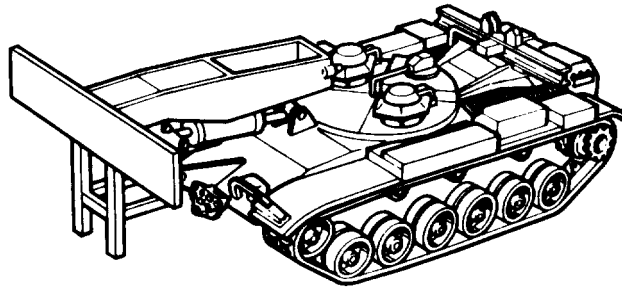


# TM 5-5420-228-24

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## TECHNICAL MANUAL

### ORGANIZATIONAL, DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL



## LAUNCHER HYDRAULICS SYSTEM, M60A1 TANK CHASSIS, TRANSPORTING: FOR BRIDGE, ARMORED-VEHICLE-LAUNCHED SCISSORING TYPE, CLASS 60 (5420-00-889-2020)

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CHANGE

NO. 2

HEADQUARTER  
DEPARTMENT OF THE ARMY  
Washington, D.C., 31 May 1996

ORGANIZATIONAL,  
DIRECT SUPPORT AND GENERAL SUPPORT  
MAINTENANCE MANUAL  
LAUNCHER HYDRAULICS SYSTEM,  
M60A1 TANK CHASSIS,  
TRANSPORTING:  
FOR BRIDGE,  
ARMORED-VEHICLE-LAUNCHED  
SCISSORING TYPE, CLASS 60  
(NSN 5420-00-889-2020)

TM 5-5420-228-24, dated 30 August 1985, is changed as follows:

1. Remove old pages and insert new pages as indicated below.
2. New or changed information is indicated by a vertical bar in the margin of the page.
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iii and iv  
2-3 thru 2-10  
None  
2-11 and 2-12  
2-51 and 2-52  
2-57 thru 2-68  
2-69 and 2-70  
2-71 and 2-72  
2-73 thru 2-76  
2-79 thru 2-92  
2-95 and 2-96  
2-99 and 2-100  
None

Insert Pages

iii and iv  
2-3 thru 2-10  
2-10.1 thru 2-10.10  
2-11 and 2-12  
2-51 and 2-52  
2-57 thru 2-68  
None  
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2-73 thru 2-76  
2-79 thru 2-92  
2-95 and 2-96  
2-99 and 2-100  
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Official:



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Secretary of the Army*

01923

DENNIS J. REIMER  
*General, United States Army  
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**DISTRIBUITION:**

To be distributed in accordance with DA Form 12-37-E, block 1230, requirements for  
TM 5-5420-228-24



**CHANGE**

**NO. 1**

**HEADQUARTERS  
DEPARTMENT OF THE ARMY  
Washington, D.C., 1 April 1986**

**ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT  
MAINTENANCE MANUAL  
LAUNCHER HYDRAULICS SYSTEM, M60A1 TANK CHASSIS  
TRANSPORTING:  
FOR BRIDGE, ARMORED-VEHICLE-LAUNCHED,  
SCISSORING TYPE, CLASS 60  
(5420-00-889-2020)**

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i and ii	i and ii
2-3 thru 2-8	2-3 thru 2-8
Cover	Cover

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*Chief of Staff*

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**R.L.DILWORTH**  
*Brigadier General United States Army*  
*The Adjutant General*

Distribution:

To be distributed in accordance with DA Form 12-37, Organizational and Direct and General Support maintenance requirements for Launching Systems, M60A1 (AVLB).



### CARBON MONOXIDE POISONING CAN BE DEADLY

Carbon monoxide is a colorless, odorless, deadly poisonous gas, which when breathed, deprives the body of oxygen and causes suffocation. Exposure to air contaminated with carbon monoxide produces symptoms of headache, dizziness, loss of muscular control, apparent drowsiness, and coma. Permanent brain damage or death can result from severe exposure. It occurs in the exhaust fumes of fuel-burning heaters and internal combustion engines and becomes dangerously concentrated under conditions of inadequate ventilation. The following precautions must be observed to insure the safety of personnel whenever the personnel heater, main, or auxiliary engine of any vehicle is operated for maintenance purposes or tactical use.

1. DO NOT operate heater or engine of vehicle in an enclosed area unless it is ADEQUATELY VENTILATED.
2. DO NOT idle engine for long periods without ventilator blower operating. If tactical situation permits, open hatches.
3. DO NOT drive any vehicle with inspection plates, cover plates, or engine compartment doors removed unless necessary for maintenance purposes.
4. BE ALERT at all times during vehicle operation for exhaust odors and exposure symptoms. If either are present, IMMEDIATELY VENTILATE personnel compartments. If symptoms persist, remove affected personnel from vehicle and treat as follows: expose to fresh air; keep warm; DO NOT PERMIT PHYSICAL EXERCISE: if necessary, administer artificial respiration.
5. Neither the gas-particulate filter unit nor the M25A1 protective mask will protect you against carbon monoxide poisoning.

THE BEST DEFENSE AGAINST CARBON MONOXIDE POISONING IS ADEQUATE VENTILATION.

For artificial respiration, refer to FM 21-11.

### WARNING

Dry cleaning solvent P-D-680 is toxic and flammable. To prevent personal injury, wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point for Type #1 Dry Cleaning Solvent is 100°F (38°C) and for Type #2 is 138°F (50°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

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The following summary list is adapted from the warnings within the manual. However, all warnings should be observed as noted in the text.

1. Make sure all personnel are in a safe position before launching or retrieving bridge.
2. Neither the gas-particulate filter unit nor the M25A1 C-B tank mask will protect you against carbon monoxide poisoning.
3. Make sure fuel tank filler neck and fuel nozzle are touching while refueling.
4. Do not allow flames or sparks within area while refueling. Have a manned fire extinguisher handy.
5. Frostbite to the cheekbone area of the face may be experienced by wearers of the M25A1 protective mask from sub-freezing air delivered by the gas-particulate filter unit. Do not connect the protective mask to the filter unit unless ambient temperature is well above freezing.
6. Do not disconnect/connect any part of the electrical equipment with power on.
7. Operation of this equipment presents a noise hazard to personnel in the area. The noise level exceeds the allowable limits for unprotected personnel. Wear ear muffs or ear plugs which were fitted by a trained professional.

**WARNING**  
**HIGH VOLTAGE**

High voltage is used in the operation of this equipment. Turn IR (infra-red) power switch only when using infra-red periscopes M24. Be sure that IR power cables are connected to prevent accidental shock to personnel.

**WARNING**  
**HAZARDOUS-NOISE**

1. Hearing protection (helmet) required.
2. Double hearing protection (helmet and ear plugs) required on road marches at speeds over 15 mph.

**WARNING**

Before you work around tracked vehicles, remove rings, bracelets, and wristwatches. These items may be caught on projections and cause injury or may be shorted across an electrical circuit and cause severe burns and electrical shock.

**WARNING**

FRH hydraulic fluid may contain Tricresyl Phosphate which, if taken internally, can produce patalysis. Hydraulic fluid may be absorbed through the skin. Wear long sleeves, gloves, goggles, and face shield. If FRH gets in eyes, wash them immediately and get medical aid immediately. If FRH gets on skin, thoroughly wash with soap and water. Wash hands thoroughly prior to eating or smoking. Application of these measures is considered an effective control of the hazard.

TA251256

Technical Manual  
 No. TM 5-5420-228-24

HEADQUARTERS  
 DEPARTMENT OF THE ARMY  
 WASHINGTON, D.C. 30 August 1985

ORGANIZATIONAL, DIRECT SUPPORT, AND GENERAL SUPPORT

MAINTENANCE MANUAL

LAUNCHER HYDRAULICS SYSTEM, M60A1 TANK CHASSIS

TRANSPORTING:

FOR BRIDGE, ARMORED-VEHICLE- LAUNCHED,

SCISSORING TYPE, CLASS 60

5420-00-889-2020

REPORTING OF ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistake 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, US Army Tank-Automotive Command, Attn: AMSTA-MBC, Warren, Michigan 48397-5000. A reply will be furnished to you.

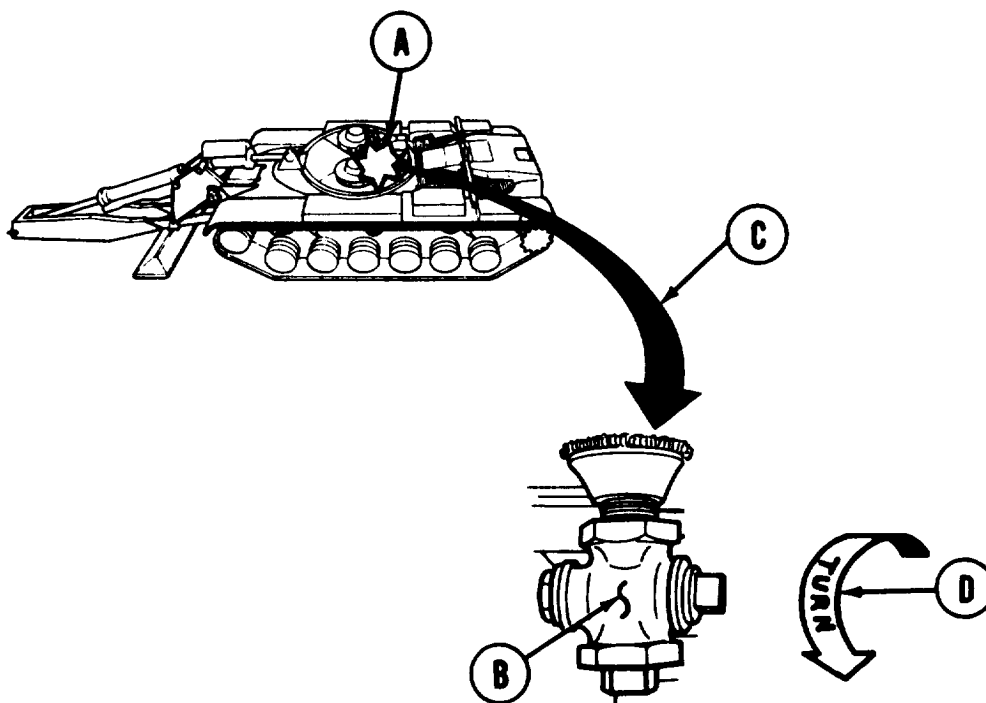
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## HOW TO USE THIS MANUAL:

- Manual is divided into chapters.
- Chapters are by functional group code and presented in same order as the RPSTL (Repair Parts and Special Tool List).
- All manual references refer to page numbers.
- Steps are numbered and are to be performed in that order.
- Be sure to read all NOTES, WARNINGS, and CAUTIONS.
- Locator views are included wherever necessary. These, will help you locate the item which the procedure is describing.
- Callouts on art are shown by a circle with a letter inside.
- Jagged circle (★) on locator (A) indicates a cutout and item is inside of tank.
- A (-) symbol represents the outside surface (B) of a piece of equipment.
- Locator arrows (C) are black and motion arrows (D) are white.



## HOW TO USE THIS MANUAL - Continued

- Bridge will not be shown on vehicle on locator views.
- Locator views will show tongue in travel position (folded on top of vehicle) unless maintenance procedure requires it in another position.
- MASTER BATTERY switch should be in OFF position prior to performance of any maintenance procedures.
- Diagrams of the hydraulic system with reference designators, part numbers, and related maintenance tasks will be found on pages 3-67 thru 3-70. A schematic diagram of the hydraulic system is located at the back of this manual (page FP-1).
- All torque values are dry torques unless otherwise specified.
- A maintenance information index lists all maintenance tasks. It provides the location of all maintenance tasks related to a component in this manual.
- As a general maintenance practice, throw away all removed lockwashers, locknuts, and cotter pins and replace with new lockwashers, locknuts, and cotter pins at installation.
- LO 5-5420-202-12, M60A1 AVLB lubrication order, has been rescinded. All crew lubrication tasks have been incorporated into TM 5-5420-202-10 PMCS and are to be performed as required or as a part of crew PMCS. All organizational maintenance lubrication tasks have been incorporated into PMCS contained in this manual and in TM 5-5420-202-20-1 and are to be performed as required and as a part of organizational maintenance PMCS. Any reference to LO 5-5420-202-12 must be considered a reference to either the crew PMCS or organizational PMCS and must be performed in accordance with instructions provided in the applicable PMCS.



## CHAPTER 1

### INTRODUCTION

---

#### Section I. GENERAL INFORMATION

##### SCOPE

Type of Manual: Organizational, Direct Support, and General Support Maintenance.

Model Number and Equipment Name: Launcher, M60A1 Tank Chassis, Transporting: for Bridge, Armored-Vehicle-Launched, Scissoring Type, Class 60.

Purpose of Equipment: To launch, retrieve, and transport a class 60 scissoring type bridge.

##### 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).

##### DESTRUCTION OF ARMY MATERIAL TO PREVENT ENEMY USE

Refer to TM 750-244-6 for instructions on destruction of material to prevent enemy use.

##### PREPARATION FOR STORAGE OR SHIPMENT

Refer to TM 740-90-1 for instructions on administrative storage.

##### QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

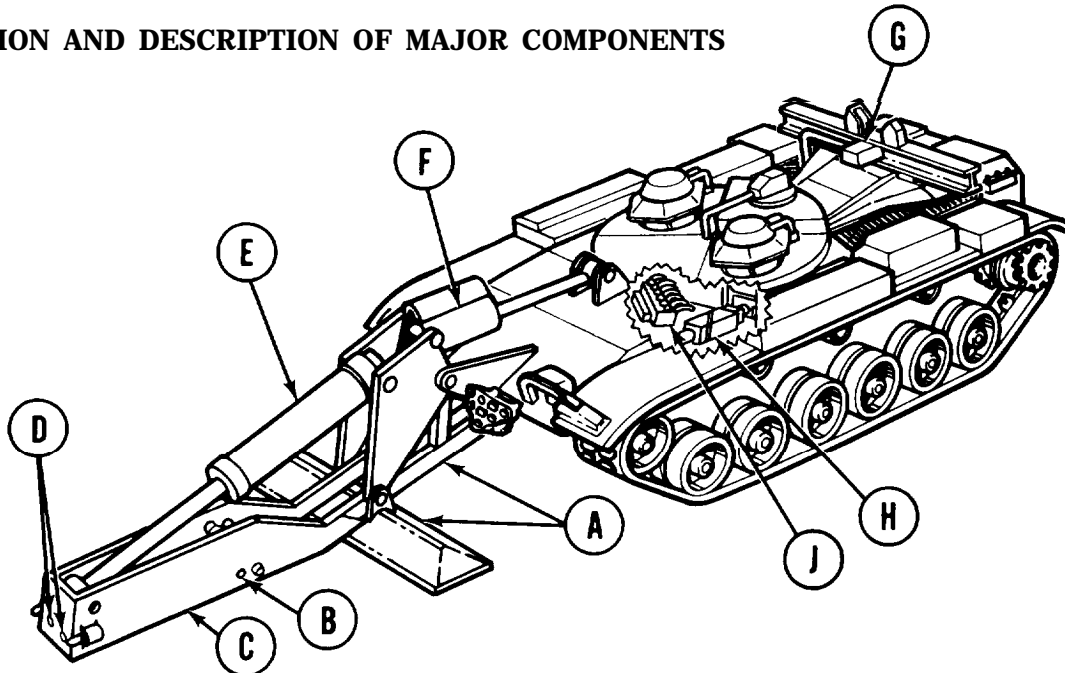
- a. No particular quality assurance or quality control manual pertains specifically to this vehicle.
- b. Defective material received through the supply system should be reported on Quality Deficiency Report (QDR) SF 368. Instructions for preparing QDR's are provided in AR 702-7, Reporting of Quality Deficiency Data. QDR's should be mailed to Commander, U.S. Army Tank-Automotive Command, ATTN: AMSTA-Q, Warren, MI 48937-5000. A reply will be furnished directly to you.

##### REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR's)

EIR's must be submitted by anyone who knows of an unsatisfactory condition with equipment design or use. You do not have to show a new design or list a better way to do a procedure, just tell why the design is unfavorable or why a procedure is hard. EIR's may be submitted on SF 368 (Quality Deficiency Report). Instructions for preparing SF 368 are provided in DA PAM 738-750. Mail directly to Commander, U.S. Army Tank-Automotive Command, AMSTA-Q, Warren, MI 48397-5000. A reply will be sent directly to you.

## Section II. EQUIPMENT DESCRIPTION AND DATA

### LOCATION AND DESCRIPTION OF MAJOR COMPONENTS



- (A) BOOM AND OUTRIGGER. Provide firm support for tongue to pivot on.
- (B) LOCKING CYLINDER. Locks scissoring bridge to the launcher tongue.
- (C) TONGUE. Contains hydraulics and provides necessary components to connect and disconnect scissoring bridge.
- (D) EJECTION CYLINDERS. Provide capability to push bridge loose from vehicle after locking cylinders are retracted.
- (E) TONGUE CYLINDER. Controls tongue and bridge movement from 90 degrees vertical to the ground.
- (F) OVERHEAD CYLINDER. Controls tongue and bridge movement from transport position to 90 degrees vertical.
- (G) HOLDDOWN CYLINDER. Provides capability to lock scissoring bridge at rear end of vehicle. It automatically unlocks when overhead cylinder operating lever is raised.
- (H) PUMP-CLUTCH. Provides hydraulic pressure for entire system.
- (J) VALVE BANK. Provides manual levers to actuate entire system.

