M174 Gun Mount consists of a cradle and an independent hydropneumatic (variable) type, recoil mechanism. The mechanism includes a recoil cylinder, counterrecoil cylinder, all housed within the cradle, and a replenisher mounted on the outside of the cradle.

**(2)** The recoil mechanism isolates the recoil cylinder from the recuperator/counter-recoil cylinders, controls forces created by firing, checks movement of recoiling parts to avoid displacement of the vehicle, and returns recoil parts to battery position so the howitzer can be fired again.

**(3)** The M174 mount is the only mount capable of self exercise which does not have a separate oil supply. It uses system hydraulic oil, the same oil used for spade operation, lockout cylinder engagement, loader and rammer operation, etc.

**(4)** The crew is not required to maintain oil reserves in the recoil system manually as the howitzer's hydraulic pump does it automatically. The crew must maintain all serviceable filters throughout the system. Also, the crew must fill the system with oil after draining.

**d Equilibrators.** Nitrogen filled equilibrators are attached to each side of the M174 mount and turret. Equilibrators adjust to help raise or lower the cannon at a constant speed.

**e Turret Traversing Systems.**

**(1)** The power traversing system includes a control valve and handle, a solenoid valve, a check valve manifold, and a drive valve mounted on the left trunnion. A switch and deceleration valve prevent power traversing the turret into mechanical turret stops. Also, a drive assembly is mounted to the turret left deck with a final drive assembly mounted beneath it.

**(2)** The manual traversing system traverses the turret in case of hydraulic power failure and includes part of the traversing drive assembly and the traversing final drive. A handcrank, mounted on the traversing drive assembly, traverses the turret, while a torque lock and slip clutch prevent handcrank rotation during power operation.

**(3)** The handcrank is keyed to a torque drive assembly which drives a shaft mounted inside a housing column. The lower end of the column attaches to the manual input drive. The manual drive shaft is geared, by bevel gears, to the manual input assembly. A slip clutch with an adjustable spring transmits power on the slip clutch shaft to the clutch pinion bevel gear which rotates the differential manual input gear to drive the traversing final drive. Operating the handcrank counter-clockwise traverses the turret left, and operating it clockwise traverses the turret to the right.

**f Loader and Rammer.** A hydraulically actuated loader and rammer loads a projectile into the cannon. In case of hydraulic failure, the loader and rammer can be operated with handcranks and a hydraulic pump.

**g Turret.** The turret is mounted toward the rear of the vehicle and can be traversed 30 degrees (533 mils) to the right or left of the vehicle centerline. The weapon mount can be elevated from 2 to 65 degrees (35 to 1156 mils). Both processes can be done hydraulically or manually.

**1-12. ARMAMENT (CONT).**

**h. Turret Bearing.** The turret is mounted on the turret bearing, a 4-point contact radial and thrust type ball bearing. Lubrication fittings and seals prevent foreign matter from entering the bearing. The bearing inner race contains a ring gear that meshes with the output gear of the traversing final drive.

**i. Cannon Elevating System.**

**(1)** The power elevating system includes a control valve and handle, an auxiliary control valve and handle, a solenoid valve, a check valve manifold, a drive assembly, and a final drive. The control valve mounts on a bracket on the right trunnion, and the auxiliary control valve mounts on the left trunnion near the traversing control valve. The elevating solenoid valve and check valve manifold mount on the right trunnion and final drive which extends through and is mounted in both trunnion supports in the front of the turret.

**(2)** The manual elevating system includes part of the elevating drive assembly and final drive. A handcrank assembly is mounted on the elevating assembly to elevate the cannon in case of hydraulic power failure. A torque lock slip clutch prevents the hand- cranks from rotating during power operation of the elevating system.

**(3)** The handcrank assembly attaches to a drive assembly with gears which drive a shaft mounted inside a housing. The shaft is geared to turn the clutch shaft mounted inside the elevating manual column. The clutch shaft rotates the differential gears that transmit power to the final drive input shaft. Operating the handle clockwise (as seen from the turret right side) elevates the weapon and mount, and operating the handle counter- clockwise depresses the weapon and mount.

**j. Electrical Power System.**

**(1)** Power for the electrical system is supplied by four 12 V storage batteries connected in series-parallel to furnish 24 V. The batteries are charged by a generator driven by the auxiliary drive. An auxiliary outlet receptacle on the left fender provides a means of connecting to an external power source.

**(2)** The electrical system is regulated and controlled by a generator control assembly, rheostat, relays, circuit breakers, switches, indicators, gages, transmitters, and connecting leads and harnesses.

**k. Hydraulic Power System.**

**(1)** The hydraulic power system supplies pressurized hydraulic fluid to operate the power elevating system, the traversing system, the loader and rammer control systems, the cannon mount, the recoil spade system, and the suspension lockout system.

**(2)** The portion of the hydraulic power system contained on the turret consists of a manual hydraulic pump, a main hydraulic pump with an electric motor, a gas bottle with filler valve, an accumulator, a pressure relief valve, tubes, and fittings. The system also incorporates elevating and traversing check valve manifolds, loader and rammer control valves, a rotating manifold, a hydraulic fluid reservoir, a strainer, and manual shut off valves.

**(3)** The accumulator stabilizes pressure during peak loads and supplies a reserve of pressurized fluid when pumps do not operate or residual hydraulic pressure if the hydraulic pump fails.

**(4)** The reservoir forms an integral part of the right trunnion support and is included under the turret right side.

**CHAPTER 2  
UNIT MAINTENANCE INSTRUCTIONS**

**CHAPTER INDEX**

	<b>Page</b>
Care of Equipment in Administrative Storage .....	2-314
Checking Unpacked Equipment .....	2-8
Cleaning .....	2-84
Common Tools and Equipment .....	2-3
Definition of Administrative Storage .....	2-312
Electrical Circuit Troubleshooting .....	2-27
General .....	2-8, 2-75, 2-82, 2-84
General Procedures .....	2-9
Intervals .....	2-8
Lubrication .....	2-85
Maintenance of Backup Computer System Wiring Harness Installation with Vehicular Applique System .....	2-299
Maintenance of Backup Computer System Wiring Harness Installation without Vehicular Applique System .....	2-305
Maintenance of Block Assembly .....	2-130
Maintenance of Breech Mechanism Assembly .....	2-123
Maintenance of Circuit Breaker and Turret Disconnect to Oil Gear Relay and 24-Volt Feed Electrical Lead .....	2-291
Maintenance of Collimator to Utility Outlet Branched Wiring Harness .....	2-289
Maintenance of Counterbalance Assembly .....	2-127
Maintenance of Electrical Installation - Hull Disconnect to Turret Disconnect .....	2-273
Maintenance of Electrical Installation - Rammer Solenoid Valve Branched Wiring Harness .....	2-266
Maintenance of Electrical Installation - Suspension Lockout Instruction Plate and Warning Light .....	2-269
Maintenance of Elevating and Traversing Manual Control Handles and Electrical Components .....	2-245
Maintenance of Elevating Final Drive Assembly .....	2-217
Maintenance of Elevating Hydraulic Drive Unit .....	2-210
Maintenance of Floor Disconnect to Oil Pump Motor Switch and Accessories Branched Wiring Harness .....	2-285
Maintenance of Floor Disconnect to Turret Disconnect and Accessories Branched Wiring Harness .....	2-282
Maintenance of Gun Mount Installation - Antenna Mast Plate .....	2-134
Maintenance of Gun Mount Installation - Trunnion Caps .....	2-135
Maintenance of Gunner's Seat and Seat Back Assembly and Assistant Gunner's Seat and Seat Back Assembly .....	2-193
Maintenance of Hand Grenade Box Assembly .....	2-197
Maintenance of Headlink Assembly .....	2-233
Maintenance of Housing Assembly .....	2-131
Maintenance of Hull Disconnect, Interphone Amplifier to Hull Disconnect Driver's Control Cable Assembly .....	2-294
Maintenance of Hydraulic Fluid Filter and Hydraulic Lines .....	2-262
Maintenance of Hydraulic System Installation - Hydraulic Reservoir and Accumulator .....	2-258

Maintenance of Hydraulic System Installation - Valve Control Rammer  
 Safety Cover Assembly and Knob Valve Handles ..... 2-238

Maintenance of Left-Side Data Display ..... 2-90

Maintenance of Loader-Rammer Exterior Hydraulic Lines and Fittings ..... 2-234

Maintenance of Modified Recuperator Cylinder Front Head Assembly..... 2-162

Maintenance of M1A1 Infinity Aiming Reference Collimator ..... 2-119

Maintenance of M15 Fire Control Quadrant and M140 Alinement Device  
 Mount (Right Side) ..... 2-103

Maintenance of M35 Firing Mechanism ..... 2-120

Maintenance of M 115 Panoramic Telescope ..... 2-98

Maintenance of M137 Telescope Mount and M140 Alinement Device Mount  
 (Left Side) ..... 2-113

Maintenance of M138 Telescope Mount ..... 2-110

Maintenance of M139 Elbow Telescope ..... 2-101

Maintenance of M174 Gun Mount Assembly - Wipers and Related Items..... 2-157

Maintenance of M174 Gun Mount Exterior Hydraulic Lines and Fittings..... 2-154

Maintenance of Pivot Interlock Push Switch ..... 2-276

Maintenance of Plain Bearing Unit ..... 2-296

Maintenance of Pneumatic Equilibrator Assembly and Modified Valve Assembly..... 2-144

Maintenance of Pneumatic Equilibrator Assembly and Unmodified Valve  
 Assembly ..... 2-137

Maintenance of Power Loader-Rammer ..... 2-230

Maintenance of Power Loader-Rammer - Loader Arm, Cylinder Assembly,  
 and Related Items..... 2-224.2

Maintenance of Projectile Lifting Tray ..... 2-297

Maintenance of Rammer Installation - Chain Case Handcranks and Case  
 Clean-out Cover Assembly ..... 2-224

Maintenance of Rammer Traversing Cylinder Assembly ..... 2-218

Maintenance of Rammer Traversing Lines and Fittings and Pressure Gage Dial  
 Assembly ..... 2-254

Maintenance of Replenisher Assembly ..... 2-159

Maintenance of Right-Side Data Display..... 2-93

Maintenance of Rim Latch Set ..... 2-228

Maintenance of Rim Lock Set ..... 2-226

Maintenance of Seat Bracket Assembly..... 2-203

Maintenance of Spindle Assembly ..... 2-132

Maintenance of Support Assembly and Manual Control Handle..... 2-200

Maintenance of Torque Lock..... 2-214

Maintenance of Traversing and Elevating Drive Breathers ..... 2-240

Maintenance of Traversing and Elevating Drive Torque Handles ..... 2-213

Maintenance of Traversing Constant Speed Drive..... 2-205

Maintenance of Traversing Control Grip Assembly..... 2-250

Maintenance of Tray Interlock Sensitive Switch..... 2-279

Maintenance of Turret Deceleration Valve to Turret Deceleration Switch  
 Wiring Harness ..... 2-241

Maintenance of Turret Deceleration Wiring Harness ..... 2-243

Maintenance of Turret Installation - Amplifier Mount Bracket ..... 2-189

Maintenance of Turret Installation - BCS Mounting Access Cover ..... 2-184

Maintenance of Turret Installation - Binocular Stowage Bracket Assembly ..... 2-182

Maintenance of Turret Installation - First Aid Rack ..... 2-181

Maintenance of Turret Installation - Quadrant Strap Assembly..... 2-188

Maintenance of Turret Installation - Right and Left Hydraulic Tube Guards ..... 2-187

Maintenance of Turret Installation - Spade Emergency Shut-off Instruction  
 Plate..... 2-186

Maintenance of Turret Installation - Stops and Seals..... 2-191

Maintenance of Turret Installation - Vehicular Access Box ..... 2-185



Maintenance of Vehicular Applique System..... 2-96

Nonskid Areas ..... 2-85

Painting Instructions ..... 2-85

Painting Load Marks..... 2-89

Painting Retract Mark..... 2-88

Repair Methods ..... 2-84

Repair Parts..... 2-3

Replacing Cable Terminals and Connectors..... 2-80

Restenciling Vehicle Markings ..... 2-87

Scope ..... 2-8

Service Upon Receipt of Materiel..... 2-3

Special Procedures for Semiannual (2400 Kilometer) Preventive Maintenance..... 2-11

Special Tools, TMDE, and Support Equipment..... 2-3

Straight Adapter to Tube Fitting..... 2-83

Tools and Supplies ..... 2-11

Touchup and Recoating ..... 2-86

Troubleshooting Information..... 2-13

Tube Elbow to Tube Fitting..... 2-82

Tube Nipple to Tube Fitting ..... 2-83

Tube Reducer to Tube Fitting..... 2-83

Tube Tee to Tube Fitting ..... 2-82

Typical Female-Type Panel Mounting Receptacle..... 2-75

Typical Female-Type Panel Mounting Receptacle..... 2-76

Typical Female-Type Plug..... 2-78

Typical Male-Type Panel Mounting Receptacle ..... 2-76

Typical Male-Type Panel Mounting Receptacle ..... 2-77

Typical Male-Type Plug..... 2-79

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

**2-1. COMMON TOOLS AND EQUIPMENT.** For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

**2-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.** Tools, special tools, and test equipment necessary to maintain the M11 OA2 self-propelled howitzer are listed in TM 9-2350-304-24P-2 and the

Maintenance Allocation Chart (MAC), appendix B of this manual. For an illustrated list of special tools and equipment, refer to appendix G of this manual.

**2-3. REPAIR PARTS.** Repair parts are listed and illustrated in TM 9-2350-304-24P-2 covering unit maintenance for this equipment.

**Section II. SERVICE UPON RECEIPT**

**2-4. SERVICE UPON RECEIPT OF MATERIEL.**  
**a** When you receive a vehicle, you must determine if the supplying agency has properly prepared it for service and if it is in condition to perform any mission.

**b** Perform a run-in road test of at least 5 mi (8 km) on all vehicles to completely check their operation.

**2-4. SERVICE UPON RECEIPT OF MATERIEL (CONT).**

**WARNING**

Dry cleaning solvent (SD2) is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated areas.

c Most armament parts received from storage are coated with rust-preventive compound. Clean these parts thoroughly with shop rags or a brush that is saturated with dry cleaning solvent (SD2) (item 9, appx C). Then lubricate the parts. Refer to page 2-8.

**NOTE**

Component parts of each vehicle should be cleaned separately whenever possible. Although like parts are interchangeable, the parts originally assembled work best together.

d Whenever possible, the vehicle crew will help do these services.

e Follow all precautions to tag DD Form 1397 (Processing and Deprocessing Record for Shipment, Storage, and Issue of Vehicle and Spare Engines). This tag is in the driver's compartment attached to the steering bar, shift lever, or MASTER switch. For vehicles from administrative storage, check DA forms in vehicle log book to determine vehicle readiness. Fill fuel cell and radiators. Lubricate vehicle. Refer to page 2-8.

**NOTE**

**Engine, transmission, and final drives will not be drained unless expected temperatures require different viscosity oil. New engines and transmissions contain preservative oil (MIL-L-21 260). This oil will be used until the next regularly scheduled oil change, refer to page 2-8.**

f Vehicles prepared for shipment by the manufacturer require additional services, refer to Table 2-1.

**Table 2-1. SERVICE UPON RECEIPT--M110A2 SELF-PROPELLED HOWITZER**

LOCATION	ITEM	ACTION	REMARKS
Hull	Protective Covers	a. Remove vehicle closure kit. b. Remove seal securing driver's cupola cover and open cover. c. Check tag DD Form 1 397 (Processing and Deprocessing Record for Shipment, Storage, and Issue Vehicle and Spare Engines) to determine level of processing, and follow all precautions. d. Remove securing fastenings from engine air cleaner access doors, and forward and rear blower access doors. e. Remove tape and protective cover from headlamps and taillights. f. Remove tape and protective cover from all seats, backrests, and crash pads.  <b>Change 1 2-4</b>	



2-4. SERVICE UPON RECEIPT OF MATERIEL (CONT).

Table 2-1. SERVICE UPON RECEIPT--M110A2 SELF-PROPELLED HOWITZER (CONT)

LOCATION	ITEM	ACTION	REMARKS
Battery Compartment	Batteries	<p style="text-align: center;"><b>WARNING</b></p> <p><b>Do not connect battery cables before activating batteries with electrolyte to avoid battery blow-up.</b></p> <ul style="list-style-type: none"> <li>a. Remove dry charged batteries and electrolyte from shipping containers.</li> <li>b. Install batteries in battery compartment.</li> <li>c. Tape positive battery cables to the battery-to-ground cable.</li> <li>d. Add electrolyte and charge batteries.</li> <li>e. Connect all battery cables.</li> </ul>	
Fan Well	Fan Belts	<ul style="list-style-type: none"> <li>a. Remove fan well deck.</li> <li>b. Adjust tension of fan belts.</li> </ul>	
Engine Compartment	Engine	<ul style="list-style-type: none"> <li>a. Remove engine cover.</li> <li>b. Remove plastic caps from engine crankcase breathers.</li> <li>c. Remove tape from turbocharger regulator exhaust pipe valve and engine exhaust manifold elbow valve.</li> <li>d. Remove plug or tape from engine aspiration air duct opening.</li> <li>e. Connect hose to opening and secure with clamp.</li> <li>f. Remove tape from engine oil filler cap and auxiliary drive fill and level caps.</li> <li>g. Check lubricant level in engine, transmission, and auxiliary drive.</li> <li>h. Check DD Form 1 397 for oil viscosity used.</li> <li>i. Install engine cover.</li> </ul>	

Table 2-1. SERVICE UPON RECEIPT-M110A2 SELF-PROPELLED HOWITZER (CONT)

LOCATION	ITEM	ACTION	REMARKS
Turret	Cannon	<ul style="list-style-type: none"> <li>a. Remove tape from elevating handcrank release lever.</li> <li>b. Remove tape from both traversing handcrank release levers.</li> <li>c. Remove bag and tape from muzzle of cannon and remove cover from muzzle.</li> <li>d. Remove tape from breech mechanism.</li> <li>e. Open breech and remove preservative plug from breech and tube.</li> <li>f. Remove wood block from breech.</li> <li>g. Clean preservative grease from breech and install obturator pad, rings, and disks.</li> <li>h. Loosen cable clamps on cable securing cannon tube to lifting eyes at front of vehicle and remove cable.</li> <li>i. Elevate howitzer with manual elevating handle and remove block under carriage.</li> </ul>	
Gun Mount	Travel Lock	<p>Lower travel lock on mount and secure lock in hull.</p>	
Turret	Recoil Mechanism	<ul style="list-style-type: none"> <li>a. Remove wire securing recoil retracting valve handle.</li> <li>b. Remove tape and barrier material from recoil, counterrecoil, and variable orifice rods.</li> </ul>	
Turret	Loader/Rammer	<ul style="list-style-type: none"> <li>a. Remove tape and barrier material from loader and rammer cylinder piston rod.</li> <li>b. Remove strap securing loader and rammer in stowed position.</li> </ul>	

**2-5. CHECKING UNPACKED EQUIPMENT.**

**a.** Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on DD Form 6, Packaging Improvement Report.

**b.** Check the equipment against the packing slip to see if the shipment is complete.

Report all discrepancies in accordance with (IAW) the instructions of DA PAM 738-750.

**c.** Check to see if the equipment has been modified.

**Section III. UNIT PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS) AND LUBRICATION INSTRUCTIONS**

**2-6. SCOPE.** This section details the preventive maintenance checks and services (PMCS) and the lubrication instructions for the turret at the unit level. Preventive maintenance is the care, inspection, and service of the M 110A2 Self-Propelled Howitzer to keep it operating and to find troubles before repairs or replacements are needed. Preventive maintenance is performed at crew and unit levels.

**a. Crew.** All crew PMCS and lubrication tasks must be completed before unit PMCS is begun; refer to TM 9-2350-304-10.

**b. Unit.** This section tells what preventive maintenance tasks are done by unit maintenance mechanics. Always start at the front and follow it in order to the back.

**2-7. INTERVALS.**

**a. Unit Preventive Maintenance Tasks.** PMCS tasks will normally be done quarterly, every 3 months, 750 kilometers, or 75 hours of howitzer operation, whichever comes first.

**(1) Semiannually.** Every 6 months, 2400 kilometers (1500 miles), or 150 hours of operation, whichever comes first.

**(2) Annually.** Once a year as specified.

**(3) Eighteen (18) months.** As specified.

**b. Column 1.** The "Item No." column contains the item number which shall be used as a source of item numbers for the TM Number Column on the DA Form 2404, Equipment Inspections and Maintenance Worksheet, in recording results of PMCS.

**c. Column 2.** The "Interval" column lists the specific interval at which the PMCS will be performed. They are as follows:

- Q - Quarterly
- S - Semiannually
- A - Annually
- 18 - 18 Month

**d. Column 3.** The "Item to Check/Service" column identifies the item to be checked, serviced, or lubricated.

**e. Column 4.** The "Procedure" column describes the check, service, or lubrication to be performed.

**f. Column 5.** The "Not Fully Mission Capable If" column contains the criteria which will render the system incapable of performing its primary mission.

**NOTE**

- All semiannual preventive maintenance tasks are also done during annual maintenance.
- High temperature is more than 100°F (38° C). Low temperature is less than 0° F (-18° C).
- Salt water is present during fording, sea spray, and morning mist in coastal areas.
- Dust conditions are high when oil level in hubcaps cannot be seen.

Operating the M 11 0A2 Self-Propelled Howitzer in very high or very low temperatures, in dust, mud, or salt water may require additional preventive maintenance.

**2-7.1. GENERAL PROCEDURES.****a. General Cleaning Instructions.****WARNING**

- **Hydraulic system is under high pressure. Make sure all hydraulic pressure is relieved before removal of any tubes or fittings. Follow safety procedures to prevent injury. Wipe up spilled hydraulic fluid.**
- **Dry cleaning solvent (SD2) (item 9, appx C) is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated areas.**

(1) Use dry cleaning solvent (item 9, appx C) to clean grease, oil, or dirt from all metal parts. If a water hose is available, it may be used to take off heavy dirt. If a steam cleaner is available, it may be used to take off any remaining dirt. Make sure steam or water does not enter roadwheel bearings, shock absorbers, optics, hatches, and powerpack openings. After water or steam cleaning, lubricate howitzer. Check all lubricant reservoirs for water droplets. If water is found, drain and refill. Clean grease, oil, or dirt from all metal parts with dry cleaning solvent, cleaning compound, or equivalent.

(2) Use mild soap and water to clean or wash parts not made of metal. Rinse thoroughly after cleaning with water and then dry.

(3) Remove rust or dirt from fine-machined surfaces with dry cleaning solvent (item 9, appx C) and crocus cloth (item 8, appx C), if necessary. Do not use any other material. Be careful not to change the dimensions of parts when rubbing off rust. Coat bare metal surfaces, after cleaning, with CLP (item 5, appx C).

(4) Nameplates, caution plates, and instruction plates may rust quickly. When they are rusty, clean parts and coat them with CLP (item 5, appx C).

b. *Precautions.* The following precautions will help prevent personal injury or damage to equipment.

(1) Do not spill solvent, fuel, or lubricants on rubber parts. Solvent, fuel, and lubricants may damage rubber parts.

(2) Do not use turbine fuel, diesel fuel, gasoline, paint thinner, or benzene (benzol) for cleaning. These liquids may cause personal injury.

(3) Always wear protective clothing when using solvent. Solvent may dry skin.

**CAUTION**

**Improper use of high pressure water hose or steam cleaner can damage seals and electrical components resulting in equipment failure. Use high pressure water only on suspension system.**

(4) Do not clean inside turret with high pressure steam or air. Some parts inside hull or turret may rust or be damaged.

(5) When washing outside of howitzer, close and lock all hatches. Cover fire control with plastic sheets, and cap main gun with muzzle cover to prevent water from getting in cannon tube. Remove covers after washing.

**2-7.1 GENERAL PROCEDURES (CONT).**

(6) Do not use polishing cloths, liquids, pastes, or other rough cleaners to clean instrument lenses or periscope lenses. Use lens paper (item 1 7, appx C) to clean lenses. Take off fingerprints, oil, and dirt with lens cleaning compound and lens paper.

(7) If anything looks wrong and cannot be fixed, report it on DA Form 2404. If something looks dangerous or may cause equipment damage, report it to the maintenance supervisor right away.

c. *Services.* Services performed by the unit maintenance mechanic consist of the following tasks:

(1) *Adjusting.* Make all necessary adjustments and alinements.

(2) *Servicing.* This usually means draining and refilling units with oil and changing or cleaning oil filters, fuel filters, and air cleaners.

(3) *Tightening.* Tighten nuts, bolts, screws, and other types of fasteners with a torque wrench to the value listed in the maintenance manual. Do not over tighten; this may strip threads and break off the part being tightened.

(4) *Repairing.* Repair includes inspecting, cleaning, preserving, adjusting, replacing, welding, riveting, strengthening, and other tasks associated with putting parts in working condition.

(a) Inspect for blowby, burrs, cracks, gouges, or nicks.

(b) Replace bent, broken, or stripped bolts, nuts, screws, and washers. Bolts, screws, and nuts may be loose if rust, chipped paint, or bare metal is around them. Tighten loose screws, bolts, and nuts. Replace missing parts.

(c) Look for bad welds where chipped paint, rust, or gaps are present. Have bad welds repaired.

(d) Look at electric wires for cracked, frayed, loose, discolored, or broken insulation. Replace bad parts and tighten loose clamps and connectors.

**NOTE**

**When tightening fittings, always hold fitting adapter with one wrench and tighten nut with another wrench until snug. Tighten nut around 1/6-turn to 1/3-turn. If fitting leaks, unscrew nut a full turn and retighten it. If still leaking, replace leaking parts.**

(e) Look at hoses, fluid lines, and tubes for bends, wear, cracks, or leaks. Replace bad parts. Make sure all clamps and fittings are tight. If a fitting leaks, tighten it.

**CAUTION**

**Equipment operation is allowable with minor leakages (Class I or II). Of course, you must consider the fluid capacity in the item/system being checked/inspected. When in doubt, notify your supervisor. When operating with Class I or Class II leaks, continue to check fluid levels as required in your PMCS. Class III leaks must be repaired.**

**NOTE**

**Fluid leaks affect howitzer status. Learn the following classes of fluid leaks for unit PMCS.**

- Class I- Seepage of fluid (as indicated by wetness or discoloration) not great enough to form drops.
- Class II- Leakage of fluid great enough to form drops but not enough to cause drops to drip from item being checked.
- Class III- Leakage of fluid great enough to form drops that fall from the item being checked. Class III leaks should be reported to your supervisor or direct support maintenance.



**(5) Corrosion.** Check for signs of deterioration, rust, unusual cracking, softening, swelling, or breaking on entire M1 10A2 howitzer. Become familiar with the four stages of corrosion listed below, and take the appropriate required maintenance action outlined below.

- Stage 1 - Red, black, or white corrosion deposits on surface with etching or pitting. However, base metal is sound.
- Stage 2 - Powdered granular or scaled condition. Base metal is sound.
- Stage 3 - Surface condition is similar to stage 2 except that metal in the corroded area is unsound and pin holes may be present.
- Stage 4 - No metal remaining at point of severest corrosion. Corrosion holes in the area or metal completely worn away.

Stage 1 & 2 Areas are to be cleaned, primed, and painted IAW TB 43-0213.

Stage 3 & 4 Try to repair metal. If not economical or repairable, replace with new parts.

d. *Modification Work Order (MWO) Application.* Check the list of current MWOs in DA PAM 25-30. Do not make any modifications except as ordered by official Army directive.

**2-7.2 SPECIAL PROCEDURES FOR SEMIANNUAL (2400 KILOMETER) PREVENTIVE MAINTENANCE.** Semiannual preventive maintenance includes complete inspection to make sure adjustment, securing, and assembly of all parts of howitzer are

right. All cleaning, replacement, lubrication, and protection of parts and/or assemblies must be done as stated for trouble-free operation until the next preventive maintenance is performed.

a. *Maintenance Forms and Records.* Refer to DA PAM 738-750.

b. *Publications.* Be sure all needed publications are on hand before starting task.

c. *Special Tools.* Be sure all special tools are on hand.

d. *Supplies.* Be sure all parts and supplies are on hand.

e. *Tools.* Be sure all common tools are on hand.

**2-7.3 TOOLS AND SUPPLIES.** The following list identifies special tools and supplies needed to perform PMCS on the M1 10A2 Self-Propelled Howitzer.

a. *Tools:*

Artillery and turret mechanic's tool kit: ordnance (item 61, appx B)

b. *Supplies:*

- Cleaner, lubricant, and preservative (CLP) (item 5, appx C)
- Cloth, crocus (item 8, appx C)
- Dry cleaning solvent (SD2) (item 9, appx C)
- Grease, automotive and artillery (GAA) (item 11, appx C)
- Hydraulic fluid, petroleum base (OHT) (item 1 2, appx C)
- Oil, lubricating (OEA) (item 15, appx C)
- Paper, lens (item 1 7, appx C)
- Rag, wiping (item 19, appx C)

**2-7.3 TOOLS AND SUPPLIES (CONT).**

c. *Mandatory Replacement Parts.* The following table reflects the mandatory

replacement parts that must be replaced during PMCS whether they have failed or not.

**Mandatory Replacement Parts**

Item No.	Part Number	National Stock Number	Nomenclature	Qty
			<b>Quarterly</b>	
1	11784316	4330-01-301-8503	Hydraulic Fluid Filter Element	2
2	MS35338-46	5310-00-637-9541	Lockwasher	5
3	MS35338-141	5310-00-984-7042	Lockwasher	3

d. *Lubrication.* The lubrication procedures identified in the PMCS table are for unit maintenance. Lubrication intervals (on condition or hard time) are based on normal operation. Lubricate more often during constant use or in severe conditions.

(1) Use only authorized lubricants identified in the lubricant table.

(2) Dispose of used lubricants in accordance with local Standing Operating Procedures (SOP).

(3) For arctic operation, see FM 9-207.

(4) For desert operation, see FM 90-3.

(5) Clean all grease fittings before attaching grease gun.

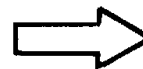
(6) When using grease gun, operate until grease appears around seals or out of relief valve and check escaping grease for contamination. If contamination is found, replace the grease.

**NOTE**

- **If no other treatment is directed, coat unprotected metal surfaces with CLP (item 5, appx C) after cleaning.**
- **Clean around filler necks/drain plugs/openings before servicing to keep dirt from entering system.**

(7) Perform a quarterly lubrication as soon as possible after water fording operation.

(8) Type of lubricants used at each point are identified by arrows as follows:



CLP



GAA

- (9) Observe the following:
- Never use the wrong type lubricant.
  - Never use too much lubrication.
  - Always clean grease fittings before lubrication.
  - Always use the Lubrication Instructions.

**WARNING**

Dry cleaning solvent (SD2) (item 9, appx C) is toxic and flammable. To avoid injury, wear protective goggles and gloves and use only in well-ventilated area. Avoid contact with skin or eyes and do not breathe vapors. Do not use near open fire or excessive heat. The flash point for Type I dry cleaning solvent is 100° F (38° C), and for Type II is 140° F (60° C). If you feel dizzy while using dry cleaning solvent, get fresh air immediately and get medical aid. If contact with eye is made, wash your eyes with water and get medical aid immediately.

(10) *Cleaning.* Use clean rag (item 19, appx C) and dry cleaning solvent (item 9, appx C) to clean grease or oil from all metal surfaces except those exposed to powder fouling. For powder fouled surfaces, use CLP (item 5, appx C).

**LUBRICANT TABLE**

LUBRICANT/COMPONENTS		REFILL CAPACITY (APPROX)	EXPECTED TEMPERATURE	INTERVALS
Oil, Lubricating, OEA (item 15, appx C)	Elevating Gearcase	2.0 qt (1.9 l)	0°F to +40°F (-18°C to + 4°C)	Annually
Oil, Lubricating, OEA (item 15, appx C)	Traversing Gearcase	3.0 qt (2.8 l)	0°F to +40°F	Annually
Fluid, Hydraulic, Petroleum Base Preservative (OHT) (item 12, appx C)	Hydraulic Reservoir.	27 gal. (102.2 l)	0°F to 40°F (-18°C to + 40°C)	18 Month
Grease, Automotive and Artillery (GAA) (item 11, appx C)		NA	All Temperatures	Quarterly/ Semiannually
Cleaner, Lubricant and Preservative (CLP) (item 5, appx C)	Equilibrators and Breech Mechanism	NA	0°F to +40°F (-18°C to +40C)	Quarterly
Dry Cleaning Solvent (item 9, appx C)		NA	All Temperatures	Quarterly/ Semiannually/ Annually

FOR ARCTIC OPERATIONS, REFER TO FM 9-207

**Change 1 2-12.1**

2-7.3 TOOLS AND SUPPLIES (CONT).

(8) *Total Man-Hour Requirements.* Total man-hour requirements required to perform lubrication requirements:

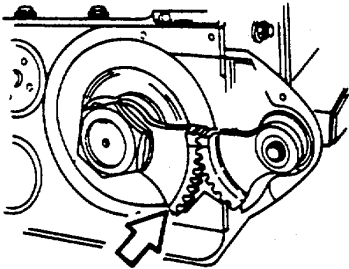
Total Man-Hours	
Interval	Man-Hours
Quarterly	14
Semiannually	12
Annually	5
18 Month	50

**Table 2-2 PREVENTIVE MAINTENANCE CHECKS AND SERVICES WITH LUBRICATION INSTRUCTIONS FOR M110A2 SELF-PROPELLED HOWITZER**

Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
1	Q	a. MIA1 Collimator b. M115 Panoramic Telescope c. M15 Elevation Quadrant d. M137 Telescope Mount e. M139 Elbow Telescope	Check instruments for moisture. Purge and charge whenever moisture is present. Refer to TM 750-116.	Any moisture is found in any telescope.
2	A	Fire Control	<p style="text-align: center;"><b>WARNING</b></p> <p><b>High-pressure nitrogen gas is used in this equipment. Keep face and body clear of release valves. Failure to observe safety precautions may result in injury or death.</b></p> Check all instrument adjustments (p 2-98).	Any fire control is out of adjustment.

Change 1 2-12.2

Table 2-2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES WITH LUBRICATION  
INSTRUCTIONS FOR MI 10A2 SELF-PROPELLED HOWITZER (CONT)

Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
3	Q	Cannon Tube	For complete inspection procedures of cannon tube; refer to TM 9-1000-202-14.	
4	Q	Breech Operating Mechanism	Observe function of breechblock and breech operating mechanism.  Inspect breech operating mechanism. Replace worn or damaged parts (p 2-123).	Breech mechanism will not close properly.
5	Q	Recoil Cylinder Gear and Segment	 <p>a. Remove eight screws, lockwashers, washers, cover, and antenna mast plate.</p> <p>b. Clean gears and cover with CLP (item 5, appx C).</p> <p>c. Coat gear and segment with grease (item 11, appx C). Install cover and mast plate.</p>	

Change 1 2-12.3

Table 2-2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES WITH LUBRICATION INSTRUCTIONS FOR M 110A2 SELF-PROPELLED HOWITZER (CONT)

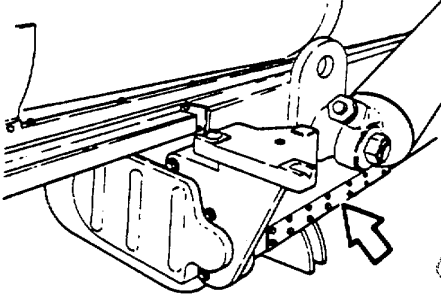
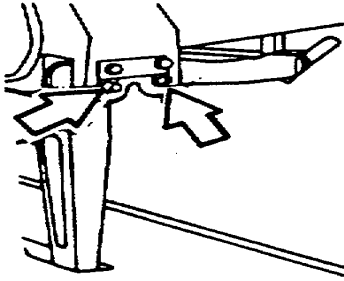
Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
6	Q	Variable Recoil Control Rod	 <p>a. Remove cover.</p> <p>b. Clean rod, control cams, and cover with CLP (item 5, appx C).</p> <p>c. Coat rod and control cams with grease (item 11, appx C). Install cover.</p>	
7	Q	Gun Travel Support Hinge Pins	 <p>Lubricate four fittings with grease (item 11, appx C).</p>	

Table 2-2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES WITH LUBRICATION INSTRUCTIONS FOR M110A2 SELF-PROPELLED HOWITZER (CONT)

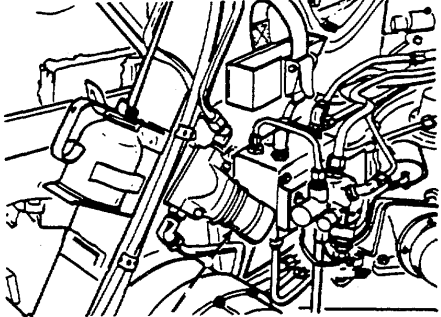
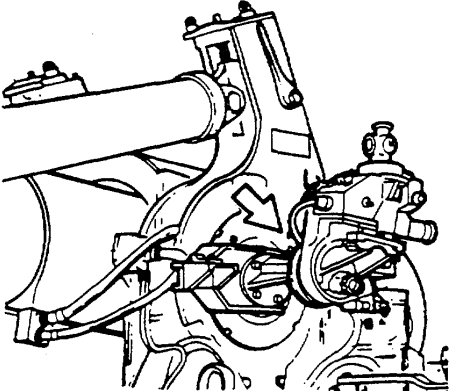
Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
8	Q	Gun Recoil Mechanism Filter	 <p style="text-align: center;">① WARNING</p> <p>Dry cleaning solvent (SD2) (item 9, appx C) is toxic and flammable. Wear protective goggles and gloves and use only in well ventilated areas.</p> <p>Remove element (1). Clean case with dry cleaning solvent (item 9, appx C). Install new element.</p>	
9	Q	Gun Mount Trunnion Bearings	 <p>Lubricate two fittings (one on each side) with grease (item 11, appx C) until grease appears at relief fitting.</p> <p style="text-align: center;"><b>Change 1 2-12.5</b></p>	

Table 2-2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES WITH LUBRICATION INSTRUCTIONS FOR M110A2 SELF-PROPELLED HOWITZER (CONT)

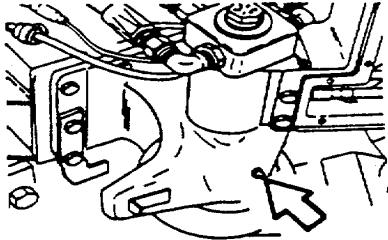
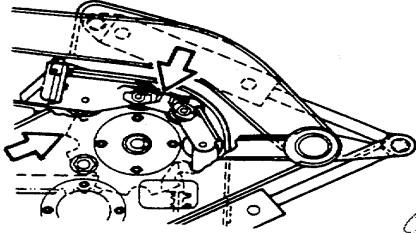
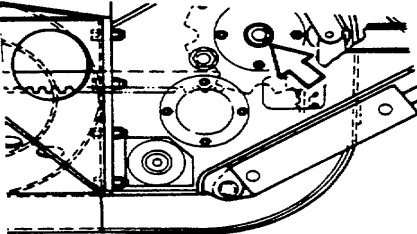
Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
10	Q	Loader-Rammer Pivot Arm Bearings	 <p>Lubricate fitting with grease (item 11, appx C) until grease can be seen at top. Lift seal to observe when grease comes out.</p>	
11	Q	Rammer Chain, Sprocket, and Trough	 <p>Clean with CLP (item 5, appx C). Coat with grease (item 11, appx C).</p>	
12	Q	Rammer Gear-case Drive Head Shaft Slide Gear	 <p>Access through headlink opening. Clean and lubricate with grease (item 11, appx C).</p>	



Table 2-2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES WITH LUBRICATION INSTRUCTIONS FOR M110A2 SELF-PROPELLED HOWITZER (CONT)

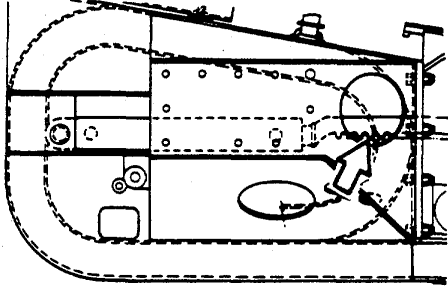
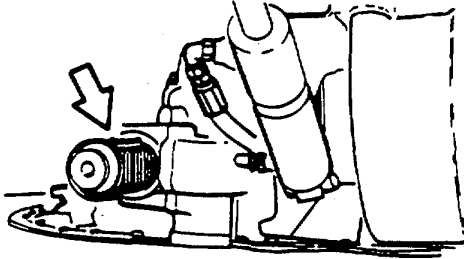
Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
13	Q	Rammer Cylinder Rack	 <p>Clean with CLP (item 5, appx C). Lubricate with grease (item 11, appx C).</p>	
14	Q	Rammer Traversing Cylinder Assembly	 <p>Clean with CLP (item 5, appx C) and coat with grease (item 11, appx C).</p>	

Table 2-2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES WITH LUBRICATION INSTRUCTIONS FOR M110A2 SELF-PROPELLED HOWITZER (CONT)

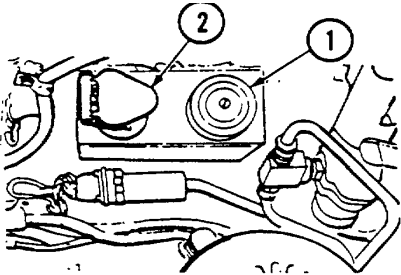
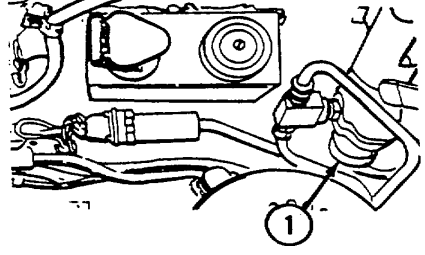
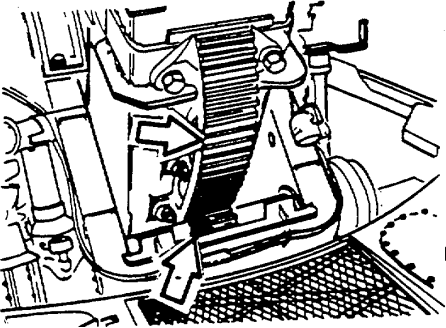
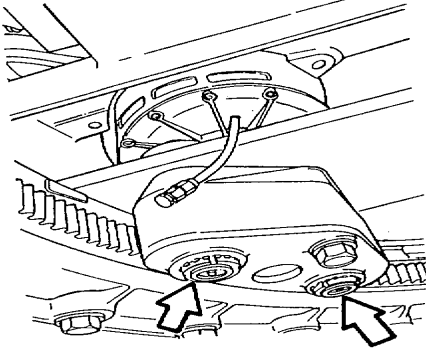
Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
15	Q	Hydraulic ( Reservoir Breather and Filter Screen	 <p>a. Service every 750 mi. (1207 km) or quarterly, whichever occurs first.</p> <p><b>WARNING</b> Dry cleaning solvent (SD2) (item 9, appx C) is toxic and flammable. Wear protective goggles and gloves and use only in well ventilated areas.</p> <p>b. Remove breather (1) and filter screen (2) and clean with dry cleaning solvent (item 9, appx C).</p> <p>c. For desert or very dusty conditions, clean daily.</p>	
16	Q	Hydraulic Supply Pressure Filter E	 <p>a. Service every 750 mi. (1207 km) or quarterly, whichever occurs first.</p> <p><b>WARNING</b> Dry cleaning solvent (SD2) (item 9, appx C) is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated areas.</p> <p>b. Remove element (1) and clean case with dry cleaning solvent (item 9, appx C). Install new element.</p>	

Table 2-2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES WITH LUBRICATION INSTRUCTIONS FOR M110A2 SELF-PROPELLED HOWITZER (CONT)

Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
17	Q	Gun Elevation Final Drive Gear and Pinion	 <p>Clean with CLP (item 5, appx C) and coat with grease (item 11, appx C).</p>	
18	Q	Traversing Final Drive Bearings	 <p>Lubricate two bearings with grease (item 11, appx C).</p>	

Change 1 2-12.9

Table 2-2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES WITH LUBRICATION INSTRUCTIONS FOR M1 10A2 SELF-PROPELLED HOWITZER (CONT)

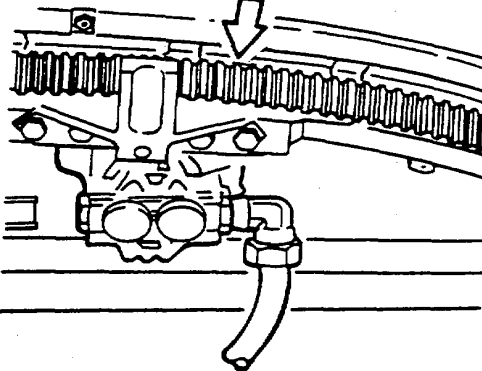
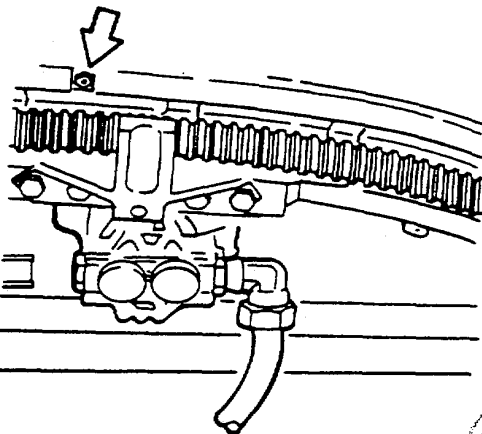
Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
19	Q	Traversing Ring Gear	 <p>Clean with CLP (item 5, appx C) and coat with grease (item 11, appx C).</p>	
20	Q	Turret Bearing	 <p>Lubricate quarterly, or after cleaning bearing or turret well with steam or high-pressure water.</p> <ol style="list-style-type: none"> <li>Lube fittings (forward and rear) with grease (item 11, appx C) until clean grease is observed at seals.</li> <li>Traverse cannon by hand to the right and left while applying grease.</li> <li>Wipe dirty grease from seals.</li> <li>Repeat steps a. thru c. until only clean grease comes out from seals.</li> </ol>	

Table 2-2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES WITH LUBRICATION INSTRUCTIONS FOR M1 10A2 SELF-PROPELLED HOWITZER (CONT)

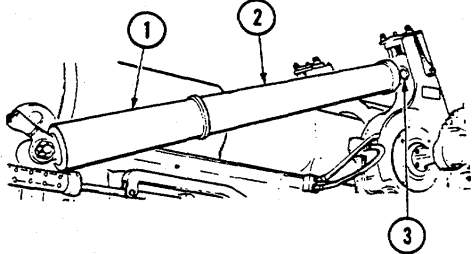
Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
21	Q	Equilibrator	 <p style="text-align: center;"><b>WARNING</b></p> <p><b>High-pressure nitrogen gas is used in this equipment. Keep face and body clear of release valves. Failure to observe safety precautions may result in injury or death.</b></p> <ol style="list-style-type: none"> <li>a. Check nitrogen charge. Recharge if pressure is low, refer to page 2-137 or 2-144. If repair is necessary, notify direct support maintenance.</li> <li>b. Depress cannon to depression stops.</li> <li>c. Unscrew cover (1) from front of Equilibrator and slide to rear.</li> <li>d. Wipe dry and apply a thin coat of CLP (item 5, appx C) to all parts, including outer surface of plunger (2) and case.</li> <li>e. Slide cover (1) forward and secure.</li> <li>f. Lubricate fitting (3) on Equilibrator mount bolts sparingly with grease (item 11, appx C).</li> </ol> <p style="text-align: center;"><b>Change 1 2-12.11</b></p>	<p>Cannon will not elevate or depress.</p>

Table 2-2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES WITH LUBRICATION INSTRUCTIONS FOR M1 10A2 SELF-PROPELLED HOWITZER (CONT)

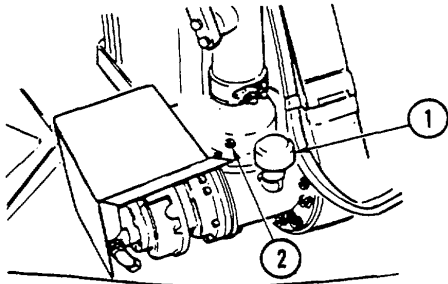
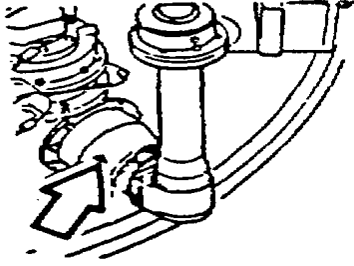
Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
22	Q	Torque Lock Drive Assemblies	<p>a. Notify direct support maintenance to remove, service, and install torque lock hand crank drive assemblies.</p> <p>b. Fill assembly with OHT (item 12, appx C) up to bottom of fill hole in flange.</p>	
23	S	Elevating Column and Breather	 <p><b>WARNING</b> Dry cleaning solvent (SD2) (item 9, appx C) is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated areas.</p> <p>a. Remove breather (1). Clean in dry cleaning solvent (item 9, appx C) and install.</p> <p>b. Lubricate fitting (2) sparingly with grease (item 11, appx C).</p>	
24	S	Traversing Drive Assembly	 <p>Lubricate fitting sparingly with grease (item 11, appx C).</p>	

Table 2-2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES WITH LUBRICATION INSTRUCTIONS FOR M1 10A2 SELF-PROPELLED HOWITZER (CONT)

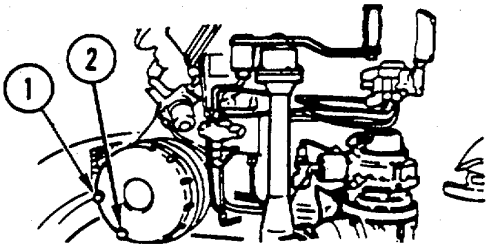
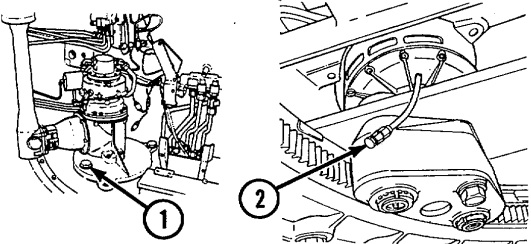
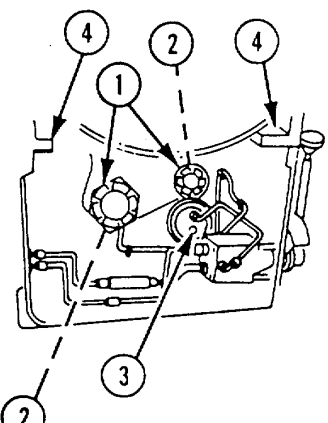
Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
25	A	Elevating Final Drive Drain and Fill	 <p>a. Remove fill and level plug (1) and drain plug (2).</p> <p><b>WARNING</b>  <b>Dry cleaning solvent (SD2) (item 9, appx C) is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated areas.</b></p> <p>b. After draining, clean drain plug (2) with dry cleaning solvent (item 9, appx C) and install.</p> <p>c. Refill to bottom of level hole with lubricating oil (OEA) (item 1 5, appx C).</p> <p>d. Clean and install fill and level plug (1).</p>	
26	A	Traversing Gearcase Lower Section Drain and Fill	 <p>a. Remove fill plug (1) and drain plug (2).</p> <p><b>WARNING</b>  <b>Dry cleaning solvent (SD2) (item 9, appx C) is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated areas.</b></p> <p>b. After draining, clean drain plug (2) with dry cleaning solvent (item 9, appx C) and install.</p> <p>c. Refill with OEA (item 15, appx C). Clean and install fill plug (1).</p> <p>d. Initial fill 3 qt (2.8 l).</p>	

Table 2-2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES WITH LUBRICATION INSTRUCTIONS FOR M1 10A2 SELF-PROPELLED HOWITZER (CONT)

Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
27	A	Recoil Mechanism	 <p>a. Make sure that recoil and counterrecoil piston rod nuts (1) are installed and secured with cotter pins (2).</p> <p>b. Check reserve oil index (3). If leaking oil exceeds three drops in 5-minute period, notify direct support maintenance.</p> <p>c. Inspect condition of rail wipers (4). Replace if damaged or worn, refer to page 2-157.</p>	<p>Counter recoil piston rod nuts and cotter pins are loose or missing</p> <p>Index pin will not extend or leaking oil exceeds three drops in 5-minute period</p>
28	A	Accumulator Gas Bottle	<p style="text-align: center;"><b>WARNING</b></p> <p>High-pressure nitrogen gas is used in this equipment. Keep face and body clear of release valves. Failure to observe safety precautions may result in injury or death.</p> <p>Check nitrogen charge. Recharge if pressure is low refer to page 2-137 or 2-144. If repair is necessary notify direct support maintenance.</p>	<p>Any leaks are present or accumulator bottle will not hold pressure</p>

Change 1 2-12.14



Table 2-2. PREVENTIVE MAINTENANCE CHECKS AND SERVICES WITH LUBRICATION INSTRUCTIONS FOR M1 10A2 SELF-PROPELLED HOWITZER (CONT)

Item No.	Interval	Item to Check/ Service	Procedure	Not Fully Mission Capable If:
29	18	Turret Bearing	<p style="text-align: center;"><b>WARNING</b></p> <p>Dry cleaning solvent (SD2) (item 9, appx C) is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated areas.</p> <p>Notify direct support maintenance to remove, disassemble, and clean turret bearing with dry cleaning solvent (item 9, appx C). Lubricate with grease (item 11, appx C) while rotating the outer race at least two complete turns to be sure bearing is packed with grease capacity 41 lb (18.6 kg).</p>	
30	18	Gun Mount Trunnion Bearings	<p style="text-align: center;"><b>WARNING</b></p> <p>Dry cleaning solvent (SD2) (item 9, appx C) is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated areas.</p> <p>Notify direct support maintenance to remove, disassemble, and clean trunnion caps and bearings with dry cleaning solvent (item 9, appx C). Repack bearing with grease (item 11, appx C) and reinstall. Replace oil seal.</p>	
31	18	Hydraulic Reservoir Drain and Fill	<p>Notify direct support maintenance to drain and fill hydraulic reservoir with OHT (item 12, appx C to) applicable full mark (spade raised or spade extended) on level gage. Capacity 27 gal. (102.2 l).</p>	

Change 1 2-12.15

**Section IV. UNIT TROUBLESHOOTING**

**2-8. TROUBLESHOOTING INFORMATION.**

- a. The symptom index can be used as a quick guide to troubleshooting. Common malfunctions are listed in alphabetical order under each major assembly, which appear in MAC order, with a page number reference to the troubleshooting table where a test or inspection and corrective action are provided.
- b. The unit troubleshooting table lists the malfunction, the test or inspection indicating the malfunction, and the necessary corrective action.
- c. If the malfunction still exists after all listed unit maintenance corrective actions have been performed, notify direct support maintenance.

**UNIT TROUBLESHOOTING SYMPTOM INDEX**

**Troubleshooting  
Procedure  
Page**

**FIRE CONTROL INSTALLATION**

M115 Pantel and M15 elevation quadrant lamps fail to light.....	2-15
No power is available to the utility outlet and collimator receptacle .....	2-15

**M201A1 CANNON ASSEMBLY**

Blowback.....	2-15
Breech closes hard .....	2-16
Breech fails to open .....	2-16
Breech mechanism does not operate freely .....	2-16
Breechblock operating lever does not rotate fully .....	2-17
Cannon does not retract to travel position .....	2-17
Cannon does not return to battery after firing .....	2-17
Cannon does not return to battery from retracted travel position.....	2-17
Cannon has uneven recoil action.....	2-18
Cannon is slow to return to battery when oil pressure is normal.....	2-18
Cannon overrecoils .....	2-18
Cannon returns to battery with too much shock.....	2-18
Cannon underrecoils .....	2-19
Firing mechanism hammer does not retract .....	2-19
No air escapes from respirator valve in counterrecoil cylinder head during counterrecoil .....	2-19
Primer fails to fire .....	2-20

**ELEVATING AND TRAVERSING INSTALLATION**

Cannon does not elevate or depress or operates too slowly (power control) .....	2-20
Cannon does not elevate or depress or operates too slowly due to low hydraulic pressure .....	2-20
Cannon elevating or depressing is not smooth (power control).....	2-20

**UNIT TROUBLESHOOTING SYMPTOM INDEX (CONT)**

**Troubleshooting  
Procedure  
Page**

Torque handle rotates over 1/4 turn before cannon moves or cannon does not stop when hand cranking is stopped ..... 2-21

Torque handle rotates over 1-1/4 turns before turret moves or turret does not stop when hand cranking is stopped ..... 2-21

Turret action is not smooth (power control) ..... 2-21

Turret does not traverse ..... 2-22

Turret does not traverse due to low hydraulic pressure ..... 2-22

**LOADER AND RAMMER INSTALLATION**

Loader arm does not operate smoothly ..... 2-22

Loader arm does not operate smoothly due to low hydraulic pressure ..... 2-22

Loader-rammer does not swing or operate properly ..... 2-22

Loader-rammer does not swing or operate properly due to low hydraulic pressure ..... 2-23

Rammer does not operate properly ..... 2-23

Rammer does not operate properly due to low hydraulic pressure ..... 2-23

Rammer does not seat projectile in forcing cone ..... 2-23

**HYDRAULIC SYSTEM INSTALLATION**

Hydraulic system pressure is too low ..... 2-24

Hydraulic pump operates more than normal during no load condition ..... 2-24

**INTERCOMMUNICATION SYSTEM**

Constant clicking sound is heard when engine is operating faster than idling speed and vehicle is not moving ..... 2-24

Too much radio interference when engine is not operating ..... 2-25

Whining noise that changes in pitch with engine speed is heard when vehicle is not moving ..... 2-25

**ELECTRICAL INSTALLATION**

Borescope outlet is not providing power for borescoping (special purpose inspection device) ..... 2-26

Both SUSPENSION LOCKED warning light and SUSPENSION LOCKOUT INDICATOR LIGHT are off when suspension is in locked position ..... 2-25

Oil pump motor does not operate when OIL PUMP MOTOR SW is ON or held in OVER-RIDE ..... 2-26

Pressure line filter indicator light fails to operate when press tested ("N" vehicles) ..... 2-26

SUSPENSION LOCKOUT INDICATOR LIGHT is off when suspension is in locked position ..... 2-25

Vehicular intercommunication system operates intermittently when there is no outside interference ..... 2-26

2-8. TROUBLESHOOTING INFORMATION (CONT).

Table 2-3. UNIT TROUBLESHOOTING

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>FIRE CONTROL INSTALLATION</b>		
1. NO POWER IS AVAILABLE TO THE UTILITY OUTLET AND COLLIMATOR RECEPTACLE.	<i>Step 1.</i> Check M115 pantel, M15 elevation quadrant, telescope mount, and collimator receptacle grounds for bad connections.	Repair bad connections.
	<i>Step 2.</i> Check continuity of any defective lamps.	a. Replace any burned out lamps (TM 9-2350-304-10). b. Troubleshoot sighting, fire control, utility outlet, and collimator circuit, refer to Electrical Circuit Symptom Index, page 2-27.
2. M115 PANTEL AND M15 ELEVATION QUADRANT LAMPS FAIL TO LIGHT.	<i>Step 1.</i> Check M1 15 pantel, M1 5 elevation quadrant, telescope mounts, and collimator receptacle grounds for bad connections.	Repair bad connections.
	<i>Step 2.</i> Check continuity of any defective lamps.	a. Replace any burned out lamps (TM 9-2350-304-10). b. Refer to page 2-28.
<b>M201A1 CANNON ASSEMBLY</b>		
3. BLOWBACK.	<i>Step 1.</i> Check for damaged spindle assembly.	Replace damaged spindle assembly parts, refer to page 2-132.
	<i>Step 2.</i> Check that split rings are rotated 180°apart.	Rotate split ring expansion slots to 180° apart, refer to page 2-132.

2-8. TROUBLESHOOTING INFORMATION (CONT).

Table 2-3. UNIT TROUBLESHOOTING (CONT)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>M201A1 CANNON ASSEMBLY (CONT)</b>		
4. BREECH CLOSSES HARD.	<i>Step 1.</i> Check for burred breechblock threads.	If breechblock threads are burred, smooth threads with file or crocus cloth (item 8, appx C).
	<i>Step 2.</i> Check for damaged or dirty breechblock assembly.	a. Clean and lubricate breechblock assembly. Refer to TM 9-2350-304-10. b. If breechblock assembly is damaged, notify direct support maintenance.
	<i>Step 3.</i> Check for damaged counterbalance assembly.	Replace damaged counterbalance assembly, refer to page 2-127.
5. BREECH FAILS TO OPEN.		Check to see if breechblock is seized and if crew has attempted to correct (TM 9-2350-304-10).
		If breechblock is seized and crew was unable to correct, notify direct support maintenance.
6. BREECH MECHANISM DOES NOT OPERATE FREELY.	<i>Step 1.</i> Check for burred breechblock threads.	If breechblock threads are burred, smooth threads with file or crocus cloth (item 8, appx C).
	<i>Step 2.</i> Check for damaged or dirty breechblock assembly.	a. Clean and lubricate breechblock assembly. Refer to TM 9-2350-304-10. b. If breechblock assembly is damaged, notify direct support maintenance.

Table 2-3. UNIT TROUBLESHOOTING (CONT)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
7. BREECHBLOCK OPERATING LEVER DOES NOT ROTATE FULLY.	Check for damaged crank, crosshead, or shaft.	Replace damaged hand crank arm, breechblock crosshead, or straight shaft, refer to page 2-123.
8. CANNON DOES NOT RETRACT TO TRAVEL POSITION.	<i>Step 1.</i> Check for damaged retracting valve.	If retracting valve is damaged, notify direct support maintenance.
	<i>Step 2.</i> Check for leaks or damaged lines in hydraulic system.	<ul style="list-style-type: none"> <li>a. Tighten loose fittings.</li> <li>b. If lines are damaged, notify direct support maintenance.</li> </ul>
9. CANNON DOES NOT RETURN TO BATTERY AFTER FIRING.	<i>Step 1.</i> Check replenisher shutoff valve. Ensure replenisher shutoff valve is open.	Open replenisher shutoff valve.
	<i>Step 2.</i> Check for damaged line and fittings between recuperator, recoil cylinder, replenisher, and retracting valve.	If line or fittings are damaged, notify direct support maintenance.
	<i>Step 3.</i> Check for damaged retracting valve	If retracting valve is damaged, notify direct support maintenance.
10. CANNON DOES NOT RETURN TO BATTERY FROM RETRACTED TRAVEL POSITION.	<i>Step 1.</i> Check for damaged retracting valve.	If retracting valve is damaged, notify direct support maintenance.
	<i>Step 2.</i> Check for damaged relief valve in linear actuating head assembly.	If relief valve is damaged, notify direct support maintenance.
	<i>Step 3.</i> Check for dirty or clogged hydraulic fluid filters.	Replace dirty or clogged hydraulic fluid filters, refer to page 2-262.

2-8. TROUBLESHOOTING INFORMATION (CONT).

Table 2-3. UNIT TROUBLESHOOTING (CONT)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>M201A1 CANNON ASSEMBLY (CONT)</b>		
11. CANNON HAS UNEVEN RECOIL ACTION.		<p>Check for scored cannon-to-mount sliding surfaces.</p> <p>If cannon-to-mount sliding surfaces are scored, notify direct support maintenance.</p>
12. CANNON IS SLOW TO RETURN TO BATTERY WHEN OIL PRESSURE IS NORMAL.		
	<p><i>Step 1.</i> Check replenisher shutoff valve. Ensure replenisher shutoff valve is open.</p> <p>Open replenisher shutoff valve.</p>	
	<p><i>Step 2.</i> Check for restricted relay valve in recuperator front head.</p> <p>If relay valve in recuperator front head assembly is restricted when oil pressure is normal, notify direct support maintenance.</p>	
13. CANNON OVERRECOILS.		
	<p><i>Step 1.</i> Check for damaged recoil connecting link.</p> <p>If recoil connecting link is damaged, notify direct support maintenance.</p>	
	<p><i>Step 2.</i> Check lines and fittings between recuperator, recoil cylinder, replenisher, and retracting valve.</p> <p>If lines or fittings are damaged, notify direct support maintenance.</p>	
	<p><i>Step 3.</i> Check for damaged retracting valve.</p> <p>If retracting valve is damaged, notify direct support maintenance.</p>	
14. CANNON RETURNS TO BATTERY WITH TOO MUCH SHOCK.		<p>Notify direct support maintenance.</p>

Table 2-3. UNIT TROUBLESHOOTING (CONT)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
15. CANNON UNDERRECOILS.	<i>Step 1.</i>	Check replenisher shutoff valve. Ensure replenisher shutoff valve is open. Open replenisher shutoff valve.
	<i>Step 2.</i>	Check for scored cannon-to-mount sliding surfaces. If cannon-to-mount sliding surfaces are scored, notify direct support maintenance.
	<i>Step 3.</i>	Check for incorrect operation of recoil connecting link. If recoil connecting link operates incorrectly, notify direct support maintenance.
	<i>Step 4.</i>	Check for damaged recoil cylinder. If recoil cylinder is damaged, notify direct support maintenance.
16. FIRING MECHANISM HAMMER DOES NOT RETRACT.	<i>Step 1.</i>	Check for broken sear. Replace broken sear, refer to page 2-120.
	<i>Step 2.</i>	Check for broken sear spring. Replace broken sear spring, refer to page 2-120.
17. NO AIR ESCAPES FROM RESPIRATOR VALVE IN COUNTERRECOIL CYLINDER HEAD DURING COUNTERRECOIL.	<i>Step 1.</i>	Check for rusted-shut or clogged respirator valve in cylinder head. If respirator valve is rusted shut or clogged, notify direct support maintenance.
	<i>Step 2.</i>	Check for dirt under respirator valve. If dirt is under respirator valve, notify direct support maintenance.
	<i>Step 3.</i>	Check for oil leak caused by restricted recuperator valve. If oil leaks because of a restricted recuperator valve, notify direct support maintenance.



2-8. TROUBLESHOOTING INFORMATION (CONT).

Table 2-3. UNIT TROUBLESHOOTING (CONT)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>M201A1 CANNON ASSEMBLY (CONT)</b>		
18. PRIMER FAILS TO FIRE.		<p>Check for damaged firing pin, helical compression spring, or firing mechanism hammer.</p> <p>Replace damaged firing pin, helical compression spring, or firing mechanism hammer, refer to page 2-123, 2-130, and 2-131.</p>
<b>ELEVATING AND TRAVERSING INSTALLATION</b>		
19. CANNON DOES NOT ELEVATE OR DEPRESS OR OPERATES TOO SLOWLY (POWER CONTROL).		<p><i>Step 1.</i> Check pneumatic equilibrator nitrogen pressure.</p> <p style="padding-left: 40px;">If required, release or add nitrogen, refer to page 2-137 or 2-144.</p> <p><i>Step 2.</i> Check for damaged pneumatic equilibrators.</p> <p style="padding-left: 40px;">If pneumatic equilibrators are damaged, notify direct support maintenance.</p> <p><i>Step 3.</i> Check ground leads on elevating trigger switches for bad connections.</p> <p style="padding-left: 40px;">a. Repair bad connections.</p> <p style="padding-left: 40px;">b. Troubleshoot cannon elevating control circuit, refer to Electrical Symptom Index, page 2-27.</p>
20. CANNON DOES NOT ELEVATE OR DEPRESS OR OPERATES TOO SLOWLY DUE TO LOW HYDRAULIC PRESSURE.		<p>See malfunction 34.</p>
21. CANNON ELEVATING OR DEPRESSING IS NOT SMOOTH (POWER CONTROL).		<p><i>Step 1.</i> Check hydraulic reservoir.</p> <p style="padding-left: 40px;">Fill hydraulic reservoir. Refer to TM 9-2350-304-10.</p> <p><i>Step 2.</i> Check for dirty or clogged hydraulic fluid filters.</p> <p style="padding-left: 40px;">Replace dirty or clogged hydraulic fluid filters, refer to page 2-262.</p>

Table 2-3. UNIT TROUBLESHOOTING (CONT)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
	<i>Step 3.</i> Check elevating gear and pinion gear.	Clean and lubricate elevating gear and pinion gear. Refer to page 2-8.
22. TORQUE HANDLE ROTATES OVER 1/4 TURN BEFORE CANNON MOVES OR CANNON DOES NOT STOP WHEN HAND CRANKING IS STOPPED.	Check for damaged key way or torque handle.	Replace damaged key or torque handle, refer to page 2-205 or 2-210.
23. TORQUE HANDLE ROTATES OVER 1-1/4 TURNS BEFORE TURRET MOVES OR TURRET DOES NOT STOP WHEN HAND CRANKING IS STOPPED.	Check for damaged key way or torque handle.	Replace damaged key or torque handle, refer to page 2-205 or 2-210.
24. TURRET ACTION IS NOT SMOOTH (POWER CONTROL).	<i>Step 1.</i> Check hydraulic reservoir.	Fill hydraulic reservoir. Refer to TM 9-2350-304-10.
	<i>Step 2.</i> Check for dirty or clogged hydraulic fluid filters.	Replace dirty or clogged hydraulic fluid filters, refer to page 2-262.
	<i>Step 3.</i> Check turret bearing for dirt or rust.	Lubricate turret bearing. Refer to page 2-8.
	<i>Step 4.</i> Check turret ring gear and traversing constant speed drive for dirt or rust.	Clean and lubricate turret ring gear and traversing constant speed drive. Refer to page 2-8.
	<i>Step 5.</i> Check ground (GND) lead from traversing deceleration system for bad connection.	Troubleshoot traversing deceleration circuit, refer to Electrical Circuit Symptom Index, page 2-27.

2-8. TROUBLESHOOTING INFORMATION (CONT).

Table 2-3. UNIT TROUBLESHOOTING (CONT)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>ELEVATING AND TRAVERSING INSTALLATION (CONT)</b>		
25. TURRET DOES NOT TRAVERSE.		<p>Check ground on traversing trigger switch for bad connection.</p> <p style="padding-left: 100px;">Troubleshoot cannon traversing control circuit, refer to Electrical Circuit Symptom Index, page 2-27.</p>
26. TURRET DOES NOT TRAVERSE DUE TO LOW HYDRAULIC PRESSURE.		See malfunction 34.
<b>LOADER AND RAMMER INSTALLATION</b>		
27. LOADER ARM DOES NOT OPERATE SMOOTHLY.		<p>Check lift cylinder for leaks.</p> <p style="padding-left: 100px;">If lift cylinder leaks, notify direct support maintenance.</p>
28. LOADER ARM DOES NOT OPERATE SMOOTHLY DUE TO LOW HYDRAULIC PRESSURE.		See malfunction 34.
29. LOADER-RAMMER DOES NOT SWING OR OPERATE PROPERLY.		<p><i>Step 1.</i> Check traversing cylinder for leaks.</p> <p style="padding-left: 100px;">If traversing cylinder leaks, notify direct support maintenance.</p> <p><i>Step 2.</i> Check GND leads for bad connections.</p> <ul style="list-style-type: none"> <li>a. Clean ground connections with crocus cloth (item 8, appx C).</li> <li>b. Make sure ground connections are tight.</li> <li>c. Troubleshoot rammer control circuit, refer to Electrical Circuit Symptom Index, page 2-27.</li> </ul>

Table 2-3. UNIT TROUBLESHOOTING (CONT)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
30. LOADER-RAMMER DOES NOT SWING OR OPERATE PROPERLY DUE TO LOW HYDRAULIC PRESSURE.	See malfunction 34.	
31. RAMMER DOES NOT OPERATE PROPERLY.	<i>Step 1.</i>	Check rammer cylinder for leaks and check for broken rammer chain.  If rammer cylinder leaks or rammer chain is broken, notify direct support maintenance.
	<i>Step 2.</i>	Check adjustment of rammer pressure switch and pivot interlock push switch.  Troubleshoot rammer control circuit, refer to Electrical Circuit Symptom Index, page 2-27.
32. RAMMER DOES NOT SEAT PROJECTILE IN FORCING CONE.	<i>Step 1.</i>	Check loader-rammer adjusting procedures (TM 9-2350-304-10).
	<i>Step 2.</i>	Check and adjust alinement of loader-rammer with cannon tube (TM 9-2350-304-10).
33. RAMMER DOES NOT OPERATE PROPERLY DUE TO LOW HYDRAULIC PRESSURE.	See malfunction 34.	

2-8. TROUBLESHOOTING INFORMATION (CONT).

Table 2-3. UNIT TROUBLESHOOTING (CONT)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>HYDRAULIC SYSTEM INSTALLATION</b>		
34. HYDRAULIC SYSTEM PRESSURE IS TOO LOW.	<i>Step 1.</i> Check HYD PUMP/PTO CLUTCH switch.	Set HYD PUMP/PTO CLUTCH switch ON with engine at idle speed.
	<i>Step 2.</i> Check hydraulic system accumulator drain valve.	If valve is open, close valve.
	<i>Step 3.</i> Check fluid in hydraulic system.	Fill hydraulic system with proper fluid. Refer to TM 9-2350-304-10.
	<i>Step 4.</i> Check for hydraulic leaks.	
	<i>Step 5.</i> Check accumulator and gas bottle for correct charge, refer to page 2-258.	Correctly charge accumulator and gas bottle, refer to page 2-258.
35. HYDRAULIC PUMP OPERATES MORE THAN NORMAL DURING NO LOAD CONDITION.		Check accumulator and gas bottle for correct charge, refer to page 2-258.
		Correctly charge accumulator and gas bottle, refer to page 2-258.
<b>INTERCOMMUNICATION SYSTEM</b>		
36. CONSTANT CLICKING SOUND IS HEARD WHEN ENGINE IS OPERATING FASTER THAN IDLING SPEED AND VEHICLE IS NOT MOVING.		Check for dirty or loose regulator mounting hardware and ground strap.
		Clean and tighten regulator mounting hardware and ground strap. Refer to TM 9-2350-304-20-1.

**Table 2-3. UNIT TROUBLESHOOTING (CONT)**

<b>MALFUNCTION</b>	<b>TEST OR INSPECTION</b>	<b>CORRECTIVE ACTION</b>
37. WHINING NOISE THAT CHANGES IN PITCH WITH ENGINE SPEED IS HEARD WHEN VEHICLE IS NOT MOVING.	Check for dirty or loose generator mounting hardware and ground strap.	Clean and tighten generator mounting hardware and ground strap. Refer to TM 9-2350-304-20-1.
38. TOO MUCH RADIO INTERFERENCE WHEN ENGINE IS NOT OPERATING.	Notify direct support maintenance.	
<b>ELECTRICAL INSTALLATION</b>		
39. SUSPENSION LOCKOUT INDICATOR LIGHT IS OFF WHEN SUSPENSION IS IN LOCKED POSITION.	Check indicator light lead for bad connection.	<ul style="list-style-type: none"> <li>a. Repair bad connection.</li> <li>b. Troubleshoot suspension lockout indicator light circuit, refer to Electrical Circuit Symptom Index, page 2-27.</li> </ul>
40. BOTH SUSPENSION LOCKED WARNING LIGHT AND SUSPENSION LOCKOUT INDICATOR LIGHT ARE OFF WHEN SUSPENSION IS IN LOCKED POSITION.	Check warning and indicator light ground leads for bad connection.	<ul style="list-style-type: none"> <li>a. Repair bad connection.</li> <li>b. Troubleshoot suspension locked warning light and suspension lockout indicator light, refer to Electrical Circuit Symptom Index, page 2-27.</li> </ul>

2-8. TROUBLESHOOTING INFORMATION (CONT).

Table 2-3. UNIT TROUBLESHOOTING (CONT)

MALFUNCTION	TEST OR INSPECTION	CORRECTIVE ACTION
<b>ELECTRICAL INSTALLATION (CONT)</b>		
41. PRESSURE LINE FILTER INDICATOR LIGHT FAILS TO OPERATE WHEN PRESS TESTED.	Check pressure line filter indicator light ground for bad connection.	<ul style="list-style-type: none"> <li>a. Repair bad connection.</li> <li>b. Troubleshoot pressure line filter indicator light circuit, refer to Electrical Circuit Symptom Index, page 2-27.</li> </ul>
42. BORESCOPE OUTLET IS NOT PROVIDING POWER FOR BORESCOPING (SPECIAL PURPOSE INSPECTION DEVICE).		Troubleshoot borescope outlet circuit, refer to Electrical Circuit Symptom Index, page 2-27.
43. OIL PUMP MOTOR DOES NOT OPERATE WHEN OIL PUMP MOTOR SW IS ON OR HELD IN OVERRIDE.		Troubleshoot oil pump motor circuit, refer to Electrical Circuit Symptom Index, page 2-27.
44. VEHICULAR INTERCOMMUNICATION SYSTEM OPERATES INTERMITTENTLY WHEN THERE IS NO OUTSIDE INTERFERENCE.	Check continuity between amplifier and wiring harness, line disconnects and driver's control box, and wiring harness.	<ul style="list-style-type: none"> <li>a. If multimeter does not indicate 0 ohms, repair wiring harness, refer to page 2-75.</li> <li>b. If multimeter indicates 0 ohms, refer to TM 11-2643 for AN/V1C-1 set or TM 11-5830-340-12 for AN/VIC-1 (V) set.</li> <li>c. Troubleshoot vehicular intercommunication system, refer to Electrical Circuit Symptom Index, page 2-27.</li> </ul>

**2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING.**

- a. The electrical circuit troubleshooting table lists the procedures necessary to inspect/repair applicable electrical circuits.
- b. If you have a problem with an electrical circuit which is not covered in the steps below, notify your supervisor.

**ELECTRICAL CIRCUIT SYMPTOM INDEX**

**Troubleshooting  
Procedure  
Page**

**FIRE CONTROL INSTALLATION**

Sighting, fire control, utility outlet, and collimator circuit ..... 2-28

**CANNON M201A1**

Cannon elevating control circuit..... 2-30

Cannon traversing control circuit ..... 2-41

Traversing deceleration circuit..... 2-37

**LOADER AND RAMMER INSTALLATION**

Rammer control circuit ..... 2-45

**ELECTRICAL INSTALLATION -**

Borescope outlet circuit..... 2-66

Oil pump motor circuit ..... 2-69

Pressure line filter indicator light circuit..... 2-61

Suspension lockout indicator light circuit ..... 2-53

Suspension locked warning light and suspension lockout indicator light..... 2-57

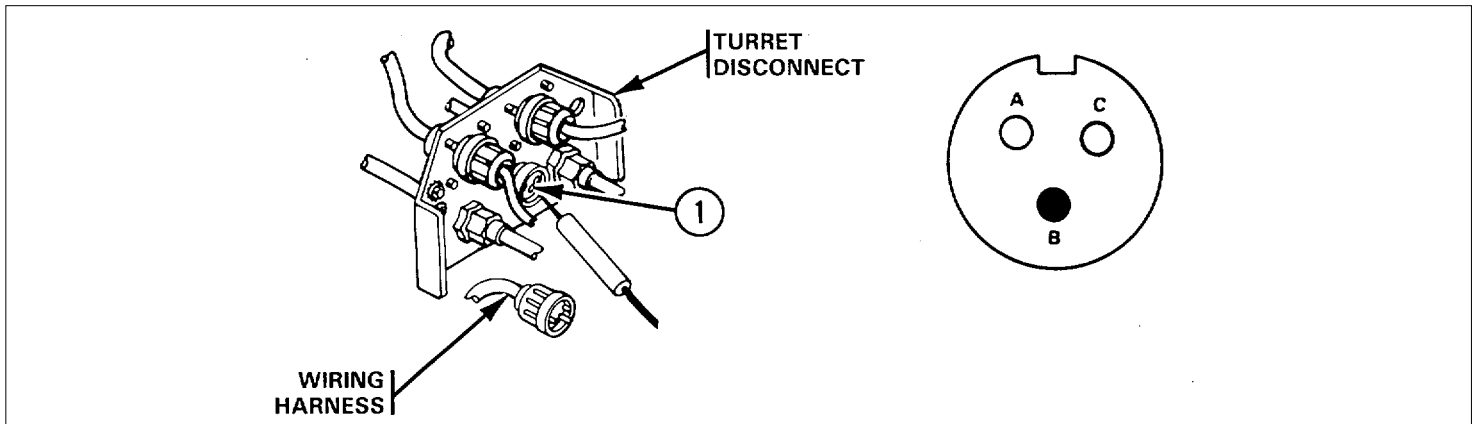
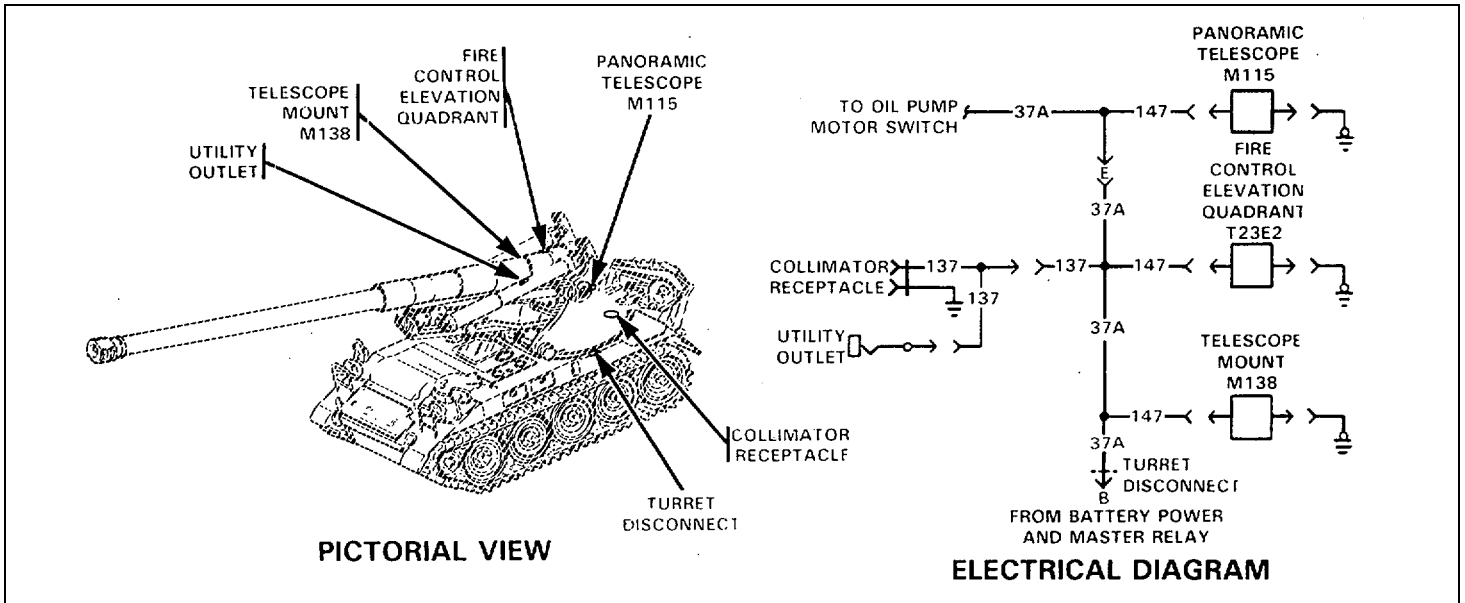
Vehicular intercommunication system ..... 2-74



2.9 ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).

Table 2-4. ELECTRICAL CIRCUIT TROUBLESHOOTING

A. FIRE CONTROL INSTALLATION-Sighting, Fire Control, Utility Outlet, and Collimator Circuit.



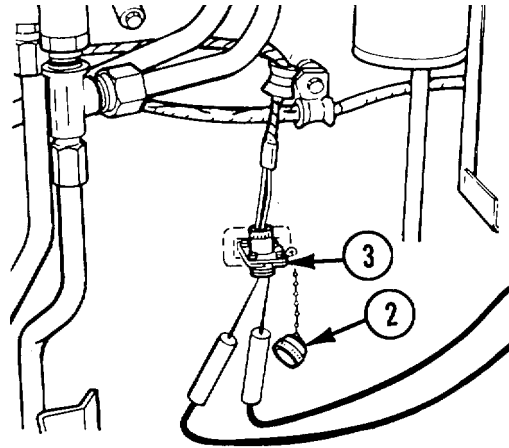
**WARNING**

Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.

**NOTE**

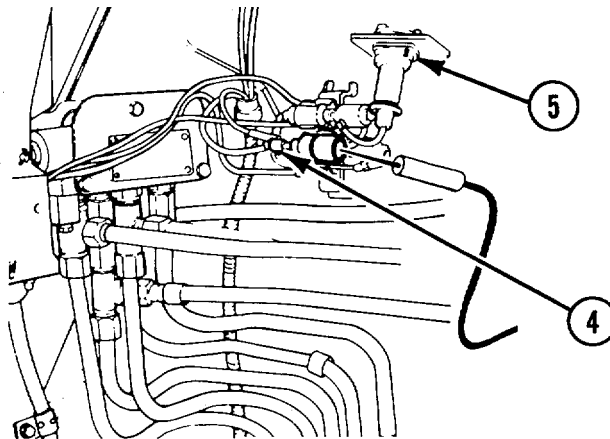
Canon must be in battery position.

- Step 1. Set MASTER switch OFF. Disconnect turret disconnect. Place red probe in socket B (1) (lead 37A). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, repair lead 37A (1) or lead 147. Refer to page 2-75. If multimeter indicates no voltage, troubleshoot battery power and master relay circuit. Refer to TM 9-2350-304-20-1. Set MASTER switch OFF. Connect turret disconnect.

**WARNING**

Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.

*Step 2.* Remove cap (2) from collimator socket. Set MASTER switch OFF. Connect multimeter to collimator receptacle (3) sockets. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 3. If multimeter indicates no voltage, repair lead 1 37. Refer to page 2-75. Set MASTER switch OFF.

**WARNING**

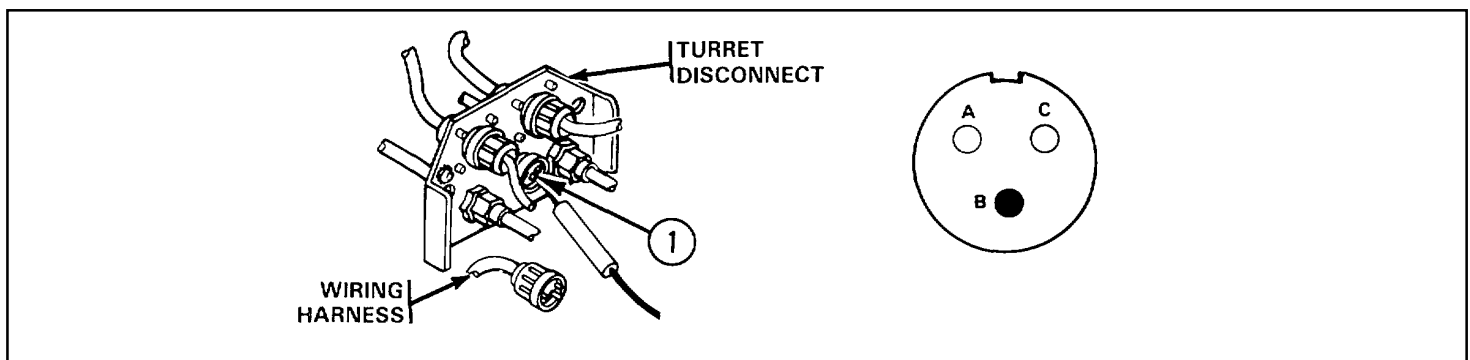
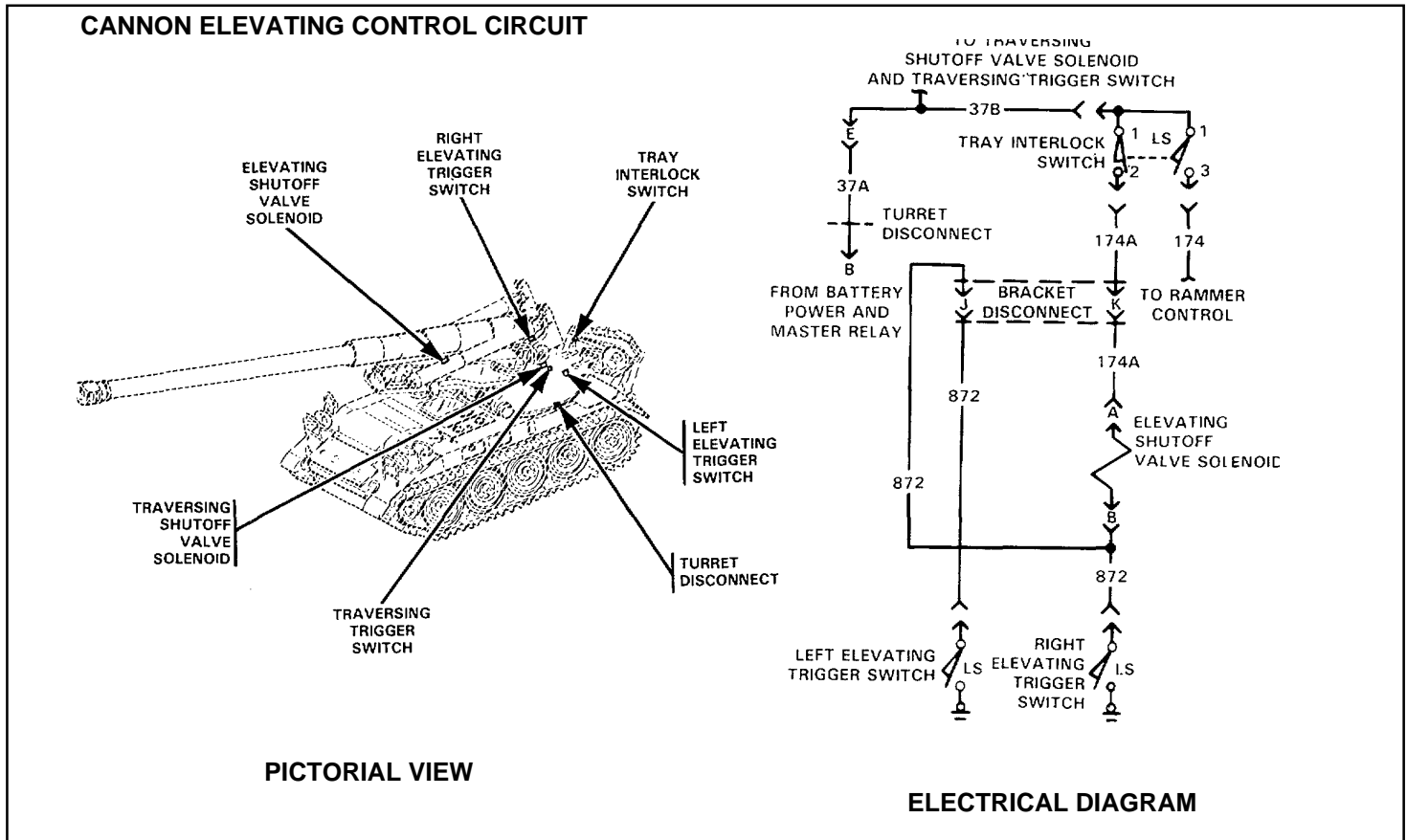
Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.

*Step 3.* Disconnect lead 1 37 (4) from utility outlet (5). Place red probe in lead 1 37 (4). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, replace collimator to utility outlet branched wiring harness. Refer to page 2-289. If multimeter indicates no voltage, repair lead 1 37 (4). Refer to page 2-75. Set MASTER switch OFF. Connect lead (4).

2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).

B. CANNON M201A1

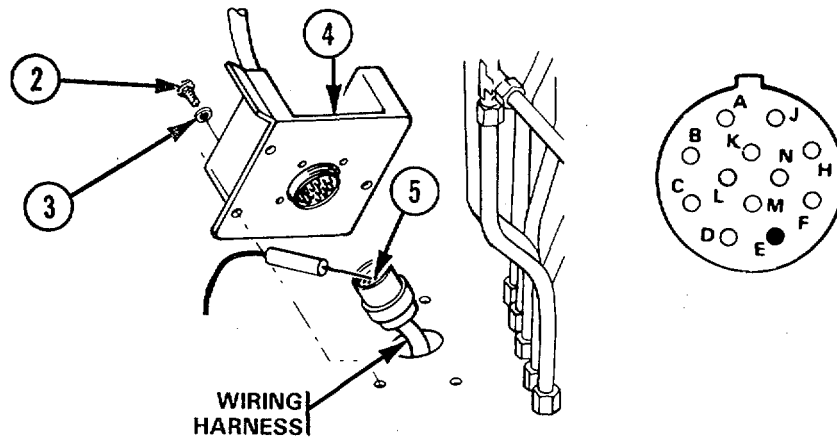
a. Cannon Elevating Control Circuit.



**NOTE**

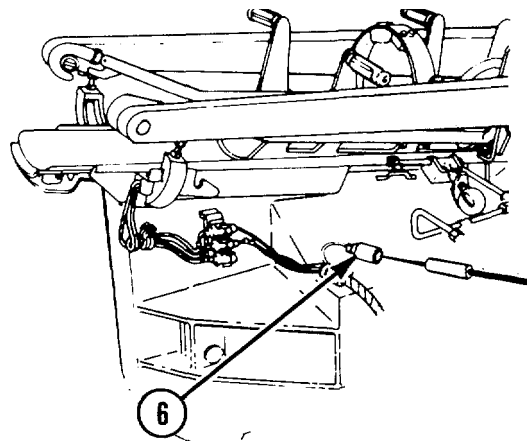
Check for operation of left and right elevation triggers. If left trigger operates and right does not, go to step 8. If right trigger operates and left does not, go to step 12. If neither trigger operates, go to step 1.

*Step 1.* Disconnect turret disconnect. Place red probe in socket B (1) (lead 37A). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 2. If multimeter indicates no voltage, troubleshoot battery power and master relay circuit. Refer to TM 9-2350-304-20-1. Set MASTER switch OFF. Connect turret disconnect.

**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

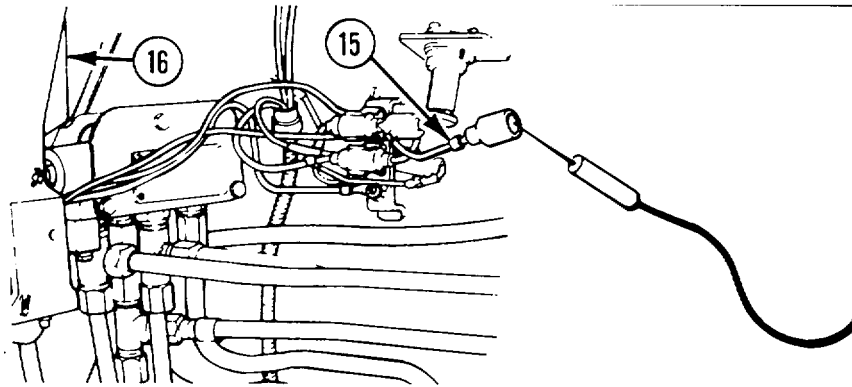
- Step 2.* Remove three screws (2) and three washers (3) attaching bracket (4) to deck. Raise bracket (4) to provide access to wiring harness. Disconnect wiring harness at disconnect. Place red probe in socket E (5) (lead 37A). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 3. If multimeter indicates no voltage, repair lead 37A between turret disconnect and bracket disconnect. Refer to page 2-75. Set MASTER switch OFF. Connect wiring harness at disconnect. Install bracket (4), using three washers (3) and three screws (2).

**WARNING**

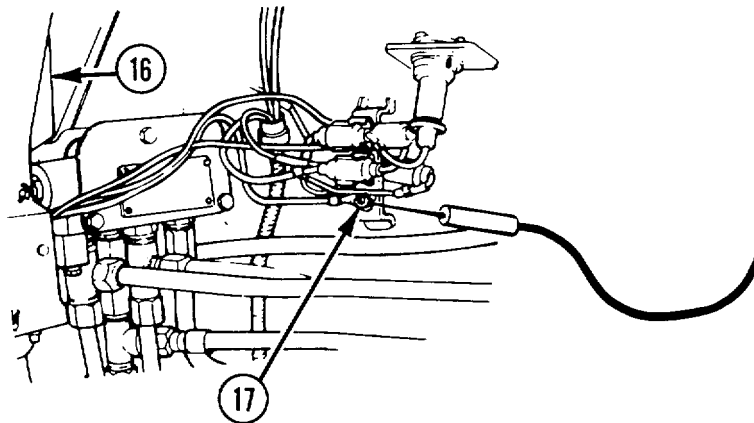
**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

- Step 3* Disconnect lead 37A (6) at line disconnect. Place red probe in lead 37A (6). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 4. If multimeter indicates no voltage, repair lead 37A (6) between bracket disconnect and line disconnect. Refer to page 2-75. Set MASTER switch OFF. Connect lead 37A (6).

## 2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).

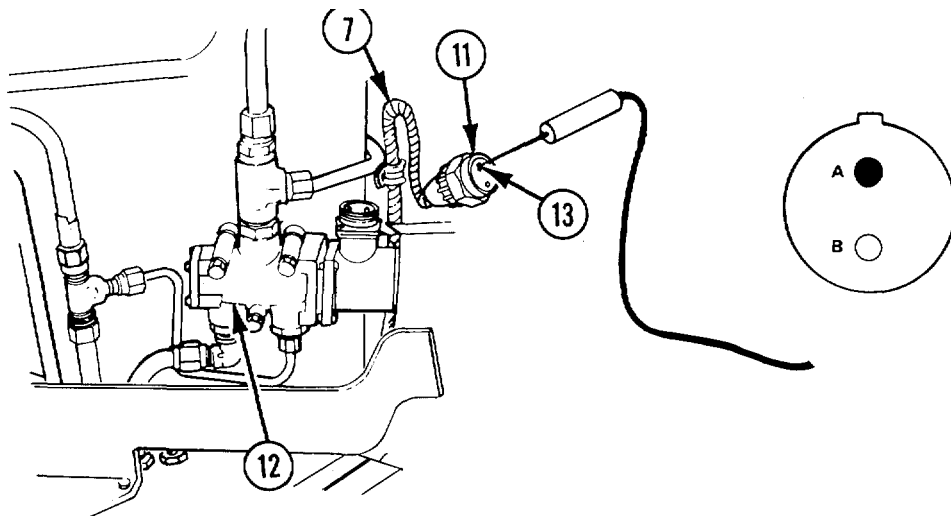


*Step 4.* Disconnect lead 174A (7) to rammer tray interlock switch. Place red probe on switch pin 2 (8). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 5. If multimeter indicates no voltage, replace tray interlock sensitive switch. Refer to page 2-279. Set MASTER switch OFF. Connect lead 174A (7).

**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

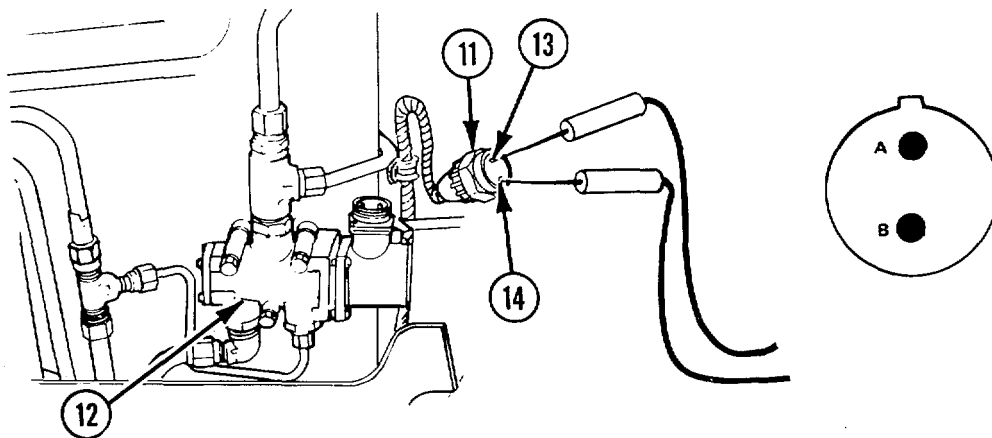
*Step 5.* Disconnect bracket disconnect wiring harness. Place jumper wire from socket E (5) to pin E (9). Place red probe in pin K (10). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 6. If multimeter indicates no voltage, repair lead 174A between rammer tray interlock switch and bracket disconnect. Refer to page 2-75. Set MASTER switch OFF. Connect wiring harness. Install bracket (4).



**WARNING**

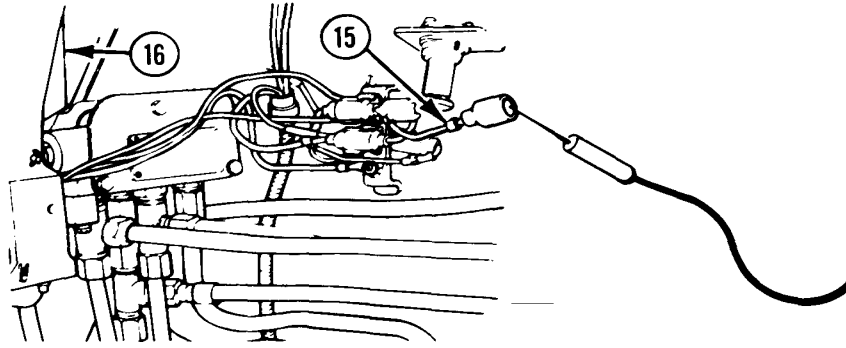
**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

*Step 6.* Disconnect connector (11) from elevating shutoff valve solenoid (12). Place red probe in socket A (13) (lead 174A). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 7. If multimeter indicates no voltage, repair lead 1 74A (7) between elevating shutoff valve solenoid (1 2) and bracket disconnect. Refer to page 2-75. Set MASTER switch OFF. Connect connector (11) to elevating shutoff valve solenoid (12).



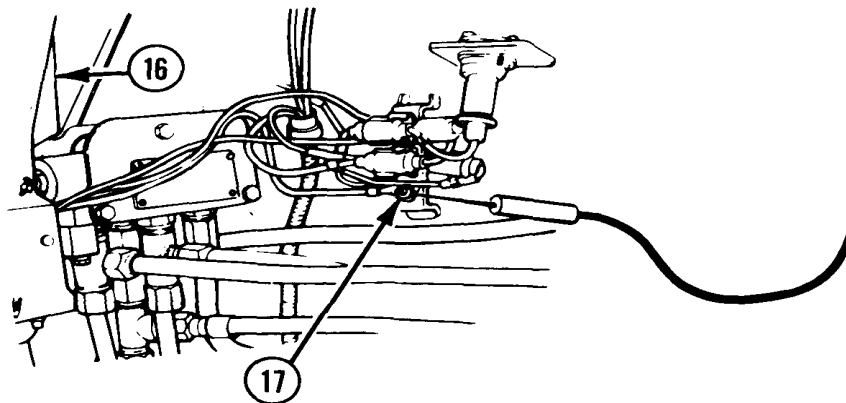
*Step 7.* Place red probe in pin socket A (13) (lead 174A). Place black probe in pin socket B (14) (lead 872) of connector (11). Set MASTER switch ON. Press right elevating trigger switch. Record reading. Release right trigger switch. Press left elevating trigger switch. If multimeter indicates about 24 V when both switches are depressed, notify direct support maintenance to replace elevating solenoid. If multimeter indicates no voltage when the right switch is pressed, go to step 8. If multimeter indicates no voltage when left switch is pressed, go to step 11. Set MASTER switch OFF. Connect connector (11) to elevating shutoff valve solenoid (12).

## 2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).

**WARNING**

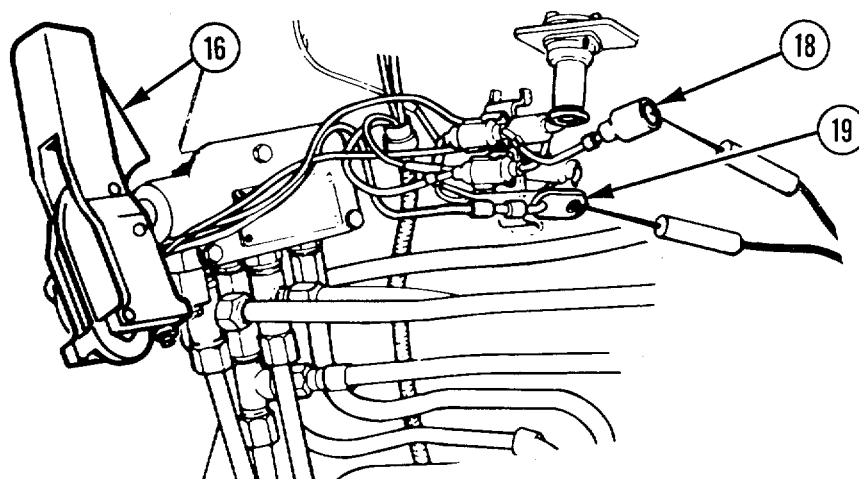
Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.

- Step 8. Disconnect lead 872 (15) from right elevating handle trigger switch (16). Place red probe in lead 872 (15). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 9. If multimeter indicates no voltage, repair lead 872 (15) between elevating shutoff valve solenoid and right elevating handle trigger switch (16). Refer to page 2-75. Set MASTER switch OFF. Connect lead 872 (15).

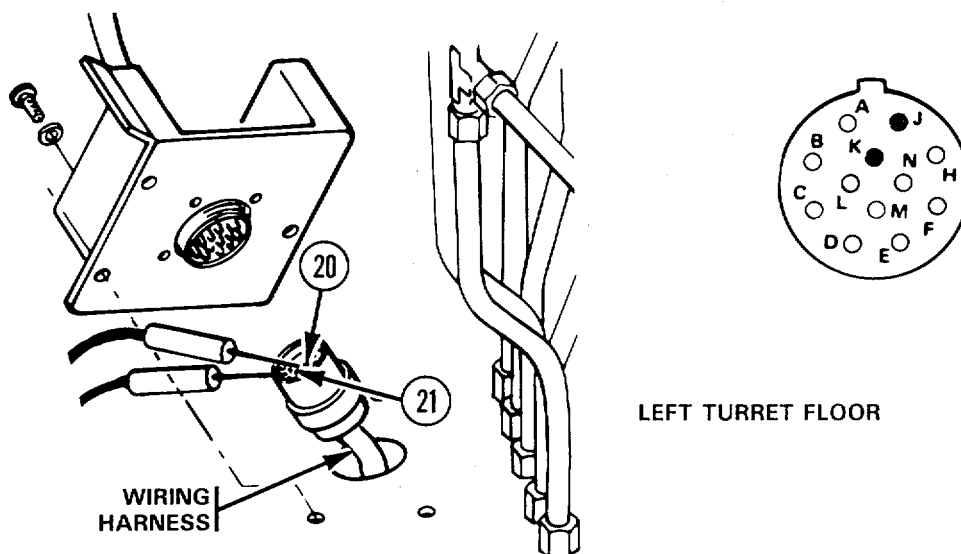
**WARNING**

Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.

- Step 9. Disconnect ground lead (17) from right elevating handle trigger switch (16). Place red probe on ground lead terminal. Ground black probe. Set MASTER switch ON. Press and release right elevating handle trigger switch (16). If multimeter indicates about 24 V when elevating handle trigger switch (16) is pressed and 0 V when elevating handle trigger switch (16) is released, repair ground lead (17). Refer to page 2-75. If multimeter indicates no voltage, go to step 10. Set MASTER switch OFF. Connect ground lead (17).



*Step 10.* Connect multimeter to switch pin (18) and ground (19). Press right elevating handle trigger switch (16). If multimeter indicates 0 ohms, go to step 11. If multimeter indicates infinity, replace right elevating handle trigger switch. Refer to page 2-245. Connect leads.



LEFT TURRET FLOOR

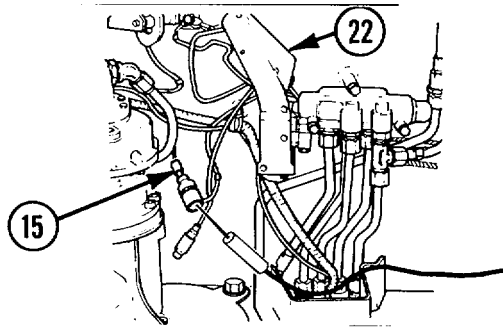
**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

*Step 11.* Disconnect bracket disconnect wiring harness. Place red probe in socket J (20) (lead 872). Place black probe in socket K (21) (lead 174A). If multimeter indicates infinity, repair lead 872 between elevating shutoff valve solenoid and bracket disconnect. Refer to page 2-75. If multimeter indicates about  $20 \pm 5$  ohms, go to step 12. Connect bracket disconnect wiring harness.

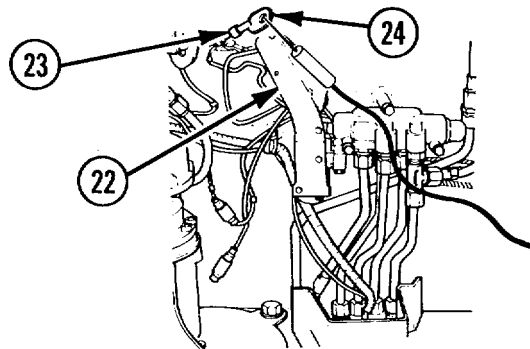


## 2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).

**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

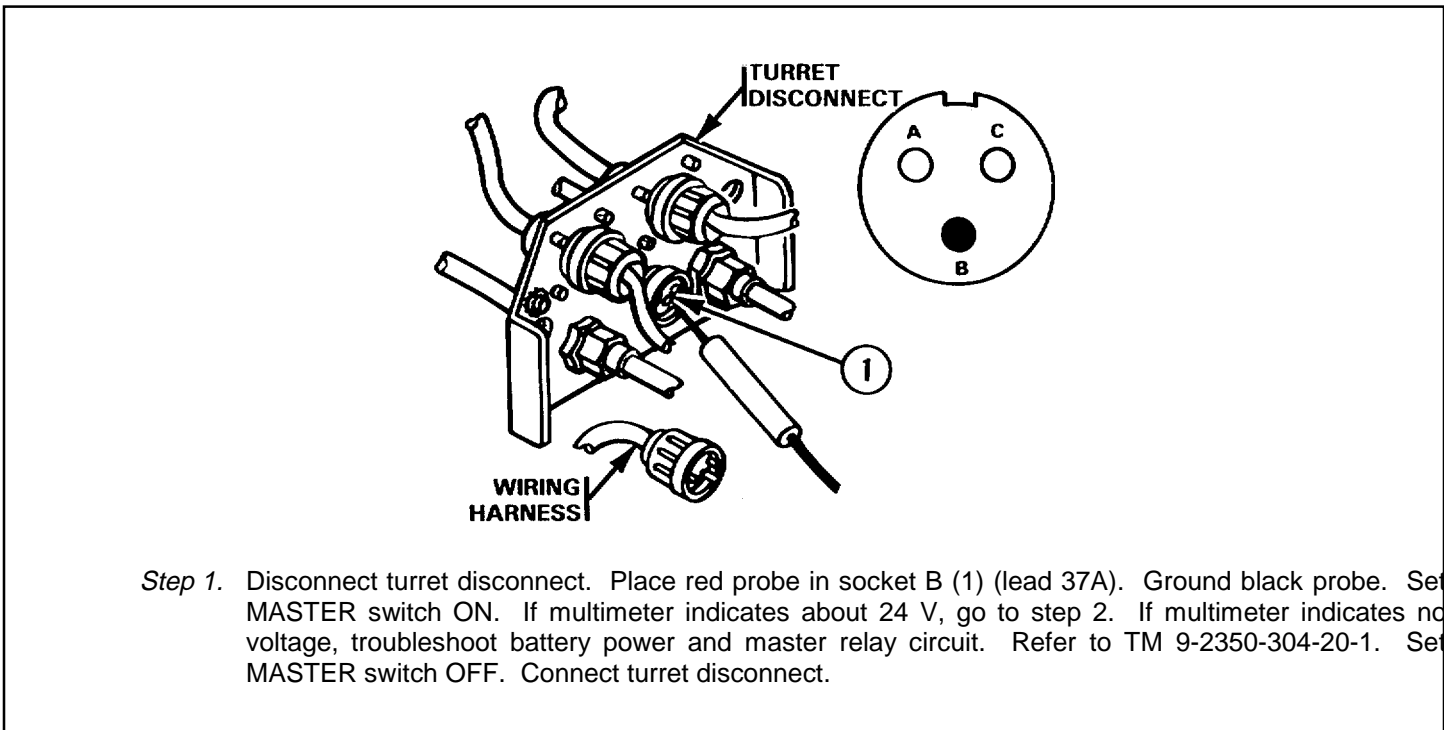
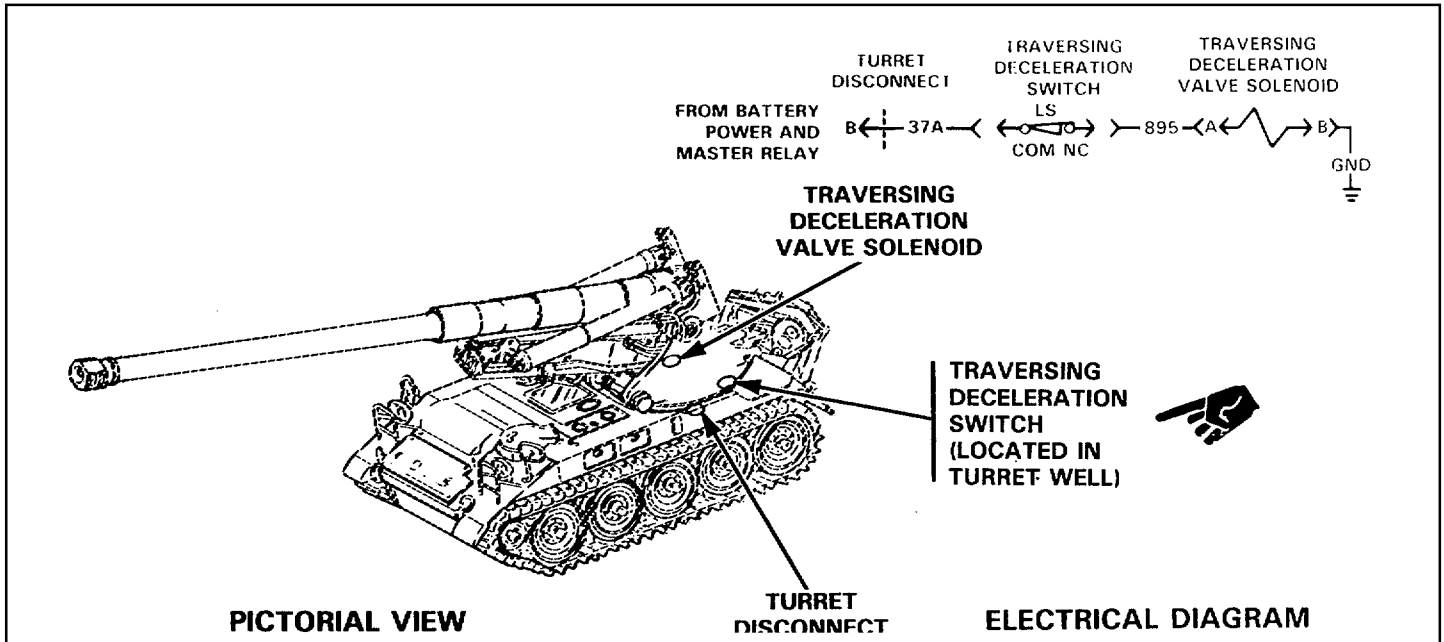
- Step 12.* Disconnect lead 872 (15) from left elevating handle trigger switch (22). Place red probe in lead 872 (15). Ground black probe. Set MASTER switch ON. If multimeter indicates no voltage, repair lead 872 (15) between bracket disconnect and left elevating handle trigger switch (22). Refer to page 2-75. Set MASTER switch OFF. Connect lead (15).

**WARNING**

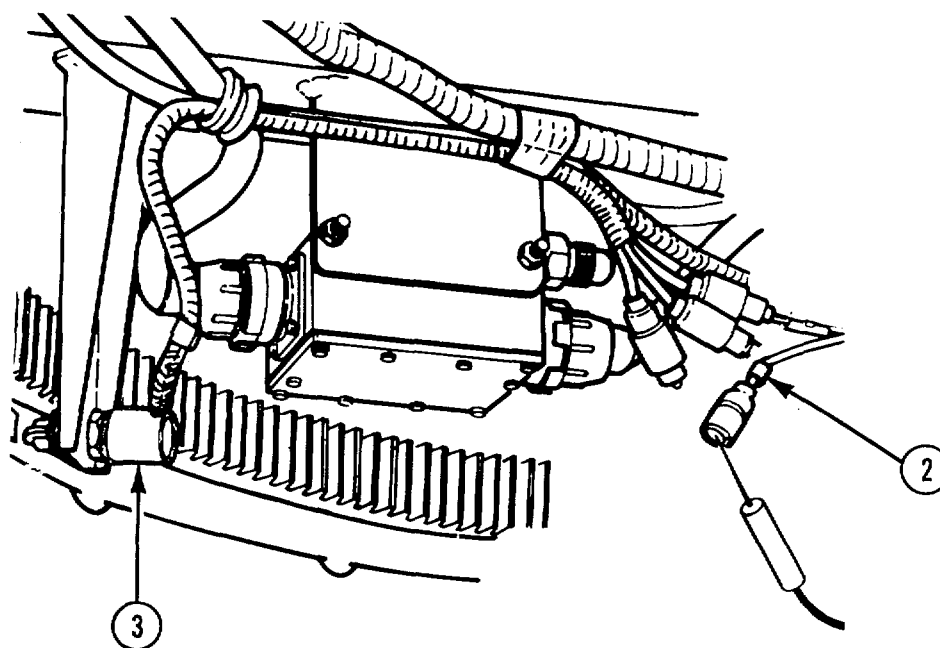
**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

- Step 13.* Disconnect ground lead (23) from left elevating handle trigger switch (22). Place red probe on ground lead terminal (24). Ground black probe. Set MASTER switch ON. Press and release left elevating handle trigger switch (22) is pressed and 0 V when left elevating handle trigger switch (22) is released, repair ground lead (23). Refer to page 2-75. If multimeter indicates no voltage, replace left elevating trigger switch. Refer to page 2-245. Set MASTER switch OFF. Connect ground lead (23).

b. Traversing Deceleration Circuit.

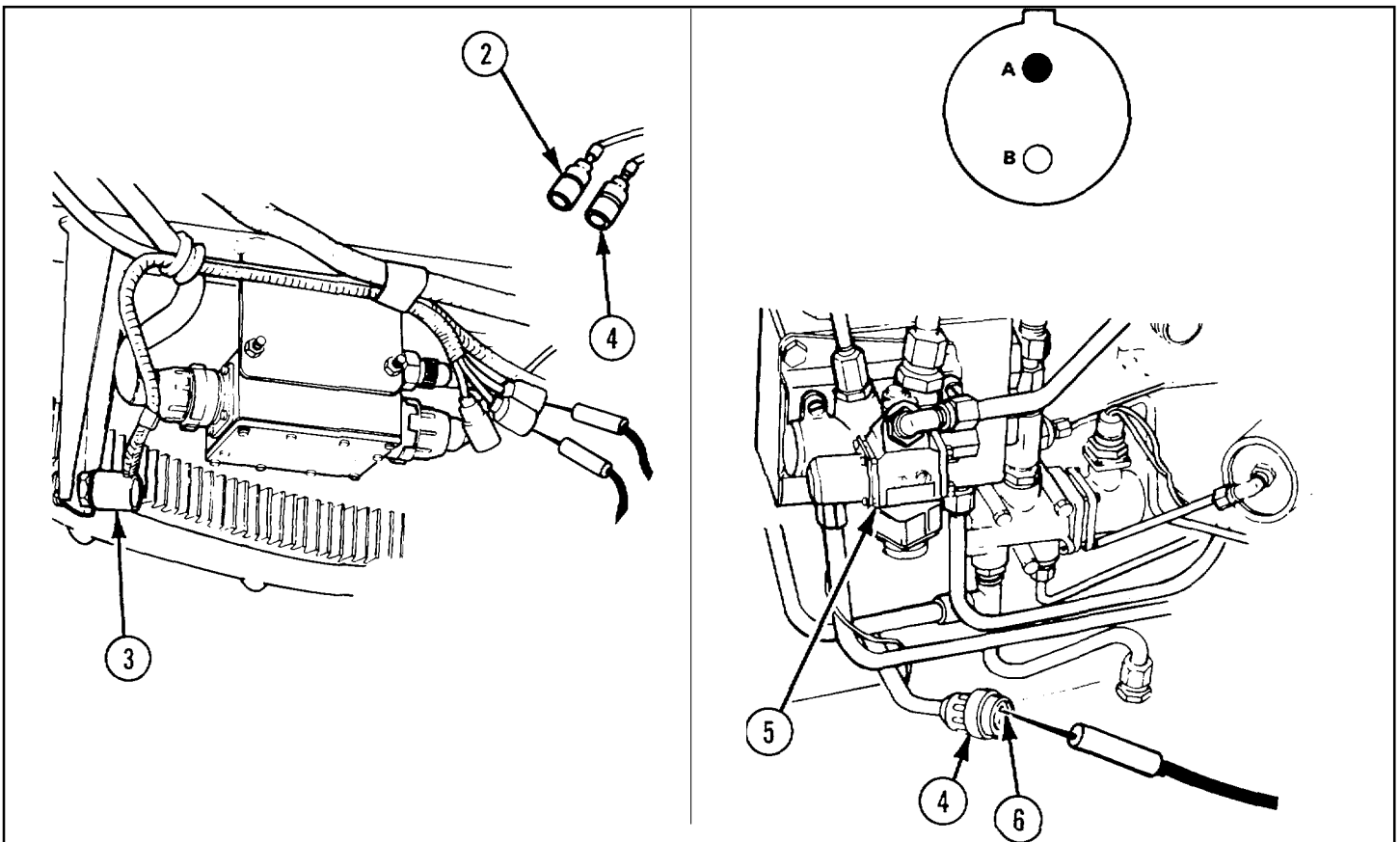


## 2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).

**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

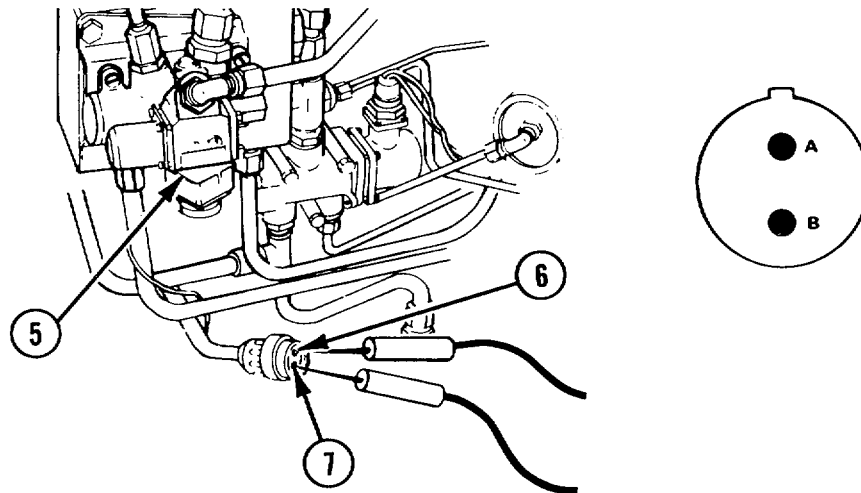
- Step 2.* Disconnect lead 37A (2) from traversing deceleration switch (3). Place red probe in lead 37A (2). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 3. If multimeter indicates no voltage, repair lead 37A (2) between turret disconnect and traversing deceleration switch (3). Refer to page 2-75. Set MASTER switch OFF. Connect lead (2).

**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

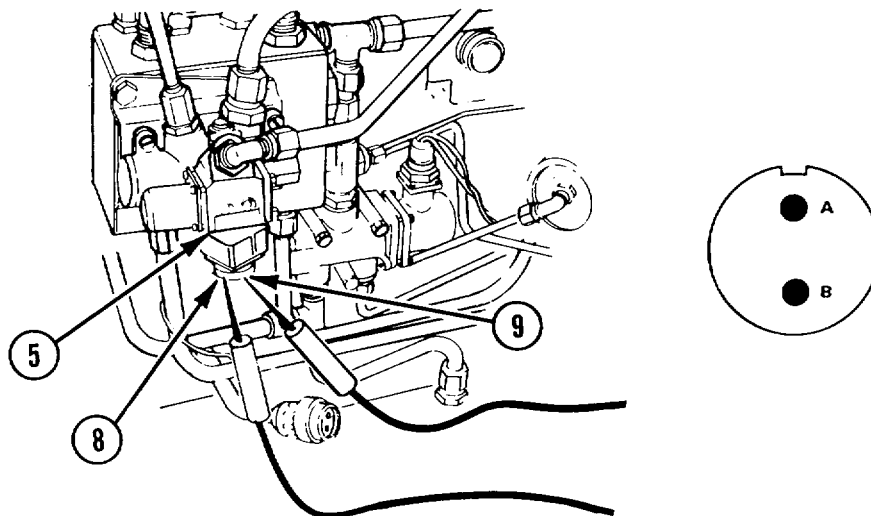
- Step 3.* Disconnect leads 895 (4) and 37A (2) from traversing deceleration switch (3). Connect multimeter to switch pins COM and NO. Press and release switch. If multimeter indicates 0 ohms when switch is pressed and infinity when switch is released, go to step 4. If multimeter does not indicate 0 ohms when switch is pressed and infinity when switch is released, replace traversing deceleration switch. Refer to page 2-243. Connect lead 37A (2) to switch pin COM and lead 895 (4) to switch pin NO.
- Step 4.* Disconnect connector from traversing deceleration valve solenoid (5) place red probe in socket A (6) (lead 895). Ground black probe. Set MASTER switch ON. Press traversing deceleration switch (3). If multimeter indicates about 24 V, GO TO STEP 5. If multimeter indicates no voltage, repair lead 895 (4) between traversing deceleration switch (3) and traversing deceleration valve solenoid (5). Refer to page 2-75. Set MASTER switch OFF. Connect connector to traversing deceleration valve solenoid (5).

## 2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).

**NOTE**

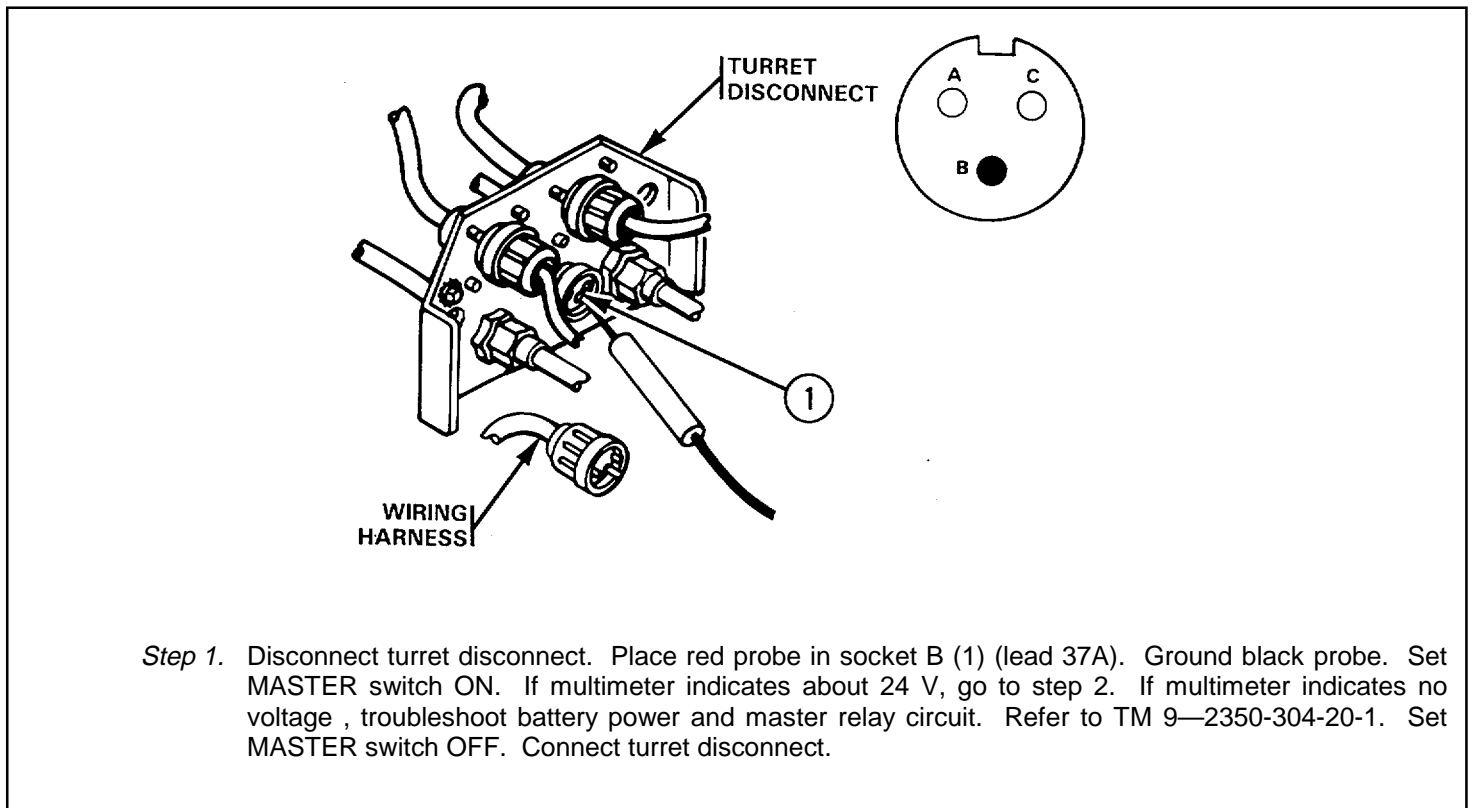
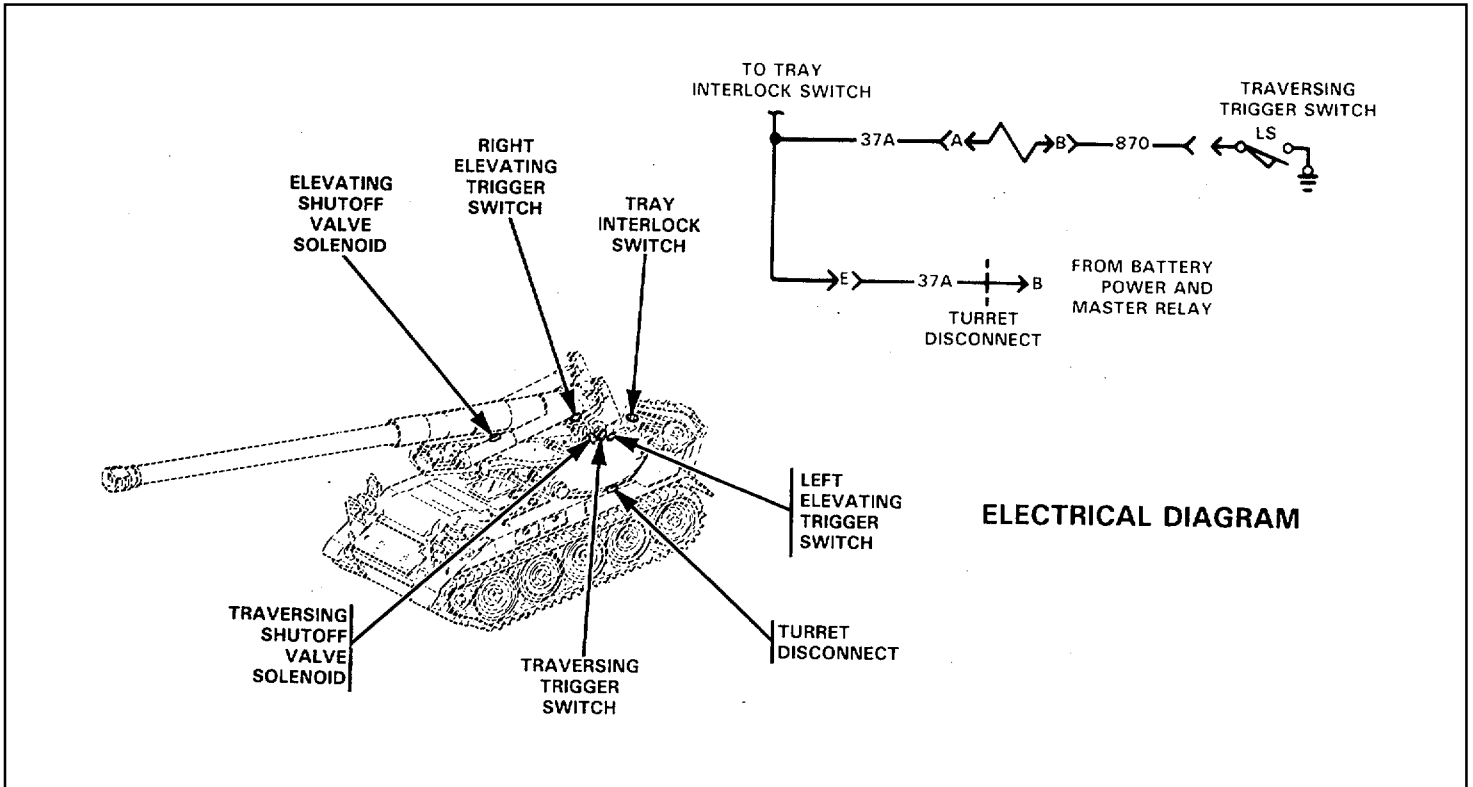
**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

*Step 5.* Place red probe in socket A (6) (LEAD 895). Place black probe in socket B (GND lead). Set MASTER switch ON. Press turret deceleration switch. If multimeter indicates about 24 V, go to step 6. If multimeter indicates no voltage, repair GND lead (7). Refer to page 2-75. Set MASTER switch OFF. Connect connector to traversing deceleration valve solenoid (5).

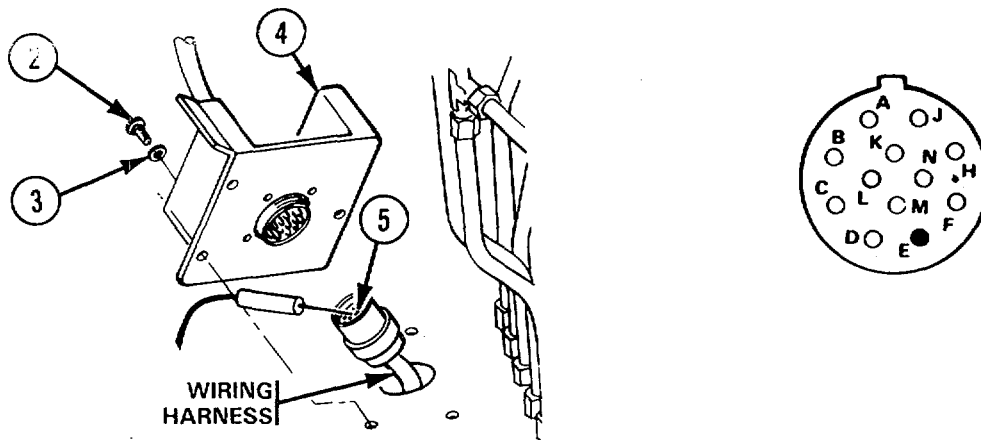


*Step 6.* Place red probe on pin A (8) (lead 895). Place black probe on pin B (9) (GND lead). If multimeter indicates about  $40 \pm 10$  ohms, circuit is operating properly. If multimeter does not indicate about  $40 \pm 10$  ohms, notify direct support maintenance. Connect connector to traversing deceleration valve solenoid (5).

c. Cannon Traversing Control Circuit.



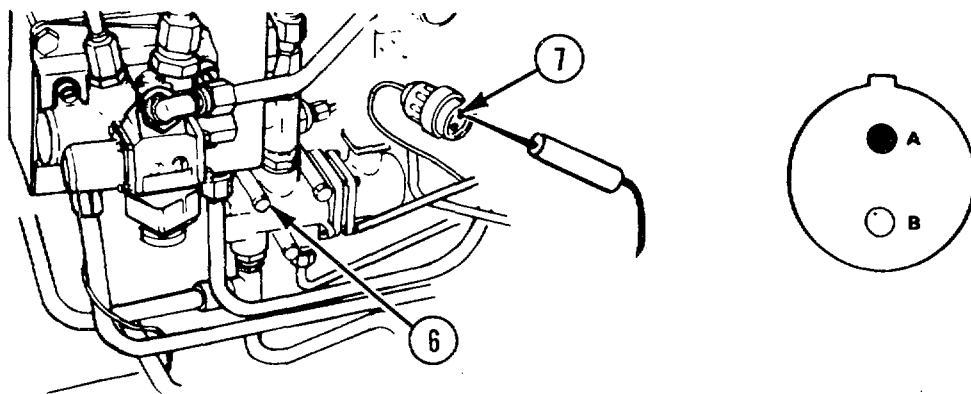
2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).



**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

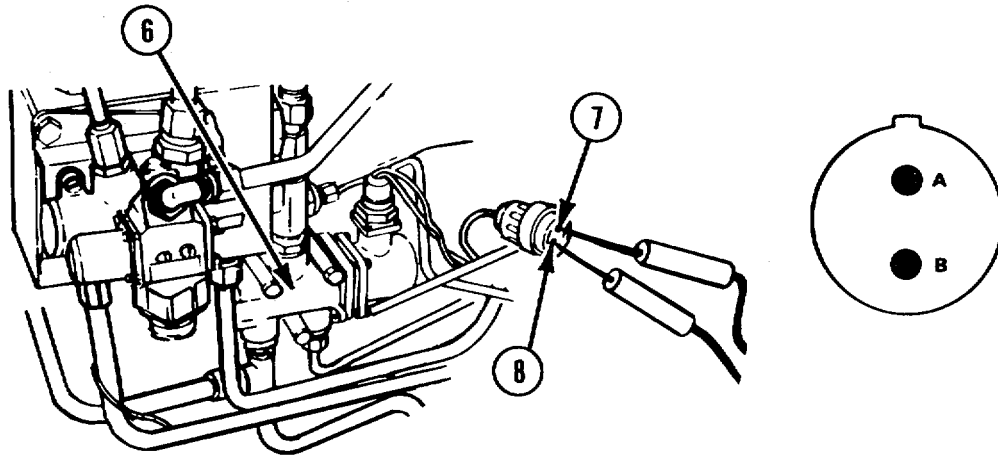
*Step 2.* Remove three screws (2) and three washers (3) attaching bracket (4) to provide access to wiring harness. Disconnect wiring harness at disconnect. Place red probe in socket E (5) (lead 37A). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 3. If multimeter indicates no voltage, repair lead 37A between turret disconnect and bracket disconnect. Refer to page 2-75. Set MASTER switch OFF. Connect wiring harness at disconnect. Install bracket (4) using three washers (3) and three screws (2).



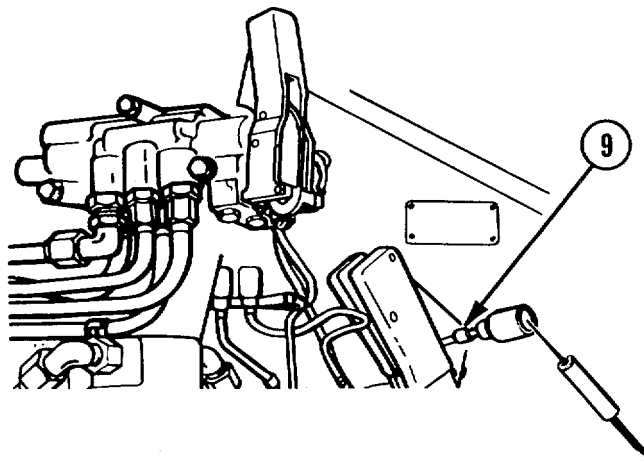
**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

*Step 3.* Disconnect connector from traversing shutoff valve solenoid (6). Place red probe in socket A (7) (lead 37A). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 4. If multimeter indicates no voltage, repair lead 37A between bracket disconnect and traversing shutoff valve solenoid (6). Refer to page 2-75. Set MASTER switch OFF. Connect connector to traversing shutoff valve solenoid (6).



*Step 4.* Place red probe in socket A (7) (lead 37 A). Place black probe in socket B (8) (lead 870) of traversing shutoff valve solenoid (6) disconnect. Set MASTER switch on. If multimeter indicates about 24 V when traversing handle is pressed and 0 V when the traversing handle is released, go to step 5. If multimeter indicates 0 V when the traversing handle is pressed, replace traversing handle trigger switch. Refer to page 2-245. Connect connector to traversing shutoff valve solenoid (6).



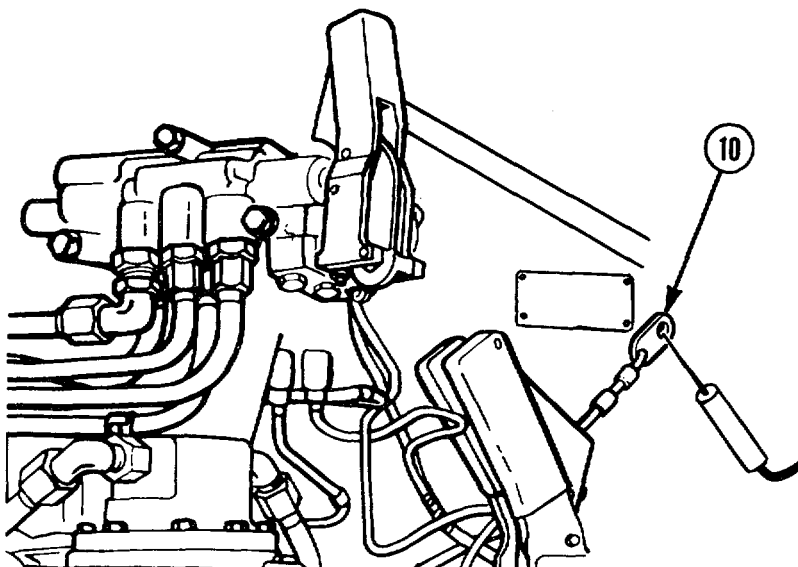
**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

*Step 5.* Disconnect lead 870 (9) from traversing handle trigger switch. Place red probe in lead 870 (9). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 6. If multimeter indicates no voltage, repair lead 870 (9) between traversing shutoff valve solenoid and traversing handle trigger switch. Refer to page 2-75. Set MASTER switch OFF. Connect lead 870 (9).



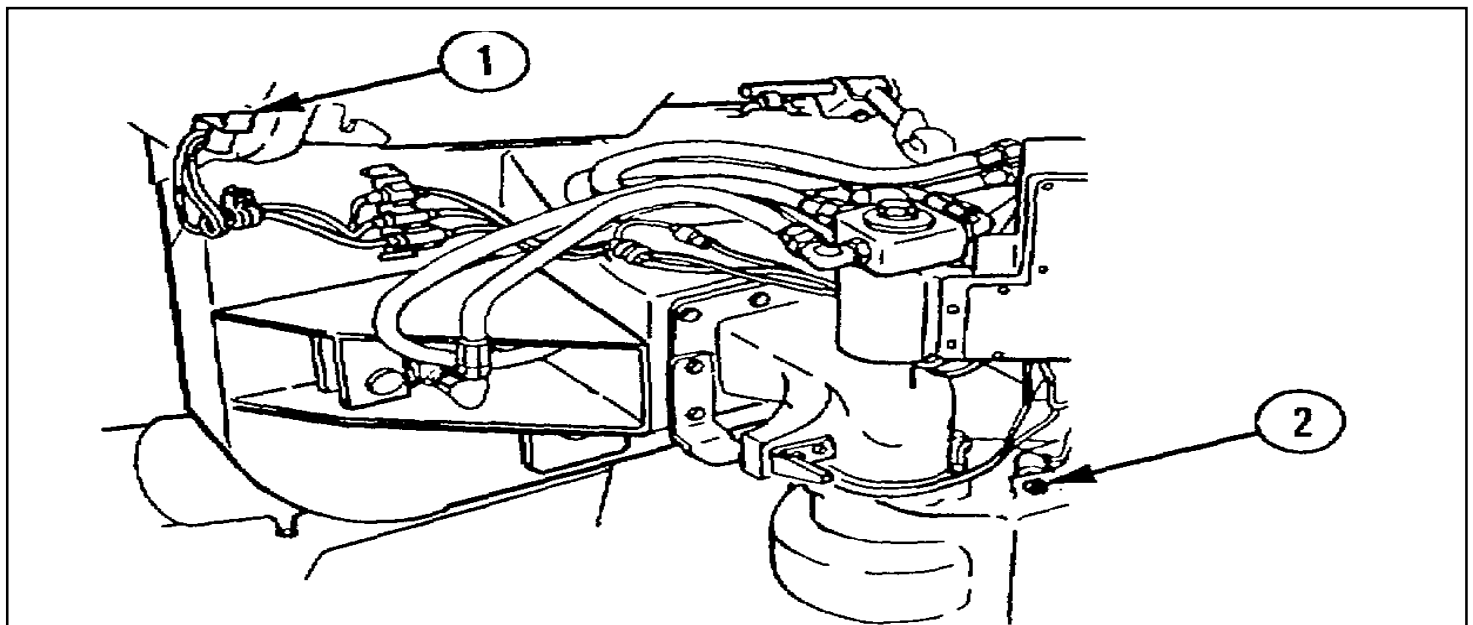
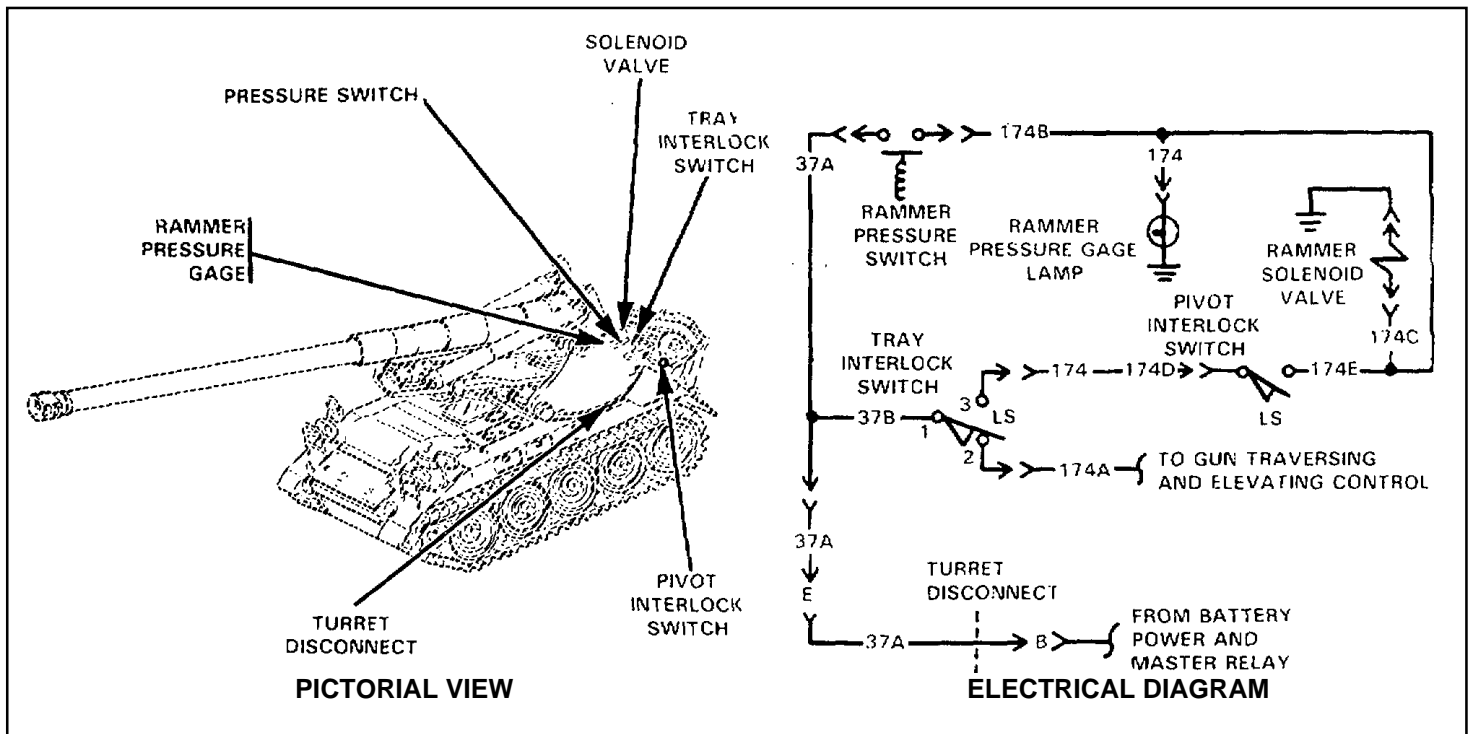
## 2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).

**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

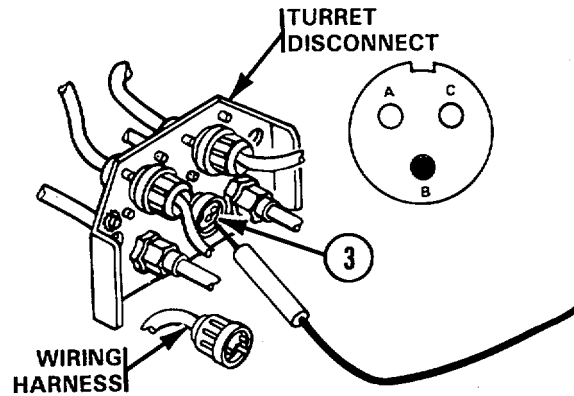
- Step 6.* Disconnect ground lead (10) from traversing handle trigger switch. Place red probe on ground lead terminal. Ground black probe. Set traversing MASTER switch ON. Press and release traversing handle trigger. If multimeter indicates 24 V when handle trigger is pressed and 0 V when trigger is released, repair ground lead connection to ground. Refer to page 2-75. If 24 V is not indicated when traversing handle trigger is pressed and 0 V when trigger is released, replace traversing handle trigger switch. Refer to page 2-245. Set MASTER switch OFF. Connect ground lead (10).

C. LOADER AND RAMMER INSTALLATION-Rammer Control Circuit.

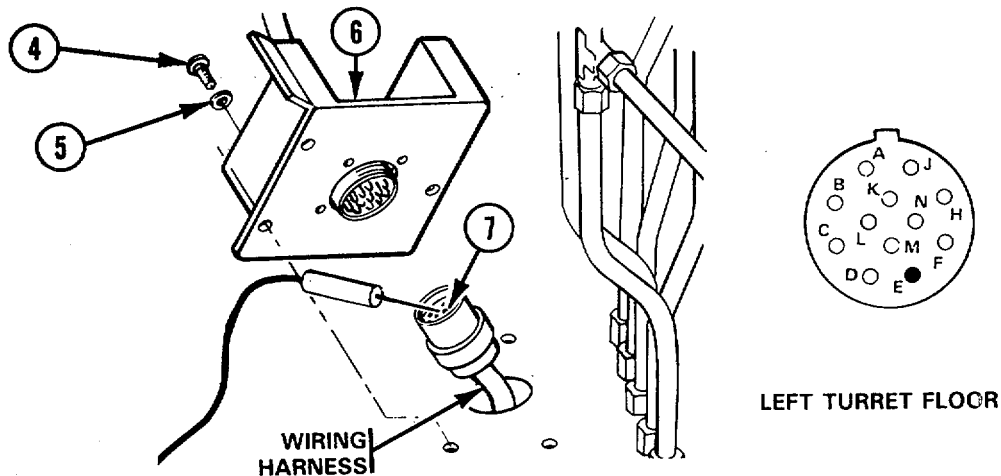


Step 1. Set MASTER switch ON. Press rammer tray interlock switch (1) and pivot interlock switch (2). If rammer pressure gage lamp lights, go to step 11. If rammer pressure gage lamp does not light, go to step 2. Set MASTER switch OFF. Release rammer tray interlock switch (1) and pivot interlock switch (2).

2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).



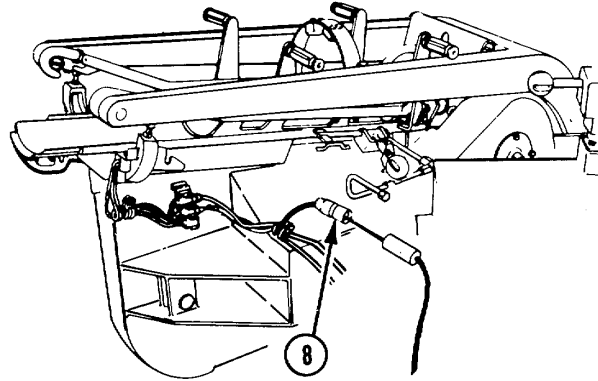
Step 2. Disconnect wiring harness at turret disconnect. Place red probe in socket B (3) (lead 37A). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 3. If multimeter indicates no voltage, troubleshoot battery power and master relay circuit. Refer to TM 92350-304-20-1. Set MASTER switch OFF. Connect turret disconnect.



**WARNING**

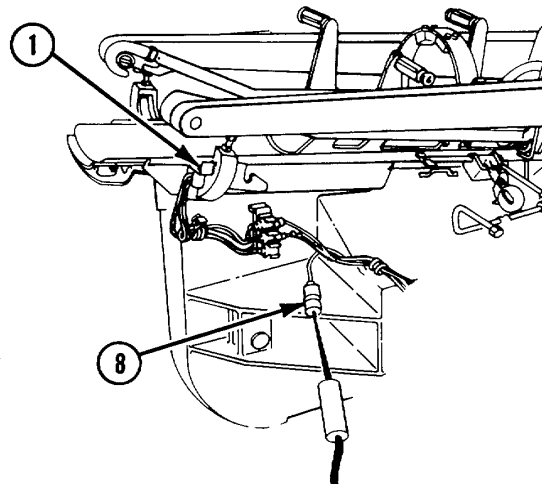
**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

Step 3. Remove three screws (4) and three washers (5) attaching bracket (6) to deck. Raise bracket (6) to provide access to wiring harness. Disconnect wiring harness at disconnect. Place red probe in socket E (7) (lead 37A). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 4. If multimeter indicates no voltage, repair lead 37A between turret disconnect and bracket disconnect. -Refer to page 2-75. Set MASTER switch OFF. Connect wiring harness at disconnect. Install bracket (6) to deck using three washers (5) and three screws (4).

**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

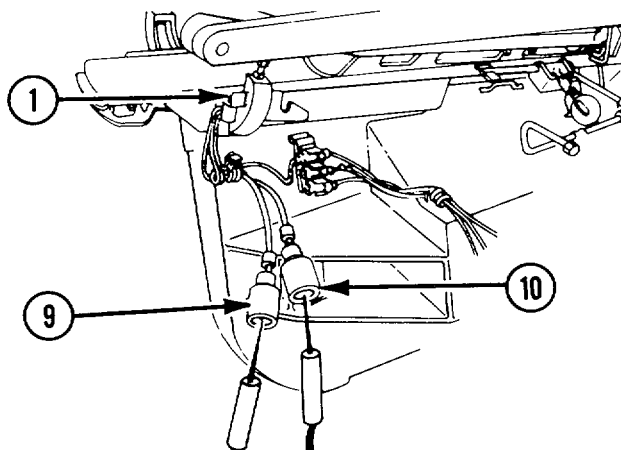
- Step 4.* Disconnect lead 37A (8) at line disconnect. Place red probe in lead 37A (8). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 5. If multimeter indicates no voltage, repair lead 37A (8) between bracket disconnect and line disconnect. Refer to page 2-75. Set MASTER switch OFF. Connect lead 37A (8).

**WARNING**

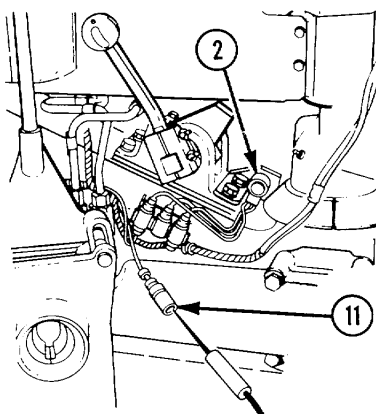
**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

- Step 5.* Disconnect lead 37A (8) from tray interlock switch (1) lead 37B. Place red probe in lead 37A (8) and ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 6. If multimeter indicates no voltage, repair lead 37A (8). Refer to page 2-75. Set MASTER switch OFF before connecting leads 37A (8) and 37B.

## 2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).

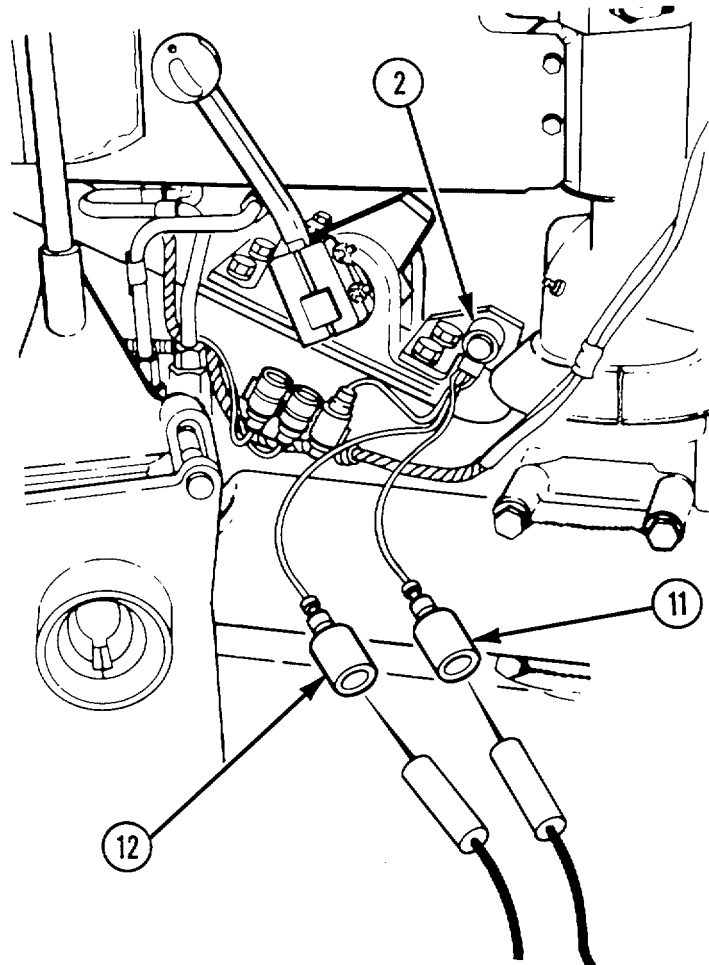


Step 6. Disconnect leads 37B (9) and 174 (10) from tray interlock switch (1). Connect multimeter to lead 37B (9) and lead 174 (10). Press tray interlock switch (1). If multimeter indicates 0 ohms, go to step 7. If multimeter indicates infinity, replace tray interlock switch (1). Refer to page 2-279. Connect leads 37B (9) and 174 (10).

**WARNING**

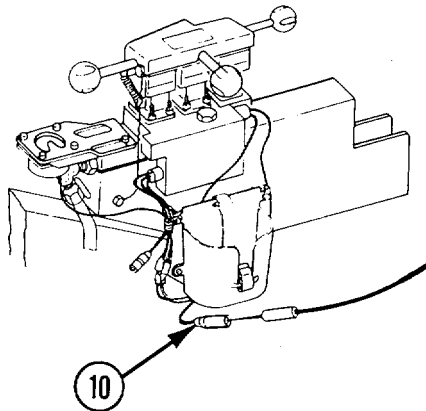
**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

Step 7. Disconnect lead 174D (11) from pivot interlock switch (2). Place red probe in lead 174D (11). Ground black probe. Set MASTER switch ON. Press rammer tray interlock switch. If multimeter indicates about 24 V, go to step 8. If multimeter indicates no voltage, repair lead 174D (11) between pivot interlock switch (2) and connector 174 at tray interlock switch. Refer to page 2-75. Set MASTER switch OFF. Release tray interlock switch. Connect lead 174D (11).



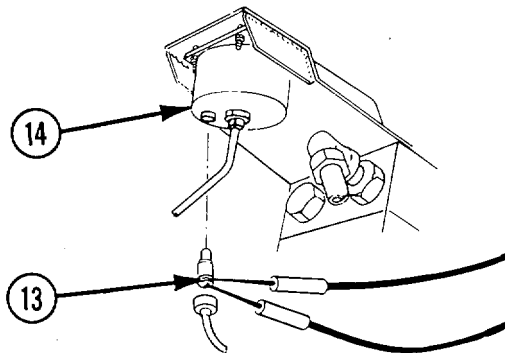
Step 8. Disconnect leads 174D (11) and 174E (12) of pivot interlock switch (2). Connect multimeter to lead 174D (11) and lead 174E (12). Press pivot interlock switch (2). If multimeter indicates 0 ohms, go to step 9. If multimeter indicates infinity, replace pivot interlock switch (2). Refer to page 2-276. Connect leads 174D (11) and 174E (12).

## 2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).

**WARNING**

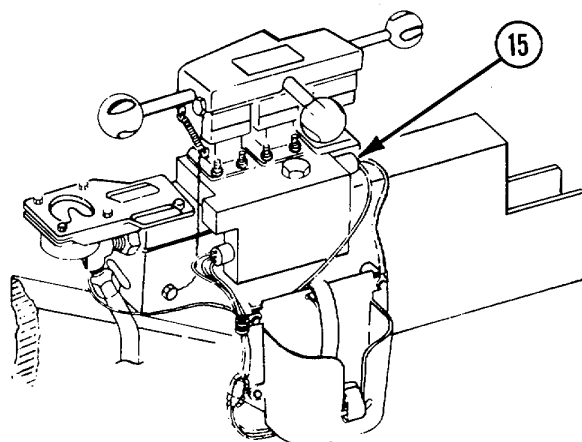
**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

- Step 9. Disconnect lead 174 (10) from rammer pressure gage lamp lead. Place red probe in lead 174 (10). Ground black probe. Set MASTER switch ON. Press tray interlock switch and pivot interlock switch. If multimeter indicates about 24 V, go to step 10. If multimeter indicates no voltage, repair lead 174 (10) between rammer pressure gage lamp lead and connector 174E at pivot interlock switch. Refer to page 2-75. Set MASTER switch OFF. Release tray interlock switch and pivot interlock switch. Connect lead 174 (10).

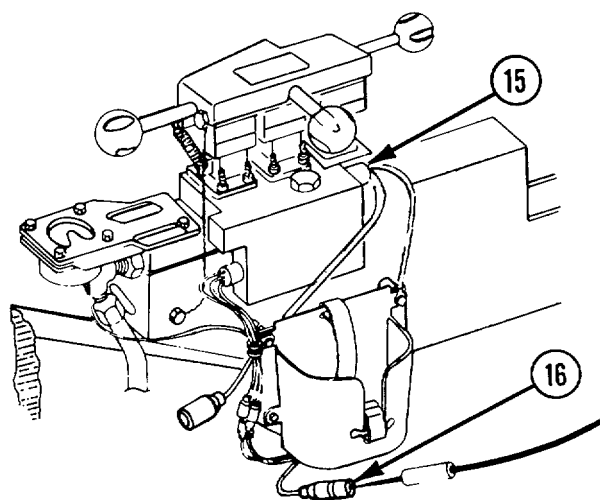
**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

- Step 10. Remove LED (13) from pressure gage (14). Connect multimeter between electrical contacts on the LED. If multimeter indicates infinity, replace LED. Refer to page 2-245.



Step 11. Set MASTER switch ON. Press rammer tray interlock switch and pivot interlock switch. If rammer solenoid valve (15) operates, go to step 14. If U rammer solenoid valve (15) does not operate, go to step 12. Set MASTER switch OFF. Release rammer tray interlock switch and pivot interlock switch.



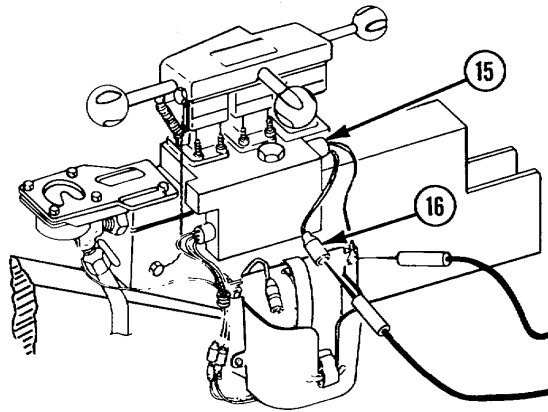
**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

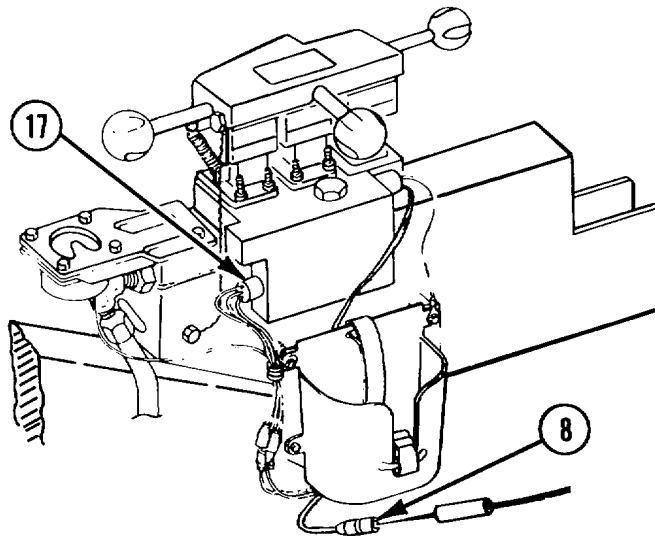
Step 12. Disconnect lead 174C (16) from rammer solenoid valve (15). Place red probe in lead 174C (16). Ground black probe. Set MASTER switch ON. Press tray interlock switch and pivot interlock switch. If multimeter indicates about 24 V, go to step 13. If multimeter indicates no voltage, repair lead 174C (16) from solenoid valve to connector 174E at pivot interlock switch. Refer to page 2-75. Set MASTER switch OFF. Release tray interlock switch and pivot interlock switch. Connect lead 174C (16).



## 2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).



Step 13. Disconnect lead 174C (16) from rammer solenoid valve (15). Connect multimeter to lead 174C (16) and lug of lead GND. If multimeter indicates 0 ohms, go to step 14. If multimeter indicates infinity, notify direct support maintenance.

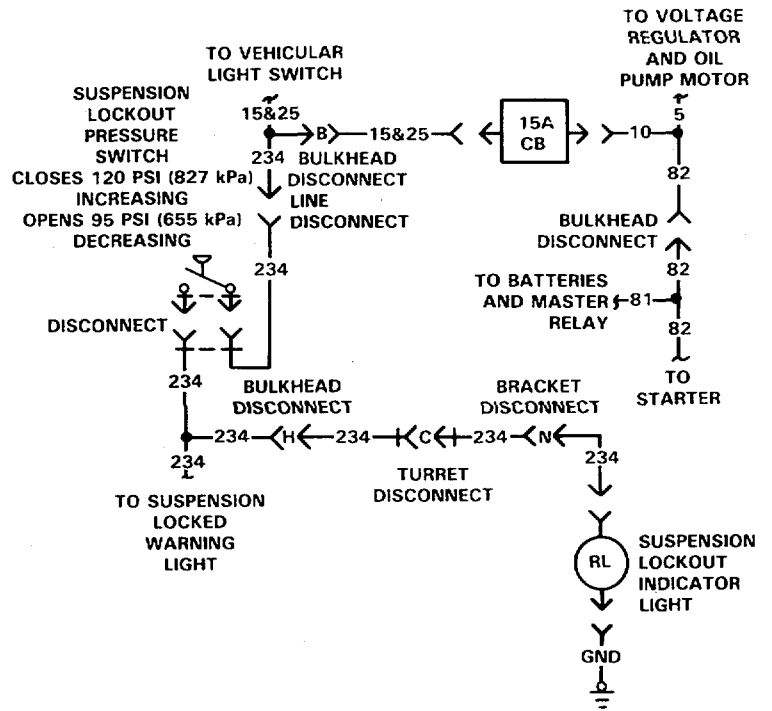
**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

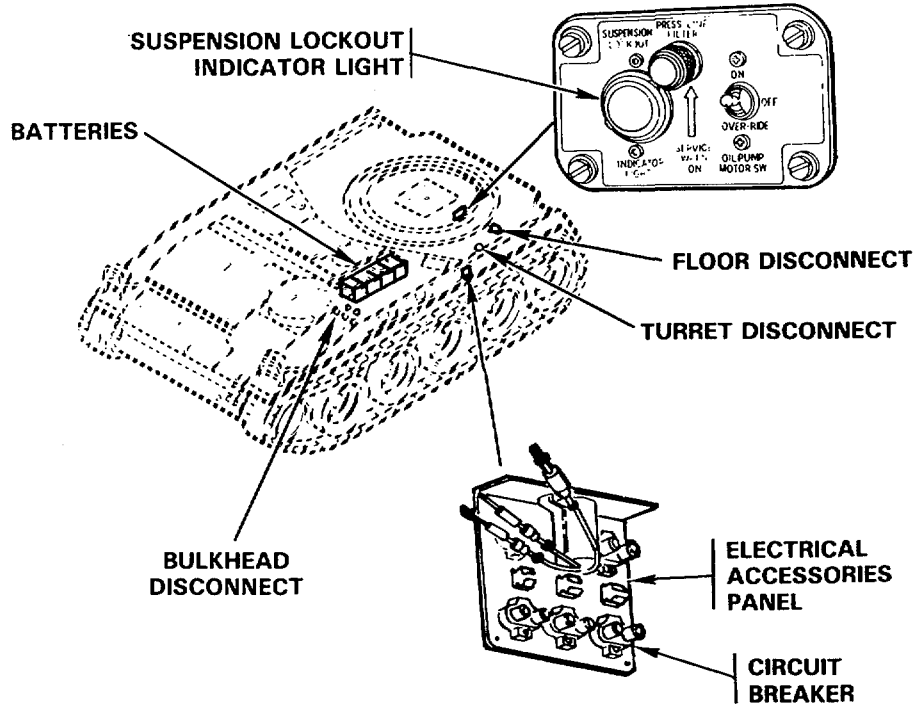
Step 14. Disconnect lead 37A (8) from rammer pressure switch (17). Connect red probe to lead 37A (8). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, notify direct support maintenance. If multimeter indicates no voltage, repair lead 37A (8) between rammer pressure switch (17) and disconnect shown in step 4. Refer to page 2-75. Set MASTER switch OFF.

D. ELECTRICAL INSTALLATION

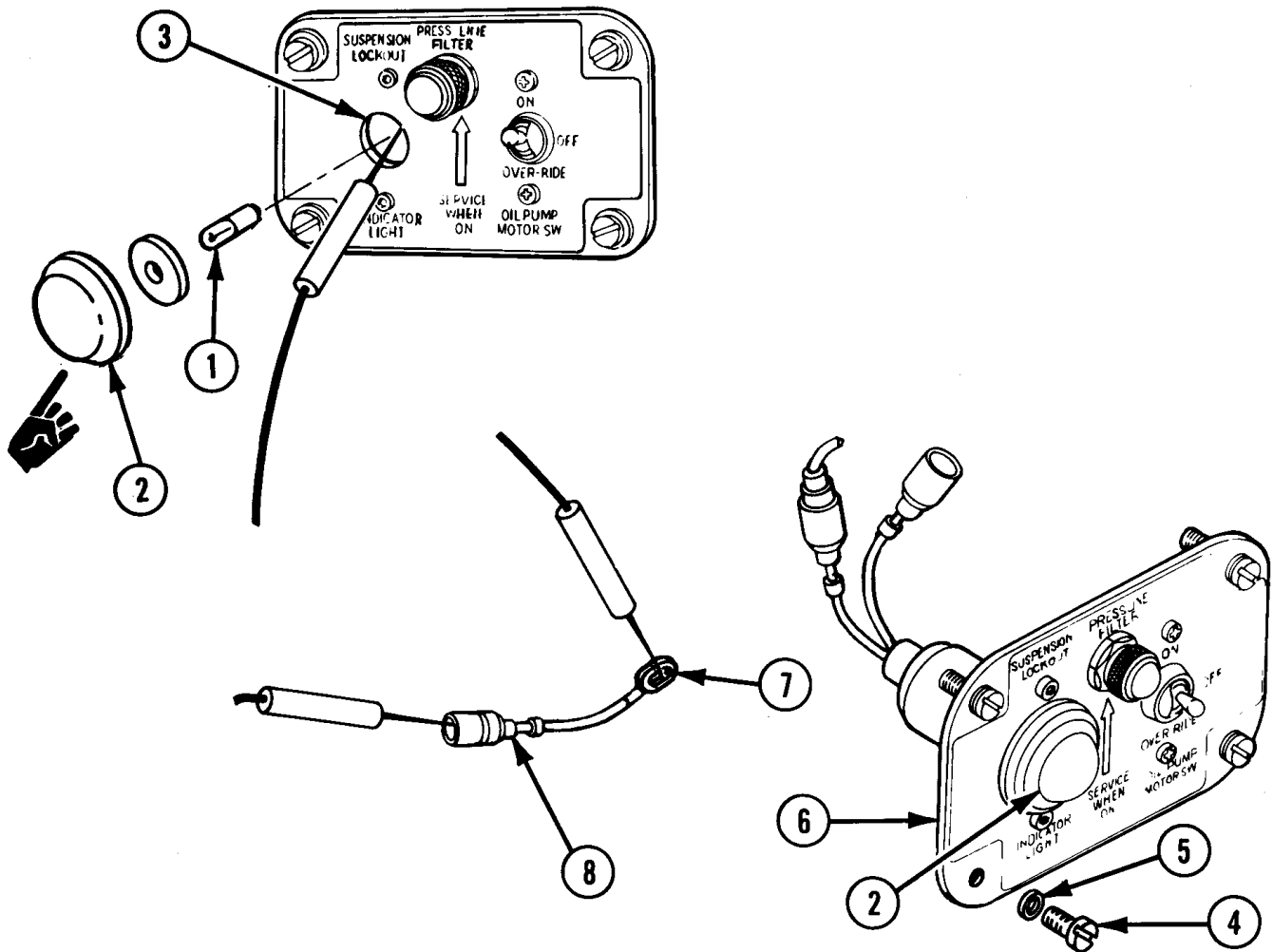
a. Suspension Lockout Indicator Light Circuit.



ELECTRICAL DIAGRAM



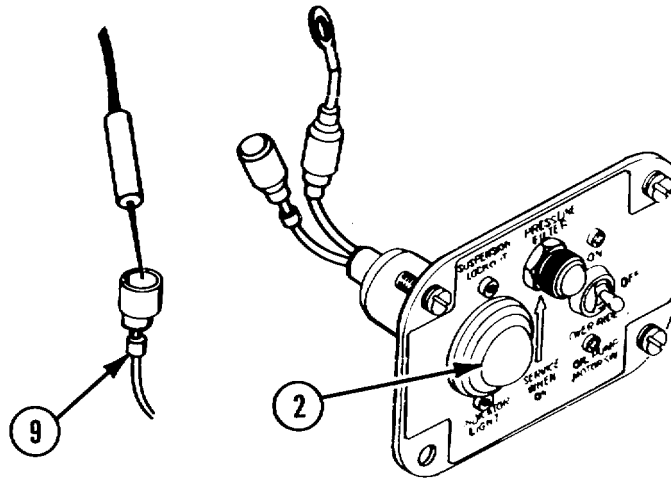
PICTORIAL VIEW



**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

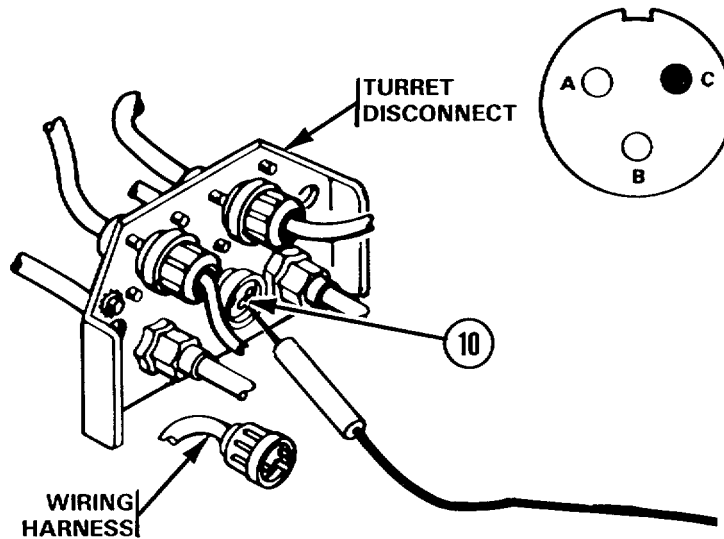
- Step 1. Remove LED (1) from SUSPENSION LOCKOUT INDICATOR LIGHT ASSEMBLY (2). Refer to page 2-269. Set MASTER switch ON. Place suspension lockout control valve handle in locked position. Place oil pump motor switch in ON position. Place red probe in socket (3). Ground black probe. If multimeter indicates about 24 V, replace LED (1). If multimeter indicates no voltage, set MASTER switch OFF, install LED (1), and go to step 2.
- Step 2. Remove four screws (4), four washers (5), and suspension lockout plate (6) for access to electrical leads. Disconnect lead GND (7) from SUSPENSION LOCKOUT INDICATOR LIGHT ASSEMBLY (2). Connect multimeter between terminal end (8) of lead GND (7) and ground. If multimeter indicates continuity, go to step 3. If multimeter does not indicate continuity, repair lead GND (7). Refer to page 2-75. Connect lead GND (7) to SUSPENSION LOCKOUT INDICATOR LIGHT ASSEMBLY (2).



**WARNING**

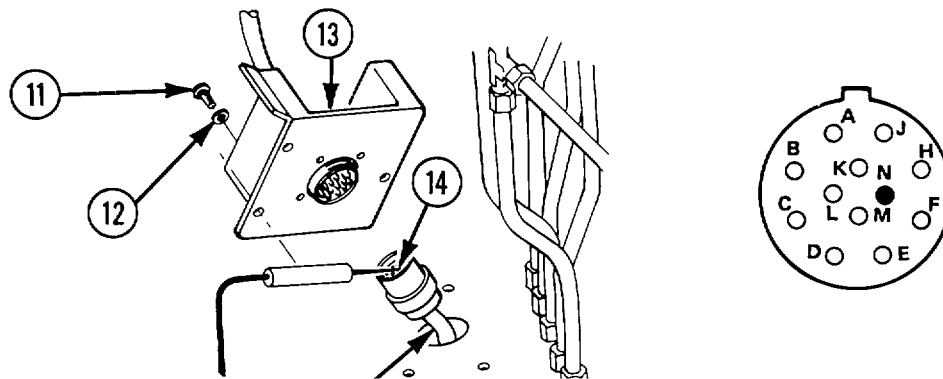
Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.

- Step 3.* Disconnect lead 234 (9) from SUSPENSION LOCKOUT INDICATOR LIGHT ASSEMBLY (2). Place red probe in lead 234 (9) and ground black probe. U Set MASTER switch ON. If multimeter indicates about 24 V, replace SUSPENSION LOCKOUT INDICATOR LIGHT ASSEMBLY (2). Refer to page 2-269. If multimeter indicates no voltage, go to step 4. Set MASTER switch OFF. Connect lead 234 (9) to SUSPENSION LOCKOUT INDICATOR LIGHT ASSEMBLY (2).



- Step 4.* Position cannon in battery position for access to turret disconnect. Disconnect wiring harness at turret disconnect. Place red probe in socket C (10) (lead 234). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 5. If multimeter indicates no voltage, go to step 6. Set MASTER switch OFF. Connect wiring harness at turret disconnect.

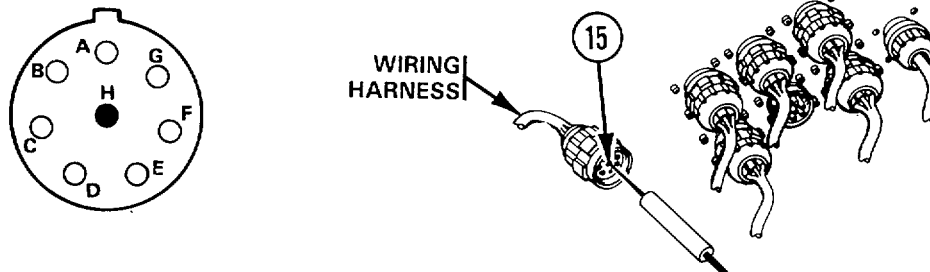
2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).



**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

*Step 5.* Remove three screws (11) and three washers (12) attaching bracket (13) to deck. Raise bracket (13) to provide access to wiring harness. Disconnect wiring harness at disconnect. Place red probe in plug socket N (14) (lead 234). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, repair lead 234 from disconnect to SUSPENSION LOCKOUT INDICATOR LIGHT ASSEMBLY. Refer to page 2-75. If multimeter indicates no voltage, repair lead 234 from disconnect to turret disconnect. Refer to page 2-75. Set MASTER switch OFF. Connect wiring harness at disconnect. Install bracket (13) using three washers (12), and three screws (11).

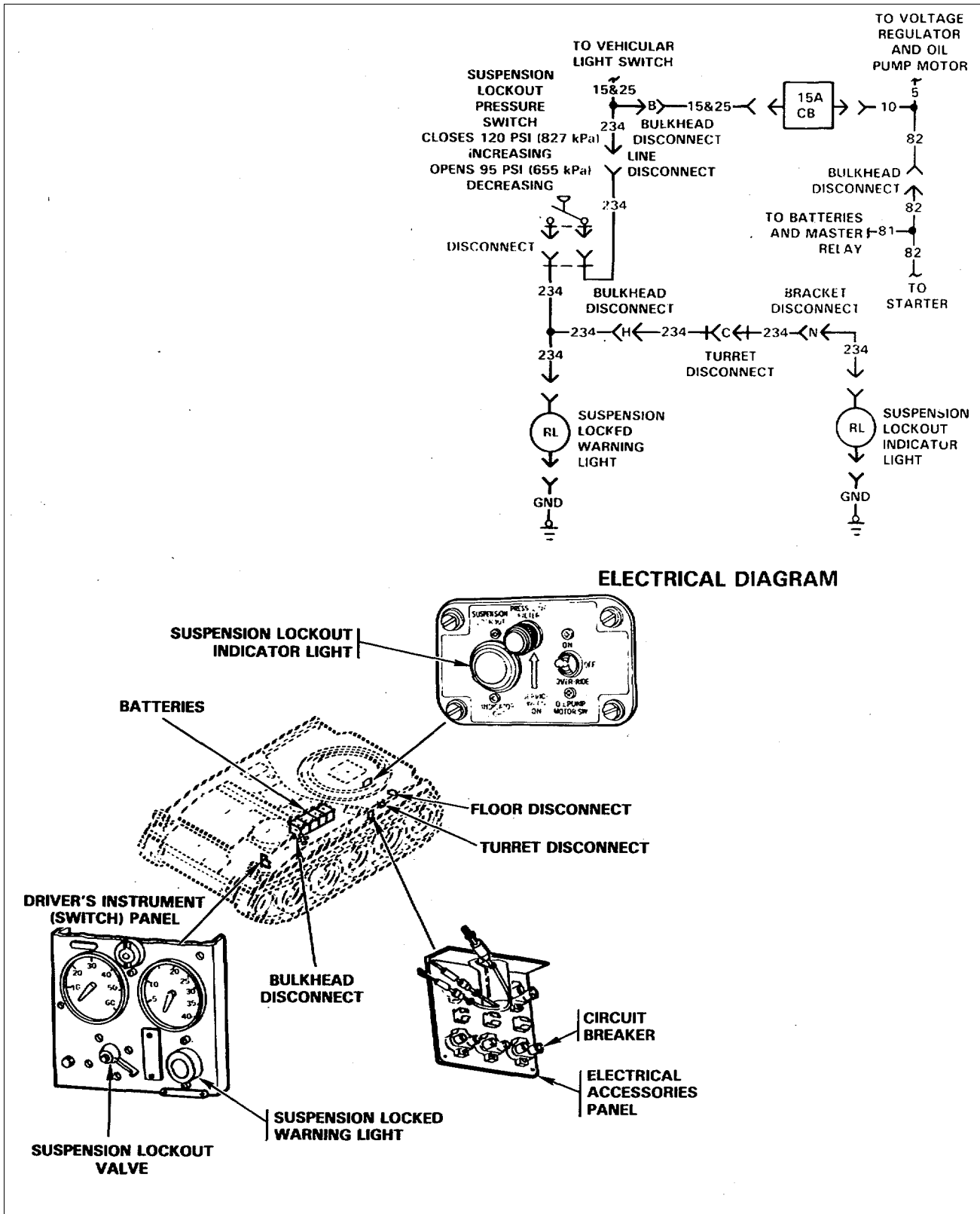


**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

*Step 6.* Refer to TM 9-2350-304-20-1 to remove driver's seat and driver's compartment aft cowl for access to bulkhead disconnect. Disconnect wiring harness at bulkhead disconnect. Place red probe in plug socket H (15) (lead 234). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, repair lead 234 from bulkhead disconnect to turret disconnect. Refer to page 2-75. If multimeter indicates no voltage, repair lead 234 from bulkhead disconnect to suspension lockout pressure switch. Refer to page 2-75. Set MASTER switch OFF. Connect wiring harness at bulkhead disconnect.

b. Suspension Locked Warning Light and Suspension Lockout Indicator Light.



2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).

The diagram shows a suspension lockout pressure switch assembly (1) with a wiring harness connected to it. A circular inset shows a two-pin socket with a black pin labeled 'A' and a white pin labeled 'B'. A red probe is shown inserted into socket A (2). The wiring harness is labeled 'WIRING HARNESS'.

**Step 1.** Disconnect wiring harness at suspension lockout pressure switch (1) behind driver's instrument (switch) panel. Place red probe in plug socket A (2) (lead 234). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 2. If multimeter indicates no voltage, connect wiring harness at suspension lockout pressure switch (1). Set MASTER switch OFF.

The diagram shows the same suspension lockout pressure switch assembly (1) with the wiring harness disconnected. A multimeter (3) is shown testing the receptacle pins (3) on the switch. The wiring harness is labeled 'WIRING HARNESS'.

**Step 2.** Connect multimeter to receptacle pins (3) on suspension lockout pressure switch (1). If multimeter indicates continuity, repair lead 234 between suspension lockout pressure switch (1) and both SUSPENSION LOCKED warning light and SUSPENSION LOCKOUT INDICATOR LIGHT. Refer to page 2-75. If multimeter does not indicate continuity, replace suspension lockout instruction plate and warning light. Refer to page 2-269. Connect wiring harness to suspension lockout pressure switch (1).

**WIRING HARNESS**

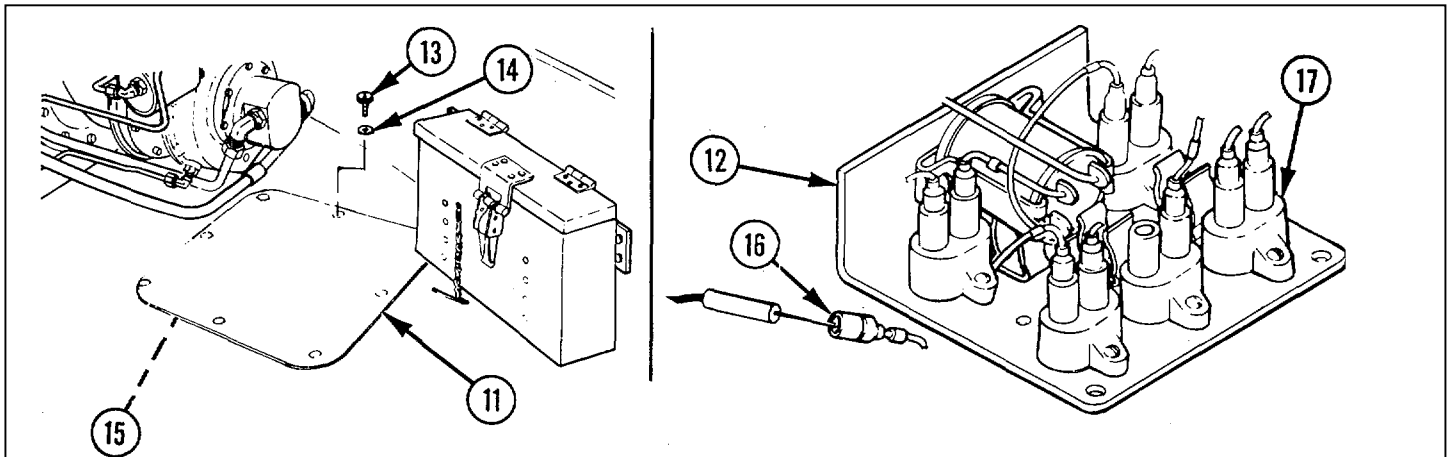
Step 3. Disconnect wiring harness at bulkhead disconnect. Place jumper wire to pin D (4) and socket D (5) (lead 459). Place red probe on pin B (6) (lead 15 & 25) of plug. Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 4. If multimeter indicates no voltage, go to step 5. Set MASTER switch OFF. Connect wiring harness at bulkhead disconnect.

**WARNING**  
**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

Step 4. Disconnect lead 234 (pin end) (7) and lead 234 (terminal end) (8) behind driver's instrument (switch) panel (9) at line disconnect (10). Place red probe in lead 234 (pin end) (7). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, repair lead 234 (pin end) (7) between line disconnect and suspension lockout pressure switch. Refer to page 2-75. If multimeter indicates no voltage, repair lead 234 (terminal end) (8) between line disconnect and bulkhead disconnect. Refer to page 2-75. Set MASTER switch OFF. Connect lead 234 (pin end) (7) and lead 234 (terminal end) (8) at line disconnect (10).

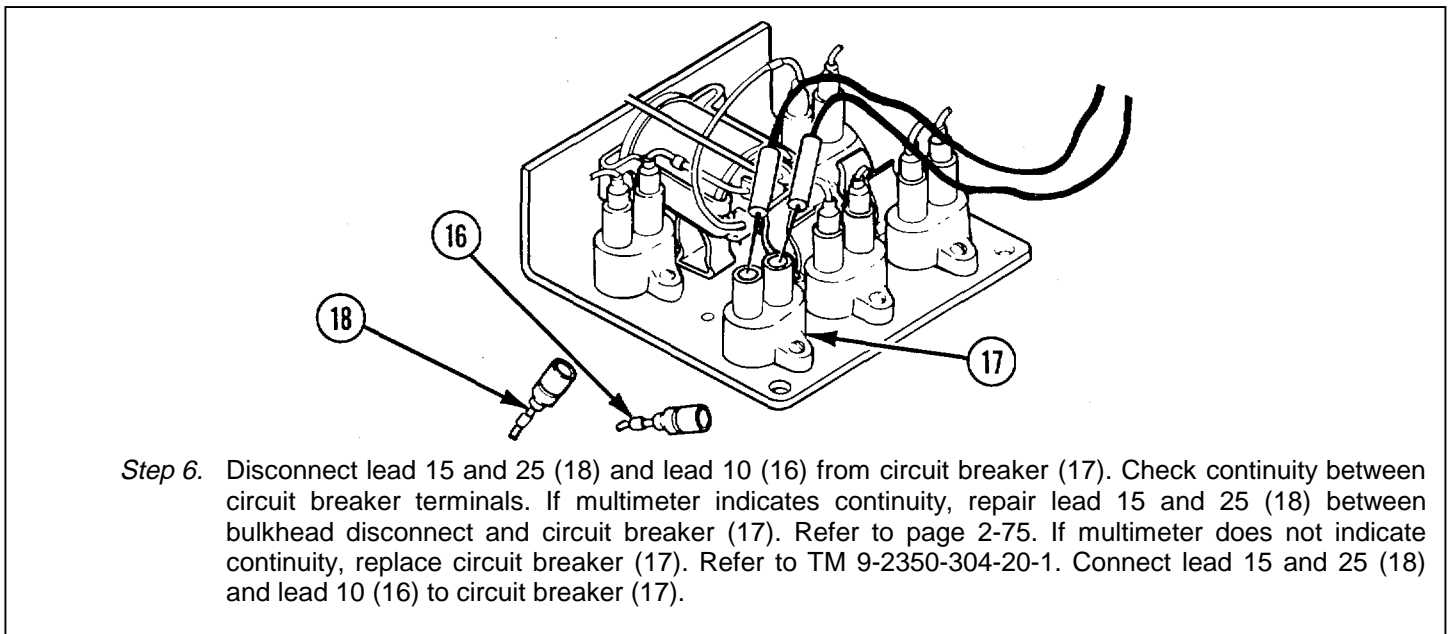


## 2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).

**WARNING**

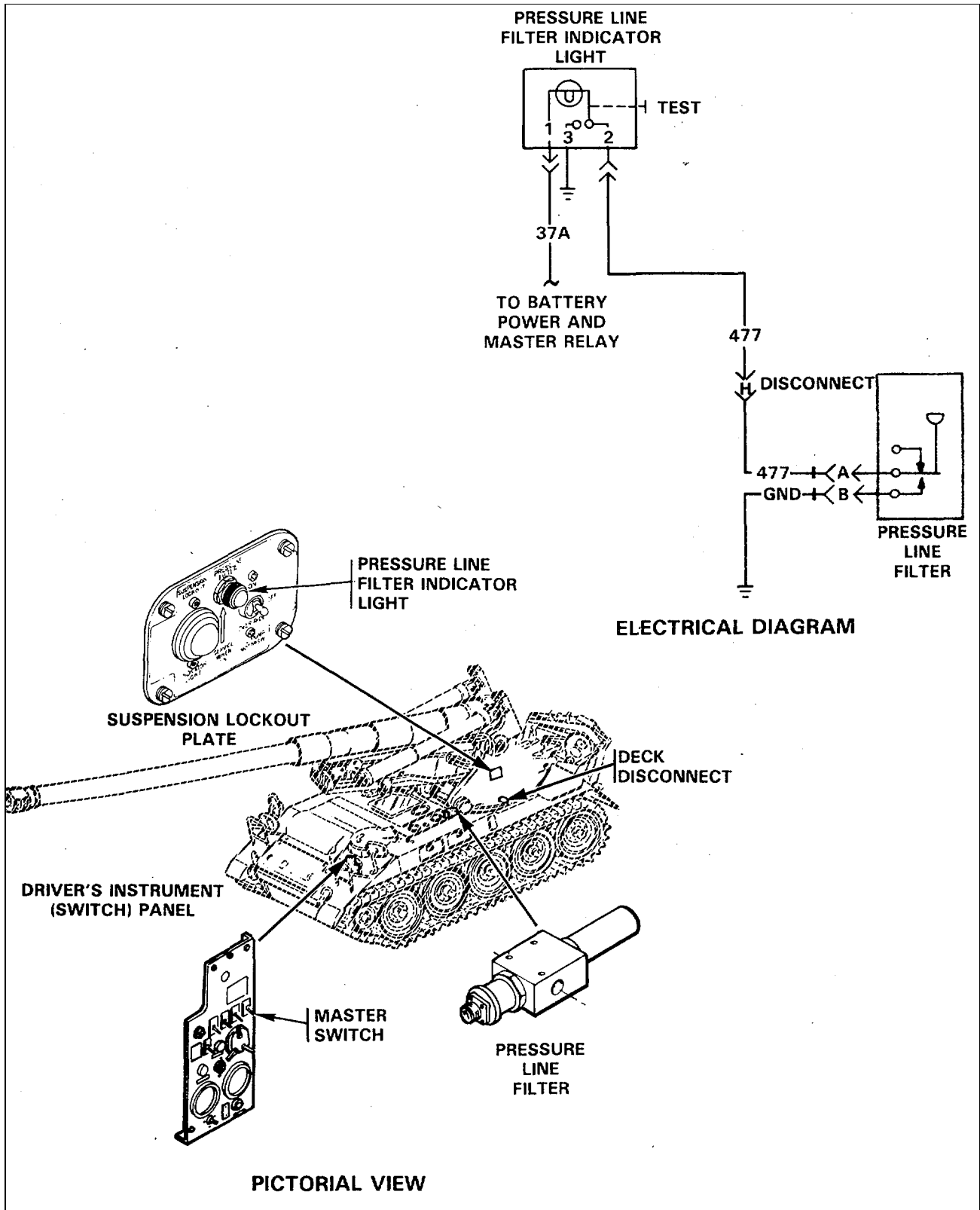
**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

- Step 5.* Remove left carbon dioxide cylinder access cover (11) for access to electrical accessories panel (12). To remove carbon dioxide cylinder access cover (11), remove eight screws (13) and eight washers (14), and remove carbon dioxide cylinder access cover (11) and gasket (15). Disconnect lead 10 (16) from circuit breaker (17). Place red probe in lead 10 (16). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 6. If multimeter indicates no voltage, repair lead 10. Refer to page 2-75. Set MASTER switch OFF. Connect lead 10 (16) to circuit breaker (17).

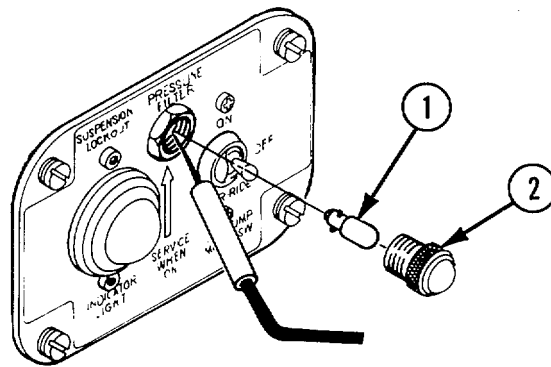


- Step 6.* Disconnect lead 15 and 25 (18) and lead 10 (16) from circuit breaker (17). Check continuity between circuit breaker terminals. If multimeter indicates continuity, repair lead 15 and 25 (18) between bulkhead disconnect and circuit breaker (17). Refer to page 2-75. If multimeter does not indicate continuity, replace circuit breaker (17). Refer to TM 9-2350-304-20-1. Connect lead 15 and 25 (18) and lead 10 (16) to circuit breaker (17).

c. Pressure Line Filter Indicator Light Circuit.