### IDENTIFICATION, LOCATION, AND INSTRUCTION INFORMATION

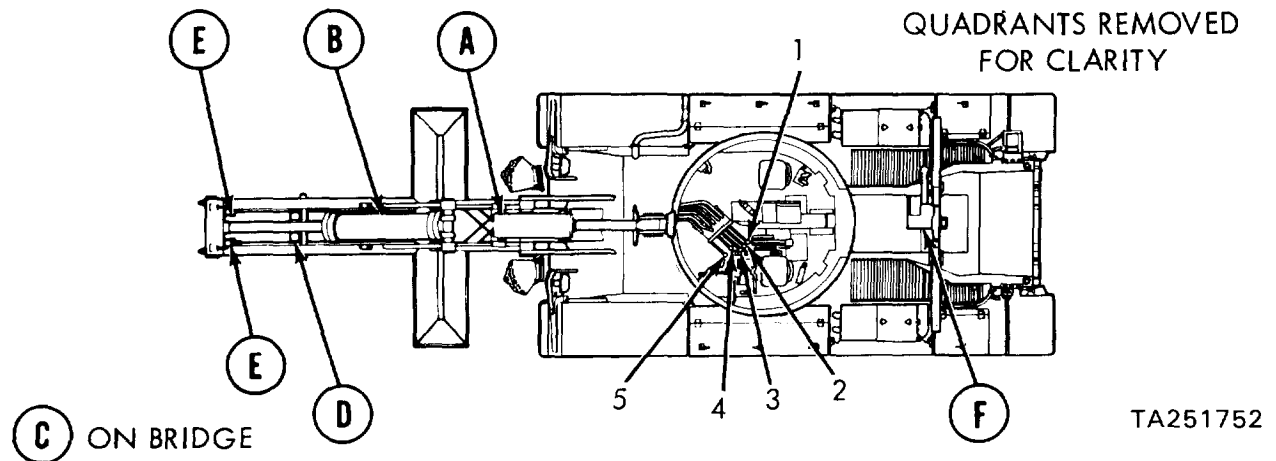
Refer to TM 5-5420-202-10 for identification, location, and instruction nameplates, decals, and stencil information under "Stowage and Sign Guides."

### EQUIPMENT DATA

Refer to TM 5-5420-202-10 for performance data.

### Section III. PRINCIPLES OF OPERATION

Hydraulic pressure is used to actuate various components to launch and retrieve a bridge. A hydraulic pump is driven by the vehicle engine through a power take-off and a manually actuated clutch. Hydraulic pressure is delivered by the hydraulic pump to the manually operated valve bank. The valve bank in turn delivers pressure to either the cap end or the rod end of the various cylinders, to either extend or retract them. Pressure relief valves, flow regulators, and check valves are located in the system to provide protection to components parts. A master relief valve is in the pressure line from the hydraulic pump, located under the hydraulic reservoir, which protects the entire system. You will find a system diagram and a hydraulic schematics on pages 3-67 thru 3-70 to aid in system analysis.



- (A) OVERHEAD CYLINDER. This cylinder is actuated by lever (1) which will shut off or allow pressure to flow to either the cap end (lever up) or the rod end (lever down) of this cylinder.
- (B) TONGUE CYLINDER. This cylinder is actuated by lever (2) which will shut off or allow pressure to flow to either the cap end (lever up) or the rod end (lever down) of the cylinder.
- (C) SCISSORS CYLINDER. This cylinder (not illustrated, is on bridge) is actuated by lever (3) which will shut off or allow pressure to flow to either the rod end (lever UP) or the cap end (lever down) of the cylinder.
- (D) LOCKING CYLINDER. This cylinder is actuated by lever (4) which will shut off or allow pressure to flow to either the rod end (lever up) or the cap end (lever down) of the cylinder.
- (E) EJECTION CYLINDERS. These cylinder are activated by lever (5), (for these cylinders to operate lever (4) must be held in the up position) which will allow pressure to flow to the cap end (lever up) or the rod end (lever down) of the cylinders.
- (F) HOLDDOWN CYLINDER. This cylinder is actuated by overhead cylinder level (1) which will shut off or allow pressure to flow to either the rod end (lever up) or the cap end (lever down) of the cylinder.



**CHAPTER 2****MAINTENANCE INSTRUCTIONS****Section I. REPAIR PARTS, SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT****COMMON TOOLS AND EQUIPMENT**

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

**SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT**

Special tools for organizational, direct support, and general support maintenance are listed in TM 5-5420-202-20P and TM 5-5420-202-34P, which are the authority for requisitioning replacements.

1. Adapter, EU male 90° 518428 (8D212)	Test flow of relief check valves during adjustment.
2. Adapter, straight 980693 (61848)	Test flow of relief check valves during adjustment.
3. Gage, pressure, dial indicating 980279 (61848)	Test flow of relief check valves during adjustment.
4. Hose assembly 981005 (61848)	Test flow of relief check valves during adjustment.

**REPAIR PARTS**

Repair parts are listed and illustrated in TM 5-5420-202-20P and TM 5-5420-202-34P which are the authority for requisitioning replacements.

**Section II. SERVICE UPON RECEIPT**

1. This section contains information on services to be performed upon issue of the vehicle to the using organization. Where practicable, the crew will assist in services described. For services to be performed on the vehicle hull components, refer to TM 5-5420-202-34. Some of the services contained herein may not be required, depending upon the degree of preservation provided by the shipper and the planned use of the vehicle.
2. Cut hold-down straps and remove wooden boxes, containers of equipment, and any other tank components secured to the exterior or interior of the vehicle.
  - 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 the instructions of DA PAM 738-750.
  - c. Check to see whether the equipment has been modified.
3. Conduct service upon receipt of the vehicle in accordance with the procedures specified in the following table.

Step/Location	Item	Action	Remarks
1. Launcher	Exterior	Check launcher components for damage.	---
2. Hull	Hatches	Remove wrapping, barrier material, and tape.	---
3. Hull	Periscope shields	Remove wrapping, barrier material, and tape.	---
4. Hull	Optical glass	Remove wrapping, barrier material, and tape.	---

**PRELIMINARY SERVICING AND ADJUSTMENT OF EQUIPMENT**

**WARNING**

Dry cleaning solvent P-D-680 is toxic and flammable. To prevent personal injury, wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point for Type #1 Dry Cleaning Solvent is 100°F (38°C) and for Type #2 is 138°F (50°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.

TA251304

1. If any surfaces of the launcher components are coated with rust preventive compound, remove the coating with dry cleaning solvent.
2. Paint the equipment in accordance with unit camouflage requirements.
3. Follow instructions specified on tag DD Form 1397 regarding processing record and stowage of the vehicle and its equipment if the vehicle is not to be placed into immediate service. Tag DD Form 1397 will be found in the driver's compartment, attached to the steering control or transmission shift lever. If the using organization plans to place the vehicle into immediate service:
  - a. Open each wooden box and container.
  - b. Check packing list against Basic Issue Items (BII) list in TM 5-5420-202-10 to make sure all items have been received.
  - c. Open inner packs and remove material.
  - d. Degrease equipment such as tools and hardware as necessary.
4. Stow basic issue items as indicated in TM 5-5420-202-10.
5. Check hydraulic level in reservoir in accordance with TM 5-5420-202-10. While falling, check for leaks at filter connections, drain plugs, link quick disconnects, and valves.
6. Ensure parking brake is set. Start engine. Check hydraulic system for leaks. Shut down engine and correct leaks if any are found.
7. Check operation of all controls (TM 5-5420-202-10).
8. perform preventive maintenance checks and services (PMCS) (page 2-4).
9. Equipment faults found during preliminary servicing or during the break-in period will be corrected by the using organization or by the supporting maintenance unit as appropriate, depending upon the nature of the fault.
10. Serious equipment faults which appear to involve unsatisfactory design or material will be reported using SF 368 (Quality Deficiency Report), as prescribed in DA PAM 738-750, The Army Maintenance Management System (TAMMS).

### **Section III. PREVENTIVE MAINTENANCE CHECKS AND SERVICES (PMCS), LUBRICATION INSTRUCTIONS, AND MANDATORY REPLACEMENT PARTS**

#### **INTRODUCTION**

##### **a. General.**

Preventive maintenance is the systematic care, inspection, and service of the M60A1 AVLB launcher to keep it in serviceable condition and to detect faults and failures before extensive and time consuming repairs or replacement are required. Maintenance checks are services performed by organizational maintenance and are described below.

This section contains the procedures and instructions to perform M60A1 AVLB launcher organizational preventive maintenance checks and services. These services are performed by organizational maintenance personnel assisted by the vehicle crew. Ensure that all crew level hull PMCS procedures have been completed prior to performing organizational PMCS. Refer to DA PAM 738-750 for instructions on the use of forms pertaining to PMCS.

Organizational services are defined by, and restricted to, the procedures outlined in this section and Appendix B, Maintenance Allocation Chart, unless approval to perform higher category services has been given by the support maintenance unit.

Knowledge of operating and maintenance procedures outlined in TM 5-5420-202-10 is essential to the performance of organizational PMCS. Organizational mechanics must be familiar with these procedures so that they can apply them in the performance of their duties.

The driver of the vehicle is often unaware of gradually developing defects. Therefore, the vehicle must be road tested by organizational maintenance personnel during preventive maintenance checks and services. Any repairs or adjustments necessary to ensure safe operation should be made prior to road test. All faults and corrective actions will be noted on DA Form 2404. The item number recorded in column "a" of DA Form 2404 must correspond to the PMCS item number. After deficiencies have been corrected and the tactical situation permits, an additional road test must be made for a distance of not less than three nor more than five miles.

The preventive maintenance checks and services listed in this section are to be performed on condition and semiannually.

Hard (fixed) time intervals and the related man-hour times are based on normal operation. The man-hour time specified is the time you need to do all the services prescribed for a particular interval. Change the interval if your lubricants are contaminated or if you are operating the equipment under adverse conditions, including longer-than-usual operating hours. The interval may be extended during periods of low activity. If extended, adequate preservation precautions must be taken.

PMCS items and intervals have been determined by using Reliability Centered Maintenance (RCM) logic.



**INTRODUCTION - Continued**

Preventive maintenance checks and services for the vehicle hull are contained in TM 5-5420-202-20-1, Preventive maintenance checks and services for the communication system will be performed by maintenance personnel in accordance with the appropriate technical manuals. The services will be performed in conjunction with hull PMCS.

If anything looks wrong and cannot be freed, report it on DA Form 2404. If something looks dangerous or may cause equipment damage, report it immediately to your maintenance supervisor.

**b. PMCS Procedures. PMCS column explanations are as follows:**

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

**Column 2 - Interval.** The second column lists the interval at which the items are to be inspected.

**Column 3 - Location - Item to Check/Service.** The third column lists the item to be checked or serviced.

**Column 4- Procedure.** The fourth column contains all the information required to accomplish the checks and services.

**Column 5- Not Fully Mission Capable if.** The fifth column contains all the conditions which make the vehicle not fully mission capable.

**c. Special Information.**

**(1) Precautions.** The following precautions will help prevent personal injury or damage to equipment:

**WARNING**

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

**CAUTION**

- Do not spill solvent, fuel, or lubricants on rubber parts. Solvent, fuel, and lubricants may damage rubber parts.
- Do not clean inside hull with high pressure steam, water, or air. Some parts inside hull may rust or be damaged.
- Do not use polishing cloths, liquids, pastes, or other rough cleaners to clean instrument lenses or mirrors. Use lens tissue paper to clean lenses and mirrors. Remove fingerprints, oil, and dirt with lens cleaning compound and lens tissue paper.

**(2) Services.** Services performed by the organizational maintenance mechanic consist of the following tasks:

Adjusting. Making all necessary adjustments and alinements.

## INTRODUCTION - Continued

Servicing. Draining and refilling units with oil and changing or cleaning oil filters, fuel filters, and air cleaners.

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

Repairing. Repairing includes inspection, cleaning, preserving, adjusting, replacing, welding, strengthening, and other tasks associated with putting parts in working condition.

### (3) General Cleaning Instructions.

If a steam cleaner is available, it may be used to remove any remaining dirt. After water or steam cleaning, lubricate launcher. 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.

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

Remove rust or dirt from fine-machined surfaces with dry cleaning solvent and crocus cloth, 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 lubricating oil.

Nameplates, caution plates, and instruction plates may rust quickly. When they are rusty, clean parts and coat them with lubricating oil.

### (4) General Maintenance Instructions.

Put protective caps or plugs on all tubes, hoses, and fittings as soon as you disconnect them. Dirt could get in and ruin the system. Do not remove caps or plugs until you are ready to connect the system.

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.

Inspect electric wires for broken, chafed, cracked, discolored, frayed, loose, melted, or worn insulation. Replace or repair bad parts.

Have another soldier help align mating ends of connectors, plugs, and receptacles on larger harnesses. Make sure that pins and keyways line up. Tighten twist-snap type connectors, plugs, or receptacles until a click is heard. Tighten screws type connectors until a ratchet noise is heard to indicate that connectors, plugs, or receptacles are tight.

Hold fitting adapter with one wrench and tighten nut with another wrench. When tightening fittings, tighten nut snug and then tighten 1/6-turn to 1/8-turn more. If fitting leaks, loosen nut a full turn and then tighten. If still leaking, replace defective parts.

## INTRODUCTION - Continued

Service, clean, or change oil filters, as applicable, when they are known to be contaminated or clogged; service is recommended by AOAP laboratory analysis; or at prescribed hardtime intervals.

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.

### (5) Lubrication.

Use only authorized lubricants.

All lubrication instructions are mandatory.

When checking fluid levels, vehicle must be on level surface.

Oil filters shall be serviced/cleaned/changed when they are known to be contaminated or clogged, service is recommended by AOAP, or hard time service is required.

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

For arctic operation, see FM 9-207.

For desert operation, see FM 90-3.

Clean all grease fittings before attaching grease gun.

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, notify support maintenance.

If no other treatment is directed, paint or clean and coat unprotected metal surfaces with cleaner, lubricant, preservative (CLP).

Clean around filler necks/drain plugs/openings before servicing to keep dirt from entering system.

### (6) Leakage Definitions.

Fluid leaks affect vehicle 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.

All Class III leaks and any class fuel leak in the engine compartment or in the personnel heater system must be repaired before operating the vehicle. Vehicle may be operated with Class I or Class II leaks.

## INTRODUCTION - Continued

(7) Corrosion. Check for corrosion on entire launcher. Become familiar with the four stages of corrosion listed below and take the appropriate maintenance action required 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.

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

Stages 3 & 4- Try to repair metal. If not economical or reparable, replace with new parts.

## INITIAL SETUP

Preventive maintenance includes complete inspection to make sure adjustment, securing, and assembly of all parts of the launcher are correct. All cleaning, replacement, lubrication, and protection of parts or assemblies must be done as stated for trouble-free operation until the next preventive maintenance is performed.

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

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

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

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

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

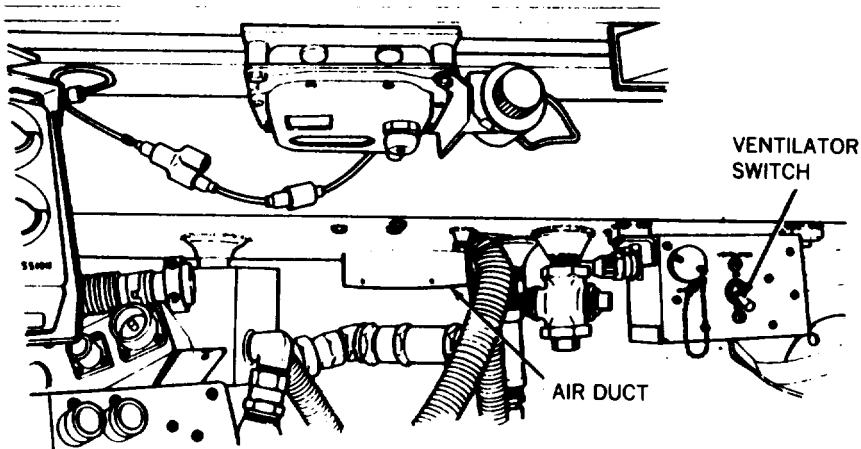
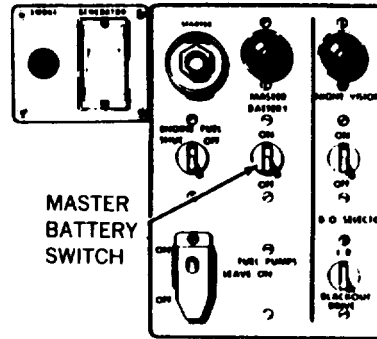
**Modification Work Order (MWO) Application.** Check the list of current MWO's in DA PAM 25-30. Do not make any launcher modifications except as ordered by official Army directive.

Preventive Maintenance Checks and Services for M60A1 AVLB Launcher

Item No.	Interval	Location	Procedure	Not Fully Mission Capable if:
		Item to Check/Service		
<b><u>WARNING</u></b>				
<p>FRH hydraulic fluid may contain tricresyl phosphate which, if taken internally, can produce paralysis. Hydraulic fluid may be absorbed through the skin. Wear long sleeves, gloves, goggles, and faceshield. If FRH gets in eyes, wash them immediately and get medical aid immediately. If FRH gets on skin, thoroughly wash with soap and water, Wash hands thoroughly prior to eating or smoking. Application of these measures is considered an effective control of the hazard.</p>				
1	Semiannual	Reservoir	<p>Perform hydraulic fluid sampling IAW DA PAM 738-750.</p> <p>ARMY OIL ANALYSIS PROGRAM (AOAP). FRH hydraulic fluid samples from the launcher system must be submitted to an assigned AOAP laboratory semiannually or after 25 hours of operation, whichever occurs first, in accordance with DA PAM 738-750. FRH hydraulic fluid will be analyzed for condition and will be changed only when directed by the AOAP laboratory. In the event AOAP laboratory support is not available, drain FRH hydraulic fluid annually. Annual hydraulic fluid changes are to be coordinated with seasonal changes.</p>	
2	On Condition	Reservoir	<p>Drain hydraulic reservoir (page 3-74). Fill hydraulic reservoir (TM 5-5420-202-10). Operate hydraulic system for 5 minutes (TM 5-5420-202-10). Bleed system if required (page 3-72).</p>	

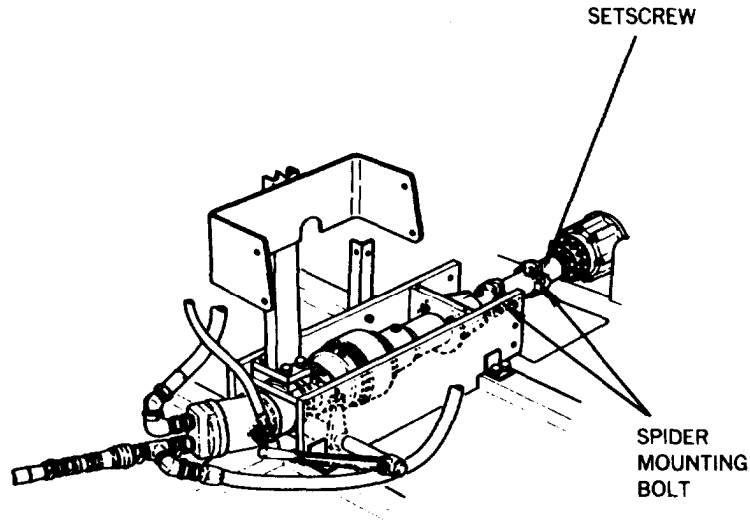
Preventive Maintenance Checks and Services for M60A1 AVLB Launcher -  
Continued

Item No.	Interval	Location		Procedure	Not Fully Mission Capable if:
		Item to Check/Service			
3	Semiannual	Ventilating Blower		<p>Set MASTER BATTERY switch to ON. Set VENTILATOR switch to ON. Listen for ventilating blower motor.</p> <p>Check that flow of air can be felt at air duct.</p> <p>Set VENTILATOR switch to OFF. Set MASTER BATTERY switch to OFF.</p>	Ventilating blower is inoperative.



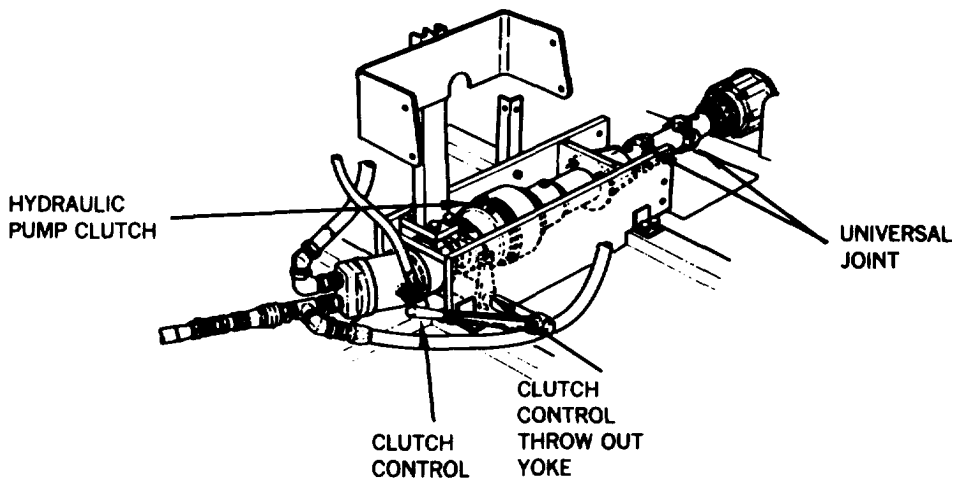
**Preventive Maintenance Checks and Services for M60A1 AVLB Launcher -  
Continued**

Item No.	Interval	Location		Procedure	Not Fully Mission Capable if:
		Item to Check/Service			
4	Semiannual	Hydraulic Pump Clutch		<p>Check hydraulic reservoir fluid level (TM 5-5420-202-10).</p> <p>Remove universal joint cover (page 3-61) and cover plate (page 3-65) from hydraulic pump clutch.</p> <p>Operate hydraulic system (TM 5-5420-202-10) and check clutch for proper operation (distinct snap). Adjust clutch, if required (page 3-66).</p>	Clutch is inoperative.
5	Semiannual	Pump Drive Universal Joints		<p>Check that universal joints spider mounting bolts and setscrew are tight. Tighten loose bolts to 265-325 lb-in (30-36 N·m).</p>	Universal joints indicate excessive wear or mounting bolts are missing.



Preventive Maintenance Checks and Services for M60A1 AVLB Launcher -  
Continued

Item No.	Interval	Location	Procedure	Not Fully Mission Capable if:
		Item to Check/Service		
6	Semiannual	Hydraulic Pump Clutch and Pump Drive Universal Joints	<p>Lubricate hydraulic pump clutch and pump drive universal joints.</p> <p>If any universal joint lubrication hole is plugged, remove plug and install lubrication fitting. Do not remove fittings after lubrication. Lubricate clutch control throw out yoke.</p> <p>Install clutch cover plate (page 3-65) and universal joint cover (page 3-61).</p>	



Clutch, Throw Out Yoke, and Universal Joints Lubricant

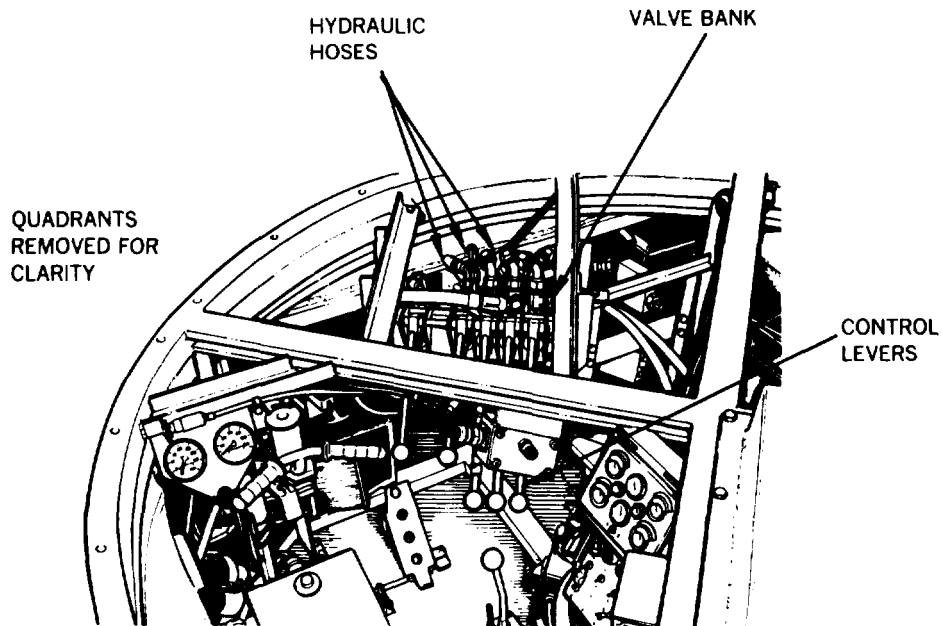
Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Clutch Throw Out Yoke Pump Drive Shaft Universal Joints				
All Temperatures	WTR (G-395) MIL-G-81322	AR	S	0.2

For arctic operation, see FM 9-207



**Preventive Maintenance Checks and Services for M60A1 AVLB Launcher -  
Continued**

Item No.	Interval	Location	Procedure	Not Fully Mission Capable if:
		Item to Check/Service		
7	Semiannual	Launch Operation	<p align="center"><b><u>WARNING</u></b></p> <p>Ensure area required for launch above and in front of launcher is clear of personnel and other equipment before attempting to launch bridge. Failure to do so could result in death or injury to personnel.</p> <p>Perform launch and retrieve procedures three times (TM 5-5420-202-10). Then perform launch procedure but do not retrieve.</p> <p>Check control levers for proper response.</p>	Any control lever sticking or binding.
8	Semiannual	Valve Bank	Visually check valve bank for leaks while performing launch and retrieve operations.	Any Class III leak.
9	Semiannual	Interior Hydraulic Hoses	Inspect interior hydraulic hoses for cracks, splits, blisters, or leaks.	Any Class III leak. Cracked, blistered, or split hoses.

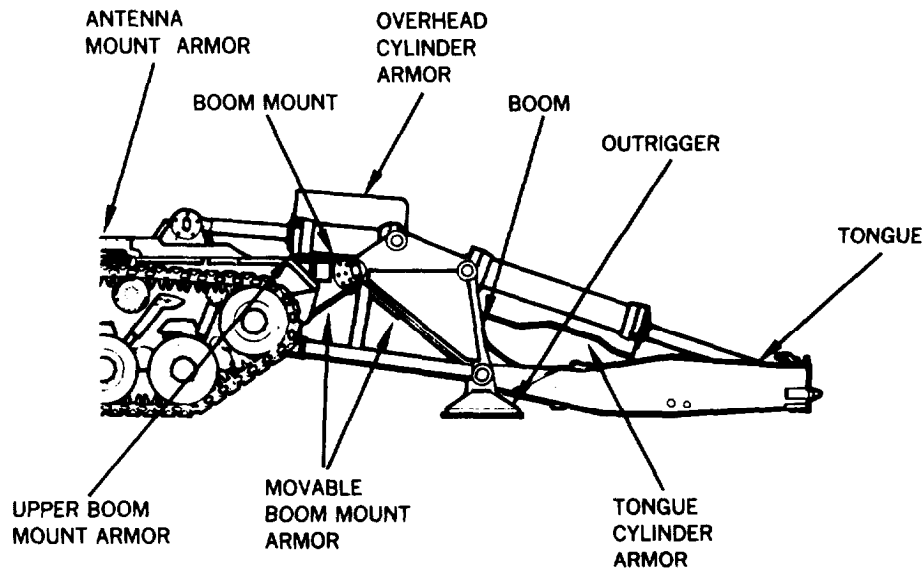


**Preventive Maintenance Checks and Services for M60A1 AVLB Launcher -  
Continued**

Item No.	Interval	Location	Procedure	Not Fully Mission Capable if:
		Item to Check/Service		
10	Semiannual	Reservoir Filter Assembly	<p align="center"><b><u>WARNING</u></b></p> <ul style="list-style-type: none"> <li>• Dry Cleaning Solvent P-D-680 is toxic and flammable. To avoid injury, wear protective goggles and gloves and use in a well-ventilated area. Avoid contact with skin, eyes, and clothes, 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 become dizzy while using Dry Cleaning Solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.</li> <li>• FRH hydraulic fluid may contain tricresyl phosphate which, if taken internally, can produce paralysis. Hydraulic fluid may be absorbed through the skin. Wear long sleeves, gloves, goggles, and faceshield. If FRH gets in eyes, wash them immediately and get medical aid immediately. If FRH gets on skin, thoroughly wash with soap and water. Wash hands thoroughly prior to eating or smoking. Application of these measures is considered an effective control of the hazard.</li> </ul> <p align="center"><b>NOTE</b></p> <p>Filter assembly can be removed without draining the hydraulic system.</p>	
			<p>Service hydraulic reservoir filter assembly (page 3-206).</p> <p>Operate hydraulic system for 5 minutes (TM 5-5420-202-10).</p> <p>Check for hydraulic fluid leaks.</p> <p>Check hydraulic reservoir fluid level and fill as required. (TM 5-5420-202-10).</p>	Any Class III leak.

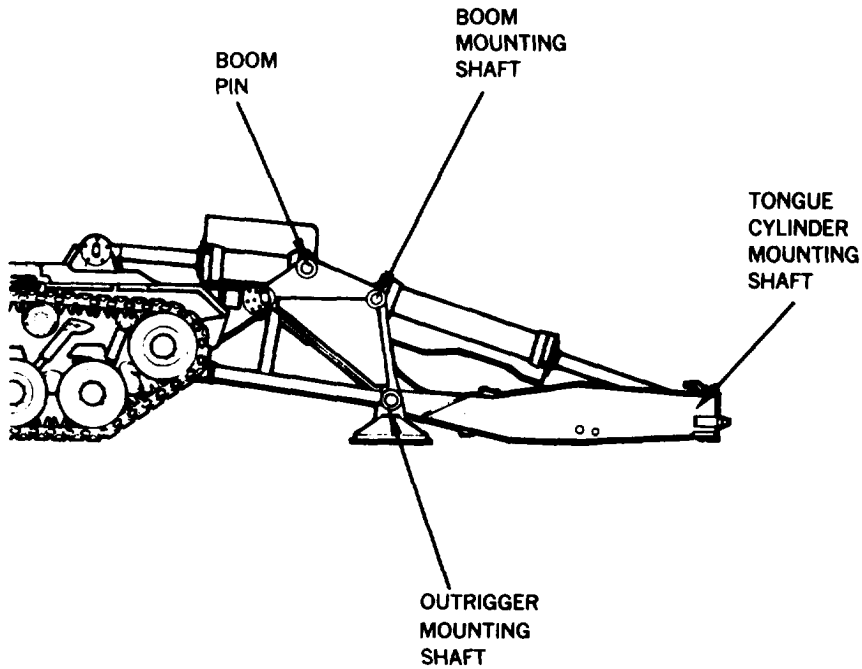
**Preventive Maintenance Checks and Services for M60A1 AVLB Launcher -  
Continued**

Item No.	Interval	Location	Procedure	Not Fully Mission Capable if:
		Item to Check/Service		
11	Semiannual	Tongue, Boom, Outrigger, and Boom Mount	Inspect tongue, boom, outrigger, and boom mount for cracks and broken welds.	Any cracked or broken welds.
12	Semiannual	Armor Protection for Tongue Cylinder, Overhead Cylinder, Boom Mount, and Antenna Mount	Inspect tongue cylinder armor, overhead cylinder armor, upper boom mount armor, lower front fixed and movable boom mount armor, and antenna mount armor for damage and for loose or missing mounting bolts.	Missing or damaged armor.



**Preventive Maintenance Checks and Services for M60A1 AVLB Launcher -  
Continued**

Item No.	Interval	Location		Procedure	Not Fully Mission Capable if:
		Item to Check/Service			
13	Semiannual	Retaining Rings		<p>Inspect for broken retaining rings at left and right outrigger mounting shafts, boom mounting shaft, boom pin, and tongue cylinder mounting shaft.</p> <p>Perform retrieve and launch procedures (TM 5-5420-202-10).</p>	Broken or missing retaining rings.



**Preventive Maintenance Checks and Services for M60A1 AVLB Launcher -  
Continued**

Item No.	Interval	Location	Procedure	Not Fully Mission Capable if:
		Item to Check/Service		
14	Semiannual	Exterior Hoses and Fittings	<p>Remove overhead cylinder armor (page 3-223), tongue cylinder armor (page 3-232), and boom mount hose armor (page 3-122).</p> <p>Inspect hydraulic lines and fittings to overhead cylinder, tongue cylinder, and hull manifold for cracks, splits, blisters, and leaks.</p>	Any Class III leak. Any cracks, splits, or blisters in hydraulic lines.

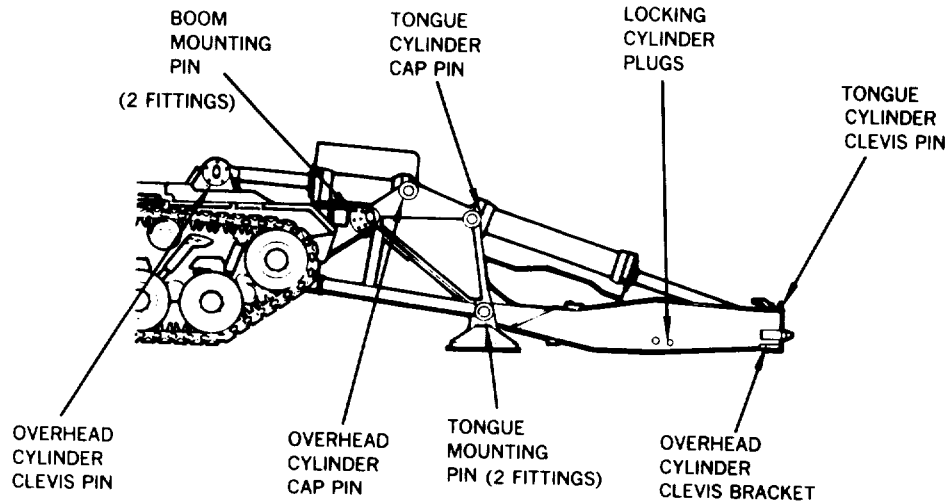
  

The diagram is a side-view technical drawing of the M60A1 AVLB launcher. It shows the chassis with tracks on the left and the launcher boom extending to the right. Three labels with leader lines point to specific hydraulic components: 'HULL MANIFOLD (HIDDEN)' points to a component on the chassis; 'OVERHEAD CYLINDER HYDRAULIC LINES' points to lines running along the top of the boom; and 'TONGUE CYLINDER HYDRAULIC LINES' points to lines connecting the boom to the chassis.