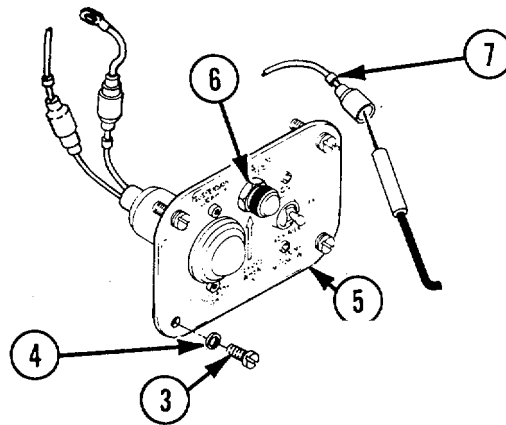
2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).



**WARNING**

Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.

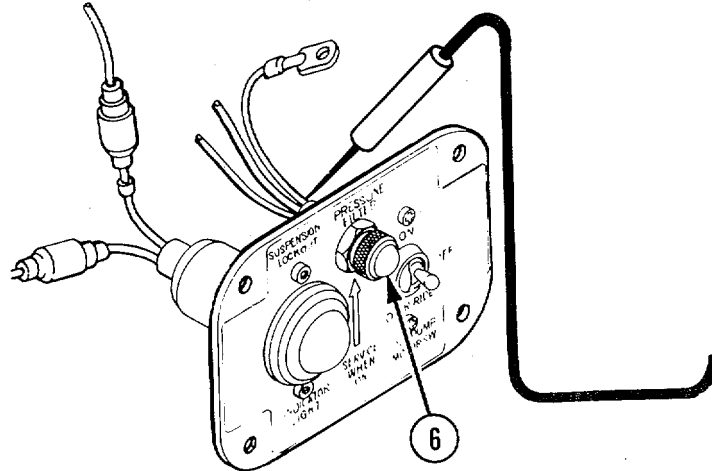
Step 1. Remove LED (1) from pressure line filter indicator light (2). Refer to page 2-269. Connect multimeter to contacts of lamp. If multimeter indicates about 24 V, install LED in pressure line filter indicator light and go to step 2. If multimeter indicates infinity, replace LED. Refer to page 2-269.



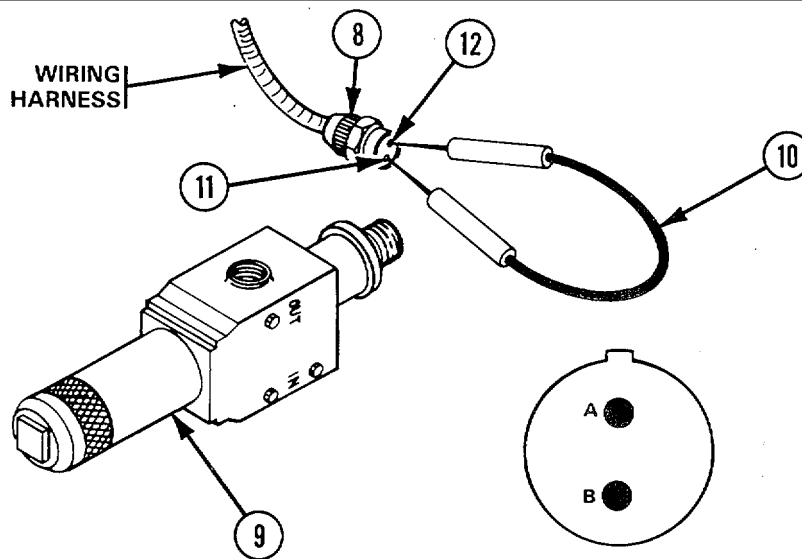
**WARNING**

Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.

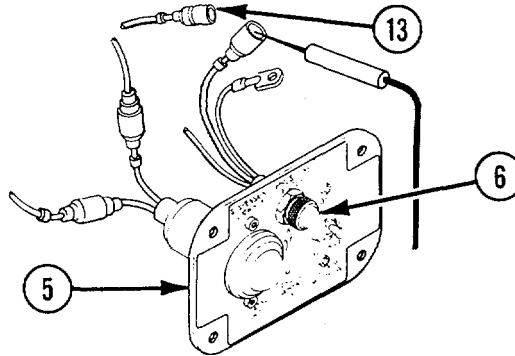
Step 2. Remove four screws (3), four washers (4), and suspension lockout plate (5) for access to pressure line filter indicator light (6). Disconnect lead 37A (7) from pressure line filter indicator light (6). Place red probe in lead 37A (7). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 3. If multimeter indicates no voltage, repair lead 37A (7). Refer to page 2-75. Set MASTER switch OFF. Connect lead 37A (7).



Step 3. Place red probe on ground contact of pressure line filter indicator light (6). Ground black probe. If multimeter indicates continuity, the lamp is operating properly. If multimeter indicates infinity, repair pressure line filter indicator light ground lead. Refer to page 2-75.



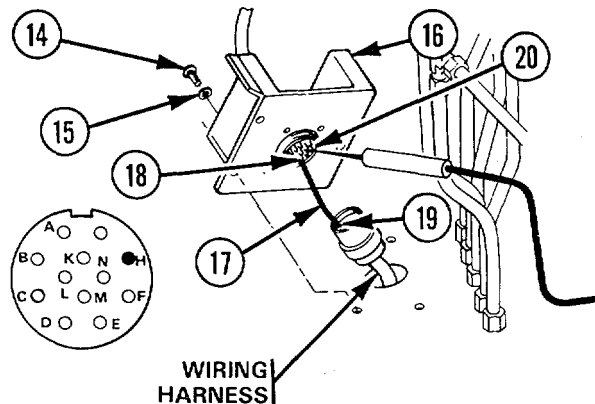
Step 4. Disconnect connector (8) from pressure line filter (9). Install a jumper wire (10) to sockets A (11) and B (12). If pressure line filter indicator light operates, the circuit is operating properly. If pressure line filter indicator light does not operate, go to Step 5. Connect connector (8) to pressure line filter (9).



**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

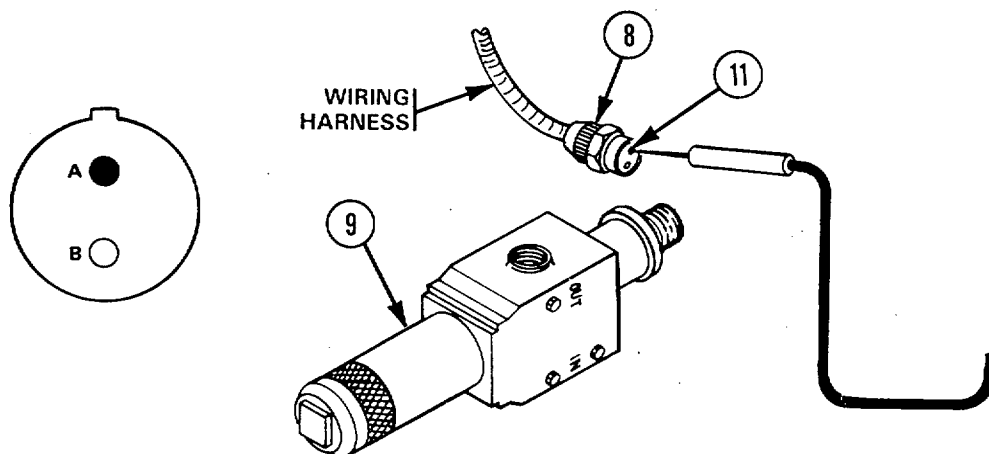
*Step 5.* Disconnect lead 477 (13) from pressure line filter indicator light (6). Place red probe in lead from light. Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 6. If multimeter indicates no voltage, repair lead to pressure line filter indicator light (6). Refer to page 2-75. Set MASTER switch OFF. Connect lead 477 (13). Install suspension lockout plate (5).



**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

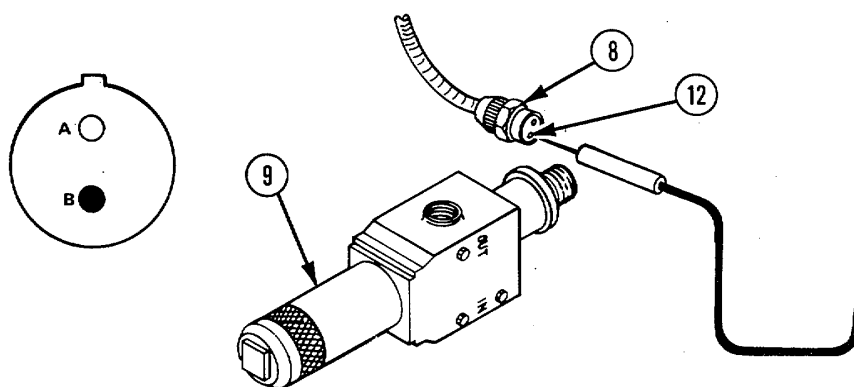
*Step 6.* Remove three screws (14) and three washers (15) attaching turret disconnect bracket (16) to deck. Raise bracket (16) to provide access to wiring harness. Disconnect wiring harness at disconnect. Install jumper wire (17) to pin E (18) and socket E (19) (lead 37A). Place red probe on pin H (20) (lead 477). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 7. If multimeter indicates no voltage, repair lead 477 between pressure line filter indicator light and disconnect. Refer to page 2-75. Set MASTER switch OFF. Remove jumper wire (17). Connect wiring harness at disconnect. Install turret disconnect bracket (16), three washers (15), and three screws (14).



**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

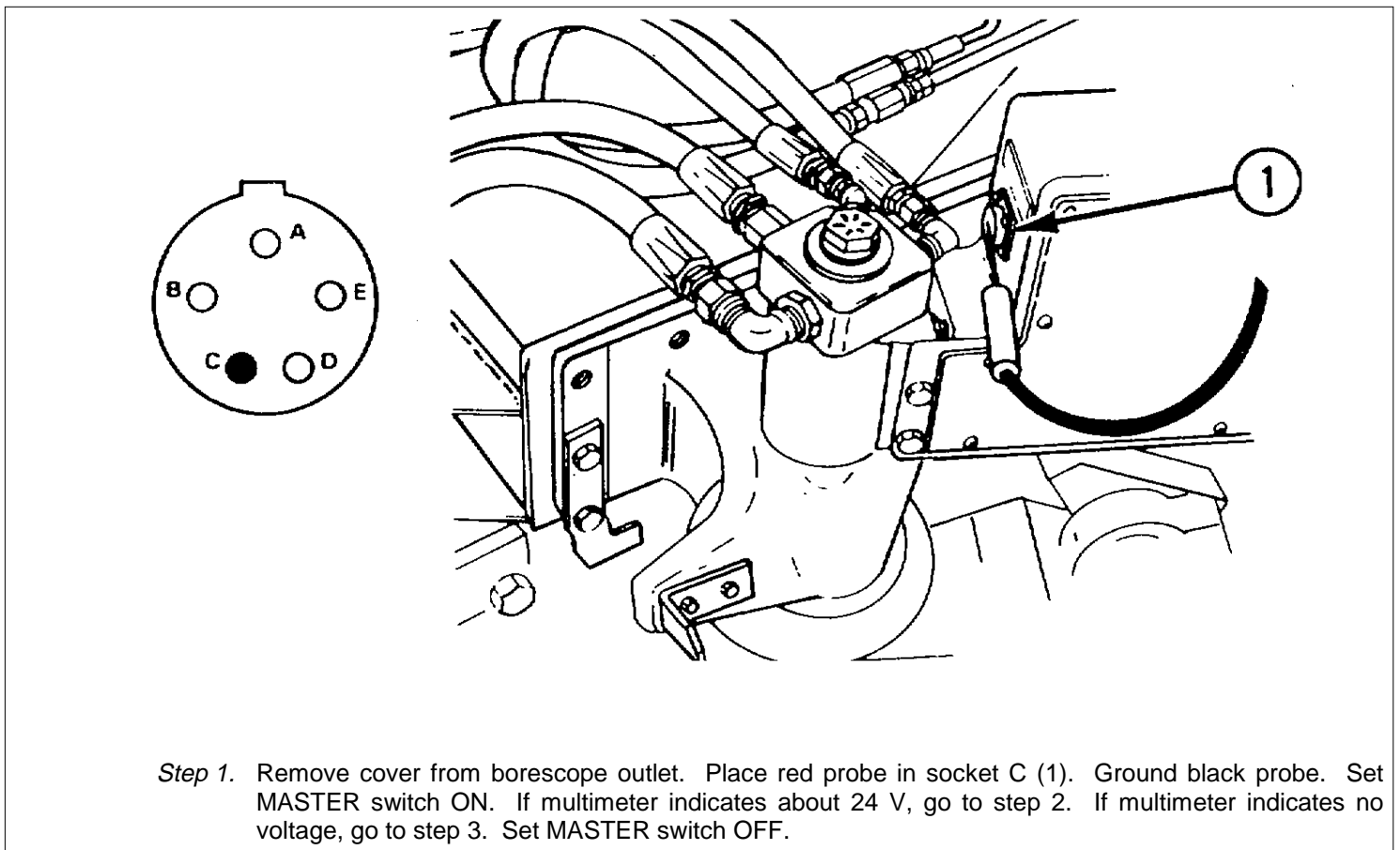
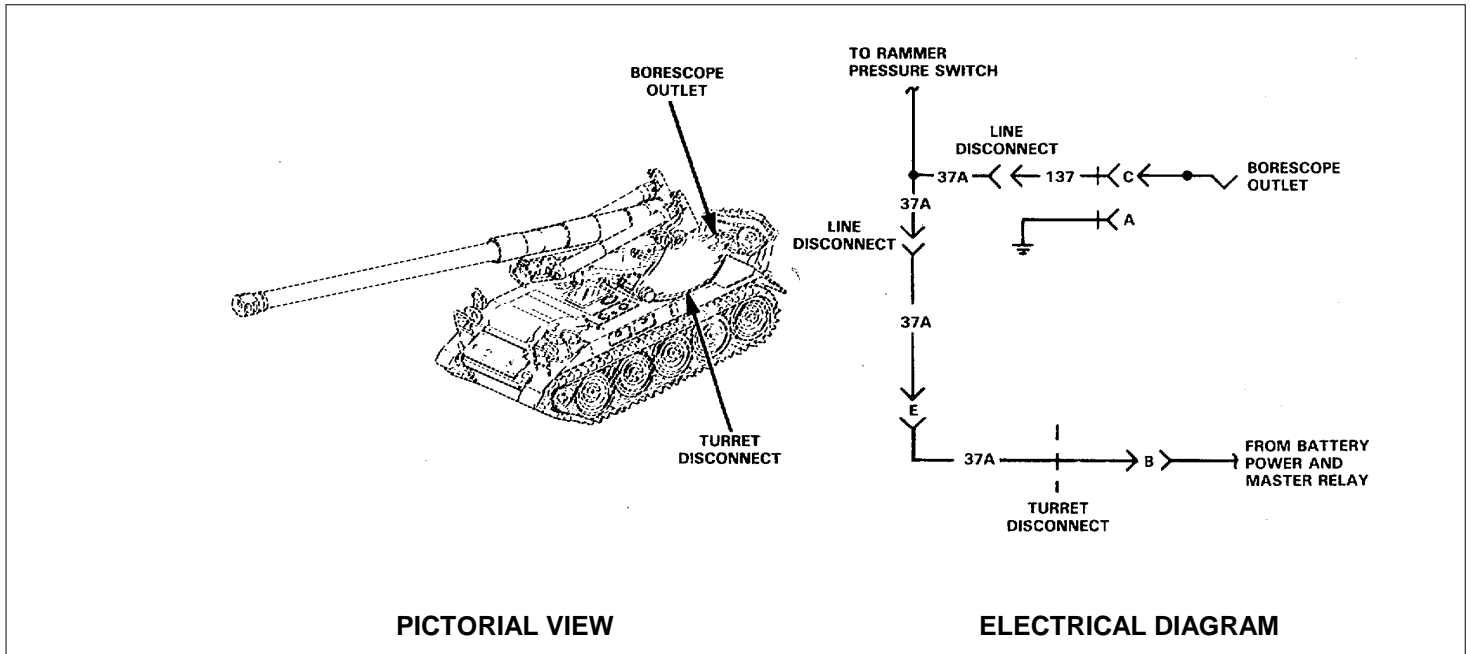
*Step 7.* Disconnect connector (8) from pressure line filter (9). Place red probe in socket A (11) (lead 477). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 8. If multimeter indicates no voltage, repair lead 477 between deck disconnect and pressure line filter connector. Refer to page 2-75. Set MASTER switch OFF. Connect connector (8) to pressure line filter (9).

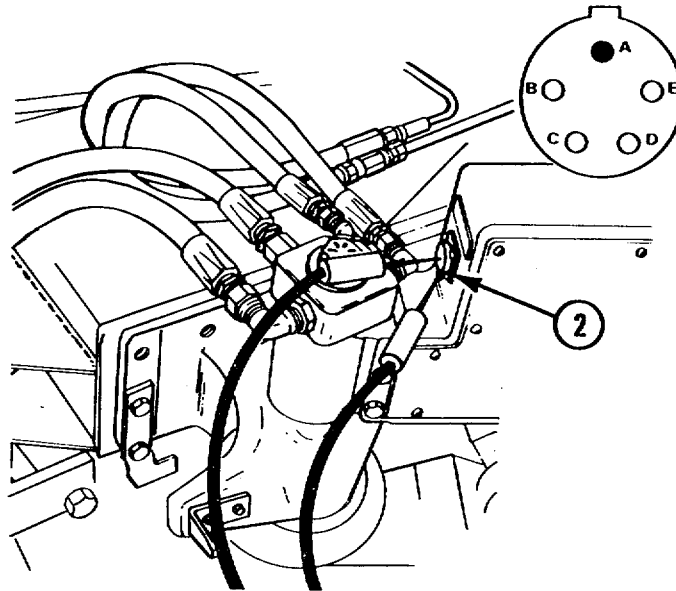


*Step 8.* Connect red probe to socket B (GND) (12). Ground black probe. If multimeter indicates continuity, replace pressure line filter (9). Refer to TM 9-2350-304-20-1. If multimeter indicates infinity, repair GND lead. Refer to page 2-75. Connect connector (8) to pressure line filter (9).

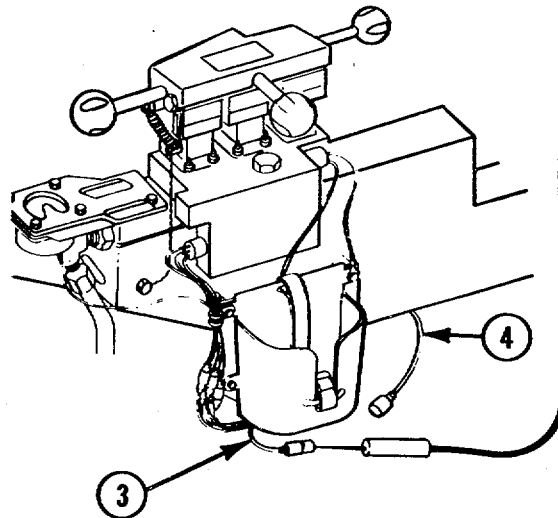
2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).

d. Borescope Outlet Circuit.





*Step 2.* Connect multimeter to socket A (2) of borescope outlet and to ground screw. If multimeter indicates continuity, replace borescope connector. Refer to page 2-266. If multimeter does not indicate continuity, repair lead GND. Refer to page 2-75.



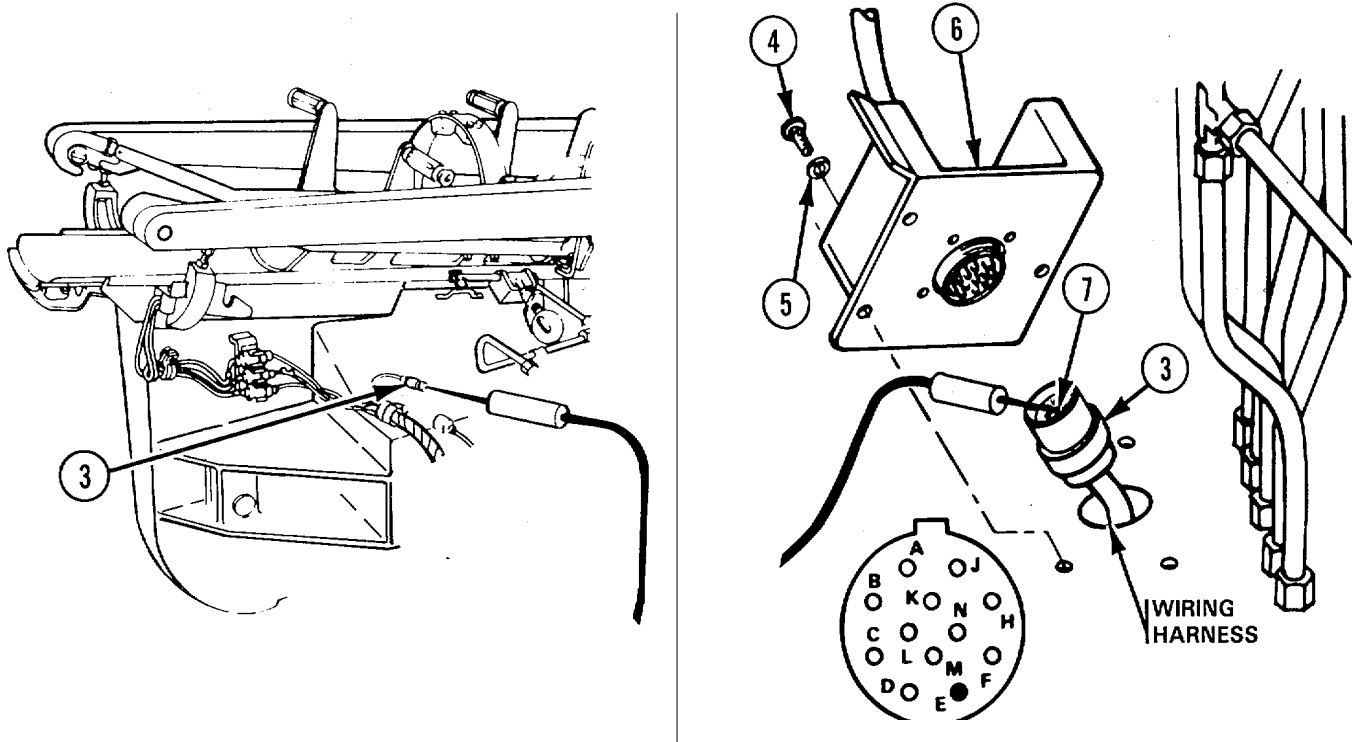
**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

*Step 3.* Disconnect lead 37A (3) from borescope outlet. Place red probe in lead 37A (3). Ground black probe. Set MASTER switch ON. If multimeter indicates no voltage, go to step 4. If multimeter indicates about 24 V, repair lead 137 (4) of borescope outlet. Set MASTER switch OFF. Connect lead 37A (3).



2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).



**WARNING**

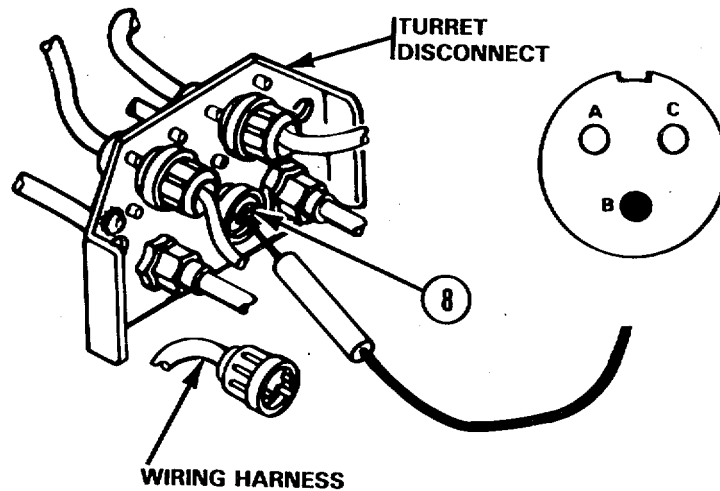
**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

- Step 4.* Disconnect lead 37A (3) at line disconnect. Place red probe in lead 37A (3). Ground black probe. Set MASTER switch ON. If multimeter indicates no voltage, go to step 5. If multimeter indicates about 24 V, repair lead 37A (3) between line disconnect and borescope outlet lead. Set MASTER switch OFF. Connect lead 37A (3).

**WARNING**

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

- Step 5.* Remove three screws (4) and three washers (5) attaching bracket (6) under gunner's seat to deck. Raise bracket (6) to provide access to wiring harness. Disconnect wiring harness at disconnect. Place red probe in socket E (7) (lead 37A). Ground black probe. Set MASTER switch ON. If multimeter indicates no voltage, go to step 6. If multimeter indicates about 24 V, repair lead 37A (3) between line disconnect and bracket disconnect. Refer to page 2-75. Set MASTER switch OFF. Connect wiring harness at disconnect. Install three washers (5) and three screws (4).

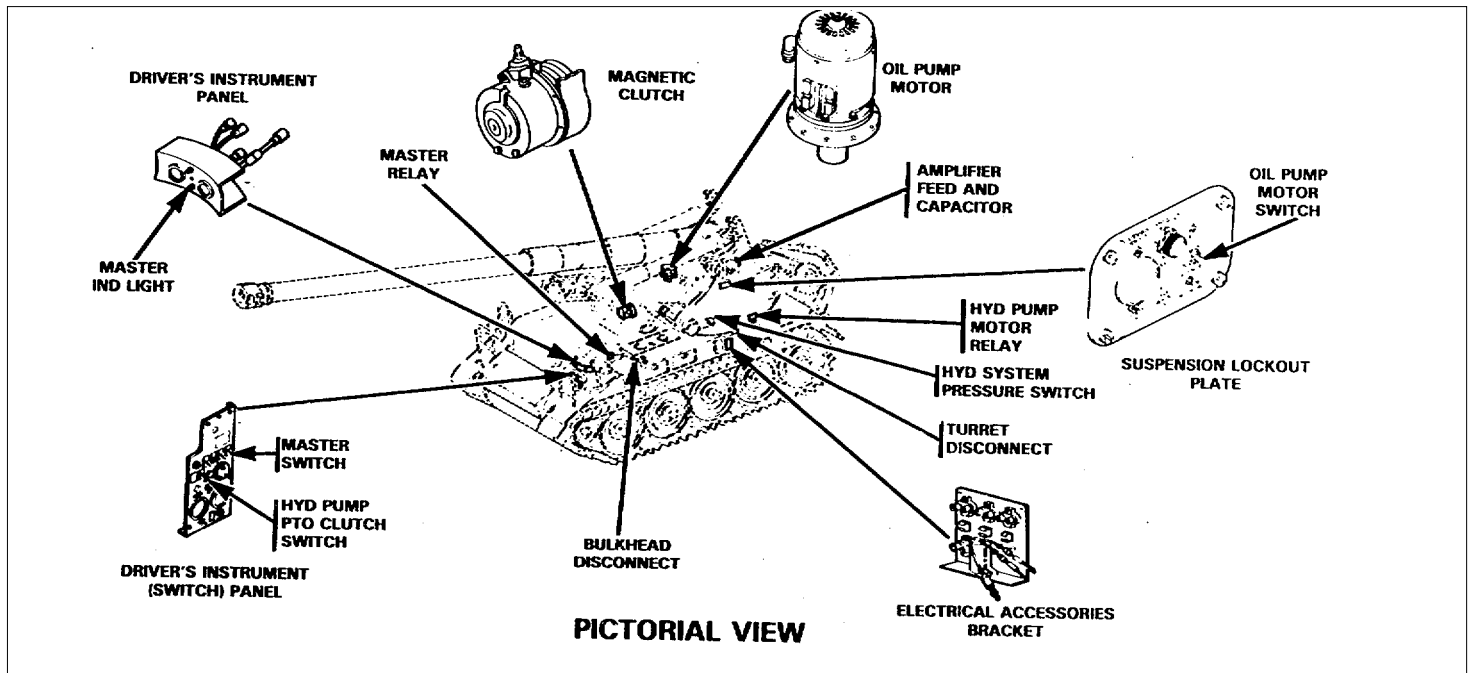


**WARNING**

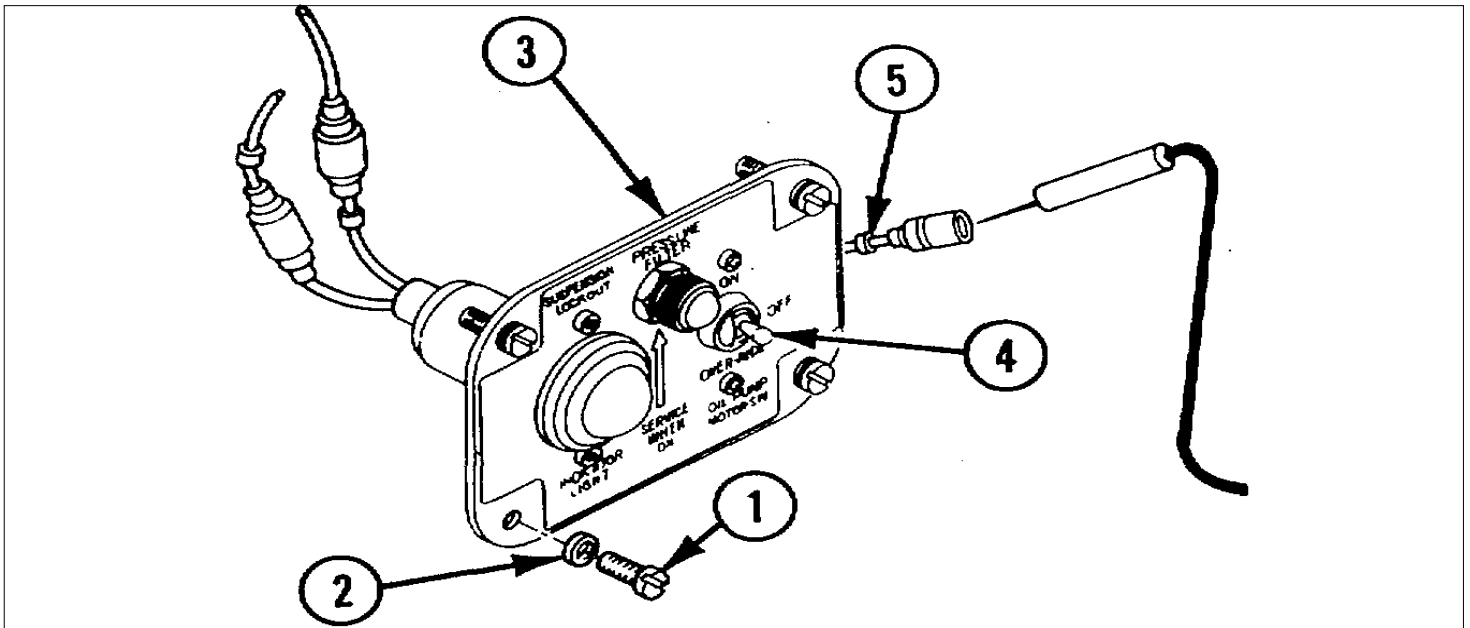
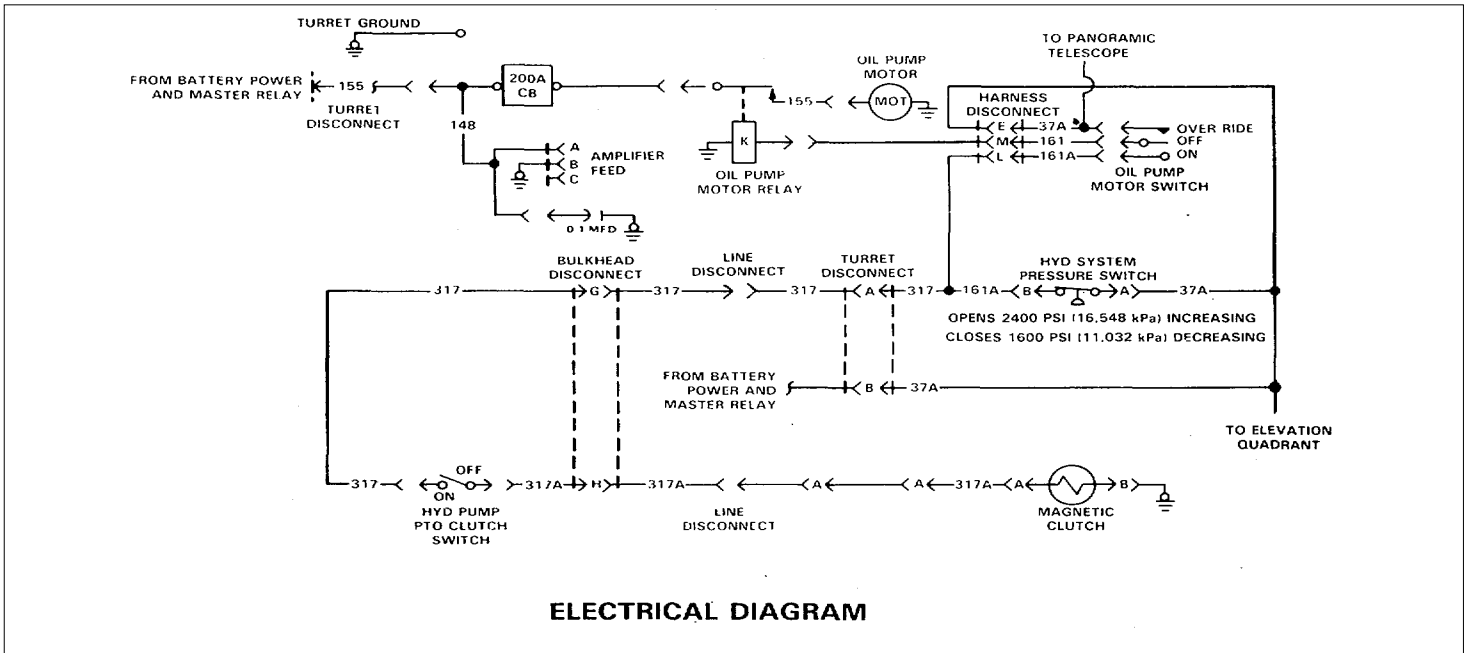
Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.

Step 6. Disconnect turret disconnect in well. Disconnect wiring harness at disconnect. Place red probe in socket B (8) (lead 37A). Ground black probe. Set MASTER switch ON. If multimeter indicates no voltage, troubleshoot battery power and master relay circuit. Refer to TM 9-2350-304-20-1. If multimeter indicates about 24 V, repair lead 37A between turret disconnect and bracket disconnect. Refer to page 2-75. Set MASTER switch OFF. Connect turret disconnect.

e. Oil Pump Motor Circuit.



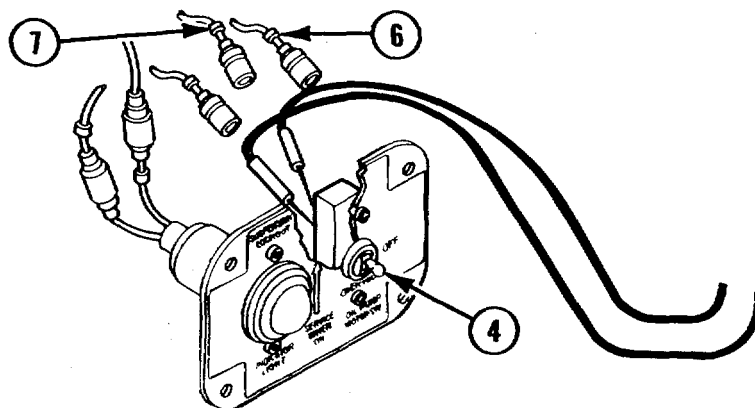
2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).



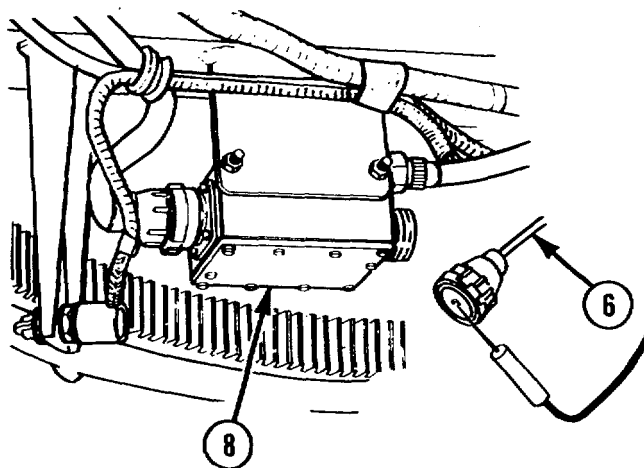
**WARNING**

Make sure **MASTER** switch is **OFF** before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.

- Step 1. Set **MASTER** switch **OFF**. Remove four screws (1), four washers (2), and suspension lockout plate (3) for access to **OIL PUMP MOTOR SWITCH** (4). Disconnect lead 37A (5) from **OIL PUMP MOTOR SWITCH** (4). Place red probe in lead 37A (5). Ground black probe. Set **MASTER** switch **ON**. If multimeter indicates about 24 V, go to step 2. If multimeter indicates no voltage, repair lead 37A (5). Refer to page 2-75. Set **MASTER** switch **OFF**. Connect lead 37A (5).



Step 2. Disconnect leads 161 (6) and 161A (7) from OIL PUMP MOTOR SWITCH (4). Place red probe in OIL PUMP MOTOR SWITCH (4) pin 3. Place black probe in OIL PUMP MOTOR SWITCH (4) pin 2. Set OIL PUMP MOTOR SWITCH (4) ON. Record reading. Place black probe in OIL PUMP MOTOR SWITCH (4) pin 1. Set OIL PUMP MOTOR SWITCH (4) to OVER-RIDE. If multimeter indicates less than 1 ohm, go to step 3. If multimeter indicates more than 1 ohm, replace OIL PUMP MOTOR SWITCH. Refer to page 2-285. Set OIL PUMP MOTOR SWITCH (4) OFF. Connect leads 161 (6) and 161A (7).

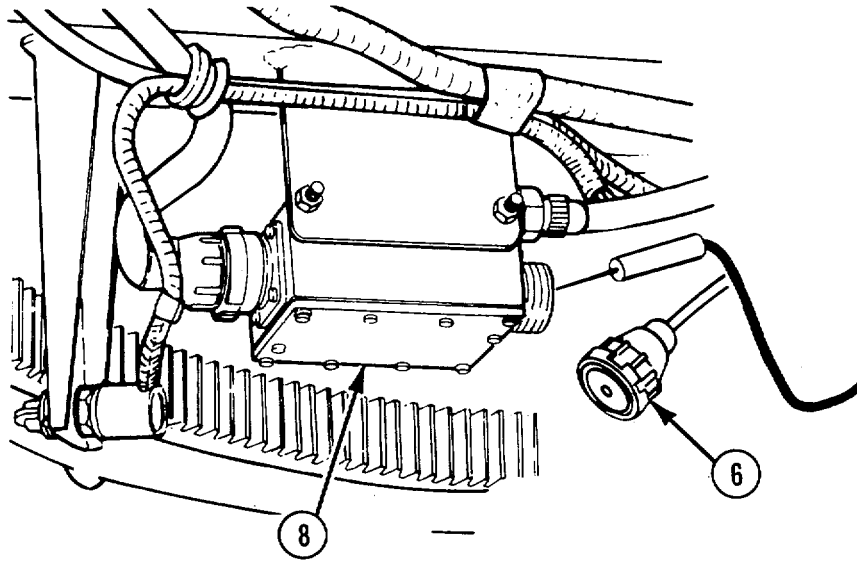


#### WARNING

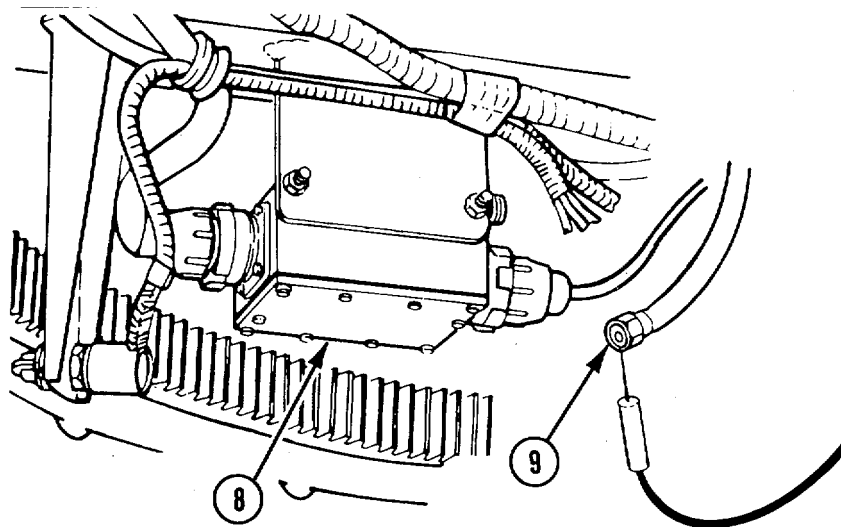
**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

Step 3. Disconnect lead 161 (6) from oil pump motor relay (8). Place red probe in lead 161 (6). Ground black probe. Set MASTER switch ON. Hold OIL PUMP MOTOR SWITCH in OVER-RIDE. If multimeter indicates about 24 V, go to step 4. If multimeter indicates no voltage, repair lead 161 (6) between harness disconnect and oil pump motor relay (8). Refer to page 2-75. Release OIL PUMP MOTOR SWITCH. Set MASTER switch OFF. Connect lead 161 (6).

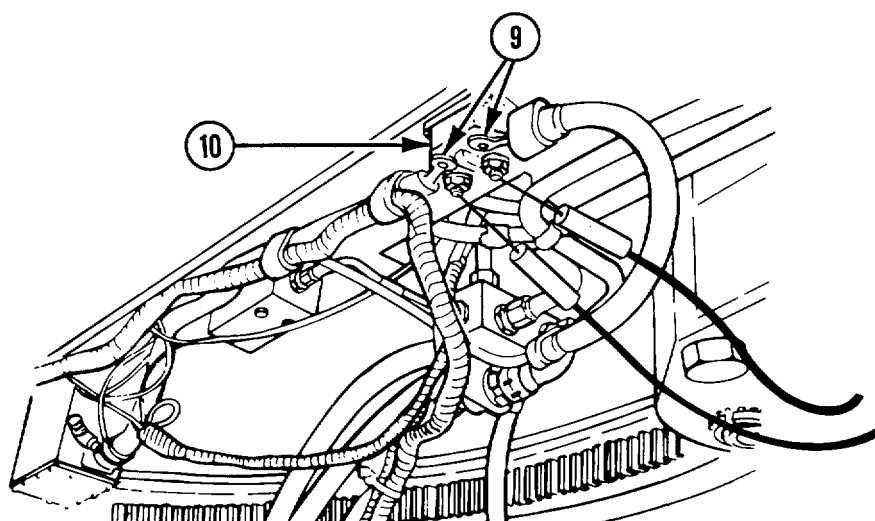
## 2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).



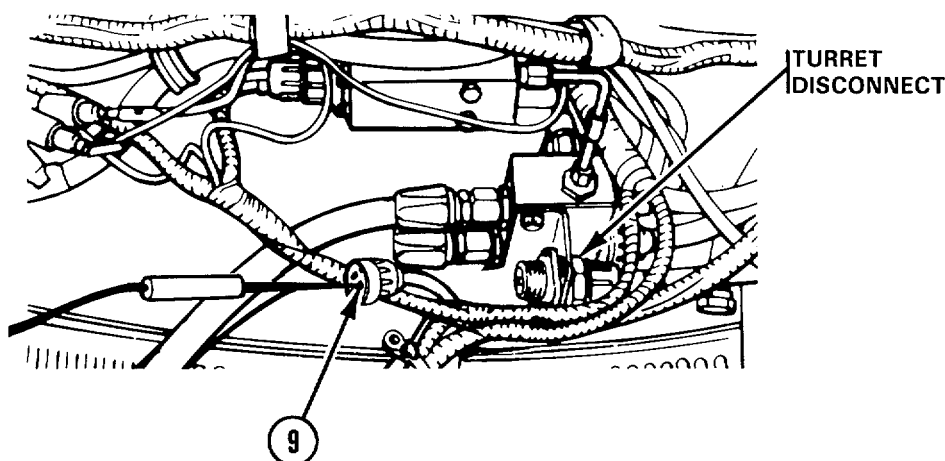
Step 4. Place red probe on oil pump motor relay pin (lead 161) (6). Ground black probe. If multimeter indicates  $35 + 10$  ohms, go to step 5. If multimeter does not indicate about 65 ohms, replace oil pump motor relay (8). Refer to TM 9-2350-304-20-1. Connect lead (6).



Step 5. Disconnect lead 155 (9) from oil pump motor relay (8). Place red probe in lead 155 (9). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, go to step 8. If multimeter indicates no voltage, go to step 6. Set MASTER switch OFF. Connect lead 155 (9).



Step 6. Disconnect leads 155 (9) from 200A circuit breaker (10). Connect multimeter to receptacles of 200A circuit breaker (10). If multimeter indicates 0 ohms, go to step 7. If multimeter indicates infinity, replace 200A circuit breaker (10). Refer to page 2-75. Connect leads 155 (9).

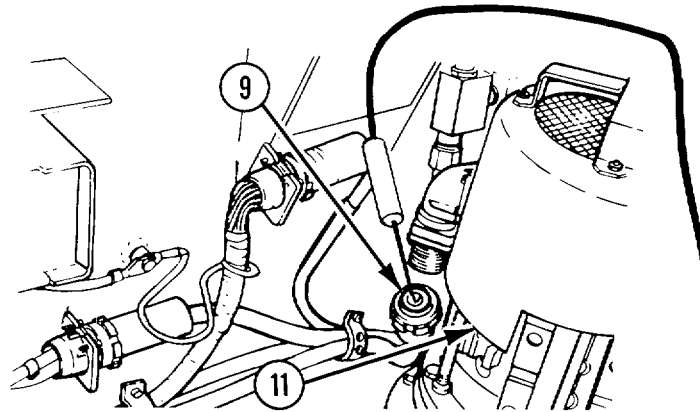


#### WARNING

**Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.**

Step 7. Disconnect lead 155 (9) from turret disconnect. Place red probe in receptacle harness plug (lead 155) (9). Ground black probe. Set MASTER switch ON. If multimeter indicates about 24 V, repair lead 155 (9) between turret disconnect and circuit breaker. Refer to page 2-75. If multimeter indicates no voltage, replace floor disconnect to turret disconnect and accessories branched wiring harness. Refer to page 2-282. Set MASTER switch OFF. Connect lead 155 (9).

2-9. ELECTRICAL CIRCUIT TROUBLESHOOTING (CONT).

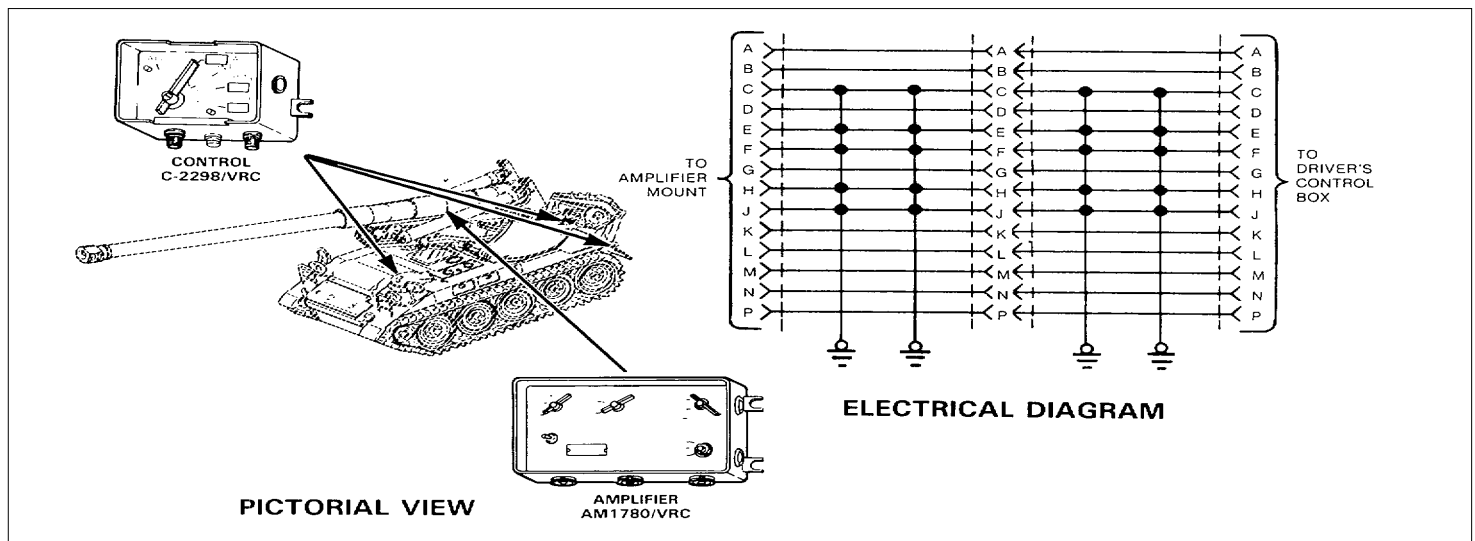


**WARNING**

Make sure MASTER switch is OFF before repairing electrical circuits. Failure to observe this warning could result in injury to personnel.

Step 8. Disconnect lead 155 (9) from oil pump motor (11). Place red probe in lead 155 (9). Ground black probe. Set MASTER switch ON. Hold OIL PUMP MOTOR SWITCH in OVER-RIDE. If multimeter indicates about 24 V, notify I direct support maintenance to replace oil pump motor. If multimeter indicates no voltage, repair lead 155 (9) between oil pump motor relay and oil pump motor (11). Refer to page 2-75. Release OIL PUMP MOTOR SWITCH. Set MASTER switch OFF. Connect lead 155 (9).

f. Vehicular Intercommunication System.



Check continuity between amplifier and wiring harness, line disconnects and driver's control box and wiring harness. If multimeter does not indicate 0 ohms, repair wiring harness. Refer to page 2-75. If multimeter indicates 0 ohms, refer to TM 11-2643 for AN/UIC-1 set or TM 11-5830-340-12 for AN/VIC-1 (V) set.

## Section V. WIRING HARNESS AND CABLE REPAIR

**2-10. GENERAL.** This section contains instructions on repair of wiring harnesses and cables (leads). Repair of wiring harnesses and cables consists of replacement of defective connectors, shells and terminals or taping cut or worn insulation and exposed wire conductors. Pages 2-75 thru 2-81 show exploded views of typical harness and cable connectors used on the vehicle, and give procedures for disassembly and assembly of connectors. When soldering is required, procedures in TB-SIG-222 must be followed.

### NOTE

Label cables on multiple receptacles during disassembly to insure proper order during reassembly.

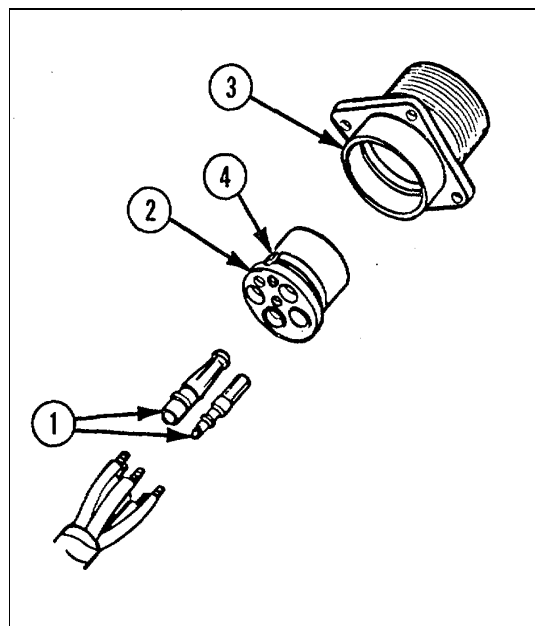
### 2-11. TYPICAL FEMALE-TYPE PANEL MOUNTING RECEPTACLE.

#### DISASSEMBLY

- 1 Drive socket contacts (1) out through rear of insert (2) with pin extractor.
- 2 Unsolder cable leads from solder wells on socket contacts (1).
- 3 Slide insert out through rear of shell assembly (3).

#### REASSEMBLY

- 1 Strip cable insulation equal to depth of solder wells of socket contacts (1)
- 2 Insert cable leads into solder wells of socket contacts (1) and solder.
- 3 Push insert (2) into shell assembly (3) from rear until seated. Groove (4) in insert must be aligned with guide in shell assembly (3) to ensure proper fit.
- 4 Push socket contacts (1) into insert (2) from rear until seated.





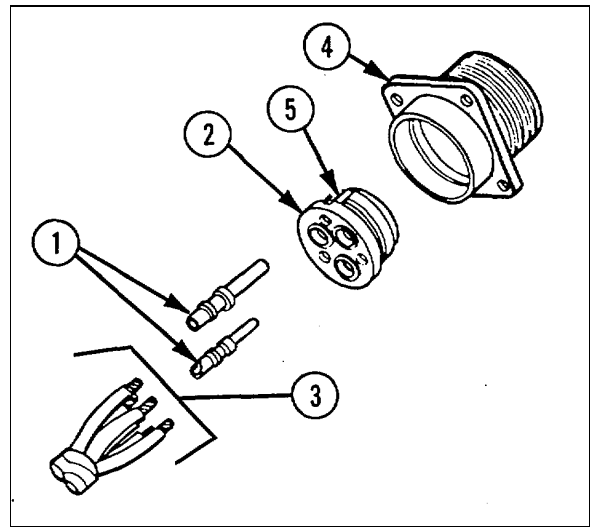
**2-12. TYPICAL MALE-TYPE PANEL MOUNTING RECEPTACLE.**

**DISASSEMBLY**

- 1 Drive pin contacts (1) out through rear of insert (2) with pin extractor.
- 2 Unsolder cable leads (3) from solder wells on pin contacts (1).
- 3 Slide insert (2) out through rear of shell assembly (4).

**REASSEMBLY**

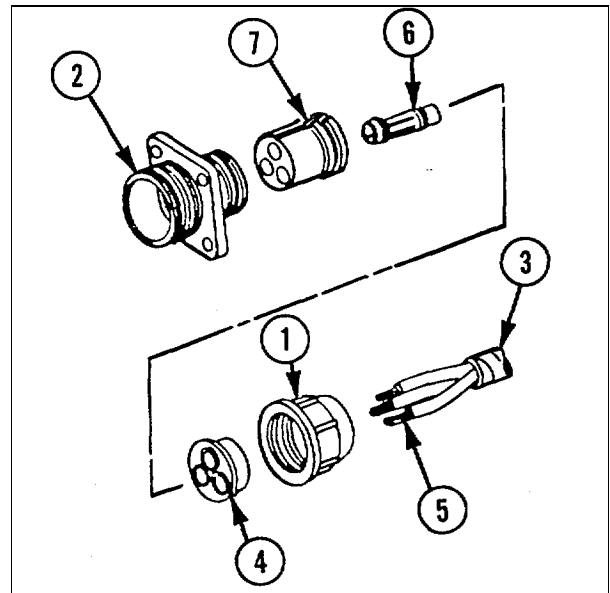
- 1 Strip cable insulation equal to depth of solder wells of pin contacts (1).
- 2 Insert cable leads (3) into solder wells of pin contacts (1) and solder.
- 3 Push insert (2) into shell assembly (4) from rear until seated. Groove (5) in insert must be aligned with guide in shell assembly (4) to ensure proper fit.
- 4 Push pin contacts (1) into insert (2) from rear until seated.



**2-13. TYPICAL FEMALE-TYPE PANEL MOUNTING RECEPTACLE.**

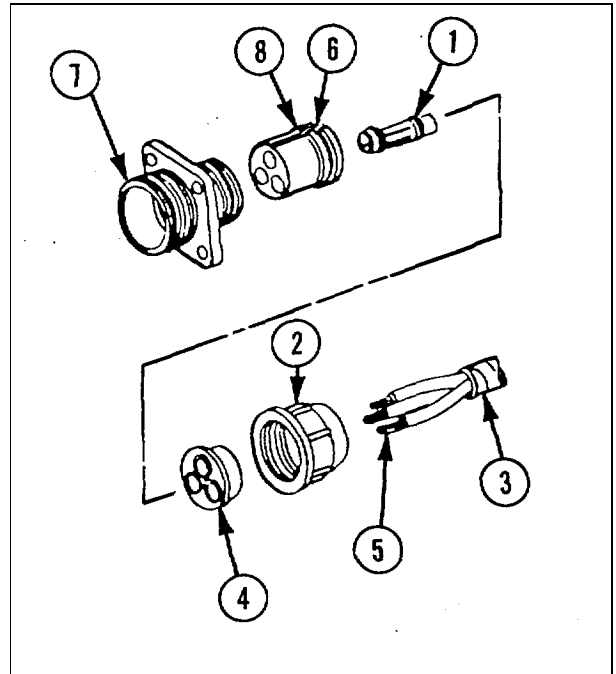
**DISASSEMBLY**

- 1 Unscrew nut (1) from shell assembly (2) and slide back on cable (3).
- 2 Slide grommet (4) back on cable leads (5).
- 3 Drive socket contacts (6) out through front of insert (7) with pin extractor.
- 4 Unsolder lead from socket contacts (6).
- 5 Push insert (7) out through rear of shell assembly (2).



**REASSEMBLY**

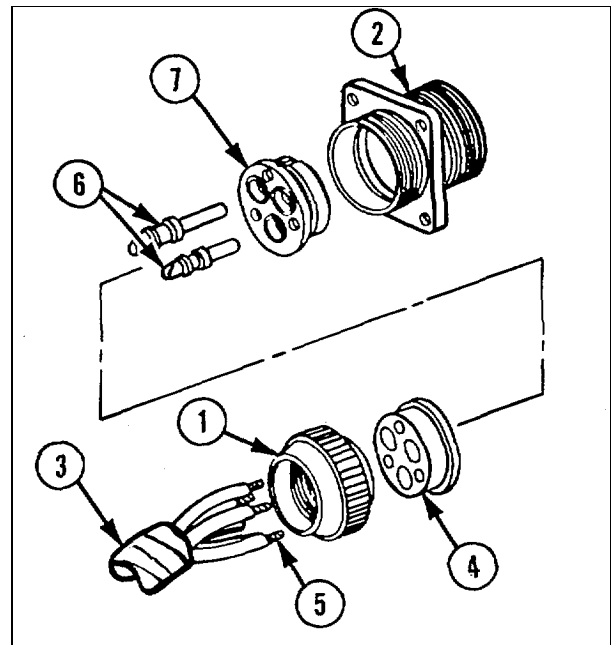
- 1 Strip cable insulation to depth of solder wells of socket contacts (1).
- 2 Slide nut (2) over cable (3).
- 3 Slide grommet (4) over cable leads (5).
- 4 Insert cable leads (5) into solder wells of socket contacts (1) and solder.
- 5 Push insert (6) into shell assembly (7) from rear until seated. Groove (8) in insert (6) must be aligned with guide in shell assembly (7) to ensure proper fit.
- 6 Push socket contacts (1) into insert (6) from rear until seated.
- 7 Push grommet (4) down cable leads (5) and over solder wells of socket contacts (1).
- 8 Screw nut (2) onto shell assembly (7).



**2-14. TYPICAL MALE-TYPE PANEL MOUNTING RECEPTACLE.**

**DISASSEMBLY**

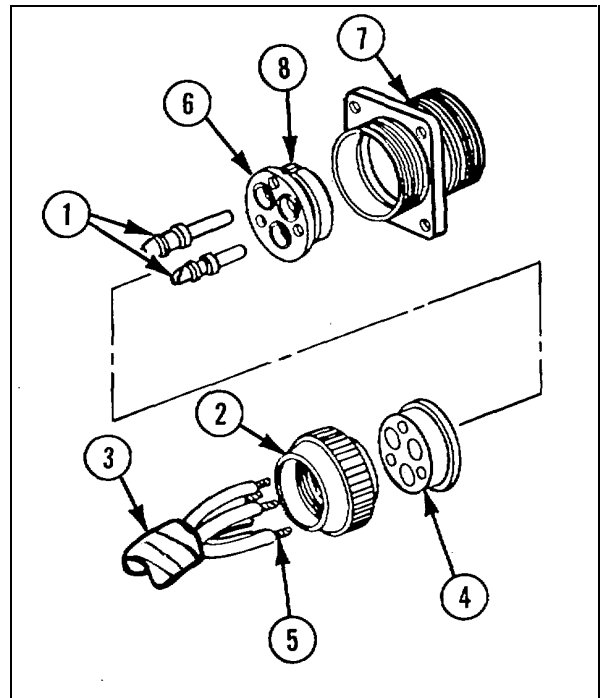
- 1 Unscrew nut (1) from shell assembly (2) and slide back on cable (3).
- 2 Push grommet (4) back on cable leads (5).
- 3 Drive pin contacts (6) out through rear of insert (7) with pin extractor.
- 4 Push insert (7) out through rear of shell assembly (2).
- 5 Unsolder cable leads (5) from pin contacts (6).



**2-14. TYPICAL MALE-TYPE PANEL MOUNTING RECEPTACLE (CONT).**

**REASSEMBLY**

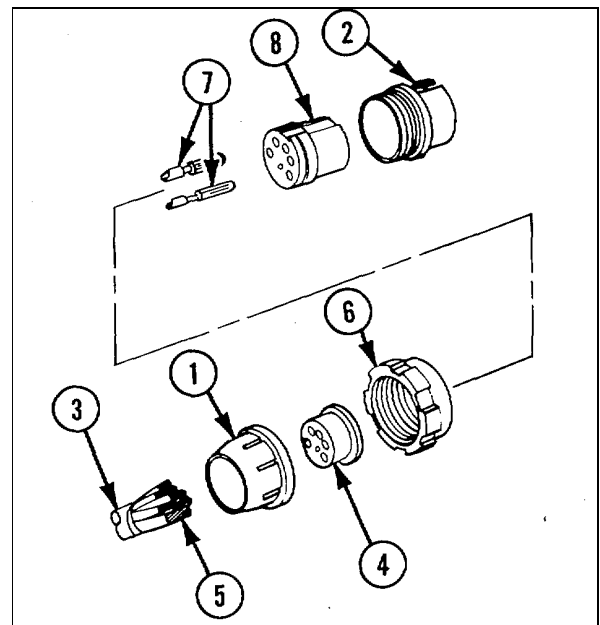
- 1 Strip cable insulation equal to depth of solder wells of pin contacts (1).
- 2 Slide nut (2) onto cable (3).
- 3 Slide grommet (4) over cable leads (5).
- 4 Insert cable leads (5) into solder wells of pin contacts (1) and solder.
- 5 Push insert (6) into shell assembly (7) from rear until seated. Groove (8) in insert (6) must be aligned with guide in shell assembly (7) to ensure proper fit.
- 6 Push pin contacts (1) into insert (6) from rear until seated.
- 7 Push grommet (4) down cable leads (5) and over solder wells of pin contacts (1).
- 8 Screw nut (2) onto shell assembly (7).



**2-15. TYPICAL FEMALE-TYPE PLUG.**

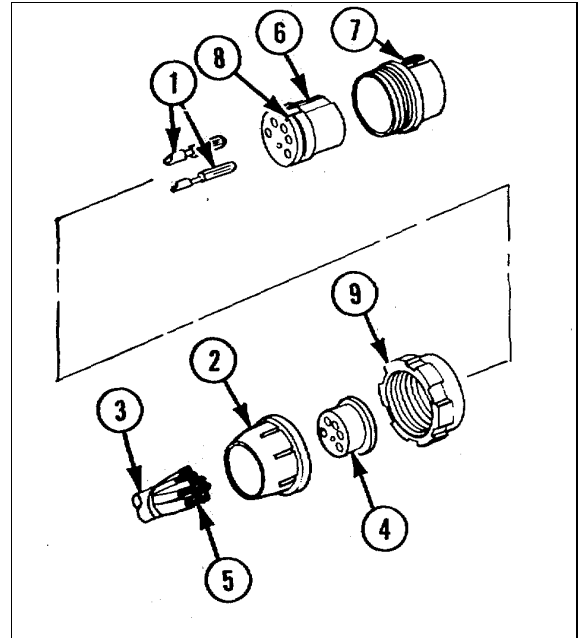
**DISASSEMBLY**

- 1 Unscrew nut (1) from shell assembly (2) and slide back on cable (3).
- 2 Slide grommet (4) back on cable leads (5).
- 3 Slide coupling (6) off shell assembly (2).
- 4 Drive socket contacts (7) out through rear of insert (8) with pin extractor.
- 5 Push insert (8) out through rear of shell assembly (2).
- 6 Unsolder cable leads (5) from socket contacts (7).



**REASSEMBLY**

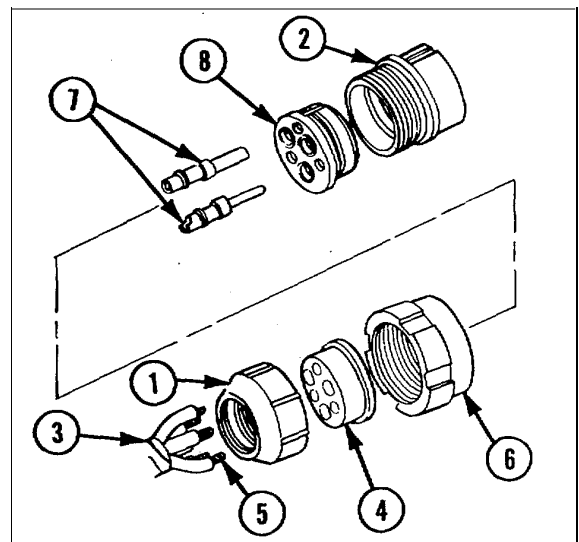
- 1 Strip cable insulation equal to depth of solder wells of socket contacts (1).
- 2 Slide nut (2) over cable (3).
- 3 Slide grommet (4) over cable leads (5).
- 4 Insert cable leads (5) into solder wells of socket contacts (1) and solder.
- 5 Push insert (6) into shell assembly (7) from rear until seated. Groove (8) in insert (6) must be aligned with guide in shell assembly (7) to ensure proper fit.
- 6 Push socket contacts (1) into insert (6) from rear until seated.
- 7 Slide coupling (9) onto shell assembly (7).
- 8 Push grommet (4) down cable leads (5) and over solder wells of socket contacts (1).
- 9 Screw nut (2) onto shell assembly (7).



**2-16. TYPICAL MALE-TYPE PLUG.**

**DISASSEMBLY**

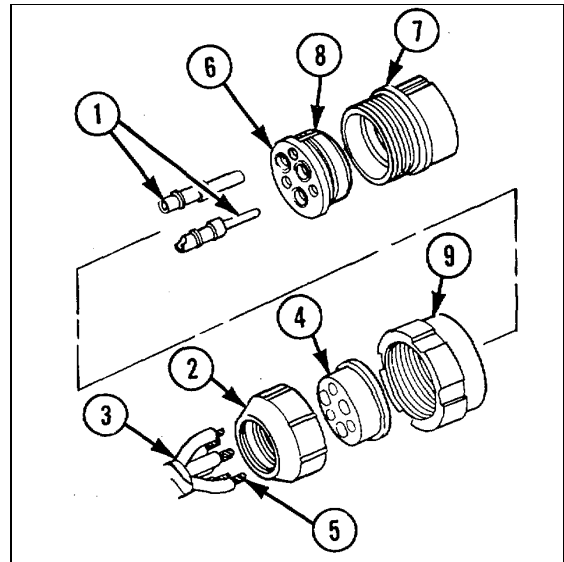
- 1 Unscrew nut (1) from shell assembly (2) and slide back on cable (3).
- 2 Slide grommet (4) back on cable leads (5).
- 3 Slide coupling (6) off shell assembly (2).
- 4 Drive pin contacts (7) out through rear of insert (8) with pin extractor.
- 5 Push insert (8) out through rear of shell assembly (2).
- 6 Unsolder cable leads (5) from pin contacts (7).



**2-16. TYPICAL MALE-TYPE PLUG (CONT).**

**REASSEMBLY**

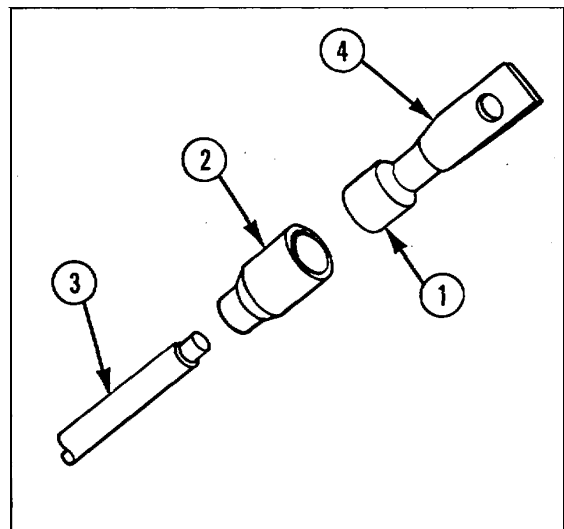
- 1 Strip cable of insulation equal to depth of solder wells of pin contacts (1).
- 2 Slide nut (2) over cable (3).
- 3 Slide grommet (4) over cable leads (5).
- 4 Insert cable leads (5) into solder wells of pin contacts (1) and solder.
- 5 Push insert (6) into shell assembly (7) from rear until seated. Groove (8) in insert (6) must be aligned with guide in shell assembly (7) to ensure proper fit.
- 6 Push pin contacts (1) into insert (6) from rear until seated.
- 7 Slide coupling (9) onto shell assembly (7).
- 8 Push grommet (4) down cable leads (5) and over solder wells of pin contacts (1).
- 9 Screw nut (2) onto shell assembly (7).



**2-17. REPLACING CABLE TERMINALS AND CONNECTORS.**

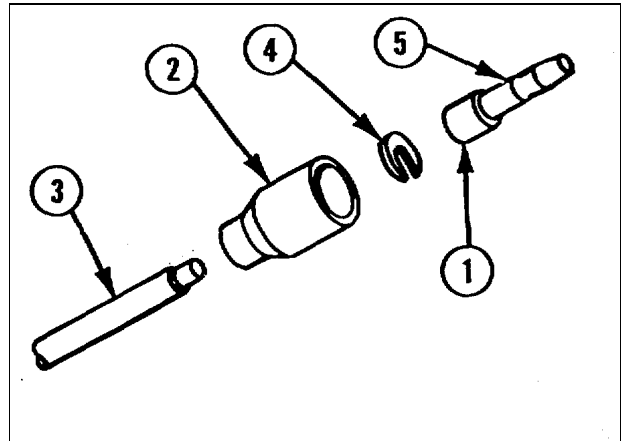
**TERMINAL-TYPE CABLE CONNECTORS**

- 1 Strip cable insulation equal to depth of terminal well (1).
- 2 Slide insulator (2) over cable (3).
- 3 Insert cable (3) into terminal well (1) and crimp.
- 4 Slide insulator (2) over crimped end of terminal (4).

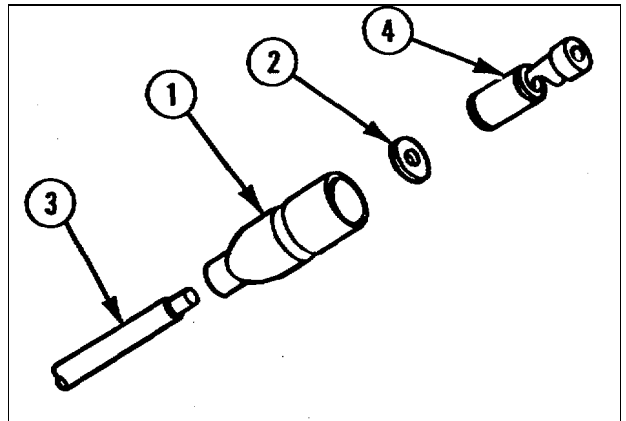


**MALE CABLE CONNECTOR**

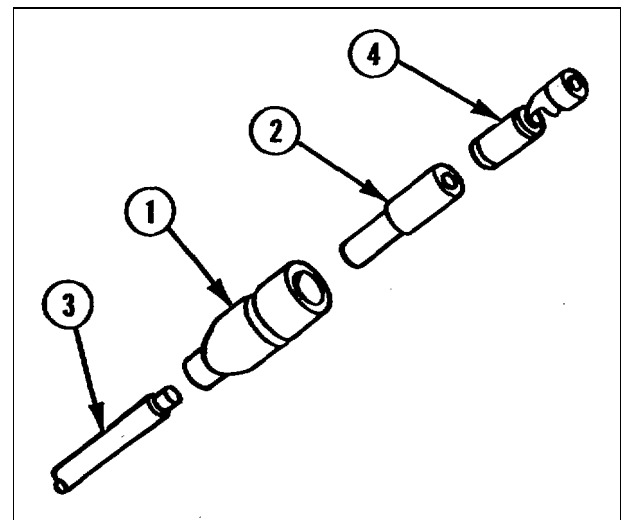
- 1 Strip cable insulation equal to depth of ferrule well (1).
- 2 Slide shell assembly (2) over cable (3).
- 3 Insert cable (3) into ferrule well (1) and crimp.
- 4 Place C-washer (4) over cable (3) at crimped junction and slide shell assembly (2) over C-washer (4) and ferrule (5).

**FEMALE CABLE CONNECTOR (WITH WASHER)**

- 1 Strip cable insulation approximately 0.125 in. (0.318 cm).
- 2 Slide shell assembly (1) and washer (2) over cable (3).
- 3 Place cable (3) in cylindrical end of terminal (4) and crimp.
- 4 Slide shell assembly (1) and washer (2) over terminal (4).

**FEMALE CABLE CONNECTOR (WITH SLEEVE)**

- 1 Strip cable insulation approximately 0.125 in. (0.318 cm).
- 2 Slide shell assembly (1) and sleeve (2) over cable (3).
- 3 Place cable (3) in cylindrical end of terminal (4) and crimp.
- 4 Slide shell assembly (1) and sleeve (2) over terminal (4).



**Section VI. MAINTENANCE OF HYDRAULIC LINES AND FITTINGS**

**2-18. GENERAL.**

a. This section contains instructions on repair of hydraulic lines and fittings. Repair of hydraulic lines and fittings consists of replacement of preformed packings, tube fitting locknuts, lockwashers, and defective sleeve spacers and washers. Pages 2-82 and 2-83 show exploded views of typical hydraulic lines and fittings used on the vehicle, and give procedures for disassembly and reassembly of fittings. For complete inspection procedures, refer to b. below. Refer to TM 9-2350-304-24P-2 for ordering of authorized parts. Ensure hydraulic pressure is relieved before performing any disassembly of hydraulic lines and fittings.

b. Inspect all unions, nipples, tees, reducers, plugs, elbows, and parts on which end fittings are used for thread damage, fractures, corrosion, distortion, slivers, restrictions, sealing surface scratches, or mutilation. Hex corners shall not be rounded. Repair is by replacement of authorized parts (TM 9-2350-304-24P-2) which do not meet above criteria.

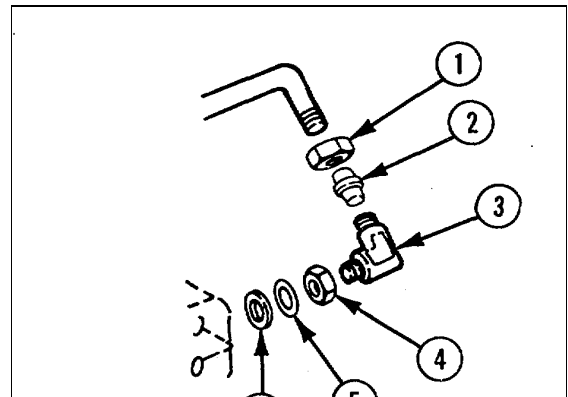
**2-19. TUBE ELBOW TO TUBE FITTING.**

**DISASSEMBLY**

Remove tube fitting locknut (1), sleeve spacer (2), tube elbow (3), tube fitting locknut (4), flat washer (5), and preformed packing (6).

**REASSEMBLY**

Install new preformed packing (6), flat washer (5), new tube fitting locknut (4), tube elbow (3), sleeve spacer (2), and new tube fitting locknut (1).



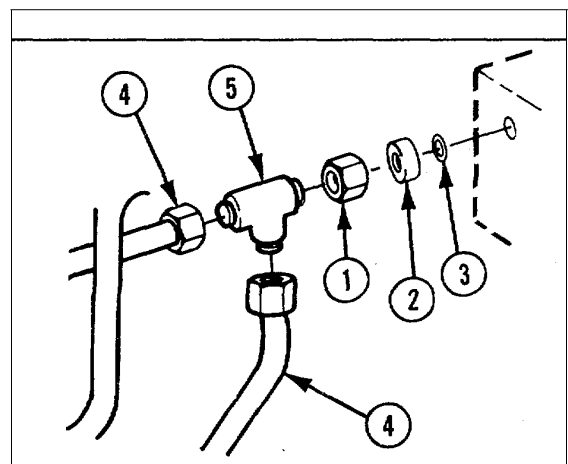
**2-20. TUBE TEE TO TUBE FITTING.**

**DISASSEMBLY**

- 1 Remove tube fitting locknut (1), flat washer (2), and preformed packing (3).
- 2 Disconnect tube assemblies (4) from tube tee (5) and remove tube tee. (C)

**REASSEMBLY**

Install tube tee (5) in tube assembly (4) before installing new preformed packing (3), flat washer (2), and new tube fitting locknut (1).



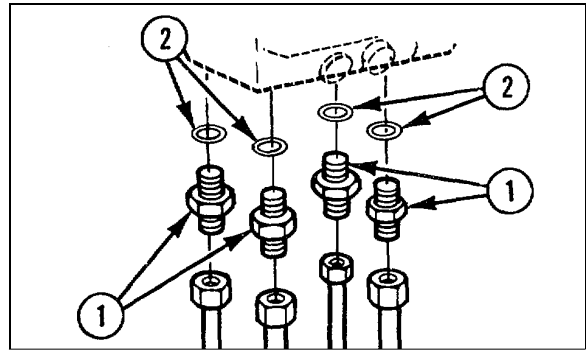
**2-21. TUBE REDUCER TO TUBE FITTING.**

**DISASSEMBLY**

Disconnect tube assembly and remove tube reducer (1) and preformed packing (2).

**REASSEMBLY**

Install new preformed packing (2) and tube reducer (1), and connect tube assembly.



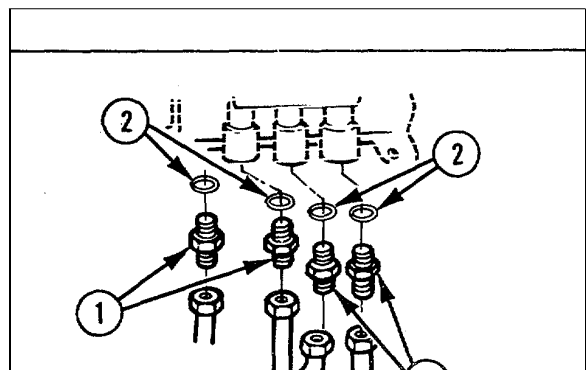
**2-22. TUBE NIPPLE TO TUBE FITTING.**

**DISASSEMBLY**

Disconnect tube fitting, and remove tube nipple (1) and preformed packing (2).

**REASSEMBLY**

Install new preformed packing (2) and tube nipple (1) and connect tube fitting.



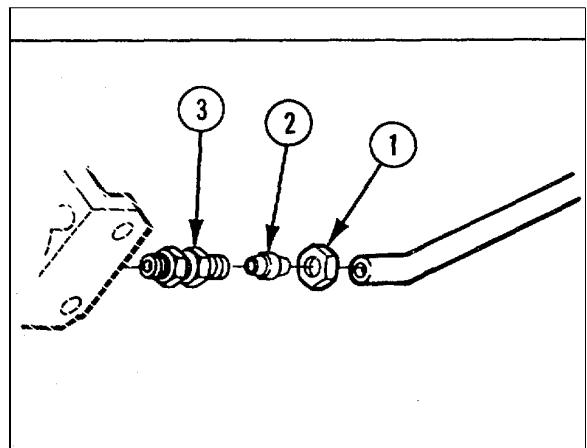
**2-23. STRAIGHT ADAPTER TO TUBE FITTING.**

**DISASSEMBLY**

Remove tube fitting locknut (1), sleeve spacer (2), and straight adapter (3).

**REASSEMBLY**

Install straight adapter (3), sleeve spacer (2), and new tube fitting locknut (1).





## Section VII. UNIT MAINTENANCE INSTRUCTIONS

**2-24. GENERAL.** This section provides general repair methods and cleaning procedures. Special repair and cleaning procedures are provided, as required, in the individual maintenance instructions.

### 2-25. REPAIR METHODS.

- 1 Complete disassembly is not always necessary to make a repair. Exercise good judgement to keep disassembly and reassembly to a minimum.
- 2 Repair or replace unserviceable parts and hardware. Always replace packings, gaskets, and seals with new parts.
- 3 Remove burrs with a stone or file. Remove burrs on closely fitted mating surfaces by lapping the surfaces with abrasive compound (item 1, appx C).
- 4 Remove corrosion or rust with crocus cloth (item 8, appx C) or emery cloth (item 6, appx C). Use the method that will not damage the surface being cleaned. Crocus cloth (item 8, appx C) should be used to remove corrosion and rust from polished surfaces. Make sure that critical dimensions are not altered when using crocus cloth.
- 5 Repair damaged threads with a thread chaser or die.
- 6 When welding is authorized, procedures in TM 9-237 must be followed. Welds must be inspected for cracks.
- 7 Bearings should be inspected and maintained following procedures in TM 9-214.
- 8 Clean electrical ground contacts with crocus cloth (item 8, appx C) or emery cloth (item 6, appx C). Make sure ground connections are tight.

- 9 Repair chafed, broken, or damaged electrical wiring with insulation tape (item 23, appx C). When soldering is required, procedures in TB SIG 222 must be followed.
- 10 After locating the malfunction and repairing the component, test it for proper function.
- 11 Follow torque values given throughout this manual. When no torque value is given, follow the torque limits guide, provided in appendix E of this manual, to prevent damaging parts.

### 2-26. CLEANING.

- 1 Wire brush metal parts to remove rust and corrosion.

#### **WARNING**

**Dry cleaning solvent (SD2) is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated area.**

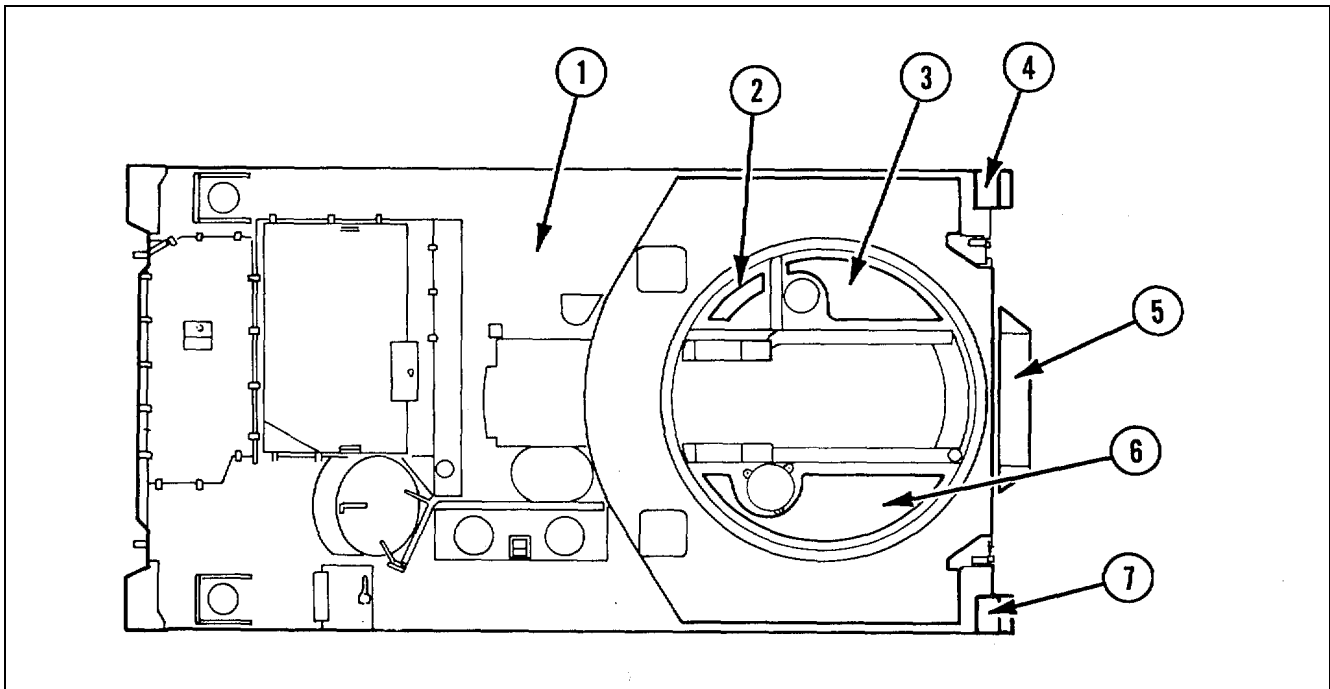
- 2 Clean metal parts with dry cleaning solvent (SD2) (item 9, appx C). Metal or fiber brushes may be used to apply cleaning solvent and to remove softened or dissolved material. Hand scraping with metal scrapers may be used to remove soft coatings or deposits.
- 3 Soak oily or greasy metal parts in a tank containing dry cleaning solvent (SD2) (item 9, appx C). The time parts must be in solvent varies with the type and amount of material to be removed.
- 4 Do not use solvent to clean electrical insulation, wires, cables, or wiring harnesses. Clean these parts by wiping with a damp cloth. Use a mild soap solution if necessary. Dry immediately with clean dry cloths. Clean contact points with flint abrasive paper (item 2, appx C) and dust thoroughly after cleaning.

- 5 Do not use solvent to clean rubber parts. Clean rubber parts by washing with mild solution of soap and water.
- 6 Dry parts by blowing with low-pressure compressed air or wiping with clean, lint-free cloths (item 7, appx C).
- 7 Bearings should be cleaned by procedures in TM 9-214.
- 8 Spot paint metal surfaces after repairs, as required. Sand damaged areas, clean with solvent, and rinse with water. Surface must be clean and dry. Paint with CARC to match existing color, refer to TM 43-0139.

**2-27. LUBRICATION.** Keep a light coat of lubricating oil (CLP) (item 5, appx C) on parts during repair procedures to prevent rusting. Lubricate parts during repair and assembly as required. Refer to page 2-8.

**2-28. PAINTING INSTRUCTIONS.** Complete painting is authorized for and done by general support maintenance personnel or higher. Spot painting and restenciling vehicle markings is done by unit maintenance personnel. Instructions for materiel preparation, priming, and finish are given in TM 43-0139.

**2-29. NONSKID AREAS.**



Nonslip paint (item 16, appx C) will be used to coat deck areas where personnel walk. The seven areas to be coated with nonslip paint are shown in the above illustration.

Change 1 2-85

**2-30. TOUCHUP AND RECOATING.****WARNING**

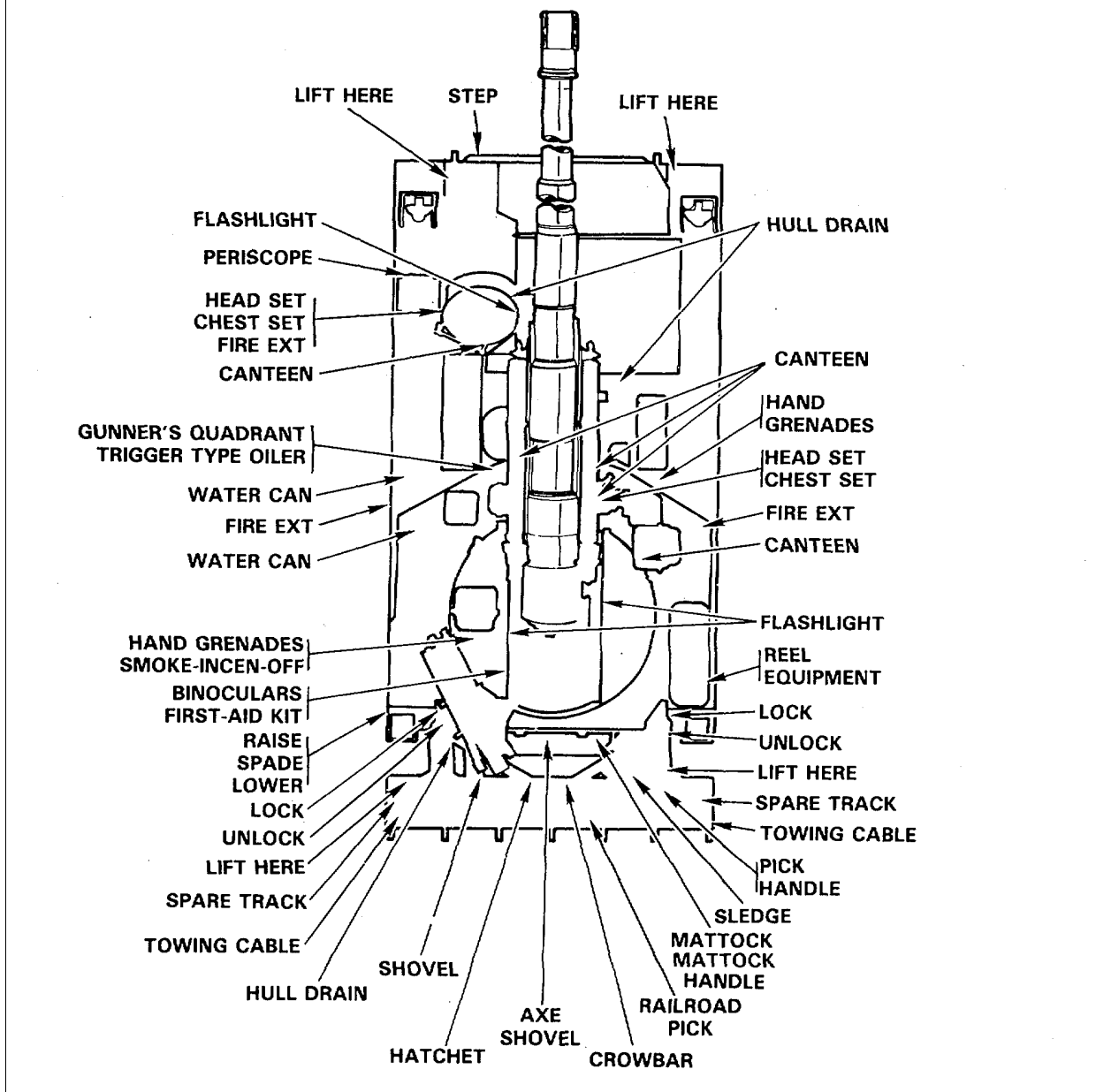
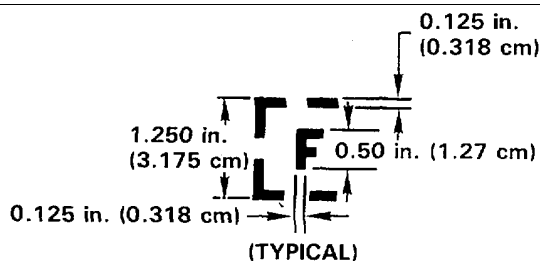
- Agent Resistant Coating (CARC) Paint: CARC paint contains isocyanate, a constituent that can cause respiratory effects during and after the application of the material. During the application of CARC paint, coughing, shortness of breath, pain on respiration, increased sputum, and chest tightness may occur. CARC paint also produces itching and reddening of the skin, a burning sensation of the throat and nose, and watering of the eyes.
- An allergic reaction may occur after initial exposure (ranging from a few days to a few months later), producing asthmatic symptoms including coughing, wheezing, tightness in the chest, or shortness of breath.
- The following precautions must be observed to insure the safety of personnel when CARC paint is applied.
- For brush/roller painting in confined spaces, an airline respirator is required, unless an air sampling shows exposure to be below standards. If the air sampling is below standards, either chemical cartridge or airline respirators are required.
- Spot painters applying CARC paint by brush or roller must wear clothing and gloves affording full coverage.

- Do not use water, alcohol, or amine based solvents to thin or remove CARC paints. Use of these solvents with CARC paints can produce chemical reactions resulting in nausea, disease, burns, or severe illness to personnel.
- Do not use paint solvents to remove paint/coating from your skin.
- Mix paint/coating in a wellventilated mixing room or spraying area away from open flames. Personnel mixing paint/coating should wear eye protection.
- Use paint/coating with adequate ventilation.
- Unusable CARC mixtures may be considered hazardous waste and may require disposal IAW Federal, state, DOD, and DA hazardous waste regulations. Consult the installation environmental office for proper disposal guidance. Mixed CARC has a flashpoint of approximately 380F (30C) due to the incorporation of solvents and is highly flammable.

When touching up damaged areas, the procedure should be as similar to the original method of finishing as possible; a clean surface is imperative. Where general disintegration of the surface is evident, or the under surface is corroded, the coating must be stripped clean from the part. Corrosion must be removed or neutralized by mechanical or chemical treatment, or both, and the surface metal must be pre-treated, primed, and then topcoated.

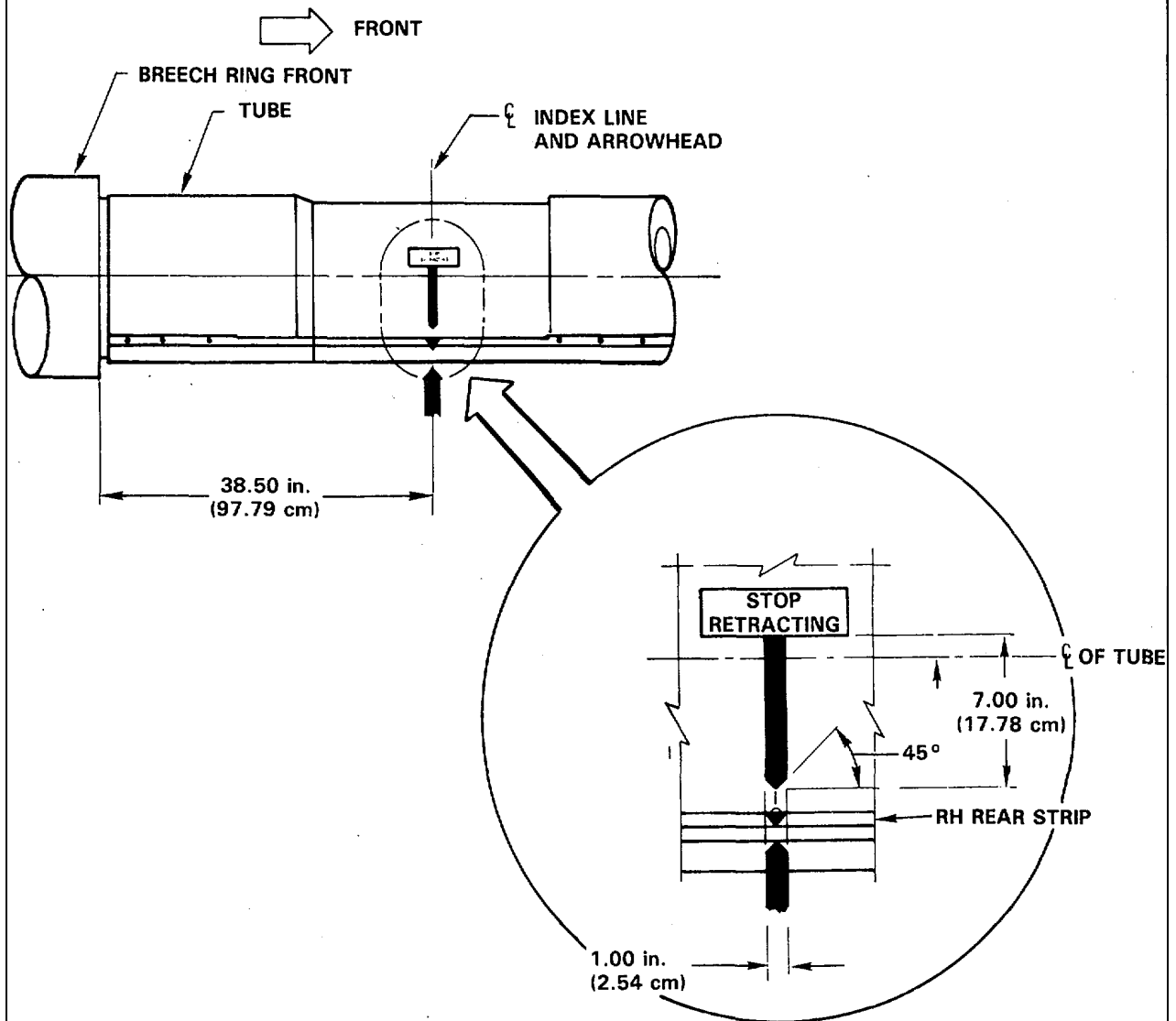
2-31. RESTENCILING VEHICLE MARKINGS.

Apply stencils to clean, painted surfaces only. Use black enamel (item 10, appx C.). When possible, position the stencil so that it is converted by the item named when the item is stowed in its proper place. Stencil dimensions and locations are shown below and to the right



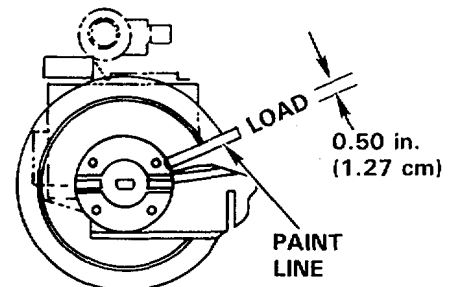
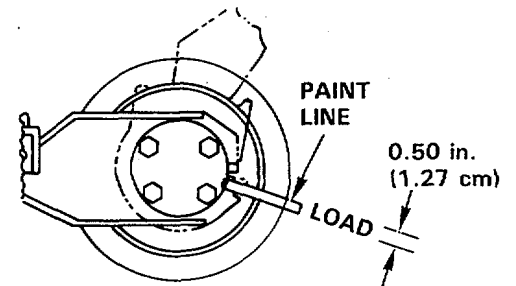
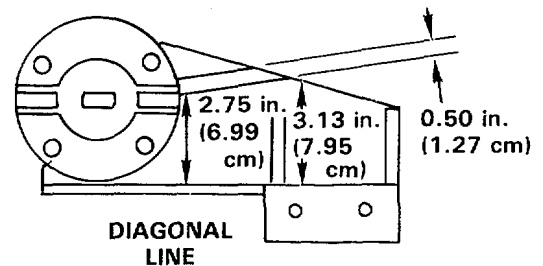
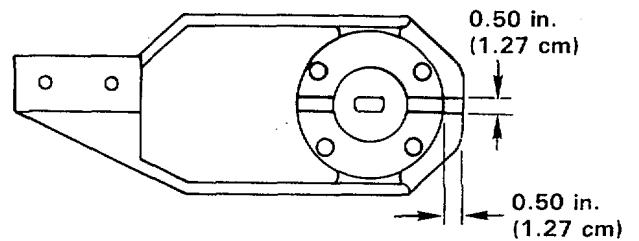
2-32. PAINTING RETRACT MARK.

Locate and apply stencil, index line, and arrowhead as shown. Use black enamel (item 10, appx C).



**2-33. PAINTING LOAD MARKS.**

- 1 Remove M137 telescope mount and M140 alinement device mount, refer to page 2-113.
- 2 Remove M15 fire control quadrant and M140 alinement device mount, refer to page 2-103.
- 3 Paint index lines on M140 alinement device mounts.
- 4 Install M140 alinement device mounts, refer to pages 2-103 and 2-113.
- 5 Open breech and place loader-rammer assembly in ramming position with trough retracted.
- 6 Elevate the gun tube until trough can slide into breech. Measure elevating angle on breech pads with gunner's quadrant (approx 145 mils).
- 7 Paint index lines on trunnion bearing cap (right side) and trunnion (left side) to aline with paint lines on mounts. Stencil "LOAD" at ends of lines.



**2-34. MAINTENANCE OF LEFT-SIDE DATA DISPLAY.**

This task covers:	a. <i>Removal/Disassembly</i> b. <i>Inspection/Repair</i>	c. <i>Reassembly/Installation</i>
-------------------	--	-----------------------------------

**INITIAL SETUP**

<p><i>Tools and Special Tools</i> Ordnance artillery and turret mechanic's tool kit (appx B)</p> <p><i>Materials/Parts</i> Lockwasher (11) (MS35338-44) Self-locking nut (4) (MS21044N4)</p> <p><i>References</i> TM 9-2350-304-24P-2 TM 11-7440-283-12-2</p> <p><i>Equipment Conditions</i> Communication box removed (TM 11-5830-340-12)</p>	<p><i>General Safety Instructions</i></p> <p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.</li> <li>• Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.</li> </ul>
--	---

**REMOVAL/DISASSEMBLY**

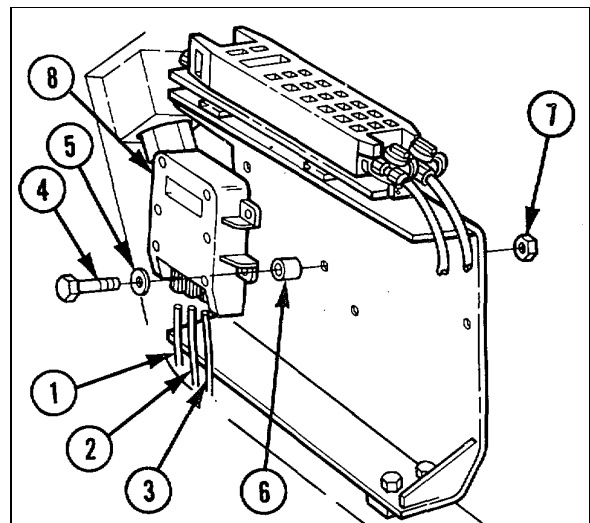
**WARNING**

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

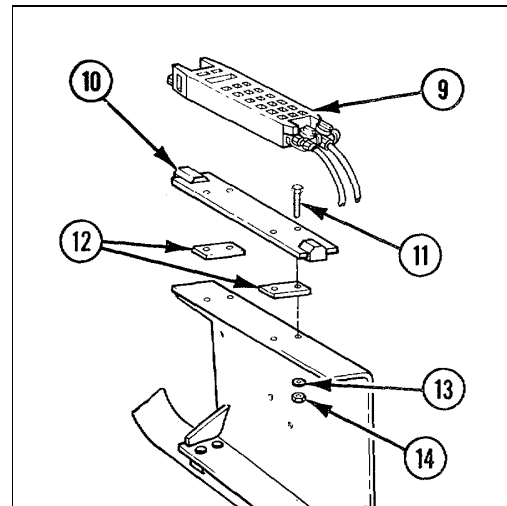
**CAUTION**

**Use care not to damage or lose parts when removing fire control equipment.**

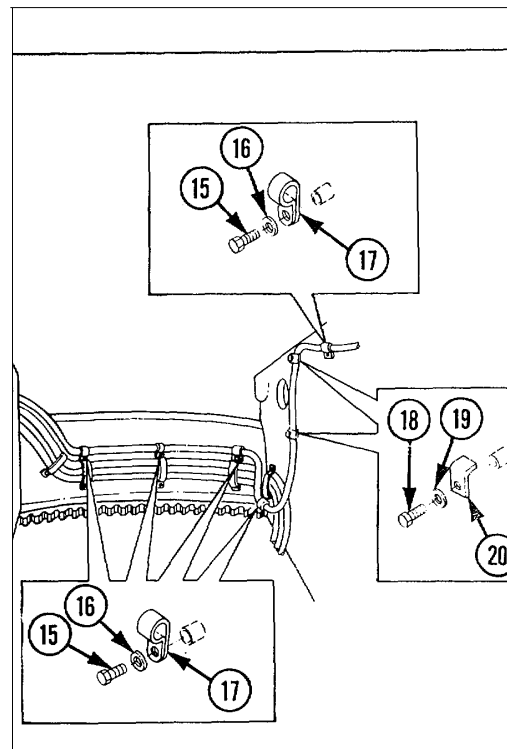
- 1 Disconnect three wire pairs at connectors DEF1 (1), DEF2 (2), and DEF3 (3).
- 2 Remove four capscrews (4), four lockwashers (5), four sleeve spacers (6), four nuts (7), and left-side data display (8).



- 3 Disconnect section chief assembly (9) from mount (10).
- 4 Remove four machine screws (11), two plate spacers (12), four flat washers (13), four self-locking nuts (14), and mount (10).



- 5 Remove five capscrews (15), five lockwashers (16), and five loop clamps (17) from wire pairs.
- 6 Remove two capscrews (18), two lockwashers (19), and two angle brackets (20) from wire pairs.



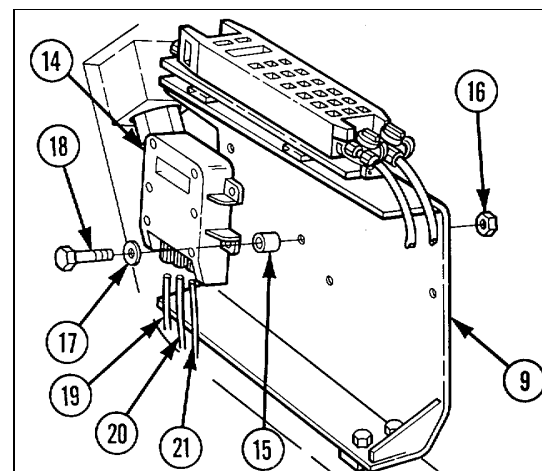
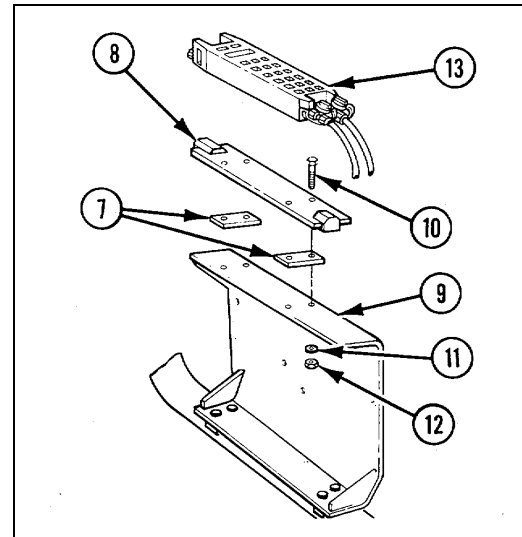
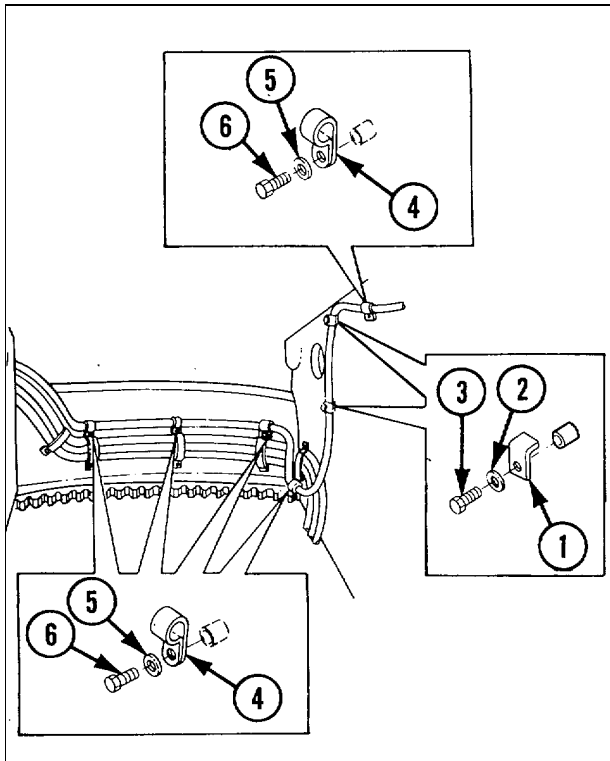
**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).



2-34. MAINTENANCE OF LEFT-SIDE DATA DISPLAY (CONT).

**REASSEMBLY/INSTALLATION**



**CAUTION**

**Make sure wires are connected to proper connectors. Refer to TM 11-7440-283-12-2.**

- 1 Install two angle brackets (1) and secure using two new lockwashers (2) and two capscrews (3).
- 2 Install five loop clamps (4), five new lockwashers (5) and five capscrews (6) securing wire pairs.
- 3 Install two plate spacers (7) and mount (8) on bracket (9). Secure using four machine screws (10), four flat washers (11), and four new self-locking nuts (12).
- 4 Connect section chief assembly (13) to mount (8).
- 5 Position left-side data display (14) and four sleeve spacers (15) on bracket (9). Secure using four nuts (16), four new lockwashers (17), and four capscrews (18).

- 6 Connect three wire pairs at connectors DEF1 (19), DEF2 (20), and DEF3 (21).

**2-35. MAINTENANCE OF RIGHT-SIDE DATA DISPLAY.**

This task covers:      a. *Removal/Disassembly*                      c. *Reassembly/Installation*  
                                     b. *Inspection/Repair*

**INITIAL SETUP**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*Materials/Parts*

- Lockwasher (10) (MS35338-44)
- Lockwasher- (9) (MS35338-46)
- Self-locking nut (2) (MS21044N4)
- Self-locking nut (6) (MS21042-6)

*References*

- TM 9-2350-304-24P-2
- TM 11-7440-283-12-2

*General Safety Instructions*

**WARNING**

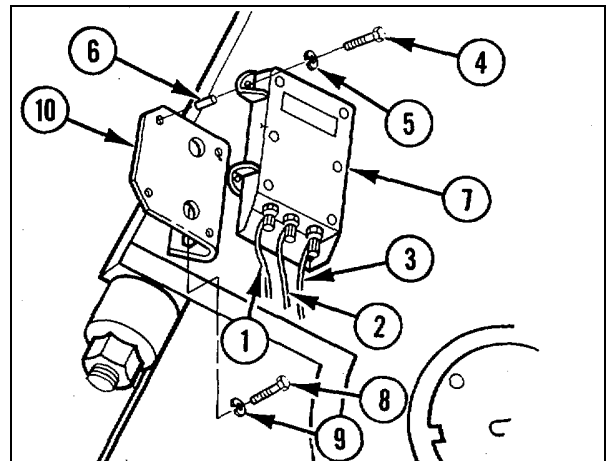
- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

**REMOVAL/DISASSEMBLY**

**WARNING**

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

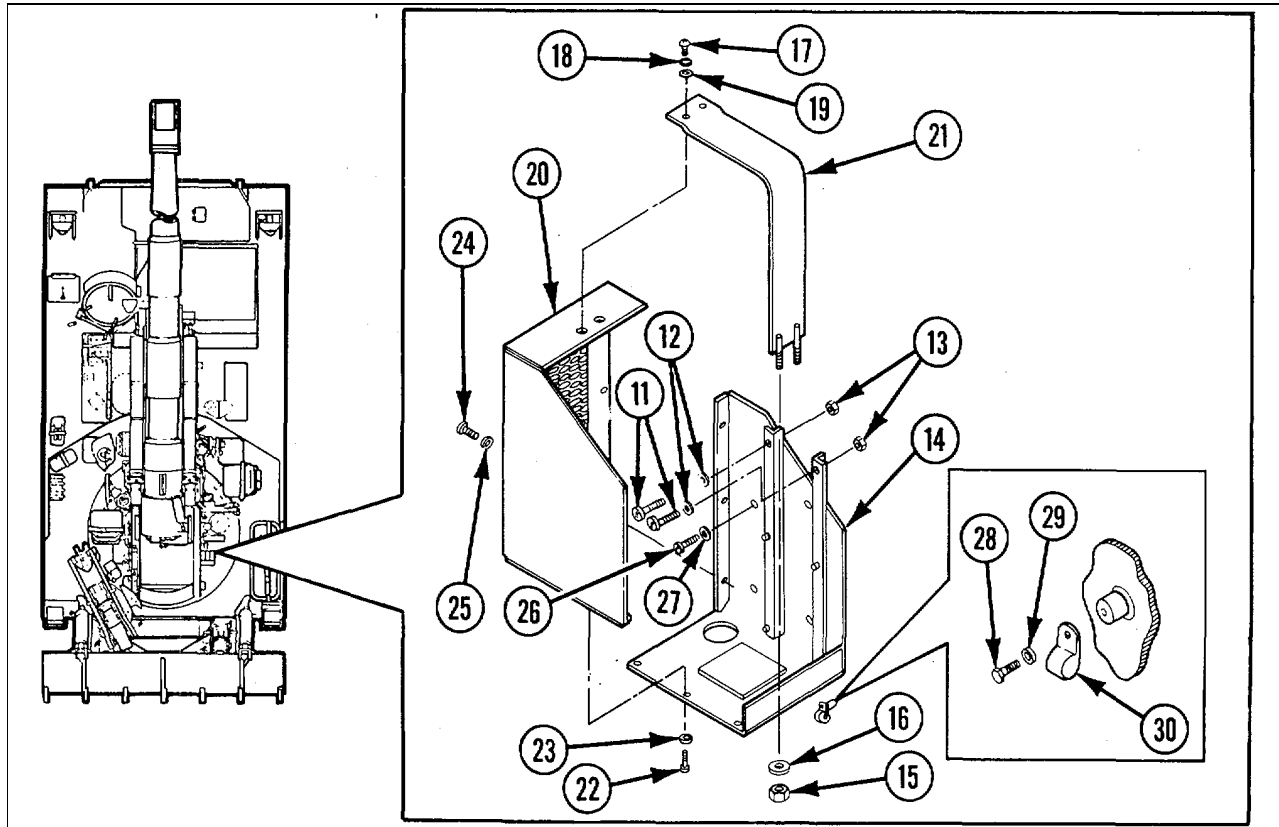
- 1 Disconnect three wire pairs at connectors QE1 (1), QE2 (2), and QE3 (3).
- 2 Remove four capscrews (4), four lockwashers (5), four sleeve spacers (6), and right-side data display (7).



- 3 Remove two capscrews (8), two lockwashers (9), and bracket (10).

**2-35. MAINTENANCE OF RIGHT-SIDE DATA DISPLAY (CONT).**

*REMOVAL/DISASSEMBLY (CONT)*



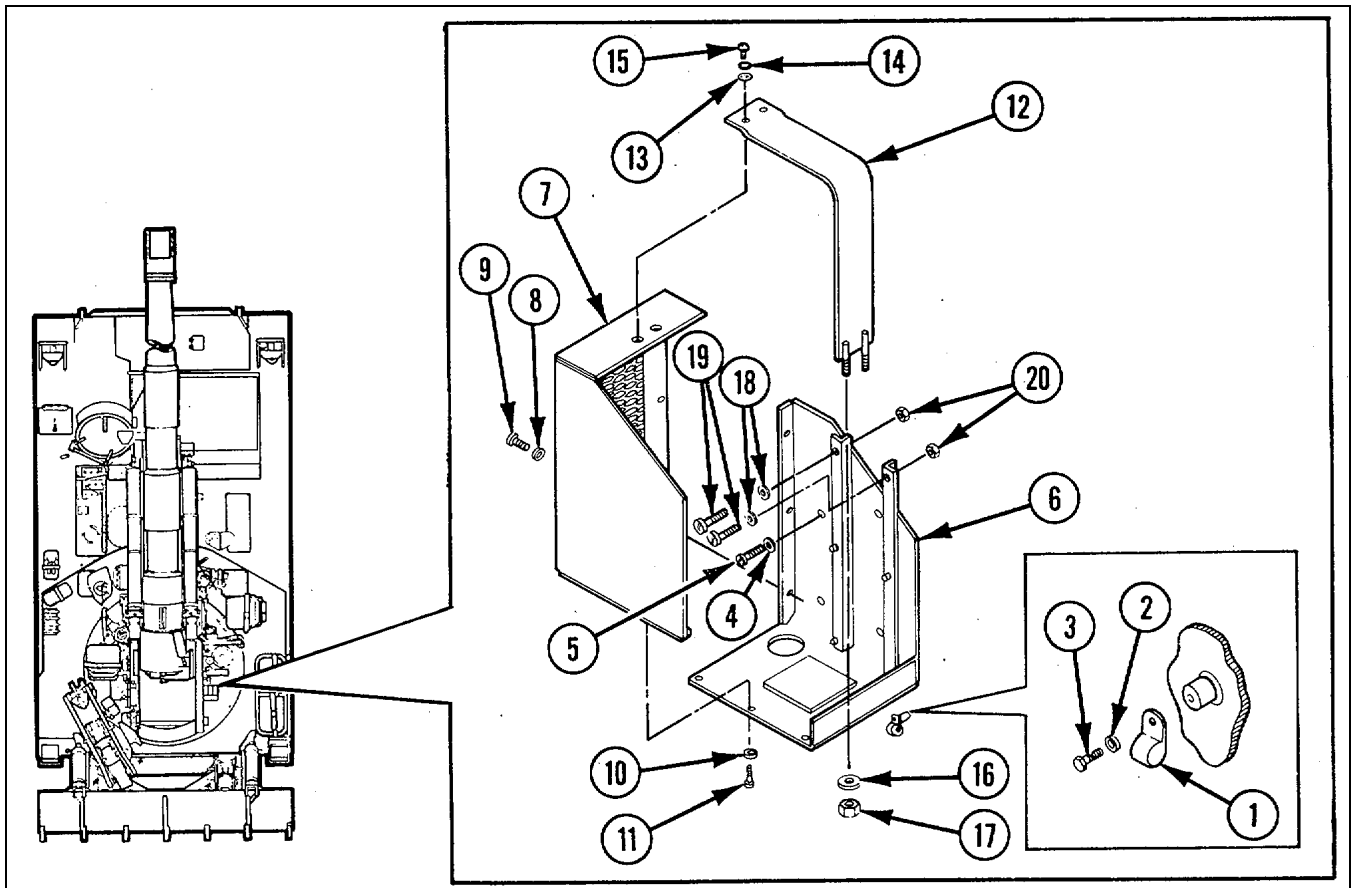
- |   |   |
|---|---|
| <p>4 Remove six cap screws (11), six flat washers (12), and six self-locking nuts (13) from blank panel (14).</p> <p>5 Remove two self-locking nuts (15) and two flat washers (16) from blank panel (14).</p> <p>6 Remove two machine screws (17), two lockwashers (18), and two flat washers (19), from metal grille (20) and remove retaining strap (21).</p> | <p>7 Remove three cap screws (22) and three lockwashers (23) from metal grille (20).</p> <p>8 Remove three cap screws (24), three lockwashers (25), and metal grille (20) from blank panel (14).</p> <p>9 Remove four cap screws (26) and four lockwashers (27) from blank panel (14).</p> <p>10 Remove cap screw (28), lockwasher (29), and loop clamp (30) from wall of howitzer.</p> |
|---|---|

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

2-35. MAINTENANCE OF RIGHT-SIDE DATA DISPLAY (CONT).

REMOVAL/DISASSEMBLY (CONT)



- |  |   |
|--|---|
| <p>1 Install loop clamp (1), new lockwasher (2), and capscrew (3) in wall of howitzer.</p> <p>2 Install four new lockwashers (4) and four cap screws (5) in blank panel (6).</p> <p>3 Install metal grille (7) on blank panel (6) using three new lockwashers (8) and three cap screws (9).</p> <p>4 Install three new lockwashers (10) and three cap screws (11) in metal grille (7).</p> | <p>5 Install retaining strap (12) on metal grille (7) and secure with two flat washers (13), two new lockwashers (14), and two cap screws (15).</p> <p>6 Install two flat washers (16) and two new self-locking nuts (17) on blank panel (6).</p> <p>7 Install six flat washers (18), six cap screws (19), and six new self-locking nuts (20) in blank panel (6).</p> |
|--|---|

**2-35. MAINTENANCE OF RIGHT-SIDE DATA DISPLAY (CONT).**

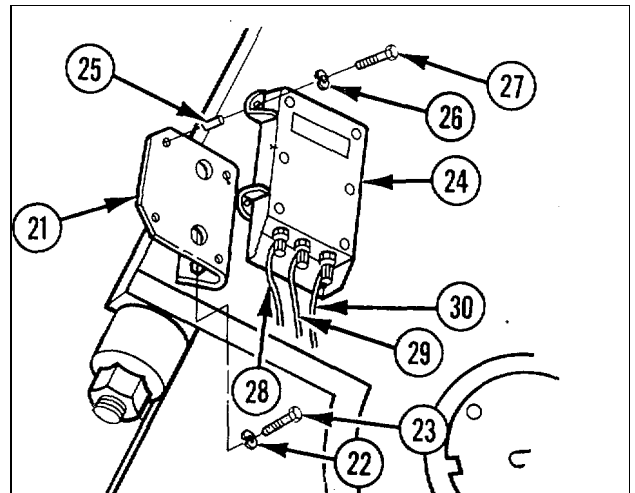
*REASSEMBLY/INSTALLATION (CONT)*

- 8 Install bracket (21), two new lockwashers (22), and two capscrews (23).
- 9 Position right-side data display (24) and four sleeve spacers (25) on bracket (21) and secure using four new lockwashers (26) and four capscrews (27).

**CAUTION**

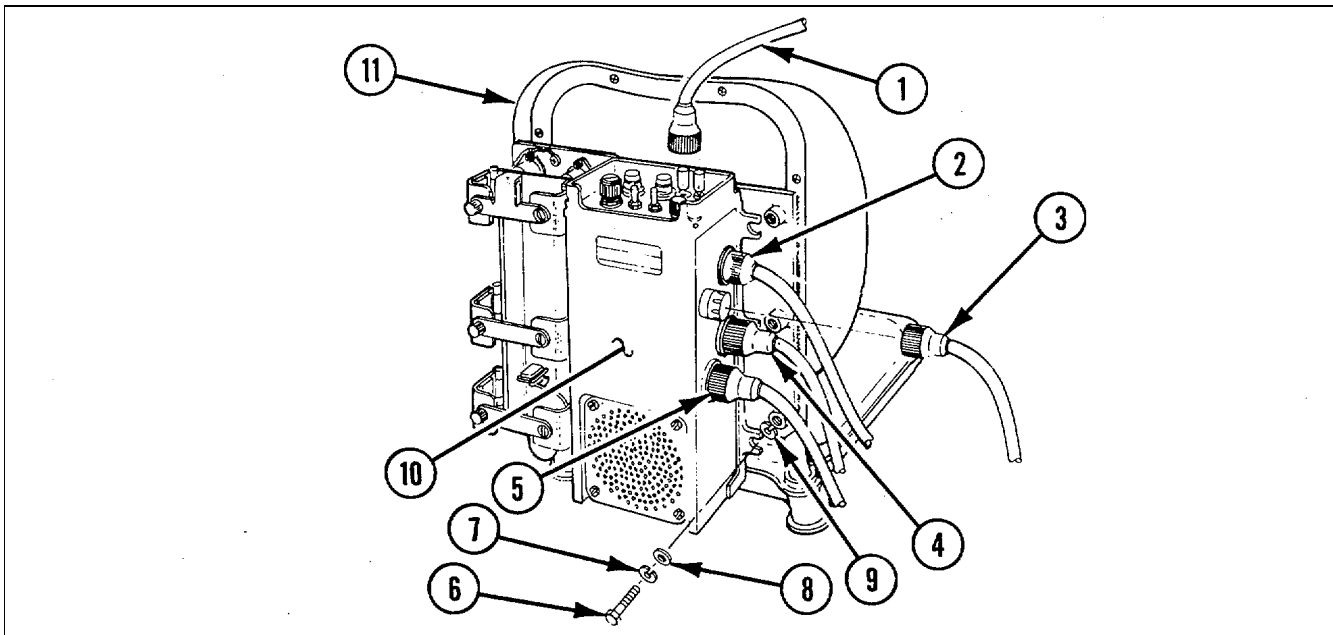
**Make sure wires are connected to proper connectors. Refer to TM 11-7440-283-1 2-2.**

- 10 Connect three wire pairs at connectors QE1 (28), QE2 (29), and QE3 (30).



**2-36. MAINTENANCE OF VEHICULAR APPLIQUE SYSTEM.**

This task covers:	a. <i>Removal</i>	b. <i>Inspection/Repair</i>	c. <i>Installation</i>
<b>INITIAL SETUP</b>			
<p><i>Tools and Special Tools</i> Ordnance artillery and turret mechanic's tool kit (appx B)</p> <p><i>Materials/Parts</i> Lockwasher (3) (MS35335-34) Lockwasher (3) (MS35338-45)</p> <p><i>References</i> TM References -23 342 2</p>	<p><i>General Safety Instructions</i></p> <p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.</li> <li>• Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.</li> </ul>		



**REMOVAL**

**WARNING**

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

- 1 Disconnect five electrical leads at connectors AUDIO (1), J101 (2), J102 (3), J103 (4), and PWR (5).
- 2 Remove six machine bolts (6), six lockwashers (7), six flat washers (8), and three lockwashers (9).
- 3 Remove vehicular applique system (10) from assistant gunner's seat (11).

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**INSTALLATION**

- 1 Position vehicular applique system (10) on back of assistant gunner's seat (11).
2. Install three new lockwashers (9), six flat washers (8), six new lockwashers (7), and six machine bolts (6).

**CAUTION**

**Make sure wires and leads are connected to proper connectors. Refer to FO-1 thru FO-3 in this manual.**

- 3 Connect five electrical leads at connectors AUDIO (1), J101 (2), J102 (3), J103 (4), and PWR (5).

**2-37. MAINTENANCE OF M115 PANORAMIC TELESCOPE.**

This task covers:	a. <i>Removal</i> b. <i>Disassembly</i> c. <i>Inspection/Repair</i>	d. <i>Reassembly</i> e. <i>Installation</i>
-------------------	---	--

**INITIAL SETUP**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*Materials/Parts*

Lockwasher (4) (M535338-140)

*References*

TM 9-2350-304-10-  
 TM 9-2350-304-24P-2  
 TM 750-116

*General Safety Instructions*

**WARNING**

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

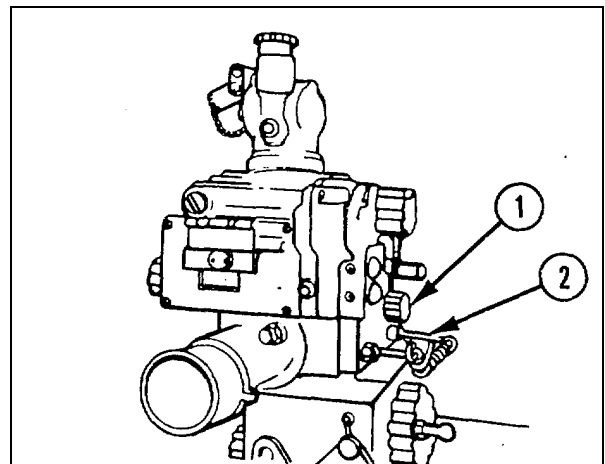
**REMOVAL**

**WARNING**

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

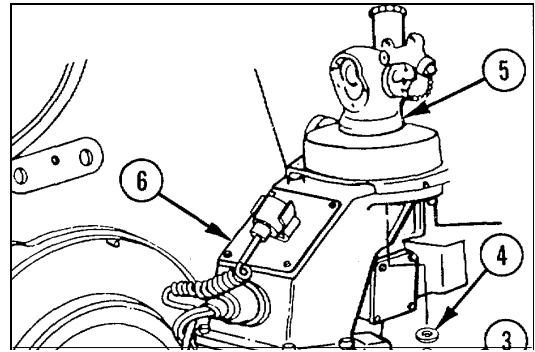
**CAUTION**

**Use care not to damage or lose parts when removing fire control equipment.**



- 1 Set rheostat-switch (1) to OFF.
- 2 Disconnect reticle lamp power connector (2).

- 3 Remove four capscrews (3) and four lockwashers (4).
- 4 Lift M1 5 panel (5) carefully from M137 telescope mount (6).

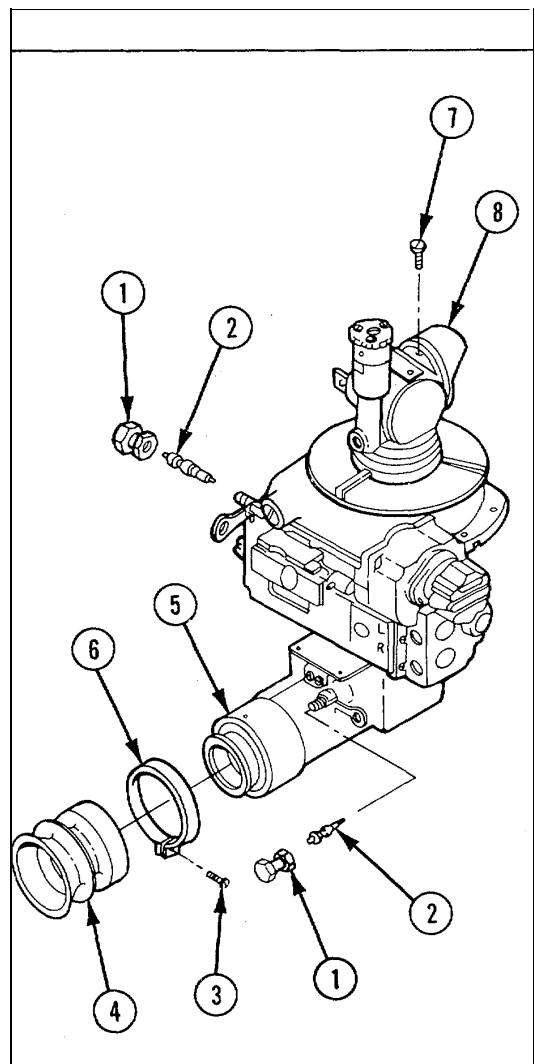


**DISASSEMBLY**

- 1 Remove two caps (1) and two valve cores (2).
- 2 Loosen screw (3) and remove optical eyeshield (4) from M1115 panel (5).
- 3 Remove loop clamp (6) and screw (3).
- 4 Remove screw (7) from top of head assembly (8).

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).





**2-37. MAINTENANCE OF M115 PANORAMIC TELESCOPE (CONT).**

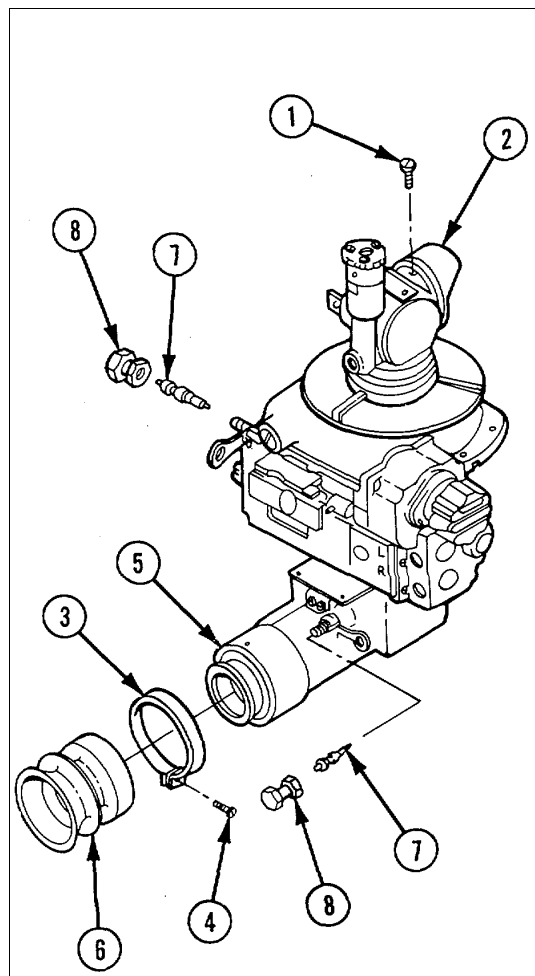
**REASSEMBLY**

- 1 Install screw (1) on top of head assembly (2).
- 2 Install loop clamp (3) and screw (4) on M115 pantel (5).
- 3 Install optical eyeshield (6) and secure by tightening screw (4).

**CAUTION**

**MI 115 Pantel must be purged after replacement of valve cores and valve caps. For complete purging procedures refer to TM 750-116.**

- 4 Install two valve cores (7) and two caps (8).

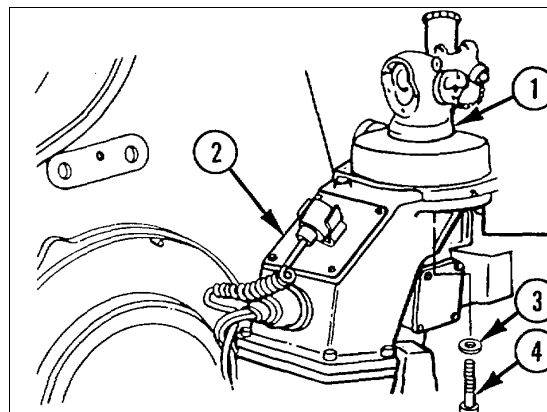


**INSTALLATION**

**CAUTION**

**Do not install M115 pantel if mounting surfaces are dirty, scratched, or damaged.**

- 1 If mounting surfaces are damaged, notify direct support maintenance.
- 2 Carefully place MI 15 pantel (1) on M137 telescope mount (2).
- 3 Install four new lockwashers (3) and four capscrews (4).
- 4 Tighten four capscrews (4).

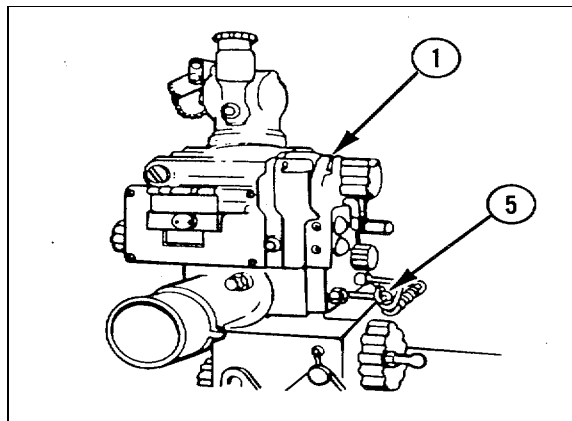


5. Connect reticle lamp power connector (5) to M115 panel (1).

**CAUTION**

If M115 panel head assembly is loose, it will no longer be optically aligned. If tightening or adjustment is required, notify general support maintenance.

6. Adjust M115 panel. Refer to TM 9-2350-304-10.



**2-38. MAINTENANCE OF M139 ELBOW TELESCOPE.**

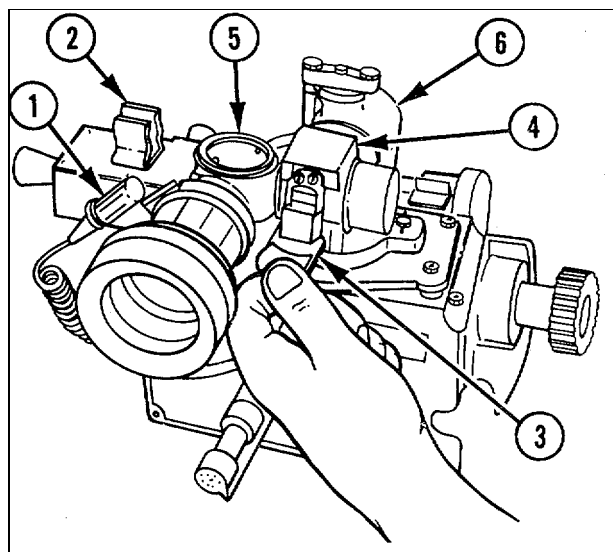
This task covers:		a. <i>Removal</i>	d. <i>Reassembly/Installation</i>
		b. <i>Disassembly</i>	e. <i>Installation.</i>
		c. <i>Inspection/Repair</i>	
<b>INITIAL SETUP:</b>			
<i>Tools and Special Tools</i>		<i>References</i>	
Ordnance artillery and turret mechanic's tool kit (appx B)		TM 9-2350-304-10	
		TM 9-2350-304-24P-2	
		TM 750-116	

**REMOVAL**

**CAUTION**

Use care not to damage or lose parts when removing fire control equipment.

- 1 Disconnect reticle lamp (1).
- 2 Place reticle lamp (1) in holding clip (2).
- 3 Release latch (3).
- 4 Raise clamp (4).
- 5 Remove M139 elbow telescope (5) from M138 telescope mount (6).



**2-38. MAINTENANCE OF M139 ELBOW TELESCOPE (CONT).**

**DISASSEMBLY**

- 1 Remove machine screw (1) and machine screw (2) from M139 elbow telescope (3).
- 2 Remove optical eyeshield (4) and adapter (5) from M139 elbow telescope (3).

**INSPECTION/REPAIR**

1. Inspect for broken, damaged, or missing parts.
2. Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

1. Install adapter (5) and optical eyeshield (4) on M139 elbow telescope (3).

**CAUTION**

**M139 elbow telescope must be purged after replacement of machine screws. For complete purging procedures, refer to TM 750-116.**

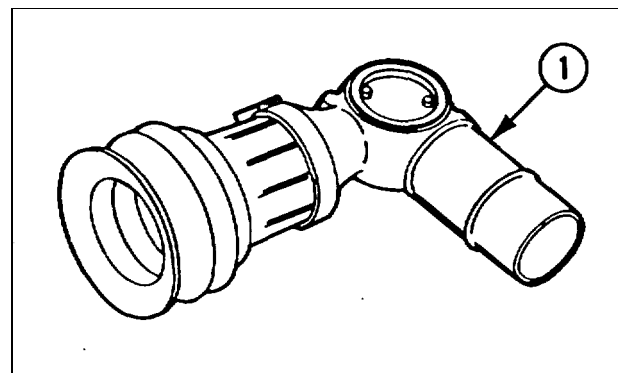
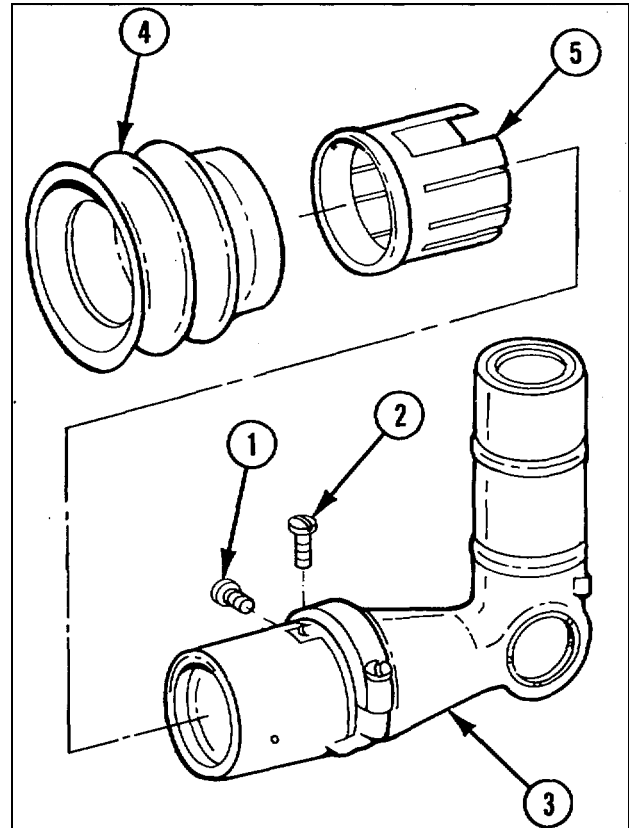
2. Install machine screw (2) and machine screw (1) in M139 elbow telescope (3).

**INSTALLATION**

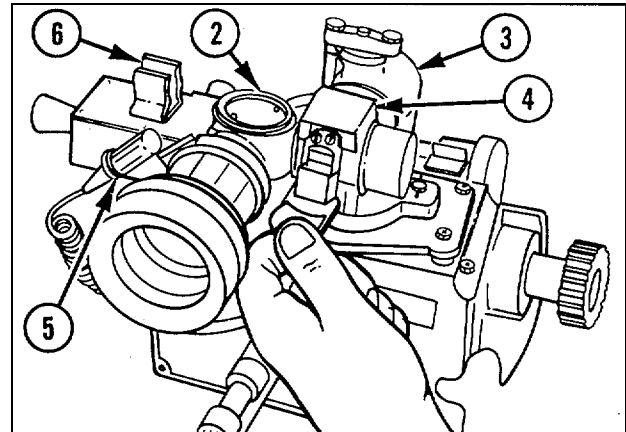
**CAUTION**

**Do not install M139 elbow telescope if mounting surfaces are dirty, scratched, or damaged.**

1. If mounting surfaces (1) are damaged, notify direct support maintenance.



2. Carefully install M139 elbow telescope (2) on M138 telescope mount (3).
3. Secure clamp (4).
4. Remove reticle lamp (5) from clip (6).
5. Install reticle lamp (5) on elbow telescope (2).
6. Boresight M139 elbow telescope. Refer to TM 9-2350-304-10.



**2-39. MAINTENANCE OF M15 FIRE CONTROL QUADRANT AND M140 ALINEMENT DEVICE MOUNT (RIGHT SIDE).**

This task covers:

a. <i>Removal</i>	e. <i>Installation</i>
b. <i>Disassembly</i>	f. <i>Adjustment of M15 Fire</i>
c. <i>Inspection/Repair</i>	
d. <i>Reassembly/Installation</i>	

**INITIAL SETUP:**

*Tools and Special Tools*

- M1A1/M1A2 gunner's quadrant (7197156)
- Ordnance artillery and turret mechanic's tool kit (appx B)
- Torque wrench (A-A-241 1)

*Materials/Parts*

- Dry cleaning solvent (item 9, appx C)
- Lockwasher (MS-35333-69)
- Lockwasher (MS35333-69)
- Lockwasher (2) (MS35338-135)
- Lockwasher (4) (MS35338-142)
- Lockwasher (8) (MS35338-143)
- Tape (item 22, appx C)

*References*

- TM 9-2350-304-24P-2
- TM 750-116

*Equipment Conditions*

- 2-101 M139 Elbow telescope removed
- 2-110 M138 Telescope mount
- 2-110 M138 Telescope mount removed

*General Safety Instructions*

**WARNING**

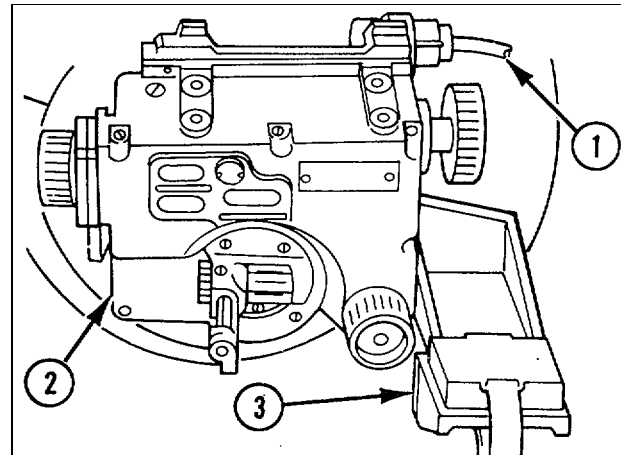
- **Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result serve this warning could result in injury to personnel.**
- **Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.**
- **Dry cleaning solvent (SD2) is toxic and flammable. Wear protective goggles and gloves protective goggles and gloves and use only in well-ventilated area.**

**2-39. MAINTENANCE OF M15 FIRE CONTROL QUADRANT AND M140 ALINEMENT DEVICE MOUNT (RIGHT SIDE) (CONT).**

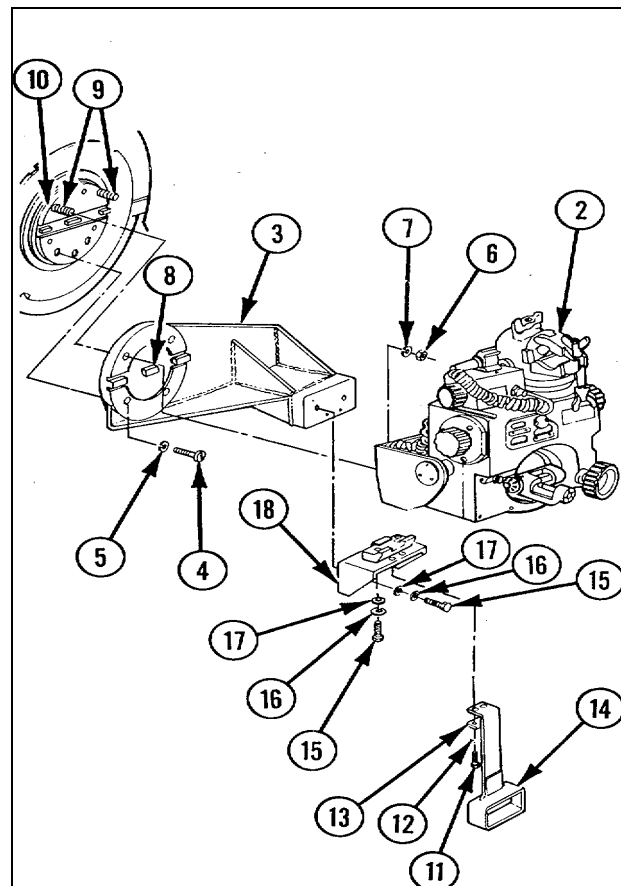
**REMOVAL**

**WARNING**

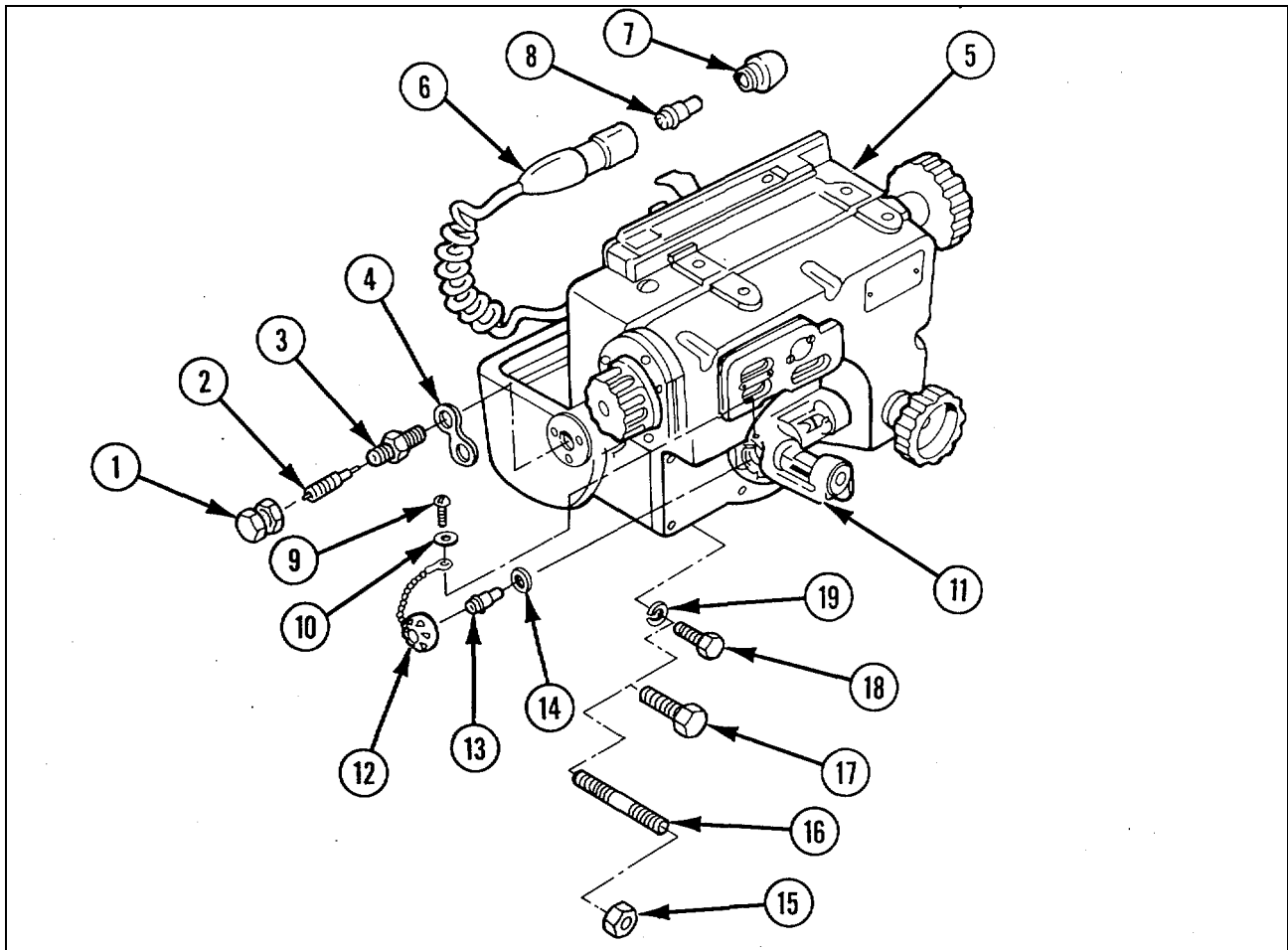
- Make sure **MASTER** switch is **OFF** before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.



1. Disconnect power cable (1).
2. Support M15 fire control quadrant (2) and M140 alignment device mount (3) as screws, nuts, and washers are removed.
3. Remove two capscrews (4) and two lockwashers (5).
4. Remove two nuts (6) and two lockwashers (7).
5. Pull M15 fire control quadrant (2) and M140 alignment device mount (3) straight off to clear locating key (8) and two plain studs (9).
6. If damaged, remove two plain studs (9).
7. mounting surfaces of M15 fire control quadrant (2), M140 alignment device mount (3), and trunnion end plate (10) with tape (item 22, appx C) to prevent damage.
8. Remove two machine screws (11), two lockwashers (12), chain link plate (13), and cover assembly (14).
9. Remove four capscrews (15), four lockwashers (16), and four flat washers (17), and blank panel (18) from M140 alignment device mount (3).



## DISASSEMBLY



### NOTE

The following steps refer to disassembly of M15 fire control quadrant.

1. Remove air valve cap (1), valve core (2), purging valve stem (3), and valve core strap (4) from M15 fire control quadrant (5).
2. Remove instrument light (6) from M15 fire control quadrant (5). Separate cap (7) of instrument light and remove 1-3/4 based LED (8).
3. Remove machine screw (9) and lockwasher (10) from level assembly (11)

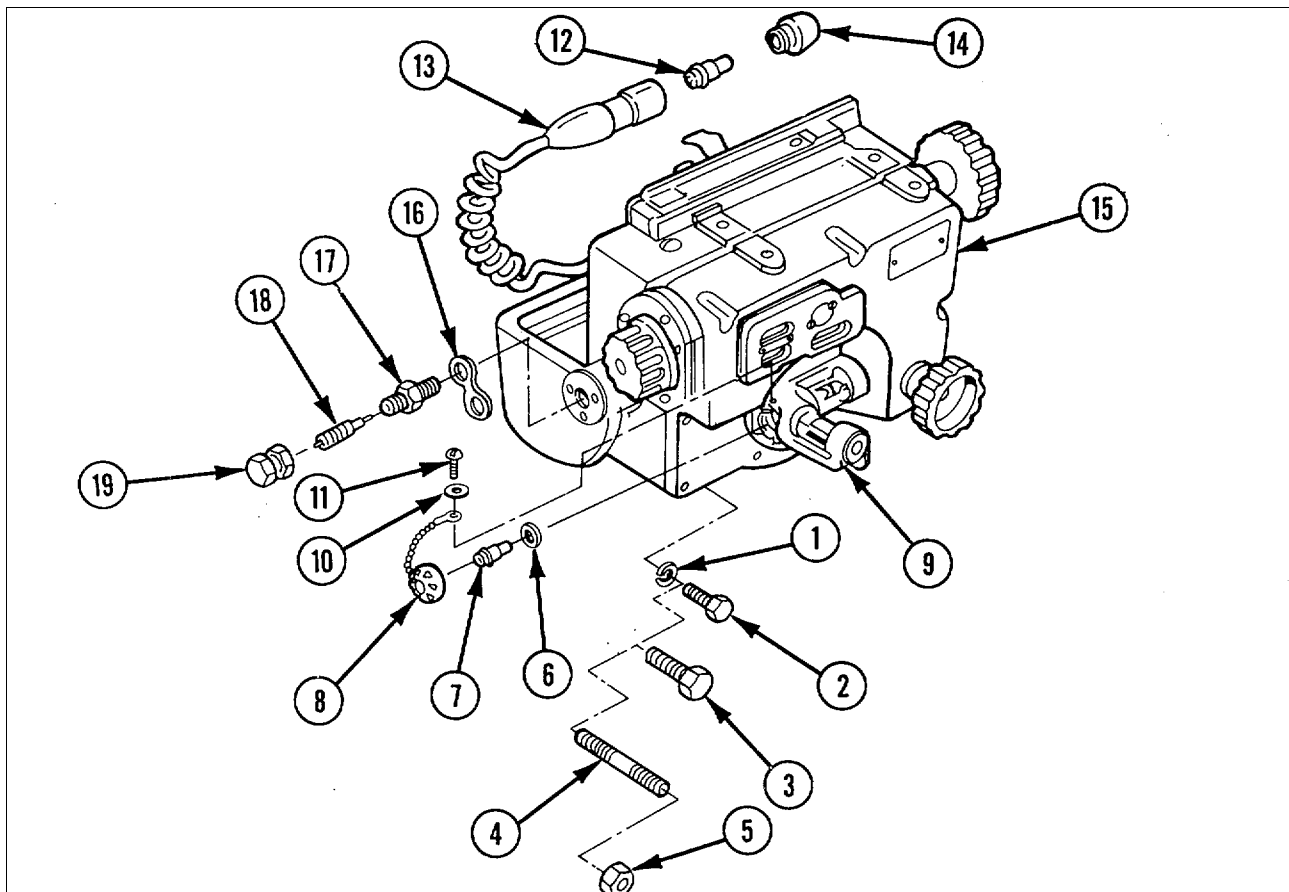
4. Remove electrical cover (12), 1-3/4 based LED (13), and spacer (14).
5. Remove two nuts (15), two plain studs (16), two cap screws (17), four cap screws (18), and four lockwashers (19).

### INSPECTION/REPAIR

1. Inspect for broken, damaged, or missing parts.
2. Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

## 2-39. MAINTENANCE OF M15 FIRE CONTROL QUADRANT AND M140 ALINEMENT DEVICE MOUNT (RIGHT SIDE) (CONT).

### REASSEMBLY



#### NOTE

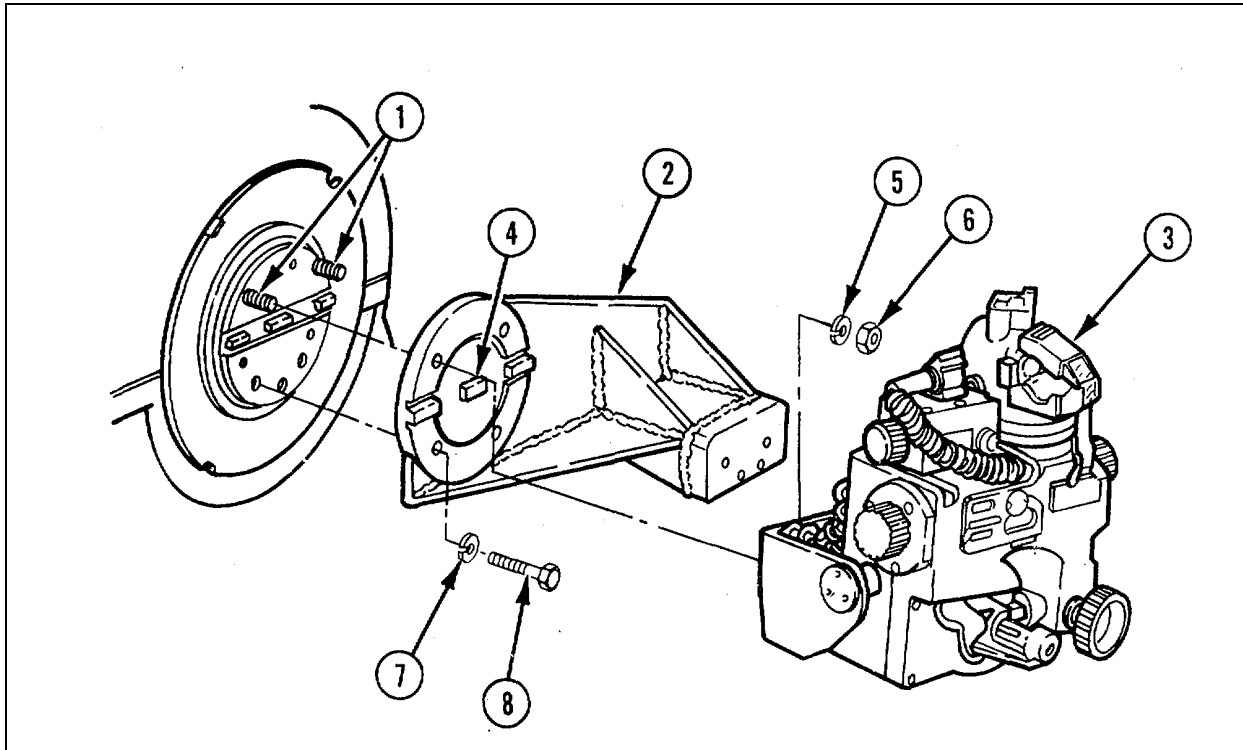
The following steps refer to reassembly of MI 15 fire control quadrant.

1. Install four new lockwashers (1), four cap screws (2), two cap screws (3), two plain studs (4), and two nuts (5).
2. Install spacer (6), 1-3/4 based LED (7), and electrical cover (8) on level assembly (9).
3. Install new lockwasher (10) and machine screw (11) securing electrical cover (8) to level assembly (9).
4. Install 1-3/4 based LED (12) in instrument light (13). Install cap (14) on instrument light (13).
5. Install instrument light (13) on M15 fire control quadrant. (15).
6. Install valve core strap (16), purging valve stem (17), valve core (18), and air valve cap (19) on M15 fire control quadrant (15).

#### CAUTION

The M15 fire control quadrant must be purged after replacement of valve core strap, purging valve stem, valve core, and air valve cap. For complete purging procedures, refer to TM 750-116.

## INSTALLATION



1. Remove tape from mounting surfaces.

**WARNING**

Dry cleaning solvent (SD2) is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated area.

**NOTE**

Mounting surfaces must be clean to ensure proper installation.

2. Clean mounting surface with dry cleaning solvent (item 9, appx C) and let air dry.

**CAUTION**

Do not install M15 fire control quadrant or M140 mount if mounting surfaces are dirty, scratched, or damaged.

3. If mounting surfaces are damaged, notify direct support maintenance.
4. If removed, install two new plain studs (1).
5. Position M140 alignment device mount (2) and M15 fire control quadrant (3) on mounting surface by aligning locating key (4) and two plain studs (1).
6. Install two new lockwashers (5) and two nuts (6) on plain studs (1).
7. Install two new lockwashers (7) and two capscrews (8).



**2-39. MAINTENANCE OF M15 FIRE CONTROL QUADRANT AND M140 ALINEMENT DEVICE MOUNT (RIGHT SIDE) (CONT)**

**INSTALLATION (CONT)**

8. Install blank panel (9) on M140 alinement device mount (2) and secure using four flat washers (10), four new lockwashers (11), and four capscrews (12).
9. Install cover assembly (13), retainer plate (14), two new lockwashers (15), and two machine screws (16). Torque screws to 45 to 50 ft-lb (61 to 68 N-m).

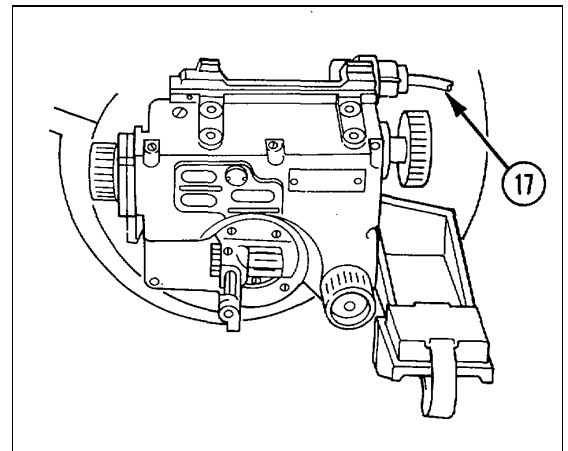
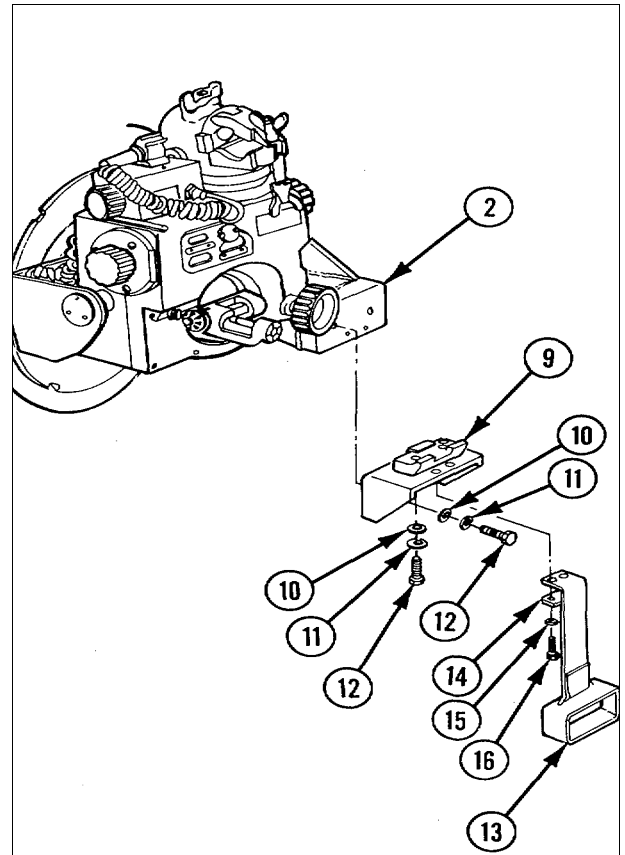
**CAUTION**

- Make sure the proper cable is connected to the MI 15 fire control quadrant. Failure to do so will cause damage to the quadrant.
- Check marker band on power cable to ensure correct cable is used.

**NOTE**

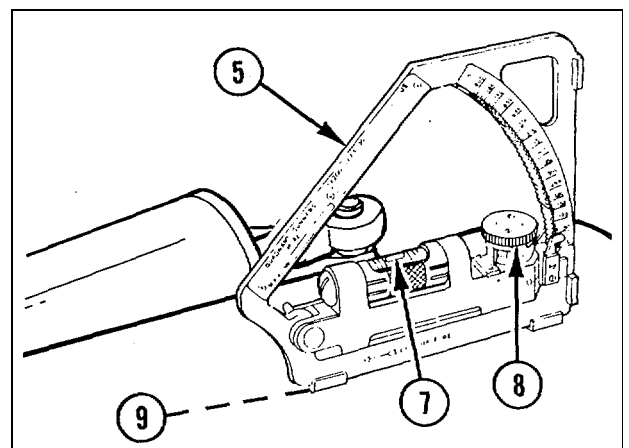
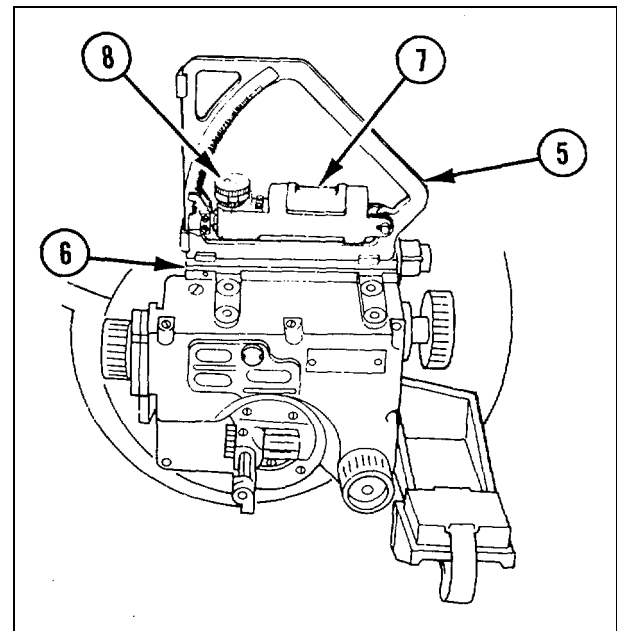
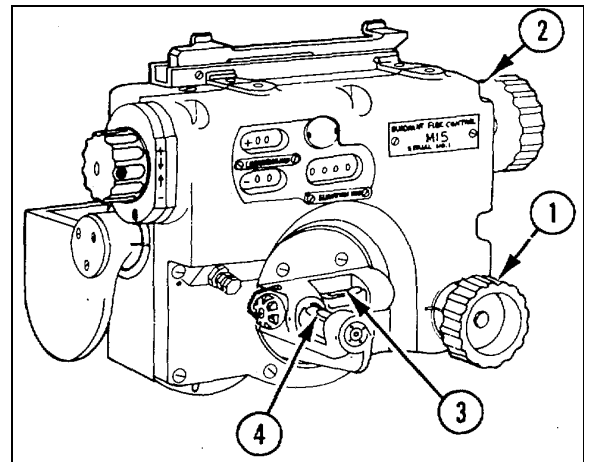
The proper cable should be marked with a band TO EL QDRNT or is the longer of the two cables.

10. Connect power cable (17).



## ADJUSTMENT OF M15 FIRE CONTROL QUADRANT

1. Level trunnions. Refer to page 2-113, Adjustment procedures.
2. Remove any special corrections from M15 fire control quadrant correction counter.
3. Turn cross level knob (1) and elevation knob (2) until bubbles (3 and 4) are centered. Cross level knob must be at midpoint adjustment.
4. If cross level knob (1) cannot be adjusted to midpoint, notify direct support maintenance.
5. Position M1A1/M1A2 gunner's quadrant (5) on quadrant seat (6) of M15 fire control quadrant.
6. Move radial arm of M1A1/M1A2 gunner's quadrant (5) until bubble (7) begins to center. Turn micrometer knob (8) to finish centering bubble.
7. After bubble (7) in M1A1/M1A2 gunner's quadrant (5) is centered, M1A1/M1A2 gunner's quadrant reading and M15 fire control quadrant counter reading must agree within 0.5 mils.
8. Without disturbing M1A1/M1A2 gunner's quadrant reading, place gunner's quadrant (5) on breech ring quadrant seats (9).
9. Bubble (7) should center. If bubble does not center, turn micrometer knob (8). After bubble centers, quadrant reading must be within  $\pm 1.0$  mil of original reading.
10. If the requirements in steps 8 and 9 cannot be met, notify direct support maintenance.



**2-40. MAINTENANCE OF M138 TELESCOPE MOUNT.**

This task covers:

a. <i>Removal</i>	d. <i>Reassembly</i>
b. <i>Disassembly</i>	e. <i>Installation</i>
c. <i>Inspection/Repair</i>	f.. <i>Adjustment</i>

**INITIAL SETUP:**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*General Safety Instructions*

**WARNING**

- **Make sure MASTER switch is OFF before repairing electrical. Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.**
- **Dry cleaning solvent (SD2) is toxic and flammable. Wear toxic and flammable protective goggles and gloves and use only in well-ventilated area.**

*Materials/Parts*

Dry cleaning solvent (item 9, appx C)  
 Lockwasher (4) (MS35338-139)  
 Self-locking screw (NAS1352-3LL8P)  
 Tape (item 22, appx C)

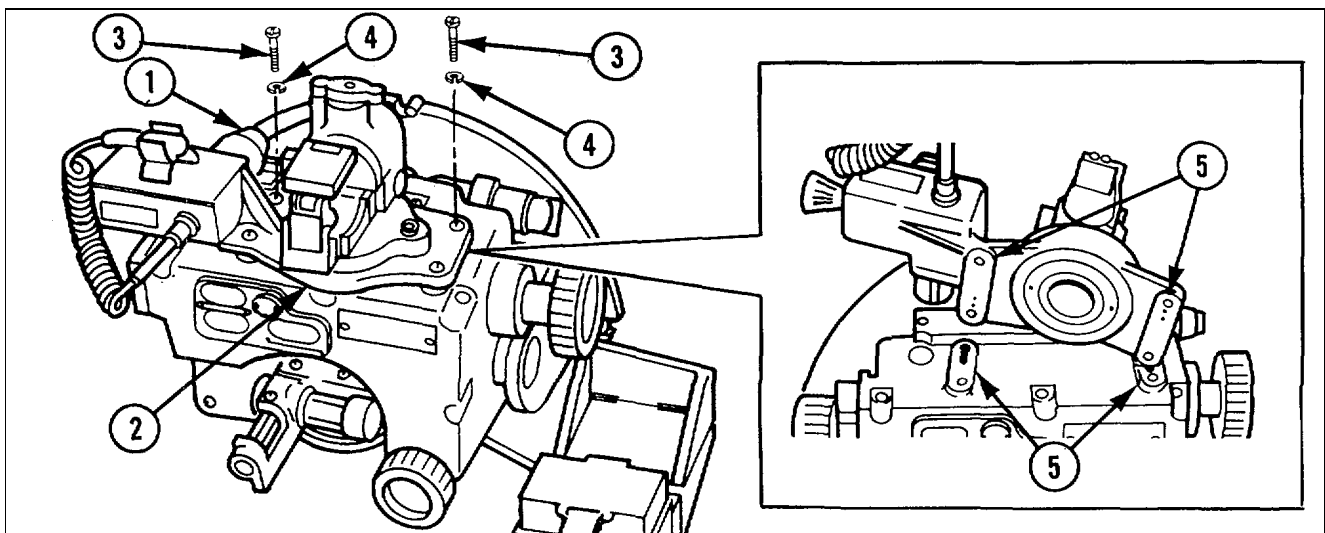
*References*

TM 9-2350-304-10  
 TM 9-2350-304-24P-2

*Equipment Conditions*

2 -101 M139 elbow telescope removed

**REMOVAL**



**WARNING**

- Make sure **MASTER** switch is **OFF** before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

**CAUTION**

Use care not to damage or lose parts when removing fire control equipment.

1. Disconnect power cable (1) from M138 telescope mount (2).
2. Remove four screws (3) and four lockwashers (4).
3. Remove M138 telescope mount (2).
4. Cover mounting surfaces (5) with tape (item 22, appx C).

**DISASSEMBLY**

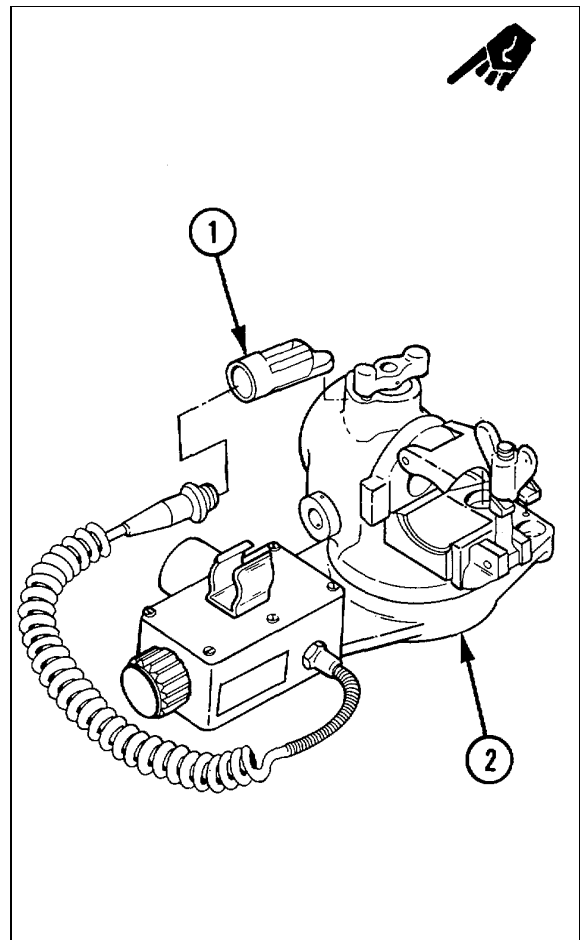
Remove shroud assembly (1) from M138 telescope mount (2).

**INSPECTION/REPAIR**

1. Inspect for broken, damaged, or missing parts.
2. Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

Install shroud assembly (1) on MI 138 telescope mount (2).



## 2-40. MAINTENANCE OF M138 TELESCOPE MOUNT

**INSTALLATION**

1. Remove tape from mounting surfaces (1).

**WARNING**

Dry cleaning solvent (SD2) is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated area.

2. Clean mounting surfaces (1) with dry cleaning solvent (item 9, appx C).
3. Dry with low-pressure compressed air.
4. If mounting surfaces (1) are damaged, notify direct support maintenance.

**CAUTION**

Use care not to damage fire control equipment during installation.

5. Position mount M138 telescope (2) on M15 fire control quadrant (3).

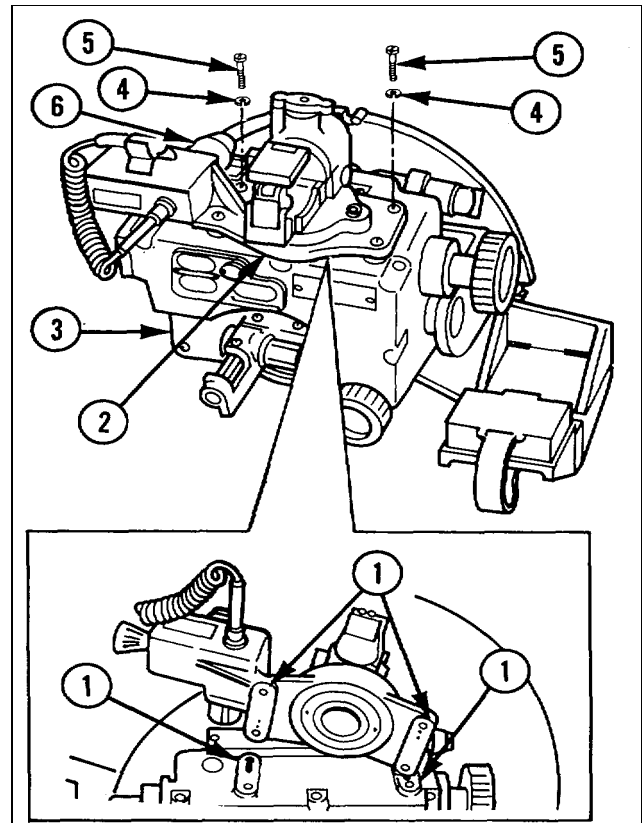
**NOTE**

Two locating pins must engage holes for proper installation.

6. Install and tighten four new lockwashers (4) and four screws (5).

**CAUTION**

Check marker band on power cable and make sure the proper cable is connected to M138 telescope mount. Failure to do so will cause damage to the mount.

**NOTE**

The proper cable should be marked with a band TO TLSCP MT or, if not marked, it is the shorter of the two cables.

7. Connect power cable (6) to M138 telescope mount (2).

**ADJUSTMENT**

Boresight cannon. Refer to TM 9-2350-30410.

**2-41. MAINTENANCE OF M137 TELESCOPE MOUNT AND M140 ALIGNMENT DEVICE MOUNT (LEFT SIDE).**

This task covers:

a. <i>Removal</i>	d. <i>Reassembly</i>
b. <i>Disassembly</i>	e. <i>Installation</i>
c. <i>Inspection/Repair</i>	f. <i>Adjustment of M137 Telescope Mount</i>

**INITIAL SETUP:***Tools and Special Tools*

M1A1/M1A2 gunner's quadrant  
(7197156)  
Ordnance artillery and turret mechanic's  
tool kit (appx B)  
Planner jacks, 35 ton (3) (GGG-J-51)  
Torque wrench (A-A-2411) components.

*Materials/Parts*

Dry cleaning solvent (item 9, appx C)  
Lockwasher (2) (MS35338-135)  
Lockwasher (2) (MS35338-135)  
Lockwasher (4) (MS35338-142)  
Lockwasher (4) (MS35338-143)

*References*

TM 9-1250-304-10  
TM 9-2350-304-24P-2  
TM 9-2350-11630424P2

*Equipment Conditions*

2-98 M115 Panel removed

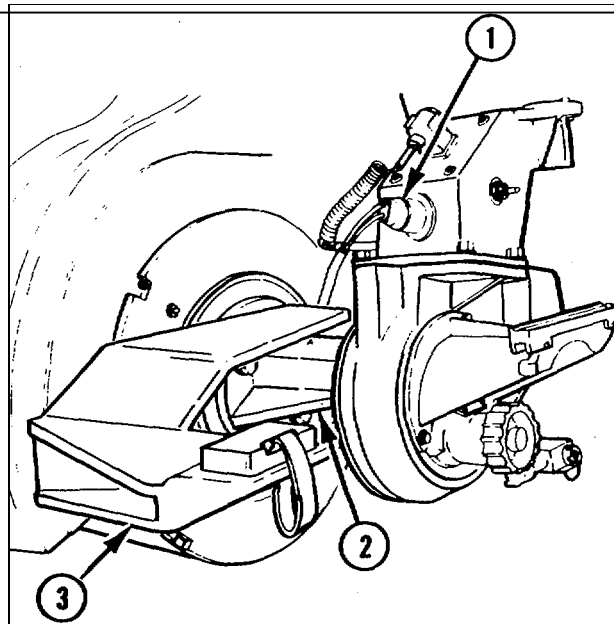
*General Safety Instructions***WARNING**

- **Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.**
- **Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.**
- **Dry cleaning solvent (SD2) is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated area.**

**REMOVAL****WARNINGS**

- **Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.**
- **Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.**

1. Disconnect power supply cord (1).
2. Support M137 telescope mount (2) and M140 alignment device mount (3).



**2-41. MAINTENANCE OF M137 TELESCOPE MOUNT AND M140 ALINEMENT DEVICE MOUNT (LEFT SIDE) (CONT).**

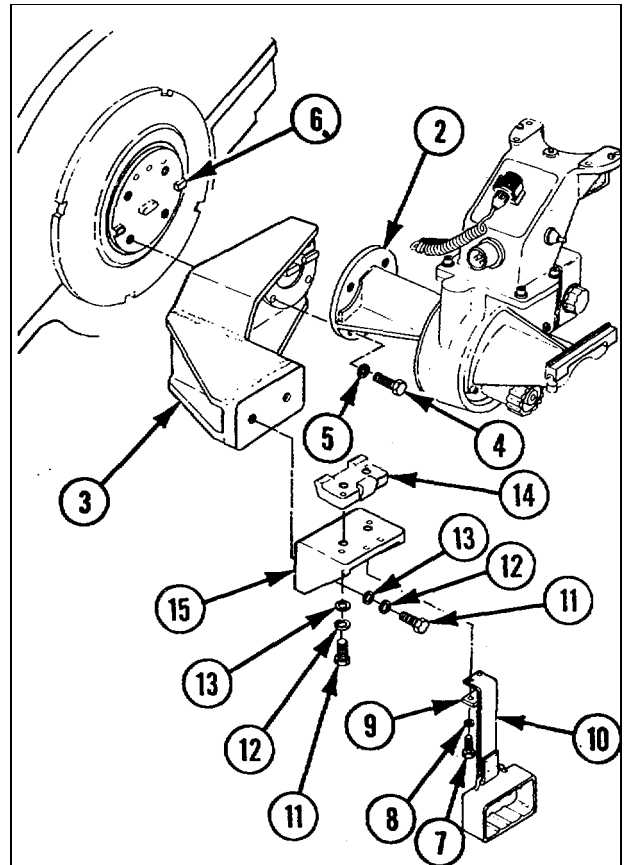
**REMOVAL (CONT)**

3. Remove four capscrews (4) and four lockwashers (5).
4. Remove M137 telescope mount (2) and M140 alinement device mount (3).
5. Cover mounting surfaces on M137 telescope mount (2) and trunnion end plate (6) with tape (item 22, appx C).
6. Remove two machine screws (7), two lockwashers (8), retainer plate (9), and cover assembly (10).

**NOTE**

**If dovetail wedge or blank panel in step 7 is damaged notify direct support maintenance.**

7. Remove four capscrews (11), four lockwashers (12), and four flat washers (13). Remove dovetail wedge (14) and blank panel (15).

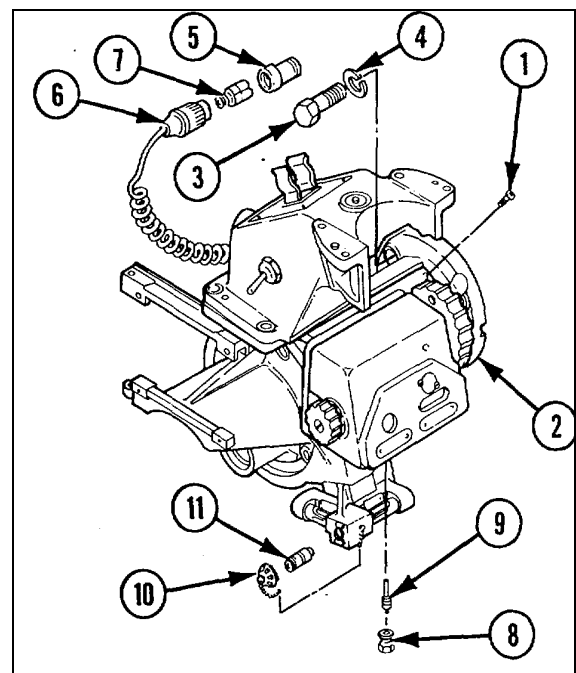


**DISASSEMBLY**

**CAUTION**

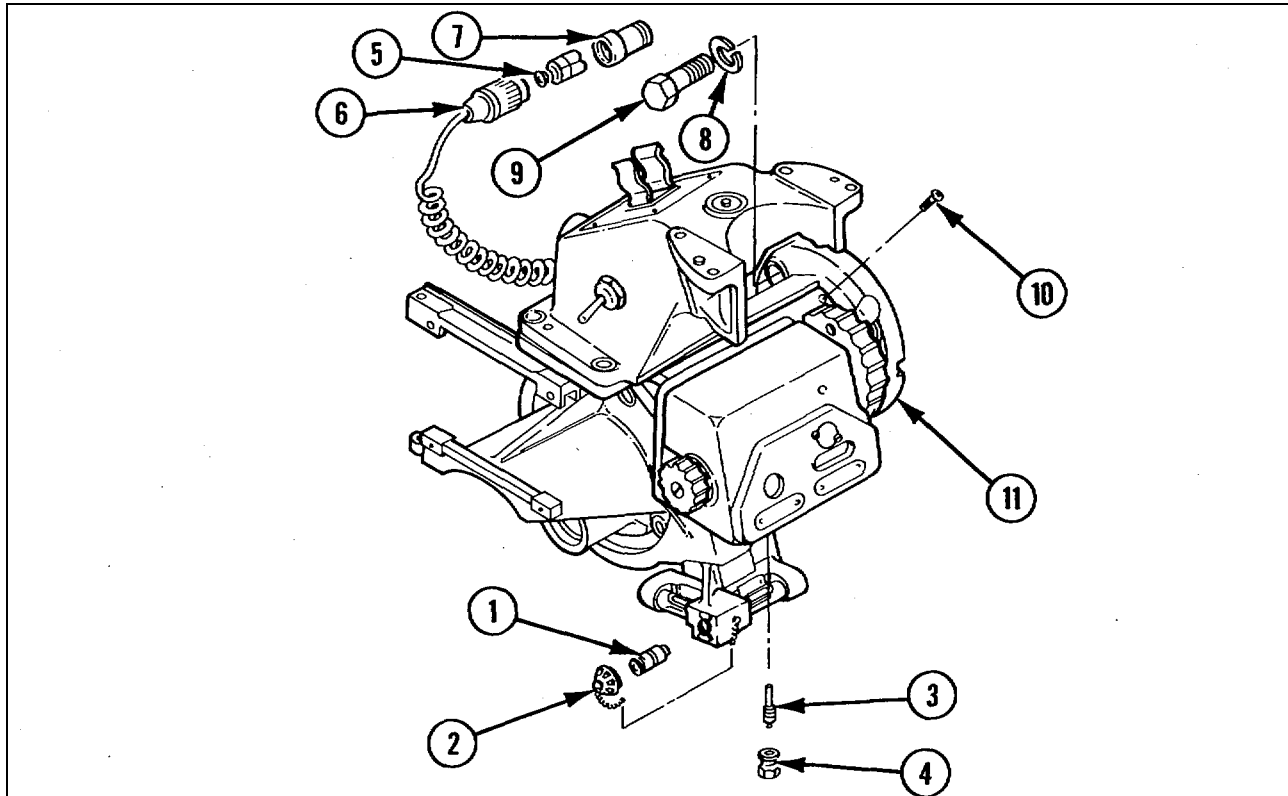
**Anytime the M 137 telescope mount is opened for maintenance it must be purged with nitrogen. For complete purging instructions, refer to TM 750-116.**

1. Remove two screws (1) from M137 telescope mount (2).
2. Remove four capscrews (3) and four lockwashers (4).
3. Separate cap (5) from instrument light (6) and remove LED (7).
4. Remove cap (8) and valve core (9).
5. Remove protective cover (10) and 1-3/4 based T LED (11).



**INSPECTION/REPAIR**

1. Inspect for broken, damaged, or missing parts.
2. Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

1. Install 1-3/4 based T LED (1) and close protective cover (2).

**CAUTION**

**Purge M137 telescope mount with nitrogen after replacement of valve core and cap. Refer to TM 750-116.**

2. Install valve core (3) and cap (4).
3. Install LED (5) into instrument light (6) and install cap (7).
4. Install four new lockwashers (8) and four capscrews (9).
5. Install two screws (10) on M137 telescope mount (11).



2-41. MAINTENANCE OF M137 TELESCOPE MOUNT AND M140 ALINEMENT DEVICE MOUNT (LEFT SIDE)  
(CONT).

**INSTALLATION**

1. Remove tape from mounting surfaces.

**WARNING**

Dry cleaning solvent (SD2) is toxic and flammable. Wear protective goggles and gloves and use only in well-ventilated area.

**NOTE**

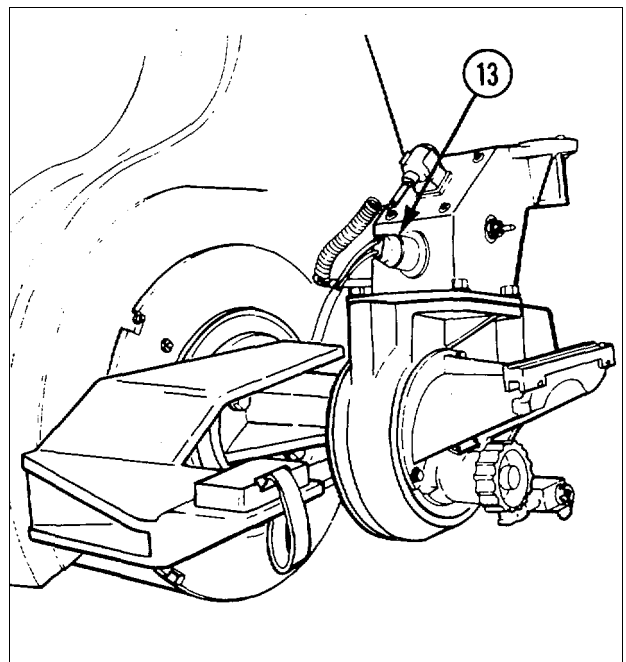
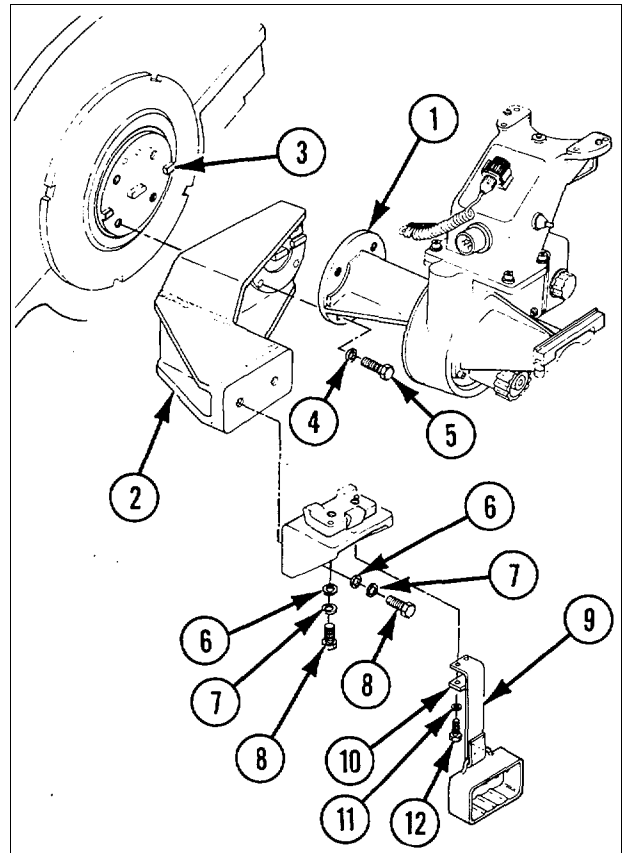
Mounting surfaces must be clean to ensure proper installation.

2. Clean mounting surfaces with dry cleaning solvent (item 9, appx C) and let air dry.

**CAUTION**

Do not install M137 telescope mount or M140 alinement device mount if mounting surfaces are dirty, scratched, or damaged.

3. If mounting surfaces are damaged, notify direct support maintenance.
4. Position M137 telescope mount (1) and M140 alinement device mount (2) on trunnion end plate (3).
5. Install four new lockwashers (4) and four capscrews (5).
6. Install four flat washers (6), four new lockwashers (7), and four capscrews (8).
7. Install cover assembly (9), retainer plate (10), two new lockwashers (11), and two machine screws (12). Torque machine screws to 45 to 50 ft-lb (61 to 68 N-m).
8. Connect power supply cord (13).

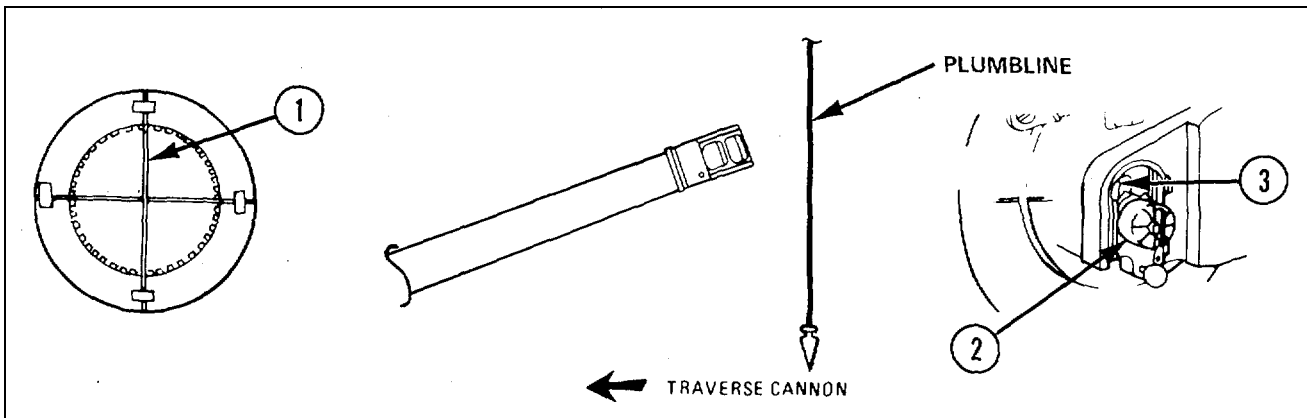
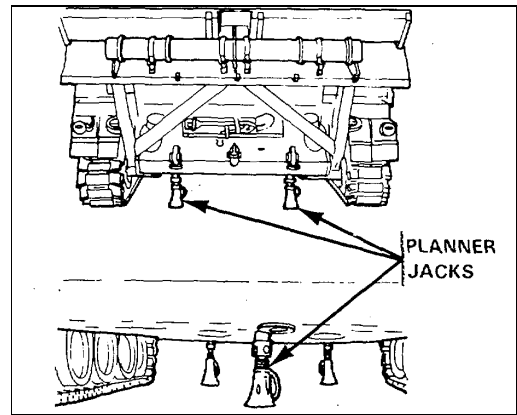


**ADJUSTMENT OF M137 TELESCOPE MOUNT**

**NOTE**

Use three 35 ton planner jacks if possible. Hydraulic jacks may leak causing adjustment to be incorrect.

- 1 Position two planner jacks under rear of vehicle.
- 2 Position one planner jack under front center of vehicle.



3. Depress cannon to depression stops.
4. Test M1A1/M1A2 gunner's quadrant. Refer to TM 9-2350-304-10.
5. Tape (item 22, appx C) muzzle crosshairs (1) to muzzle witness marks.
6. Hang plumbline approximately 12 in. (30 cm) in front of muzzle.
7. Slide firing mechanism (2) down so primer vent (3) is exposed to sight plumbline.
8. Traverse cannon to aline vertical crosshairs (1) with plumbline.

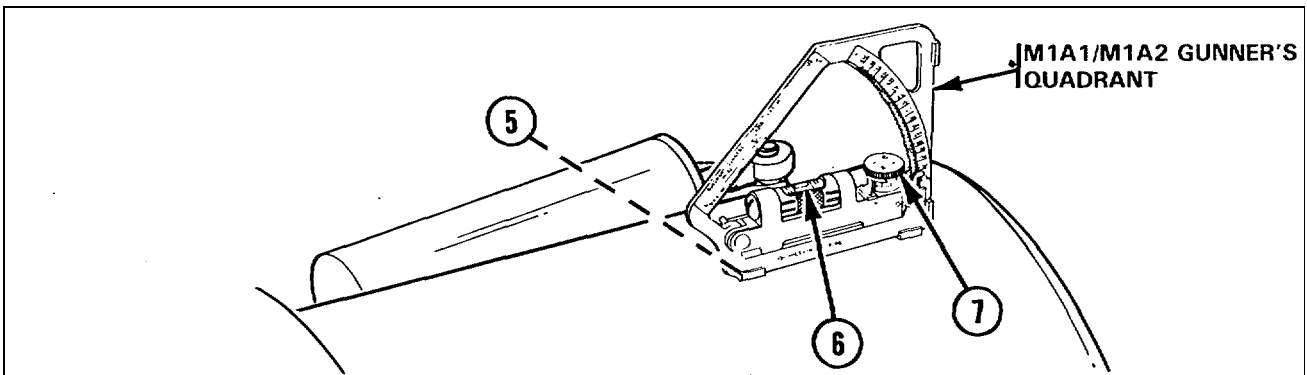
**NOTE**

Do not traverse over 100 mils from center. If cannon must be traversed over 100 mils, remove jacks and shift entire vehicle.

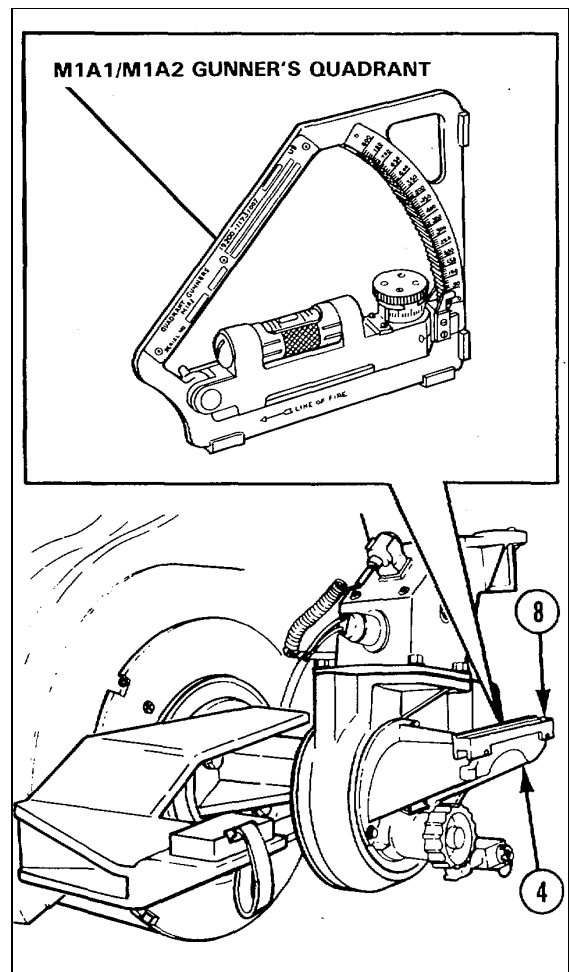
9. Elevate cannon to 600 mils.
10. If vertical muzzle hair (1) is not alined with the plumbline, adjust rear jacks until alinement is accomplished.
11. Depress cannon to depression stops.
12. Manually traverse cannon to aline crosshairs (1) and plumbline.
13. Repeat steps 9 thru 12 until all error is removed. Leave cannon on depression stops.

2-41. MAINTENANCE OF M137 TELESCOPE MOUNT AND M140 ALINEMENT DEVICE MOUNT (LEFT SIDE)  
(CONT).

ADJUSTMENT OF M137 TELESCOPE MOUNT (CONT)



14. Adjust elevation and cross-level knobs on M137 telescope mount (4) to center elevation and cross level bubbles. Elevation and cross level knobs must be at midpoint of adjustment.
15. If elevation and cross-level knobs cannot be adjusted to midpoint, notify direct support maintenance.
16. Position M1A1/M1A2 gunner's quadrant, with end for end correction applied, on breech ring seats (5). Center bubble (6) in M1A1/M1A2 gunner's quadrant by moving radial arm up or down and turning micrometer knob (7).
17. Remove any corrections from special corrections counter on M137 telescope mount (4). Place M1A1/M1A2 gunner's quadrant on quadrant seat (8) of M137 telescope mount (4). Reading on M137 telescope mount (4) elevation counter and M1A1/M1A2 gunner's quadrant must agree within + 1.0 mil. If this requirement cannot be met, notify direct support maintenance.