**Preventive Maintenance Checks and Services for M60A1 AVLB Launcher -  
Continued**

Item No.	Interval	Location	Procedure	Not Fully Mission Capable if:
		Item to Check/Service		

15	Semiannual	Launcher Components	Lubricate the following components (left and right sides):	
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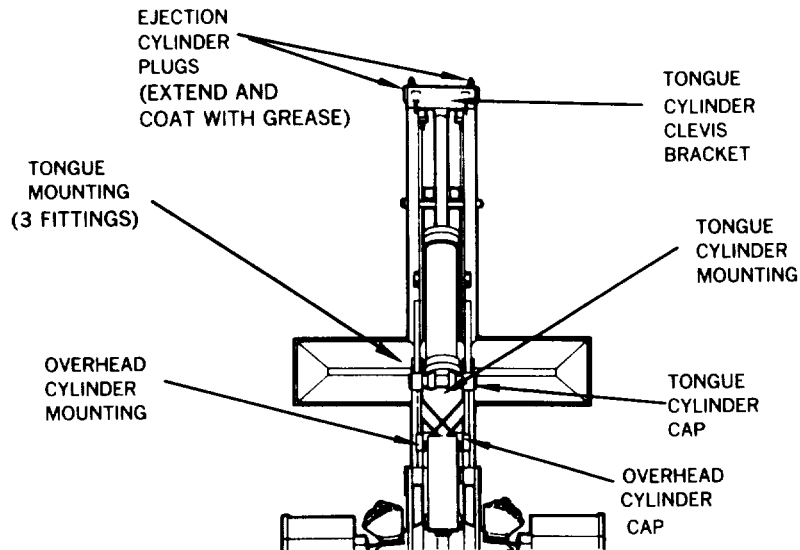
**Launcher Lubricant**

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Tongue Cylinder Clevis Pin	WTR (G-395) MIL-G-81322	AR	S	1.5
Overhead Cylinder Clevis Bracket				
Locking Cylinder Plugs				
Tongue Cylinder Cap Pin				
Tongue Mounting Pin				
Overhead Cylinder Cap Pin				
Boom Mounting Pin				
Overhead Cylinder Clevis Pin				

For arctic operation, see FM 9-207

**Preventive Maintenance Checks and Services for M60A1 AVLB Launcher - Continued**

Item No.	Interval	Location	Procedure	Not Fully Mission Capable if:
		Item to Check/Service		
15	Semiannual	Launcher Components - Continued	Lubricate the following components (left and right sides):	



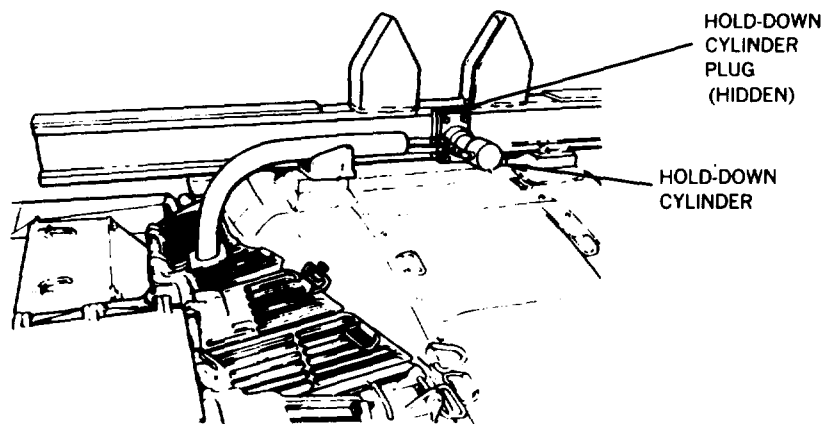
Launcher Lubricant

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Ejection Cylinder Plugs				
Tongue Cylinder Clevis Bracket				
Tongue Mounting				
Tongue Cylinder Mounting				
Tongue Cylinder Cap				
Overhead Cylinder Cap				
Overhead Cylinder Mounting				
All Temperatures	WTR (G-395) MIL-G-81322	AR	S	1.5

For arctic operation, see FM 9-207

**Preventive Maintenance Checks and Services for M60A1 AVLB Launcher -  
Continued**

Item No.	Interval	Location	Procedure	Not Fully Mission Capable if:
		Item to Check/Service		
16	Semiannual	Hold-down Cylinder and Armor	<p>Remove hold-down cylinder armor (page 3-253). Inspect hold-down cylinder armor for damage.</p> <p>Check hold-down cylinder for leaks.</p> <p>Extend and coat hold-down cylinder plug with grease.</p> <p>Install overhead cylinder armor (page 3-224), tongue cylinder armor (page 3-233), boom mount hose armor (page 3-122), and hold-down cylinder armor (page 3-253).</p> <p>Perform retrieval procedures (TM 5-5420-202-10).</p>	Any Class III leak



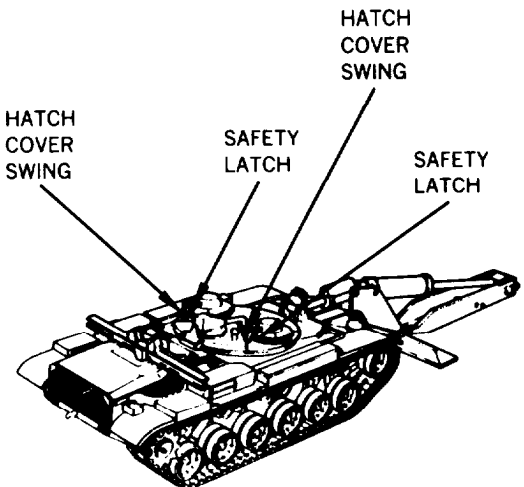
**Hold-Down Cylinder Plug Lubricant**

Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour
Hold-Down Cylinder Plug  All Temperatures	WTR (G-395) MIL-G-81322	AR	S	0.1

For arctic operation, see FM 9-207



**Preventive Maintenance Checks and Services for M60A1 AVLB Launcher -  
Continued**

Item No.	Interval	Location	Procedure	Not Fully Mission Capable if:										
		Item to Check/Service												
17	Semiannual	Hatch Cover Swing and Safety Latch	Lubricate left and right hatch cover swing and safety latch.											
														
<b>Hatch Cover Swing and Safety Latch Lubricant</b>														
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 25%;">Temperature Range</th> <th style="width: 30%;">Lubricant Mil. Symbol (NATO Code) Specification</th> <th style="width: 10%;">Capacity</th> <th style="width: 10%;">Interval</th> <th style="width: 10%;">Man-hour</th> </tr> </thead> <tbody> <tr> <td>Hatch Cover Swing and Safety Latch  All Temperatures</td> <td align="center">WTR (G-395) MIL-G-81322</td> <td align="center">AR</td> <td align="center">S</td> <td align="center">0.1</td> </tr> </tbody> </table>					Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour	Hatch Cover Swing and Safety Latch  All Temperatures	WTR (G-395) MIL-G-81322	AR	S	0.1
Temperature Range	Lubricant Mil. Symbol (NATO Code) Specification	Capacity	Interval	Man-hour										
Hatch Cover Swing and Safety Latch  All Temperatures	WTR (G-395) MIL-G-81322	AR	S	0.1										
For arctic operation, see FM 9-207														

**Section IV. Troubleshooting**

<b>Contents</b>	<b>Page</b>
• User Guide	2-18
• Troubleshooting Subject Index	2-34
• Troubleshooting Subject Index	2-34
• Launcher Operation Symptom and Resource Table	2-35
• Support System Symptom and Resource Table	2-35
• STE/ICE Troubleshooting (Simplified Test Equipment for Internal Combustion Engines)	2-36
• Detailed Troubleshooting Procedures: Symptoms 1 through 8	2-59

**NOTE**

A launcher hydraulic system schematic is included in the back of this manual (page FP-1).

**GENERAL**

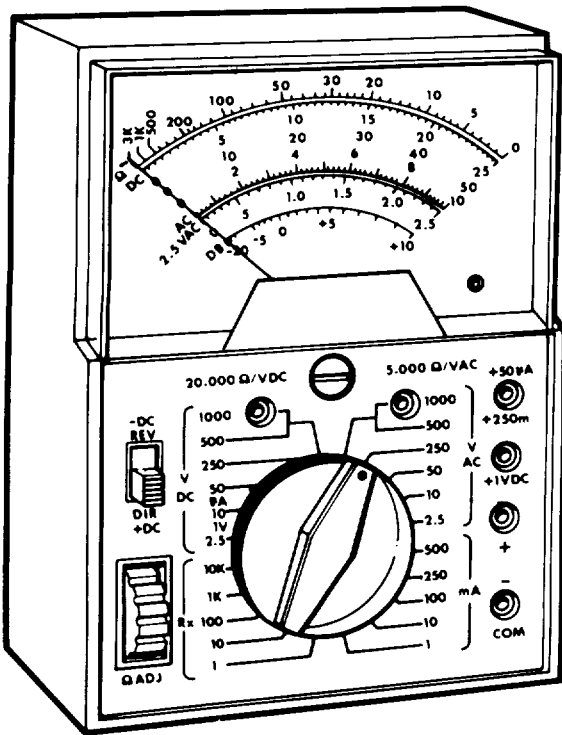
Troubleshooting is a step-by-stop process of finding and repairing what is wrong with your vehicle. This section contains tests and information (including STE/ICE, Simplified Test Equipment for Internal Combustion Engines) for troubleshooting common faults that may develop in the launcher. Due to the numerous operating conditions of the vehicle, not all possible troubles are covered.

**GENERAL INSTRUCTIONS FOR USE OF MULTIMETERS AS DC VOLTMETER**

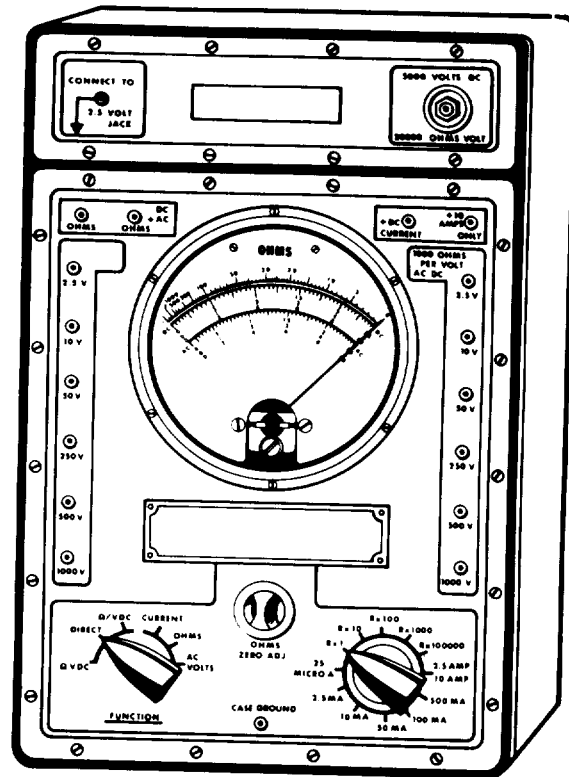
General. Shop sets may contain any one of three multimeters: the Simpson 160, the TS-352 B/U, or the AN/URM-105 (page 2-14). Any of these can be used to troubleshoot the vehicle electrical system. The following paragraph and accompanying illustrations contain instructions for use of multimeters as dc voltmeters.

b. DC Voltage Measurement. Before using the multimeter to measure dc voltage, proceed according to instructions on pages 2-15 and 2-16 to set up the multimeter to measure dc voltage, proceed as instructed on page 2-17.

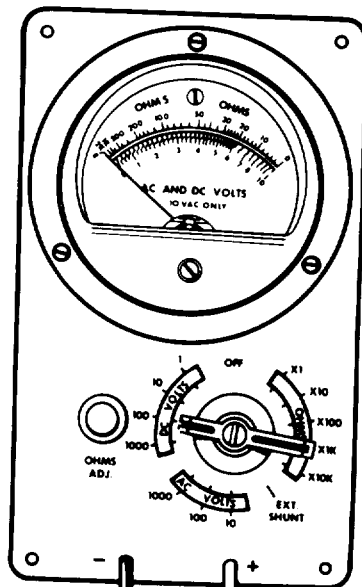
SIMPSON 160  
NSN 6625-00-935-1333



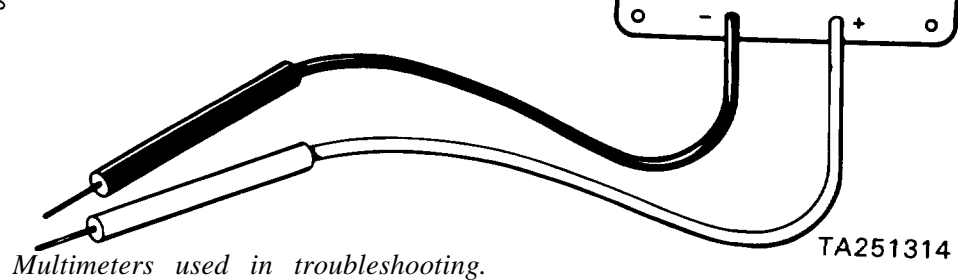
NOTE: THE SIMPSON 160 IS ONLY AVAILABLE IN NEW SHOP SETS AS A SUBSTITUTE FOR THE TS-352B/U OR AN/URM-105.



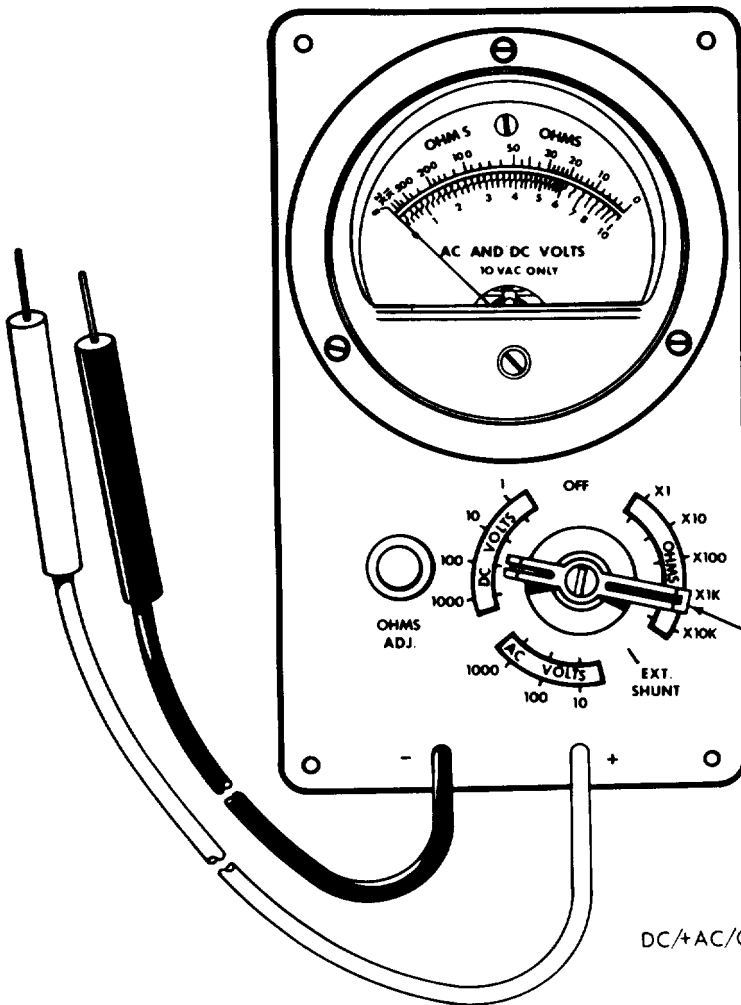
TS-352B/U  
NSN 6625-00-553-0142



AN/URM-105  
NSN 6625-00-999-6282



Multimeters used in troubleshooting.



AN/URM-105

TURN SELECTOR SWITCH TO DC VOLTS RANGE REQUIRED FOR VOLTAGE YOU WISH TO MEASURE.

(E.G., TO MEASURE 24 VOLTS DC, SET SELECTOR AT DC VOLTS 100.)

IF YOU ARE UNSURE OF VOLTAGE TO BE MEASURED, SET SELECTOR AT DC VOLTS 1000 FOR THE FIRST READING. IF FIRST READING WAS LESS THAN 100 VOLTS, SET SELECTOR TO DC VOLTS 100. IF SECOND READING WAS LESS THAN 10 VOLTS, SET SELECTOR TO DC VOLTS 10 AND TAKE THIRD READING, ETC.

SET ON DC VOLTS 100

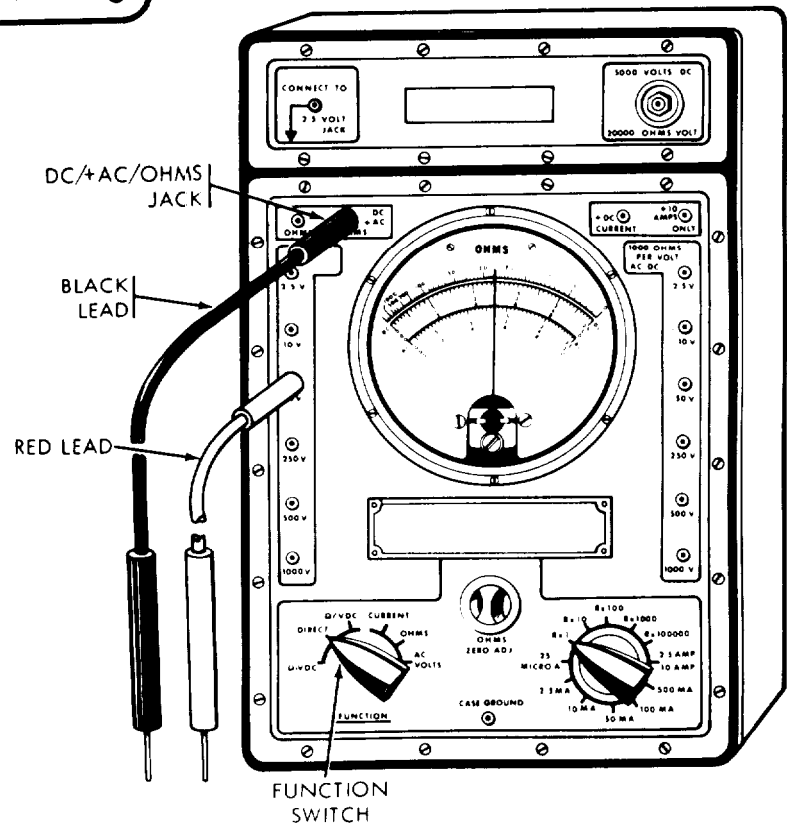
TS-352 B/U

1. SET FUNCTION SWITCH TO DIRECT. (RANGE SWITCH CAN BE IN ANY POSITION.)
2. PLUG BLACK LEAD INTO DC/+AC/OHMS JACK.

3. PLUG RED LEAD INTO JACK ON LEFT SIDE OF METER SUITABLE FOR RANGE OF VOLTAGE YOU WISH TO MEASURE.

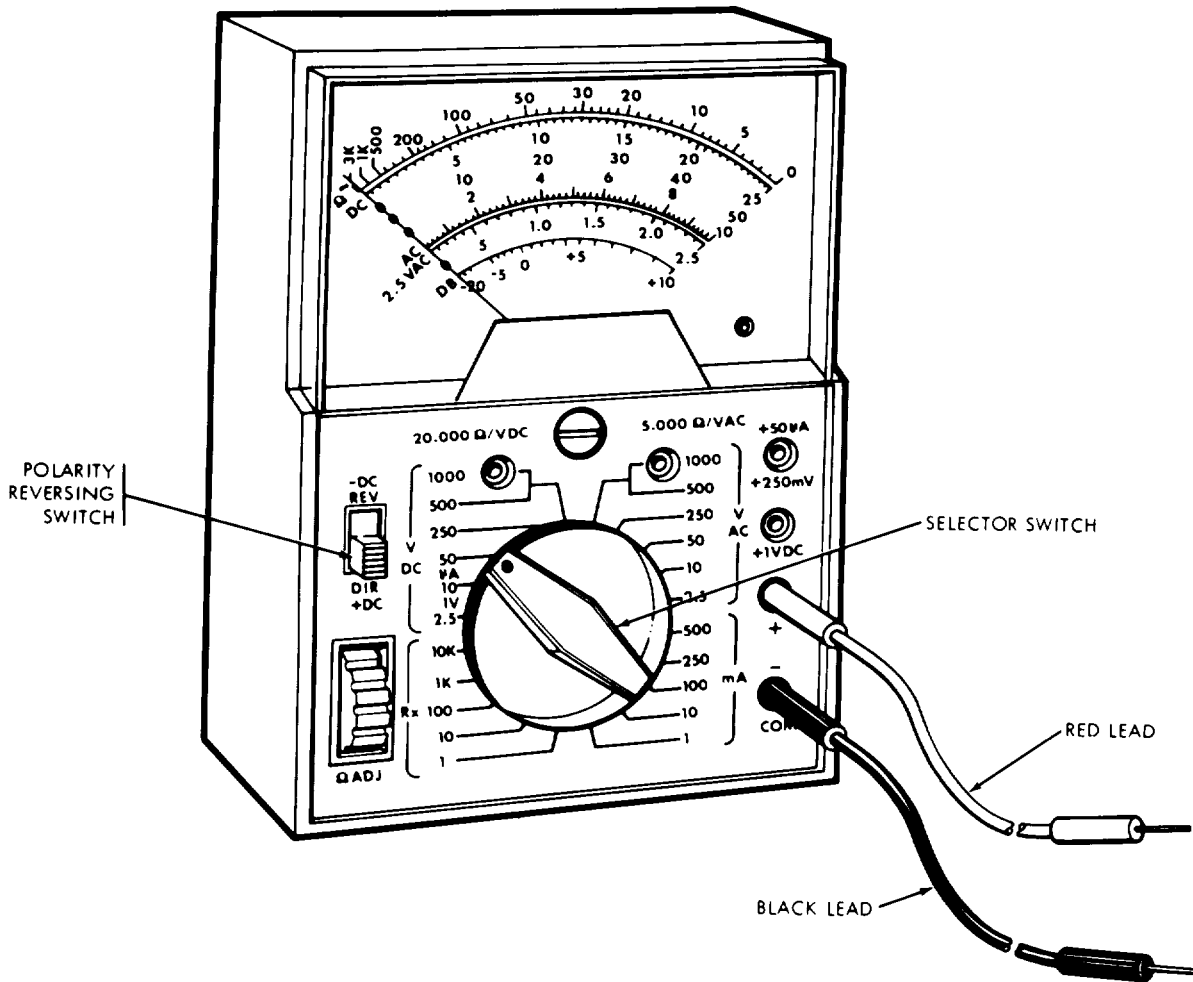
(E.G., TO MEASURE 24 VOLTS, PLUG RED LEAD INTO 50V JACK. TO MEASURE LESS THAN 10 VOLTS, USE 10V JACK. TO MEASURE LESS THAN 2.5 VOLTS, USE 2.5V JACK.)

IF YOU ARE UNSURE OF VOLTAGE TO BE MEASURED, PLUG RED LEAD INTO 1000V JACK FOR FIRST READING. THEN, REDUCE RANGE AS SHOWN ABOVE FOR THE AN/URM-105 MULTIMETER BUT USING YOUR RANGES. NEXT READING WOULD BE MADE FROM 500V JACK.



DC voltage measurement setup.

TA251315



SIMPSON 160

1. PLUG BLACK LEAD INTO -COM JACK.
2. PLUG RED LEAD INTO +JACK.
3. SET POLARITY REVERSING SWITCH TO DIR/+DC POSITION.
4. TURN SELECTOR SWITCH TO PROPER VDC RANGE FOR VOLTAGE YOU WISH TO MEASURE.

(E.G. TO MEASURE 24 VOLTS DC, TURN SELECTOR TO VDC 50. TO MEASURE LESS THAN 10 VOLTS, TURN SELECTOR TO VDC 10. TO MEASURE LESS THAN 2.5 VOLTS, TURN SELECTOR TO VDC 2.5.)

IF YOU ARE UNSURE OF VOLTAGE TO BE MEASURED, TURN SELECTOR TO VDC 1000 FOR FIRST READING, THEN REDUCE RANGE AS SHOWN ABOVE FOR THE AN/URM-105 MULTIMETER. USING YOUR RANGES, NEXT READING WOULD BE MADE IN VDC 50A POSITION.

*DC voltage measurement setup.*

TA251316

**MEASURING DC VOLTAGE:**

**1. SET UP MULTIMETER.**

**CAUTION**

IF YOU ARE UNSURE OF ANY VOLTAGE TO BE MEASURED, ALWAYS START WITH THE HIGHEST RANGE GIVEN IN THE SETUP INSTRUCTIONS TO AVOID DAMAGE TO THE MULTIMETER.

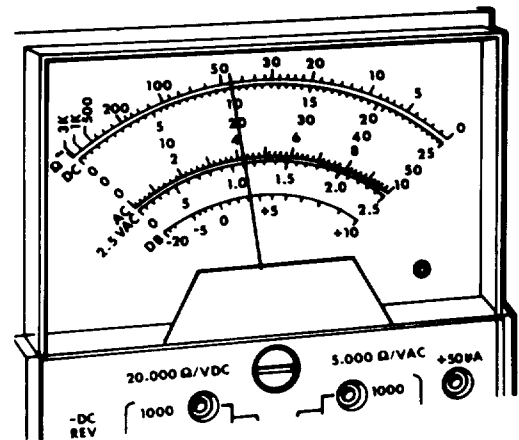
2. WITH ALL THREE METERS, CONNECT THE RED PROBE TO THE POSITIVE SIDE (+) OF THE CIRCUIT UNDER TEST AND THE BLACK PROBE TO THE NEGATIVE (-) SIDE. IF NEEDLE TRIES TO MOVE OFF SCALE TO LEFT, REVERSE PROBES ON CIRCUIT UNDER TEST.
3. READ METER. THE EXAMPLES ON THIS PAGE SHOW HOW TO READ ALL THREE METERS.

**SIMPSON 160**

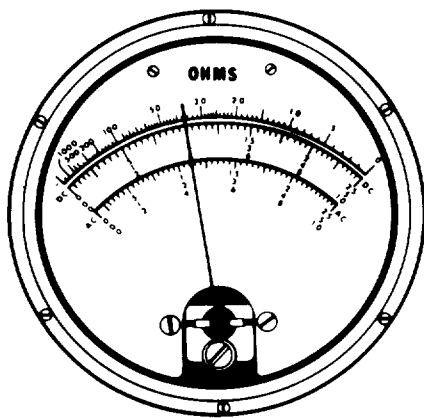
READ DC SCALE FOR RANGE CHOSEN BY SELECTOR SWITCH. METER AT RIGHT SHOWS FOLLOWING READINGS:

SWITCH SETTING	SCALE	READING
VDC 50	0 - 50	20 VOLTS DC
VDC 10	0 - 10	4 VOLTS DC
VDC 2.5	0 - 25 (DIVIDE BY 10)	1 VOLT DC

**SIMPSON 160**



**TS-352B/U**



**TS-352B/U**

READ DC SCALE FOR RANGE OF JACK RED LEAD IS CONNECTED TO. METER AT LEFT SHOWS FOLLOWING READINGS:

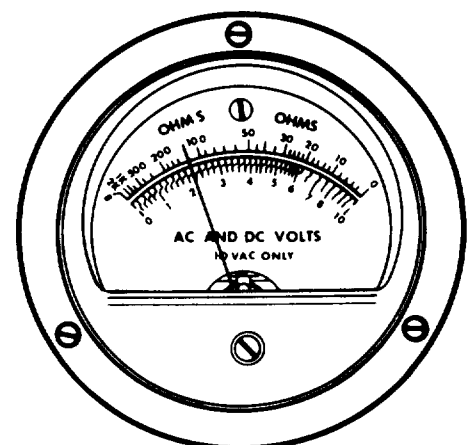
RANGE	SCALE	READING
50 V	0 - 5 (MULTIPLY BY 10)	20 VOLTS DC
10 V	0 - 10	4 VOLTS DC
2.5 V	0 - 2.5	1 VOLT DC

**AN/URM-105**

READ UPPER BLACK STRAIGHT LINED PORTION OF AC AND DC VOLTS SCALE FOR RANGE CHOSEN BY SELECTOR SWITCH. METER AT RIGHT SHOWS FOLLOWING READINGS:

SWITCH SETTING	SCALE	READING
1000 DC V	0 - 10 (MULTIPLY BY 100)	200 VOLTS DC
100 DC V	0 - 10 (MULTIPLY BY 10)	20 VOLTS DC
10 DC V	0 - 10	2 VOLTS DC
1 DC V	0 - 10 (DIVIDE BY 10)	.2 VOLT DC

**AN/URM-105**



*DC voltage measurement.*

TA251317

## DETAILED TROUBLESHOOTING PROCEDURE TROUBLESHOOTING

### USER GUIDE

#### NOTE

This **TROUBLESHOOTING USER GUIDE** is presented in the same format as the detailed troubleshooting procedures you will be using to identify and correct the trouble with your vehicle.

1

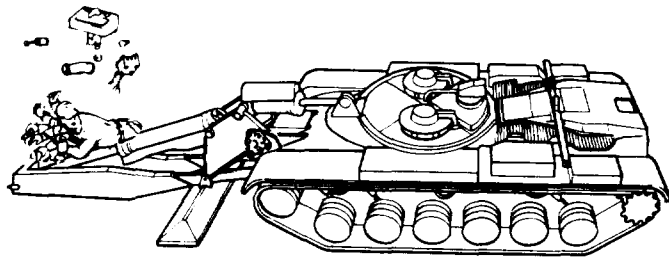
Check the four key steps that make good troubleshooting (troubleshooting without the **SHOTGUN APPROACH**).

- Identify the trouble.
- Find the right troubleshooting procedure.
- Determine the test equipment, special tools and number of technicians needed to perform the procedure.
- Use the troubleshooting procedure to isolate and repair the trouble.

How do you "Identify" the troublespot?

#### NOTE

This line indicates the procedure is continued on the next page.



THE SHOTGUN APPROACH

TA251318



## DETAILED TROUBLESHOOTING PROCEDURE TROUBLESHOOTING USER GUIDE (Continued)

**NOTE**

This line indicates the procedure is continued from the previous page.

**WARNING**

Do not attempt to operate the vehicle if there is any chance the trouble may harm personnel or damage equipment.

**2**

To identify the troublespot, check DA Form 2404 filled out by the crew.

- Check what the crew has entered on DA Form 2404.
- Question the crew to get as much information as possible about the trouble.

**EXAMPLE:**

- Does the hydraulic pump work?
- Is the reservoir full of oil?
- Is there any apparent leakage?
- Make sure there was no crew error in following the operator procedure listed in TM 5-5420-202-10.
- If necessary, operate the vehicle to help identify the problem.

Now that you have an idea what the trouble is, how do you find the right troubleshooting procedure?

**DETAILED TROUBLESHOOTING PROCEDURE**  
**TROUBLESHOOTING**  
**USER GUIDE**  
**(Continued)**

**NOTE**

The circled number at the top left corner of each block is a step number.

**3** Check the **TROUBLESHOOTING SYSTEM INDEX** to find the proper system/subsystem.

- Turn to **TROUBLESHOOTING SYSTEM INDEX (PAGE 2-34)**.
- Find the system in which your trouble occurs.
- Find the subsystem in which your trouble occurs.

*TROUBLESHOOTING SYSTEM INDEX*

LAUNCHER OPERATION	SYMPTOM AND RESOURCE TABLE 1	PAGE 2-35
● LAUNCHER SYSTEM HYDRAULICS		
SUPPORT SYSTEM	SYMPTOM AND RESOURCE TABLE 2	PAGE 2-35
● VENTILATION		

**NOTE**

- Most troubleshooting procedures contain many branches (paths).
- You will not follow every possible branch.
- The branch you follow will depend on your answer to each question block.
- If your answer is **NO**, follow this branch.
- If your answer is **YES**, follow this branch.

Were you able to find the proper system/subsystem in which your trouble occurs?

**4** If you have trouble locating the proper system/subsystem, check the **TROUBLESHOOTING SUBJECT INDEX (page 2-34)**.

- See Step **8**.

YES

NO

## DETAILED TROUBLESHOOTING PROCEDURE TROUBLESHOOTING USER GUIDE (Continued)

**5** Find the right troubleshooting procedure.

- Note the TROUBLESHOOTING SYMPTOM AND RESOURCE TABLE listed for the system/subsystem in which your trouble occurs.
- Turn to the page number indicated for the above table.
- Find the same subsystem.
- Check the symptom titles listed under this subsystem until you find the one that describes your trouble.

**Have you found the proper symptom title?**

TROUBLESHOOTING SYSTEM INDEX

LAUNCHER OPERATION	SYMPTOM AND RESOURCE TABLE 1	PAGE 2-35
• LAUNCHER SYSTEM HYDRAULICS		
SUPPORT SYSTEM	SYMPTOM AND RESOURCE TABLE 2	PAGE 2-35
• VENTILATION		

**6** Notify your supervisor.

**7**

- Determine the test equipment, special tools and number of technicians required.
- See step **13**



TABLE 1 LAUNCHER OPERATION SYMPTOM AND RESOURCE TABLE

SYMPTOM NO / SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
			MULTIMETER OR STE/ICE		Ref App B	
			A	B	SPECIAL TOOLS	PERSONNEL
<b>HYDRAULICS</b>						
1	Bridge does not lift off bridge seat	2-99	X		1,2,3,4,5	2
2	Bridge does not lower smoothly from vertical position	2-71	X		1,2,3,4,5	2
3	Bridge does not scissor open or does not open smoothly	2-74	X		1,2,3,4,5	2
4	Launcher does not release/engage bridge	2-81	X		1,2,3,4,5	2
5	Bridge does not retrieve	2-87	X		1,2,3,4,5	2
6	Bridge does not scissor closed or does not close smoothly	2-80	X		1,2,3,4,5	2
7	Bridge does not retract from vertical position or does not retract smoothly	2-97	X		1,2,3,4,5	2

TABLE 2 SUPPORT SYSTEM SYMPTOM AND RESOURCE TABLE

SYMPTOM NO / SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
			MULTIMETER OR STE/ICE		PERSONNEL	
			A	B	C	D
<b>VENTILATION</b>						
8	Ventilating Blower motor does not work	2-100	X			1

TA251321

**DETAILED TROUBLESHOOTING PROCEDURE  
TROUBLESHOOTING  
USER GUIDE  
(Continued)**

FROM STEP

4

**8** If you can not locate the proper system/subsystem in the **SYSTEM INDEX**, find an item in the **TROUBLESHOOTING SUBJECT INDEX** that pertains to your trouble.

- Turn to **TROUBLESHOOTING SUBJECT INDEX** (page 2-34).
- Check the subjects listed in this index until you find one that pertains to your trouble.