**2-43. MAINTENANCE OF M35 FIRING MECHANISM.**

This task covers: a. *Disassembly* c. *Reassembly*  
 b. *Inspection/Repair*

**INITIAL SETUP:**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*References*

TM 9-2350-304-24P-2

*Equipment Conditions*

M35 Firing mechanism removed (TM 9-2350-304-10)

*General Safety Instructions*

**WARNING**

**M35 Firing mechanism contains springs under high pressure. Be careful and hold parts securely throughout disassembly.**

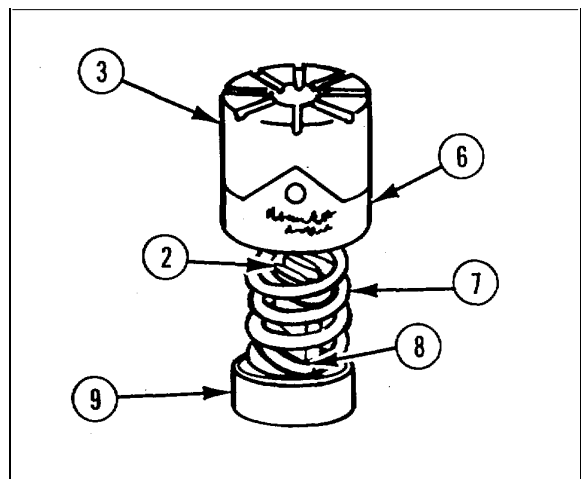
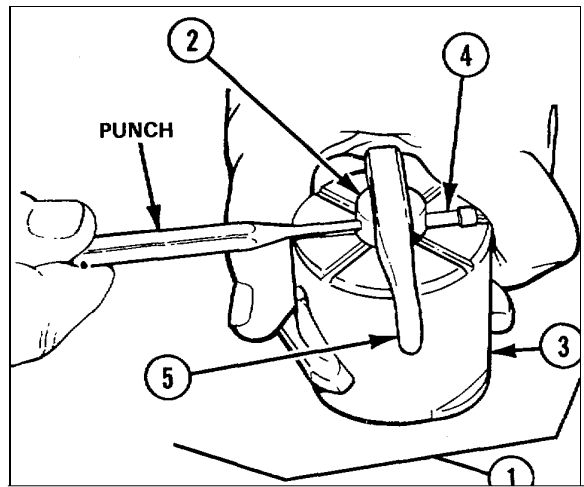
**DISASSEMBLY**

- 1 Place M35 firing mechanism (1) on flat surface and press down on M35 firing mechanism until hammer guide yoke (2) projects from case follower (3) sufficiently to permit removal of headless grooved pin (4) and manual control lever (5).

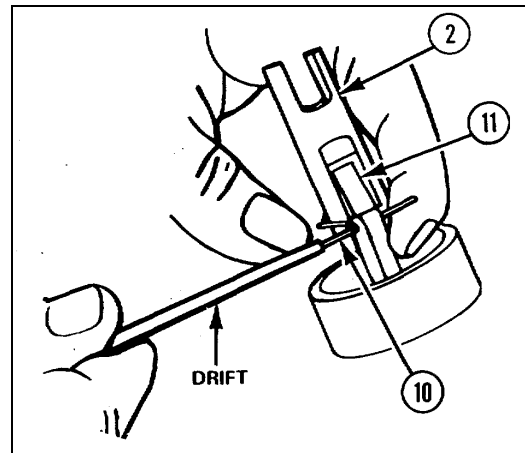
**WARNING**

**M35 Firing mechanism contains springs under high pressure. Be careful and hold parts securely throughout disassembly.**

- 2 Using punch, remove headless grooved pin (4) from hammer guide yoke (2) and release slowly to prevent scattering of parts.
- 3 Remove case follower (3), firing mechanism case (6), and compression helical springs (7 and 8) from hammer guide cup (9) and hammer guide yoke (2).



- 4 Pull up on hammer guide yoke (2) and, using small drift, remove sear spring (10) and sear (11).

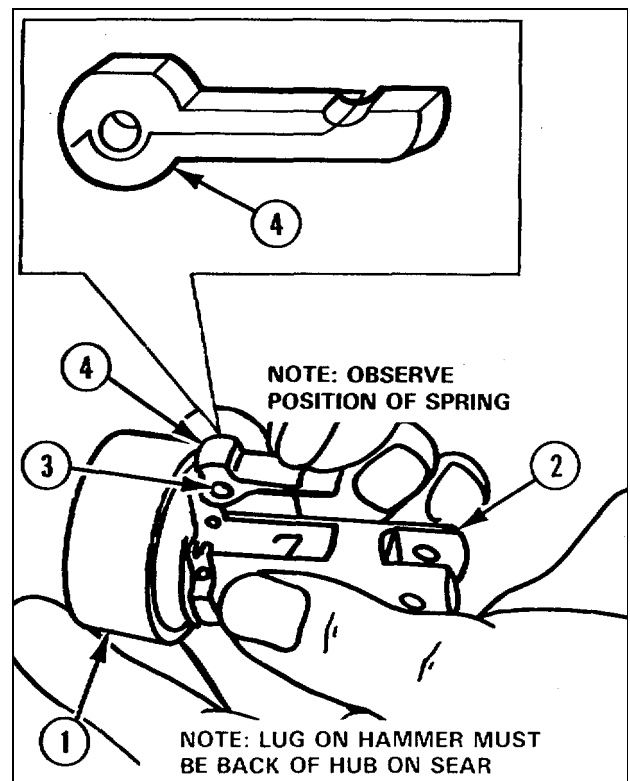


**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 If case follower is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 3 If firing mechanism case is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 4 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

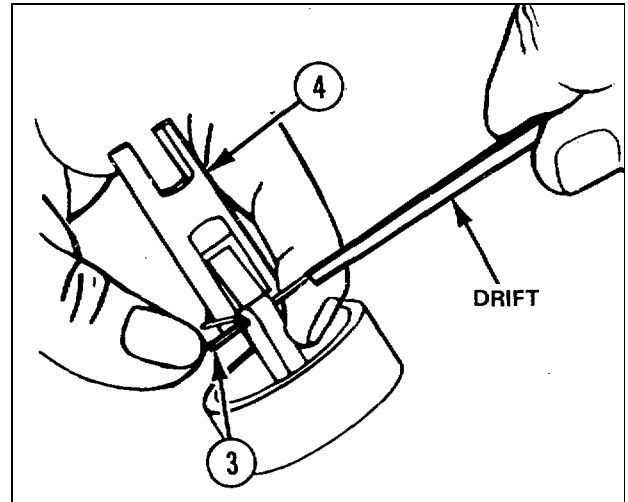
- 1 To assemble M35 firing mechanism, insert hammer guide cup (1) into bore of hammer guide yoke (2), position sear spring (3) on sear (4), and place sear with spring into slot in hammer guide yoke. Engage ends of sear spring into two grooves above sear pin hole.



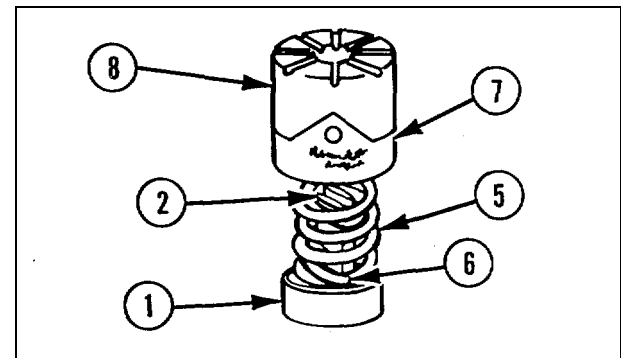
2-43. MAINTENANCE OF M35 FIRING MECHANISM (CONT).

REASSEMBLY (CONT)

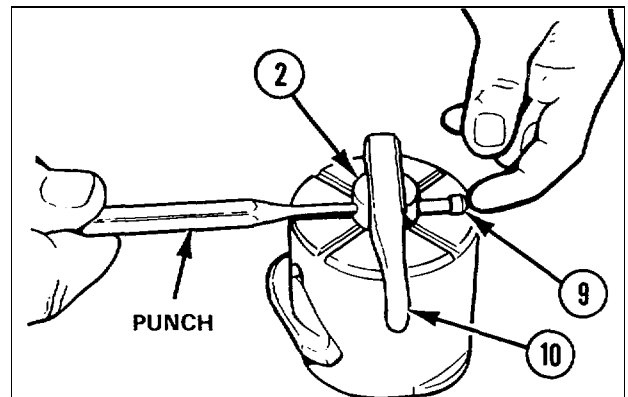
- 2 Using small drift, install sear spring (3) and sear (4).



- 3 Install compression helical springs (5 and 6), firing mechanism case (7), and case follower (8) on hammer guide yoke (2) and hammer guide cup (1).



- 4 Place M35 firing mechanism on flat surface and using punch, install headless grooved pin (9) and manual control lever (10) into hammer guide yoke (2).



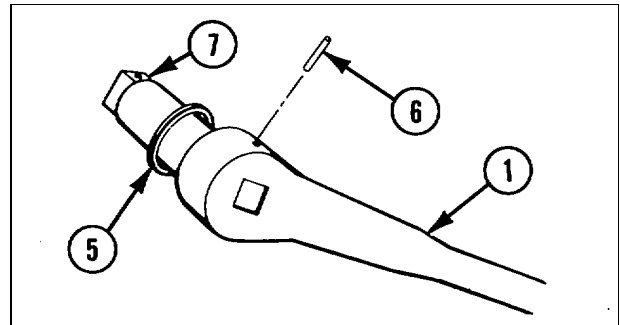




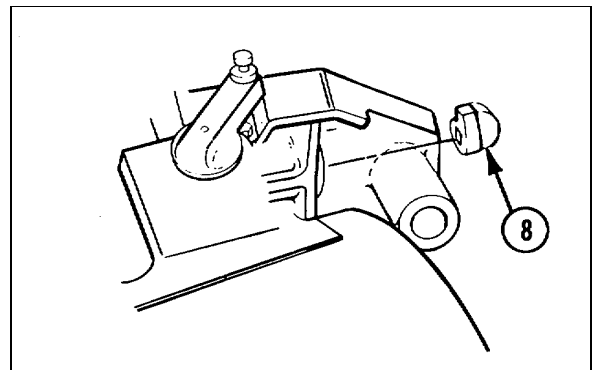
2-44. MAINTENANCE OF BREECH MECHANISM ASSEMBLY (CONT).

DISASSEMBLY (CONT)

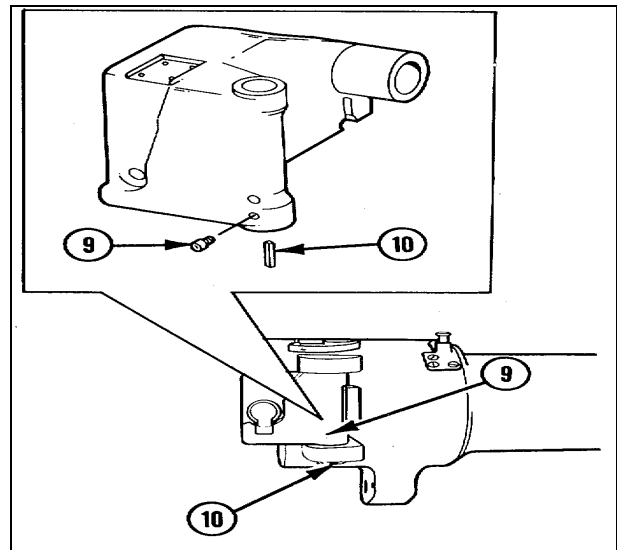
- 5 Remove flat washer (5) spring pin (6), and straight shaft (7) from breechblock lever (1).



- 6 Remove breechblock crosshead (8)



- 7 Remove capscrew (9) and machine key (10).



**NOTE**

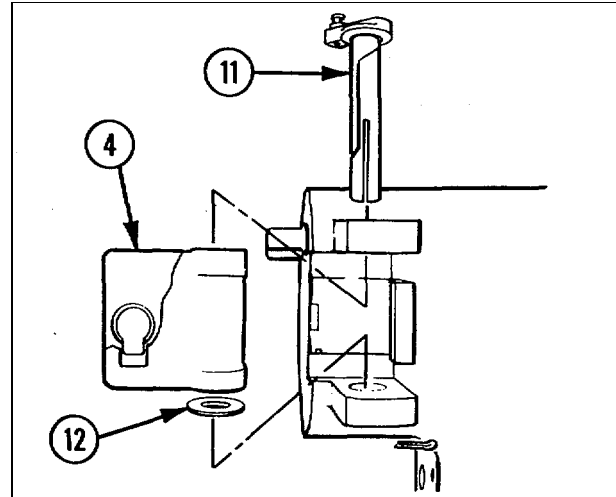
Hinge pin is not repairable at this level. If damaged, notify direct support maintenance.

- 8 Remove hinge pin (11)

**NOTE**

Hinge block assembly is not repairable at this level. If damaged, notify direct support maintenance.

- 9 Remove hinge block assembly (4) and flat washer(12).

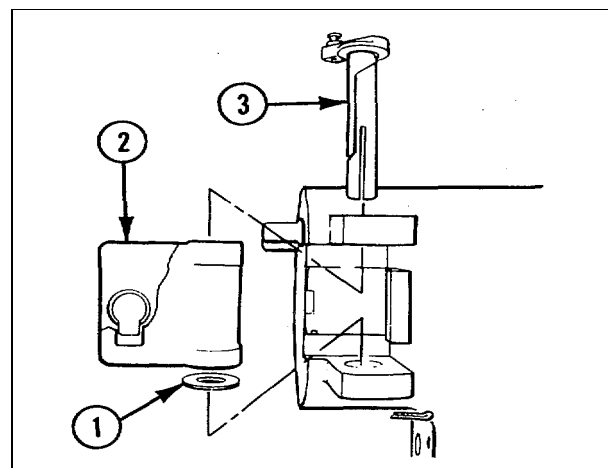


**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Block assembly is a repairable assembly. Refer to page 2-130.
- 3 Housing assembly is a repairable assembly. Refer to page 2-131.
- 4 Spindle assembly is a repairable assembly. Refer to page 2-132.
- 5 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2)

**REASSEMBLY**

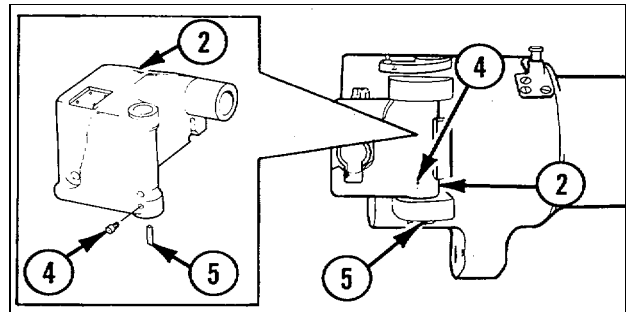
- 1 Install flat washer (1) and hinge block assembly (2).
- 2 Install hinge pin (3)



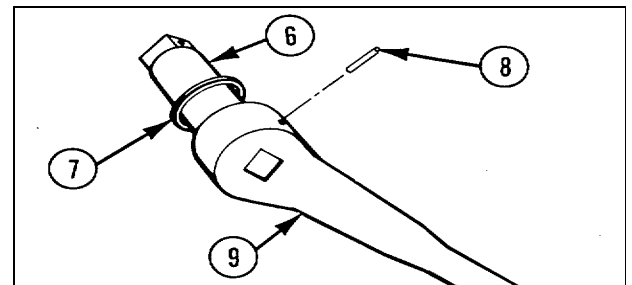
2-44. MAINTENANCE OF BREECH MECHANISM ASSEMBLY (CONT).

REASSEMBLY (CONT)

- 3 Install capscrew (4) and machine key (5) in hinge block assembly (2).

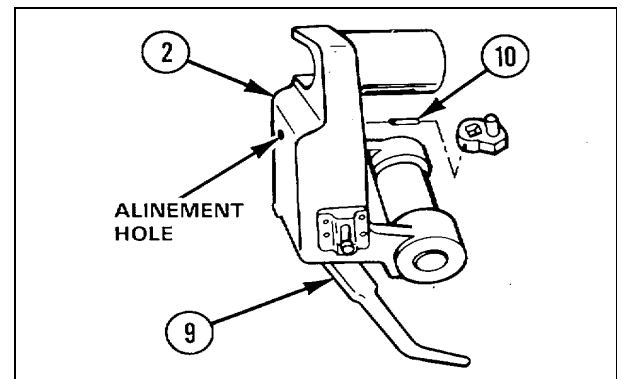


- 4 Install straight shaft (6) flat washer (7), and spring pin (8) in breechblock lever (9).



- 5 Install breechblock lever (9) in hinge block assembly (2).

- 6 Aline spring pin (10) with alinement hole.

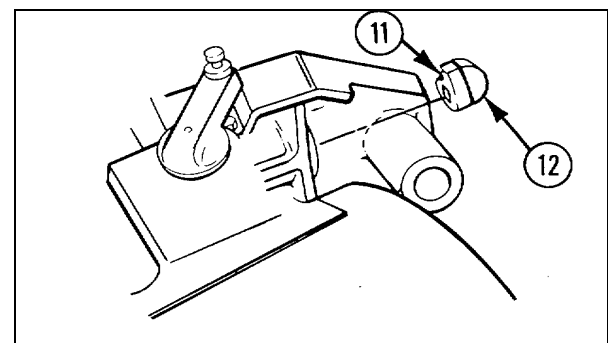


**NOTE**

**Hand crank arm and breechblock crosshead must be assembled prior to installation.**

- 7 Install spring pin (10) hand crank arm (11), and breechblock crosshead (12).

- 8 Put breechblock lever (9) in up position.

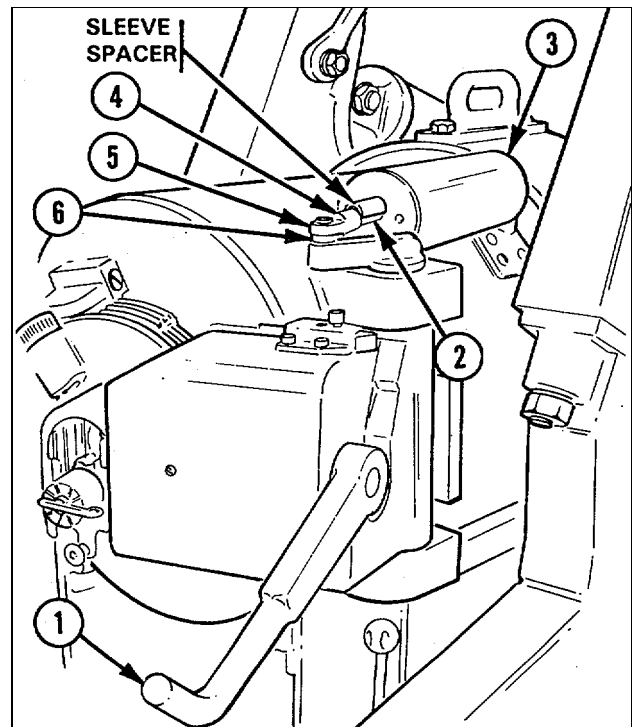


**2-45. MAINTENANCE OF COUNTERBALANCE ASSEMBLY.**

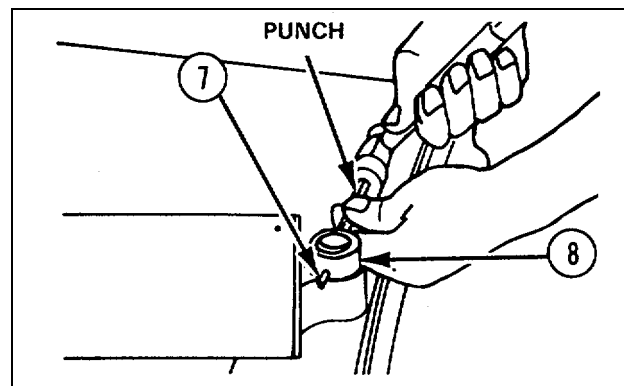
This task covers:	a. <i>Removal</i>	b. <i>Inspection/Repair</i>	c. <i>Installation</i>
<b>INITIAL SETUP:</b>			
<i>Tools and Special Tools</i>		<i>References</i>	
Ordnance artillery and turret mechanic's tool kit (appx B)		TM 9-2350-304-24P-2	
Sleeve Spacer (5207129)			

**REMOVAL**

- 1 Operate breechblock lever (1) to extend rod assembly (2) and install sleeve spacer over rod assembly between counterbalance cylinder (3) and rod shoulder (4). Secure sleeve spacer to rod assembly to prevent sleeve spacer from coming loose.
- 2 Push breechblock toward closed position and lift rod end (5) from hinge pin assembly (6).



- 3 Remove spring pin (7) using small punch and hammer.
- 4 Remove shaft collar (8)



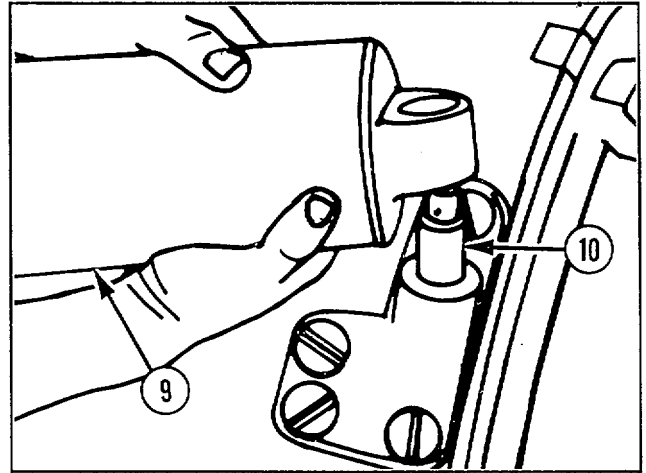
**2-45. MAINTENANCE OF COUNTERBALANCE ASSEMBLY (CONT).****REMOVAL (CONT)**

5. Lift counterbalance assembly (9) from counterbalance bracket (10).

**NOTE**

Counterbalance assembly is not repairable at this level. If damaged, notify direct support maintenance.

- 6 Remove counterbalance assembly (9) from the vehicle.

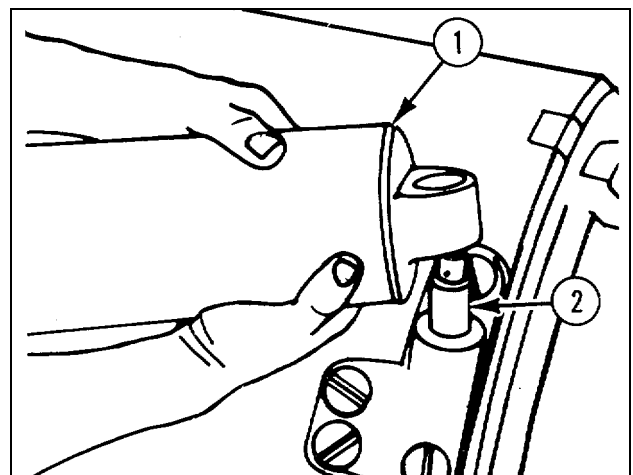
**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 If counterbalance assembly is damaged, notify direct support maintenance.
- 3 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2)

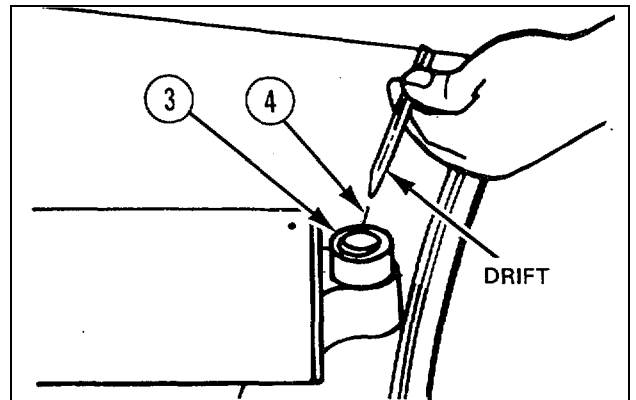
**INSTALLATION****CAUTION**

When replacing counterbalance assembly, do not install upside down. Offset side of rod must face downward for proper assembly.

1. Install counterbalance assembly (1) on counterbalance bracket (2).



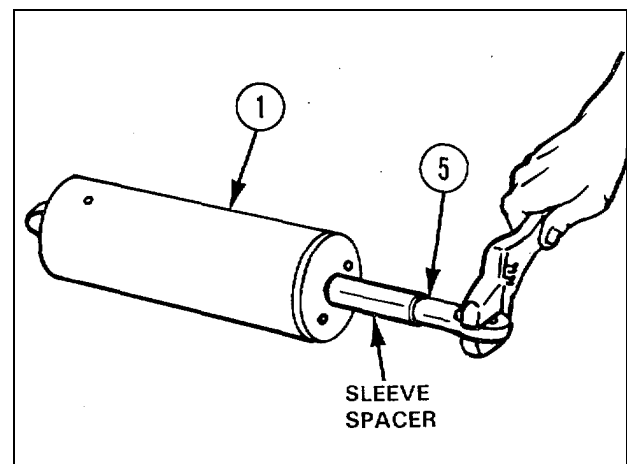
- 2 Using drift, install shaft collar (3) and spring pin (4).



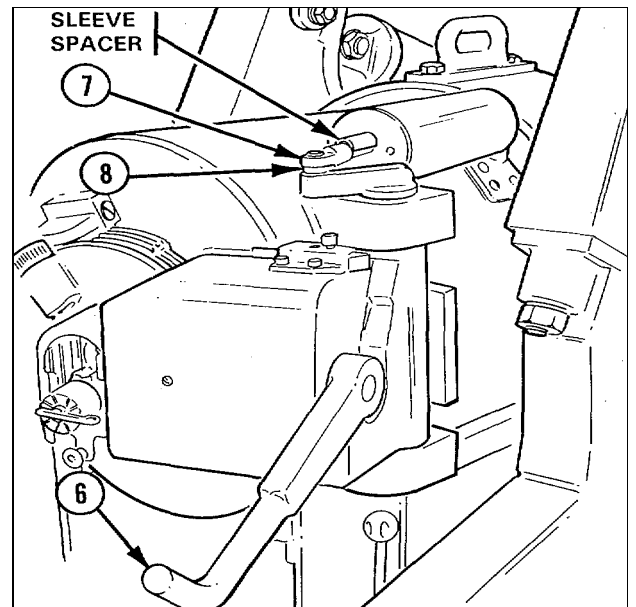
**NOTE**

Insure sleeve spacer is secured to rod.

- 3 Adjust counterbalance assembly (1) by turning rod assembly (5) with wrench clockwise to increase or counterclockwise to decrease tension as needed.



- 4 Operate breechblock lever (6) to position rod end (7) over hinge pin assembly (8).
- 5 Install rod end (7) on hinge pin (8) assembly.
- 6 Push housing away from cannon and remove sleeve spacer.



**2-46. MAINTENANCE OF BLOCK ASSEMBLY.**

This task covers:	a. <i>Disassembly</i>	b. <i>Inspection/Repair</i>	c. <i>Reassembly</i>
<b>INITIAL SETUP:</b>			
<p><i>Tools and Special Tools</i>                  Ordnance artillery and turret mechanic's tool kit (appx B)</p>		<p><i>General Safety Instructions</i></p> <p style="text-align: center;"><b>WARNING</b>  <b>Block assembly contains springs under high pressure. Be careful and hold parts when removing retainer and firing pin.</b></p>	
<p><i>References</i>                  TM 9-2350-304-24P-2</p> <p><i>Equipment Conditions</i>                  Block assembly contains springs (TM 9-2350-304-10)</p>			

**DISASSEMBLY**

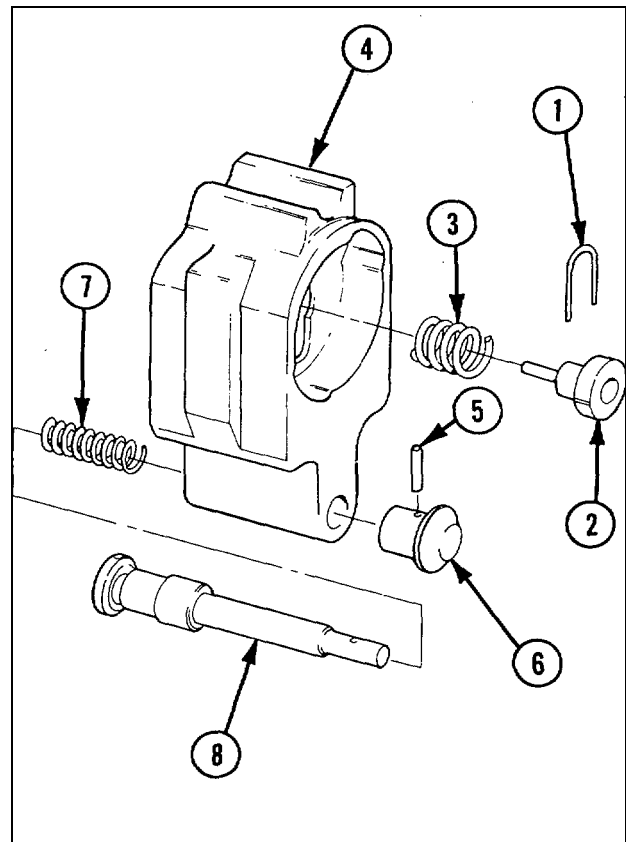
**WARNING**

**Block assembly contains springs under high pressure. Be careful and hold parts when removing Block assembly removed retainer and firing pin.**

1. Remove lock pin (1) firing pin (2), and compression helical spring (3) from firing group block (4).
2. Remove spring pin (5) and knob (6).
3. Remove compression helical spring (7) and follower assembly (8).

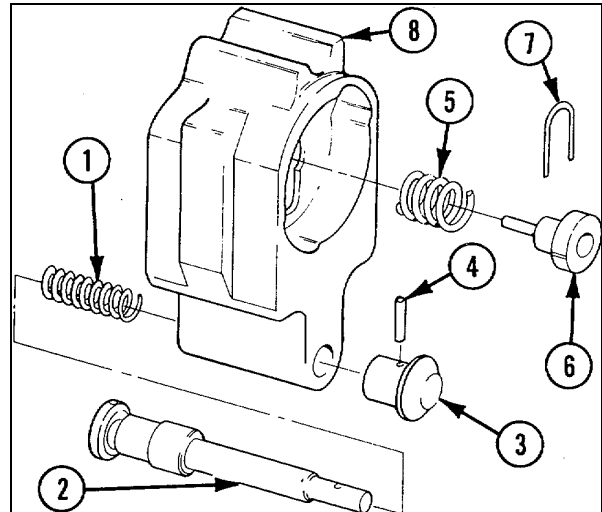
**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 If firing group block is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 3 Repair is by replacement of authorized parts (TM-9-2350-304-24P-2)



**REASSEMBLY**

- 1 Install compression helical spring (1) and follower assembly (2).
- 2 Install knob (3) and spring pin (4).
- 3 Install compression helical spring (5) firing pin (6), and lock pin (7) in firing group block (8).

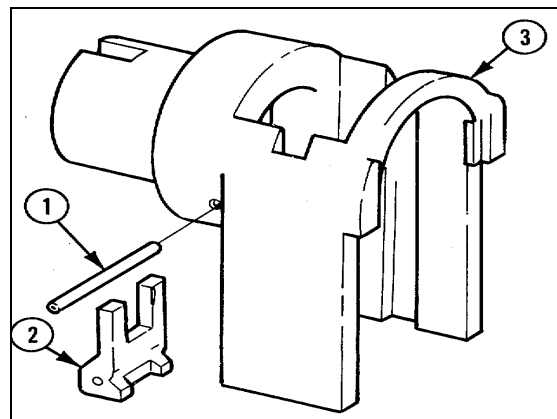


**2-47. MAINTENANCE OF HOUSING ASSEMBLY.**

This task covers:	a. Disassembly	b. Inspection/Repair	c. Reassembly
<b>INITIAL SETUP:</b>			
<p><i>Tools and Special Tools</i> Ordnance artillery and turret mechanic's tool kit (appx B)</p> <p><i>References</i> TM 9-2350-304-24P-2</p>		<p><i>Equipment Conditions</i> Housing Assembly removed (TM 9-2350-304-10)</p>	

**DISASSEMBLY**

Remove spring pin (1) and cartridge extractor (2) from housing assembly (3).





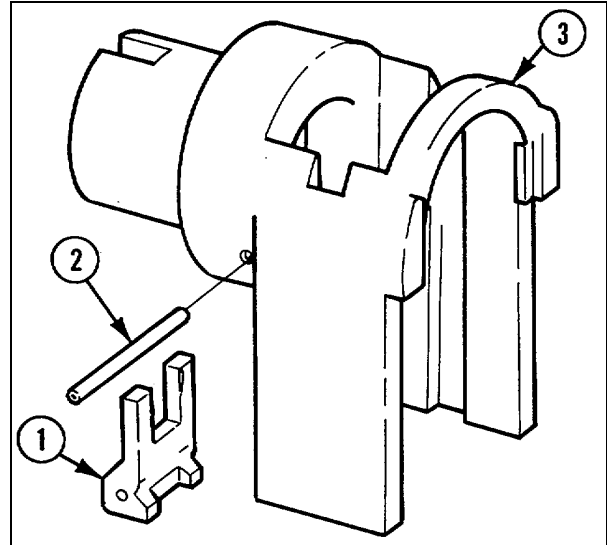
**2-47. MAINTENANCE OF HOUSING ASSEMBLY (CONT).**

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 housing assembly is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 3 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2)

**REASSEMBLY**

Install cartridge extractor (1) and spring pin (2) into housing assembly (3).

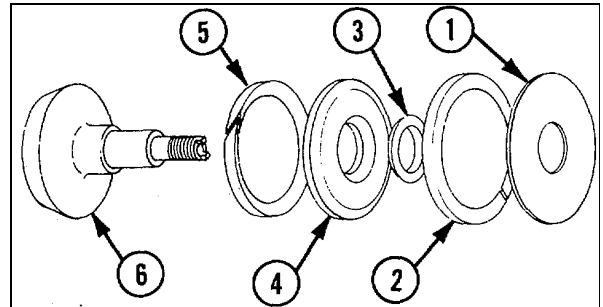


**2-48. MAINTENANCE OF SPINDLE ASSEMBLY.**

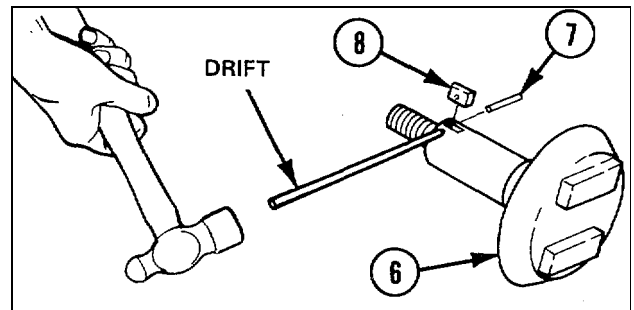
This task covers:	a. Disassembly	b. Inspection/Repair	c. Reassembly
<b>INITIAL SETUP:</b>			
Tools and Special Tools Ordnance artillery and turret mechanic's tool kit (appx B)		Equipment Conditions Spindle assembly removed and partially disassembled (TM 9-2350-304-10)	
References TM 9-2350-304-24P-2			

**DISASSEMBLY**

- 1 Remove flat washer (1) rear split ring (2), packing retainer (3), cushioning pad (4), and obturator ring (5) from shaft of spindle assembly (6).



- 2 Using drift and hammer, remove spring pin (7) and machine key (8) from shaft of spindle assembly (6).



**INSPECTION/REPAIR**

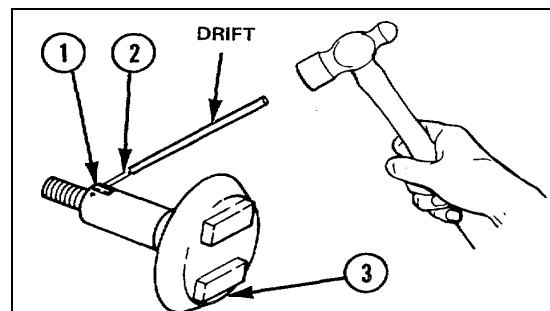
**CAUTION**

**Do not clean pad with gasoline or any solvent since this will quickly deteriorate pad. Use soap and water only, wipe dry.**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Inspect cushioning pad for nicks, cracks, evidence of faulty seating, or evidence of blowby. Refer to page 2-9.
- 3 Inspect split ring expansion slots for burnt areas, nicks, or gouges.
- 4 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2) which do not meet inspection criteria.

**REASSEMBLY**

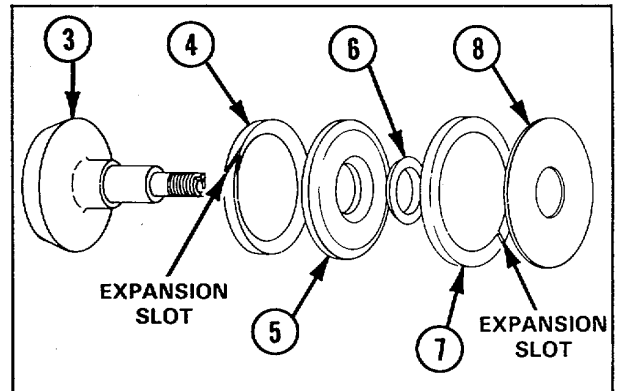
- 1 Using hammer and drift, install machine key (1) and spring pin (2) into shaft of spindle assembly (3).



**2-48. MAINTENANCE OF SPINDLE ASSEMBLY (CONT).**

**REASSEMBLY (CONT)**

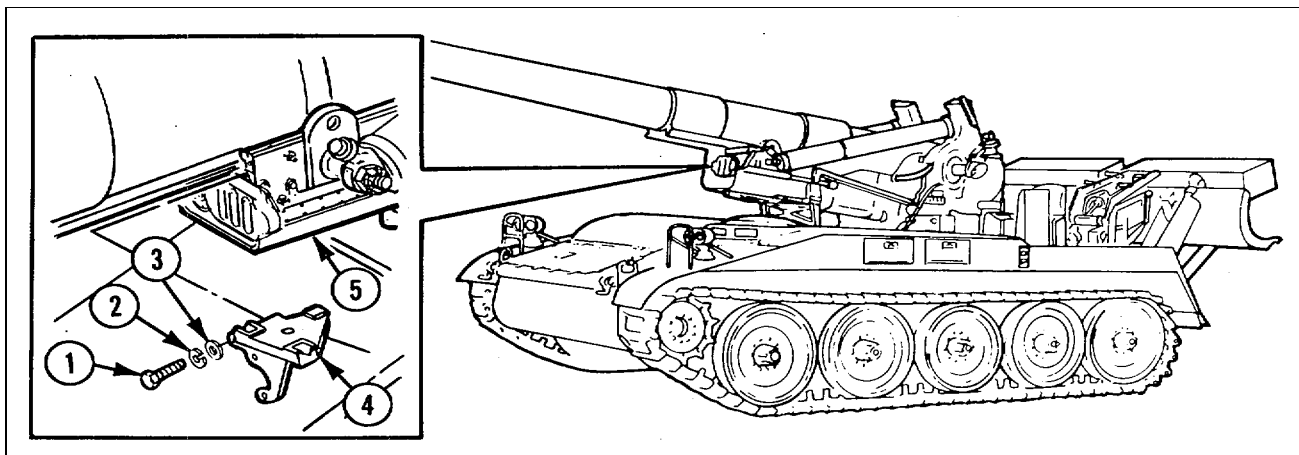
- 2 Install obturator ring (4), cushioning pad (5), packing retainer (6), rear split ring (7), and flat washer (8) on shaft of spindle assembly (3) with split ring expansion slots 180 degrees apart.



**2-49. MAINTENANCE OF GUN MOUNT INSTALLATION-ANTENNA MAST PLATE.**

This task covers:	a. <i>Disassembly</i>	b. <i>Inspection/Repair</i>	c. <i>Reassembly</i>
<b>INITIAL SETUP:</b>			
<i>Tools and Special Tools</i> Ordnance artillery and turret mechanic's tool kit (appx B)		<i>References</i> TM 9-2350-304-24P	
<i>Materials/Parts</i> Lockwasher (3) (MS35338-141)			

**REMOVAL**



- 1 Remove three machine bolts (1) three lockwashers (2), and three flat washers (3).
- 2 Remove antenna mast plate (4) from M174 gun mount (5).

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2)

**INSTALLATION**

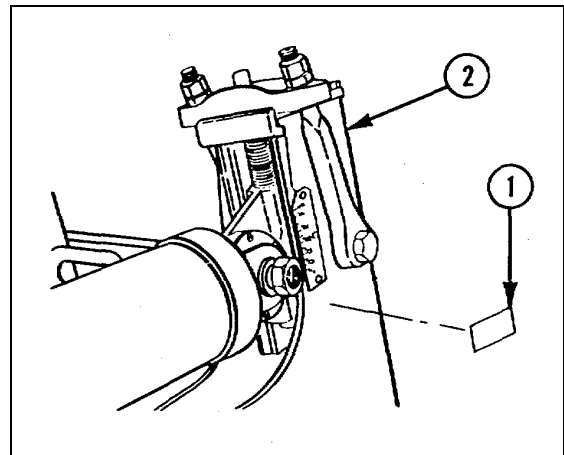
- 1 Install antenna mast plate (4) on M174 gun mount (5).
- 2 Install three flat washers (3) three new lockwashers (2), and three machine bolts (1).

**2-50. MAINTENANCE OF GUN MOUNT INSTALLATION-TRUNNION CAPS.**

This task covers:	a. <i>Disassembly</i>	b. <i>Inspection/Repair</i>	c. <i>Reassembly</i>
<b>INITIAL SETUP:</b>			
<i>Tools and Special Tools</i> Ordnance artillery and turret mechanic's tool kit (appx B)		<i>References</i> TM 9-2350-304-24P-2	

**DISASSEMBLY**

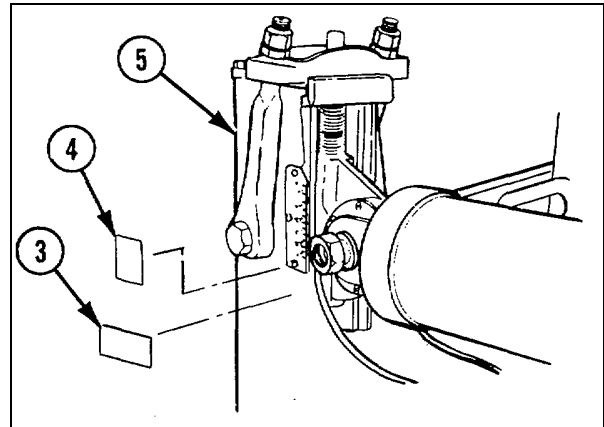
1. If damaged, remove high noise level instruction plate (1) from left trunnion bearing cap (2).



**2-50. MAINTENANCE OF GUN MOUNT INSTALLATION-TRUNNION CAPS (CONT).**

**DISASSEMBLY (CONT)**

- 2 If damaged, remove instruction plates (3 and 4) from right trunnion bearing cap (5).

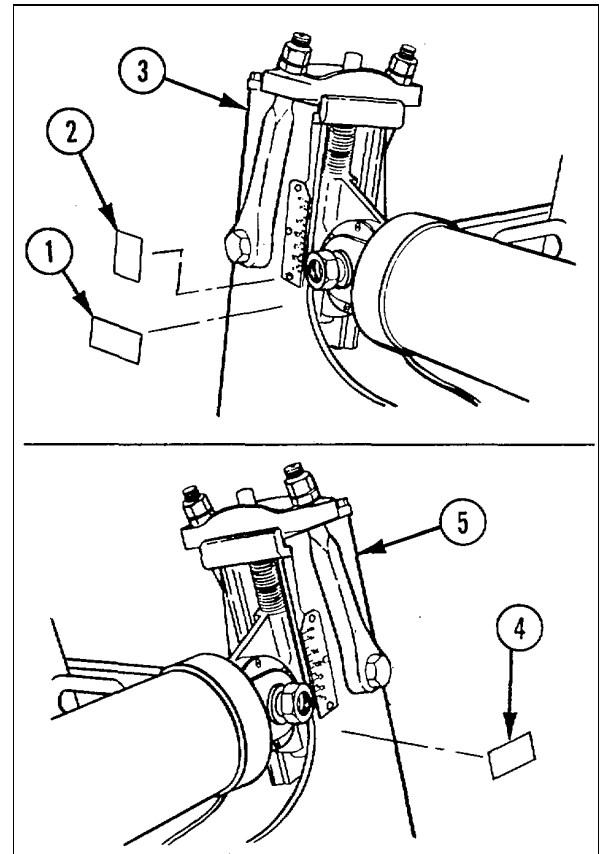


**INSPECTION/REPAIR**

- 1 Inspect for damaged or missing instruction plates.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2)

**REASSEMBLY**

If necessary, install new instruction plates (1 and 2) on right trunnion bearing cap (3) and new high noise level instruction plate (4) on left trunnion bearing cap (5).



**2-51. MAINTENANCE OF PNEUMATIC EQUILIBRATOR ASSEMBLY AND UNMODIFIED VALVE ASSEMBLY.**

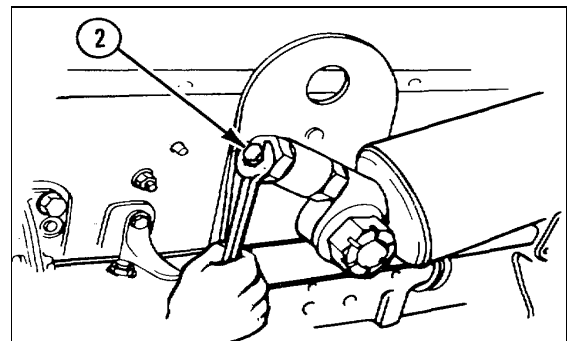
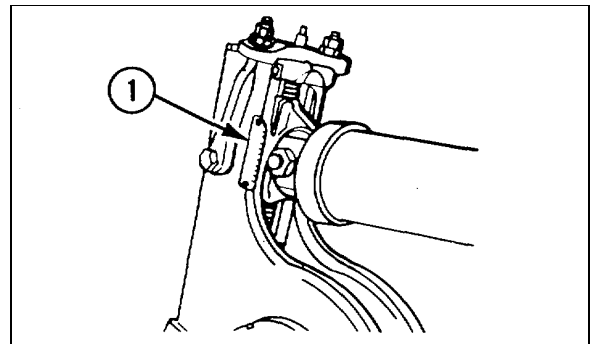
This task covers:	a. <i>Checking Nitrogen pressure</i> b. <i>Inspection/Repair</i>	c. <i>Adding Nitrogen(Charging Equilibrator)</i> d. <i>Emergency Charging of Equilibrator</i>
<p><b>INITIAL SETUP:</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><i>Tools and Special Tools</i></p> <ul style="list-style-type: none"> <li>Dial indicating pressure gage (45-1056-04L5000)</li> <li>Nitrogen cylinder (BBN411)</li> <li>Nitrogen filling hose assembly (8403740)</li> <li>Ordnance artillery and turret mechanic's tool kit (appx B)</li> <li>Recoil mechanism adapter (6169945)</li> <li>Strap wrench (9171739)</li> <li>Tube assembly (7136909)</li> </ul> <p><i>Materials/Parts</i></p> <ul style="list-style-type: none"> <li>Leak detector (item 13, appx C)</li> </ul> </div> <div style="width: 45%;"> <p><i>General Safety Instructions</i></p> <p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>High-pressure nitrogen gas is used in this equipment. Keep face and body clear of release valves and filling plugs. Failure to observe safety precautions may result in injury or death.</li> <li>Keep hands and body behind valve opener. Failure to do so may result in injury or death to personnel.</li> </ul> </div> </div>		

**CHECKING NITROGEN PRESSURE**

**WARNING**

**High-pressure nitrogen gas is used in this equipment. Keep face and body clear of release valves and filling plugs. Failure to observe safety precautions may result in injury or death.**

- 1 Position cannon at maximum depression.
- 2 Adjust equilibrator temperature scale dial (1) to read the same as outdoor temperature.
- 3 Slowly remove gas filling plug (2)



**2-51. MAINTENANCE OF PNEUMATIC EQUILIBRATOR ASSEMBLY AND UNMODIFIED VALVE ASSEMBLY (CONT).**

*CHECKING NITROGEN PRESSURE (CONT)*

- 4 Tighten tee cap (3)
- 5 Close release valve (4)

**CAUTION**

**When unscrewing valve opener, do not separate valve opener from tube assembly. Failure to do so may result in the tube assembly leaking.**

- 6 Turn valve opener (5) counterclockwise until completely unscrewed, then turn clockwise four complete turns.
- 7 Assemble tube assembly and dial indicating pressure gage and install on gas filling valve (6) by loosening jam nut (7). Screw adapter into gas filling valve, then tighten jam nut.

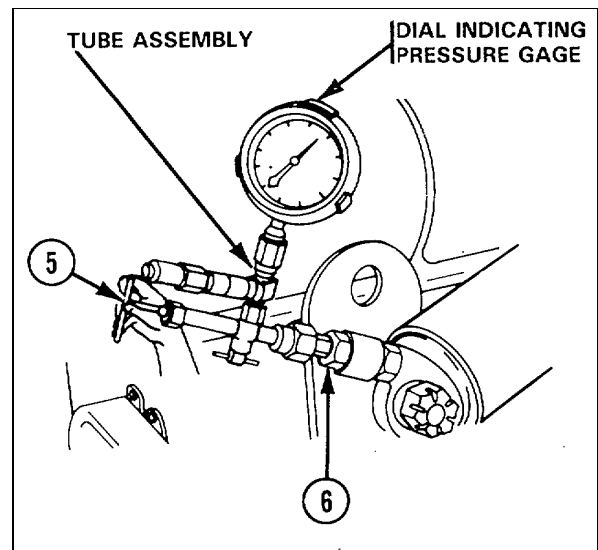
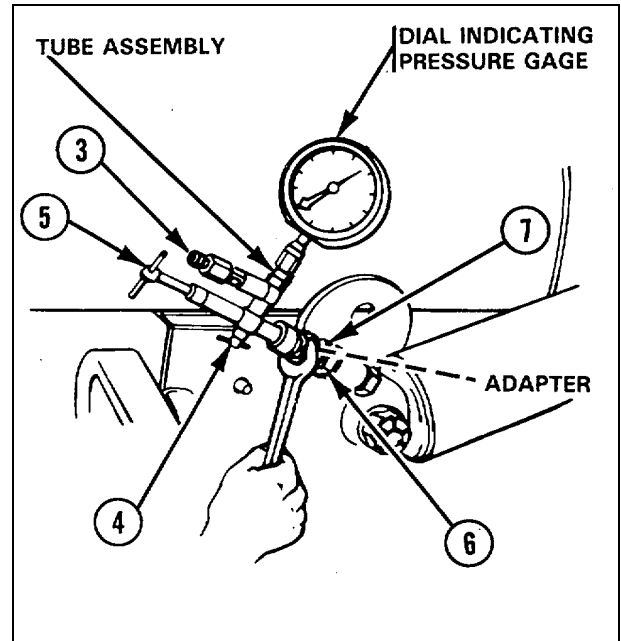
**WARNING**

- High-pressure nitrogen gas is used in this equipment. Keep face and body clear of release valves and filling plugs. Failure to observe safety precautions may result in injury or death.
- Keep hands and body behind valve opener. Failure to do so may result in injury or death to personnel.

**CAUTION**

**Do not turn valve opener more than 1-1/2 turns clockwise after it contacts filling valve and pressure appears on gage.**

- 8 Slowly open gas filling valve (6) using valve opener (5).
9. Tap dial indicating pressure gage with finger to make sure that needle is not sticking.

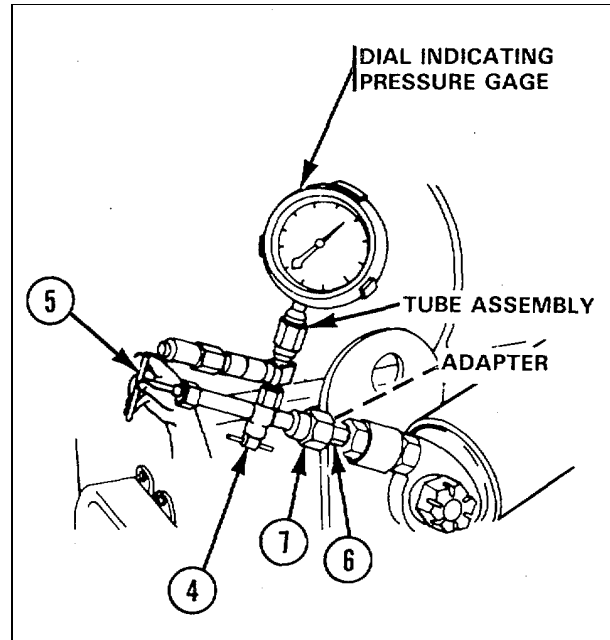


- 10 Read pressure indication on dial indicating pressure gage and compare reading with table 2-4, Equilibrator Nitrogen Charging Pressure, on page 2-147.
- 11 If nitrogen pressure is too high, refer to Releasing Nitrogen.
- 12 If nitrogen pressure is too low, refer to Adding Nitrogen (Charging Equilibrator)

**CAUTION**

**Do not turn valve opener more than 4 turns counterclockwise.**

- 13 Back off valve opener (5) to close valve (6).
- 14 Open release valve (4) to let nitrogen escape.
- 15 Remove tube assembly and dial indicating pressure gage from filling valve (6) by loosening jam nut (7) and unscrewing adapter.



**RELEASING NITROGEN**

**WARNING**

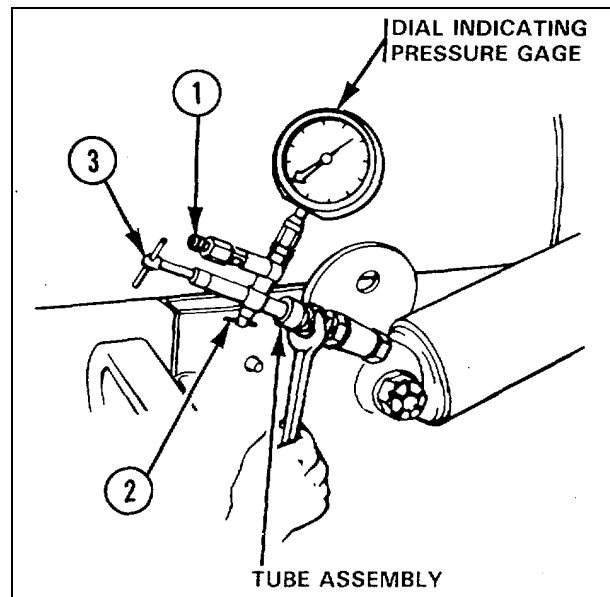
**High-pressure nitrogen gas is used in this equipment. Keep face and body clear of release valves and filling plugs. Failure to observe safety precautions may result in injury or death.**

- 1 Place cannon at maximum depression.
- 2 Tighten tee cap (1)
- 3 Close release valve (2)

**CAUTION**

**When unscrewing valve opener, do not separate valve opener from tube assembly. Failure to do so may result in the tube assembly leaking.**

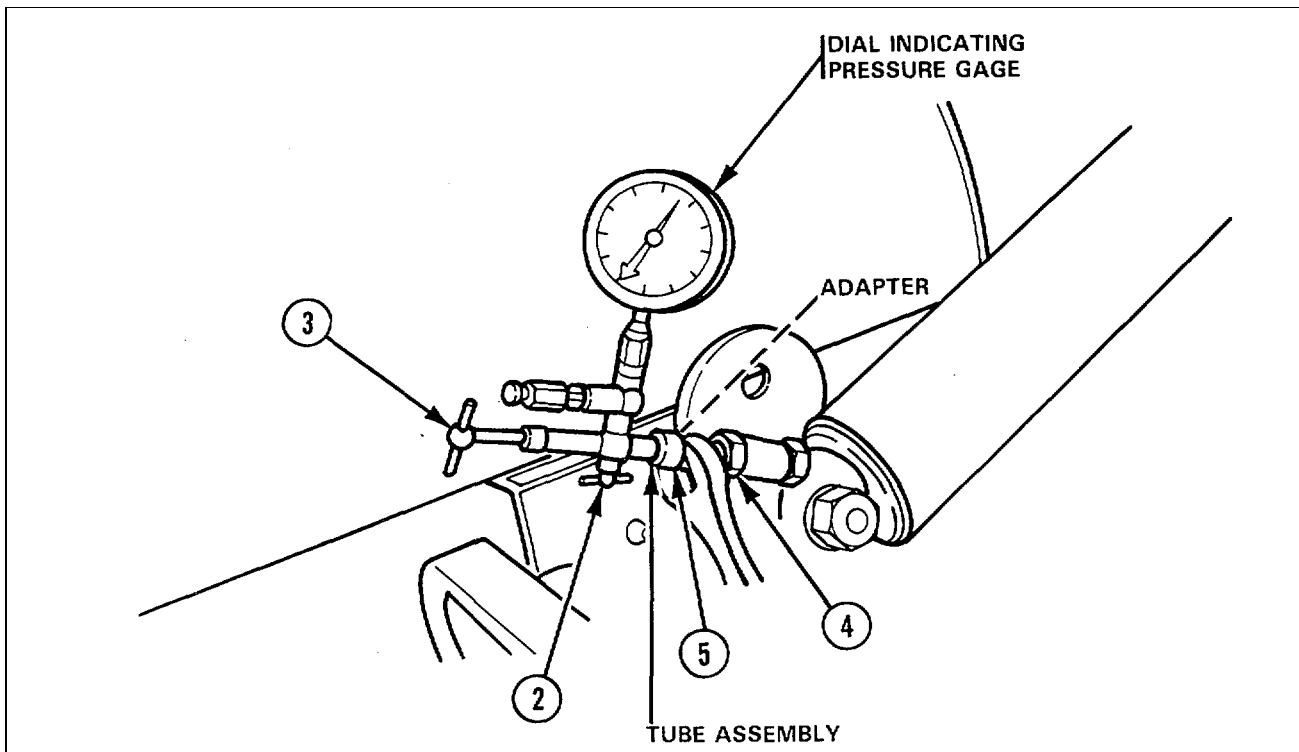
- 4 Turn valve opener (3) counterclockwise until completely unscrewed. Then turn clockwise 4 complete turns.





2-51. MAINTENANCE OF PNEUMATIC EQUILIBRATOR ASSEMBLY AND UNMODIFIED VALVE ASSEMBLY (CONT).

RELEASING NITROGEN (CONT)



5. Assemble tube assembly and dial indicating pressure gage and install in gas filling valve (4) by loosening jam nut (5). Screw adapter into gas filling valve, then tighten jam nut.

**WARNING**

**Keep hands and body behind valve opener. Failure to do so may result in injury or death to personnel.**

**CAUTION**

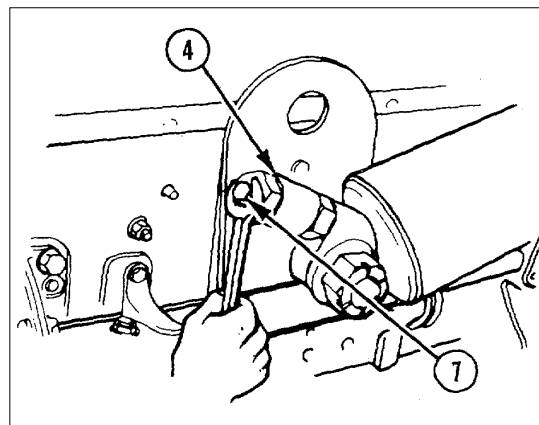
**Do not turn valve opener more than 1-1/2 turns clockwise after it contacts filling valve and pressure appears on gage.**

- 6 Open release valve (2)
- 7 Slowly open gas filling valve (4) using valve opener (3).
- 8 Allow nitrogen to slowly escape until pressure dial indicating gage reads 0 psi.
- 9 Tag pneumatic equilibrator as empty.
- 10 Remove tube assembly and dial indicating pressure gage by loosening jam nut (5) and unscrewing adapter from gas filling valve (4).

**NOTE**

**If gas filling plug is damaged, repair is by replacement of valve assembly. Notify direct support maintenance.**

- 11 Install gas filling plug (7) in gas filling valve (4). Check for leaks using leak detector (item 13, appx C).

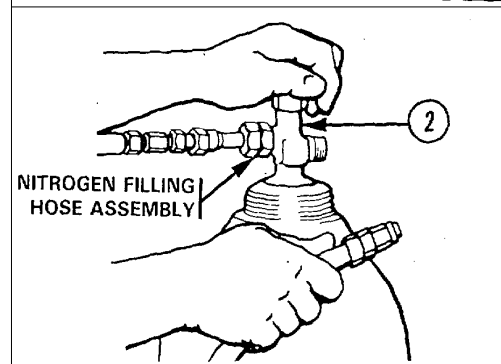
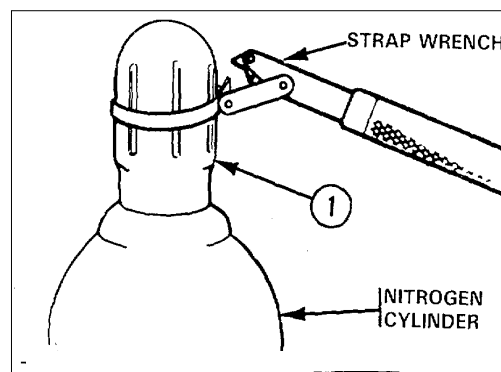


**ADDING NITROGEN (CHARGING EQUILIBRA TOR)**

**WARNING**

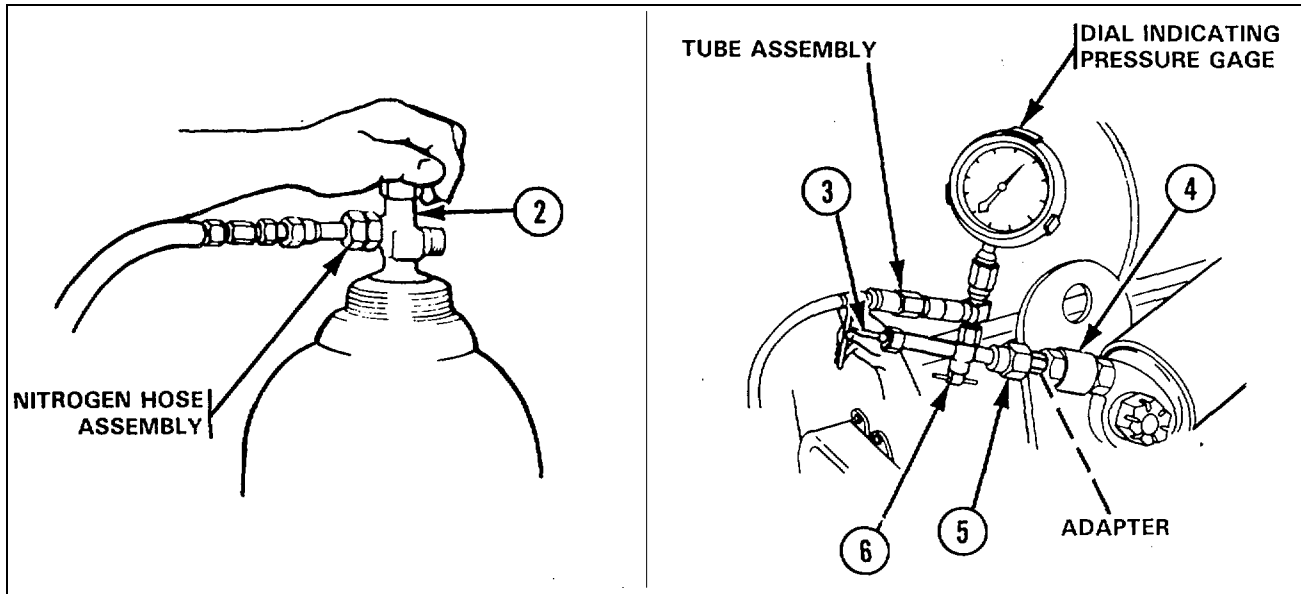
**High-pressure nitrogen gas is used in this equipment. Keep face and body clear of release valves and filling plugs. Failure to observe safety precautions may result in injury or death.**

- 1 Place cannon at maximum depression.
- 2 Using strap wrench, remove cap (1) from nitrogen cylinder.
- 3 Connect nitrogen filling hose assembly to cylinder valve (2).
- 4 To purge air, moisture, and dirt from nitrogen filling hose assembly, partly open cylinder valve (2) then close cylinder valve.



2-51. MAINTENANCE OF PNEUMATIC EQUILIBRATOR ASSEMBLY AND UNMODIFIED VALVE ASSEMBLY (CONT).

ADDING NITROGEN (CHARGING EQUILIBRATOR) (CONT)



**CAUTION**

When unscrewing valve opener, do not separate valve opener from tube assembly. Failure to do so may result in the tube assembly leaking.

- 5 Turn valve opener (3) counterclockwise until completely unscrewed then turn clockwise 4 complete turns.
- 6 Install tube assembly and dial indicating pressure gage in gas filling valve (4) by loosening jam nut (5). Screw adapter into gas filling valve, then tighten jam nut.

**CAUTION**

Do not turn valve opener more than 1-1/2 turns clockwise after it contacts filling valve. Do not turn valve opener more than 4 turns counterclockwise when closing valve.

- 7 Purge air, moisture, and dirt from tube assembly and dial indicating pressure gage using valve opener (3) to partly open, then close gas filling valve (4).
- 8 Connect nitrogen filling hose assembly to tube assembly.
- 9 Close release valve (6).
- 10 Slowly open cylinder valve (2).
- 11 Tap dial indicating pressure gage with finger to make sure that needle is not sticking.

**NOTE**

Cylinder pressure must be higher than charging pressure. See table 2-4, Equilibrator Nitrogen Charging Pressure, on page 2-147.

- 12 Read pressure on dial indicating pressure gage.

13. Close cylinder valve (2).
14. Check table 2-4, Equilibrator Nitrogen Charging Pressure, on page 2-147 for correct charging pressure.

**WARNING**

**Keep hands and body behind valve opener. Failure to do so may result in injury or death to personnel.**

15. Slowly open gas filling valve (4) using valve opener (3).
16. Partly open cylinder valve (2) for 1 or 2 seconds.

**CAUTION**

**Nitrogen cylinder valve must be tightly closed.**

17. Close cylinder valve (2).
18. Read pressure on dial indicating pressure gage. If pressure is within limits, as specified in table 2-4, Equilibrator Nitrogen Charging Pressure, on page 2-147, proceed to step 19. If pressure is too low, repeat steps 16 thru 18 until pressure is within limits. If pressure is too high, release nitrogen gas.

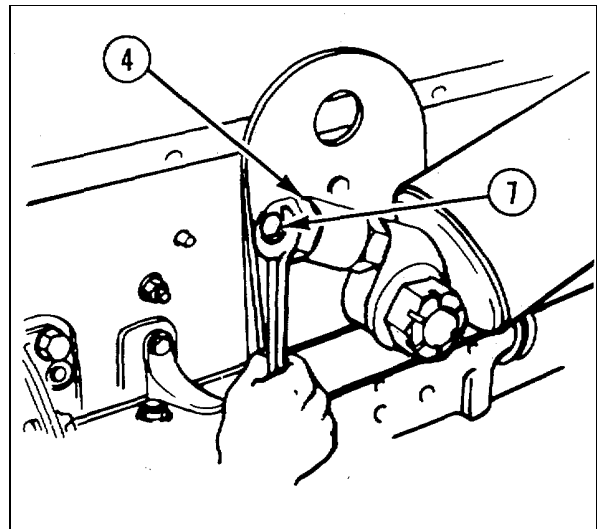
**WARNING**

**Keep hands and body behind valve opener. Failure to do so may result in injury or death to personnel.**

**CAUTION**

**Do not turn valve opener more than 4 turns counterclockwise.**

19. Back off valve opener (3) to close gas filling valve (4).
20. Slowly open release valve (6) allowing gas pressure in tube assembly and nitrogen filling hose assembly to escape.
21. Remove nitrogen filling hose assembly from cylinder valve (2) and tube assembly.
22. Remove tube assembly from gas filling valve (4) by loosening jam nut (5) and unscrewing adapter from gas filling valve.



**NOTE**

**If gas filling plug is damaged, repair is by replacement of valve assembly. Notify direct support maintenance.**

23. Install plug (7) in gas filling valve (4).
24. Cover area around gas filling valve (4) with leak detector (item 13, appx C).

**EMERGENCY CHARGING OF EQUILIBRATOR**

**CAUTION**

**Low-pressure nitrogen cylinder charging of equilibrator is for emergency use only and is not a routine procedure.**

- 1 In an emergency, nitrogen cylinders with low pressure (about 2000 psi (13,784 kPa)) can be used to charge the equilibrator.
- 2 Use the normal charging procedure with the following changes:
  - a. Elevate cannon to 1150 mils elevation instead of maximum depression.
  - b. Charge equilibrator to a pressure that is 990 psi (6831 kPa) less than the pressure required in Table 2-4, Equilibrator Nitrogen Charging Pressure, on page 2-147. For example: 2790 psi (19,229 kPa) minus 990 psi (6831 kPa) equals 1800 psi (12,398 kPa).
  - c. Depress cannon to maximum depression and check nitrogen pressure. Nitrogen pressure should be as required in Table 2-4, Equilibrator Nitrogen Charging Pressure, on page 2-147 (which would be 2790 psi (19,229 kPa) in the example used in step b).

**2-52. MAINTENANCE OF PNEUMATIC EQUILIBRATOR ASSEMBLY AND MODIFIED VALVE ASSEMBLY.**

This task covers:

- |                              |   |
|------------------------------|---|
| a. <i>Checking Nitrogen</i>  | c. <i>Adding Nitrogen (Charging Equilibrator)</i> |
| b. <i>Releasing Nitrogen</i> | d. <i>Emergency Charging of Equilibrator</i>      |

**INITIAL SETUP:**

*Tools and Special Tools*

- Air gage assembly (MIL-G-8348-A-4)
- Dial indicating pressure gage WARNING (45-1056-04L5000)
- Nitrogen charging kit (8449334)
- Nitrogen cylinder (BBN411)
- Nitrogen hose assembly (12008918)
- Nitrogen hose assembly (1 200891 8)
- Ordnance artillery and turret mechanic's tool kit (appx B)
- Strap wrench (9171739)

*Materials/Parts*

- Leak detector (item 13, appx C)

*References*

- TM 9-2350-304-24P-2

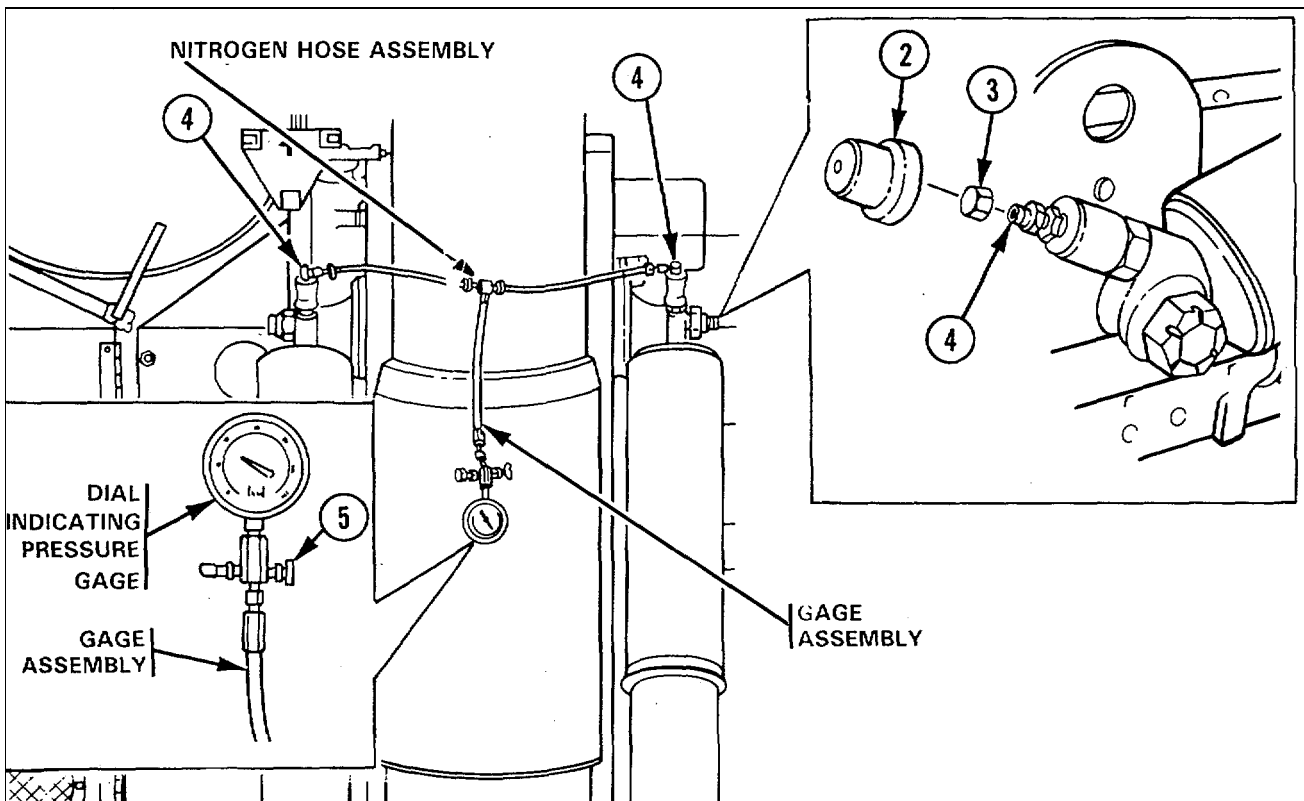
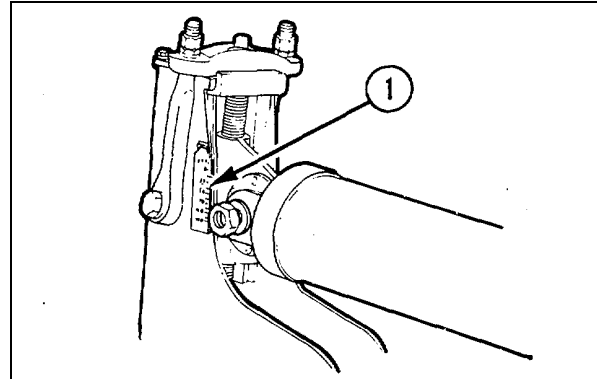
*General Safety Instructions*

**WARNING**

**High-pressure nitrogen gas is used in this equipment. Keep face and body clear of release valves and filling plugs. Failure to observe safety precautions may result in injury or death.**

**CHECKING NITROGEN PRESSURE**

1. Position cannon at maximum depression.
2. Adjust equilibrator temperature adjustment scale (1) to read same as outdoor temperature.



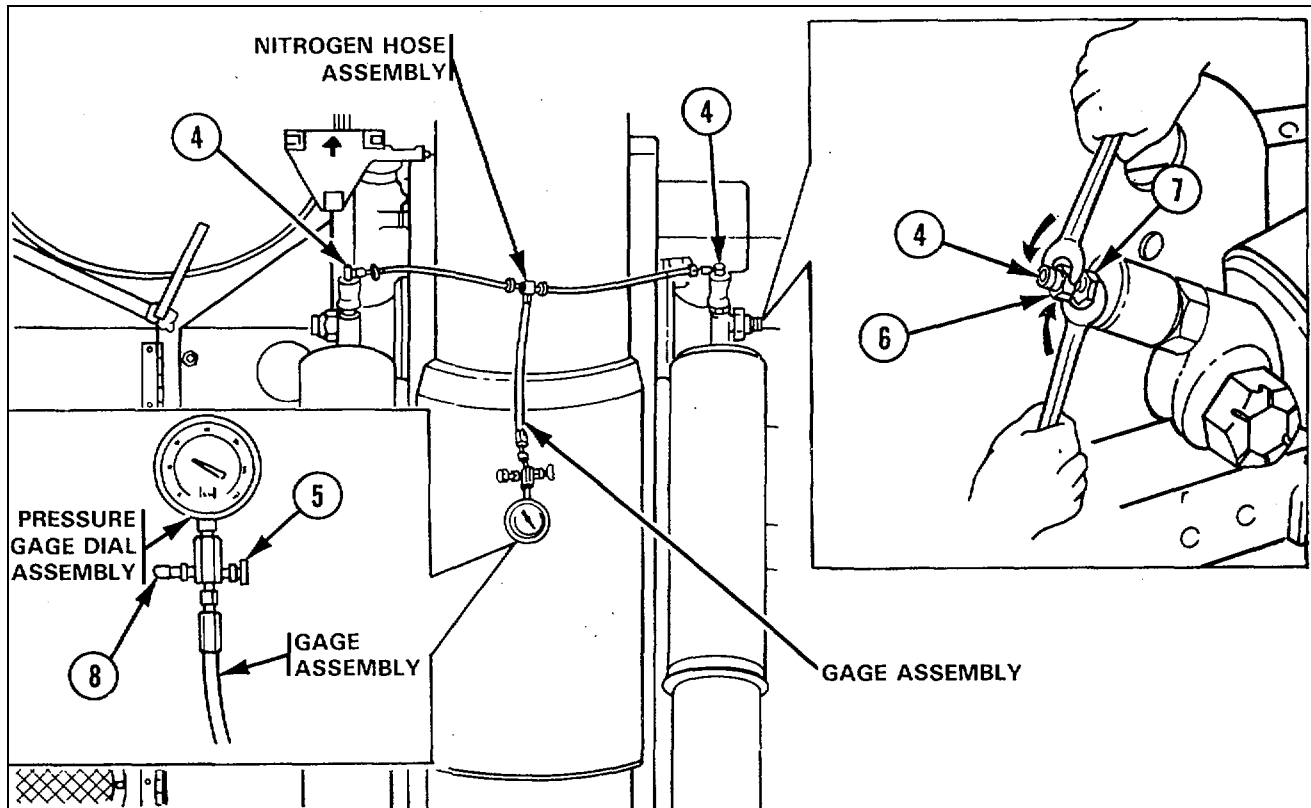
**WARNING**

**High-pressure nitrogen gas is used in this equipment. Keep face and body clear of release valves and filling plugs. Failure to observe safety precautions may result in injury or death.**

3. Remove two protective caps (2) and two valve caps (3) from two equilibrator valve assemblies (4).
4. Connect nitrogen hose assembly to two equilibrator valve assemblies (4).
5. Connect gage assembly to nitrogen hose assembly.
6. Close bleeder valve (5) on gage assembly.

2-52. MAINTENANCE OF PNEUMATIC EQUILBRATOR ASSEMBLY AND MODIFIED VALVE ASSEMBLY (CONT).

CHECKING NITROGEN PRESSURE (CONT)



**NOTE**

To check pressure in only one equilibrator, open only the valve assembly on that equilibrator.

7. Open two equilibrator valve assemblies (4) by turning outside nut (6) while holding inside nut (7), until pressure registers on dial indicating pressure gage. Refer to table 2-4, Equilibrator Nitrogen Charging Pressure, to determine correct pressure.
8. If nitrogen pressure is too high, refer to Releasing Nitrogen.
9. If nitrogen pressure is too low, refer to Adding Nitrogen (Charging Equilibrator).
10. Close two equilibrator valve assemblies (4).
11. Remove bleeder valve cap (8).
12. Open bleeder valve (5) and drain pressurized nitrogen from lines until dial indicating pressure gage reads 0 psi.
13. Install bleeder valve cap (8).
14. Disconnect gage assembly from nitrogen hose assembly.
15. Disconnect nitrogen hose assembly from two equilibrator valve assemblies (4).
16. Coat two equilibrator valve assemblies (4) with leak detector (item 13, appx C).

Table 2-4. EQUILIBRATOR NITROGEN CHARGING PRESSURE

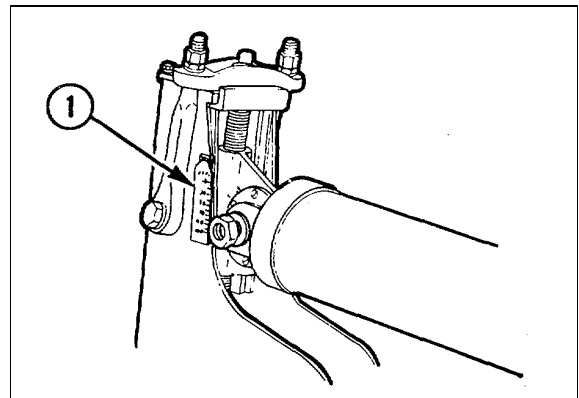
OUTDOOR TEMPERATURE AT TIME OF CHARGING		EQUILIBRATOR NITROGEN PRESSURE (GAGE)	
°F	°C	PSI	kPa
0°	-17.8°	2640	18,203
10°	-12.0°	2670	18,410
20°	-6.7°	2700	18,616
30°	-1.1°	2730	18,823
40°	4.4°	2760	19,030
50°	10.0°	2790	19,237
60°	15.6°	2820	19,444
70°	21.0°	2850	19,651
80°	26.7°	2880	19,858
90°	32.2°	2910	20,064
100°	37.8°	2940	20,271
110°	43.3°	2970	20,478

**RELEASING NITROGEN**

**WARNING**

High-pressure nitrogen gas is used in this equipment. Keep face and body clear of release valves and filling plugs. Failure to observe safety precautions may result in injury or death.

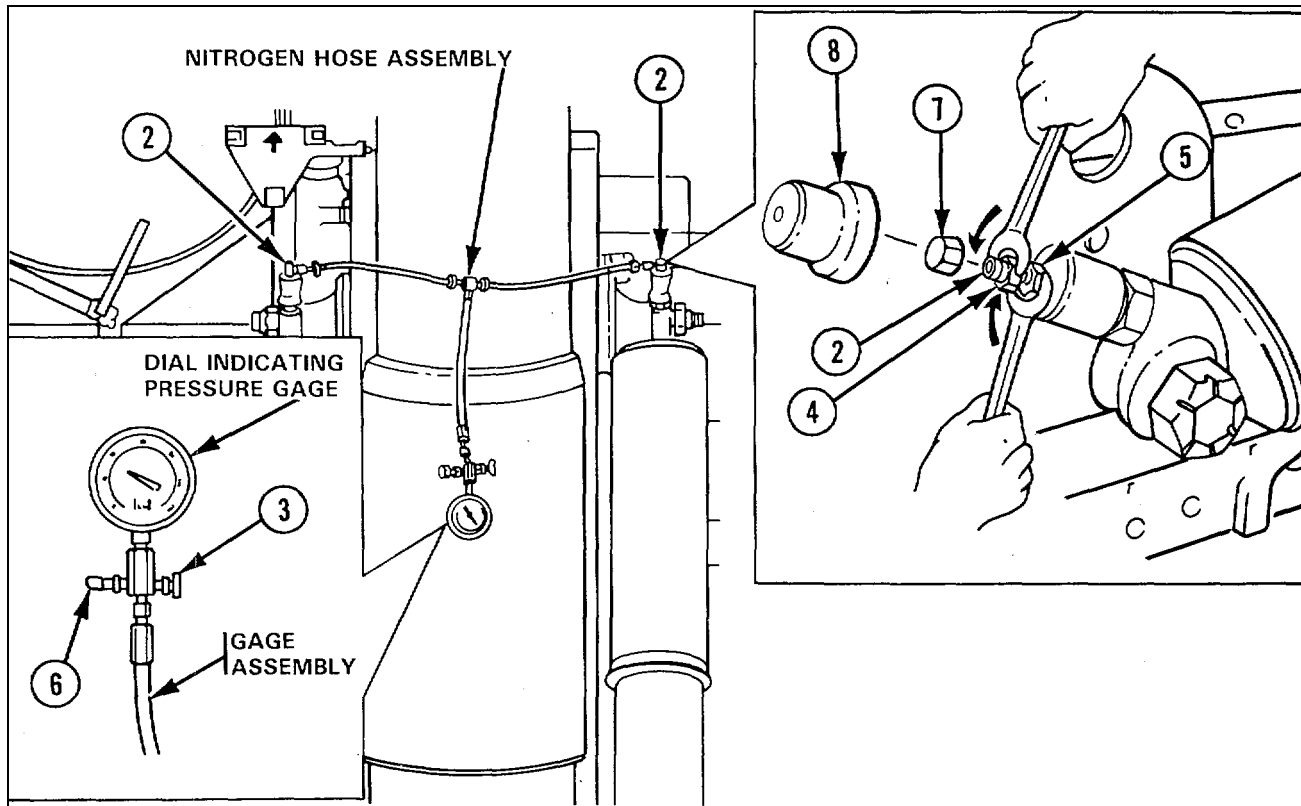
1. Position cannon at maximum depression.
2. Adjust equilibrator temperature scale (1) to read same as outdoor temperature.





2-52. MAINTENANCE OF PNEUMATIC EQUILBRATOR ASSEMBLY AND MODIFIED VALVE ASSEMBLY (CONT).

**RELEASING NITROGEN (CONT)**



**NOTE**

To release all nitrogen from equilibrator, slowly open valve assembly counterclockwise until all pressure is released. Tag equilibrator as empty.

3. Connect nitrogen hose assembly to two equilibrator valve assemblies (2).
4. Connect gage assembly to nitrogen hose assembly.
5. Close bleeder valve (3) on gage assembly.
6. Open two equilibrator valve assemblies (2) by turning outside nut (4) while holding inside nut (5).
7. Remove bleeder valve cap (6).
8. Open bleeder valve (3) and release nitrogen until dial indicating pressure gage reads desired pressure. Refer to

table 2-4, Equilibrator Nitrogen Charging Pressure, to determine correct pressure. Close bleeder valve.

9. Close two valve assemblies (2).
10. Open bleeder valve (3) and drain pressurized nitrogen from lines until dial indicating pressure gage reads 0 psi.
11. Install bleeder valve cap (6).
12. Disconnect gage assembly from nitrogen hose assembly.
13. Disconnect nitrogen hose assembly from two equilibrator valve assemblies (2).
14. Coat two equilibrator valve assemblies (2) with leak detector (item 13, appx C).
15. Install two valve caps (7) and two protective caps (8) on two equilibrator valve assemblies (2).

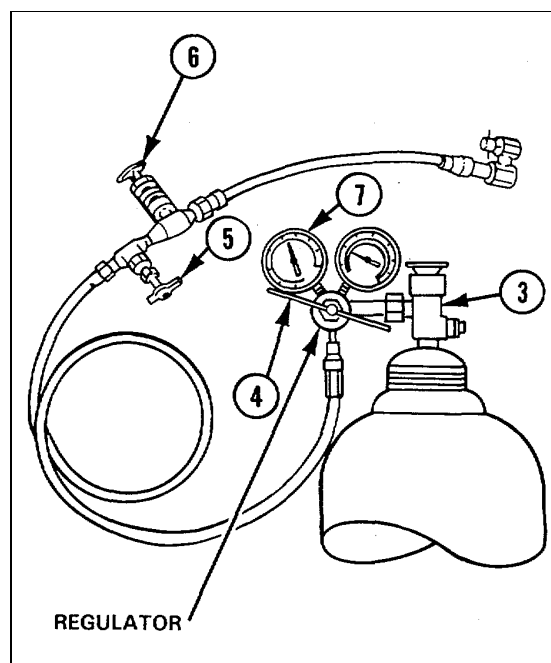
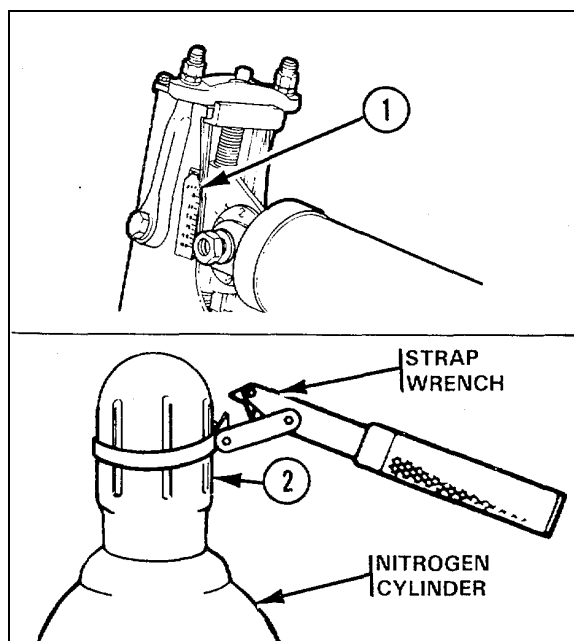
**ADDING NITROGEN (CHARGING EQUILIBRATOR)****WARNING**

High-pressure nitrogen gas is used in this equipment. Keep face and body clear of release valves and filling plugs. Failure to observe safety precautions may result in injury or death.

**NOTE**

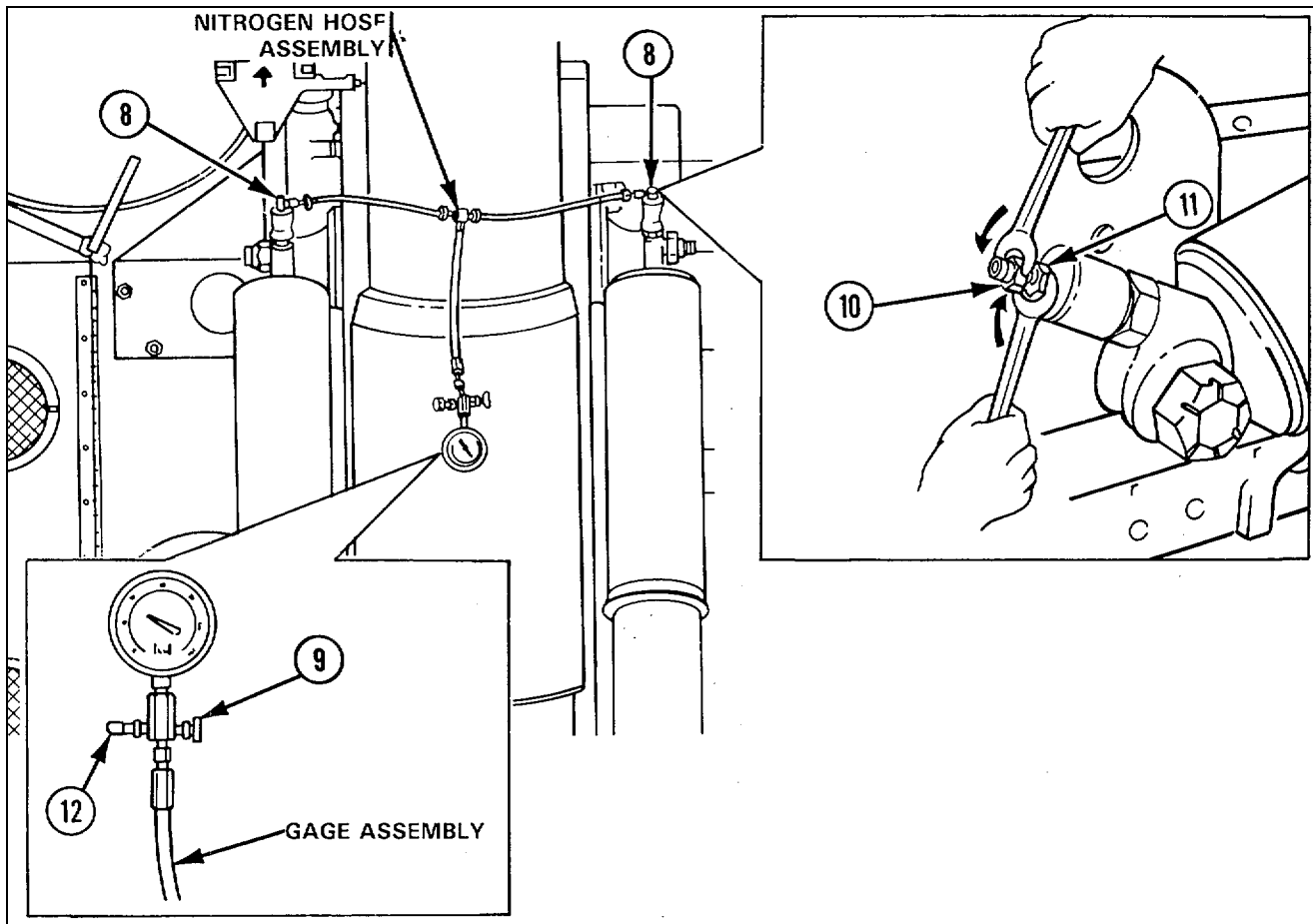
After charging, wait 30 minutes before checking pressure in equilibrator. This allows time for gas temperature to normalize to same temperature as equilibrator and gives more accurate reading.

1. Position cannon at maximum depression.
2. Adjust equilibrator temperature adjustment scale (1) to read same as outdoor temperature.
3. Using strap wrench, remove cap (2) from nitrogen cylinder.
4. Open cylinder valve (3) for about 3 seconds to purge opening of dirt and moisture. Close cylinder valve.
5. Connect regulator to cylinder valve (3).
6. Close regulator valve (4) by turning valve counterclockwise.
7. Close shutoff valve (5).
8. Close bleeder valve (6).
9. Open cylinder valve (3).
10. Open regulator valve (4) until 100 psi (690 kPa) is registered on 3000-psi (20,685-kPa) gage (7).
11. Open shutoff valve (5) for about 10 seconds to purge regulator.
12. Close shutoff valve (5).

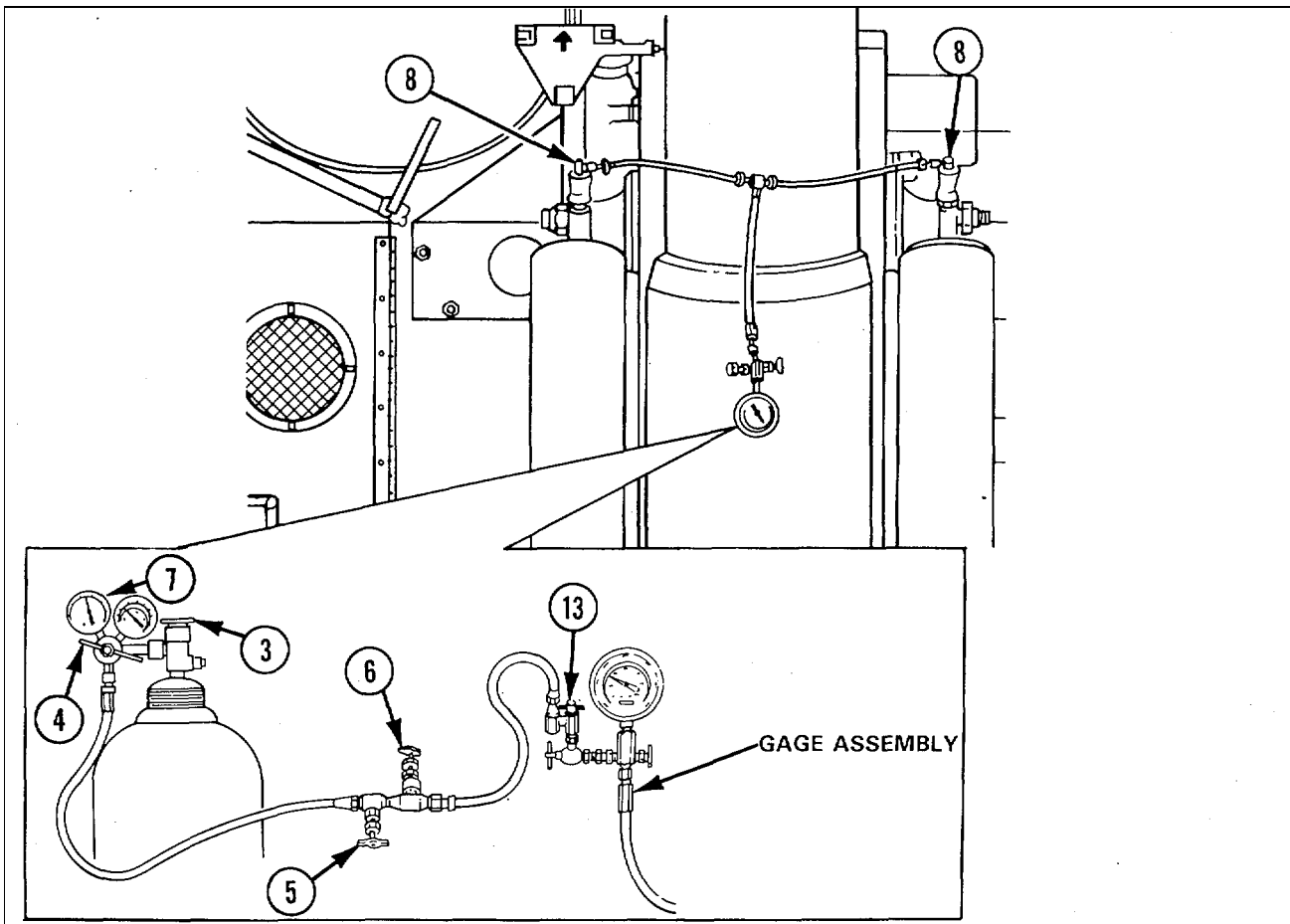


2-52. MAINTENANCE OF PNEUMATIC EQUILBRATOR ASSEMBLY AND MODIFIED VALVE ASSEMBLY (CONT).

ADDING NITROGEN (CHARGING EQUILBRATOR) (CONT)



13. Connect nitrogen hose assembly to two equilibrator valve assemblies (8).
14. Connect gage assembly to nitrogen hose assembly.
15. Close bleeder valve (9) on gage assembly.
16. Open two equilibrator valve assemblies (8) by turning outside nut (10) counterclockwise while holding inside nut (11).
17. Remove bleeder valve cap (12).
18. Open bleeder valve (9) for about 10 seconds to purge lines.
19. Close bleeder valve (9).



20. Connect adapter valve (13) to gage assembly.

**NOTE**

If only one equilibrator cylinder requires pressurizing, close the valve assembly of the other equilibrator at this time.

21. Open shutoff valve (5) and bleeder valve (6).
22. While reading 3000-psi (20,685-kPa) gage (7), slowly adjust regulator valve (4) in 100 psi (690 kPa) increments to the desired equilibrator pressure. Refer to table 2-4, Equilibrator Nitrogen Charging Pressure, to determine correct pressure. Allow time for nitrogen flow to stop between each incremental adjustment.

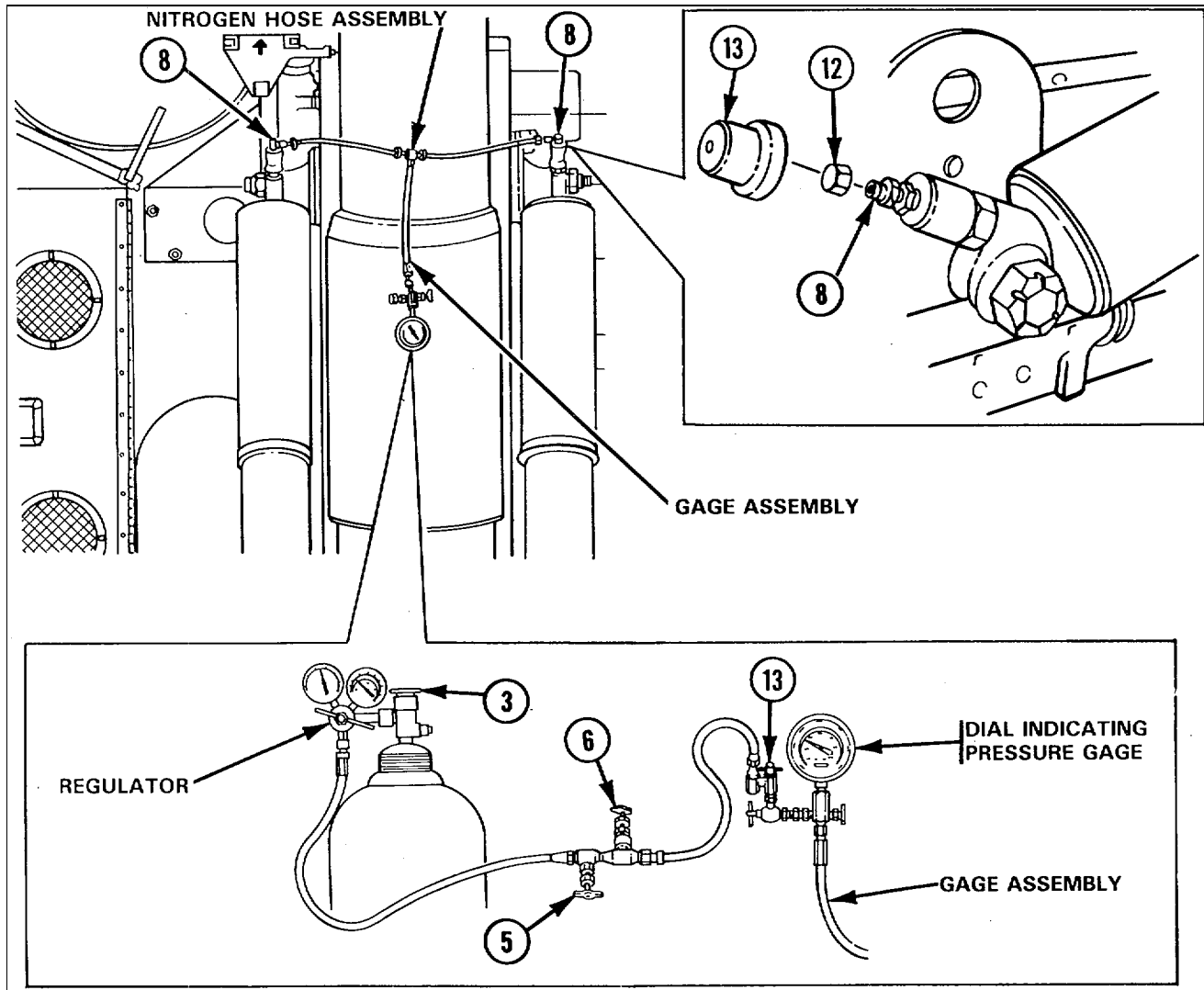
**NOTE**

If only one equilibrator cylinder is being charged, it will be necessary to open the valve assembly of the other equilibrator before performing step 23 so that pressure in both equilibrator cylinders will be equalized.

23. Close shutoff valve (5) and allow equilibrator cylinders to cool about 30 minutes.
24. Compare pressure reading on pressure dial indicating gage with desired value given in table 2-4, Equilibrator Nitrogen Charging Pressure. If system pressure is too high, release nitrogen slowly through bleeder valve (6) until desired pressure is obtained. If pressure is too low, repeat steps 21 thru 23.

2-52. MAINTENANCE OF PNEUMATIC EQUILBRATOR ASSEMBLY AND MODIFIED VALVE ASSEMBLY (CONT).

ADDING NITROGEN (CHARGING EQUILBRATOR) (CONT)



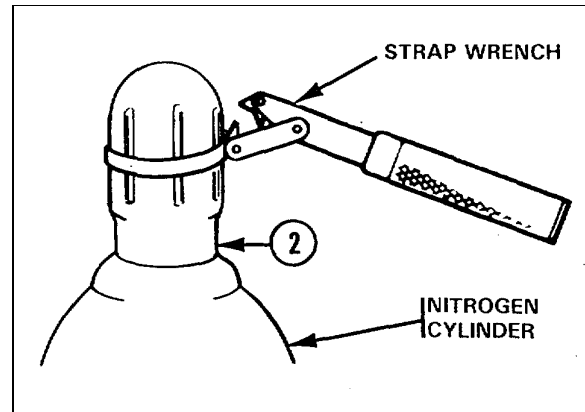
- 25. Close cylinder valve (3) and two equilibrator valve assemblies (8).
- 26. Open shutoff valve (5).
- 27. Open bleeder valve (6) and release all pressure from lines.
- 28. Disconnect adapter valve (13) from gage assembly.

- 29. Disconnect gage assembly from nitrogen hose assembly.
- 30. Disconnect nitrogen hose assembly from two equilibrator valve assemblies (8).
- 31. Coat two equilibrator valve assemblies (8) with leak detector (item 13, appx C).

**NOTE**

If valve caps or caps are damaged, repair is by replacement of valve caps or caps.

32. Install two valve caps (12) and two caps (13) on two equilibrator valve assemblies (8).
33. Disconnect regulator from cylinder valve (3).
34. Install cap (2) on nitrogen cylinder and label cylinder with approximate psi remaining in cylinder.
35. After charging equilibrator and it is apparent it is leaking, notify direct support maintenance.

**EMERGENCY CHARGING OF EQUILIBRATOR****CAUTION**

**Low-pressure nitrogen cylinder charging of equilibrator is for emergency use only and is not a routine procedure.**

1. In an emergency, nitrogen cylinders with low-pressure (about 2000 psi (13,784 kPa)) can be used to charge the equilibrator.
2. Use the normal charging procedure with the following changes:
  - a. Elevate cannon to 1150 mils elevation instead of maximum depression.
  - b. Charge equilibrator to a pressure that is 990 psi (6831 kPa) less than the pressure required in Table 2-4, Equilibrator Nitrogen Charging Pressure. For example: 2790 psi (19,229 kPa) minus 990 psi (6831 kPa) equals 1800 psi (12,398 kPa).
  - c. Depress cannon to maximum depression and check nitrogen pressure. Nitrogen pressure should be as required in Table 2-4, Equilibrator Nitrogen Charging Pressure (which would be 2790 psi (19,229 kPa) in the example used in step b).

**2-53. MAINTENANCE OF M174 GUN MOUNT EXTERIOR HYDRAULIC LINES AND FITTINGS.**

This task covers:

- a. *Relieving Hydraulic Pressure*
- b. *Removing/Disassembly*
- c. *Inspection/Repair*
- d. *Reassembly/Installation*
- e. *Applying Hydraulic Pressure*

**INITIAL SETUP:**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*References*

TM 9-2350-304-24P-2

*General Safety Instructions*

**WARNING**

- Before relieving hydraulic pressure, be sure travel lock is engaged and vehicle is on as level ground as possible. This will stop the cannon from sliding out of battery.

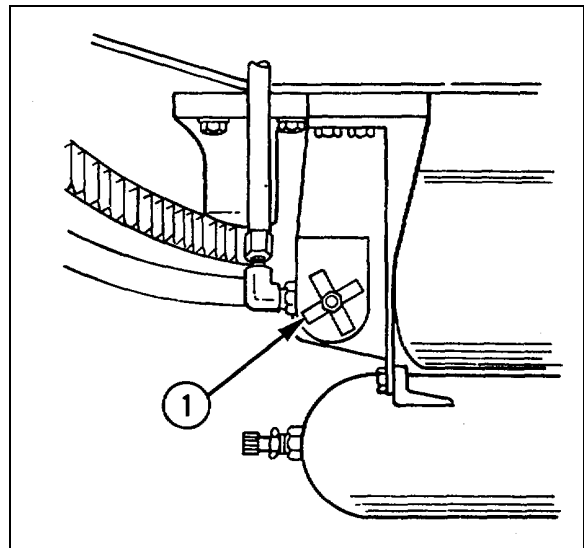
- Hydraulic system is under high pressure. Make sure all hydraulic pressure is relieved before removal of any tubes or fittings. Follow safety procedures to prevent injury  
Wipe up spilled hydraulic fluid.

**RELIEVING HYDRAULIC PRESSURE**

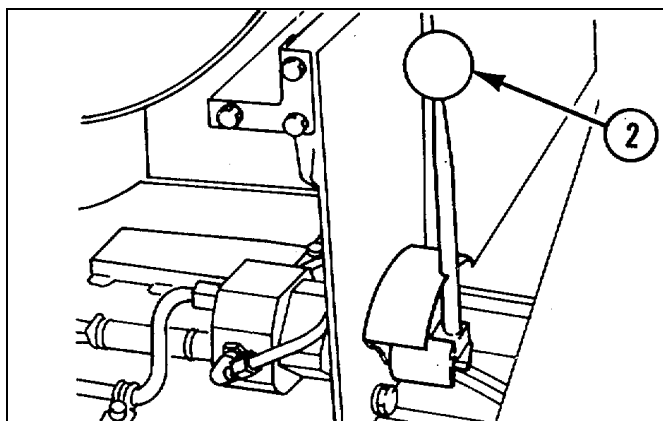
**WARNING**

**Before relieving hydraulic pressure, be sure travel lock is engaged and vehicle is on as level ground as possible. This will stop the cannon from sliding out of battery.**

- 1 Set MASTER switch to OFF and open globe angle valve (1).



- 2 Hold manual control lever (2) in RETURN for 1 minute, then in RETRACT for 1 minute.



### REMOVAL/DISASSEMBLY

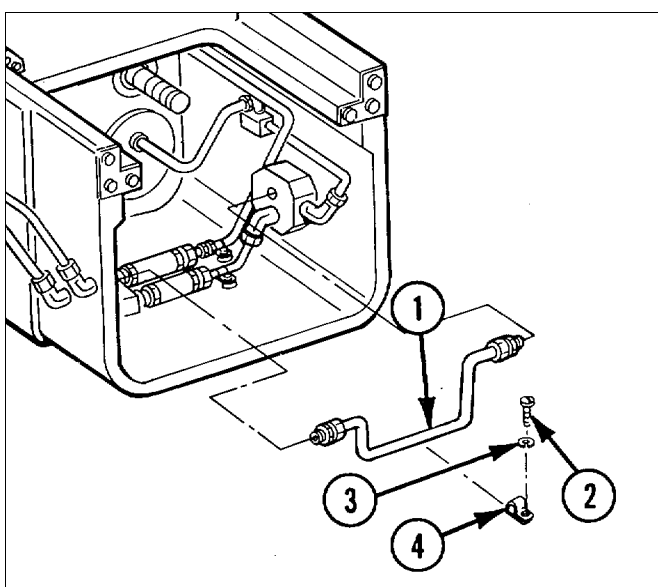
#### **WARNING**

Hydraulic system is under high pressure. Make sure all hydraulic pressure is relieved before removal of any tubes or fittings. Follow safety procedures to prevent injury. Wipe up spilled hydraulic fluid.

#### **NOTE**

The following procedures are written and illustrated for one hydraulic line, but they apply to all unit maintenance lines in rear of recoil system.

- 1 Check hydraulic line for leaks. Refer to page 2-9 for definition of leaks.
- 2 Disconnect each end of hydraulic line (1) at nearest disconnect. Refer to page 2-82 for complete disassembly of hydraulic lines and fittings.
- 3 Remove necessary capscrews (2), lockwashers (3), loop clamps (4), and hydraulic line (1).



- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

### INSPECTION/REPAIR

1. Inspect for broken, damaged, or missing parts.

### REASSEMBLY/INSTALLATION

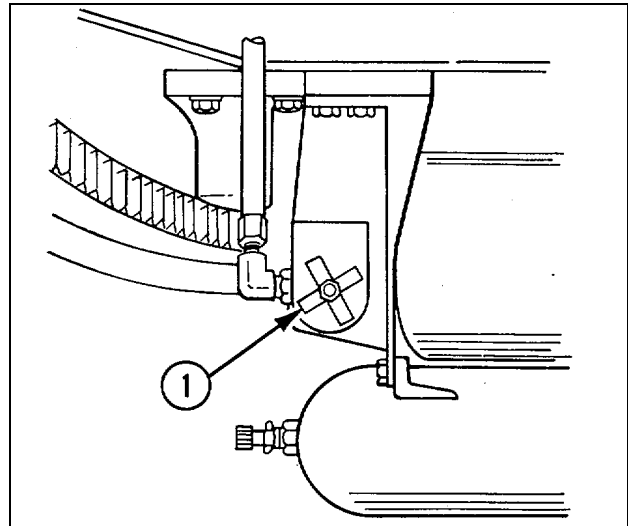
Connect each end of hydraulic line (1) at nearest connector, and secure using necessary loop clamps (4), new lockwashers (3), and capscrews (2). Refer to page 2-82 for complete reassembly of hydraulic lines and fittings.



2-53. MAINTENANCE OF M174 GUN MOUNT EXTERIOR HYDRAULIC LINES AND FITTINGS (CONT).

APPLYING HYDRAULIC PRESSURE

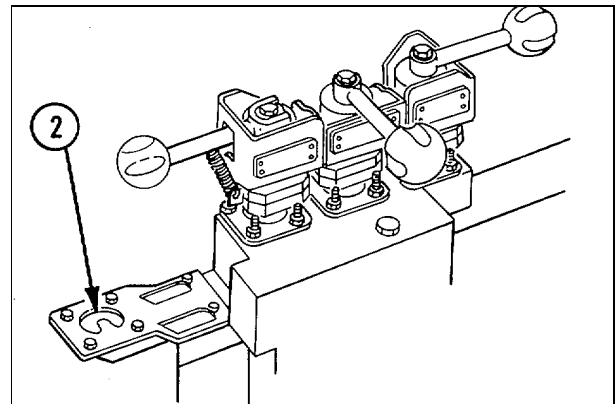
- 1 Close globe angle valve (1).
- 2 Start engine.



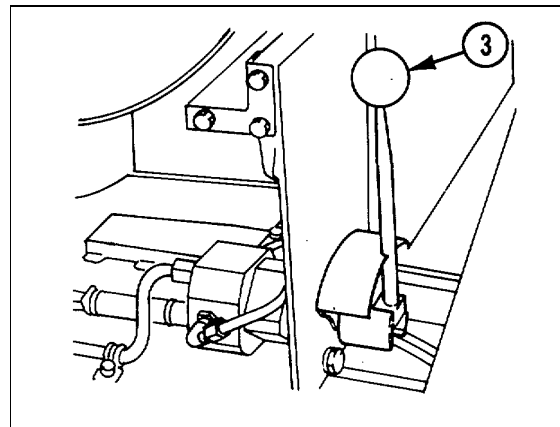
**NOTE**

Hydraulic motor and pump may be used to apply pressure at hydraulic system without starting engine by setting MASTER switch and OIL PUMP MOTOR SWITCH ON.

- 3 Set HYD PUMP/PTO CLUTCH switch to ON.
- 4 Check dial assembly pressure gage (2-) indication. Normal pressure is 1 600 to 2400 psi (11,032 to 16,548 kPa).
- 5 Stop engine.



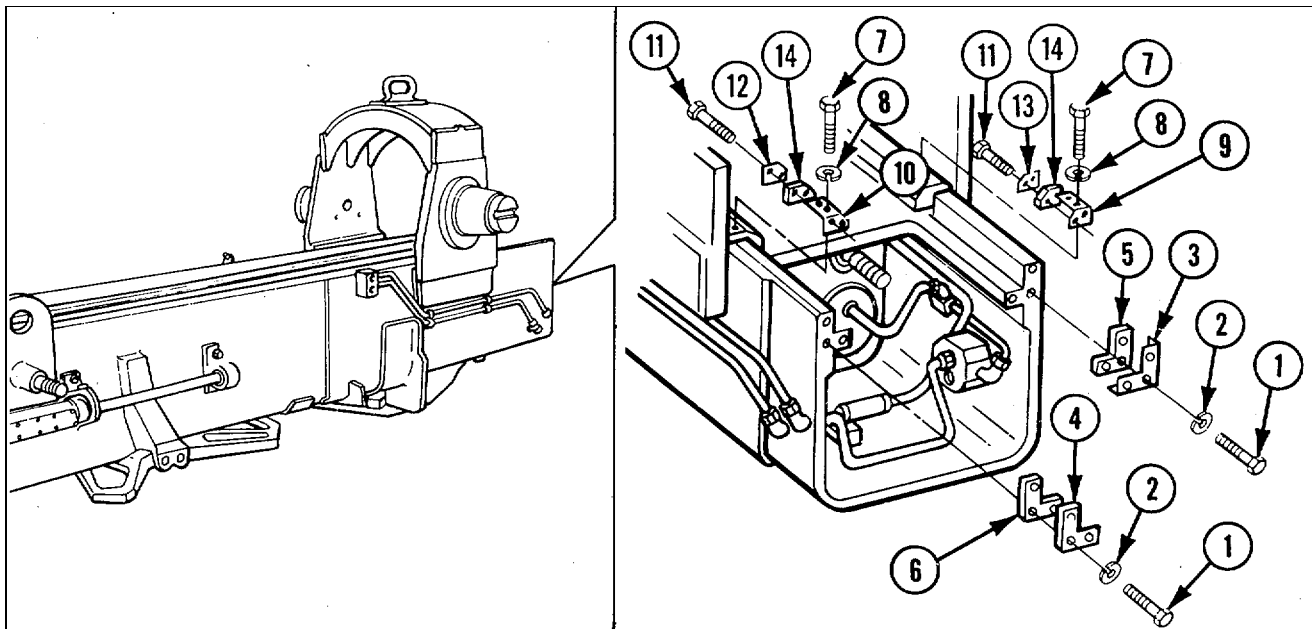
- 6 Move manual control lever (3) to RETRACT, then to RETURN, then back to RETRACT several times to bleed air from system.



**2-54. MAINTENANCE OF M174 GUN MOUNT ASSEMBLY-WIPERS AND RELATED ITEMS.**

This task covers:	a. Removal/Disassembly b. Inspection/Repair	c. Reassembly/Installation
<b>INITIAL SETUP</b>		
<i>Tools and Special Tools</i> Ordnance artillery and turret mechanic's tool kit (appx B)		
<i>Materials/Parts</i> Left rear wiper preformed mechanical felt (5140034) Lockwasher (16) (MS35338-44) Preformed felt wiper (2) (5140041)		
Preformed left front wiper mechanical felt (5140051) Preformed right front wiper mechanical felt (5139936) Right rear wiper preformed mechanical felt (5140036)		
<i>References</i> TM 9-2350-304-24P-2		

**REMOVAL/DISASSEMBLY**



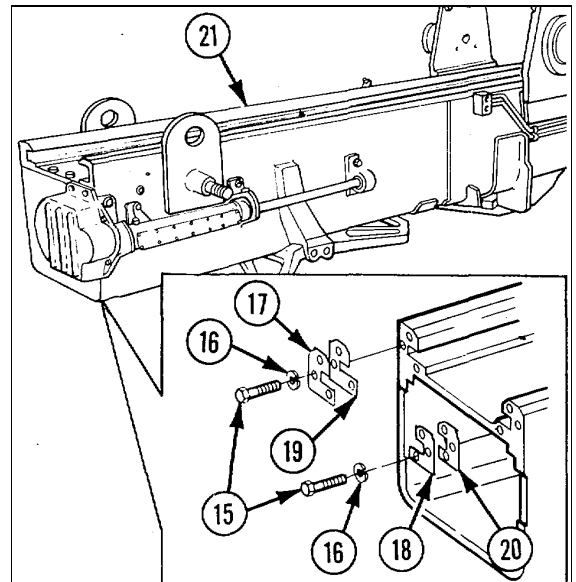
- 1 Remove six capscrews (1), six lockwashers (2), gun rail wiper corner brace (3), gun rail wiper corner brace (4), right rear wiper preformed mechanical felt (5), and left rear wiper preformed mechanical felt (6).
- 2 Remove four capscrews (7), four lockwashers (8), gun rail wiper angle bracket (9), and gun rail wiper angle bracket (10).

- 3 Remove four machine screws (11), upper left rear packing retainer (12), upper right rear packing retainer (13), and two preformed mechanical wiper felts (14).

**2-54. MAINTENANCE OF M174 GUN MOUNT ASSEMBLY-WIPERS AND RELATED ITEMS (CONT).**

**REMOVAL/DISASSEMBLY (CONT)**

- 4 Remove six capscrews (15), six lockwashers (16), gun rail wiper retainer (17), gun rail wiper mending plate (18), preformed right front wiper mechanical felt (19), and preformed left front wiper mechanical felt (20) from gun mount (21).

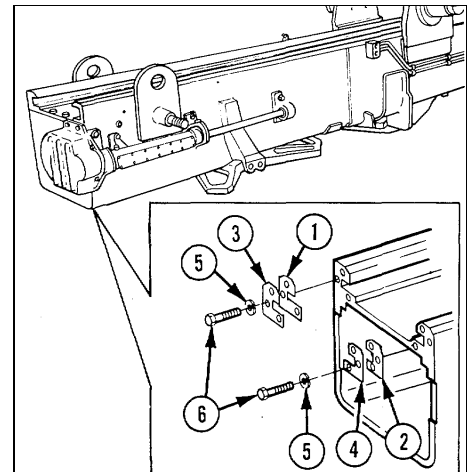


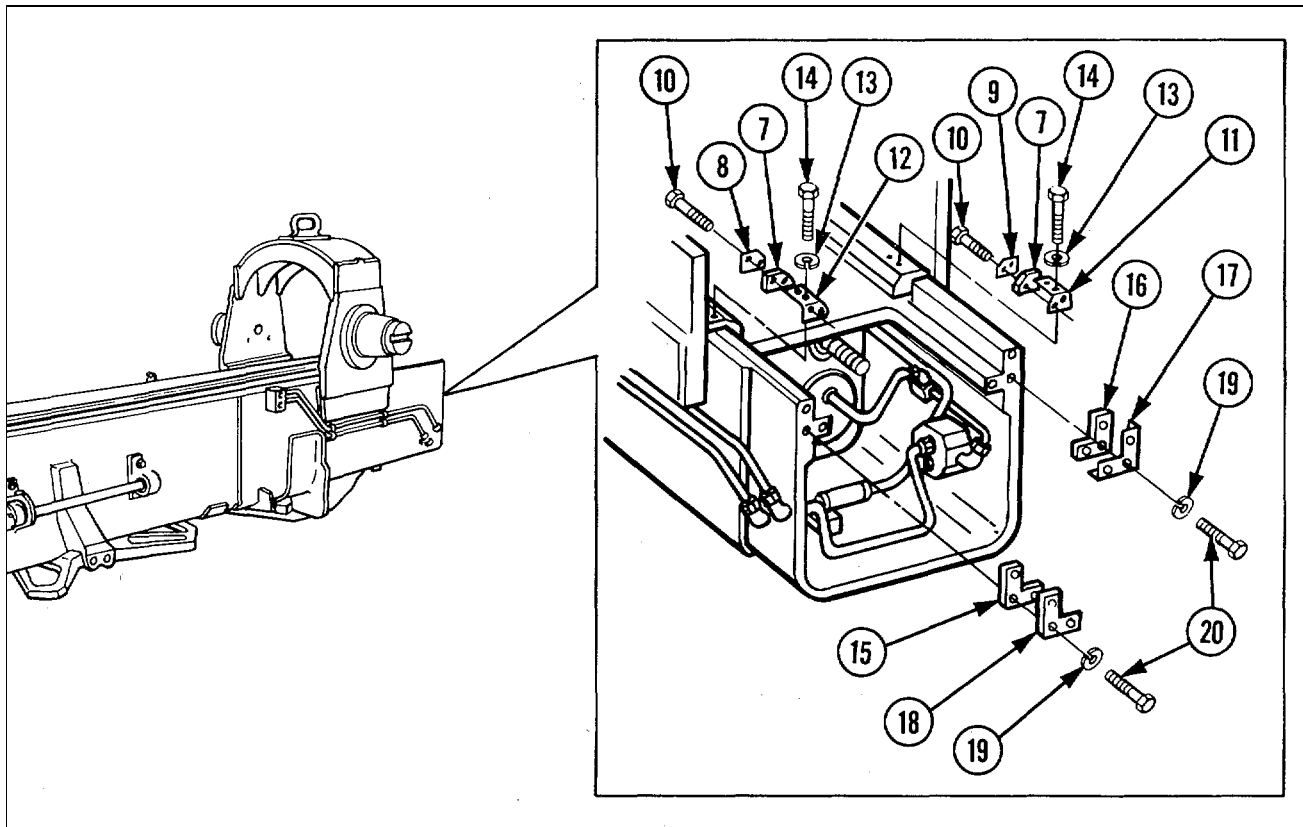
**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY/INSTALLATION**

- 1 Install new preformed right front wiper felt (1), new preformed left front wiper felt (2), gun rail wiper retainer (3), gun rail wiper mending plate (4), six new lockwashers (5), and six capscrews (6).





- 2 Install two new preformed felt wipers (7), upper left rear packing retainer (8), upper right rear packing retainer (9), and four machine screws (10).
- 3 Install gun rail wiper angle bracket (11), gun rail wiper angle bracket (12), four new lockwashers (13), and four cap-screws (14)

- 4 Install new left rear wiper mechanical felt (15), new right rear wiper preformed mechanical felt (16), gun rail corner brace (17), gun rail corner brace (18), six new lockwashers (19), and six cap-screws (20).

**2-55. MAINTENANCE OF REPLENISHER ASSEMBLY.**

This task covers:	a. <i>Disassembly</i>	b. <i>Inspection/Repair</i>	c. <i>Reassembly</i>
<b>INITIAL SETUP</b>			
<i>Tools and Special Tools</i> Ordnance artillery and turret mechanic's tool kit (appx B)		<i>References</i> TM 9-2350-304-24P-2	

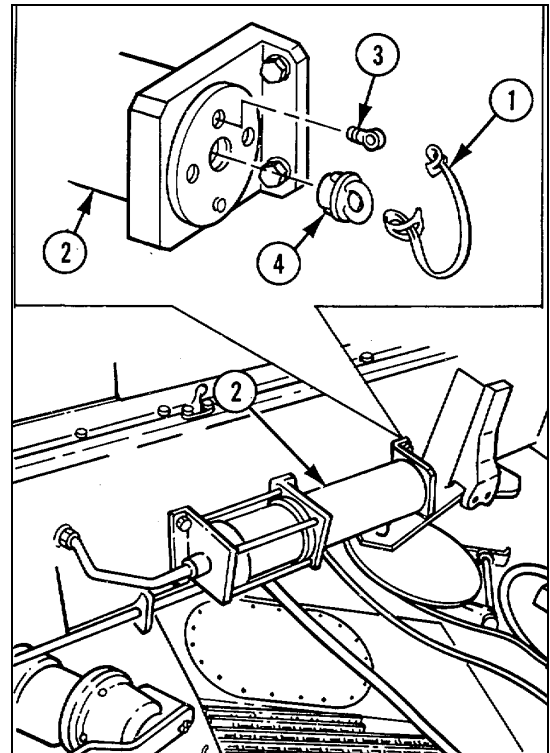
2-55. MAINTENANCE OF REPLENISHER ASSEMBLY (CONT).

**DISASSEMBLY**

**NOTE**

Steps 1 and 2 are written and illustrated for replenisher assembly (9328469).

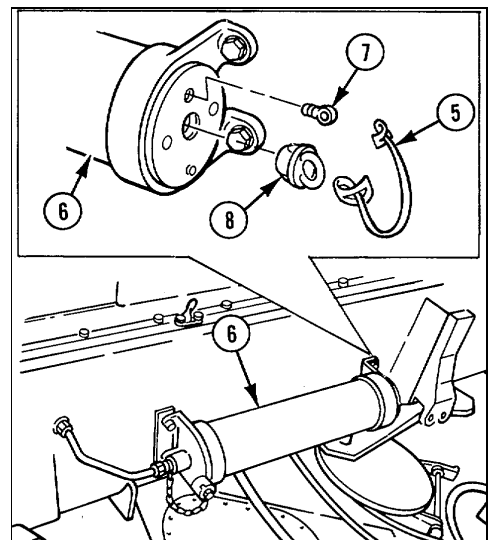
- 1 Remove leather strap (1) from replenisher assembly (2).
- 2 Remove eyebolt (3) and plug (4).



**NOTE**

Steps 3 and 4 are written and illustrated for replenisher assembly (10914823).

- 3 Remove leather replenisher ring strap (5) from replenisher assembly (6).
- 4 Remove eyebolt (7) and plug guide (8).



**INSPECTION/REPAIR**

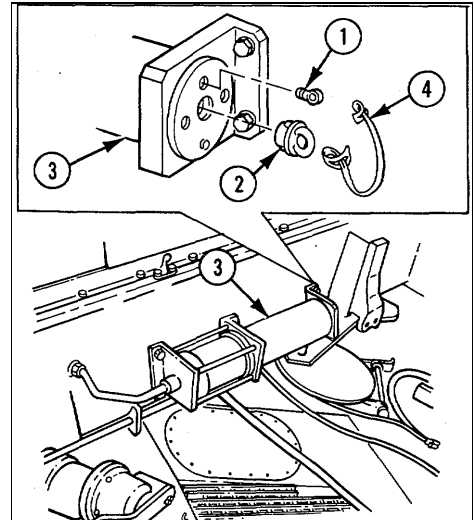
- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

**NOTE**

Steps 1 and 2 are written and illustrated for replenisher assembly (9328469).

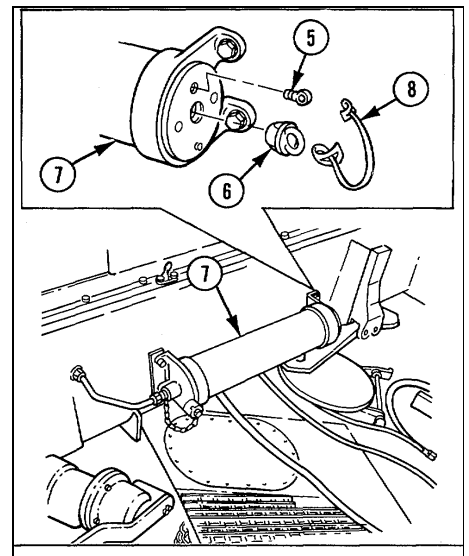
- 1 Install eyebolt (1) and plug (2) in replenisher assembly (3).
- 2 Install leather strap (4).



**NOTE**

Steps 3 and 4 are written and illustrated for replenisher assembly (10914823).

- 3 Install eyebolt (5) and plug guide (6) in replenisher assembly (7).
- 4 Install leather replenisher ring strap (8).



**2-56. MAINTENANCE OF MODIFIED RECUPERATOR CYLINDER FRONT HEAD ASSEMBLY.**

<p>This task covers:</p>	<ul style="list-style-type: none"> <li>a. <i>Relieving Hydraulic Pressure</i></li> <li>b. <i>Disassembly</i></li> <li>c. <i>Inspection/Repair</i></li> <li>d. <i>Reassembly</i></li> <li>e. <i>Testing</i></li> </ul>	<ul style="list-style-type: none"> <li>f. <i>Releasing</i></li> <li>g. <i>Charging</i></li> <li>h. <i>Final Inspection of Nitrogen Pressure</i></li> <li>i. <i>Applying Hydraulic Pressure</i></li> </ul>
--------------------------	---	---

**INITIAL SETUP**

*Tools and Special Tools*

- Accumulator charging device (12252157) WARNING
- Air gage assembly (MIL-G-8348-A-4)
- Nitrogen cylinder (BBN411)
- Nitrogen cylinder (BBN41)
- Ordnance artillery and turret mechanic's tool kit (appx B)

*Materials/Parts*

- Leak detector (item 13, appx C)

*References*

- TM 9-2350-304-24P-2

*General Safety Instructions*

**WARNING**

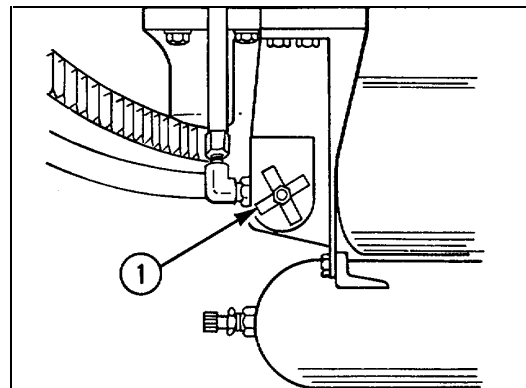
- **Before relieving hydraulic pressure, be sure travel lock is engaged and vehicle is on as level ground as possible. This will stop the cannon from sliding out of battery.**
- **High-pressure nitrogen gas is used in this equipment. Keep face and body clear of release valves and filling plugs.**

**RELIEVING HYDRAULIC PRESSURE**

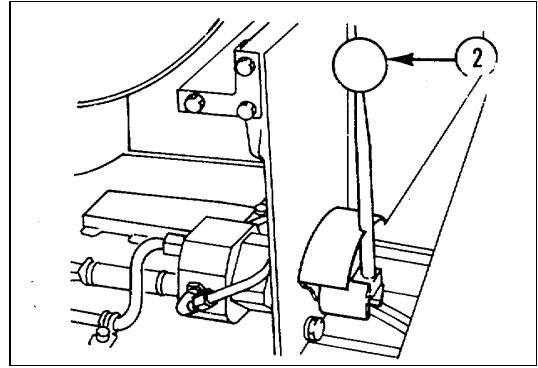
**WARNING**

**Before relieving hydraulic pressure, be sure travel lock is engaged and vehicle is on as level ground as possible. This will stop the cannon from sliding out of battery.**

1. Set MASTER switch to OFF.
2. Open globe angle valve (1).



- 3 Hold manual control lever (2) in RETURN for 1 minute, then in RETRACT for 1 minute to relieve hydraulic pressure from system.

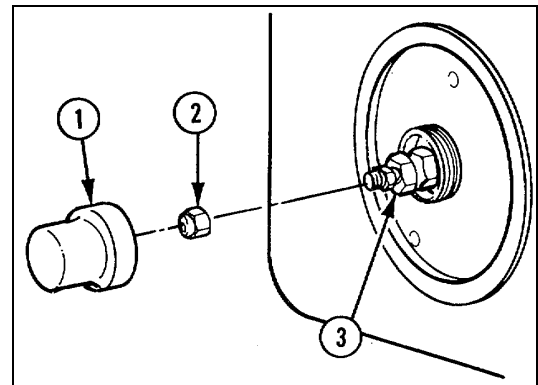


**DISASSEMBLY**

**WARNING**

High-pressure nitrogen gas is used in this equipment. Keep face and body clear of release valves and filling plugs.

Remove cap (1) and valve cap (2) from recuperator cylinder front head assembly (3).

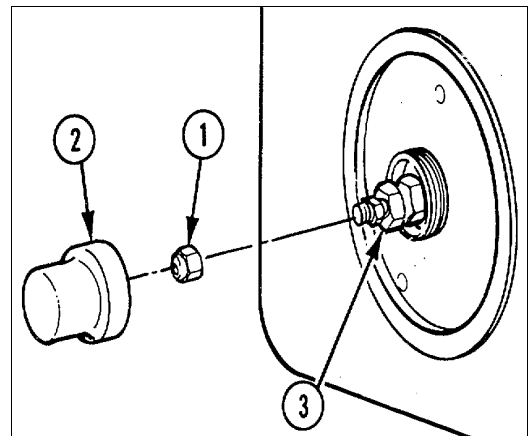


**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

Install valve cap (1) and cap (2) on recuperator cylinder front head assembly (3).

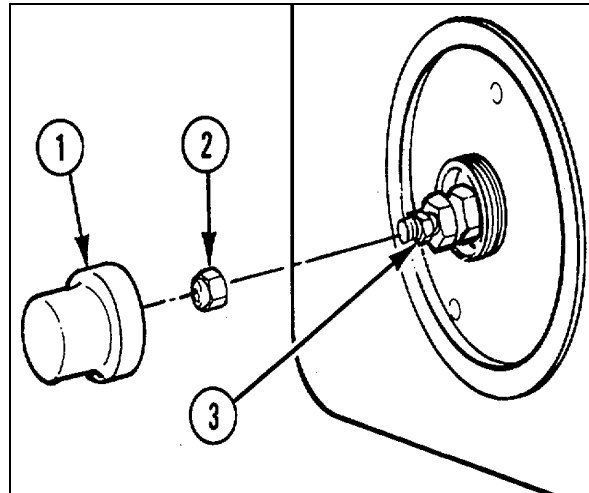




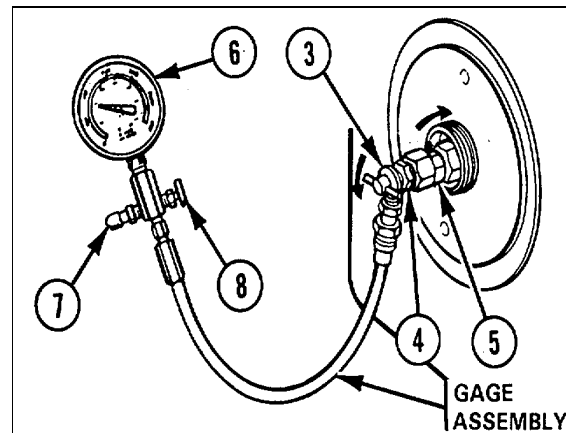
**2-56. MAINTENANCE OF MODIFIED RECUPERATOR CYLINDER FRONT HEAD ASSEMBLY (CONT).**

**TESTING**

1. If gun mount is installed, place cannon in battery and secure travel lock in stow position at 0 elevation.
2. Remove cap (1) and valve cap (2) from air relay valve (3).
3. Connect gage assembly to air relay valve (3).



4. Open air relay valve (3) by turning outside nut (4) counterclockwise while holding inside nut (5). Continue to open air relay valve until pressure shows on gage (6). Refer to Table 2-5, Nitrogen Pressure for Recuperator Mechanism, for correct pressure.



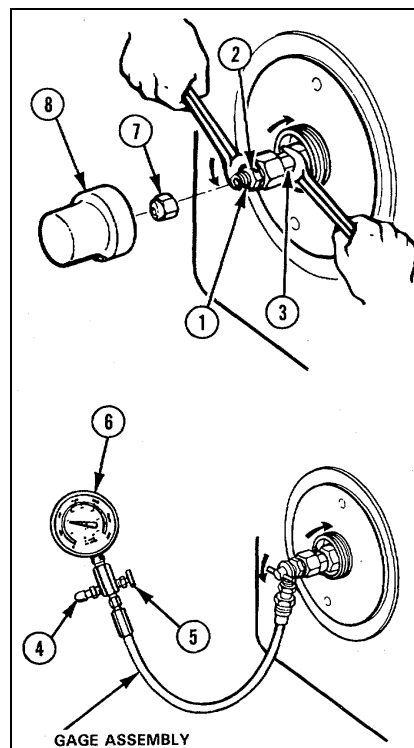
*Table 2-5. NITROGEN PRESSURE FOR RECUPERATOR MECHANISM*

<u>Degree Fahrenheit</u>	<u>Degrees Celsius</u>	<u>Pounds per Square Inch</u>	<u>Kilopascals</u>
110	43.4	2460	16,962
105	40.5	2440	16,824
100	37.8	2420	16,686
95	35.0	2400	16,548
90	32.2	2380	16,410
85	29.5	2360	16,272
80	26.7	2340	16,134
75	23.9	2320	15,996
70	21.0	2300	15,859
65	18.3	2280	15,721
60	15.6	2260	15,583
55	12.8	2240	15,445
50	10.0	2220	15,307
45	7.2	2200	15,169
40	4.4	2180	15,031
35	1.6	2160	14,893
30	- 1.0	2140	14,755

- 5 Close air relay valve (3).
- 6 Remove bleeder valve cap (7).
- 7 Open bleeder valve (8) until gage (6) reads 0 psi.
- 8 Install bleeder valve cap (7).
- 9 Disconnect gage assembly from air relay valve (3).
- 10 Apply leak detector (item 13, appx C) to check for leaks. If leaks occur, refer to Unit Troubleshooting Symptom Index on page 2-13.
- 11 Install valve cap (2) on air relay valve (3) and cap (1) over valve cap.

## RELEASING

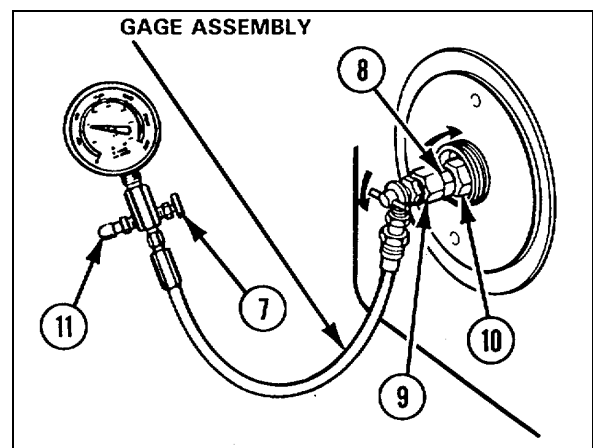
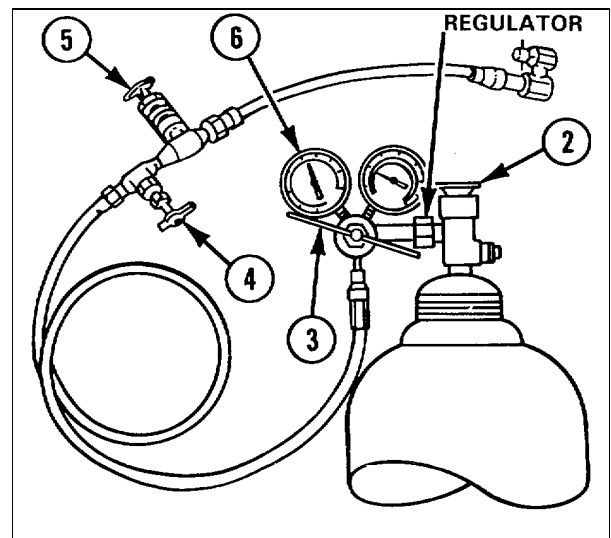
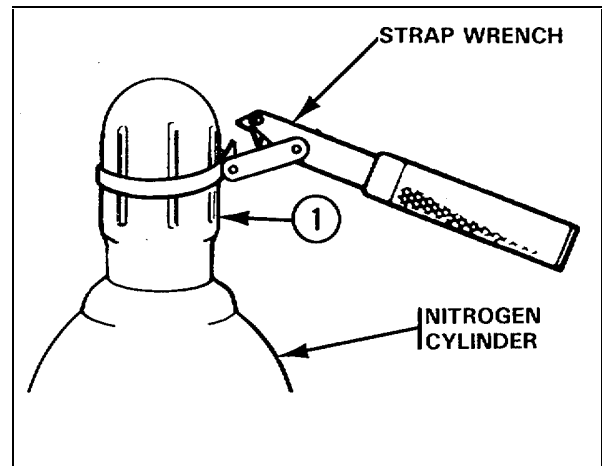
- 1 Open air relay valve (1) by turning outside nut (2) counterclockwise while holding inside nut (3).
- 2 Remove bleeder valve cap (4).
- 3 Open bleeder valve (5) and release nitrogen until gage (6) reads desired pressure. For correct pressure, refer to Table 2-5, Nitrogen Pressure for Recuperator Mechanism.
- 4 Close bleeder valve (5) and air relay valve (1).
- 5 Open bleeder valve (5) until gage (6) reads 0 psi. Close bleeder valve.
- 6 Disconnect gage assembly from air relay valve (1).
- 7 Install valve cap (7) on air relay valve (1) and cap (8) over valve cap.

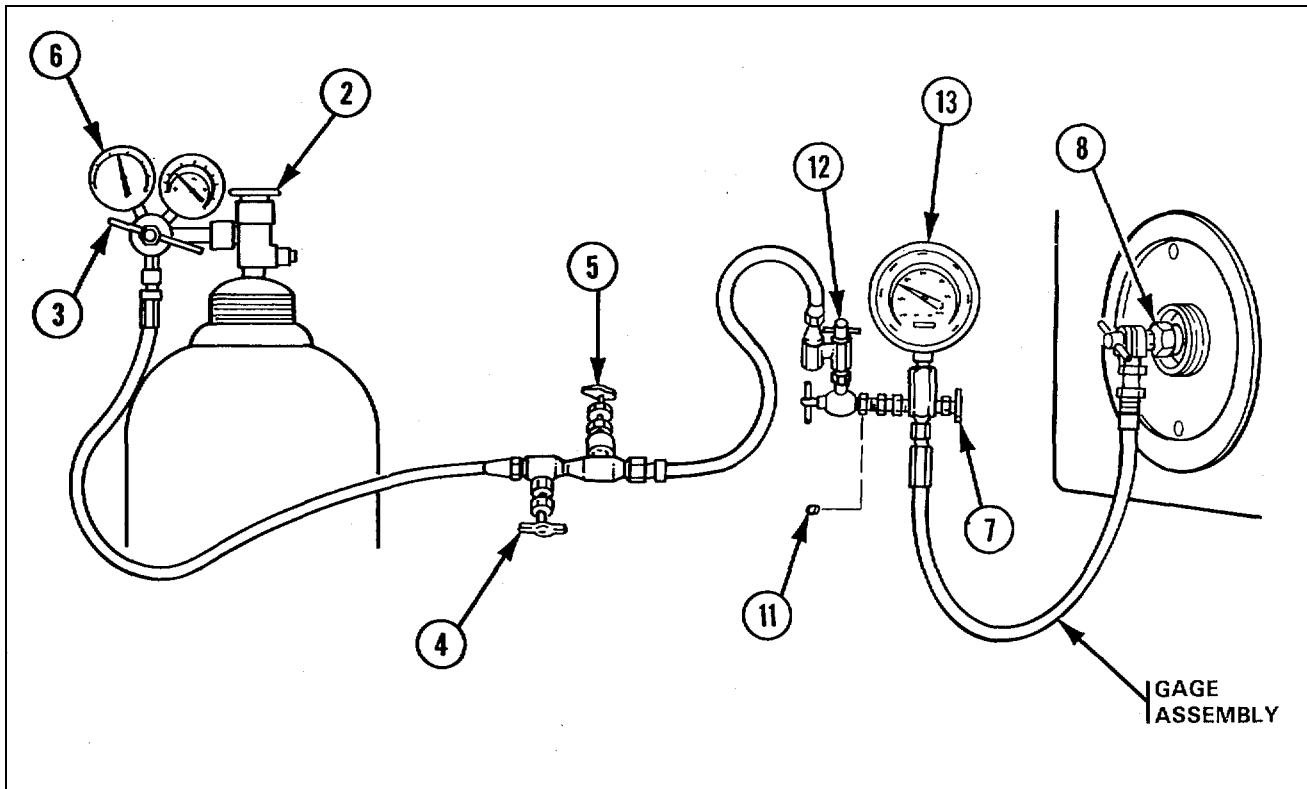


**2-56. MAINTENANCE OF MODIFIED RECUPERATOR CYLINDER FRONT HEAD ASSEMBLY (CONT).**

**CHARGING**

- 1 Remove cap (1) from nitrogen cylinder using strap wrench.
- 2 Open cylinder valve (2) for about 3 seconds to purge opening of dirt and moisture. Close cylinder valve.
- 3 Connect regulator to cylinder valve (2).
- 4 Close regulator valve (3) by turning valve counterclockwise.
- 5 Close shutoff valve (4) and bleeder valve (5).
- 6 Open cylinder valve (2).
- 7 Open regulator valve (3) until 100 psi (690 kPa) is registered on 3000-psi (20,685-kPa) gage (6).
- 8 Open shutoff valve (4) for about 10 seconds to purge regulator.
- 9 Close shutoff valve (4).
- 10 Close bleeder valve (7).
- 11 Open air relay valve (8) by turning outside nut (9) counterclockwise while holding inside nut (10).
- 12 Remove bleeder valve cap (11).
- 13 Open bleeder valve (7) for about 10 seconds to purge lines.
- 14 Close bleeder valve (7).



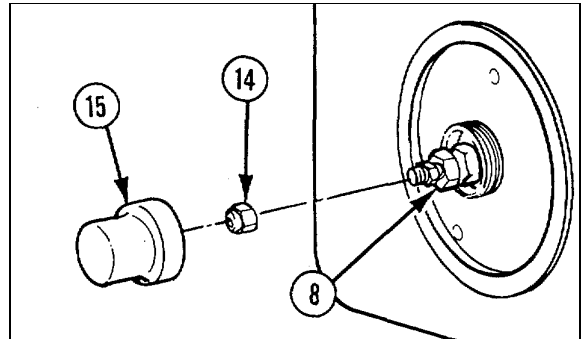


- 15 Connect adapter valve (12) to gage assembly.
- 16 Open regulator valve (3) until 3000-psi (20,685 k-Pa) gage (6) registers the desired pressure. For correct pressure, refer to Table 2-5, Nitrogen Pressure for Recuperator Mechanism.
- 17 Open bleeder valve (7) and shutoff valve (4).
- 18 Wait for nitrogen flow to stop, then close shutoff valve (4) and wait 30 minutes for nitrogen to stabilize.
- 19 Compare reading on pressure gage (13) with desired pressure level. If system pressure is too high, release nitrogen slowly through bleeder valve (5) until desired pressure is obtained. If pressure is too low, repeat steps 18 and 19.
- 20 Close cylinder valve (2) and air relay valve (8).
- 21 Open shutoff valve (4) and bleeder valve (5) and release all pressure from lines.
- 22 Disconnect adapter valve (12) from gage assembly. Install bleeder valve cap (11).
- 23 Disconnect gage assembly from air relay valve (8).
- 24 Coat air relay valve (8) with leak detector (item 13, appx C).

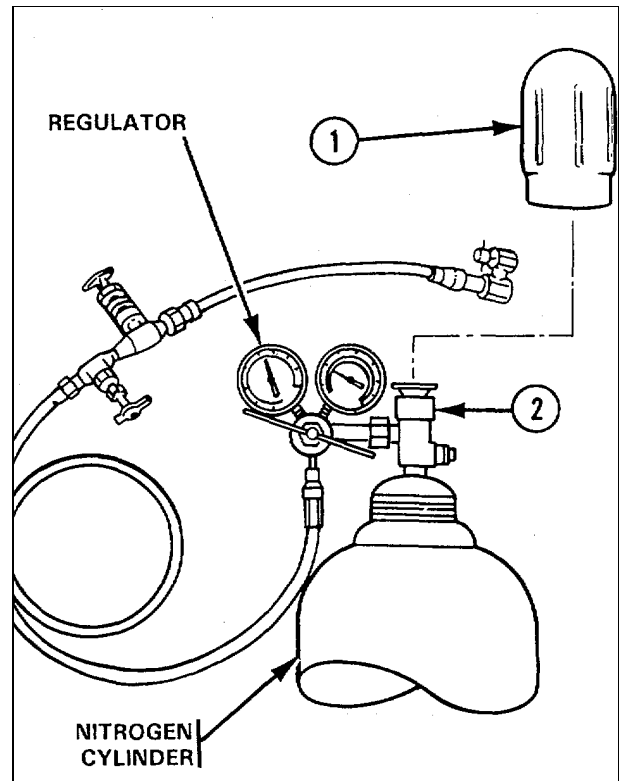
2-56. MAINTENANCE OF MODIFIED RECUPERATOR CYLINDER FRONT HEAD ASSEMBLY (CONT).

CHARGING (CONT)

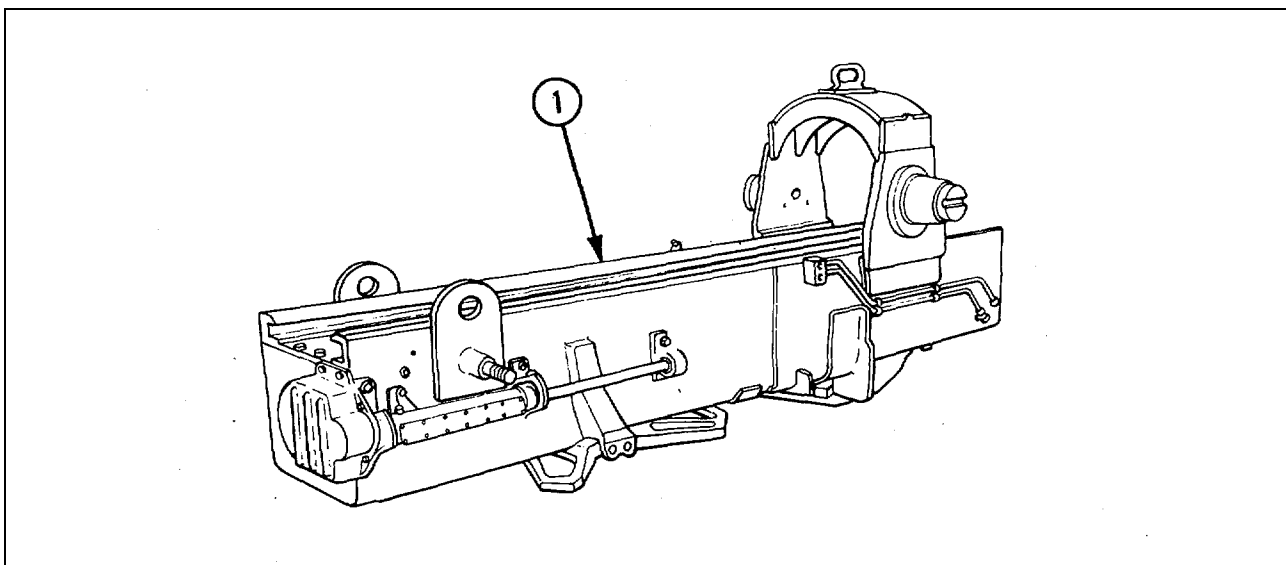
- 25 Install valve cap (14) on air relay valve (8) and cap (15) over valve cap.



- 26 Disconnect regulator from cylinder valve (2).
- 27 Install cap (1) on nitrogen cylinder and label cylinder with approximate psi remaining in cylinder.



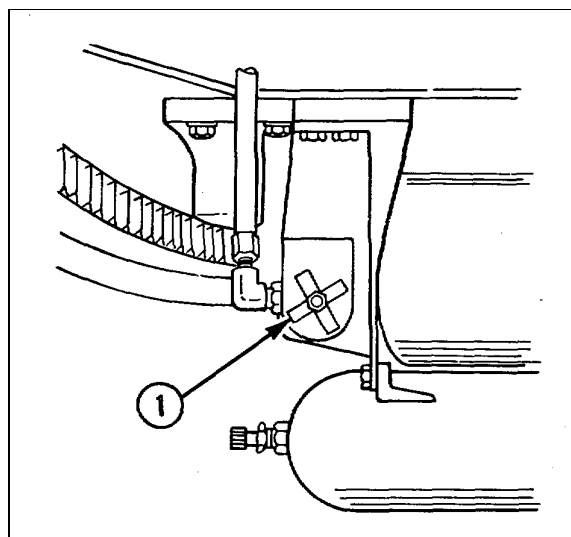
**FINAL INSPECTION OF NITROGEN PRESSURE**



- 1 After testing and charging recuperator mechanism, apply leak detector (item 13, appx C). If bubbles form, valve seal is leaking and must be replaced.
- 2 Allow M174 gun mount assembly (1) to stand undisturbed for several hours to determine if there are any slow, internal nitrogen leaks.
- 3 Again test recuperator mechanism nitrogen pressure.
- 4 If nitrogen pressure has decreased, M174 gun mount assembly (1) is leaking internally. Notify direct support.

**APPLYING HYDRAULIC PRESSURE**

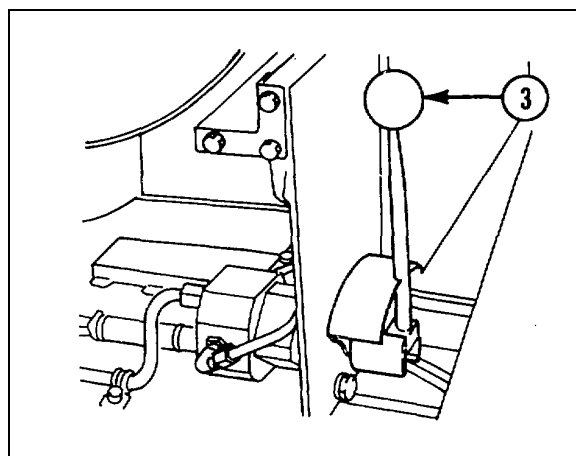
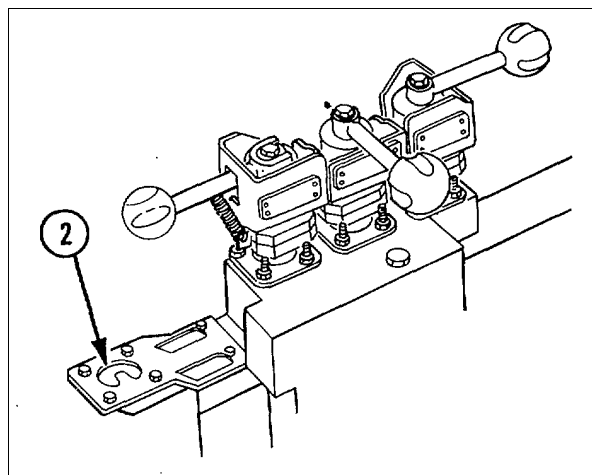
- 1 Close globe angle valve (1).
- 2 Start engine.



**2-56. MAINTENANCE OF MODIFIED RECUPERATOR CYLINDER FRONT HEAD ASSEMBLY (CONT).****APPLYING HYDRAULIC PRESSURE (CONT)****NOTE**

Hydraulic motor and pump may be used to apply pressure to hydraulic system without starting engine by setting **MASTER switch** and **OIL PUMP MOTOR SWitch ON**.

- 3 Set HYD PUMP/PTO CLUTCH switch to ON.
- 4 Check dial pressure gage (2) indication. Normal pressure is 1600 to 2400 (11,032 to 16,548 kPa).
- 5 Stop engine.
  
- 6 Move control handle (3) to RETRACT, then to RETURN, then back to RETRACT several times to bleed air from system.



**2-57. MAINTENANCE OF UNMODIFIED RECUPERATOR CYLINDER FRONT HEAD ASSEMBLY.**

- This task covers:
- |  |    |   |
|--|----|---|
| a. <i>Relieving Hydraulic Pressure</i> | f. | f. <i>Charging</i>                              |
| b. <i>Disassembly</i>                  |    | g. <i>Final Inspection of Nitrogen Pressure</i> |
| c. <i>Inspection/Repair</i>            |    | h. <i>Applying Hydraulic Pressure</i>           |
| d. <i>Reassembly</i>                   |    |   |
| e. <i>Testing</i>                      |    |   |

**INITIAL SETUP:**

*Tools and Special Tools*

- Adapter (6169953)
- Air filling tube assembly (7136909)
- Air seal wrench (6169841)
- Dial indicating pressure gage (45-1056-04L5000)
- Extractor (6195043)
- Nitrogen filling hose (8403740)
- Ordnance artillery and turret mechanic's tool kit (SC 5180-95-CL-A12)
- Safety shield (6166474)
- Strap wrench '9171739)

*Materials/Parts*

- Gasket (5158875)
- Grease (item 11, appx C)

*References*

- TM 9-2350-304-24P-2

*General Safety instructions*

**WARNING**

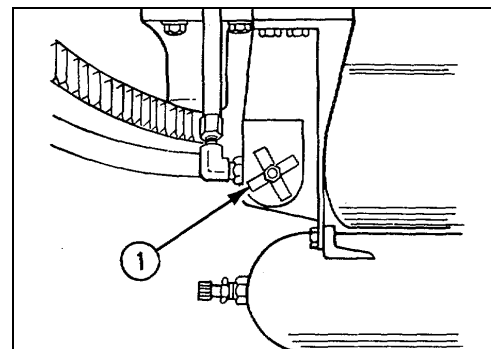
- **Before relieving hydraulic pressure, be sure travel lock is engaged and vehicle is on as level ground as possible. This will stop the cannon from sliding out of battery.**
- **Recuperator chamber is under high pressure. Reduction of nitrogen pressure to zero must be done with safety shield in place. Refer to Testing procedures.**
- **Do not stand directly in front of recuperator when opening valve. Failure to observe this warning may result in injury to personnel.**
- **Closing valve opener more than 3 turns may disengage valve opener from tube assembly, causing injury to personnel.**

**RELIEVING HYDRAULIC PRESSURE**

**WARNING**

**Before relieving hydraulic pressure, be sure travel lock is engaged and vehicle is on as level ground as possible. This will stop the cannon from sliding out of battery.**

- 1 Set MASTER switch to OFF.
- 2 Open globe angle valve (1).

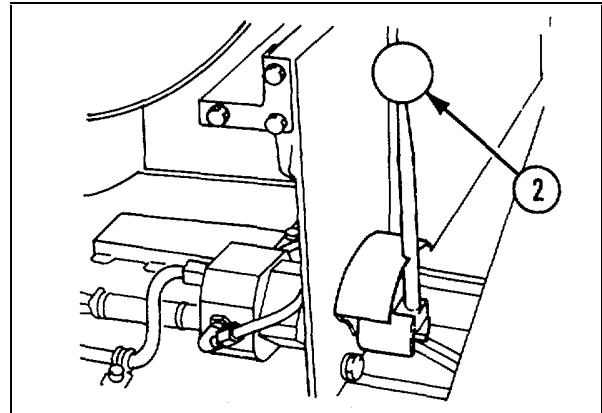




**2-57. MAINTENANCE OF UNMODIFIED RECUPERATOR CYLINDER FRONT HEAD ASSEMBLY (CONT).**

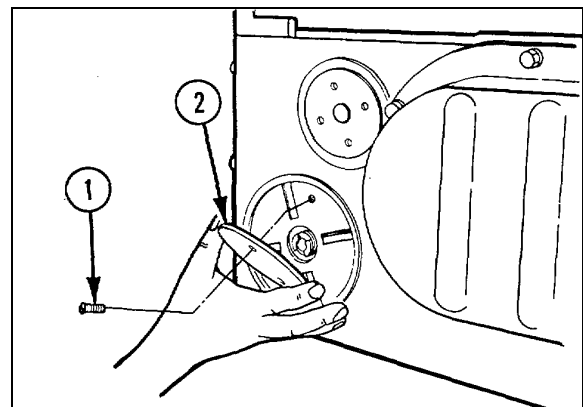
**RELIEVING HYDRAULIC PRESSURE (CONT)**

- 3 Hold control handle (2) in RETURN for 1 minute, then in RETRACT for 1 minute to relieve hydraulic system pressure.



**DISASSEMBLY**

- 1 If gun mount is installed, place cannon in battery and secure travel lock in stow position.
- 2 Remove two machine screws (1) and access cover (2).



- 3 Install safety shield.

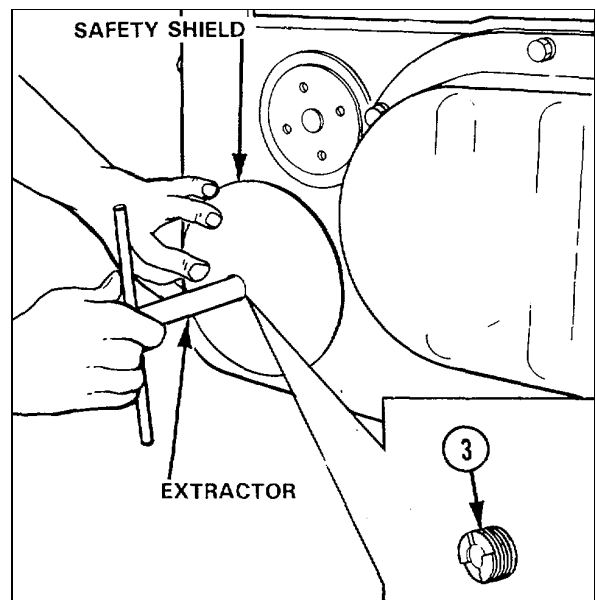
**WARNING**

Recuperator chamber is under high nitrogen pressure. Reduction of nitrogen pressure to zero must be done with safety shield in place. Refer to Testing procedures.

**NOTE**

Tap air seal wrench to ensure all pressure is removed from follower.

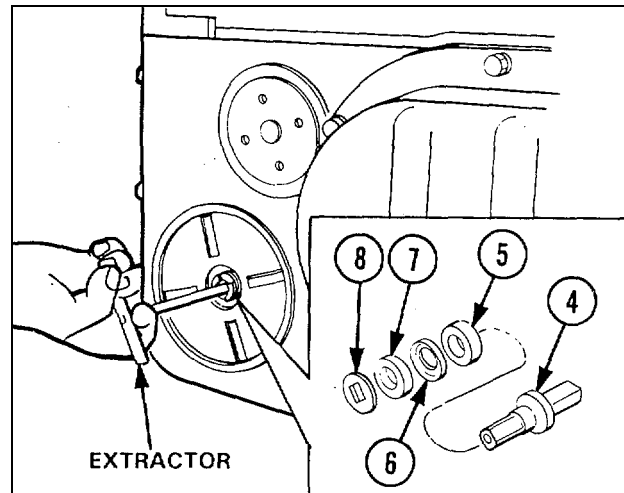
- 4 Using air seal wrench, slowly unscrew externally threaded ring (3) to relieve any pressure in chamber.
- 5 Remove externally threaded ring (3).



**NOTE**

Do not disassemble gasket, two packing retainers, and flat washer from recuperator charging valve seal.

- Using extractor, remove recuperator charging valve seal (4) with gasket (5), packing retainer (6), packing retainer (7), and flat washer (8) installed.



**INSPECTION/REPAIR**

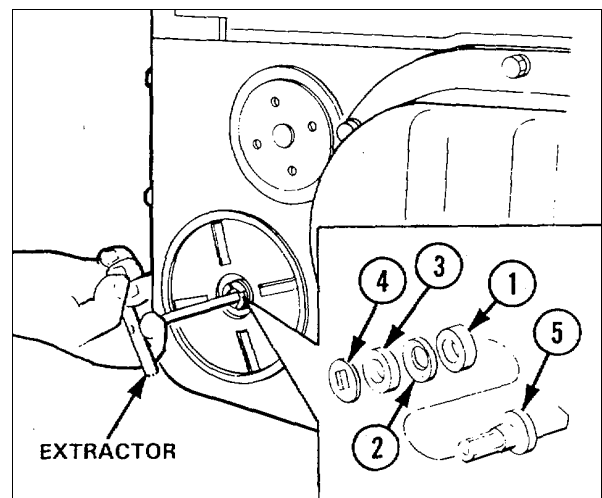
- Inspect for broken, damaged, or missing parts.
- Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

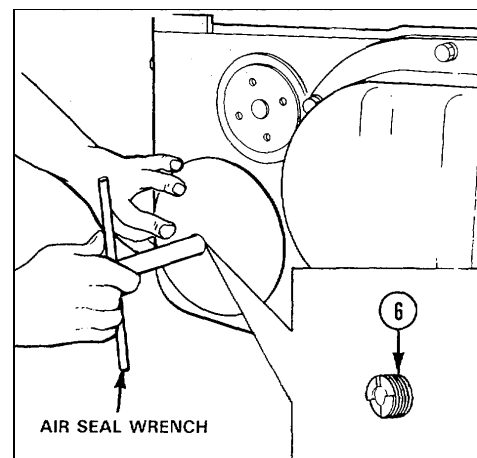
**NOTE**

If gasket, two packing retainers, and flat washer were removed from recuperator charging valve seal, perform step 1.

- Install new gasket (1) packing retainer (2), packing retainer (3), and flat washer (4) on recuperator charging valve seal (5).
- Using extractor, install recuperator charging valve seal (5) with new gasket (1), packing retainer (2), packing retainer (3), and flat washer (4).



- Using air seal wrench, install externally threaded ring (6).



**2-57. MAINTENANCE OF UNMODIFIED RECUPERATOR CYLINDER FRONT HEAD ASSEMBLY (CONT).**

**REASSEMBLY (CONT)**

- 4 Charge hydraulic system pressure. Refer to Applying Hydraulic Pressure.

**NOTE**

**Coat cover mating surface with grease (item 11, appx C).**

- 5 Install access cover (7) and two screws (8).

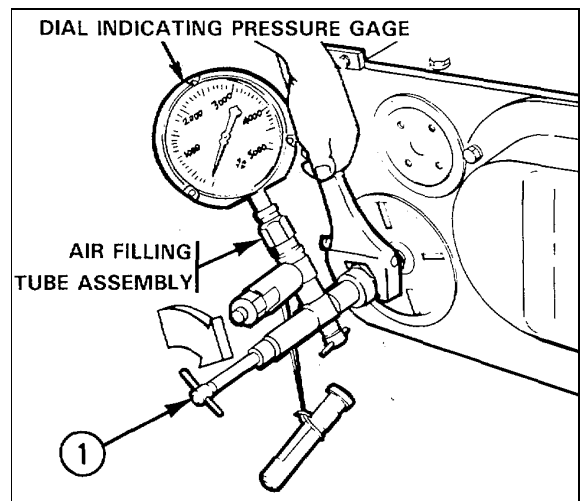
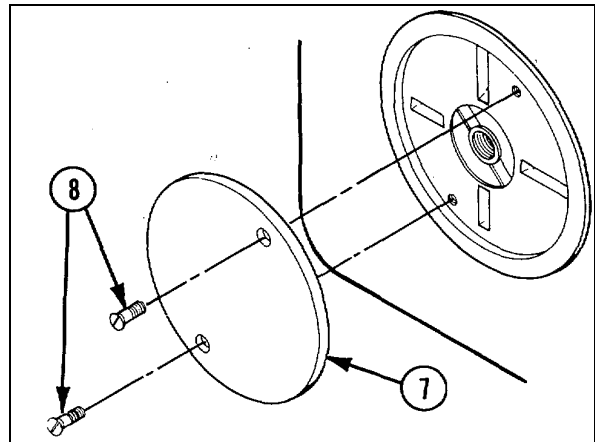
**TESTING**

- 1 Perform Disassembly procedures.
- 2 Install air filling tube assembly with adapter and dial indicating pressure gage.

**WARNING**

**Do not stand directly in front of recuperator when opening valve. Failure to observe this warning may result in injury to personnel.**

- 3 Turn valve opener (1) clockwise until it contacts charging valve and pressure begins to show on dial indicating pressure gage.



**CAUTION**

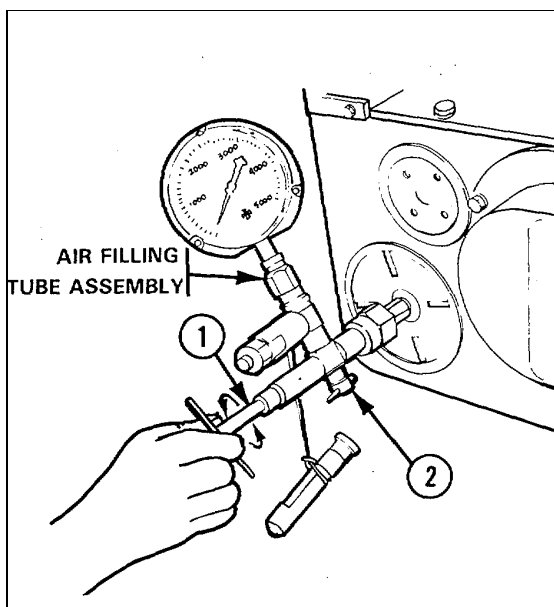
Opening valve opener more than 1-1/2 turns can damage valve.

- 4 Turn valve opener (1) clockwise 1-1/2 turns and read dial indicating pressure gage.
- 5 Determine present temperature.
- 6 Compare gage reading with proper nitrogen pressure indicated for present temperature. Refer to Table 2-5, Nitrogen Pressure for Recuperator Mechanism on page 2-164.

**WARNING**

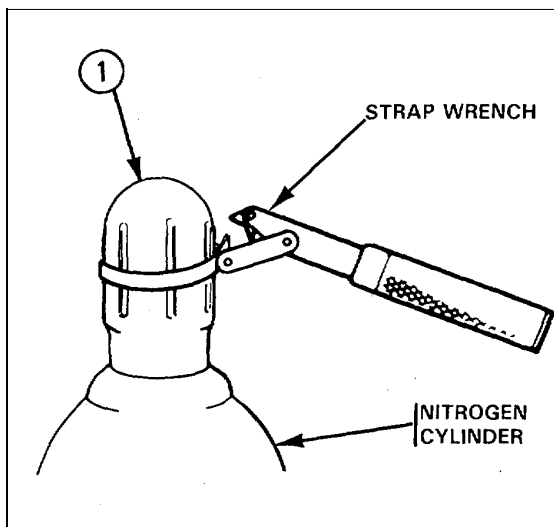
Closing valve opener more than 3 turns may disengage valve opener from tube assembly, causing injury to personnel.

- 7 Turn valve opener (1) counterclockwise 3 turns to close valve.
- 8 Open relief valve (2) to vent any pressure in air filling tube assembly.
- 9 If gage reading indicated proper nitrogen pressure, go to step 18 of Charging procedures. If gage reading indicated nitrogen pressure was below proper amount, charge recuperator mechanism, go to step 1 of Charging procedures.



**CHARGING**

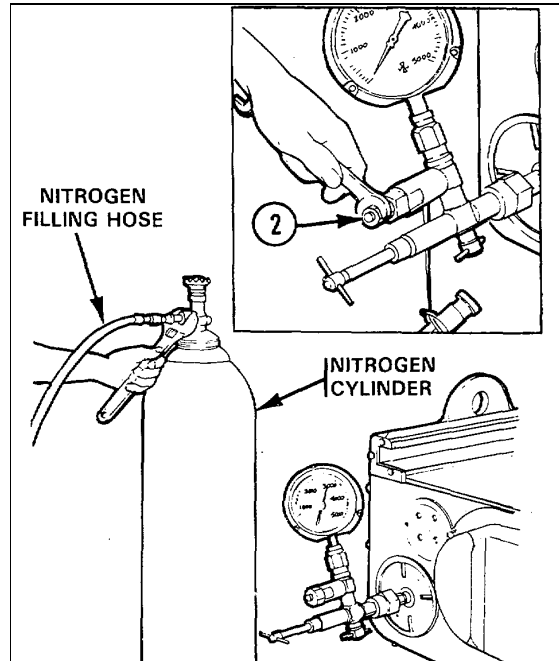
1. Remove cap (1) from nitrogen cylinder using strap wrench. i



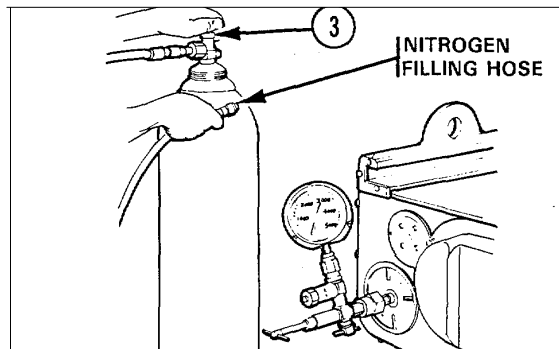
2-57. MAINTENANCE OF UNMODIFIED RECUPERATOR CYLINDER FRONT HEAD ASSEMBLY (CONT)

CHARGING (CONT)

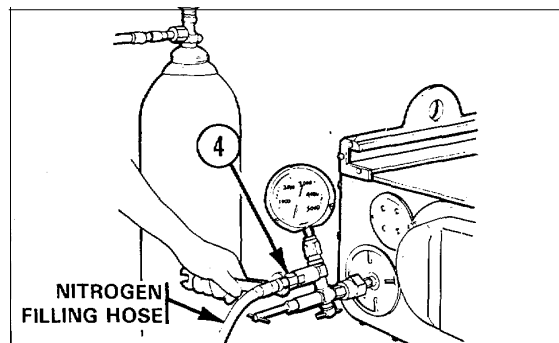
- 2 Remove filling tube cap (2).
- 3 Connect nitrogen filling hose to nitrogen cylinder.



- 4 Open cylinder valve (3) enough to purge any air, moisture, or dirt from nitrogen filling hose.
- 5 Close cylinder valve (3).



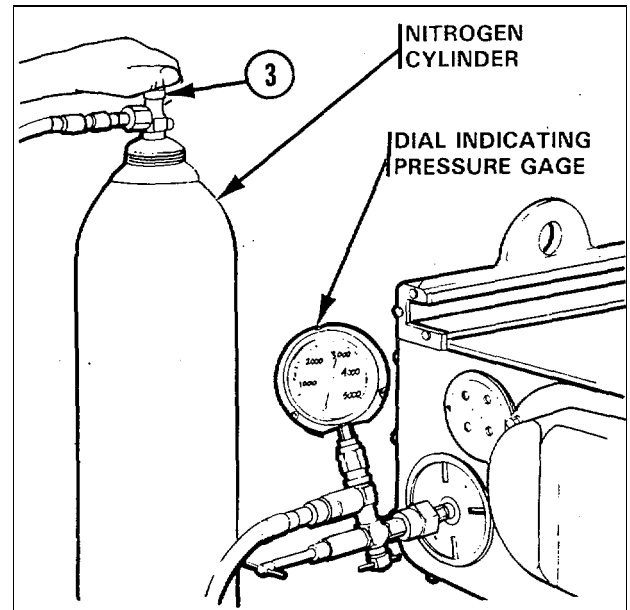
- 6 Connect nitrogen filling hose to tube assembly (4).



**NOTE**

Nitrogen supply cylinder pressure must be more than desired counterrecoil mechanism pressure.

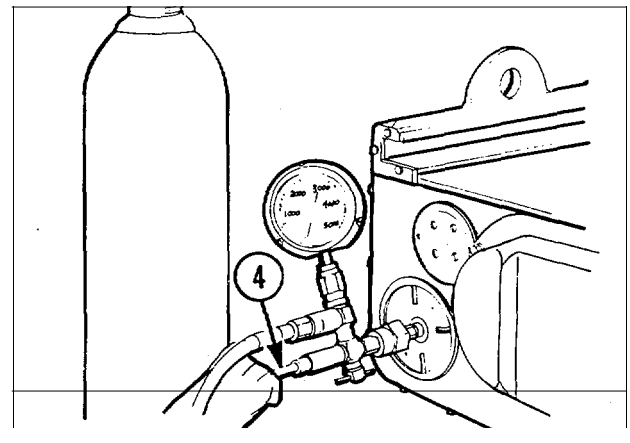
- 7 Open cylinder valve (3) and read dial indicating pressure gage to see that nitrogen cylinder contains enough nitrogen to charge recuperator mechanism.
- 8 Close cylinder valve (3).



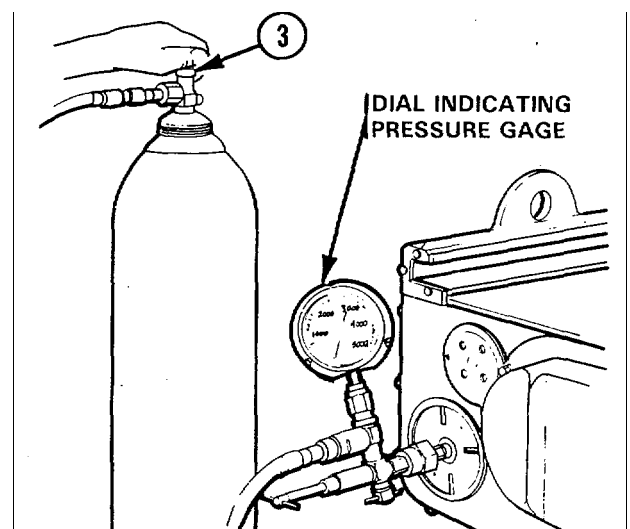
**CAUTION**

Opening charging valve more than 1-1/2 turns can cause damage to valve.

- 9 Turn valve opener (4) clockwise 1-1/2 turns to open charging valve.



- 10 Observe dial indicating pressure gage and open cylinder valve (3) enough to show pressure charging on dial indicating pressure gage.
- 11 Close cylinder valve (3) and wait a few minutes to allow nitrogen pressure to stabilize.
- 12 Read dial indicating pressure gage and compare measurement with proper nitrogen pressure. Refer to table 2-5, page 2-164, for proper nitrogen pressure.
- 13 If necessary, repeat steps 10 thru 12 until desired pressure is obtained.



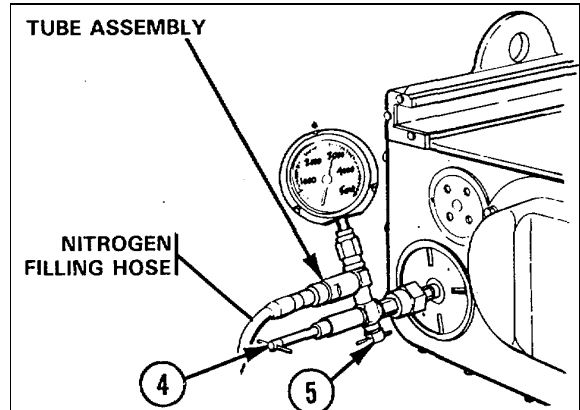
2-57. MAINTENANCE OF UNMODIFIED RECUPERATOR CYLINDER FRONT HEAD ASSEMBLY (CONT).

CHARGING (CONT)

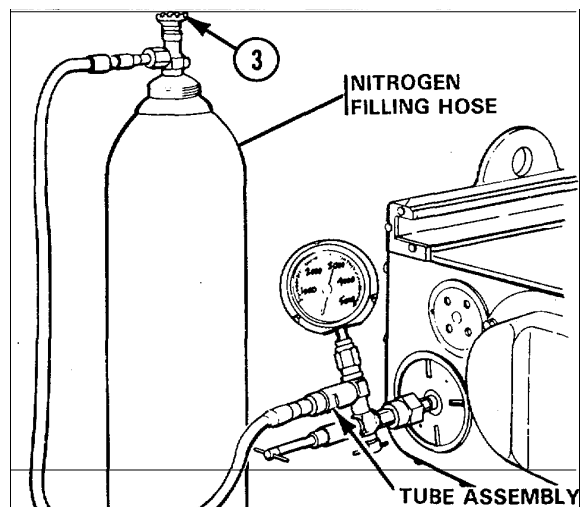
**WARNING**

Closing valve opener more than 3 turns may disengage opener from tube assembly, causing injury to personnel.

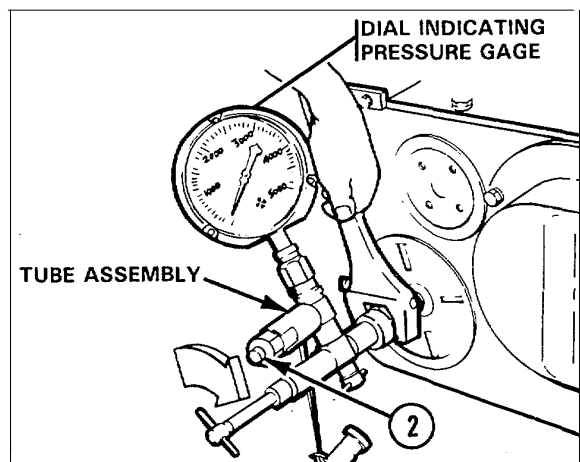
- 14 Turn valve opener (4) counterclockwise 3 turns to close charging valve.
- 15 Open release valve (5) to vent any pressure in tube assembly and nitrogen filling hose.



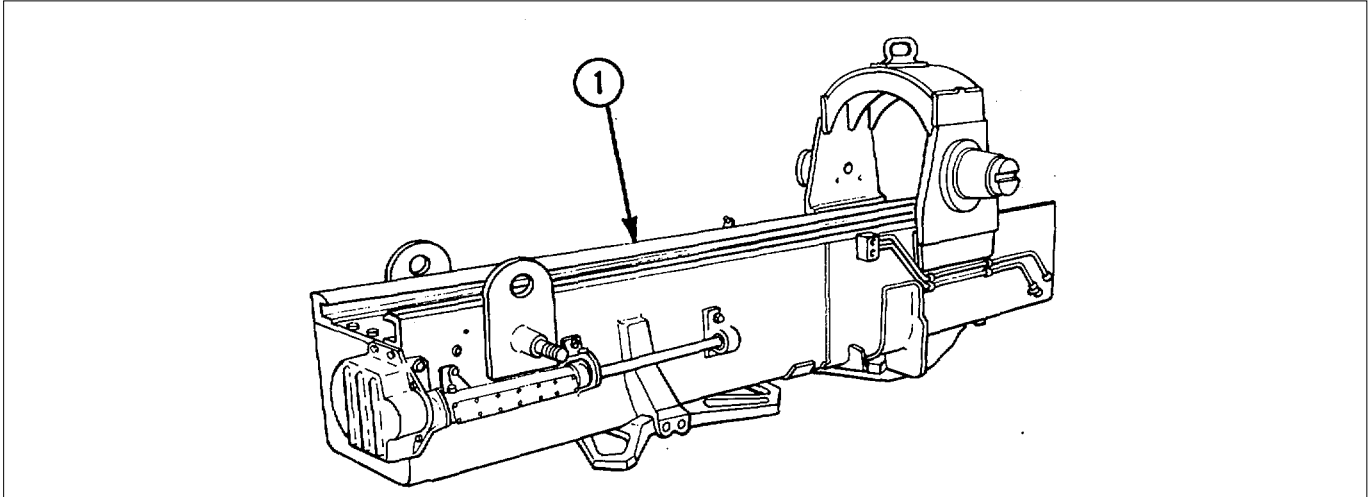
- 16 Disconnect nitrogen filling hose from tube assembly and cylinder valve (3).



- 17 Install filling tube cap (2).
- 18 Remove tube assembly and dial indicating pressure gage.
- 19 Perform Reassembly procedures.



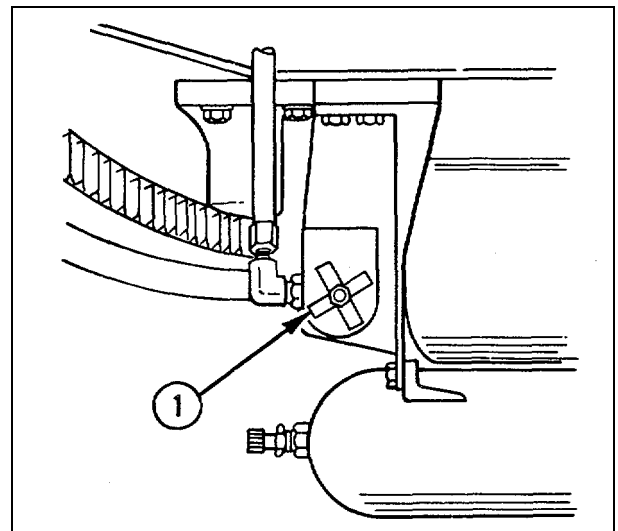
**FINAL INSPECTION OF NITROGEN PRESSURE**



- 1 After testing and charging recuperator mechanism, apply leak detector (item 13, appx C) to recuperator charging valve seal. If bubbles form, valve seal is leaking and must be replaced.
- 2 Allow M174 gun mount assembly (1) to stand undisturbed for several hours to determine if there are any slow, internal nitrogen leaks.
- 3 Again test recuperator mechanism nitrogen pressure.
- 4 If nitrogen pressure has decreased, M174 gun mount assembly (1) is leaking internally. Notify direct support maintenance.

**APPLYING HYDRAULIC PRESSURE**

- 1 Close globe angle valve (1).
- 2 Start engine.



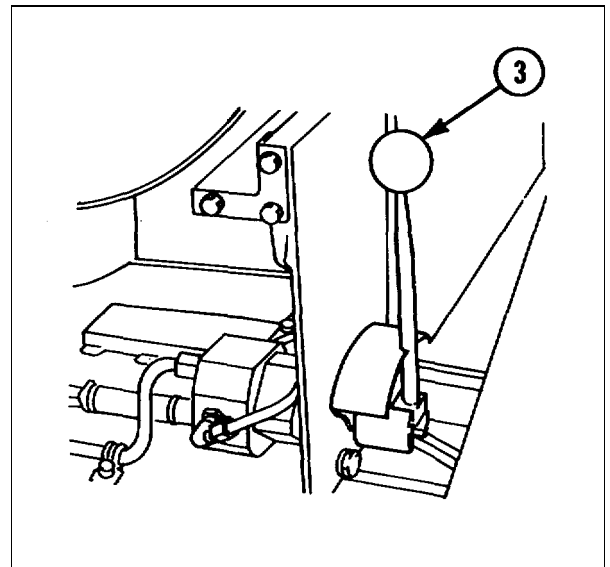
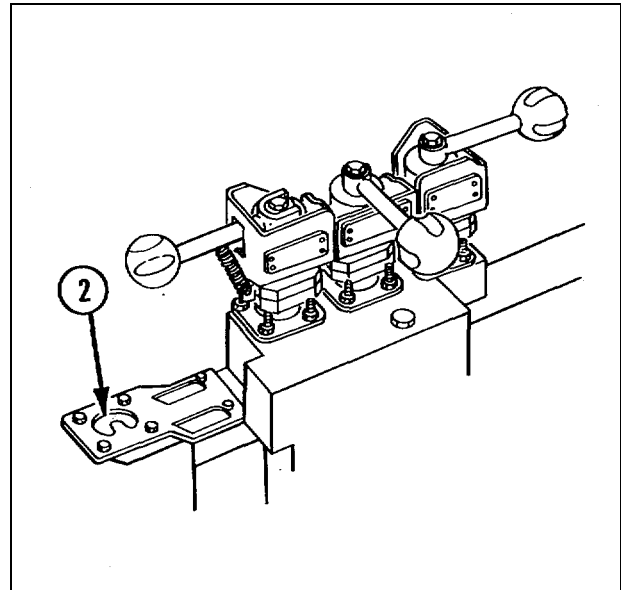


## 2-57. MAINTENANCE OF UNMODIFIED RECUPERATOR CYLINDER FRONT HEAD ASSEMBLY (CONT).

APPLYING HYDRAULIC PRESSURE (CONT)**NOTE**

Hydraulic motor and pump may be used to apply pressure to hydraulic system without starting engine by setting MASTER switch and OIL PUMP MOTOR SWITCH to ON.

- 3 Set HYD PUMP/PTO CLUTCH switch to ON.
  - 4 Check dial pressure gage (2) indication. Normal pressure is 1600 to 2400 psi (11,032 to 16,548 kPa).
  - 5 Stop engine.
- 
- 6 Move control handle (3) to RETRAT, then to RETURN, then to RETRACT several times to bleed air from system.



**2-58. MAINTENANCE OF TURRET INSTALLATION-FIRST AID RACK.**

This task covers:    a. *Removal/Disassembly*                      c. *Reassembly/Installation*  
                               b. *Inspection/Repair*

**INITIAL SETUP:***Tools and Special Tools*

Ordnance artillery and turret mechanic's  
 tool kit (appx B)

*References*

TM 9-2350-304-24P-2

*Materials/Parts*

Lockwasher (4) (MS35338-44)

**REMOVAL/DISASSEMBLY**

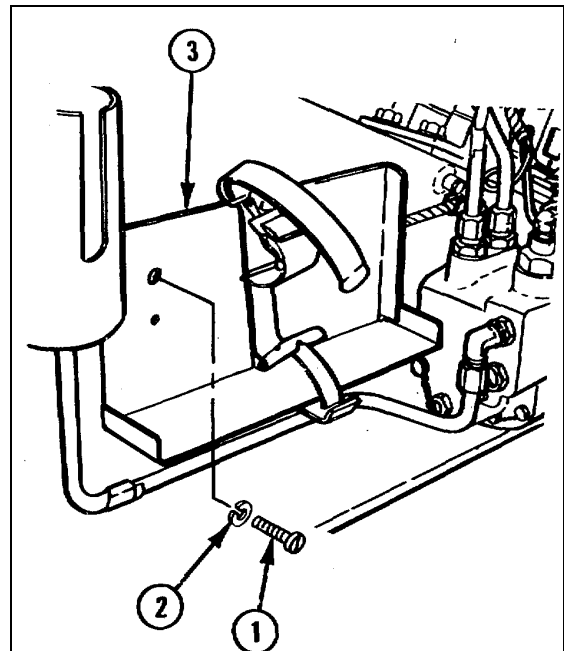
- 1 Remove first-aid kit.
- 2 Remove four screws (1), four lockwashers (2), and first-aid rack assembly (3).

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY/INSTALLATION**

- 1 Install first-aid rack assembly (3) and secure with four new lockwashers (2) and four screws (1).
- 2 Secure first-aid kit in first-aid rack assembly (3).



**2-59. MAINTENANCE OF TURRET INSTALLATION-BINOCULAR STOWAGE BRACKET ASSEMBLY.**

This task covers:    a. *Removal/Disassembly*                      c. *Reassembly/Installation*  
                               b. *Inspection/Repair*

**INITIAL SETUP:**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*References*

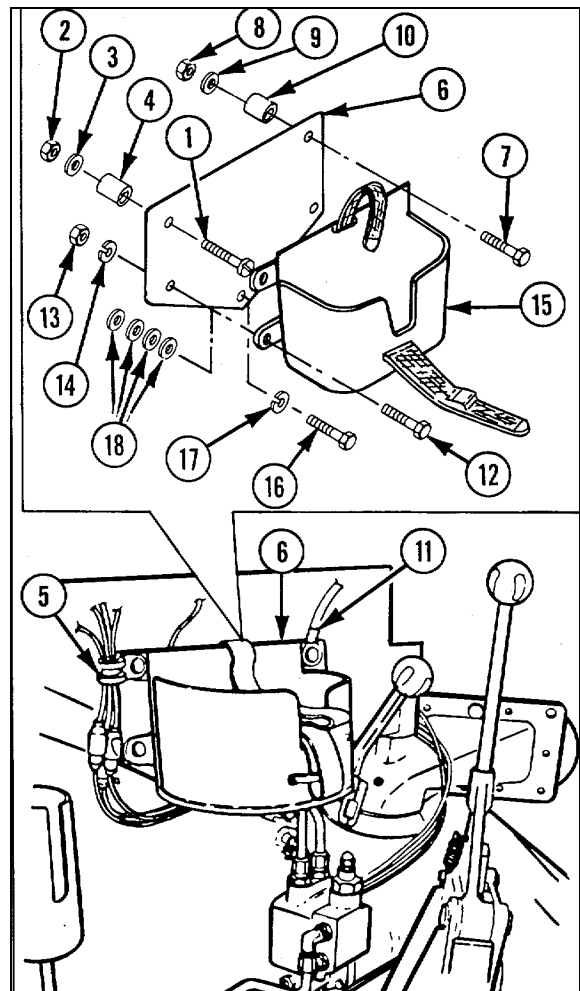
TM 9-2350-304-24P-2

*Materials/Parts*

Lockwasher (3) (MS35338-44)  
 Self-locking nut (2) (MS21042-4)

**REMOVAL/DISASSEMBLY**

- 1 Remove binoculars.
- 2 Remove capscrew (1), self-locking nut (2), flat washer (3), sleeve spacer (4), and clamp (5) from binocular mounting plate (6).
- 3 Remove capscrew (7), self-locking nut a (8), flat washer (9), sleeve spacer (10), and ground lead (11) from binocular 18 mounting plate (6).
- 4 Remove two capscrews (12), two hex nuts (13), two lockwashers (14), and binocular stowage bracket assembly (15) from binocular mounting plate (6).
- 5 Remove capscrew (16), lockwasher (17), and four flat washers (18).
- 6 Remove binocular mounting plate (6).

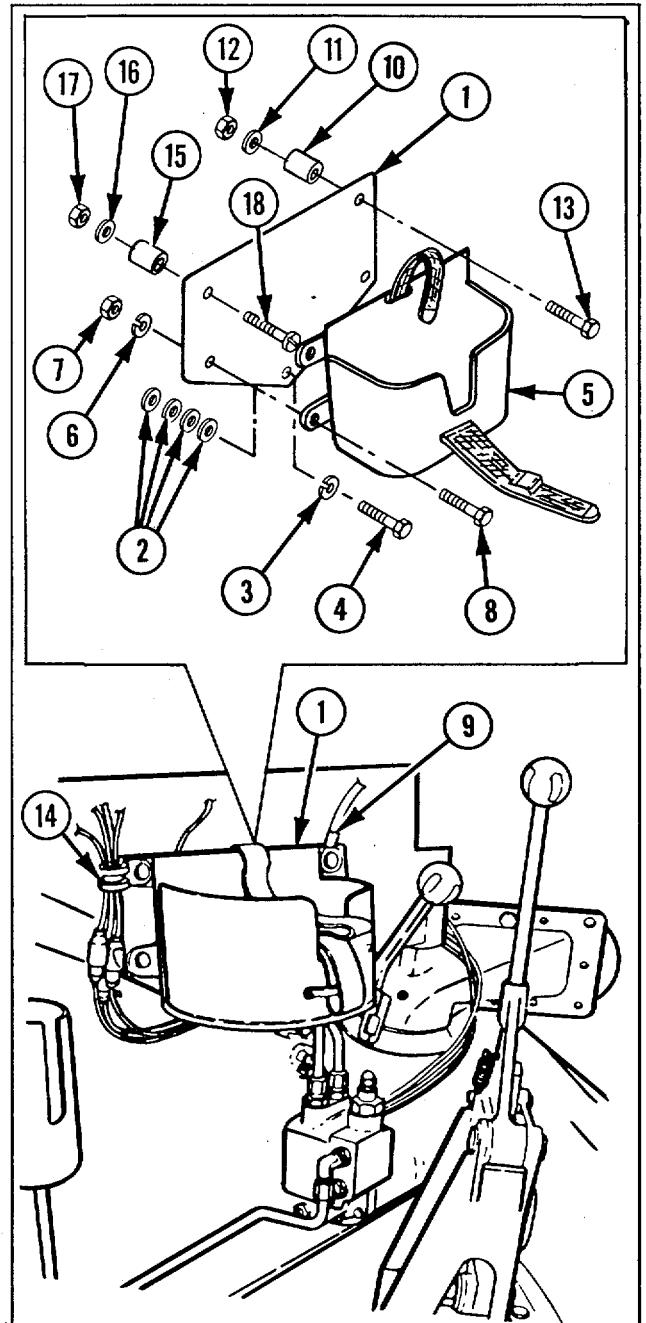


**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY/INSTALLATION**

- 1 Install binocular mounting plate (1).
- 2 Install four flat washers (2), new lockwasher (3), and capscrew (4).
- 3 Install binocular stowage bracket assembly (5), two new lockwashers (6), two hex nuts (7), and two capscrews (8) on binocular mounting plate (1).
- 4 Install ground lead (9), sleeve spacer (10), flat washer (11), new self-locking 9 nut (12), and capscrew (13) on binocular mounting plate (1).
- 5 Install clamp (14), sleeve spacer (15), flat washer (16), new self-locking nut (17), and capscrew (18) on binocular mounting plate (1).
- 6 Install binoculars.