→ TROUBLESHOOTING SUBJECT INDEX

SUBJECT	SYMPTOM AND RESOURCE TABLE(S)	PAGE	SYMPTOM NUMBER(S)
Bridge Engaging	1	2-81	4
Bridge Lift Off	1	2-59	1
Bridge Lowering	1	2-71	2
Bridge Releasing	1	2-81	4
Bridge Retracting	1	2-97	7
Bridge Retrieving	1	2-87	5
Bridge Scissoring	1	2-74, 2-90	3, 6
Engaging Bridge	1	2-81	4
Launching Bridge	1	2-59, 2-71, 2-74, 2-81	1, 2, 3, 4
Lowering Bridge	1	2-71, 2-74	2, 3
Retracting Bridge	1	2-90, 1-97	6, 7
Retrieving Bridge	1	2-87	5
Scissoring Closed	1	2-90	6
Scissoring Open	1	2-74	3
Ventilating Blower	2	1-100	8

**Can you find an item that pertains to your trouble?**

YES

NO

**9** Notify your supervisor.

**DETAILED TROUBLESHOOTING PROCEDURE  
TROUBLESHOOTING  
USER GUIDE  
(Continued)**

**10**

**Find the right troubleshooting procedure.**

- Check the SYMPTOM AND RESOURCE TABLE listed for the subject you have selected.
- Note the symptom number(s) listed for your subject.
- Turn to the page number indicated for the SYMPTOM AND RESOURCE TABLE.

*TROUBLESHOOTING SUBJECT INDEX*

SUBJECT	SYMPTOM AND RESOURCE TABLE(S)	PAGE	SYMPTOM NUMBER(S)
Bridge Engaging	1	2-81	4
Bridge Lift Off	1	2-99	1
Bridge Lowering	1	2-71	2
Bridge Retaining	1	2-81	4
Bridge Retracting	1	2-97	7
Bridge Retracting	1	2-87	5
Bridge Retracting	1	2-90	3,6
Engaging Bridge	1	2-81	4
Launching Bridge	1	2-99, 2-71, 2-74, 2-81	1, 2, 3, 4
Lowering Bridge	1	2-71, 2-74	2, 1
Retracting Bridge	1	2-90, 2-97	6, 7
Retracting Bridge	1	2-87	5
Securing Cover	1	2-90	6
Securing Open	1	2-74	1
Ventilating Blower	2	2-100	8

**DETAILED TROUBLESHOOTING PROCEDURE  
TROUBLESHOOTING  
USER GUIDE  
(Continued)**

STEP **10** CONTINUED

- Find the same symptom number(s).
- The title listed for this number is the symptom title that describes your trouble.

TABLE 1. LAUNCHER OPERATION SYMPTOM AND RESOURCE TABLE

SYMPTOM NO / SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
			MULTIMETER OR STE/ICE	Ref App B	SPECIAL TOOLS	PERSONNEL
			A	B	C	D
<b>HYDRAULICS</b>						
1	Bridge does not lift off bridge seat	2-99	X		1,2,3,4,5	2
2	Bridge does not lower smoothly from vertical position	2-71	X		1,2,3,4,5	2
3	Bridge does not scissor open or does not open smoothly	2-74	X		1,2,3,4,5	2
4	Launcher does not release/engage bridge	2-81	X		1,2,3,4,5	2
5	Launcher does not retract	2-87	X		1,2,3,4,5	2
6	Bridge does not scissor closed or does not close smoothly	2-80	X		1,2,3,4,5	2
7	Bridge does not retract from vertical position or does not retract smoothly	2-97	X		1,2,3,4,5	2

TABLE 2. SUPPORT SYSTEM SYMPTOM AND RESOURCE TABLE

SYMPTOM NO / SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
			MULTIMETER OR STE/ICE	SPECIAL TOOLS	PERSONNEL	
			A	B	C	D
<b>VENTILATION</b>						
8	Ventilating blower motor does not work	2-100	X			1

**NOTE**

If there is more than one symptom number listed, review the symptom title for each number until you find the title that describes your trouble.

**Have you found the proper symptom title?**

**11**

Notify your supervisor.

NO

**12**

- Determine the test equipment, special tools, and number of technicians required.
- See step **13**.

YES

**DETAILED TROUBLESHOOTING PROCEDURE  
TROUBLESHOOTING  
USER GUIDE  
(Continued)**

FROM STEP

7 OR 12

**13** Determine the test equipment, special tools, and number of technicians required to perform the procedure.

- Locate the RESOURCES REQUIRED COLUMNS.
- Check Column B to see if you will need test equipment. Either a multimeter or a STE/ICE set can be used. You do not need both.
- Check Column C to see if you will need special tools.

**NOTE**

- If Column C indicates that special tools are needed, see Appendix B, Section III (page B-7).
- Locate the same item number in this section. This will tell you which special tool is needed.

- Check Column D to determine how many technicians are required to perform the procedure.

**Now that you have identified the trouble; found the right troubleshooting procedure; and obtained the test equipment, special tools, and number of technicians required: what is the last step to good troubleshooting?**

TABLE 1 LAUNCHER OPERATION SYMPTOM AND RESOURCE TABLE

SYMPTOM NO / SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED		
			MULTIMETER OR STE/ICE	Ref. App. B	
				SPECIAL TOOLS	PERSONNEL
A	B	C	D		
<b>HYDRAULICS</b>					
1	Bridge does not lift off bridge seat	2-59	X	1,2,3,4,5	2
2	Bridge does not lower smoothly from vertical position.	2-71	X	1,2,3,4,5	2
3	Bridge does not release open or does not open smoothly	2-74	X	1,2,3,4,5	2
4	Launcher does not release/engage bridge	2-81	X	1,2,3,4,5	2
5	Bridge does not return	2-87	X	1,2,3,4,5	2
6	Bridge does not retract closed or does not close smoothly	2-89	X	1,2,3,4,5	2
7	Bridge does not retract from vertical position or does not retract smoothly	2-97	X	1,2,3,4,5	2

TABLE 2 SUPPORT SYSTEM SYMPTOM AND RESOURCE TABLE

SYMPTOM NO / SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED		
			MULTIMETER OR STE/ICE	SPECIAL TOOLS	PERSONNEL
<b>VENTILATION</b>					
8	Ventilating blower motor does not work	2-100	X		1

## DETAILED TROUBLESHOOTING PROCEDURE TROUBLESHOOTING USER GUIDE (Continued)

**WARNING**

Do not start your troubleshooting procedure until you have studied step ⑩. This step contains important information you will need to know in order to perform the procedure safely.

⑭

Use the troubleshooting procedure to isolate and repair the trouble.

- After studying step ⑩, you will be ready to begin your Troubleshooting Procedure.

Are you familiar with the Important Troubleshooting Information contained in step ⑩ ?

NO

YES

⑮

- Turn to the page number indicated in Column A.
- On this page you will see the procedure that covers your trouble.
- Use this troubleshooting procedure to isolate and repair the trouble.

TABLE 1 LAUNCHER OPERATION SYMPTOM AND RESOURCE TABLE

SYMPTOM NO / SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
			MULTIMETER OR STE/ICE		PERSONNEL	
			A	B	SPECIAL TOOLS	D
<b>HYDRAULICS</b>						
1	Bridge does not lift off bridge seat	2-59	X		1,2,3,4,5	2
2	Bridge does not lower smoothly from vertical position	2-6	X		1,2,3,4,5	2
3	Bridge does not actuator open or does not open smoothly	2-4	X		1,2,3,4,5	2
4	Launcher does not release/engage bridge	2-81	X		1,2,3,4,5	2
5	Bridge does not retrieve	2-87	X		1,2,3,4,5	2
6	Bridge does not actuator closed or does not close smoothly	2-80	X		1,2,3,4,5	2
7	Bridge does not retract from vertical position or does not retract smoothly	2-97	X		1,2,3,4,5	2

TABLE 2 SUPPORT SYSTEM SYMPTOM AND RESOURCE TABLE

SYMPTOM NO / SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
			MULTIMETER OR STE/ICE		PERSONNEL	
			A	B	SPECIAL TOOLS	D
<b>VENTILATION</b>						
4	Ventilating blower motor does not work	2-100	X			1



**DETAILED TROUBLESHOOTING PROCEDURE  
TROUBLESHOOTING  
USER GUIDE  
(Continued)**

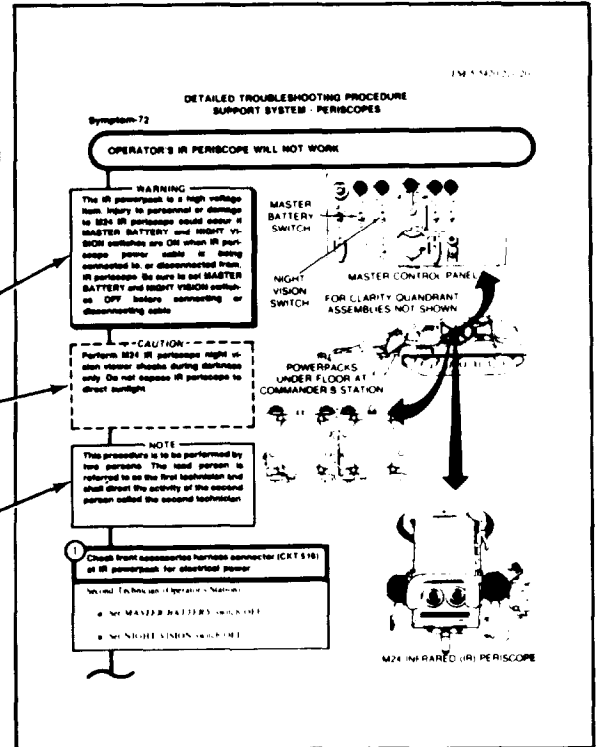
**16**

**IMPORTANT TROUBLESHOOTING INFORMATION**

- Be sure you read every **WARNING**, **CAUTION**, and **NOTE**.
- A **WARNING**: Instructions which if not followed, could result in injury or death of personnel.
- A **CAUTION** indicates possible equipment damage only.
- A **NOTE** contains information you will need to know in order to properly perform the troubleshooting procedure.

**WARNING**

- Be sure there is no electrical power at the cable to be disconnected or repaired.
- Before making cable repairs or disconnecting any cable, be sure **MASTER BATTERY** switch is set **OFF**.



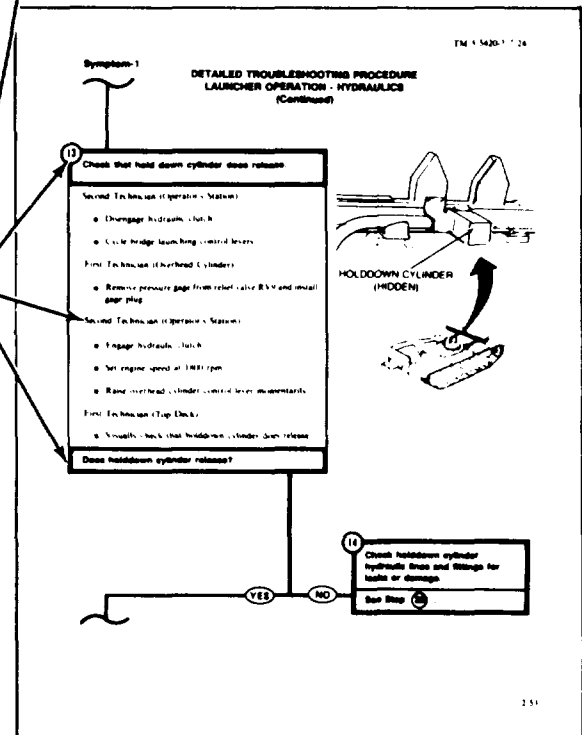
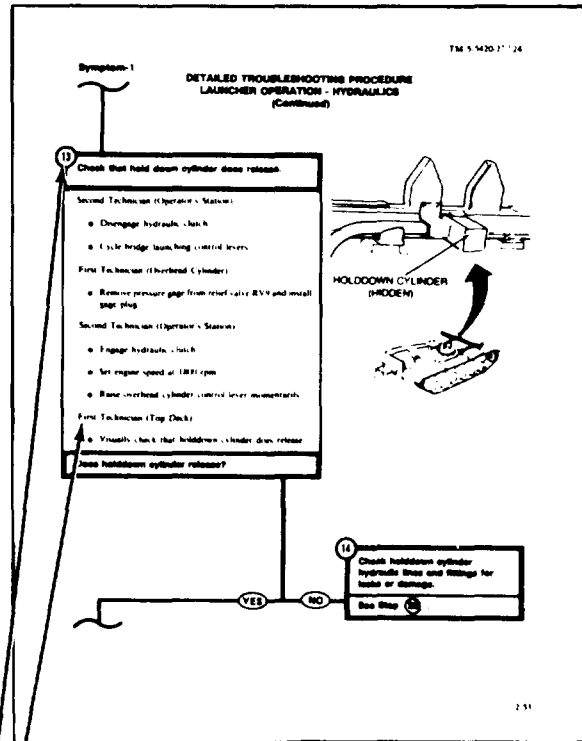
## DETAILED TROUBLESHOOTING PROCEDURE TROUBLESHOOTING USER GUIDE (Continued)

STEP **16** CONTINUED

### WARNING

- **Setting MASTER BATTERY switch OFF will not de-energize the following circuits: 49, 81, 400, 459 and 975. When working with any of the above circuits, the battery ground straps must be disconnected.**
- **When working with CKT 405, set HEATER MASTER switch OFF.**
- **Failure to de-energize any electrical circuit prior to working on it may result in serious injury to personnel.**

- If you are a skilled technician and already know how to perform the test or inspection called for here, you may skip the part of that step that is not shaded with heavy lines and printed in bold type.
- If you do not know how to do the test or inspection called for, you must perform every part of each step.



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## DETAILED TROUBLESHOOTING PROCEDURE TROUBLESHOOTING USER GUIDE (Continued)

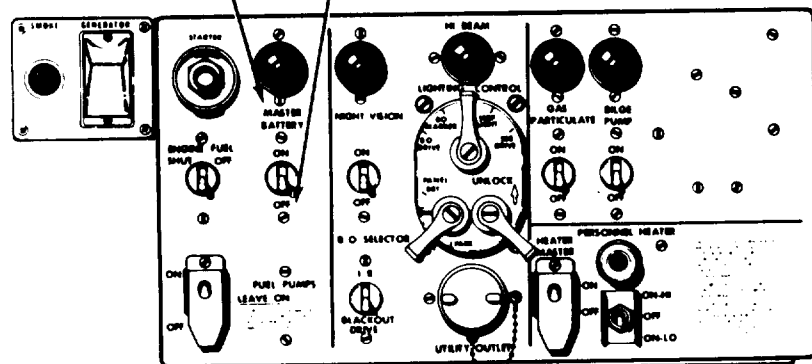
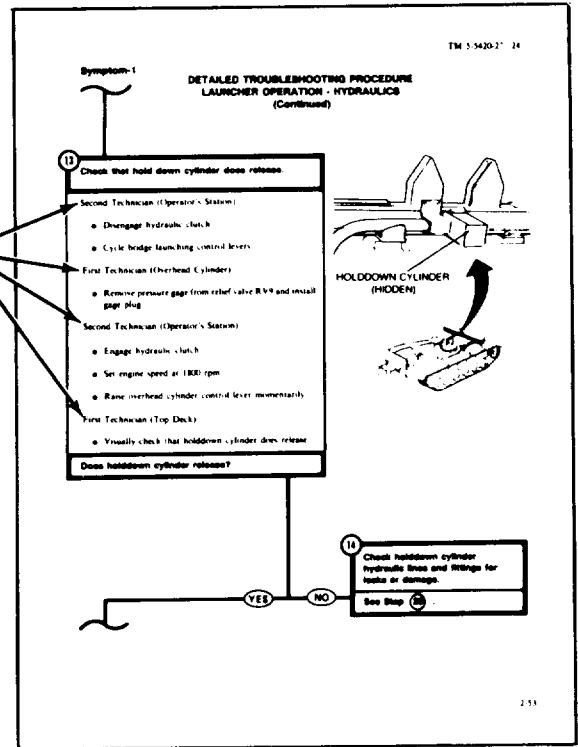
STEP **16** CONTINUED

- These locators tell you two things:
  - Which person will do the task that follows.
  - Where this person must be in order to do the task.

Example: First Technician (Top Deck)

- The words printed in **BOLD TYPE** show you what you will see marked on the actual equipment you will be using.

Example: ● Set **MASTER BATTERY** switch OFF.



TA251329

## DETAILED TROUBLESHOOTING PROCEDURE TROUBLESHOOTING USER GUIDE (Continued)

STEP 16 CONTINUED

- Some steps call for the use of test equipment.
- If you do not know how to use this equipment (or if you have forgotten how to do the test called for) see page 2-17 for multimeter or page 2-36 for STE/ICE instructions.
- A picture is included with most steps to make the task easier to understand, or show you where a particular part is located.

Symptom-6 DETAILED TROUBLESHOOTING PROCEDURE  
SUPPORT SYSTEM - VENTILATION

**VENTILATING BLOWER MOTOR DOES NOT WORK**

1 Check CKT 158 harness connector of blower motor for electrical power

Technical Operator's Station:

- NO MASTER BATTERY SWITCH
- Discharge CKT 158 harness connector from ventilating motor
- Set multimeter to measure DC voltage (see STE/ICE Test No. 100 (page 2-47))
- Connect positive lead of multimeter to harness connector of ventilating blower motor and negative lead to ground
- NO MASTER BATTERY SWITCH ON
- NO VENTILATOR OPERATION
- Check electrical indicator for correct status

Does meter indicate 16 to 28 volts dc?