**2-61. MAINTENANCE OF TURRET INSTALLATION-VEHICULAR ACCESS BOX.**

<p>This task covers: <i>Installation</i></p>	<p>a. <i>Removal</i></p>	<p>b. <i>Inspection/Repair</i></p>	<p>c.</p>
<p><b>INITIAL SETUP</b></p>			
<p><i>Tools and Special Tools</i></p>	<p><i>References</i></p>		
<p>Ordnance artillery and turret mechanic's tool kit (appx B)</p>	<p>TM 9-2350-304-24P-2</p>		
<p><i>Materials/Parts</i></p>			
<p>Lockwasher (2) (MS35338-44)</p>			

**REMOVAL**

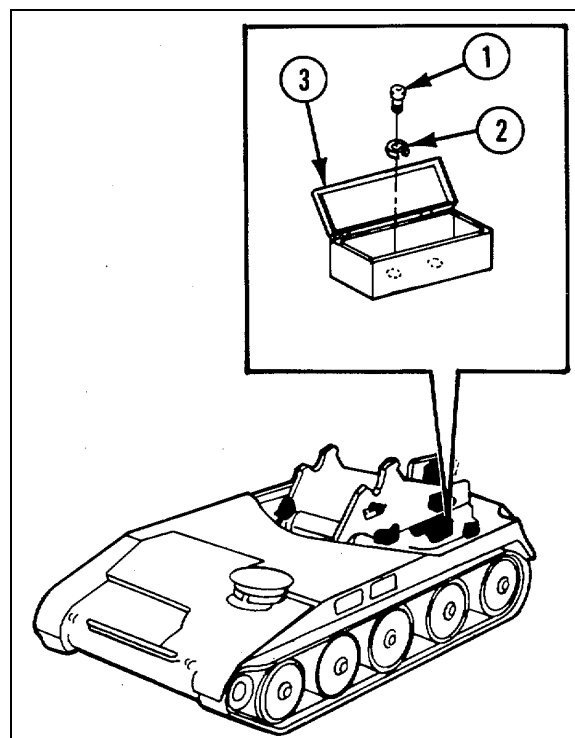
Remove two machine screws (1), two lockwashers (2), and vehicular access box (3).

**INSPECTION/REPAIR**

1. Inspect for broken, damaged, or missing parts.
2. Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**INSTALLATION**

Install vehicular access box (3) using two new lockwashers (2) and two machine screws (1).



**2-62. MAINTENANCE OF TURRET INSTALLATION-SPADE EMERGENCY SHUT-OFF INSTRUCTION PLATE.**

<p>This task covers: <i>Installation</i></p>	<p>a. <i>Removal</i></p>	<p>b. <i>Inspection/Repair</i></p>	<p>c.</p>
<p><b>INITIAL SETUP</b></p>			
<p><i>Tools and Special Tools</i></p>	<p><i>References</i></p>		
<p>Ordnance artillery and turret mechanic's tool kit (appx B)</p>	<p>TM 9-2350-304-24P-2</p>		
<p><i>Materials/Parts</i></p>			
<p>Adhesive (item 4, appx C)</p>			

**REMOVAL**

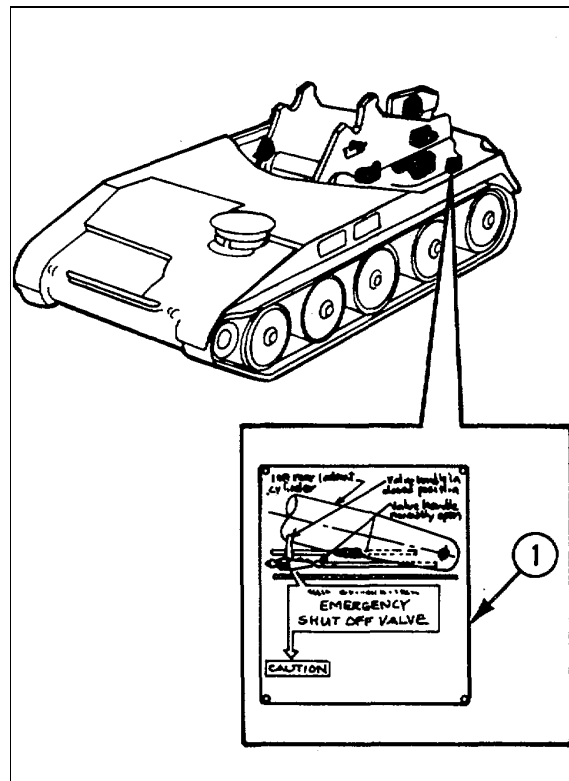
Remove spade emergency shut-off instruction plate (1) if damaged.

**INSPECTION/REPAIR**

1. Inspect for broken, damaged, or missing parts.
2. Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**INSTALLATION**

If necessary, install new spade emergency shut-off instruction plate (1) using adhesive (item 4, appx C).



**2-63. MAINTENANCE OF TURRET INSTALLATION-RIGHT AND LEFT HYDRAULIC TUBE GUARDS.**

This task covers:  
Installation

a. Removal      b. Inspection/Repair      c.

**INITIAL SETUP**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*References*

TM 9-2350-304-24P-2

*Materials/Parts*

Lockwasher (9) (MS35338-44)

**REMOVAL**

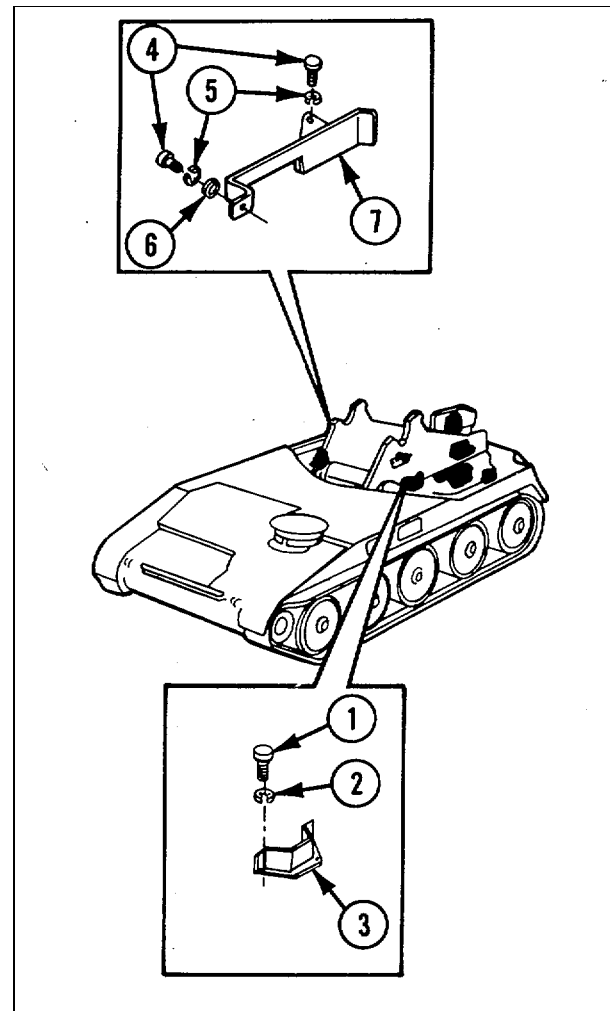
1. Remove five capscrews (1), five lockwashers (2), and left hydraulic tube guard (3).
2. Remove four capscrews (4), four lockwashers (5), flat washer (6), and right hydraulic tube guard (7).

**INSPECTION/REPAIR**

1. Inspect for broken, damaged, or missing parts.
2. Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**INSTALLATION**

1. Install right hydraulic tube guard (7), flat washer (6), four new lockwashers (5), and four capscrews (4)
2. Install left hydraulic tube guard (weldment) (3), five new lockwashers (2), and five capscrews (1).





**2-64. MAINTENANCE OF TURRET INSTALLATION-QUADRANT STRAP ASSEMBLY.**

This task covers:  
Installation

a. *Removal*      b.      Inspection/Repair      c.

**INITIAL SETUP**

*Tools and Special Tools*  
Ordnance artillery and turret mechanic's  
tool kit (appx B)

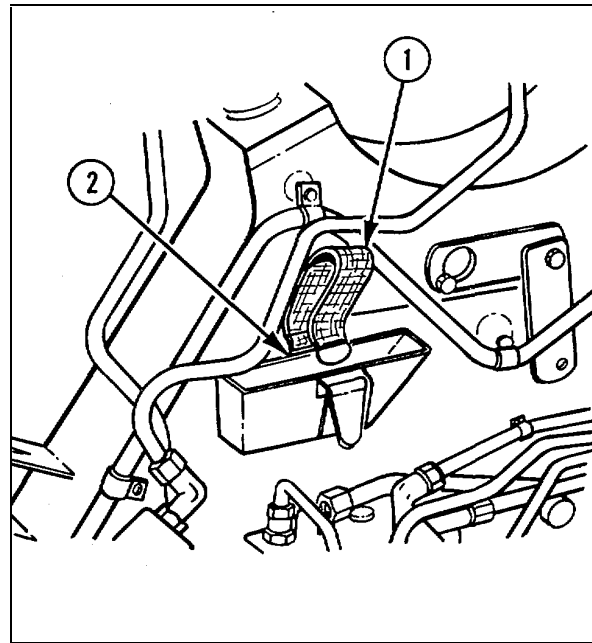
*References*  
TM 9-2350-304-24P-2

**REMOVAL**

1. If damaged, cut quadrant strap assembly (1) from footman loop (2).
2. Remove quadrant strap assembly (1).

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**INSTALLATION**

If removed, install new quadrant strap assembly (1) by sewing new strap to footman loop (2).

**2-65. MAINTENANCE OF TURRET INSTALLATION--AMPLIFIER MOUNT BRACKET.**

<p>This task covers: <i>Installation</i></p>	<p>a. <i>Removal</i></p>	<p>b. <i>Inspection/Repair</i></p>	<p>c.</p>
<p><b>INITIAL SETUP</b></p>			
<p><i>Tools and Special Tools</i> Ordnance artillery and turret mechanic's tool kit (appx B)</p>	<p><i>General Safety Instructions</i></p>		
<p><i>Materials/Parts</i> Cable marker kit (PPL 3695) Lockwasher (4) (MS35333-42) Lockwasher (4) (MS45904-72)</p>	<p><b>WARNING</b></p>		
<p><i>References</i> TM 9-2350-304-24P-2</p>	<ul style="list-style-type: none"> <li>• Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.</li> <li>• Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.</li> </ul>		

**REMOVAL**

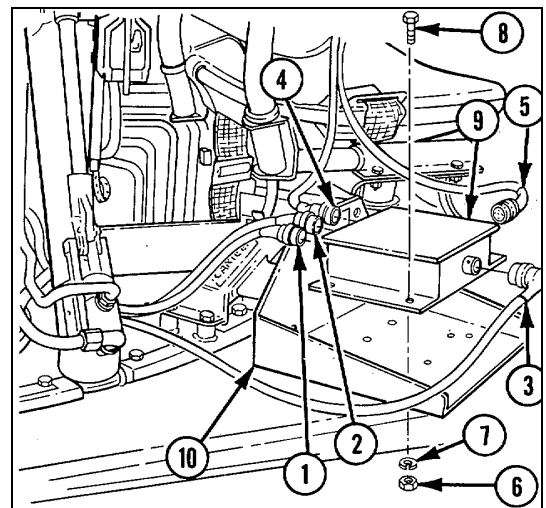
**WARNING**

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

**CAUTION**

Be sure to label all cable assembly connectors with cable markers provided in cable marker kit to ensure proper installation.

- 1 Disconnect cable assembly at connector J507 (1).
- 2 Disconnect cable assembly at connector J506 (2).



- 3 Disconnect cable assembly at connector J504 (3).
- 4 Disconnect cable assemblies at connectors J508 (4) and J501 (5).
- 5 Remove four nuts (6), four lockwashers (7), four screws (8), and amplifier (9) from amplifier mount bracket (10).

**2-65. MAINTENANCE OF TURRET INSTALLATION--AMPLIFIER MOUNT BRACKET (CONT).**

**REMOVAL (CONT)**

- 6 Remove four nuts (11), four lockwashers (1 2), four capscrews (13), and amplifier mount bracket (10).

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

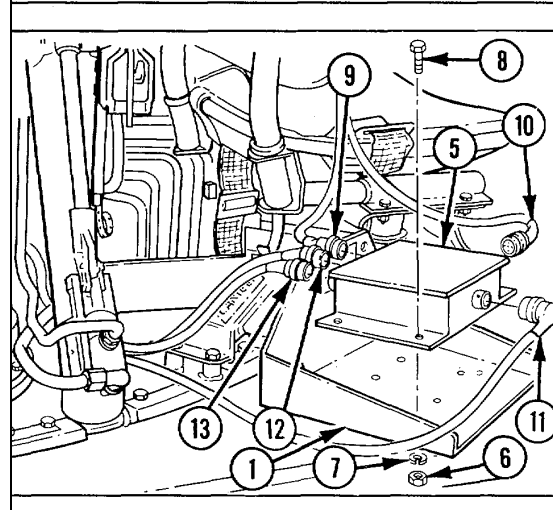
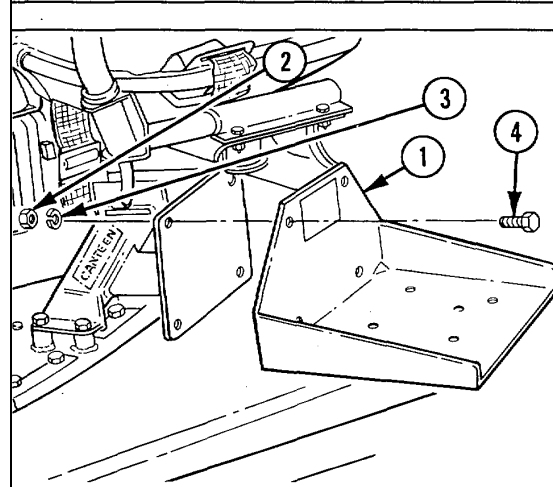
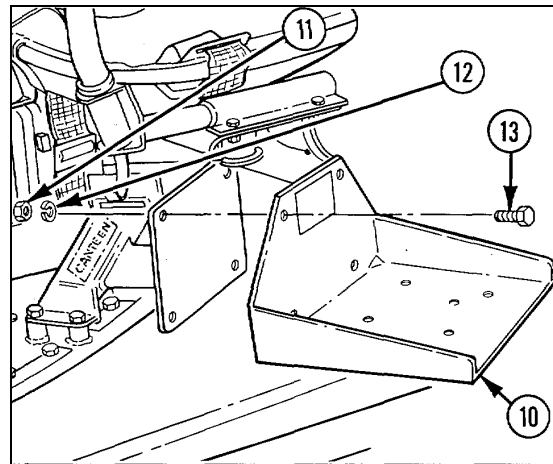
**INSTALLATION**

- 1 Install amplifier mount bracket (1), four nuts (2), four new lockwashers (3), and four capscrews (4).
2. Install amplifier (5), four nuts (6), four new lockwashers (7), and four screws (8) on amplifier mount bracket (1).

**CAUTION**

**Make sure cables are connected to proper connectors. Refer to FO-1 thru FO-3 in this manual.**

- 3 Connect cable assemblies at connectors J508 (9) and J501 (10).
- 4 Connect cable assembly at connector J504 (11).
- 5 Connect cable assembly at connector J506 (12).
- 6 Connect cable assembly at connector J507 (13).

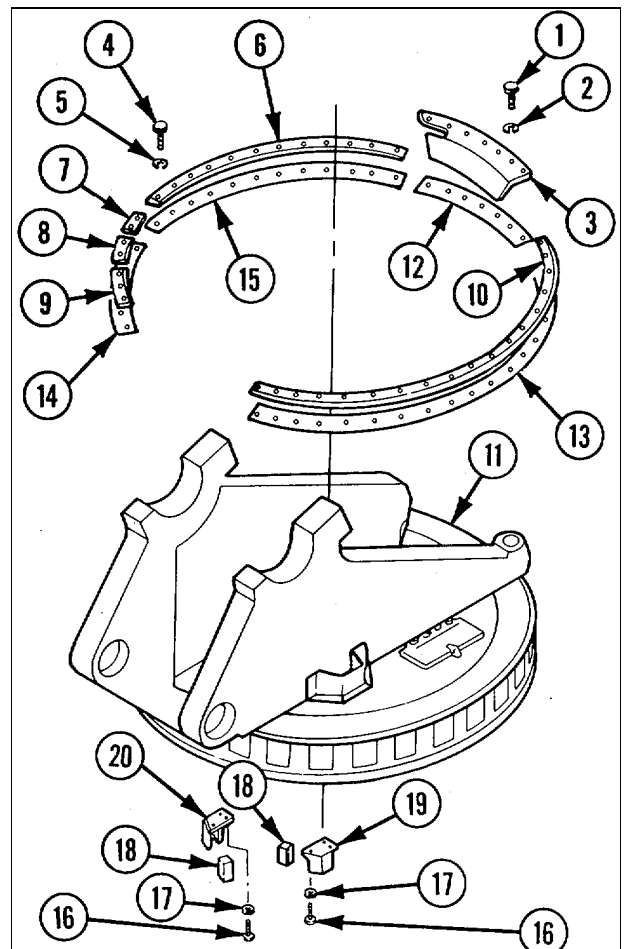


**2-66. MAINTENANCE OF TURRET INSTALLATION--STOPS AND SEALS.**

This task covers: b.	a. <i>Removal/Disassembly                  Inspection/Repair</i>	b. <i>Reassembly/Installation</i>
<b>INITIAL SETUP:</b>		
<i>Tools and Special Tools</i> Ordnance artillery and turret mechanic's tool kit (appx B)	Nonmetallic special strip seal (10919747) Nonmetallic special strip seal (10919752) Nonmetallic strip seal (10919749)	
<i>Materials/Parts</i> Adhesive (item 3, appx C) Lockwasher (42) (MS35338-46) Lockwasher (6) (MS35338-48) Nonmetallic rubber seal (10919751)	<i>References</i> TM 9-2350-304-24P-2	

**REMOVAL/DISASSEMBLY**

- 1 Remove seven capscrews (1), seven lockwashers (2), and turret bearing guard (3).
- 2 Remove 35 capscrews (4), 35 lockwashers (5), metal seal molding (6), turret bearing strip seal retainer (7), seal retaining strip (8), retaining seal strip (9), and turret seal strip (10) from turret (11).
- 3 Remove nonmetallic special strip seal (12), nonmetallic special strip seal (13), nonmetallic special strip seal (14), and nonmetallic rubber seal (15).
- 4 Remove six capscrews (16), six lockwashers (17), two rubber stop block pads (18), left stop bracket (19), and right stop block (20).



**2-66. MAINTENANCE OF TURRET INSTALLATION-STOPS AND SEALS (CONT).**

**INSPECTION/REPAIR**

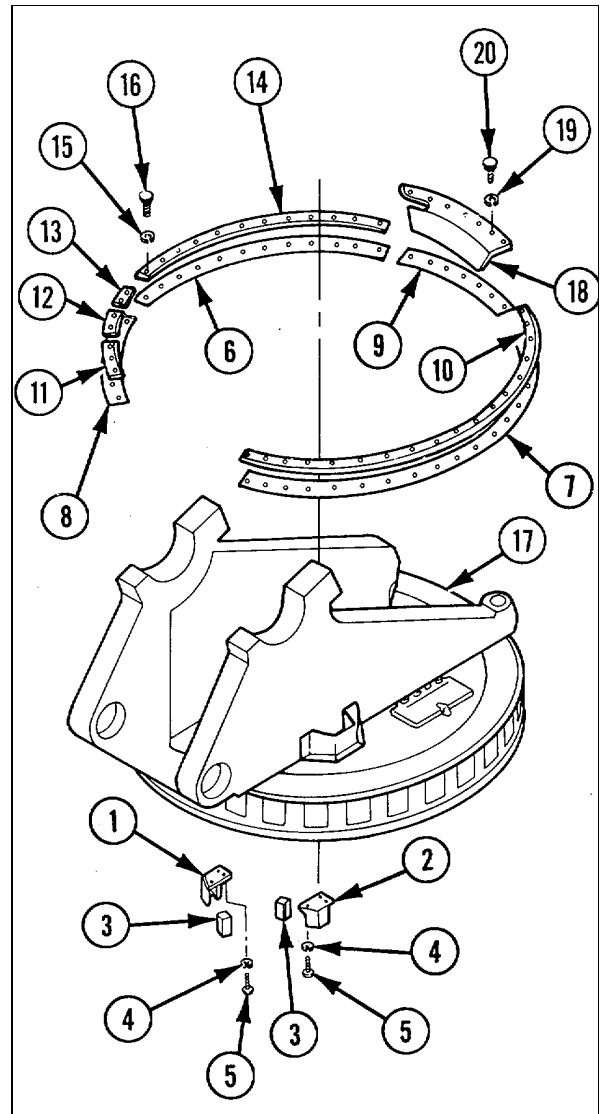
1. Inspect for broken, damaged, or missing parts.
2. Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY/INSTALLATION**

**NOTE**

**Apply adhesive (item 3, appx C) to all seals and strips before reassembly/installation.**

- 1 Install right stop block (1), left stop bracket (2), two rubber stop block pads (3), six new lockwashers (4), and six capscrews (5).
- 2 Install new nonmetallic rubber seal (6), new nonmetallic special strip seal (7), new nonmetallic special strip seal (8), and new nonmetallic special strip seal (9).
- 3 Install turret seal strip (10), retaining seal strip (11), seal retaining strip (12), turret bearing strip seal retainer (13), metal seal molding (14), 35 new lockwashers (15), and 35 capscrews (16) on turret (17).
- 4 Install turret bearing guard (18) and secure using seven new lockwashers (19) and seven capscrews (20).



**2-67. MAINTENANCE OF GUNNER'S SEAT AND SEAT BACK ASSEMBLY AND ASSISTANT GUNNER'S SEAT AND SEAT BACK ASSEMBLY.**

<p>This task covers:</p> <p>b.</p> <p>c.</p>	<p>a. <i>Removal</i></p> <p><i>Disassembly</i></p> <p><i>Inspection/Repair</i></p>	<p>d. <i>Reassembly</i></p> <p>e. <i>Installation</i></p>
<p><b>INITIAL SETUP:</b></p> <p><i>Tools and Special Tools</i> Ordnance artillery and turret mechanic's tool kit (appx B)</p> <p><i>Materials/Parts</i> Adhesive (item 4, appx C) Cotter pin (MS24665-283) Lockwasher (6) (MS35333-40)</p> <p><i>References</i> TM 9-2350-304-24P-2</p>		

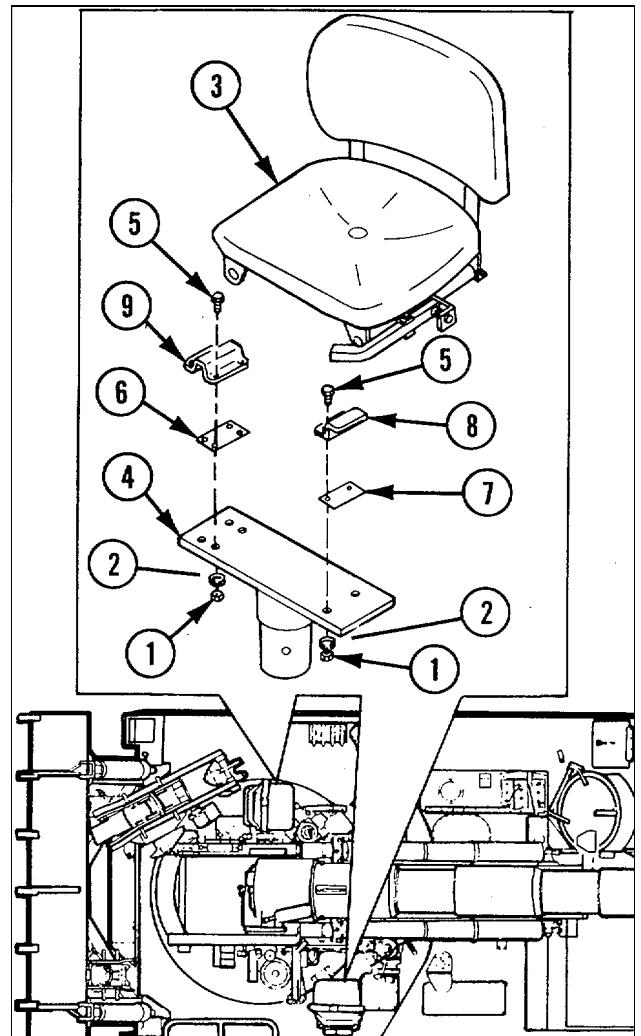
**REMOVAL**

**NOTE**

•The following steps are written and illustrated for the gunner's seat but apply to both the gunner's seat and assistant gunner's seat.

•Removal of gunner's seat and removal of assistant gunner's seat are similar with the exception that a vehicular applique system must be removed from the assistant gunner's seat. Refer to page 2-96.

- 1 Remove six hex nuts (1) and six lockwashers (2) securing seat assembly (3) to seat support base (4).
- 2 Remove six capscrews (5), right bearing plate (6), left bearing plate (7), double angle bracket (8), and retaining strap (9).



**2-67. MAINTENANCE OF GUNNER'S SEAT AND SEAT BACK ASSEMBLY AND ASSISTANT GUNNER'S SEAT AND SEAT BACK ASSEMBLY (CONT).**

**DISASSEMBLY**

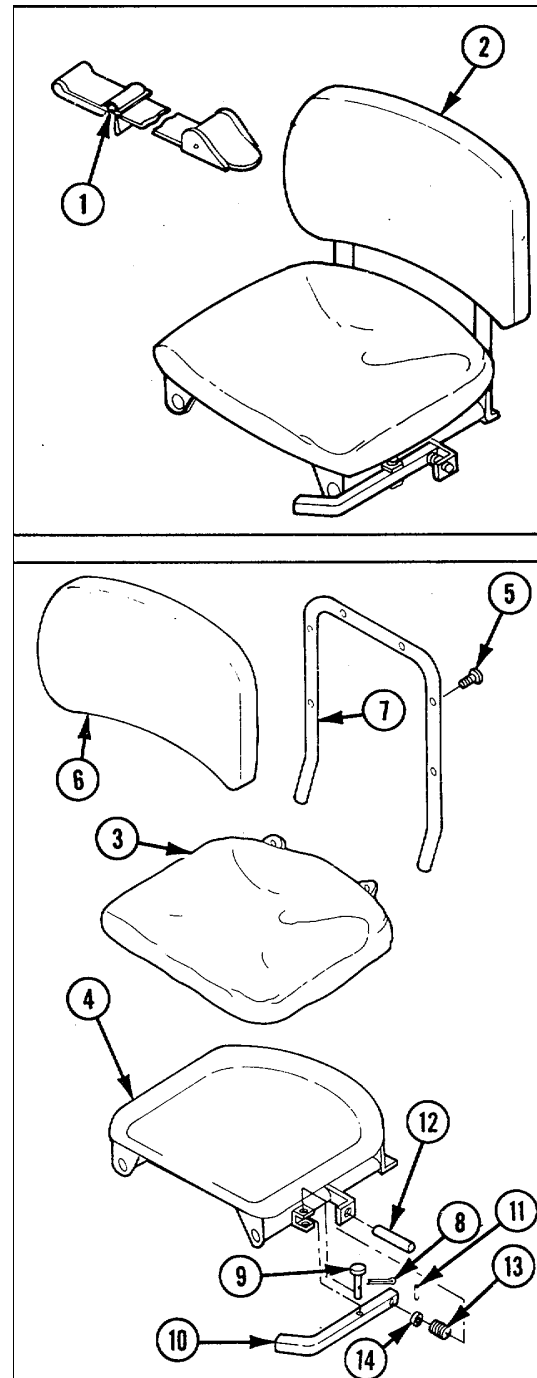
**NOTE**

The following steps are written and illustrated for gunner's seat but also apply to assistant gunner's seat.

1. Remove safety belt (1) from gunner's seat (2).
2. Disconnect and remove seat cushion (3) from seat (4).
3. Remove six machine screws (5) and cushion assembly (6) from seat back (7).
4. Lift up and remove seat back (7) from seat (4).
5. Remove cotter pin (8) and headed straight pin (9) from lock-release lever (10).
6. Remove headless straight pin (11), headless straight pin (12), compression helical spring (13), shaft collar (14), and lock-release lever (10).

**INSPECTION/REPAIR**

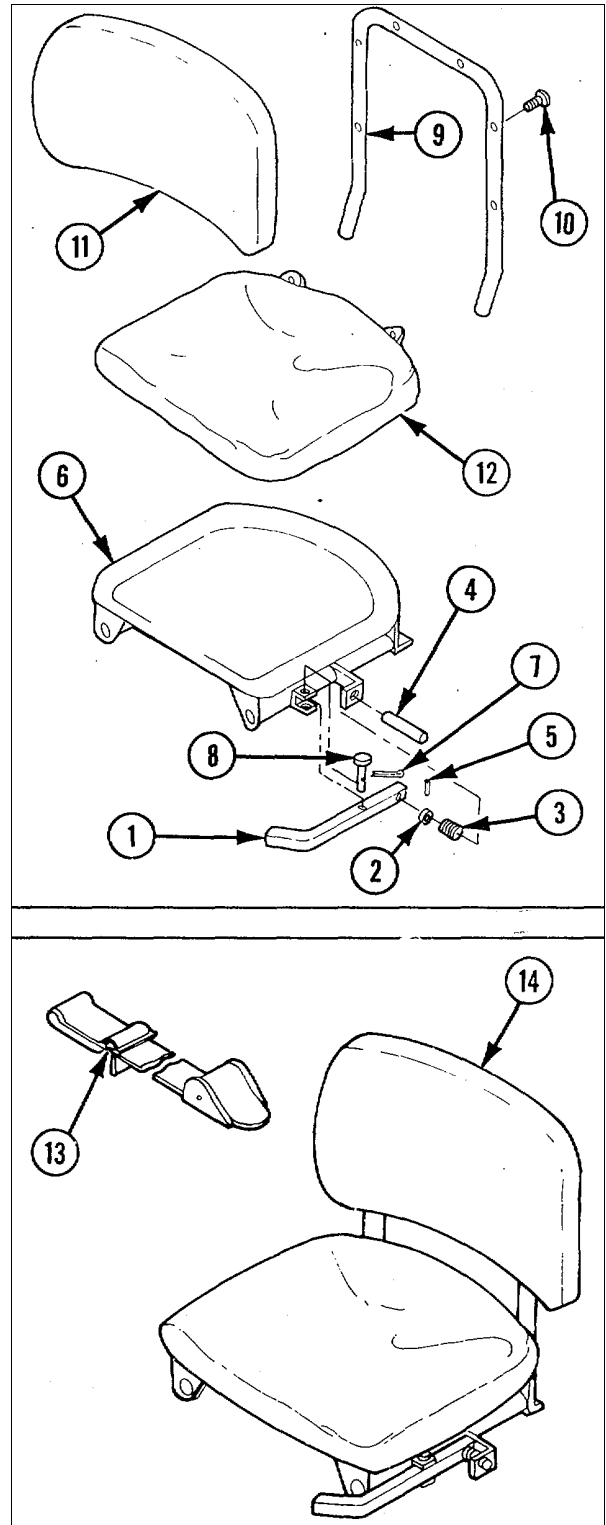
- 1 Inspect for broken, damaged, or missing parts.
- 2 If seat back is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 3 If seat is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 4 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).



**REASSEMBLY****NOTE**

The following steps are written and illustrated for the gunner's seat but apply to both the gunner's seat and assistant gunner's seat.

- 1 Install lock-release lever (1), shaft collar (2), compression helical spring (3), headless straight pin (4), and headless straight pin (5) on seat (6).
- 2 Install new cotter pin (7) and headed straight pin (8) on lock-release lever (1).
- 3 Connect seat back (9) to seat (6).
- 4 Using six machine screws (10), install cushion assembly (11) on seat back (9).
- 5 Using adhesive (item 4, appx C), install seat cushion (12) to seat (6).
- 6 Install safety belt (13) to gunner's seat (14)





## 2-67. MAINTENANCE OF GUNNER'S SEAT AND SEAT BACK ASSEMBLY AND ASSISTANT GUNNER'S SEAT AND SEAT BACK ASSEMBLY (CONT).

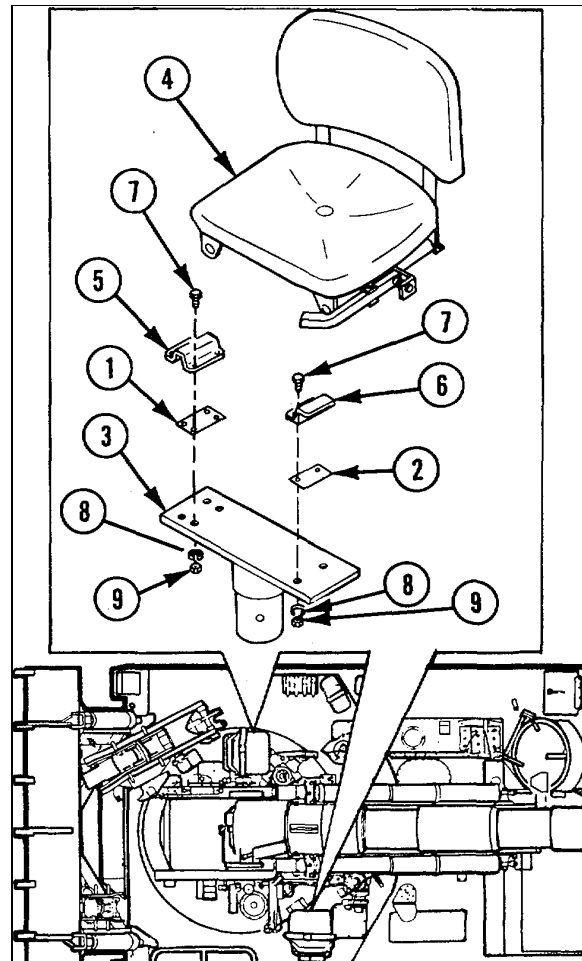
### INSTALLATION

#### NOTE

•The following steps are written and illustrated for the gunner's seat but apply to both the gunner's seat and assistant gunner's seat.

•Installation of gunner's seat and installation of assistant gunner's seat are similar with the exception that a vehicular applique system must be installed on the assistant gunner's seat. Refer to page 2-96.

- 1 Position right bearing plate (1) and left bearing plate (2) on seat support base (3).
- 2 Position seat assembly (4) on right bearing plate (1) and left bearing plate (2) and install retaining strap (5) and double angle bracket (6). Secure with six capscrews (7), six new lockwashers (8), and six hex nuts (9).



**2-68. MAINTENANCE OF HAND GRENADE BOX ASSEMBLY.**

This task covers: <i>Installation</i>	a. <i>Removal</i>	b. <i>Inspection/Repair</i>	c.
<p><b>INITIAL SETUP:</b></p> <p><i>Tools and Special Tools</i> Ordnance artillery and turret mechanic's tool kit (appx B)</p> <p><i>Materials/Parts</i> Lockwasher (4) (MS35338-44)</p> <p><i>References</i> TM 9-2350-304-24P-2</p>			

**REMOVAL****NOTE**

**Hand grenade box assembly is not repairable at this level. If damaged, notify direct support maintenance.**

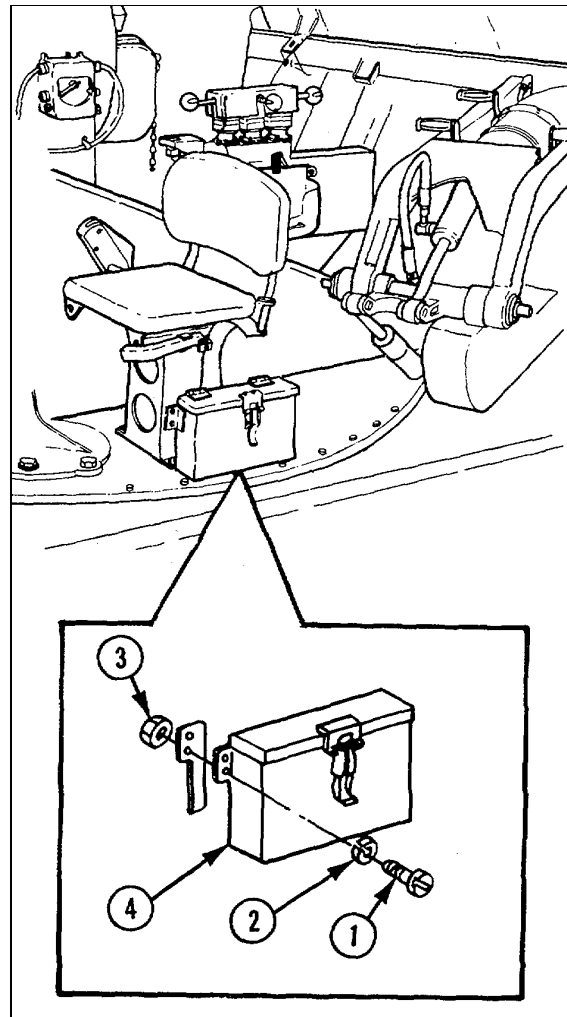
Remove four capscrews (1), four lockwashers (2), four hex nuts (3), and hand grenade box assembly (4).

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 If hand grenade box assembly is damaged, notify direct support maintenance.
- 3 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**INSTALLATION**

Install hand grenade box assembly (4) using four hex nuts (3), four new lockwashers (2), and four capscrews (1).

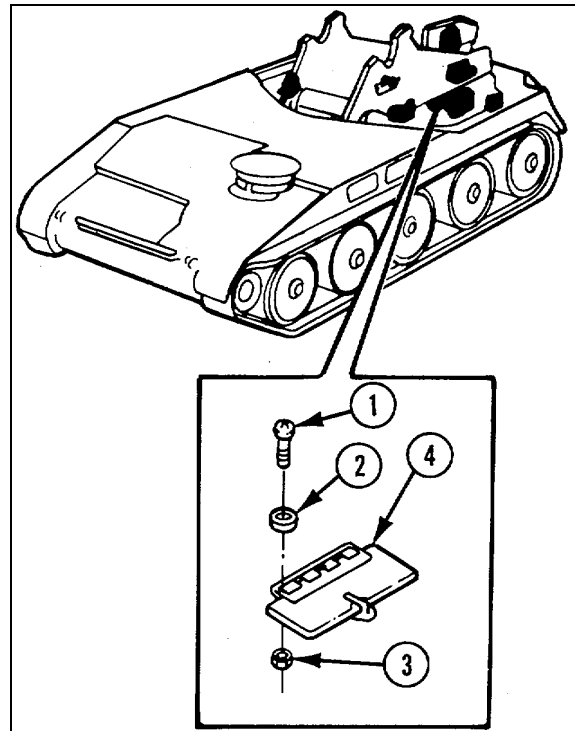


**2-69. MAINTENANCE OF TURRET STOWAGE ACCESS DOOR.**

<p>This task covers:          b.          c.</p>	<p>a. <i>Removal</i>          Disassembly          Inspection/Repair</p>	<p>d. <i>Reassembly</i>          e. <i>Installation</i></p>
<p><b>INITIAL SETUP</b></p>		
<p><i>Tools and Special Tools</i>          Ordnance artillery and turret mechanic's tool kit (appx B)</p>	<p><i>References</i>          TM 9-2350-304-24P-2</p>	
<p><i>Materials/Parts</i>          Adhesive (item 4, appx C)          Gasket (10902696)          Lockwasher (6) (MS35333-37)          Lockwasher (6) (MS35333-39)          Self-locking nuts (6) (MS21044N3)</p>		

**REMOVAL**

Remove six machine screws (1), six flat washers (2), six self-locking nuts (3), and turret stowage access door (4).



**DISASSEMBLY**

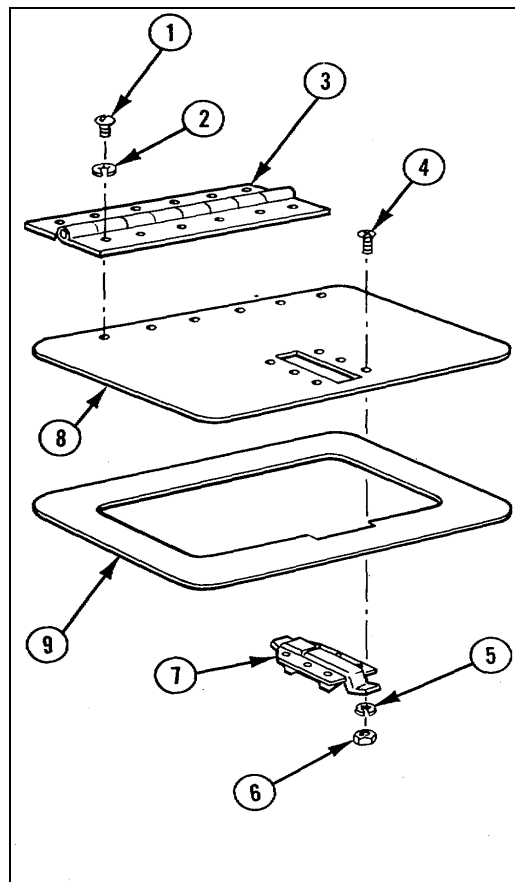
- 1 Remove six machine screws (1), six lockwashers (2), and hinge (3).
- 2 Remove six machine screws (4), six lockwashers (5), six hex nuts (6), and flush catch (7). 3 Remove plate (8), and gasket (9).

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 If hinge is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 3 If flush catch is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 4 If plate is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 5 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

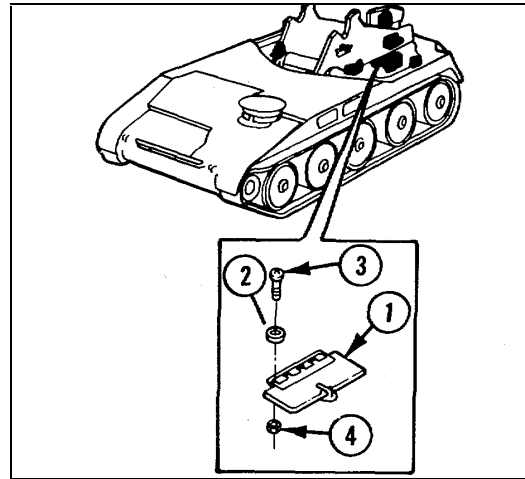
- 1 Apply adhesive (item 4, appx C) to new gasket (9) and secure new gasket to plate (8).
- 2 Install plate (8), flush catch (7), six machine screws (4), six new lockvwashers (5), and six hex nuts (6).
- 3 Install hinge (3), six new lockwashers (2), and six machine screws (1).



**2-69. MAINTENANCE OF TURRET STOWAGE ACCESS DOOR (CONT).**

**INSTALLATION**

Install turret stowage access door (1) using six flat washers (2), six machine screws (3), and six new self-locking nuts (4).



**2-70. MAINTENANCE OF SUPPORT ASSEMBLY AND MANUAL CONTROL HANDLE.**

This task covers:	a. Removal	d. Reassembly
	b. Disassembly	e. Installation
	c. Inspection/Repair	

**INITIAL SETUP**

**Tools and Special Tools**  
 Ordnance artillery and turret mechanic's tool kit (appx B)

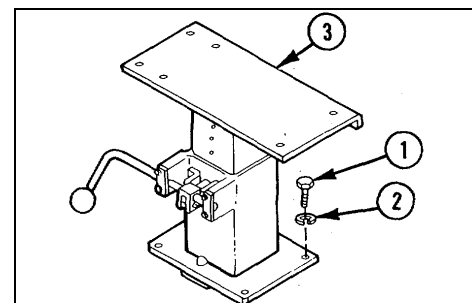
**Materials/Parts**  
 Cotter pin (MS24665-208)  
 Lockwasher (2) (MS35333-40)  
 Lockwasher (6) (MS35338-44)

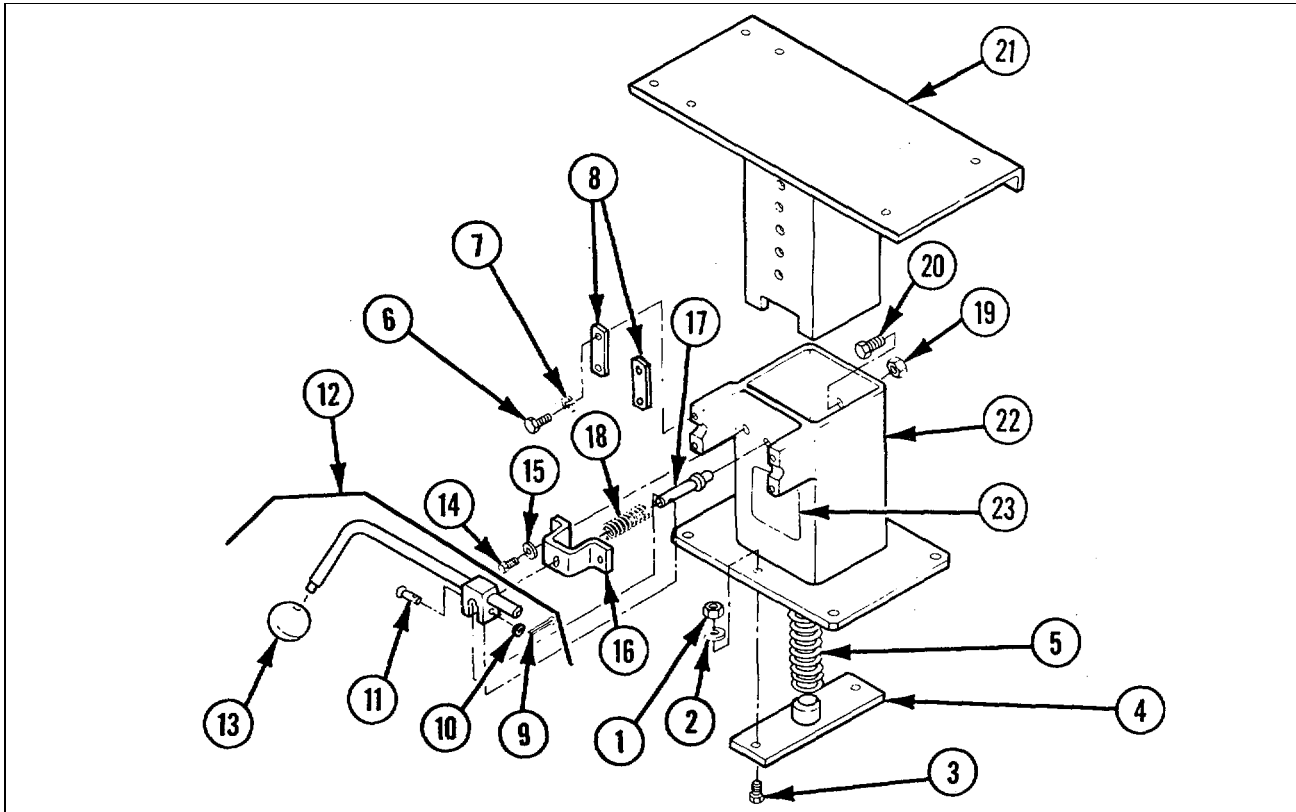
Lockwasher (4) (MS35338-46)  
 Sealing compound (item 20, appx C)  
 Self-locking nut (2) (MS21044N4)  
 Self-locking nut (MS21044N6)

**References**  
 TM 9-2350-304-24P-2

**REMOVAL**

Remove four capscrews (1), four lockwashers (2), and support assembly (3).



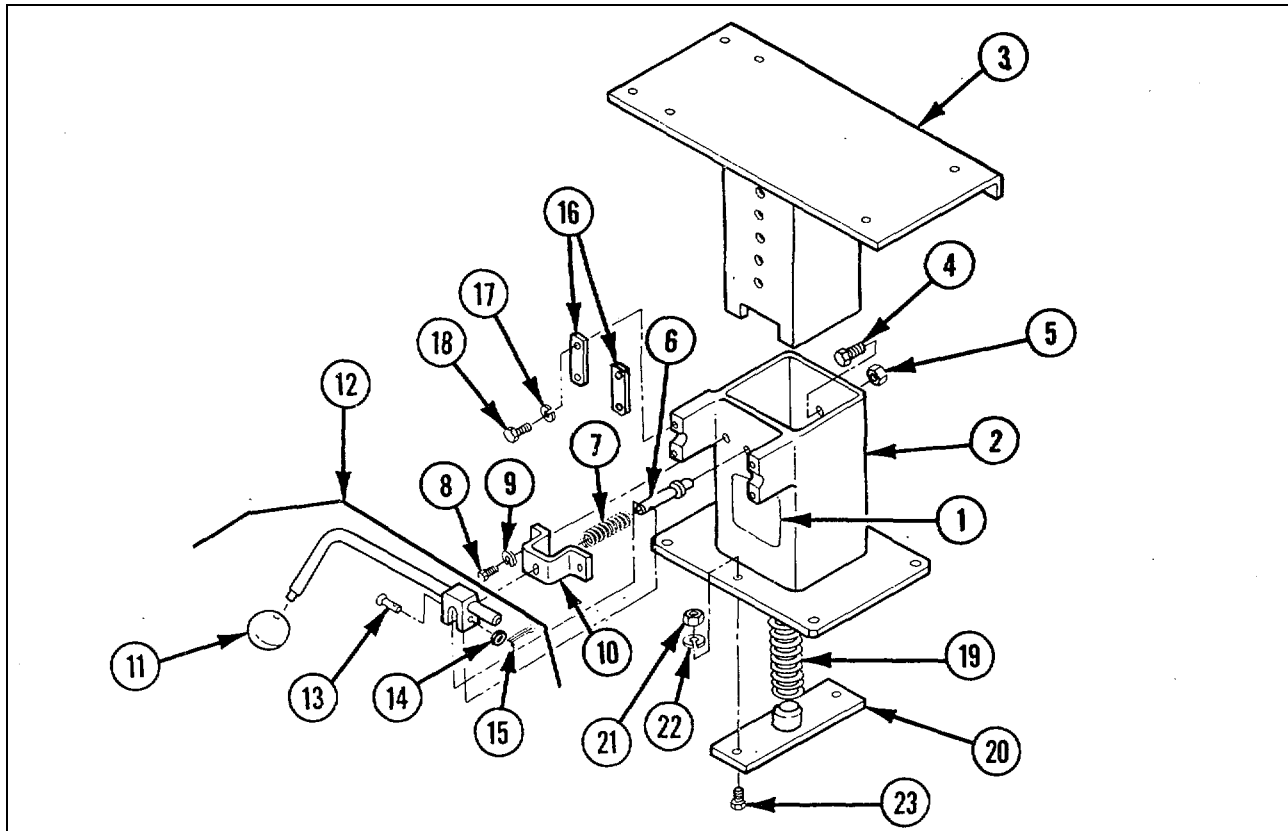
**DISASSEMBLY**

1. Remove two self-locking nuts (1), two lockwashers (2), two cap screws (3), retainer (4), and compression helical spring (5).
2. Remove four cap screws (6), four lockwashers (7), and two connecting links (8).
3. Remove cotter pin (9), flat washer (10), headed straight pin (11), and manual control handle (12). Remove knob (13) from manual control handle (12).
4. Remove two cap screws (14), two lockwashers (15), and retaining strap (16).
5. Remove headless shoulder pin (17) and compression helical spring (18).
6. Remove self-locking nut (19) and cap screw (20).
7. Remove base plate assembly (21) from support (22).
8. Remove caution sign (23) from support (22) if damaged.

**INSPECTION/REPAIR**

1. Inspect for broken, damaged, or missing parts.
2. If base plate assembly is broken, damaged, or missing, repair is by replacement of next higher assembly.
3. If support is broken, damaged, or missing, repair is by replacement of next higher assembly.
4. Repair is by replacement of authorized parts (TM 9-2350-304-24P-21).

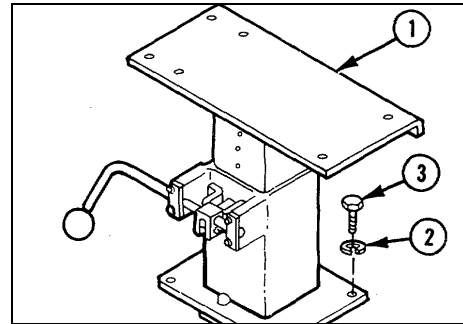
## 2-70. MAINTENANCE OF SUPPORT ASSEMBLY AND MANUAL CONTROL HANDLE (CONT).

REASSEMBLY

- 1 Install caution sign (1) on support (2) if necessary.
- 2 Install base plate assembly (3) in support (2).
- 3 Install capscrew (4) and new self-locking nut (5).
- 4 Install headless shoulder pin (6) and compression helical spring (7).
- 5 Install two capscrews (8), two new lockwashers (9), and retaining strap (10).
- 6 Apply sealing compound (item 20, appx C) to threads before installing knob (11).
- 7 Install manual control handle (12), headed straight pin (13), flat washer (14), and new cotter pin (15). Install knob (11) on manual control handle (12).
- 8 Install two connecting links (16), four new lockwashers (17), and four capscrews (18).
- 9 Install compression helical spring (19) and retainer (20), to support (2) and secure with two new self-locking nuts (21), two new lockwashers (22), and two capscrews (23).

**INSTALLATION**

Install support assembly (1) and secure using four new lockwashers (2) and four capscrews (3).



**2-71. MAINTENANCE OF SEAT BRACKET ASSEMBLY.**

This task covers:	a. <i>Removal</i>	d. <i>Reassembly</i>
	b. <i>Disassembly</i>	e. <i>Installation</i>
	c. <i>Inspection/Repair</i>	

**INITIAL SETUP**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*References*

TM 9-2350-304-24P-2

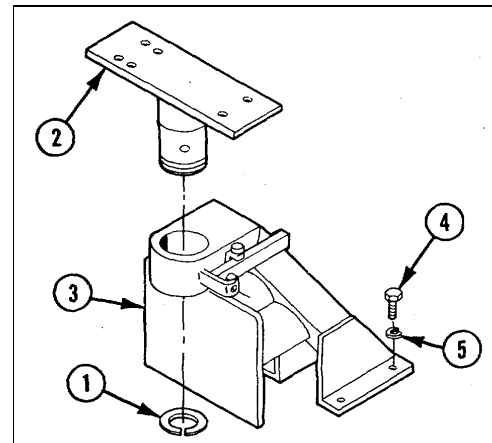
*Materials/Parts*

Cotter pin (MS24665-283)

Lockwasher (4) (MS35338-48)

**REMOVAL**

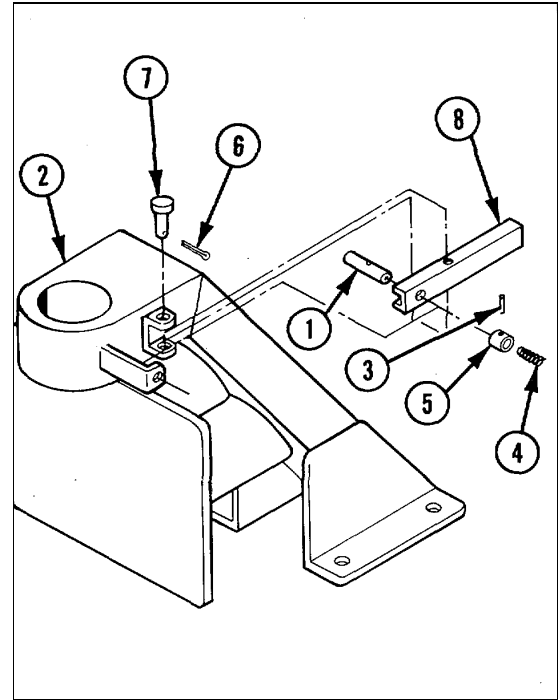
- 1 Remove retaining ring (1) from shaft of seat support base (2).
- 2 Remove seat support base (2) from seat bracket assembly (3).
- 3 Remove four capscrews (4), four lockwashers (5), and seat bracket assembly (3).





**2-71. MAINTENANCE OF SEAT BRACKET ASSEMBLY (CONT).****DISASSEMBLY**

- 1 Remove headless straight pin (1) from seat bracket (2).
- 2 Remove headless straight pin (3), compression helical spring (4), and shaft collar (5) from seat bracket (2).
- 3 Remove cotter pin (6), headed straight Q pin (7), and lock-release lever (8).

**INSPECTION/REPAIR**

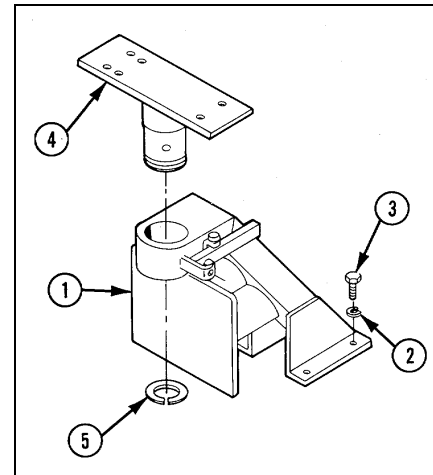
- 1 Inspect for broken, damaged, or missing parts.
- 2 If seat bracket is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 3 If lock-release lever is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 4 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

- 1 Install lock-release lever (8), headed straight pin (7), and new cotter pin (6) in seat bracket (2).
- 2 Install shaft collar (5), compression helical spring (4), and headless straight pin (3).
- 3 Install headless straight pin (1) in seat bracket (2).

**INSTALLATION**

- 1 Install seat bracket assembly (1), four new lockwashers (2), and four cap-screws (3).
- 2 Install seat support base (4) into seat bracket assembly (1).
- 3 Install retaining ring (5) on shaft of seat support base (4).



**2-72. MAINTENANCE OF TRAVERSING CONSTANT SPEED DRIVE.**

This task covers:	a. <i>Disassembly</i>	c. <i>Reassembly</i>
	b. <i>Inspection/Repair</i>	d. <i>Adjustment of Torque Lock</i>

**INITIAL SETUP**

*Tools and Special Tools*

- Ordnance artillery and turret mechanic's tool kit (appx B)
- Slip clutch adapter (11631543)
- Torque wrench (A-A-2411)

*References*

- TM 9-2350-304-10
- TM 9-2350-304-24P-2

*Materials/Parts*

- Grease (item 11, appx C)
- Lockwashers (4) (MS35338-44)
- Preformed packing (MS28778-6)

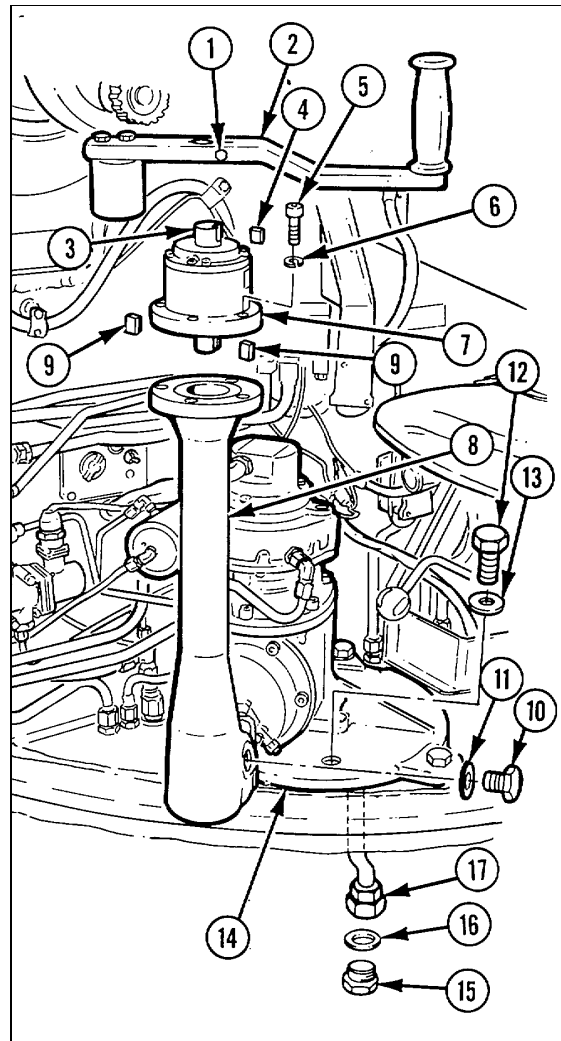
2-72. MAINTENANCE OF TRAVERSING CONSTANT SPEED DRIVE (CONT).

**DISASSEMBLY**

**NOTE**

**Capscrew in step 1 is part of handle assembly.  
Use care not to damage or lose capscrew. 5**

- 1 Loosen capscrew (1) securing torque handle (2) to straight shaft (3).
- 2 Tap underside of torque handle (2) and remove.
- 3 Remove machine key (4).
- 4 Remove four capscrews (5) and four lockwashers (6) securing torque lock (7) to handwheel column (8).
- 5 Remove two machine keys (9) from lower shaft of torque lock (7).
- 6 Remove machine thread plug (10) and packing with retainer (11) from hand-wheel column (8).
- 7 Remove machine thread plug (12) and packing with retainer (13) from mechanical housing (14).
- 8 Remove machine thread plug (15) and preformed packing (16) from drain tube assembly (17).

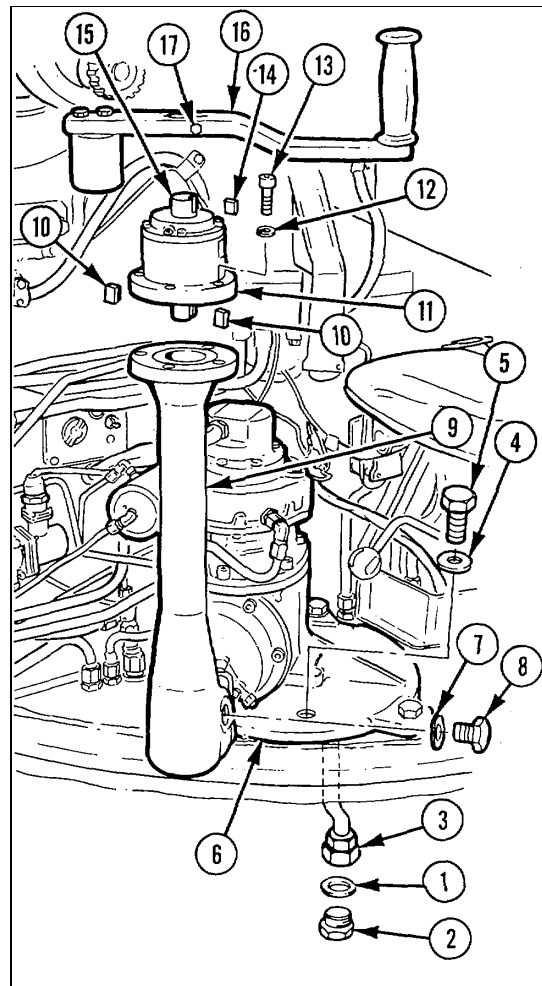


**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Torque handle is a repairable assembly, refer to page 2-213.
- 3 If torque lock (11675354) is removed from traversing constant speed drive, refer to page 2-214 for adjustment procedures.
- 4 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

- 1 Install new preformed packing (1) and machine thread plug (2) on drain tube assembly (3).
- 2 Install packing with retainer (4) and machine thread plug (5) in mechanical housing (6).
- 3 Install packing with retainer (7) and machine thread plug (8) in handwheel column (9).
- 4 Install two machine keys (10) in lower shaft of torque lock (11).
- 5 Install torque lock (11) on handwheel column (9) and secure using four new lockwashers (12) and four capscrews (13).
- 6 Install machine key (14) in straight shaft (15).
- 7 Install torque handle (16) on straight shaft (15).
- 8 Torque capscrew (17) 10 to 12 ft-lb (14 to 16 N-m).



## 2-72. MAINTENANCE OF TRAVERSING CONSTANT

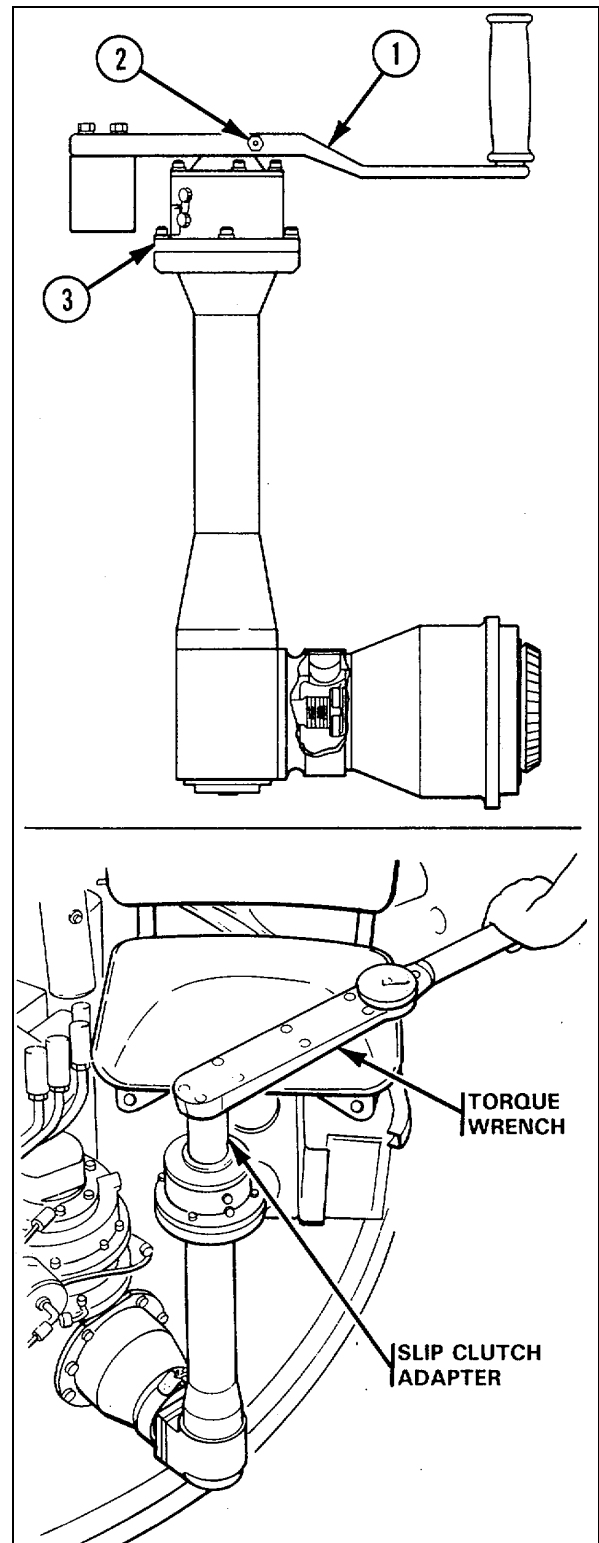
### ADJUSTMENT OF TORQUE LOCK

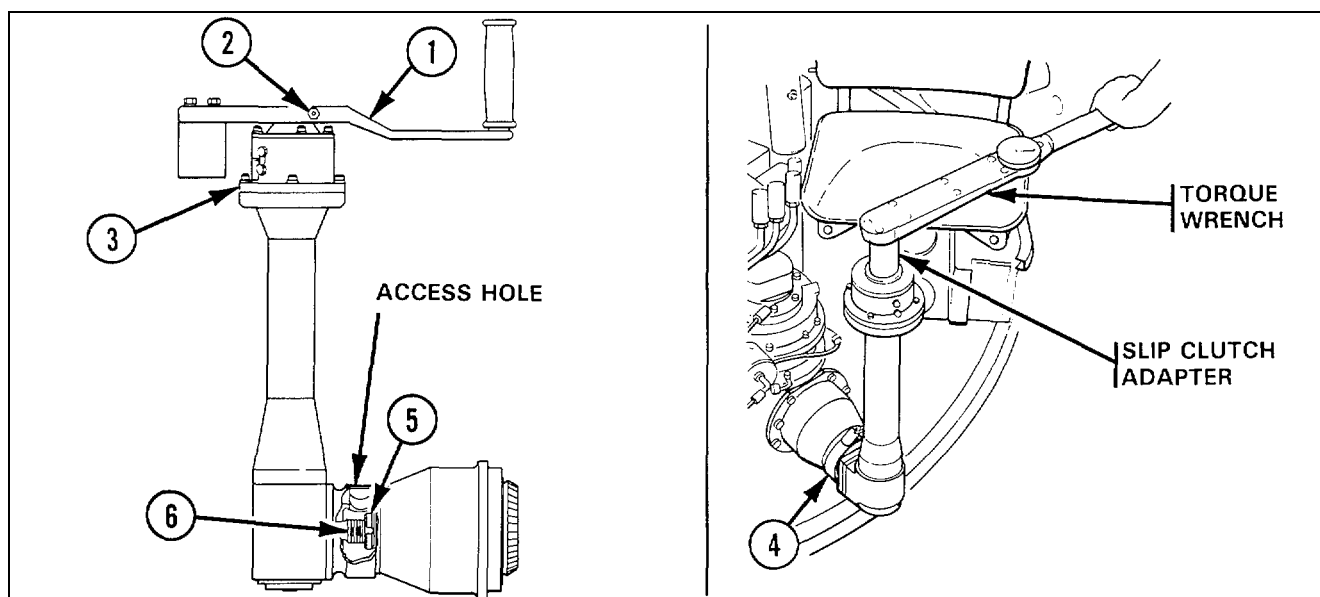
- 1 Engage travel lock and turn handle (1) to take up any slack in traversing drive assembly. Refer to TM 9-2350-304-10.

#### NOTE

**When slack is removed handle will be tight and not turn under easy pressure. Two or more complete turns may be needed.**

- 2 Apply necessary pressure to turn handle (1). When handle starts to turn again, clutch assembly will break loose and begin to slip.
- 3 Continue to turn handle (1) for at least two complete turns to make sure traversing constant speed drive is not locked or frozen.
- 4 Loosen nut, lockwasher, and capscrew (2) clamping handle (1) to traversing constant speed drive (3).
- 5 Lightly tap underside of handle (1) to remove it.
- 6 Install slip clutch adapter and torque wrench.
- 7 Turn torque wrench and read measurements. Maximum measurement, shown as traversing constant speed drive breaks loose and begins to turn, must not exceed 250 in.-lb (28 N-m). Minimum measurement, shown as traversing constant speed drive continues to turn, must not fall below 150 in.-lb (17 N-m).



**NOTE**

Measurements will be slightly different each time. Readings should be taken at least three times and compared to get correct measurement..

- 8 To adjust torque measurement, remove slip clutch access hole clamp and gasket (4).
- 9 Remove grease from access hole until adjustment nut (5) is clear.
- 10 Using torque wrench, turn traversing constant speed drive until tab on key washer (6) is accessible.
- 11 Turn torque wrench and read measurements. Continue adjusting adjustment nut (5) until correct measurements in step 7 are reached. Using screwdriver, tighten adjustment nut clockwise to increase torque. Loosen adjustment nut counterclockwise to decrease torque. For correct torque, refer to appendix E.
- 12 When proper torque is reached, bend tabs on key washer (6) into slots in adjustment nut (5).
- 13 Fill slip clutch access hole with grease (item 11, appx C). Refer to page 2-8
- 14 Install slip clutch access hole clamp and gasket (4).
- 15 Remove slip clutch adapter and torque wrench.
- 16 Install handle (1) and secure to traversing constant speed drive (3) using nut, lockwasher, and capscrew (2).

**2-73. MAINTENANCE OF ELEVATING HYDRAULIC DRIVE UNIT.**

This task covers:	a. Disassembly	c. Reassembly
	b. Inspection/Repair	d. Adjustment of Torque Lock

**INITIAL SETUP**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)  
 Slip clutch adapter (11631543)  
 Torque wrench (A-A-2411)

*References*

TM 9-2350-304-10  
 TM 9-2350-304-24P-2

*Materials/Parts*

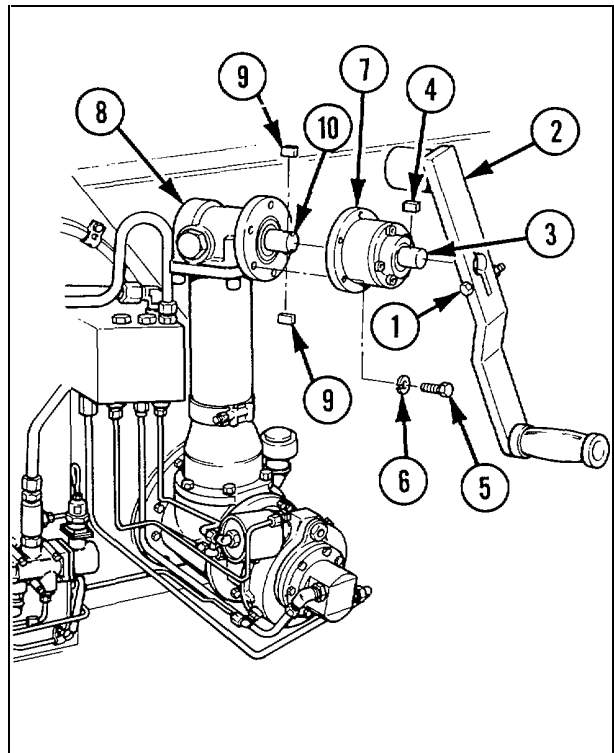
Grease (item 11, appx C)  
 Lockwasher (4) (MS35338-44)

**DISASSEMBLY**

**NOTE**

**Capscrew in step 1 is part of handle assembly. Use care not to damage or lose capscrew.**

- 1 Loosen capscrew (1) securing torque handle (2) to straight shaft (3).
- 2 Tap underside of torque handle (2) and remove.
- 3 Remove machine key (4) from straight shaft (3).
- 4 Remove four capscrews (5), four lockwashers (6), and torque lock (7) from elevating drive assembly housing (8).
- 5 Remove two machine keys (9) from shouldered shaft (10).

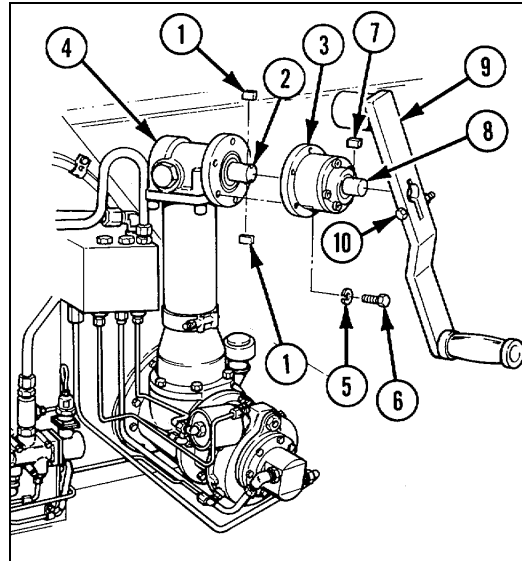


**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Torque handle is a repairable assembly, refer to page 2-213.
- 3 If torque lock (11675354) is removed from elevating hydraulic drive unit, refer to page 2-214 for adjustment procedures.
- 4 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

- 1 Install two machine keys (1) in shouldered shaft (2) and position torque lock (3) on elevating drive assembly housing (4), matching keyways in torque lock to two keys.
- 2 Secure torque lock (3) to elevating drive assembly housing (4) with four new lockwashers (5) and four capscrews (6). Torque capscrews 40 to 45 ft-lb (54 to 61 N-m).
- 3 Install machine key (7) in straight shaft (8), and position torque handle (9) on straight shaft matching keyway in torque handle with machine key.
- 4 Tighten capscrew (10) securing torque handle (9) to straight shaft (8).



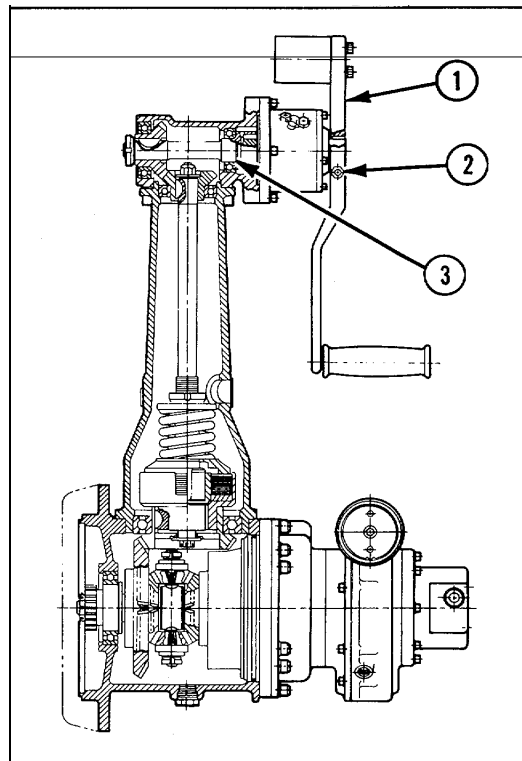
**ADJUSTMENT OF TORQUE LOCK**

- 1 Engage travel lock and turn handle (1) to take up any slack in elevating hydraulic drive unit. Refer to TM 9-2350-304-10.

**NOTE**

**When slack is removed, handle will be tight and not turn under easy pressure. Two or more complete turns may be needed.**

- 2 Apply necessary pressure to turn handle (1). When handle starts to turn again, clutch assembly will break loose and begin to slip.
- 3 Continue to turn handle (1) for at least two complete turns to make sure elevating hydraulic drive unit is not locked or frozen.
- 4 Loosen nut, lockwasher, and capscrew (2) clamping handle (1) to elevating hydraulic drive unit (3).
- 5 Lightly tap underside of handle (1) to remove it.





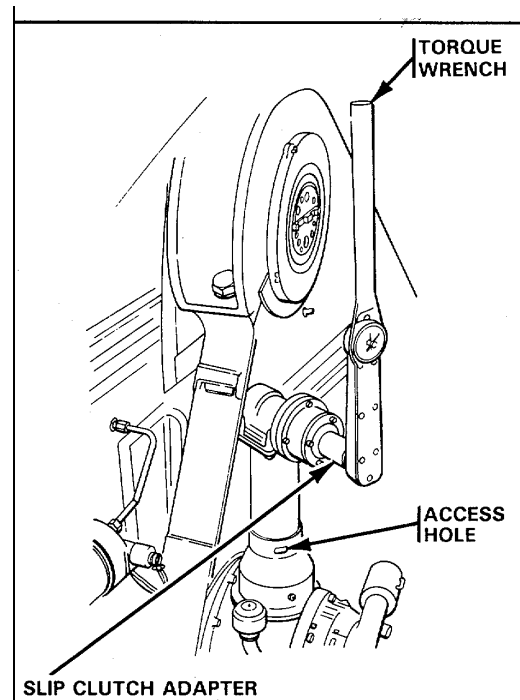
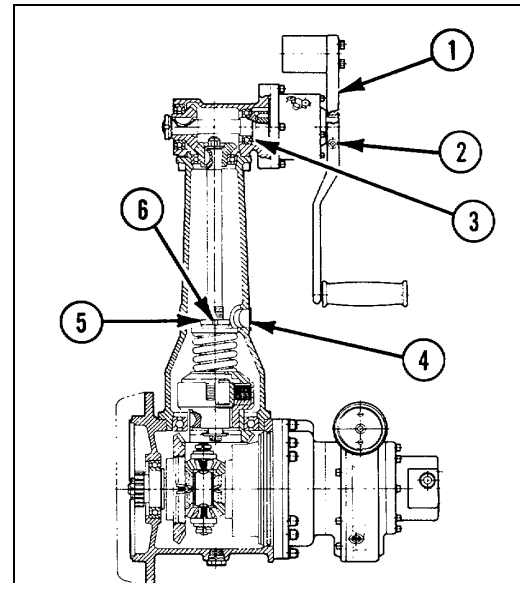
**2-73. MAINTENANCE OF ELEVATING HYDRAULIC DRIVE UNIT (CONT).****ADJUSTMENT OF TORQUE LOCK (CONT)**

- 6 Install slip clutch adapter and torque wrench.
- 7 Turn torque wrench and read measurements. Maximum measurement, shown as elevating hydraulic drive unit breaks loose and begins to turn, must not exceed 79 A ft-lb (107 N-m). Minimum measurement, shown as drive assembly continues to (turn, must not fall below 54 ft-lb (73 N-m).

**NOTE**

**Measurements will be slightly different each time. Readings should be taken at least three times and compared to get correct measurement.**

- 8 To adjust torque measurement, remove slip clutch access hole hose clamp and access hole cover gasket (4).
- 9 Remove grease from access hole until adjustment nut (5) is clear.
- 10 Using torque wrench, turn elevating hydraulic drive unit until tabs on key washer (6) are accessible.
- 11 Using screwdriver, tighten adjustment nut (5) clockwise to increase torque. Loosen nut counterclockwise to decrease torque.
- 12 Turn torque wrench and read measurements. Continue adjusting nut (5) until correct measurements shown in step 7 are reached.
- 13 When proper torque is reached, bend tabs of key washer (6) in slots on nut (5).
- 14 Fill slip clutch access hole with grease (item 11, appx C). Refer to page 2-8.
- 15 Install access hole cover gasket (4) and access hole hose clamp.
- 16 Remove slip clutch adapter and torque wrench.
- 17 Install handle (1) and secure to elevating hydraulic drive unit (3) by tightening nut, lockwasher, and capscrew (2).



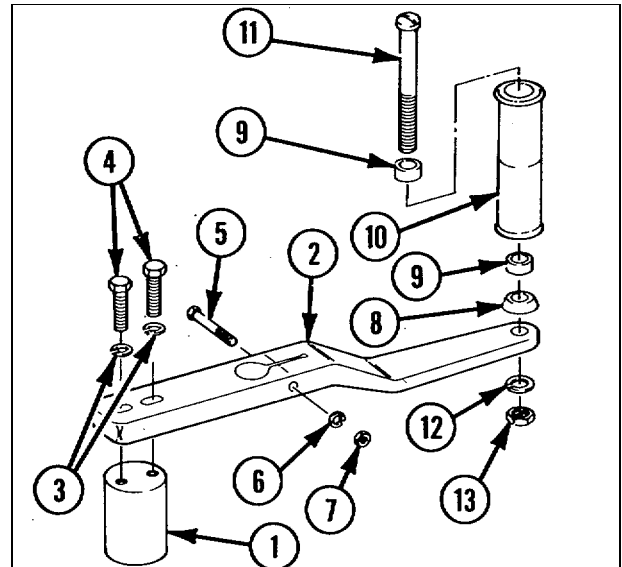
**Change 1 2-212**



**2-74. MAINTENANCE OF TRAVERSING AND ELEVATING DRIVE TORQUE HANDLES (CONT).**

**REASSEMBLY**

- 1 Install counterbalance weight (1) on door handle (2) and secure with two new lockwashers (3) and two capscrews (4).
- 2 Install capscrew (5), new lockwasher (6), and hex nut (7).
- 3 Install handle grip boss (8), two sleeve bushings (9), and handle grip (10).
- 4 Install shoulder screw (11), new lockwasher (12), and hex nut (13) into door handle (2).



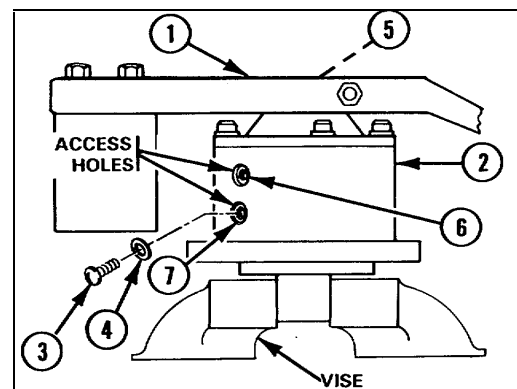
**2-75. MAINTENANCE OF TORQUE LOCK.**

This task covers: <i>Adjustment</i>	
<b>INITIAL SETUP:</b>	
<p><i>Tools and Special Tools</i></p> <p>Ordnance artillery and turret mechanic's tool kit (appx B)</p> <p>Quadrant (figure 8, appx D)</p> <p>Slip clutch adapter (11631543)</p> <p>Slip clutch adapter (11631565)</p>	<p>Torque wrench (A-A-2411)</p> <p>Vise</p> <p>Vise clamps</p>
	<p><b>Equipment Conditions</b></p> <p>2-210 Elevating torque lock removed</p> <p>2-205 Traversing torque lock removed</p>

**ADJUSTMENT**

**NOTE**

- If system has torque lock (9391475), repair is by replacement of torque lock (9391475). If system has torque lock (11675354), proceed with adjustment steps.
- For handle installation procedures refer to p 2-205 or 2-210.



- 1 With handle (1) installed, place torque lock (2) in vise.

- 2 Remove two capscrews (3) and two packings (4) from access holes in torque lock (2).

**NOTE**

- **If control straight shaft will not turn, notify direct support maintenance.**
- **Upper adjustment screw controls the counterclockwise movement of the control straight shaft. Lower adjustment screw controls the clockwise movement of the control straight shaft.**
- **Turning adjustment screws clockwise allows control straight shaft to turn more freely. Turning screws counterclockwise increases pressure required to turn control straight shaft, making it difficult to turn.**

- 3 Turn control straight shaft (5) until upper adjustment screw (6) and lower adjustment screw (7) can be reached through access holes with alien wrench.

- 4 Using alien wrench, turn adjustment screws (6 and 7) counterclockwise a half turn.

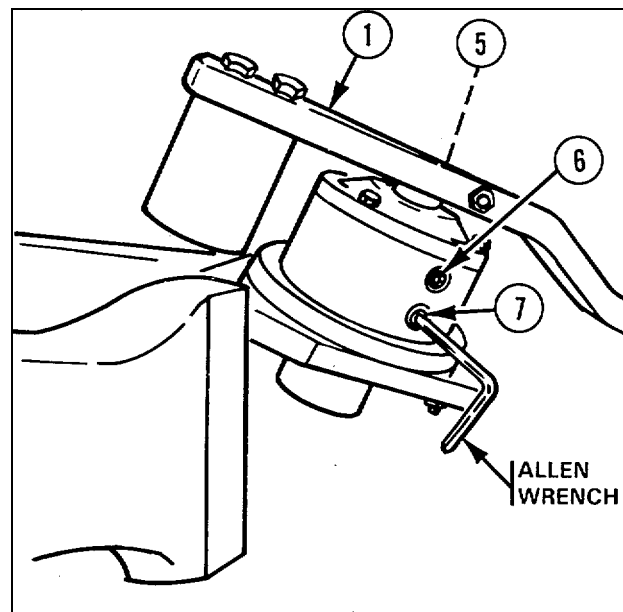
- 5 Remove alien wrench and attempt to turn control straight shaft (5) clockwise and counterclockwise.

- 6 Repeat steps 4 and 5 until control straight shaft (5) will not turn in either direction.

- 7 Using alien wrench, turn adjustment screws (6 and 7) clockwise a half turn.

- 8 Remove alien wrench and attempt to turn control straight shaft (5) clockwise and counterclockwise.

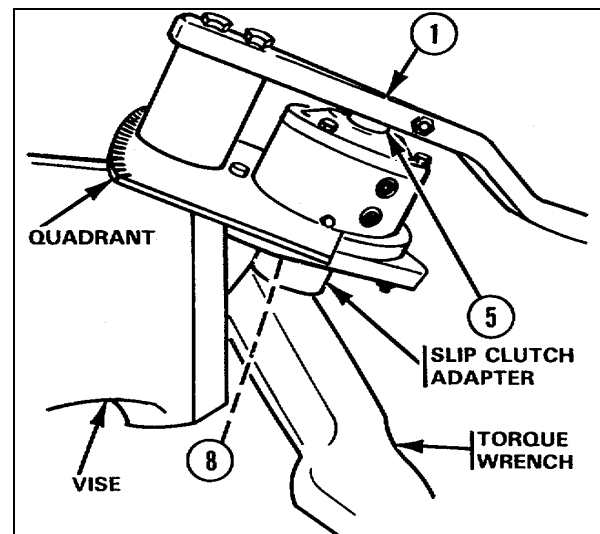
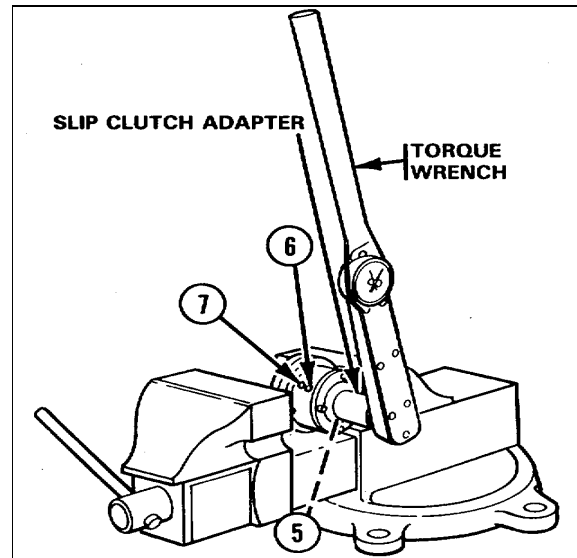
- 9 Repeat steps 7 and 8 until control straight shaft (5) will not turn in either direction. Remove handle (1), refer to page 2-205 or 2-210.



**2-75. MAINTENANCE OF TORQUE LOCK (I**

**ADJUSTMENT (CONT)**

- 10 Install slip clutch adapter and torque wrench to control straight shaft (5).
- 11 Using torque wrench, turn control straight shaft (5) one complete turn in either direction. Observe torque measurements. Reading on torque wrench must not exceed 72 in.-lb (8 N-m) in either direction.
- 12 If necessary, adjust movement of control straight shaft (5) to meet torque requirements. Turn screw (6) clockwise to decrease torque in counterclockwise movement of control straight shaft. Turn screw (7) clockwise to decrease torque in clockwise movement of control straight shaft (5).
- 13 Remove slip clutch adapter and torque wrench from control straight shaft (5) and install handle (1), refer to page 2-205 or 2-210.
- 14 Install fabricated quadrant.
- 15 Install slip clutch adapter and torque wrench to straight shaft (8).
- 16 Apply 166 ft-lb (224 N-m) torque to straight shaft (8) in either direction. Control straight shaft (5) and handle (1) must not move more than 2 degrees in either direction.
- 17 Apply 42 ft-lb (57 N-m) to straight shaft (8) in clockwise direction.
- 18 Using handle (1), turn control straight shaft (5) in clockwise direction. Straight shaft (8) must turn under load at a rate of speed controlled by the turning of the control straight shaft. If shafts do not turn properly, readjust control straight shaft torque in clockwise direction by repeating steps 10 thru 12.
- 19 Apply 42 ft-lb (57 N-m) to straight shaft (8) in counterclockwise direction.



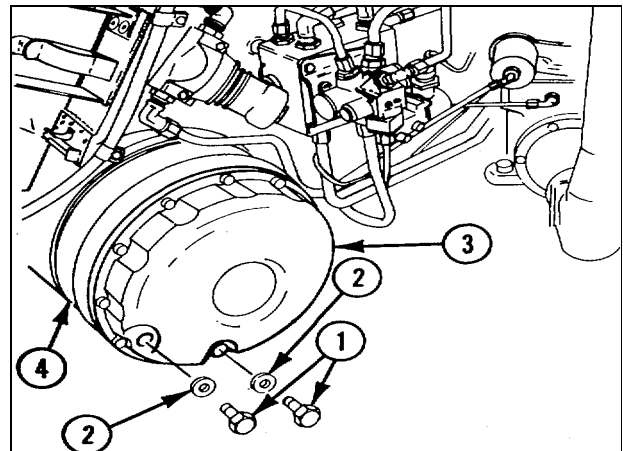
- 20 Using handle (1), turn control straight shaft (5) in counterclockwise direction. Straight shaft (8) must turn under load at a rate of speed controlled by the turning of the control straight shaft. If shafts do not turn properly, readjust control straight shaft torque in counterclockwise direction by repeating steps 10 thru 12.

**2-76. MAINTENANCE OF ELEVATING FINAL DRIVE ASSEMBLY.**

This task covers:		
a. <i>Disassembly</i>	b. <i>Inspection/Repair</i>	c. <i>Reassembly</i>
<b>INITIAL SETUP:</b>		
<i>Tools and Special Tools</i> Ordnance artillery and turret mechanic's tool kit (appx B)		<i>References</i> TM 9-2350-304-24P-2
<i>Materials/Parts</i> Preformed packing (2) (MS28778-8)		

**DISASSEMBLY**

Remove two machine thread plugs (1) and two preformed packings (2) from access cover (3) of elevating final drive assembly (4).

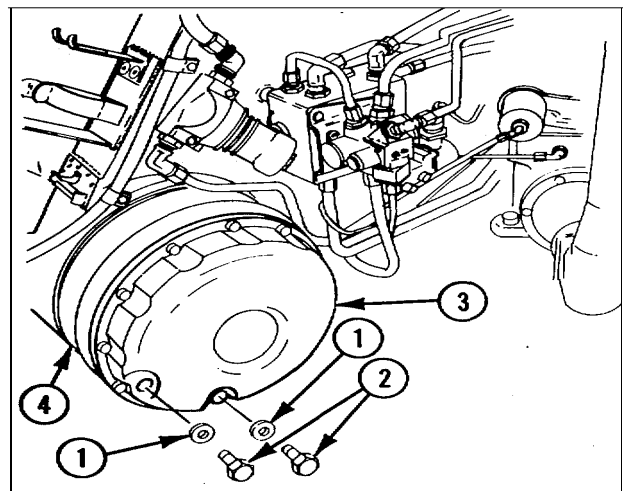


**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

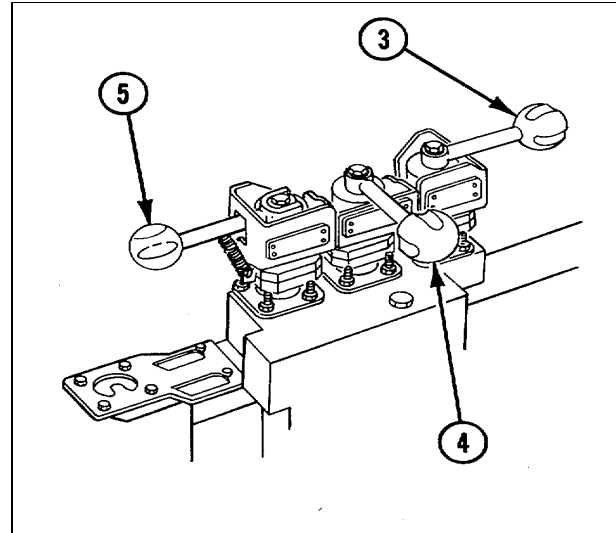
**REASSEMBLY**

Install two new preformed packings (1) and two machine plugs (2) in access cover (3) of elevating final drive assembly (4).





- 4 Move SWING control handle (3) to full LOAD.
- 5 Move SWING control handle (3) to full STOW.
- 6 Repeat steps 4 and 5 several times to relieve pressure from system.
- 7 Move LOADER control handle (4), to full IN.
- 8 Move LOADER control handle (4) to full OUT.
- 9 Repeat steps 7 and 8 several times to relieve pressure from system.



**CAUTION**

Do not operate RAMMER control handle without a projectile in the trough.

- 10 Move RAMMER control handle (5) to RAM several times to relieve pressure from system.

**REMOVAL**

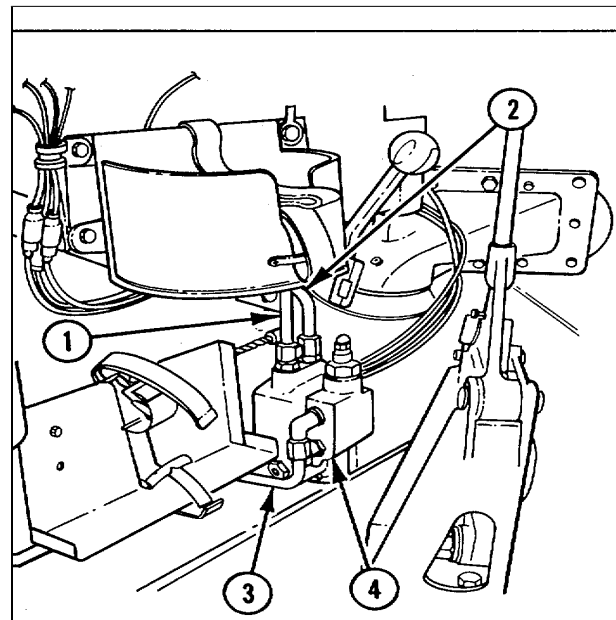
**WARNING**

Hydraulic system is under high pressure. Make sure all hydraulic pressure is relieved before removal of any tubes or fittings. Follow safety procedures to prevent injury. Wipe up spilled hydraulic fluid.

**NOTE**

Rammer must be in load position when removing traversing cylinder.

- 1 Disconnect tubes (1, 2, and 3) from traversing cylinder (4).
- 2 Cover openings of tubes (1, 2, and 3) to keep dirt out.





2-77. MAINTENANCE OF RAMMER TRAVERSING CYLINDER ASSEMBLY (CONT).

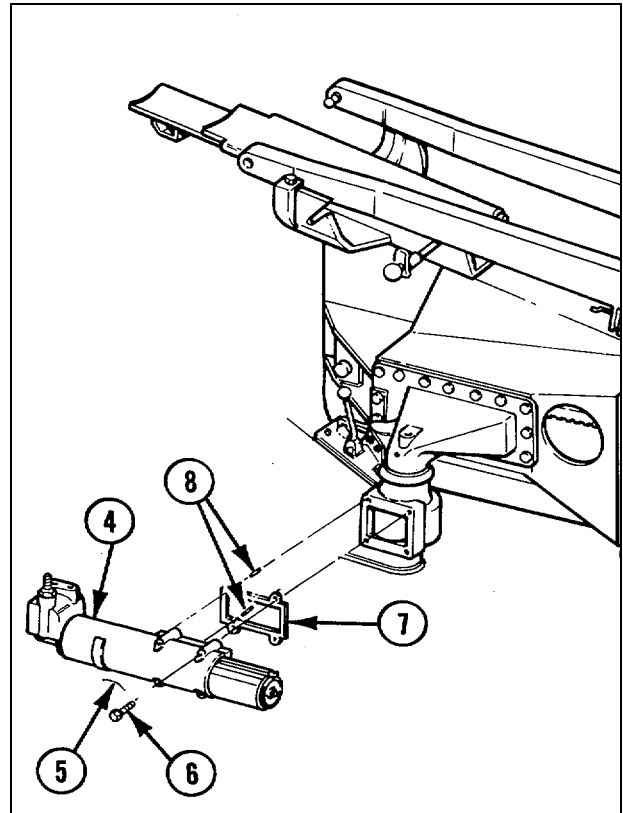
**REMOVAL (CONT)**

- 3 Remove lockwire (5).
- 4 Remove four capscrews (6).

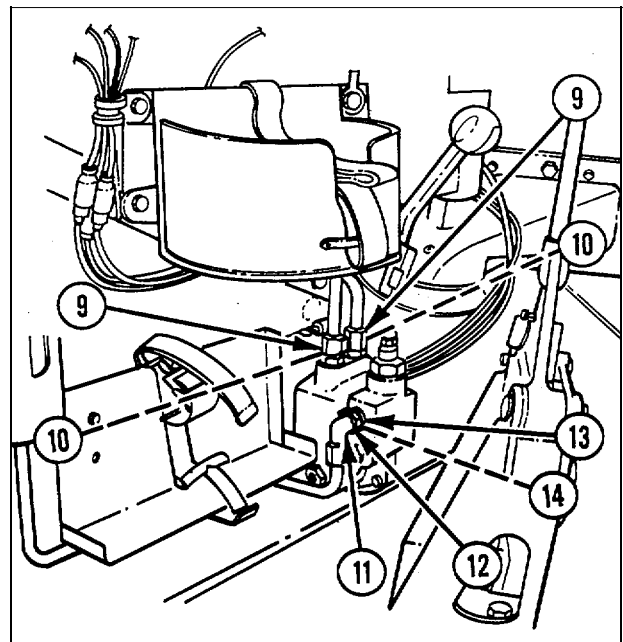
**NOTE**

Traversing cylinder is not repairable at this level. If damaged, notify direct support maintenance.

- 5 Remove traversing cylinder (4) and shim (7).
- 6 Tag shim (7) and save for reassembly.
- 7 If damaged, remove two headless straight pins (8).

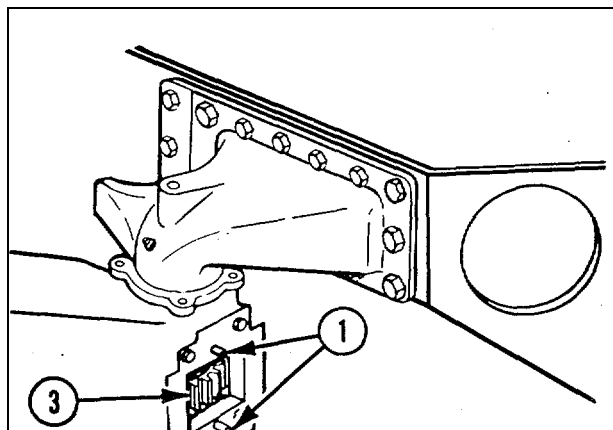


- 8 Remove two reducers (9).
- 9 Remove two preformed packings (10).
- 10 Remove tube elbow (11) and tube fitting locknut (12).
- 11 Remove flat washer (13) and preformed packing (14).

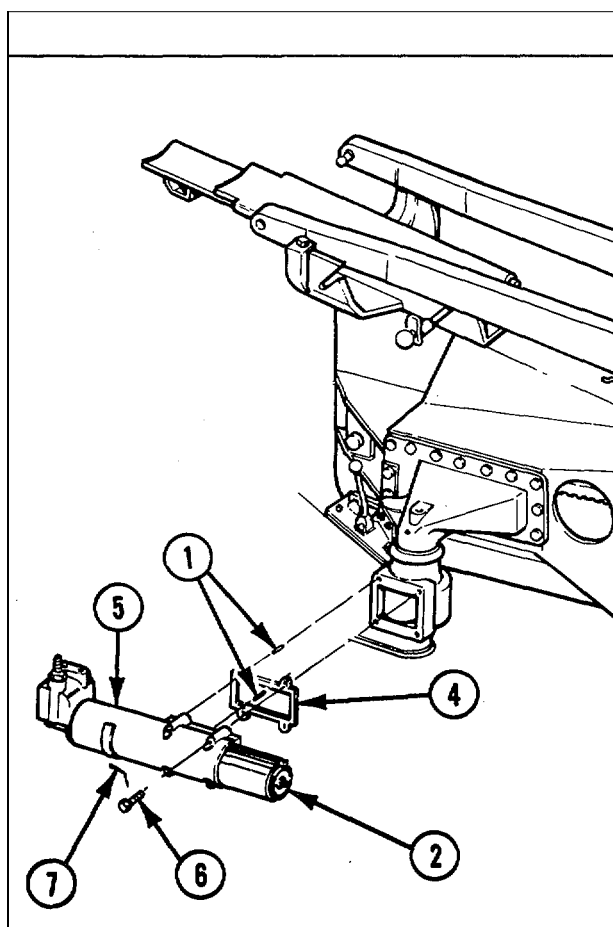


**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**INSTALLATION I**

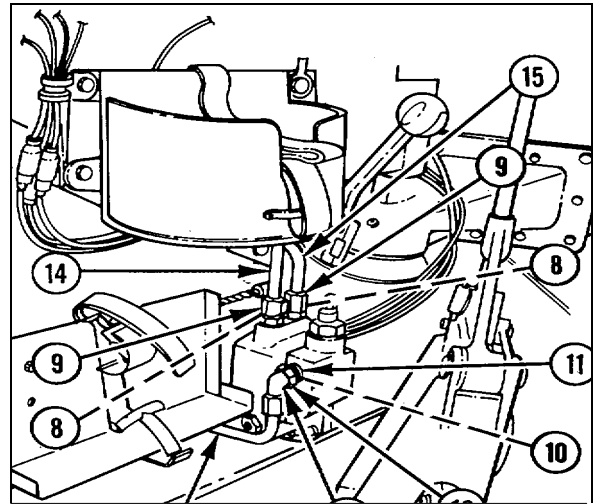
- 1 If necessary, install two new headless straight pins (11).
- 2 Keep loader-rammer against stop.
- 3 Extend tube (2) to full extension.
- 4 Pack drive spur gearshaft (3) and tube (2) teeth with grease (item 11, appx C).
- 5 Reinstall shim (4) and cylinder (5).
- 6 Install four capscrews (6).
- 7 Tighten capscrews (6) to 58 ft-lb (78 N-m).
- 8 Secure capscrews (6) with new lockwire (item 14, appx C) (7).



**2-77. MAINTENANCE OF RAMMER TRAVERSING CYLINDER ASSEMBLY (CONT).**

**INSTALLATION (CONT)**

- 9 Install two new preformed packings (8) and reducers (9).
- 10 Install new preformed packing (10), flat washer (11), tube fitting locknut (12), and tube elbow (13).
- 11 Remove protective coverings from tubes (14, 15, and 16).
- 12 Connect tube (14) to reducer (9).
- 13 Connect tube (15) to reducer (9).
- 14 Connect tube (16) to tube elbow (13).



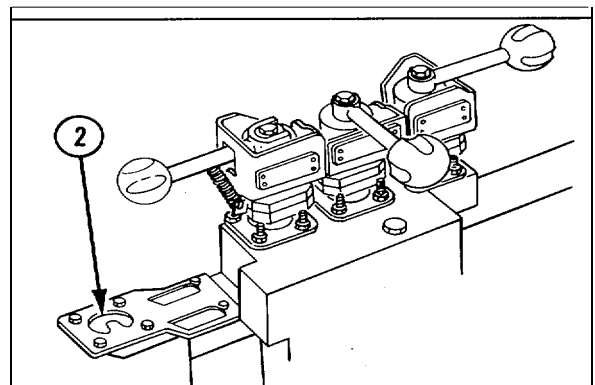
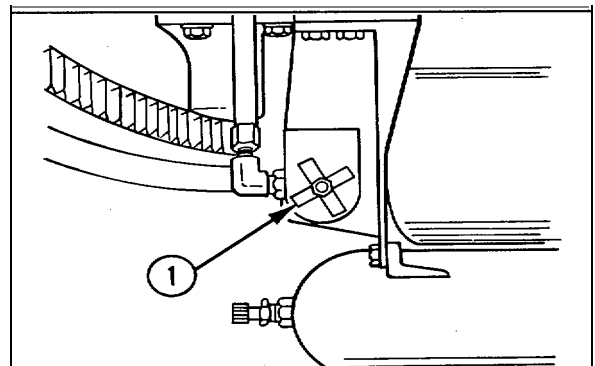
**APPLYING HYDRAULIC PRESSURE**

- 1 Close globe angle valve (1).
- 2 Start engine.

**NOTE**

Hydraulic motor and pump may be used to apply pressure to hydraulic system without starting engine by setting MASTER switch and OIL PUMP MOTOR SWITCH ON.

- 3 Set HYD PUMP/PTO CLUTCH switch to ON.
- 4 Check dial pressure gage (2) indication. Normal pressure is 1600 to 2400 psi (11,032 to 16,548 kPa).
- 5 Stop engine.

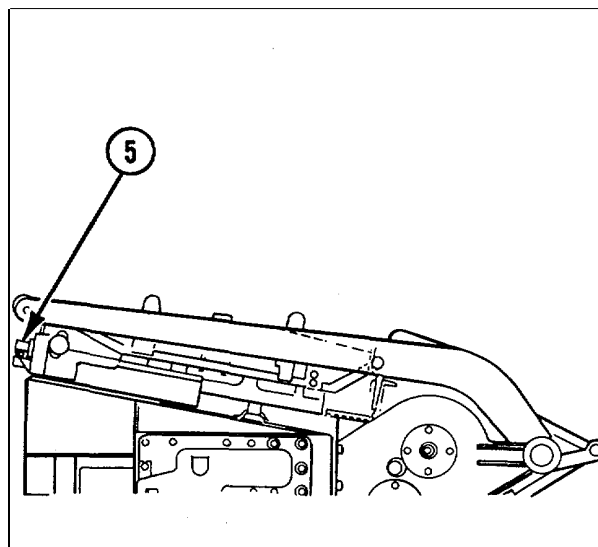
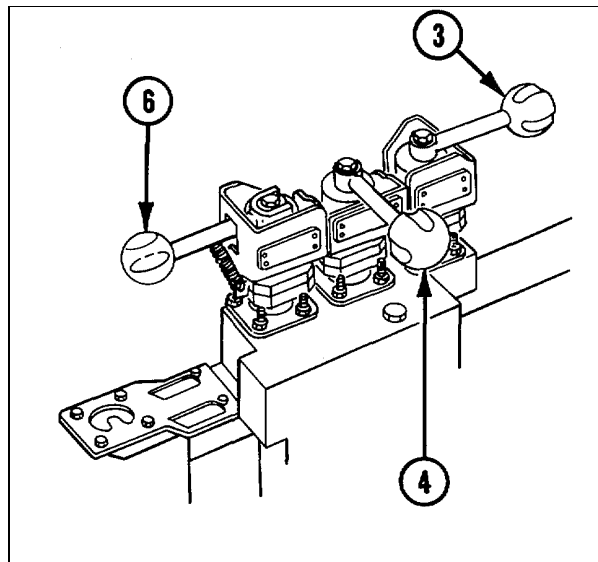


- 6 Traverse loader and rammer in and out of loading position several times, using SWING control handle (3) to bleed air from system.
- 7 Stop with loader and rammer in loading position.
- 8 Operate loader arms in and out several times, using LOADER control handle (4), to bleed air from system.
- 9 Stop with loader arms on tray.
- 10 Traverse loader and rammer to ram position using SWING control handle (3).
- 11 Extend tray into breech, making sure to engage tray interlock switch (5).

**CAUTION**

**Do not operate RAMMER control handle without a projectile in the trough.**

- 12 Extend and retract rammer several times, using RAMMER control handle (6), to bleed air from system.
- 13 Stop with rammer chain in stowed position.
- 14 Place loader and rammer in stowed position.
- 15 Check for leaks in hydraulic lines.



**2-78. MAINTENANCE OF RAMMER INSTALLATION-CHAIN CASE HANDCRANKS AND CASE CLEANOUT COVER ASSEMBLY.**

This task covers: a. *Removal/Disassembly* c. *Reassembly/Installation*  
 b. *Inspection/Repair*

**INITIAL SETUP:**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*References*

TM 9-2350-304-24P-2

*Materials/Parts*

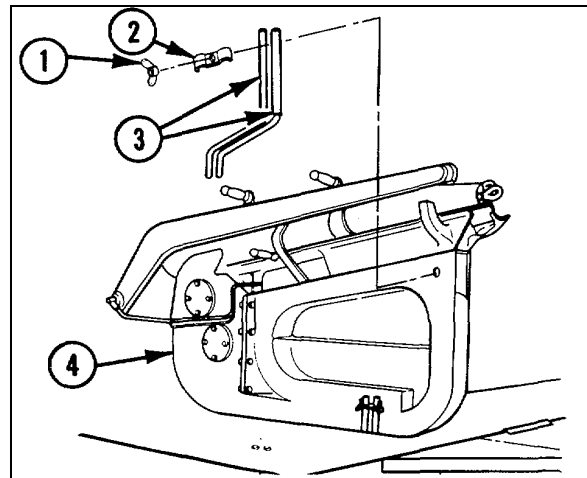
Lockwasher (MS35338-48)

**REMOVAL/DISASSEMBLY**

**NOTE**

**Step 1 refers to the removal of the chain case handcranks.**

- 1 Remove wing nut (1), retaining strap (2), and two chain case handcranks (3) from power loader-rammer (4).



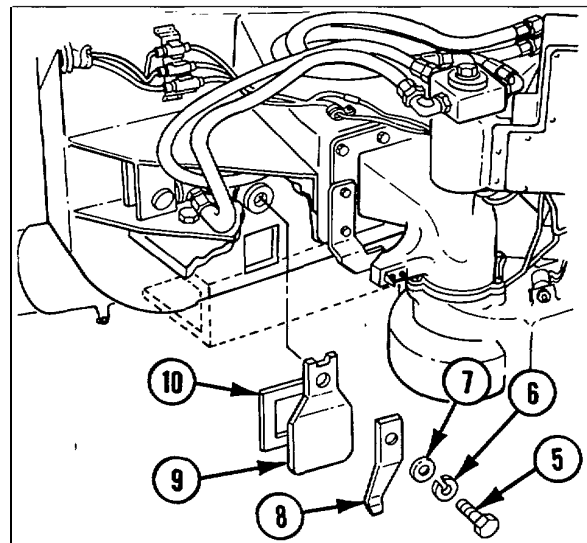
**NOTE**

**Step 2 refers to the removal and disassembly of the case cleanout cover assembly.**

- 2 Remove capscrew (5), lockwasher (6), flat washer (7), cover retaining spring (8), weldment cover (9), and if damaged, nonmetallic seal (10).

**INSPECTION/REPAIR**

- 1 for broken, damaged, or missing parts.
- 2 weldment cover is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 3 is by replacement of authorized parts (TM 9-2350-304-24P-2).

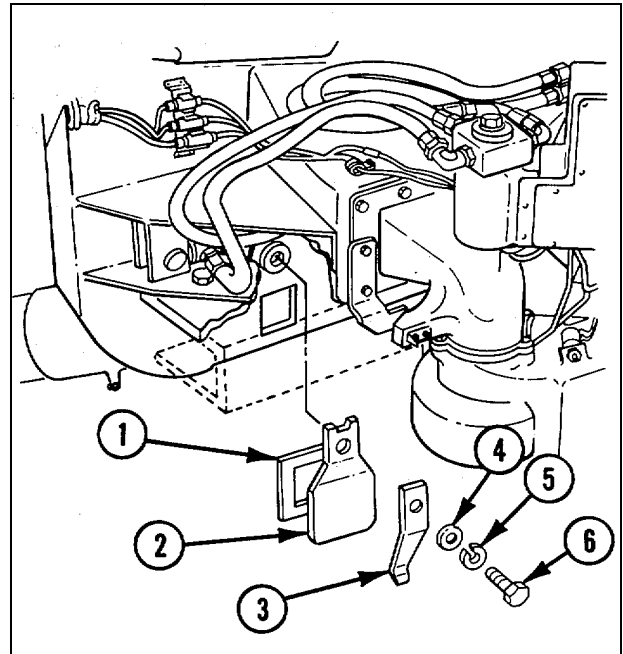


**REASSEMBLY/INSTALLATION**

**NOTE**

Steps 1 and 2 refer to the reassembly and installation of the case cleanout cover assembly.

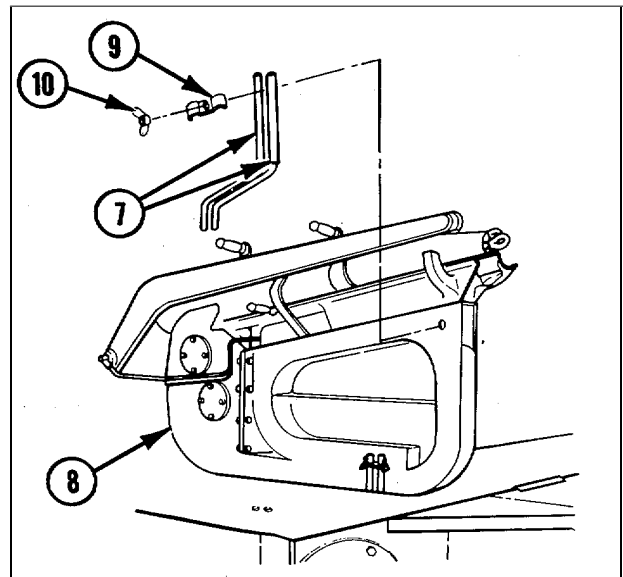
- 1 If necessary, install new nonmetallic seal (1).
- 2 Install weldment cover (2), cover retaining spring (3), flat washer (4), new lockwasher (5), and capscrew (6).



**NOTE**

Step 3 refers to the installation of the chain case handcranks.

3. Install two chain case handcranks (7) on power loader-rammer (8) and secure with retaining strap (9) and wing nut (10).



**SERVICE OF HEADLINK AND CHAIN ASSEMBLY**

For complete service procedures for headlink and chain assembly, refer to page 2-8.

**2-78.1 MAINTENANCE OF POWER LOADER-RAMMER-LOADER ARM, CYLINDER ASSEMBLY, AND RELATED ITEMS.**

This task covers: a. *Removal/Disassembly* c. *Reassembly/Installation*  
 b. *Inspection/Repair*

**INITIAL SETUP:**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

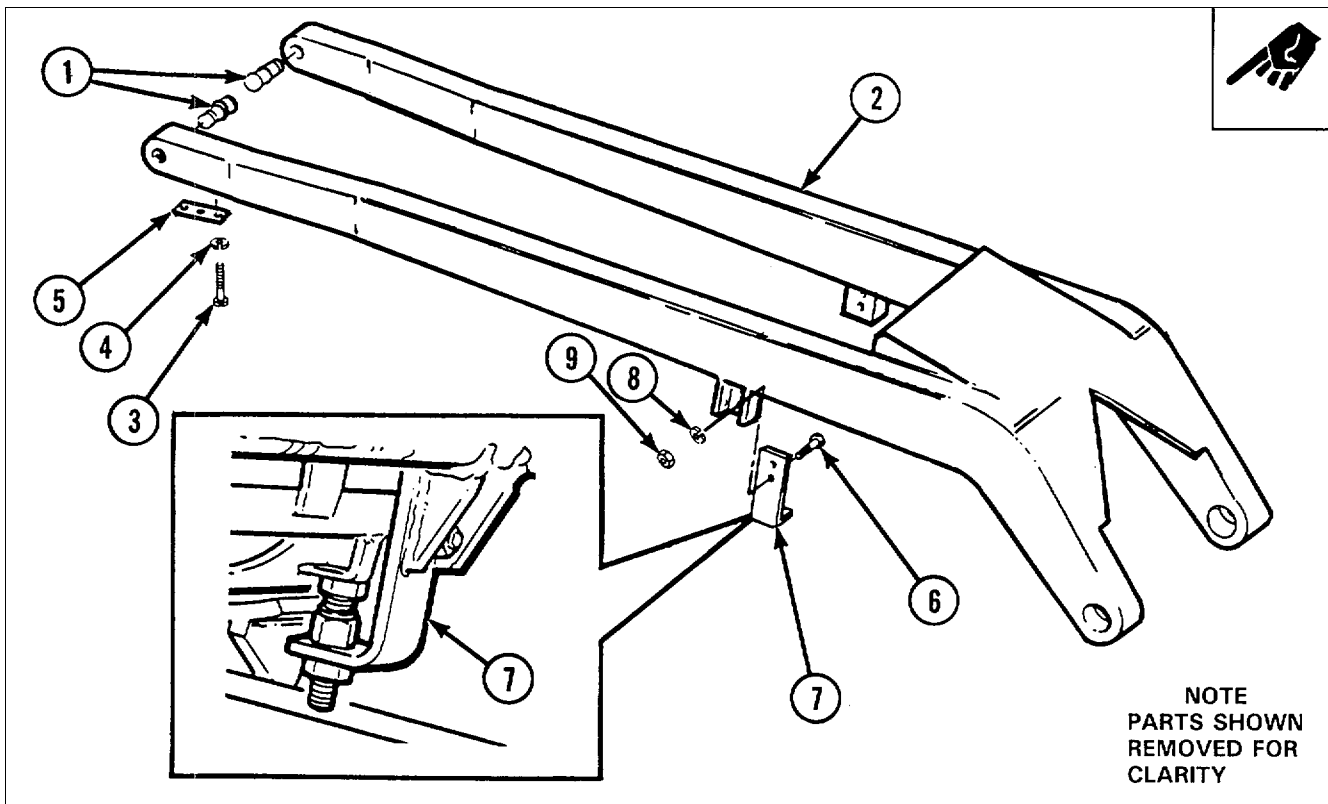
*References*

TM 9-2350-304-24P-2

*Materials/Parts*

Lockwasher (4) (MS35338-44)  
 Lockwasher (4) (MS35338-46)

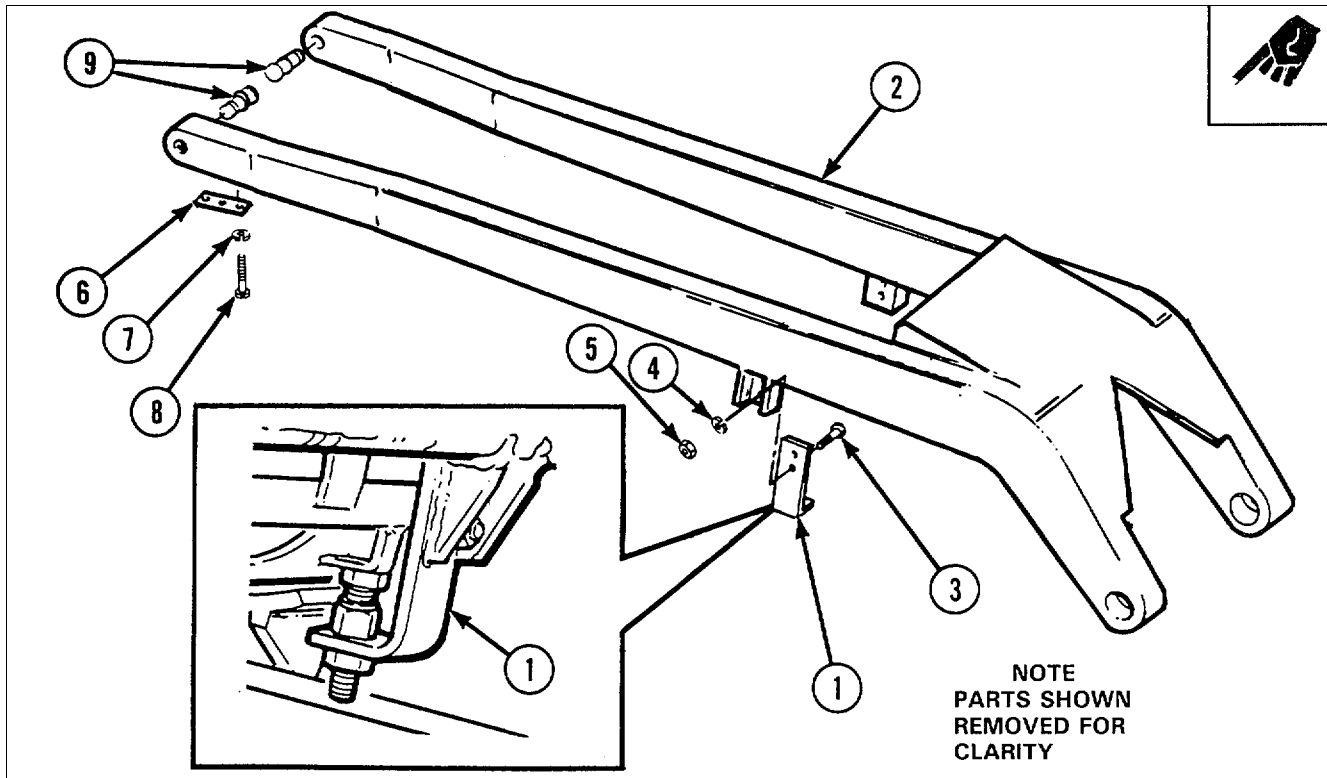
**DISASSEMBLY**



- 1 Remove two threaded straight pins (1) from loader arm (2).
- 2 Remove four capscrews (3), four lockwashers (4), and two plate spacers (5) from loader arm (2).
- 3 Remove four capscrews (6), two stop brackets (7), four lockwashers (8), and four hex nuts (9) from loader arm (2).

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

- 1 Position two stop brackets (1) on loader arm (2) and secure with four cap screws (3), four new lockwashers (4), and four nuts (5).
- 2 Position two plate spacers (6) on loader arm (2) and secure with four new lockwashers (7) and four cap screws (8).
- 3 Install two threaded straight pins (9) in loader arm (2).

Change 1 2-225



**2-79. MAINTENANCE OF RIM LOCK SET.**

This task covers:    a. *Removal/Disassembly*                      c. *Reassembly/Installation*  
                               b. *Inspection/Repair*

**INITIAL SETUP:***Tools and Special Tools*

Ordnance artillery and turret mechanic's  
 tool kit (appx B)  
 Torque wrench (A-A-2411)

*References*

TM 9-2350-304-10  
 TM 9-2350-304-24P-2

*Materials/Parts*

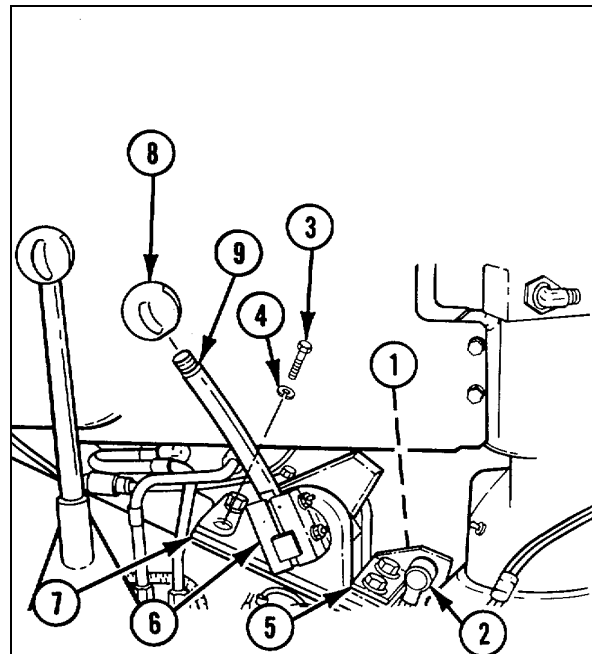
Lockwasher (4) (MS35338-48)  
 Sealing compound (item 21, appx C)

*Equipment Conditions*

Rim lock set does not need to be re-  
 moved to perform maintenance on  
 lever shaft knob.

**REMOVAL/DISASSEMBLY**

- 1 Rotate loader and rammer to STOW position. Refer to TM 9-2350-304-10.
- 2 Remove nut and washer (1) from pivot interlock push switch (2).
- 3 Remove pivot interlock push switch (2). Refer to page 2-276.
- 4 Remove four capscrews (3) and four lockwashers (4).
- 5 Remove angle bracket (5), rim lock set (6), and cushioning pad (7).
- 6 Unscrew lever shaft knob (8) from manual control lever (9).

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged or missing parts.
- 2 If rim lock set is damaged, notify direct support maintenance.
- 3 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY/INSTALLATION**

- 1 Apply sealing compound (item 21, appx C) to threads on manual control lever (1) and secure shaft knob (2) to manual control lever.
- 2 Install cushioning pad (3), rim lock set (4), angle bracket (5), four new lockwashers (6), and four capscrews (7).
- 3 Install pivot interlock push switch (8) and secure using nut and washer (9). Refer to page 2-276.
- 4 Using SWING control handle, set loader and rammer to full LOAD position.

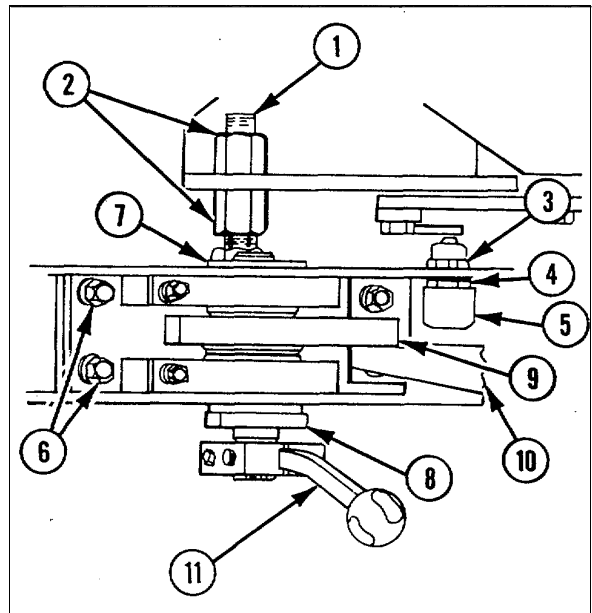
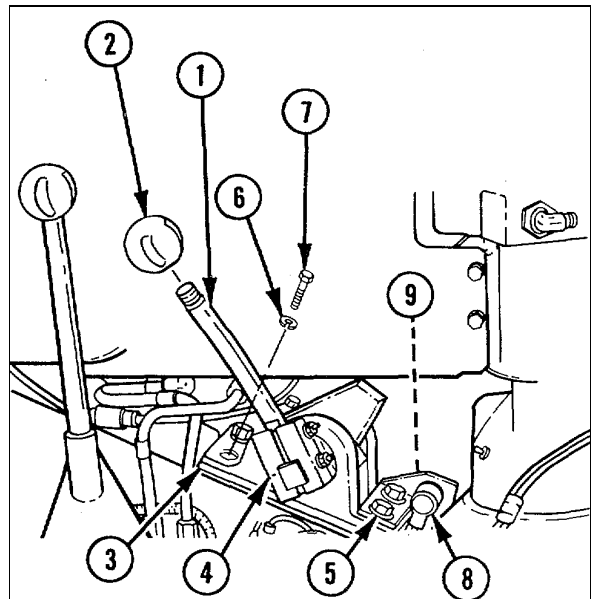
**ADJUSTMENT**

- 1 By sight, aline rammer with gun tube by adjusting capscrew (1) and two selflocking nuts (2).

**NOTE**

**Capscrew should contact edge of cushioning pad.**

- 2 Turn two nuts (3 and 4) to adjust position of pivot interlock push switch (5) until plunger travels 0.125 to 0.188 in. (3.175 to 4.775 mm).
- 3 Tighten two nuts (3 and 4) to secure adjustment.
- 4 Loosen two capscrews (6).
- 5 Adjust machine thread bushings (7) and (8) to position lock tongue (9) against pivot arm (10).
- 6 Turn machine thread bushing (8) clockwise until manual control lever (1) cannot be rotated.
- 7 Turn machine thread bushing (8) counterclockwise 20 degrees.
- 8 Torque two capscrews (6) to 18.00 ft-lb (24.41 N-m).



**2-80. MAINTENANCE OF RIM LATCH SET.**

This task covers:    a. *Removal/Disassembly*                      c. *Reassembly/Installation*  
                               b. *Inspection/Repair*

**INITIAL SETUP:***Tools and Special Tools*

Ordnance artillery and turret mechanic's  
 tool kit (appx B)

*References*

TM 9-2350-304-10  
 TM 9-2350-304-24P-2

*Materials/Parts*

Cotter pin (MS24665-423)  
 Lockwasher (4) (MS35338-48)  
 Shim (2) (11675464)

**REMOVAL**

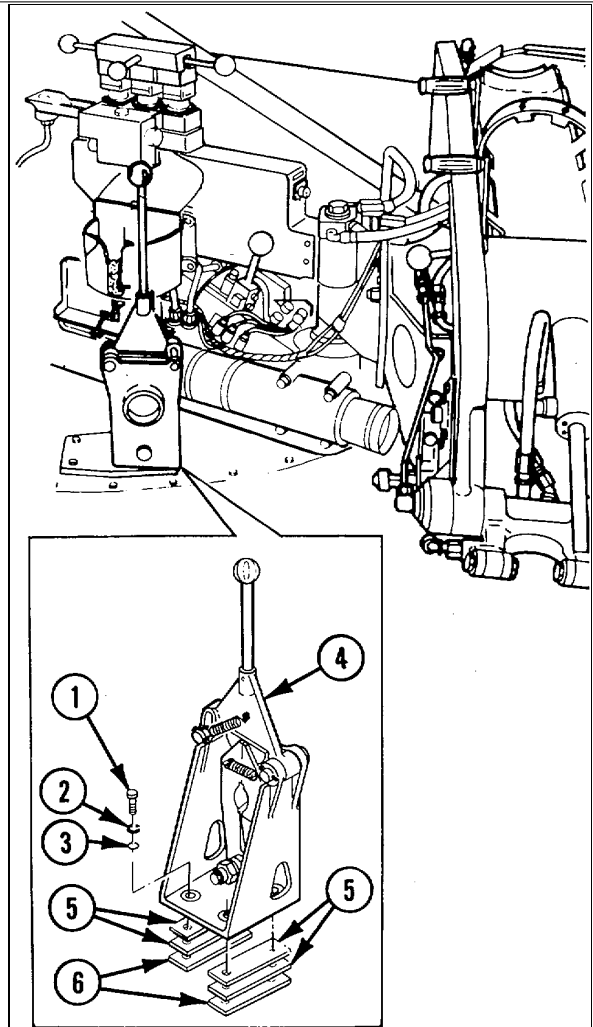
- 1 Rotate loader-rammer to ram position. Refer to TM 9-2350-304-10.
- 2 Remove four capscrews (1), four lockwashers (2), and four flat washers (3).
- 3 Remove rim latch set (4), four plate spacers (5), and two shims (6).

**INSPECTION/REPAIR**

1. Inspect for broken, damaged, or missing parts.
2. If rim latch set is damaged, notify direct support maintenance.
3. Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

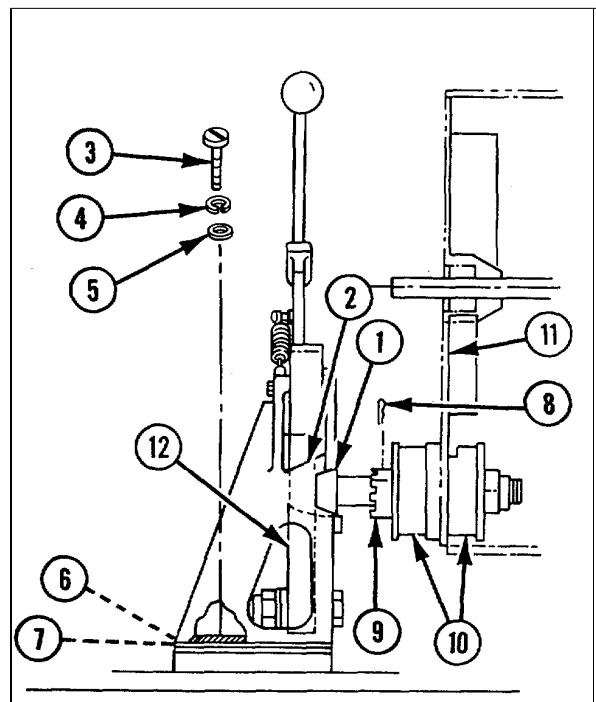
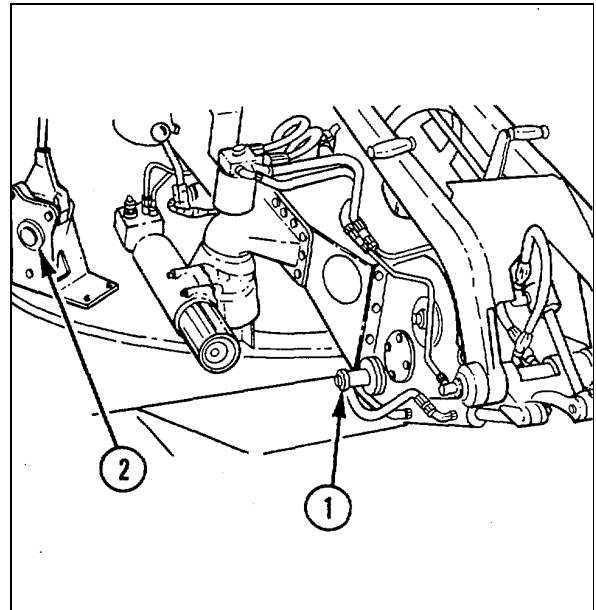
**INSTALLATION**

- 1 Install two new shims (6), four plate spacers (5), and rim latch set (4).
- 2 Install four flat washers (3), four new lockwashers (2), and four capscrews (1).



**ADJUSTMENT**

- 1 Move loader-rammer until plunger (1) is near latch hole (2).
- 2 Remove four capscrews (3), four lockwashers (4), and four flat washers (5).
- 3 Remove four plate spacers (6) and two shims (7).
- 4 Install plate spacers (6) and new shims (7), as needed, to aline plunger (1) and latch hole (2) by sight.
- 5 Install four capscrews (3), four new lockwashers (4), and as many flat washers (5) as needed to prevent capscrews from bottoming out on deck.
- 6 Remove cotter pin (8).
- 7 Tighten slotted plain nut (9) until plunger (1) is fastened against rubber bushing (10) and mechanical housing (11).
- 8 Operate SWING control valve to move loader-rammer into STOW position.
- 9 Adjust plunger (1) until it engages latch bar (12) without play.
- 10 To tighten engagement, hold slotted plain nut (9) stationary and turn plunger (1) clockwise.
- 11 To loosen engagement, hold slotted plain nut (9) stationary and turn plunger (1) counterclockwise.
- 12 Install new cotter pin (8).



**2-81. MAINTENANCE OF POWER LOADER-RAMMER.**

This task covers:    a. *Removal/Disassembly*                      c. *Reassembly/Installation*  
                               b. *Inspection/Repair*

**INITIAL SETUP:**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

References

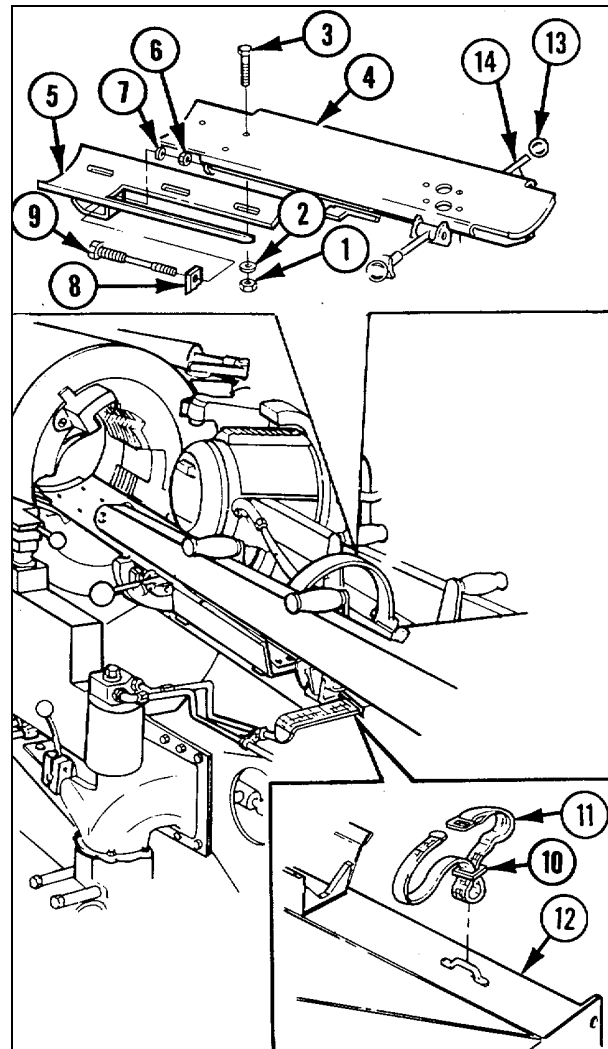
TM 9-2350-304-24P-2

*Materials/Parts*

Sealing compound (item 21, appx C)  
 Self-locking nut (4) (MS21042-3)  
 Self-locking nut (MS21042-6)

**DISASSEMBLY**

- 1 Remove four self-locking nuts (1), four flat washers (2), and four machine screws (3) from rammer trough (4) and ammunition loading tray (5).
- 2 Remove self-locking nut (6), flat washer (7), spacer (8), and clevis bolt (9).
- 3 Remove ammunition loading tray (5) from rammer trough (4).
- 4 Remove buckle (10) and webbing strap (11) from mechanical guard (12).
- 5 Remove two knobs (13) from two handles (14).

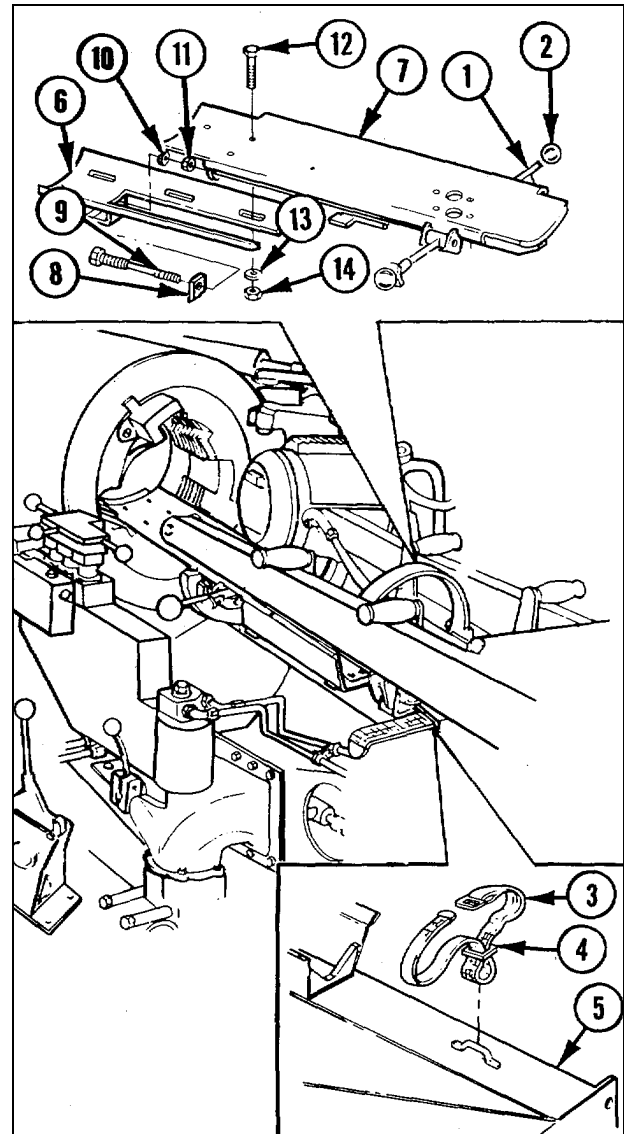


**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

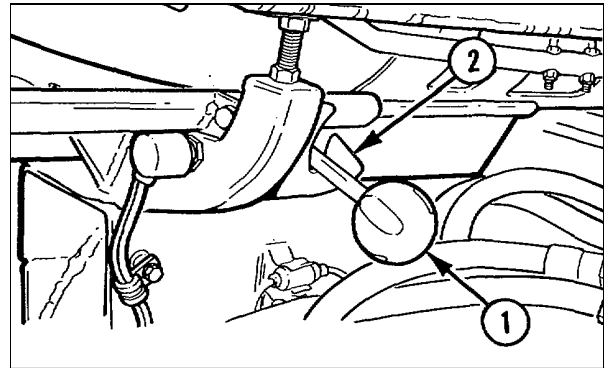
- 1 Apply sealing compound (item 21, appx C) to threads on two handles (1).
- 2 Install two knobs (2) on two handles (1).
- 3 Install webbing strap (3) and buckle (4) on mechanical guard (5).
- 4 Install ammunition loading tray (6) on rammer trough (7).
- 5 Install spacer (8), clevis bolt (9), flat washer (10), and new self-locking nut (11) into ammunition loading tray (6).
- 6 Install four machine screws (12), four flat washers (13), and four new selflocking nuts (14) into rammer trough (7) and ammunition loading tray (6).



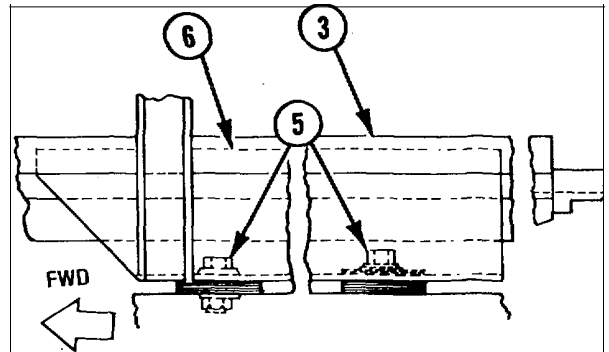
**2-81. MAINTENANCE OF POWER LOADER-RAMMER (CONT).**

**ADJUSTMENT**

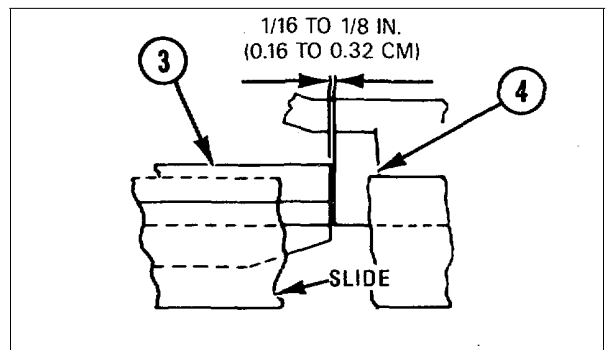
1 With trough handle (1) engaged in latch (2), check that clearance between aft end of rammer trough (3) and forward end of ammunition loading tray (4) is 1/16 to 1/8 in. (0.16 to 0.32 cm). If required, loosen four machine screws (5) and move rammer trough slide (6) until proper clearance of 1/16 to 1/8 in. (0.16 to 0.32 cm) is obtained. Tighten screws.



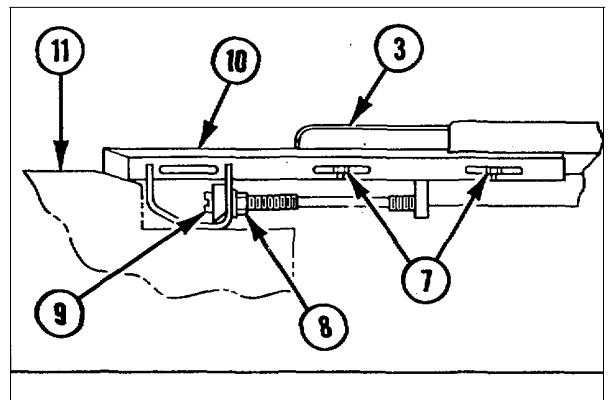
2 With trough handle (1) engaged in latch (2) and ammunition loading tray (4) and projectile on rammer trough (3), loosen four machine screws (7).



3 Loosen self-locking nut (8) on clevis bolt (9). Turn clevis bolt (9) to position trough support (10) to contact conical surface at entrance to tube (11). Tighten self-locking nut (8) on clevis bolt (9) and tighten four machine screws (7).



4 Trough support (10) should slide freely into tube (11) each time rammer trough (3) is moved to forward position. If necessary, adjust height of shim pack.



**2-82. MAINTENANCE OF HEADLINK ASSEMBLY.**

This task covers:      a. <i>Disassembly</i> b. <i>Inspection/Repair</i> c. <i>Reassembly</i>		
<b>INITIAL SETUP</b>		
<p><i>Tools and Special Tools</i>                  Ordnance artillery and turret mechanic's tool kit (appx B)</p> <p><i>References</i>                  TM 9-2350-304-24P2</p>	<p><i>General Safety Instructions</i></p> <p><b>WARNING</b>                  Parts of headlink assembly are under spring tension. Use caution in removal to prevent injury.</p>	

**DISASSEMBLY**

**NOTE**

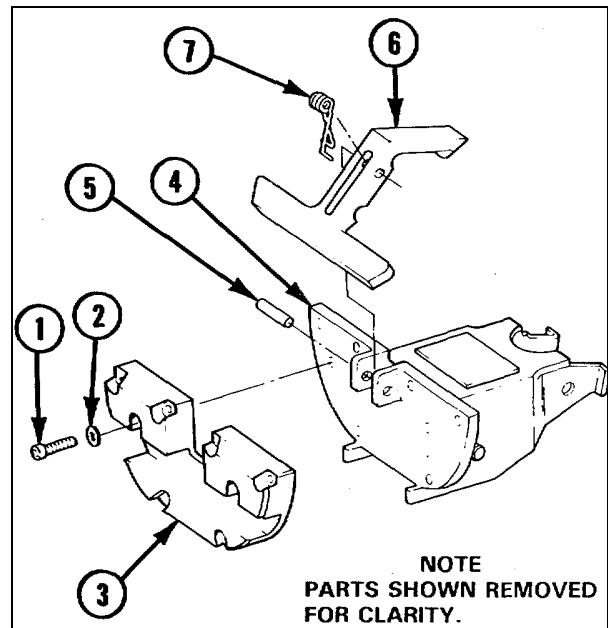
Following procedures can be performed with headlink support installed on the howitzer.

- 1 Remove eight machine screws (1), eight flat washers (2), and headlink pad (3) from headlink support (4).

**WARNING**

Parts of headlink assembly are under spring tension. Use caution in removal to prevent injury.

- 2 Using drift, remove spring pin (5) from headlink support (4).
- 3 Remove headlink trigger (6) and helical torsion spring (7).



**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

- 1 Install headlink trigger (6) and helical torsion spring (7), and using drift, install spring pin (5).
- 2 Install headlink pad (3), eight flat washers (2), and eight machine screws (1) on headlink support (4).



**2-83. MAINTENANCE OF LOADER-RAMMER EXTERIOR HYDRAULIC LINES AND FITTINGS.**

This task covers:

a. <i>Relieving Hydraulic Pressure</i>	d. <i>Reassembly/Installation</i>
b. <i>Removal/Disassembly</i>	e. <i>Applying Hydraulic Pressure</i>
c. <i>Inspection/Repair</i>	

**INITIAL SETUP**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*References*

TM 9-2350-304-24P-2

*General Safety Instructions*

**WARNING**

- Before relieving hydraulic pressure, be sure travel lock is

engaged and vehicle is on as level ground as possible. This will stop the cannon from sliding out of battery.

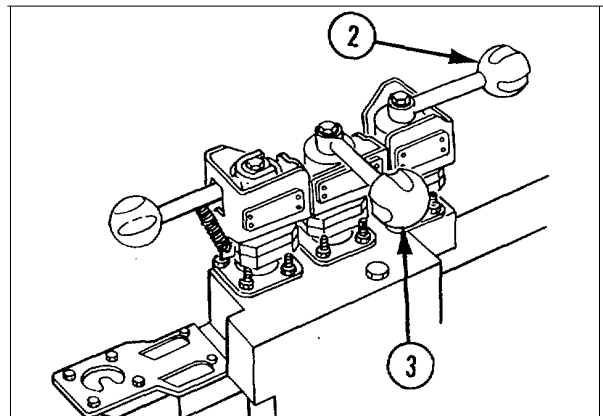
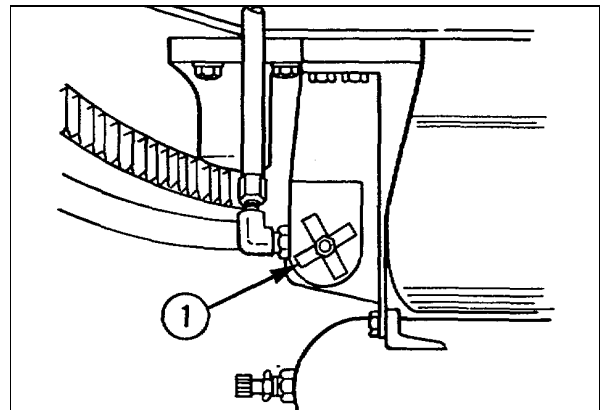
- Hydraulic system is under high pressure. Make sure all hydraulic pressure is relieved before removal of any tubes or fittings. Follow safety procedures to prevent injury. Wipe up spilled hydraulic fluid.

**RELIEVING HYDRAULIC PRESSURE**

**WARNING**

**Before relieving hydraulic pressure, be sure travel lock is engaged and vehicle is on as level ground as possible. This will stop the cannon from sliding out of battery.**

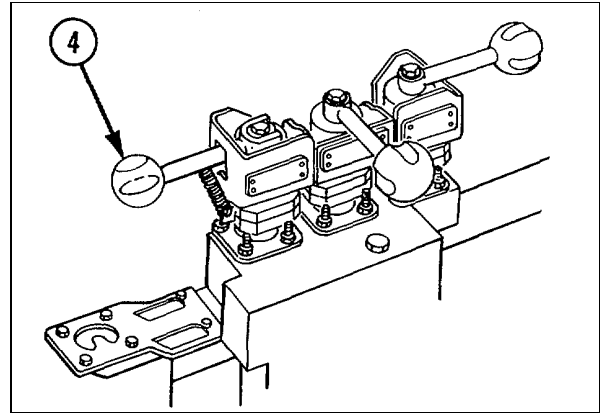
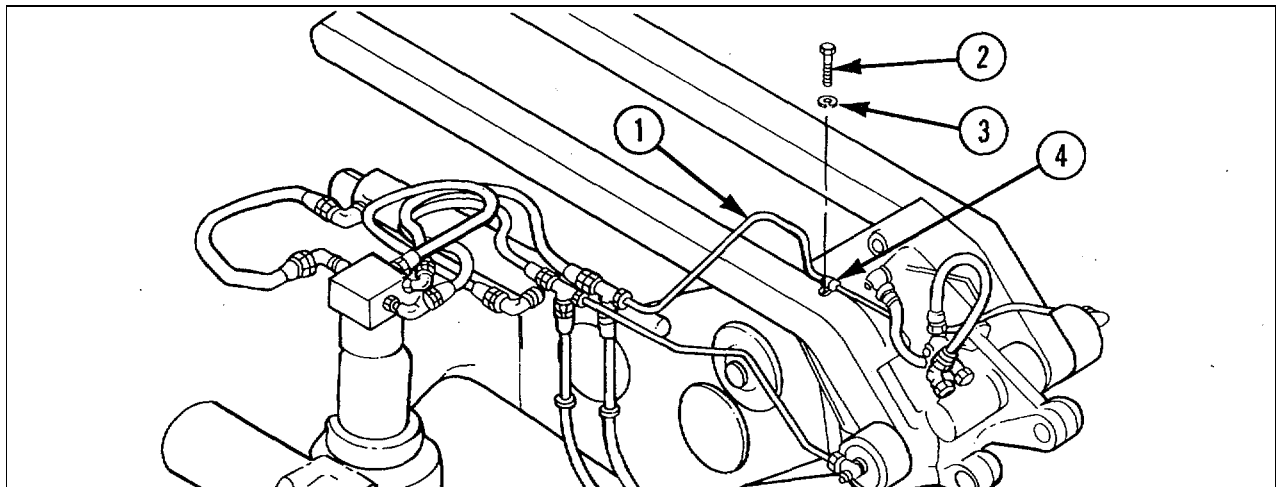
- 1 Set MASTER switch to OFF and open globe angle valve (1).
- 2 Move SWING control handle (2) to full LOAD.
- 3 Move SWING control handle (2) to full STOW.
- 4 Repeat steps 2 and 3 several times to relieve pressure from system.
- 5 Move LOADER control handle (3) to full IN.
- 6 Move LOADER control handle (3) to full OUT.
- 7 Repeat steps 5 and 6 several times to relieve pressure from system.



**CAUTION**

Do not operate rammer control valve handle without a projectile in the trough.

- 8 Move RAMMER control handle (4) to RAM several times to relieve pressure from system.

**REMOVAL/DISASSEMBLY****WARNING**

Hydraulic system is under high pressure. Make sure all hydraulic pressure is relieved before removal of any tubes or fittings. Follow safety procedures to prevent injury. Wipe up spilled hydraulic fluid.

**NOTE**

The following steps are written and illustrated for one hydraulic line, but apply to all unit level loader-rammer hydraulic lines.

- 1 Check hydraulic line for leaks.
- 2 Disconnect each end of hydraulic line (1) at nearest disconnect.
- 3 Remove necessary capscrews (2), lock-washers (3), loop clamps (4), and hydraulic line (1).

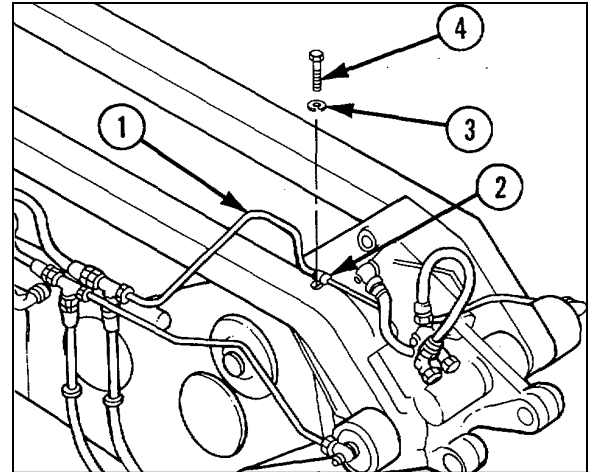
**2-83. MAINTENANCE OF LOADER-RAMMER EXTERIOR HYDRAULIC LINES AND FITTINGS (CONT).**

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 For complete repair of hydraulic fittings, refer to page 2-82.
- 3 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY/INSTALLATION**

Connect each end of hydraulic line (1) at nearest connector, and secure using necessary loop clamps (2), new lockwashers (3), and capscrews (4).



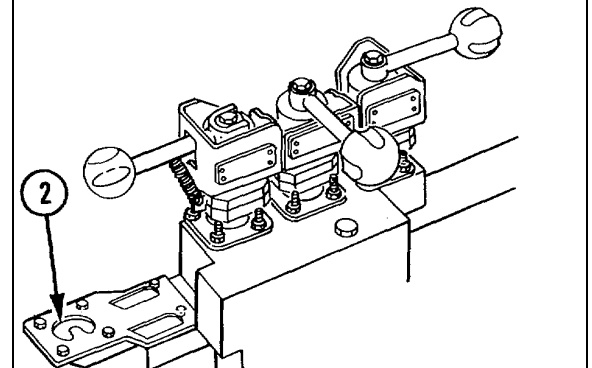
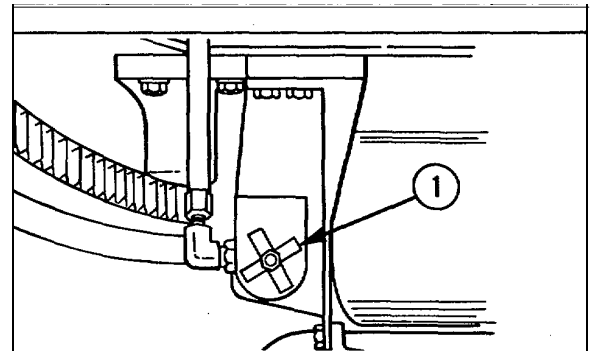
**APPLYING HYDRAULIC PRESSURE**

- 1 Close globe angle valve (1).
- 2 Start engine.

**NOTE**

Hydraulic motor and pump may be used to apply pressure to hydraulic system without starting engine by setting MASTER switch and OIL PUMP MOTOR SWitch ON.

- 3 Set HYD PUMP/PTO CLUTCH switch to ON.
- 4 Check dial assembly pressure gage (2) indication. Normal pressure is 1 600 to 2400 psi (11,032 to 16,548 kPa).
- 5 Stop engine.

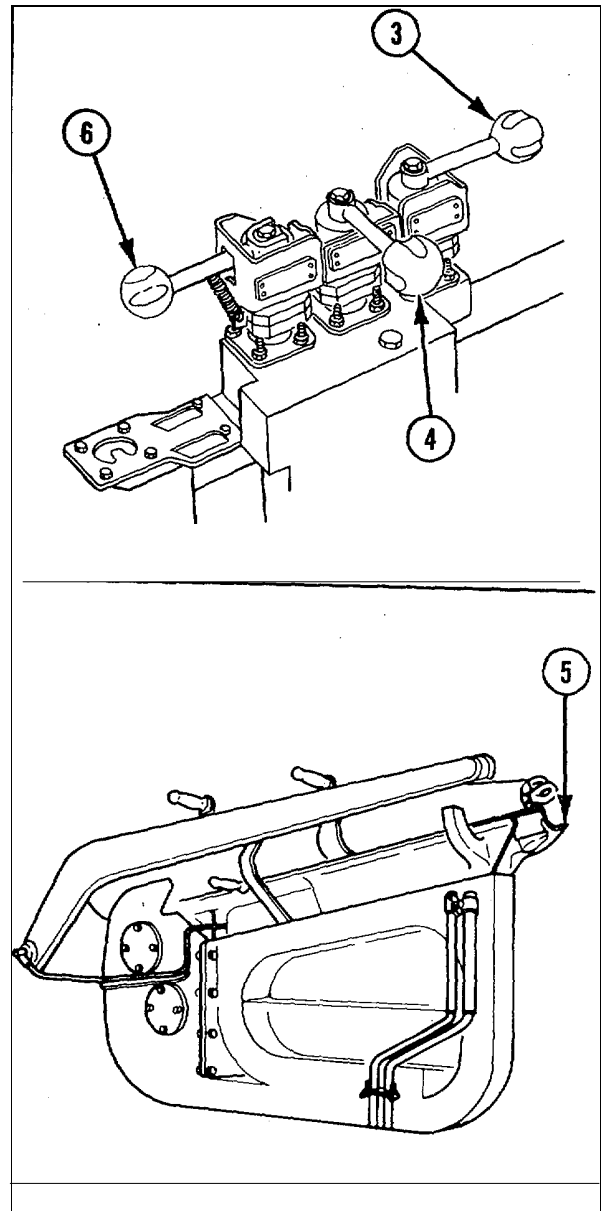


- 6 Traverse loader-rammer in and out of loading position several times, using SWING control handle (3) to bleed air from system.
- 7 Stop with loader-rammer in loading position.
- 8 Operate loader arms in and out several times, using LOADER control handle (4) to bleed air from system.
- 9 Stop with loader arms on tray.
- 10 Traverse loader-rammer to ram position using SWING control handle (3).
- 11 Extend tray into breech, making sure to engage tray interlock switch (5).

**CAUTION**

**Do not operate RAMMER control handle (6) without a projectile in the trough.**

- 12 Extend and retract rammer several times using RAMMER control handle (6) to bleed air from system.
- 13 Stop with rammer chain in stowed position.
- 14 Place loader-rammer in stowed position.



**2-84. MAINTENANCE OF HYDRAULIC SYSTEM INSTALLATION-VALVE CONTROL RAMMER SAFETY COVER ASSEMBLY AND KNOB VALVE HANDLES.**

This task covers:      a. *Removal/Disassembly*  
                                  b. *Inspection/Repair*

c. *Reassembly/Installation*

**INITIAL SETUP**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*References*

TM 9-2350-304-24P-2

*Materials/Parts*

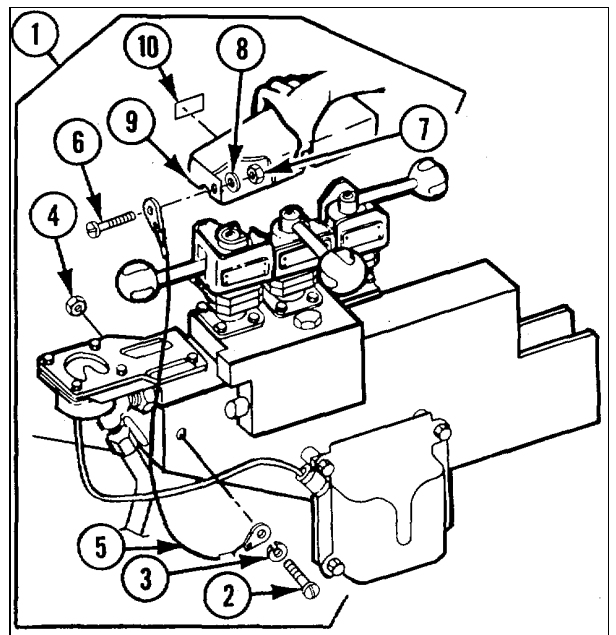
Lockwasher (MS35338-44)  
 Sealing compound (item 20, appx C)  
 Self-locking nut (MS21044N3)

**REMOVABLE/DISASSEMBLY**

**NOTE**

**Steps 1 thru 4 refer to removal/disassembly of valve control rammer safety cover assembly.**

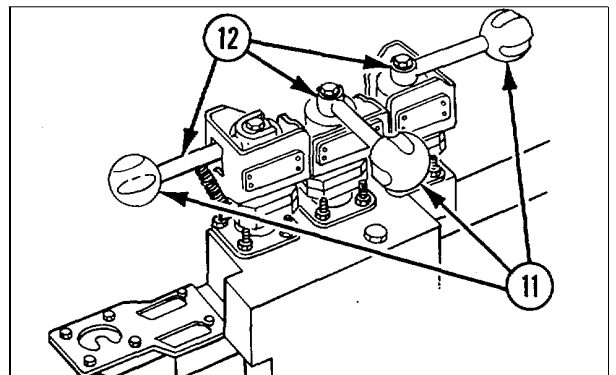
- 1 Remove valve control rammer safety cover assembly (1) from loader-rammer controls.
- 2 Remove capscrew (2), lockwasher (3), and nut (4) securing rammer control cover wire rope assembly (5) to loader-rammer controls.
- 3 Remove machine screw (6), self-locking nut (7), flat washer (8), and rammer control cover wire rope assembly (5) from cover (9).
- 4 If damaged, remove identification plate (10) from cover (9).



**NOTE**

**Step 5 refers to removal/disassembly of knob valve handles.**

- 5 Unscrew three valve handle knobs (11) from three manual control handles (12).



**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY/INSTALLATION**

**NOTE**

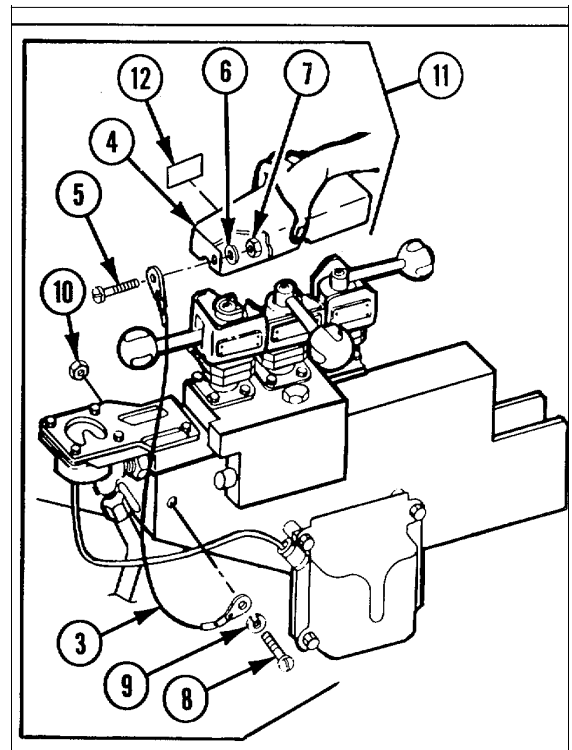
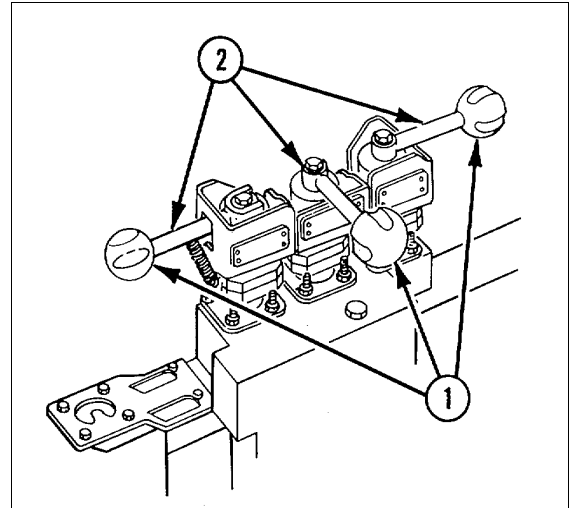
Step 1 refers to reassembly/installation of knob valve handles.

- 1 Apply sealing compound (item 20, appx C) to threads and install three valve handle knobs (1) on three manual control handles (2).

**NOTE**

Steps 2 thru 5 refer to reassembly/installation of valve control rammer safety cover assembly.

- 2 Install rammer control cover wire rope assembly (3) to cover (4) and secure with machine screw (5), flat washer (6), and new self-locking nut (7).
- 3 Secure rammer control cover wire rope assembly (3) and cover (4) to loader-rammer controls using capscrew (8), new lockwasher (9), and nut (10).
- 4 Install valve control rammer safety cover assembly (11) over loader-rammer controls.
- 5 If necessary, install new identification plate (12) on cover (4).



**2-85. MAINTENANCE OF TRAVERSING AND ELEVATING DRIVE BREATHERS.**

This task covers:		
a. <i>Removal</i>	b. <i>Inspection/Repair</i>	c. <i>Installation</i>
<b>INITIAL SETUP</b>		
<i>Tools and Special Tools</i>	<i>References</i>	
Ordnance artillery and turret mechanic's tool kit (appx B)	TM 9-2350-304-24P-2	

**REMOVAL**

**NOTE**

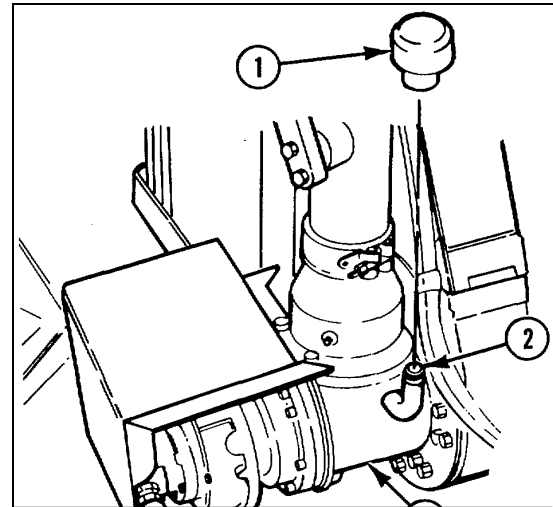
**Step 1 is written and illustrated for elevating drive housing breather.**

- 1 Unscrew and remove elevating drive housing breather (1) from pipe elbow (2) on elevating hydraulic drive unit (3).

**NOTE**

**Step 2 is written and illustrated for traversing drive breather.**

- 2 Unscrew and remove traversing drive breather (4) from reservoir (5).



**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-340-24P-2).

**INSTALLATION**

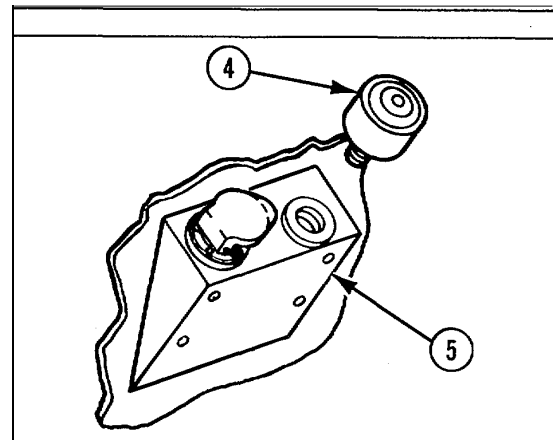
**NOTE**

**Step 1 is written and illustrated for the traversing drive breather.**

- 1 Install traversing drive breather (4) on reservoir (5).

**NOTE**

**Step 2 is written and illustrated for the elevating drive housing breather.**



- 2 Install elevating housing breather (1) on pipe elbow (2) on elevating hydraulic drive unit (3).

**2-86. MAINTENANCE OF TURRET DECELERATION VALVE TO TURRET DECELERATION SWITCH WIRING HARNESS.**

This task covers:      a. *Removal*      b. *Inspection/Repair*      c. *Installation*

**INITIAL SETUP**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*Materials/Parts*

Lockwasher (2) (MS35333-42)

*References*

TM 9-2350-304-24P-2

*General Safety Instructions*

**WARNING**

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

**REMOVAL**

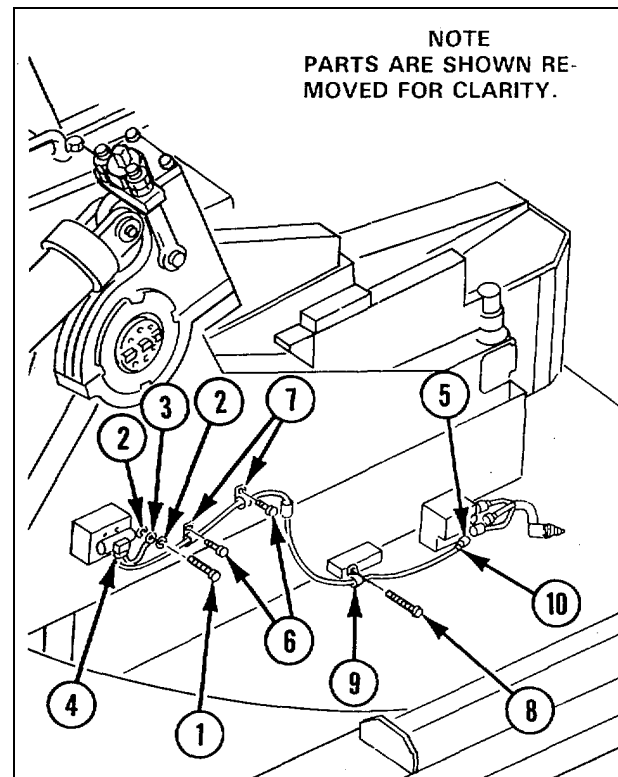
**WARNING**

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

**NOTE**

Tag all wires and leads before disconnecting to ensure proper installation.

- 1 Remove capscrew (1) and two lockwashers (2) and disconnect ground terminal (3).
- 2 Disconnect terminal assembly (4).
- 3 Disconnect shell assembly (5).
- 4 Remove two bolts (6) and two loop clamps (7).



- 5 Remove bolt (8) and loop clamp (9).
- 6 Remove turret deceleration valve to turret deceleration switch wiring harness (10).

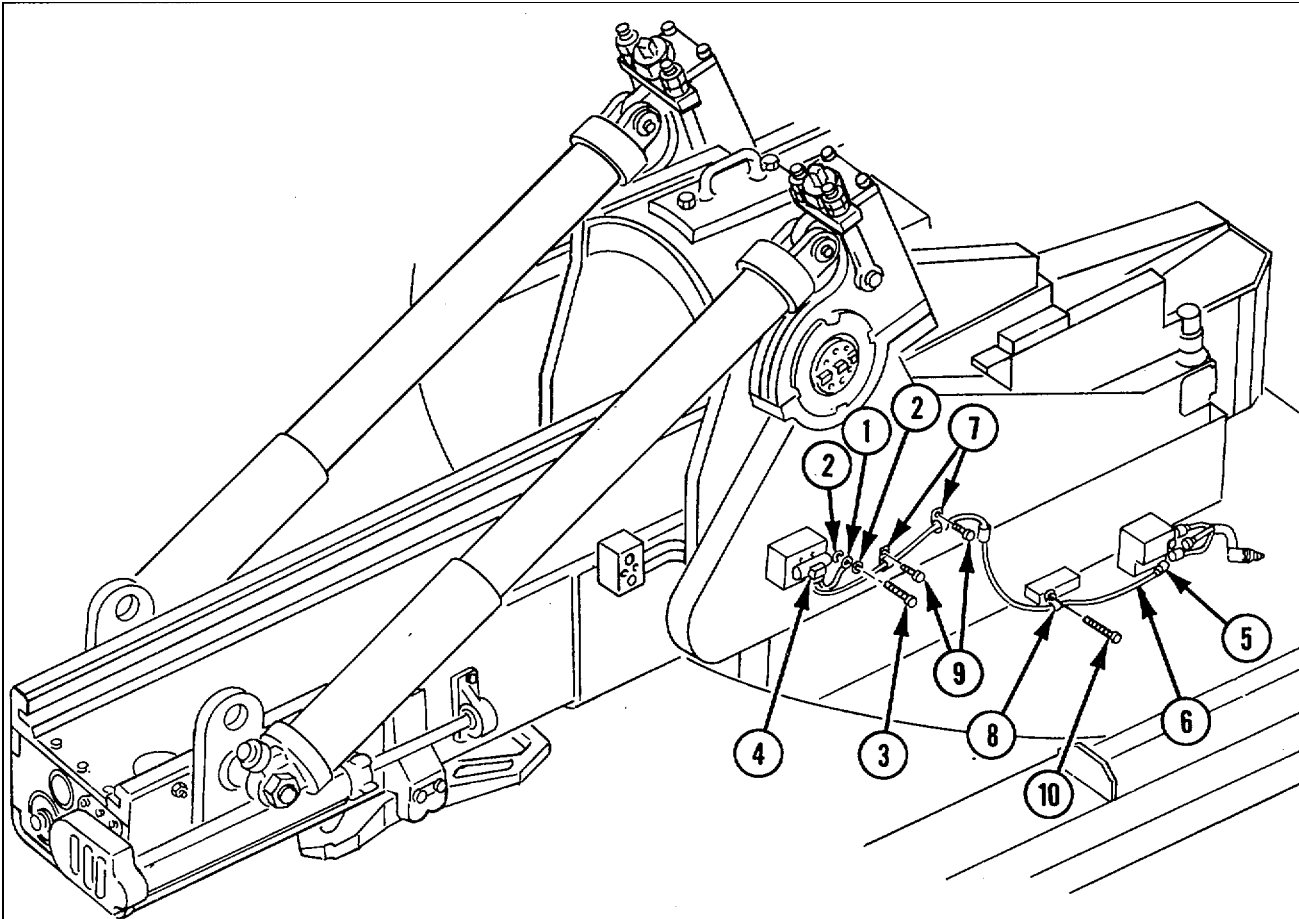


## 2-86. MAINTENANCE OF TURRET DECELERATION VALVE TO TURRET DECELERATION SWITCH WIRING HARNESS (CONT).

### INSPECTION/REPAIR

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

### INSTALLATION



#### **CAUTION**

**Make sure wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.**

- 1 Connect ground terminal (1), and secure using two new lockwashers (2) and capscrew (3).
- 2 Connect terminal assembly (4).
- 3 Connect shell assembly (5).
- 4 Secure turret deceleration valve to turret deceleration switch wiring harness (6) using two loop clamps (7), loop clamp (8), two bolts (9), and bolt (10).

**2-87. MAINTENANCE OF TURRET DECELERATION WIRING HARNESS.**

This task covers:	a. <i>Removal</i>	c. <i>Inspection/Repair</i>	e. <i>Installation</i>
	b. <i>Disassembly</i>	d. <i>Reassembly</i>	f. <i>Adjustment</i>

**INITIAL SETUP**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*Materials/Parts*

Lockwasher (2) (MS35333-40)  
Lockwire (item 14, appx C)

*References*

TM 9-2350-304-24P-2

*General Safety Instructions*

**WARNING**

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

**REMOVAL**

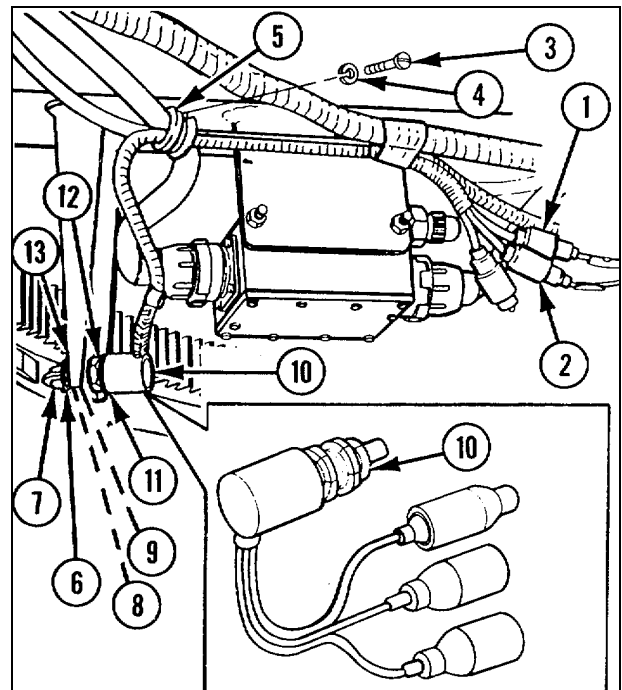
**WARNING**

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

**NOTE**

Tag all wires and leads before disconnecting to ensure proper installation.

- 1 Disconnect electrical connectors (1 and 2).
- 2 Remove capscrew (3), lockwasher (4), and loop clamp (5).
- 3 Remove lockwire (6).



- 4 Remove roller guide (7).
- 5 Remove lower nut (8) and washer (9).
- 6 Remove sensitive switch (10), key washer (11), and nut (12) from bracket (13).

**2-87. MAINTENANCE OF TURRET DECELERATION WIRING HARNESS (CONT).**

**DISASSEMBLY**

For complete disassembly of turret deceleration wiring harness, refer to page 2-75.

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 If sensitive switch is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 3 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

For complete reassembly of turret deceleration wiring harness, refer to page 2-75.

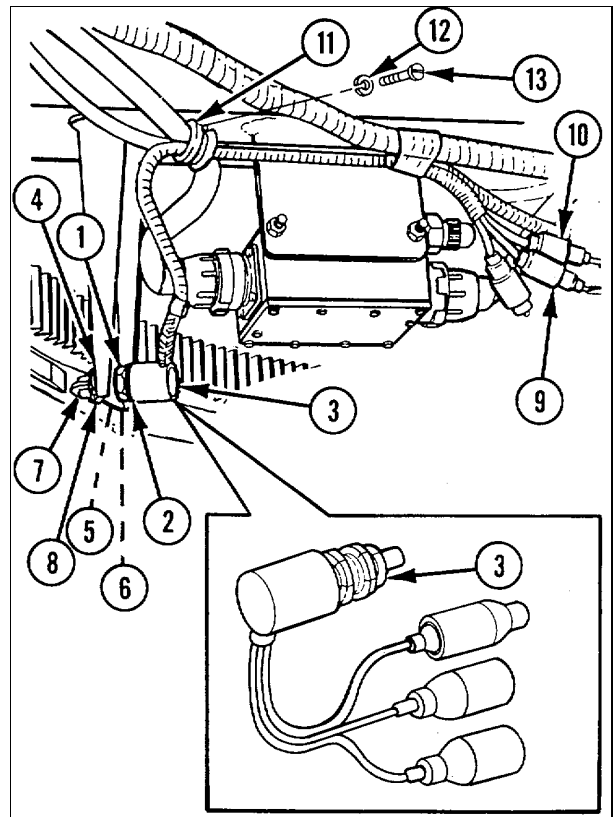
**INSTALLATION**

- 1 Install nut (1) and key washer (2) on sensitive switch (3).
- 2 Install sensitive switch (3) on bracket (4), and secure using washer (5) and lower nut (6).
- 3 Install roller guide (7), and secure using new lockwire (item 14, appx C) (8).

**CAUTION**

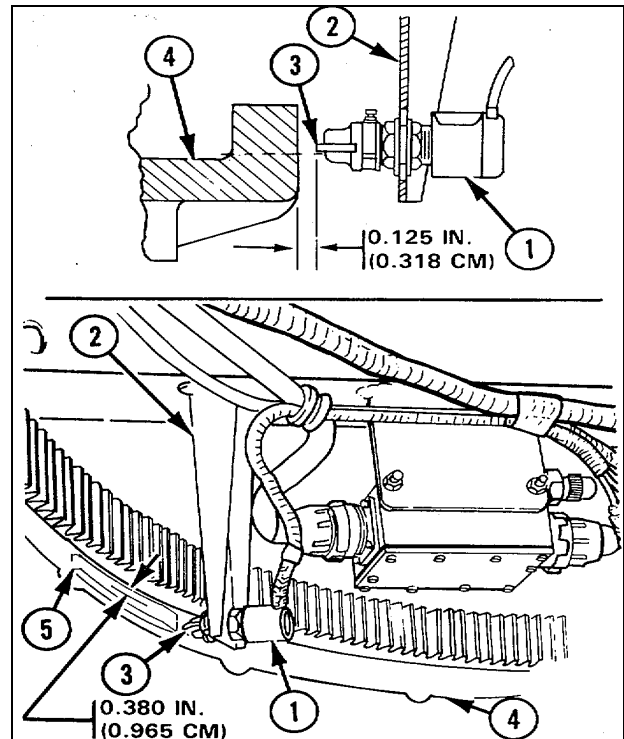
**Make sure wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.**

- 4 Connect two electrical connectors (9 and 10).
- 5 Install loop clamp (11), new lockwasher (12), and capscrew (13).



**ADJUSTMENT**

- 1 Position sensitive switch (1) in bracket (2) so roller (3) is horizontal.
- 2 Position sensitive switch (1) so roller (3) is 0.125 in. (0.318 cm) from inside face of plain bearing unit (4).
- 3 Vertically adjust sensitive switch (1) 0.380 in. (0.965 cm) down from top of ramp (5).
- 4 Horizontally adjust sensitive switch (1) until it can be actuated by ramp (5).



**2-88. MAINTENANCE OF ELEVATING AND TRAVERSING MANUAL CONTROL HANDLES AND ELECTRICAL COMPONENTS.**

This task covers:      a. *Removal*                      c. *Inspection/Repair*              e. *Installation/Adjustment*  
                                     b. *Disassembly*                      d. *Reassembly*

**INITIAL SETUP**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*Materials/Parts*

- Cotter pin (4) (P7170)
- Lockwasher (2) (MS35338-44)
- Lockwire (item 14, appx C)
- Self-locking nut (2) (MS21044N3)

*References*

TM 9-2350-304-24P-2

*General Safety Instructions*

**WARNING**

- Make sure MASTER switch is OFF before repairing electrical

components. Failure to observe this warning could result in injury to personnel.

- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or

damaged equipment.

- Handle assembly contains

parts under spring tension. Use caution in removal to prevent injury.

## 2-88.MAINTENANCE OF ELEVATING AND TRAVERSING MANUAL CONTROL HANDLES AND ELECTRICAL COMPONENTS (CONT).

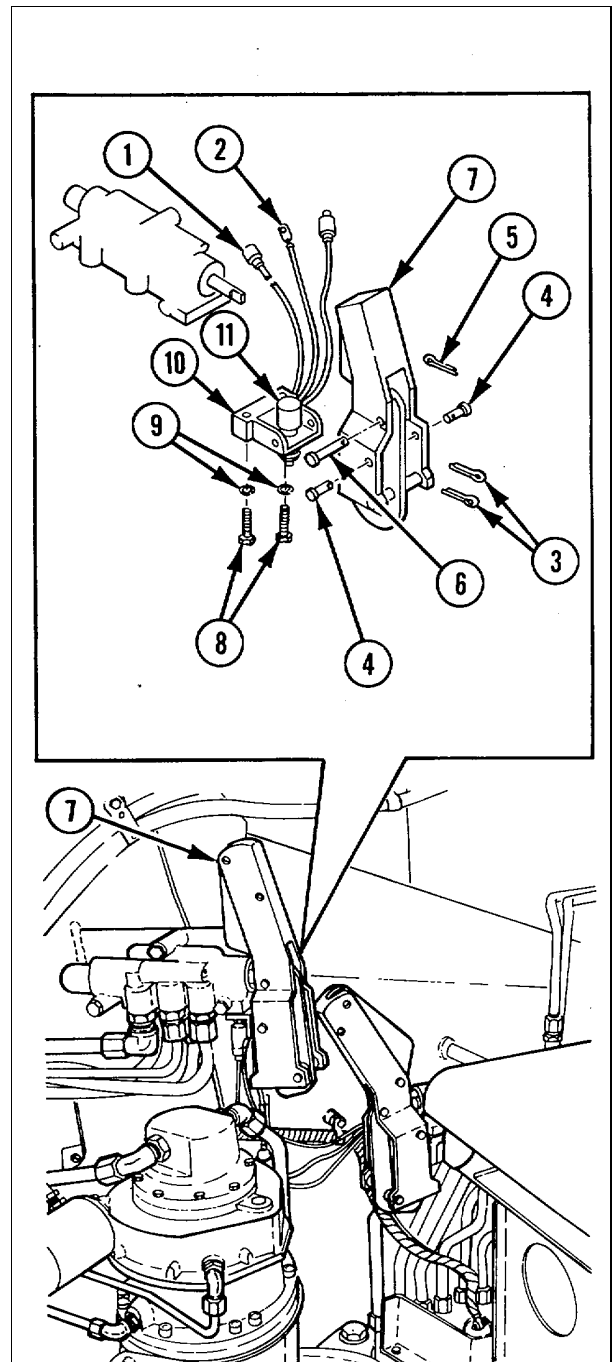
### REMOVAL

#### WARNING

- Make sure **MASTER** switch is **OFF** before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

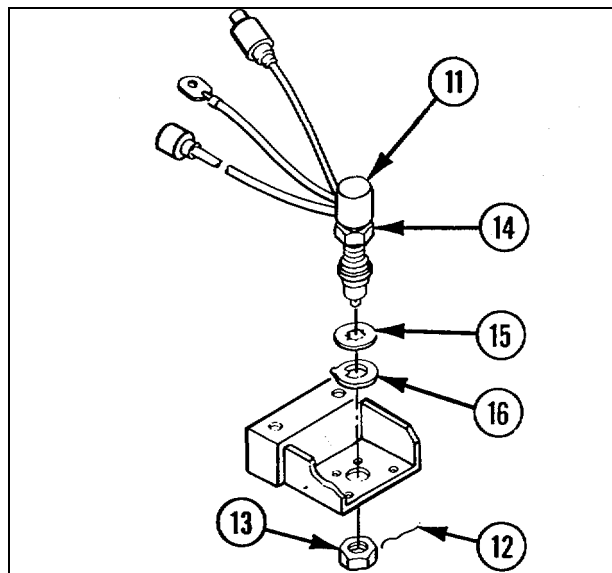
#### NOTE

- Steps 1 thru 11 are written and illustrated for one elevating handle but they apply to two elevating handles and one traversing handle.
- Tag all wires and leads before disconnecting to ensure proper installation.



- 1 Disconnect two electrical leads (1 and 2).
- 2 Remove two cotter pins (3).
- 3 Remove two headed straight pins (4).
- 4 Remove cotter pin (5).
- 5 Remove headed straight pin (6).
- 6 Remove elevating and traversing manual control handle (7).
- 7 Remove two capscrews (8) and two lockwashers (9).
- 8 Remove cannon bracket (10) with elevating and traversing handle sensitive switch (11) attached.

- 9 Remove lockwire (12).
- 10 Remove lower nut (13).
- 11 Remove elevating and traversing handle sensitive switch (11), nut (14), washer (15), and key washer (16).



**DISASSEMBLY**

- 1 For complete disassembly of elevating and traversing handle sensitive switches, refer to page 2-75.

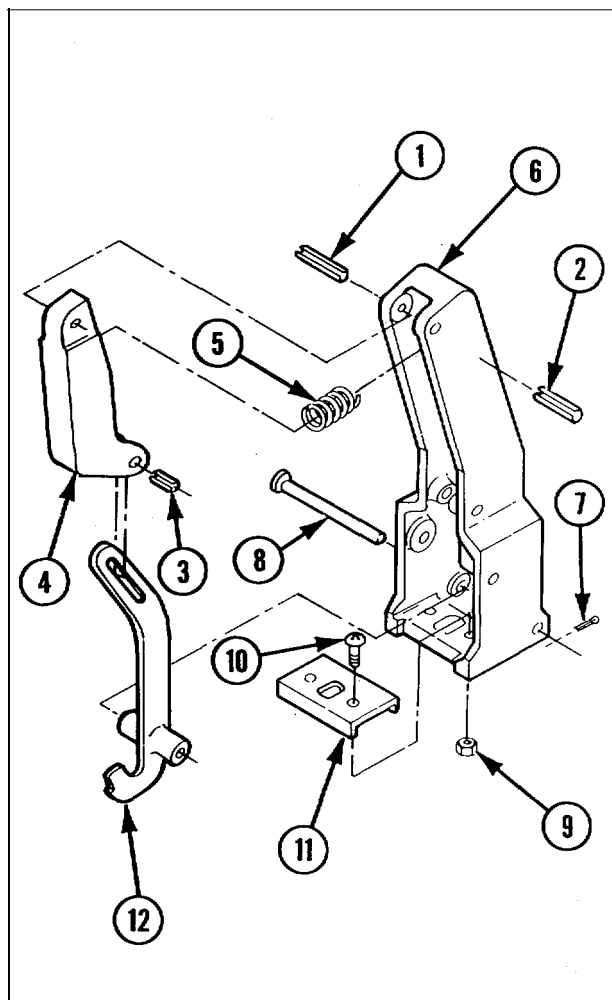
**WARNING**

Handle assembly contains parts under spring tension. Use caution in removal to prevent injury.

**NOTE**

The following steps are written and illustrated for one handle assembly but apply to three.

- 2 Remove spring pins (1 and 2) and spring pin (3).
- 3 Remove rod end clevis (4) and helical compression spring (5) from handle (6).
- 4 Remove cotter pin (7) from headed straight pin (8) and remove headed straight pin.
- 5 Remove two self-locking nuts (9), two machine screws (10), and trigger guide plate (11) from handle (6).
- 6 Remove manual control trigger lever (12) from handle (6).



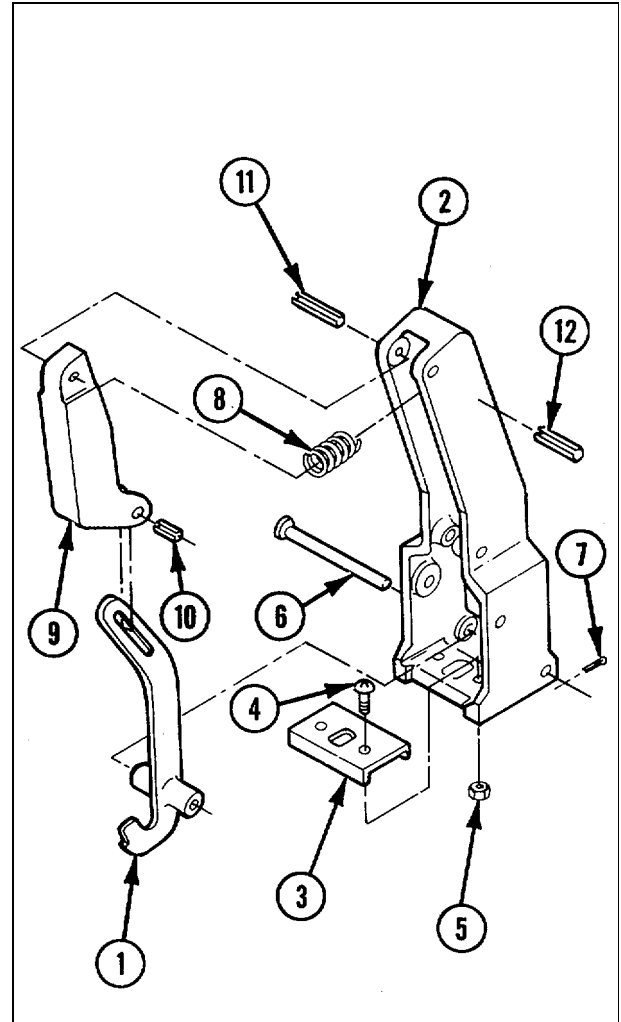
**2-88. MAINTENANCE OF ELEVATING AND TRAVERSING MANUAL CONTROL HANDLES AND ELECTRICAL COMPONENTS (CONT).**

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 If handle is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 3 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

- 1 Install manual control trigger lever (1) into handle (2).
- 2 Position trigger guide plate (3) in handle (2) and secure with two machine screws (4) and two new self-locking nuts (5).
- 3 Slide headless straight pin (6) into handle (2) and secure with new cotter pin (7).
- 4 Install helical compression spring (8) and rod end clevis (9).
- 5 Install spring pin (10) and spring pins (11 and 12).
- 6 For complete reassembly of elevating and traversing handle sensitive switches, refer to page 2-75.



**INSTALLATION/ADJUSTMENT****NOTE**

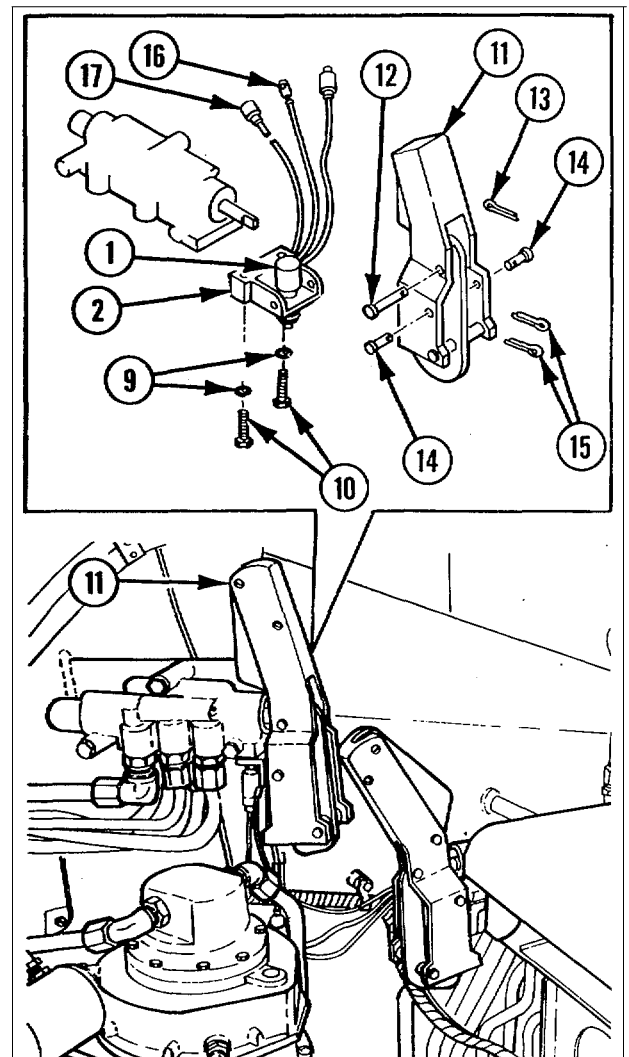
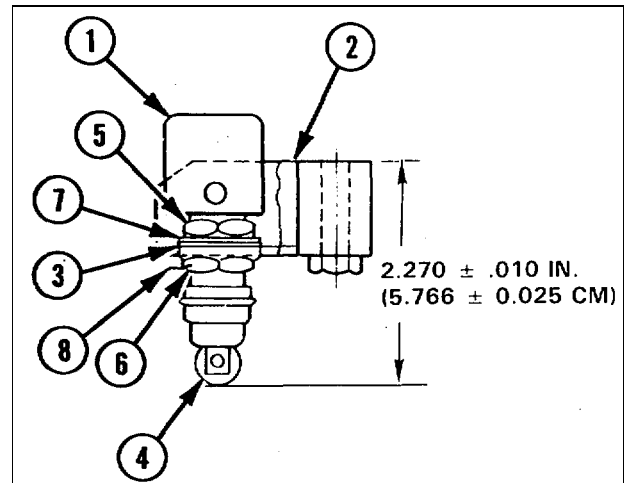
Steps 1 thru 10 are written and illustrated for one elevating handle, but they apply to two elevating handles and one traversing handle.