2 Harness multimeter assembly (page 3-2)

YES

NO

MASTER BATTERY SWITCH

Symptom-7 DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)

TM 5-5420-7 24

3 Check tongue cylinder hydraulic lines and fittings for leaks or damage.

First Technician (Operator's Station):

- Disengage hydraulic clutch
- Cycle bridge launching control levers

Second Technician (Commander's Station):

- Remove pressure gage from gage port and install gage plug

First Technician (Operator's Station):

- Launch the bridge (TM 5-5402-10)
- Disengage hydraulic clutch

Both Technicians (Launcher Tongue):

- Remove tongue cylinder armor (page 4-215)

First Technician (Operator's Station):

- Engage hydraulic clutch
- Set engine speed at 1800 rpm
- Raise tongue cylinder control lever

Second Technician (Launcher Tongue):

- Visually check hydraulic lines and fittings for leaks, crimping or other damage

Are hydraulic lines or fittings leaking or damaged?

NO

YES

4 Identify leaking hydraulic line by reference on line with diagram (page 3-66)

- Replace leaking line

TONGUE CYLINDER HYDRAULIC LINES

TA251330

# DETAILED TROUBLESHOOTING PROCEDURE TROUBLESHOOTING USER GUIDE (Continued)

STEP 16 CONTINUED

- When a step tells you inspect for bent/broken connector contacts or loose wires at the rear of connectors (or repair a harness)—a circuit diagram is included.
- This circuit diagram will show you which connectors to inspect/repair and where they are located.
  - Indicates a male pin, single contact.
  - Indicates female socket, single contact.

TM 5-5420-24

### Symptom-8 DETAILED TROUBLESHOOTING PROCEDURE LAUNCHER OPERATION - HYDRAULICS (Continued)

**11** Check hull power harness (CKT 47) for electrical power

Technician (Operator's Station)

- Set MASTER BATTERY switch OFF
- Reconnect interconnecting box cable connector to interconnecting box
- Disconnect interconnecting box cable connector from hull power harness connector (CKT 47)
- Connect red probe of meter to center contact of hull power harness connector (CKT 47) and black probe to ground
- Set MASTER BATTERY switch ON
- Check if meter indicates 18 to 30 volts dc

Does meter indicate 18 to 30 volts dc?

**12** Inspect interconnecting box cable for bent/broken connector contacts or loose wires at rear of connectors.

- Repair connectors if defective TM5-5420-2-1-20
- If connectors are not defective, replace interconnecting box cable TM5-5420-2-1-20

YES

NO

**13** Inspect hull power harness for bent/broken connector contacts or loose CKT 47 wire at rear of connectors.

- Repair connectors if defective TM5-5420-2-1-20
- If connectors are not defective, notify support maintenance of a defective hull power harness
- Reconnect hull power harness connector to interconnecting box cable

COMMANDER'S STATION

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TM 5-5420-24

### Symptom-8 DETAILED TROUBLESHOOTING PROCEDURE LAUNCHER OPERATION - HYDRAULICS (Continued)

**1** Check output connector (CKT 159) of accessories control box for electrical power

Technician (Operator's Station)

- Set MASTER BATTERY switch OFF
- Reconnect CKT 159 harness connector to remaining power
- Disconnect CKT 159 output harness connector from accessories control box
- Connect red probe of meter to center contact of CKT 159 connector on accessories control box and black probe to ground
- Set MASTER BATTERY switch ON
- Check if meter indicates 18 to 30 volts dc

Does meter indicate 18 to 30 volts dc?

**2** Inspect CKT 159 harness for bent/broken harness connectors or loose CKT 159 wire at rear of connectors.

- Repair connectors if defective TM5-5420-2-1-20
- If connectors are not defective, replace CKT 159 harness between accessories control box and launcher assembly (TM5-5420-2-1-20)

YES

NO

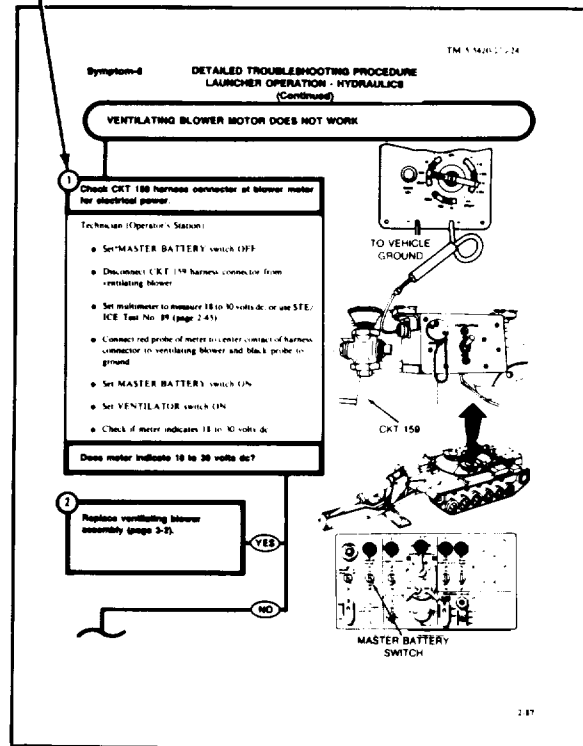
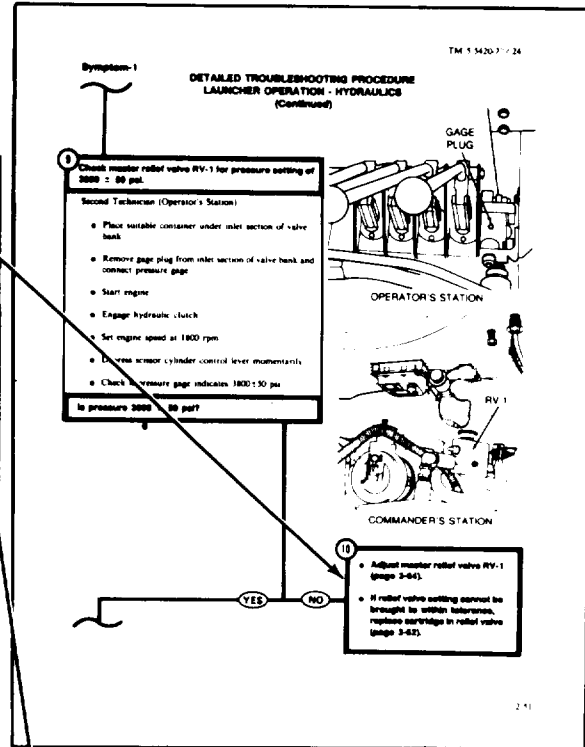
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TA251331

# DETAILED TROUBLESHOOTING PROCEDURE TROUBLESHOOTING USER GUIDE (Continued)

STEP 16 CONTINUED

- After you finish any repair in a troubleshooting procedure, check to see that the trouble has been corrected.
- If the problem still exists, go back to step ① of the same procedure and repeat procedure again. If the problem still exists after performing the procedure twice, notify your supervisor.



TA251332

## DETAILED TROUBLESHOOTING PROCEDURE TROUBLESHOOTING USER GUIDE (Continued)

STEP 16 CONTINUED

**Do you understand all the information in this USER GUIDE?**

17 **Ask your supervisor to help you with the part you don't understand.**

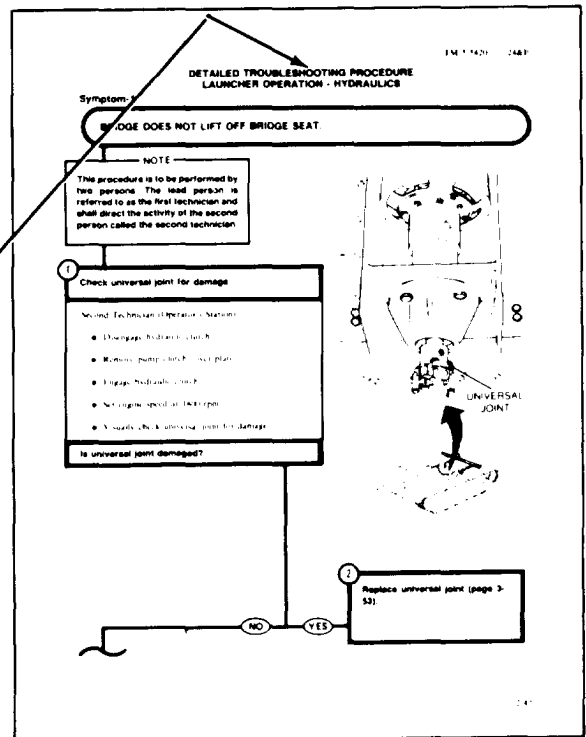
- 18
- Turn to the page number indicated in Column A.
  - On this page you will see the procedure that pertains to your trouble.
  - Use this DETAILED TROUBLESHOOTING PROCEDURE to isolate and repair the trouble.

TABLE 1. LAUNCHER OPERATION SYMPTOM AND RESOURCE TABLE

SYMPTOM NO./SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
			MULTIMETER OR STE/ICE	SPECIAL TOOLS	PERSONNEL	
<b>HYDRAULICS</b>						
1	Bridge does not lift off bridge seat	2-99	X	1,2,3,4,5	2	
2	Bridge does not lower smoothly from vertical position	2-71	X	1,2,3,4,5	2	
3	Bridge does not scissor open or does not open smoothly	2-74	X	1,2,3,4,5	2	
4	Launcher does not release/engage bridge	2-81	X	1,2,3,4,5	2	
5	Bridge does not retrieve	2-87	X	1,2,3,4,5	2	
6	Bridge does not scissor close or does not close smoothly	2-80	X	1,2,3,4,5	2	
7	Bridge does not retract from vertical position or does not retract smoothly	2-97	X	1,2,3,4,5	2	

TABLE 2. SUPPORT SYSTEM SYMPTOM AND RESOURCE TABLE

SYMPTOM NO./SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED			
			MULTIMETER OR STE/ICE	SPECIAL TOOLS	PERSONNEL	
<b>VENTILATION</b>						
1	Ventilating blower motor does not work	2-100	X		1	



TA251333

**TROUBLESHOOTING SYSTEM INDEX**

<b>LAUNCHER OPERATION</b>	<b>SYMPTOM AND RESOURCE TABLE 1.</b>	<b>PAGE 2-35</b>
● <b>LAUNCHER SYSTEM HYDRAULICS</b>		
<b>SUPPORT SYSTEM</b>	<b>SYMPTOM AND RESOURCE TABLE 2.</b>	<b>PAGE 2-35</b>
● <b>VENTILATION</b>		

**TROUBLESHOOTING SUBJECT INDEX**

<b>SUBJECT</b>	<b>SYMPTOM AND RESOURCE TABLE(S)</b>	<b>PAGE</b>	<b>SYMPTOM NUMBER(S)</b>
Bridge Engaging	1	2-82	4
Bridge Lift Off	1	2-59	1
Bridge Lowering	1	2-72	2
Bridge Releasing	1	2-82	4
Bridge Retracting	1	2-98	7
Bridge Retrieving	1	2-88	5
Bridge Scissoring	1	2-75, 2-91	3,6
Engaging Bridge	1	2-82	4
Launching Bridge	1	2-59, 2-72, 2-75, 2-82	1, 2, 3, 4
Lowering Bridge	1	2-72, 2-75,	2, 3
Retracting Bridge	1	2-91, 2-98	6, 7
Retrieving Bridge	1	2-88	5
Scissoring Closed	1	2-91	6
Scissoring Open	1	2-75	3
Ventilating Blower	2	2-101	8

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**TABLE 1. LAUNCHER OPERATION SYMPTOM AND RESOURCE TABLE**

SYMPTOM NO./ SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED		
			MULTIMETER OR STE/ICE	Ref. App. B	PERSONNEL
				SPECIAL TOOLS	
		A	B	C	D
HYDRAULICS					
1	Bridge does not lift off bridge seat.	2-59	X	1,2,3,4,5	2
2	Bridge does not lower smoothly from vertical position.	2-72	X	1,2,3,4,5	2
3	Bridge does not scissor open or does not open smoothly.	2-75	X	1,2,3,4,5	2
4	Launcher does not release/engage bridge.	2-82	X	1,2,3,4,5	2
5	Bridge does not retrieve.	2-88	X	1,2,3,4,5	2
6	Bridge does not scissor closed or does not close smoothly.	2-91	X	1,2,3,4,5	2
7	Bridge does not retract from vertical position or does not retract smoothly.	2-98	X	1,2,3,4,5	2

**TABLE 2. SUPPORT SYSTEM SYMPTOM AND RESOURCE TABLE**

SYMPTOM NO., SUBSYSTEM	SYMPTOM TITLE	PAGE	RESOURCES REQUIRED		
			MULTIMETER OR STE/ICE	SPECIAL TOOLS	PERSONNEL
		A	B	C	D
VENTILATION					
8	Ventilating blower motor does not work	2-101	X		1

***STE/ICE TROUBLESHOOTING (SIMPLIFIED  
TEST EQUIPMENT FOR INTERNAL COMBUSTION ENGINES)***

● **General**

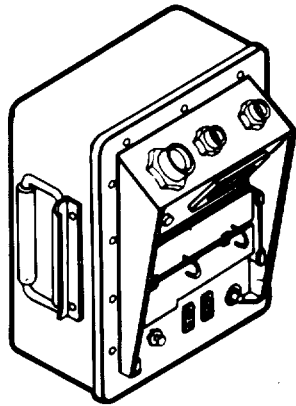
- a. This section is applicable only if STE/ICE is available. This section contains information and tests which may be used with STE/ICE to locate malfunctions that may develop in the vehicle hull. The tests can be used during troubleshooting or after replacing parts to isolate malfunctions, and to make sure that proper repairs have been made.
- b. STE/ICE is used primarily with the vehicle electrical system. These tests cannot cover all possible troubles which may occur. To obtain the maximum number of observed symptoms of the malfunction, question the vehicle crew.

● ***STE/ICE Tests and Set-Up Procedures.***

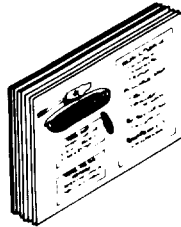
- a. The STE/ICE testing capability that may be applied to the launcher are tests No. 51, 0-4000 PSIG Pressure Test and No. 89, DC Voltage Test,
- b. STE/ICE set up and confidence test (Tests No. 66/60) must be performed prior to performing any tests.

● ***STE/ICE Description and Operation.***

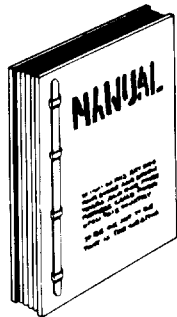
- a. General. The following describes the operation of the STE/ICE system and contains detailed operating procedures. It is used to test the serviceability of vehicles and to perform primary fault detection and isolation. After the technician has identified a faulty part or subsystem, he is referred to a paragraph number for replacement or repair procedures for individual parts,
- b. Description and Operation. STE/ICE is used in this technical manual as a measuring device for DC voltage. STE/ICE is portable and operates on either 12 or 24 volt vehicle batteries or equivalent power source. The STE/ICE system consists of a vehicle test meter (VTM), a transducer kit (TK), four electrical cables, a transit case, and technical publications. Only the VTM and cables W2 and W5 are required for STE/ICE tests in this manual.