- 1 Install elevating and traversing handle sensitive switch (1) in cannon bracket (2) with tab of key washer (3) in left hole.
- 2 Adjust elevating and traversing handle sensitive switch position. Switch roller (4) must be  $2.270 \pm 0.010$  in. ( $5.766 \pm 0.025$  cm) from top of cannon bracket (2).
- 3 Tighten nut (5), lower nut (6), washer (7), and key washer (3), and secure with new lockwire (item 14, appx C) (8).
- 4 Install cannon bracket (2) with elevating and traversing handle sensitive switch (1) attached, and secure using two new lockwashers (9) and two capscrews (10).
- 5 Install elevating and traversing manual control handle (11).
- 6 Install headed straight pin (12).
- 7 Install new cotter pin (13).
- 8 Install two headed straight pins (14).
- 9 Install two new cotter pins (15).

**CAUTION**

Make sure wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.

- 10 Connect two electrical leads (16 and 17).







**WARNING**

- **Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.**
- **Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.**

**NOTE**

**Tag all wires and leads before disconnecting to ensure proper installation.**

- 1 Disconnect two electrical leads (1 and 2).
- 2 Remove two cotter pins (3).

**DISASSEMBLY**

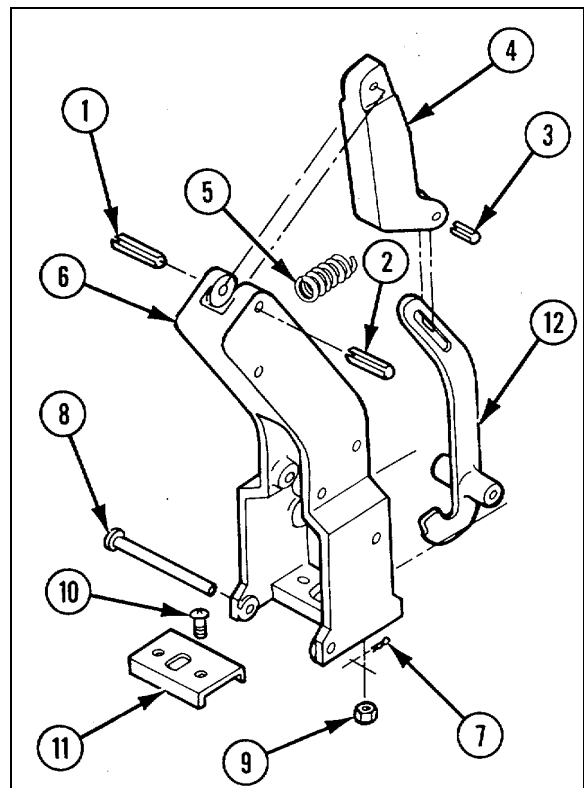
- 1 For complete disassembly of elevating and traversing handle sensitive switch, refer to page 2-75.

**WARNING**

**Grip assembly contains parts under spring tension. Use care when removing to prevent injury.**

- 2 Remove spring pin (1), spring pin (2), and spring pin (3).
- 3 Remove rod end clevis (4) and helical compression spring (5) from handle (6).
- 4 Remove cotter pin (7) and headed straight pin (8) from handle (6).
- 5 Remove two self-locking nuts (9), two machine screws (10), and trigger guide plate (11).
- 6 Remove manual control trigger lever (12) from handle (6).

- 3 Remove two headed straight pins (4).
- 4 Remove cotter pin (5).
- 5 Remove headed straight pin (6).
- 6 Remove traversing control grip assembly (7).
- 7 Remove two capscrews (8) and two lockwashers (9).
- 8 Remove cannon bracket (10) with elevating and traversing handle sensitive switch (11) attached.
- 9 Remove lockwire (12) securing lower nut (13).
- 10 Remove lower nut (13).
- 11 Remove elevating and traversing handle sensitive switch (11), nut (14), washer (15), and key washer (16).

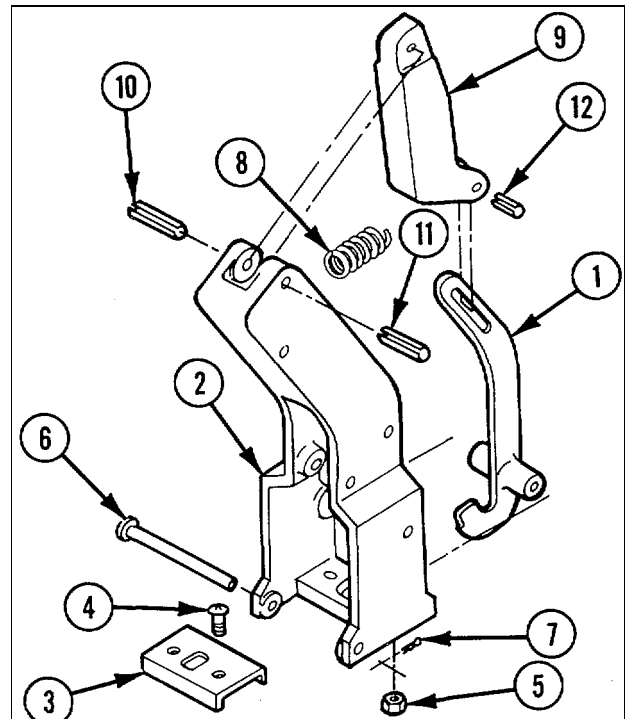


**2-89. MAINTENANCE OF TRAVERSING CONTROL GRIP ASSEMBLY (CONT).****INSPECTION/REPAIR**

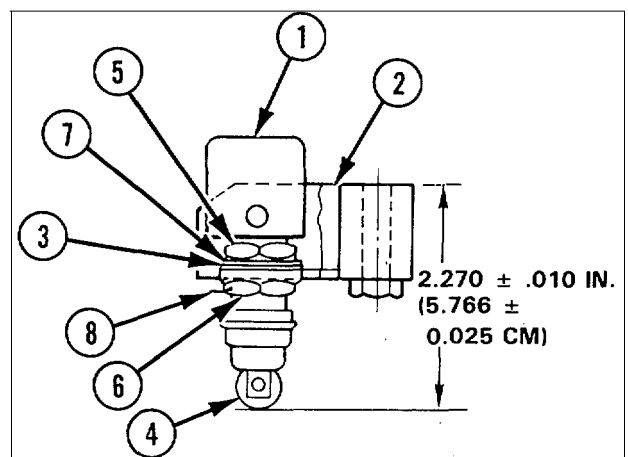
- 1 Inspect for broken, damaged, or missing parts.
- 2 If handle is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 3 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

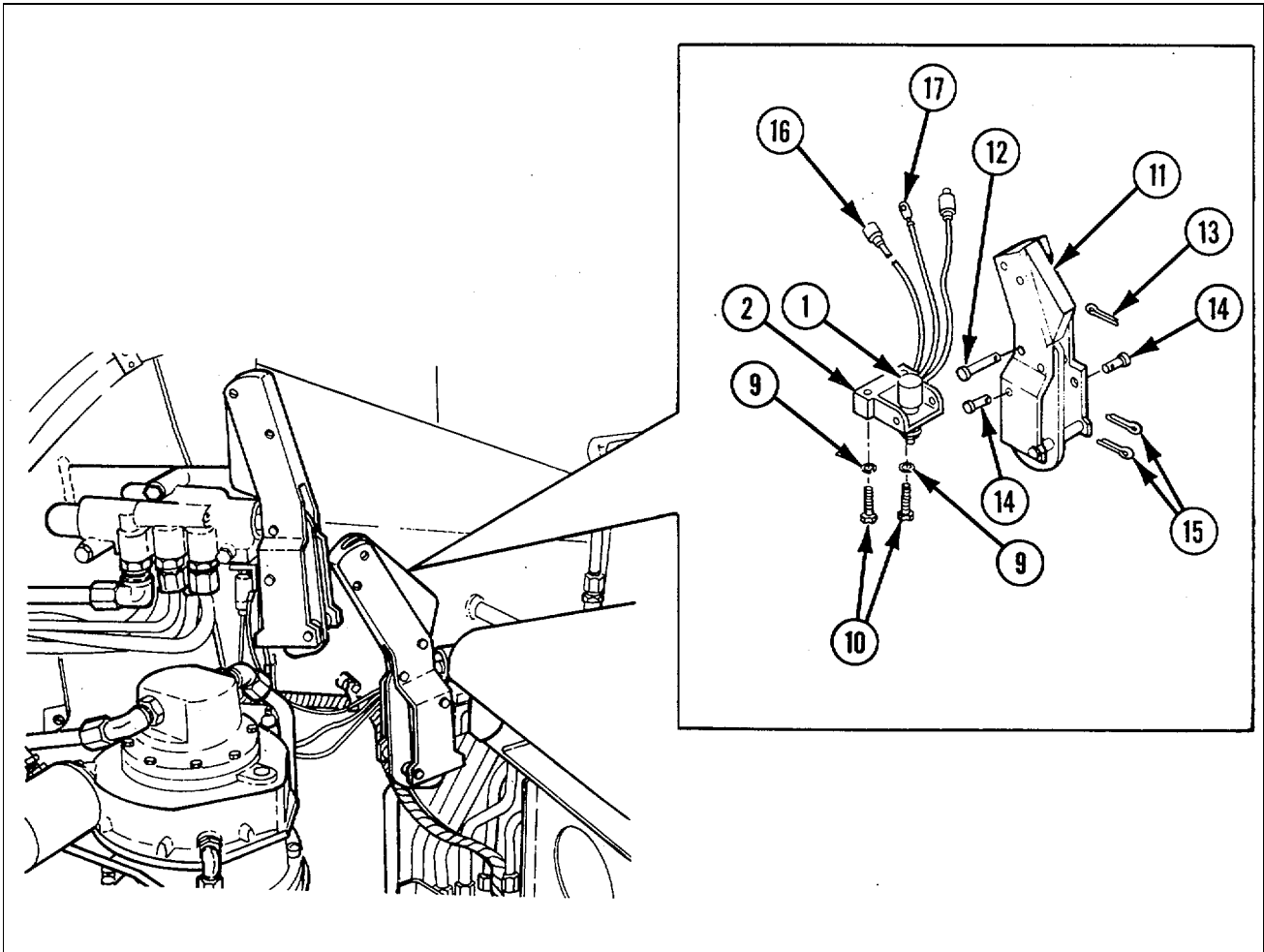
**REASSEMBLY**

- 1 Install manual control trigger lever (1) in handle (2).
- 2 Install trigger guide plate (3), two machine screws (4), and two new self-locking nuts (5).
- 3 Slide headed straight pin (6) in handle (2) and secure with new cotter pin (7).
- 4 Install helical compression spring (8) and rod end clevis (9) in handle (2).
- 5 Install spring pin (10), spring pin (11), and spring pin (12).
- 6 For complete reassembly of elevating and traversing handle sensitive switch, refer to page 2-75.

**INSTALLATION/ADJUSTMENT**

- 1 Install elevating and traversing handle sensitive switch (1) in cannon bracket (2) with tab of key washer (3) in left hole.
- 2 Adjust elevating and traversing handle sensitive switch position. Switch roller (4) must be  $2.270 \pm 0.010$  in. ( $5.766 \pm 0.025$  cm) from top of cannon bracket (2).
- 3 Tighten nut (5), lower nut (6), washer (7), and key washer (3), and secure with new lockwire (item 14, appx C) (8).





4 Install cannon bracket (2) with elevating and traversing handle sensitive switch (1) attached, and secure using two new lockwashers (9) and two capscrews (10).

5 Install traversing control grip assembly (11).

6 Install headed straight pin (12).

7 Install new cotter pin (13).

8 Install two headed straight pins (14).

9 Install two new cotter pins (15).

**CAUTION**

**Make sure wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.**

10 Connect electrical leads (16 and 17).

**2-90. MAINTENANCE OF RAMMER TRAVERSING LINES AND FITTINGS AND PRESSURE GAGE DIAL ASSEMBLY.**

This task covers:    a. *Relieving Hydraulic Pressure*                      d. *Reassembly/Installation*  
                               b. *Removal/Disassembly*                                      e. *Applying Hydraulic Pressure*  
                               c. *Inspection/Repair*

**INITIAL SETUP:**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*Materials/Parts*

Lockwasher (12) (MS35338-43)  
 Self-locking nut (4) (MS21044N4)

*References*

TM 9-2350-304-24P-2

*General Safety Instructions*

**WARNING**

Before relieving hydraulic pressure, be sure travel lock is engaged and vehicle is on as level ground as possible. This will stop the cannon from sliding out of battery.

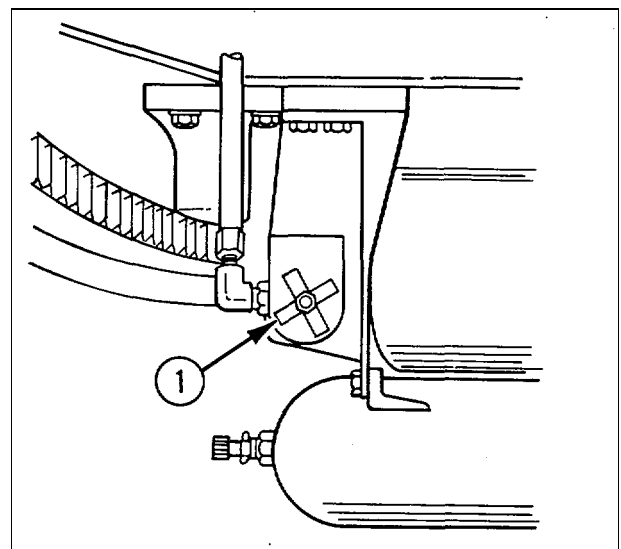
- **Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.**
- **Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.**
- **Hydraulic system is under high pressure. Make sure all hydraulic pressure is relieved before removal of any tubes or fittings. Follow safety procedures to prevent injury. Wipe up spilled hydraulic fluid.**

**RELIEVING HYDRAULIC PRESSURE**

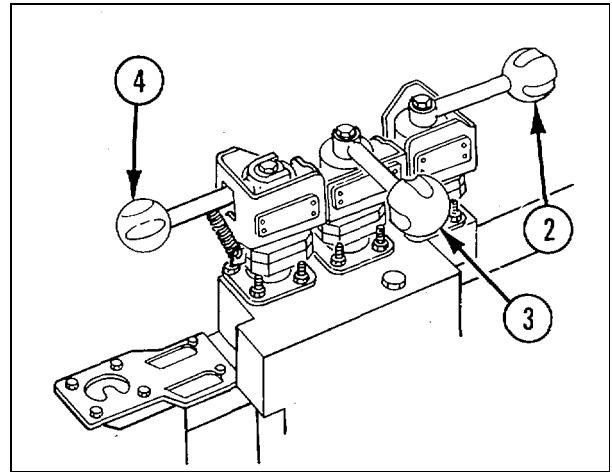
**WARNING**

Before relieving hydraulic pressure, be sure travel lock is engaged and vehicle is on as level ground as possible. This will stop the cannon from sliding out of battery.

- 1 Set MASTER switch to OFF.
- 2 Open globe angle valve (1).



- 3 Move SWING control handle (2) to full LOAD.
- 4 Move SWING control handle (2) to full STOW.
- 5 Repeat steps 3 and 4 several times to relieve pressure from system.
- 6 Move LOADER control handle (3) to full IN.
- 7 Move LOADER control handle (3) to full OUT.
- 8 Repeat steps 6 and 7 several times to relieve pressure from system.



**CAUTION**

**Do not operate RAMMER control handle without a projectile in the trough.**

- 9 Move RAMMER control handle (4) to RAM several times to relieve pressure from system.

**REMOVAL/DISASSEMBLY**

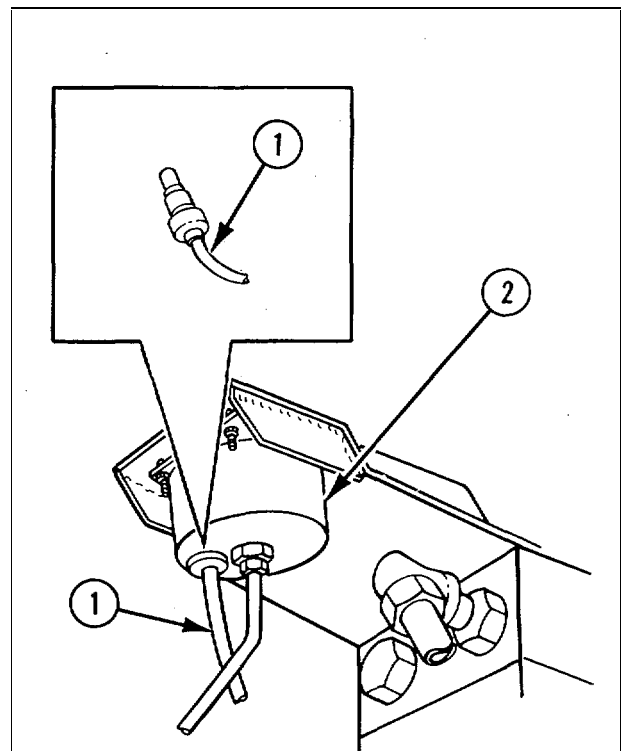
**WARNING**

- Make sure **MASTER** switch is **OFF** before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

**NOTE**

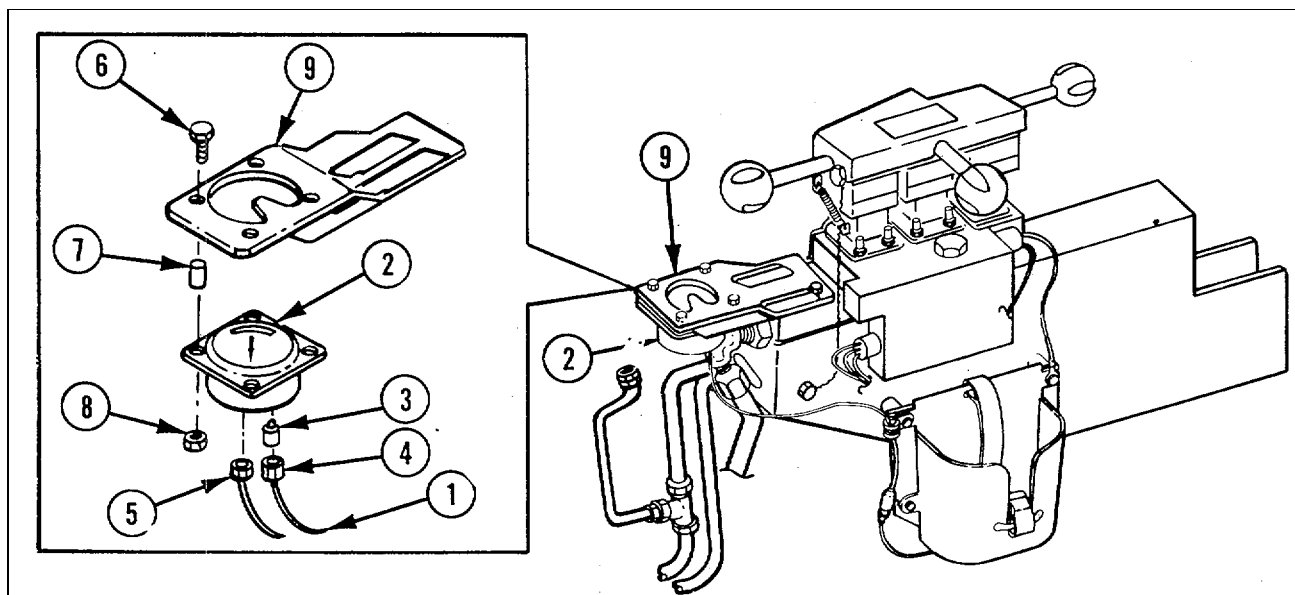
Tag all wires and leads before disconnecting to ensure proper installation.

- 1 Disconnect socket nut of electrical lead (1) from pressure gage dial assembly (2).



## 2-90. MAINTENANCE OF RAMMER TRAVERSING LINES AND FITTINGS AND PRESSURE GAGE DIAL ASSEMBLY (CONT).

### REMOVAL/DISASSEMBLY (CONT)



#### NOTE

LED can be replaced with pressure gage dial assembly removed from or installed on the howitzer.

- 2 Remove LED (3) from socket (4).

#### WARNING

Hydraulic system is under high pressure. Make sure all hydraulic pressure is relieved before removal of any tubes or fittings. Follow safety procedures to prevent injury. Wipe up spilled hydraulic fluid.

- 3 Disconnect hydraulic tube assembly (5) from pressure gage dial assembly (2). For complete disassembly of hydraulic lines and fittings, refer to page 2-82.
- 4 Remove four capscrews (6), four rammer manifold sleeve spacers (7), four self-locking nuts (8), pressure gage bracket (9), and pressure gage dial assembly (2).

#### INSPECTION/REPAIR

- 1 Inspect for broken, damaged, or missing parts.
- 2 If gage is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 3 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

#### REASSEMBLY/INSTALLATION

- 1 Position pressure gage dial assembly (2) in pressure gage bracket (9), and secure using four capscrews (6), four rammer manifold sleeve spacers (7), and four new self-locking nuts (8).
- 2 Connect hydraulic tube assembly (5) to pressure gage dial assembly (2). For complete reassembly of hydraulic lines and fittings, refer to page 2-82.

**CAUTION**

**Make sure wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.**

- 3 Install LED (3) into socket (4).
- 4 Connect socket nut of electrical lead (1) to pressure gage dial assembly (2).

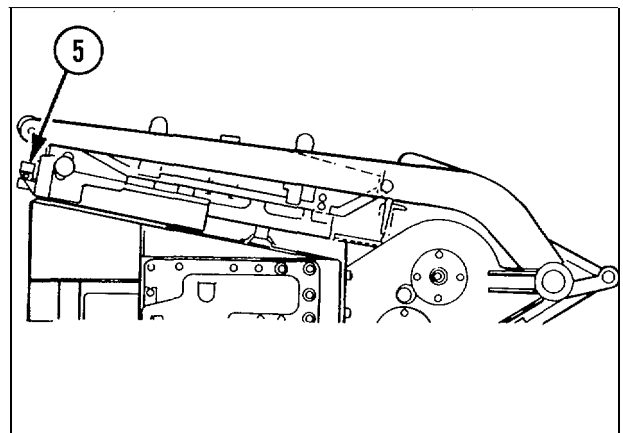
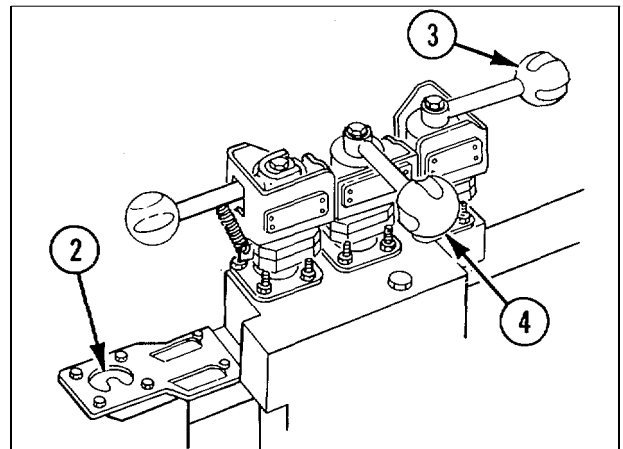
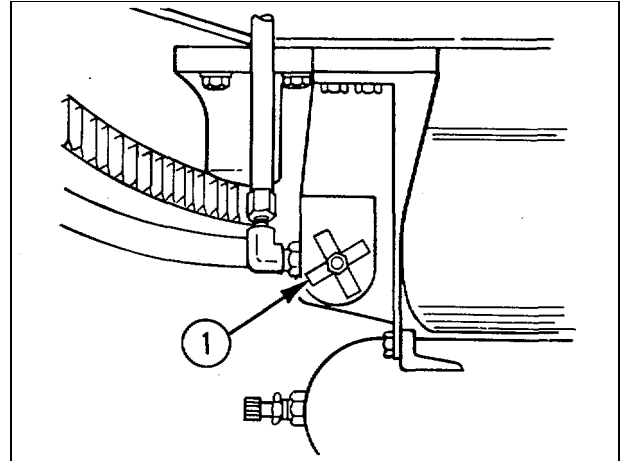
**APPLYING HYDRAULIC PRESSURE**

- 1 Close globe angle valve (1).
- 2 Start engine.

**NOTE**

**Hydraulic motor and pump may be used to apply pressure to hydraulic system without starting engine by setting MASTER switch and OIL PUMP MOTOR SWITCH ON.**

- 3 Set HYD PUMP/PTO CLUTCH switch to ON.
- 4 Check dial pressure gage (2) indication. Normal pressure is 1 600 to 2400 psi (11,032 to 16,548 kPa).
- 5 Stop engine.
- 6 Traverse loader-rammer in and out of loading position several times, using SWING control handle (3) to bleed air from system.
- 7 Stop with loader-rammer in loading position.
- 8 Operate loader arms in and out several times, using LOADER control handle (4), to bleed air from system.
- 9 Stop with loader arms on tray.
- 10 Traverse loader-rammer to ram position using SWING control handle (3).
- 11 Extend tray into breech, making sure to engage tray interlock switch (5).





**2-90. MAINTENANCE OF RAMMER TRAVERSING LINES AND FITTINGS AND PRESSURE GAGE DIAL ASSEMBLY (CONT).**

**APPLYING HYDRAULIC PRESSURE (CONT)**

**CAUTION**

**Do not operate RAMMER control handle without a projectile on the trough.**

- 12 Extend and retract rammer several times using RAMMER control handle (6) to bleed air from system.
- 13 Stop with rammer chain in stowed position.
- 14 Place loader-rammer in stowed position.

**2-91. MAINTENANCE OF HYDRAULIC SYSTEM INSTALLATION-HYDRAULIC RESERVOIR AND ACCUMULATOR.**

This task covers:	a. <i>Relieving Hydraulic Pressure</i> b. <i>Disassembly</i> c. <i>Inspection/Repair</i>	d. <i>Reassembly</i> e. <i>Charging with Nitrogen</i> f. <i>Applying Hydraulic Pressure</i>
<p><b>INITIAL SETUP:</b></p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p><i>Tools and Special Tools</i></p> <ul style="list-style-type: none"> <li>Accumulator Charging Device (12252157)</li> <li>Nitrogen cylinder (BBN41 1)</li> <li>Ordnance artillery and turret mechanic's tool kit (appx B)</li> </ul> <p><i>References</i></p> <ul style="list-style-type: none"> <li>TM 9-2350-304-24P-2</li> </ul> </div> <div style="width: 45%;"> <p><i>General Safety Instructions</i></p> <p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• <b>Before relieving hydraulic pressure, be sure travel lock is engaged and vehicle is on as level ground as possible. This will stop the cannon from sliding out of battery.</b></li> <li>• <b>High pressure nitrogen gas is used in this equipment. Keep face and body clear of bleed valves. Failure to observe safety precautions may result in injury or death.</b></li> </ul> </div> </div>		

**RELIEVING HYDRAULIC PRESSURE****WARNING**

Before relieving hydraulic pressure, be sure travel lock is engaged and vehicle is on as level ground as possible. This will stop the cannon from sliding out of battery.

- 1 Set MASTER switch to OFF.
- 2 Open globe angle valve (1).

**DISASSEMBLY**

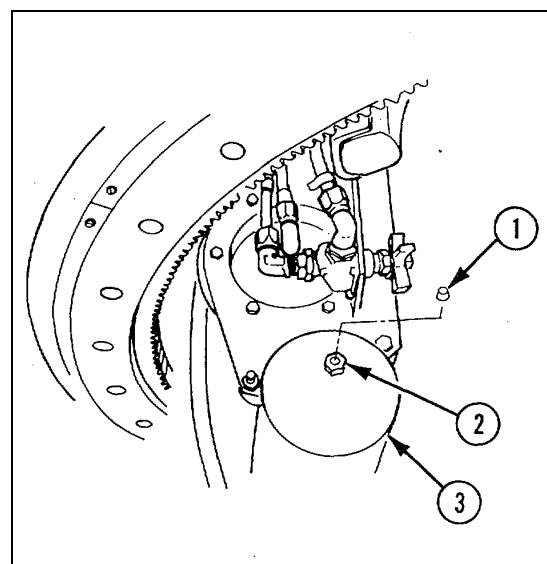
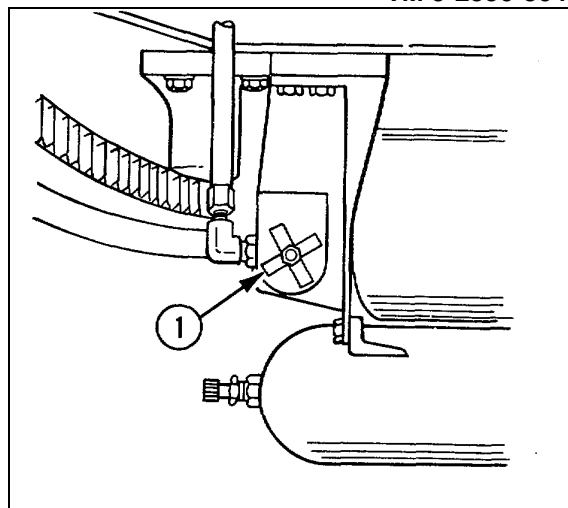
Remove valve cap (1) from nitrogen high pressure charge valve (2) on accumulator gas bottle (3).

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

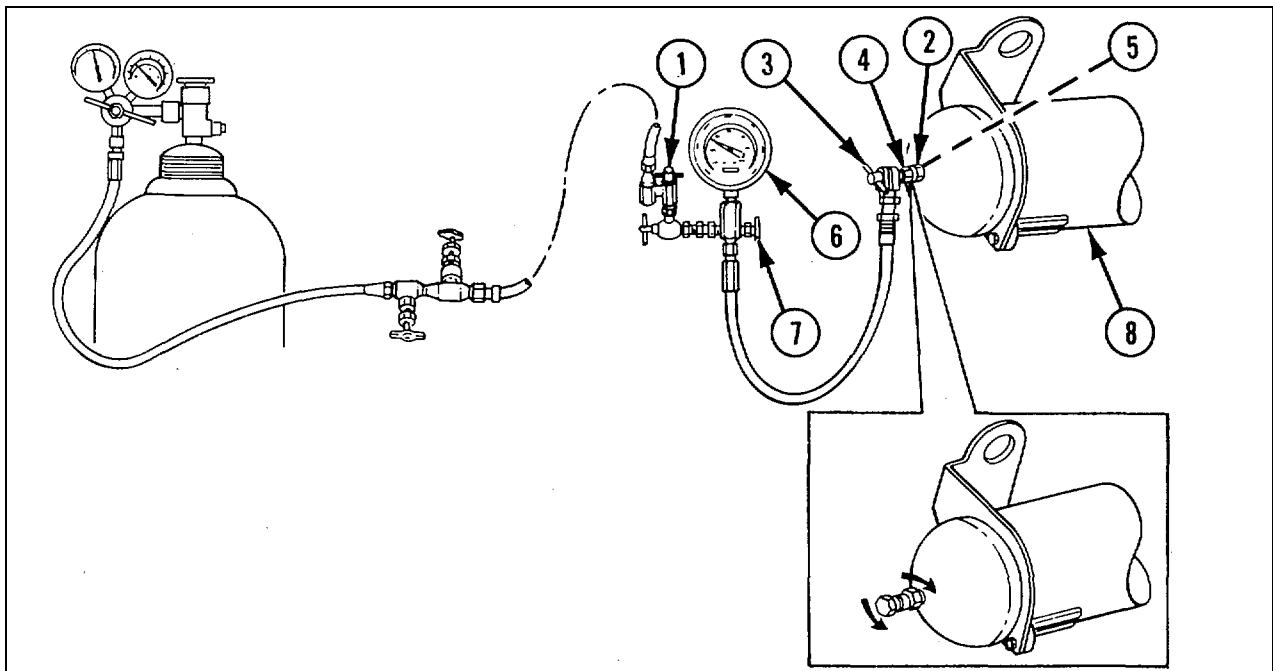
**REASSEMBLY**

Install valve cap (1) on nitrogen high pressure charge valve (2) on accumulator gas bottle (3).



2-91. MAINTENANCE OF HYDRAULIC SYSTEM INSTALLATION-HYDRAULIC RESERVOIR AND ACCUMULATOR (CONT).

**CHARGING WITH NITROGEN**



**WARNING**

**High-pressure nitrogen gas is used in this equipment. Keep face and body clear of bleed valves. Failure to observe safety precautions may result in injury or death.**

- 1 Relieve hydraulic pressure from accumulator. Refer to Relieving Hydraulic Pressure.
- 2 Install accumulator charging device on nitrogen cylinder.
- 3 Adjust accumulator charging device for 1500 psi (10,343 kPa).
- 4 Slightly open shutoff valve (1). Allow nitrogen gas to escape from adapter valve for about 10 seconds to purge hose of air.

- 5 Close shutoff valve (1).
- 6 Remove valve cap from nitrogen high pressure charge valve (2).
- 7 Connect adapter valve (3) to charge valve (2).
- 8 To open charge valve (2) turn valve nut (4) while holding inside nut (5).
- 9 Slightly open shutoff valve (1) until gage (6) reads 1500 psi (10,343 kPa).
- 10 Close shutoff valve (1).
- 11 Wait about 30 minutes to allow nitrogen gas temperature to stabilize.

- 12 Slightly open bleed valve (7) and allow nitrogen gas to escape until gage (6) reads at proper charging pressure for temperature. See Table 2-6, Temperature/ Pressure Table below.
- 13 Close bleed valve (7).
- 14 Close release valve by hand tightening nut (4) clockwise while holding inside nut (5).
- 15 Disconnect adapter valve (3) from charge valve (2) on accumulator gas bottle (8).
- 16 Install cap on charge valve (2).
- 17 Shut off accumulator charging device and stow charging equipment.

**Table 2-6. TEMPERATURE/PRESSURE TABLE**

TEMPERATURE AT TIME OF CHARGING		CHARGING PRESSURE	
°F	°C	psi	kPa
105°	41°	1310	9032
100°	38°	1300	8964
95°	35°	1290	8895
90°	32°	1270	8757
85°	29°	1265	8722
80°	27°	1250	8619
75°	24°	1240	8550
70°	21°	1230	8481
65°	18°	1215	8377
60°	16°	1205	8308
55°	13°	1195	8239
50°	10°	1180	8136
45°	7°	1170	8067
40°	4°	1155	7964
35°	2°	1145	7895
30°	-1°	1130	7791
25°	-4°	1120	7722

**2-91. MAINTENANCE OF HYDRAULIC SYSTEM INSTALLATION-HYDRAULIC RESERVOIR AND ACCUMULATOR (CONT).**

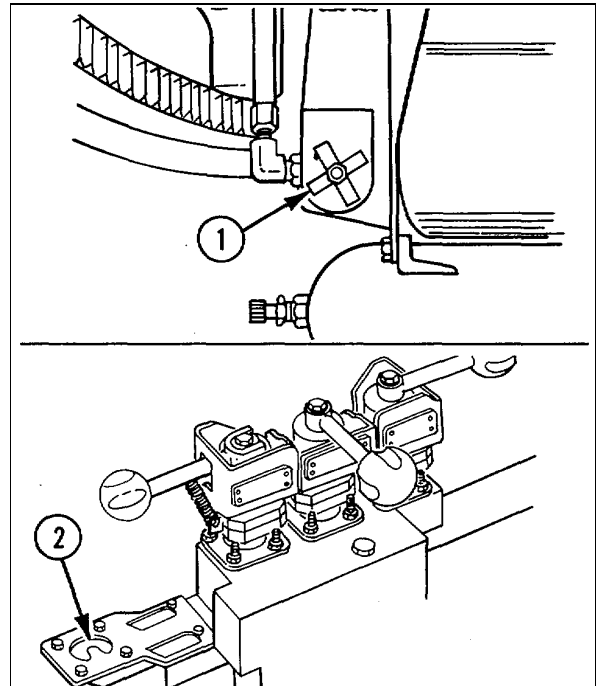
**APPLYING HYDRAULIC PRESSURE**

- 1 Close globe angle valve (1).
- 2 Start engine.

**NOTE**

Hydraulic motor and pump may be used to apply pressure to hydraulic system without starting engine by setting MASTER switch and OIL PUMP MOTOR SWitch ON.

- 3 Set HYD PUMP/PTO CLUTCH switch to ON.
- 4 Check dial pressure gage (2) indication. Normal pressure is 1600 to 2400 psi (11,032 to 16,548 kPa).
- 5 Stop engine.



**2-92. MAINTENANCE OF HYDRAULIC FLUID FILTER AND HYDRAULIC LINES.**

- |                   |  |                                       |
|-------------------|--|---------------------------------------|
| This task covers: | a. <i>Relieving Hydraulic Pressure</i> | e. <i>Reassembly</i>                  |
|                   | b. <i>Removal</i>                      | f. <i>Installation</i>                |
|                   | c. <i>Disassembly</i>                  | g. <i>Applying Hydraulic Pressure</i> |
|                   | d. <i>Inspection/Repair</i>            |                                       |

**INITIAL SETUP:**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*Materials/Parts*

- Lockwasher (4) (MS35338-44)
- Preformed packing (2) (MS28778-8)
- Tube fitting locknut (AN6289-8)

*References*

TM 9-2350-304-24P-2

*General Safety Instructions*

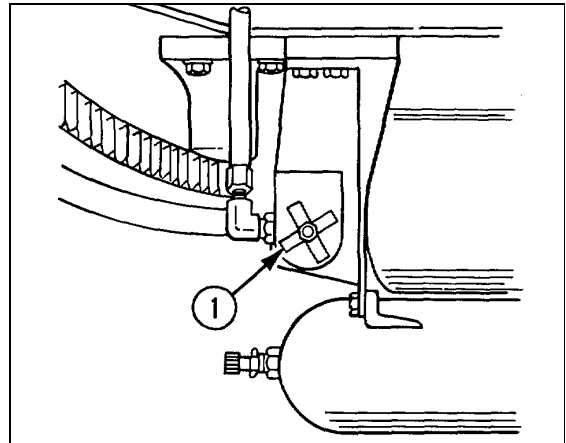
**WARNING**

- Before relieving hydraulic pressure, be sure travel lock is engaged and vehicle is on as level ground as possible. This will stop the cannon from sliding out of battery.
- Hydraulic system is under high pressure. Make sure all hydraulic pressure is relieved before removal of any tubes or fittings. Follow safety procedures to prevent injury. Wipe up spilled hydraulic fluid.

**RELIEVING HYDRAULIC PRESSURE****WARNING**

Before relieving hydraulic pressure, be sure travel lock is engaged and vehicle is on as level ground as possible. This will stop the cannon from sliding out of battery.

- 1 Set MASTER switch to OFF.
- 2 Open globe angle valve (1).

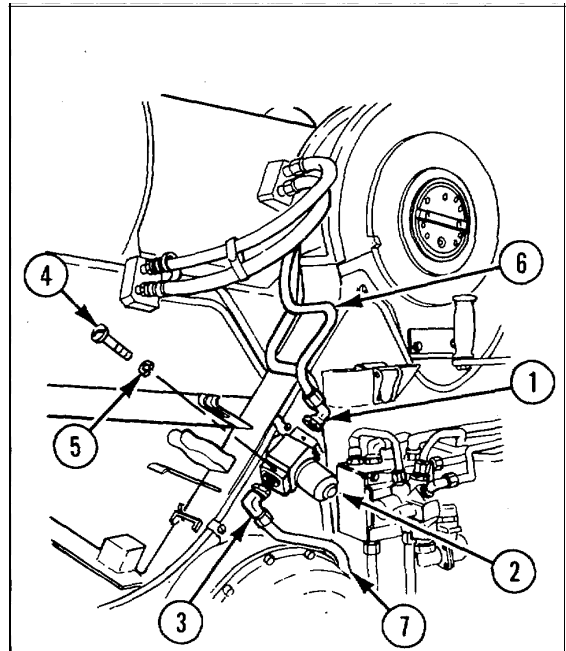
**REMOVAL****WARNING**

Hydraulic system is under high pressure. Make sure all hydraulic pressure is relieved before removal of any tubes or fittings. Follow safety procedures to prevent injury. Wipe up spilled hydraulic fluid.

**NOTE**

Steps 1 thru 4 are written and illustrated for hydraulic fluid filter on left trunnion.

- 1 Disconnect tube elbow (1) from hydraulic fluid filter (2).
- 2 Disconnect tube elbow (3) from hydraulic fluid filter (2).
- 3 Remove two capscrews (4) two lockwashers (5), and hydraulic fluid filter (2).
- 4 If damaged or leaking, remove hydraulic lines (6 and 7).



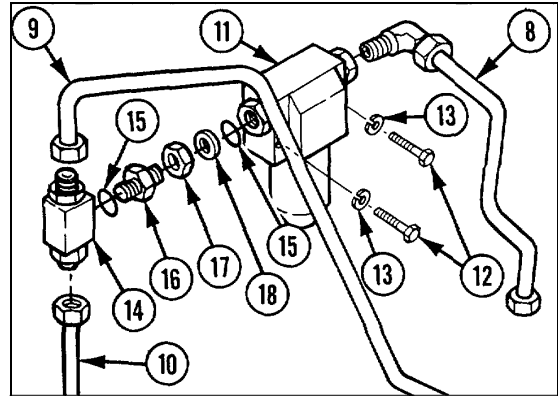
2-92. MAINTENANCE OF HYDRAULIC FLUID FILTER AND HYDRAULIC LINES (CONT).

**REMOVAL (CONT)**

**NOTE**

Steps 5 thru 7 are written and illustrated for hydraulic fluid filter on right trunnion.

- 5 Disconnect three hydraulic lines (8, 9, and 10) from fluid filter (11). For complete disassembly of hydraulic lines and fittings, refer to page 2-82.
- 6 Remove two capscrews (12) two lockwashers (13), and fluid filter (11).
- 7 Remove motor control multiple connector (14) two preformed packings (15), tube nipple (16), tube fitting locknut (17), and flat washer (18).

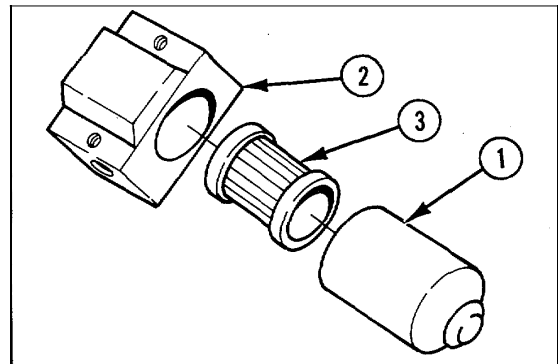


**DISASSEMBLY**

**NOTE**

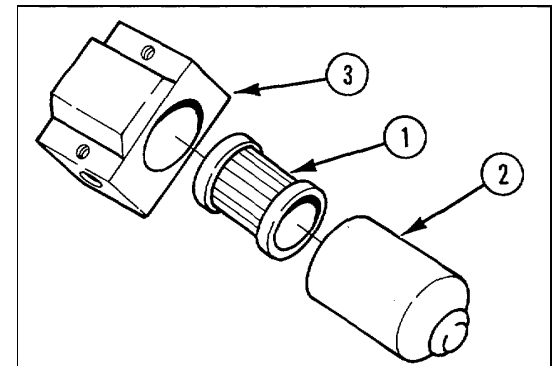
The following steps are written and illustrated for one fluid filter but apply to both.

- 1 Remove filter bowl (1) from hydraulic fluid filter (2).
- 2 Remove filter element (3) from filter bowl (1).



**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 If hydraulic fluid filter is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 3 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).



**REASSEMBLY**

**NOTE**

The following steps are written and illustrated for one fluid filter but apply to both.

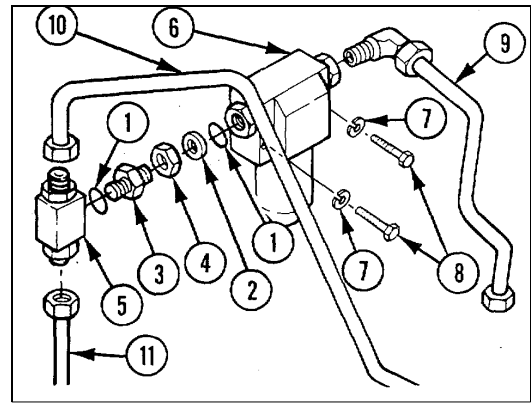
- 1 Install filter element (1) into filter bowl (2).
- 2 Install filter bowl (2) into hydraulic fluid filter (3).

**INSTALLATION**

**NOTE**

Steps 1 thru 3 are written and illustrated for hydraulic fluid filter on right trunnion.

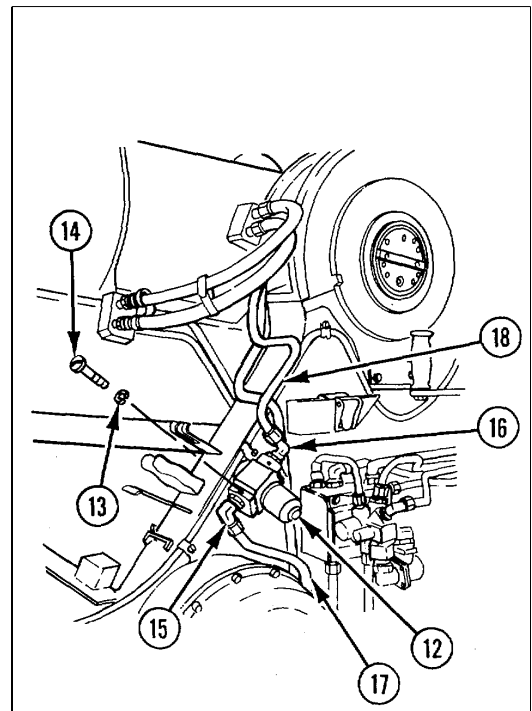
- 1 Install two new preformed packings (1) flat washer (2), tube nipple (3), new tube fitting locknut (4), and motor control multiple connector (5).
- 2 Install fluid filter (6) two new lockwashers (7), and two capscrews (8).
- 3 Connect three hydraulic lines (9, 10, and 11) For complete reassembly of hydraulic lines and fittings, refer to page 2-82.



**NOTE**

Steps 4 thru 7 are written and illustrated for hydraulic fluid filter on left trunnion.

- 4 Install hydraulic fluid filter (12) using two new lockwashers (13) and two capscrews (14).
- 5 Connect tube elbow (15) to hydraulic fluid filter (12).
- 6 Connect tube elbow (16) to hydraulic fluid filter (12).
- 7 If necessary, install new hydraulic lines (17 and 18).





**2-92. MAINTENANCE OF HYDRAULIC FLUID FILTER AND HYDRAULIC LINES (CONT).**

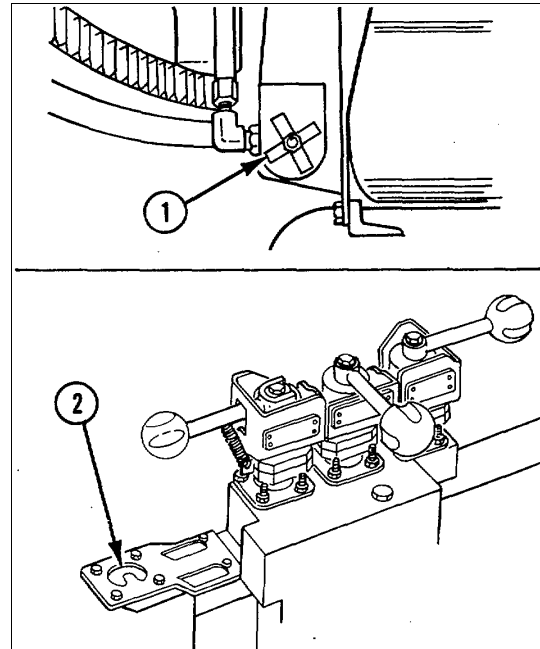
**APPLYING HYDRAULIC PRESSURE**

- 1 Close globe angle valve (1).
- 2 Start engine.

**NOTE**

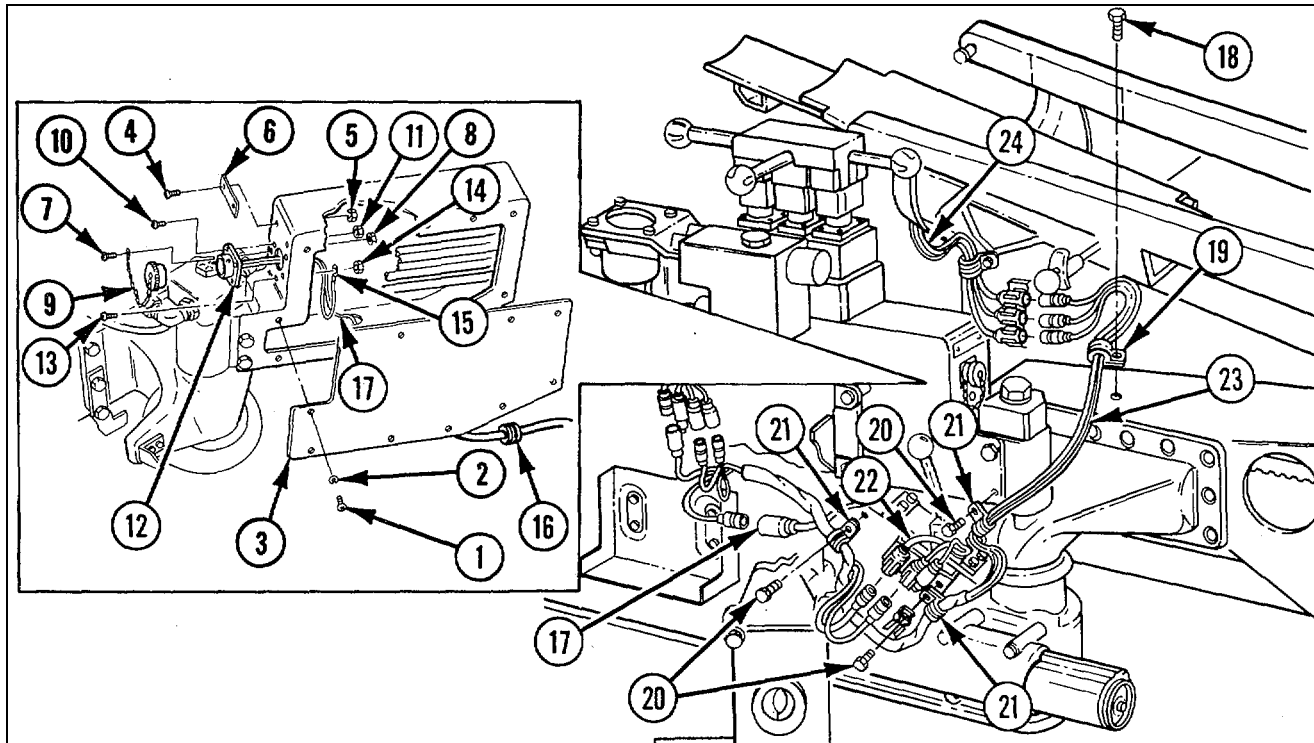
Hydraulic motor and pump may be used to apply pressure to hydraulic system without starting engine by setting MASTER switch and OIL PUMP MOTOR SWitch ON.

- 3 Set HYD PUMP/PTO CLUTCH switch to ON.
- 4 Check dial pressure gage (2) indication. Normal pressure is 1600 to 2400 psi (11,032 to 16,548 kPa).
- 5 Stop engine.



**2-93. MAINTENANCE OF ELECTRICAL INSTALLATION -RAMMER SOLENOID VALVE BRANCHED WIRING HARNESS.**

This task covers:	<i>a. Removal</i>	<i>b. Inspection/Repair</i>	<i>c. Installation</i>
<b>INITIAL SETUP:</b>			
<p><i>Tools and Special Tools</i> Ordnance artillery and turret mechanic's tool kit (appx B)</p> <p><i>Materials/Parts</i> Lockwasher (12) (MS35338-43) Self-locking nut (5) (MS21044N04) Self-locking nut (2) (MS21044N06) Self-locking nut (MS21044N4)</p> <p><i>References</i> TM 9-2350-304-24P-2</p>		<p><i>General Safety Instructions</i></p> <p style="text-align: center;"><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.</li> <li>• Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.</li> </ul>	

**REMOVAL**

- 1 Remove 12 threaded tapping screws (1) 12 lockwashers (2), and access cover (3).
- 2 Remove two machine screws (4) two self-locking nuts (5), and identification plate (6).
- 3 Remove machine screw (7) self-locking nut (8), and electrical cover (9).
- 4 Remove four machine screws (10) and four self-locking nuts (11) from receptacle (12).
- 5 Remove machine screw (13) and self-locking nut (14) from terminal (15).
- 6 Remove grommet (16) and receptacle connector (17).
- 7 Remove bolt (18) and loop clamp (19).
- 8 Remove three bolts (20) and three loop clamps (21).

**WARNING**

- Make sure **MASTER** switch is **OFF** before repairing electrical components. Failure to observe this warning could result in injury to personnel.

- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

**NOTE**

Tag all wires and leads before disconnecting to ensure proper installation.

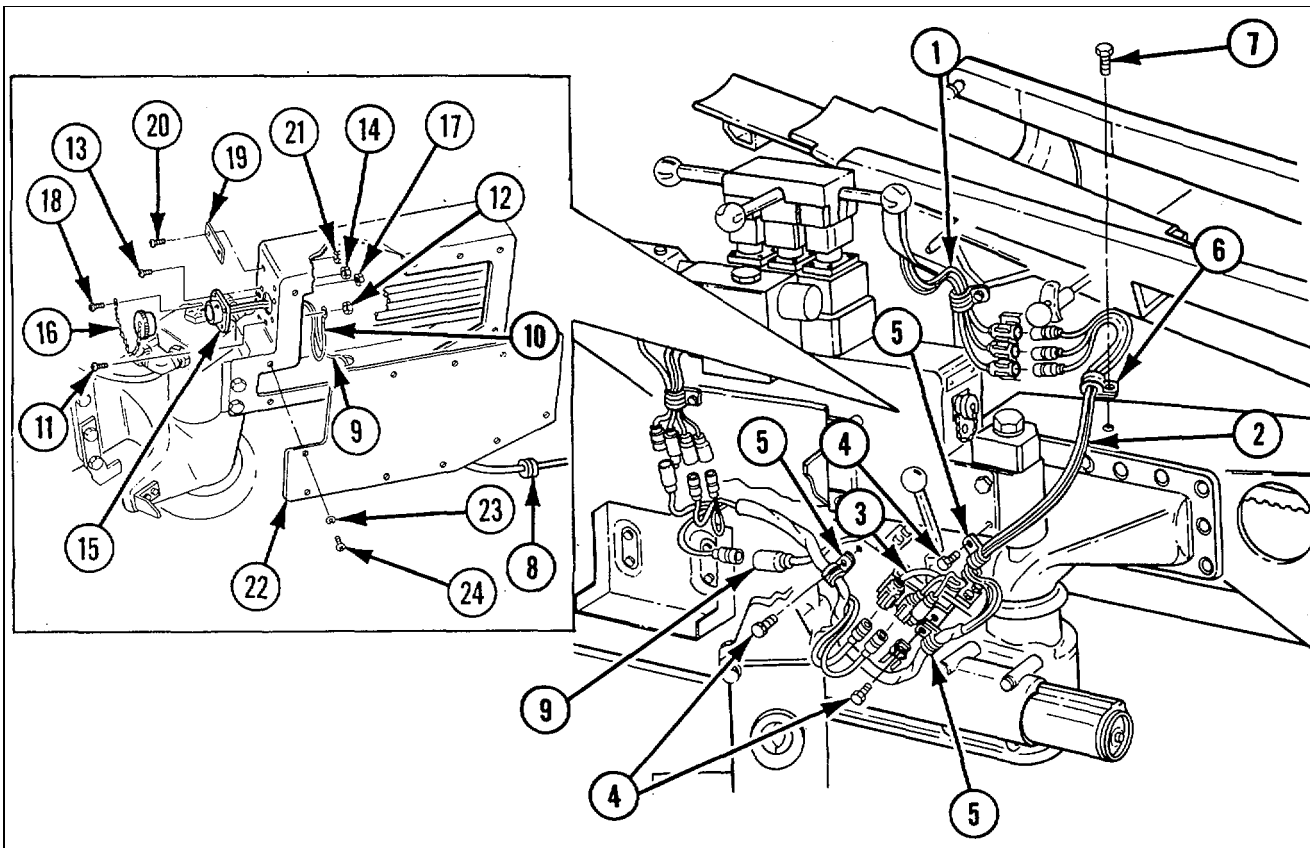
- 9 Disconnect pivot interlock push switch (22).
- 10 Disconnect and remove rammer solenoid valve branched wiring harness (23).
- 11 Disconnect tray interlock sensitive switch (24).

**2-93. MAINTENANCE OF ELECTRICAL INSTALLATION-RAMMER SOLENOID VALVE BRANCHED WIRING HARNESS (CONT).**

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**INSTALLATION**



**CAUTION**

**Make sure wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.**

- |  |   |
|--|---|
| <ol style="list-style-type: none"> <li>1 Connect tray interlock sensitive switch (1).</li> <li>2 Connect and install rammer solenoid valve branched wiring harness (2).</li> </ol> | <ol style="list-style-type: none"> <li>3 Connect pivot interlock push switch (3).</li> <li>4 Install three bolts (4) and three loop clamps (5).</li> <li>5 Install loop clamp (6) and bolt (7).</li> <li>6 Install grommet (8) and receptacle connector (9).</li> </ol> |
|--|---|

- 7 Install terminal (10) using machine screw (11) and new self-locking nut (12).
- 8 Install four machine screws (13) and four new self-locking nuts (14) securing receptacle (15).
- 9 Install electrical cover (16) new self-locking nut (17), and machine screw (18).
- 10 Install identification plate (19) and secure with two machine screws (20) and two new self-locking nuts (21).
- 11 Install access cover (22) 12 new lockwashers (23), and 12 threaded tapping screws (24).

**2-94. MAINTENANCE OF ELECTRICAL INSTALLATION-SUSPENSION LOCKOUT INSTRUCTION PLATE AND WARNING LIGHT.**

This task covers:

- |  |                                       |
|--|---------------------------------------|
| a. <i>Relieving Hydraulic Pressure</i> | e. <i>Reassembly</i>                  |
| b. <i>Removal</i>                      | f. <i>Installation</i>                |
| c. <i>Disassembly</i>                  | g. <i>Applying Hydraulic Pressure</i> |
| d. <i>Inspection/Repair</i>            |                                       |

**INITIAL SETUP:**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B) WARNING

*General Safety Instructions*

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

*Materials/Parts*

Lockwasher (2) (MS35338-41)  
 Lockwasher (2) (MS35338-42)  
 Lockwasher (4) (MS35338-44)  
 Lockwasher (MS45904-68)  
 Rubber grommet (MS35489-104)

*References*

TM 9-2350-304-24P-2

2-94. MAINTENANCE OF ELECTRICAL INSTALLATION-SUSPENSION LOCKOUT INSTRUCTION PLATE AND WARNING LIGHT (CONT).

**REMOVAL**

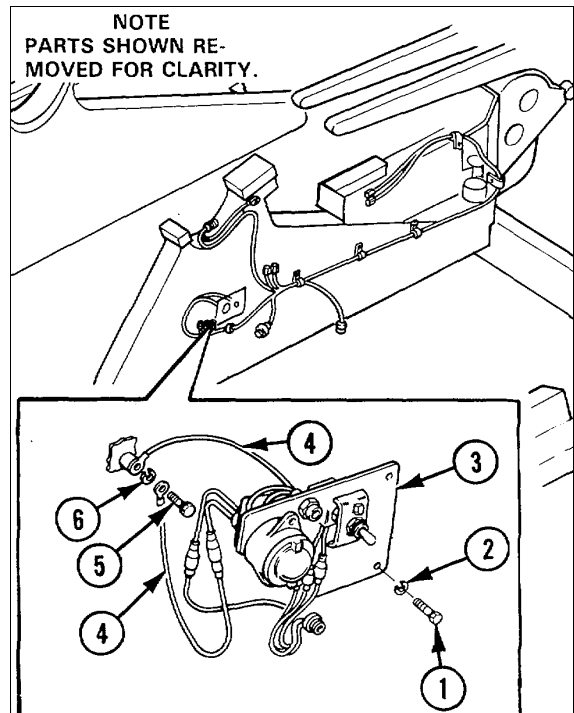
**WARNING**

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.

- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

**NOTE**

Wiring harnesses and leads are secured to the turret and components with loop clamps, straps, clips, screws, etc. Remove only hardware which secures the wiring harness or lead which is being removed.

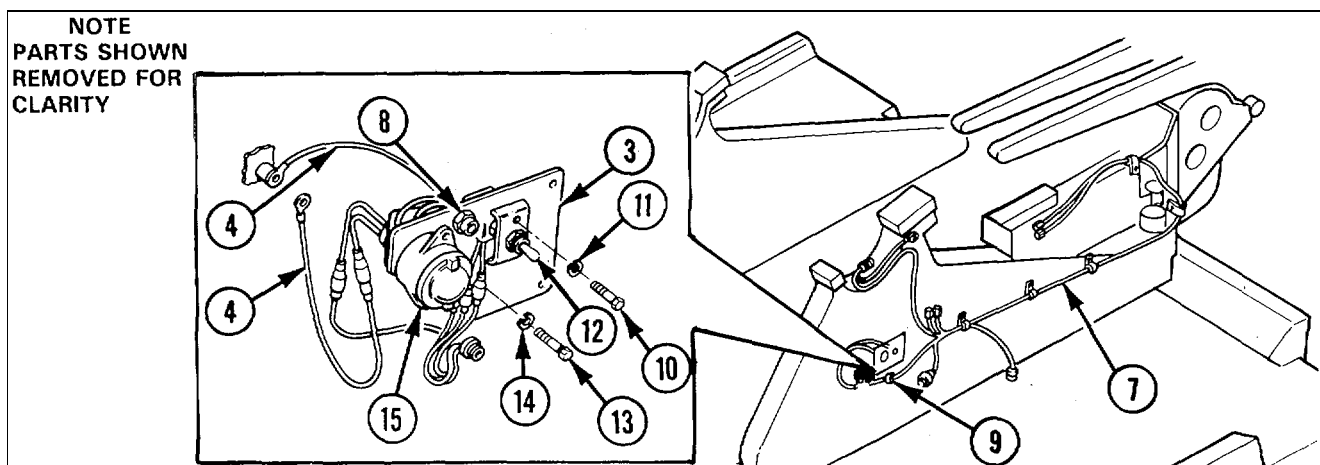


- 1 Remove four machine screws (1) four lockwashers (2), and suspension lockout instruction plate (3) from howitzer.

**NOTE**

Tag all wires and leads before disconnecting to ensure proper installation.

- 2 Disconnect two electrical suspension lockout system indicator light ground leads (4) by removing bolt (5) and lockwasher (6).



- 3 Disconnect floor disconnect to oil pump motor switch and accessories branched wiring harness (7) leads (4), and related wiring. Remove test light (8).
- 4 Remove floor disconnect to oil pump motor switch and accessories branched wiring harness (7) from howitzer. If damaged, remove rubber grommet (9) from suspension lockout instruction plate (3).
- 5 Remove two machine screws (10) two lockwashers (11), and toggle switch (12).
- 6 Remove two capscrews (13) two lockwashers (14), and warning light (15).

**DISASSEMBLY**

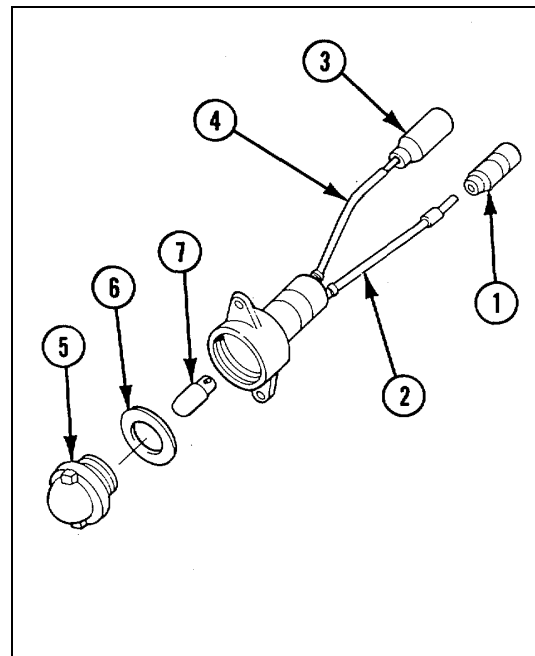
- 1 Remove electrical plug connector (1) from electrical wire (2).
- 2 Remove electrical plug connector (3) from electrical wire (4).
- 3 Remove light lens (5) flat washer (6), and LED (7).

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 If electrical wire is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 3 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

- 1 Install LED (7) flat washer (6), and light lens (5).
- 2 Install electrical plug connector (3) on electrical wire (4).
- 3 Install electrical plug connector (1) on electrical wire (2).



**2-94. MAINTENANCE ELECTRICAL INSTALLATION-SUSPENSION LOCKOUT INSTRUCTION PLATE AND WARNING LIGHT (CONT).**

**INSTALLATION**

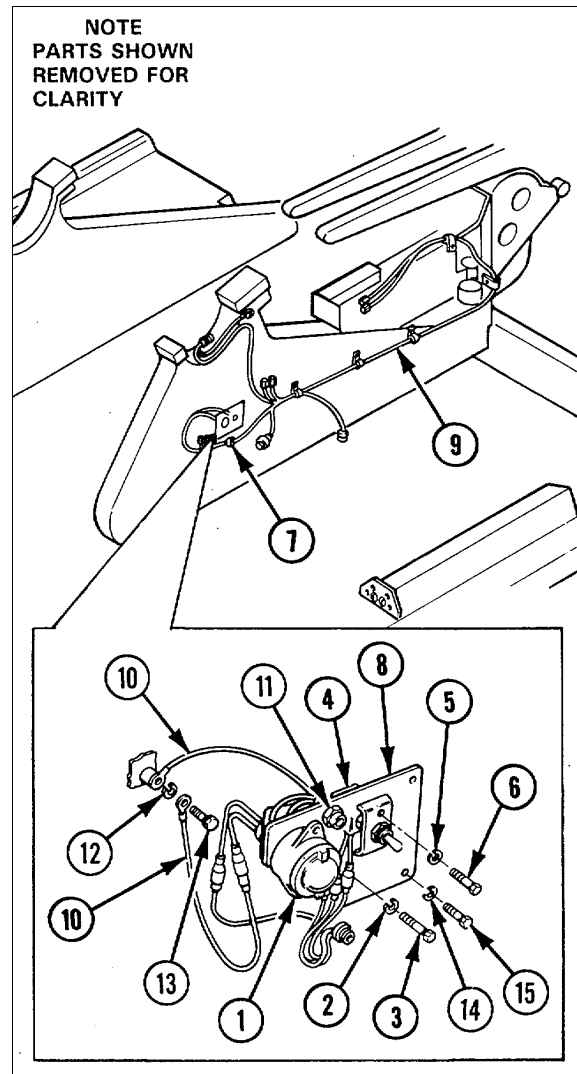
**CAUTION**

Make sure wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.

**NOTE**

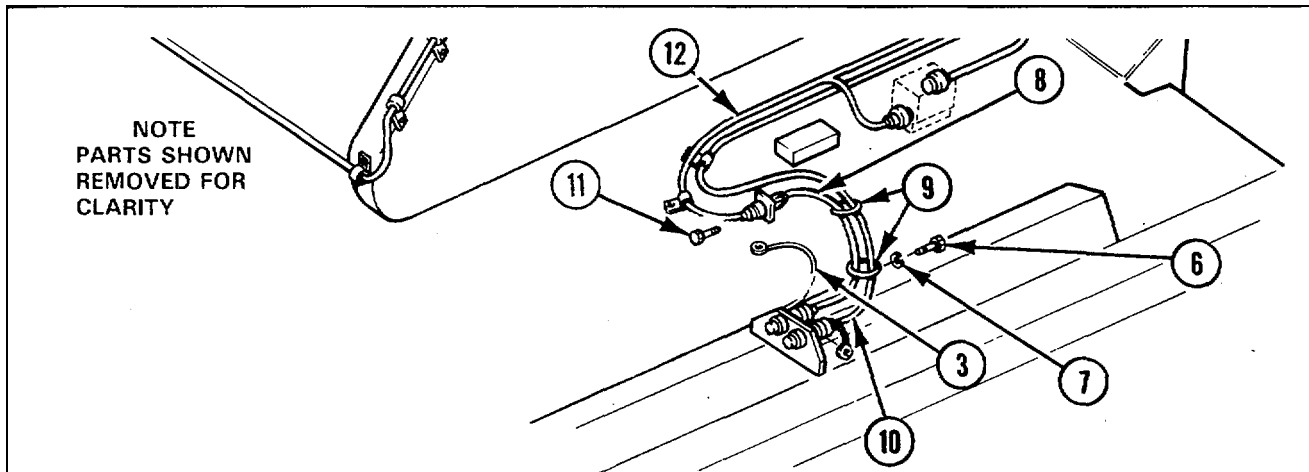
Make sure all electrical connections are tight.

- 1 Connect all electrical connectors.
- 2 Install warning light (1) two new lockwashers (2), and two capscrews (3).
- 3 Install toggle switch (4) two new lockwashers (5), and two machine screws (6).
- 4 If removed, install new rubber grommet (7) in suspension lockout instruction plate (8).
- 5 Position floor disconnect to oil pump motor switch and accessories branched wiring harness (9) on howitzer and connect floor disconnect to oil pump motor switch and accessories branched wiring harness (9), leads (10), and related wiring.
- 6 Install test light (11).
- 7 Using lockwasher (12) and bolt (13), connect two electrical suspension lockout system indicator light ground leads (10).
- 8 Position suspension lockout instruction plate (8) on howitzer and secure using four new lockwashers (14) and four machine screws (15).







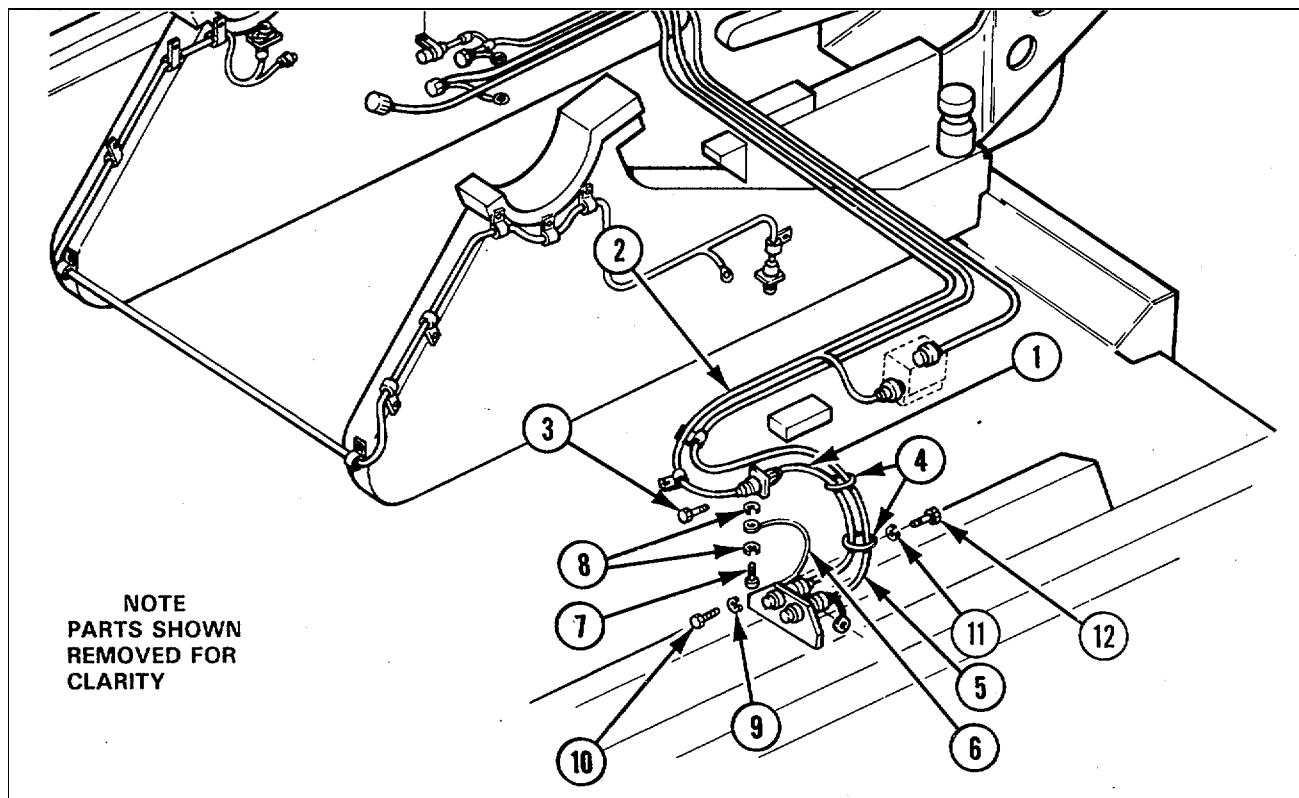
**2-95. MAINTENANCE OF ELECTRICAL INSTALLATION-HULL DISCONNECT TO TURRET DISCONNECT (CONT).****REMOVAL (CONT)**

- 3 Remove four cap screws (6) and four lockwashers (7).
- 4 Remove hull disconnect to turret disconnect electrical lead (8) from howitzer.
- 5 Remove two marker bands (9) from interphone amplifier to hull disconnect driver's control cable assembly (10) and hull disconnect to turret disconnect electrical lead (8).
- 6 Remove four cap screws (11) and remove hull disconnect to turret disconnect electrical lead (8) from circuit breaker and electrical turret disconnect to oil gear relay and 24-volt feed (12).

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**INSTALLATION**



NOTE  
PARTS SHOWN  
REMOVED FOR  
CLARITY

**CAUTION**

Make sure wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.

**NOTE**

When installing electrical leads, make sure all electrical connectors are connected.

- 1 Connect hull disconnect to turret disconnect electrical lead (1) to circuit breaker and electrical turret disconnect to oil gear relay and 24-volt feed (2) using four cap screws (3).
- 2 Install two new marker bands (4) on interphone amplifier to hull disconnect

driver's control cable assembly (5) and hull disconnect to turret disconnect electrical lead (1).

- 3 Position hull disconnect to turret disconnect electrical lead (1) on howitzer.
- 4 Connect turret to hull ground electrical lead (6) using cap screw (7) and two new lockwashers (8).
- 5 Install four new lockwashers (9) and two cap screws (10).
- 6 Install four new lockwashers (11) and four cap screws (12).

**2-96 MAINTENANCE OF PIVOT INTERLOCK PUSH SWITCH.**

- This task covers:**
- |                             |                                   |
|-----------------------------|-----------------------------------|
| a. <i>Removal</i>           | d. <i>Reassembly/Installation</i> |
| b. <i>Disassembly</i>       | e. <i>Installation/Adjustment</i> |
| c. <i>Inspection/Repair</i> |                                   |

**INITIAL SETUP:**

*Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*References*

TM 9-2350-304-24P-2

*General Safety Instructions*

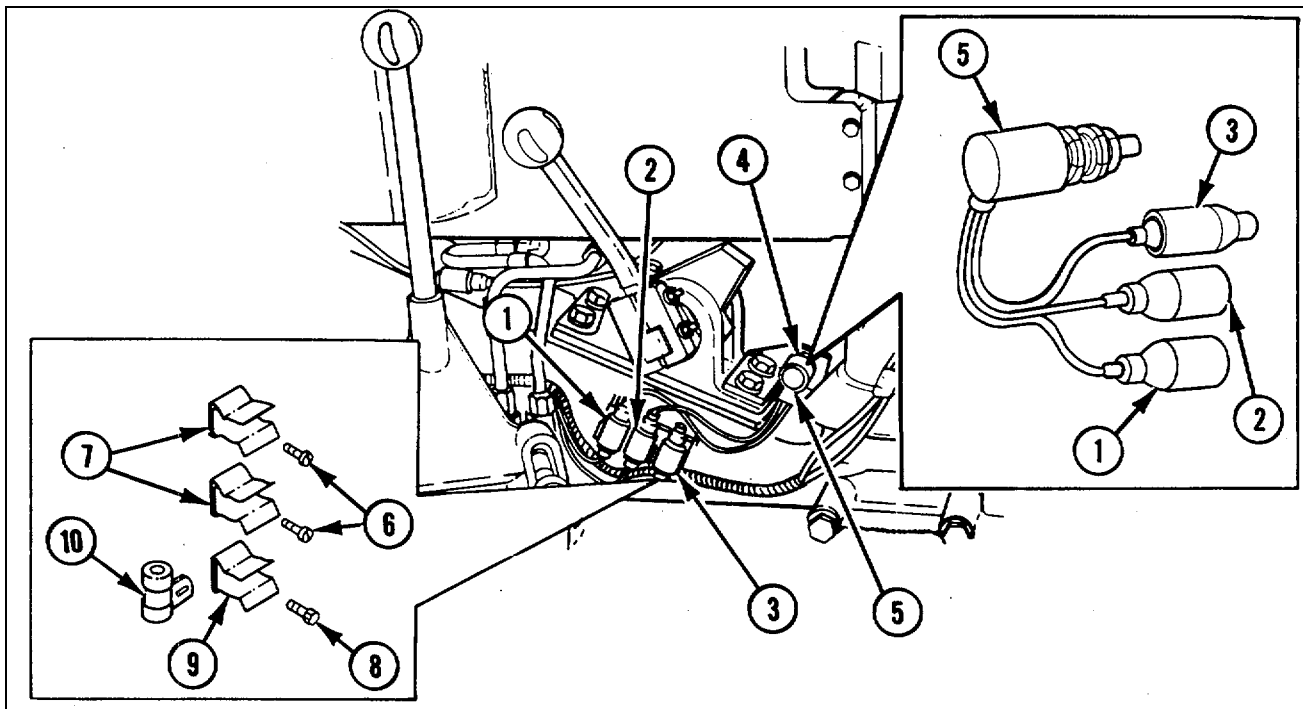
**WARNING**

- Make sure MASTER switch is OFF before repairing electrical

components. Failure to observe this warning could result in injury to personnel.

- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

**REMOVAL**



**WARNING**

- **Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.**
- **Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.**

**NOTE**

**Tag all wires and leads before disconnecting to ensure proper installation.**

- 1 Disconnect three electrical connectors (1, 2, and 3).
- 2 Remove nut and washer (4).
- 3 Remove pivot interlock push switch (5).
- 4 Remove two screws (6) and two spring tension clips (7).
- 5 Remove screw (8), spring tension clip (9), and loop clamp (10).

**DISASSEMBLY**

For complete disassembly of pivot interlock push switch, refer to page 2-75

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

For complete reassembly of pivot interlock push switch, refer to page 2-75

2-96 MAINTENANCE OF PIVOT INTERLOCK PUSH SWITCH (CONT).

**INSTALLATION/ADJUSTMENT**

- 1 Install loop clamp (1), spring tension clip (2), and screw (3).
- 2 Install two spring tension clips (4) and two screws (5).
- 3 Install pivot interlock push switch (6).
- 4 Install nut and washer (7).

**CAUTION**

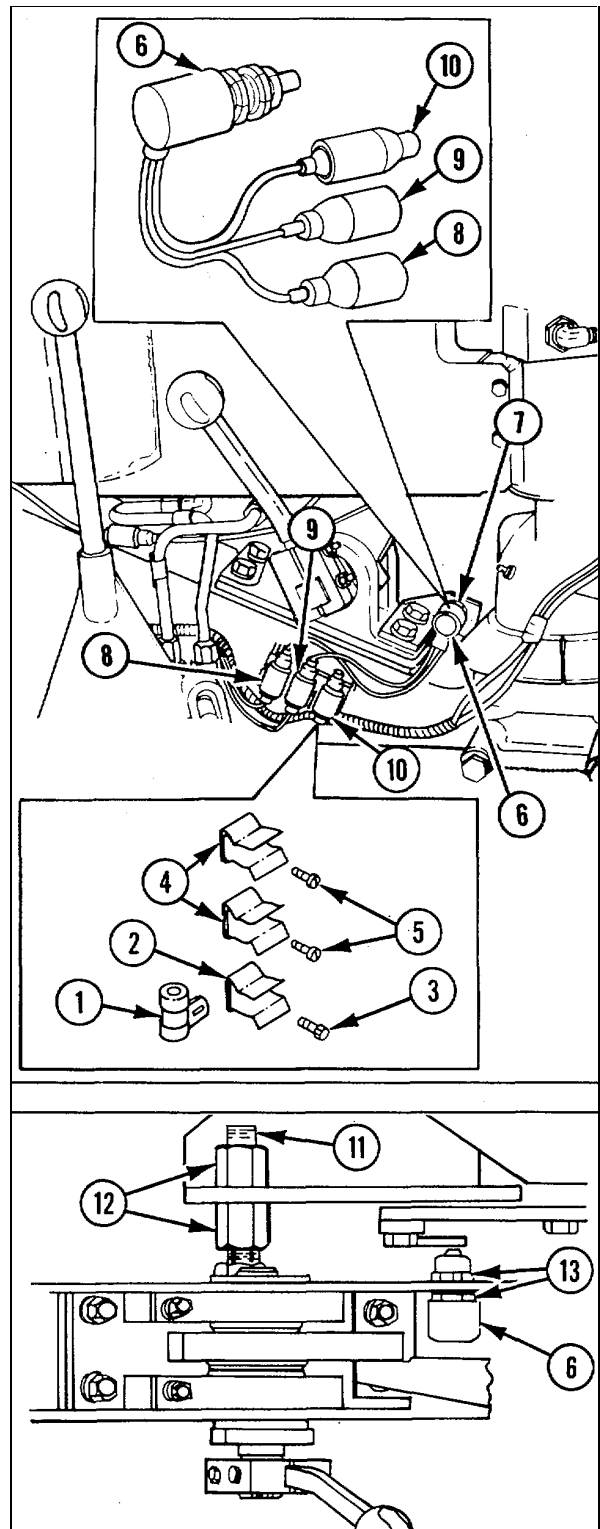
**Make sure wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.**

- 5 Connect three electrical connectors (8, 9, and 10).
- 6 Using SWING control handle set loader and rammer to full LOAD position.
- 7 By sight, aline rammer with gun tube by adjusting capscrew (11) and two self-locking nuts (1 2).

**NOTE**

**Capscrew should contact edge of cushioning pad.**

- 8 Turn two nuts (1 3) to adjust position of pivot interlock push switch (6) until plunger travels 0.125 to 0.188 in. (32 to 48 mm).
- 9 Tighten two nuts (13) to secure adjustment.



**2-97 MAINTENANCE OF TRAY INTERLOCK SENSITIVE SWITCH.**

This task covers:

a. <i>Removal</i>	d. <i>Reassembly/Installation</i>
b. <i>Disassembly</i>	e. <i>Installation/Adjustment</i>
c. <i>Inspection/Repair</i>	

**INITIAL SETUP:***General Safety Instructions**Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*References*

TM 9-2350-304-10  
TM 9-2350-304-24P-2

**WARNING**

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

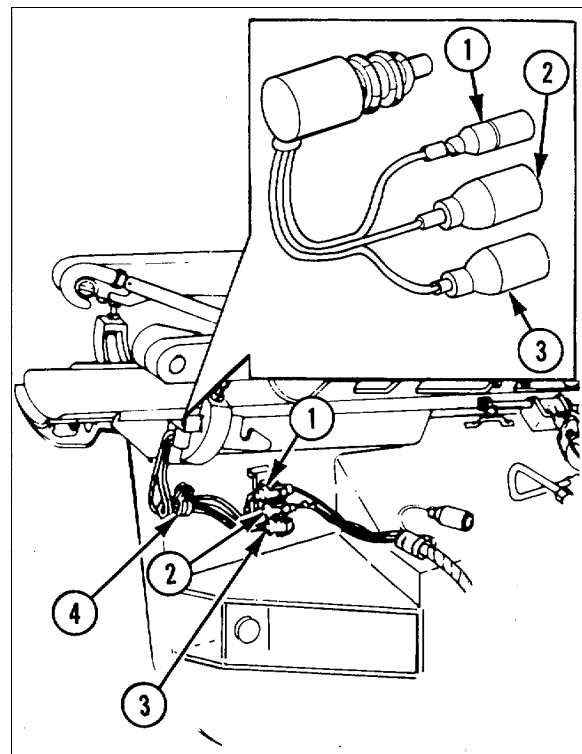
**REMOVAL****WARNING**

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

**NOTE**

Tag all wires and leads before disconnecting to ensure proper installation.

- 1 Disconnect three electrical leads (1, 2, and 3).
- 2 Remove bolt and loop clamp (4).



**2-97 MAINTENANCE OF TRAY INTERLOCK SENSITIVE SWITCH (CONT).**

**REMOVAL (CONT)**

- 3 Remove nut and washer (5).
- 4 Remove tray interlock sensitive switch (6).
- 5 Remove three screws (7) and three spring tension clips (8).

**DISASSEMBLY**

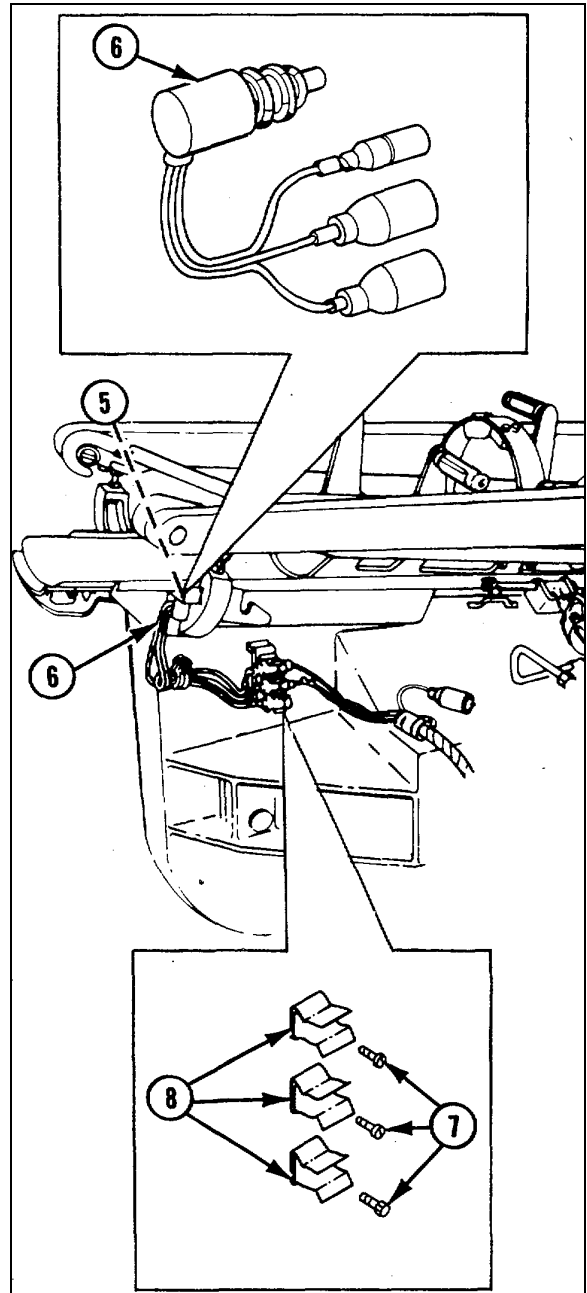
For complete disassembly of tray interlock sensitive switch, refer to page 2-75

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

For complete reassembly of tray interlock sensitive switch, refer to page 2-75



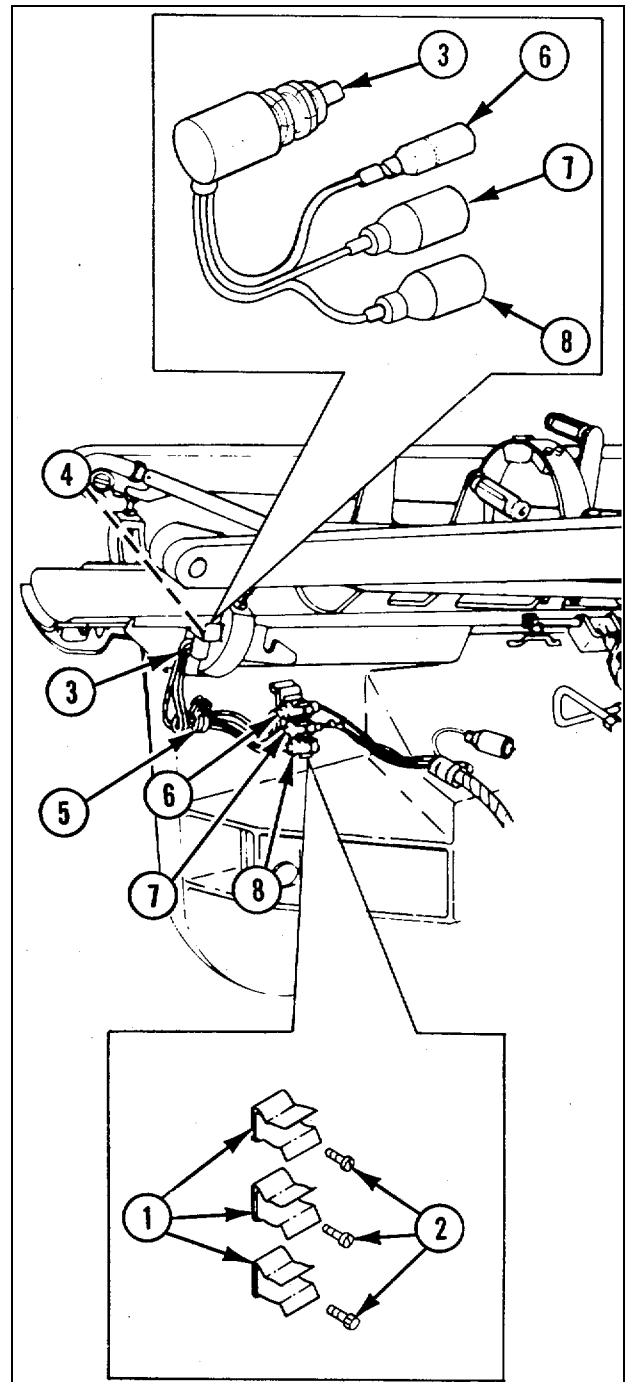
**INSTALLATION/ADJUSTMENT**

- 1 Install three spring tension clips (1) using three screws (2).
- 2 Install tray interlock sensitive switch (3).
- 3 Install washer and nut (4).
- 4 Install loop clamp and bolt (5).

**CAUTION**

**Make sure wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.**

- 5 Connect three electrical leads (6, 7, and 8). Lead 37A to lead 1, lead 174A to lead 2, and lead 174 to lead 3
- 6 Adjust tray interlock sensitive switch. Refer to TM 9-2350-304-10







**WARNING**

- **Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.**
- **Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.**

**NOTE**

**Tag all wires and leads before disconnecting to ensure proper reassembly.**

- 1 Disconnect floor disconnect to turret disconnect and accessories branched wiring harness (1) from receptacle assembly (2).

**NOTE**

**Prior to removal of floor disconnect to turret disconnect and accessories branched wiring harness, all electrical connectors must be disconnected.**

- 2 Remove marker band (3) and wiring harness terminal shield (4).
- 3 Remove nine bolts (5) and nine loop clamps (6).
- 4 Remove 14 bolts (7) and seven electrical retainers (8).
- 5 Remove two bolts (9) and three lockwashers (10).

- 6 Remove connector (11) from spring tension clip (12) and remove screw (13) and spring tension clip from howitzer.
- 7 Disconnect and remove floor disconnect to turret disconnect and accessories branched wiring harness (1).

*DISASSEMBLY*

For complete disassembly of floor disconnect to turret disconnect and accessories branched wiring harness, refer to page 2-75

*INSPECTION/REPAIR*

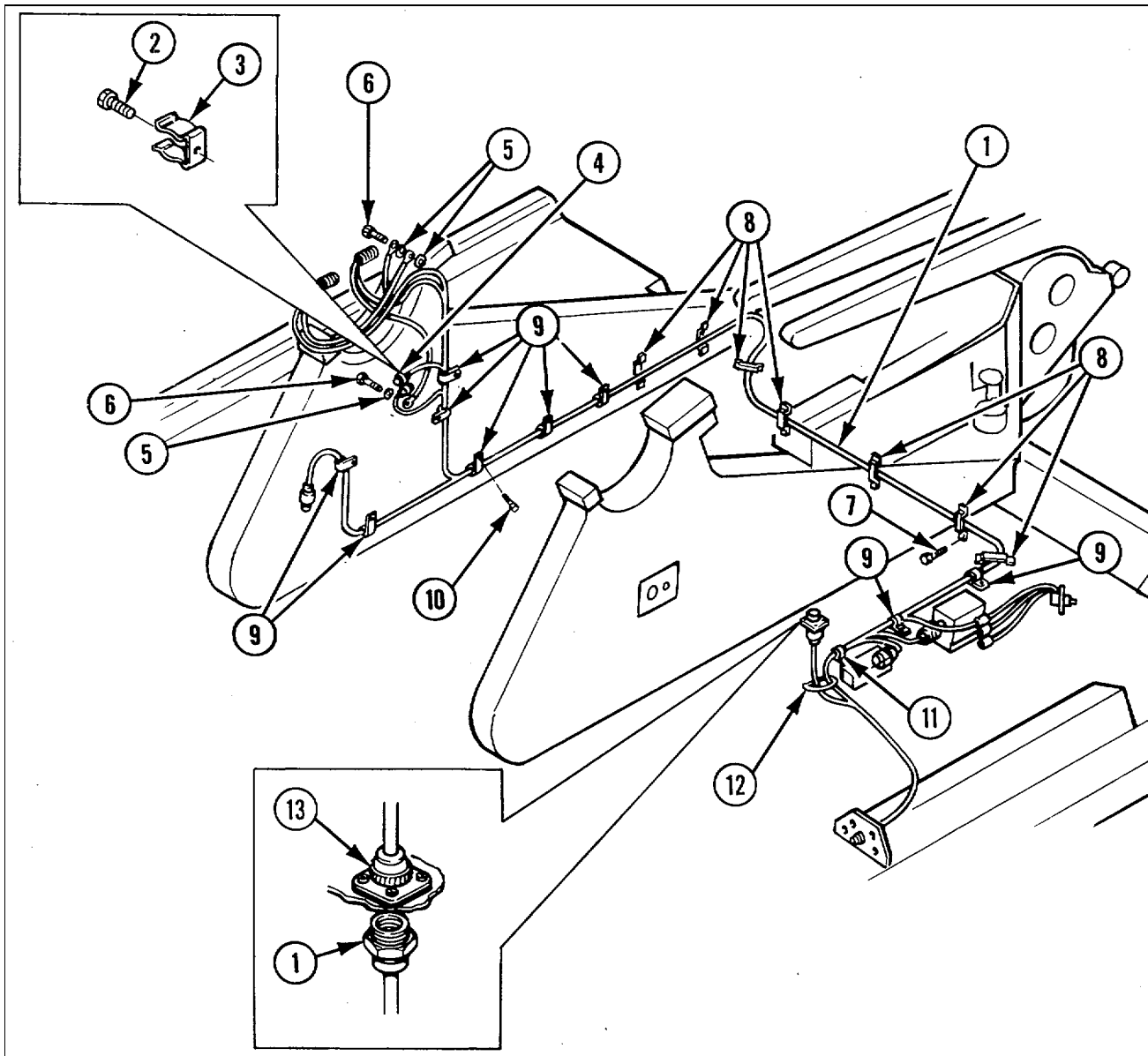
- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

*REASSEMBLY*

For complete reassembly of floor disconnect to turret disconnect and accessories branched wiring harness, refer to page 2-75

**2-98 MAINTENANCE OF FLOOR DISCONNECT TO TURRET DISCONNECT AND ACCESSORIES BRANCHED WIRING HARNESS (CONT).**

**INSTALLATION**



**1** Position floor disconnect to turret disconnect and accessories branched wiring harness (1) on howitzer.

**2** Using screw (2), install spring tension clip (3) and place connector (4) in spring tension clip.

**3** Install three new lockwashers (5) and two bolts (6).

**4** Using 14 bolts (7), install seven electrical retainers (8).

- 5 Install nine loop clamps (9) using nine bolts (10).
- 6 Install wiring harness terminal shield (11) and marker band (12).

**CAUTION**

**Make sure wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.**

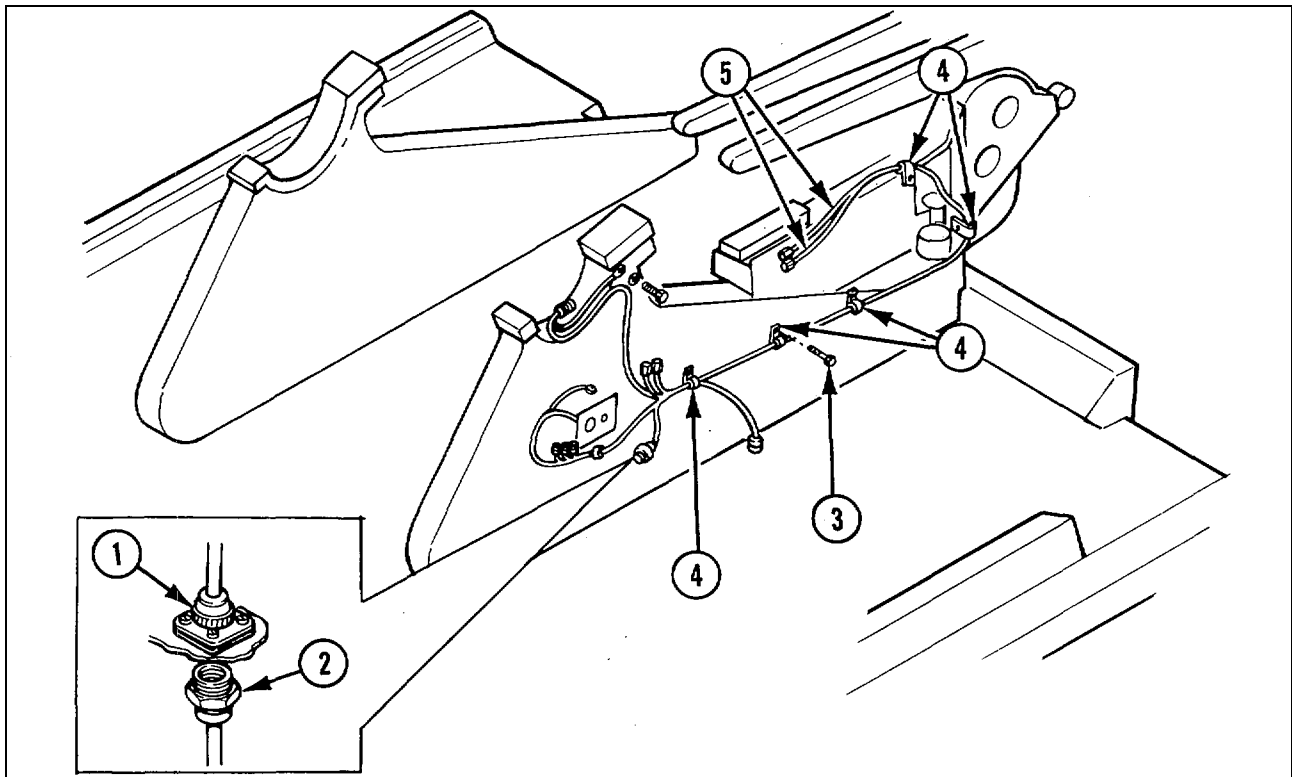
- 7 Connect receptacle assembly (13) to floor disconnect to turret disconnect and accessories branched wiring harness (1).

**2-99 MAINTENANCE OF FLOOR DISCONNECT TO OIL PUMP MOTOR SWITCH AND ACCESSORIES BRANCHED WIRING HARNESS.**

This task covers:	<ul style="list-style-type: none"> <li>a. <i>Removal</i></li> <li>b. <i>Disassembly</i></li> <li>c. <i>Inspection/Repair</i></li> </ul>	<ul style="list-style-type: none"> <li>d. <i>Reassembly</i></li> <li>e. <i>Installation</i></li> </ul>
<b>INITIAL SETUP</b>		
<p><i>Tools and Special Tools</i> Ordnance artillery and turret mechanic's tool kit (appx B)</p> <p><i>Materials/Parts</i> Lockwasher (4) (MS35338-42) Lockwasher (4) (MS35338-44) Lockwasher (5) (MS45904-68) Receptacle wiring harness gasket (MS52000-1 0)</p> <p><i>References</i> TM 9-2350-304-24P-2</p>	<p><i>General Safety Instructions</i></p> <p><b>WARNING</b></p> <ul style="list-style-type: none"> <li>Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.</li> <li>Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.</li> </ul>	

## 2-99 MAINTENANCE OF FLOOR DISCONNECT TO OIL PUMP MOTOR SWITCH AND ACCESSORIES BRANCHED WIRING HARNESS (CONT).

### REMOVAL



### WARNING

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

### NOTE

- Wiring harnesses and leads are secured to the turret and components with loop clamps, straps, clips, screws, etc. Remove only hardware which secures the wiring harness or lead which is being removed.
- Tag all wires and leads before disconnecting to ensure proper reassembly.

1 Disconnect receptacle assembly (1) from floor disconnect to turret disconnect and accessories branched wiring harness (2).

2 Remove five bolts (3) and five loop clamps (4) from wall of howitzer.

3 Disconnect two shell disconnects (5) from rammer cylinder valve.

- 4 Disconnect receptacle assembly (1) by removing four capscrews (6), four lockwashers (7), and receptacle wiring harness gasket (8).
- 5 Remove shell disconnects (9) from spring tension clips (10) and remove two screws (11) and two spring tension clips (10).
- 6 Remove screw (12) and three lockwashers (13) and disconnect three terminals (14).
- 7 Disconnect shell (1 5) and disconnect ground terminal (16) by removing bolt (17) and lockwasher (18).
- 8 Disconnect suspension lockout instruction plate (19) from oil pump motor switch and accessories branched wiring harness (20).
- 9 Remove floor disconnect to oil pump motor switch and accessories branched wiring harness (20) from howitzer.

**DISASSEMBLY**

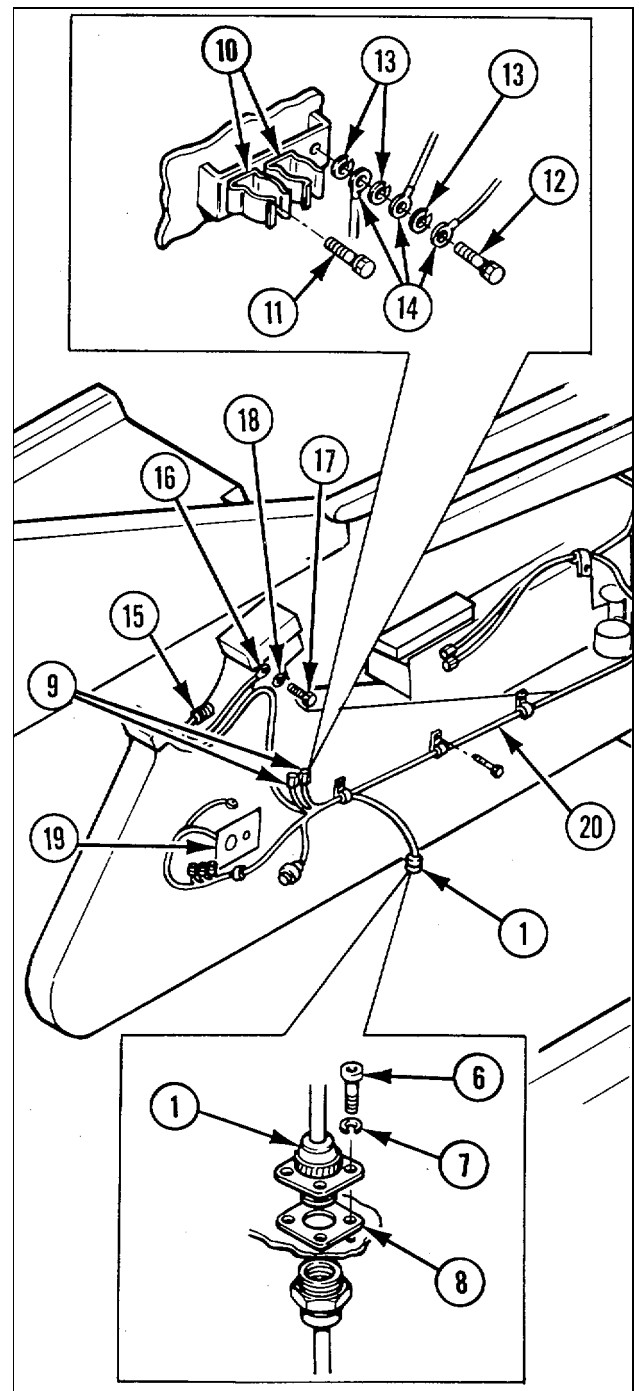
- 1 For complete disassembly of floor disconnect to oil pump motor switch and accessories branched wiring harness, refer to page 2-75
- 2 For complete disassembly of suspension lockout instruction plate (19), refer to page 2-269

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

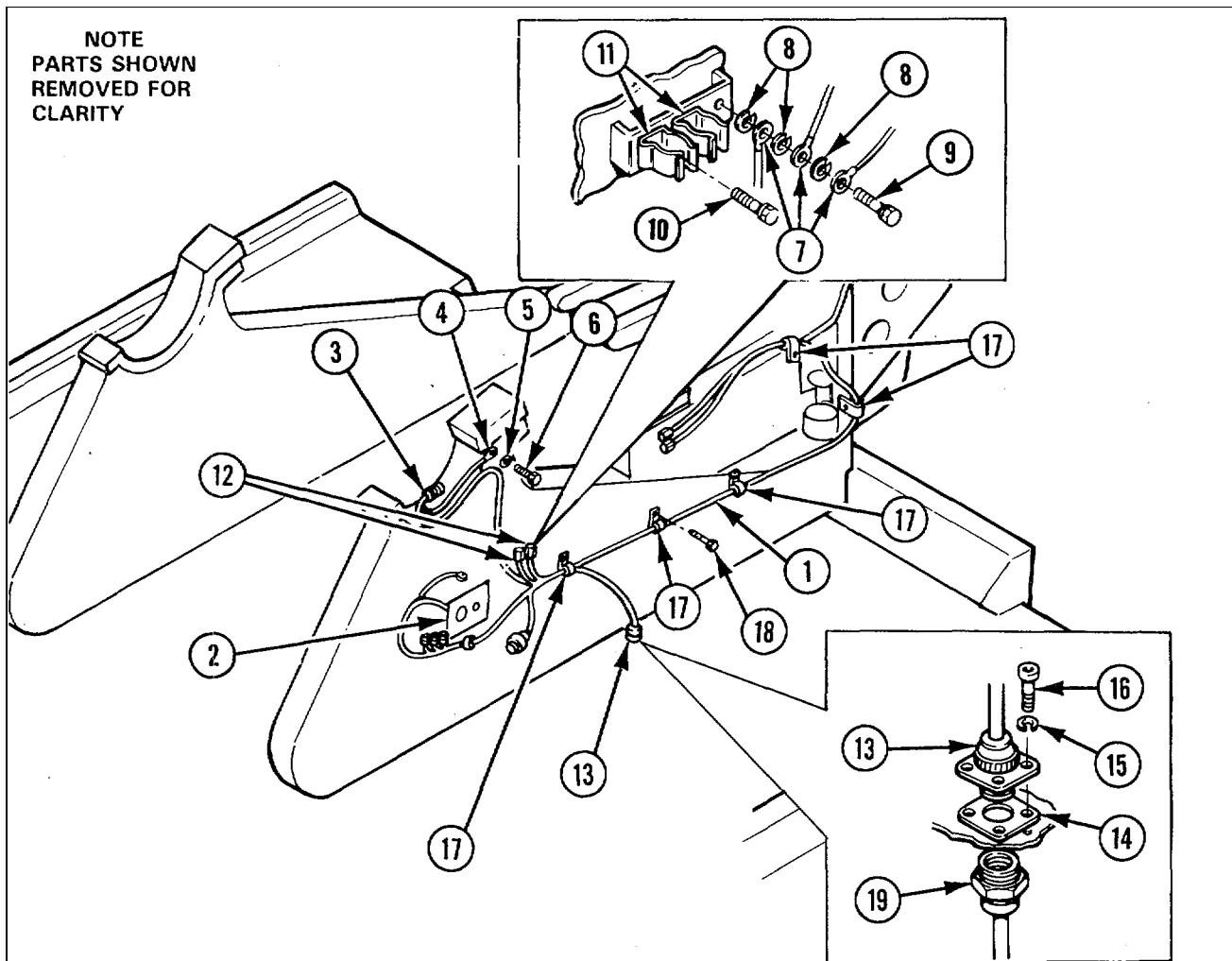
- 1 For complete reassembly of floor disconnect to oil pump motor switch and accessories branched wiring harness, refer to page 2-75



- 2 For complete reassembly of suspension lockout instruction plate, refer to page 2-269

2-99 MAINTENANCE OF FLOOR DISCONNECT TO OIL PUMP MOTOR SWITCH AND ACCESSORIES BRANCHED WIRING HARNESS (CONT).

**INSTALLATION**



**CAUTION**

Make sure all wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.

**NOTE**

Make sure all electrical connections are tight.

1 Connect all electrical connectors.

2 Connect oil pump motor switch and accessories branched wiring harness (1) to suspension lockout instruction plate (2) and position on howitzer.

3 Connect shell (3) and connect ground terminal (4) by installing new lockwasher (5) and bolt (6).

4 Connect three terminals (7) and install three new lockwashers (8) and screw (9).

- 5 Using two screws (10), install two spring tension clips (11) and place shell disconnects (12) on spring tension clips.
- 6 Connect receptacle assembly (13) by installing new receptacle wiring harness gasket (14), four new lockwashers (15), and four capscrews (16).
- 7 Connect two shell disconnects (12) on rammer cylinder valve.
- 8 Position five loop clamps (17) on wall of howitzer and secure with five bolts (18).
- 9 Connect floor disconnect to turret disconnect and accessories branched wiring harness (19) to receptacle assembly (13).

**2-100. MAINTENANCE OF COLLIMATOR TO UTILITY OUTLET BRANCHED WIRING HARNESS.**

<p>This task covers:</p>	<ul style="list-style-type: none"> <li>a. <i>Removal</i></li> <li>b. <i>Disassembly</i></li> <li>c. <i>Inspection/Repair</i></li> </ul>	<ul style="list-style-type: none"> <li>d. <i>Reassembly/Installation</i></li> <li>e. <i>Installation/Adjustment</i></li> </ul>
<p><b>INITIAL SETUP</b></p>		
<p><i>Tools and Special Tools</i>                  Ordnance artillery and turret mechanic's tool kit (appx B)</p> <p><i>References</i>                  TM 9-2350-304-24P-2</p>	<p><i>General Safety Instructions</i></p> <p><b>WARNING</b></p> <ul style="list-style-type: none"> <li>Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.</li> <li>Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.</li> </ul>	



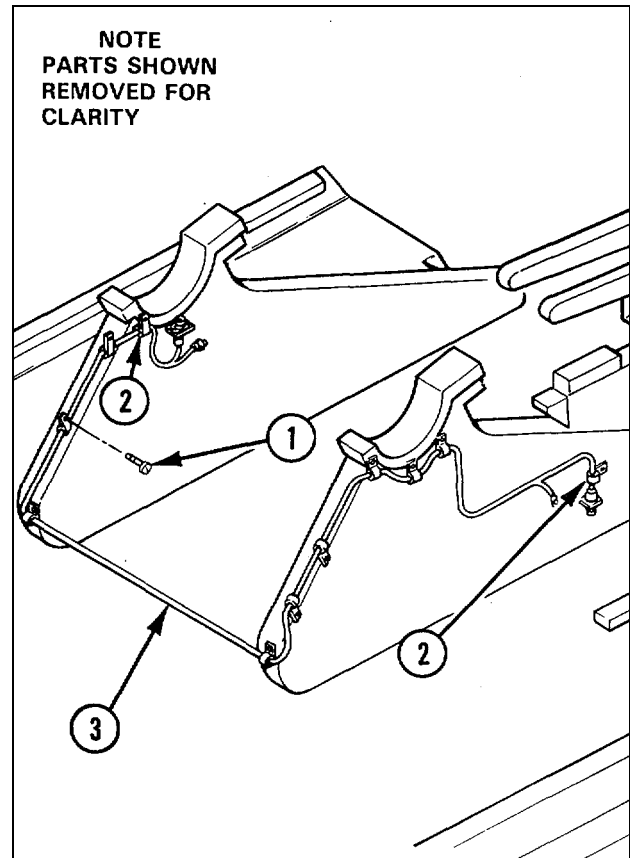
**2-100. MAINTENANCE OF COLLIMATOR TO UTILITY OUTLET BRANCHED WIRING HARNESS (CONT).****REMOVAL****WARNING**

- Make sure **MASTER** switch is **OFF** before repairing electrical components. Failure to observe this warning could result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

**NOTE**

Tag all wires and leads before disconnecting to ensure proper installation.

- 1 Remove screws (1) and loop clamps (2) securing collimator to utility outlet branched wiring harness (3).
- 2 Disconnect and remove collimator to utility outlet branched wiring harness (3) from howitzer.

**DISASSEMBLY**

For complete disassembly of collimator to utility outlet branched wiring harness, refer to page 2-75

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

For complete reassembly of collimator to utility outlet branched wiring harness, refer to page 2-75

**INSTALLATION**

**CAUTION**

**Make sure all wires and leads are attached to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.**

**NOTE**

**When installing wiring harness, make sure all electrical connectors are connected.**

- 1 Connect and install collimator to utility outlet branched wiring harness (3).
- 2 Install loop clamps (2) and screws (1) securing collimator to utility outlet branched wiring harness (3).

**2-101 MAINTENANCE OF CIRCUIT BREAKER AND TURRET DISCONNECT TO OIL GEAR RELAY AND 24-VOLT FEED ELECTRICAL LEAD.**

This task covers:	a. <i>Removal</i> b. <i>Disassembly</i> c. <i>Inspection/Repair</i>	d. <i>Reassembly/Installation</i> e. <i>Installation/Adjustment</i>
<b>INITIAL SETUP</b>		
<i>Tools and Special Tools</i> Ordnance artillery and turret mechanic's tool kit (appx B)	<i>General Safety Instructions</i>  <b>WARNING</b> <ul style="list-style-type: none"> <li>Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning may result in injury to personnel.</li> <li>Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.</li> </ul>	
<i>References</i> TM 9-2350-304-24P-2		

**2-101 MAINTENANCE OF CIRCUIT BREAKER AND TURRET DISCONNECT TO OIL GEAR RELAY AND 24-VOLT FEED ELECTRICAL LEAD (CONT).**

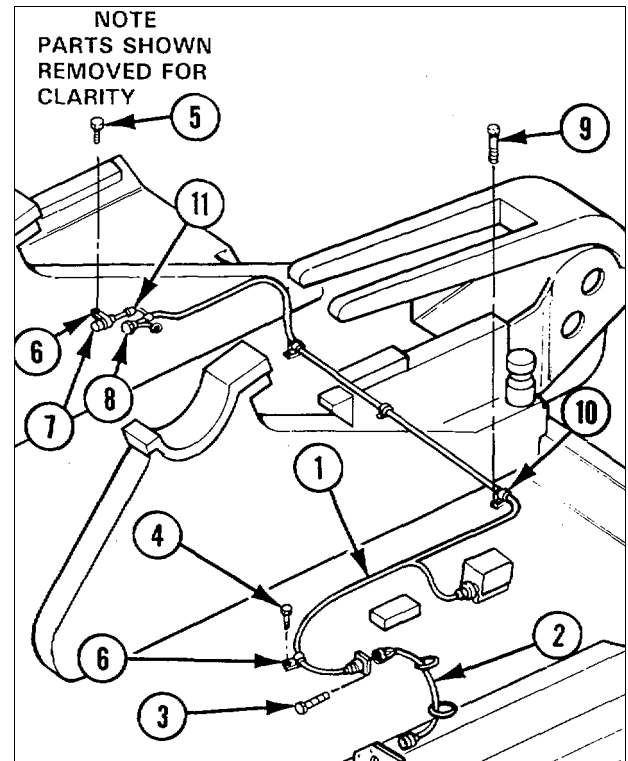
**REMOVAL**

**WARNING**

- Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning may result in injury to personnel.
- Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.

**NOTE**

Tag all wires and leads before disconnecting to ensure proper installation.



- 1 Disconnect circuit breaker and turret disconnect to oil gear relay and 24-volt feed electrical lead (1) from hull disconnect to turret disconnect electrical lead (2) by removing four capscrews (3).
- 2 Remove bolt (4), screw (5), and two terminal shields (6).
- 3 Disconnect circuit breaker and turret disconnect to oil gear relay and 24-volt feed electrical lead (1) at connectors (7 and 8).
- 4 Remove all necessary assembled washer bolts (9) and loop clamps (10), and remove 24-volt feed to capacitor electrical lead (11) from circuit breaker and turret disconnect to oil gear relay and 24-volt feed electrical lead (1).

**DISASSEMBLY**

For complete disassembly of circuit breaker and turret disconnect to oil gear relay and 24-volt feed electrical lead, refer to page 2-75

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 If circuit breaker and turret disconnect to oil gear relay and 24-volt feed electrical lead is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 3 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

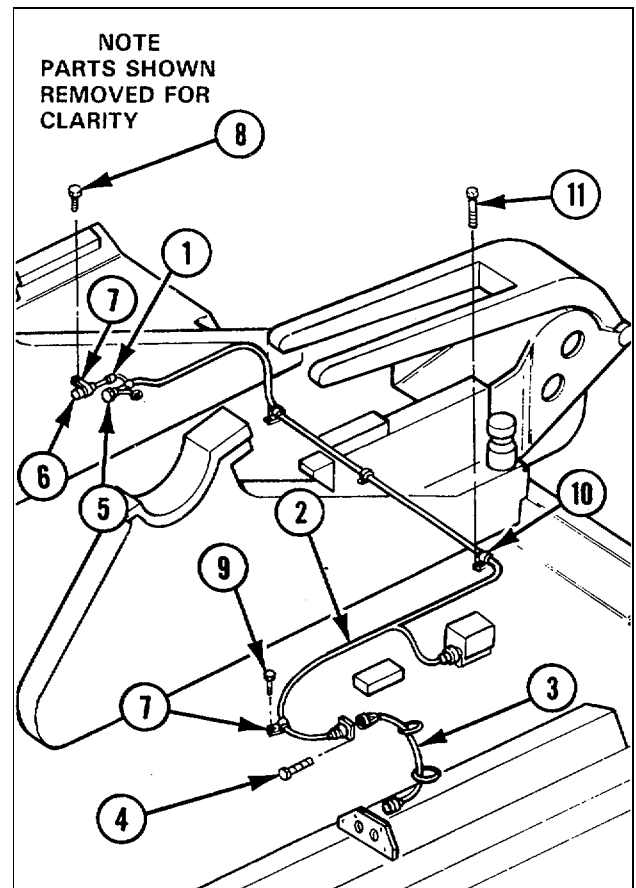
**REASSEMBLY**

For complete reassembly of circuit breaker and turret disconnect to oil gear relay and 24-volt feed electrical lead, refer to page 2-75

**INSTALLATION****CAUTION**

**Make sure wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.**

- 1 Connect 24-volt feed to capacitor electrical lead (1) to circuit breaker and turret disconnect to oil gear relay and 24-volt feed electrical lead (2).
- 2 Connect hull disconnect to turret disconnect electrical lead (3) to circuit breaker and turret disconnect to oil gear relay and 24-volt feed electrical lead (2) using four capscrews (4).
- 3 Connect circuit breaker and turret disconnect to oil gear relay and 24-volt feed electrical lead (2) at connectors (5 and 6).
- 4 Install two terminal shields (7) using screw (8), bolt (9), and install all necessary loop clamps (10) and assembled washer bolts (11).





**REMOVAL****WARNING**

- **Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning may result in injury to personnel.**
- **Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.**

- 1 Remove four capscrews (1) and four lockwashers (2) and disconnect hull disconnect, interphone amplifier to hull disconnect driver's control cable assembly (3).
- 2 Remove bolt (4) and two lockwashers (5) from terminal (6).
- 3 Remove screw (7) and terminal shield (8).

**NOTE**

**Tag all wires and leads before disconnecting to ensure proper installation.**

- 4 Disconnect hull disconnect, interphone amplifier to hull disconnect driver's control cable assembly (3) at connector (9).
- 5 Remove all necessary assembled washer bolts (10), loop clamps (11), two marker bands (12), and hull disconnect, interphone amplifier to hull disconnect driver's control cable assembly (3).

**DISASSEMBLY**

For complete disassembly of hull disconnect, interphone amplifier to hull disconnect driver's control, refer to page 2-75

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

For complete reassembly of hull disconnect, interphone amplifier to hull disconnect driver's control cable assembly, refer to page 2-75

**INSTALLATION****CAUTION**

**Make sure wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.**

- 1 Install two new marker bands (12), hull disconnect, interphone amplifier to hull disconnect driver's control cable assembly (3), and necessary loop clamps (11) and assembled washer bolts (10).
- 2 Connect hull disconnect, interphone amplifier to hull disconnect driver's control cable assembly (3) at connector (9).
- 3 terminal shield (8) and screw (7).
- 4 terminal (6) by installing bolt (4) and two new lockwashers (5).
- 5 Install four new lockwashers (2) and four capscrews (1).

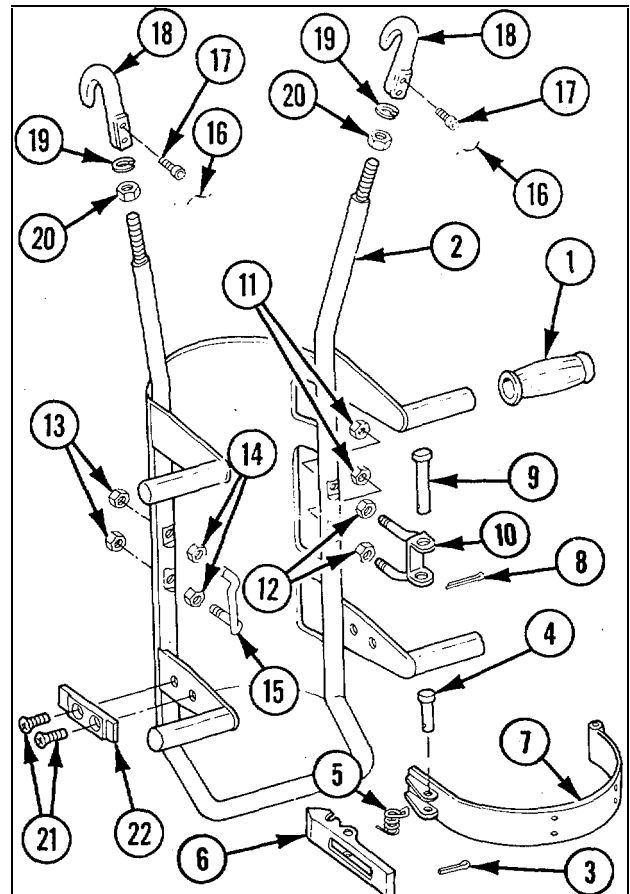


**2-104 MAINTENANCE OF PROJECTILE LIFTING TRAY.**

This task covers:		
<i>a. Disassembly</i>	<i>b. Inspection/Repair</i>	<i>c. Reassembly</i>
<b>INITIAL SETUP</b>		
<i>Tools and Special Tools</i>	<i>References</i>	
Ordnance artillery and turret mechanic's tool kit (appx B)	TM 9-2350-304-24P-2	
<i>Materials/Parts</i>	<i>Equipment Conditions</i>	
Adhesive (item 3, appx C)	Projectile lifting tray removed (TM 9-2350-304-10)	
Cotter pin (2) (P7170)		
Lockwasher (2) (MS35338-48)		
Lockwire (item 14, appx C)		
Self-locking nut (4) (MS21044N4)		

**DISASSEMBLY**

- 1 Remove four handle grips (1) from projectile tray (2).
- 2 Remove cotter pin (3), headed straight pin (4), torsion helical spring (5), and strap catch (6) from strap (7).
- 3 Remove cotter pin (8) and headed straight pin (9) from strap bracket bolt (10).
- 4 Remove two self-locking nuts (11) and two nuts (12) from strap bracket bolt (10).
- 5 Remove strap bracket bolt (10) from projectile tray (2).
- 6 Remove two self-locking nuts (13) and two nuts (14) from U-bolt (15).
- 7 Remove U-bolt (15) from projectile tray (2).
- 8 Remove lockwire (16) and four capscrews (17) from two pintle hooks (18).
- 9 Remove two pintle hooks (18), two lockwashers (19), and two nuts (20) from projectile tray (2).



- 10 Remove four machine screws (21) from two gun guides (22).
- 11 Remove two gun guides (22) from projectile tray (2).



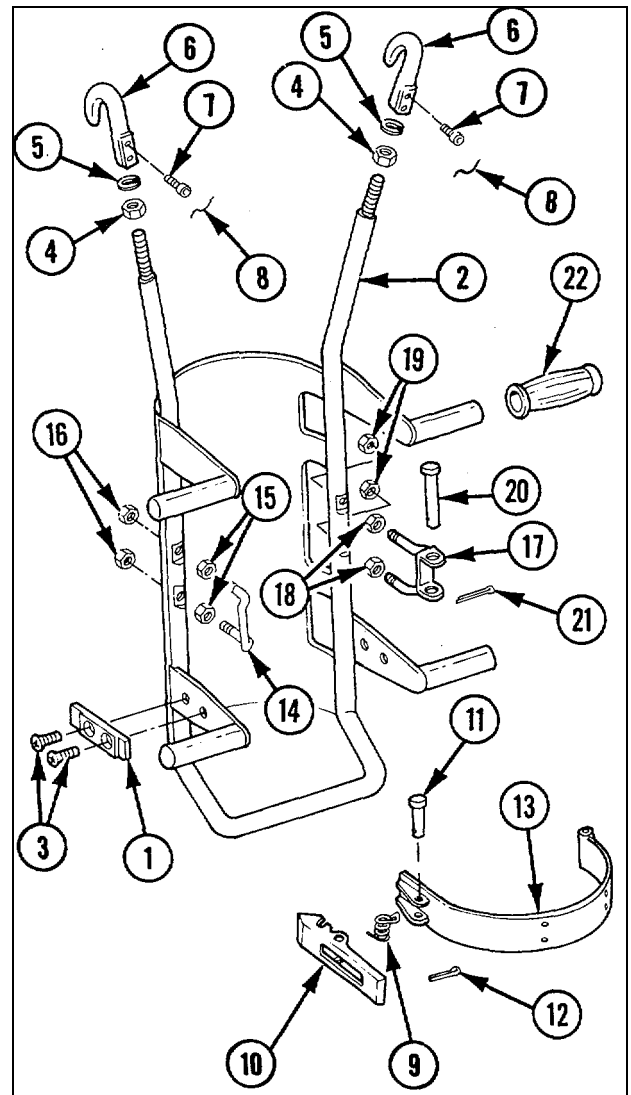
**2-104 MAINTENANCE OF PROJECTILE LIFTING TRAY (CONT).**

**INSPECTION/REPAIR**

- 1 Inspect for broken, damaged, or missing parts.
- 2 If projectile tray is broken, damaged, or missing, repair is by replacement of next higher assembly.
- 3 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY**

- 1 Position two gun guides (1) on projectile tray (2).
- 2 Install four machine screws (3) on two gun guides (1).
- 3 Install two nuts (4), two new lockwashers (5), and two pintle hooks (6) on projectile tray (2).
- 4 Install four capscrews (7) and new lockwire (item 14, appx C) (8) on two pintle hooks (6).
- 5 Install torsion helical spring (9), strap catch (10), headed straight pin (11), and new cotter pin (12) on strap (13).
- 6 Position U-bolt (14) and two nuts (15) on projectile tray (2).
- 7 Install two new self-locking nuts (16) on U-bolt (14).
- 8 Position strap bracket bolt (17) and two nuts (18) on projectile tray (2).
- 9 Install two new self-locking nuts (19) on strap bracket bolt (17).
- 10 Install headed straight pin (20) and new cotter pin (21) on strap bracket bolt (17).
- 11 Apply adhesive (item 3, appx C) to four handle grips (22) and install four handle grips on projectile tray (2).



**2-105 MAINTENANCE OF BACKUP COMPUTER SYSTEM WIRING HARNESS INSTALLATION WITH VEHICULAR APPLIQUE SYSTEM.**

This task covers:	a. <i>Removal/Disassembly</i> b. <i>Inspection/Repair</i>	c. <i>Reassembly/Installation</i>
-------------------	--	-----------------------------------

**INITIAL SETUP***Tools and Special Tools*

Ordnance artillery and turret mechanic's tool kit (appx B)

*Materials/Parts*

Cable market kit (PPL 3695)  
Hardware kit (PPL-1469)  
Lockwasher (6) (MS45904-75)

*References*

TM 9-2350-304-24P-2  
TM 11-5830-340-12

*General Safety Instructions***WARNING**

- **Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.**
- **Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.**

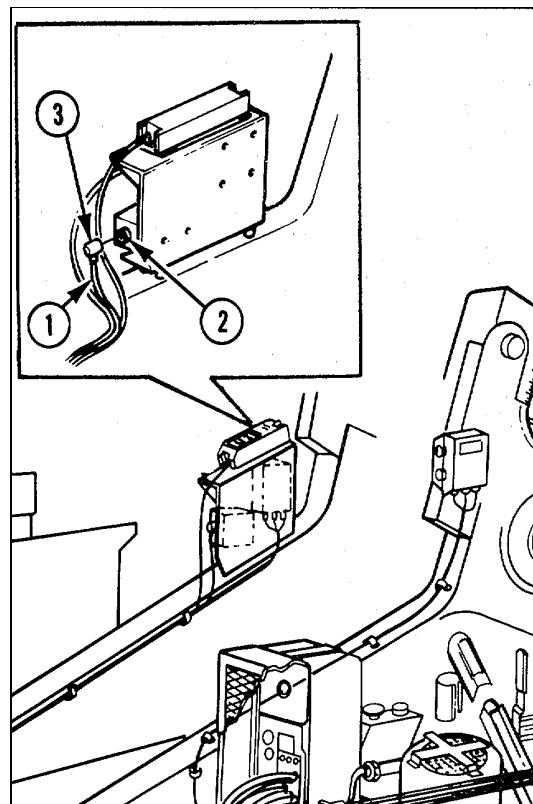
**REMOVAL/DISASSEMBLY****WARNING**

- **Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.**
- **Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.**

**CAUTION**

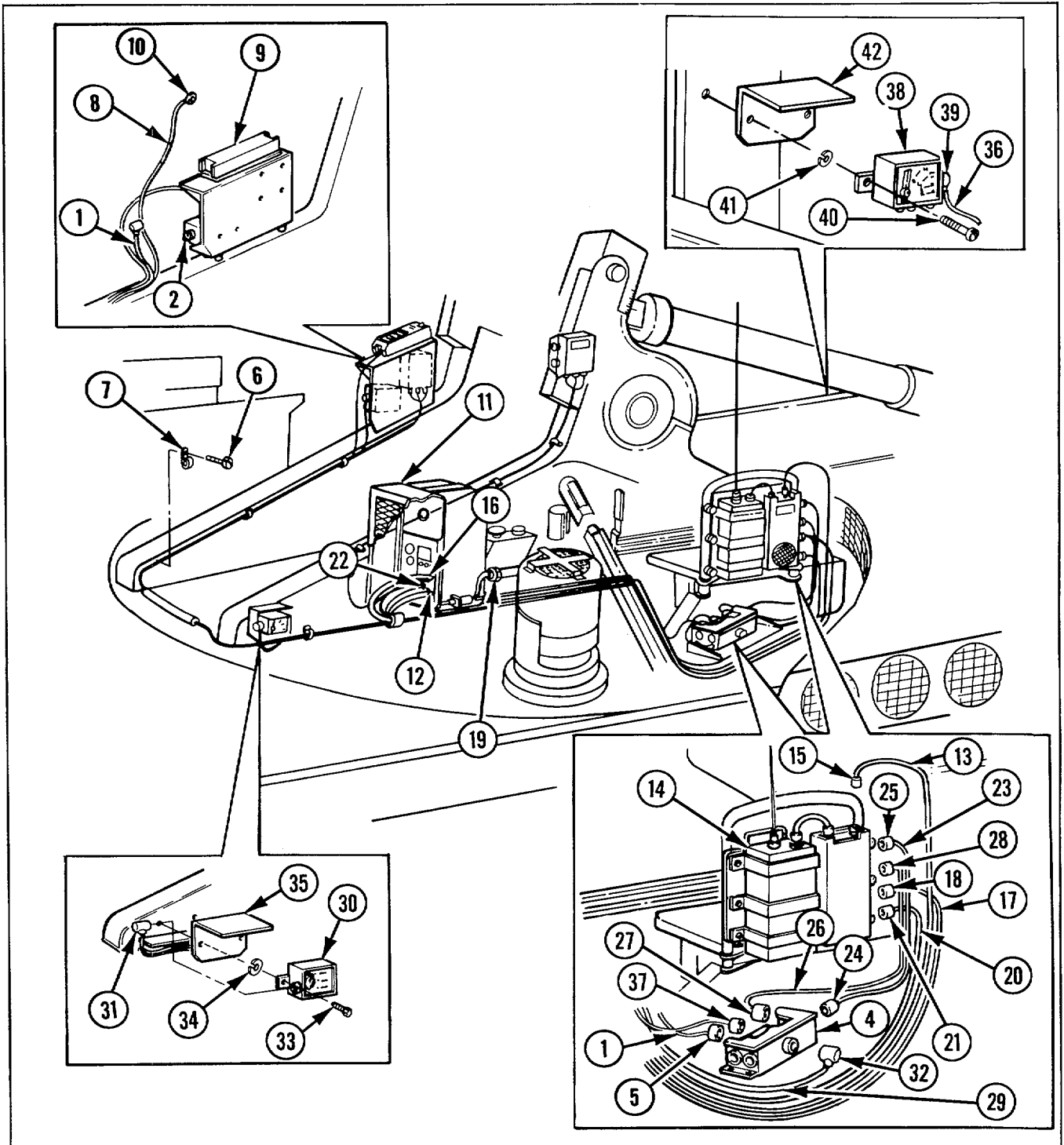
**Be sure to label all cable assembly connectors with cable markers provided in hardware kit to ensure proper installation.**

- 1** Disconnect cable assembly (1) from gunner's control intercom set (2) at connector (3).



2-105. MAINTENANCE OF BACKUP COMPUTER SYSTEM WIRING HARNESS INSTALLATION WITH VEHICULAR APPLIQUE SYSTEM (CONT).

REMOVAL/DISASSEMBLY (CON T)



- 2 If necessary, remove gunner's control intercom set (2). Refer to TM 11-5830340-12.
- 3 Disconnect cable assembly (1) from amplifier (4) at connector J507 (5).

**NOTE**

**Preserve clamp material to determine length of new clamps.**

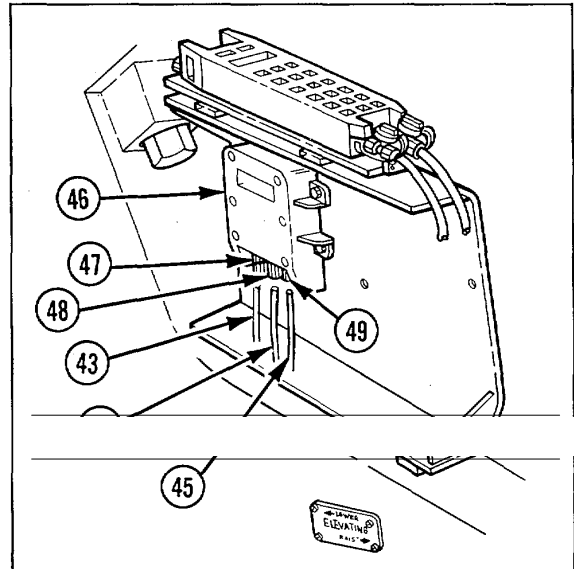
- 4 Remove four screws (6), four clamps (7), and cable assembly (1).
- 5 Disconnect cable assembly (8) from section chief assembly (9) at connector (10).
- 6 If necessary, remove section chief assembly (9). Refer to page 2-90.
- 7 Disconnect cable assembly (8) from data display control case (11) at connector SCA (12) and remove cable assembly (8).
- 8 Disconnect W33A cable assembly (13) from vehicular applique system (14) at connector J101 (15).
- 9 Disconnect W33A cable assembly (13) from data display control case (11) at connector AUDIO (16) and remove W33A cable assembly (13).
- 10 Disconnect power cable assembly (17) from vehicular applique system (14) at connector J103 (18).
- 11 Disconnect power cable assembly (17) from VEH 24V DC INTERFACE (19) and remove power cable assembly (17).
- 12 Disconnect W34A cable assembly (20) from vehicular applique system (14) at connector (21).
- 13 Disconnect W34A cable assembly (20) from data display control case (11) at connector PWR (22) and remove W34A cable assembly (20).

- 14 Disconnect power cable assembly (23) from amplifier (4) at connector J501 (24).
- 15 Disconnect power cable assembly (23) from vehicular applique system (14) at connector J101 (25) and remove power cable assembly.
- 16 Disconnect power cable assembly (26) from amplifier (4) at connector J505 (27).
- 17 Disconnect power cable assembly (26) from vehicular applique system (14) at connector J102 (28) and remove power cable assembly.
- 18 If necessary, remove vehicular applique system (14). Refer to page 2-96.
- 19 Disconnect W33A cable assembly (29) from section chief control intercom set (30) at connector (31).
- 20 Disconnect W33A cable assembly (29) from amplifier (4) at connector J504 (32) and remove W33A cable assembly.
- 21 Remove two screws (33), two lockwashers (34), guard (35), and section chief control intercom set (30).
- 22 Disconnect cable assembly (36) from amplifier (4) at connector J506 (37).
- 23 If necessary, remove amplifier (4). Refer to page 2-189.
- 24 Disconnect cable assembly (36) from driver's control intercom set (38) at connector (39) and remove cable assembly.
- 25 Remove two screws (40), two lockwashers (41), guard (42), and driver's control intercom set (38).

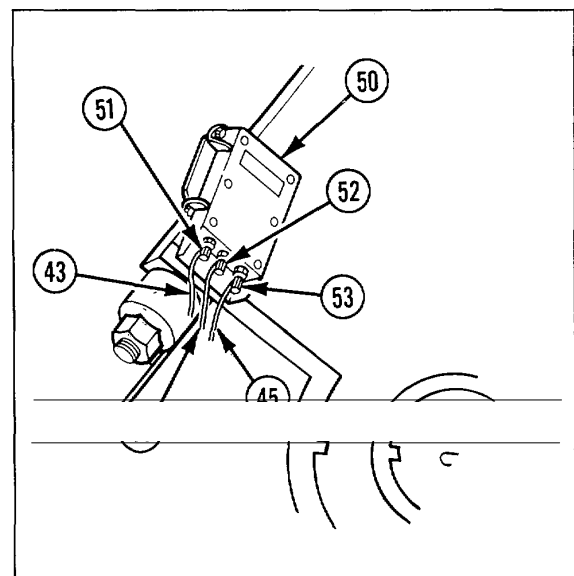
**2-105. MAINTENANCE OF BACKUP COMPUTER SYSTEM WIRING HARNESS INSTALLATION WITH VEHICULAR APPLIQUE SYSTEM (CONT).**

**REMOVAL/DISASSEMBLY (CONT)**

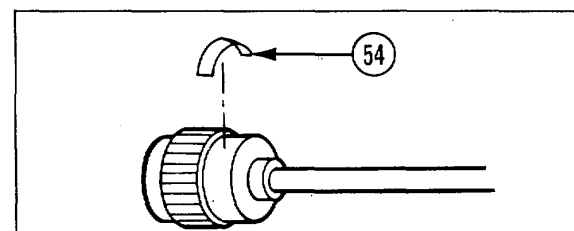
- 26** Disconnect three wire pairs (43, 44, and 45) from left-side data display (46) at three connectors DEF1 (47), DEF2 (48), and DEF3 (49).
- 27** If necessary, remove left-side data display (46). Refer to page 2-90.



- 28** Disconnect three wire pairs (43, 44, and 45) from right-side data display (50) at three connectors QE1 (51), QE2 (52), and QE3 (53) and remove three wire pairs.
- 29** If necessary, remove right-side data display (50). Refer to page 2-93.



- 30** If damaged, remove cable markers (54) from connectors on cable assemblies.

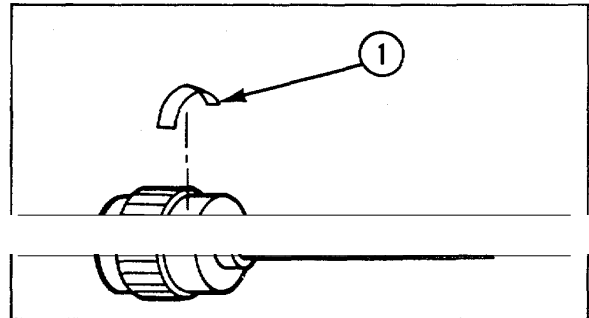


**INSPECTION/REPAIR**

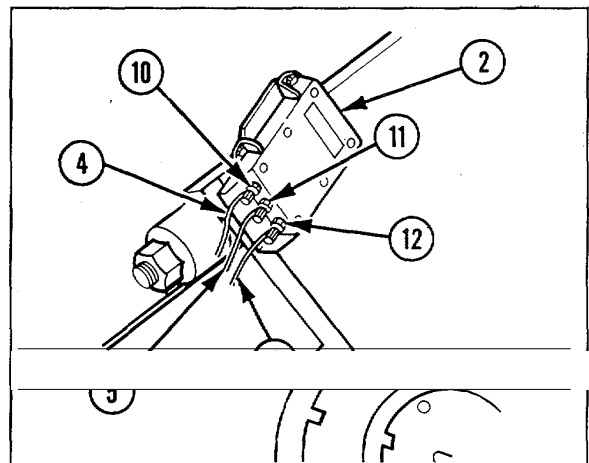
- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY/INSTALLATION**

- 1 If necessary, install new cable markers (1) on connectors of cable assemblies.



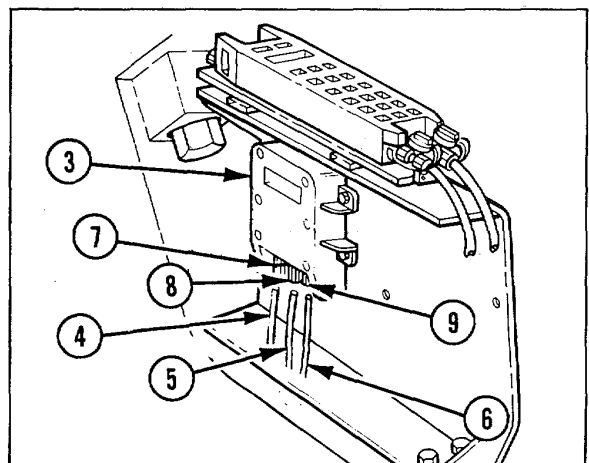
- 2 If necessary, install right side data display (2). Refer to page 2-93.
- 3 Cut field wires to required length and strip back outer jackets 6 to 8 in. (15 to 20 cm) and form six wires into three wire pairs prior to installation.



**CAUTION**

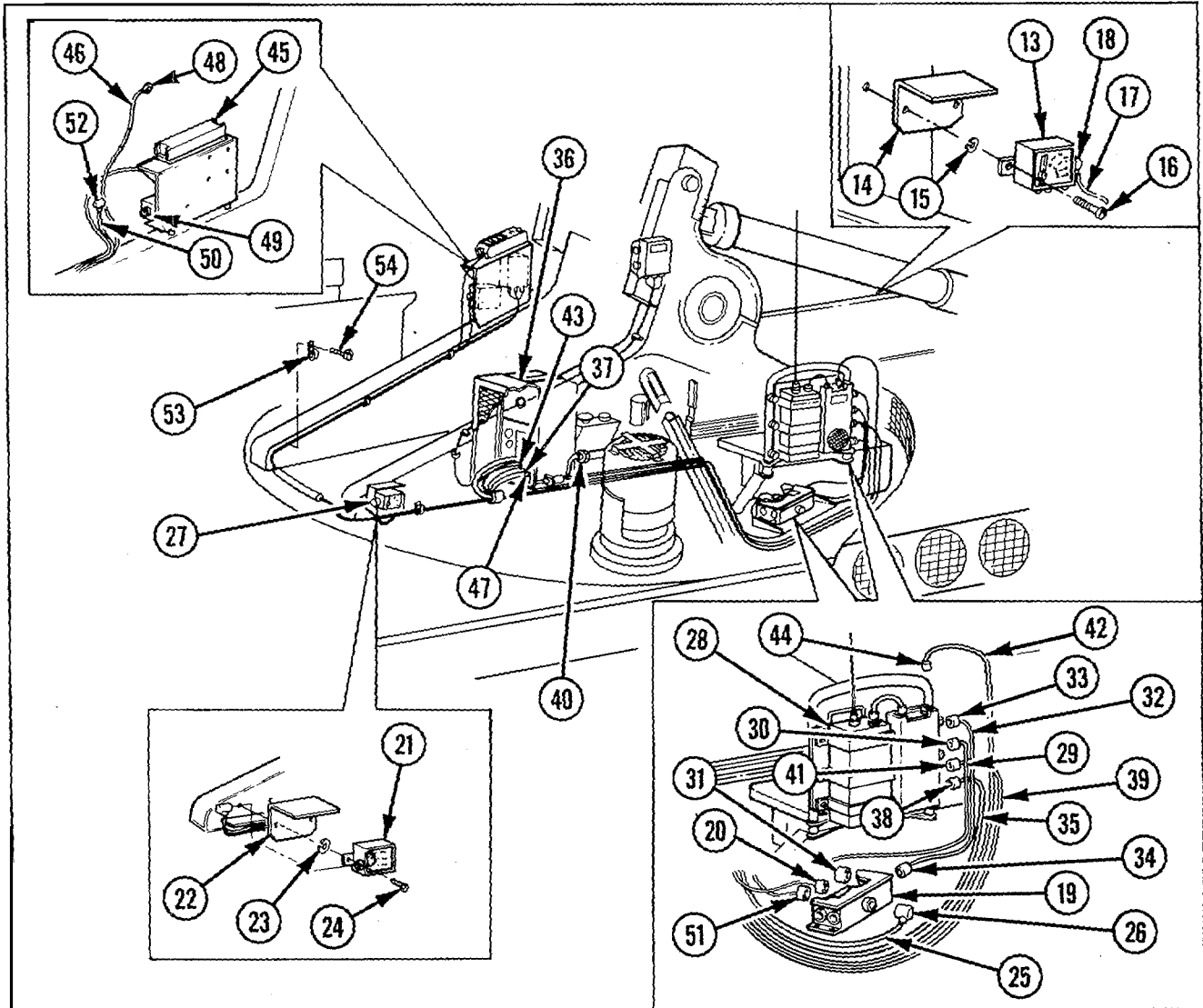
**Make sure wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.**

- 4 If necessary, install left-side data display (3). Refer to page 2-90.
- 5 To install three wire pairs (4, 5, and 6), connect three wire pairs to left-side data display (3) at three connectors DEF1 (7), DEF2 (8), and DEF3 (9) and to right-side data display (2) at three connectors QE1 (10), QE2 (11), and QE3 (12).



**2-105. MAINTENANCE OF BACKUP COMPUTER SYSTEM WIRING HARNESS INSTALLATION WITH VEHICULAR APPLIQUE SYSTEM (CONT).**

**REASSEMBLY/INSTALLATION (CONT)**



- 6 Install driver's intercom control set (13), guard (14), two new lockwashers (15), and two screws (16).
- 7 To install cable assembly (17), connect cable assembly to driver's control intercom set (13) at connector (18) and to amplifier (19) at connector J506 (20).
- 8 Install section chief control intercom set (21), guard (22), two new lockwashers (23), and two screws (24).

- 9 To install cable assembly W33A (25), connect cable assembly W33A to amplifier (19) at connector J504 (26) and to section chief control intercom set (21) at connector (27).
- 10 If necessary, install vehicular applique system (28). Refer to page 2-96.

- 11 To install power cable assembly (29), connect power cable assembly to vehicular applique system (28) at connector J102 (30) and to amplifier (19) at connector J505 (31).
- 12 To install power cable assembly (32), connect power cable assembly to vehicular applique system (28) at connector J101 (33) and to amplifier (19) at connector J501 (34).
- 13 To install W34A cable assembly (35), connect W34A cable assembly to data display control case (36) at connector PWR (37) and to vehicular applique system (28) at connector (38).
- 14 To install power cable assembly (39), connect cable assembly to VEH 24V DC INTERFACE (40) and to vehicular applique system (28) at connector J103 (41).
- 15 To install W33A cable assembly (42), connect W33A cable assembly to data display control case (36) at connector AUDIO (43) and to vehicular applique system (28) at connector J101 (44).

- 16 If necessary, install section chief assembly (45). Refer to page 2-90.
- 17 To install cable assembly (46), connect cable assembly to data display control case (36) at connector SCA (47) and to section chief assembly (45) at connector (48).
- 18 If necessary, install gunner's control intercom set (49). Refer to TM 11-5830340-12.
- 19 To install cable assembly (50), connect cable assembly to amplifier (19) at connector J507 (51) and to gunner's control intercom set (49) at connector (52).

**NOTE**

**Clamp strap material must be cut to desired length for cable clamping. Use old clamp strap material to determine length for new clamps.**

- 20 Install four new clamps (53) and four screws (54) approximately as shown on illustration.

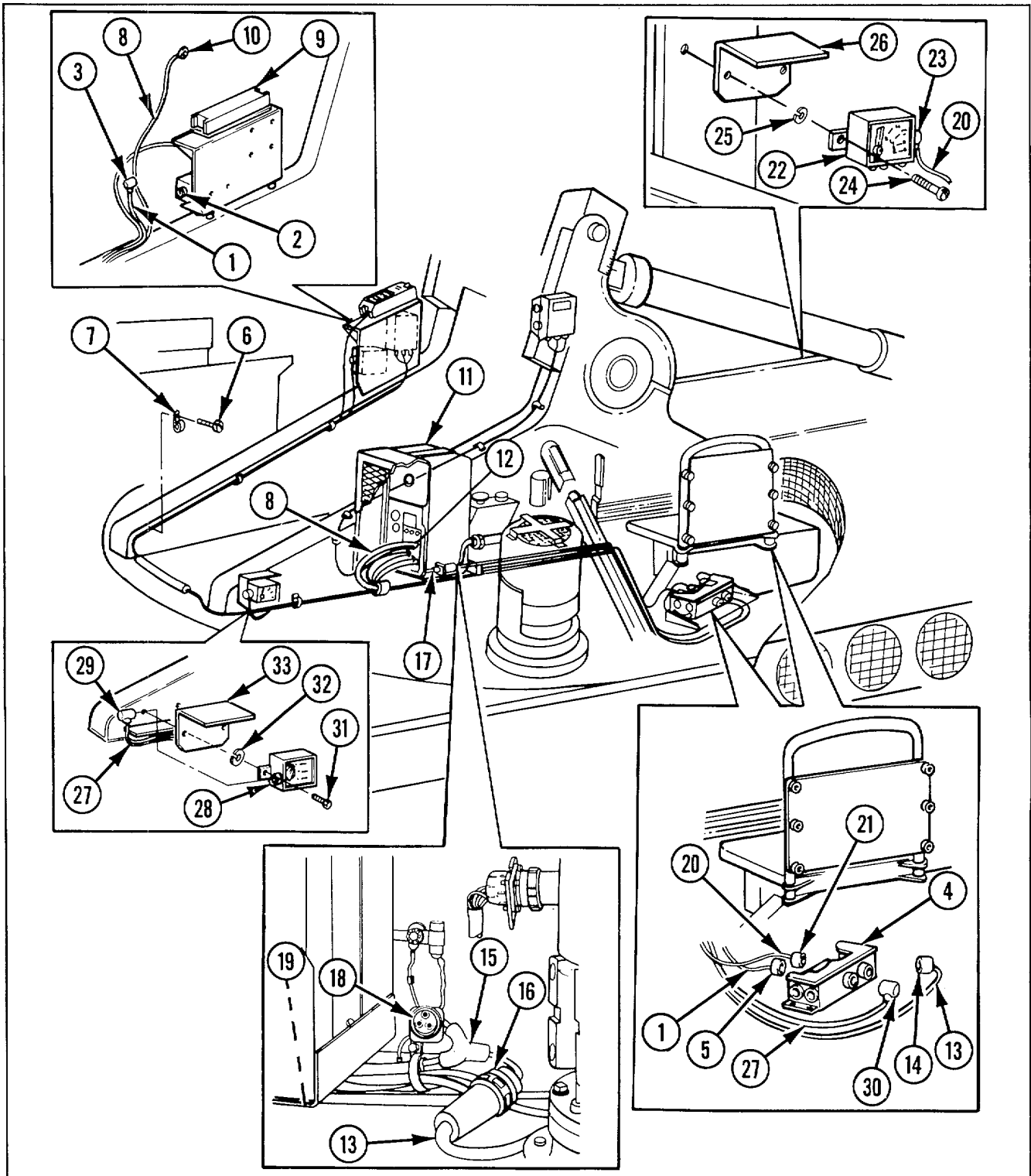
**2-106. MAINTENANCE OF BACKUP COMPUTER SYSTEM WIRING HARNESS INSTALLATION WITHOUT VEHICULAR APPLIQUE SYSTEM.**

This task covers:		a. <i>Removal/Disassembly</i>	c. <i>Reassembly/Installation</i>
		b. <i>Inspection/Repair</i>	
<b>INITIAL SETUP</b>			
<i>Tools and Special Tools</i>		<i>General Safety Instructions</i>	
Ordnance artillery and turret mechanic's tool kit (appx B)		<p><b>WARNING</b></p> <ul style="list-style-type: none"> <li>• Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.</li> <li>• Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.</li> </ul>	
<i>Materials/Parts</i>			
Cable marker kit (PPL 3695)			
Hardware kit (PPL-1469)			
Lockwasher (6) (MS45904-72)			
<i>References</i>			
TM 9-2350-304-24P-2			
TM 11-5830-340-12			



2-106. MAINTENANCE OF BACKUP COMPUTER SYSTEM WIRING HARNESS INSTALLATION WITHOUT VEHICULAR APPLIQUE SYSTEM (CONT).

REMOVAL/DISASSEMBLY



**WARNING**

- **Make sure MASTER switch is OFF before repairing electrical components. Failure to observe this warning could result in injury to personnel.**
- **Failure to remove or disconnect the batteries before removing or installing any electrical wiring harness or lead may result in injury or damaged equipment.**

**CAUTION**

**Be sure to label all cable assembly connectors with cable markers provided in hardware kit to ensure proper installation.**

- 1 Disconnect cable assembly (1) from gunner's control intercom set (2) at connector (3).
- 2 If necessary, remove gunner's control intercom set (2). Refer to TM 11-5830340-12.
- 3 Disconnect cable assembly (1) from amplifier (4) at connector J507 (5).

**NOTE**

**Preserve clamp material to determine length of new clamps.**

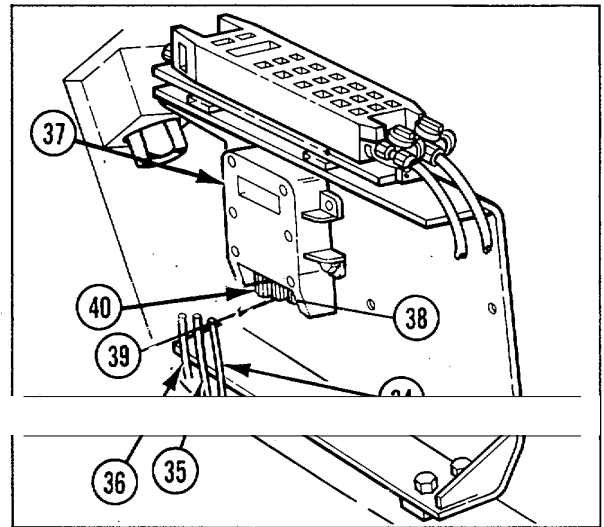
- 4 Remove four screws (6), four clamps (7), and cable assembly (1).
- 5 Disconnect cable assembly (8) from section chief assembly (9) at connector (10).
- 6 If necessary, remove section chief, assembly (9). Refer to page 2-90.
- 7 Disconnect cable assembly (8) from data display control case (11) at connector SCA (12) and remove cable assembly.

- 8 Disconnect cable assembly (13) from amplifier (4) at connector J508 (14).
- 9 Disconnect cable assembly (13) from power Y cable assembly (15) at connector (16) and remove cable assembly.
- 10 Disconnect power Y cable assembly (15) from power cable assembly at connector (16).
- 11 Disconnect power cable assembly (17) from data display control case (11) at connector PWR (18) and remove power cable assembly.
- 12 Disconnect and remove power Y cable assembly (15) from VEH 24 V DC INTERFACE at bulkhead disconnect (19).
- 13 Disconnect cable assembly (20) from amplifier (4) at connector J506 (21).
- 14 Disconnect cable assembly (20) from driver's control intercom set (22) at connector (23) and remove cable assembly.
- 15 Remove two screws (24), two lockwashers (25), guard (26), and driver's control intercom set (22).
- 16 Disconnect W33A cable assembly (27) from section chief control intercom set (28) at connector (29).
- 17 Disconnect W33A cable assembly (27) from amplifier (4) at connector J504 (30) and remove W33A cable assembly.
- 18 Remove two screws (31), two lockwashers (32), guard (33), and section chief control intercom set (28).
- 19 If necessary, remove amplifier (4). Refer to page 2-189.

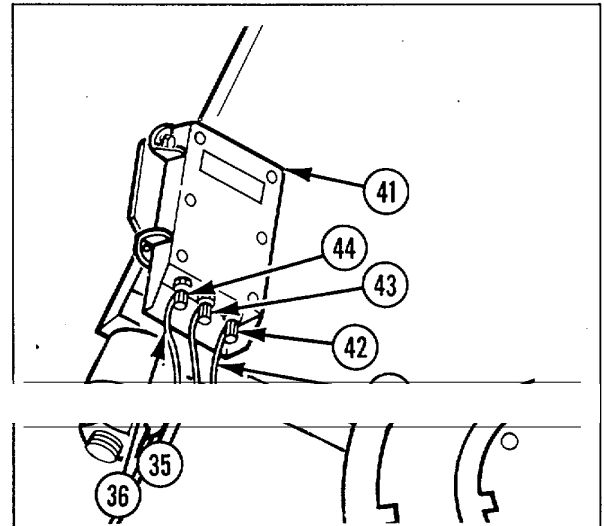
**2-106. MAINTENANCE OF BACKUP COMPUTER SYSTEM WIRING HARNESS INSTALLATION WITHOUT VEHICULAR APPLIQUE SYSTEM (CONT).**

**REMOVAL/DISASSEMBLY (CONT)**

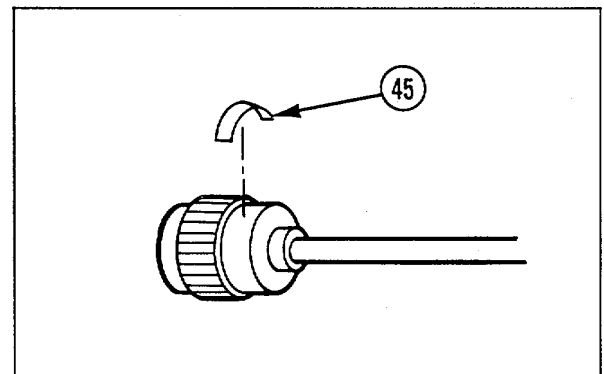
- 20** Disconnect three wire pairs (34, 35, and 36) from left-side data display (37) at three connectors DEF1 (38), DEF2 (39), and DEF3 (40).
- 21** If necessary, remove left-side data display (37). Refer to page 2-90.



- 22** Disconnect three wire pairs (34, 35, and 36) from right-side data display (41) at three connectors QE1 (42), QE2 (43), and QE3 (44) and remove three wire pairs.
- 23** If necessary, remove right-side data display (41). Refer to page 2-93.



- 24** If damaged, remove cable markers (45) from connectors on cable assemblies.

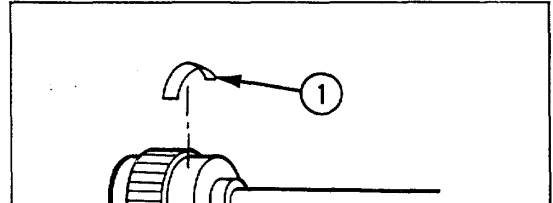


**INSPECTION/REPAIR**

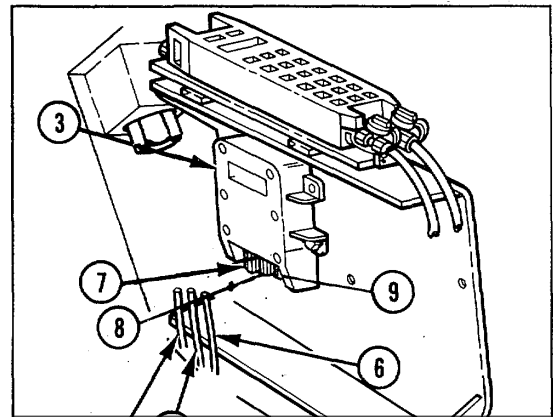
- 1 Inspect for broken, damaged, or missing parts.
- 2 Repair is by replacement of authorized parts (TM 9-2350-304-24P-2).

**REASSEMBLY/INSTALLATION**

- 1 If necessary, install new cable markers (1) on connectors or cable assemblies.



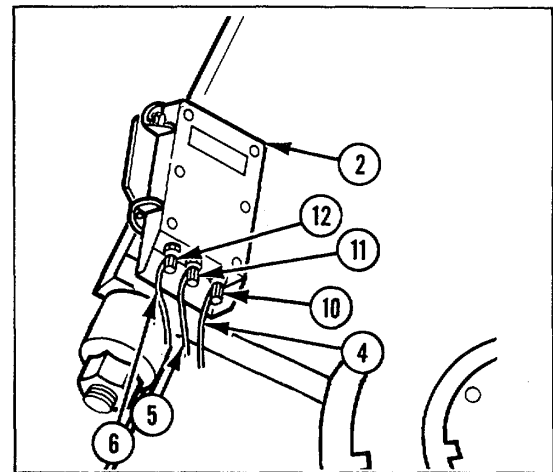
- 2 If necessary, install right-side data display (2). Refer to page 2-93.
- 3 Cut field wires to required length and strip back outer jackets 6 to 8 in. (15 to 20 cm) and form six wires into three wire pairs.



**CAUTION**

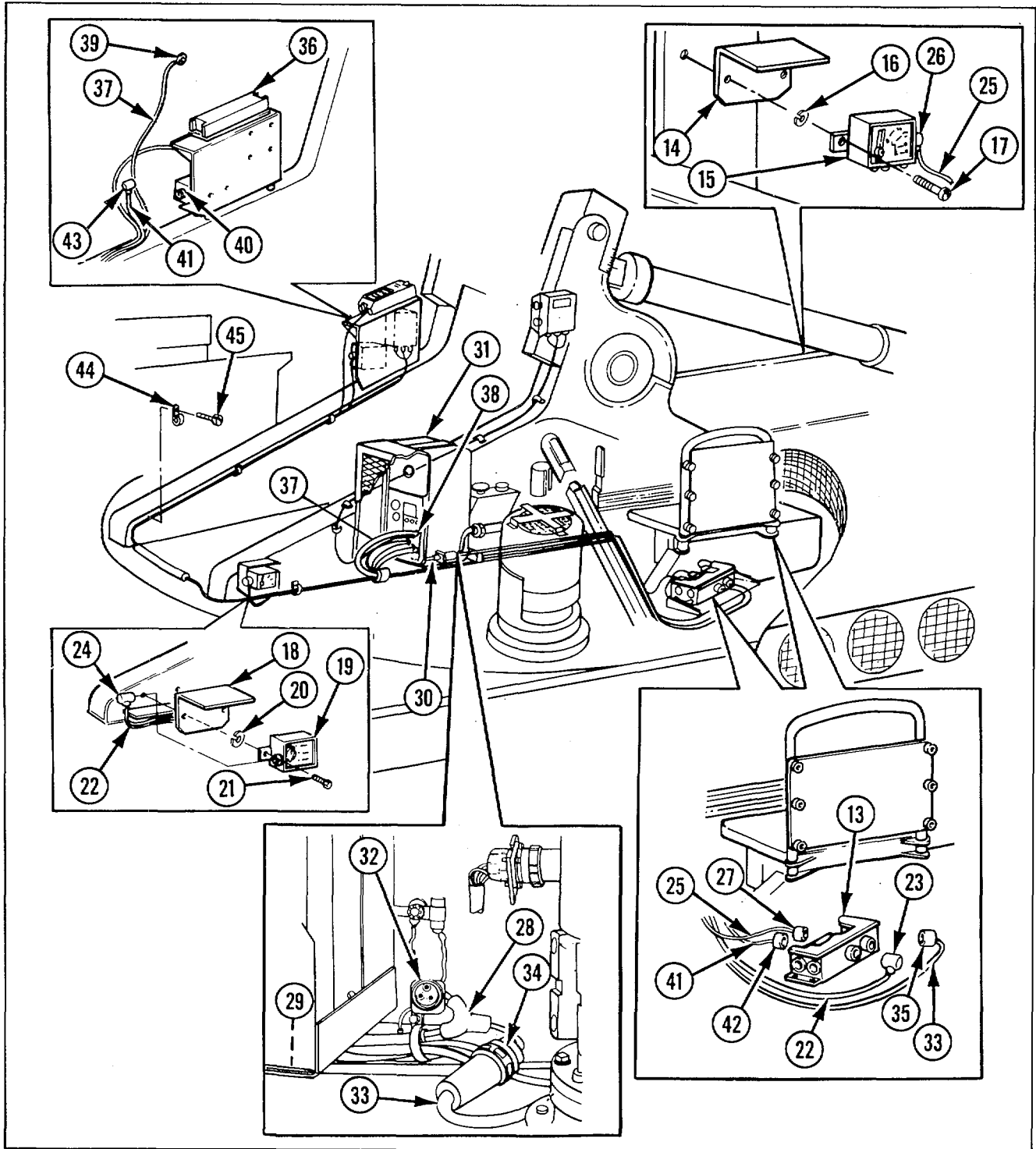
**Make sure wires and leads are connected to proper connectors. Refer to figures FO-1 thru FO-3 in this manual.**

- 4 If necessary, install left-side data display (3). Refer to page 2-90.
- 5 To install three wire pairs (4, 5, and 6), connect three wire pairs to left-side data display (3) at three connectors DEF1 (7), DEF2 (8), and DEF3 (9) and to right-side data display (2) at three connectors QE1 (10), QE2 (11), and QE3 (12).



2-106. MAINTENANCE OF BACKUP COMPUTER SYSTEM WIRING HARNESS INSTALLATION WITHOUT VEHICULAR APPLIQUE SYSTEM (CONT).

REASSEMBLY/INSTALLATION (CONT)



6. If necessary, install amplifier (1 3). Refer to page 2-189.
7. Install guard (14), driver's control intercom set (15), two new lockwashers (16), and two screws (17).
8. Install guard (18), section chief control intercom set (19), two new lockwashers (20), and two screws (21).
9. To install W33A cable assembly (22), connect W33A cable assembly to amplifier (13) at connector J504 (23) and to section chief control intercom set (19) at connector (24).
10. To install cable assembly (25), connect cable assembly to driver's control intercom set (15) at connector (26) and to amplifier (13) at connector J506 (27).
11. Connect power Y cable assembly (28) to VEH 24 V DC INTERFACE at bulkhead disconnect (29).
12. To install power cable assembly (30), connect power cable assembly to data display control case (31) at connector PWR (32).
13. To install cable assembly (33), connect cable assembly to power Y cable assembly (28) at connector (34) and to amplifier (13) at connector J508 (35).
14. If necessary, install section chief assembly (36). Refer to page 2-90.
15. To install cable assembly (37), connect cable assembly to data display control case (31) at connector SCA (38) and to section chief assembly (36) at connector (39).
16. If necessary, install gunner's control intercom set (40). Refer to TM 11-5830340-12.
17. To install cable assembly (41), connect cable assembly to amplifier (13) at connector J507 (42) and to gunner's control intercom set (40) at connector (43).

**NOTE**

**Clamp strap material must be cut to desired length for cable clamping. Use old clamp strap material to determine length for new clamps.**

18. Install four new clamps (44) and four screws (45) approximately as shown on illustration.

## Section VIII. PREPARATION FOR STORAGE OR SHIPMENT

### 2-107. DEFINITION OF ADMINISTRATIVE STORAGE.

The placement of equipment in administrative storage can be for short periods of time when: (1) An organization lacks operating funds, personnel, other resources, or normal usage of its organic materiel, and (2) materiel exceeds the capability of the owning organization to operate or maintain and must be retained by that organization for contingency or other cogent reasons.

Installation or organization commanders may authorize the administrative storage of their materiel within guidance furnished by MACOM commanders and AR 750-1. Howitzers should be ready for use within the time factors as determined by the directing authority.

During the storage period appropriate maintenance records will be kept.

**a. Scope.** The requirements specified herein are necessary to maintain the M1 10A2 self-propelled howitzer in administrative storage in such a way as to achieve the maximum readiness condition.

**b. General.**

(1) Except as indicated in the Maintenance Services and Inspection and Corrections of Shortcomings and Deficiencies paragraphs, equipment that is placed in administrative storage should be capable of being readied to perform its mission within a 24 hour period or as otherwise prescribed by the approving authority. Before equipment is placed in administrative storage, current maintenance services, shortcomings, and deficiencies should be corrected, and all modification work orders (MWOs) should be applied.

(2) Report equipment in administrative storage in Materiel Readiness and Unit Readiness reports as prescribed for all reportable equipment. See AR 220-1.

(3) Perform inspections, maintenance services, and lubrications IAW TM 9-2350-304 series

manuals or applicable technical manuals. In case of conflict in lubrication instructions, the system technical manuals will apply.

(4) Records and reports to be maintained for equipment in administrative storage are those prescribed by DA PAM 738-750, for equipment in use.

(5) Ten percent variance is acceptable on time running hours, or mileage used to determine maintenance actions required.

**c. Security.** Instructions contained herein do not modify security procedures and requirements for classified or pilferable items. See AR 190-13, DA PAM 738-750, and DA PAM 750-35.

**d. Storage Site.**

(1) Select the best available site for administrative storage. Separate stored equipment from equipment in use. Conspicuously mark the area "Administrative Storage".

(2) Covered space is preferred. When sufficient covered space for all howitzers to be stored is not available, select an open site.

(3) Open sites should be improved hardstand, if available. Unimproved sites should be firm, well-drained, and kept free of excessive vegetation.

**e. Storage Plan.**

(1) Store equipment so as to provide maximum protection from the elements and to provide access for inspection, maintenance, and exercise. Anticipate removal or deployment problems and take suitable precautions.

(2) Take into account environmental conditions, such as extreme heat or cold; high humidity; blowing sand, dust, or loose debris; soft ground; mud; heavy snows; earthquakes; or combinations thereof and take adequate precautions.

(3) Establish a fire plan and provide for adequate firefighting equipment and personnel.

f. *Maintenance Services and Inspection.* Prior to storage, perform the next scheduled major preventive maintenance service (monthly, quarterly, or semiannually).

g. *Auxiliary Equipment and Basic Issue Items.* Process auxiliary and basic issue items simultaneously with the howitzer to which they are assigned. If possible, store auxiliary and basic issue items with the howitzer. If stored apart from the howitzer, mark auxiliary and basic issue items with tags indicating the howitzer, its registration or serial number and location, and store in protective type closures. In addition, place a tag or list indicating the location of the removed items in a conspicuous place on the howitzer.

h. *Corrections of Shortcomings and Deficiencies.* Correct all shortcomings and deficiencies prior to storage, or obtain a deferment from the approving authority.

i. *Lubrication.* Lubricate equipment IAW the applicable LO or technical manual. Retract hydraulic systems linkage and coat exposed portion of shafts with grease.

j. *General Cleaning, Painting, and Preservation.*

**CAUTION**

**Do not direct water or steam under pressure against air cleaners, air duct outlets, exhaust outlets, unsealed electrical systems, fire control instruments, upholstery, or any exterior opening which will damage a component.**

(1) Clean the equipment of dirt, grease, and other contaminants IAW this manual.

(2) Removal of rust and damaged paint by scraping, wire brushing, sanding, or buffing is not authorized on cannon, fire control, or other armament components.

(3) After cleaning and drying, immediately coat unpainted metal surfaces with an oil or grease as appropriate.

**CAUTION**

**Place a piece of barrier material between desiccant bags and metal surfaces.**

**NOTE**

**Air circulation under draped covers reduces deterioration from moisture and heat.**

(4) Sunlight, heat, moisture (humidity), and dirt tend to accelerate deterioration. Install all covers (including vehicle protection closures) authorized for the equipment. Close and secure all openings except those required for venting and draining. Seal openings to prevent the entry of rain, snow, or dust. Insert desiccant when complete seal is required. Place equipment and provide blocking or framing to allow for ventilation and water drainage. Support cover away from howitzer surfaces which may rust, rot, or mildew.

k. *Preparation of Cannon and Fire Control Instruments.*

(1) *Cannon.*

(a) Thoroughly clean, dry, and coat the inside of cannon tube with preservative oil and insert a strip of Volatile Corrosion Inhibitor (VCI) paper (item 18, appx C) the full length of the tube. Seal breech and muzzle to sustain VCI benefits.

(b) Remove, clean, and dry the muzzle brake, coat the muzzle brake lock, key, hardware, and unpainted surfaces of the muzzle brake with grease (item 11, appx C). Reassemble and wrap muzzle brake with pressure-sensitive tape (item 23, appx C).

(c) Wrap the end of the cannon tubes with barrier material and seal with tape (item 23, appx C).



## 2-107. DEFINITION OF ADMINISTRATIVE STORAGE (CONT).

(d) Thoroughly clean and dry the breech, breech ring, and breechblock before coating with grease (item 11, appx C). Set the breechblock in the closed position.

(e) Breech mechanism of cannon is protected by wrapping it in VCI paper (item 18, appx C).

### (2) Fire Control instruments.

(a) Thoroughly clean and dry fire control instruments and coat unpainted surfaces with grease (item 11, appx C).

(b) Wrap all optical glass with lens paper (item 17, appx C) and fasten with tape.

(c) Store all instruments on racks or in cases or protect with covers.

## 2-108. CARE OF EQUIPMENT IN ADMINISTRATIVE STORAGE.

a. *Maintenance Services.* After equipment has been placed in administrative storage, suspend all regularly scheduled preventive maintenance services and inspect and exercise as specified herein. Do not reduce Prescribed Load List. See DA PAM 738-750 and DA PAM 750-35.

b. *Inspection.* Inspection will usually be visual and must consist of at least a walk-around examination of all equipment to observe any deficiencies that may have occurred. Inspect equipment in open storage weekly and that in covered storage monthly. Immediately after any severe storm or environmental change inspect all equipment. The following are examples of things to look for during visual inspection:

(1) Leaks: coolant, fuel, oil, or hydraulic fluid.

(2) Condition of preservatives, seals, and wraps. Seals may develop leaks during storage, during exercise, or shortly thereafter. If leaking continues, refer to maintenance procedures in this manual or notify direct support maintenance.

(3) Corrosion or other deterioration.

(4) Missing or damaged parts.

(5) Water in compartments.

(6) Purge and charge fire control instruments as required. See TM 750-116.

(7) Inspect cannon at the time recoil mechanisms and equilibrators are exercised. See TB 9-1000-234-30. Record date of exercise on DA Form 2408-4.

(8) Any other readily recognizable shortcomings or deficiencies.

c. *Exercising.* Exercise equipment before administrative storage if schedule calls for exercising during administrative storage. Limit depreservation to removal of materials that will restrict exercising. Perform the before, during, and after operational checks IAW TM 9-2350-304-10. Immediately take action to correct shortcomings and deficiencies noted. Exercise all hydraulic units when exercising the howitzer IAW TB 9-1000-234-30. Note inspection and exercise results on DA Form 2404. Record and report maintenance actions on DA Form 2407. After exercising, restore the preservation to the original condition. Replenish fuel and oil used during exercising and note the amount on DA Form 2408-1.

d. *Rotation.* To assure utilization of all assigned materiel, rotate items IAW any rotational plan that will keep equipment in an operational condition and reduce maintenance effort.

e. *Removal from Administrative Storage.* Remove preservative materials. Perform the next scheduled preventive maintenance service and prepare equipment for service as outlined in TM 9-2350-304-10.

f. *Servicing.* Resume the maintenance service schedule in effect at the commencement of storage as per DD Form 314. See DA PAM 738-750.

**APPENDIX A**

**REFERENCES**

**A-1. SCOPE.** This appendix lists all forms, field manuals, technical bulletins, technical manuals, and miscellaneous publications referenced in this manual.

**A-2. FORMS.**

DA Form 2028 .....	Recommended Changes to Publications and Blank Forms
DA Form 2028-2 .....	Recommended Changes to Equipment Technical Manuals
DA Form 2404 .....	Equipment Inspection and Maintenance Worksheet
DA Form 2407 .....	Maintenance Request
DA Form 2408-1 .....	Equipment Log Assembly
DA Form 2408-4 .....	Weapon Record Data
DD Form 6 .....	Packaging Improvement Report
DD Form 314 .....	Preventive Maintenance Schedule and Record
DD Form 1397 .....	Processing and Deprocessing Record for Shipment, Storage, and Issue of Vehicles and Spare Engines
SF Form 368 .....	Product Quality Deficiency Report

**A-3. FIELD MANUALS.**

FM 9-207 .....	Operation and Maintenance of Ordnance Materiel in Extreme Cold Weather (00 to -65° F)
FM 21-11 .....	First Aid for Soldiers
FM 90-3 .....	Desert Operation

**A-4. TECHNICAL BULLETINS.**

TB SIG 222.....	Solder and Soldering
TB 9-1000-234-30 .....	Exercising of Recoil Mechanisms and Equilibrators
TB 43-0213.....	Rustproofing Various Trucks and Trailers

**A-5. TECHNICAL MANUALS.**

TM 9-214 .....	Inspection, Care, and Maintenance of Antifriction Bearings
TM 9-237 .....	Operator's Manual for Welding Theory and Application
TM 9-1000-202-14.....	Operator's, Organizational, Direct Support, and General Support Maintenance Manual for Evaluation of Cannon Tubes
TM 9-2350-274-BD.....	Operator's, Organizational, Direct Support, and General Support Maintenance, Battlefield Damage Assessment and Repair: for M109/M1 10/M578 Vehicles
TM 9-2350-304-10.....	Operator's Manual for Howitzer, Heavy, Self-Propelled: 8-inch, M110A2
TM 9-2350-304-20-1 .....	Unit Maintenance Manual for Howitzer, Heavy, Self-Propelled: 8-inch, M110A2 Hull and Related Components
TM 9-2350-304-24P-2 .....	Unit, Direct Support, and General Support Repair Parts and Special Tools List (Including Depot Maintenance Repair Parts and Special Tools) for Howitzer, Heavy, Self-Propelled: 8-inch, M110A2
TM 11-206 .....	Interphone Controls, C-980/U and C-981 /U
TM 11-2643 .....	Intercommunication Sets AN/UIC-1 and AN/UIC-1X
TM 11-5820-882-23.....	Organizational and Direct Support Maintenance Manual for Radio Set, AN/VRC 68
TM 11-5830-203-14P .....	Operator's, Organizational, Direct Support, and General Support Maintenance Repair Parts and Specials Tools List for Intercommunication Set, Control, C-375/VRC.

TM 11-5830-340-12.....	Operator's and Organizational Maintenance Manual for Intercommunications Set AN/VIC-1 (V)
TM 11-7440-283-12-2 .....	Operators and Organizational Maintenance Manual for Data Display Groups, Gun Direction
TM 43-0139 .....	Painting Instructions for Field Use
TM 750-116 .....	General Procedures for Purging and Charging of Fire Control Instruments
TM 750-244-5-1.....	Destruction of Conventional Ammunition and Improved Conventional Munitions to Prevent Enemy Use
TM 750-244-6.....	Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use

**A-6. MISCELLANEOUS PUBLICATIONS.**

AR 190-13 .....	The Army Physical Security Program
AR 220-1 .....	Unit Status Reporting
AR 700-138 .....	Army Logistics Readiness and Sustainability
AR 750-1 .....	Army Materiel Maintenance Policies
CTA 8-100 .....	Army Medical Department Expendable/Durable Items
CTA 50-970 .....	Expendable Items (Except Medical, Class V, Repair Parts, and Heraldic Items)
DA PAM 25-30.....	Consolidated Index of Army Publications and Blank Forms
DA PAM 738-750.....	The Army Maintenance Management Systems (TAMMS)
DA PAM 750-35.....	Functional User's Guide for Motor Pool Operations

## 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 levels.

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 levels.

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 I maintenance function.

**B-2. MAINTENANCE FUNCTIONS.** Maintenance functions will be limited to and defined as follows: (except for ammunition MAC<sup>1</sup>)

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.

---

<sup>1</sup>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.

**B-2. MAINTENANCE FUNCTIONS (CONT).**

**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.

**g. Remove/Install.** To remove and install the same item when required to perform service or other maintenance functions. Install may be the act of emplacing, seating, or fixing into a 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 third position code of the SMR code.

**i. Repair.** The application of maintenance services<sup>2</sup>, including fault location/troubleshooting<sup>3</sup>, removal/installation, and disassembly/assembly<sup>4</sup> procedures, and maintenance actions<sup>5</sup> to identify troubles and restore serviceability to an item by correcting specific damage, fault, malfunction, or failure in a part, subassembly, module (component or 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.

<sup>2</sup> Services-inspect, test, service, adjust, align, calibrate, and/or replace.

<sup>3</sup> Fault location/troubleshooting-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).

<sup>4</sup> Disassembly/assembly-encompasses the step-by-step taking apart (or breakdown) of a spare/functional group coded item to the level of its least componentry identified as maintenance significant (i.e., assigned an SMR code) for the level of maintenance under consideration.

<sup>5</sup> Actions-welding, grinding, riveting, straightening, facing, remachinery, and/or resurfacing.

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.)

d. *Column 4, Maintenance Level.* Column 4 specifies, by the listing of a work time figure in the appropriate subcolumn(s), the level of maintenance authorized to perform the function listed in column 3. This figure represents the active time required to perform that maintenance functions at the indicated level of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance levels, appropriate work time figures will be shown for each level. 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 levels are as follows:

- C.....Operator or crew
- O.....Unit maintenance
- F.....Direct support maintenance
- H.....General support maintenance
- L.....Specialized Repair Activity (SRA)<sup>6</sup>
- 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 1, 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 Level.* The lowest level 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.

---

<sup>6</sup>This maintenance level is not included in section II, column 4 of the Maintenance Allocation Chart. To identify functions to this level 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. *Column 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 (MAC)  
FOR  
M110A2 SELF-PROPELLED HOWITZER ARMAMENT  
AND TURRET COMPONENTS**

NOMENCLATURE OF END ITEMS  
M110A2 SPH Armament

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
00	M110A2 SPH Armament and Turret Components	Inspect Service Adjust Test Repair Overhaul	1.0 1.0 1.0 1.0	2.0 2.5  2.5	  1.0  14.0	     ** **	61		
01	Fire Control Installation						61		
0101	M115 Panoramic Telescope	Inspect Service Adjust Replace Repair	0.1	 0.2 0.5 0.3	   2.0	   1.5 2.0	1.1,22,55, 56,61,62, 69	A	
010101	Head Assembly Replace Repair	Adjust		  0.1	  1.0	0.2 0.5 1.0	55,56,61		
010102	Body Assembly	Repair		0.1		8.0	55,56,61, 63.1		
01010201	Worm Assembly Optical Instrument	Replace Repair				1.0 1.0	55,56,61		



(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0101020101	Cell Assembly Optical Instrument Collective	Replace Repair					0.2 0.5	55,56,61	
0101020102	Cell Assembly Optical Instrument Objective	Replace Repair					0.2 0.5	55,56,61	
0101020103	Reticle Assembly	Replace Repair					0.2 0.5	55,56,61	
01010202	Deleted								
01010203	Adapter Assembly	Adjust Repair					0.5 3.0	55,56,61	
0101020301	Counter Assembly	Replace Repair					0.5 1.0	55,56,61	
01010204	Cover Assembly Repair	Replace					0.3 0.5	61	
01010205	Telescope Subassembly	Replace Repair					0.3 0.5	61	
010103	Elbow Assembly	Adjust Repair					0.5 5.0	55,56,61	
01010301	Eyepiece Assembly	Replace Repair				0.2 1.0		29,55,56, 61	
01010302	Cell Assembly Optical Instrument	Adjust Replace Repair					0.5 0.5 1.0	55,56,61	
0102	M139 Elbow Telescope	Inspect Service Aline Remove/ Install Replace Repair	0.1   0.1	0.1   0.1			1.0  0.5	25,29,38, 55,56,61, 69	
010201	Eyepiece Assembly	Replace Repair					0.2 0.3	56,61	

Change 1 B-5

**Section II. MAINTENANCE ALLOCATION CHART (MAC)  
FOR  
M110A2 SELF-PROPELLED HOWITZER ARMAMENT AND TURRET COMPONENTS (CONT)**

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
010202	Reticle Cell Assembly	Replace Repair					0.2 0.2	56,61	
010203	Objective Cell Assembly	Replace Repair					0.2 0.3	56,61	
0103	M15 Fire Control Quadrant	Inspect Service Replace Repair	0.1	0.2 0.5 0.1	4.0	16.0		55,56,61, 69,71,80	B
010301	Knob Assembly	Adjust Replace Repair			0.1 0.2 1.0			55,61	
010302	Cover Assembly	Repair			1.5			55,61	
010303	Counter Assembly	Adjust Replace Repair					0.2 1.0 3.0	55,61	
01030301	Base	Repair					0.2	55,61	
010304	Level Assembly	Adjust Repair		0.1			0.3 1.0	55,61	
0104	M138 Telescope Mount	Inspect Adjust Replace Repair	0.1	0.5 0.5 0.1	1.0		0.5 2.5	55,56,61, 69	A
010401	Support Assembly	Replace Repair					0.5 1.0	56,61	
010402	Bracket Assembly	Repair		0.1	2.0			56,61	
01040201	Instrument Light	Repair			0.1			56,61	

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0105	M137 Telescope Mount	Inspect Service Adjust Replace Repair	0.1	0.5		1.5		25,35,55, 56,61,62, 69,80	
010501	Bracket Assembly	Replace Repair				0.5 2.0		55,56,61	▬
010502	Upper Telescope Mount	Repair		0.1	1.5	2.0		54,56,61	▬
01050201	Light Extension Assembly	Repair			0.2			56,61	▬
010503	Cover Assembly	Repair		0.2	0.1			55,56,61	▬
010504	Level Assembly	Adjust Replace Repair			0.5 0.5 1.0			55,56,61	▬
010505	Telescope Mount Subassembly Lower Assembly	Repair				10.0		55,56,61	▬
01050501	Telescope Mount Subassembly	Adjust Repair				0.5 2.5		56,61	▬
0105050101	Base Assembly	Repair				1.0		56,61	
0106	Collimator, Infinity Aiming Reference, M1A1 Overhaul	Inspect Service Replace Repair	0.1	0.5 0.2 0.2	0.5 7.0			55,56,61	C ▬
010601	Case, Collimator M1A1	Replace Repair			1.5 2.0			55,61	
010602	Cover Assembly, M1A1	Replace Repair			0.5 1.0			55,61	

**SECTION II. MAINTENANCE ALLOCATION CHART (MAC)  
FOR  
M110A2 SELF-PROPELLED HOWITZER ARMAMENT AND TURRET COMPONENTS (CONT)**

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
010603	Mount, Tripod Collimator, Infinity Aiming Reference, M1A1	Replace Repair			0.5 1.0			55,61	
01060301	Leg, Collimator Repair	Replace			0.5 1.0			55,61	
0106030101	Tube Assembly Metal	Replace Repair			0.5 1.0			55,61	
0106030102	Leg Section Tripod	Replace Repair			0.5 1.0			55,61	
01060302	Bushing Sleeve	Replace Repair			0.5 1.0			55,61	
01060303	Support	Replace Repair			0.5 1.0			55,61	
01060304	Collar Assembly, M1A1	Replace Repair			0.5 1.0			55,61	
010604	Collimator, Scope M1A1	Replace Repair Service			0.2 0.5	0.5 1.5 0.5	**	61	
01060401	Cell Assembly	Replace Repair				0.5 1.0		61	
01060402	Cell Assembly Optical, M1A1	Replace Repair				1.0	**	61	
0107	Quadrant, Gunner's With Case	Inspect Replace Repair		0.2 0.2	2.0			55,61	D

☆U.S. G.P.O.:1993-746-045:80038

PIN: 046491-002

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0108	Alinement Device With Case, M140	Replace Repair		0.1 0.5				55,61,80	E
02	M201A1 Cannon Assembly	Inspect Service Replace Repair	0.2 0.3	0.5		2.0 1.0		2,23,28, 33,40,57, 59,61,63, 68,70	
0201	Cannon Assembly	Inspect Service Replace Repair	0.2 0.3	0.5	0.5			57,59,61, 70,71	
020101	M35 Firing Mechanism Assembly	Inspect Service Replace Repair	0.1 0.1					57,61	
020102	Breech Mechanism Assembly	Inspect Service Repair	0.1 0.5					23,61	
02010201	Block Assembly	Inspect Service Replace Repair	0.1 0.1					61	
02010202	Housing Assembly	Inspect Service Replace Repair	0.1 0.1					61	
02010203	Counterbalance Assembly	Inspect Service Replace Repair	0.1 0.1					57,58,61, 77	
02010204	Spindle Assembly	Inspect Service Replace Repair	0.1 0.1					61	

Change 1 B-9

**SECTION II. MAINTENANCE ALLOCATION CHART (MAC)  
FOR  
M110A2 SELF-PROPELLED HOWITZER ARMAMENT AND TURRET COMPONENTS (CONT)**

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
02010205	Hinge Block As- sembly	Inspect	0.1					61	
		Service	0.1						
		Replace Repair		0.3	0.1				
02010206	Breechblock Assembly	Inspect	0.1	0.1				61	
		Service	0.1						
		Replace Repair			0.3 0.3				
02010207	Hinge Pin	Service		0.3				61	
		Replace Repair		0.5	1.5				
02010208	Breech Ring Assembly	Inspect			0.3			61	
		Service			1.0				
		Repair	0.5		0.5				
020103	Tube Assembly	Inspect			0.3			61	
		Service			0.5				
		Repair	0.5		1.0				
03	Gun Mount Installation	Service	0.1	0.4	0.2			50,57,61 73,75,79	
		Replace			1.0				
		Repair		0.5	3.0				
		Overhaul					**		
0301	Pneumatic Equil- ibrator Assembly	Test		0.2				4,16,28, 33,40,57, 61,63	
		Inspect	0.1						
		Service		0.7					
		Adjust	0.1						
		Replace Repair			0.5 0.5		**		
030101	Valve Assembly	Replace			0.2			15,28,32, 37,40,57, 61	
		Repair		0.1	0.2				

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0302	M174 Gun Mount Assembly	Inspect Test Service Replace Repair	1.0	0.3 0.5	2.0 2.0			61	
030201	Cradle Mount Assembly	Replace Repair					** **	57,61	
03020101	M174 Cradle Assembly	Replace Repair					** **	61	
030202*	Replenisher As- sembly	Inspect Replace Repair	0.1	0.5	0.5 1.5			19,61,74	
030202*	Replenisher As- sembly (Alter- nate)	Inspect Replace Repair	0.1	0.5	1.2 1.5			19,61,74	
03020201	Actuating Cylinder	Replace Repair			1.2			19,61,74	
030203	Cam, Recoil Stroke Control	Inspect Service Replace Repair		0.5 0.5	1.0 1.0			57,61	
030204	Recuperator and Counterrecoil Cylinder Assembly	Replace Repair			1.0		** **	61	
03020401	Head Assembly, Linear Actuating	Replace Repair			0.5 0.5			61,64,67, 76	
03020402	Box Assembly, Counterrecoil Stuffing	Replace Repair					** **	61	
0302040201	Gland Assembly	Replace Repair					** **	61	
03020403	Piston Assembly, Counterrecoil	Replace Repair			1.0		** **	61	

**SECTION II. MAINTENANCE ALLOCATION CHART (MAC)  
FOR  
M110A2 SELF-PROPELLED HOWITZER ARMAMENT AND TURRET COMPONENTS (CONT)**

(1)  Group Number	(2)  Component/Assembly	(3)  Maintenance Function	(4) Maintenance Level					(5)  Tools and Equipment	(6)  Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0302040301	Gland and Key Assembly	Inspect Replace Repair					** ** **	61	
03020404*	Recuperator Cylinder Front Head Assembly (Modified)	Replace Repair		0.5	1.5		** **	1,15,40, 61	
03020404*	Recuperator Cylinder Front Head Assembly (Unmodified)	Replace Repair		0.5	1.5		** **	5,20,28, 33,54,61, 63,65	
03020405	Recuperator Cylinder Head Assembly (Rear)	Replace Repair			4.5		** **	61,72	
0302040501	Valve Assembly	Replace Repair					** **	61	
0302040502	Oil Index Mechanical Housing Assembly	Replace Repair					** **	61	
03020406	Recuperator Floating Piston Assembly	Replace Repair					** **	61	
030205	Recoil Cylinder Assembly	Replace Repair					** **	61	
03020501	Stuffing Box Assembly	Replace Repair					** **	61	
0302050101	Deleted								
0302050102	Gland and Dowel Assembly	Replace Repair					** **	61	

Change 1 B-12



(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level				(5) Tools and Equipment	(6) Remarks	
			UNIT		DS	GS			DEPOT
			C	O	F	H			D
0302050103	Deleted								
03020502 Assembly	Piston and Rod Repair	Replace					** **	61	
0303	Recoil Connect- ing Link	Replace Repair			0.5 0.5			61	
04	Turret Installa- tion	Service Replace Repair		2.5 2.5			**	57, 61	
0401	Individual Gun- ner's Vehicular Seat	Service Replace Repair	1.5 0.1	0.3 1.0				61	
040101	Seat Back Cushion	Replace Repair		0.3 0.1				61	
0402	Assistant Gun- ner's Vehicular Seat	Service Replace Repair	0.1	0.3 1.0				61	
040201	Seat Back Cushion	Replace Repair		0.3 0.1				61	
0403	Hand Grenade Box Assembly	Replace Repair		0.1	0.3			61	
0404	Turret Stowage Access Door	Replace Repair		0.2 0.3				61	
0405	Support Assem- bly	Service Replace Repair	0.3	0.3 1.0 1.5				61	
040501	Manual Control Handle	Replace Repair		1.5 0.5				61	
0406	Seat Bracket Assembly	Service Replace Repair		0.1 0.5 1.0				61	

Change 1 B-13

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
05	Elevating and Traversing Installation							61	
0501	Traversing Constant Speed Drive Assembly	Inspect Service Adjust Replace Repair	0.5	0.5	0.2 2.0 0.1 2.0			31,34,43 44,45,48, 49,50,51, 53,57,61, 65,71,78, 79,80	
050101	Traversing Drive Torque Handle	Replace Repair		0.1 0.3				57,61	
050102*	Traversing Drive Torque Lock	Adjust Repair	0.3	1.0	0.3		61,80	7,8,57,	
050102*	Traversing Drive Torque Lock	Replace		0.3			**	7,8,61, 80	
05010201	Remote Control Lever	Replace Repair			0.2 1.0			61	
050103	Traversing Drive Hydraulic Motor	Replace Repair			1.0 1.2			45,51,57, 61	
05010301	Traversing Hydraulic Motor and Brake Assembly	Repair			1.0			61	
050104	Differential, Traversing	Replace Repair			2.0 2.0			57,61	
050105	Gear Assembly, Speed	Replace Repair			0.5 2.0			31,44,57, 61	
0502	Traversing Final Drive	Service Replace Repair		0.2	3.0 3.0			31,34,44, 57,61,76	

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0503	Elevating Hydraulic Drive Unit	Inspect Service Adjust Replace Repair	0.5	0.5	1.0 1.0 2.0			27,31,34, 43,44,46, 47,50,51, 53,57,61, 76	
050301	Elevating Drive Torque Handle	Replace Repair		0.1 0.3				61	
050302*	Elevating Drive Torque Lock	Adjust Replace Repair		1.0 0.3		0.3		7,8,57, 61,80	
050302*	Elevating Drive Torque Lock	Replace		0.3				61,80	
05030201	Remote Control Lever	Replace Repair			0.2 1.0			61	
050303	Elevating Drive Hydraulic Motor	Replace Repair		0.1	1.0 1.2			45,51,57, 61	
05030301	Elevating Hydraulic Motor and Brake Assembly	Repair			1.0			61	
050304	Elevating Differential	Replace Repair			2.0 2.0			57,61	
0504	Elevating Final Drive Assembly	Inspect Service Replace Repair	0.3	0.3	3.0 3.0			19,31,47, 49,50,57, 61	
050401	Gear Assembly, Primary Speed	Replace Repair		0.1	0.5 2.0			61	
06	Rammer Installation	Replace Repair			0.5 0.2	1.0		48,57,61	
0601	Rammer Traversing Cylinder Assembly	Service Replace Repair		0.2 0.3	0.5			57,61	

**SECTION II. MAINTENANCE ALLOCATION CHART (MAC)  
FOR  
M110A2 SELF-PROPELLED HOWITZER ARMAMENT AND TURRET COMPONENTS (CONT)**

(1)  Group Number	(2)  Component/Assembly	(3)  Maintenance Function	(4) Maintenance Level					(5)  Tools and Equipment	(6)  Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0602	Rim Latch Set	Adjust Replace Repair		0.2 0.2	0.3			57,61	
0603	Rim Lock Set Replace	Repair		0.1 0.1	0.5			57,61	
0604	Power Loader-Rammer	Inspect Service Adjust Replace Repair	0.2  2.0	0.2	4.0 1.0 4.4			57,61	
060401	Roller Chain	Service Replace Repair		0.2	0.5 2.0			61	
06040101	Headlink Assembly	Replace Repair		0.2	0.2 0.5			61	
06040102	Chain, Roller	Replace Repair			0.3 1.0			61	
060402	Lift Cylinder Assembly	Replace Repair			1.0 1.5			57,61	
060403	Ramming Cylinder	Service Replace Repair		0.1	2.0 4.0			61	
0605	Cover Assembly	Replace Repair	0.5		0.3 0.3			61	
07	Hydraulic System Installation	Service Replace Repair		0.3 2.5 0.5				61	
0701	Wiring Harness, Turret Deceleration Valve to Traverse Deceleration Switch	Inspect Test Replace Repair		0.1 0.1 1.0 1.0				57,61	

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0702	Wiring Harness, Turret Deceleration	Inspect Test Replace Repair Adjust		0.1 0.2 1.0 1.0 0.1				57,61	
0703	Manual Control Handle Assembly (Elevating and Traversing)	Replace Repair		0.5 0.5				61	
0704	Check Valve Multiple Connector	Replace Repair			1.0 1.5			57,61	
0705	Traversing Control Grip Assembly (Left Side)	Replace Repair		0.5 0.5				61	
0706	Dial Pressure Gage	Replace Repair		0.2 0.2				57,61	
0707	Rammer Multiple Connector	Inspect Replace Repair		0.2	1.0 1.0			61	
070701	Regulator Flow Valve	Test Replace Repair			1.0 1.0 1.5			61	
070702	Rammer Pressure Sensitive Cable Assembly	Replace Repair			0.3 0.3			57,61	
070703	Solenoid Valve	Replace Repair			0.3 0.3			61	
0708	Rotating Manifold	Inspect Replace Repair	0.2		0.3 0.3			61	

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0709	Hydraulic Accumulator	Inspect Test Service Replace Repair	0.2	0.5 0.5	2.8 4.6			1,40,57,61	
0710	Motor and Pump	Inspect Replace Repair		0.3	2.5 0.1			61	
071001	Hydraulic Rotary Pump	Replace Repair		0.3			**	61	
071002	Direct Current Motor	Replace Repair			0.3 0.5		**	57,61	
0711	Rammer Cover Assembly	Replace Repair		0.5 0.5				61	
0712	Hydraulic Filter	Replace Repair		0.1 0.1				61	
08	Electrical Installation								
0801	Pivot Interlock Push Switch	Adjust Replace Repair		0.1 0.3 0.3				57,61	
0802	Tray Interlock Sensitive Switch	Adjust Replace Repair		0.1 0.3 0.3				57,61	
0803	Warning Light	Replace Repair		0.5 0.2				57,61	
0804	Branched Wiring Harness, Floor Disconnect to Turret Disconnect and Accessories	Replace Repair		1.0 1.0				57,61	

(1) Group Number	(2) Component/Assembly	(3) Maintenance Function	(4) Maintenance Level					(5) Tools and Equipment	(6) Remarks
			UNIT		DS	GS	DEPOT		
			C	O	F	H	D		
0805	Branched Wiring Harness, Floor Disconnect to Oil Pump Motor Switch and Accessories	Replace Repair		1.0 1.0				57,61	
0806	Wiring Harness, Collimator to Utility Outlet	Replace Repair		3.0 0.5				57,61	
0807	Circuit Breaker and Turret Disconnect to Oil Gear Relay and 24-Volt Feed Electrical Lead	Replace Repair		0.3 0.5				57,61	
0808	Cable Assembly, Hull Disconnect Interphone Amplifier to Hull Disconnect Driver's Control	Replace Repair		0.3 0.5				57,61	
09	Turret Bearing Installation	Replace Repair			0.5 0.5			6,17,52, 57,61,79	
0901	Plain Bearing Unit	Inspect Service Replace Repair	0.3	0.3	4.0 2.0 4.0 0.3			6, 17,39, 57,61,70, 78	
090101 10	Race Assembly Projectile Lifting Tray	Repair Inspect Adjust Replace Repair	0.1 0.4 0.1					61 61	
11	Backup Computer System Wiring Harness Installation	Replace Replace Repair		0.2 1.0 1.0				61	
<p>*INDICATES ITEM HAS TWO DIFFERENT CONFIGURATIONS  **INDICATES TIME FOR MAINTENANCE FUNCTION IS ALLOTTED IN DMWR</p>									
<p><b>B-19</b></p>									

**SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS  
FOR  
M 1 10A2 SELF-PROPELLED HOWITZER ARMAMENT  
AND TURRET COMPONENTS**

Ref Code	Maintenance Level	Nomenclature	National Stock Number	Tool Number
1	O	Accumulator Charging Device	4933-01-046-7109	12252157
1.1	H	Adapter Fixture with Reflecting Mirror	4931-00-801-6861	8213899
2	F	Adapter, Lifting Fix	4933-01-074-3418	11579530
3	O	Adapter, Nitrogen Technical	8120-00-508-5453	7680682
4	O	Adapter, Recoil Mechanism (Equilibrator Charging)	4933-00-616-9945	6169945
5	O	Adapter, Recoil Mechanism (Recuperator Charging)	4933-00-616-9953	6169953
6	F	Adapter, Retainer	5120-00-472-2713	11643222
7	O	Adapter, Slip Clutch	5120-00-744-6555	11631543
8	O	Adapter, Slip Clutch	5120-00-869-3600	11631565
9		Deleted		
10		Deleted		
11		Deleted		
12		Deleted		
13		Deleted		
14		Deleted		
15	O	Assembly, Air Gage	6685-00-300-3653	MIL-G-8348
16	O	Assembly, Tube	4933-00-713-6909	7136909
17	F	Bolt, Eye	5306-00-522-2910	5222910
18	O	Cylinder, Compressed Gas	8120-00-144-9820	RR-C-901/1
<b>Change 1 B-20</b>				



Ref Code	Maintenance Level	Nomenclature	National Stock Number	Tool Number
19	F	Extension, Wrench, Piston Replenisher	4933-00-711-4815	7114815
20	O	Extractor Assembly	4933-00-619-5043	6195043
21	H	Fixture, Adapter	1240-00-801-6861	8213899
22	H	Fixture, Azimuth Test	4931-00-769-1596	7691596
23	F	Fixture, Breech Mechanism	4933-00-868-6872	11576380
24	H	Fixture, Cross-level	4931-00-508-5484	7681019
25	H	Fixture, Telescope	4931-00-848-7752	8213745
25.1	H	Fixture, Telescope Test	4931-00-508-5434	7197944
26		Deleted		
27	F	Gage, End Plate Check	4931-00-863-5651	8213259
28	O	Gage, Pressure, Dial Indicating	6685-00-965-1364	45-1056- 04L5000
29	F	Gun, Hand Sealing Compound	4931-00-764-8117	7648117
30		Deleted		
31	F	Handle, Remover and Replacer	5120-00-316-9182	7950864
32	O	Hose Assembly, Nitrogen	1025-01-039-4675	12008918
33	O	Hose Assembly, Nitro- gen Filling	4933-00-840-3740	8403740
34	F	Insertor, Seal	5120-00-733-8915	10904173
35	O	Jack, Planner	3460-00-238-3079	GGG-J-51
36	O	Key, Socket Wrench	5120-00-242-7411	1940719
37		Deleted		
		<b>Change 1 B-21</b>		

**SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS  
FOR  
MI110A2 SELF-PROPELLED HOWITZER ARMAMENT AND TURRET COMPONENTS (CONT)**

**TM 9-2350-304-20-2**

Ref Code	Maintenance Level	Nomenclature	National Stock Number	Tool Number
38		Deleted		
39	F	Magnetic Retrieving Tool	5120-00-545-4268	GGG-F-00360
40	O	Nitrogen, Technical	6830-00-840-6578	BB-N-411
41	F	Plate, Surface	4931-00-879-6405	10553998
42	F	Reamer	5110-00-255-6579	GGG-R-180
43	F	Remover and Replacer	5120-00-733-8932	10904175
44	F	Remover and Replacer	5120-00-722-4063	10902750
45	F	Replacer, Bearing	5120-00-733-8962	10904194
46	F	Replacer, Bearing and Bushing	5120-00-212-4722	8390340
47	F	Replacer, Bearing and Seal	5120-00-733-8978	10904216
48	F	Replacer, Bushing, Inserter	5120-00-860-9580	10908799
49	F	Replacer, Eye Bearing	5120-00-602-4855	8350230
50	F	Replacer, Eye Bearing	5120-00-733-8979	10904217
51	F	Replacer, Oil Seal, Inserter	5120-00-378-4323	8375152
52	F	Scale, Spring	6670-00-164-0567	AAA-S-133
53	F	Screw, Jacking	4910-00-722-3915	10904195
54	O	Shield, Safety	4933-00-616-6474	6166474
55	F	Shop Equipment, Fire Control System	4931-00-754-0740	SC 4931-95-CL-A07
56	F	Tool Kit Electronic: System Maintenance	4931-00-947-8243	SC 5180-95-CL-B29
<b>Change 1 B-22</b>				

Ref Code	Maintenance Level	Nomenclature	National Stock Number	Tool Number
57	F	Shop Equipment, Artillery Maintenance: Field Maintenance, Set N, Less Power	4933-00-754-0704	SC 4933-95-CL-A12
58	O	Spacer, Sleeve	4933-00-520-7129	52071 29
59	F	Strap, Webbing	5340-00-699-9307	8735440
60	F	Tester, Spring Resiliency	6635-00-790-0733	719-20MRP
61	O	Tool Kit, Artillery and Turret Mechanic's: Ordnance	5180-00-357-7727	SC 5180-95-CL-A 12
62	O	Tool Set	4931-00-065-1110	SC 4931-95-CL-J54
63	O	Tube Assembly, Air Filling	4933-00-713-6909	7136909
63.1	H	Wrench, Adjustable Spanner	5120-00-394-5416	QC 70028-1
64	F	Wrench, Air Check Valve Housing	4933-00-619-3825	6193825
65	O	Wrench, Air Seal	4933-00-616-9841	6169841
66	F	Wrench, Bearing Locknut	5120-00-733-8975	10904215
67	F	Wrench, Counterrecoil	4933-00-473-7744	7079082
68	F	Wrench, Recoil Rod Nut	4933-00-556-9223	5569223
69		Deleted		
70	F	Wrench, Socket	4933-00-610-5331	6105331

Change 1 B-23

**SECTION III. TOOL AND TEST EQUIPMENT REQUIREMENTS  
FOR  
MI 10A2 SELF-PROPELLED HOWITZER ARMAMENT AND TURRET COMPONENTS (CONT)**

Ref Code	Maintenance Level	Nomenclature	National Stock Number	Tool Number
71	F	Wrench, Spanner	5120-00-277-9075	MS16147-2
72	F	Wrench, Spanner	5120-00-500-7488	5007488
72.1	F	Wrench, Spanner	5120-00-277-9075	GGG-W-665
73	F	Wrench, Spanner	5120-00-550-7360	5507360
74	F	Wrench, Spanner	4933-00-712-4975	7124975
75	F	Wrench, Spanner	4933-00-064-6208	10919860
76	F	Wrench, Spanner Air Check Valve Guide	4933-00-619-3630	6193630
77	F	Wrench, Spanner Counterbalance Head	4933-00-633-1389	7309882
78	O	Wrench, Torque, 0-600 ft-lb	5120-00-221-7983	A-A-2411
79	F	Wrench, Torque, 0-1 000 ft-lb	5120-00-555-1521	A-A-2411
80	O	Wrench, Torque, 0-175 ft-lb	5120-00-640-6364	A-A-2411

**SECTION IV. REMARKS**

Reference Code	Remarks
A	Refer to TM 9-1240-400-34&P
B	Refer to TM 9-1290-322-34P
C	Refer to TM 9-1240-324-34&P
D	Refer to TM 9-1290-200-14&P
E	Refer to TM 9-4931-710-14&P

**APPENDIX C  
EXPENDABLE/DURABLE SUPPLIES AND  
MATERIALS LIST**

---

**Section I. INTRODUCTION**

**C-1. SCOPE.** This appendix lists expendable/durable supplies and materials you will need to operate and maintain the M110A2 Heavy, Self-propelled Howitzer. 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.

**C-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., cleaning compound (item 7, appx C)).

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

O - Unit 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 Contractor and Government Entity Code (CAGEC) 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 SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
1	0	5350-00-193-7227	ABRASIVE COMPOUND (58536) A-A-1203	LB
2	0	5350-00-598-5537	ABRASIVE PAPER, FLINT (58536) A-A-1202	HD
3	0	8040-00-262-9026	ADHESIVE (81348) MMM-A-1617	PT
4	0	8040-00-262-9025	ADHESIVE: reclaimed rubber, liquid, general purpose, type II (81349) MIL-A-5092 4 oz tube	OZ
5	0		CLEANER, LUBRICANT, PRE- SERVATIVE: CLP (81349) MIL-L-63460 1 gal. container	GL
6	0	9150-01-053-6688 9150-01-054-6453 5350-00-584-4654	1 pt container CLOTH, FINE EMERY (58536) A-A-1049	PT EA
7	0	8305-00-152-3587	CLOTH, LINT-FREE (81349) MIL-C-40129 45-in. (114.30 cm) wide	SH
8	0	5350-00-221-0872	CLOTH, CROCUS: 9 x 11 sheet (58536) A-A-1206	SH
9	0		DRY CLEANING SOLVENT: liquid, white, 140 degree flash point (SD-2) (81348) P-D-680 4 oz can	OZ
10	0	6850-00-281-3061 6850-00-281-1985 8010-00-079-3752	1 gal. can ENAMEL, black, class A (70785) PSP6	GL PT
11	0		GREASE, AUTOMOTIVE AND ARTILLERY: (GAA) (81349) MIL-G-10924 14 oz carton	OZ
		9150-01-197-7693	1.75 oz can	OZ
		9150-01-197-7689	6.5 oz can	OZ

Change 1 C-2

## SECTION II. EXPENDABLE SUPPLIES AND MATERIALS LIST

(1) ITEM NUMBER	(2) LEVEL	(3) NATIONAL STOCK NUMBER	(4) DESCRIPTION	(5) U/M
12	0	9150-00-935-9807 9150-00-935-5808	HYDRAULIC FLUID, PETROLEUM BASE: (OHT) (81349) MIL-G-6083 1 qt can 1 gal. can	QT GL
13	0	6850-00-621-1819	LEAK DETECTOR (81349) MIL-L-25567C	OZ
14	0	9905-00-684-4843	LOCKWIRE (QQW461)	FT
15	0	9150-00-402-2372	LUBRICATING OIL, OEA (81349) MIL-L-46167	QT
16	0	5610-00-141-7838	PAINT, NONSLIP, WALKWAY COMPOUND, type II, Color: OD (81349) MIL-W-5044	GL
17	0	6640-00-285-4694	PAPER, LENS: cleaning paper, Type 1, Class 3, packet (81348) NNN-P-40	PZ
18	0	8135-00-810-0481	PAPER, Volatile corrosion inhibitor (VCI) (81349) MIL-P-3420	YD
19	0	7920-00-205-1711	RAG, WIPING: cleaned, 50 lb bale (81348) DDD-R-30	EA
20	0	8030-00-878-9520	SEALING COMPOUND: (81349) MIL-S-1 1030 1 gal. can	GL
21	0	8030-00-081-2330 8030-00-900-4412	SEALING COMPOUND: blue, liquid, C or CV (80244) MIL-S-22473 10 cc bottle 250 cc bottle	CC CC
22	0	7510-00-266-6712	TAPE (58536) A-A-883	RO
23	0	5970-00-184-2003	TAPE, Insulation (58536) A-A-2094	RO
Change 1			C-3/(C-4 blank)	

**APPENDIX D  
ILLUSTRATED LIST OF MANUFACTURED ITEMS**

**D-1. INTRODUCTION.** This appendix includes complete instructions for making items authorized to be manufactured or fabricated at unit maintenance.

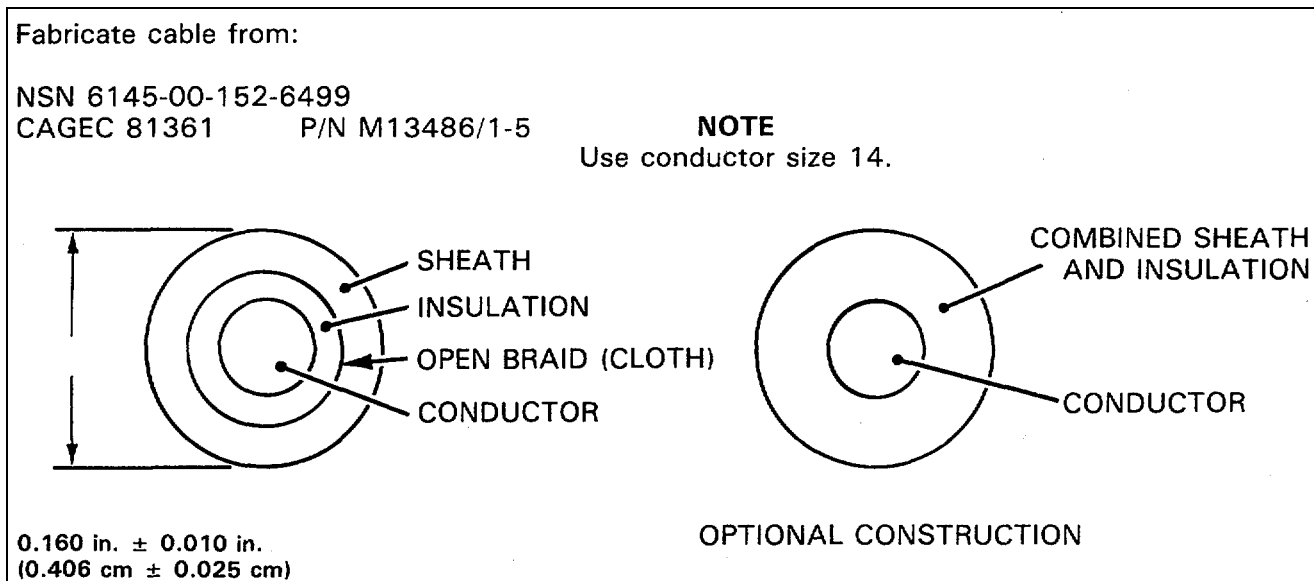
a. A part number index in alphanumeric order is provided for cross-referencing the part number of the item to be manufactured to the figure which covers fabrication criteria.

b. All bulk materials needed for manufacture of an item are listed by part number or specification number in a tabular list on the illustration.

**D-2. MANUFACTURED ITEMS PART NUMBER INDEX.**

Part Number	Figure Number
M13486/1-5 .....	1
M43436/1-1 .....	2
M43436/1-3 .....	3
MILC13486-1.....	4
MS14357R017.....	5
MS28762-6-0140.....	6
MS28762-8-0260.....	7
MS28762-10-0450.....	8

**D-3. MANUFACTURED ITEMS ILLUSTRATIONS.**



*Figure 1. Cable (M13486/1-5)*



D-3. MANUFACTURED ITEMS ILLUSTRATIONS (CONT).

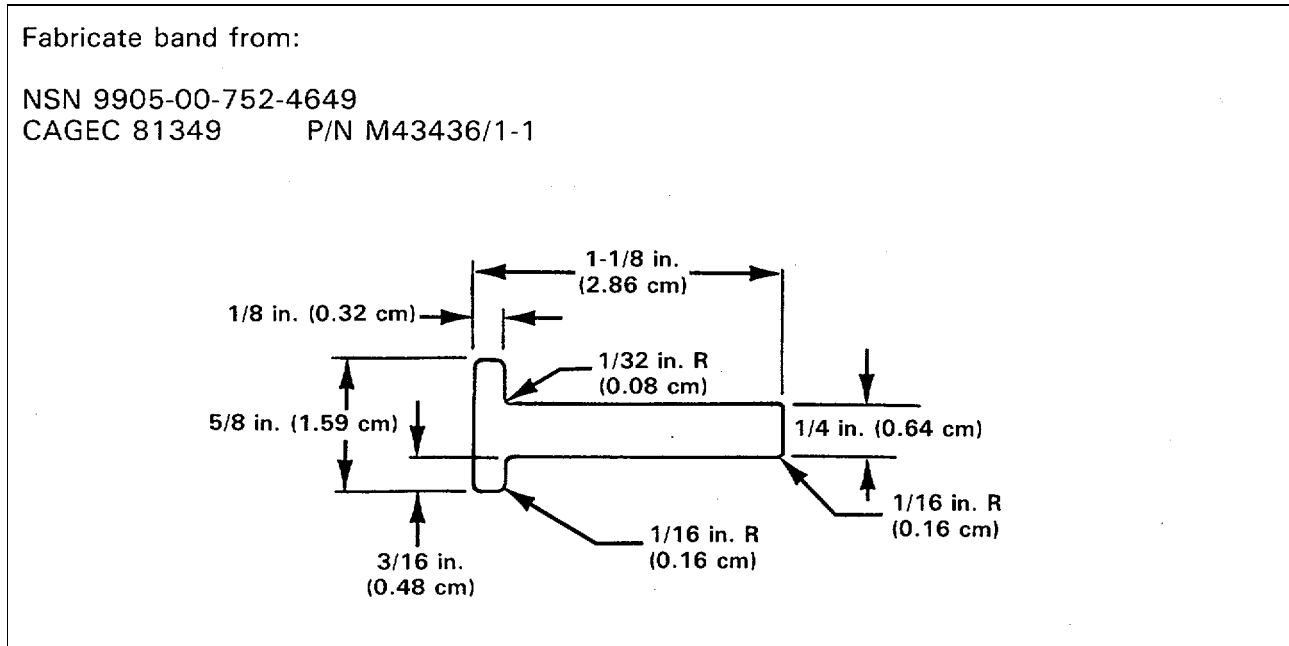


Figure 2. Band (M43436/1-1)

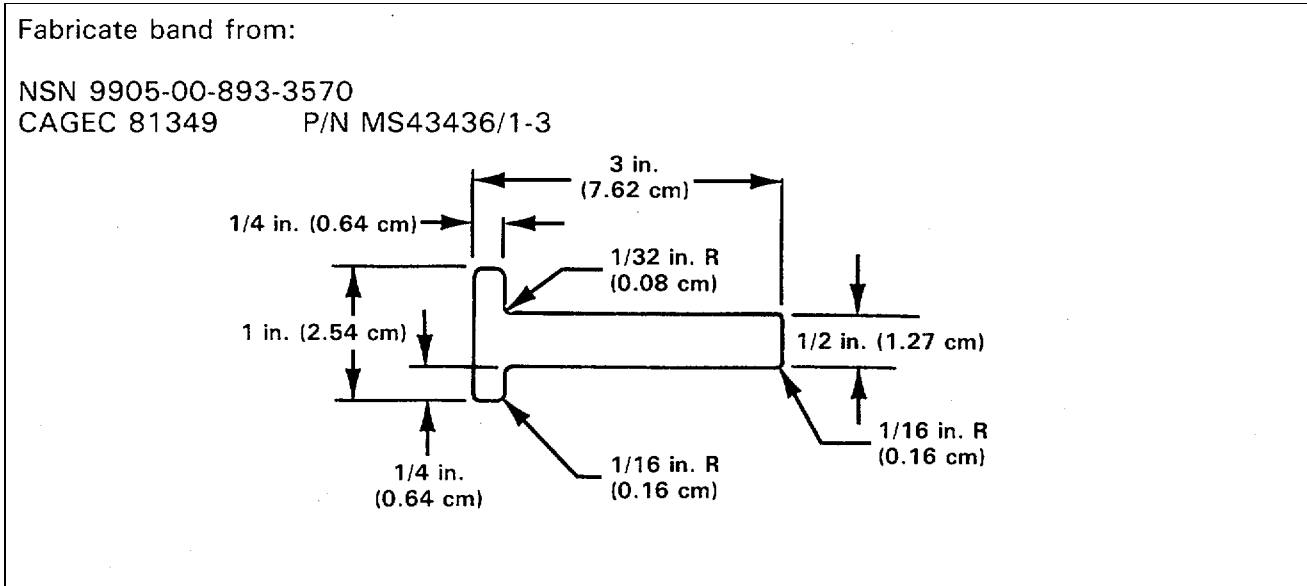


Figure 3. Band (M43436/1-3)

Fabricate cable from:

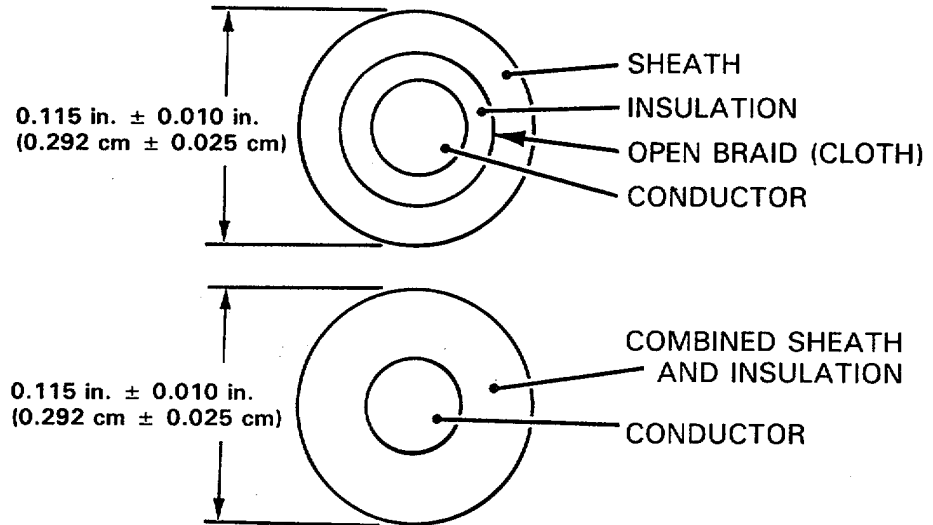
NSN 6145-00-152-6499

CAGEC 81361

P/N M13486/1-5

**NOTE**

Use conductor size 20.



OPTIONAL CONSTRUCTION

Figure 4. Cable (MIL C 13486-1)

D-3. MANUFACTURED ITEMS ILLUSTRATIONS (CONT).

Fabricate quadrant from:

NSN 9535-00-684-6055  
 CAGEC 96906 P/N MS14357R017

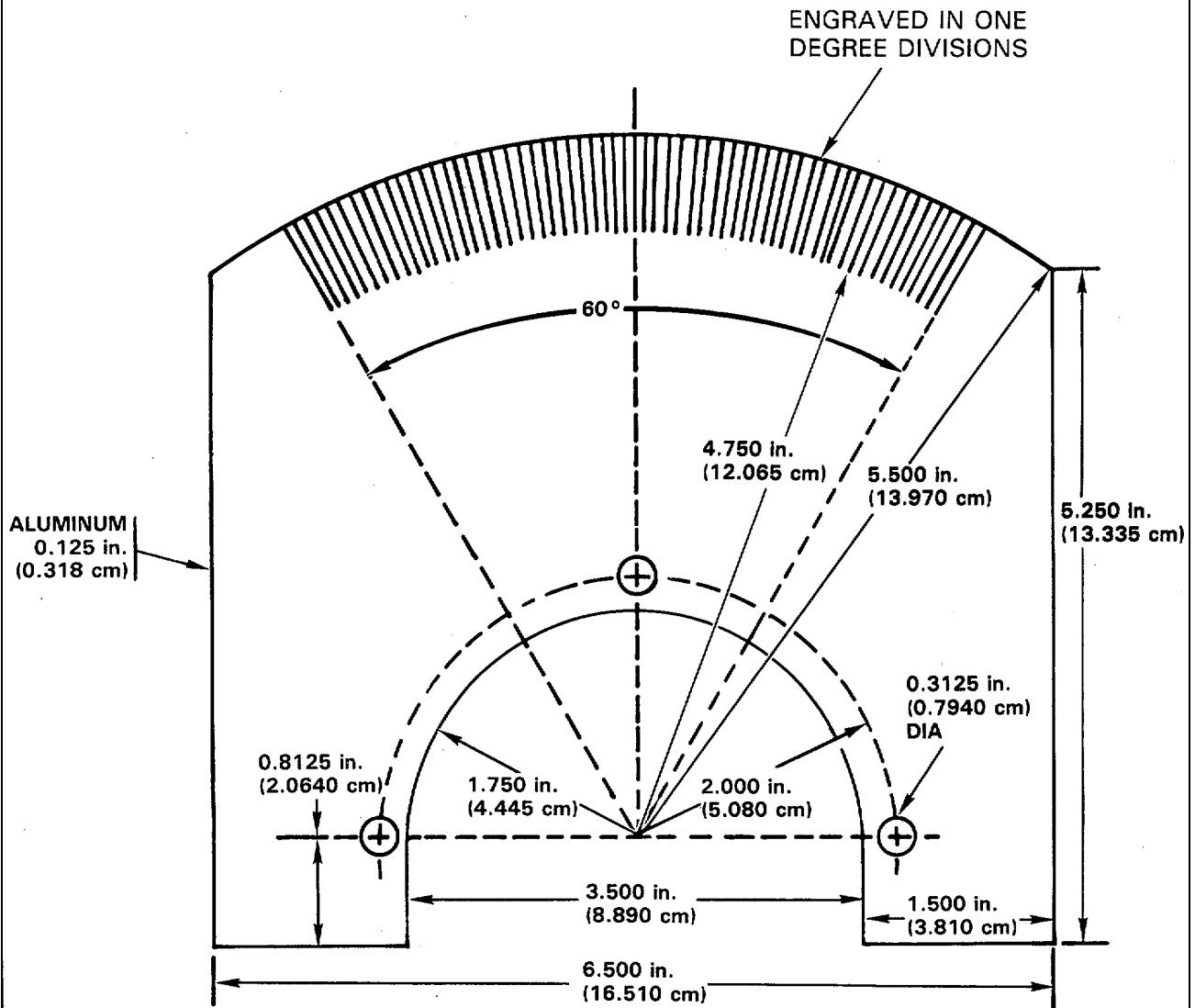


Figure 5. Quadrant (MS14357R017)

Fabricate hose assembly from:

NSN 4720-00-554-8085  
 CAGEC 81349 P/N MIL-H-8788

NSN 4730-00-541-6603  
 CAGEC 96906 P/N MS28761-8

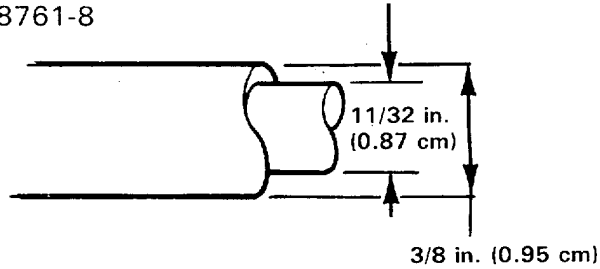


Figure 6. Hose Assembly (MS28762-6-0140)

Fabricate hose assembly from:

NSN 4720-00-554-8086  
 CAGEC 81349 P/N MIL-H-8788

NSN 4730-00-541-6603  
 CAGEC 96906 P/N MS28761-8

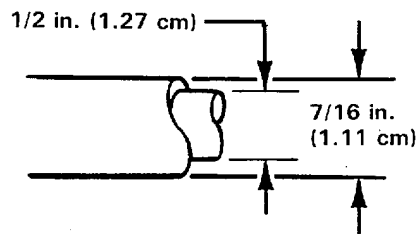


Figure 7. Hose Assembly (MS28762-8-0260)

## D-3. MANUFACTURED ITEMS ILLUSTRATIONS (CONT).

Fabricate hose assembly from:

NSN 4720-00-554-8087  
CAGEC 81349 P/N MIL-H-8788

NSN 4730-00-541-6608  
CAGEC 96906 P/N MS28761-10

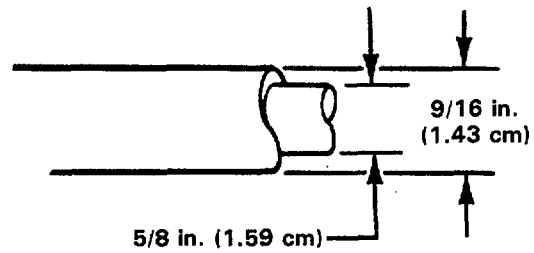


Figure 8. Hose Assembly (MS28762-10-0450)

**APPENDIX E  
TORQUE VALUES**

**E-1. GENERAL.**

a. Follow torque values given throughout this manual. When no torque value is given, follow the guide to prevent damaging parts.

b. The guide is based on using clean, dry threads.

**TORQUE VALUE GUIDE**

<b>TORQUE SCREW DIAMETER</b>	<b>TORQUE NO DASHES (SAE GRADE 2)</b>	<b>TORQUE 3 DASHES (SAE GRADE 5)</b>	<b>6 DASHES (SAE GRADE 8)</b>	<b>SOCKET SIZE</b>
1/4-20 UNC (4-7 N-m)	3-5 ft-lb (8-11 N-m)	6-8 ft-lb (14-16 N-m)	10-12 ft-lb	7/16
1/4-28 UNF (5-8 N-m)	4-6 ft-lb (11-14 N-m)	8--10 ft-lb (12-19 N-m)	9-14 ft-lb	7/16
5/16--18 UNC (9--15 N-m)	7--11 ft-lb (18-23 N-m)	13--17 ft-lb (26-33 N-m)	19--24 ft-lb	1/2
5/16-24 UNF (9-15 N-m)	7--11 ft-lb (19-26 N-m)	14--19 ft-lb (31--38 N-m)	23-28 ft-lb	1/2
3/8-16 UNC (19-24 N-m)	14--18 ft-lb (35-42 N-m)	26-31 ft-lb (53-.60 N-m)	39-44 ft-lb	9/16
3/8-24 UNF (20-26 N-m)	15--19 ft-lb (41--47 N-m)	30-35 ft-lb (62-69 N-m)	46-51 ft-lb	9/16
7/16-14 UNC (31--38 N-m)	23-28 ft-lb (60-66 N-m)	44-49 ft-lb (88-95 N-m)	65-70 ft-lb	5/8
7/16-20 UNF (31-38 N-m)	23-28 ft-lb (60-73 N-m)	44-54 ft-lb (94-107 N-m)	69-79 ft-lb	5/8
1/2-13 UNC (43-50 N-m)	32-37 ft-lb (88-102 N-m)	65-75 ft-lb (129-142 N-m)	95--105 ft-lb	3/4
1/2-20 UNF (46-56 N-m)	34-41 ft-lb (99-113 N-m)	73-83 ft-lb (153--167 N-m)	113-123 ft-lb	3/4
9/16-12 UNC (62-76 N-m)	46-56 ft-lb (136-149 N-m)	100--1 10 ft-lb (197-210 N-m)	145--1 55 ft-lb	13/16
9/16-18 UNF (64-77 N-m)	47-57 ft-lb (145-159 N-m)	107--117 ft-lb (224-237 N-m)	165--175 ft-lb	13/16
5/8-11 UNC (84-98 N-m)	62-72 ft-lb (190--203 N-m)	140-150 ft-lb (271--285 N-m)	200-210 ft-lb	15/16
5/8-18 UNF (91--104 N-m)	67-77 ft-lb (207-221 N-m)	1 53--163 ft-lb (319-332 N-m)	235-245 ft-lb	15/16
3/4-10 UNC (144-157 N-m)	106--116 ft-lb (353-366 N-m)	260-270 ft-lb (495-508 N-m)	365-375 ft-lb	1-1/4
3/4-16 UNF (156--169 N-m)	115-125 ft-lb (363-377 N-m)	268-278 ft-lb (565-579 N-m)	417 - 427 ft-lb	1-1/4

## TORQUE VALUE GUIDE

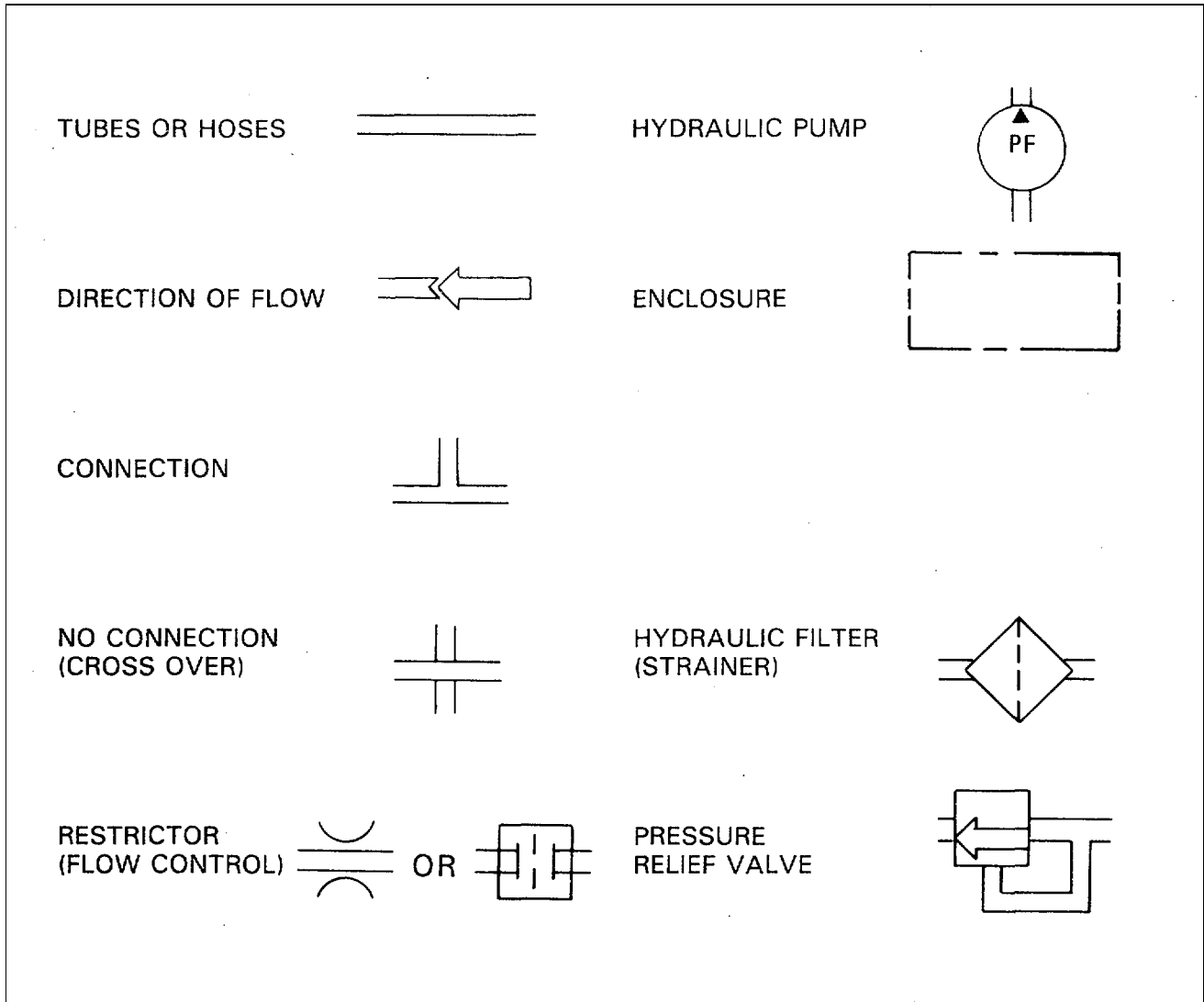
<b>TORQUE SCREW DIAMETER</b>	<b>TORQUE NO DASHES (SAE GRADE 2)</b>	<b>TORQUE 3 DASHES (SAE GRADE 5)</b>	<b>6 DASHES (SAE GRADE 8)</b>	<b>SOCKET SIZE</b>
7/8-9 UNC (224-237 N-m)	165-175 ft-lb (522-536 N-m)	385-395 ft-lb (807-820 N-m)	595-605 ft-lb	1-5/16
7/8--14 UNF (241-255 N-m)	178--188 ft-lb (575-588 N-m)	424-434 ft-lb (899-912 N-m)	663-673 ft-lb	1-5/16
1--8 UNC (340-354 N-m)	251-261 ft-lb (786-800 N-m)	580-590 ft-lb (1220-1234 N-m)	900-910 ft-lb	1-1/2
1-14 UNF (346-359 N-m)	255-265 ft-lb (793-860 N-m)	585-634 ft-lb (1279-1346 N-m)	943-993 ft-lb	1-1/2
1-1/4-7 UNC (611-625 N-m)	451--461 ft-lb (1451-1518 N-m)	1070--1120 ft-lb (2396-2463 N-m)	1767--1817 ft-lb	1-7/8
1-1/4-12 UNF (662-675 N-m)	488-498 ft-lb (1642-1710 N-m)	1211--1261 ft-lb (2661--2729 N-m)	1963--2013 ft-lb	1-7/8
1-1/2-6 UNC (986-999 N-m)	727-737 ft-lb (2575-2642 N-m)	1899-1949 ft-lb (4218-4286 N-m)	3111--3161 ft-lb	2-1/4
1-1/2-12 UNF (1106-1120 N-m)	816-826 ft-lb (2907-2975 N-m)	2144--21 94 ft-lb (4753-4821 N-m)	3506-3556 ft-lb	2-1/4

APPENDIX F

HYDRAULIC SYSTEM DESCRIPTION  
AND SCHEMATIC DIAGRAMS

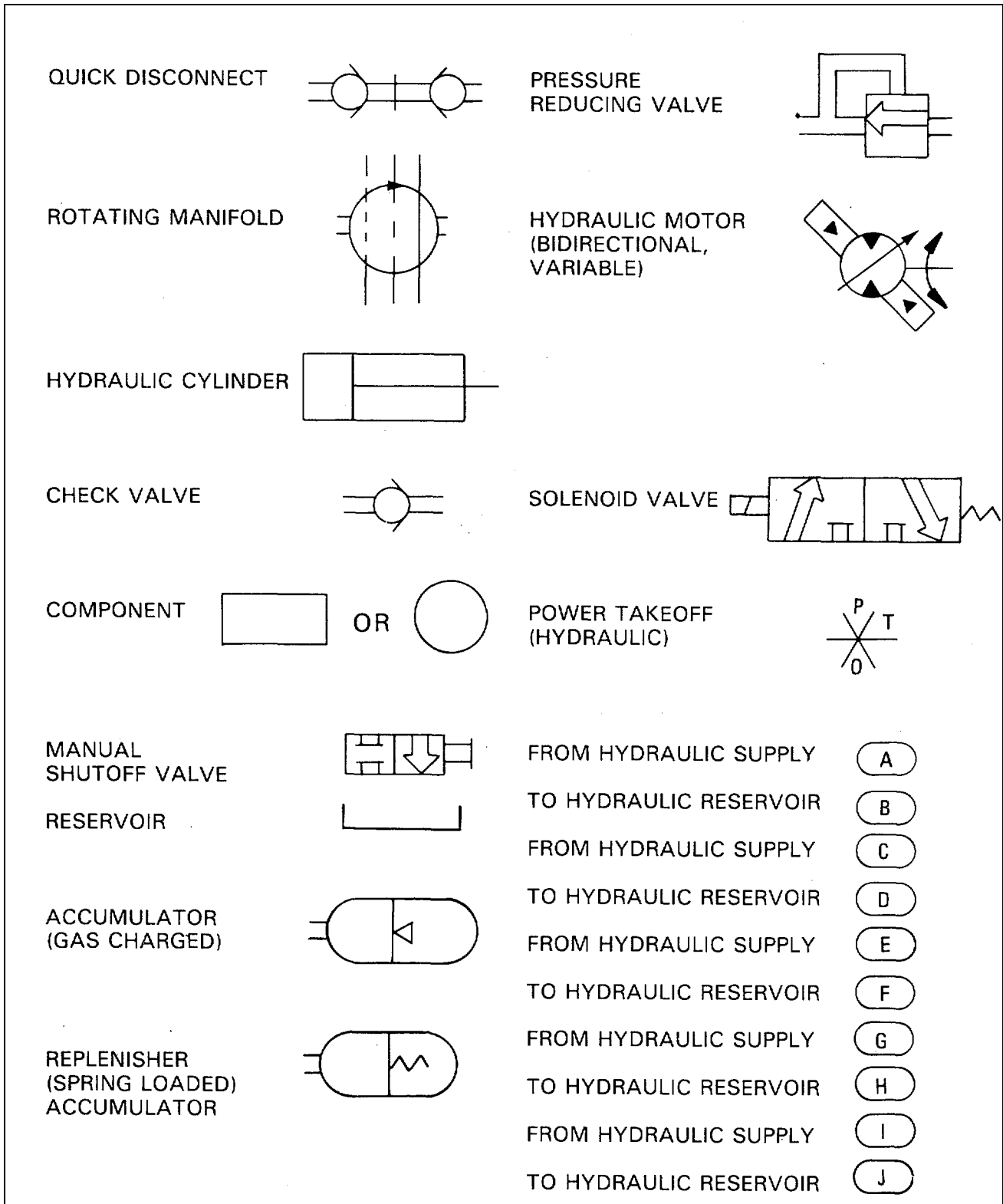
**F-1. GENERAL.** This appendix contains functional descriptions and schematic diagrams of the hydraulic system. The hydraulic system is divided into nine basic subsystems: hydraulic power, suspension lockout, spade, cannon recoil, turret traversing, cannon elevating, loader-rammer traversing, loader, and rammer.

**F-2. HYDRAULIC SYMBOLS.**



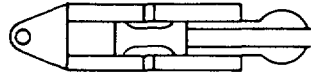


F-2. HYDRAULIC SYMBOLS (CONT). F-2

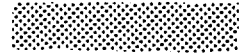


BAR CODE

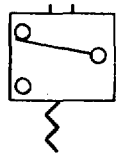
LOCKOUT CYLINDER



INTENSIFIED PRESSURE



PRESSURE SWITCH



SUPPLY PRESSURE



CHARGING PRESSURE  
REDUCED PRESSURE  
PILOT PRESSURE



METERED OR BLOCKED  
FLOW



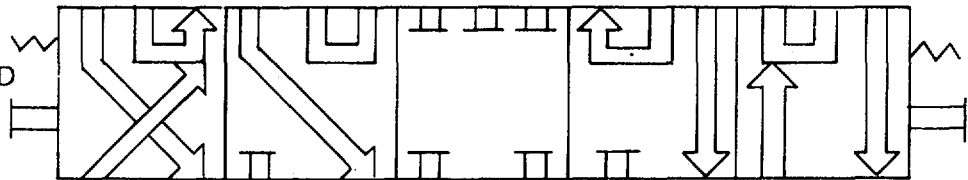
INTAKE DRAIN



BLANK INACTIVE



DIRECTIONAL  
CONTROL VALVE  
(MANUALLY OPERATED  
SPRING RETURN  
CENTER OFF)



**F-3. HYDRAULIC POWER SUBSYSTEM.**

*Functional Description.* Hydraulic reservoir (21) is filled with hydraulic fluid. Fluid from hydraulic reservoir (21) is filtered through strainer (20) and pumped through either filter (7) by engine driven pump (14) or filter (4) by electric motor driven pump (15). The fluid is pumped into nitrogen charged accumulator (6) until fluid pressure in accumulator (6) reaches 2400 psi (16,548 kPa). Then pressure switch (10) opens the electrical circuits to magnetic clutch (13) and electric motor (16), stopping the pump (14 or 15). Hydraulic pressure is stored in accumulator (6) ready for use by any of the other eight subsystems. When the hydraulic pressure in accumulator (6) drops below 1600 psi (11,032 kPa), pressure switch (10) closes to start either pump (14 or 15).

Check valves (5, 8, and 9) prevent hydraulic fluid from draining back to hydraulic reservoir (21) through engine-driven pump (14), electric motor-driven pump (15), handdriven ram pump (17).









The system is protected from over-pre, by pressure relief valve (1), which bypfluid over 2850 psi (19,651 kPa) back hydraulic reservoir (21).

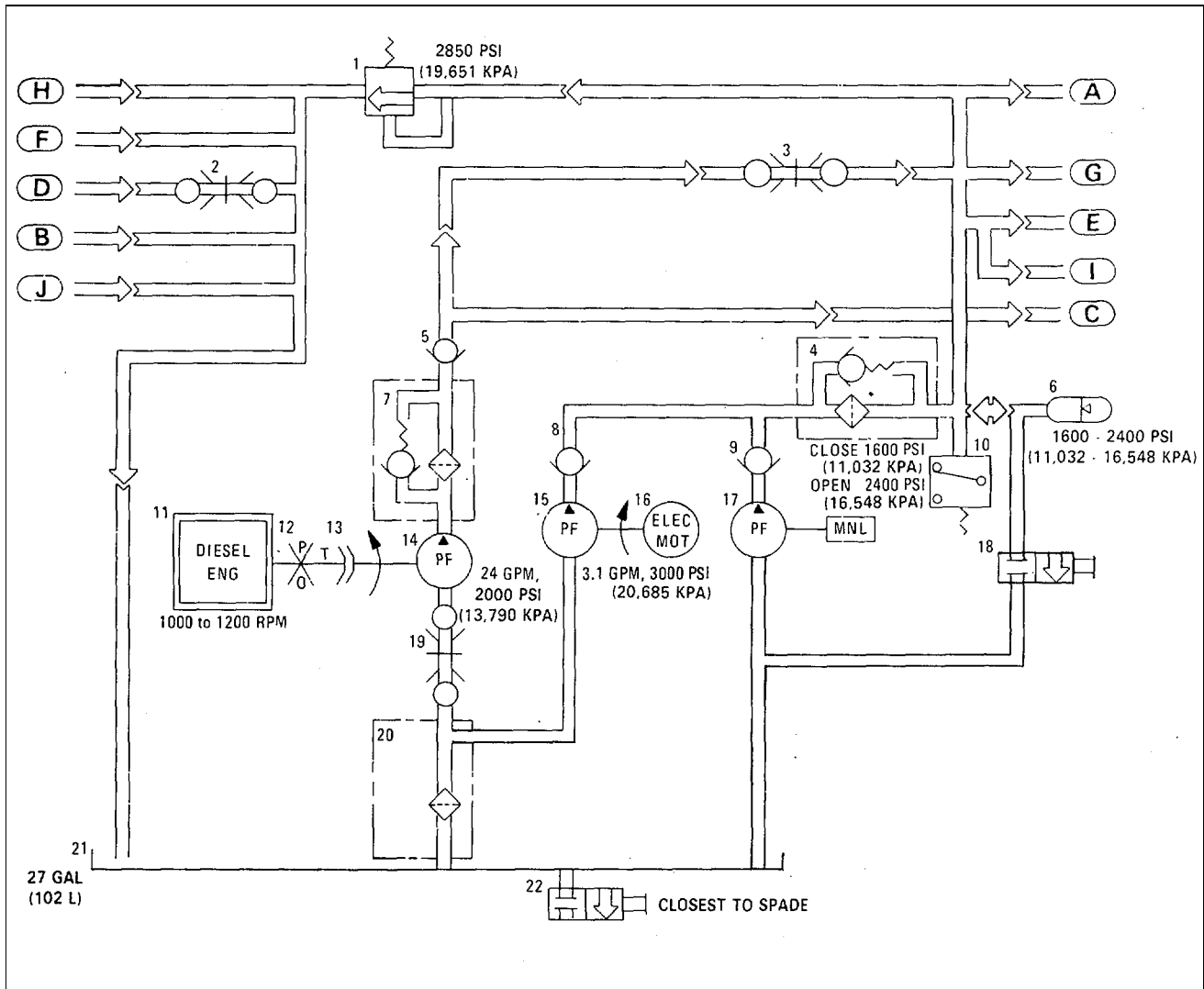
In an emergency and for maintenance operations, hydraulic fluid pressure can be up in accumulator (6) by operating handdriven ram pump (1 7). Hydraulic system pressure can be quickly dropped to zero opening dump valve (18). Hydraulic reservoir (21) is drained by opening valve (22).

**LEGEND**

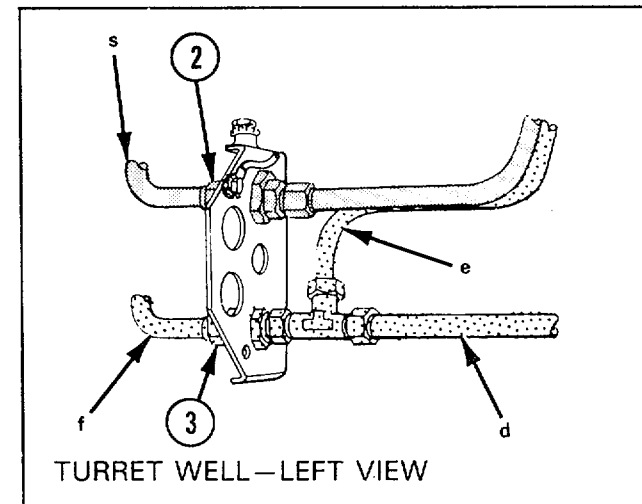
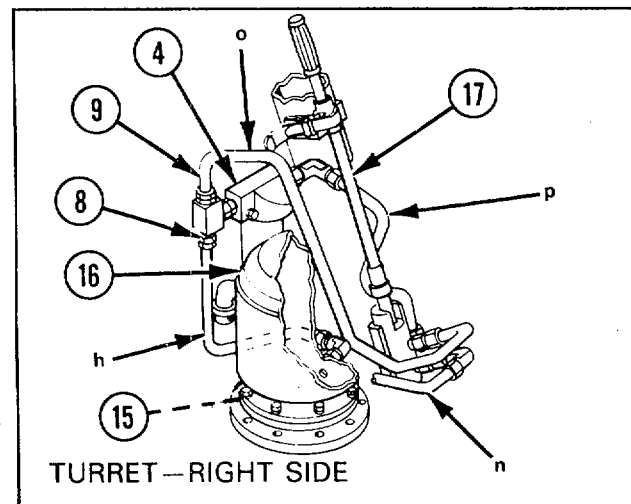
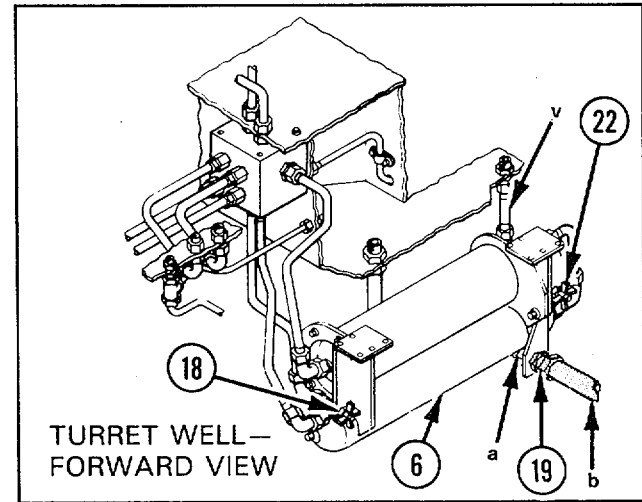
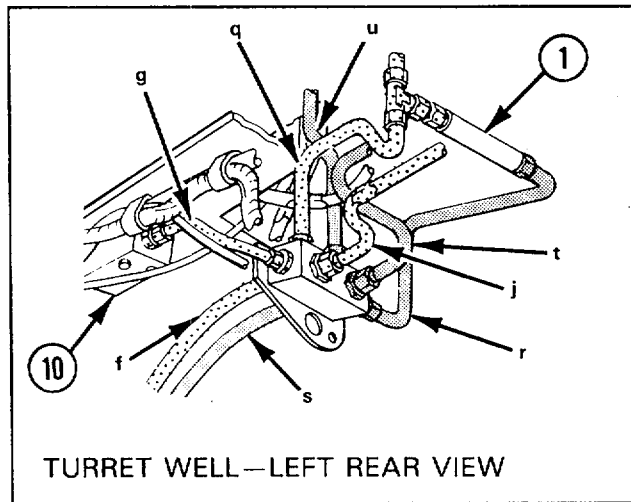
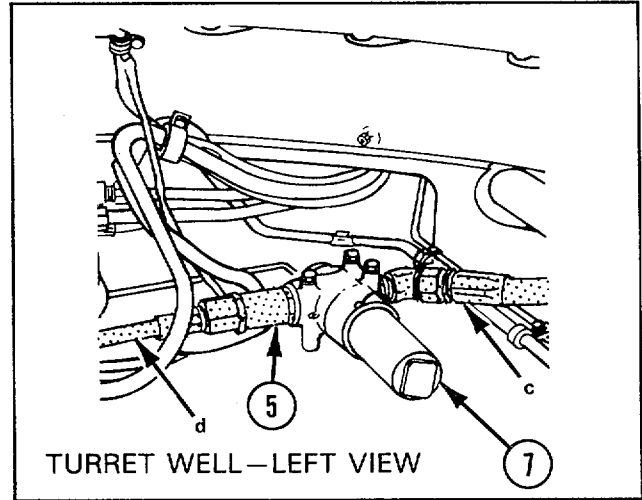
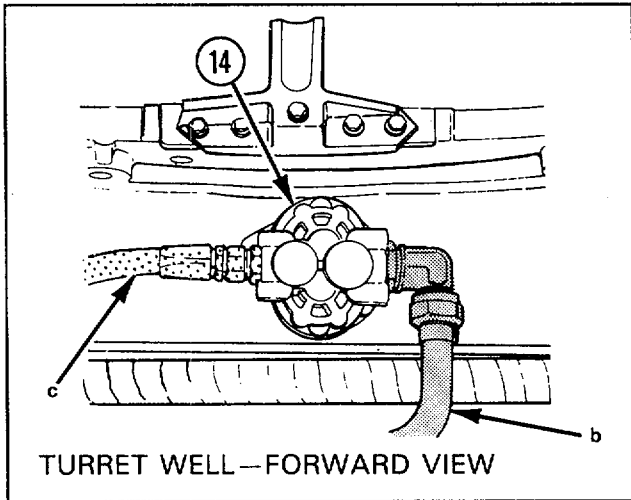
- 1 System pressure relief valve
- 2 Quick-disconnect coupling
- 3 Quick-disconnect coupling
- 4 Hydraulic fluid filter
- 5 Check valve
- 6 Accumulator
- 7 Hydraulic fluid filter
- 8 Check valve
- 9 Check valve
- 10 Hydraulic pressure switch
- 11 Diesel engine
- 12 Power takeoff (PTO)
- 13 Magnetic clutch
- 14 Hydraulic fluid pump
- 15 Hydraulic fluid pump
- 16 Electric motor
- 17 Hand-driven ram pump
- 18 Accumulator pressure dump valve
- 19 Quick-disconnect coupling
- 20 Hydraulic fluid strainer
- 21 Hydraulic reservoir
- 22 Reservoir drain valve

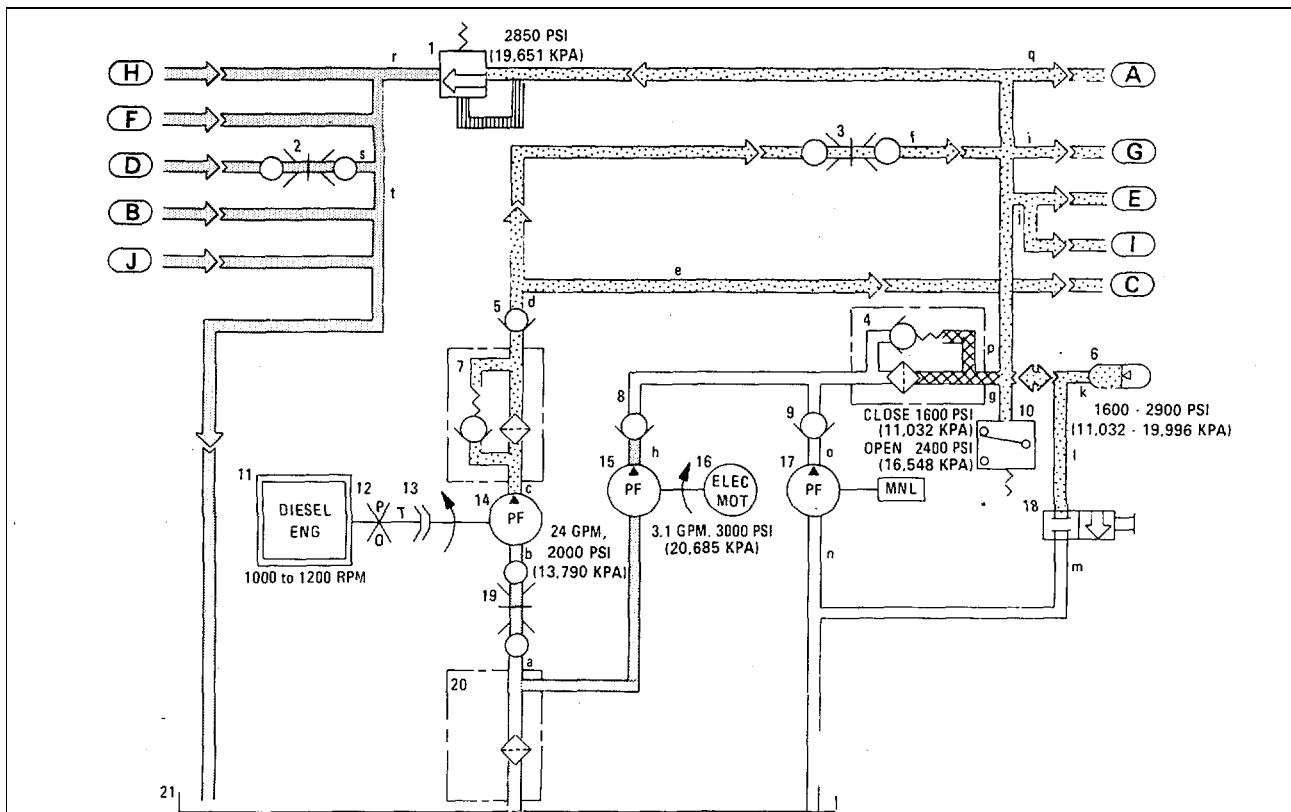
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



F-4. ENGINE-DRIVEN PUMP OPERATING. F-6













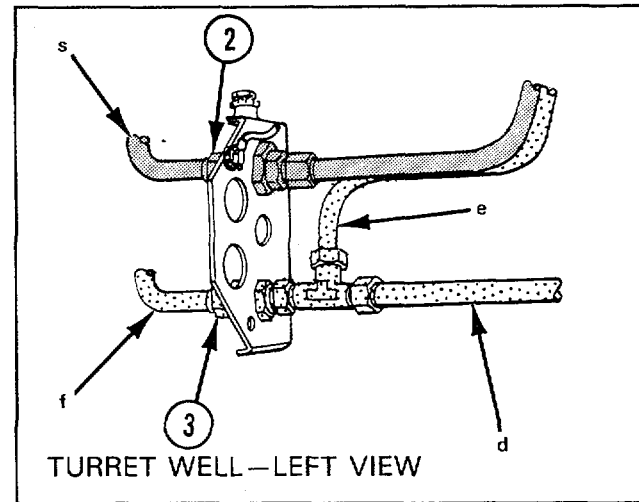
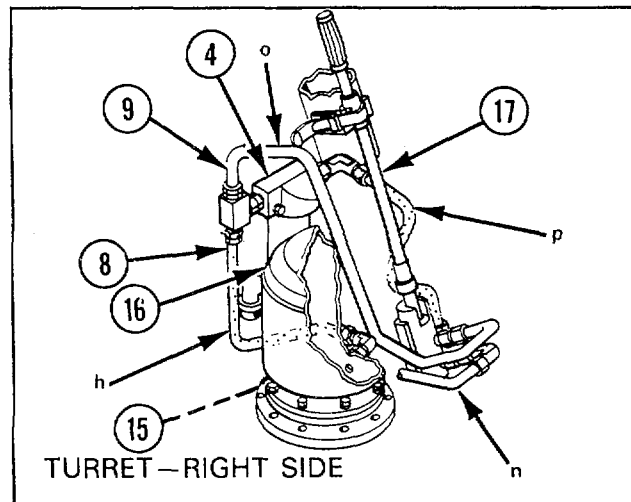
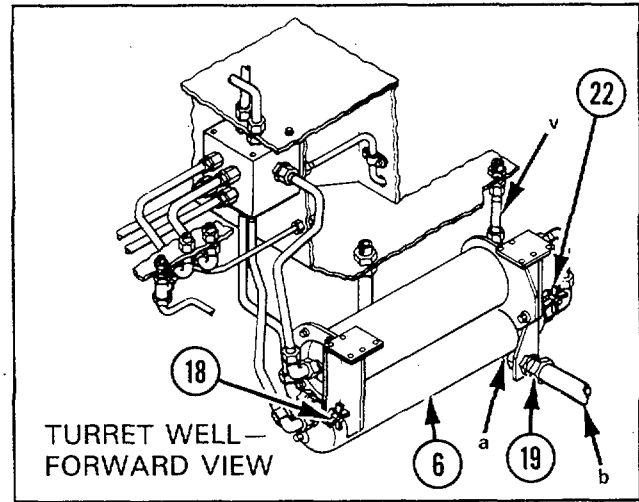
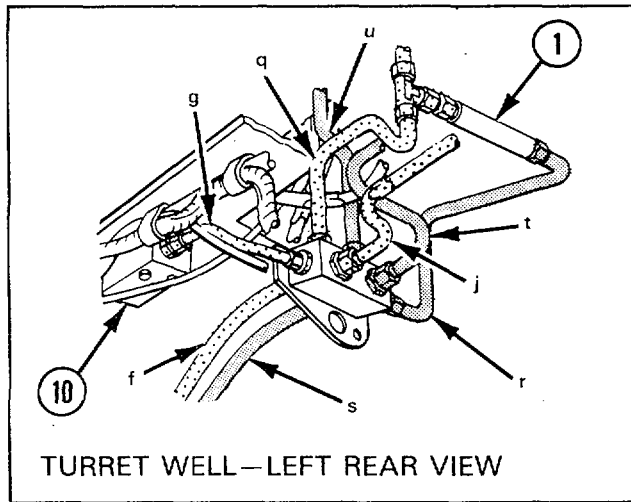
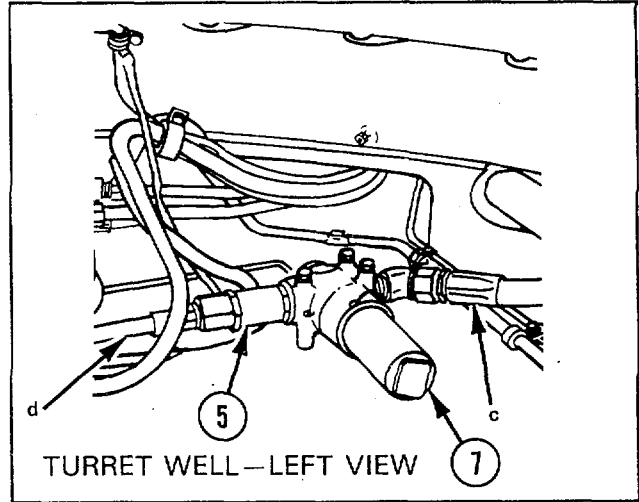
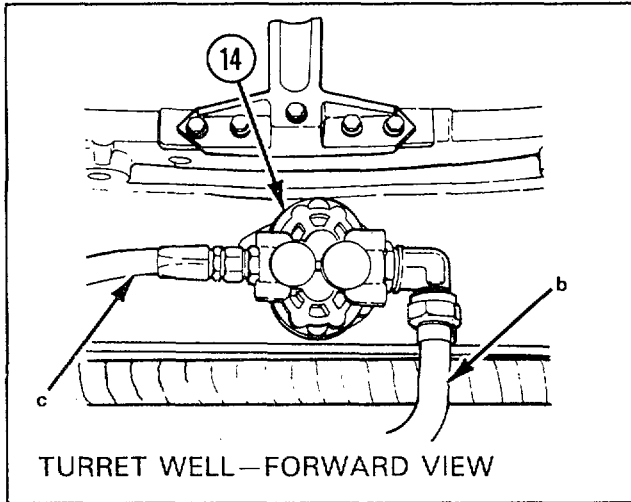
**LEGEND**

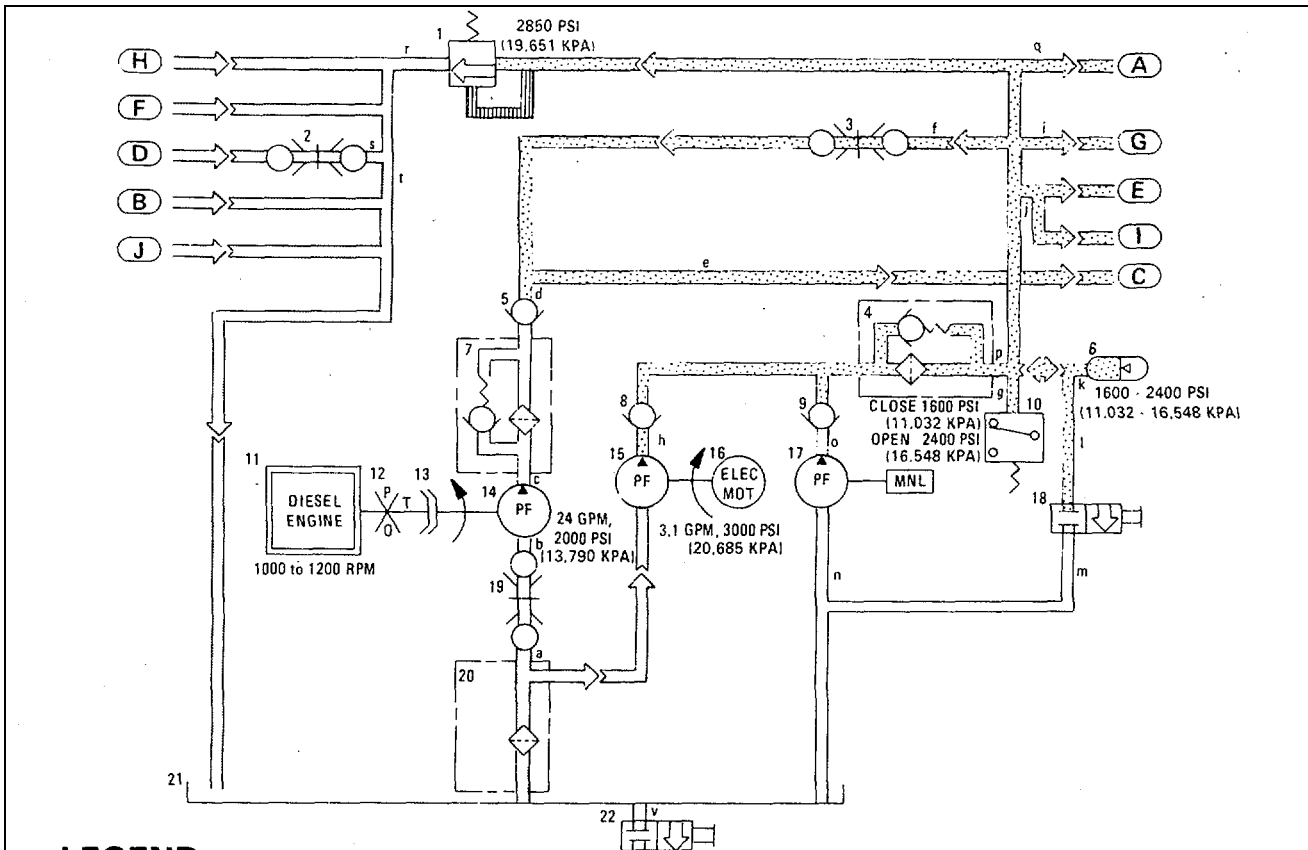
- 1 System pressure relief valve
- 2 Quick-disconnect coupling
- 3 Quick-disconnect coupling
- 4 Hydraulic fluid filter
- 5 Check valve
- 6 Accumulator
- 7 Hydraulic fluid filter
- 8 Check valve
- 9 Check valve
- 10 Hydraulic pressure switch
- 11 Diesel engine
- 12 Power takeoff (PTO)
- 13 Magnetic clutch
- 14 Hydraulic fluid pump
- 15 Hydraulic fluid pump
- 16 Electric motor
- 17 Hand-driven ram pump
- 18 Accumulator pressure dump valve
- 19 Quick-disconnect coupling
- 20 Hydraulic fluid strainer
- 21 Hydraulic reservoir
- 22 Reservoir drain valve

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-5. ELECTRIC MOTOR-DRIVEN PUMP OPERATING.













**LEGEND**

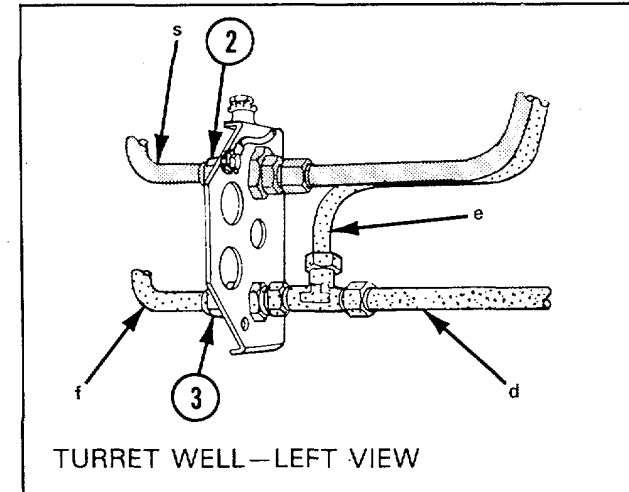
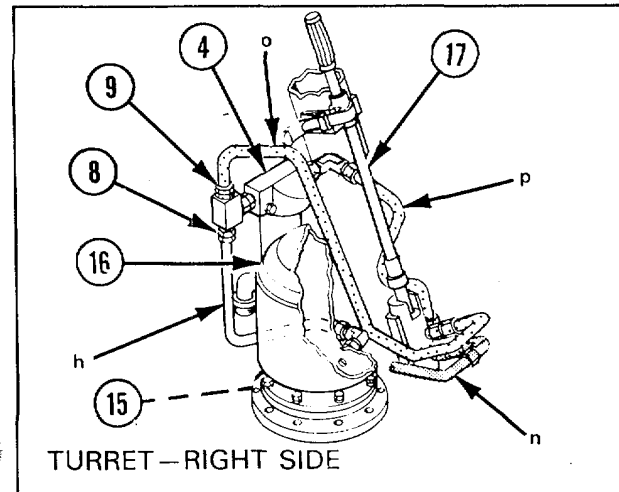
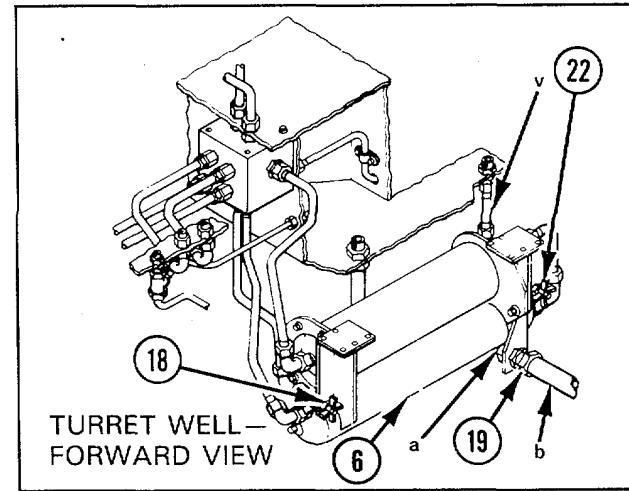
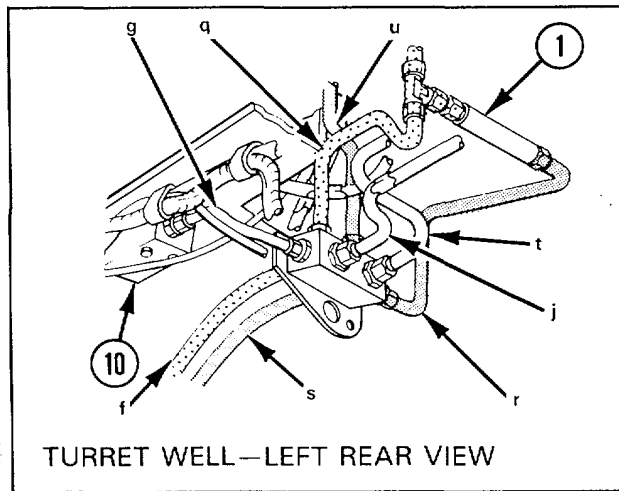
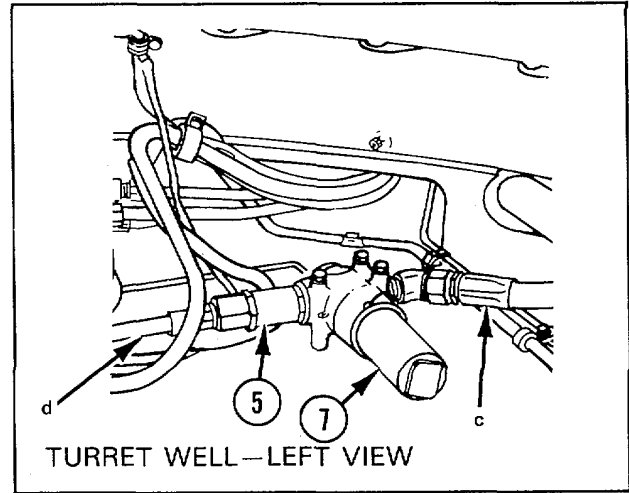
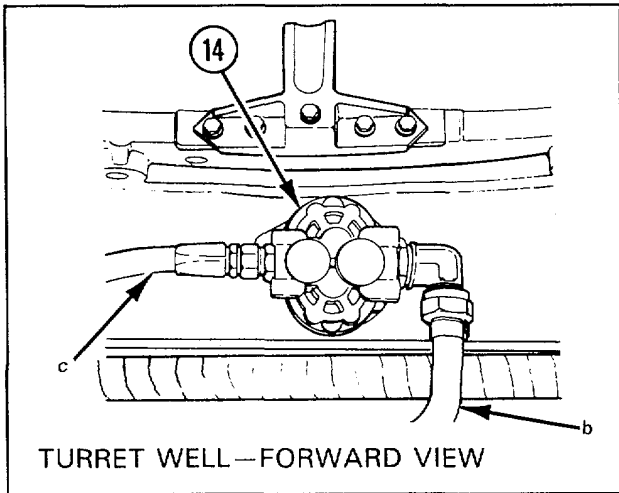
- 1 System pressure relief valve
- 2 Quick-disconnect coupling
- 3 Quick-disconnect coupling
- 4 Hydraulic fluid filter
- 5 Check valve
- 6 Accumulator
- 7 Hydraulic fluid filter
- 8 Check valve
- 9 Check valve
- 10 Hydraulic pressure switch
- 11 Diesel engine
- 12 Power takeoff (PTO)
- 13 Magnetic clutch
- 14 Hydraulic fluid pump
- 15 Hydraulic fluid pump
- 16 Electric motor
- 17 Hand-driven ram pump
- 18 Accumulator pressure dump valve
- 19 Quick-disconnect coupling
- 20 Hydraulic fluid strainer
- 21 Hydraulic reservoir
- 22 Reservoir drain valve

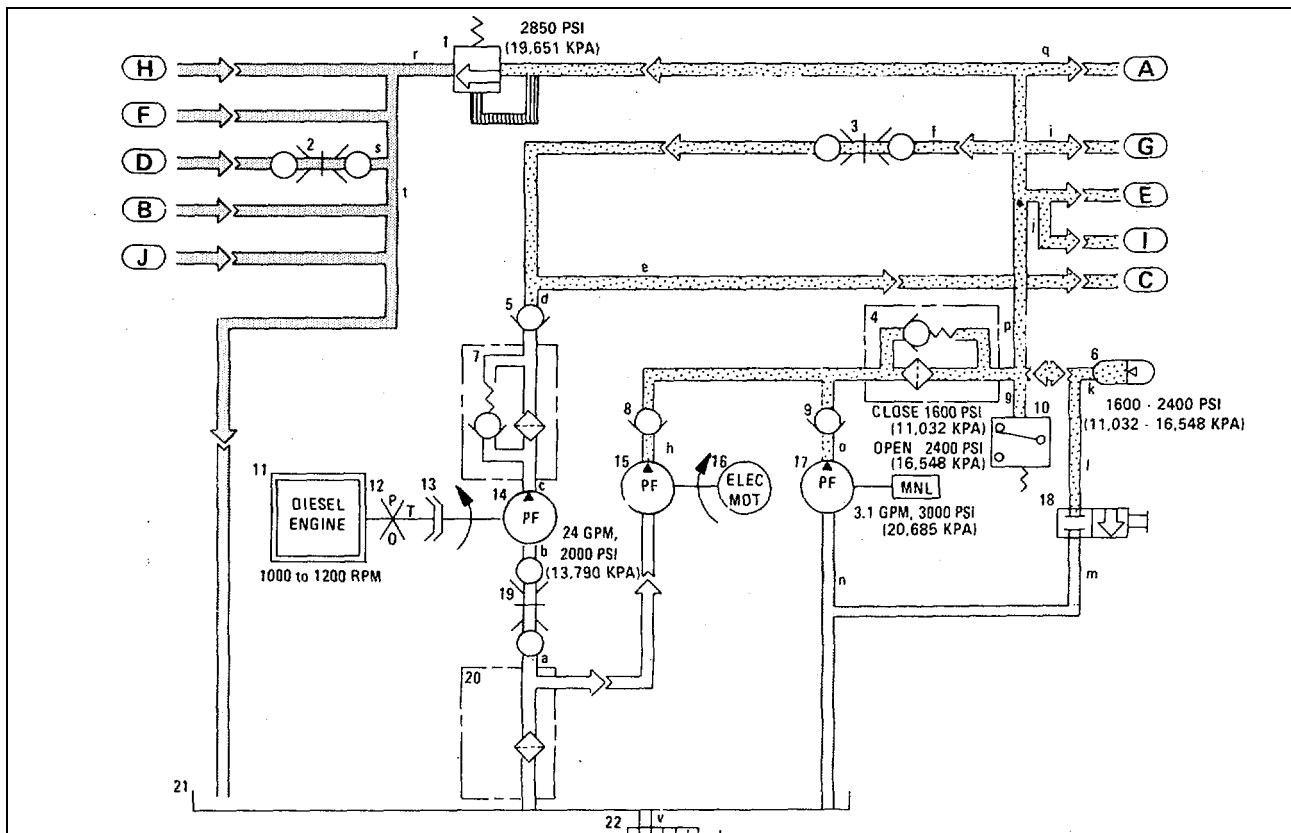
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



F-6. HAND-DRIVEN RAM PUMP OPERATING.













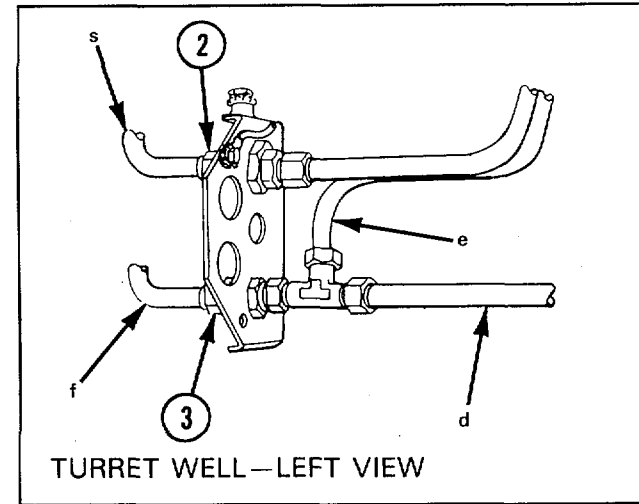
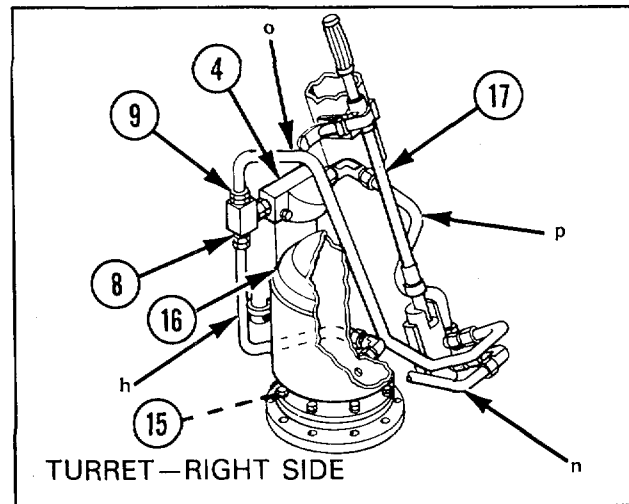
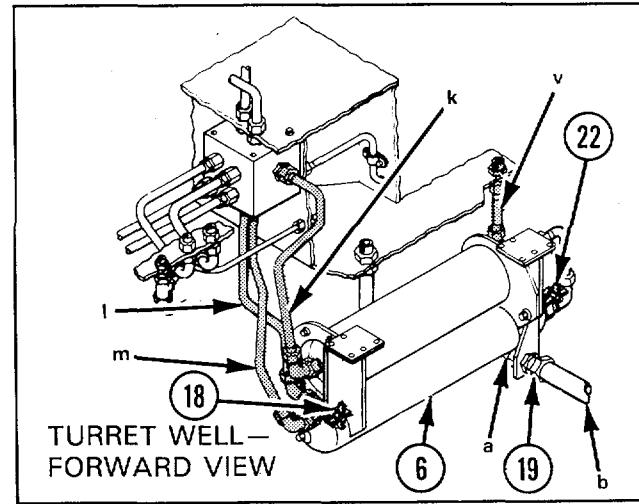
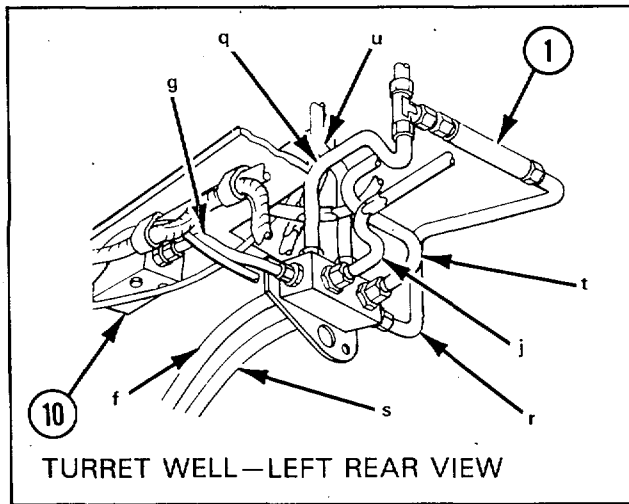
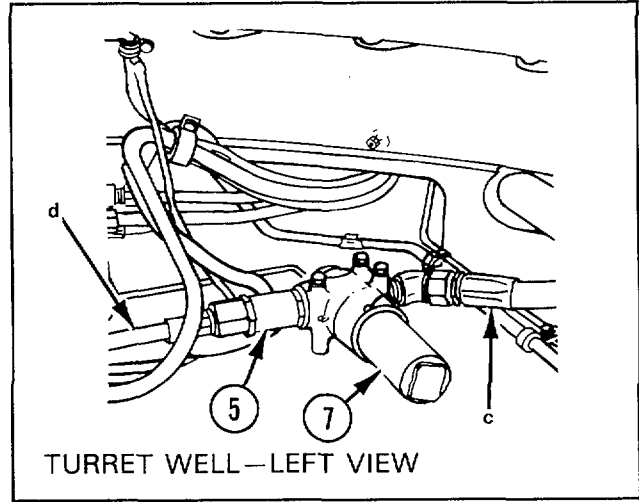
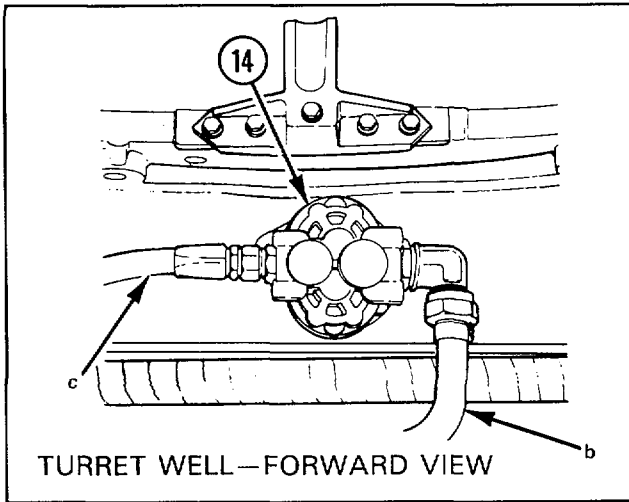
**LEGEND**

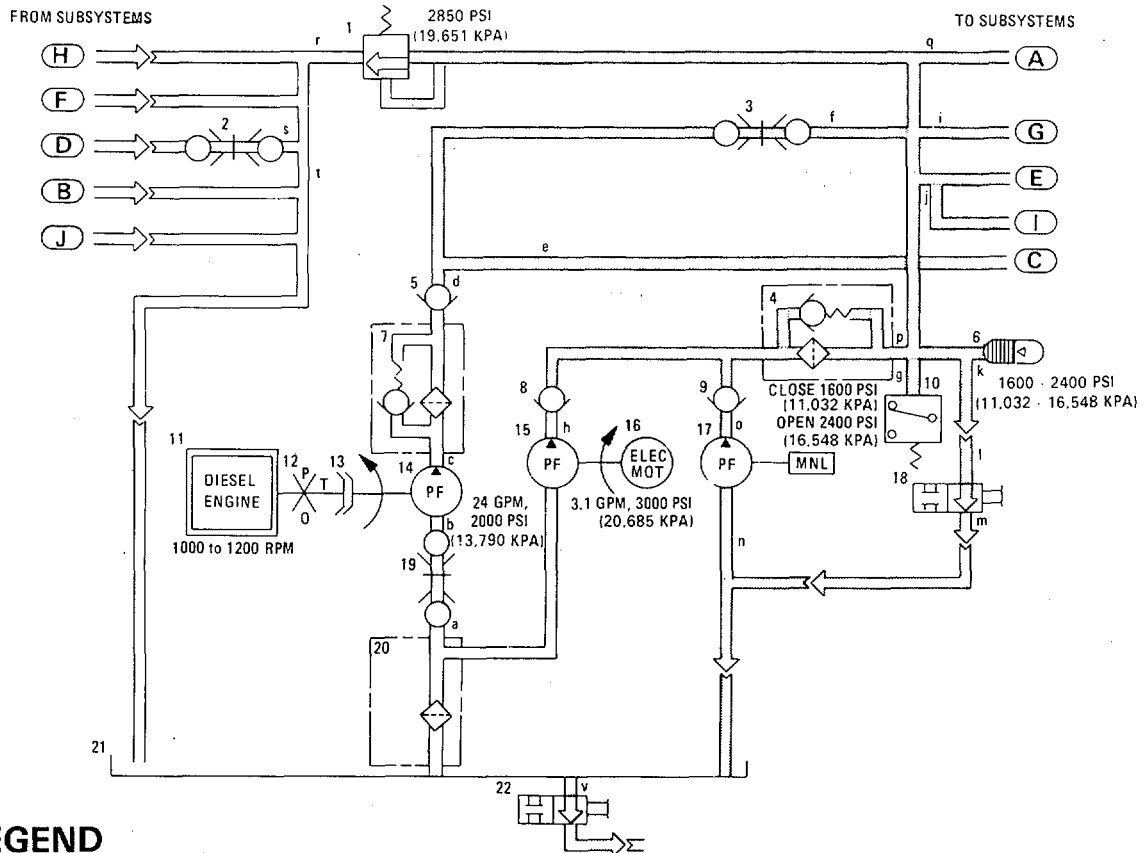
- 1 System pressure relief valve
- 2 Quick-disconnect coupling
- 3 Quick-disconnect coupling
- 4 Hydraulic fluid filter
- 5 Check valve
- 6 Accumulator
- 7 Hydraulic fluid filter
- 8 Check valve
- 9 Check valve
- 10 Hydraulic pressure switch
- 11 Diesel engine
- 12 Power takeoff (PTO)
- 13 Magnetic clutch
- 14 Hydraulic fluid pump
- 15 Hydraulic fluid pump
- 16 Electric motor
- 17 Hand-driven ram pump
- 18 Accumulator pressure dump valve
- 19 Quick-disconnect coupling
- 20 Hydraulic fluid strainer
- 21 Hydraulic reservoir
- 22 Reservoir drain valve

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-7. DRAINING.













**LEGEND**

- 1 System pressure relief valve
- 2 Quick-disconnect coupling
- 3 Quick-disconnect coupling
- 4 Hydraulic fluid filter
- 5 Check valve
- 6 Accumulator
- 7 Hydraulic fluid filter
- 8 Check valve
- 9 Check valve
- 10 Hydraulic pressure switch
- 11 Diesel engine
- 12 Power takeoff (PTO)
- 13 Magnetic clutch
- 14 Hydraulic fluid pump
- 15 Hydraulic fluid pump
- 16 Electric motor
- 17 Hand-driven ram pump
- 18 Accumulator pressure dump valve
- 19 Quick-disconnect coupling
- 20 Hydraulic fluid strainer
- 21 Hydraulic reservoir
- 22 Reservoir drain valve

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

**F-8. SUSPENSION LOCKOUT HYDRAULIC SUBSYSTEM.**

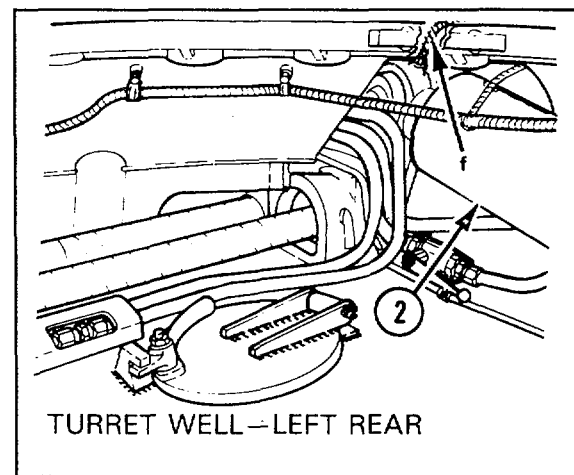
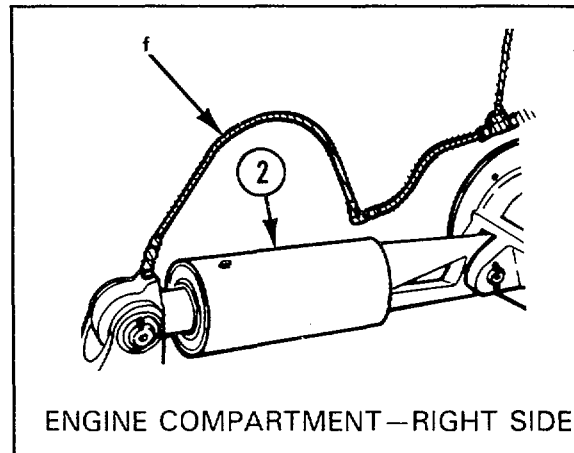
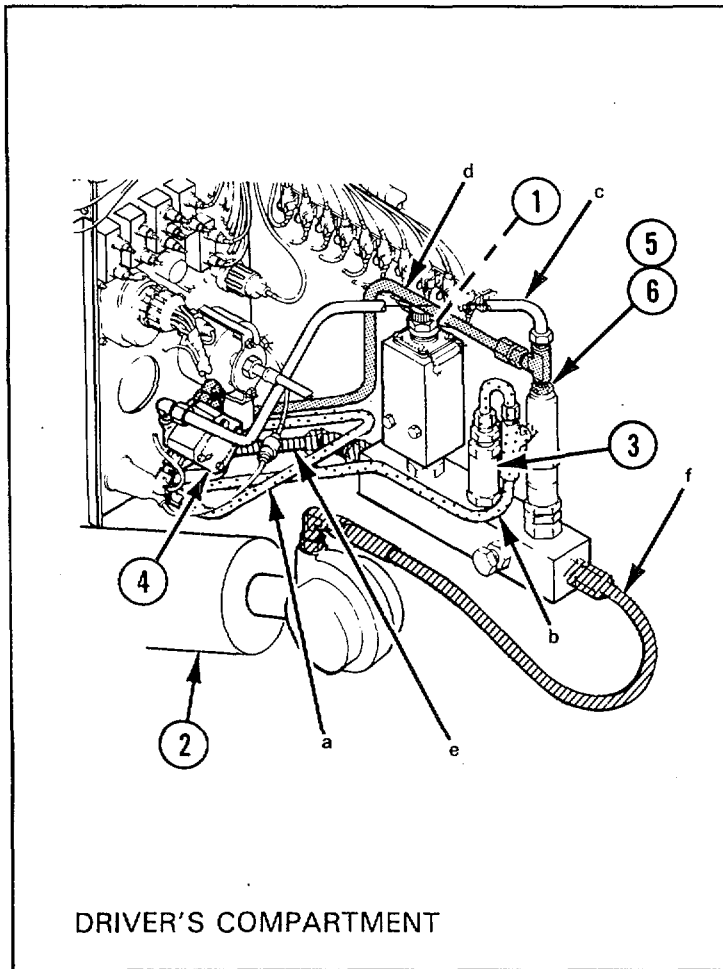
*Functional Description.* The suspension lockout hydraulic subsystem forms a hydrostatic lock within each lockout cylinder (2). This stops up and down movement of the road wheels and provides a solid firing platform when the cannon is fired.

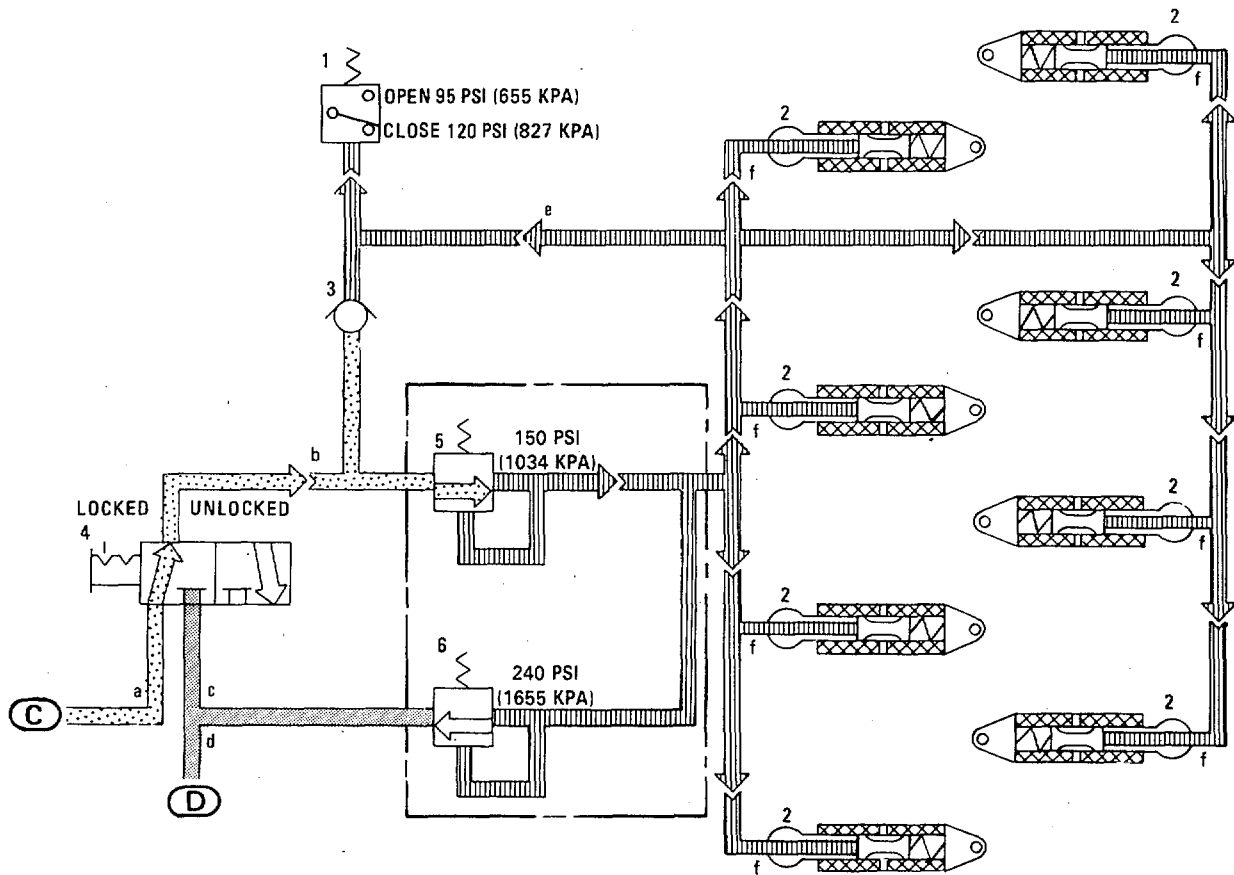
Lockout cylinders (2) are locked by setting valve (4) to LOCKED. Hydraulic fluid at 1600 to 2400 psi (11,032 to 16,548 kPa) flows through valve (4) to valve (5). Valve (5) reduces the fluid pressure to 150 psi (1034 kPa). As the fluid pressure builds up in lockout cylinders (2), the lockout pistons are forced into lockout position. This prevents hydraulic fluid from passing from one side of

the cylinder piston to the other. Pressure switch (1) is closed when pressure in the lockout cylinder is over 120 psi (827 kPa), lighting the SUSPENSION LOCKED indicator lights. When the hydraulic pressure drops below 95 psi (655 kPa), pressure switch (1) opens, putting out the SUSPENSION LOCKED indicator lights.

The subsystem is protected from overpressure by relief valve (6), which bypasses fluid over 240 psi (1655 kPa) back to reservoir. Cylinders (2) are unlocked by setting valve (4) to UNLOCKED. This allows the hydraulic fluid to flow back to the reservoir.

**F-9. SUSPENSION LOCKOUT HYDRAULIC SUBSYSTEM-LOCKED.**













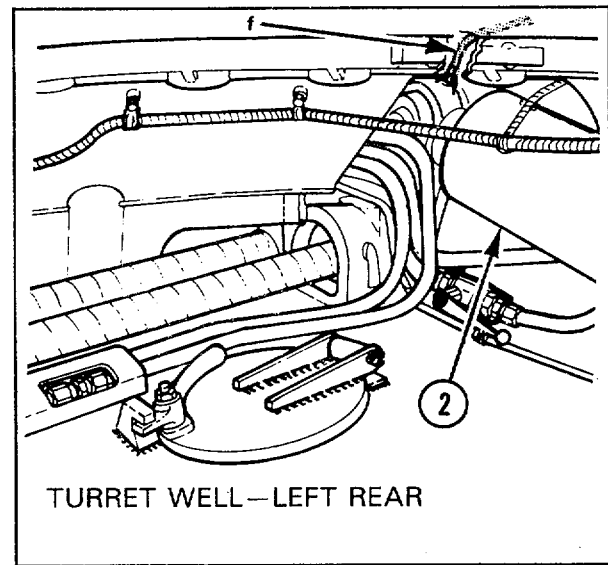
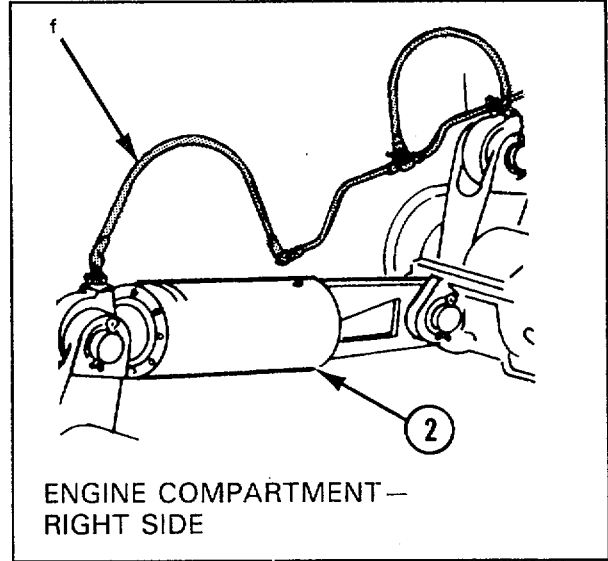
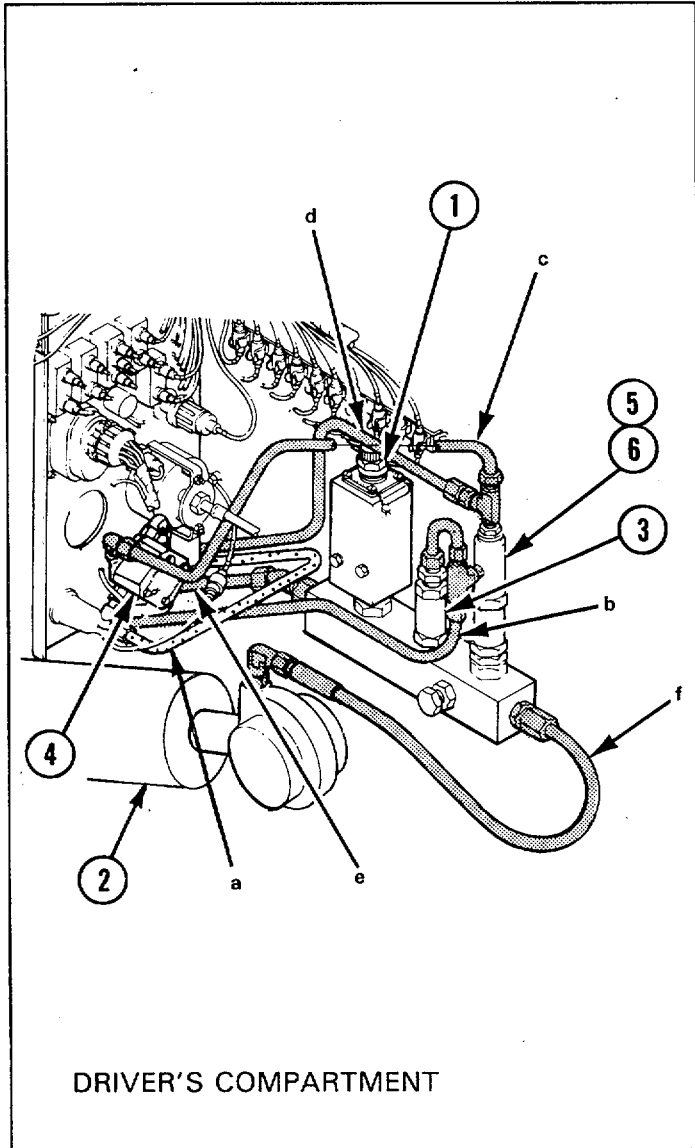
**LEGEND**

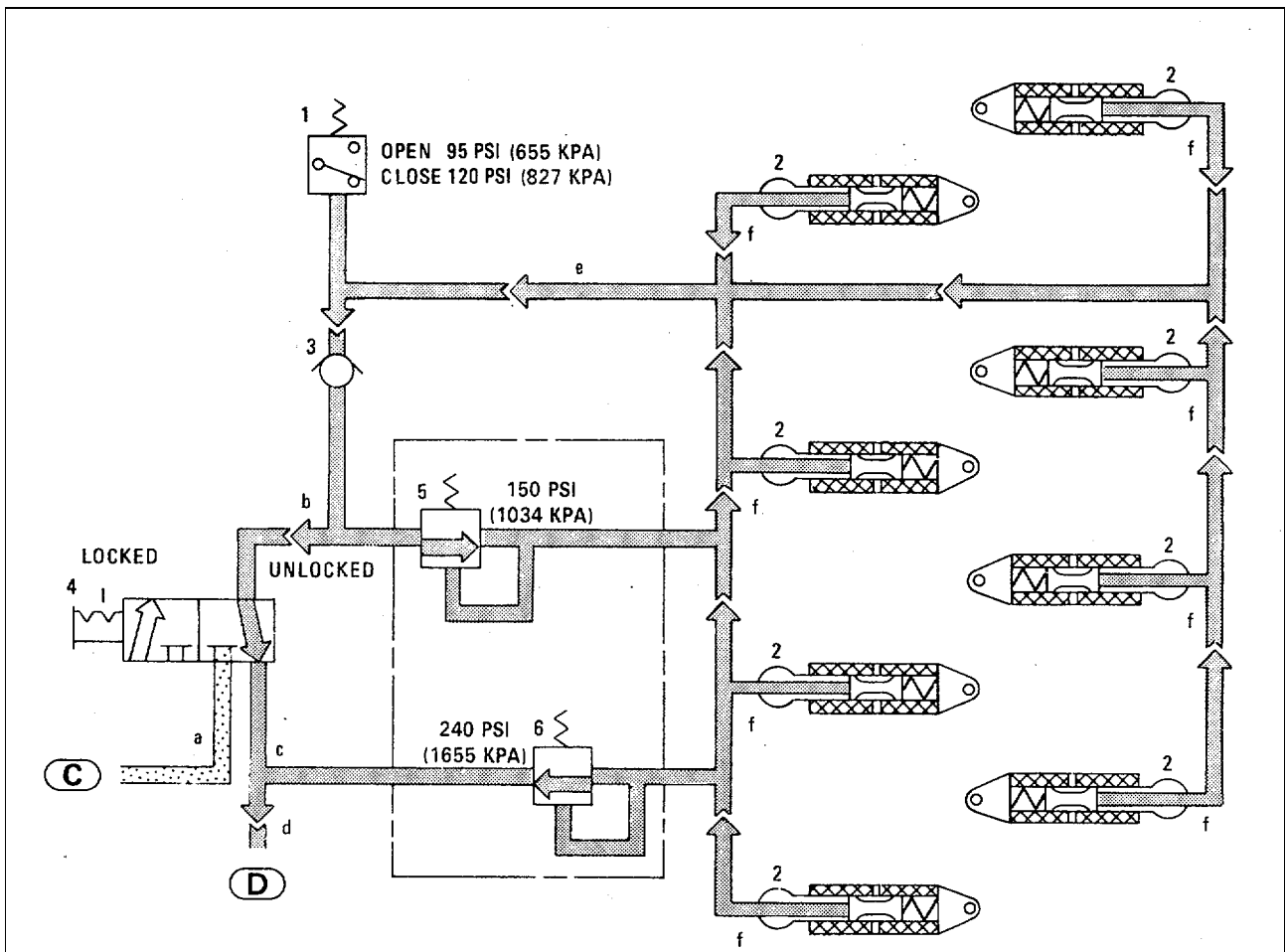
- 1 Pressure switch
- 2 Lockout cylinder
- 3 Check valve
- 4 Three-way valve
- 5 Pressure reducing valve
- 6 Pressure relief valve

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-10. SUSPENSION LOCKOUT HYDRAULIC SUBSYSTEM--UNLOCKED.





**LEGEND**

- 1 Pressure switch
- 2 Lockout cylinder
- 3 Check valve
- 4 Three-way valve
- 5 Pressure relief valve
- 6 Pressure reducing valve

**BAR CODE**

- Intensified pressure
- Supply pressure
- Charging pressure
- Reduced pressure
- Pilot pressure
- Metered or blocked flow
- Intake drain
- Blank inactive



**F-11. SPADE HYDRAULIC SUBSYSTEM.**

*Functional Description.* The spade hydraulic subsystem lowers the spade for firing emplacement or bulldozing, slows and cushions cannon recoil during firing, and raises the spade for stowage.

The spade is lowered by setting both cylinder lock handles to UNLOCK and, at the same time, holding the SPADE control valve handle in the RAISE position. Then, by holding the SPADE directional control valve handle in the LOWER position, hydraulic fluid at about 2400 psi (16,548 kPa) flows through directional control valve (5) to spade cylinders (1 and 2). Cylinders (1 and 2) extend to lower the spade. Pressure relief valve (10) keeps a 50 psi (345 kPa) back pressure in the subsystem to slow the speed of the spade.

The spade is raised by holding the SPADE control valve handle in the RAISED position. This causes hydraulic fluid at about 2400 psi (16,548 kPa) to flow through control valve (5) to spade cylinders (1 and 2). Cylinders (1 and 2) retract to raise the spade.

When the spade reaches the stowed position, the cylinder lock handles must be set to LOCK before

releasing the SPADE control valve handle to prevent the spade from returning to the lowered position.

During cannon recoil, shock is slowed and cushioned by spade cylinders (1 and 2). This is done by forcing hydraulic fluid from the extend side of the cylinder through restrictors (3 and 4) to the retract side. The subsystem is protected from overpressure by pressure relief valve (7), which bypasses fluid over 1050 psi (7240 kPa) back to the reservoir.







When the SPADE control valve handle is in the OFF position, hydraulic pressure at 800 psi (5516 kPa) is applied to both sides of the spade cylinder pistons. The extend side of the spade cylinder pistons has a larger area exposed to hydraulic pressure. This keeps a downward force on the spade and causes it to reset after firing the cannon.

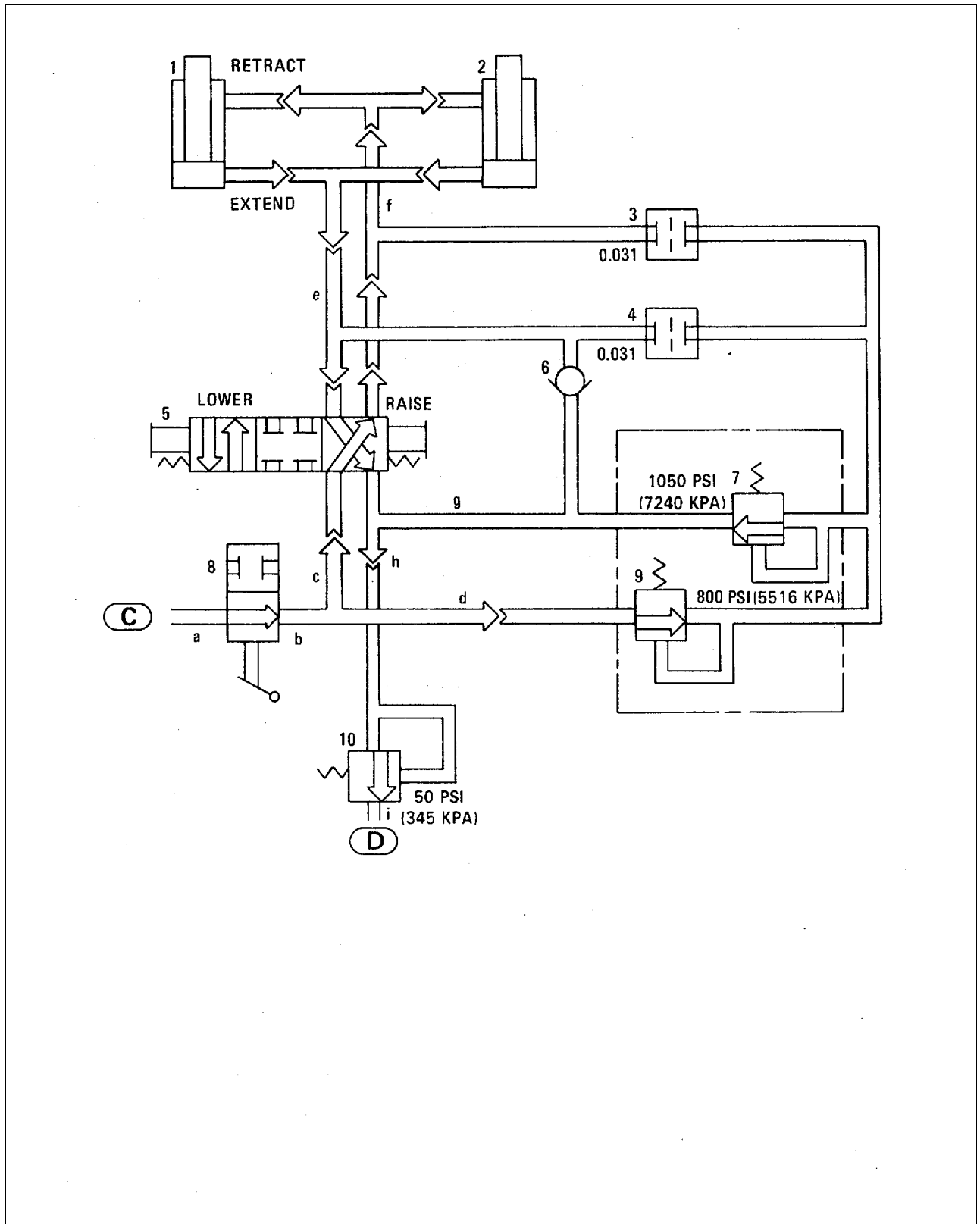
In an emergency and for maintenance operations, the input hydraulic pressure can be blocked by closing shutoff valve (8).

**LEGEND**

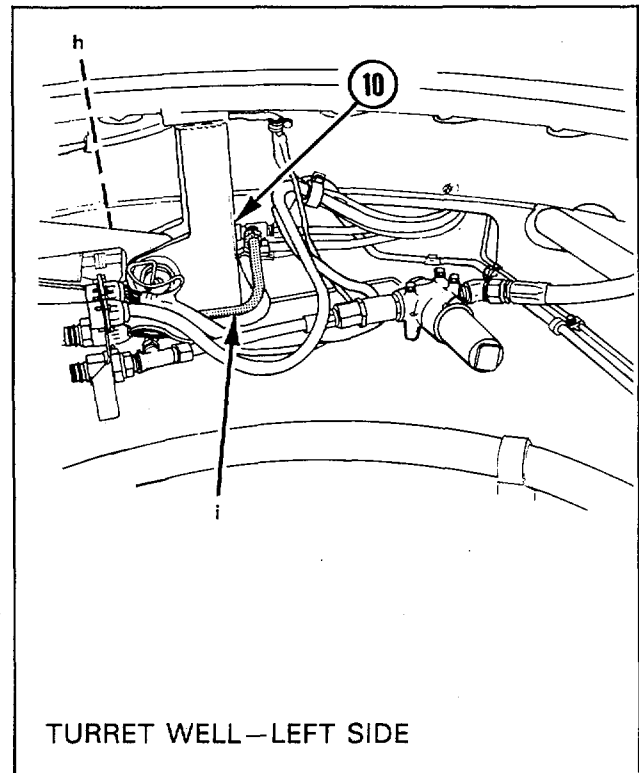
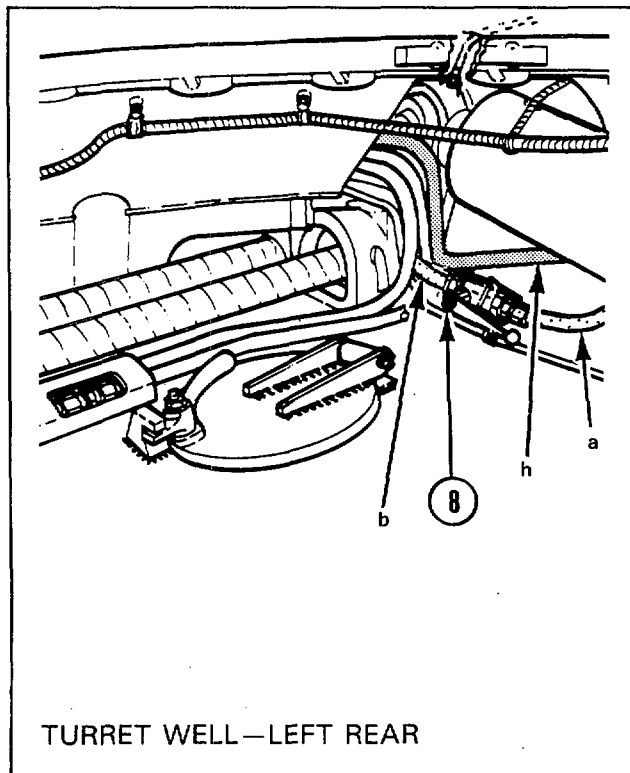
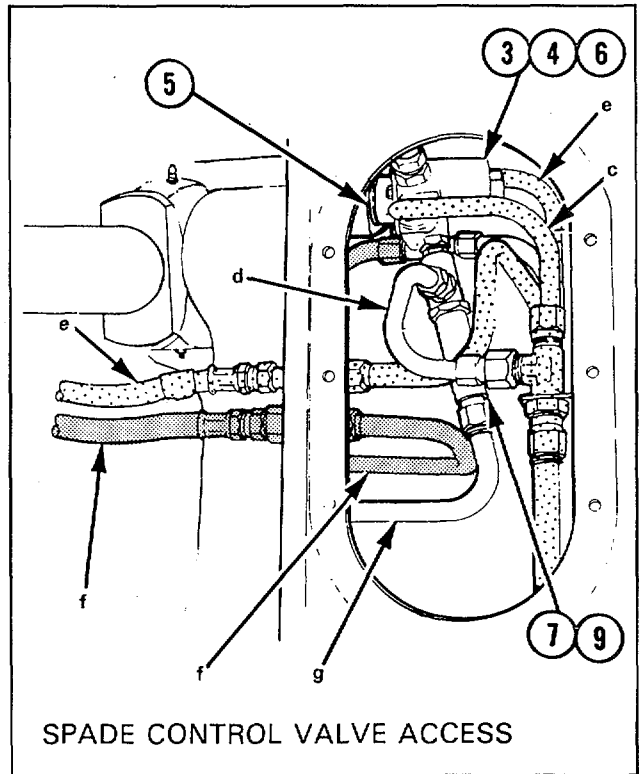
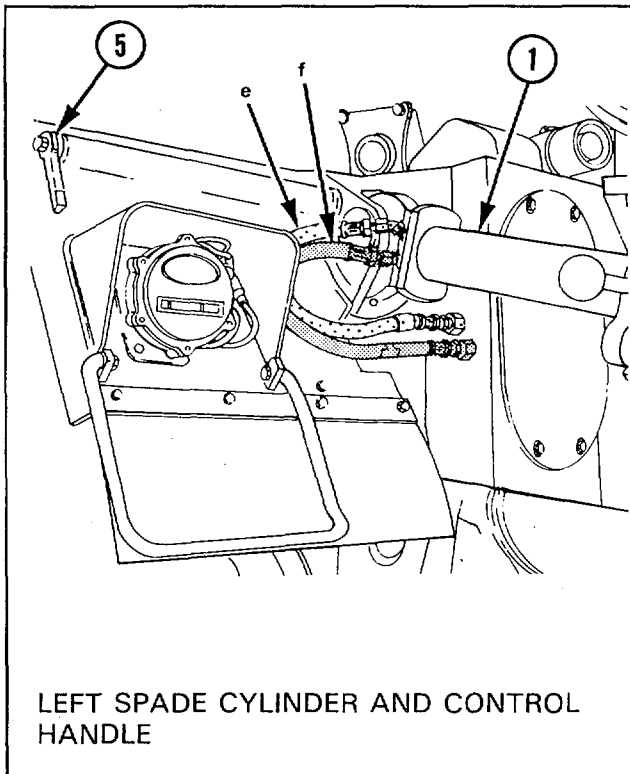
- 1** Left spade cylinder
- 2** Right spade cylinder
- 3** Restrictor
- 4** Restrictor
- 5** Directional control valve
- 6** Check valve
- 7** Pressure relief valve
- 8** Shutoff valve
- 9** Pressure reducing valve
- 10** Pressure relief valve

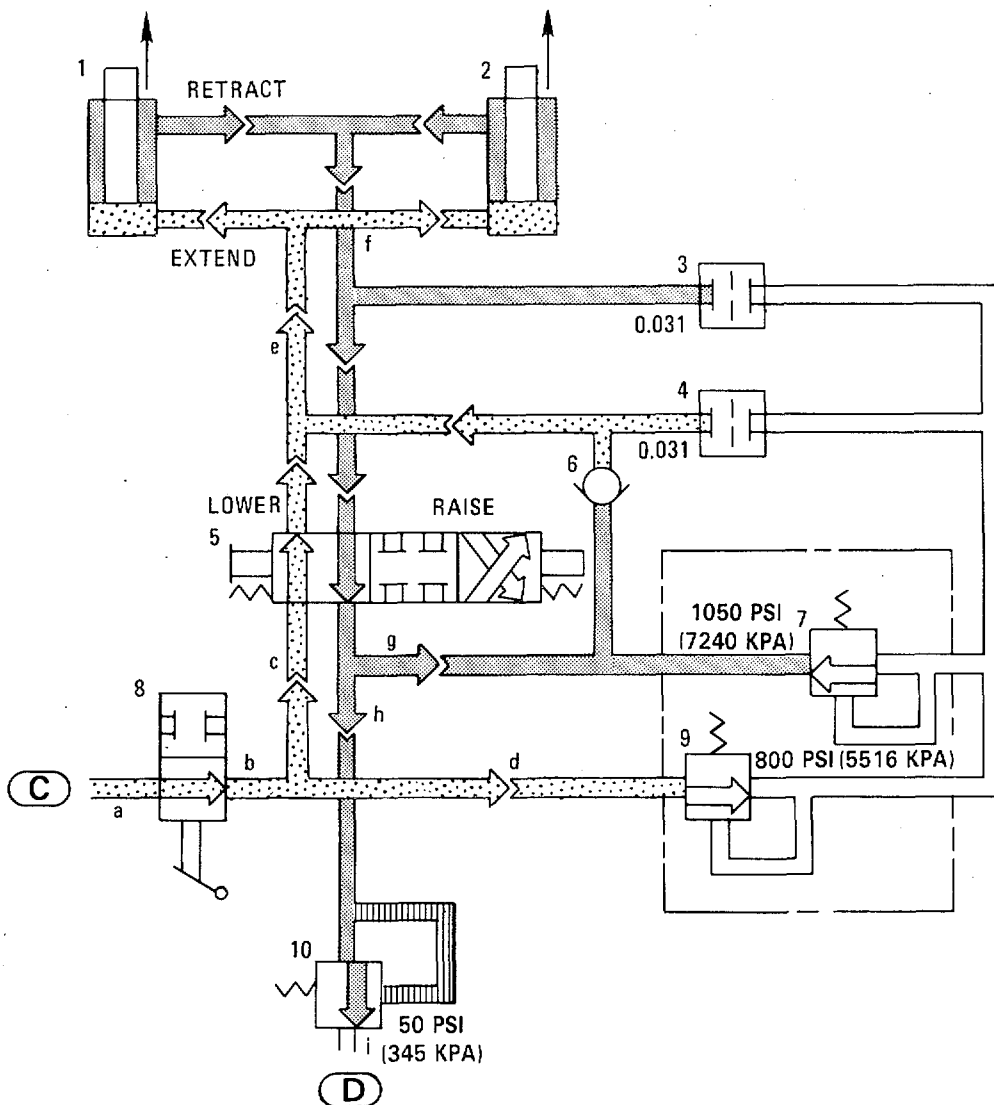
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure  
Reduced pressure  
Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



F-12. SPADE LOWERING.





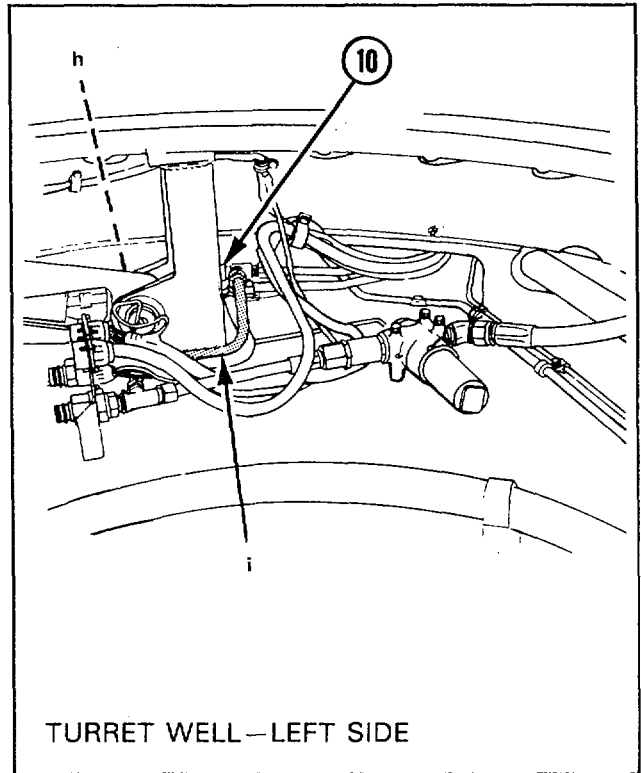
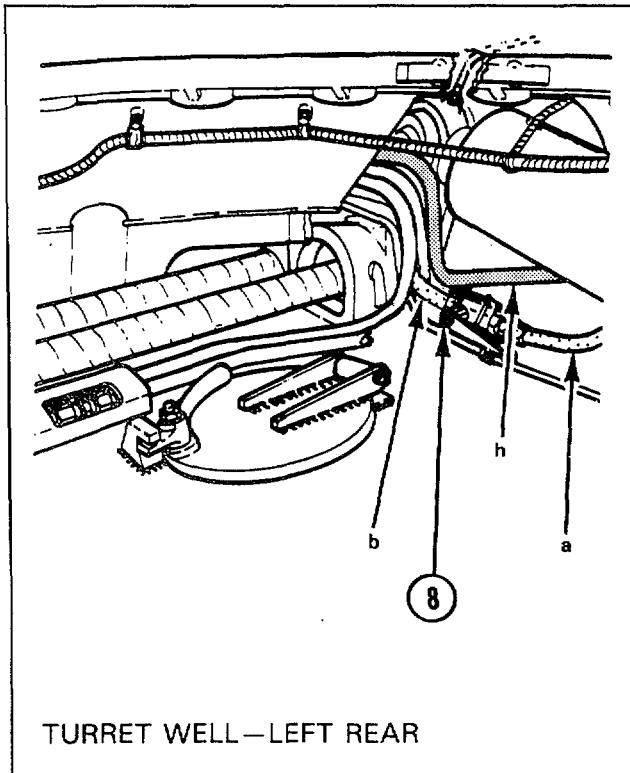
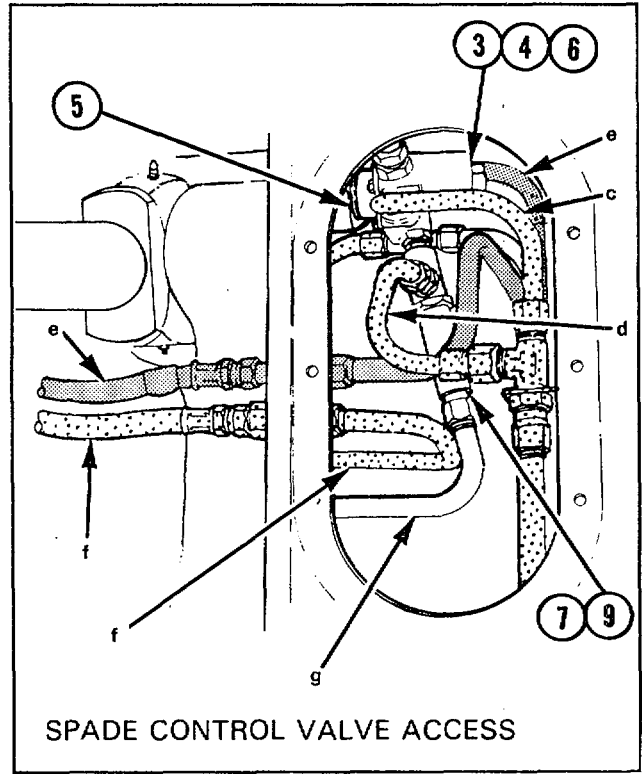
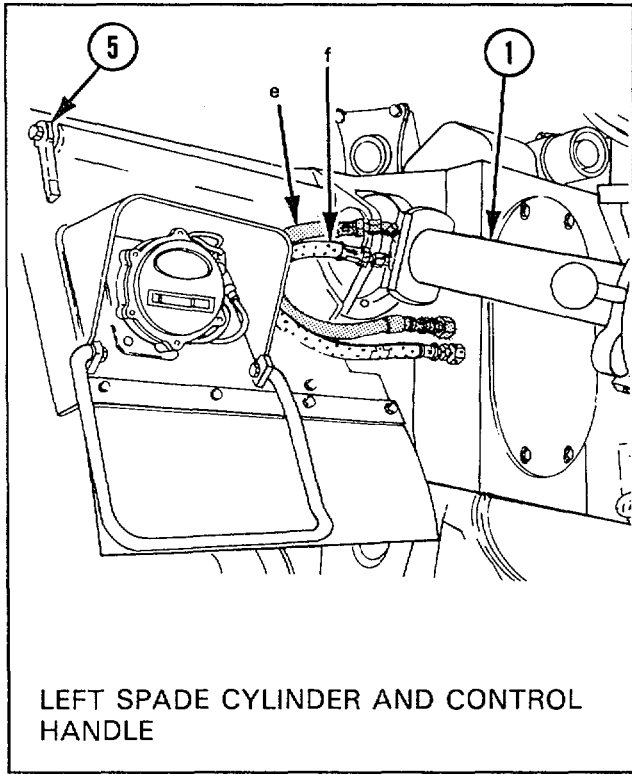
**LEGEND**

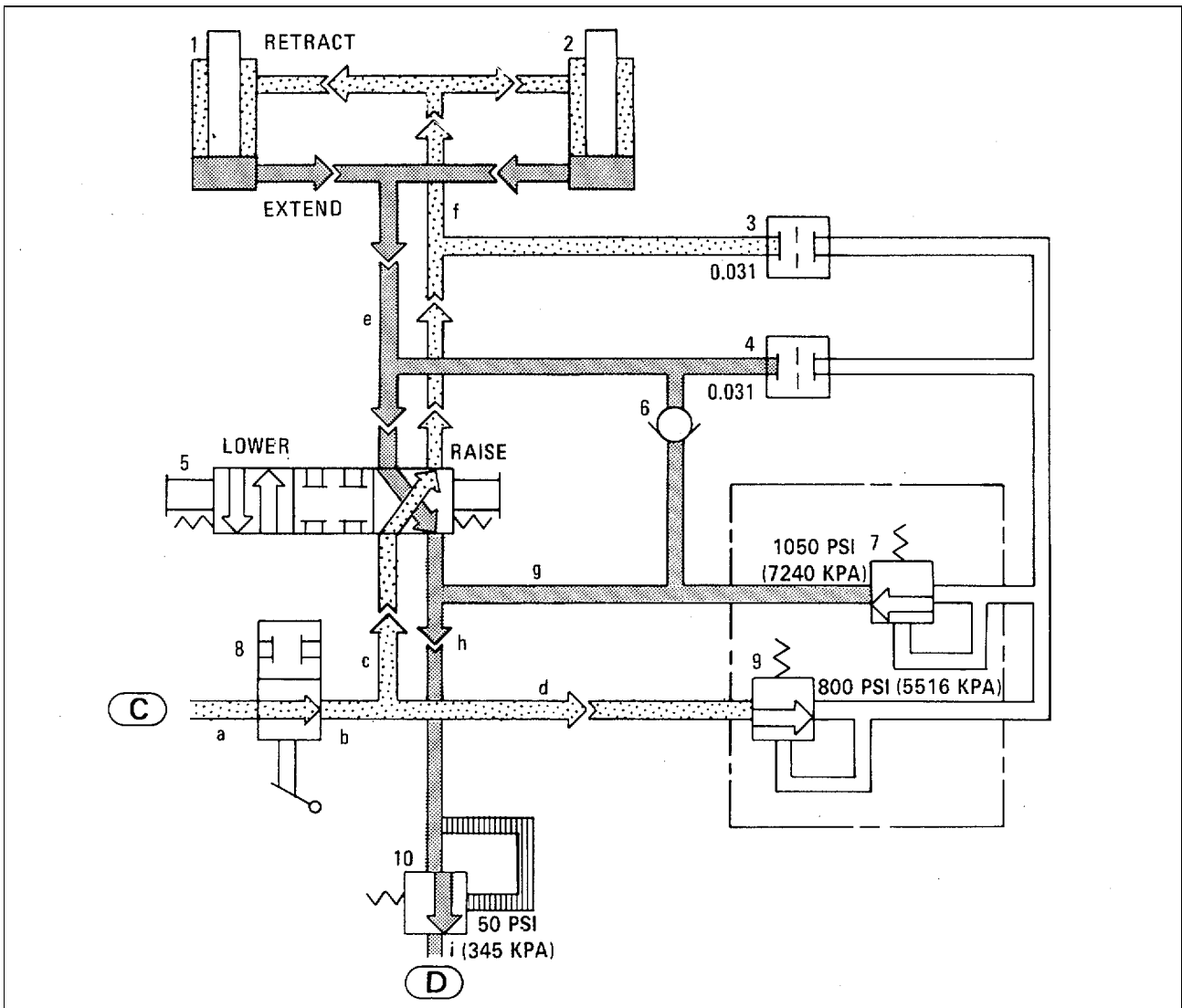
- 1 Left spade cylinder
- 2 Right spade cylinder
- 3 Restrictor
- 4 Restrictor
- 5 Directional control valve
- 6 Check valve
- 7 Pressure reducing valve
- 8 Shutoff valve
- 9 Pressure reducing valve
- 10 Pressure relief valve

**BAR CODE**

- Intensified pressure
- Supply pressure
- Charging pressure
- Reduced pressure
- Pilot pressure
- Metered or blocked flow
- Intake drain
- Blank inactive

F-13. SPADE RAISING.





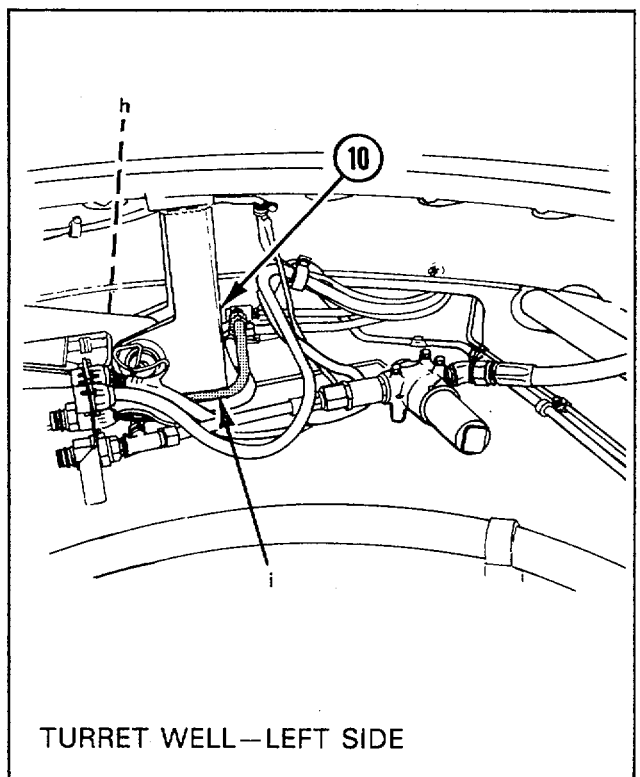
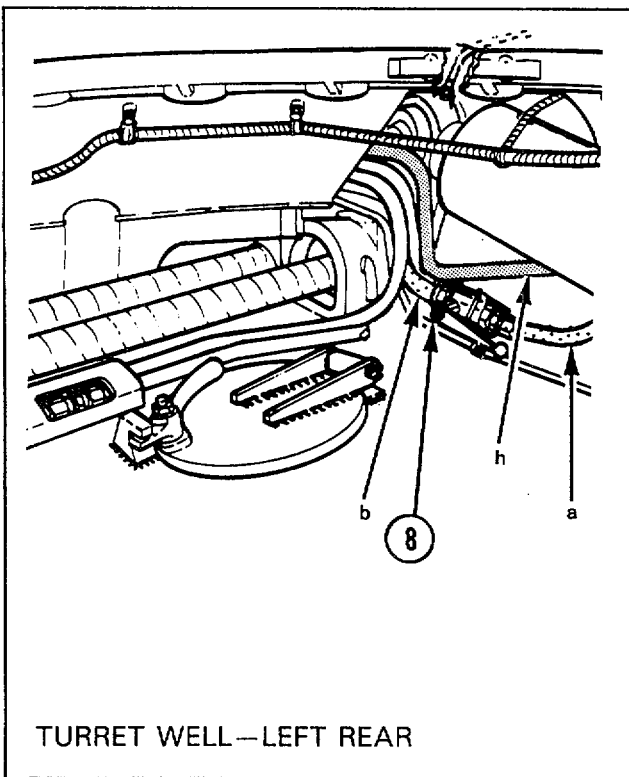
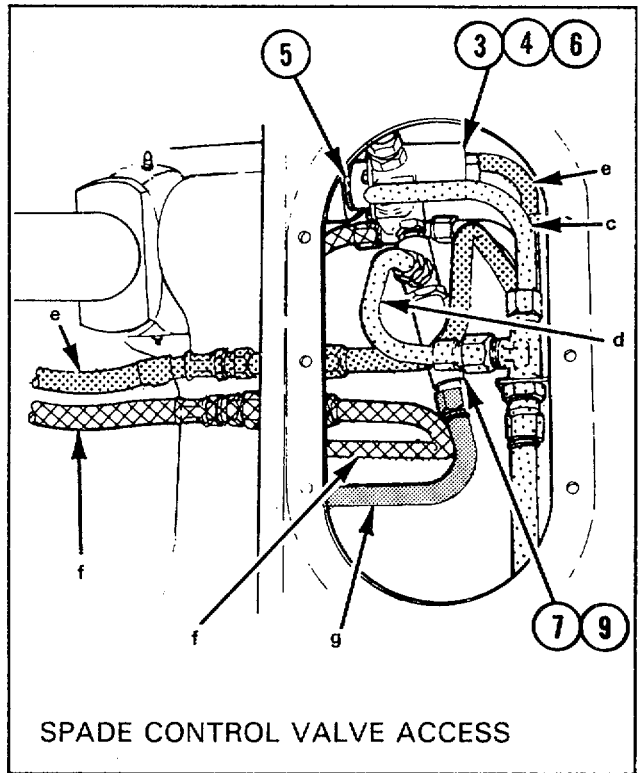
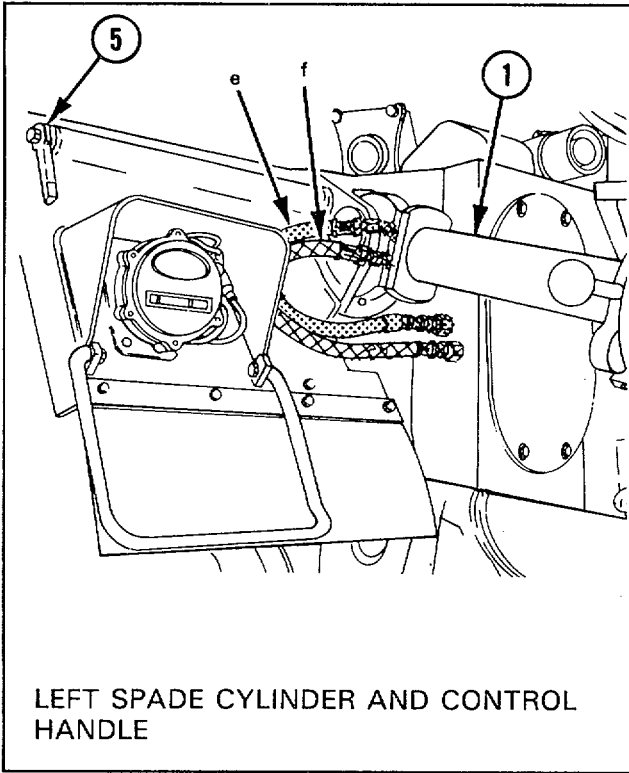
**LEGEND**

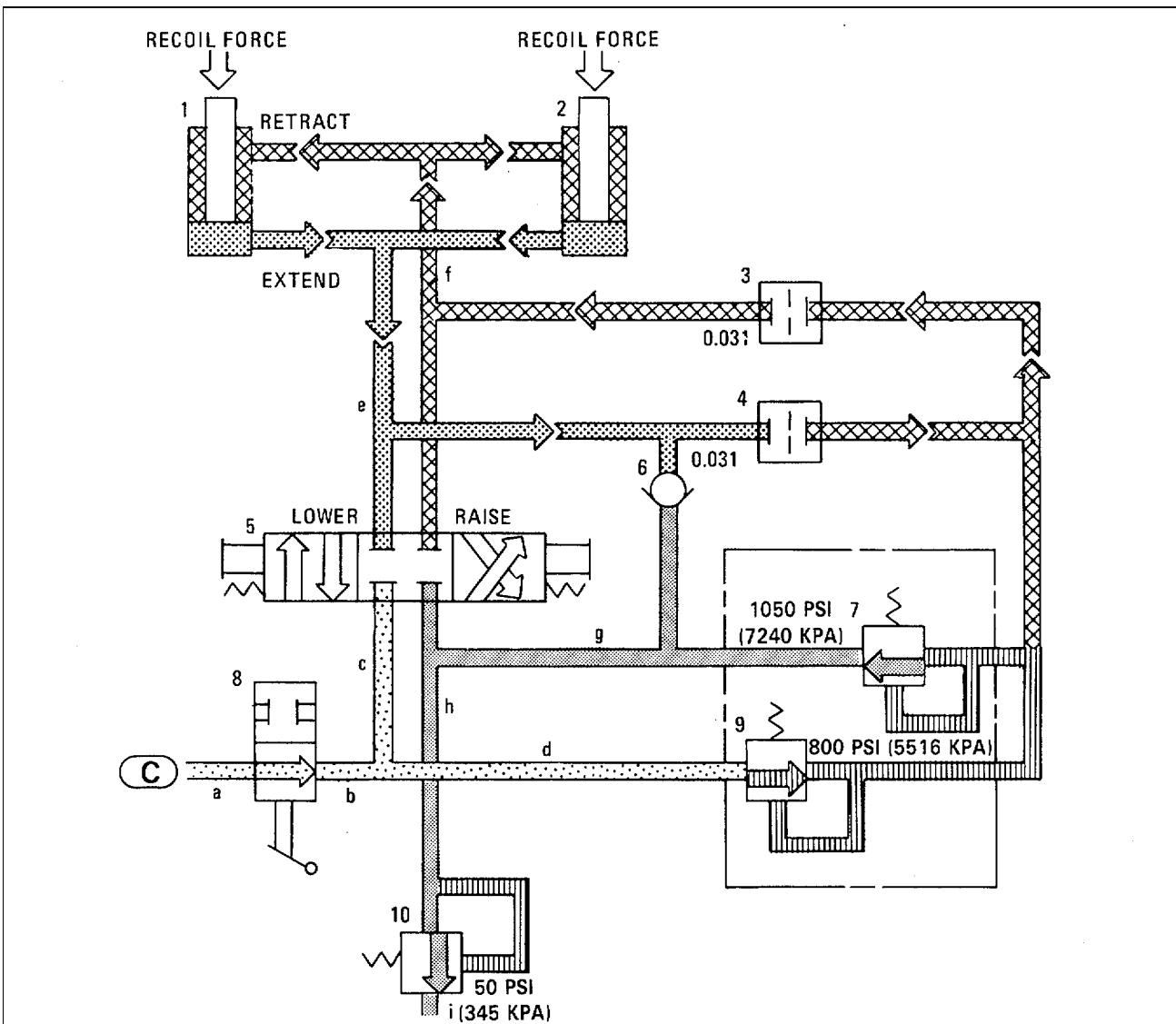
- 1 Left spade cylinder
- 2 Right spade cylinder
- 3 Restrictor
- 4 Restrictor
- 5 Directional control valve
- 6 Check valve
- 7 Pressure relief valve
- 8 Shutoff valve
- 9 Pressure reducing valve
- 10 Pressure relief valve

**BAR CODE**

- Intensified pressure
- Supply pressure
- Charging pressure
- Reduced pressure
- Pilot pressure
- Metered or blocked flow
- Intake drain
- Blank inactive

F-14. SPADE DURING RECOIL.





**LEGEND**

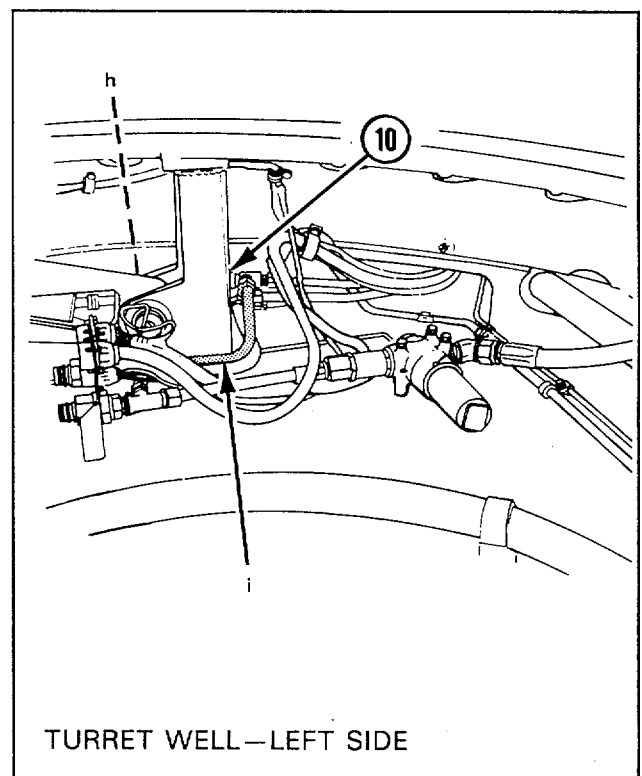
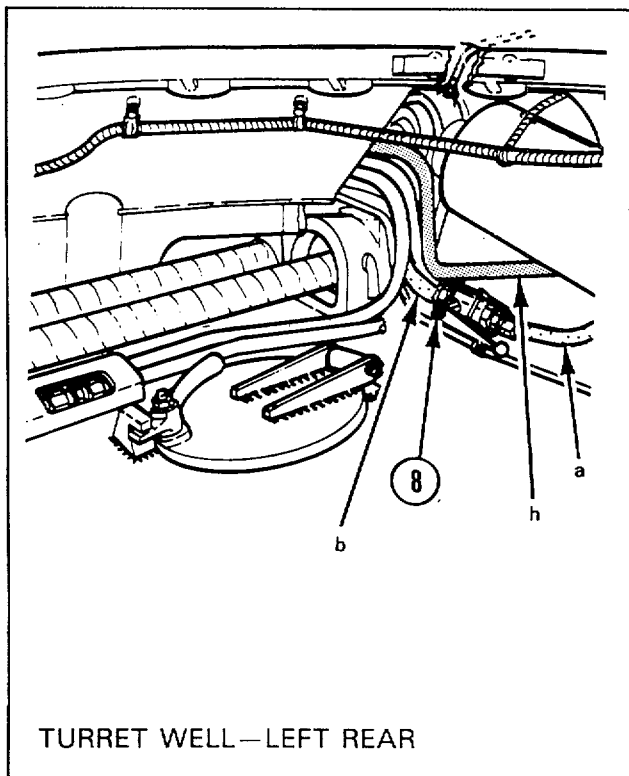
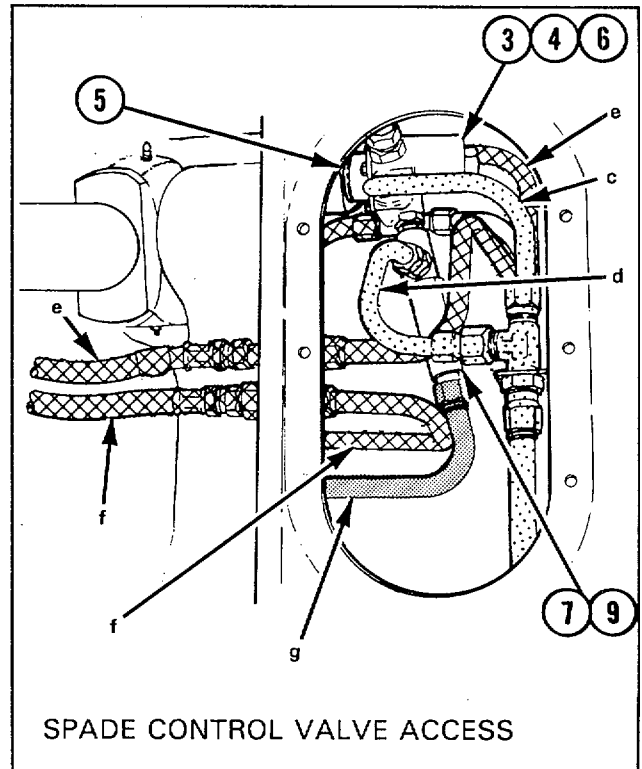
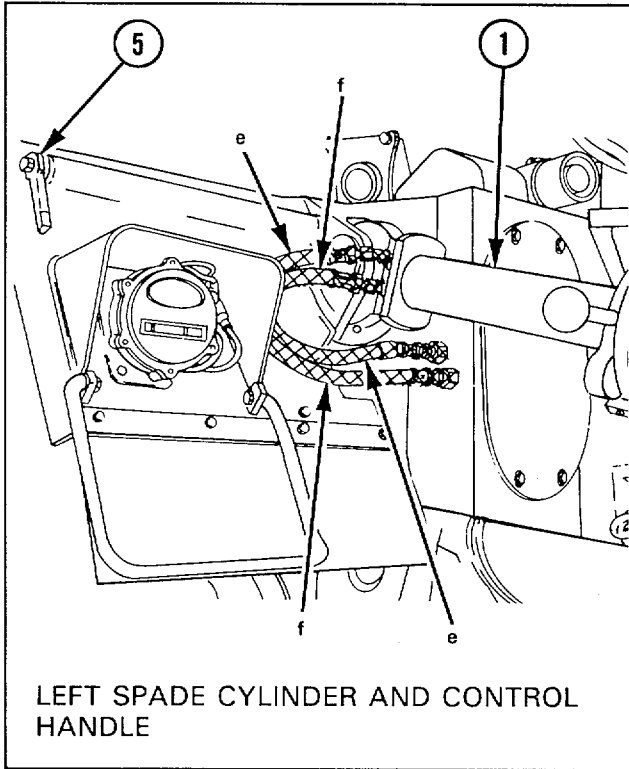
- 1 Left spade cylinder
- 2 Right spade cylinder
- 3 Restrictor
- 4 Restrictor
- 5 Directional control valve
- 6 Check valve
- 7 Pressure relief valve
- 8 Shutoff valve
- 9 Pressure reducing valve
- 10 Pressure relief valve

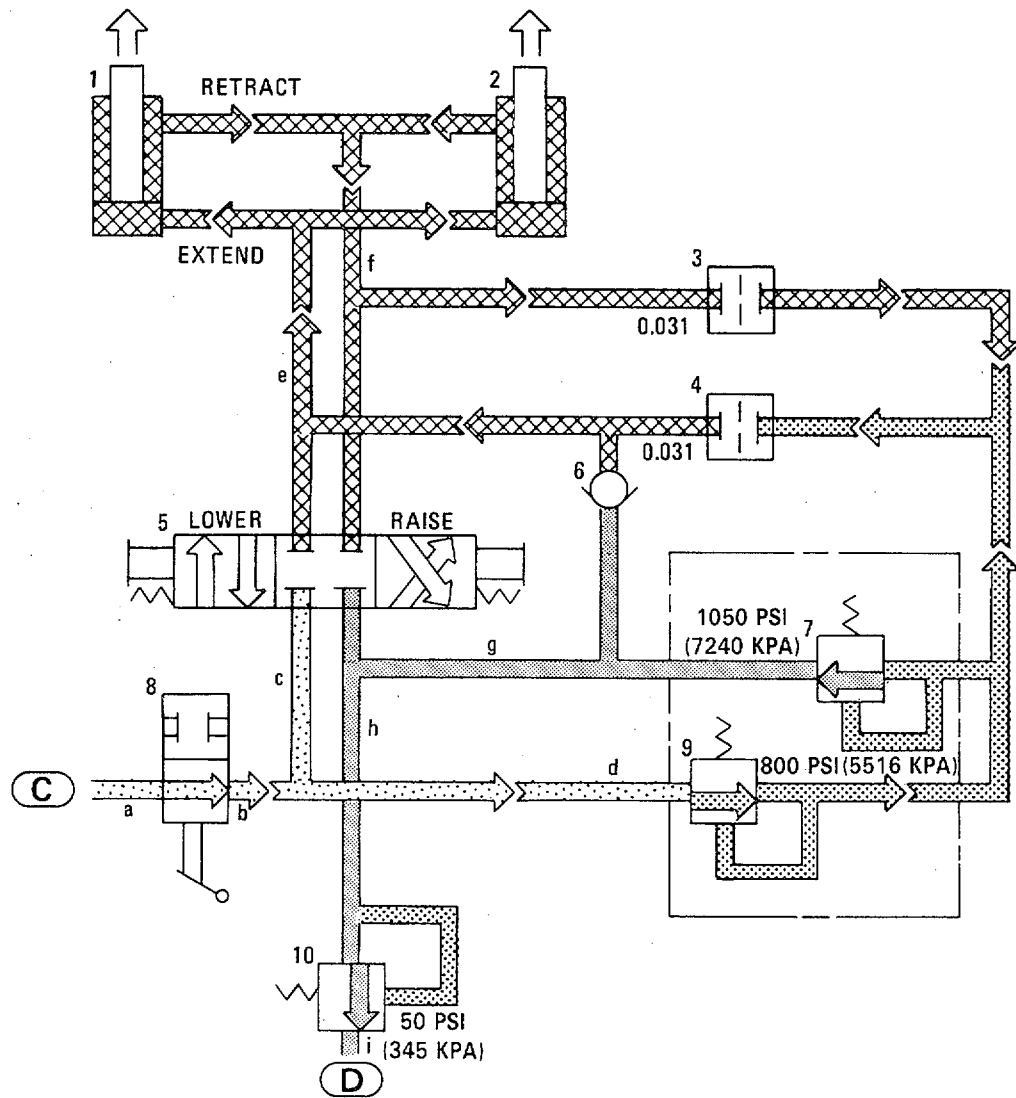
**BAR CODE**

- Intensified pressure
- Supply pressure
- Charging pressure
- Reduced pressure
- Pilot pressure
- Metered or blocked flow
- Intake drain
- Blank inactive



F-15. SPADE RESETTING.













**LEGEND**

- 1 Left spade cylinder
- 2 Right spade cylinder
- 3 Restrictor
- 4 Restrictor
- 5 Directional control valve
- 6 Check valve
- 7 Pressure relief valve
- 8 Shutoff valve
- 9 Pressure reducing valve
- 10 Pressure relief valve

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

**F-16 CANNON RECOIL HYDRAULIC SUBSYSTEM.**

*Functional Description.* The cannon recoil hydraulic subsystem slows and cushions the cannon when it is fired, retracts the cannon for traveling or maintenance, and returns the cannon to battery for firing.

During cannon firing, the directional control valve handle is in the NORMAL AND HOLD position. When fired, the cannon recoils. Hydraulic fluid in recoil cylinder (4) is forced from one side of the piston, through a restrictive opening in the piston, to the other side. The hydraulic fluid in counterrecoil cylinder (5) is forced into recuperator cylinder (7), where the fluid displaces high pressure nitrogen 'gas.

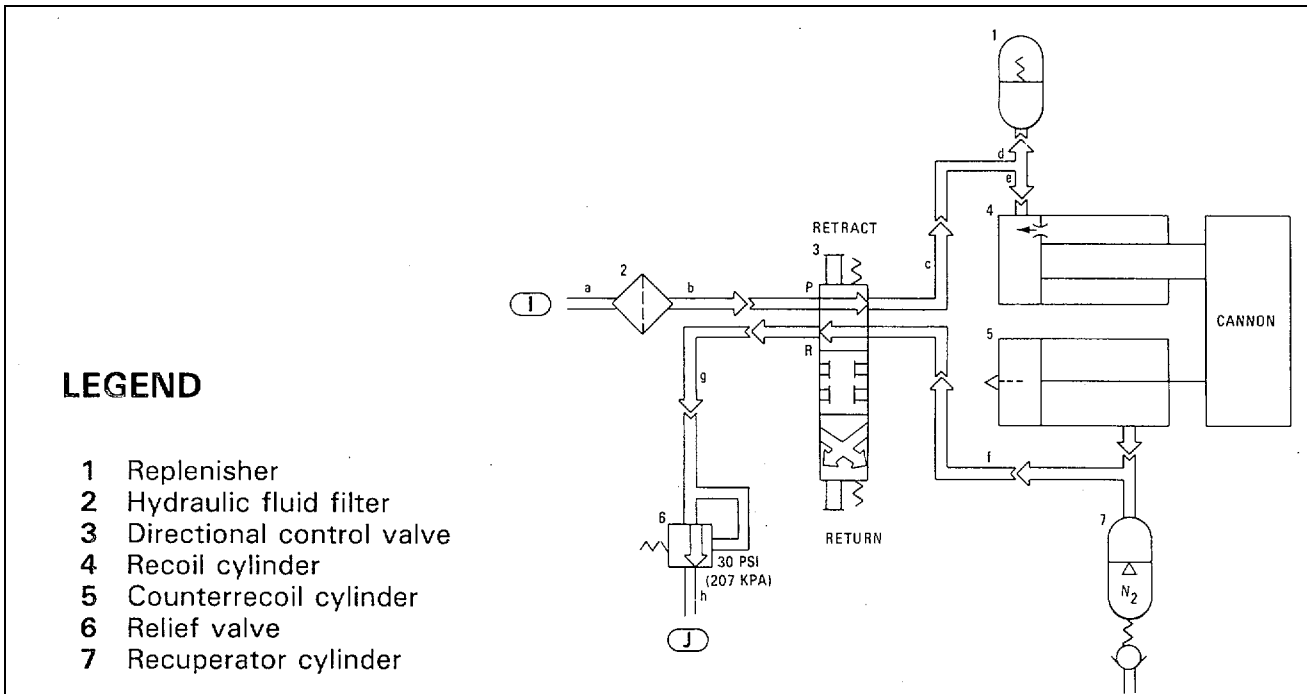
After the recoil energy has been absorbed, the high-pressure nitrogen gas forces the hydraulic fluid back into counterrecoil cylinder (5), which returns the cannon to the battery position.

When the control Valve handle is held in RETRACT position, hydraulic pressure at

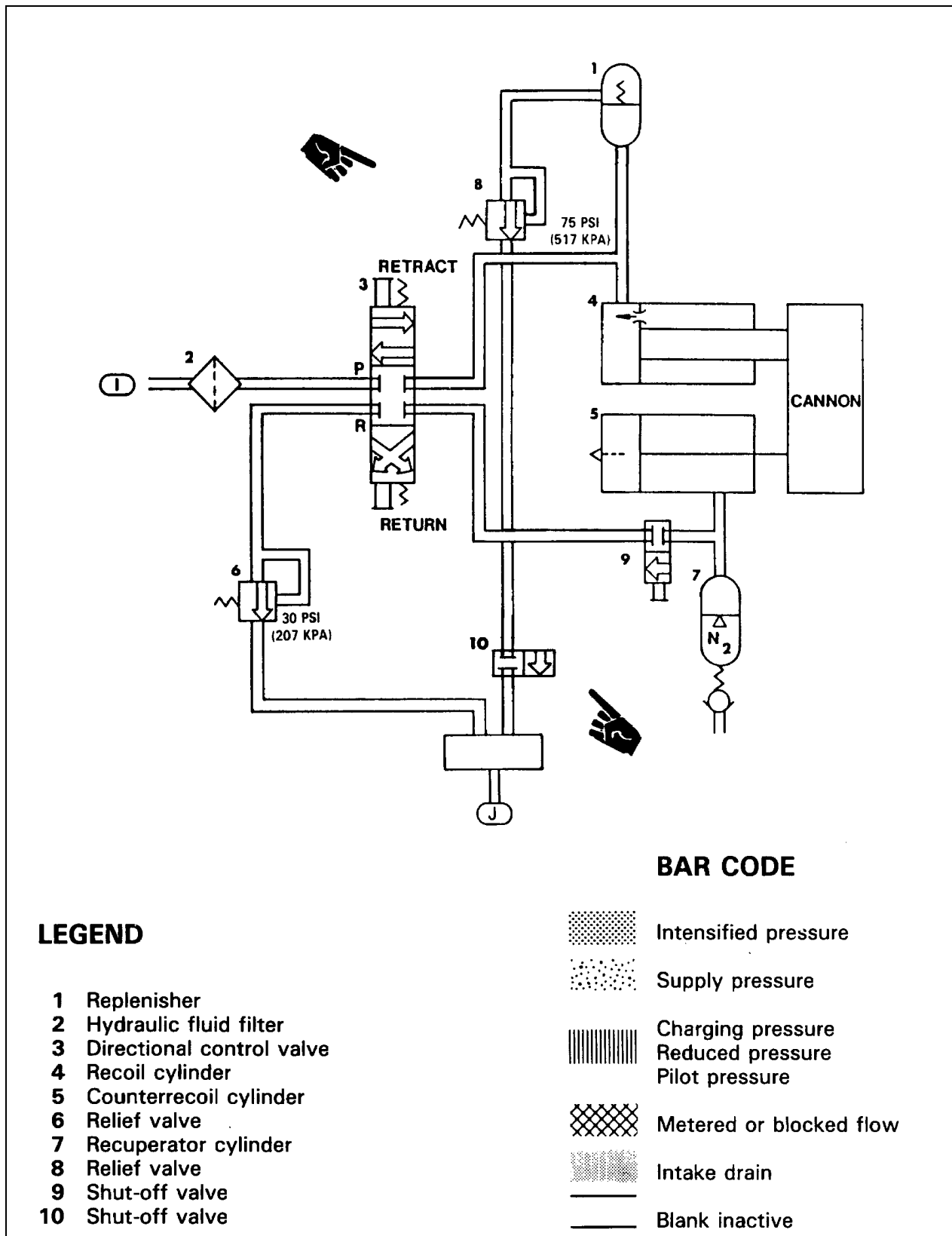
about 2400 psi (16,548 kPa) flows through control valve (3) to replenisher (1) and recoil cylinder (4). The piston area exposed to hydraulic pressure in the recoil cylinder is larger on the retract side. This produces a greater force in the retract direction. Hydraulic fluid in counterrecoil cylinder (5) and recuperator cylinder (7) is forced through control valve (3) and relief valve (6) to the hydraulic reservoir.

When the control valve handle is held in RETURN position, hydraulic pressure at about 2400 psi (1 6,548 kPa) flows through control valve (3) to counterrecoil cylinder (5) and recuperator cylinder (7), forcing the cannon into the battery position. Hydraulic fluid is forced from replenisher (1) through control valve (3) and relief valve (6) to the hydraulic reservoir. Relief valve (6) keeps the hydraulic pressure in replenisher (1) at about 30 psi (207 kPa). This allows the replenisher to adjust for minor fluid losses and for fluid expansion and contraction caused by temperature changes.

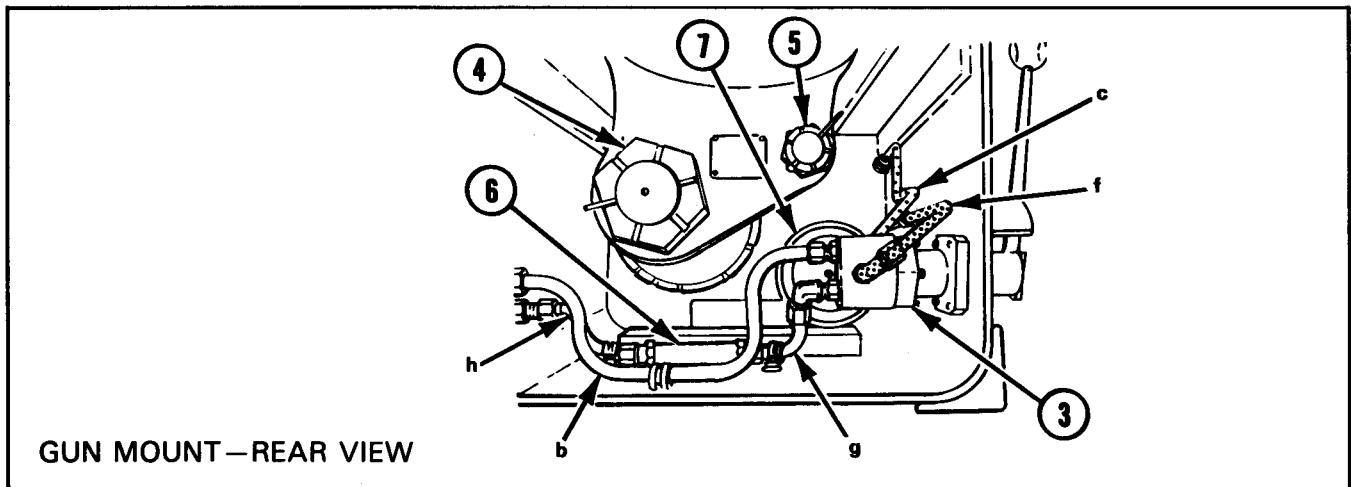
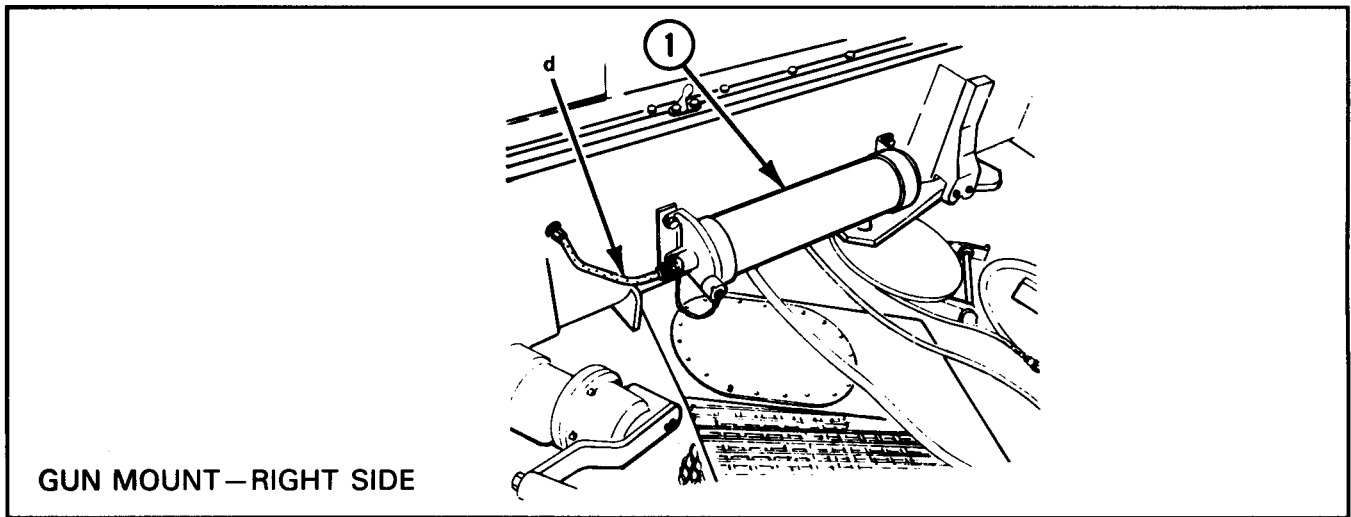
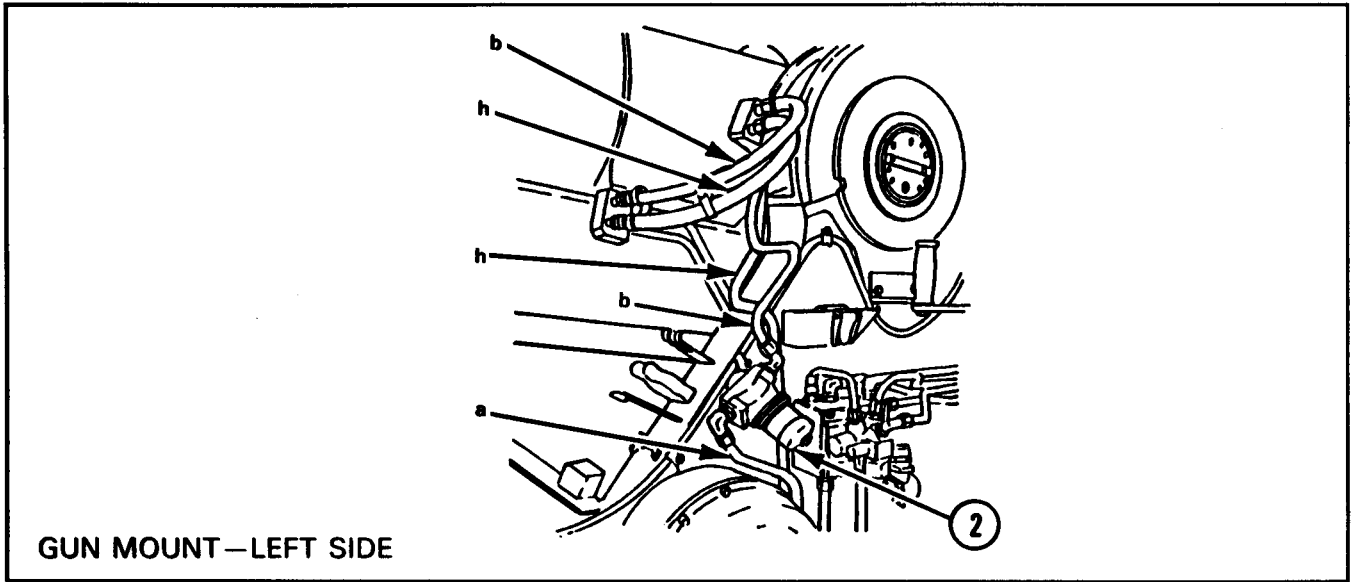
**F-17. CANNON RECOIL HYDRAULIC SUBSYSTEM (UNMODIFIED WEAPON).**

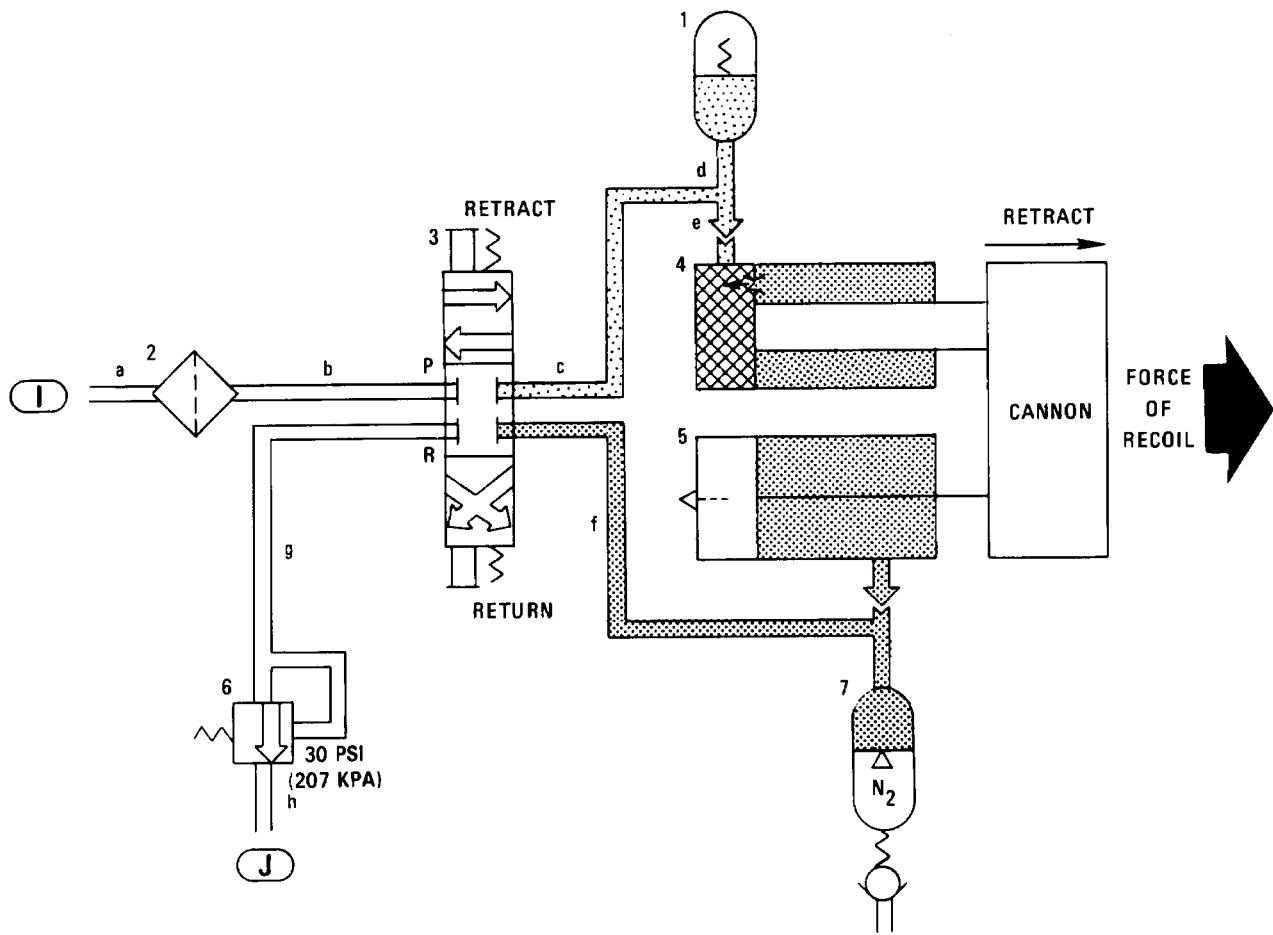


F-18. CANNON RECOIL HYDRAULIC SUBSYSTEM (MODIFIED WEAPON).



F-19. CANNON-RECOIL (UNMODIFIED WEAPON).













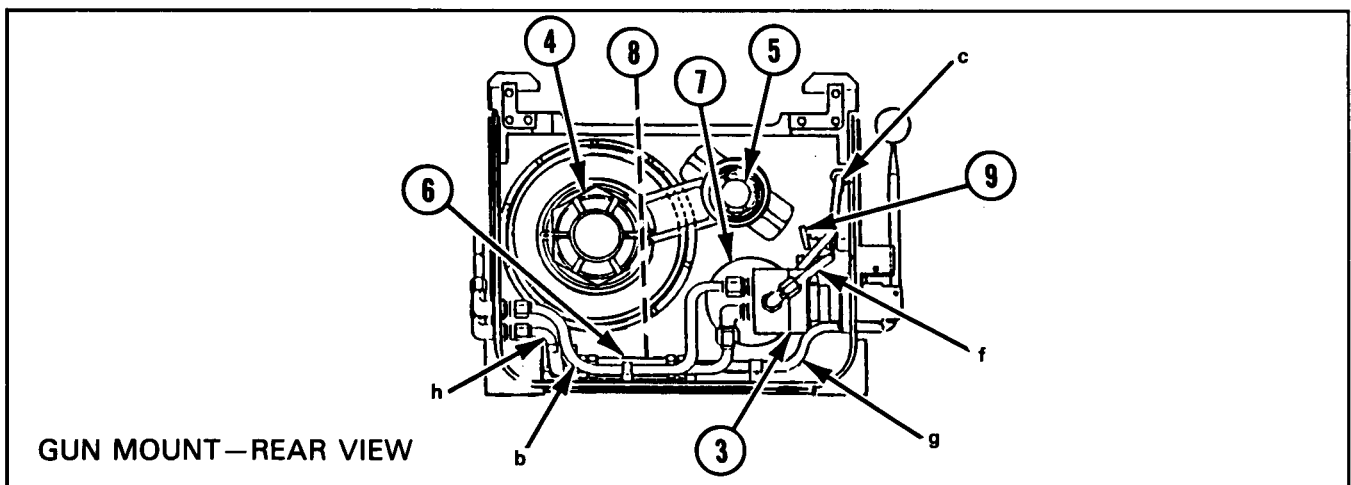
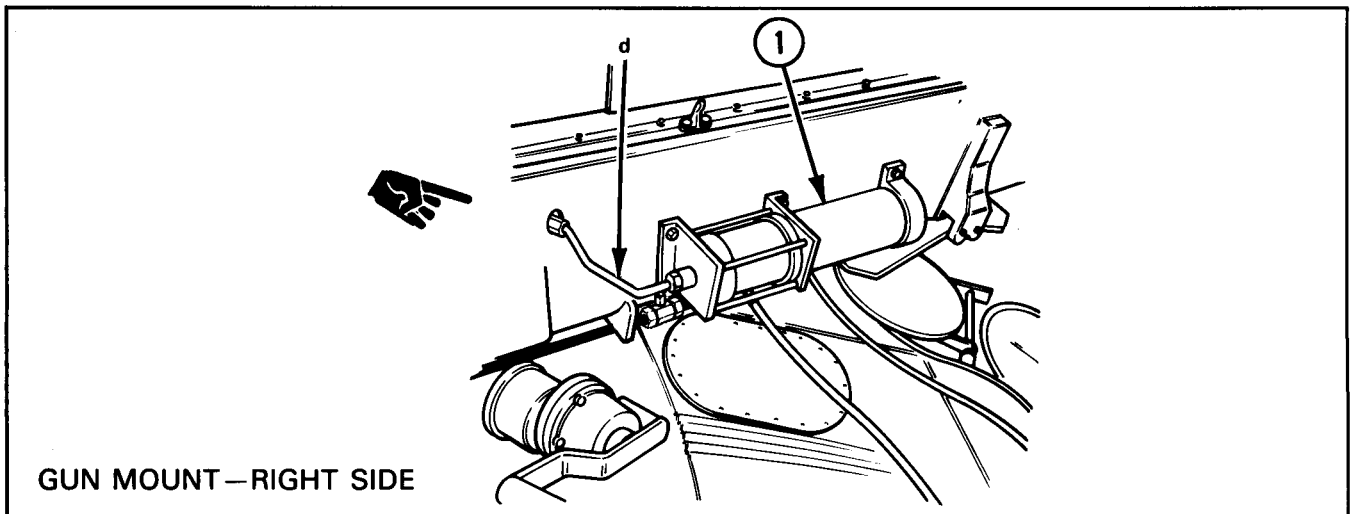
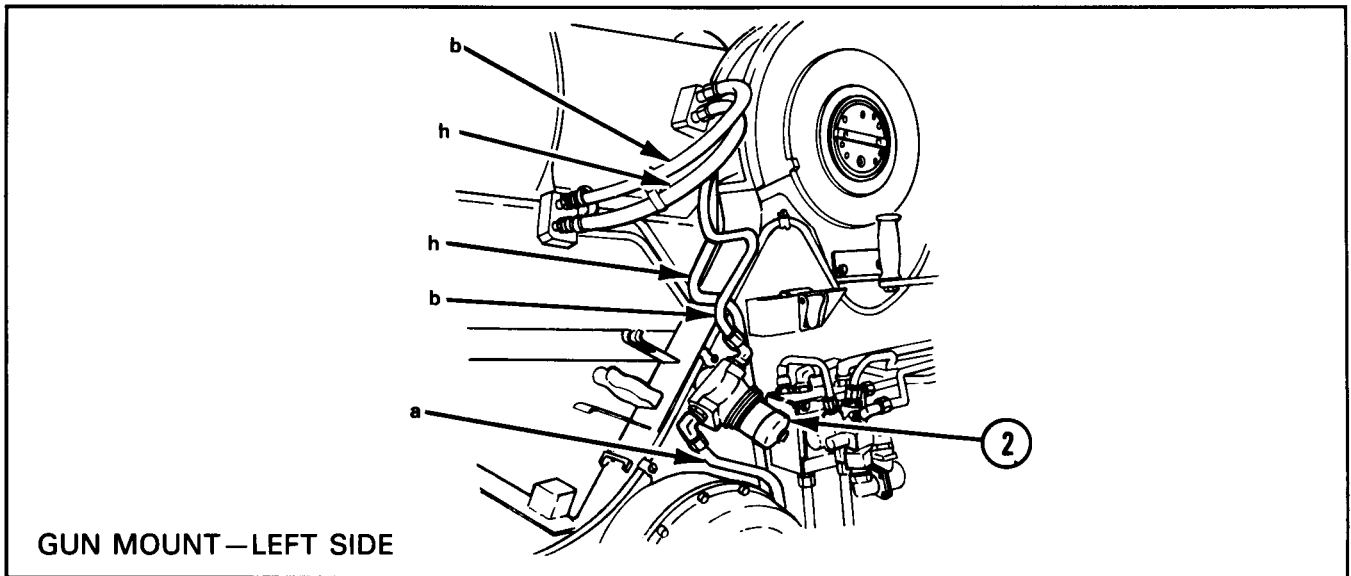
**LEGEND**

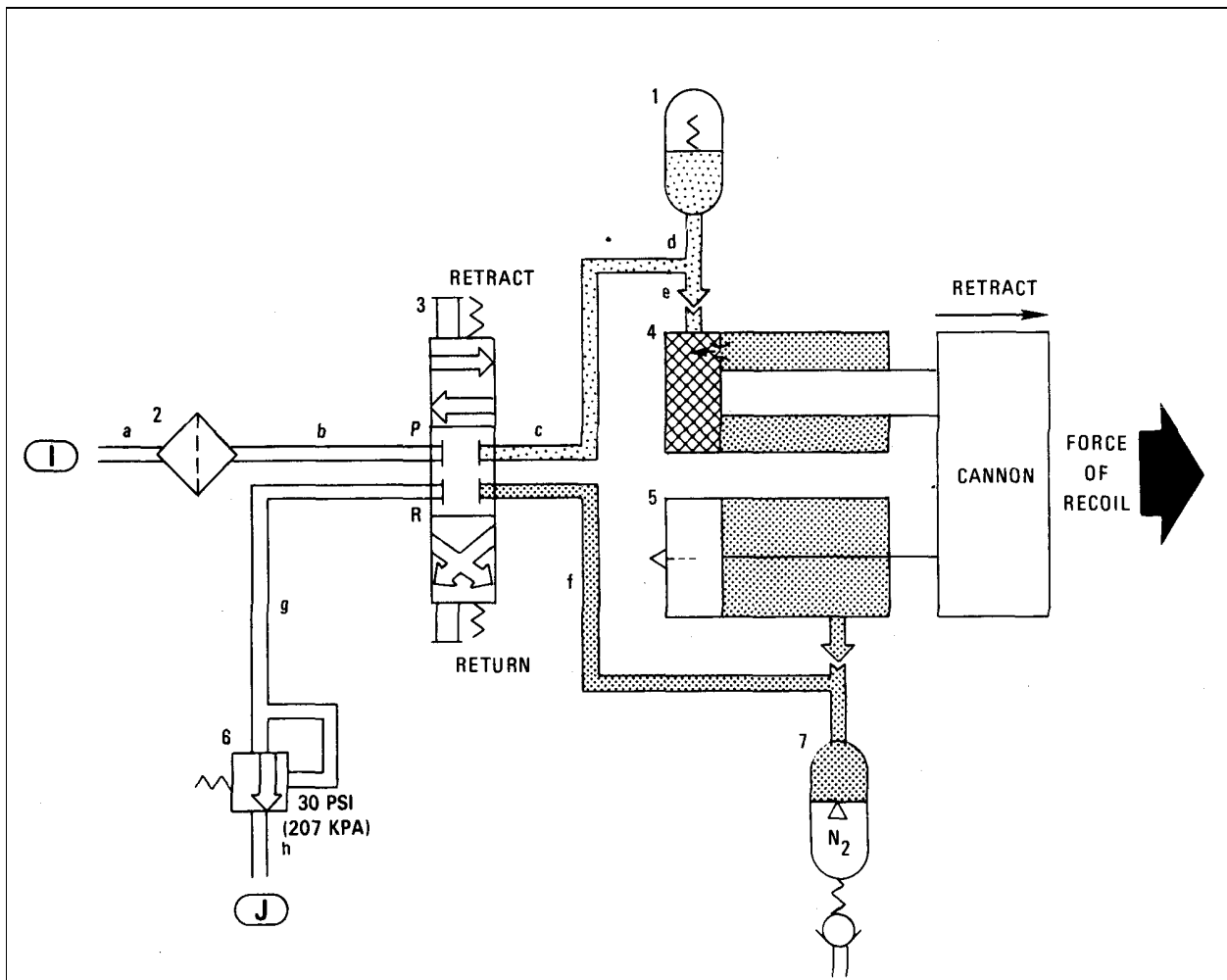
- 1 Replenisher
- 2 Hydraulic fluid filter
- 3 Directional control valve
- 4 Recoil cylinder
- 5 Counterrecoil cylinder
- 6 Relief valve
- 7 Recuperator cylinder

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-20. CANNON-RECOIL (MODIFIED WEAPON).












**LEGEND**

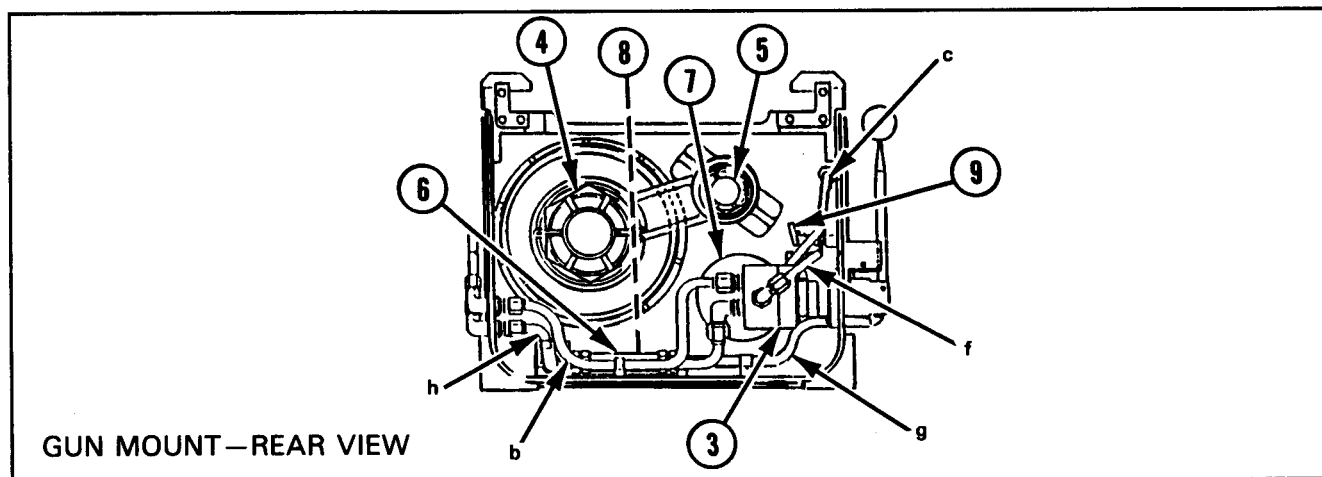
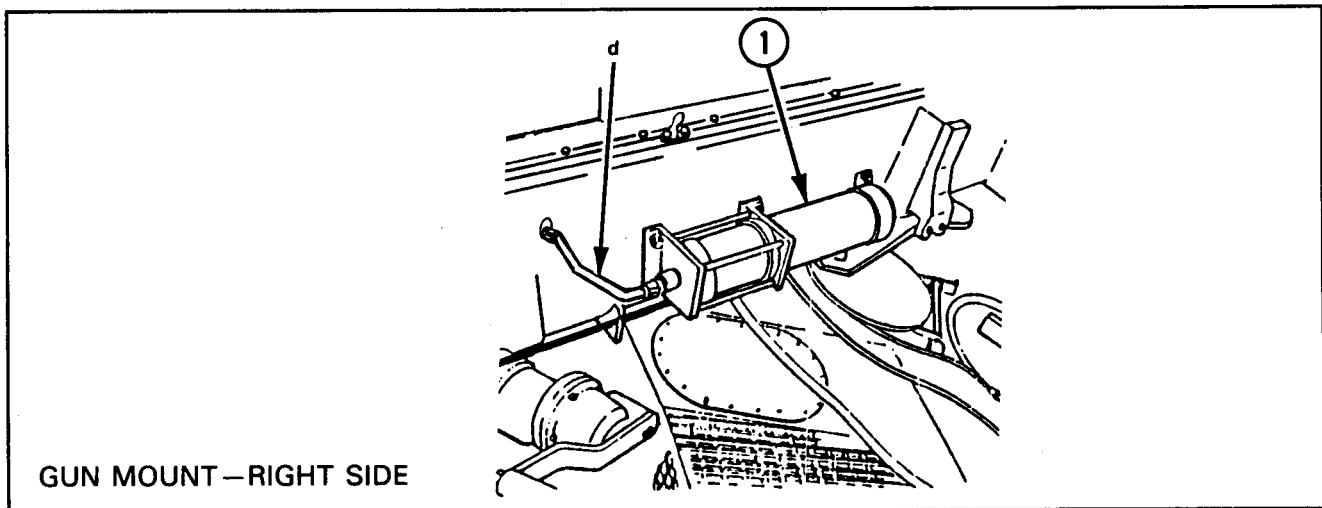
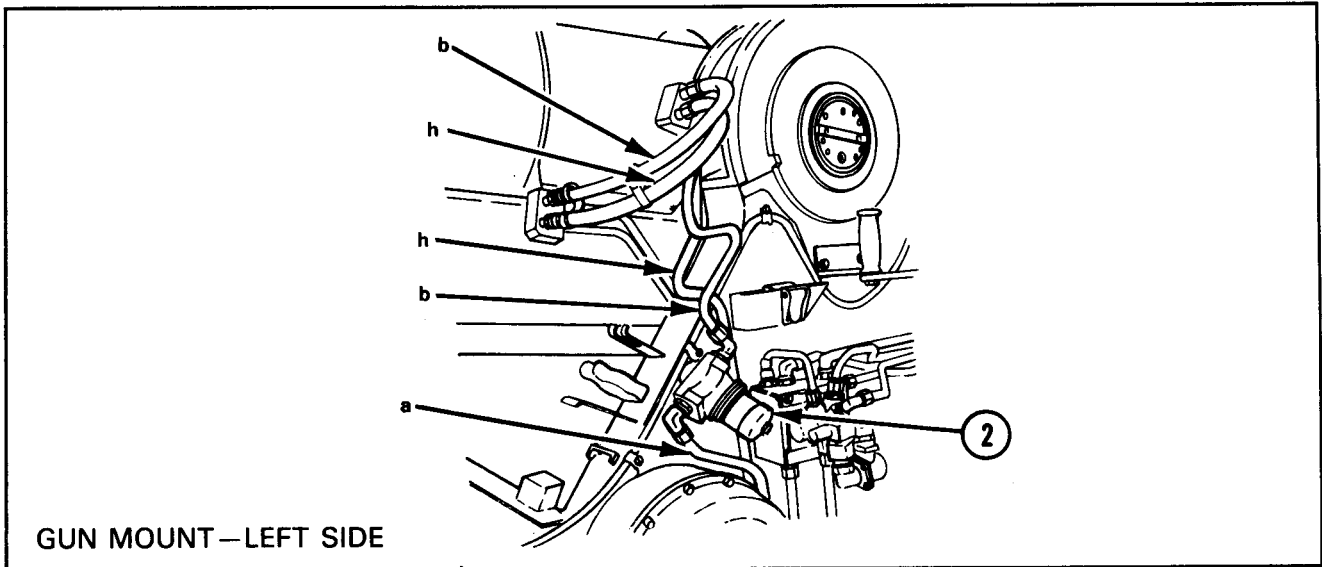
- 1 Replenisher
- 2 Hydraulic fluid filter
- 3 Directional control valve
- 4 Recoil cylinder
- 5 Counterrecoil cylinder
- 6 Relief valve
- 7 Recuperator cylinder

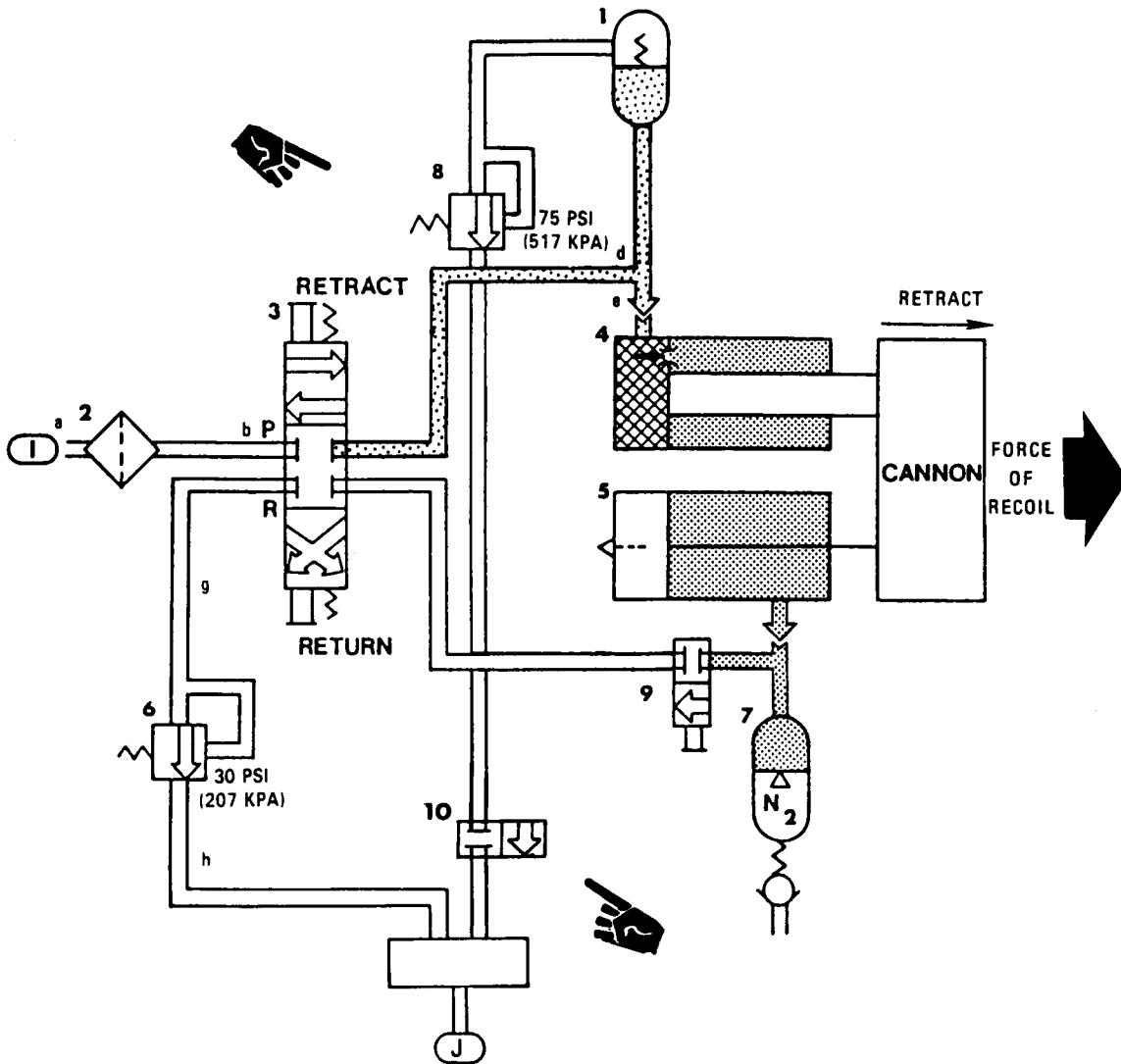
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



F-20. CANNON-RECOIL (MODIFIED WEAPON).













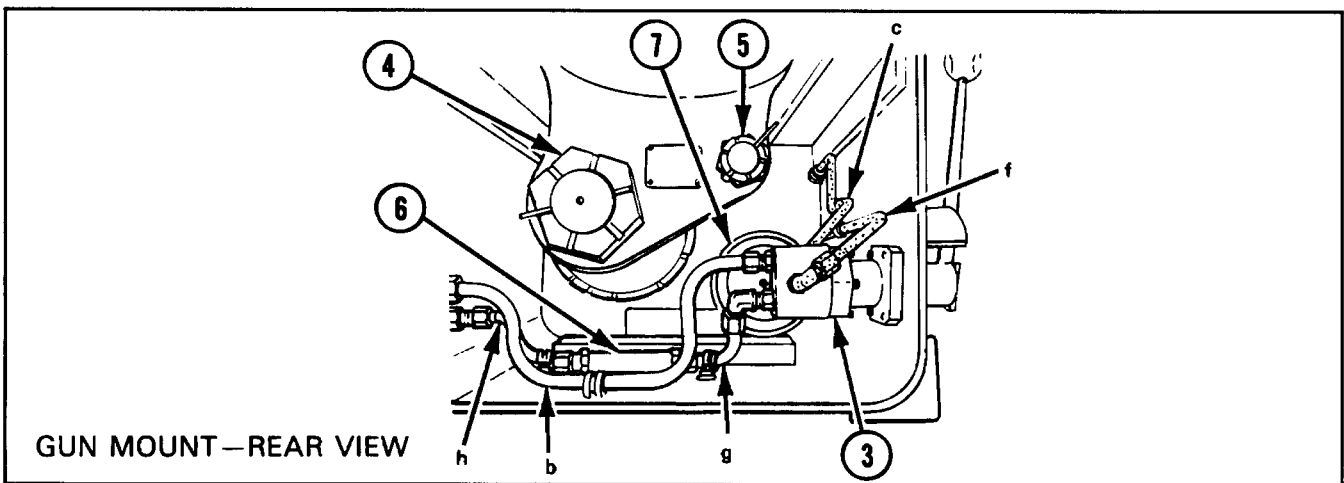
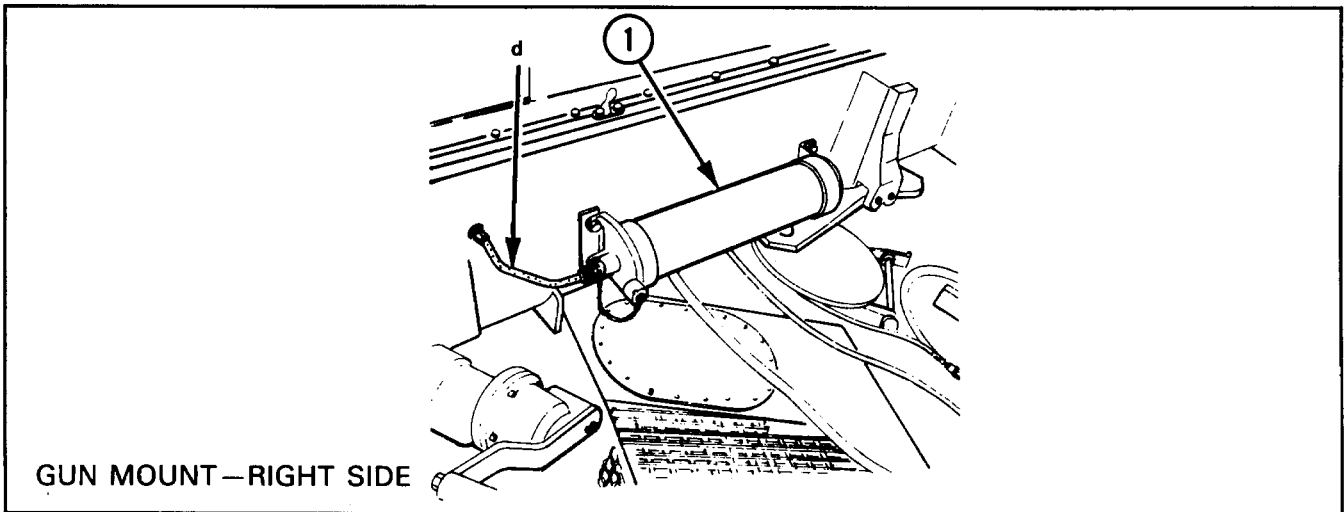
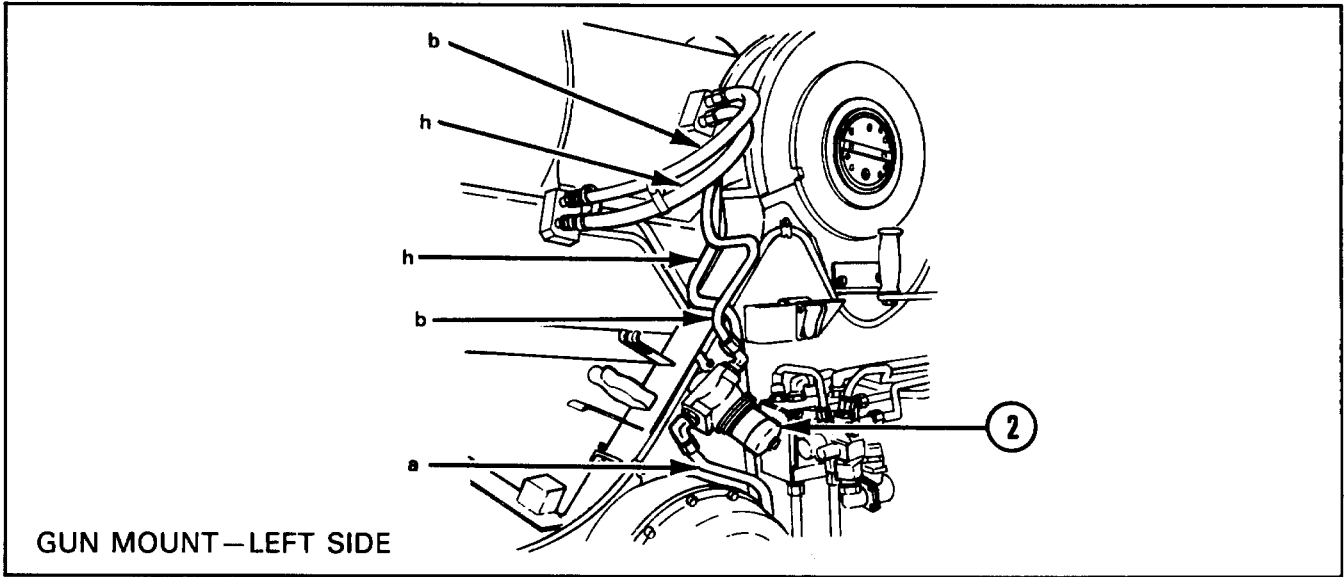
**LEGEND**

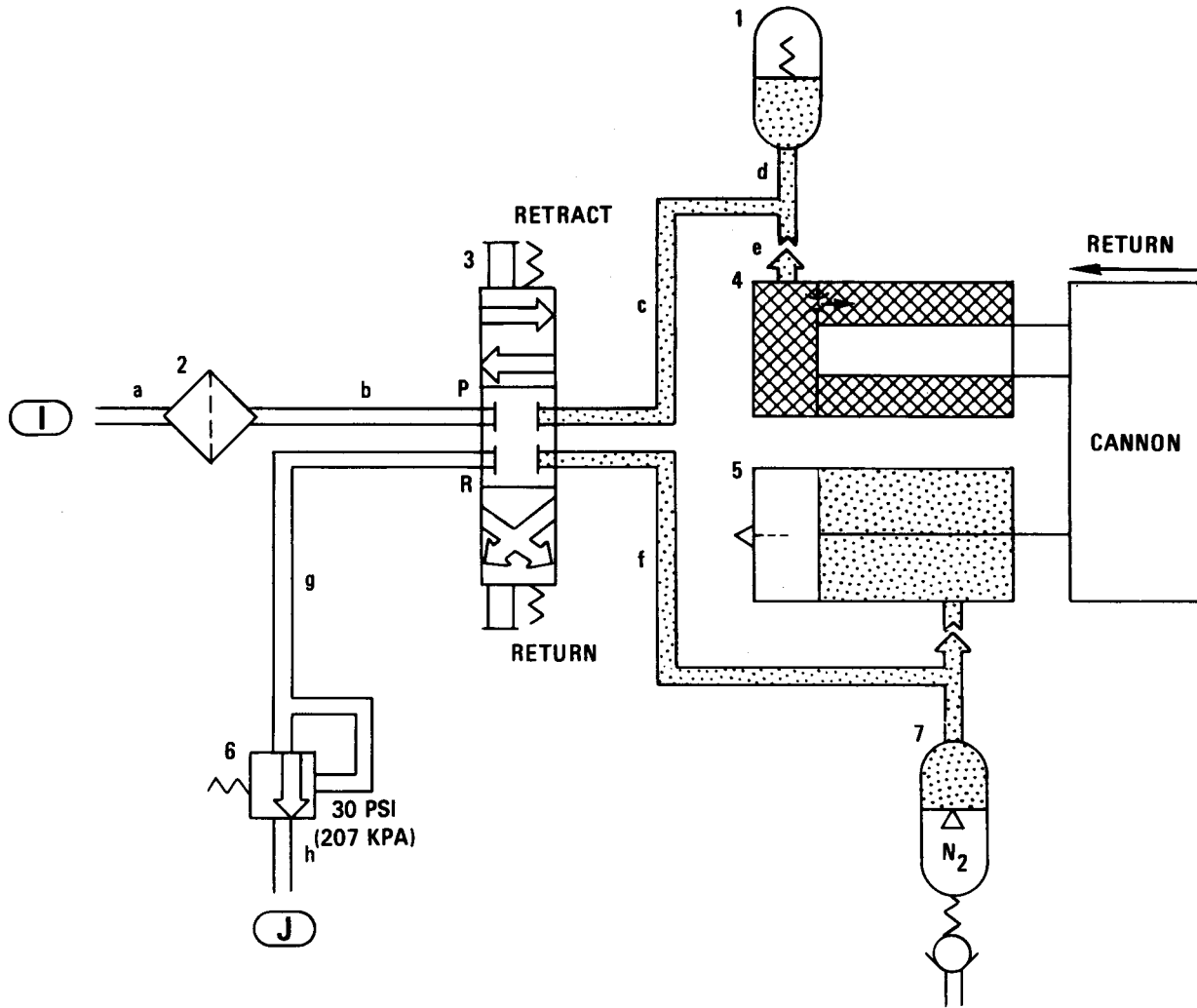
- 1 Replenisher
- 2 Hydraulic fluid filter
- 3 Directional control valve
- 4 Recoil cylinder
- 5 Counterrecoil cylinder
- 6 Relief valve
- 7 Recuperator cylinder
- 8 Relief valve
- 9 Shut-off valve
- 10 Shut-off valve

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-21. CANNON-RETURN AFTER RECOIL (UNMODIFIED WEAPON).













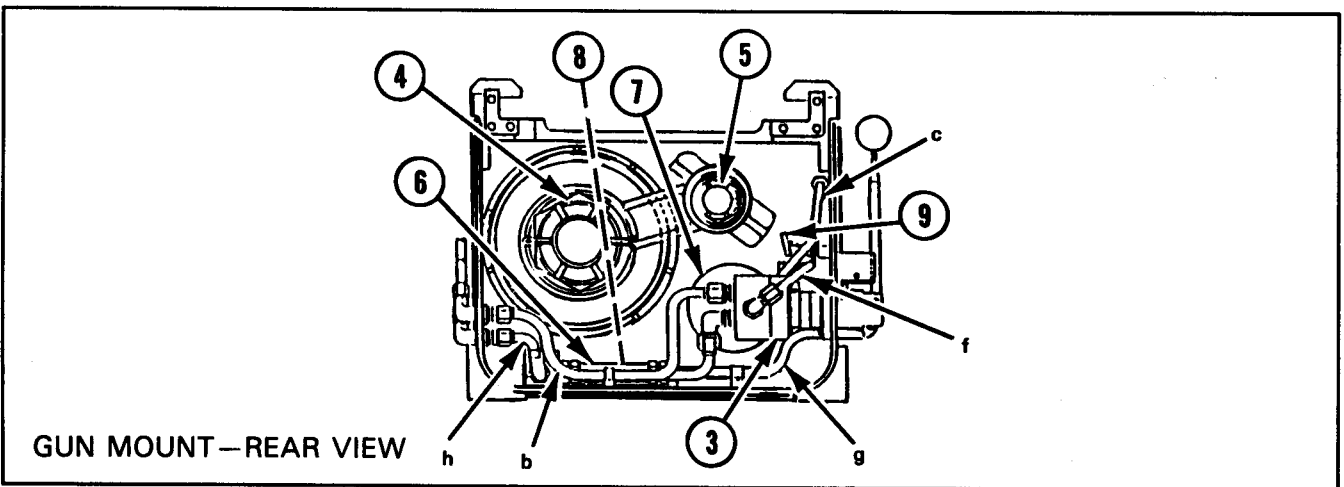
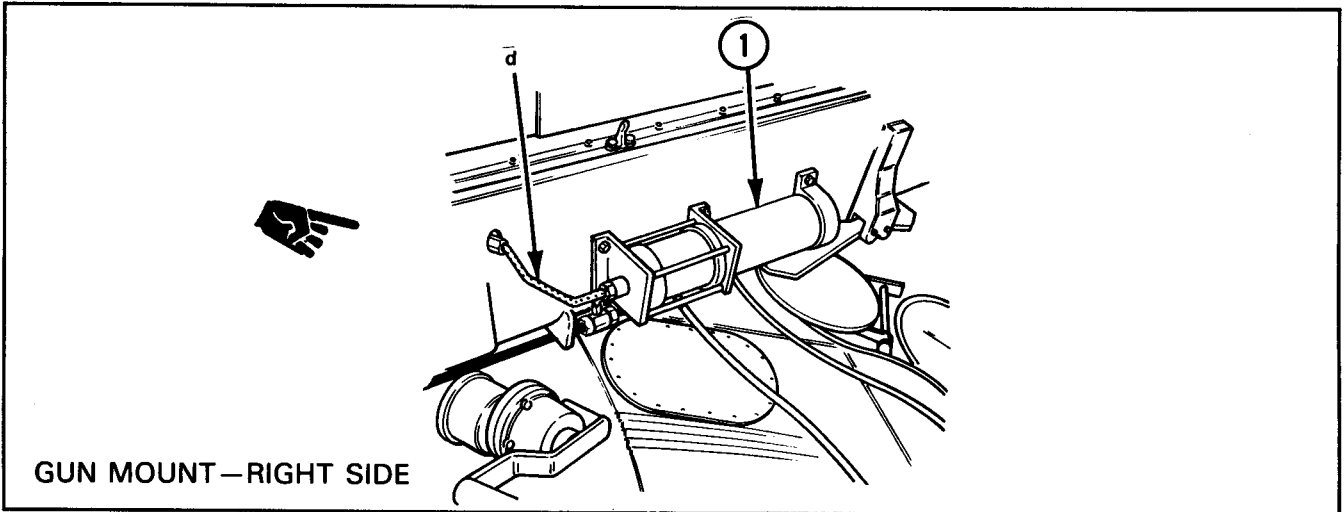
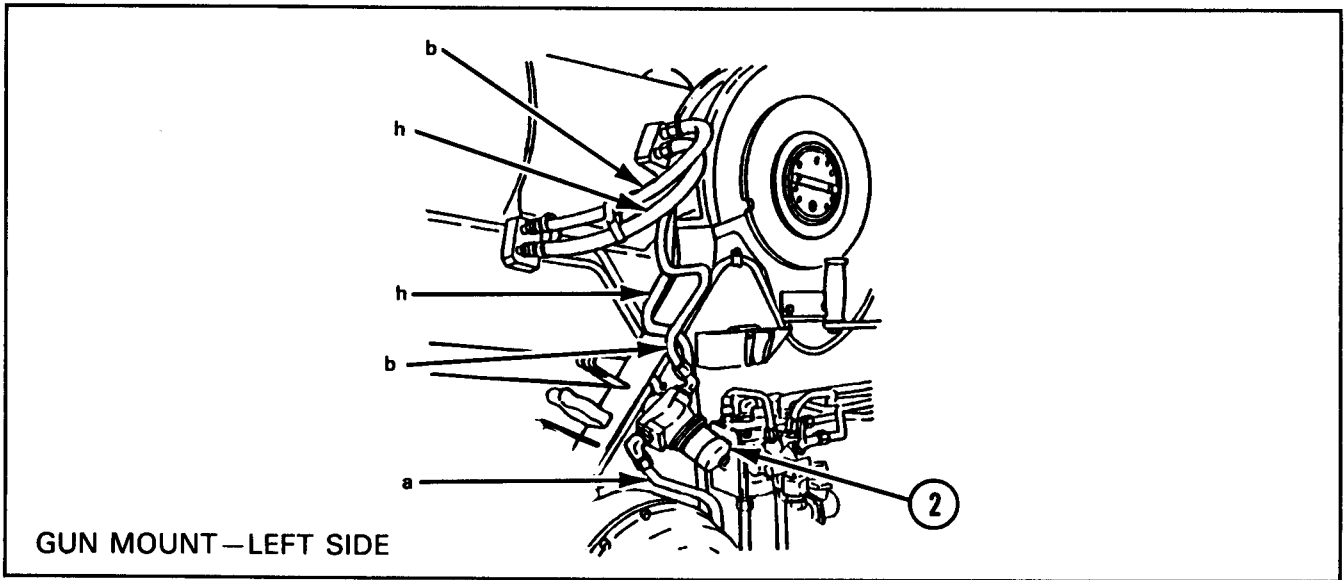
**LEGEND**

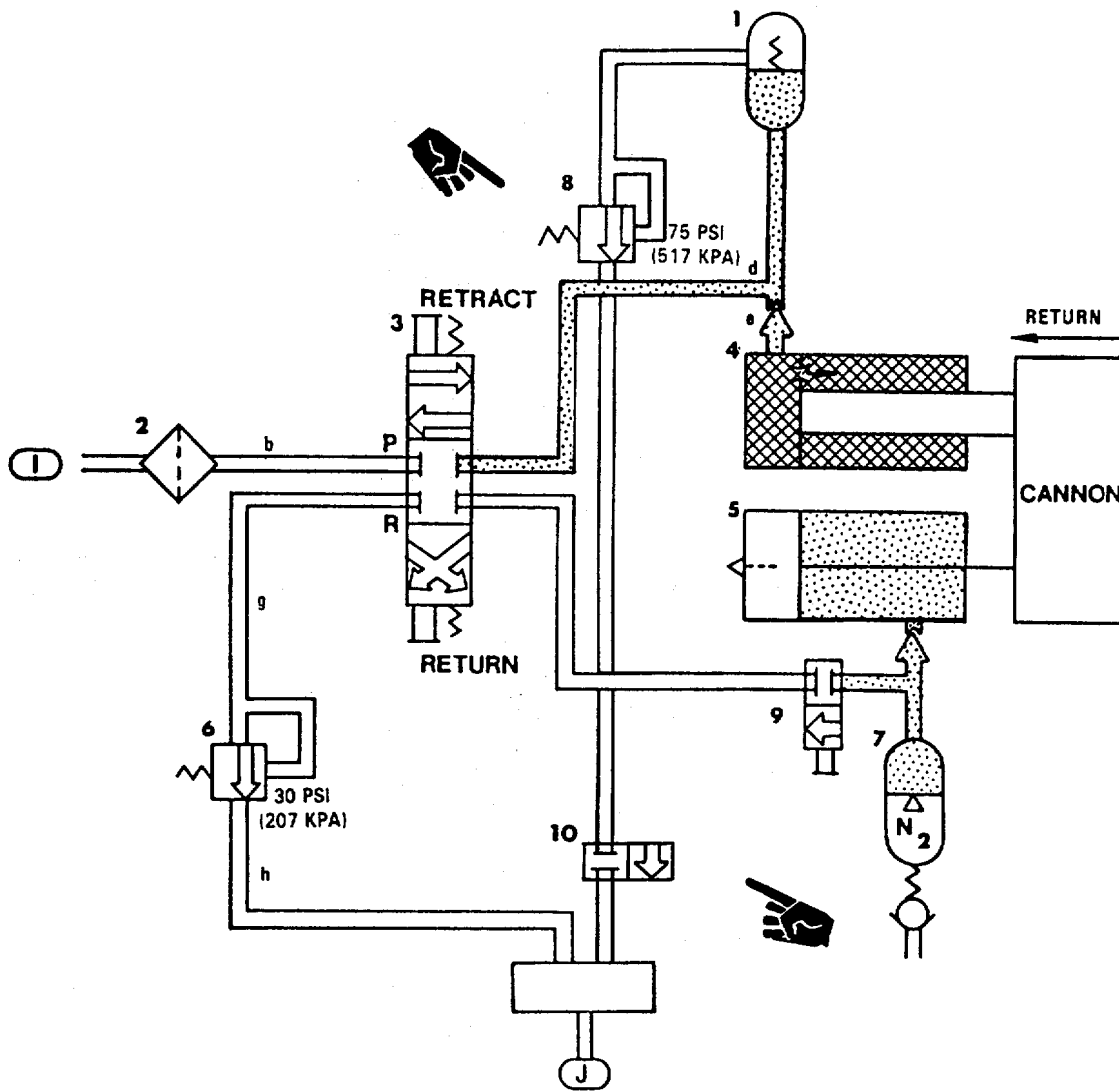
- 1 Replenisher
- 2 Hydraulic fluid filter
- 3 Directional control valve
- 4 Recoil cylinder
- 5 Counterrecoil cylinder
- 6 Relief valve
- 7 Recuperator cylinder

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-22. CANNON-RETURN AFTER RECOIL (MODIFIED WEAPON).





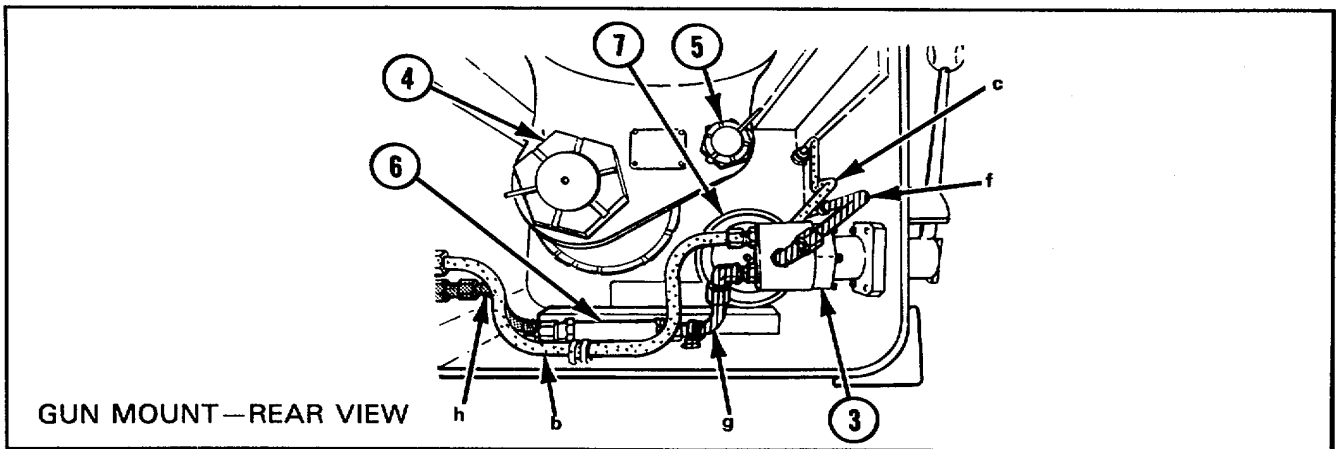
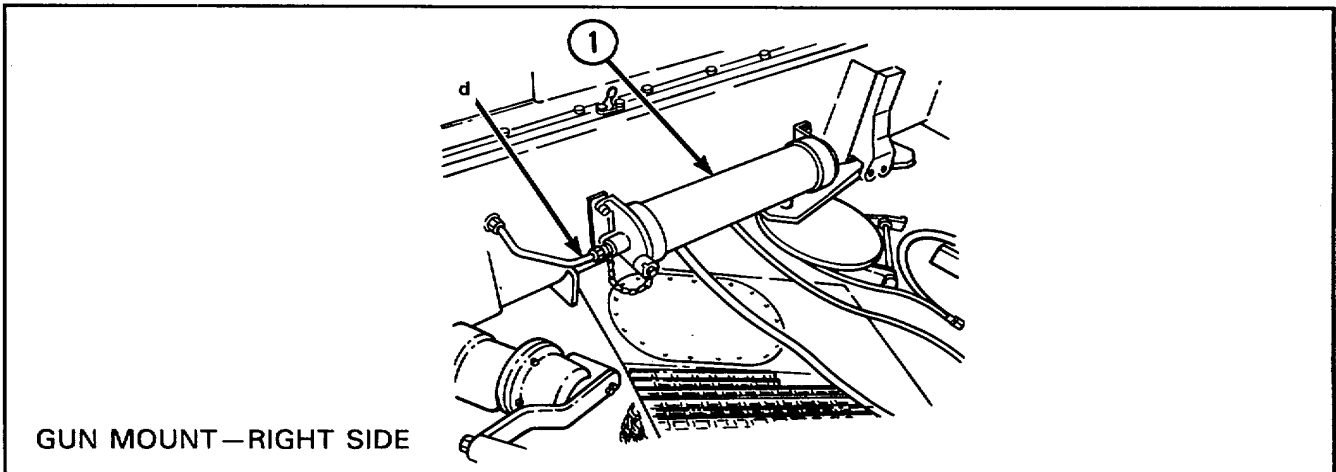
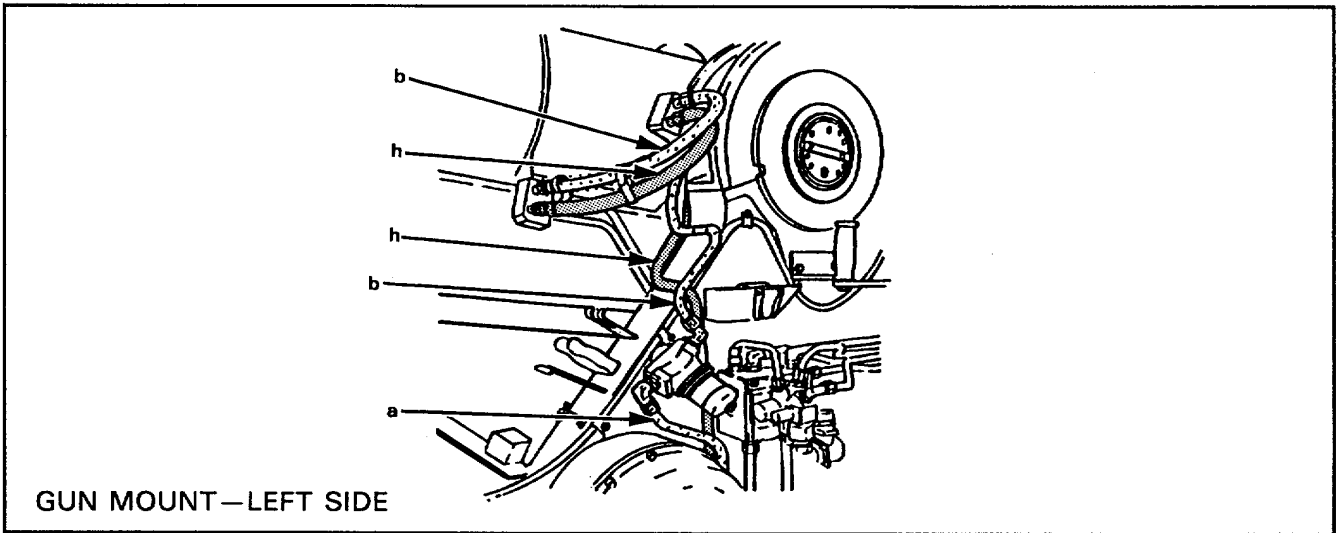
**LEGEND**

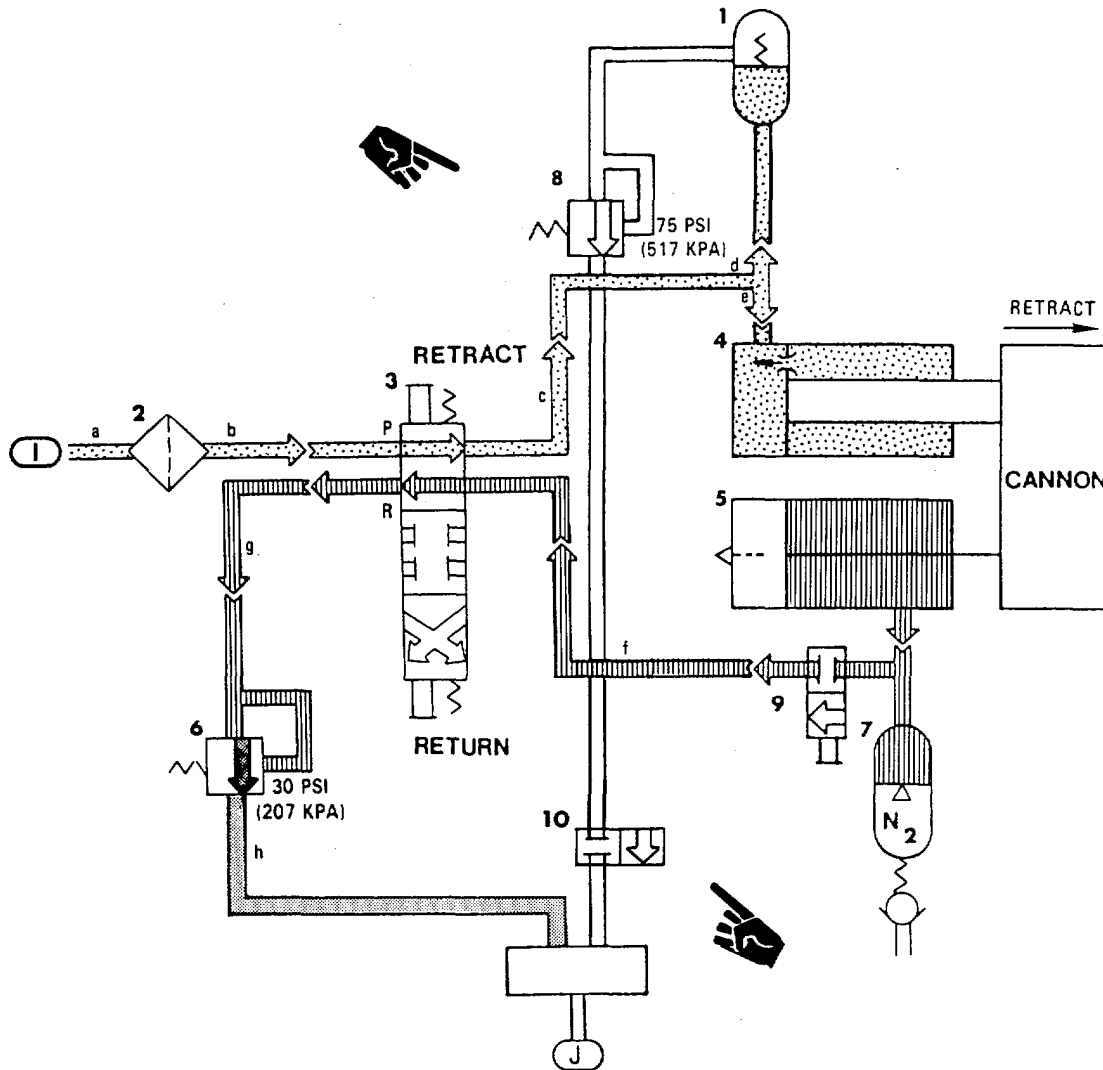
- 1 Replenisher
- 2 Hydraulic fluid filter
- 3 Directional control valve
- 4 Recoil cylinder
- 5 Counterrecoil cylinder
- 6 Relief valve
- 7 Recuperator cylinder
- 8 Relief valve
- 9 Shut-off valve
- 10 Shut-off valve

**BAR CODE**

- Intensified pressure
- Supply pressure
- Charging pressure
- Reduced pressure
- Pilot pressure
- Metered or blocked flow
- Intake drain
- Blank inactive

F-23. CANNON -RETRACTING (UNMODIFIED WEAPON).





**LEGEND**

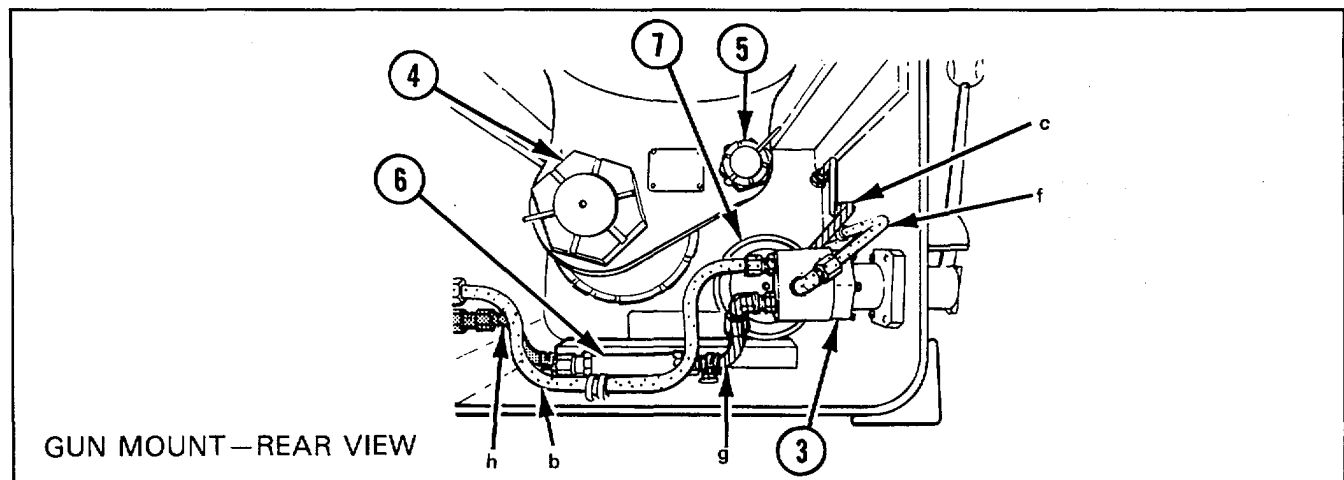
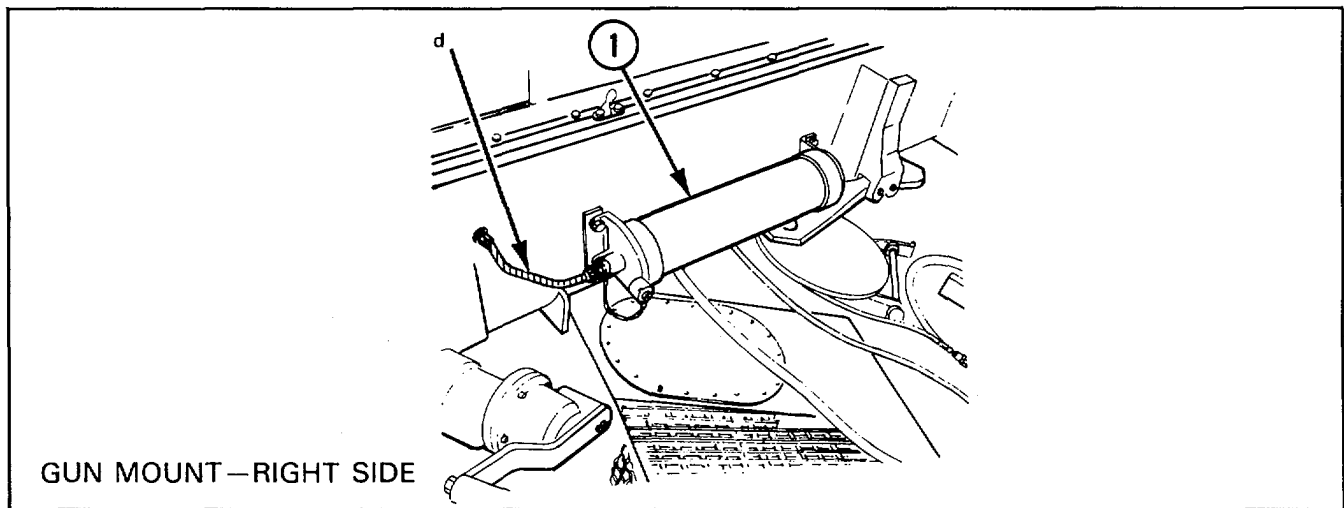
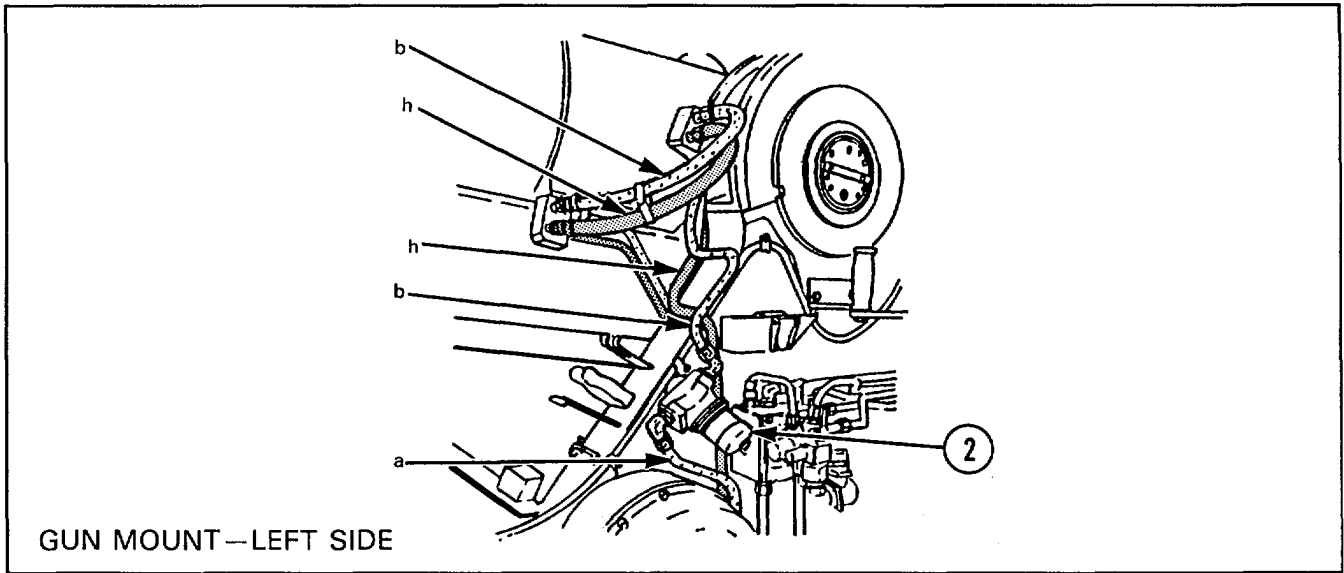
- 1 Replenisher
- 2 Hydraulic fluid filter
- 3 Directional control valve
- 4 Recoil cylinder
- 5 Counterrecoil cylinder
- 6 Relief valve
- 7 Recuperator cylinder
- 8 Relief valve
- 9 Shut-off valve
- 10 Shut-off valve

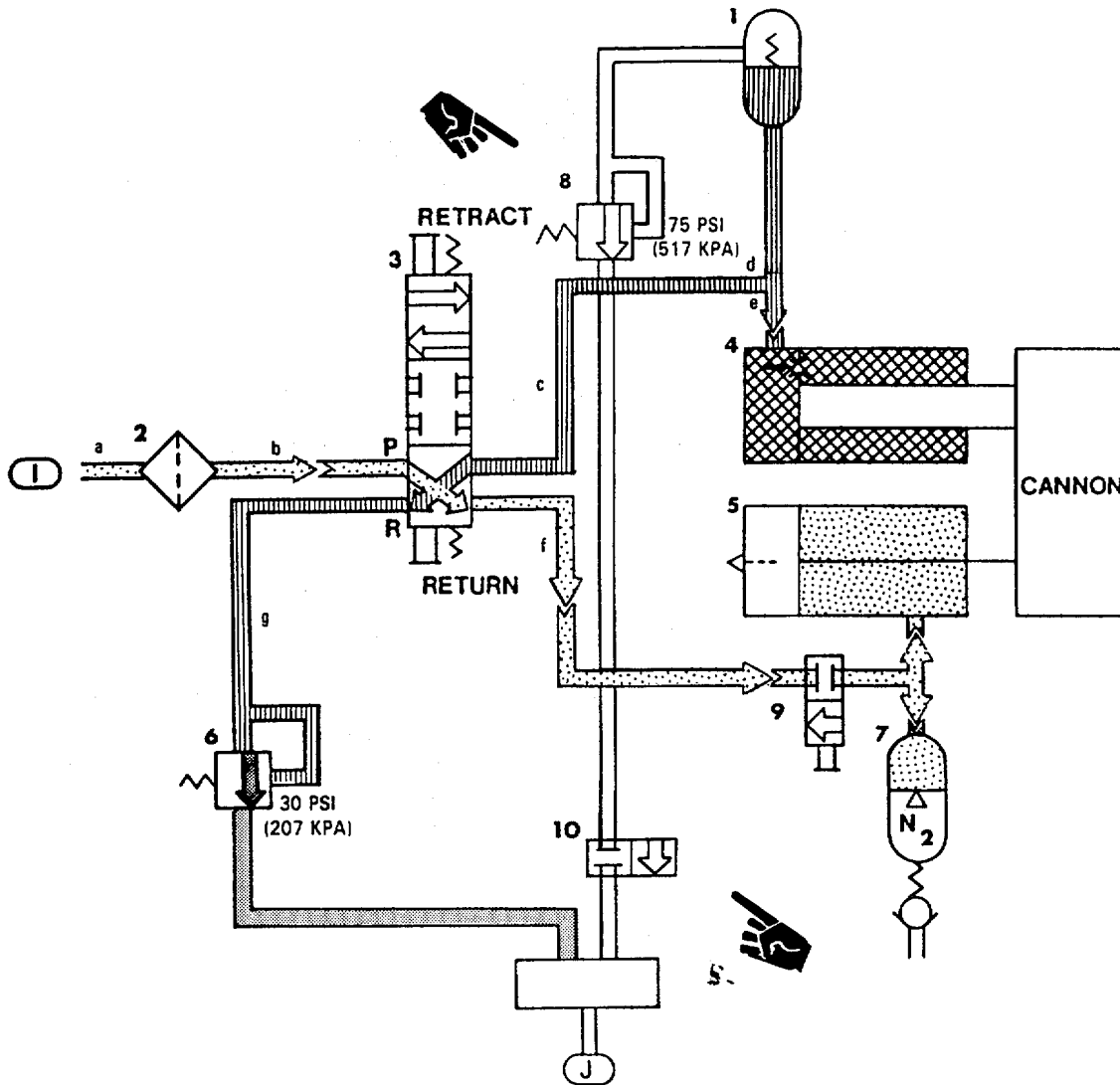
**BAR CODE**

- Intensified pressure
- Supply pressure
- Charging pressure
- Reduced pressure
- Pilot pressure
- Metered or blocked flow
- Intake drain
- Blank inactive



F-24. CANNON-RETRACTING (MODIFIED WEAPON).





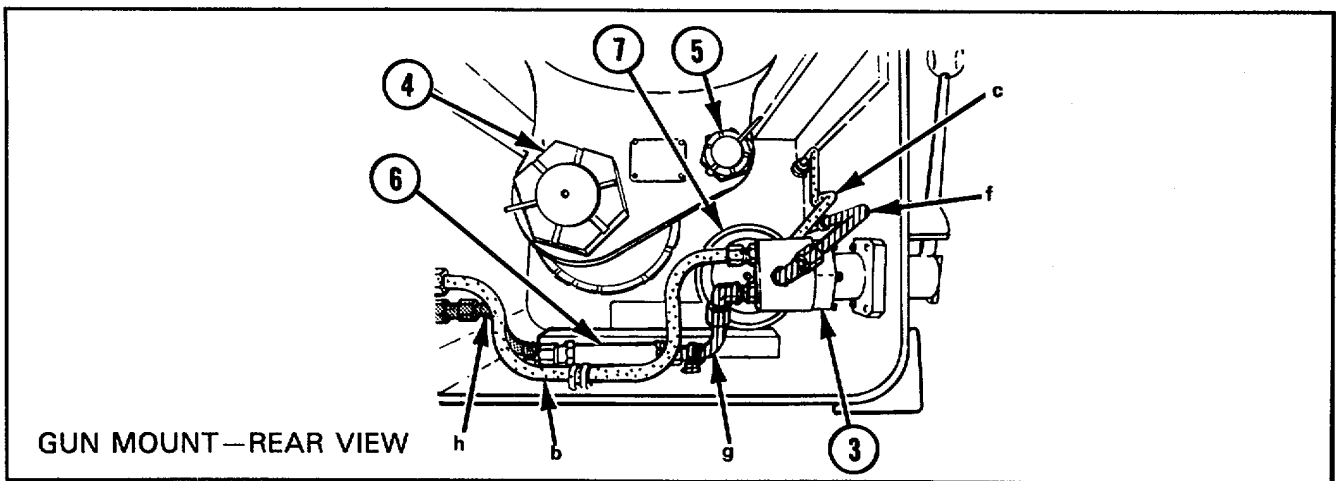
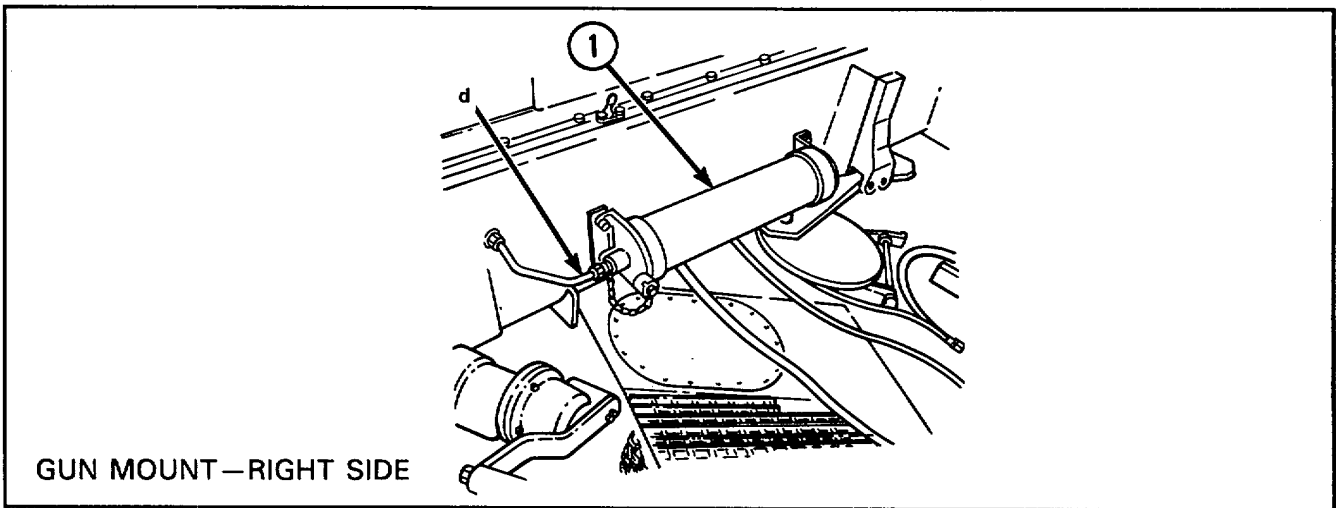
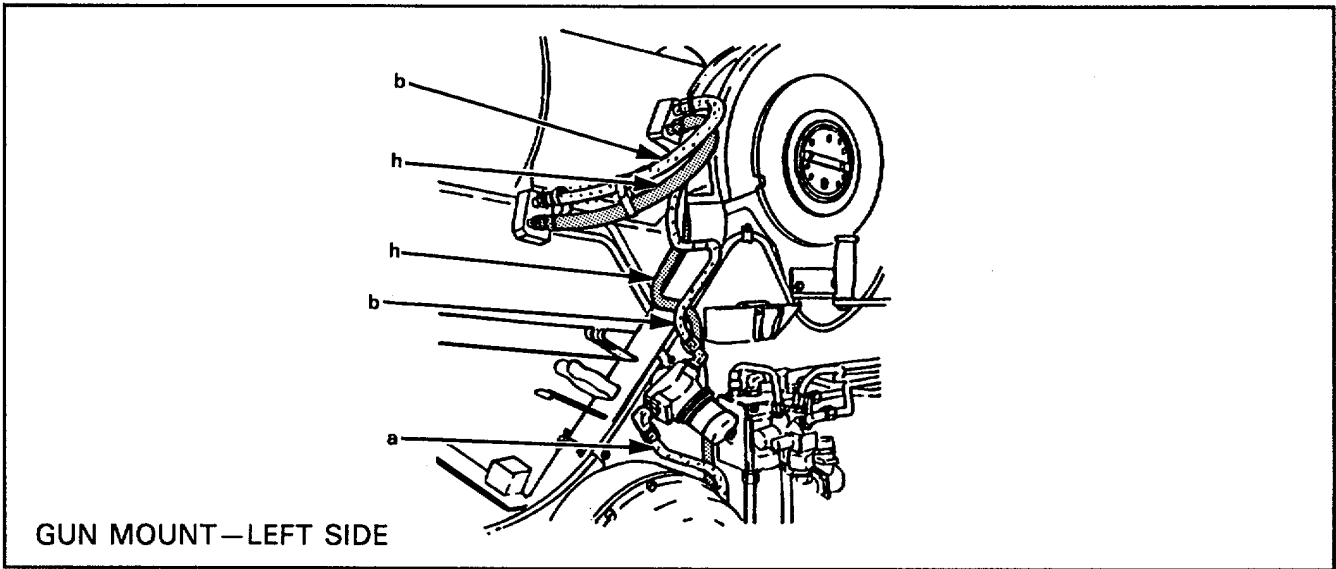
**LEGEND**

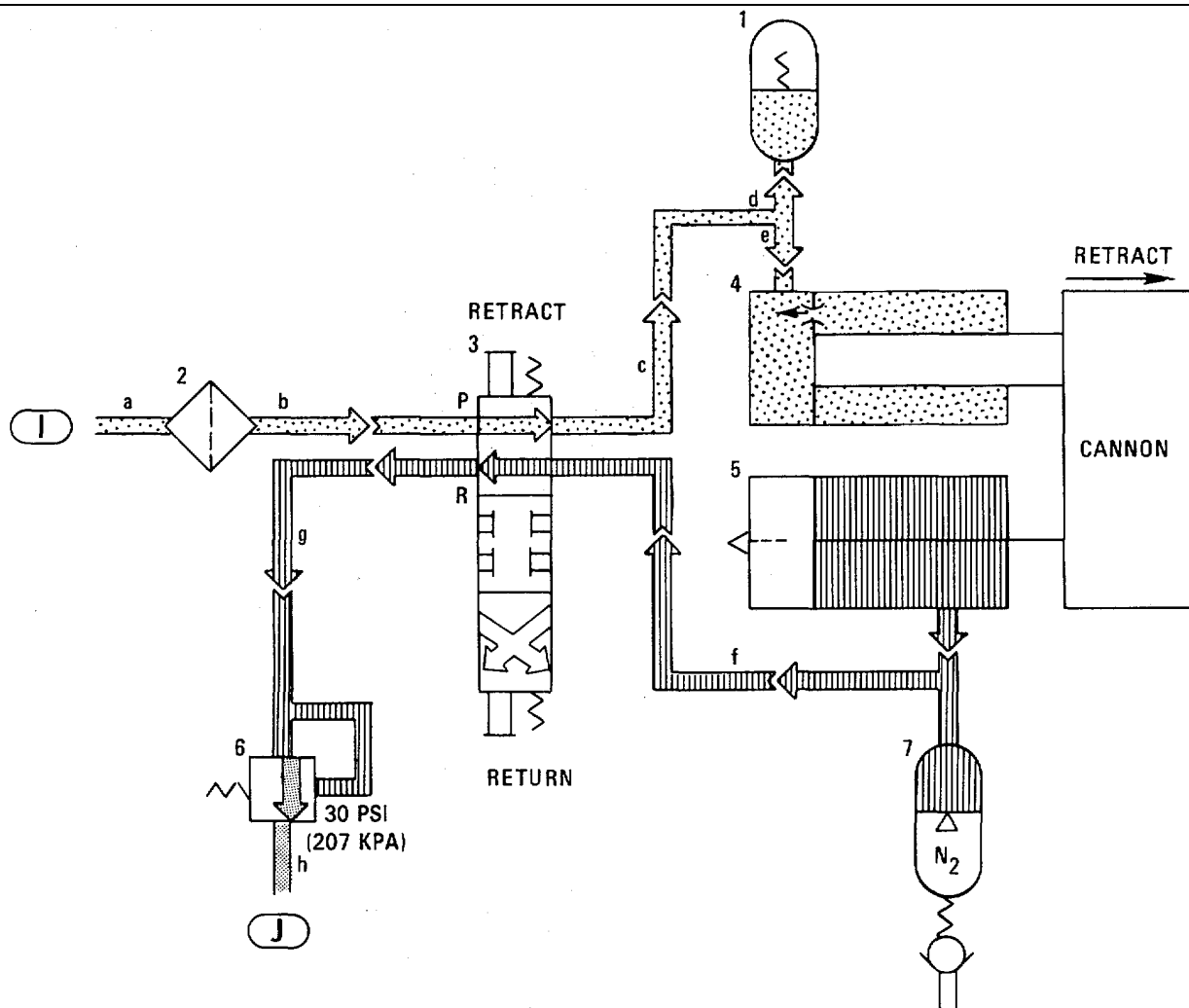
- 1 Replenisher
- 2 Hydraulic fluid filter
- 3 Directional control valve
- 4 Recoil cylinder
- 5 Counterrecoil cylinder
- 6 Relief valve
- 7 Recuperator cylinder
- 8 Relief valve
- 9 Shut-off valve
- 10 Shut-off valve

**BAR CODE**

- Intensified pressure
- Supply pressure
- Charging pressure
- Reduced pressure
- Pilot pressure
- Metered or blocked flow
- Intake drain
- Blank inactive

F-25. - CANNON-RETURN (TO BATTERY) (UNMODIFIED WEAPON).

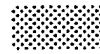





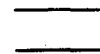





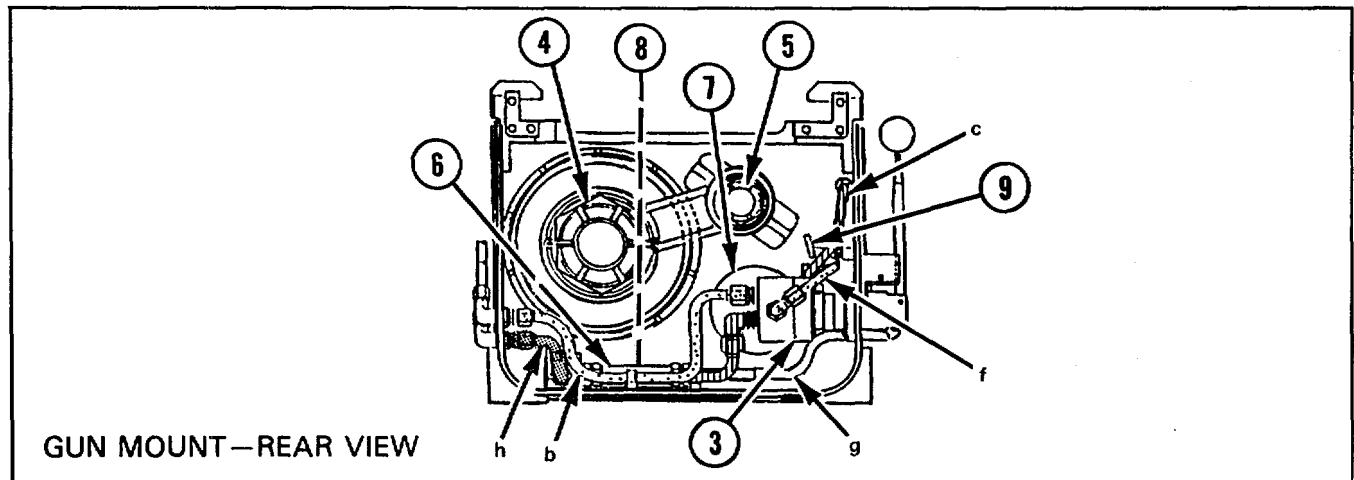
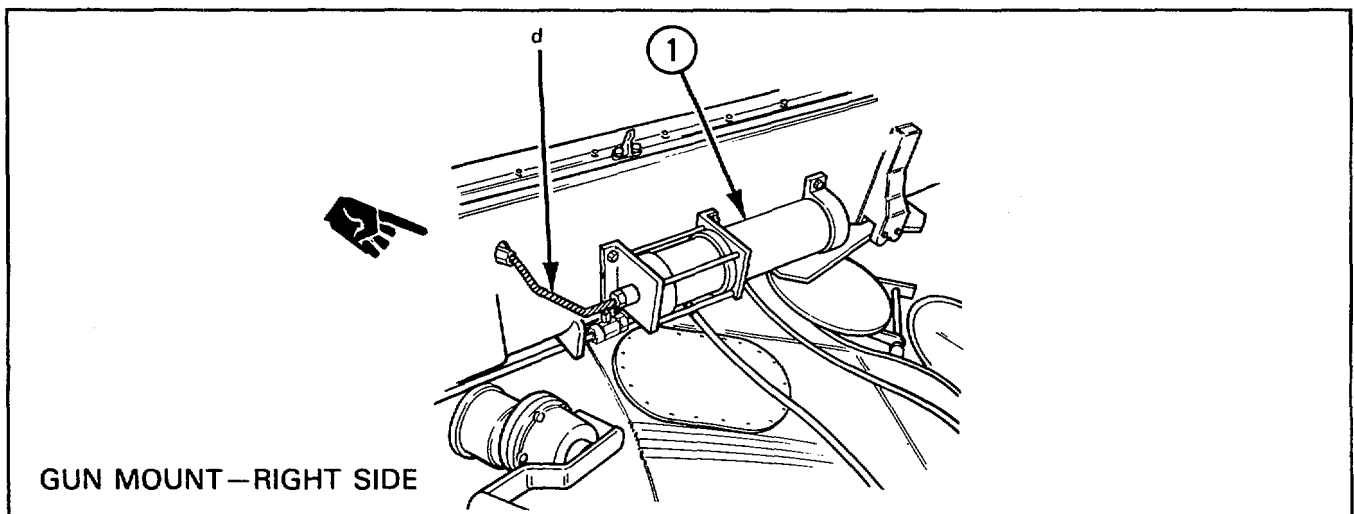
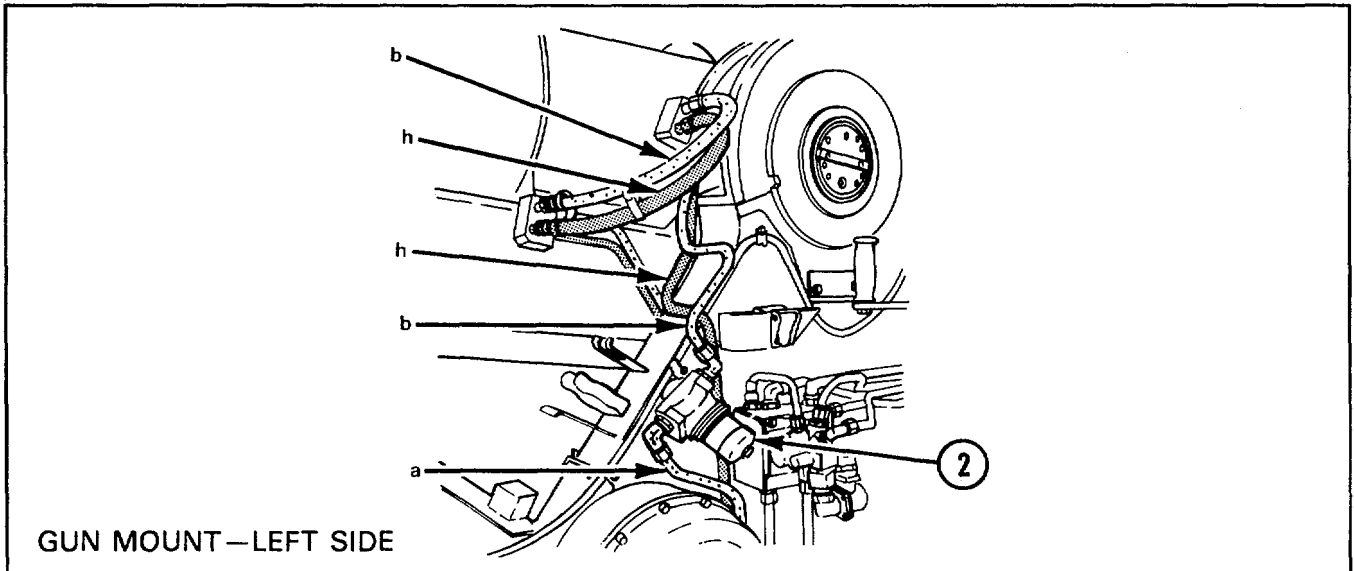
**LEGEND**

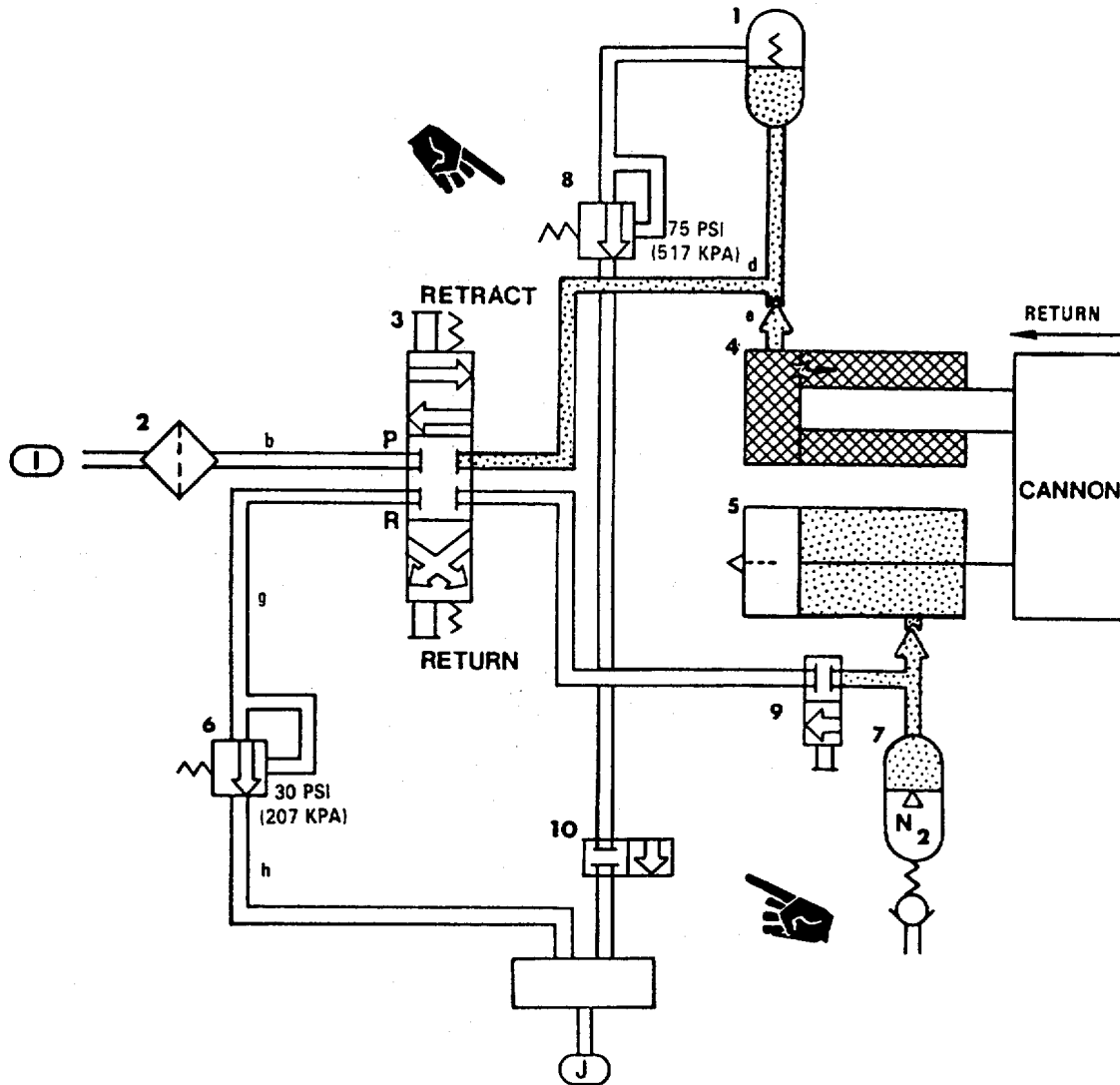
- 1 Replenisher
- 2 Hydraulic fluid filter
- 3 Directional control valve
- 4 Recoil cylinder
- 5 Counterrecoil cylinder
- 6 Relief valve
- 7 Recuperator cylinder

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-26. CANNON-RETURN (TO BATTERY) (MODIFIED WEAPON).













**LEGEND**

- 1 Replenisher
- 2 Hydraulic fluid filter
- 3 Directional control valve
- 4 Recoil cylinder
- 5 Counterrecoil cylinder
- 6 Relief valve
- 7 Recuperator cylinder
- 8 Relief valve
- 9 Shut-off valve
- 10 Shut-off valve

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

**F-27. TURRET TRAVERSING HYDRAULIC SUBSYSTEM.**

Functional Description. The turret traversing hydraulic subsystem traverses the gun turret to any position within 300 left or right of the vehicle centerline.

A single directional control valve (2) is provided on the left side of the turret so that the gunner can traverse the cannon to align it with a target. Squeezing the handle of directional control valve (2) actuates a switch that energizes solenoid valve (13).

When energized, solenoid valve (13) directs hydraulic pressure to hydraulic brake (9), to pressure reducing valve (5), to the stroke control cylinder of hydraulic motor (10), and to directional control valve (2).

Moving the handle of directional control valve (2) in either LEFT or RIGHT traversing direction controls and directs hydraulic fluid at about 2400 psi (16,548 kPa) to hydraulic motor (10). Moving the handle farther away from the center (off) position increases the hydraulic fluid flow through hydraulic motor (10). This increases the rotational speed of the turret.

As the turret approaches the 300 traverse position, deceleration solenoid valve (1) is energized by a cam-actuated switch.

**LEGEND**

- 1 Solenoid valve
- 2 Directional control valve
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Turret drive gearbox
- 12 Check valve
- 13 Solenoid valve

When energized, solenoid valve (1) shuts off hydraulic pressure to the stroke control cylinder of motor (10), and directs the motor return fluid through the restrictor in solenoid valve (1) and through pressure reducing valve (5).

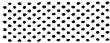
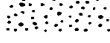




Supply pressure shifts the stroke control cylinder to position motor (10) at minimum stroke.

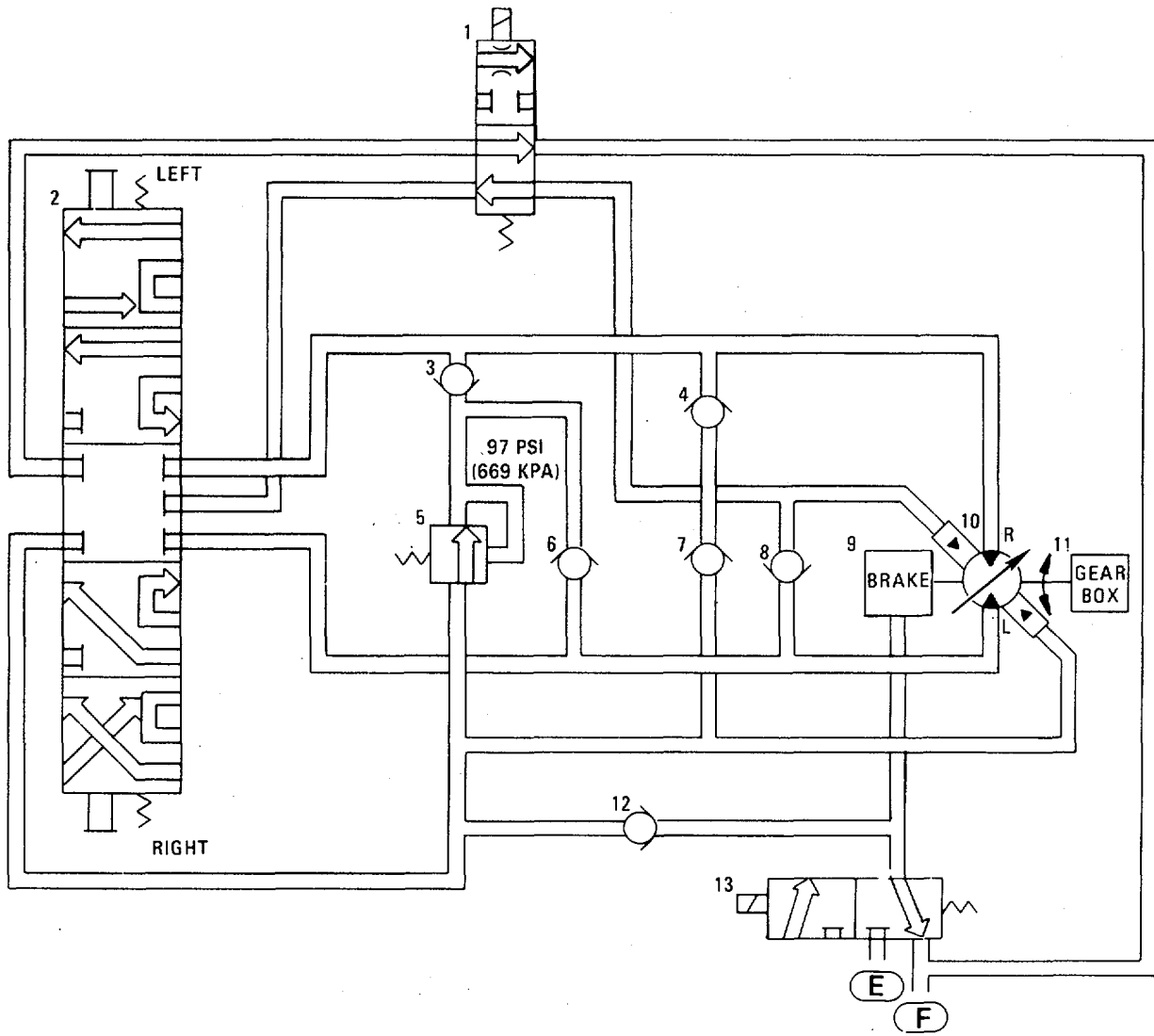
The momentum of the turret puts back pressure on motor (10), making it work as a pump. However, pressure reducing valve (5) prevents rapid return of the hydraulic fluid to the other side of the motor (10).

This action slows the turret to prevent damage to the turret stops.

When the handle of directional control valve (2) is released, the switch is deactuated, which deenergizes solenoid valve (13). Hydraulic pressure to the subsystem is shut off, allowing spring pressure to set hydraulic brake (9), stopping hydraulic motor (10) and the turret.

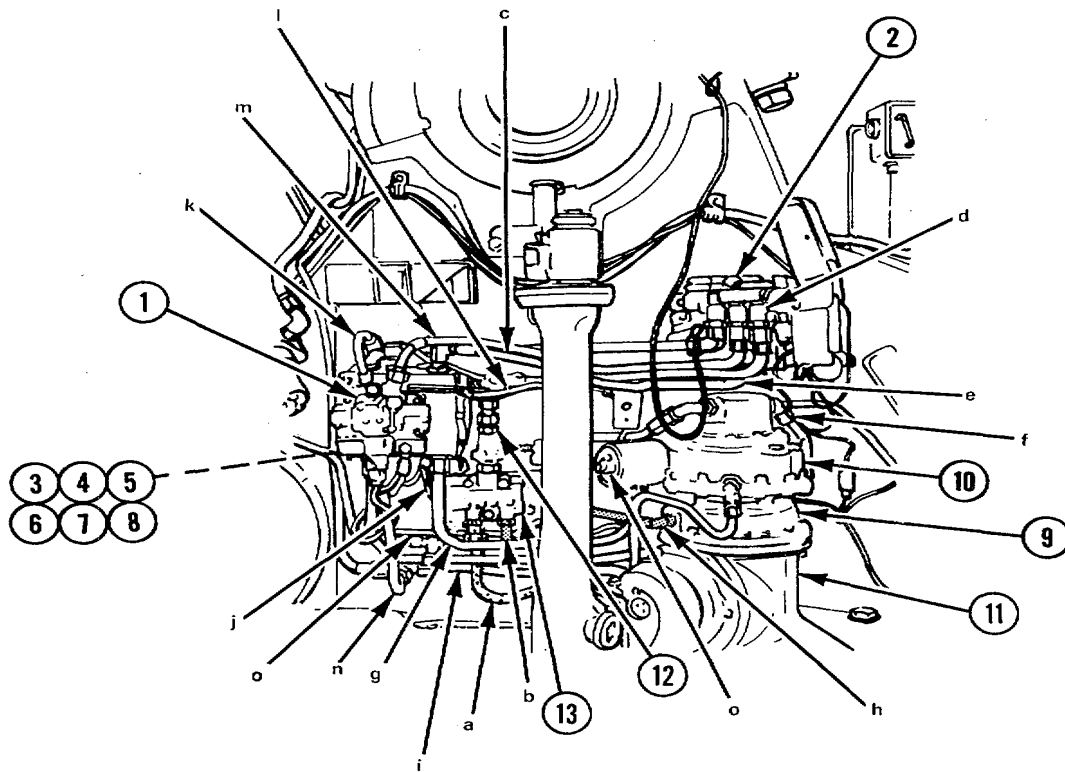
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure  
Reduced pressure  
Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

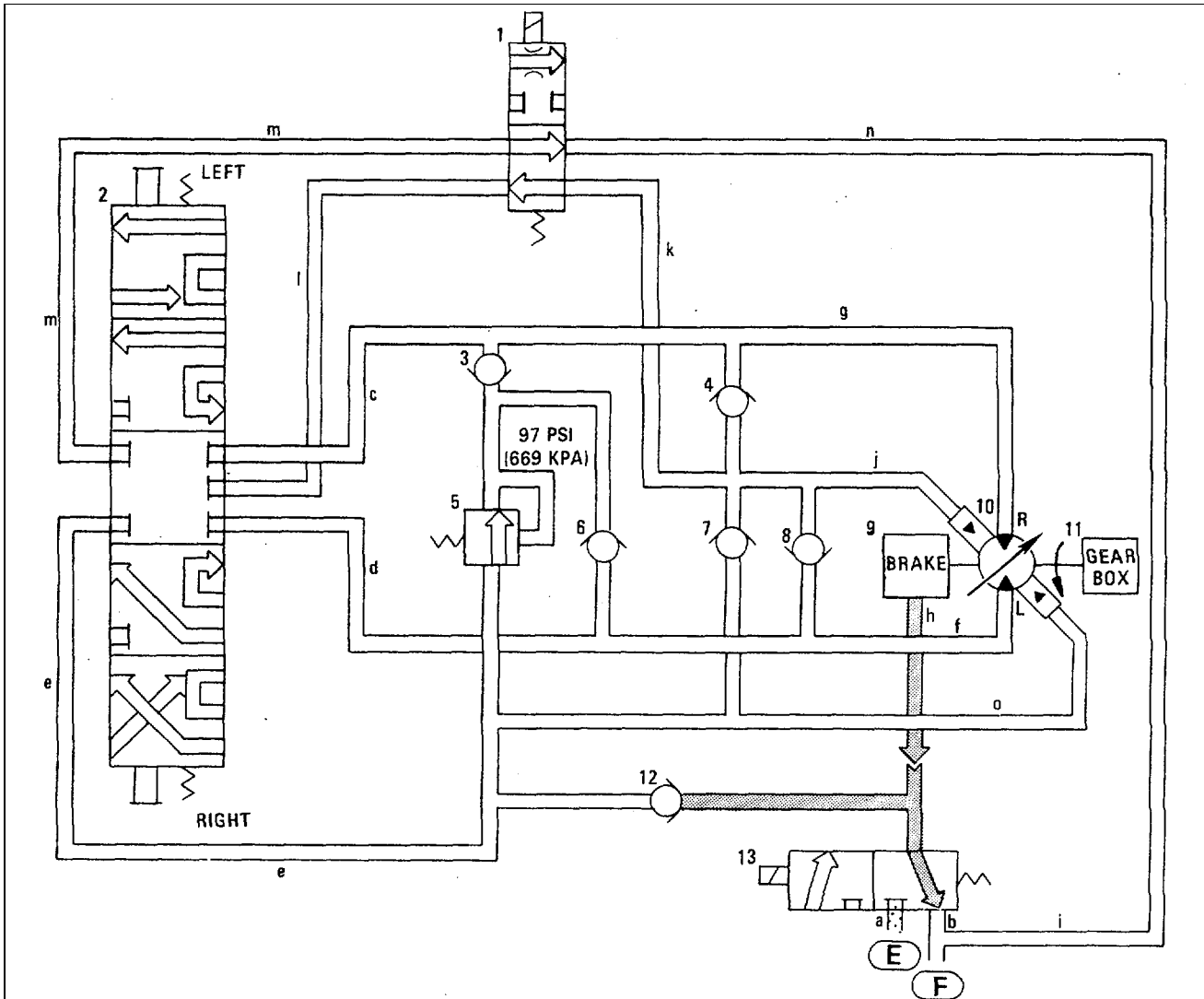




F-28. TURRET TRAVERSING-STOPPED (BRAKE ON).











TURRET—LEFT SIDE



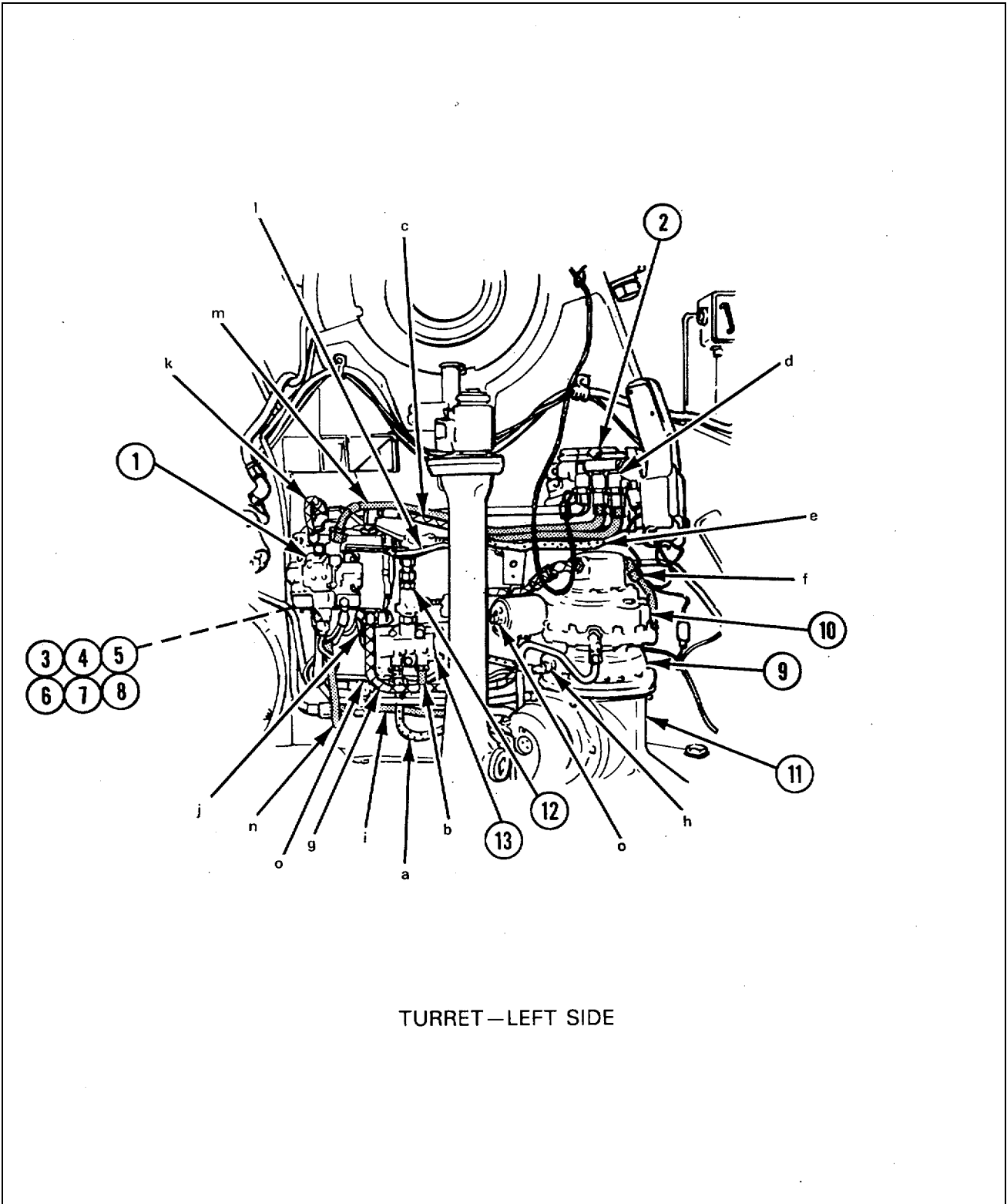
**LEGEND**

- 1 Solenoid valve
- 2 Directional control valve
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Turret drive gearbox
- 12 Check valve
- 13 Solenoid valve

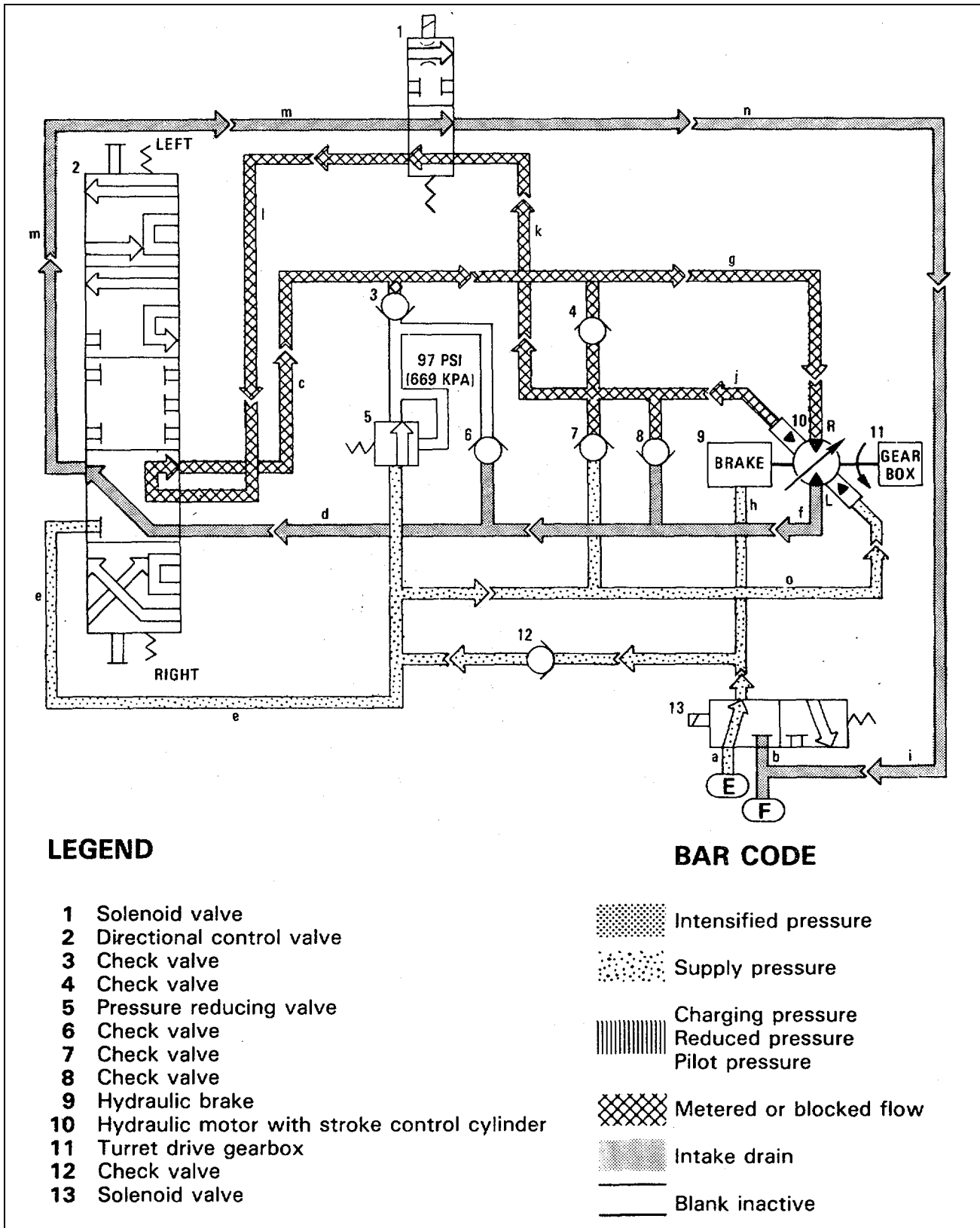
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-29. TURRET TRAVERSING - RIGHT (SLOW).



TURRET - LEFT SIDE



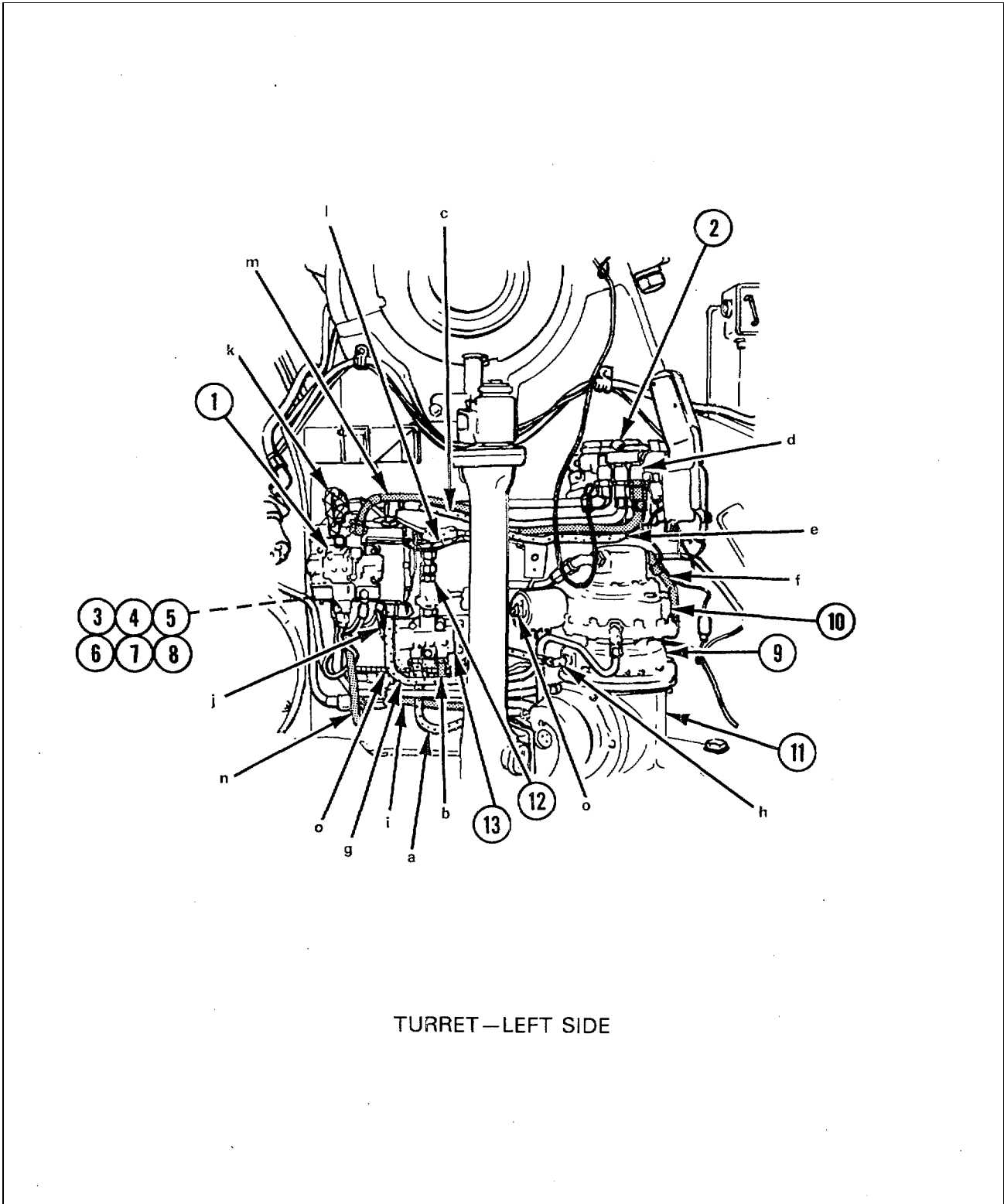
**LEGEND**

- 1 Solenoid valve
- 2 Directional control valve
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Turret drive gearbox
- 12 Check valve
- 13 Solenoid valve

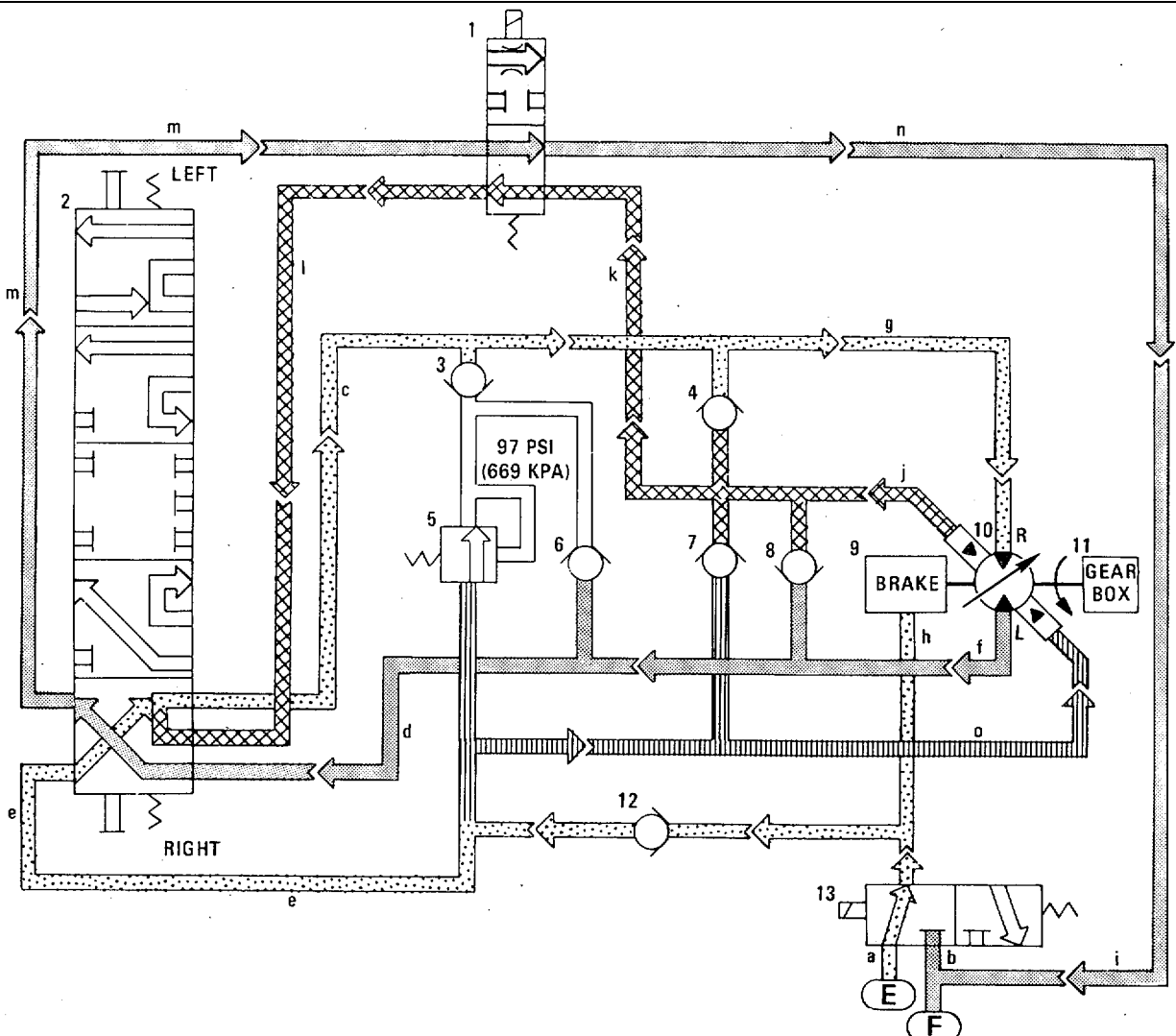
**BAR CODE**

- Intensified pressure
- Supply pressure
- Charging pressure
- Reduced pressure
- Pilot pressure
- Metered or blocked flow
- Intake drain
- Blank inactive

F-30. TURRET TRAVERSING - RIGHT (FULL FLOW).










TURRET - LEFT SIDE



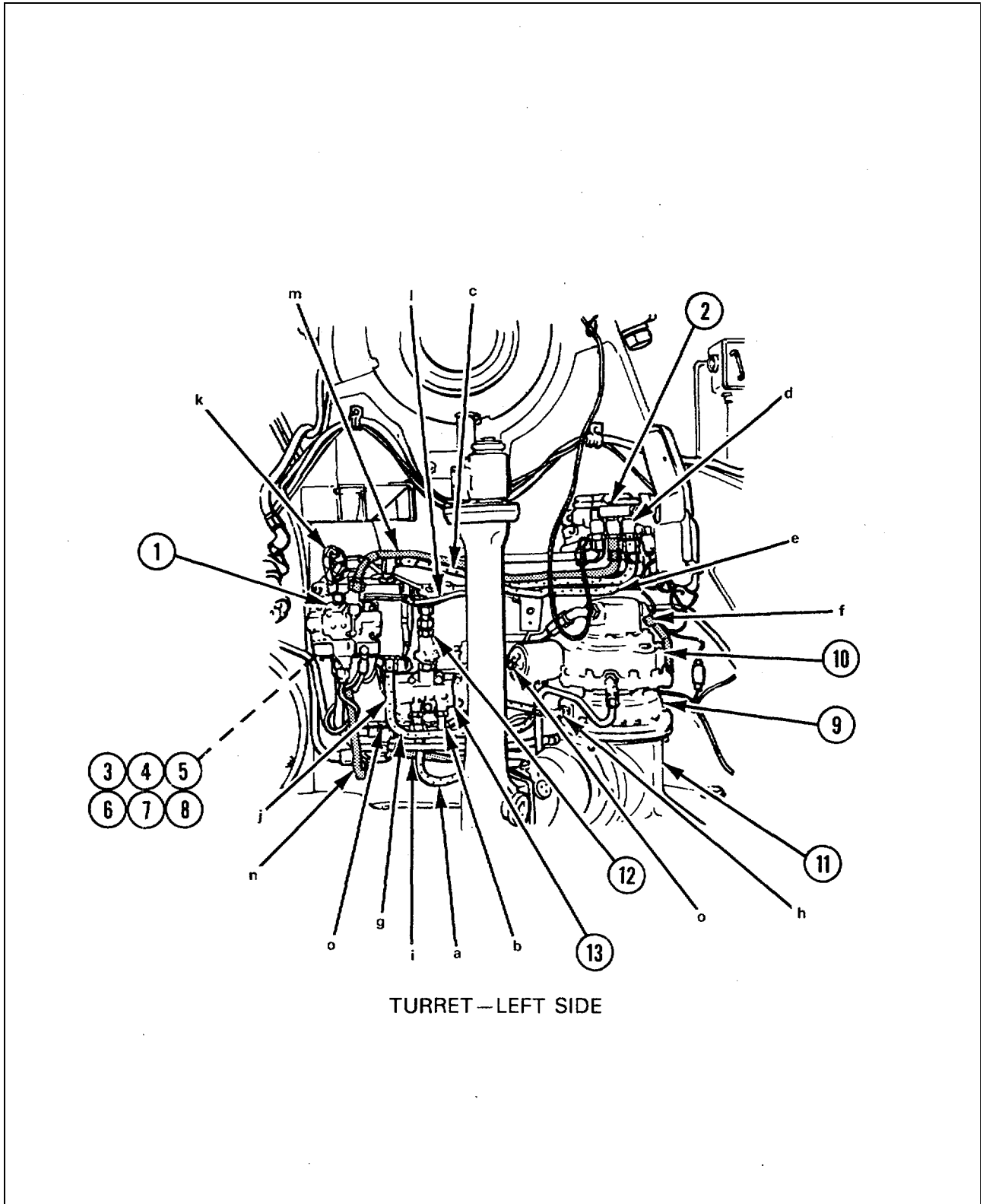
**LEGEND**

- 1 Solenoid valve
- 2 Directional control valve
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Turret drive gearbox
- 12 Check valve
- 13 Solenoid valve

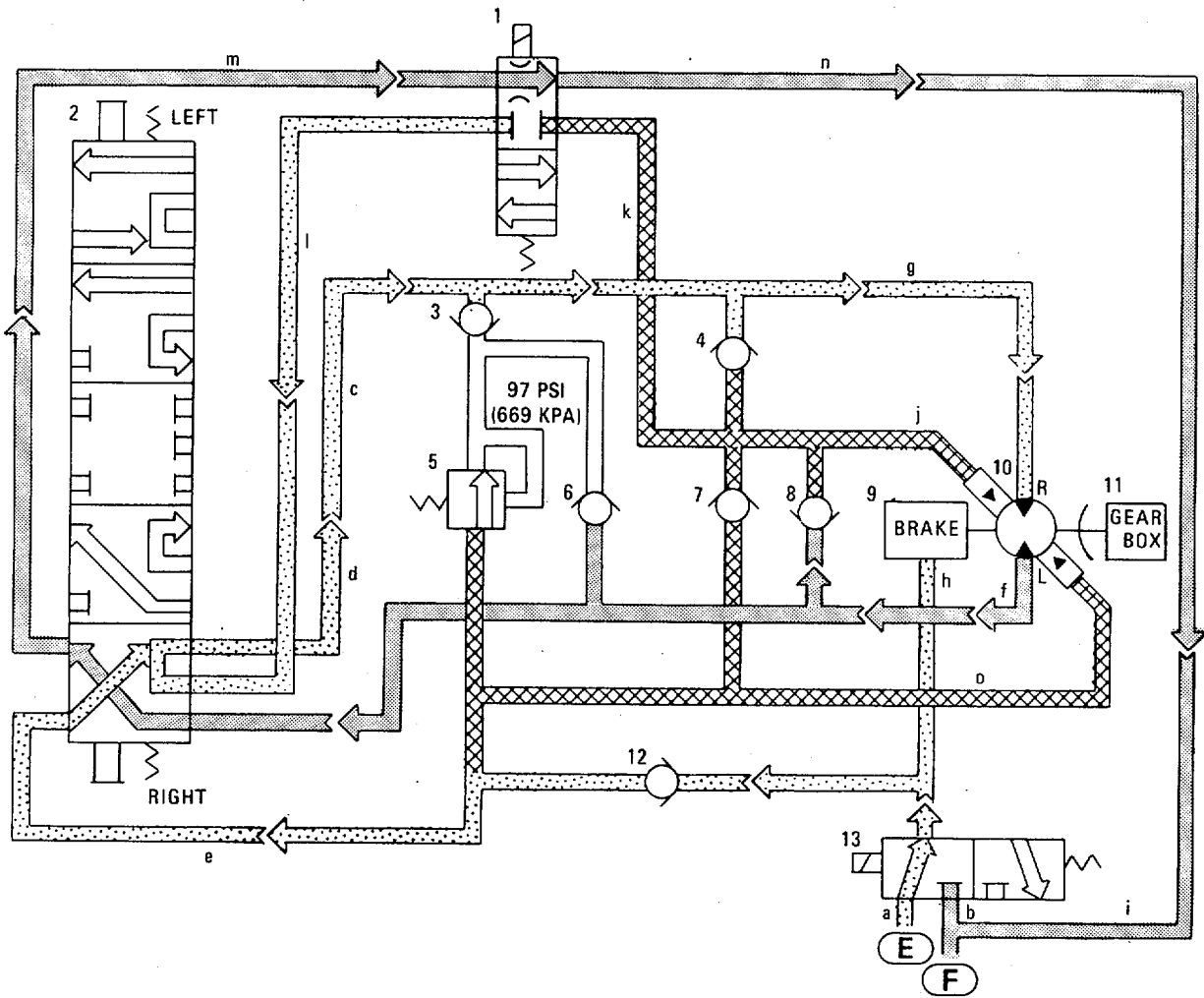
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-31. TURRET TRAVERSING - RIGHT (DECELERATION)











TURRET - LEFT SIDE



**LEGEND**

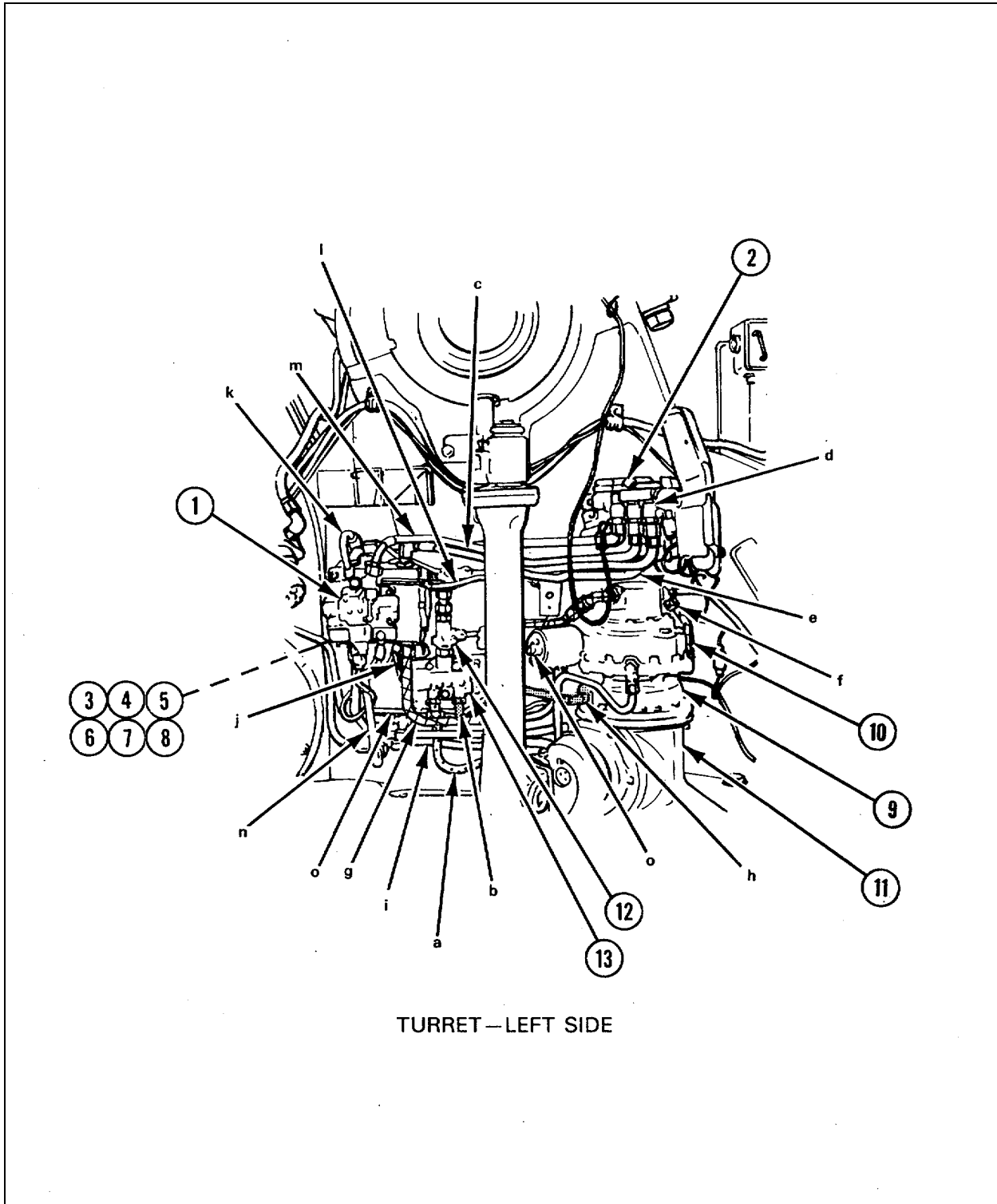
- 1 Solenoid valve
- 2 Directional control valve
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Turret drive gearbox
- 12 Check valve
- 13 Solenoid valve

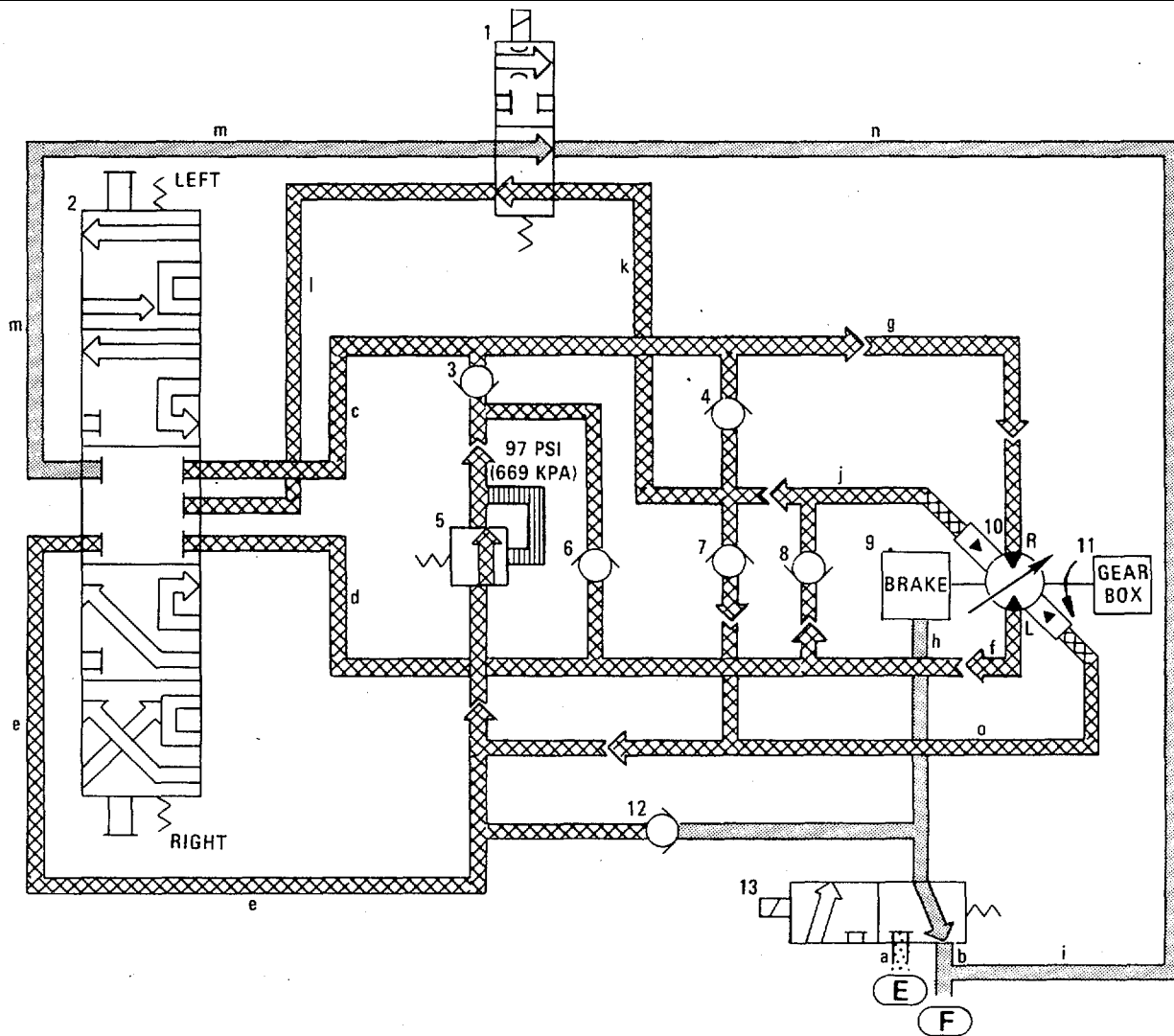
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



F-32. TURRET TRAVERSING - RIGHT (STOPPING).





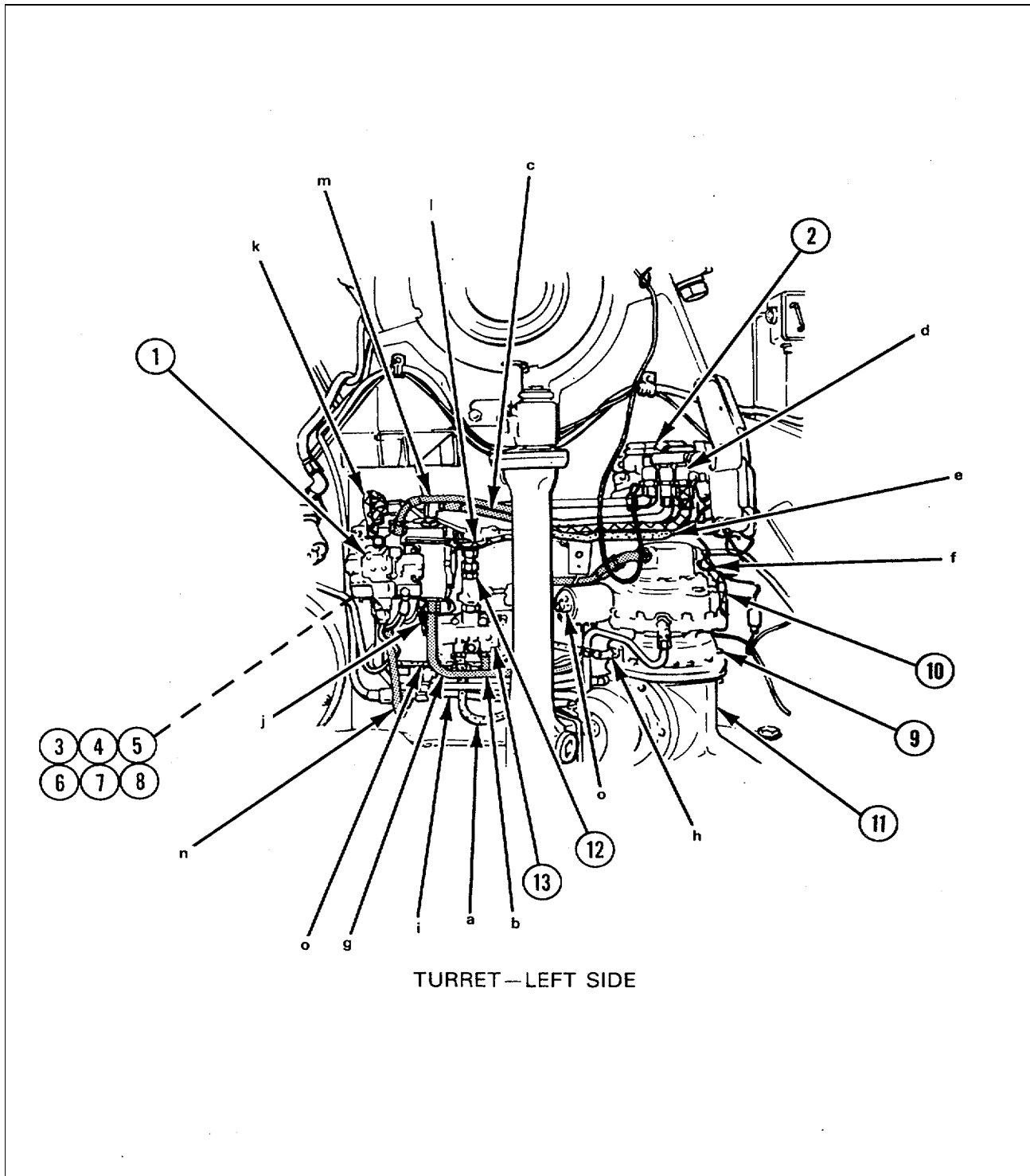
**LEGEND**

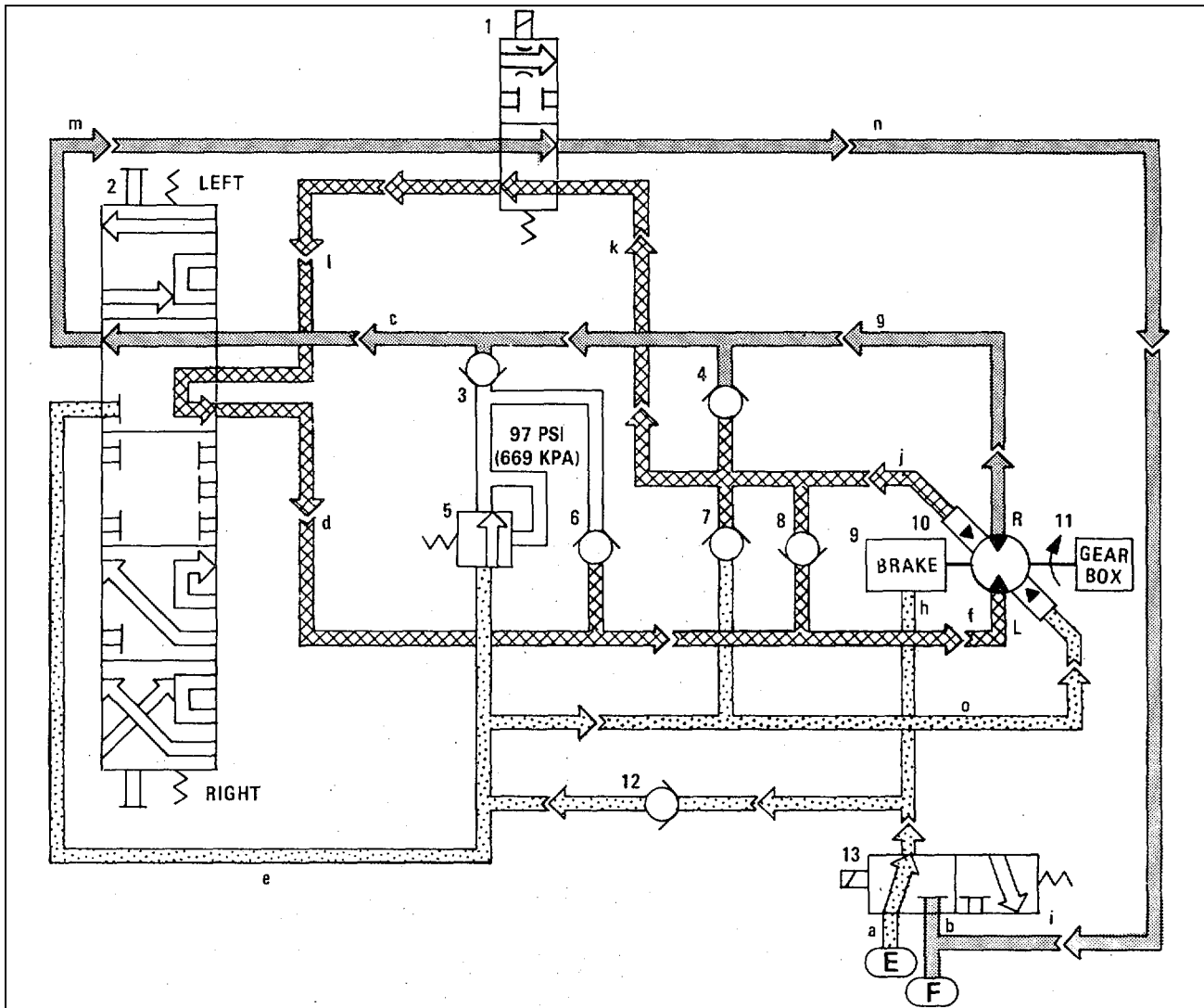
- 1 Solenoid valve
- 2 Directional control valve
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Turret drive gearbox
- 12 Check valve
- 13 Solenoid valve

**BAR CODE**

- Intensified pressure
- Supply pressure
- Charging pressure
- Reduced pressure
- Pilot pressure
- Metered or blocked flow
- Intake drain
- Blank inactive

F-33. TURRET TRAVERSING - LEFT (SLOW).













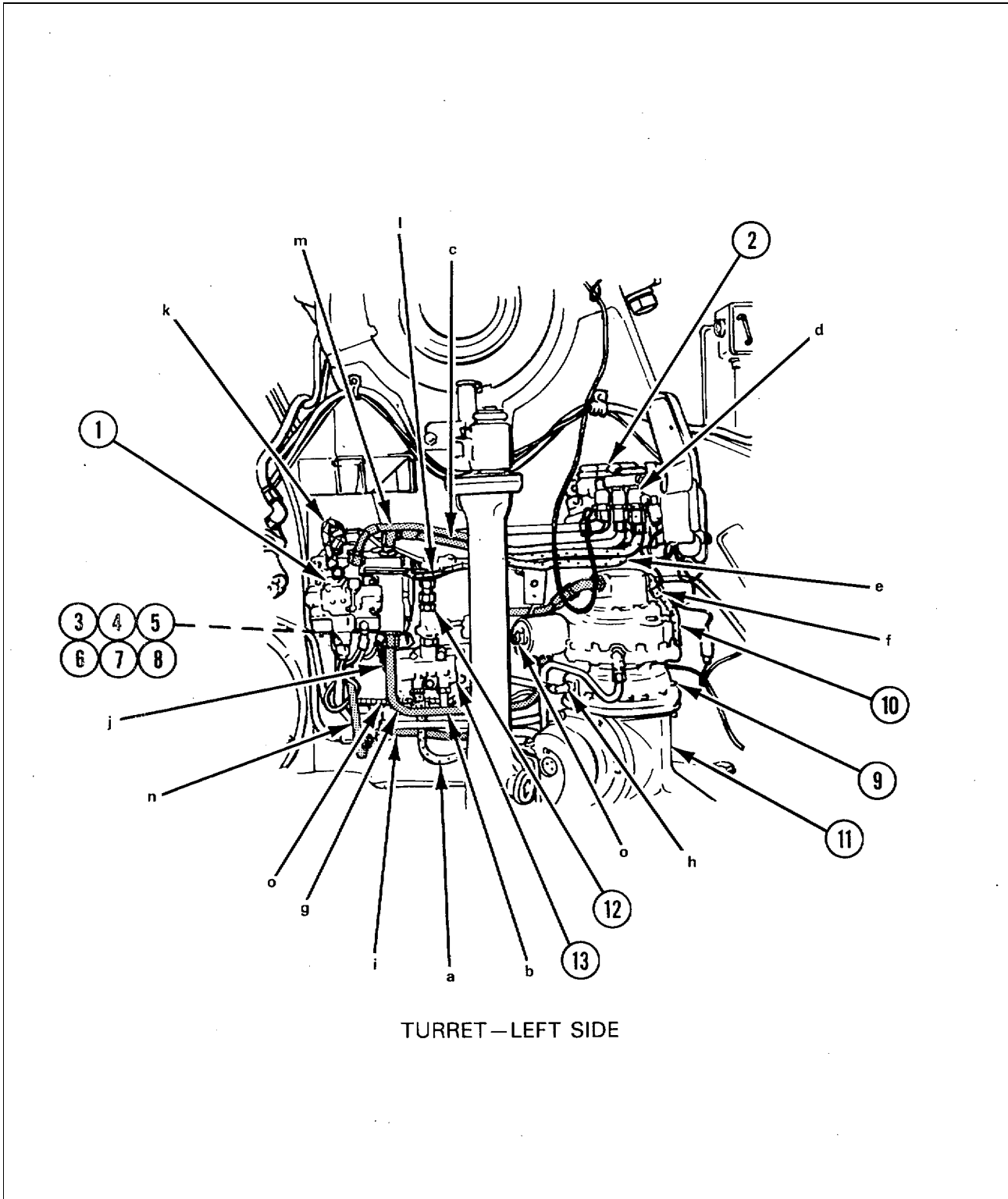
**LEGEND**

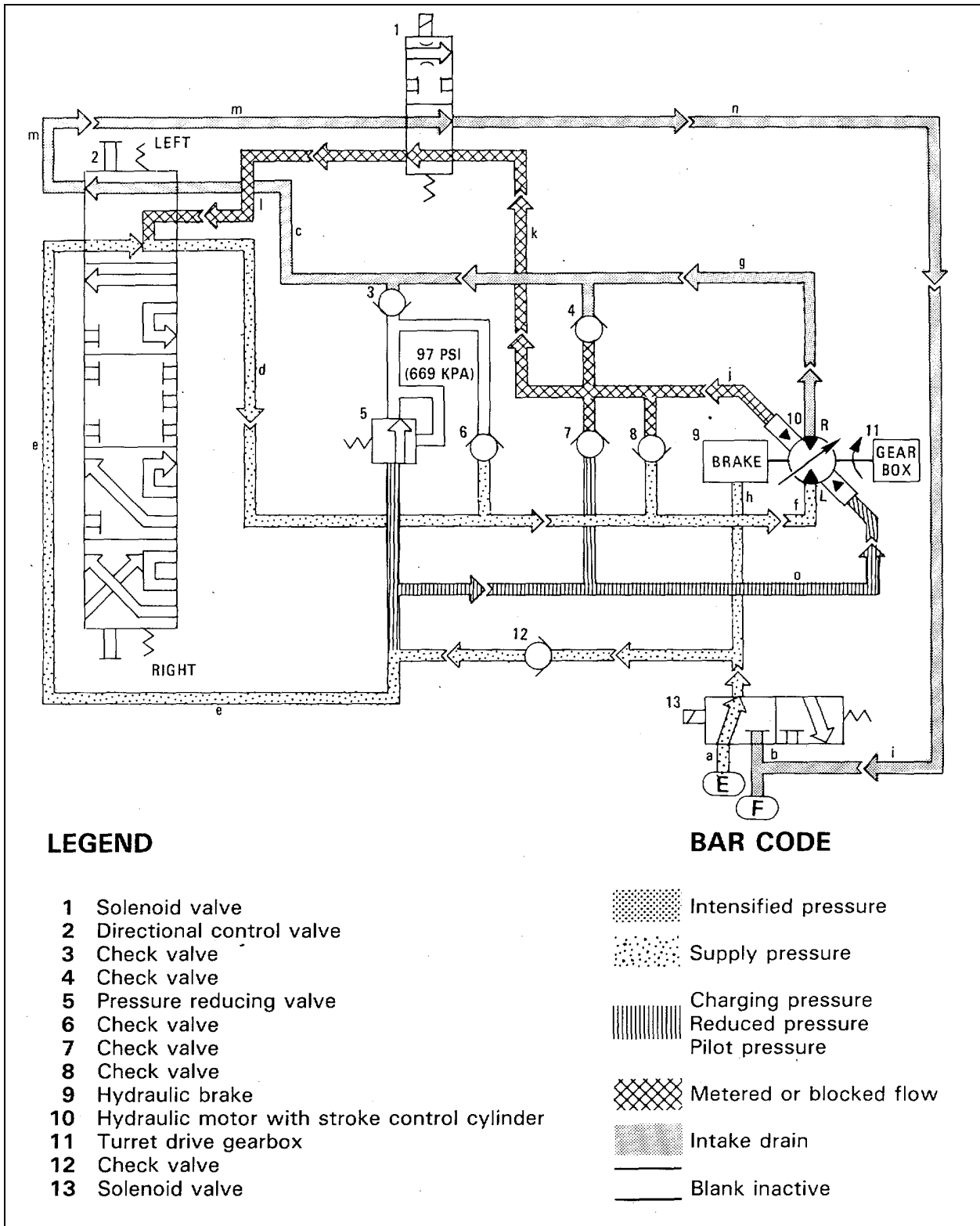
- 1 Solenoid valve
- 2 Directional control valve
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Turret drive gearbox
- 12 Check valve
- 13 Solenoid valve

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-34. TURRET TRAVERSING - LEFT (FULL FLOW).













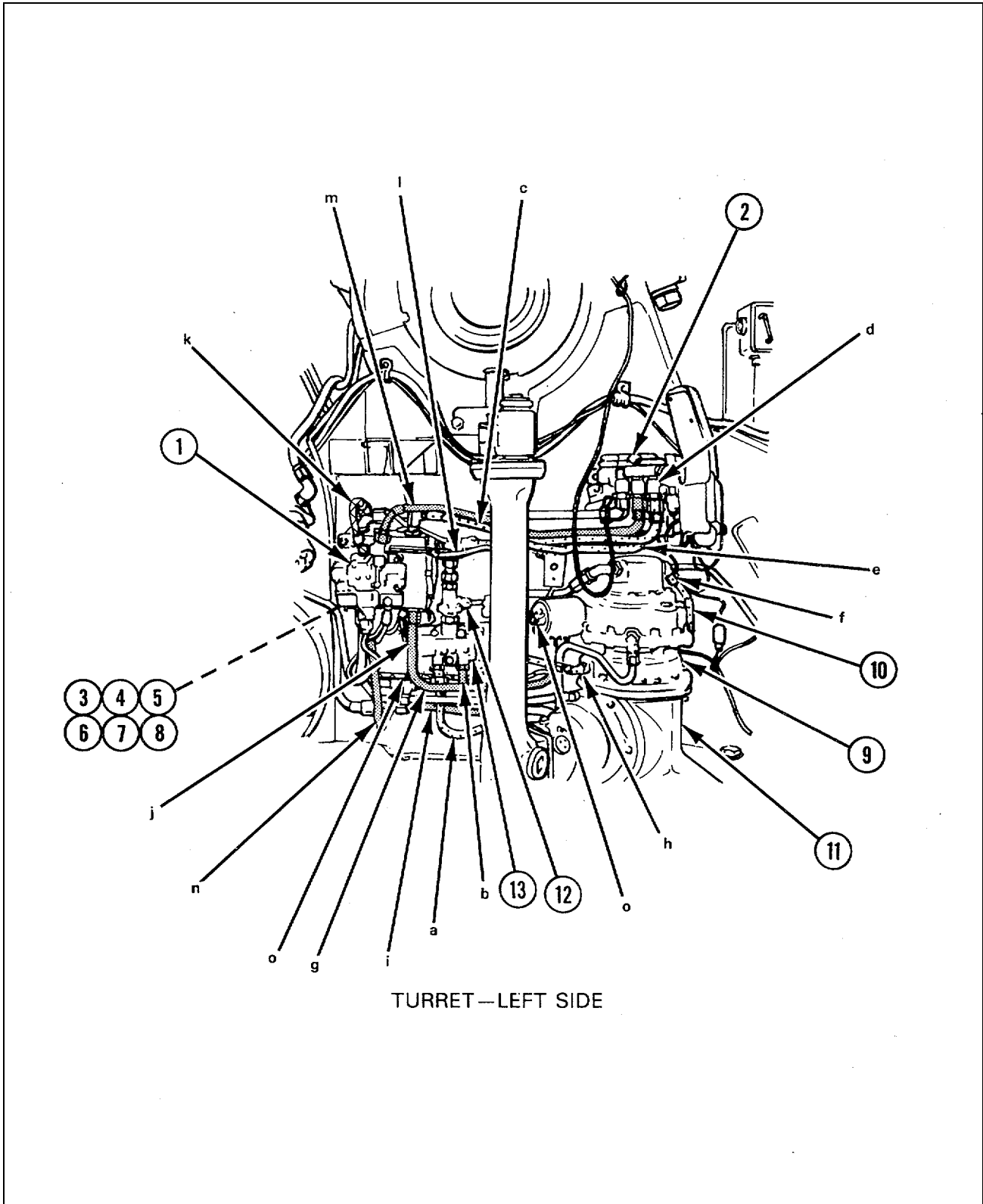
**LEGEND**

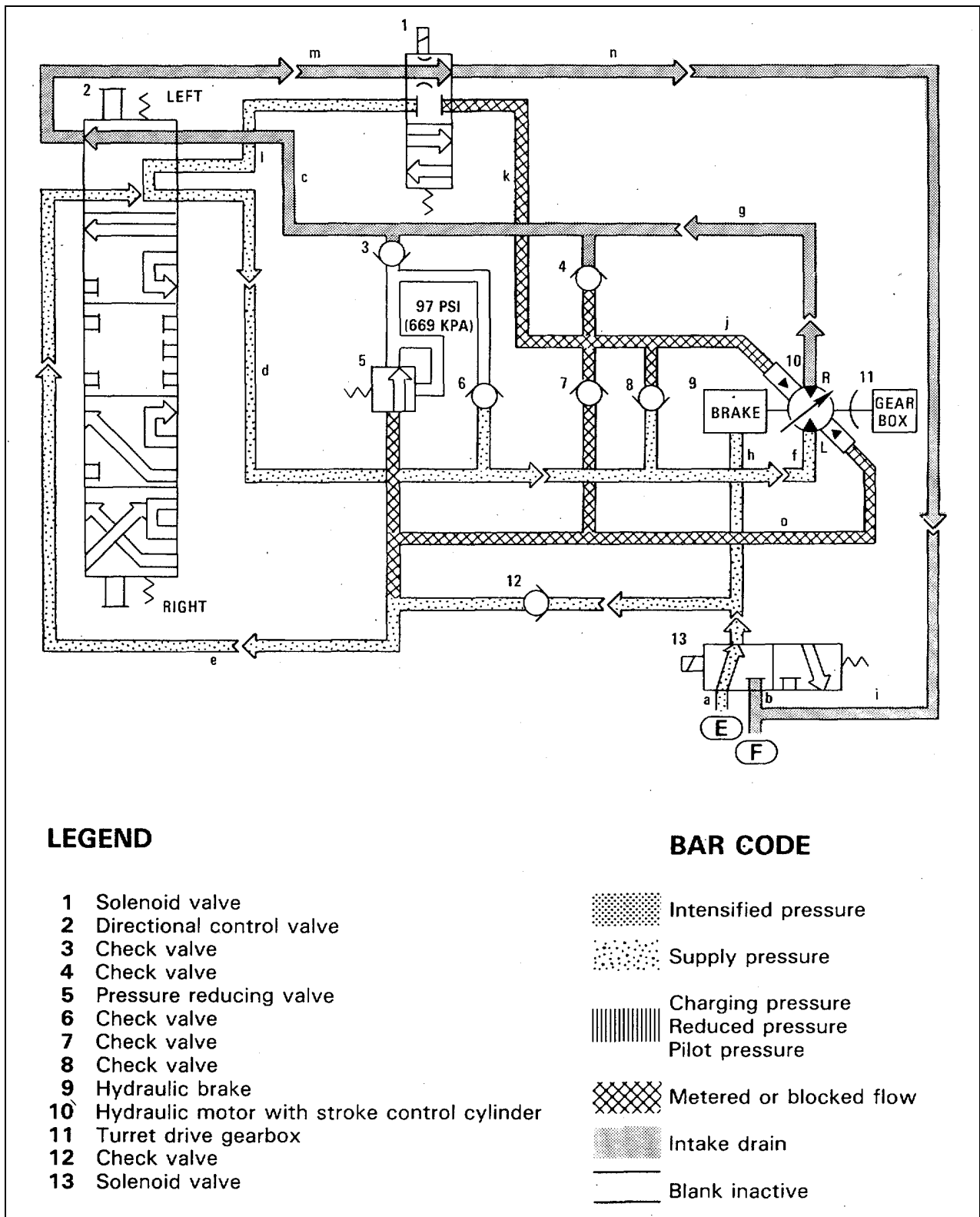
- 1 Solenoid valve
- 2 Directional control valve
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Turret drive gearbox
- 12 Check valve
- 13 Solenoid valve

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

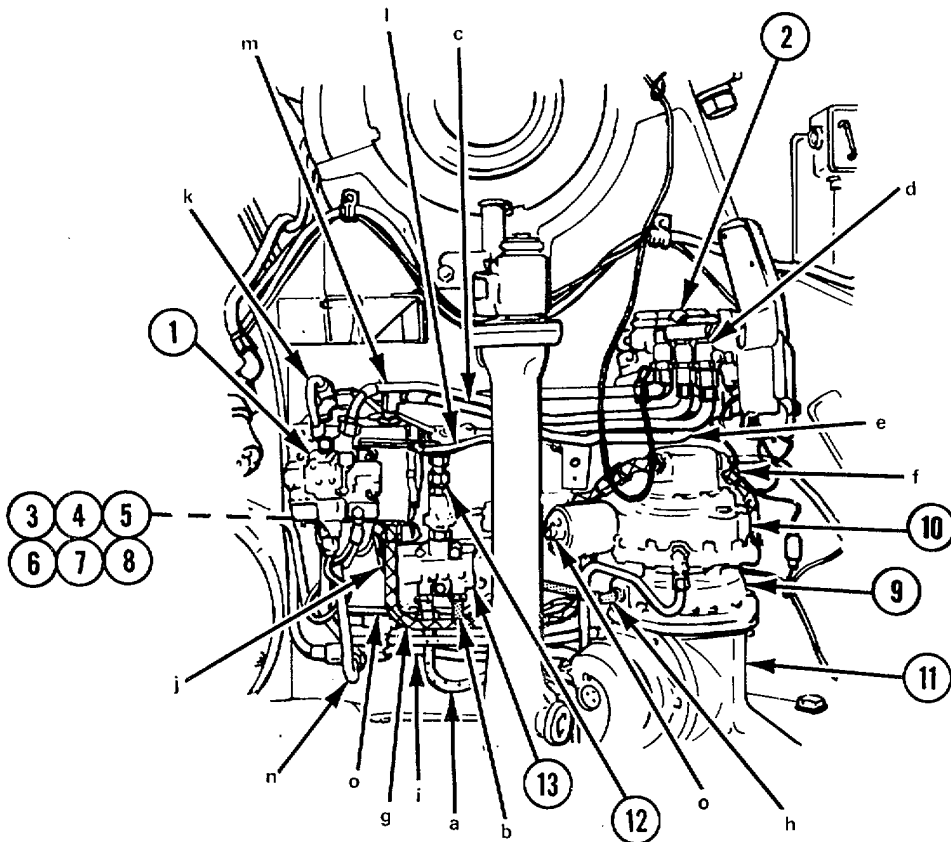
F-35. TURRET TRAVERSING - LEFT (DECELERATION).



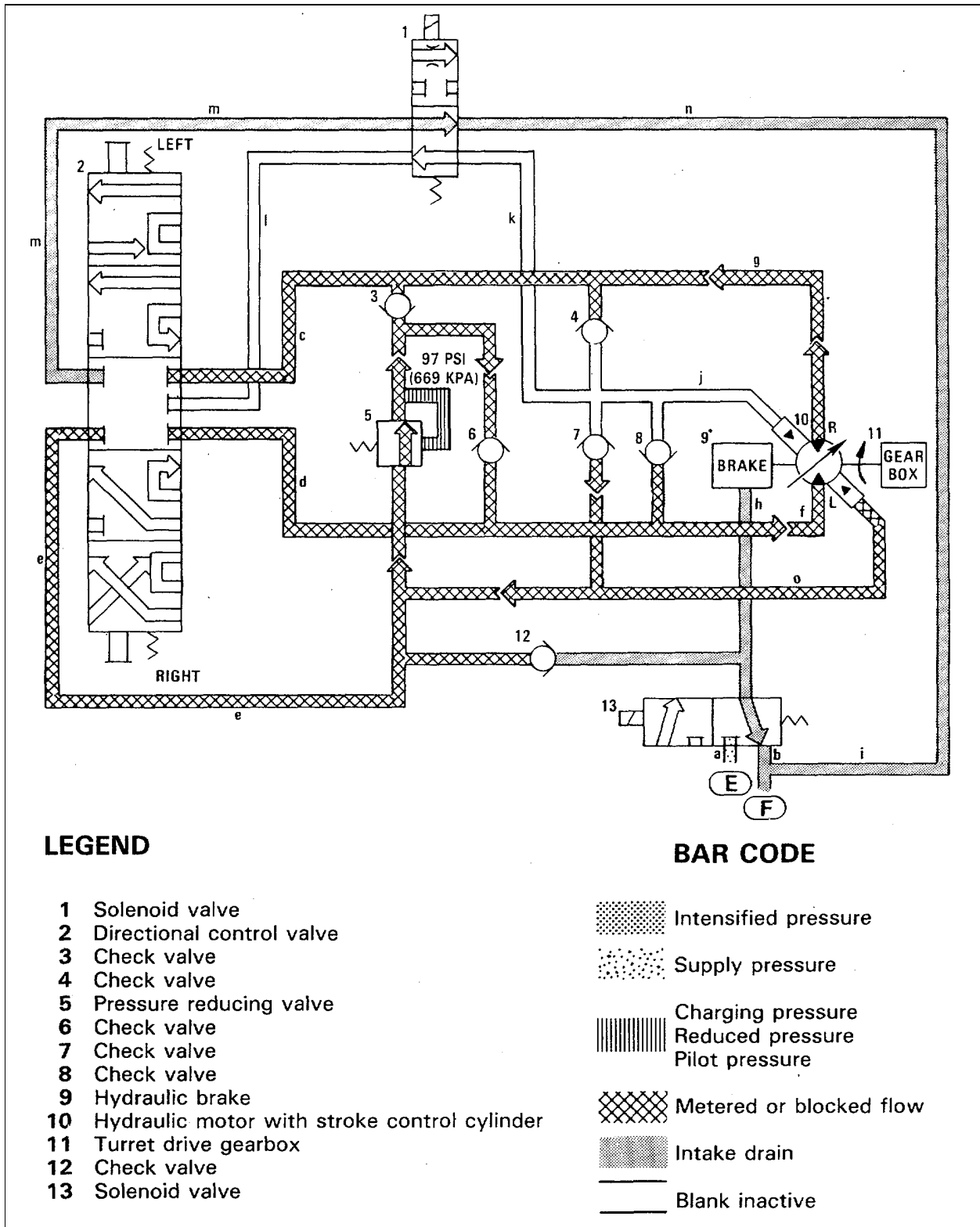


F-36. TURRET TRAVERSING - LEFT (STOPPING)













TURRET—LEFT SIDE



**LEGEND**

- 1 Solenoid valve
- 2 Directional control valve
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Turret drive gearbox
- 12 Check valve
- 13 Solenoid valve

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-37. CANNON ELEVATING HYDRAULIC SUBSYSTEM. F-66

*Functional Description.* The cannon elevating hydraulic subsystem raises and lowers the cannon to any angle between 0° horizontal and 65° maximum raised position.

Two cannon elevating directional control valves (1 and 2) are provided so that either the gunner or the assistant gunner can raise or lower the cannon. Squeezing the handles of directional control valve (1 or 2) actuates a switch that energizes solenoid valve (13).

When energized, solenoid valve (13) directs hydraulic pressure to hydraulic brake (9), to pressure reducing valve (5), to the stroke control cylinder of hydraulic motor (10), and to directional control valve (1 and 2).

Moving the handle of either directional control valve in either RAISE or LOWER direction controls and directs hydraulic fluid at about 2400 psi (16,548 kPa) to hydraulic motor (10). Moving the handle farther

away from the center (off) position increases the hydraulic fluid through hydraulic motor (10). This increases the raising or lowering speed of the cannon.









During lowering, the weight of the cannon puts back pressure on hydraulic motor (10), making it work as a pump. However, pressure reducing valve (5) prevents rapid return of the hydraulic fluid to the other side of hydraulic motor (10). This action slows The lowering of the cannon to a slow speed. Either directional control valve (1 or 2) bypasses pressure reducing valve (5) and allows the cannon to be lowered faster

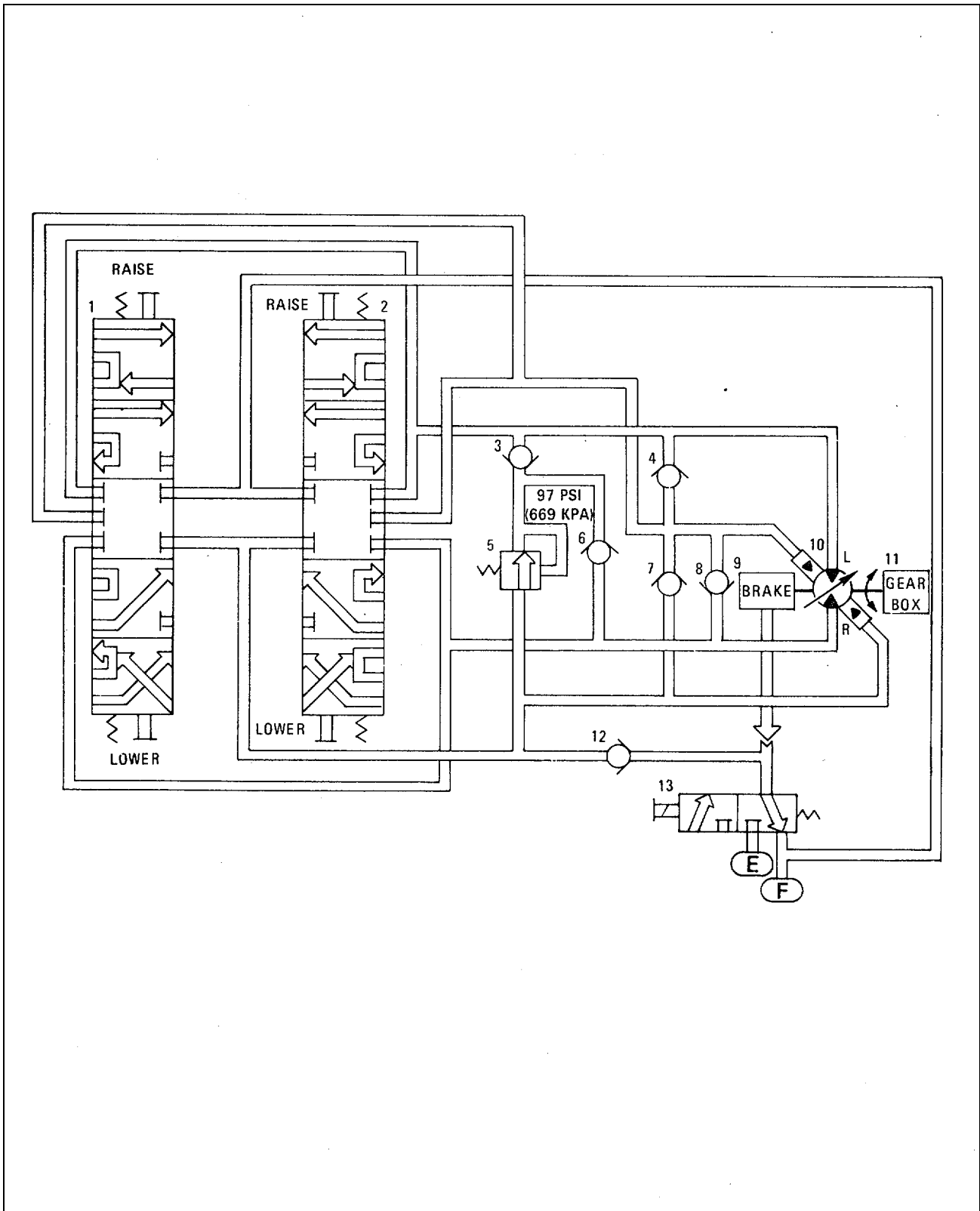
When the handle of directional control valve (1 or 2) is release, the switch is deactivated, which deenergizes solenoid valve (13). Hydraulic pressure to the subsystem is shut off, allowing spring pressure to set hydraulic brake (9) stopping hydraulic motor (10) and the cannon.

**LEGEND**

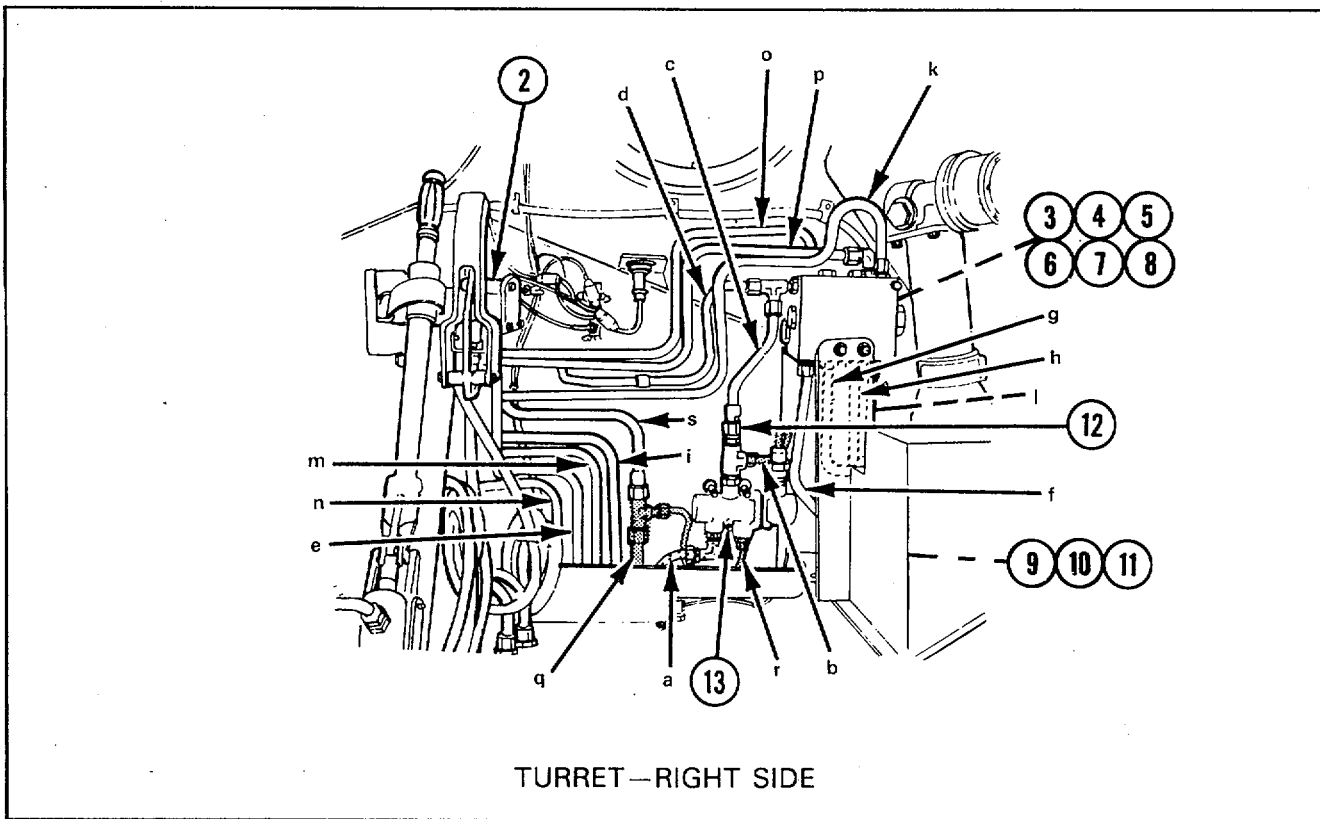
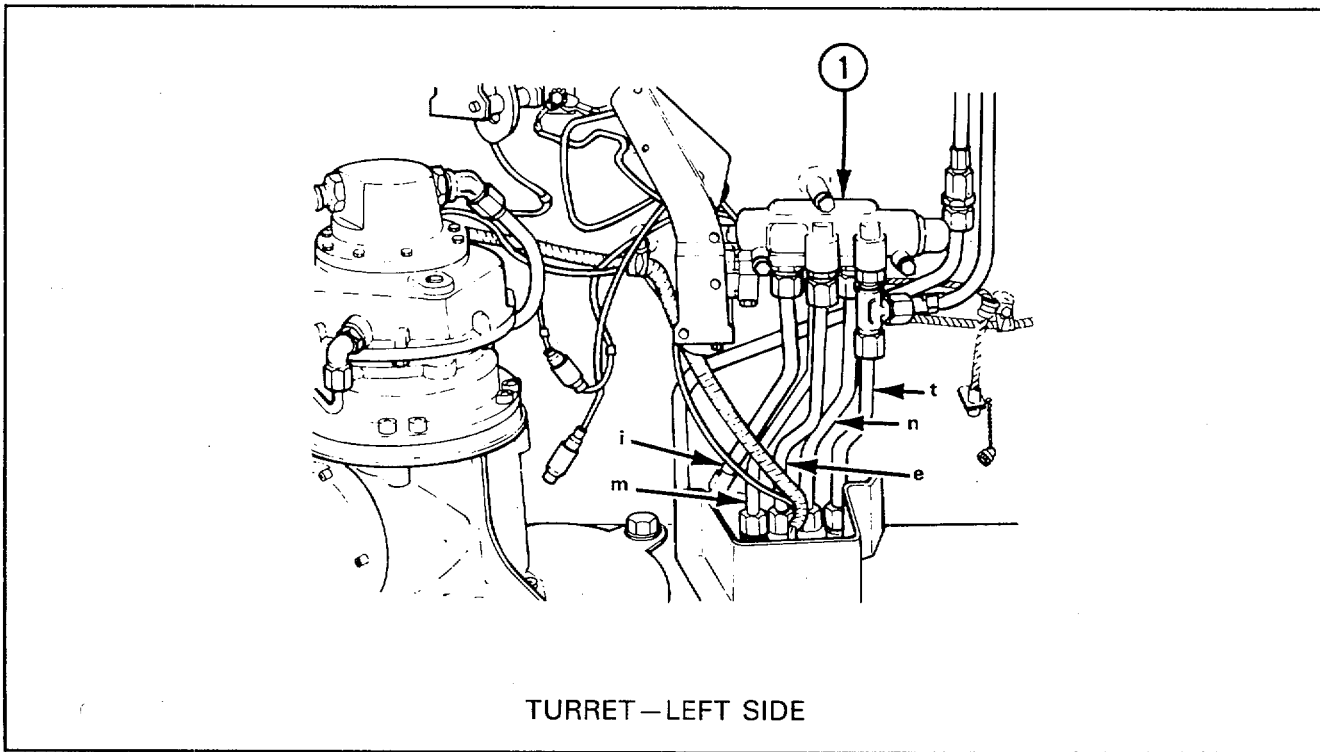
- 1 Directional control valve (left)
- 2 Directional control valve (right)
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Cannon elevating gearbox
- 12 Check valve
- 13 Solenoid valve

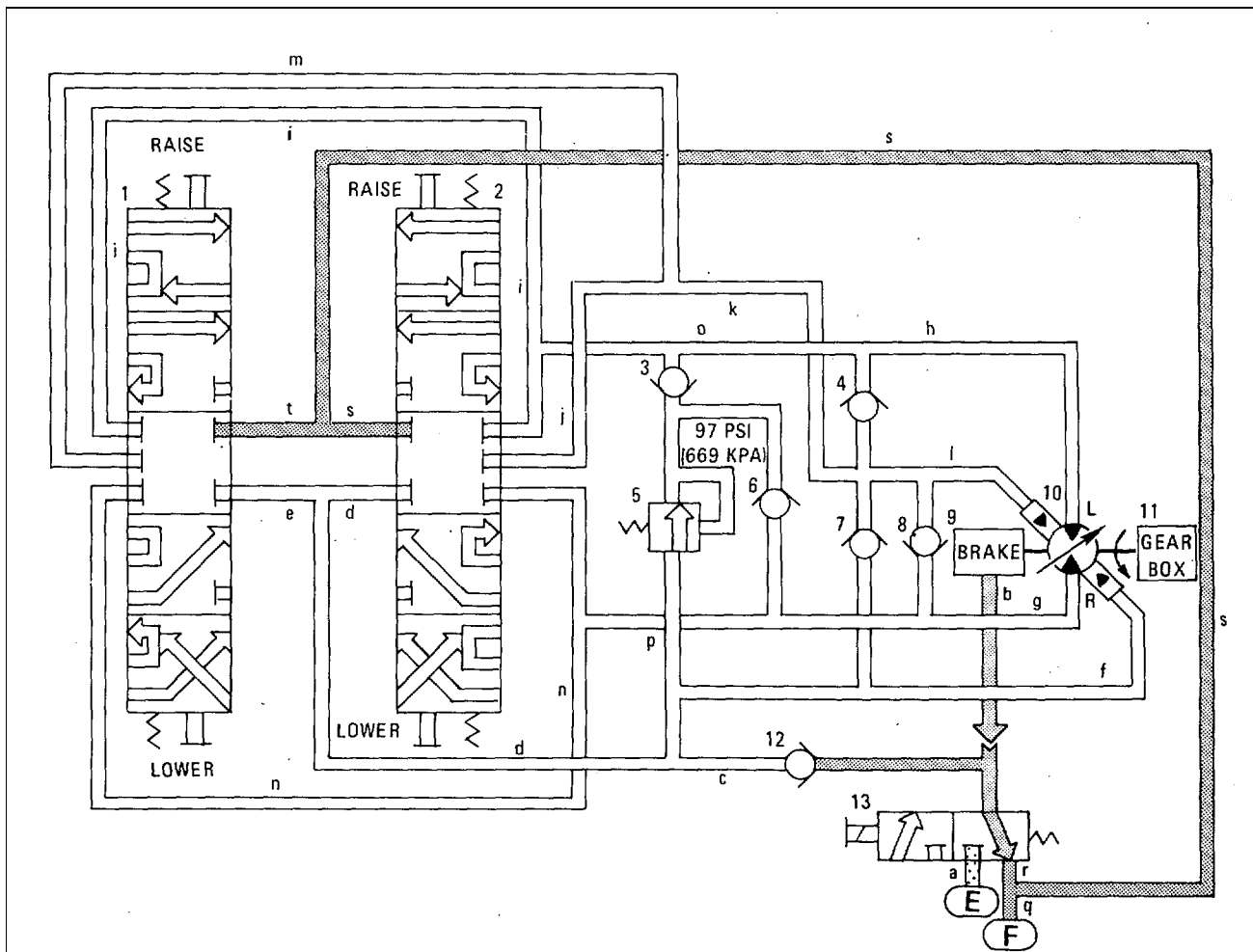
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



F-38. CANNON ELEVATING - STOPPED (BRAKE ON).







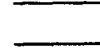
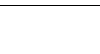


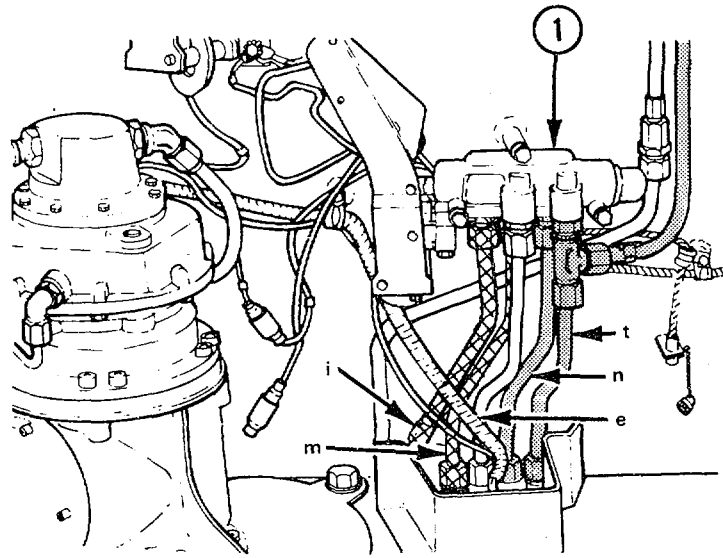


**LEGEND**

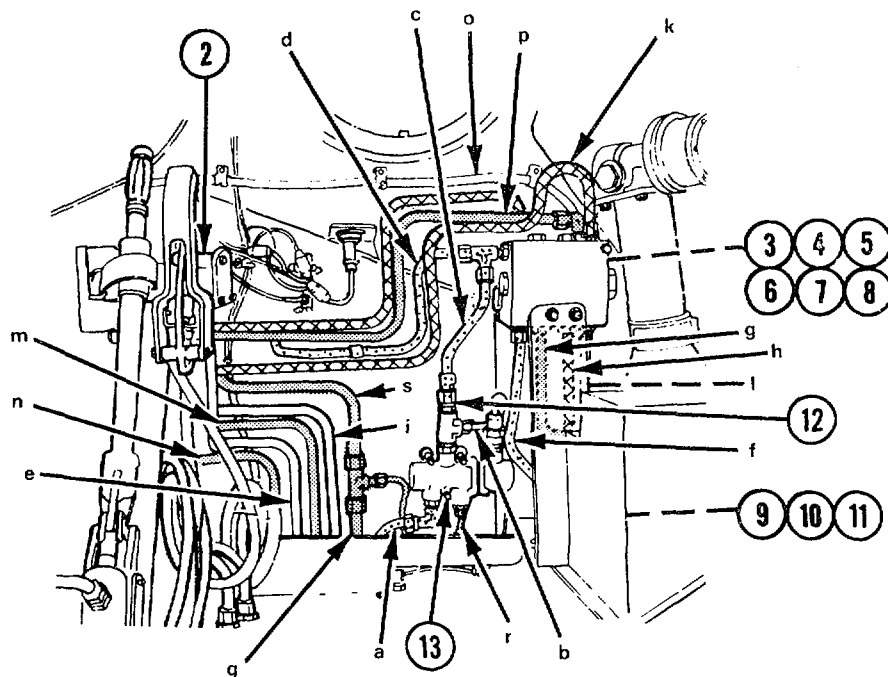
- 1 Directional control valve (left)
- 2 Directional control valve (right)
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Cannon elevating gearbox
- 12 Check valve
- 13 Solenoid valve

**BAR CODE**

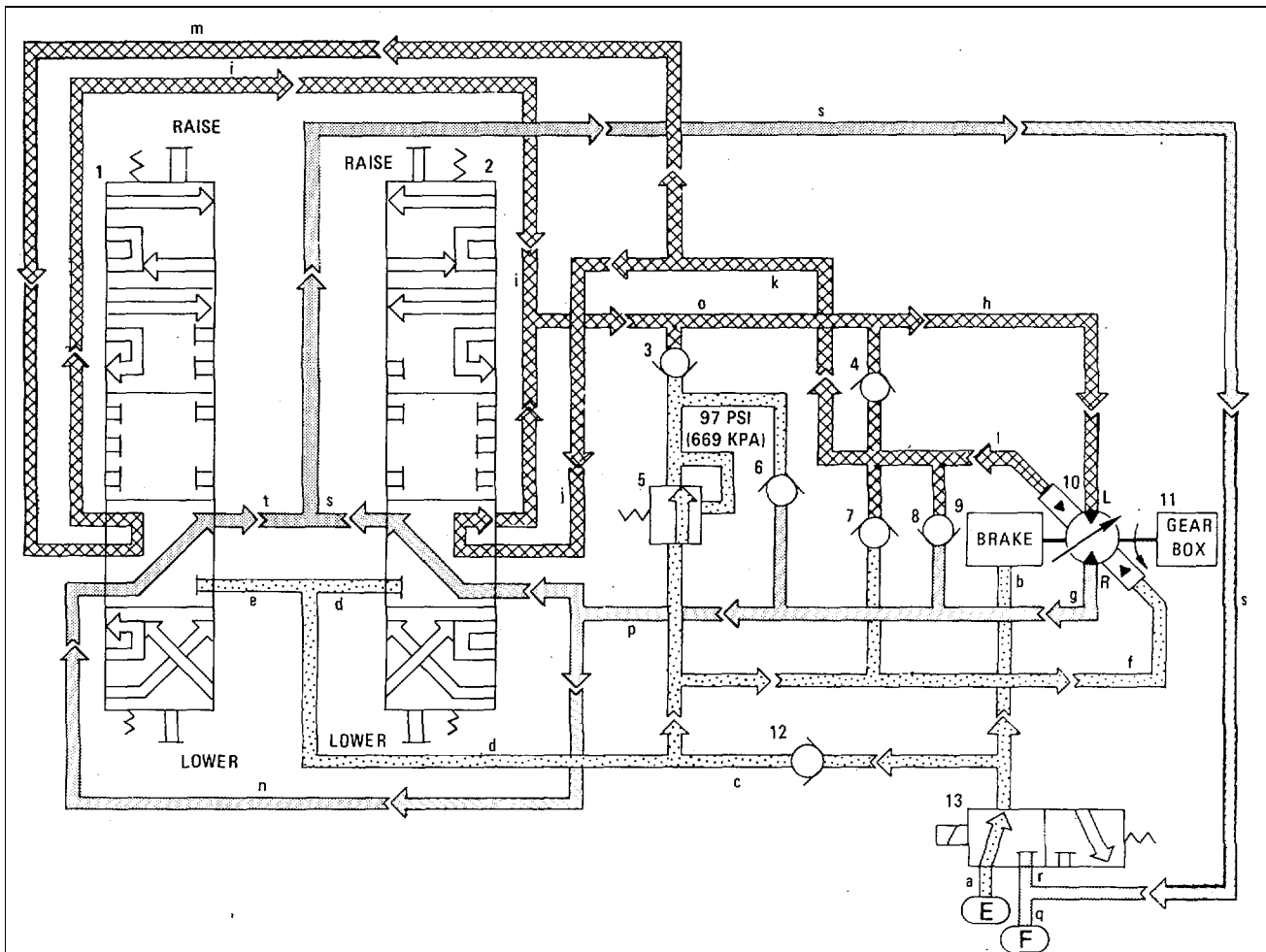
-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



TURRET—LEFT SIDE



TURRET—RIGHT SIDE











**NOTE**

Both directional control valves (1 and 2) are shown operated: actually only one would be in use and the other one would be off

**LEGEND**

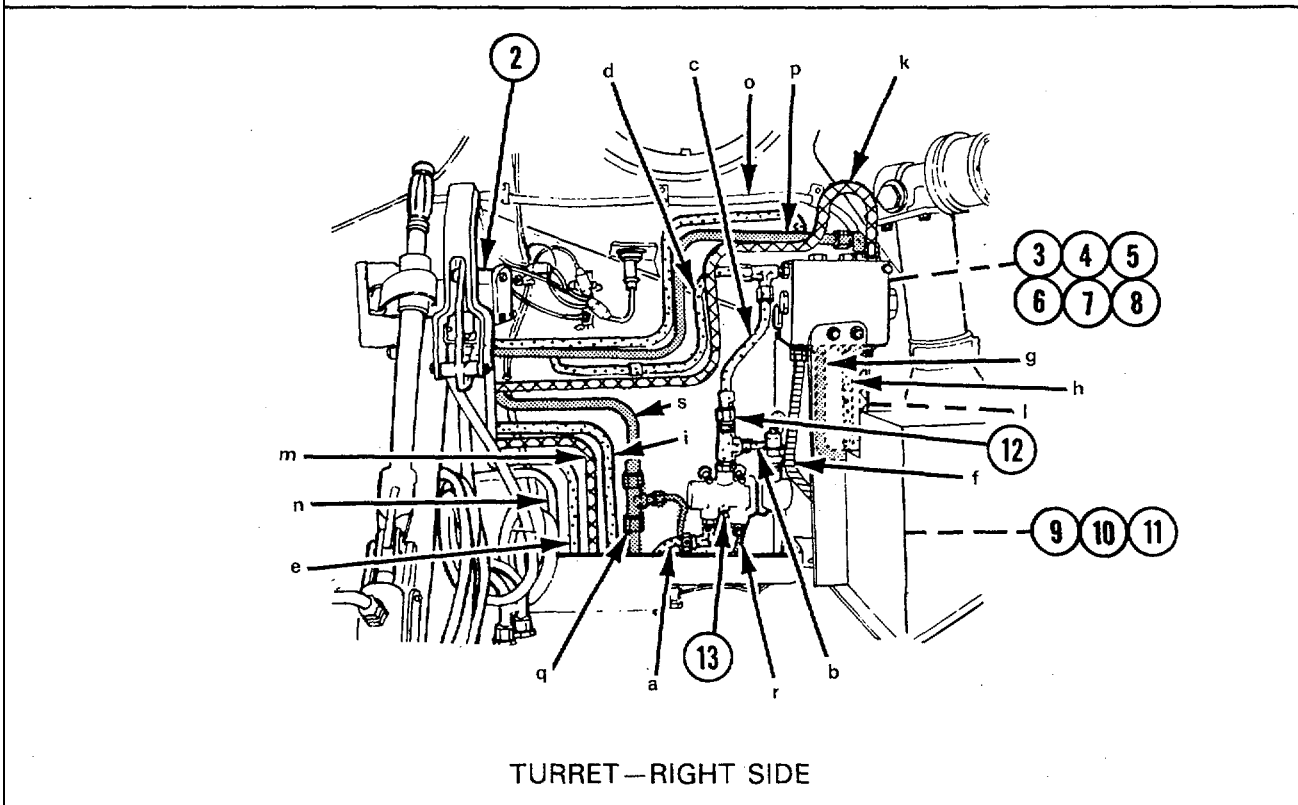
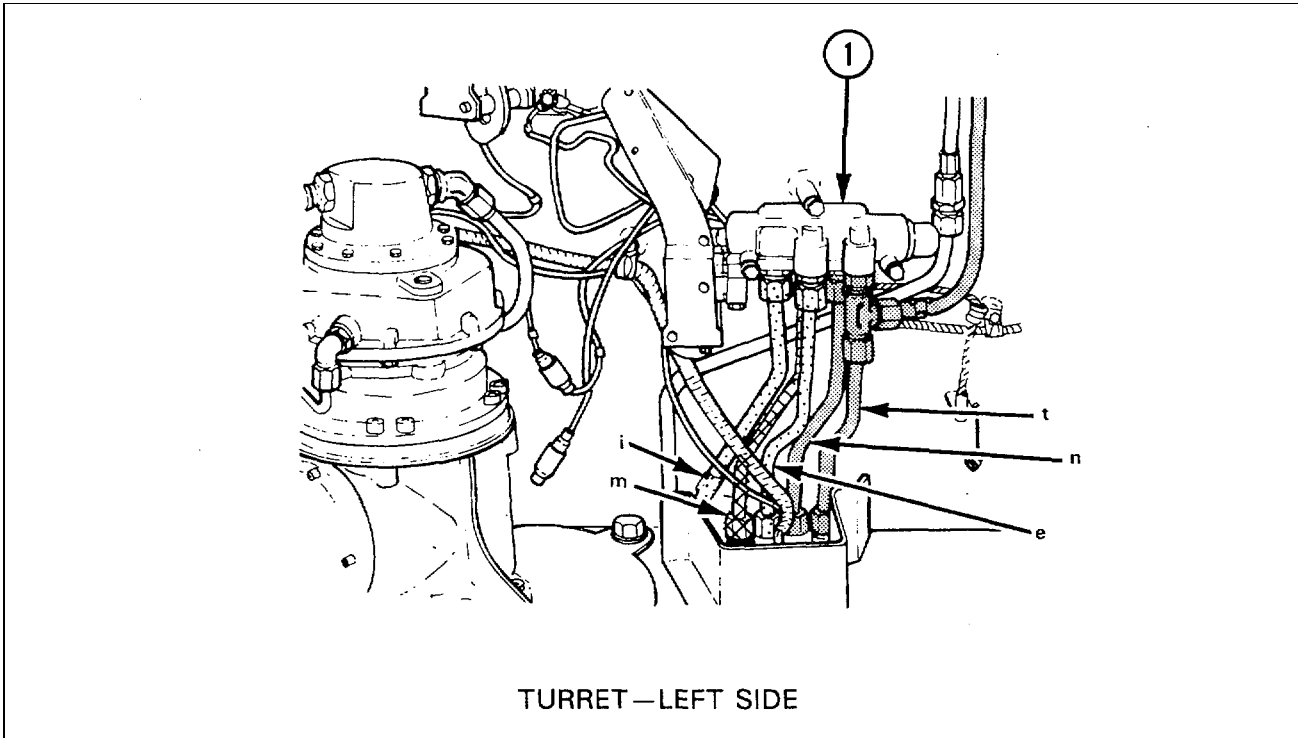
- 1 Directional control valve (left)
- 2 Directional control valve (right)
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Cannon elevating gearbox
- 12 Check valve
- 13 Solenoid valve

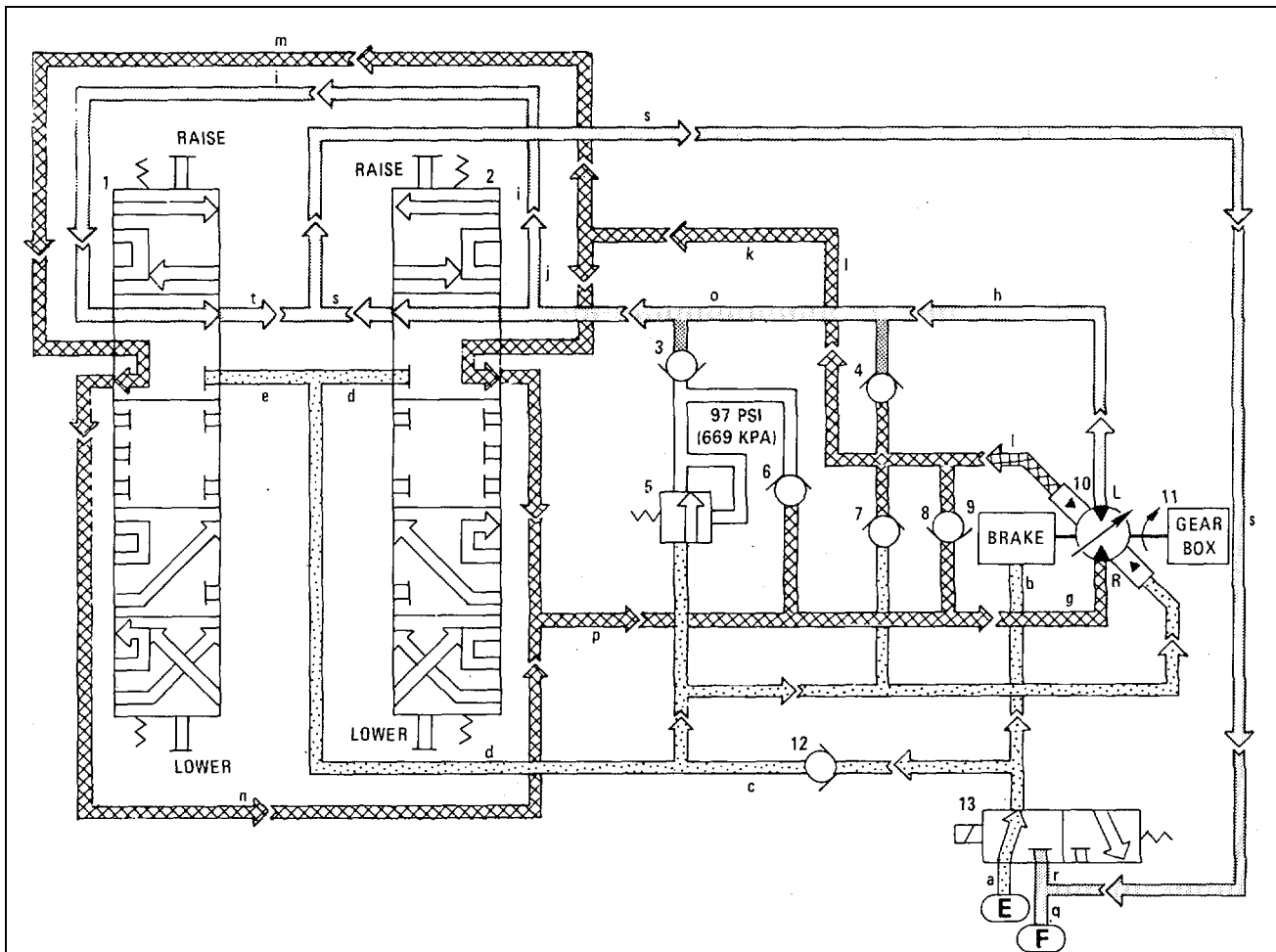
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



F-40. CANNON ELEVATING-LOWERING (FULL FLOW).











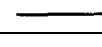

**NOTE**

Both directional control valves (1 and 2) are shown operated: actually only one would be in use and the other one would be off

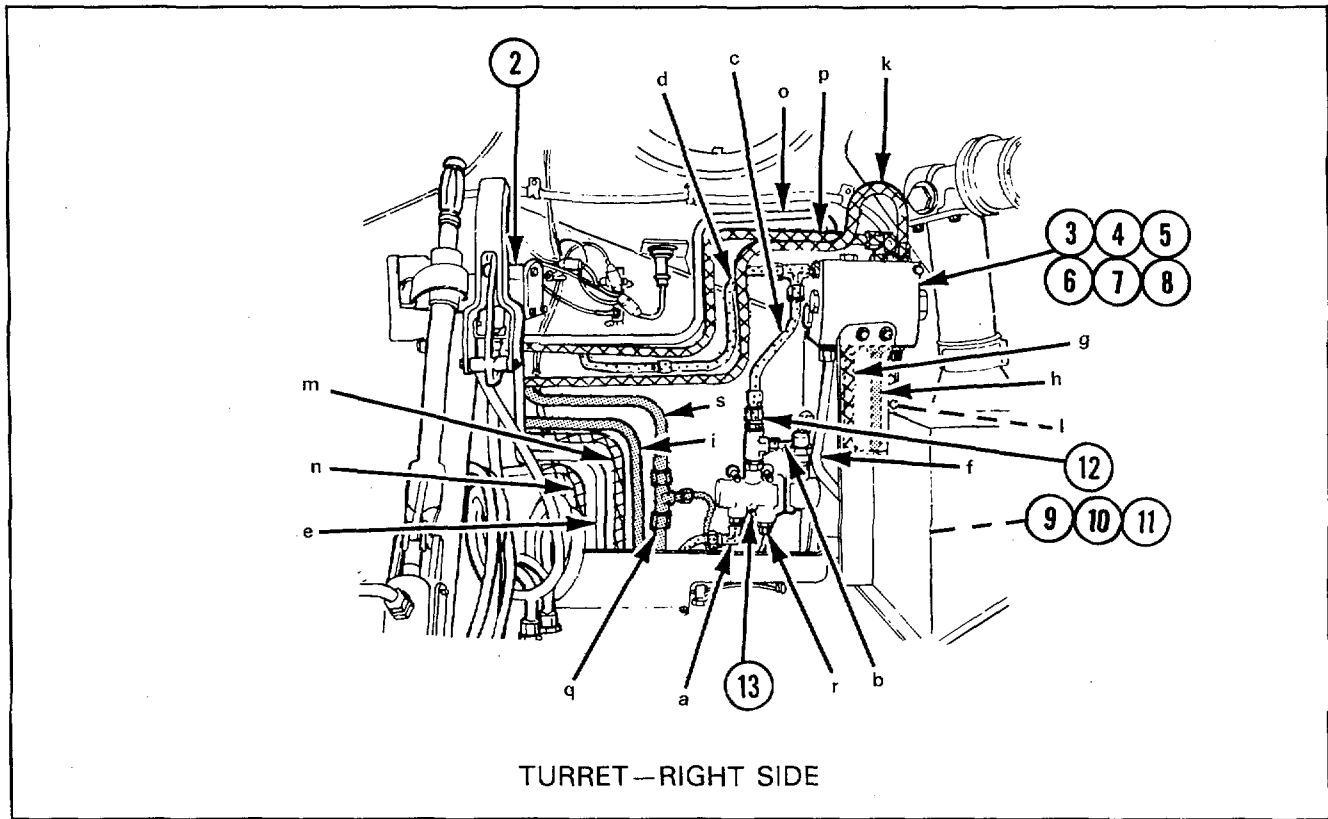
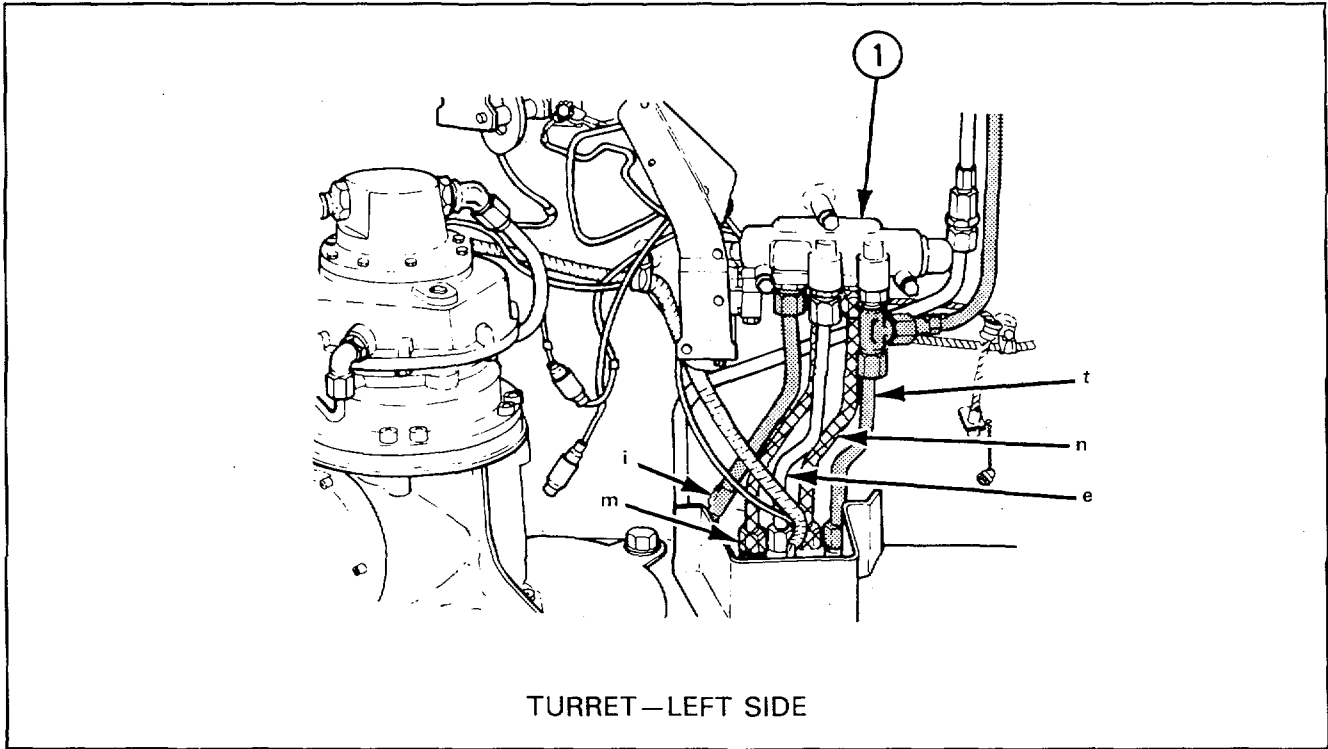
**LEGEND**

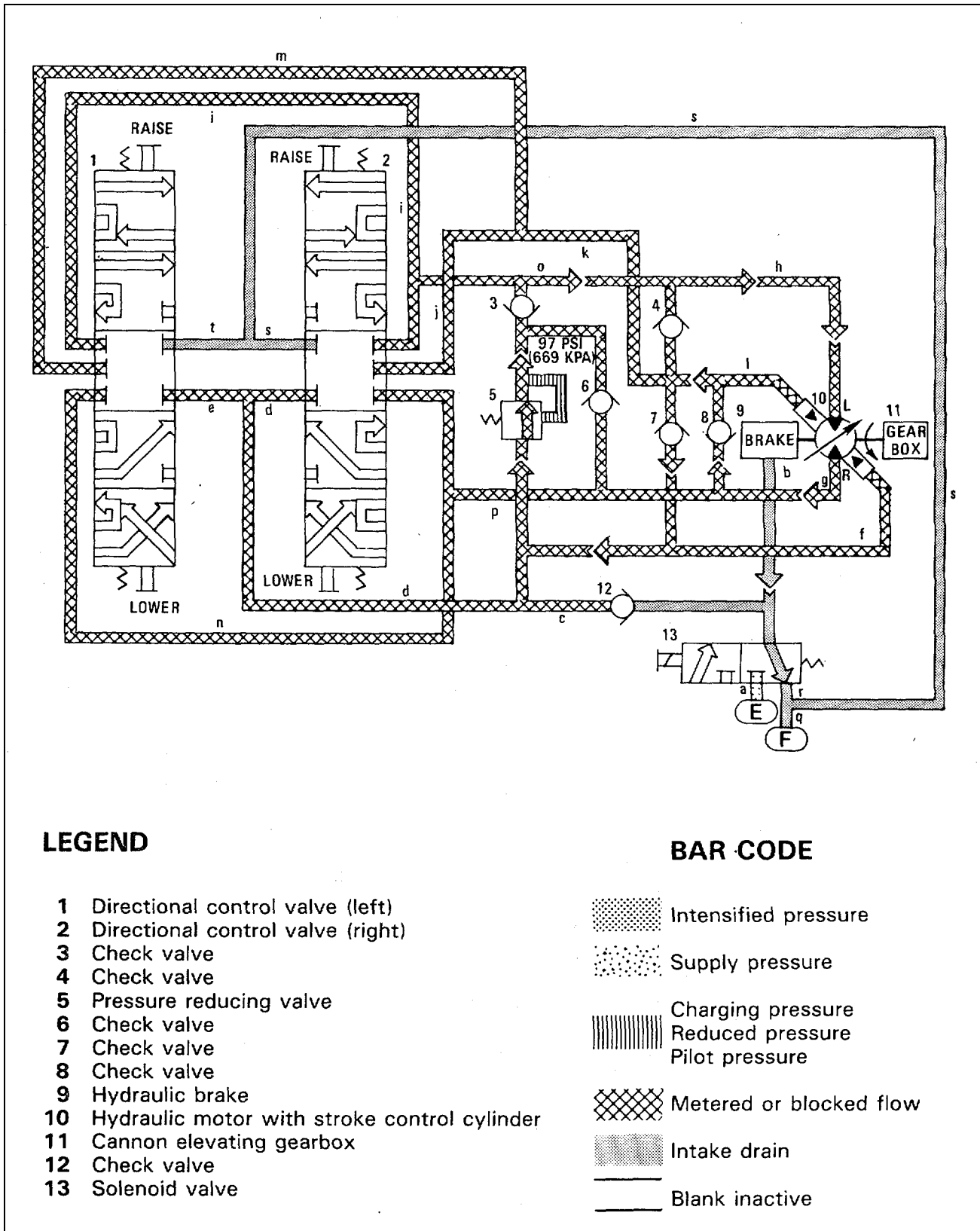
- 1 Directional control valve (left)
- 2 Directional control valve (right)
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Cannon elevating gearbox
- 12 Check valve
- 13 Solenoid valve

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-41. CANNON ELEVATING-LOWERING (STOPPING).






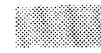

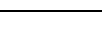


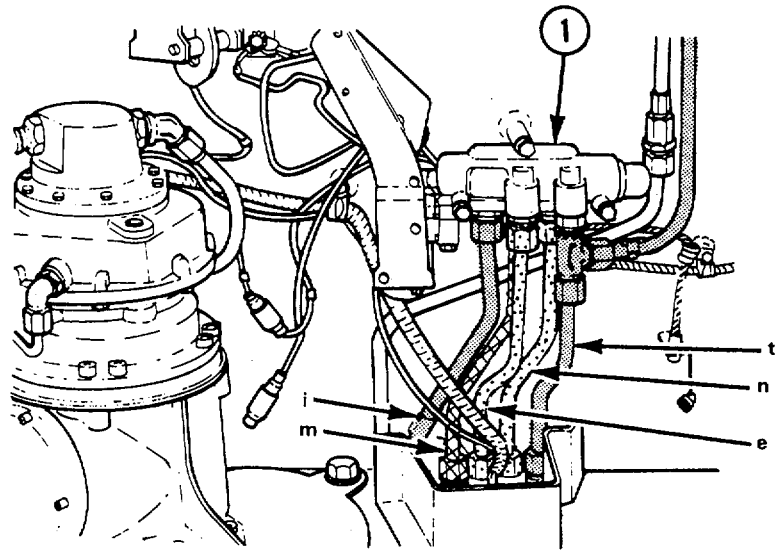


**LEGEND**

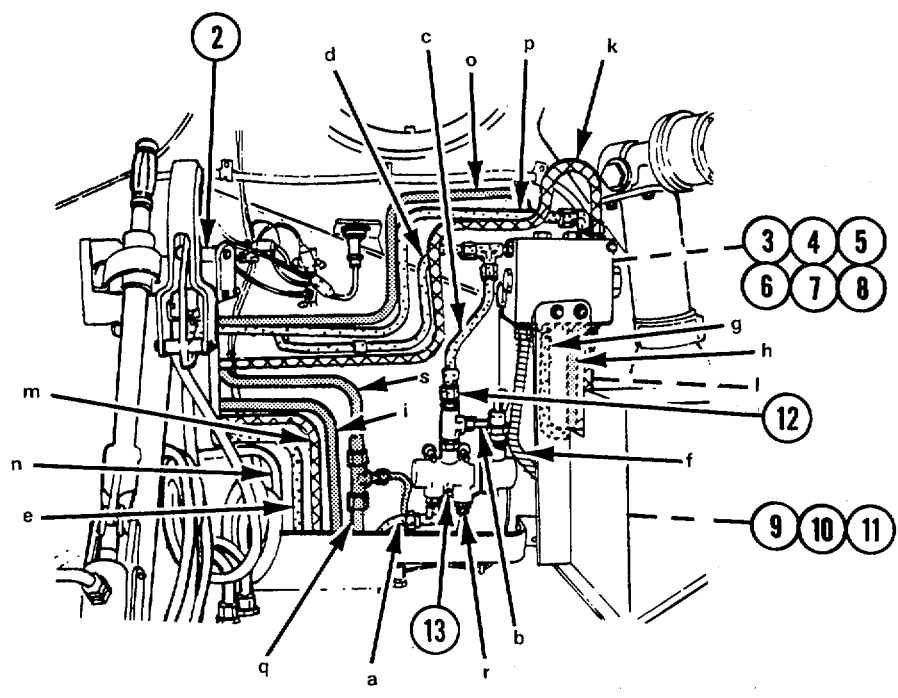
- 1 Directional control valve (left)
- 2 Directional control valve (right)
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Cannon elevating gearbox
- 12 Check valve
- 13 Solenoid valve

**BAR CODE**

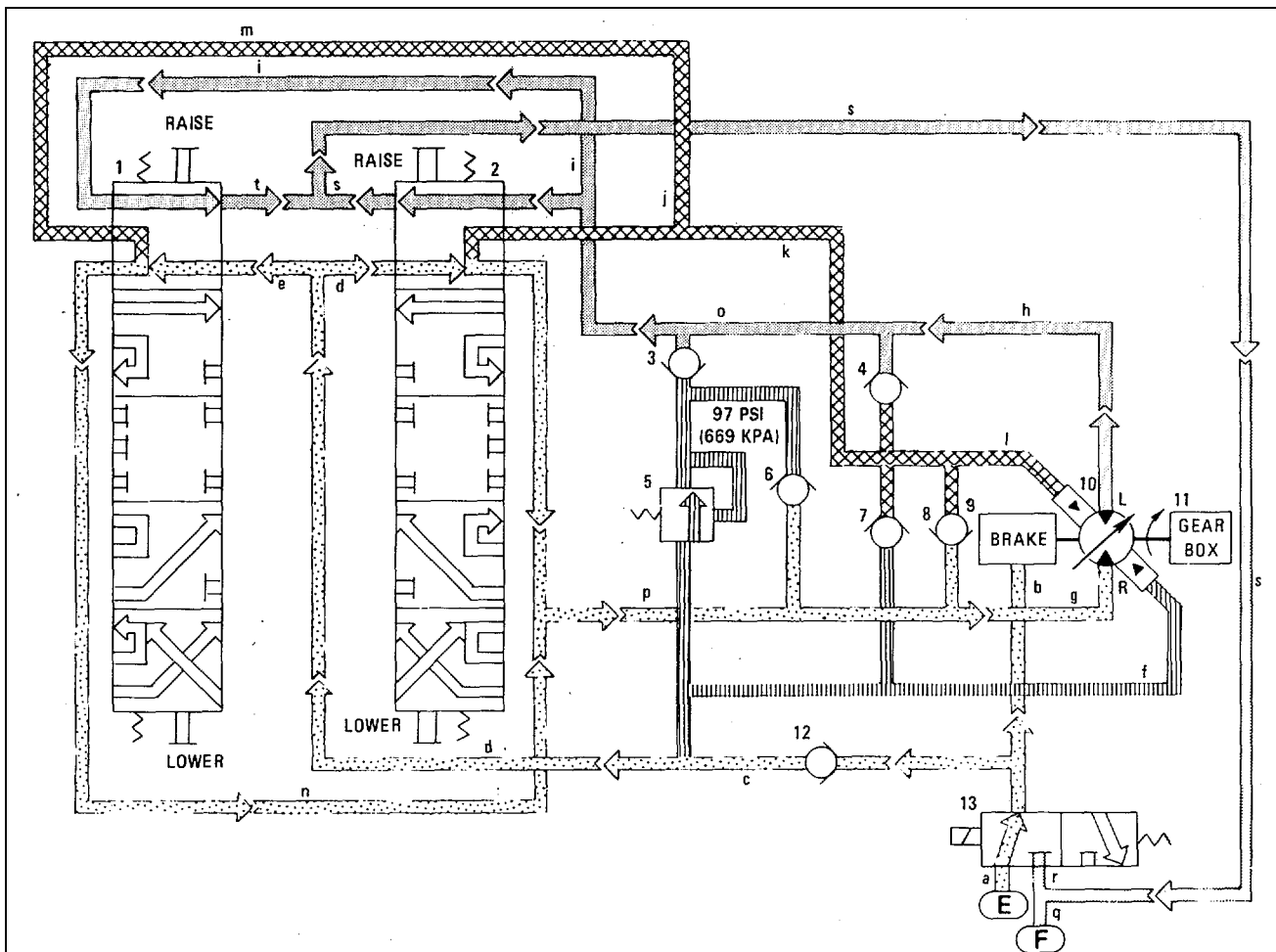
-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



TURRET - LEFT SIDE



TURRET - RIGHT SIDE











**NOTE**

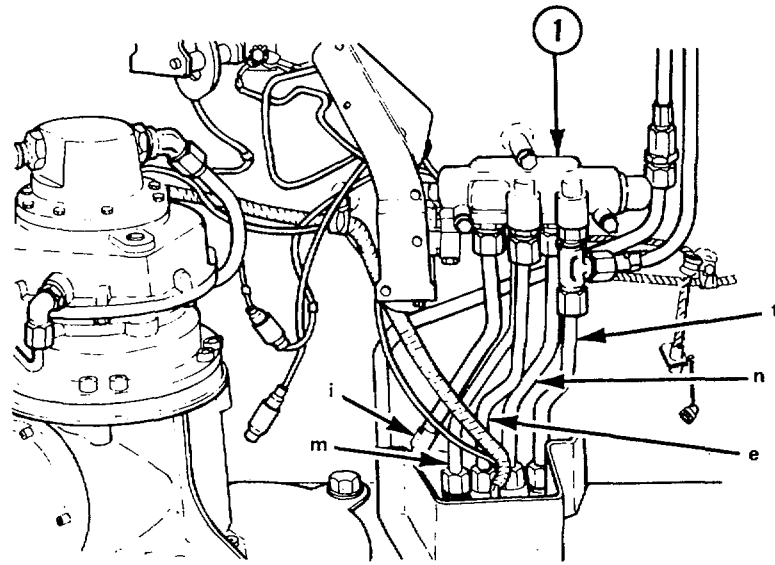
Both directional control valves (1 and 2) are shown operated: actually only one would be in use and the other one would be off

**LEGEND**

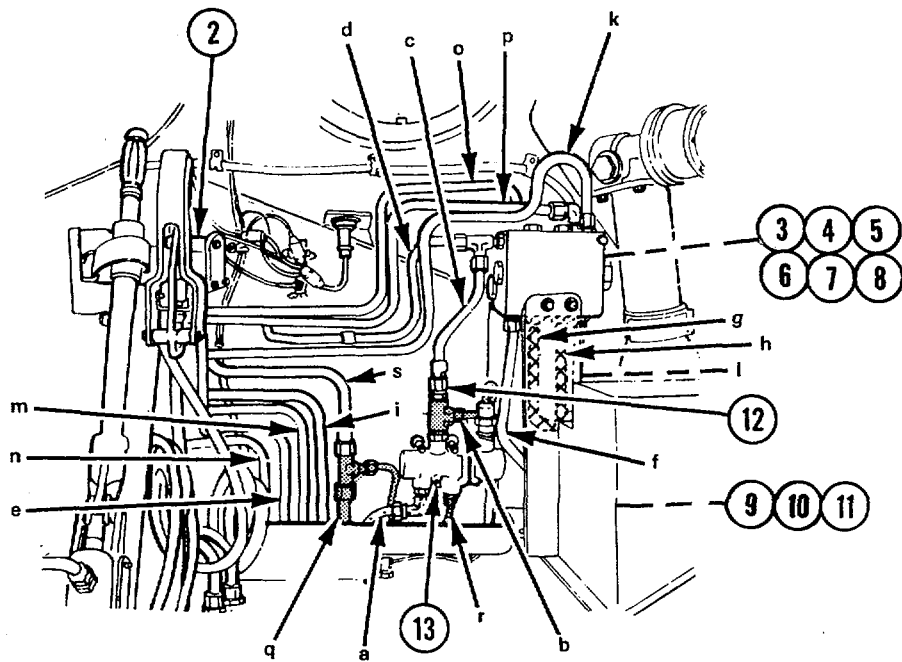
- 1 Directional control valve (left)
- 2 Directional control valve (right)
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Cannon elevating gearbox
- 12 Check valve
- 13 Solenoid valve

**BAR CODE**

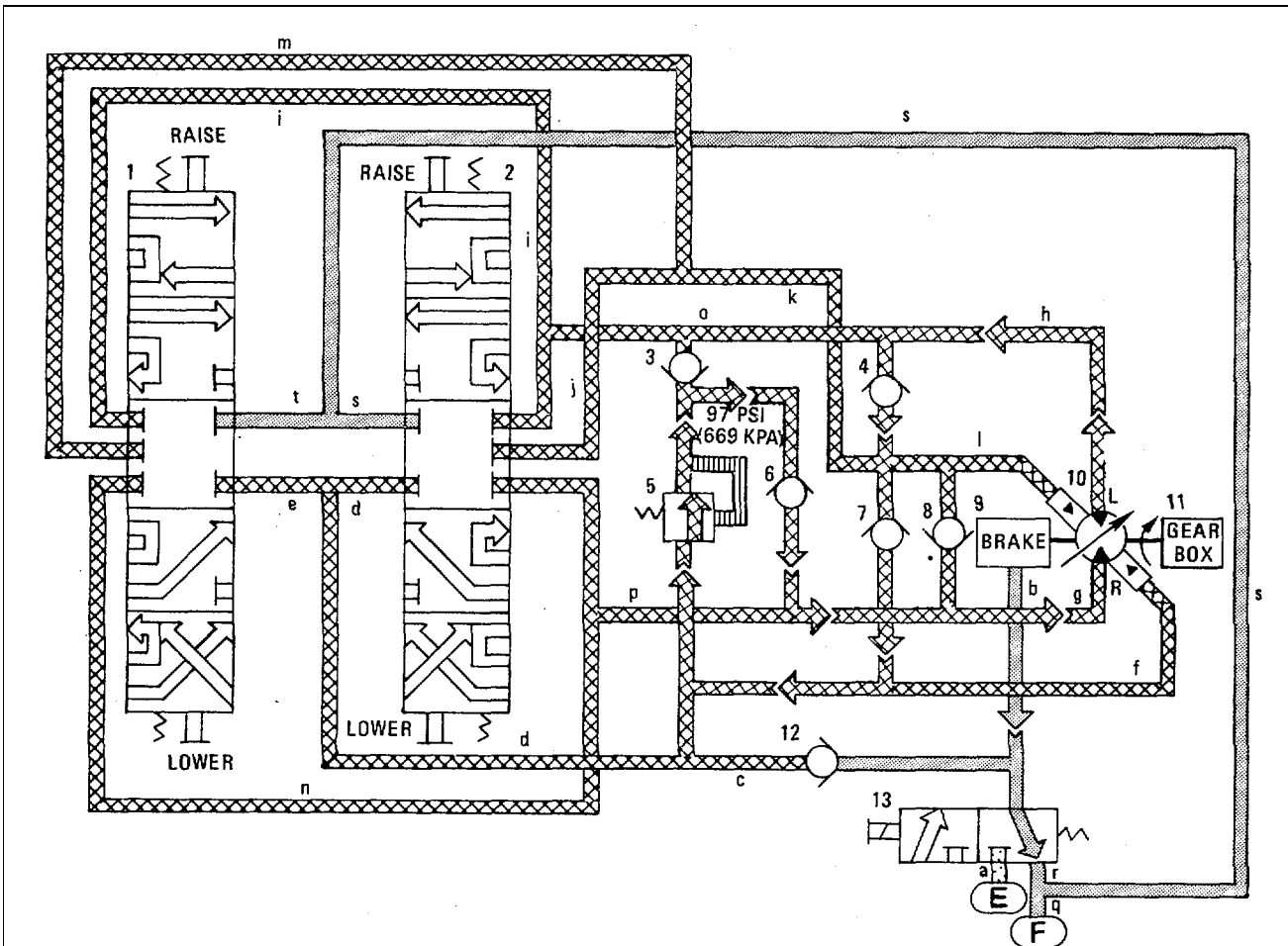
-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



TURRET—LEFT SIDE











TURRET—RIGHT SIDE



**LEGEND**

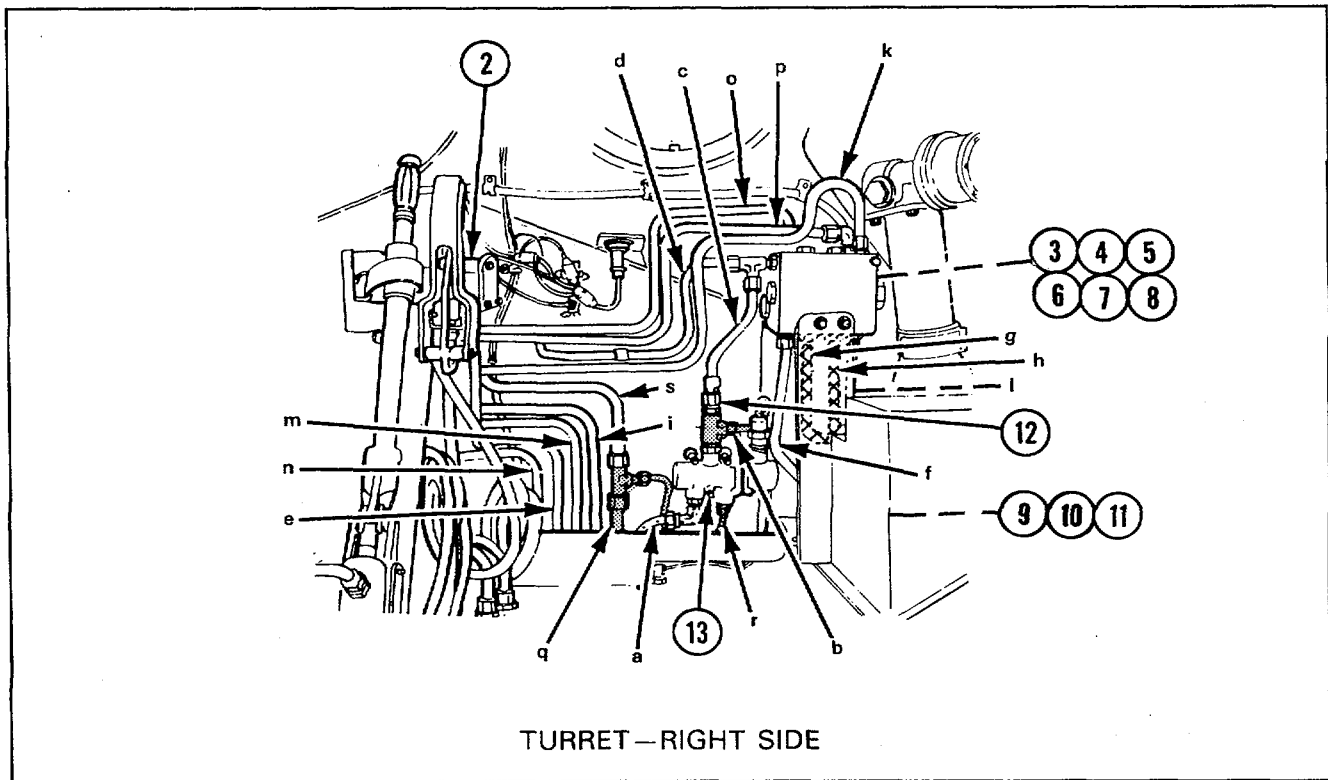
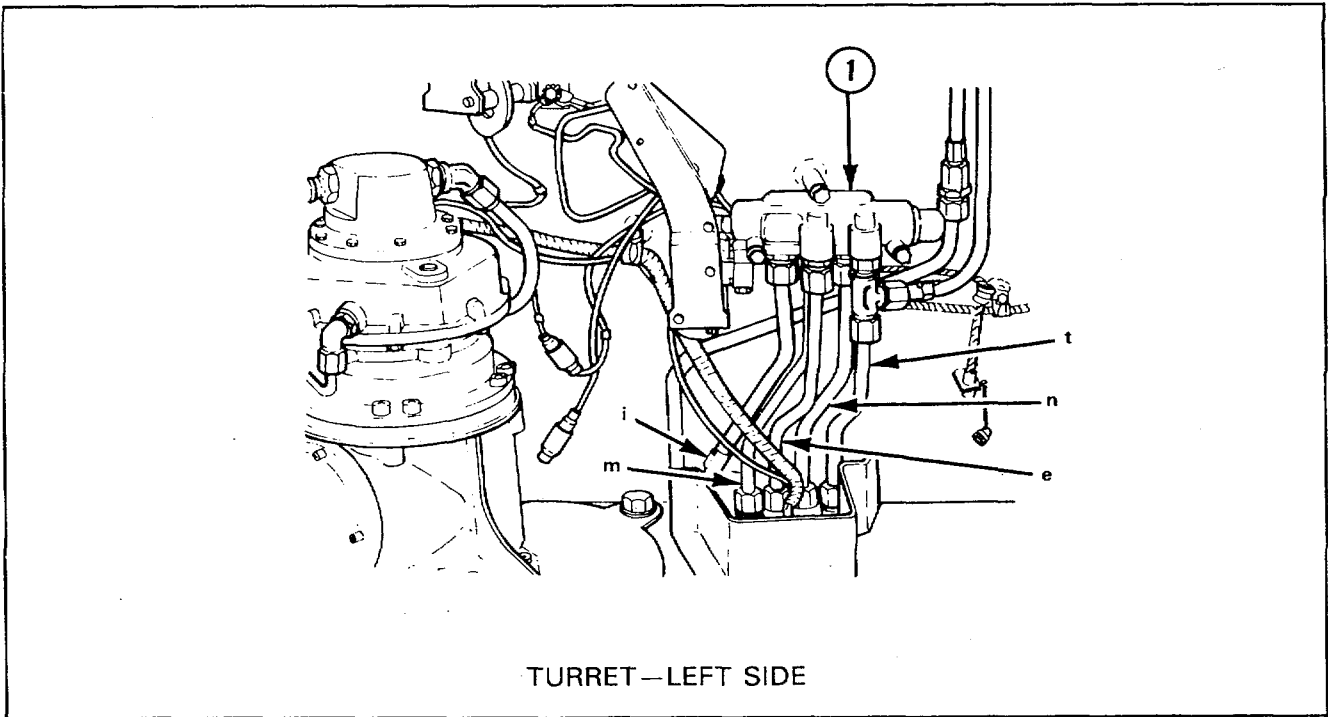
- 1 Directional control valve (left)
- 2 Directional control valve (right)
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Cannon elevating gearbox
- 12 Check valve
- 13 Solenoid valve

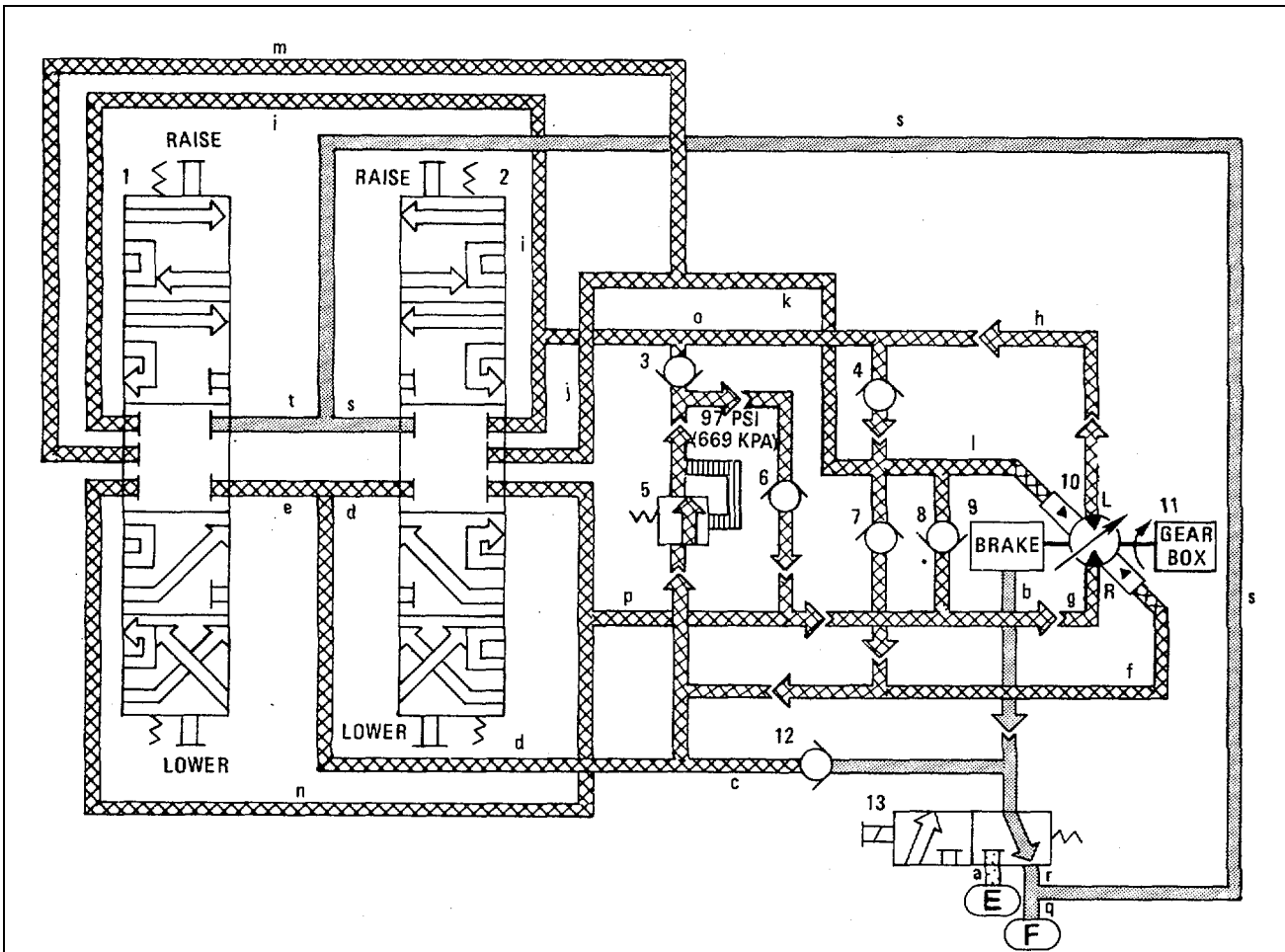
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



F-44. CANNON ELEVATING-RAISING (STOPPING).













**LEGEND**

- 1 Directional control valve (left)
- 2 Directional control valve (right)
- 3 Check valve
- 4 Check valve
- 5 Pressure reducing valve
- 6 Check valve
- 7 Check valve
- 8 Check valve
- 9 Hydraulic brake
- 10 Hydraulic motor with stroke control cylinder
- 11 Cannon elevating gearbox
- 12 Check valve
- 13 Solenoid valve

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

**F-45. LOADER AND RAMMER TRAVERSING HYDRAULIC SUBSYSTEM.**

*Functional Description.* The loader and rammer traversing hydraulic subsystem swings the loader and rammer from the stowed position to the loading position and back again.

Releasing the loader and rammer stowed position lock and moving the handle of directional control valve (9) to LOAD position directs hydraulic fluid at about 2400 psi (16,548 kPa) through restrictor (5) to extend side of loader and rammer traversing cylinder (8).

As cylinder (8) extends, a rack and pinion gearset swings the loader and rammer to the loading position.

Releasing the handle allows directional control valve (9) to return to the center (off) position, blocking both hydraulic fluid supply and return lines. This locks the loader and rammer in position.

When the loader and rammer is locked in the loading position, the pivot interlock switch is actuated, which energizes the rammer solenoid operated shutoff valve and allows the rammer hydraulic subsystem to be operated.

Releasing the ram position lock and moving the handle of directional control valve (9) to STOW position, directs hydraulic fluid through restrictor (1) to the retract side of loader and rammer traversing cylinder (8).









As cylinder (8) retracts, the loader and rammer swings back to the stowed and locked position.

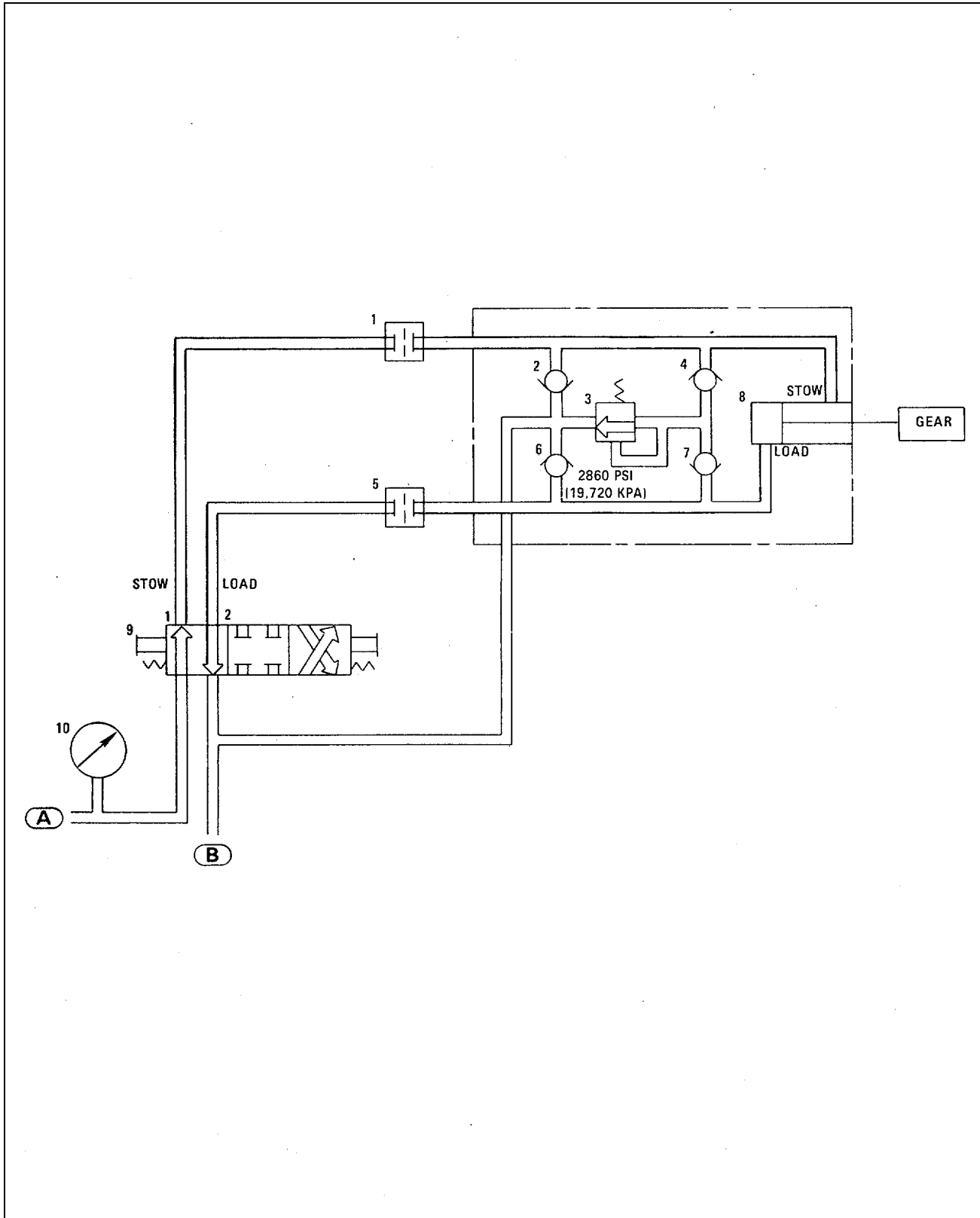
The subsystem is protected from over-pressure by pressure relief valve (3), which bypasses hydraulic fluid over 2860 psi (19,720 kPa) back to the reservoir.

**LEGEND**

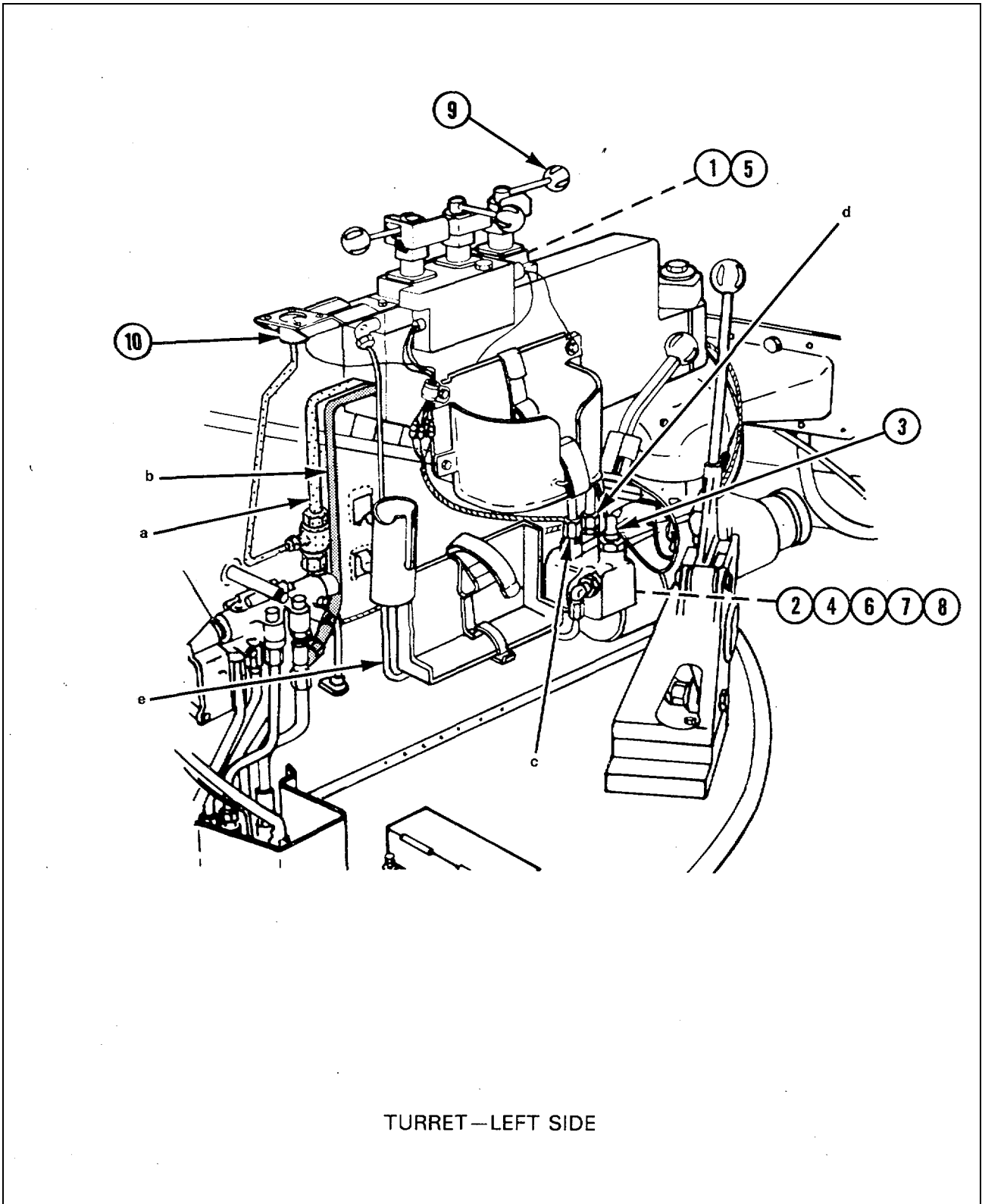
- 1 Restrictor union
- 2 Check valve
- 3 Pressure relief valve
- 4 Check valve
- 5 Restrictor union Charging pressure
- 6 Check valve
- 7 Check valve
- 8 Loader and rammer traversing cylinder
- 9 Directional control valve
- 10 Pressure gage

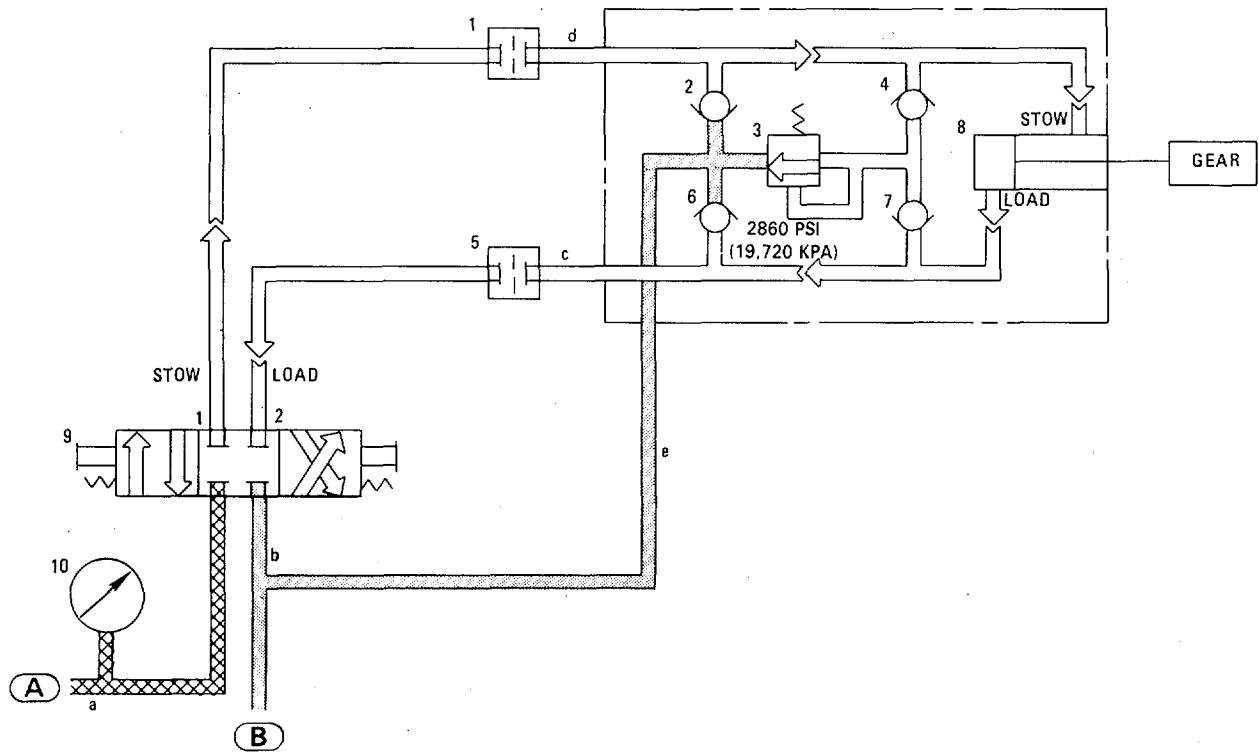
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



F-46. LOADER AND RAMMER TRAVERSING - CENTER (OFF) POSITION













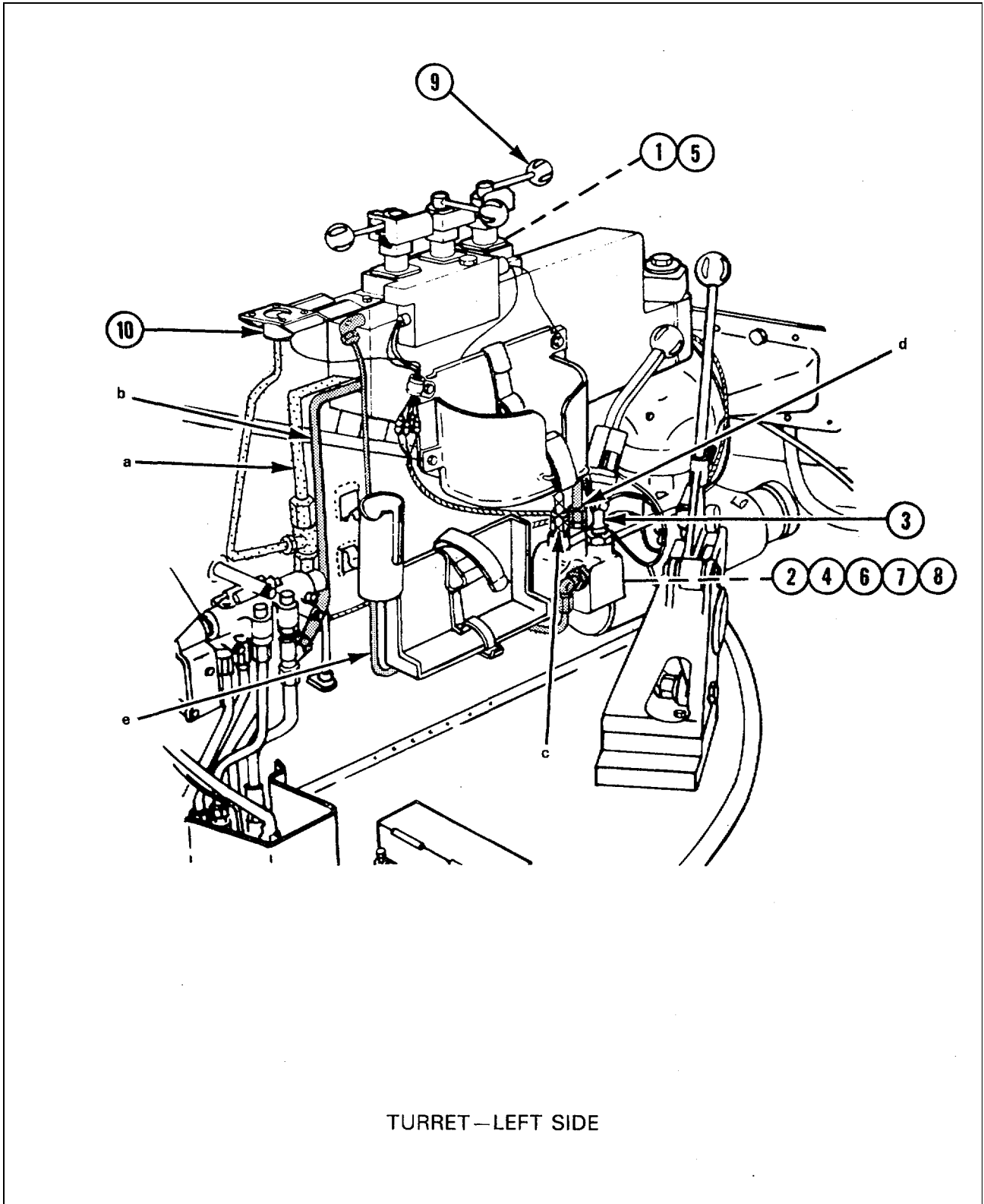
**LEGEND**

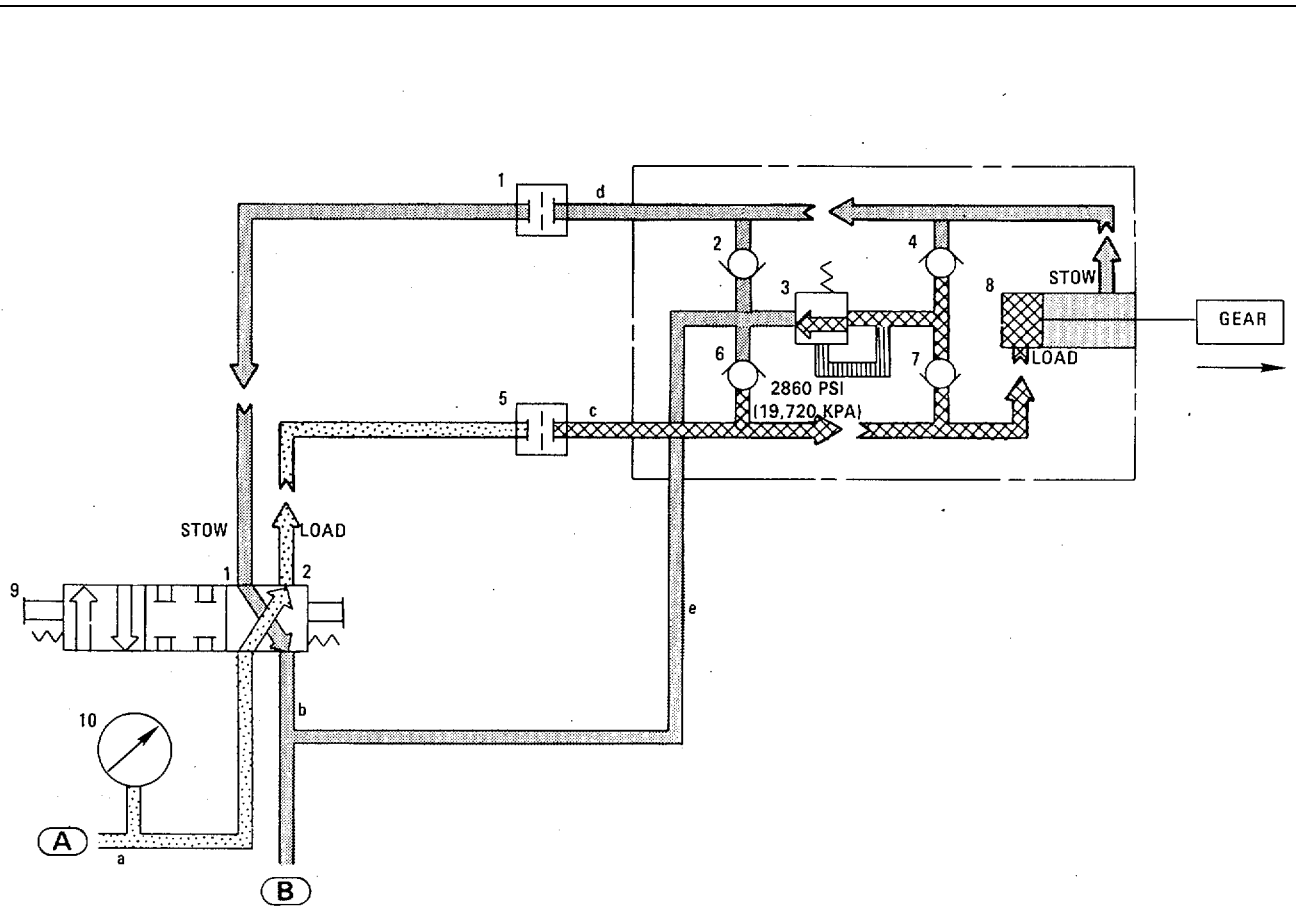
- 1 Restrictor union
- 2 Check valve
- 3 Pressure relief valve
- 4 Check valve
- 5 Restrictor union
- 6 Check valve
- 7 Check valve
- 8 Loader and rammer traversing cylinder
- 9 Directional control valve
- 10 Pressure gage

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-47. LOADER AND RAMMER TRAVERSING - LOAD POSITION.













**LEGEND**

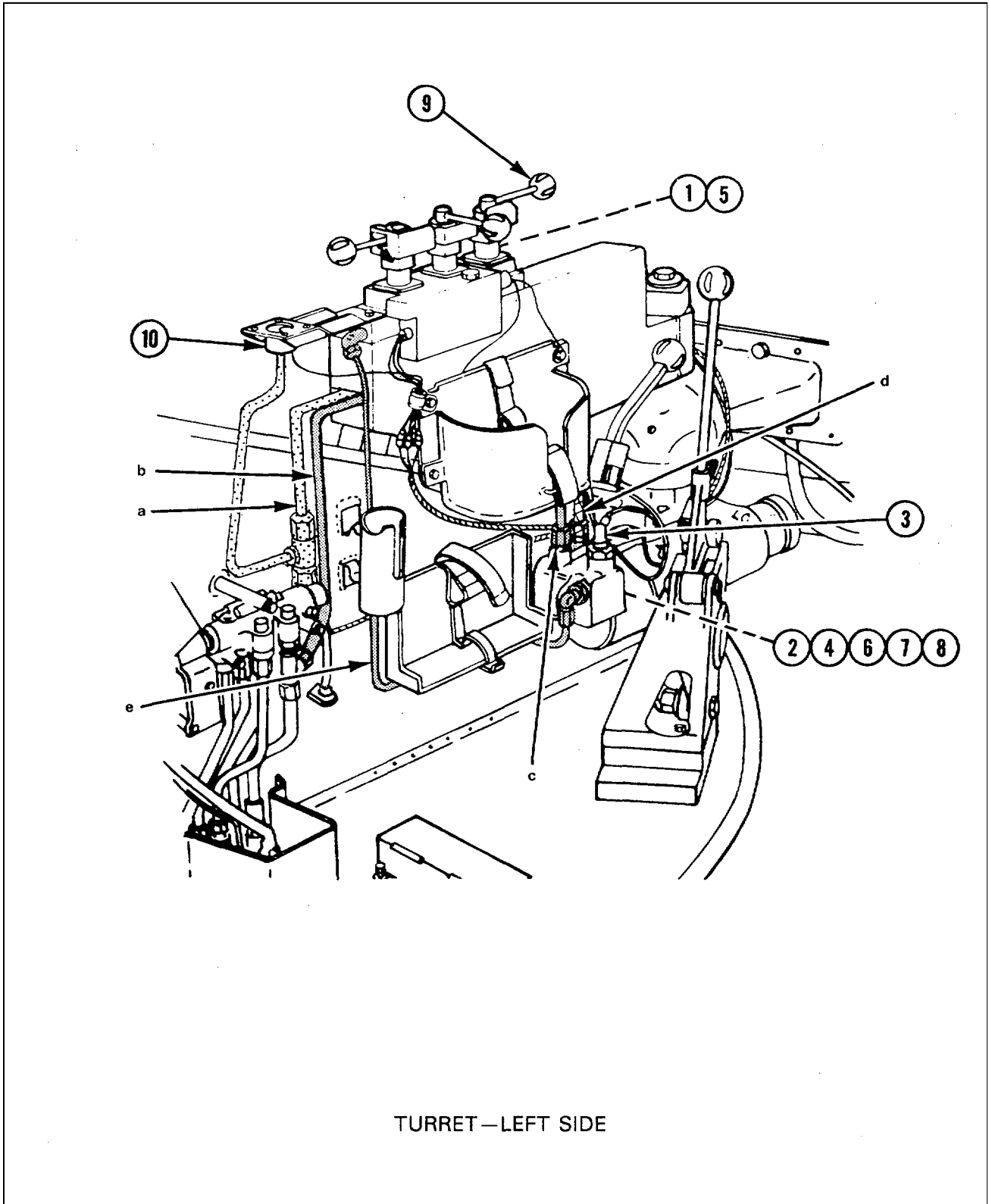
- 1 Restrictor union
- 2 Check valve
- 3 Pressure relief valve
- 4 Check valve
- 5 Restrictor union
- 6 Check valve
- 7 Check valve
- 8 Loader and rammer traversing cylinder
- 9 Directional control valve
- 10 Pressure gage

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



F-48. LOADER AND RAMMER TRAVERSING - STOW POSITION.





**F-49. LOADER HYDRAULIC SUBSYSTEM.**

*Functional Description.* The loader hydraulic subsystem swings the loader arms in and out to pick up and load ammunition on the loader and rammer.

Moving the handle of directional control valve (7) in the OUT position directs hydraulic fluid at about 2400 psi (16,548 kPa) through restrictor (6) and rotating manifold (2) to the retract sides of lift cylinders (3 and 5).

As cylinders (3 and 5) retract, loader arms (4) swing out over the spade to pick up a projectile.

Releasing the handle allows directional control valve (7) to return to the center (off) position, blocking both hydraulic fluid supply and return lines. This locks loader arms (4) in any desired position.







Moving the handle of directional control valve (7) in the IN position directs hydraulic fluid through restrictor (1) and rotating manifold (2) to the extend side of lift cylinders (3 and 5).

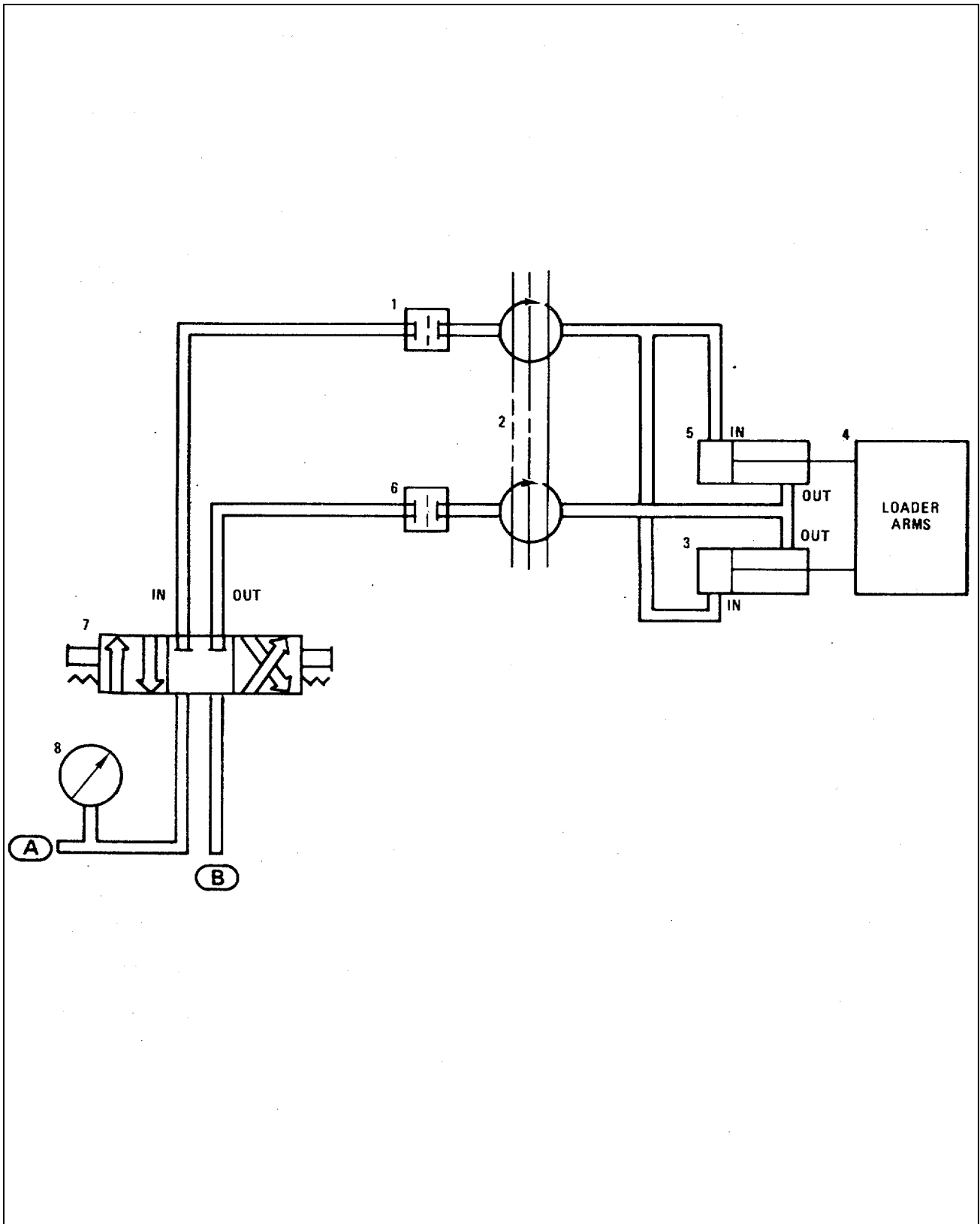
As cylinders (3 and 5) extend, loader arms (4) swing up and in, depositing the projectile on the loader and rammer, ready for ramming into the cannon breach.

**LEGEND**

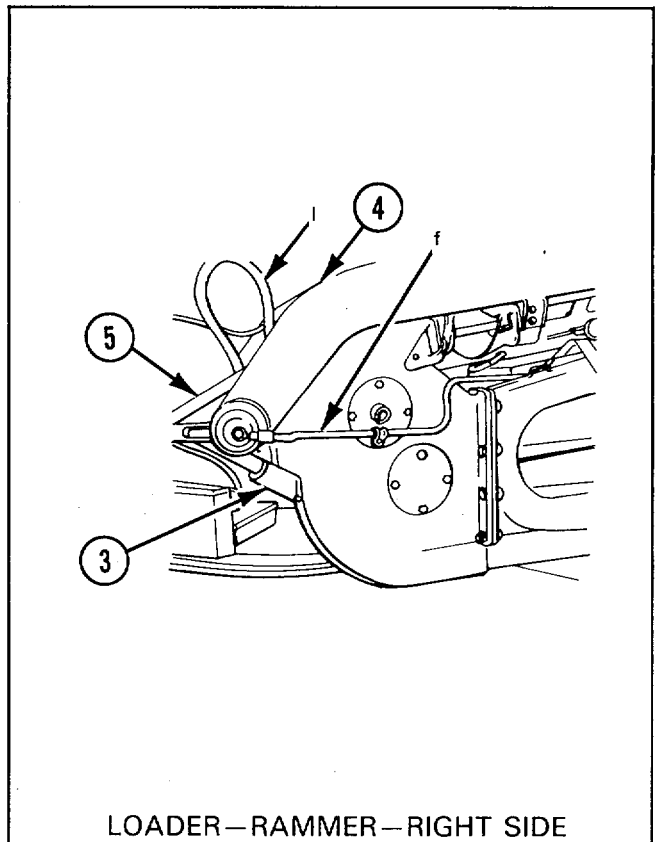
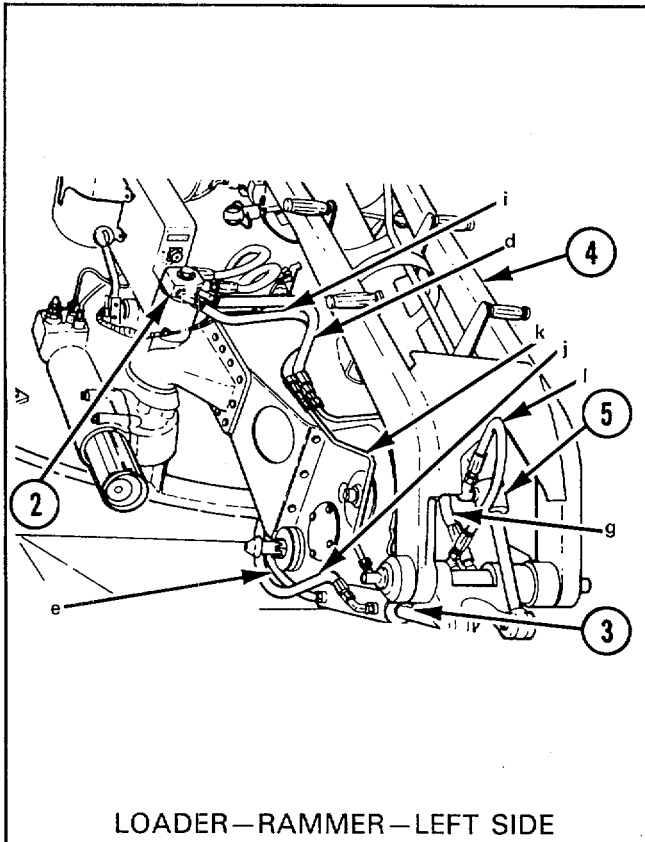
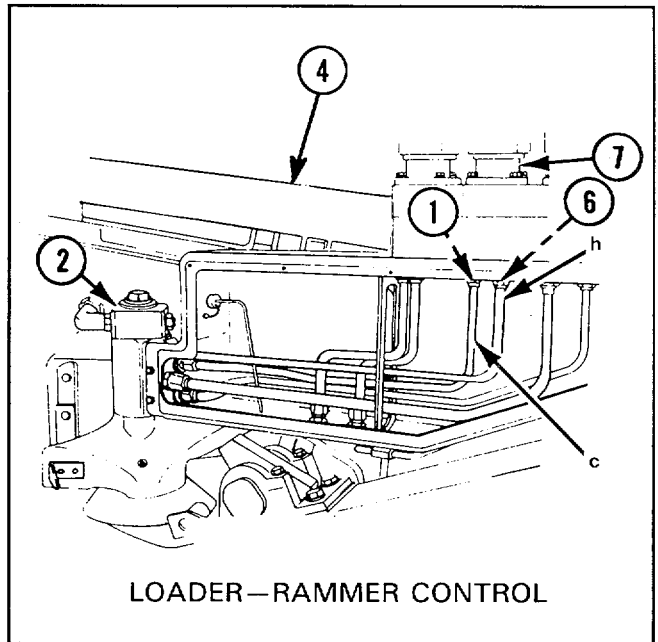
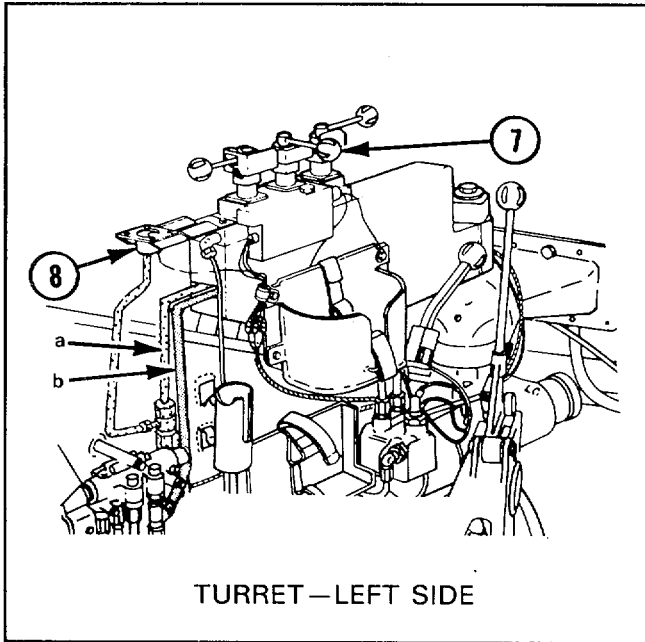
- 1 Restrictor union
- 2 Rotating manifold
- 3 Lift cylinder
- 4 Loader arms
- 5 Lift cylinder
- 6 Restrictor union
- 7 Directional control valve
- 8 Pressure gage

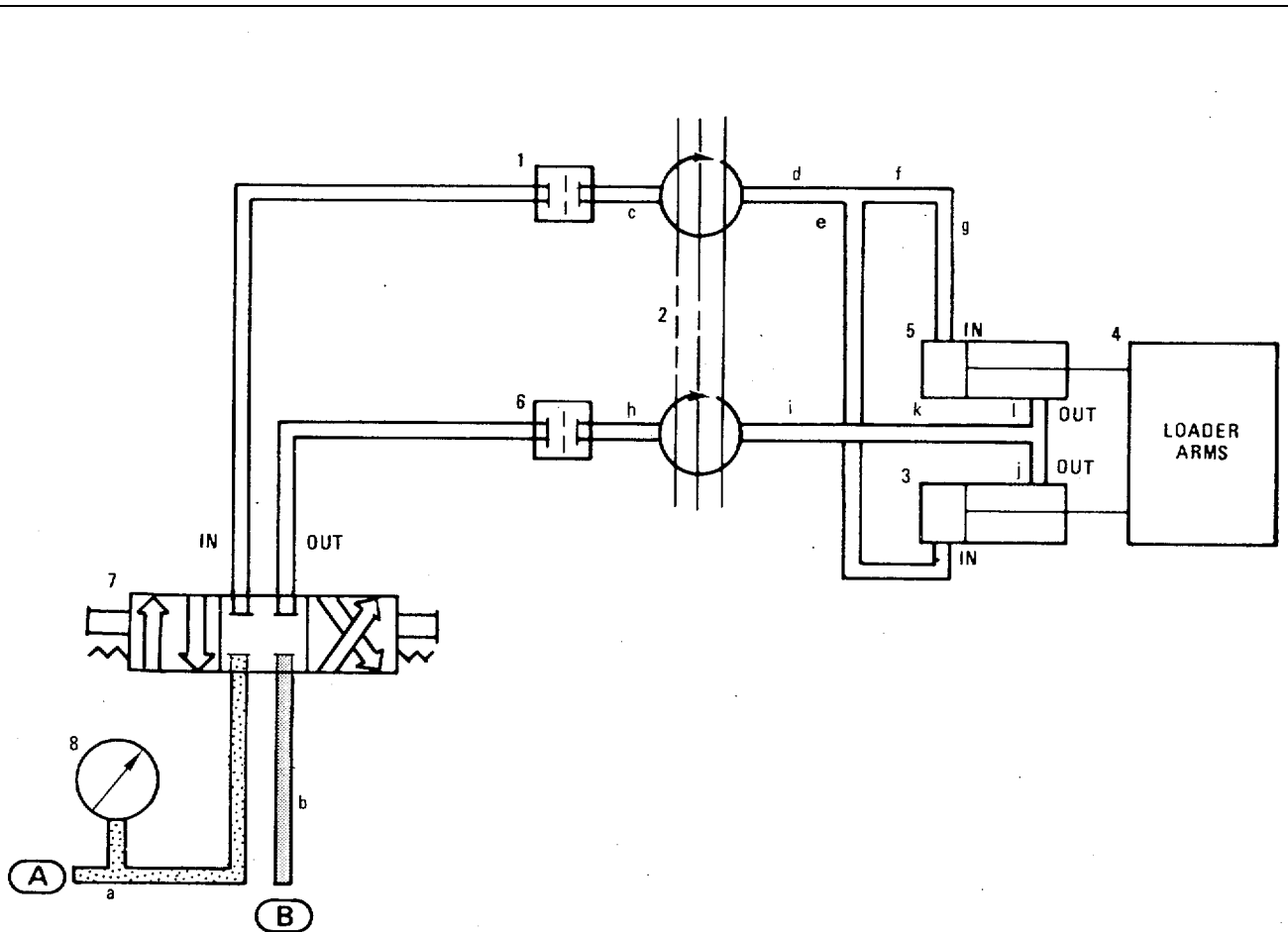
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure  
Reduced pressure  
Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



F-50. LOADER - CENTER (OFF) POSITION












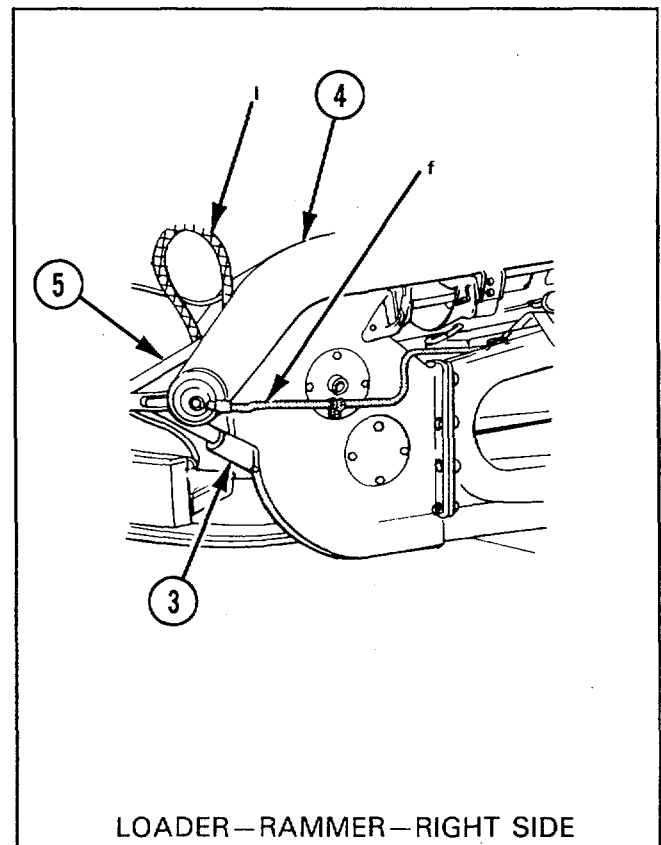
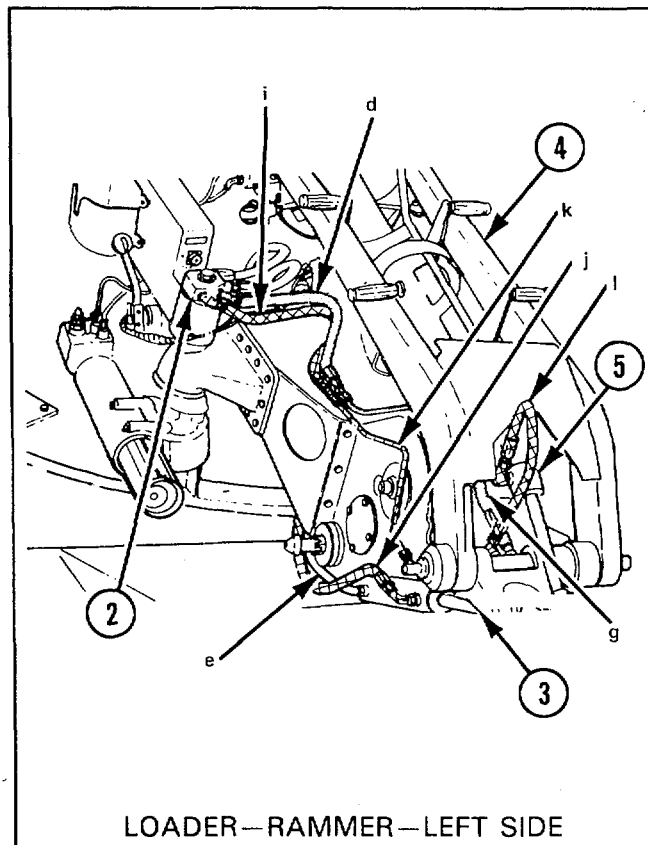
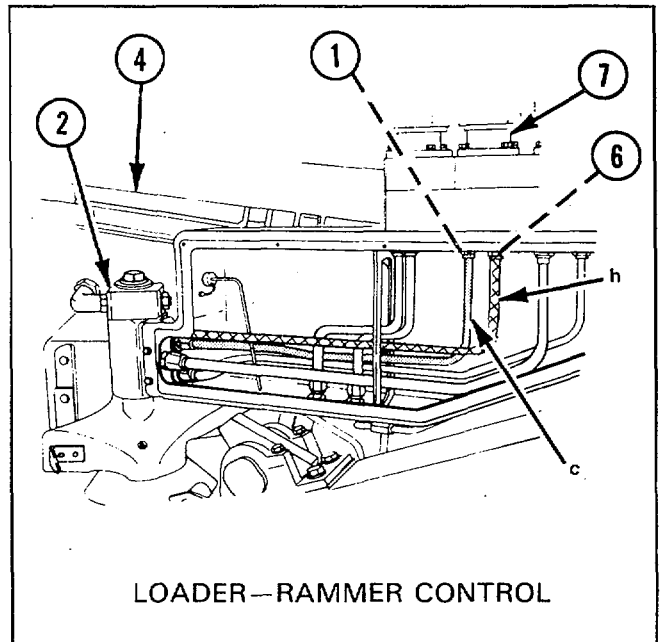
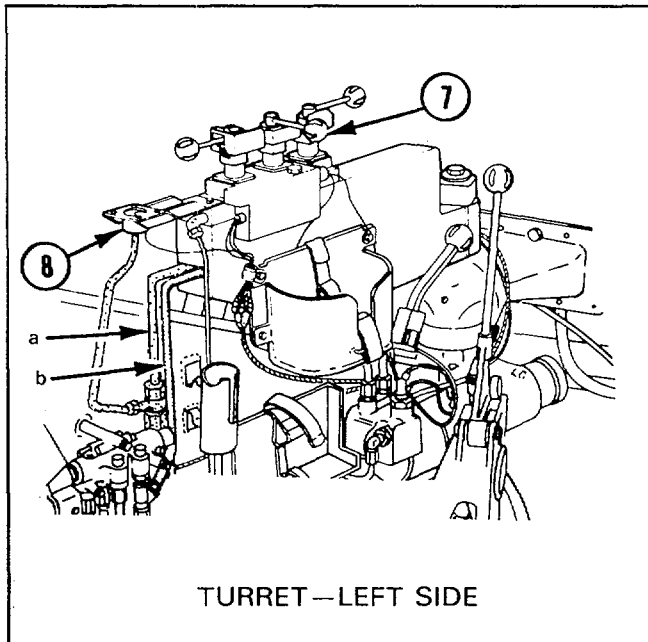
**LEGEND**

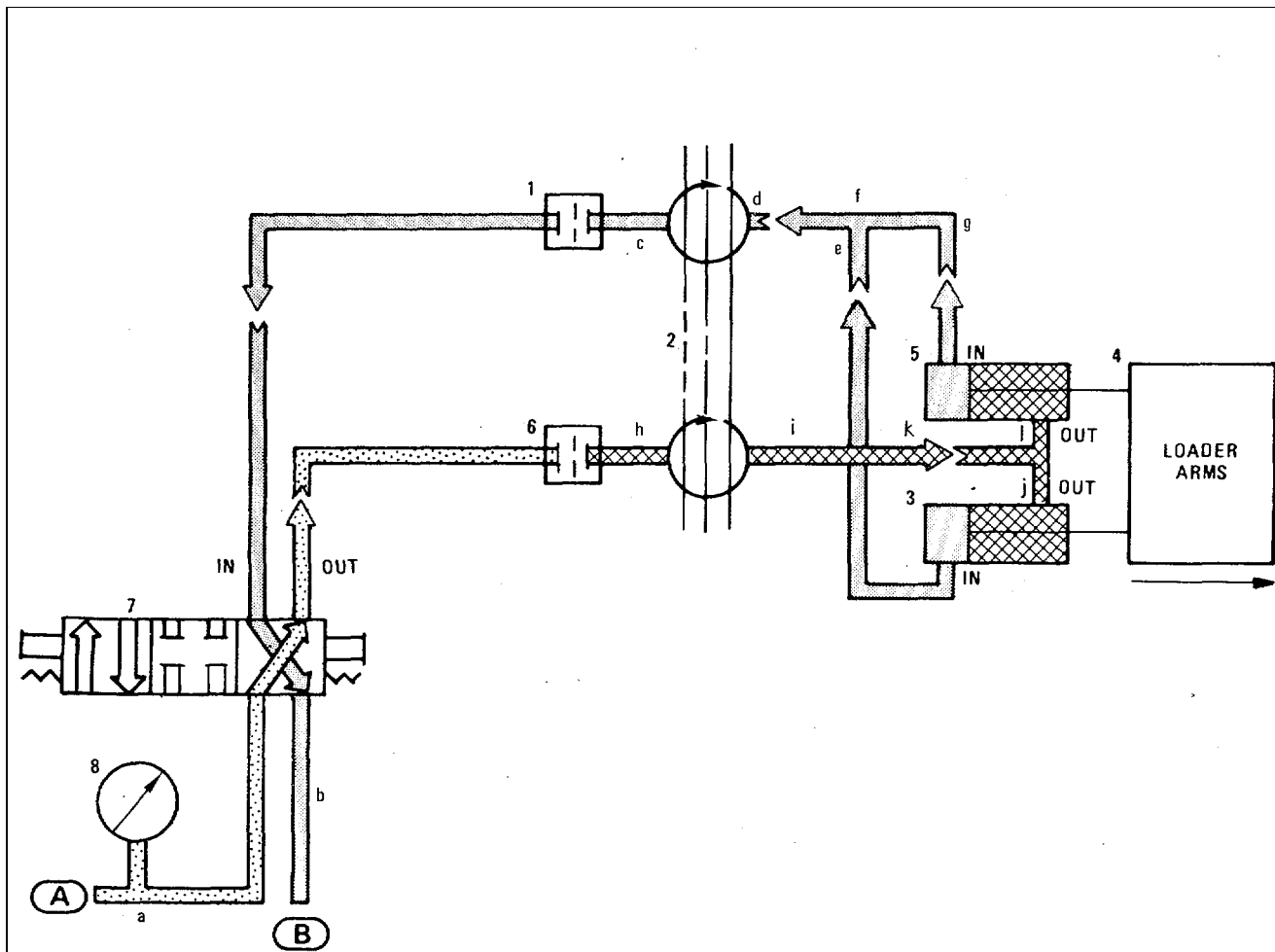
- 1 Restrictor union
- 2 Rotating manifold
- 3 Lift cylinder
- 4 Loader arms
- 5 Lift cylinder
- 6 Restrictor union
- 7 Directional control valve
- 8 Pressure gage

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-51. LOADER - "OUT" POSITION.













**LEGEND**

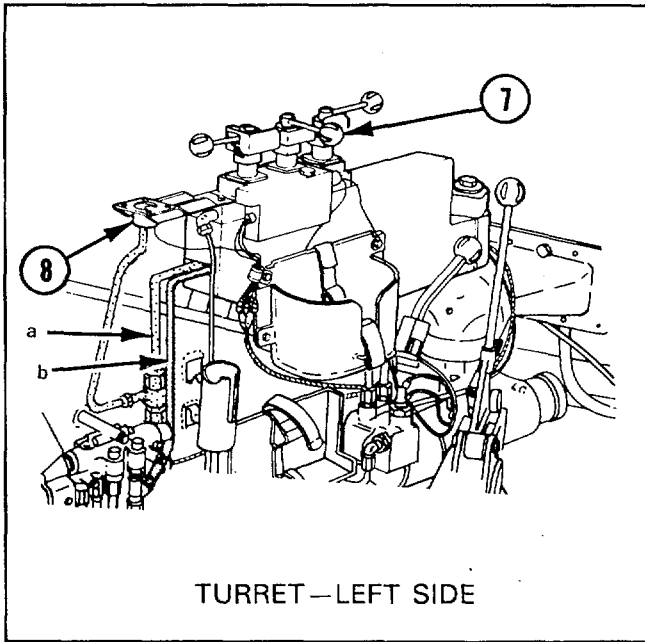
- 1 Restrictor union
- 2 Rotating manifold
- 3 Lift cylinder
- 4 Loader arms
- 5 Lift cylinder
- 6 Restrictor union
- 7 Directional control valve
- 8 Pressure gage

**BAR CODE**

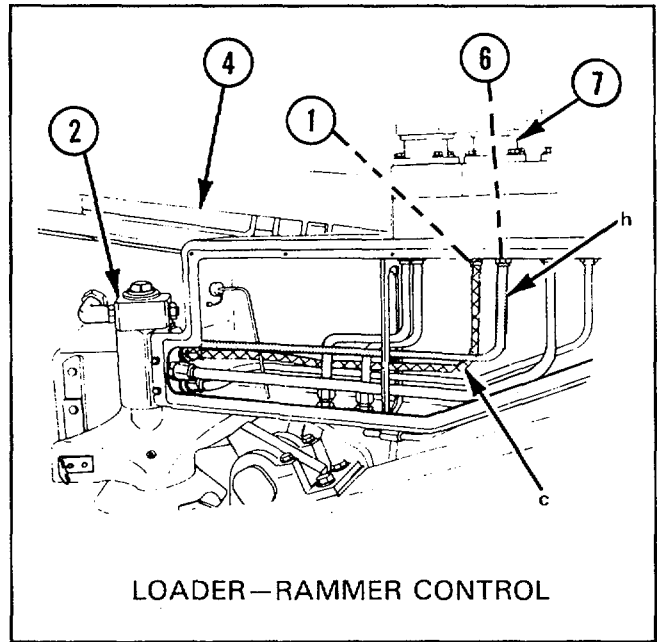
-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



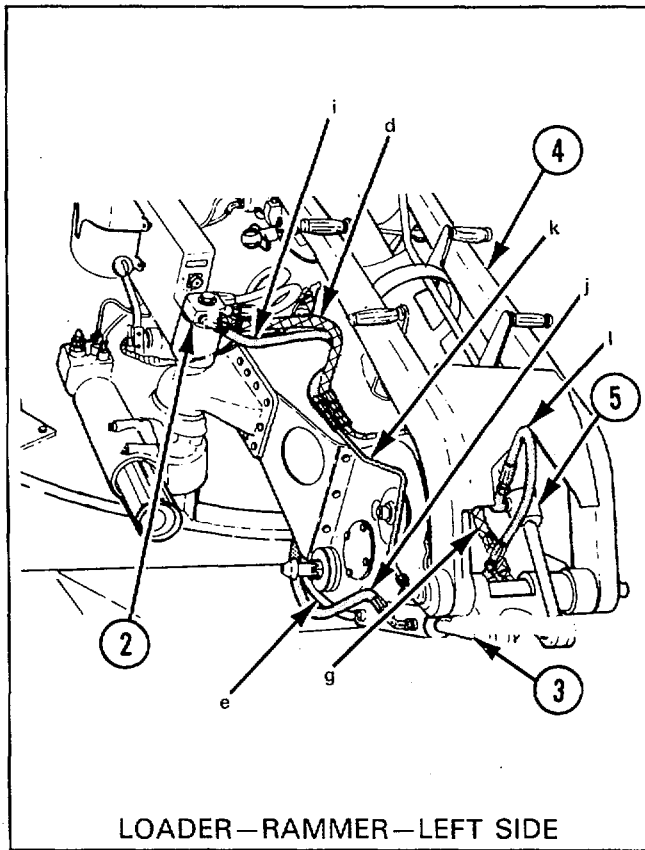
F-52. LOADER-"IN" POSITION.



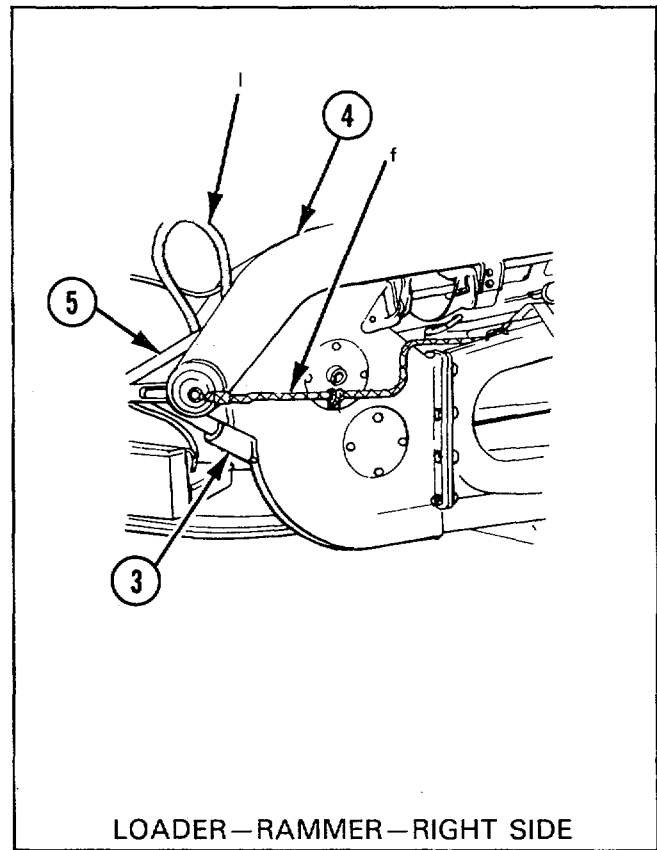
TURRET—LEFT SIDE



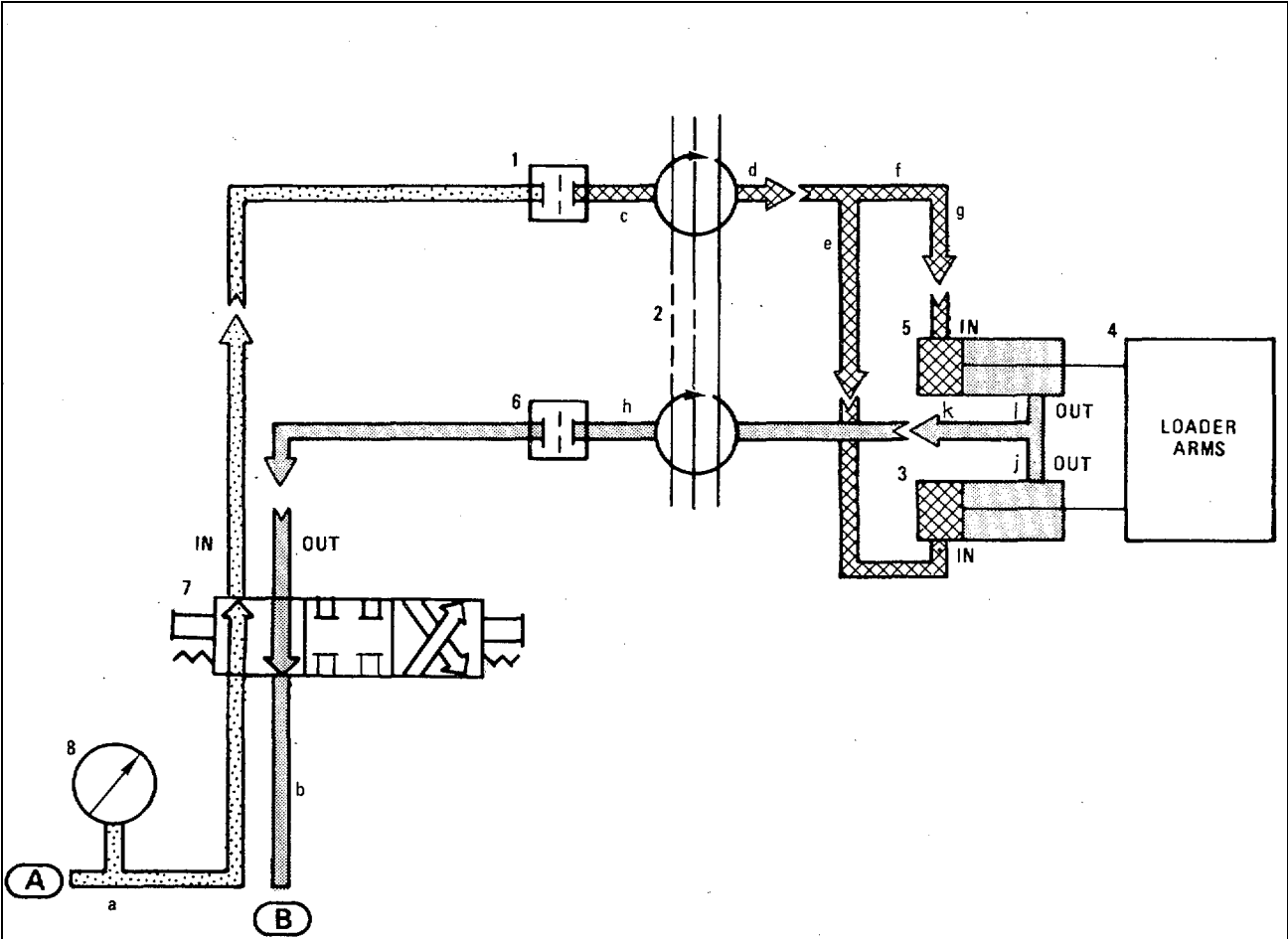
LOADER—RAMMER CONTROL



LOADER—RAMMER—LEFT SIDE











LOADER—RAMMER—RIGHT SIDE



**LEGEND**

- 1 Restrictor union
- 2 Rotating manifold
- 3 Lift cylinder
- 4 Loader arms
- 5 Lift cylinder
- 6 Restrictor union
- 7 Directional control valve
- 8 Pressure gage

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

**F-53. RAMMER HYDRAULIC SUBSYSTEM**

*Functional Description.* The rammer hydraulic subsystem rams the projectile from the loading tray into the breech of the cannon.

When the pivot and tray interlock switches are closed, the rammer solenoid valve (1) is energized, allowing hydraulic fluid at about 2400 psi (16,548 kPa) to flow, independently, to the rammer control valve (2) and, through the rotating manifold (3), to the retract side of the rammer cylinder.

When the handle of the rammer control valve (2) is moved out of its spring loaded, rest position gate, fluid under pressure flows through the control valve and closes a pressure switch. This switch by-passes the tray and pivot interlock switches and keeps the solenoid valve (1) energized throughout the ram and retract cycle.

The flow of hydraulic fluid through the control valve (2) is also directed against a spring loaded piston within the rammer manifold. This forces open a poppet valve,

allowing pressure to flow to the extend side of the rammer cylinder, starting the ram action.







The ram cylinder drives the ramming chain gearbox and the ramming chain, which pushes the projectile into the cannon breech. When the cylinder bottoms, pressure within the rammer hydraulic subsystem equalizes, allowing spring pressure to return the piston to its rest position.

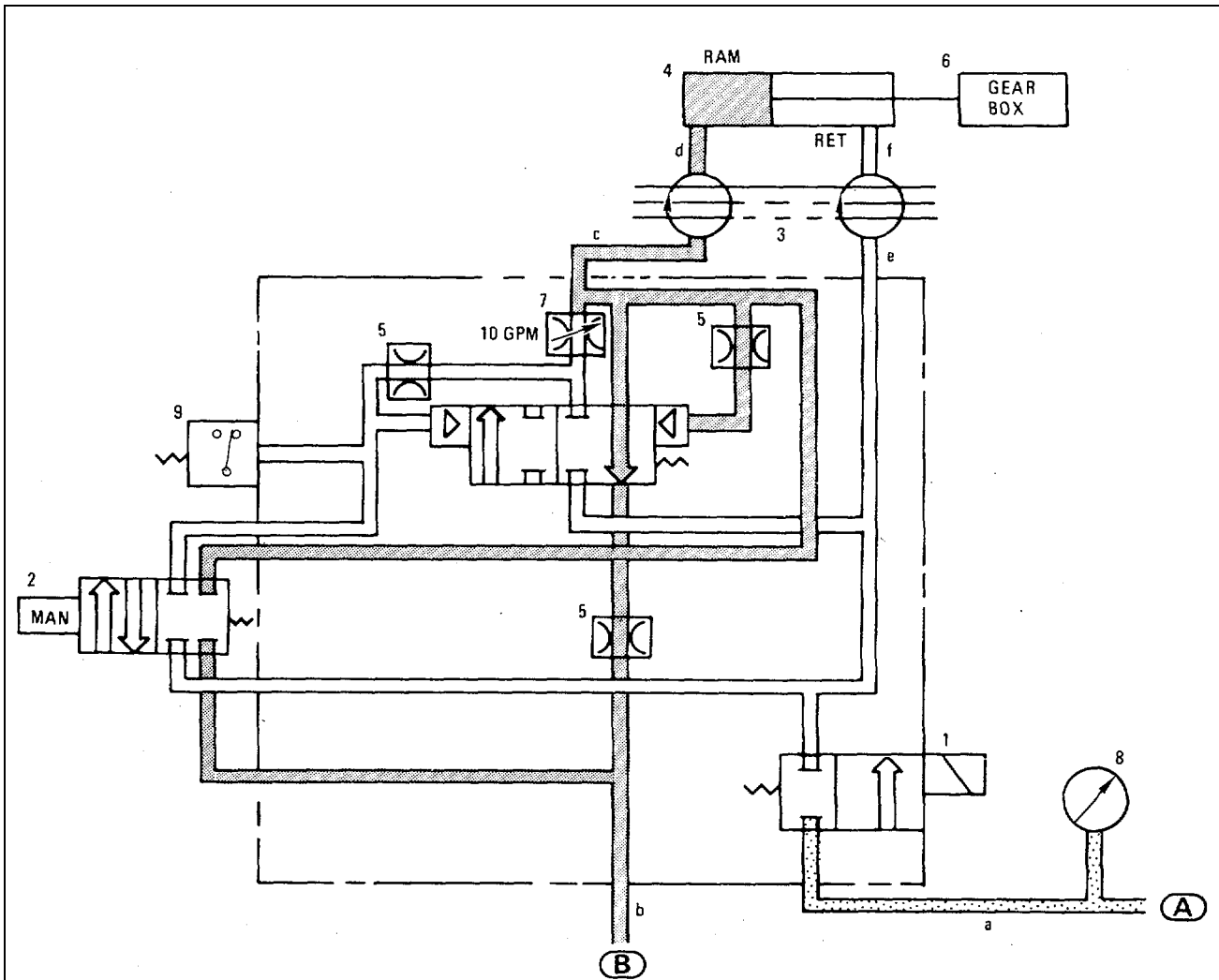
This piston movement closes the first poppet valve, transferring pressure flow back to the retract side of the rammer cylinder, starting the chain retraction. It also opens the second poppet valve which allows the flow to drain to the reservoir. Return speed of the chain is controlled by restricting the flow of hydraulic fluid through a flow control orifice.

**LEGEND**

- 1 Solenoid operated shutoff valve
- 2 Ram control valve
- 3 Rotating manifold
- 4 Ramming cylinder
- 5 Flow control ports Charging pressure
- 6 Ramming chain gearbox Reduced pressure
- 7 Flow control valve Pilot pressure
- 8 Pressure gage
- 9 Pressure switch

**BAR CODE**








-  Intensified pressure
-  Supply pressure
-  Charging pressure  
Reduced pressure  
Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



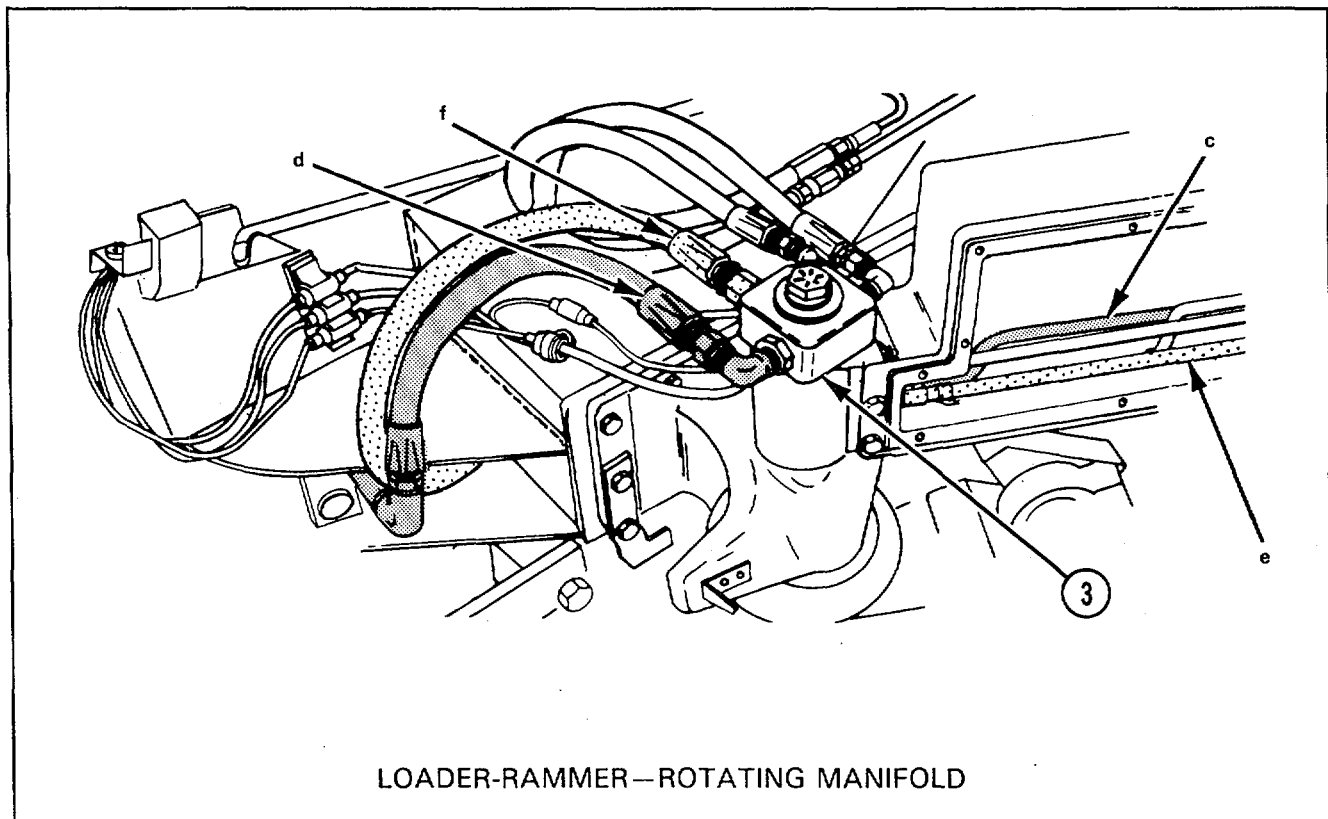
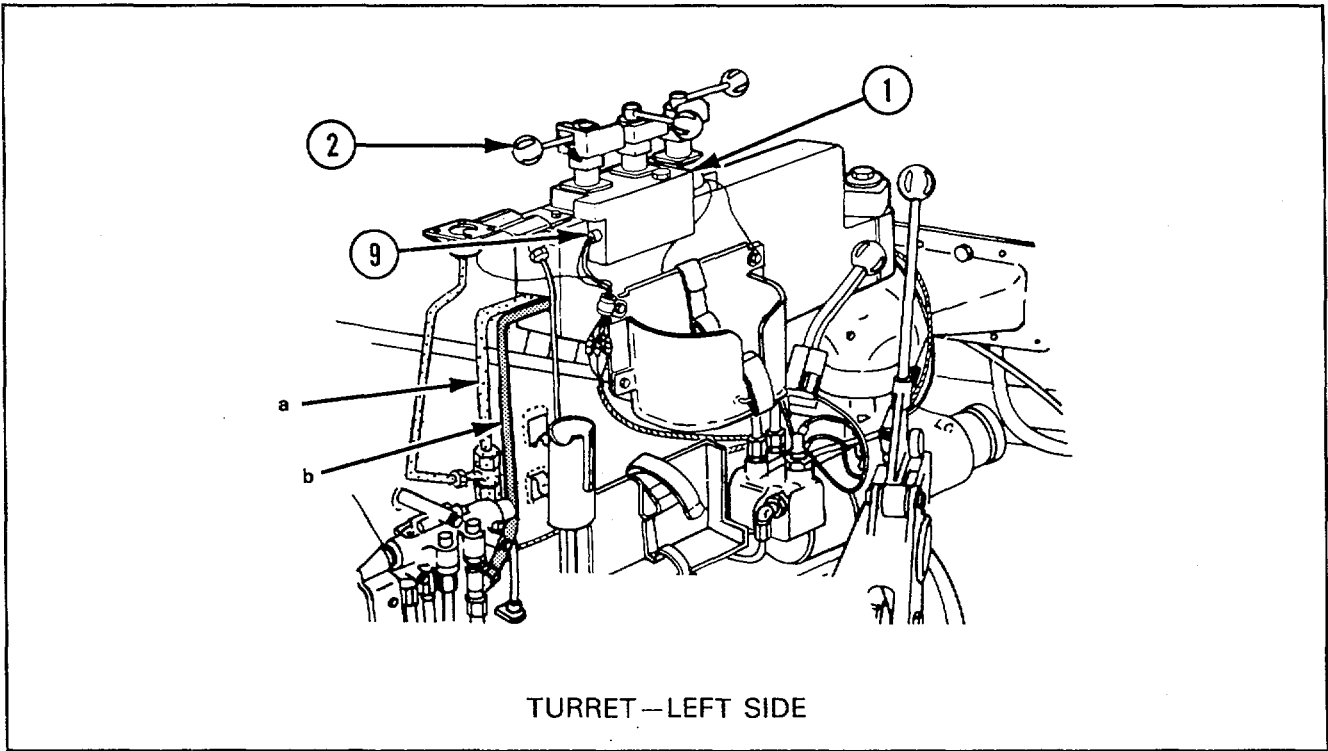
**LEGEND**

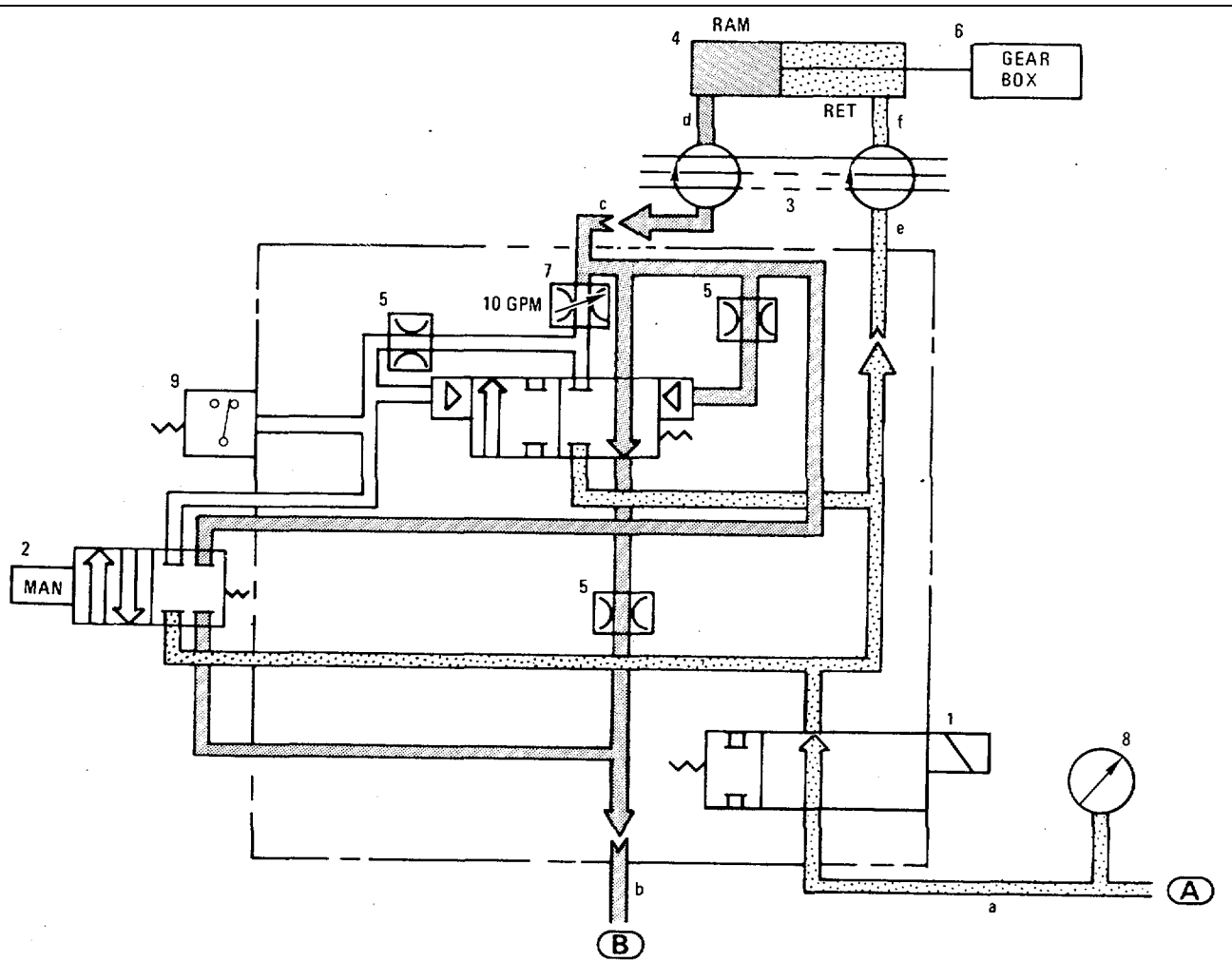
- 1 Solenoid operated shutoff valve
- 2 Ram control valve
- 3 Rotating manifold
- 4 Ramming cylinder
- 5 Flow control ports
- 6 Ramming chain gearbox
- 7 Flow control valve
- 8 Pressure gage
- 9 Pressure switch

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-54. RAMMER-REST (OFF) POSITION. F-100













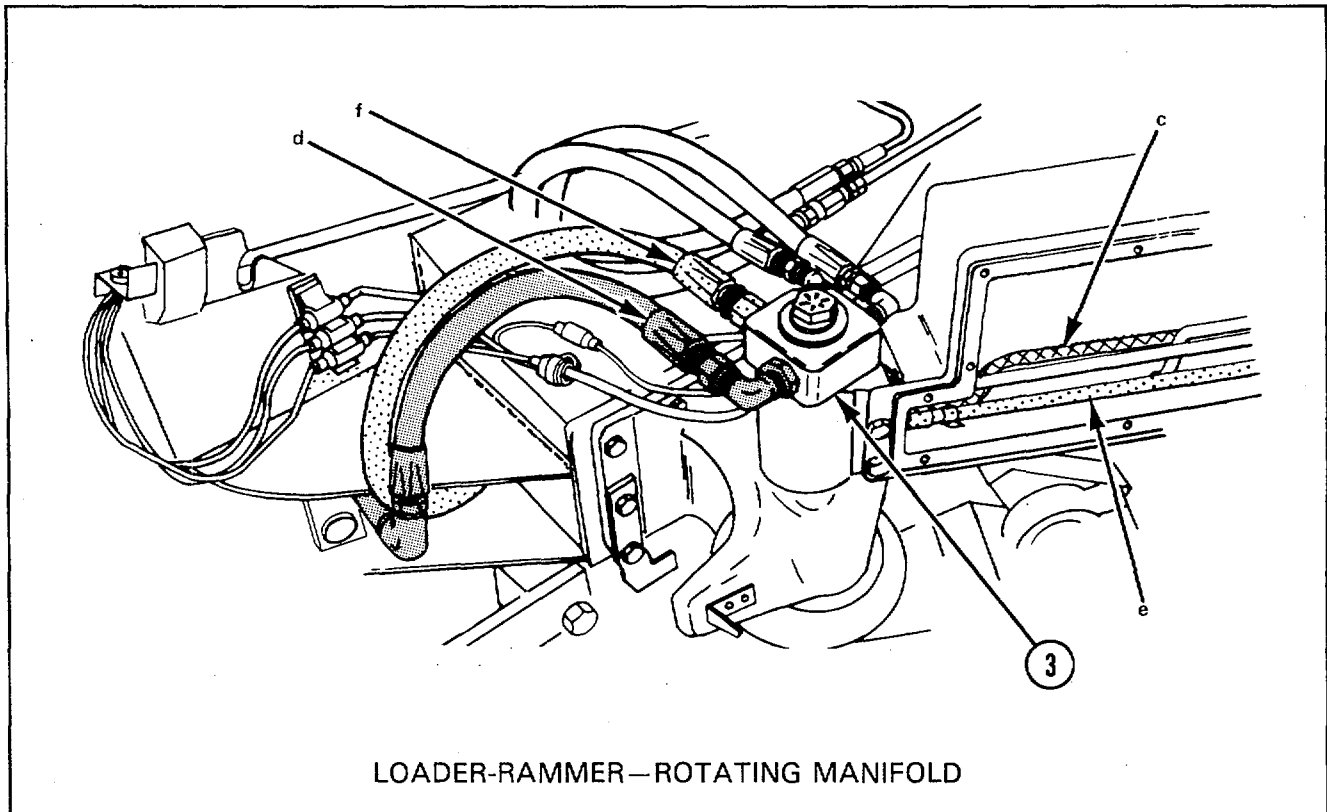
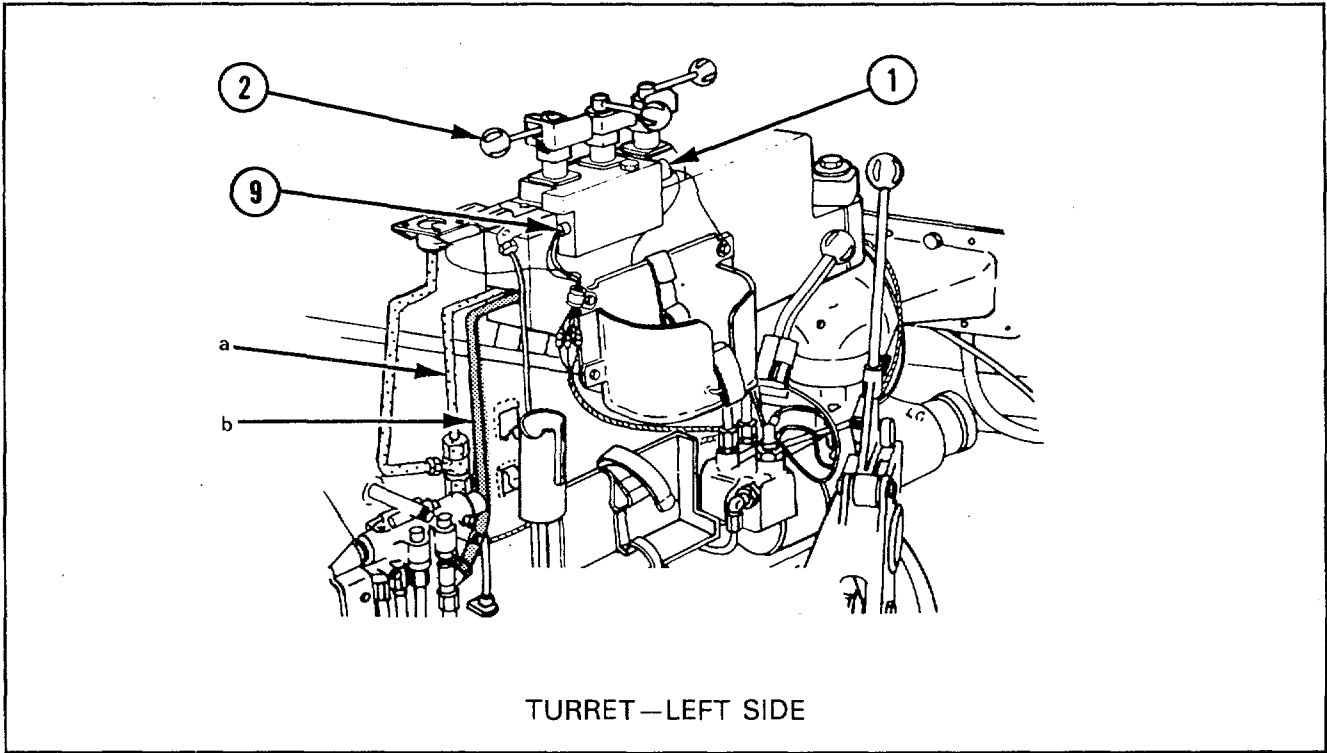
**LEGEND**

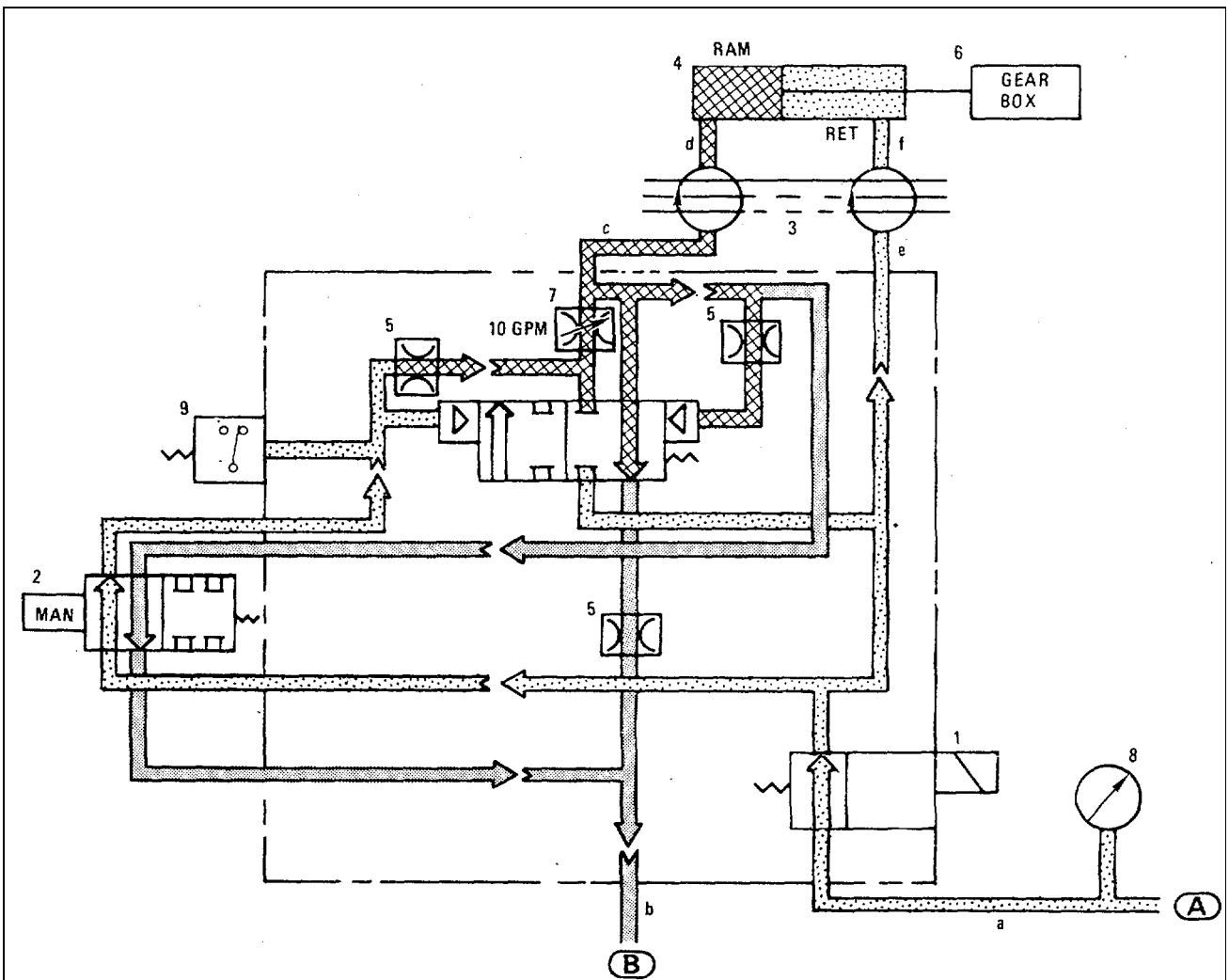
- 1 Solenoid operated shutoff valve
- 2 Ram control valve
- 3 Rotating manifold
- 4 Ramming cylinder
- 5 Flow control ports
- 6 Ramming chain gearbox
- 7 Flow control valve
- 8 Pressure gage
- 9 Pressure switch

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-55. RAMMER-SOLENOID VALVE ENERGIZED.













**LEGEND**

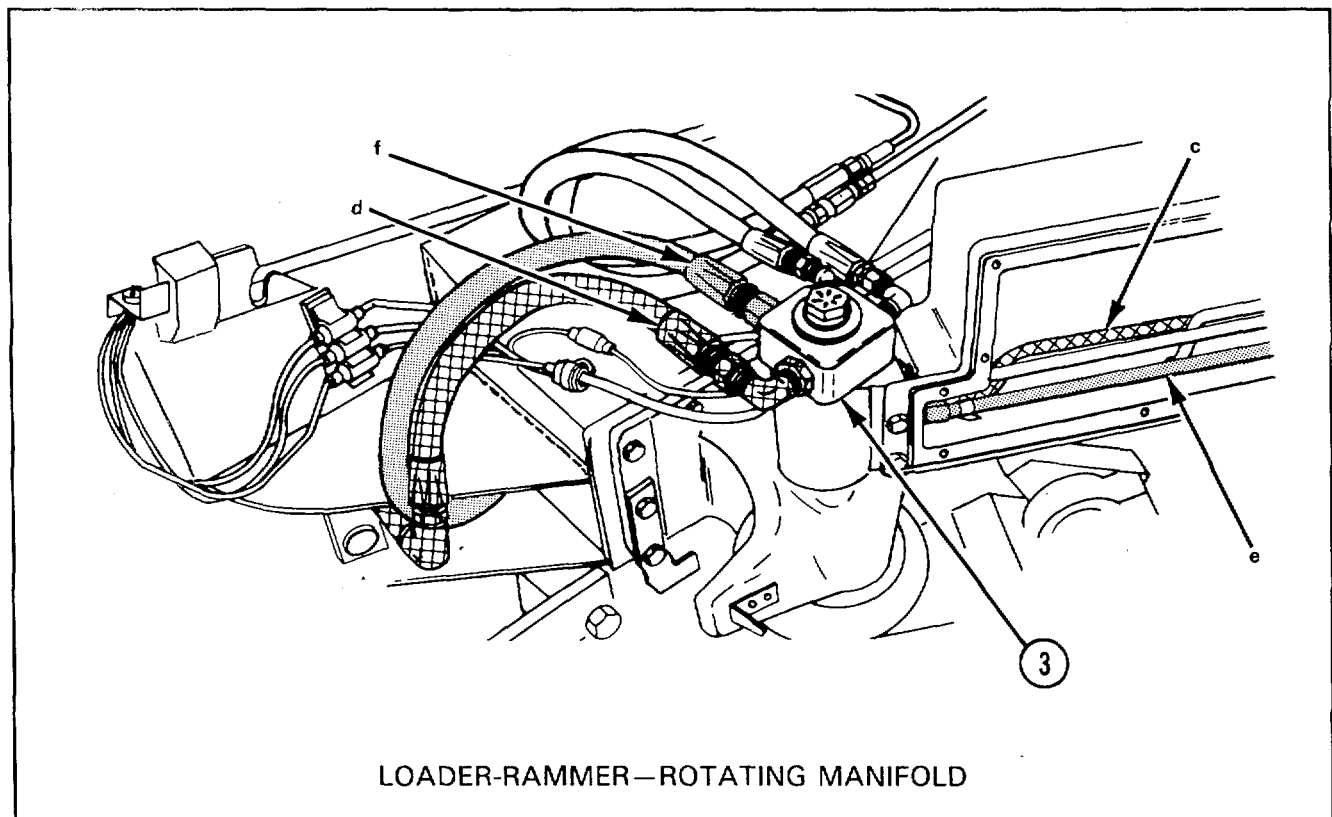
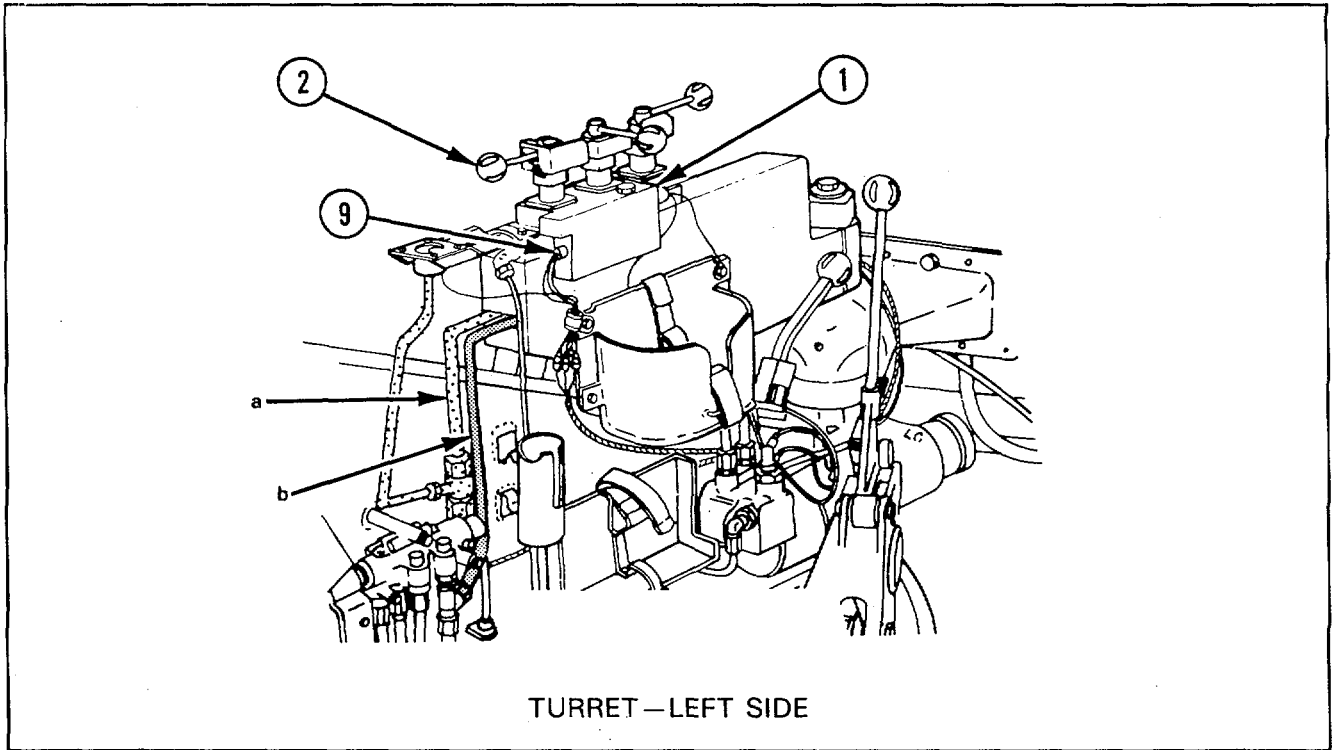
- 1 Solenoid operated shutoff valve
- 2 Ram control valve
- 3 Rotating manifold
- 4 Ramming cylinder
- 5 Flow control ports
- 6 Ramming chain gearbox
- 7 Flow control valve
- 8 Pressure gage
- 9 Pressure switch

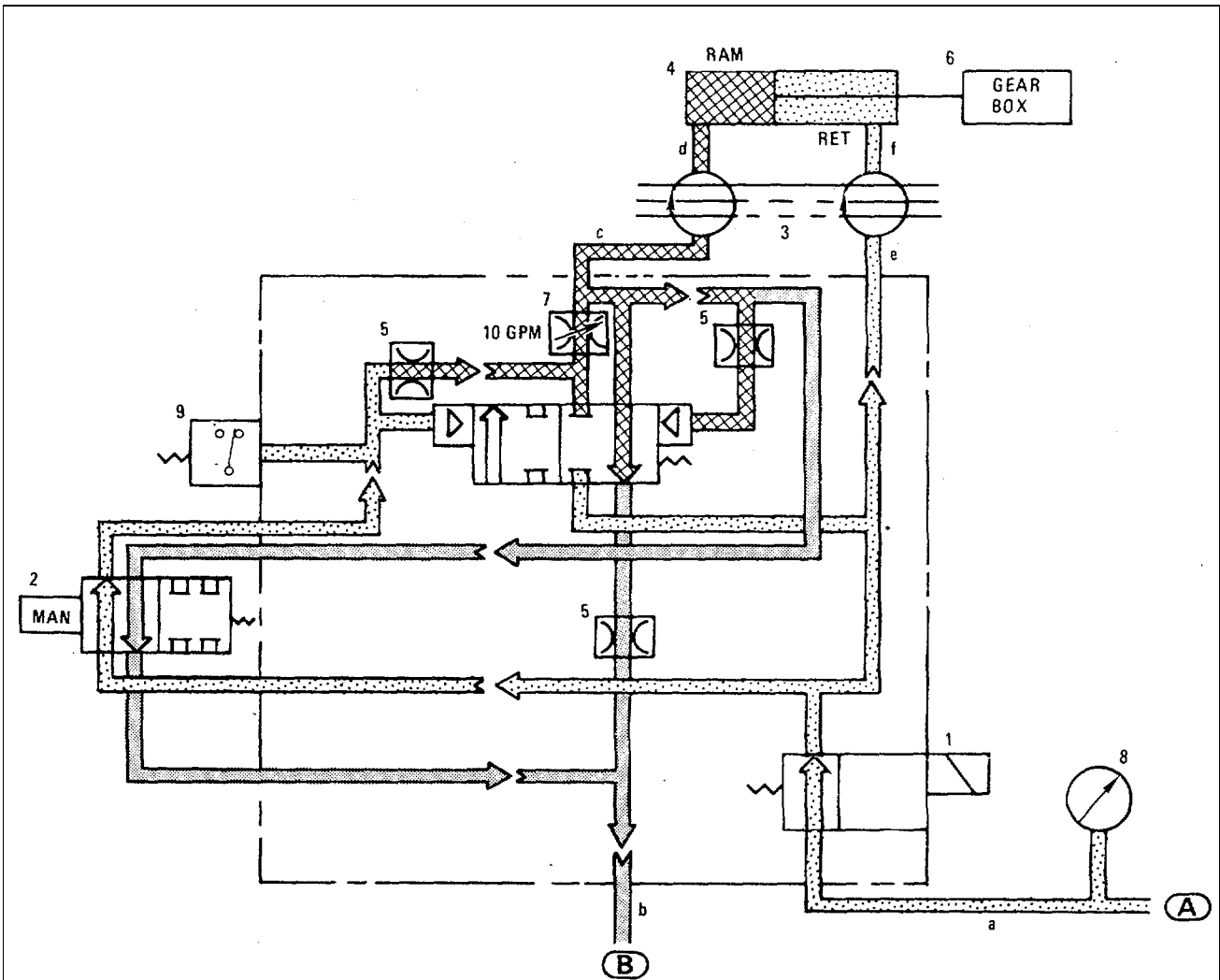
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



F-56. RAMMER--CONTROL VALVE OPEN.












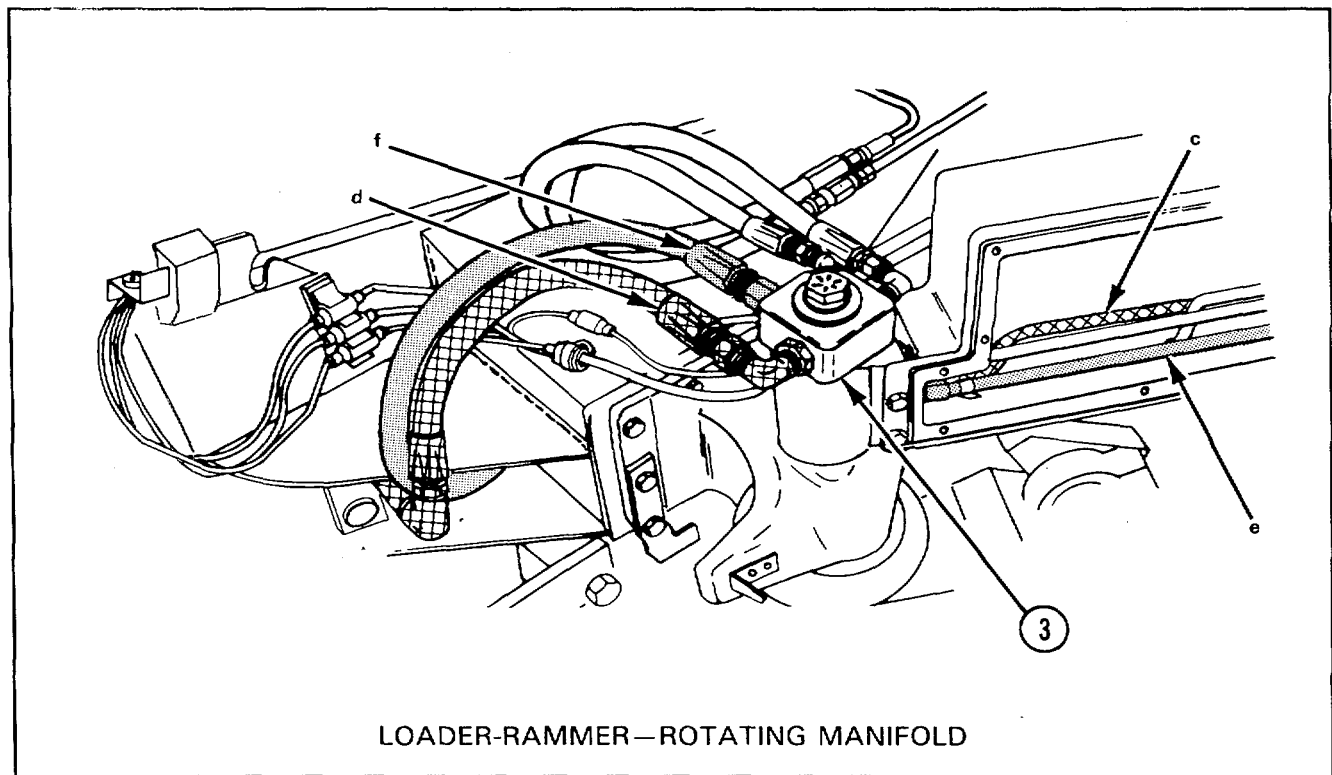
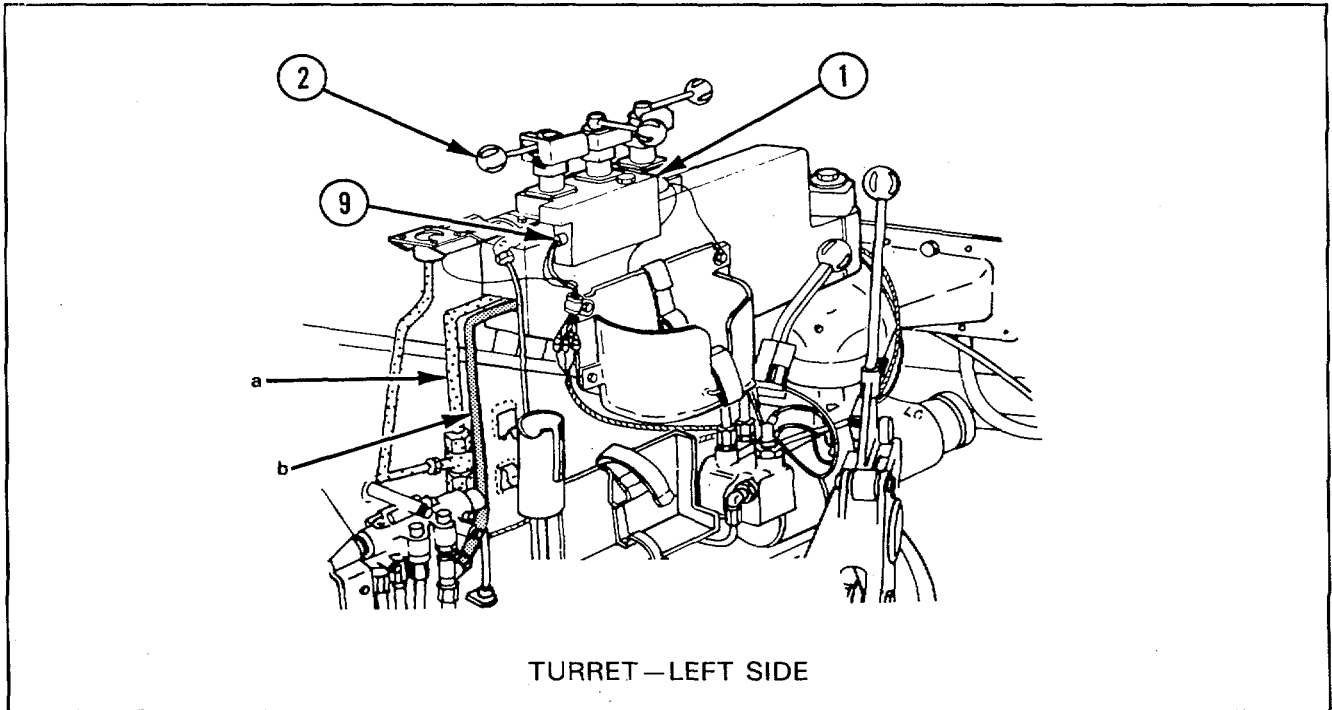
**LEGEND**

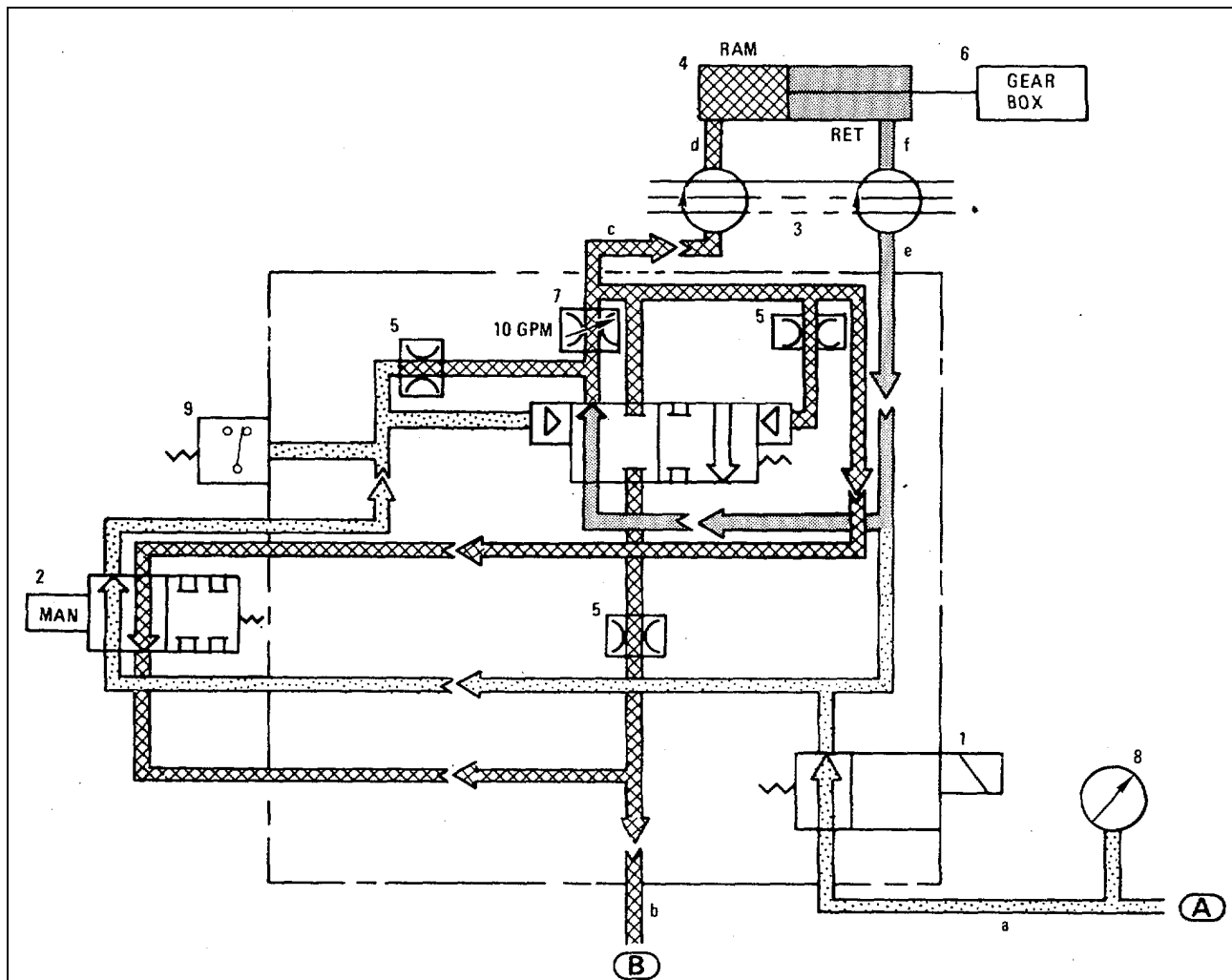
- 1 Solenoid operated shutoff valve
- 2 Ram control valve
- 3 Rotating manifold
- 4 Ramming cylinder
- 5 Flow control ports
- 6 Ramming chain gearbox
- 7 Flow control valve
- 8 Pressure gage
- 9 Pressure switch

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

F-57. RAMMER-RAM STARTED.













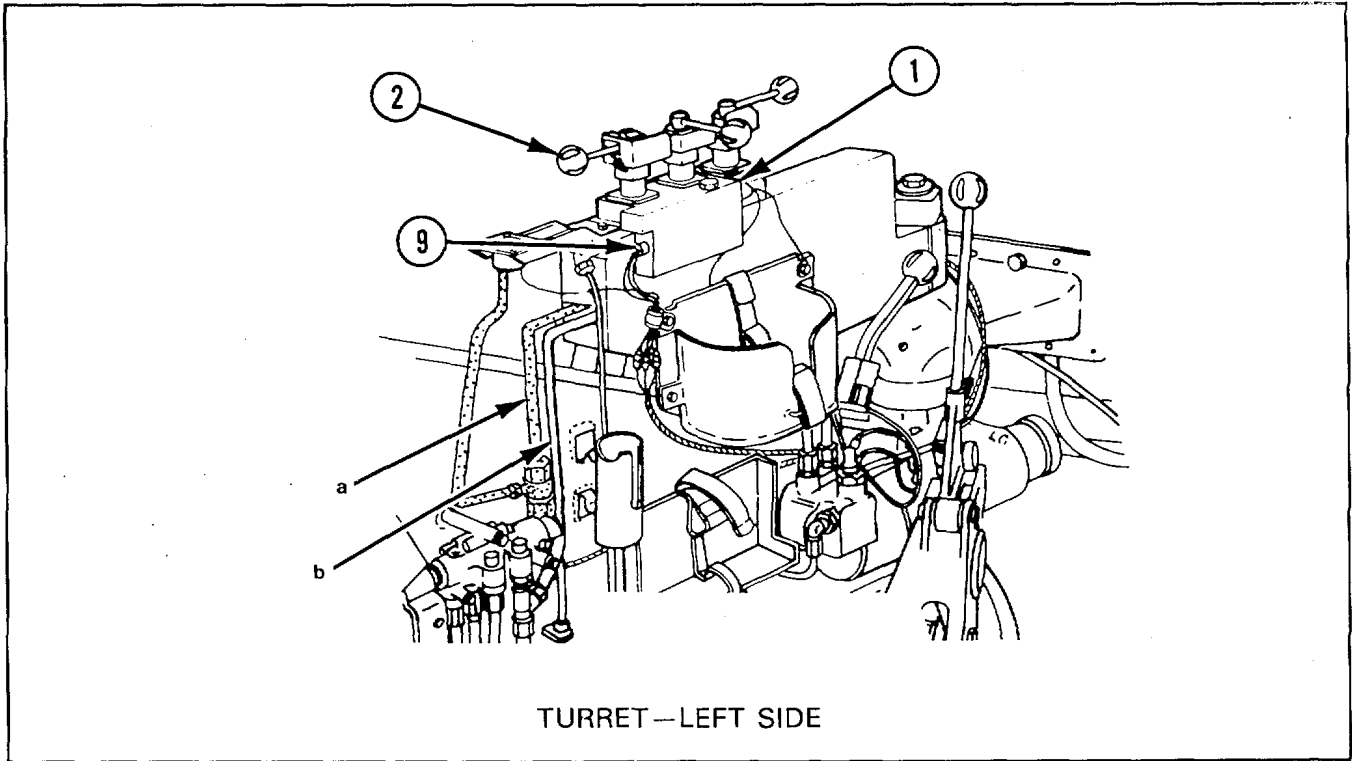
**LEGEND**

- 1 Solenoid operated shutoff valve
- 2 Ram control valve
- 3 Rotating manifold
- 4 Ramming cylinder
- 5 Flow control ports
- 6 Ramming chain gearbox
- 7 Flow control valve
- 8 Pressure gage
- 9 Pressure switch

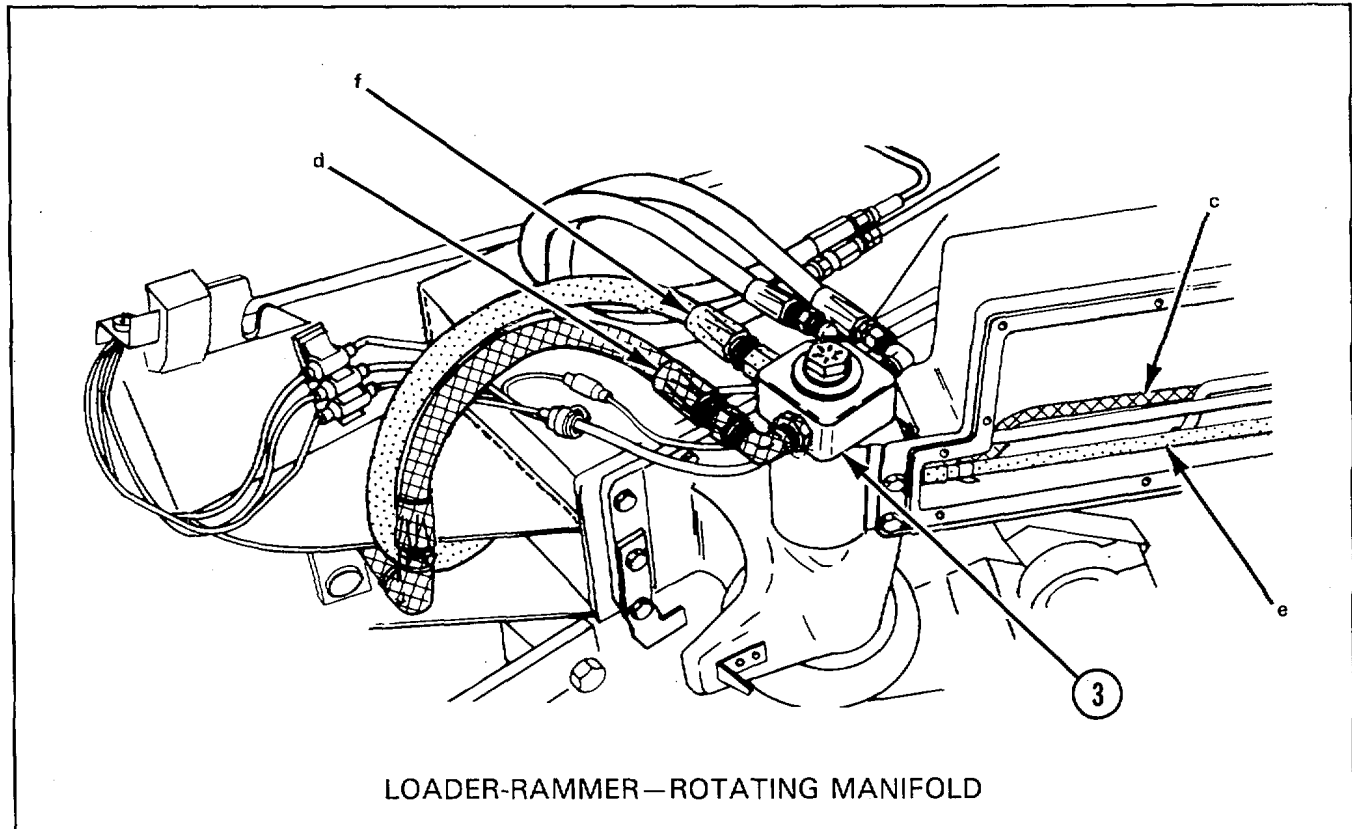
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

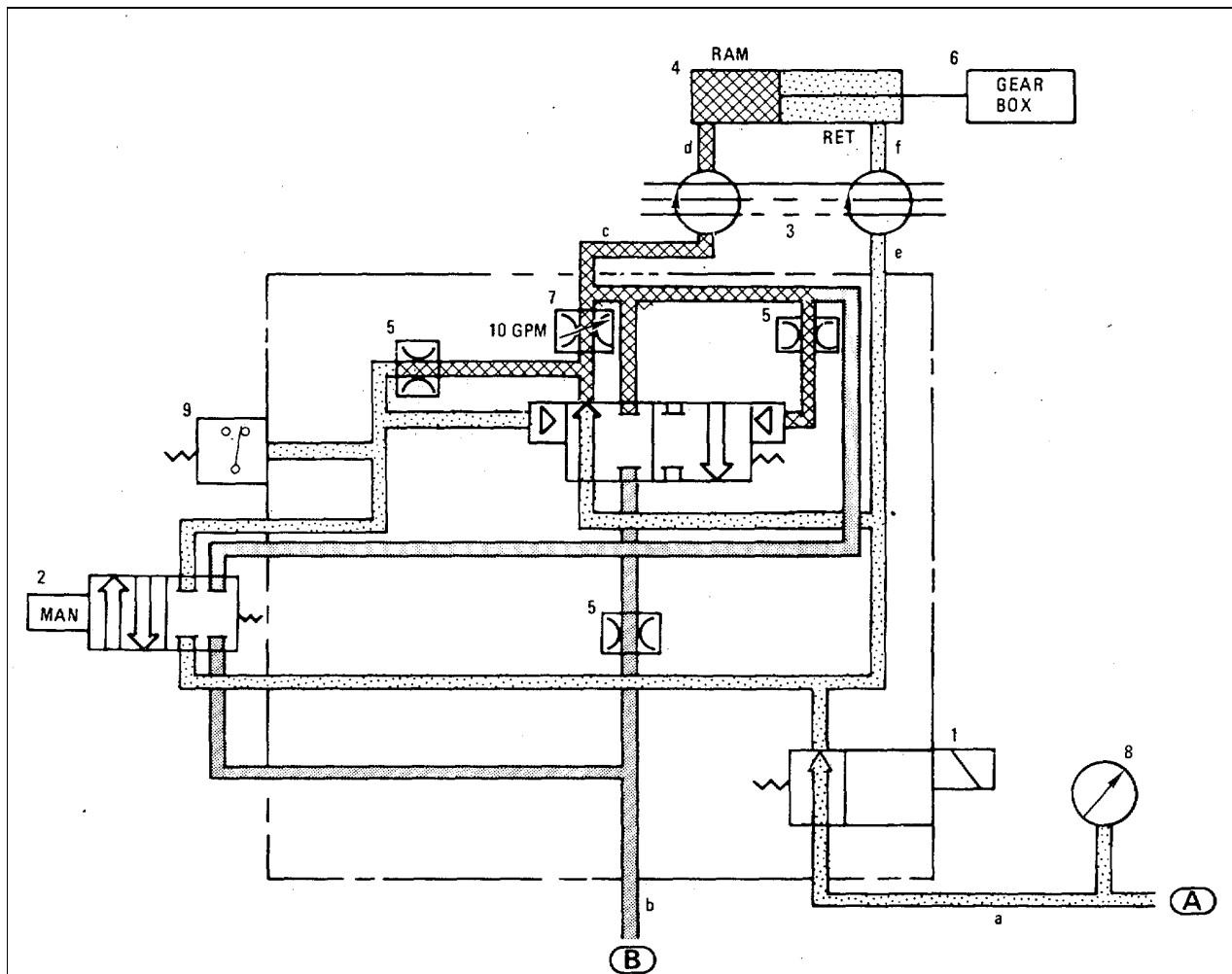
F-58. RAMMER – RAM COMPLETED, PROJECTILE SEATED.



TURRET—LEFT SIDE








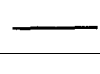


LOADER-RAMMER—ROTATING MANIFOLD



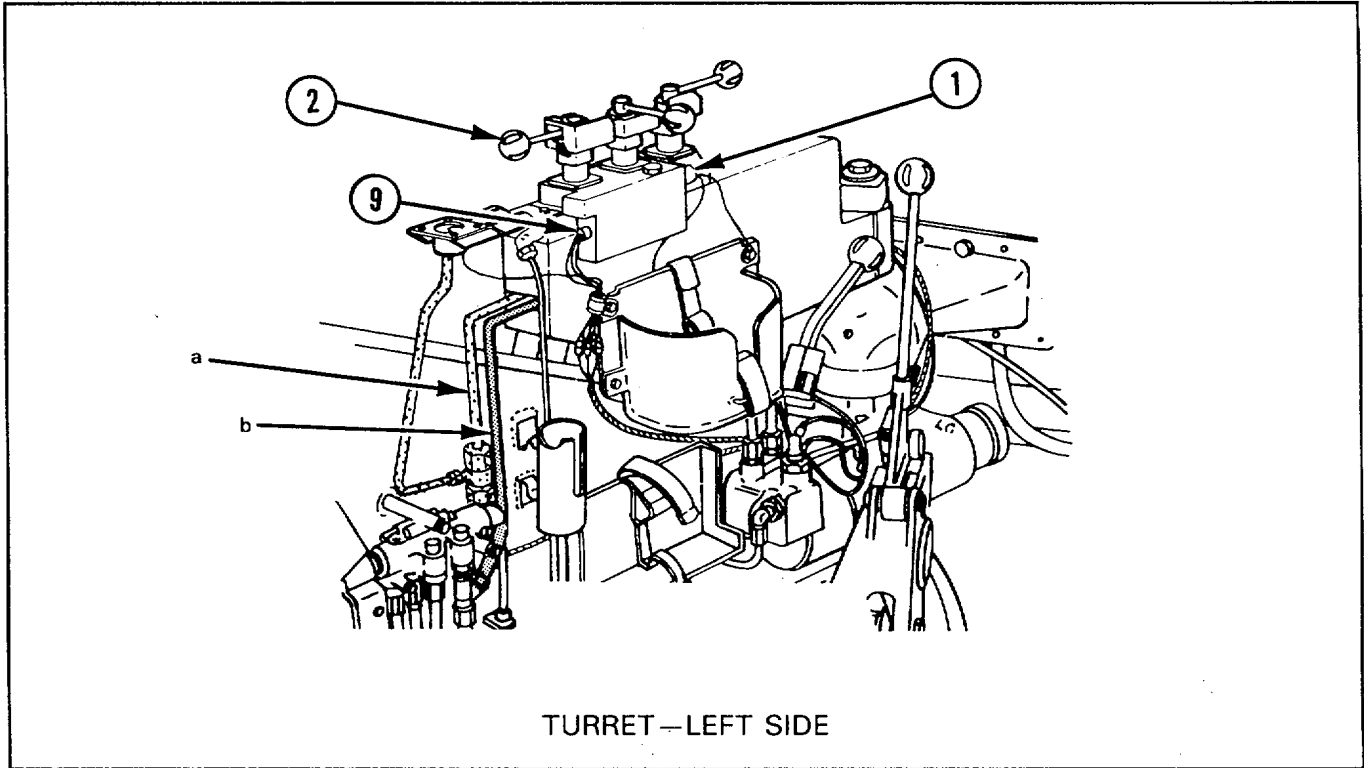
**LEGEND**

- 1 Solenoid operated shutoff valve
- 2 Ram control valve
- 3 Rotating manifold
- 4 Ramming cylinder
- 5 Flow control ports
- 6 Ramming chain gearbox
- 7 Flow control valve
- 8 Pressure gage
- 9 Pressure switch

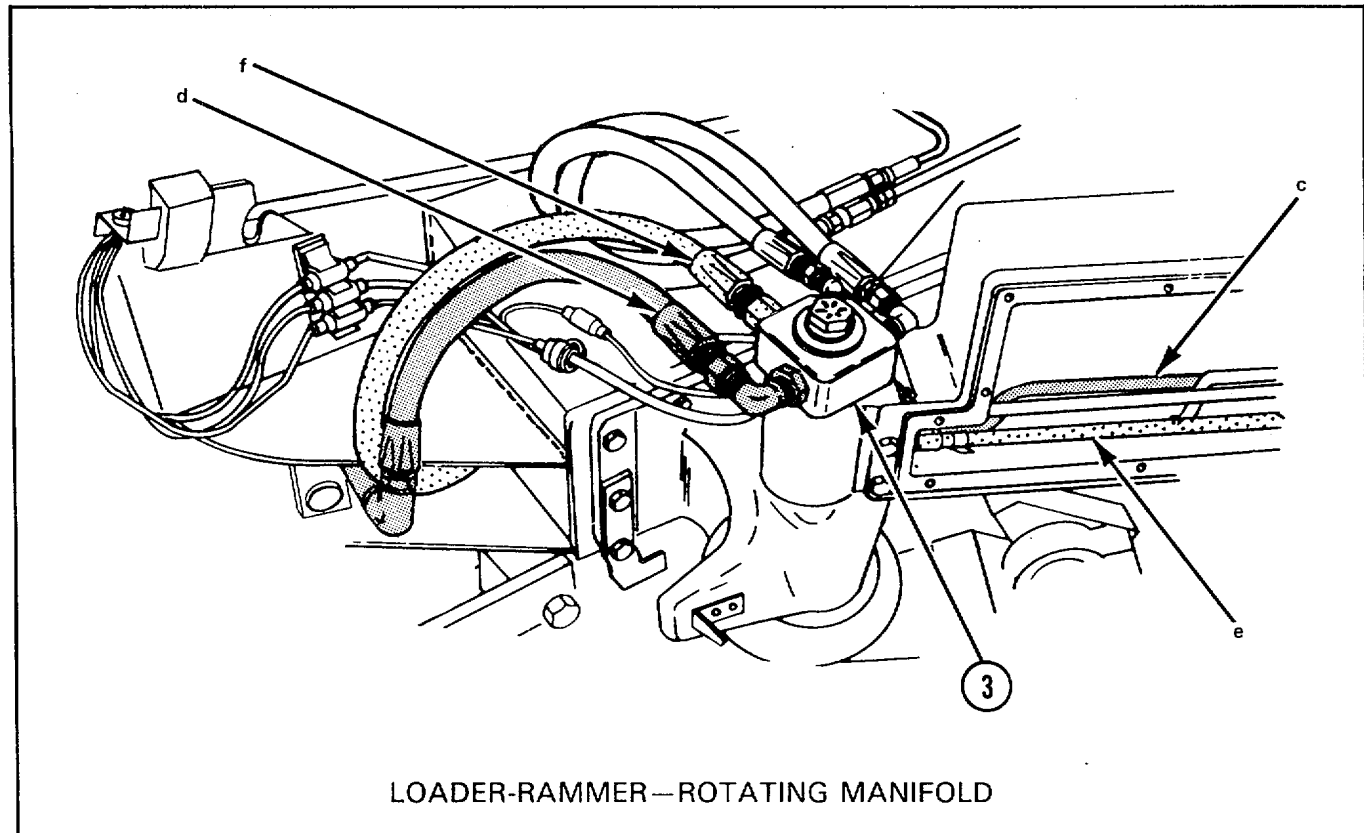
**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive

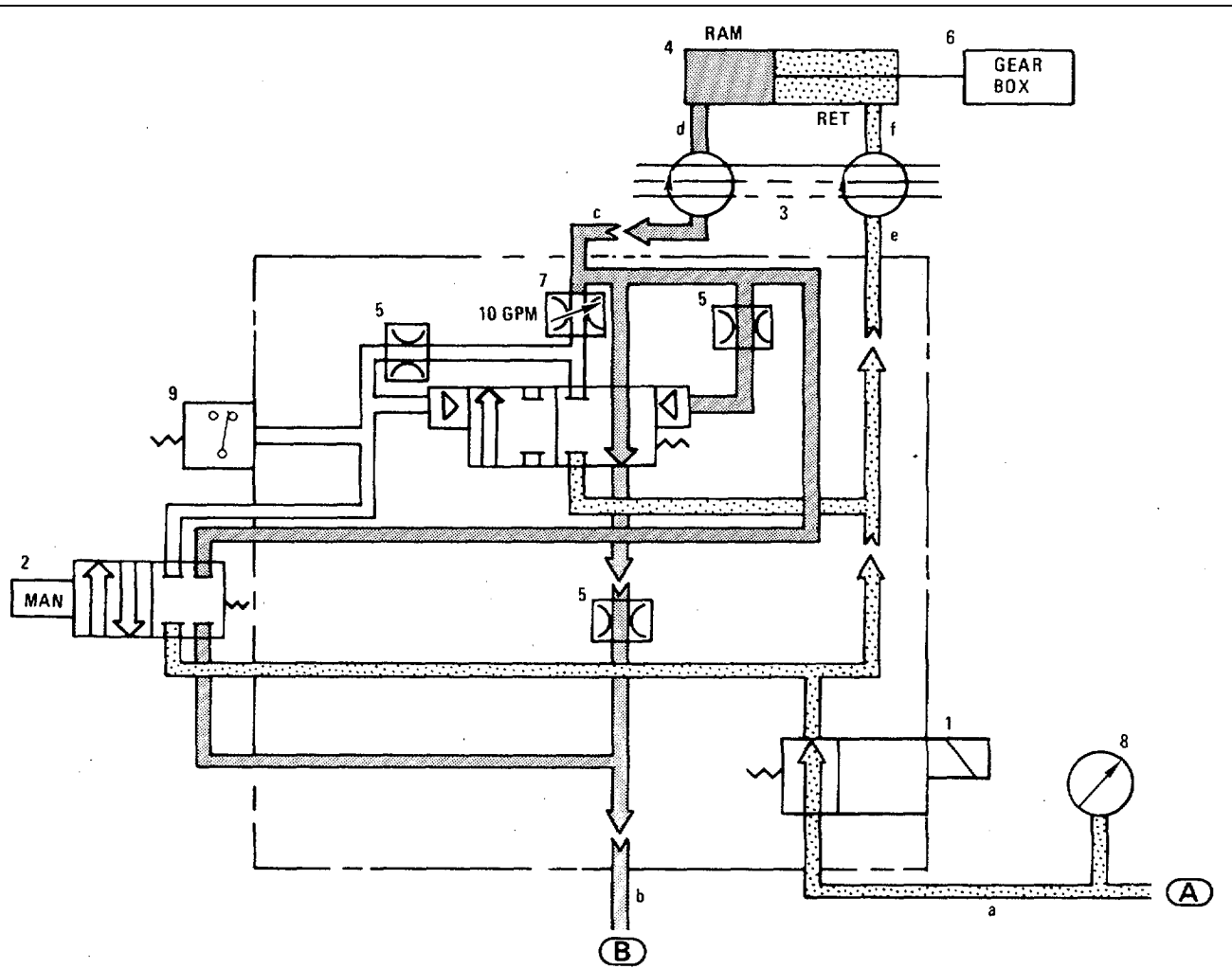
F-59 RAMMER-CHAIN RETRACTION.



TURRET — LEFT SIDE











LOADER-RAMMER — ROTATING MANIFOLD



**LEGEND**

- 1 Solenoid operated shutoff valve
- 2 Ram control valve
- 3 Rotating manifold
- 4 Ramming cylinder
- 5 Flow control ports
- 6 Ramming chain gearbox
- 7 Flow control valve
- 8 Pressure gage
- 9 Pressure switch

**BAR CODE**

-  Intensified pressure
-  Supply pressure
-  Charging pressure
-  Reduced pressure
-  Pilot pressure
-  Metered or blocked flow
-  Intake drain
-  Blank inactive



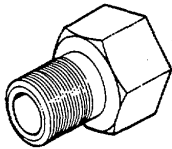
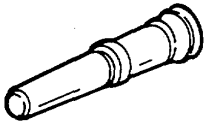
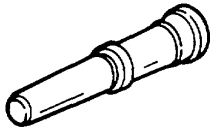
**APPENDIX G  
SPECIAL TOOLS AND EQUIPMENT**

**G-1. GENERAL.** Repair parts, special tools, and support equipment are issued for maintaining the vehicle. Tools and equipment should not be used for purposes other than those prescribed. When not in use, they should be properly stowed.

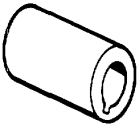


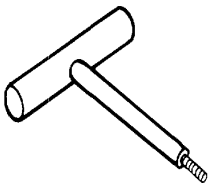
**G-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT.** Special tools and equipment necessary to perform the maintenance described in this manual are listed for your information. Special tools and support equipment are listed in TM 9-2350-304-24P-2 which is the authority for requisitioning replacements.

**G-3. REPAIR PARTS.** Repair parts are issued for the replacement of parts that have become worn, broken, or otherwise unserviceable. Repair parts are listed in TM 9-2350-304-24P-2 which is the authority for requisitioning replacements.

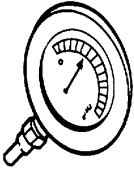
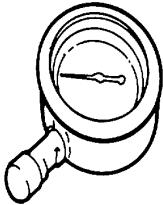
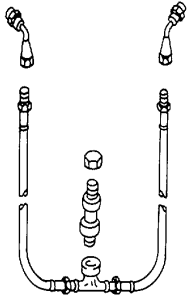

**SPECIAL TOOLS AND EQUIPMENT**

ITEM	NUMBER	USE
 <p><b>ADAPTER ASSEMBLY</b></p>	<p align="center">4933-00-103-2802 (11658921)</p>	<p>Used to connect nitrogen hose to high pressure cylinders.</p>
 <p><b>ADAPTER, RECOIL MECHANISM</b></p>	<p align="center">4933-00-616-9945 (6169945)</p>	<p>Used with tube assembly 4933-00-713-6909 to charge equilibrators.</p>
 <p><b>ADAPTER, RECOIL MECHANISM</b></p>	<p align="center">4933-00-616-9953 (6169953)</p>	<p>Used with tube assembly 4933-00-713-6909 on recuperator cylinder front head assembly.</p>

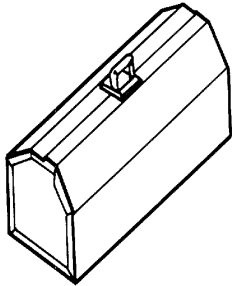

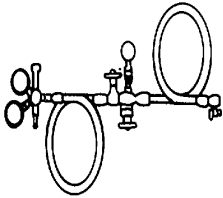
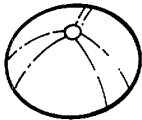
SPECIAL TOOLS AND EQUIPMENT (CONT)

ITEM	NUMBER	USE
 <p>ADAPTER, SLIP CLUTCH</p>	<p>5120-00-744-6555 (11631543)</p>	<p>Used to adjust elevating and traversing slip clutch.</p>
 <p>ADAPTER, TORQUE LOCK</p>	<p>5120-00-869-3600 (11631565)</p>	<p>Used to adjust elevating and traversing torque lock.</p>
 <p>CYLINDER, COMPRESSED GAS</p>	<p>8120-00-144-9820 (RR-C-901/1) (Empty Bottle, 3500 psi)</p>	<p>Used with accumulator charging regulator to support nitrogen filled assemblies.</p>
 <p>EXTRACTOR</p>	<p>4933-00-619-5043 (6195043)</p>	<p>Used to remove and install recuperator charging valve seal.</p>

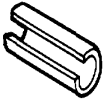
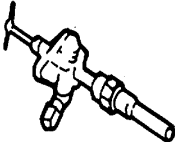
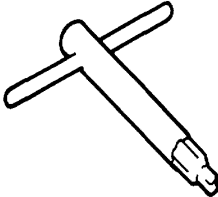
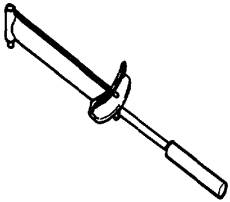
SPECIAL TOOLS AND EQUIPMENT (CONT)

ITEM	NUMBER	USE
 <p>GAGE ASSEMBLY, AIR PRESSURE, DIAL INDICATING</p>	<p>6685-00-300-3653 (MIL-G-8348-A-4)</p>	<p>Used with nitrogen charging kit 1025-01-070-3200 to test air pressure, 0 to 5000 psi (0 to 34,475 kPa).</p>
 <p>GAGE, PRESSURE, DIAL INDICATING</p>	<p>6685-00-965-1364 (45-1056-04L5000)</p>	<p>Used to check nitrogen pressure in equilibrators with unmodified valve assembly and unmodified recuperator.</p>
 <p>HOSE ASSEMBLY, NITROGEN</p>	<p>1025-01-039-4675 (12008918)</p>	<p>Used to check nitrogen pressure in equilibrators with modified valve assembly.</p>
 <p>HOSE, NITROGEN FILLING</p>	<p>4933-00-840-3740 (8403740)</p>	<p>Used to fill equilibrators with unmodified valve assembly and unmodified recuperator with nitrogen.</p>

**SPECIAL TOOLS AND EQUIPMENT (CONT)**

ITEM	NUMBER	USE
 <p><b>KIT, NITROGEN CHARGING</b></p>	<p>1025-01-070-3200 (8449334)</p>	<p>Used to charge equilibrators with modified valve assembly and modified recuperator with nitrogen.</p>
 <p><b>NITROGEN, CYLINDER</b></p>	<p>6830-00-840-6578 (BBN411) (Full Bottle, 3500 psi)</p>	<p>Used to add nitrogen to equilibrators, accumulator, and recuperator.</p>
 <p><b>REGULATOR, ACCUMULATOR CHARGING</b></p>	<p>4933-01-046-7109 (12252157)</p>	<p>Used to charge accumulator.</p>
 <p><b>SHIELD, SAFETY</b></p>	<p>4933-00-616-6474 (6166474)</p>	<p>Used with wrench 4933-00-616-9841 to remove or install slotted nut on recuperator front head assembly.</p>

**SPECIAL TOOLS AND EQUIPMENT (CONT)**

ITEM	NUMBER	USE
 SPACER	4933-00-520-7129 (5207129)	Used to adjust spring tension of counterbalance assembly.
 TUBE ASSEMBLY, AIR FILLING	4933-00-713-6909 (7136909)	Used to charge equilibrators and recuperators with nitrogen.
 WRENCH, AIR SEAL	5120-00-616-9841 (6169841)	Used to remove or install slotted nut on recuperator front head assembly.
 WRENCH, TORQUE	5120-00-221-7983 5120-00-640-6364 (A-A-2411)	Used to apply required torque to any assembly authorized at unit level maintenance.

ALPHABETICAL INDEX

Subject	Page	Subject	Page
<b>A</b>			
Administrative Storage, Care of Equipment in.....	2-314	Cleaning.....	2-84
Administrative Storage, Definition of .....	2-312	Collimator to Utility-Outlet Branched Wiring Harness (See maintenance of collimator to utility outlet branched wiring harness.).....	2-289
Armament.....	1-10	Common Tools and Equipment .....	2-3
<b>B</b>			
Backup Computer System Wiring Harness Installation with Vehicular Applique System (See maintenance of backup computer system wiring harness installation with vehicular applique system.) .....	2-299	Corrosion Prevention and Control (CPC) .....	1-2
Backup Computer System Wiring Harness Installation without Vehicular Applique System (See maintenance of backup computer system wiring harness installation without vehicular applique system.) .....	2-305	Counterbalance Assembly (See maintenance of counterbalance assembly.).....	2-127
Block Assembly (See maintenance of block assembly.) .....	2-130	<b>D</b>	
Breech Mechanism Assembly (See maintenance of breech mechanism assembly.).....	2-123	Definition of Administrative Storage.....	2-312
<b>C</b>			
Care of Equipment in Administrative Storage.....	2-314	Destruction of Army Materiel to Prevent Enemy Use.....	1-1
Checking Unpacked Equipment .....	2-8	<b>E</b>	
Circuit Breaker and Turret Disconnect to Oil Gear Relay and 24-Volt Feed Electrical Lead (See maintenance of circuit breaker and turret disconnect to oil gear relay and 24-volt feed electrical lead.) .....	2-291	Electrical Circuit Troubleshooting.....	2-27
		Electrical Installation-Hull Disconnect to Turret Disconnect (See maintenance of electrical installation-hull disconnect to turret disconnect.) .....	2-273
		Electrical Installation-Rammer Solenoid Valve Branched Wiring Harness (See maintenance of electrical installation-rammer solenoid valve branched wiring harness.) .....	2-266
		Electrical Installation-Suspension Lockout Instruction Plate and Warning Light (See maintenance of electrical installation-suspension lockout instruction plate and warning light.).....	2-269

ALPHABETICAL INDEX (CONT)

Subject	Page	Subject	Page
<b>E (Cont)</b>			
Elevating and Traversing Manual Control Handles and Electrical Components (See maintenance of elevating and traversing manual control handles and electrical components.)	2-245	Gun Mount Installation-Trunnion Caps (See maintenance of gun mount installation -trunnion caps.)	2-135
Elevating Final Drive Assembly (See maintenance of elevating final drive assembly.)	2-217	Gunner's Seat and Seat Back Assembly and Assistant Gunner's Seat and Seat Back Assembly (See maintenance of gunner's seat and seat back assembly and assistant gunner's seat and seat back assembly.)	2-193
Elevating Hydraulic Drive Unit (See maintenance of elevating hydraulic drive unit.)	2-210	<b>H</b>	
Equipment Characteristics, Capabilities, and Features	1-3	Hand Grenade Box Assembly (See maintenance of hand grenade box assembly.)	2-197
Equipment Data	1-9	Headlink Assembly (See maintenance of headlink assembly.)	2-233
Expendable/Durable Supplies and Materials List	C-1	Housing Assembly (See maintenance of housing assembly.)	2-131
<b>F</b>			
Floor Disconnect to Oil Pump Motor Switch and Accessories Branched Wiring Harness (See maintenance of floor disconnect to oil pump motor switch and accessories branched wiring harness.)	2-285	Hull Disconnect, Interphone Amplifier to Hull Disconnect Driver's Control Cable Assembly (See maintenance of hull disconnect, interphone amplifier to hull disconnect driver's control cable assembly.)	2-294
Floor Disconnect to Turret Disconnect and Accessories Branched Wiring Harness (See maintenance of floor disconnect to turret disconnect and accessories branched wiring harness.)	2-282	Hydraulic Fluid Filter and Hydraulic Lines (See maintenance of hydraulic fluid filter and hydraulic lines.)	2-262
<b>G</b>			
Gun Mount Installation-Antenna Mast Plate (See maintenance of gun mount installation-antenna mast plate.)	2-134	Hydraulic System Description and Schematic Diagrams	F-1
		Hydraulic System Installation-Hydraulic Reservoir and Accumulator (See maintenance of hydraulic system installation-hydraulic reservoir and accumulator.)	2-258

ALPHABETICAL INDEX (CONT)

Subject	Page	Subject	Page
<b>H</b>			
Hydraulic System Installation-Valve Control Rammer Safety Cover Assembly and Knob Valve Handles (See maintenance of hydraulic system installation--valve control rammer safety cover assembly and knob valve handles.)	2-238	Maintenance of Block Assembly:	
		Disassembly .....	2-130
		Inspection/repair .....	2-130
		Reassembly .....	2-131
		Maintenance of Breech Mechanism Assembly:	
		Disassembly .....	2-123
		Inspection/repair .....	2-125
		Reassembly .....	2-125
		Maintenance of Circuit Breaker and Turret Disconnect to Oil Gear Relay and 24-Volt Feed Electrical Lead:	
		Disassembly .....	2-292
		Inspection/repair .....	2-293
		Installation.....	2-293
		Reassembly.....	2-293
		Removal .....	2-292
		Maintenance of Collimator to Utility Outlet Branched Wiring Harness:	
		Disassembly .....	2-290
		Inspection/repair .....	2-290
		Installation.....	2-291
		Reassembly .....	2-290
		Removal .....	2-290
		Maintenance of Counterbalance Assembly:	
		Inspection/repair .....	2-128
		Installation.....	2-128
		Removal .....	2-127
		Maintenance of Electrical Installation-Hull Disconnect to Turret Disconnect:	
		Inspection/repair .....	2-274
		Installation.....	2-275
		Removal .....	2-273
		Maintenance of Electrical Installation-Rammer Solenoid Valve Branched Wiring Harness:	
		Inspection/repair .....	2-268
		Installation.....	2-268
		Removal .....	2-267
<b>I</b>			
Illustrated List of Manufactured Items	D-1		
<b>L</b>			
Left-Side Data Display (See maintenance-of left-side data display.)	2-90		
Loader-Rammer Exterior Hydraulic Lines and Fittings (See maintenance of loader-rammer exterior hydraulic lines and fittings.)	2-234		
Location and Description of Major Components	1-3		
Lubrication	2-85		
<b>M</b>			
Maintenance Allocation Chart	B-1		
Maintenance Forms, Records, and Reports	1-1		
Maintenance of Backup Computer System Wiring Harness Installation with Vehicular Applique System:			
Inspection/repair .....	2-303		
Reassembly/installation .....	2-303		
Removal/disassembly .....	2-299		
Maintenance of Backup Computer System Wiring Harness Installation without Vehicular Applique System:			
Inspection/repair .....	2-309		
Reassembly/installation .....	2-309		
Removal/disassembly	2-306		



ALPHABETICAL INDEX (CONT)

Subject	Page	Subject	Page
<b>M (Cont)</b>			
Maintenance of Electrical Installation-- Suspension Lockout Instruction Plate and Warning Light:		Maintenance of Gun Mount Installa- tion - Antenna Mast Plate:	
Disassembly.....	2-271	Inspection/repair .....	2-135
Inspection/repair .....	2-271	Installation.....	2-135
Installation.....	2-272	Removal .....	2-134
Reassembly .....	2-271	Maintenance of Gun Mount Installa- tion - Trunnion Caps:	
Removal.....	2-270	Disassembly .....	2-135
Maintenance of Elevating and Traver- sing Manual Control Handles and Electrical Components:		Inspection/repair .....	2-136
Disassembly.....	2-247	Reassembly.....	2-136
Inspection/repair .....	2-248	Maintenance of Gunner's Seat and Seat Back Assembly and Assistant Gunner's Seat and Seat Back Assembly:	
Installation/adjustment .....	2-249	Disassembly .....	2-194
Reassembly .....	2-248	Inspection/repair .....	2-194
Removal.....	2-246	Installation.....	2-196
Maintenance of Elevating Final Drive Assembly:		Reassembly.....	2-195
Disassembly.....	2-217	Removal .....	2-193
Inspection/repair .....	2-217	Maintenance of Hand Grenade Box Assembly:	
Reassembly .....	2-217	Inspection/repair .....	2-197
Maintenance of Elevating Hydraulic Drive Unit:		Installation.....	2-197
Adjustment of torque lock.....	2-211	Removal .....	2-197
Disassembly.....	2-210	Maintenance of Headlink Assembly:	
Inspection/repair .....	2-210	Disassembly .....	2-233
Reassembly .....	2-211	Inspection/repair .....	2-233
Maintenance of Floor Disconnect to Oil Pump Motor Switch and Ac- cessories Branched Wiring Harness:		Reassembly.....	2-233
Disassembly.....	2-287	Maintenance of Housing Assembly:	
Inspection/repair .....	2-287	Disassembly .....	2-131
Installation.....	2-288	Inspection/repair .....	2-132
Reassembly .....	2-287	Reassembly.....	2-132
Removal.....	2-286	Maintenance of Hull Disconnect, In- terphone Amplifier to Hull Disconnect Driver's Control Cable Assembly:	
Maintenance of Floor Disconnect to Turret Disconnect and Accessories Branched Wiring Harness:		Disassembly .....	2-295
Disassembly.....	2-283	Inspection/repair .....	2-295
Inspection/repair .....	2-283	Installation.....	2-295
Installation.....	2-284	Reassembly.....	2-295
Reassembly .....	2-283	Removal .....	2-295
Removal.....	2-282		

ALPHABETICAL INDEX (CONT)

Subject	Page	Subject	Page
<b>M</b>			
Maintenance of Hydraulic Fluid Filter and Hydraulic Lines:		Maintenance of Modified Recuperator Cylinder Front Head Assembly:	
Applying hydraulic pressure.....	2-266	Applying hydraulic pressure.....	2-169
Disassembly.....	2-264	Charging.....	2-166
Inspection/repair.....	2-264	Disassembly.....	2-163
Installation.....	2-265	Final inspection of nitrogen pressure.....	2-169
Reassembly.....	2-264	Inspection/repair.....	2-163
Relieving hydraulic pressure.....	2-263	Reassembly.....	2-163
Removal.....	2-263	Releasing.....	2-165
Maintenance of Hydraulic System Installation - Hydraulic Reservoir and Accumulator:		Relieving hydraulic pressure.....	2-162
Applying hydraulic pressure.....	2-262	Testing.....	2-164
Charging with nitrogen.....	2-260	Maintenance of M1A1 Infinity Aiming Reference Collimator:	
Disassembly.....	2-259	Disassembly.....	2-119
inspection/repair.....	2-259	Inspection/repair.....	2-119
Reassembly.....	2-259	Reassembly.....	2-119
Relieving hydraulic pressure.....	2-259	Maintenance of M15 Fire Control Quadrant and M140 Alinement Device Mount (Right Side):	
Maintenance of Hydraulic System Installation - Valve Control Rammer Safety Cover Assembly and Knob Valve Handles:		Adjustment of M15 fire control quadrant.....	2-109
Inspection/repair.....	2-239	Disassembly.....	2-105
Reassembly/installation.....	2-239	Inspection/repair.....	2-105
Removal/disassembly.....	2-238	Installation.....	2-107
Maintenance of Left-Side Data Display:		Reassembly.....	2-106
Inspection/repair.....	2-91	Removal.....	2-104
Reassembly/installation.....	2-92	Maintenance of M35 Firing Mechanism:	
Removal/disassembly.....	2-90	Disassembly.....	2-120
Maintenance of Loader-Rammer Exterior Hydraulic Lines and Fittings:		Inspection/repair.....	2-121
Applying hydraulic pressure.....	2-236	Reassembly.....	2-121
Inspection/repair.....	2-236	Maintenance of M 115 Panoramic Telescope:	
Reassembly/installation.....	2-236	Disassembly.....	2-99
Relieving hydraulic pressure.....	2-234	Inspection/repair.....	2-99
Removal/disassembly.....	2-235	Installation.....	2-100
		Reassembly.....	2-100
		Removal.....	2-98

ALPHABETICAL INDEX (CONT)

Subject	Page	Subject	Page
<b>M (Cont)</b>			
Maintenance of M137 Telescope Mount and M140 Alinement Device		Maintenance of Plain Bearing Unit:	
Mount (Left Side):		Disassembly .....	2-296
Adjustment of M137 telescope mount .....	2-117	Inspection/repair .....	2-296
Disassembly .....	2-114	Reassembly .....	2-296
Inspection/repair .....	2-115	Service .....	2-296
Installation .....	2-116	Maintenance of Pneumatic Equilibrator Assembly and Modified Valve Assembly:	
Reassembly .....	2-115	Adding nitrogen (charging equilibrators) .....	2-149
Removal .....	2-113	Checking nitrogen pressure .....	2-145
Maintenance of M138 Telescope Mount:		Emergency charging of equilibrators .....	2-153
Adjustment .....	2-112	Releasing nitrogen .....	2-147
Disassembly .....	2-111	Maintenance of Pneumatic Equilibrator Assembly and Unmodified Valve Assembly:	
Inspection/repair .....	2-111	Adding nitrogen (charging equilibrators) .....	2-141
Installation .....	2-112	Checking nitrogen pressure .....	2-137
Reassembly .....	2-111	Emergency charging of equilibrators .....	2-144
Removal .....	2-110	Releasing nitrogen .....	2-139
Maintenance of M139 Elbow Telescope:		Maintenance of Power Loader-Rammer:	
Disassembly .....	2-102	Adjustment .....	2-232
Inspection/repair .....	2-102	Disassembly .....	2-230
Installation .....	2-102	Inspection/repair .....	2-231
Reassembly .....	2-102	Reassembly .....	2-231
Removal .....	2-101	Maintenance of Power Loader-Rammer--Loader Arm, Cylinder Assembly, and Related Items:	
Maintenance of M174 Gun Mount Exterior Hydraulic Lines and Fittings:		Disassembly .....	2-224.2
Applying hydraulic pressure .....	2-156	Inspection/repair .....	2-225
Inspection/repair .....	2-155	Reassembly .....	2-225
Reassembly/installation .....	2-155	Maintenance of Projectile Lifting Tray:	
Relieving hydraulic pressure .....	2-154	Disassembly .....	2-297
Removal/disasassembly .....	2-155	Inspection/repair .....	2-298
Maintenance of M174 Gun Mount Assembly - Wipers and Related Items:		Reassembly .....	2-298
Inspection/repair .....	2-158	Maintenance of Pivot Interlock Push Switch:	
Reassembly/installation .....	2-158	Disassembly .....	2-277
Removal/disasassembly .....	2-157	Inspection/repair .....	2-277
Maintenance of Pivot Interlock Push Switch:		Installation/adjustment .....	2-278
Disassembly .....	2-277	Reassembly .....	2-277
Inspection/repair .....	2-277	Removal .....	2-276
Installation/adjustment .....	2-278		
Reassembly .....	2-277		
Removal .....	2-276		

ALPHABETICAL INDEX (CONT)

Subject	Page	Subject	Page
<b>M</b>			
Maintenance of Rammer Installation-Chain Case Handcranks and Case Cleanout Cover Assembly:		Maintenance of Seat Bracket Assembly:	
Inspection/repair .....	2-224	Disassembly .....	2-204
Reassembly/installation .....	2-224.1	Inspection/repair .....	2-204
Removal/disassembly .....	2-224	Installation.....	2-205
Service of headlink and chain assembly.....	2-224.1	Reassembly.....	2-204
		Removal .....	2-203
Maintenance of Rammer Traversing Cylinder Assembly:		Maintenance of Spindle Assembly:	
Applying hydraulic pressure.....	2-222	Disassembly .....	2-133
Inspection/repair .....	2-221	Inspection/repair .....	2-133
Installation.....	2-221	Reassembly.....	2-133
Relieving hydraulic pressure.....	2-218	Maintenance of Support Assembly and Manual Control Handle:	
Removal.....	2-219	Disassembly .....	2-201
Maintenance of Rammer Traversing Lines and Fittings and Pressure Gage Dial Assembly:		Inspection/repair .....	2-201
Applying hydraulic pressure.....	2-257	Installation.....	2-203
Inspection/repair .....	2-256	Reassembly.....	2-202
Reassembly/installation .....	2-256	Removal .....	2-200
Relieving hydraulic pressure .....	2-254	Maintenance of Torque Lock:	
Removal/disassembly .....	2-255	Adjustment.....	2-214
Maintenance of Replenisher Assembly:		Maintenance of Traversing and Ele- vating Drive Breathers:	
Disassembly.....	2-160	Inspection/repair .....	2-240
Inspection/repair .....	2-161	Installation.....	2-240
Reassembly .....	2-161	Removal .....	2-240
Maintenance of Right-Side Data Display:		Maintenance of Traversing and Ele- vating Drive Torque Handles:	
Inspection/repair .....	2-94	Disassembly .....	2-213
Reassembly/installation .....	2-95	Inspection/repair .....	2-213
Removal/disassembly .....	2-93	Reassembly.....	2-214
Maintenance of Rim Latch Set:		Maintenance of Traversing Constant Speed Drive:	
Adjustment.....	2-229	Adjustment of torque lock.....	2-208
Inspection/repair .....	2-228	Disassembly .....	2-206
Installation.....	2-228	Inspection/repair .....	2-207
Removal.....	2-228	Reassembly.....	2-207
Maintenance of Rim Lock Set:		Maintenance of Traversing Control Grip Assembly:	
Adjustment.....	2-227	Disassembly .....	2-251
Removal/disassembly .....	2-226	Inspection/repair .....	2-252
Inspection/repair .....	2-226	Installation/adjustment.....	2-252
Reassembly/installation .....	2-227	Reassembly.....	2-252
		Removal .....	2-250

ALPHABETICAL INDEX (CONT)

Subject	Page	Subject	Page
<b>M (Cont)</b>			
Maintenance of Tray Interlock Sensitive Switch:		Maintenance of Turret Installation - Quadrant Strap Assembly:	
Disassembly.....	2-280	Inspection/repair .....	2-188
Inspection/repair .....	2-280	Installation.....	2-188
Installation/adjustment .....	2-281	Removal .....	2-188
Reassembly .....	2-280	Maintenance of Turret Installation - Right and Left Hydraulic Tube Guards:	
Removal.....	2-279	Inspection/repair .....	2-187
Maintenance of Turret Deceleration Valve to Turret Deceleration Switch		Installation.....	2-187
Wiring Harness:		Removal .....	2-187
Inspection/repair .....	2-242	Maintenance of Turret Installation - Spade Emergency Shut-off Instruction Plate:	
Installation.....	2-242	Inspection/repair .....	2-186
Removal.....	2-241	Installation.....	2-186
Maintenance of Turret Deceleration Wiring Harness:		Removal .....	2-186
Adjustment.....	2-245	Maintenance of Turret Installation - Stops and Seals:	
Disassembly.....	2-244	Inspection/repair .....	2-192
Inspection/repair .....	2-244	Reassembly/installation.....	2-192
Installation.....	2-244	Removal/disassembly.....	2-191
Reassembly .....	2-244	Maintenance of Turret Installation - Vehicular Access Box:	
Removal.....	2-243	Inspection/repair .....	2-185
Maintenance of Turret Installation - Amplifier Mount Bracket:		Installation.....	2-185
Inspection/repair .....	2-190	Removal .....	2-185
Installation.....	2-190	Maintenance of Turret Stowage Access Door:	
Removal.....	2-189	Disassembly .....	2-199
Maintenance of Turret Installation - BCS Mounting Access Cover:		Inspection/repair .....	2-199
Inspection/repair .....	2-184	Installation.....	2-200
Installation.....	2-184	Reassembly .....	2-199
Removal.....	2-184	Removal .....	2-198
Maintenance of Turret Installation - Binocular Stowage Bracket Assembly:			
Inspection/repair .....	2-183		
Reassembly/installation .....	2-183		
Removal/disassembly .....	2-182		
Maintenance of Turret Installation - First Aid Rack:			
Inspection/repair .....	2-181		
Reassembly/installation .....	2-181		
Removal/disassembly .....	2-181		

ALPHABETICAL INDEX (CONT)

Subject	Page	Subject	Page
<b>M</b>			
Maintenance of Unmodified Recuperator Cylinder Front Head Assembly:		M 138 Telescope Mount (See maintenance of M138 tele- scope mount.).....	2-110
Applying hydraulic pressure.....	2-179	M 139 Elbow Telescope (See maintenance of M139 elbow telescope.) .....	2-101
Charging .....	2-175	M174 Gun Mount Exterior Hydraulic Lines and Fittings (See maintenance of M174 gun mount exterior hydraulic lines and fittings.) .....	2-154
Disassembly.....	2-172		
Final inspection of nitrogen pressure .....	2-179		
Inspection/repair .....	2-173	M174 Gun Mount Assembly-Wipers and Related Items (See maintenance of M174 gun mount assembly-wipers and re- lated items.) .....	2-157
Reassembly .....	2-173		
Relieving hydraulic pressure.....	2-171		
Testing .....	2-174		
Maintenance of Vehicular Applique System:			
Inspection/repair .....	2-97		
Installation.....	2-97		
Removal.....	2-97		
Modified Recuperator Cylinder Front Head Assembly (See maintenance of modified recuperator cylinder front head assembly.).....	2-162	<b>N</b>	
		Nonskid Areas.....	2-85
M1A1. Infinity Aiming Reference Collimator (See maintenance of M1A1 infinity aiming reference collimator.) .....	2-119	<b>O</b>	
		Official Nomenclature, Names, and Designations .....	1-2
M15 Fire Control Quadrant and M140 Alinement Device Mount (Right Side) (See maintenance of M15 fire con- trol quadrant and M140 alinement device mount (right side).) .....	2-103	<b>P</b>	
		PMCS Procedures and Lubrication Instructions.....	2-8
M35 Firing Mechanism (See maintenance of M35 firing mechanism.) .....	2-120	Painting Instructions.....	2-85
		Painting Load Marks .....	2-89
M 115 Panoramic Telescope (See maintenance of M115 panoramic telescope.) .....	2-98	Painting Retract Mark.....	2-88
		Pivot Interlock Push Switch (See maintenance of pivot interlock push switch.).....	2-276
M137 Telescope Mount and M140 Alinement Device Mount (Left Side) (See maintenance of M137 tele- scope mount and M140 alinement device mount (left side).) .....	2-113	Plain Bearing Unit (See maintenance of plain bearing unit.).....	2-296

ALPHABETICAL INDEX (CONT)

Subject	Page	Subject	Page
<b>P (Cont)</b>			
Pneumatic Equilibrator Assembly and Modified Valve Assembly (See maintenance of pneumatic equilibrator assembly and modified valve assembly.)	2-144	Rammer Traversing Lines and Fittings and Pressure Gage Dial Assembly (See maintenance of rammer traversing lines and fittings and pressure gage dial assembly.)	2-254
Pneumatic Equilibrator Assembly and Unmodified Valve Assembly (See maintenance of pneumatic equilibrator assembly and unmodified valve assembly.)	2-137	References	A-1
Power Loader-Rammer (See maintenance of power loader-rammer.)	2-230	Repair Methods	2-84
Power Loader-Rammer-Loader Arm, Cylinder Assembly, and Related Items (See maintenance of power loader-rammer-loader arm, cylinder assembly, and related items)	2-224.2	Repair Parts	2-3
Preparation for Storage or Shipment	1-2	Replacing Cable Terminals and Connectors: Female cable connector (with sleeve)	2-81
Projectile Lifting Tray (See maintenance of projectile lifting tray.)	2-297	Female cable connector (with washer)	2-81
<b>R</b>			
Rammer Installation-Chain Case Handcranks and Case Cleanout Cover Assembly (See maintenance of rammer installation-chain case handcranks and case cleanout cover assembly.)	2-224	Male cable connector	2-81
Rammer Traversing Cylinder Assembly (See maintenance of rammer traversing cylinder assembly.)	2-218	Terminal-type cable connectors	2-80
		Replenisher Assembly (See maintenance of replenisher assembly.)	2-159
		Reporting Equipment Improvement Recommendations (EIR)	1-2
		Restenciling Vehicle Markings	2-87
		Right-Side Data Display (See maintenance of right-side data display.)	2-93
		Rim Latch Set (See maintenance of rim latch set.)	2-228
		Rim Lock Set (See maintenance of rim lock set.)	2-226
		<b>S</b>	
		Seat Bracket Assembly (See maintenance of seat bracket assembly.)	2-203

ALPHABETICAL INDEX (CONT)

Subject	Page	Subject	Page
<b>S</b>			
Semiannual (2400 Kilometer) Preventive Maintenance, Special Procedures for .....	2-11	Traversing and Elevating Drive Torque Handles (See maintenance of traversing and elevating drive torque handles.).....	2-213
Service Upon Receipt of Materiel.....	2-3	Traversing Constant Speed Drive (See maintenance of traversing constant speed drive.) .....	2-205
Special Procedures for Semiannual (2400 Kilometer) Preventive Maintenance.....	2-11	Traversing Control Grip Assembly (See maintenance of traversing control grip assembly.) .....	2-250
Special Tools and Equipment.....	G-1	Tray Interlock Sensitive Switch (See maintenance of tray interlock sensitive switch.) .....	2-279
Special Tools, TMDE, and Support Equipment .....	2-3	Troubleshooting Information .....	2-13
Spindle Assembly (See maintenance of spindle assembly.).....	2-132	Tube Elbow to Tube Fitting: Disassembly .....	2-82
Straight Adapter to Tube Fitting: Disassembly .....	2-83	Reassembly .....	2-82
Reassembly .....	2-83	Tube Nipple to Tube Fitting: Disassembly .....	2-83
Support Assembly and Manual Control Handle (See maintenance of support assembly and manual control handle.) .....	2-200	Reassembly .....	2-83
<b>T</b>			
Tools and Supplies .....	2-11	Tube Reducer to Tube Fitting Disassembly .....	2-83
Torque Lock (See maintenance of torque lock.).....	2-214	Reassembly .....	2-83
Torque Values .....	E-1	Tube Tee to Tube Fitting Disassembly .....	2-82
Touchup and Recoating .....	2-86	Reassembly .....	2-82
Traversing and Elevating Drive Breathers (See maintenance of-traversing and elevating drive breathers.) .....	2-240	Turret Deceleration Valve to Turret Deceleration Switch Wiring Harness (See maintenance of turret deceleration valve to turret deceleration switch wiring harness.).....	2-241
		Turret Deceleration Wiring Harness (See maintenance of turret deceleration wiring harness.).....	2-243



ALPHABETICAL INDEX (CONT)

Subject	Page	Subject	Page
<b>T (Cont)</b>			
Turret Installation-Amplifier Mount Bracket (See maintenance of turret installation-amplifier mount bracket.)	2-189	Turret Stowage Access Door (See maintenance of turret stowage access door.)	2-198
Turret Installation-BCS Mounting Access Cover (See maintenance of turret installation-BCS mounting access cover.)	2-184	Typical Female-Type Panel Mounting Receptacle: Disassembly Reassembly	2-75 2-75
Turret Installation-Binocular Stowage Bracket Assembly (See maintenance of turret installation-binocular stowage bracket assembly.)	2-182	Typical Female-Type Panel Mounting Receptacle: Disassembly Reassembly	2-76 2-77
Turret Installation-First Aid Rack (See maintenance of turret installation-first aid rack.)	2-181	Typical Female-Type Plug: Disassembly Reassembly	2-78 2-79
Turret Installation-Quadrant Strap Assembly (See maintenance of turret installation-quadrant strap assembly.)	2-188	Typical Male-Type Panel Mounting Receptacle: Disassembly Reassembly	2-76 2-76
Turret Installation-Right and Left Hydraulic Tube Guards (See maintenance of turret installation-right and left hydraulic tube guards.)	2-187	Typical Male-Type Panel Mounting Receptacle: Disassembly Reassembly	2-77 2-78
Turret Installation-Spade Emergency Shut-off Instruction Plate (See maintenance of turret installation-spade emergency shut-off instruction plate.)	2-186	Typical Male-Type Plug: Disassembly Reassembly	2-79 2-80
Turret Installation-Stops and Seals (See maintenance of turret installation-stops and seals.)	2-191	<b>U</b>	
Turret Installation-Vehicular Access Box (See maintenance of turret installation-vehicular access box.)	2-185	Unmodified Recuperator Cylinder Front Head Assembly (See maintenance of unmodified recuperator cylinder front head assembly)	2-171
		<b>V</b>	
		Vehicular Applique System (See maintenance of vehicular applique system.)	2-96

By Order of the Secretary of the Army:

CARL E. VUONO  
General, United States Army  
Chief of Staff

Official:

JOHN A. FULMER  
Colonel, United States Army  
Acting The Adjutant General

DISTRIBUTION:

To be distributed in accordance with DA Form 12-37E, (Block 1105), Unit Maintenance Requirements for TM 9-2350-304-20-2.

\*U.S. G.P.O. : 1991-543-050:40047

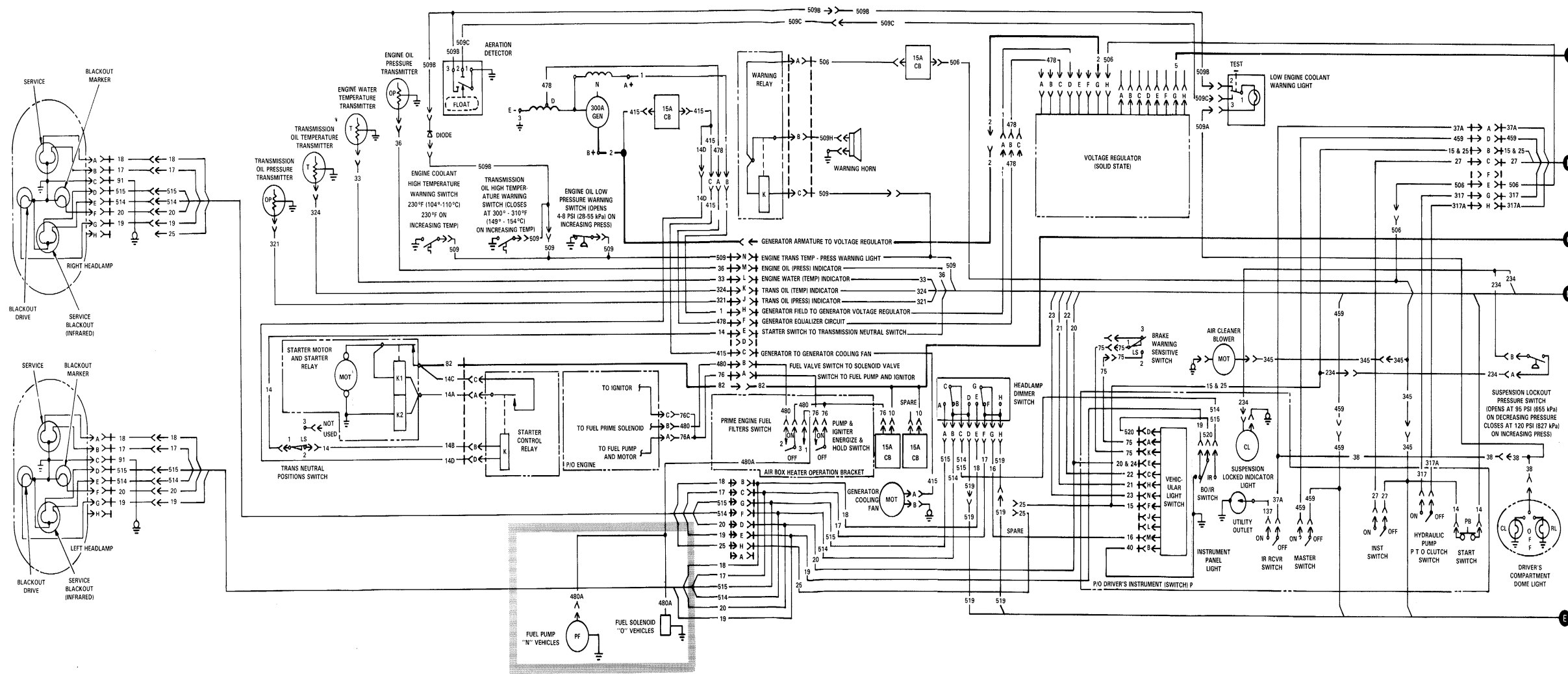


FIGURE FO-1

FP-1/(FP-2 Blank)

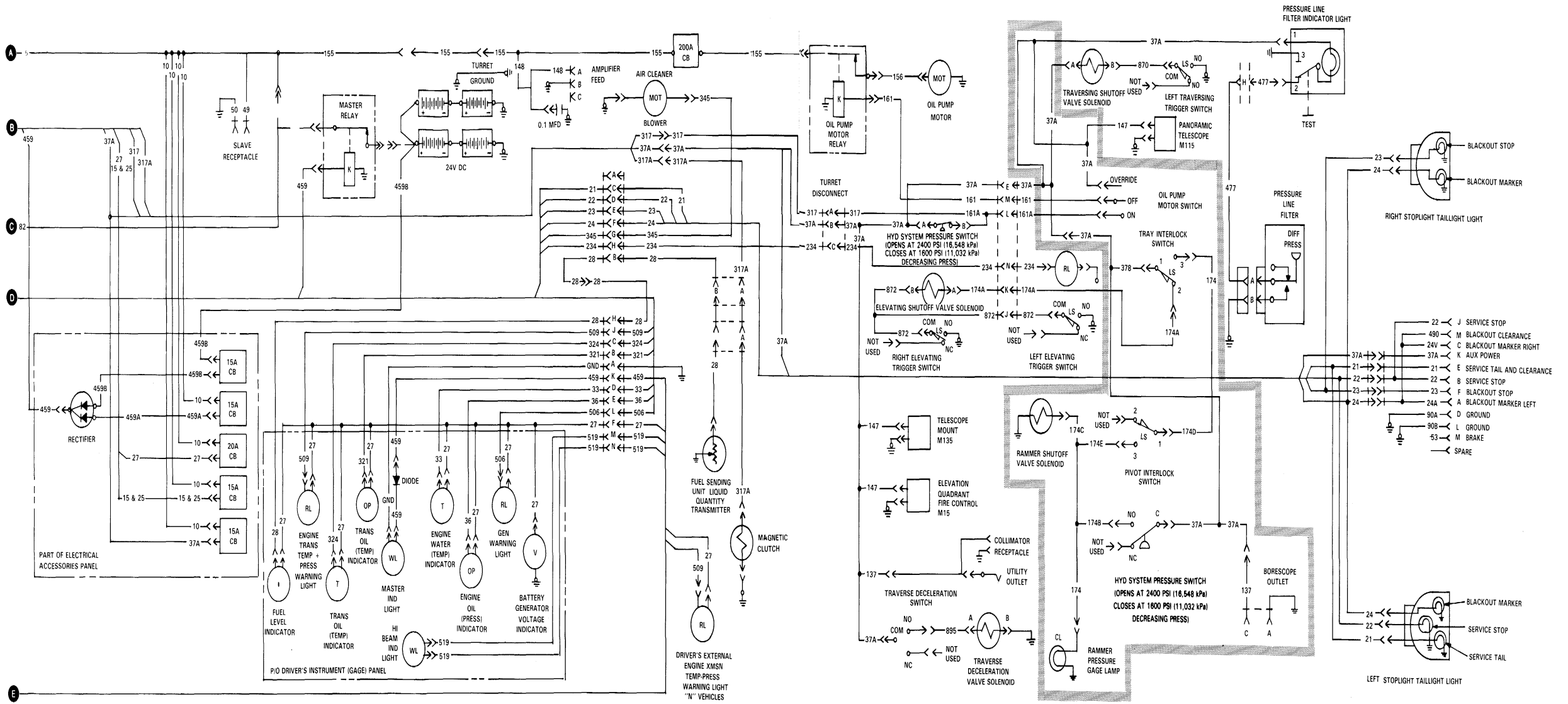
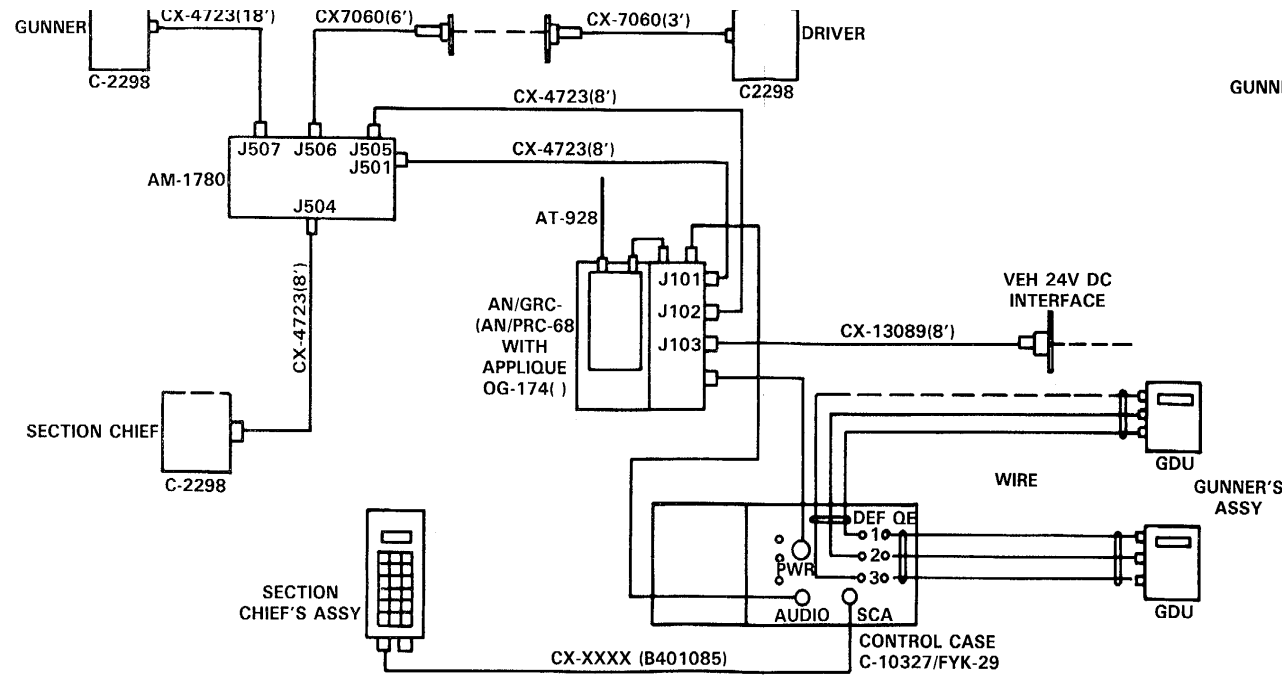
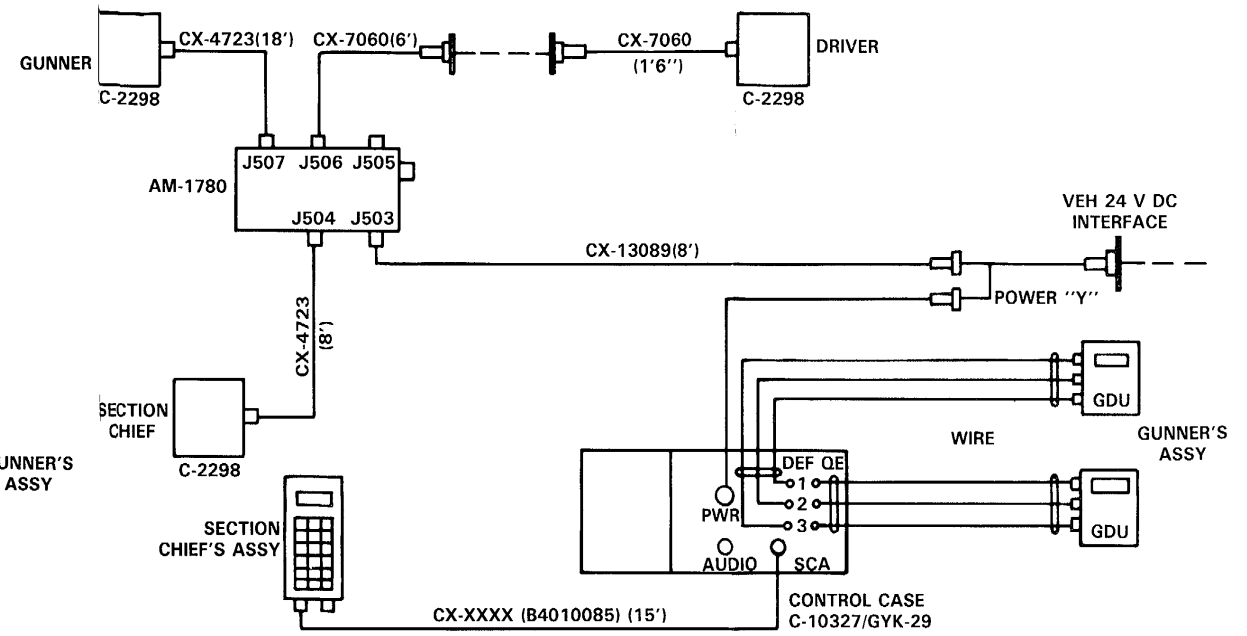


FIGURE FO-3

FP-3/(FP-4 Blank)



INSTALLATION OF AN/PRC-68 WITH APPLIQUE & INTERCOM WITH BCS IN M110



INSTALLATION OF INTERCOM WITH BCS IN M110 (INTERIM HOOK-UP)

FIGURE FO-3  
FP-5/(FP-6 Blank)

- 1. ALL CALLOUTS ARE FOR REFERENCE ONLY
- 2.  $\diamond$  FRACTIONAL O.D. OF TUBING
- 3.  $\odot$  FRACTIONAL I.D. OF HOSE

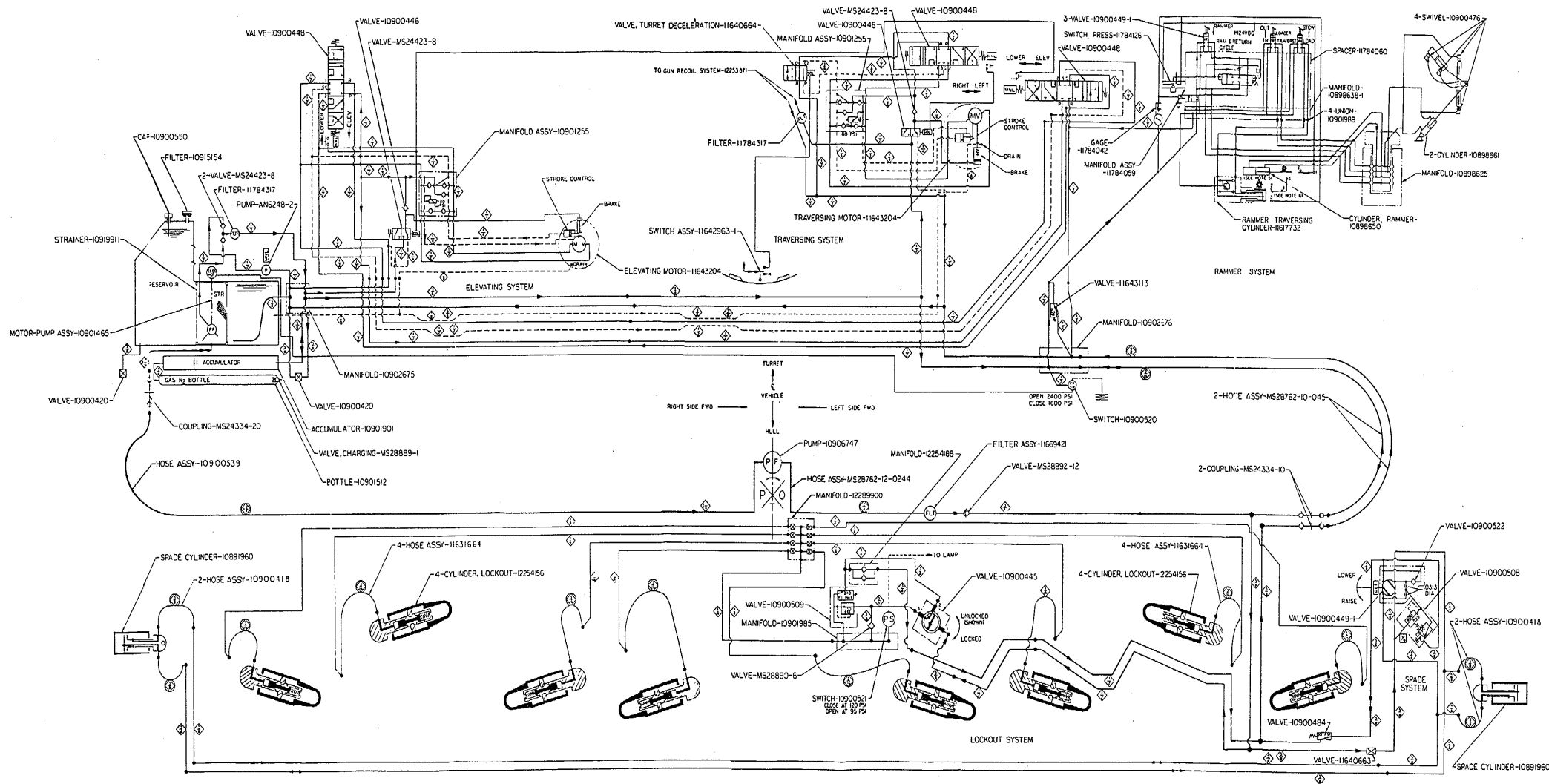


FIGURE FO-4

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL PUBLICATIONS

**SOMETHING WRONG WITH THIS PUBLICATION?**



THEN... JOT DOWN THE DOPE ABOUT IT ON THIS FORM, CAREFULLY TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (PRINT YOUR UNIT'S COMPLETE ADDRESS)

DATE SENT

PUBLICATION NUMBER

PUBLICATION DATE

PUBLICATION TITLE

BE EXACT... PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

TEAR ALONG PERFORATED LINE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

DA FORM 2028-2  
1 JUL 78

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

## THE METRIC SYSTEM AND EQUIVALENTS

### LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches  
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches  
 1 Kilometer = 1000 Meters = 0.621 Miles

### SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches  
 1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet  
 1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

### WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces  
 1 Kilogram = 1000 Grams = 2.2 Lb  
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

### CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches  
 1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

### LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces  
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

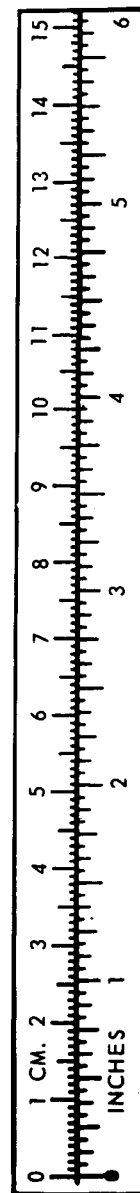
### TEMPERATURE

$5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}$   
 212<sup>o</sup> Fahrenheit is equivalent to 100<sup>o</sup> Celsius  
 90<sup>o</sup> Fahrenheit is equivalent to 32.2<sup>o</sup> Celsius  
 32<sup>o</sup> Fahrenheit is equivalent to 0<sup>o</sup> Celsius  
 $9/5 \text{ C}^{\circ} + 32 = \text{F}^{\circ}$

### APPROXIMATE CONVERSION FACTORS

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Inches . . . . .	Centimeters . . . . .	2.540
Feet . . . . .	Meters . . . . .	0.305
Yards . . . . .	Meters . . . . .	0.914
Miles . . . . .	Kilometers . . . . .	1.609
Square Inches . . . . .	Square Centimeters . . . . .	6.451
Square Feet . . . . .	Square Meters . . . . .	0.093
Square Yards . . . . .	Square Meters . . . . .	0.836
Square Miles . . . . .	Square Kilometers . . . . .	2.590
Acres . . . . .	Square Hectometers . . . . .	0.405
Cubic Feet . . . . .	Cubic Meters . . . . .	0.028
Cubic Yards . . . . .	Cubic Meters . . . . .	0.765
Fluid Ounces . . . . .	Milliliters . . . . .	29.573
Pints . . . . .	Liters . . . . .	0.473
Quarts . . . . .	Liters . . . . .	0.946
Gallons . . . . .	Liters . . . . .	3.785
Ounces . . . . .	Grams . . . . .	28.349
Pounds . . . . .	Kilograms . . . . .	0.454
Short Tons . . . . .	Metric Tons . . . . .	0.907
Pound-Feet . . . . .	Newton-Meters . . . . .	1.356
Pounds per Square Inch . . . . .	Kilopascals . . . . .	6.895
Miles per Gallon . . . . .	Kilometers per Liter . . . . .	0.425
Miles per Hour . . . . .	Kilometers per Hour . . . . .	1.609

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Centimeters . . . . .	Inches . . . . .	0.394
Meters . . . . .	Feet . . . . .	3.280
Meters . . . . .	Yards . . . . .	1.094
Kilometers . . . . .	Miles . . . . .	0.621
Square Centimeters . . . . .	Square Inches . . . . .	0.155
Square Meters . . . . .	Square Feet . . . . .	10.764
Square Meters . . . . .	Square Yards . . . . .	1.196
Square Kilometers . . . . .	Square Miles . . . . .	0.386
Square Hectometers . . . . .	Acres . . . . .	2.471
Cubic Meters . . . . .	Cubic Feet . . . . .	35.315
Cubic Meters . . . . .	Cubic Yards . . . . .	1.308
Milliliters . . . . .	Fluid Ounces . . . . .	0.034
Liters . . . . .	Pints . . . . .	2.113
Liters . . . . .	Quarts . . . . .	1.057
Liters . . . . .	Gallons . . . . .	0.264
Grams . . . . .	Ounces . . . . .	0.035
Kilograms . . . . .	Pounds . . . . .	2.205
Metric Tons . . . . .	Short Tons . . . . .	1.102
Newton-Meters . . . . .	Pound-Feet . . . . .	0.738
Kilopascals . . . . .	Pounds per Square Inch . . . . .	0.145
Kilometers per Liter . . . . .	Miles per Gallon . . . . .	2.354
Kilometers per Hour . . . . .	Miles per Hour . . . . .	0.621



TA089991