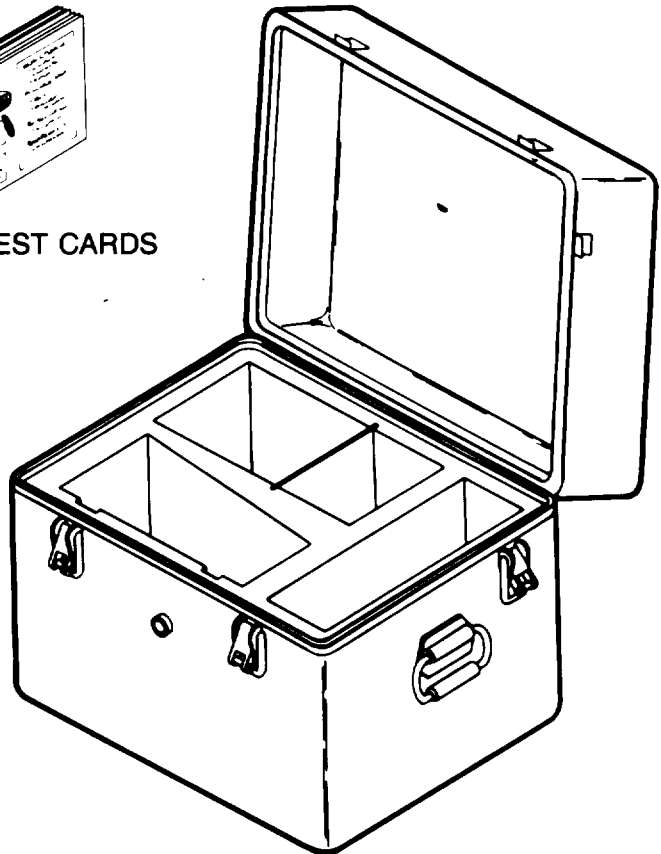
VEHICLE TEST METER (VTM)



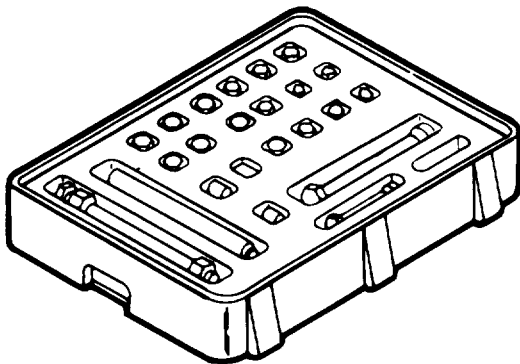
VEHICLE TEST CARDS



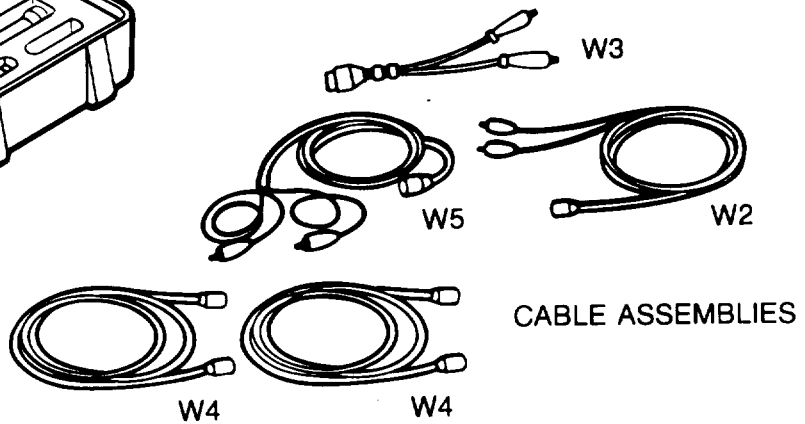
TECHNICAL MANUAL



TRANSIT CASE

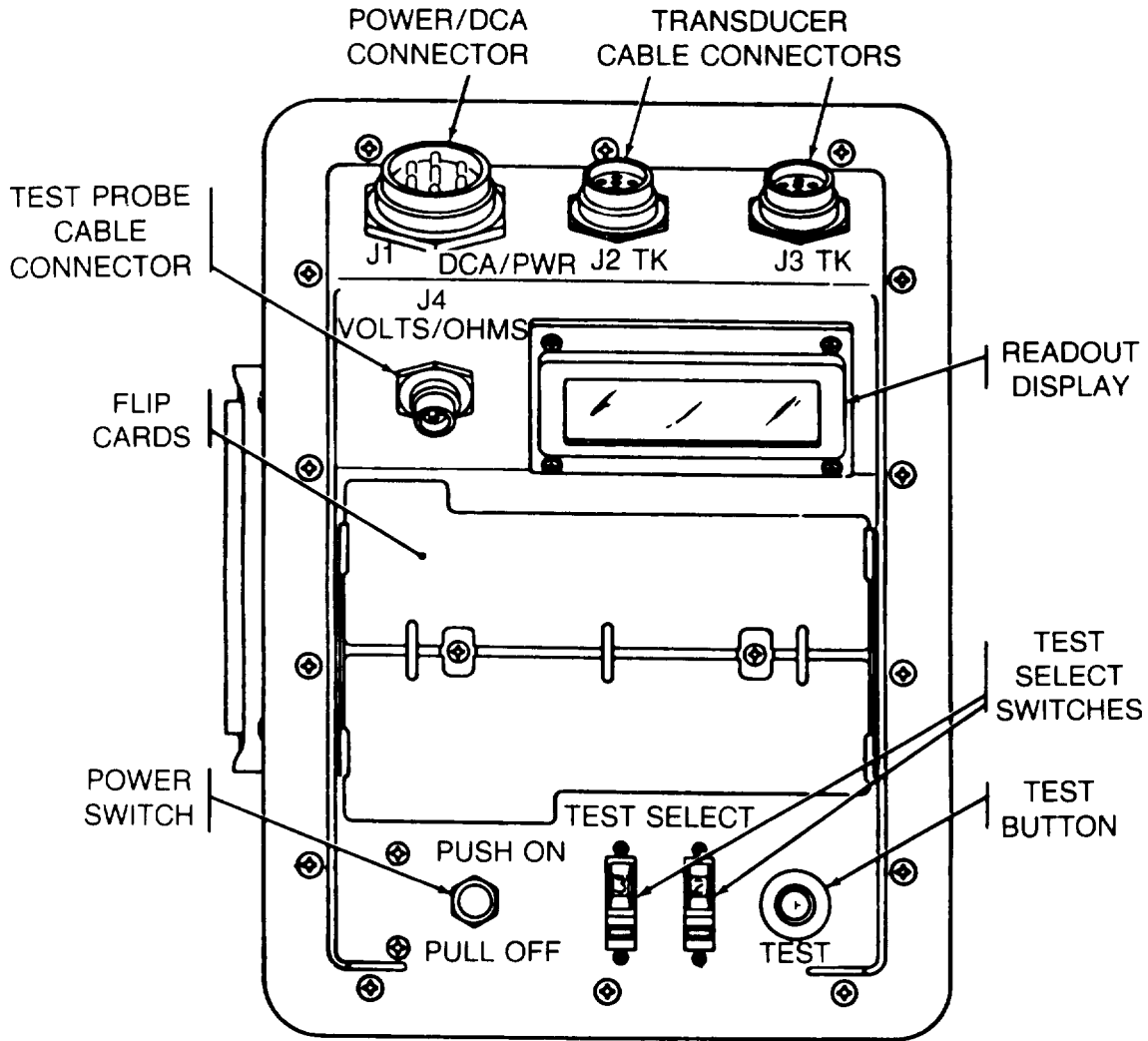


TRANSDUCER KIT



CABLE ASSEMBLIES

Simplified test equipment internal combustion engine (STE/ICE) system.



VTM controls and readout display

c. Vehicle Test Meter.

(1) General. The VTM provides a method for the technician to test vehicle electrical components. Readings are either pass/fail indications or digital displays in units such as volts. Operating power for the VTM is drawn from the vehicle batteries or some equivalent battery source.

(2) Controls and Indicators, The controls and readout display on the VTM are illustrated on page 2-38,

(a) Power Switch (PUSH ON/PULL OFF). VTM power is on when the power switch is pushed in and off when pulled out. The power switch contains a 4-amp circuit breaker and will pop out automatically if something is wrong which causes the VTM to use more power than it should. If the switch pops, check your hookup carefully and try again before turning in the VTM to support maintenance.

(b) Test Select Switches. The TEST SELECT switches are used to select the actual test to be performed. There are ten positions on each switch numbered 0 through 9. The number dialed into these switches is read by the VTM when you press the TEST button.

(c) Test Button, Pressing and releasing the TEST button causes the test measurement to begin. Observe the measured value on the readout display. The TEST button must be pressed and immediately released, unless instructions in the test being performed state otherwise,

(d) Readout Display. The readout display will show different types of readouts during testing up to a maximum of 4-characters (for example .8.8.8.8). The types of readouts you will see are summarized as follows:

1. Status Readout. A status readout keeps the technician informed of what is happening. The status readout displays are described in page 2-40.

2. Prompting Message. A prompting message is a technician action message. Prompting messages are described in page 2-40.

3. Numerical Readout. A numerical readout is the measured value in units of the measurement being made. For example, if you are measuring 0-45 volts dc, 24.2 is volts dc.

4. Error Readout. There are 5 different error readouts used with this vehicle. All error readouts start with E. All error messages must be corrected before continuing testing. Error messages are listed in page 2-41.

5. Confidence Error Readouts. C004 is a typical error readout resulting from the detection of a faulty VTM during confidence test.

d. Cable Assemblies. Cable assemblies are referred to by the cable number and by a name which describes how the cable is used. For example power cable W5, test probe cable W2. If you experience any difficulty during testing and suspect a cable is bad, refer to TM9-4910-571-12&P for checking cable continuity.

*Status Readouts*

VTM Readout	Interpretation
.8.8.8.8	<p>A readout of .8.8.8.8 appears for 1 to 2 seconds each time the power is applied to the VTM. It means that there is power to the VTM, and that all elements of the readout display are operative.</p> <p>A readout of ---- indicates the following:</p> <ul style="list-style-type: none"> <li>(1) After power turn on it signifies that the VTM is ready for testing.</li> <li>(2) During a compression unbalance test it signifies testing is in progress.</li> <li>(3) During battery condition test it signifies battery may be in discharged state.</li> </ul>
.9.9.9.9	<p>A readout of .9.9.9.9 indicates that the VTM is reading a test value beyond the range of its measurement capability. Either (1) the wrong test number is selected, or (2) there is a fault in the vehicle, (3) during battery condition test, it signifies base connections, discharged, or bad batteries.</p>
PASS FAIL	<p>A PASS or FAIL readout is the result of a test that checks the condition of a component being measured. A PASS/FAIL readout means just that - the component either passes the test or fails the test.</p>

*Prompting Messages*

VTM Readout	Interpretation
CAL	<p>Signal to the technician to release the TEST button during an offset test.</p>
66	<p>Numbers are used for prompting messages in several tests. They areas follows: in confidence test 66 signals the technician to dial in "99"; in CI acceleration/deceleration power test No. 12, the first numerical readout signals the technician to shut off fuel.</p>

*Error Readouts*

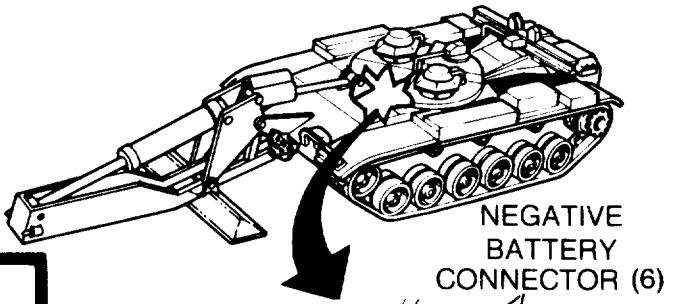
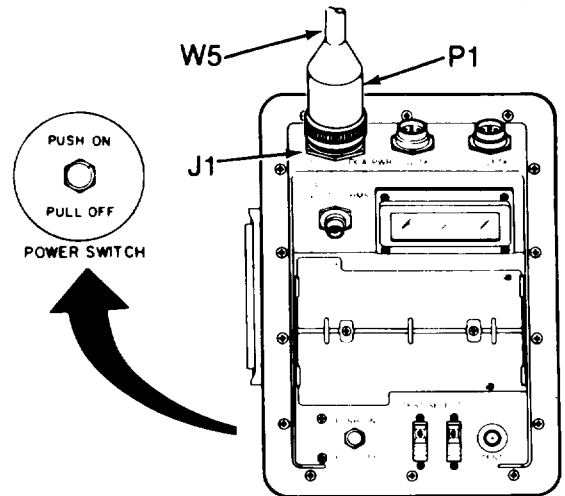
VTM Readout	Interpretation
E000	Occurs if you request the VTM for information it does not have. For example, if you request the vehicle ID and it has not been entered.
E001	It indicates that a non-existent test number has been dialed into the TEST SELECT switches.
E002	Required transducer is not connected.
E005	Indicates that the transducer offset test was not performed.
E013	Indicates bad data were taken for the test in progress. Repeat the test one (1) time.

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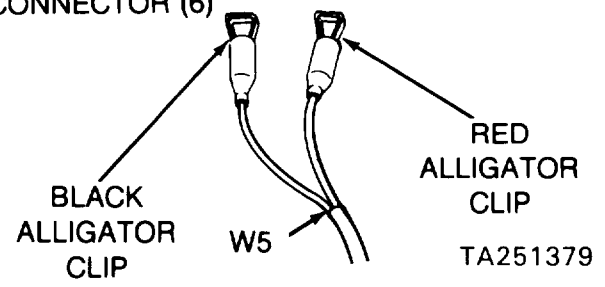
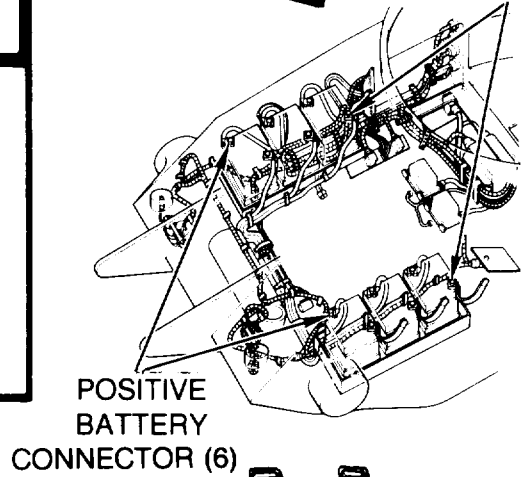
STE/ICE Test Procedures

**VTM GENERAL SET UP**

- CAUTION**
- Do not connect or disconnect VTM while vehicle engine is running.
  - Connect P1 of power cable W5 to J1 of VTM before connecting clip leads to battery cable.
  - Observe polarity. Make sure red alligator clip of power cable W5 connects to positive (+) connector on battery and black alligator clip of power cable W5 connects to negative (-) on battery.



- 1 VTM general set up.**
- Pull PULL OFF power switch on VTM.
  - Connect P1 of power cable W5 to J1 on VTM.
  - Connect red alligator clip of power cable W5 to positive (+) connector on battery.
  - Connect black alligator clip of power cable W5 to negative (-) connector on battery.



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STE/ICE Test Procedures - Continued

STEP 1 CONTINUED

● Push PUSH ON power switch on VTM.

● Check that VTM display indicates **[.8 .8 .8 .8]** for approximately two seconds and then changes to **----**.

---

Does VTM display **[.8 .8 .8 .8]** and then change to **----**?

3

● Perform confidence test (page 2-44).

YES NO

2

Check battery power source of test set.

- Pull PULL OFF power switch.
- Locate a known good battery.
- Connect red alligator clip of power cable W5 to positive and black alligator clip to negative battery terminal.
- Push PUSH ON power switch.

---

Does VTM display **[.8 .8 .8 .8]** and then change to **----**?

YES NO

5

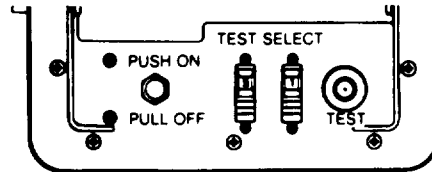
● Perform confidence test (page 2-44).

4

- Replace STE/ICE test set.
- Begin test again.

STE/ICE Test Procedures - Continued

**CONFIDENCE TEST 66**



**1**

**Confidence Test**

- Dial TEST SELECT switches to 66.
- Press and release TEST button.
- Check that VTM display indicates **0066** and holds.

Does VTM display and hold **0066** ?

**2**

Re-dial 66 and press TEST button.

Does VTM display indicate and hold **0066** ?

**3**

Replace STE/ICE set.

**4**

- Dial TEST SELECT switches to 99.
- Check that several numbers appear on VTM display, **99**, **.8 .8 .8 .8** and others.
- Wait for VTM display to indicate **PASS**.

Does VTM display **PASS** ?

**5**

- Repeat Confidence Test.
- Wait for VTM display to indicate **PASS**.

Does VTM display indicate **PASS** ?

**6**

Replace STE/ICE set.

**END TEST**

STE/ICE Test Procedures - Continued

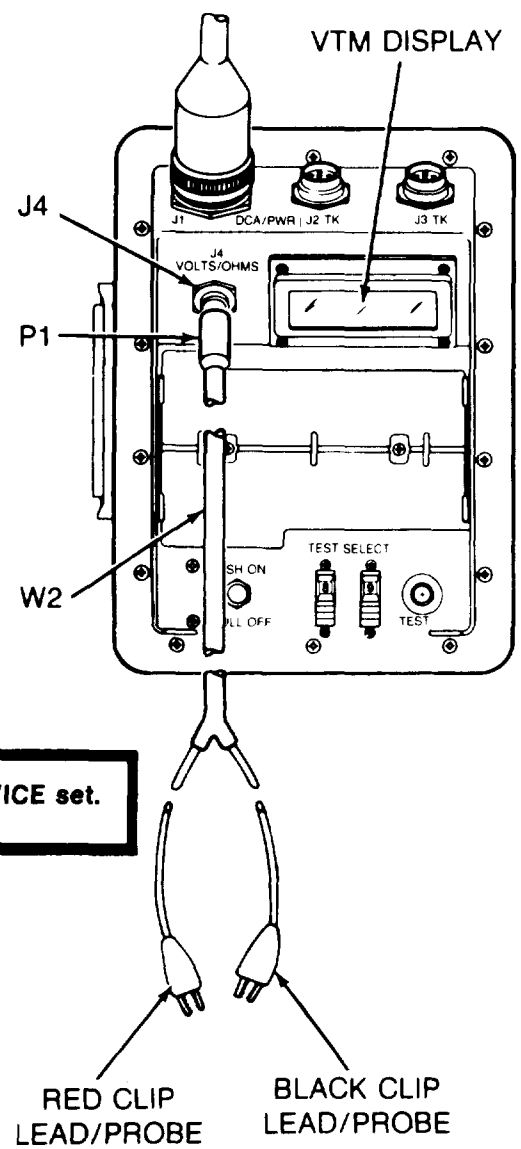
**DC VOLTAGE TEST NO. 89**

**1**  
Perform VTM GENERAL SET UP (page 2-42) AND CONFIDENCE TEST NO. 66 (page 2-44).

**2**  
**Connect test probe cable to VTM, do OFFSET test.**

- Connect P1 of test probe cable W2 to J4 of VTM.
- Connect red and black clip leads/probes of cable W2 together.
- Dial TEST SELECT switches to 89.
- Press TEST button and hold until VTM display indicates **CAL**.
- Release TEST button.
- Check that offset measurement on VTM display indicates between **-6.8** to **+6.8**.

**Does VTM display indicate between **-6.8** to **+6.8** ?**



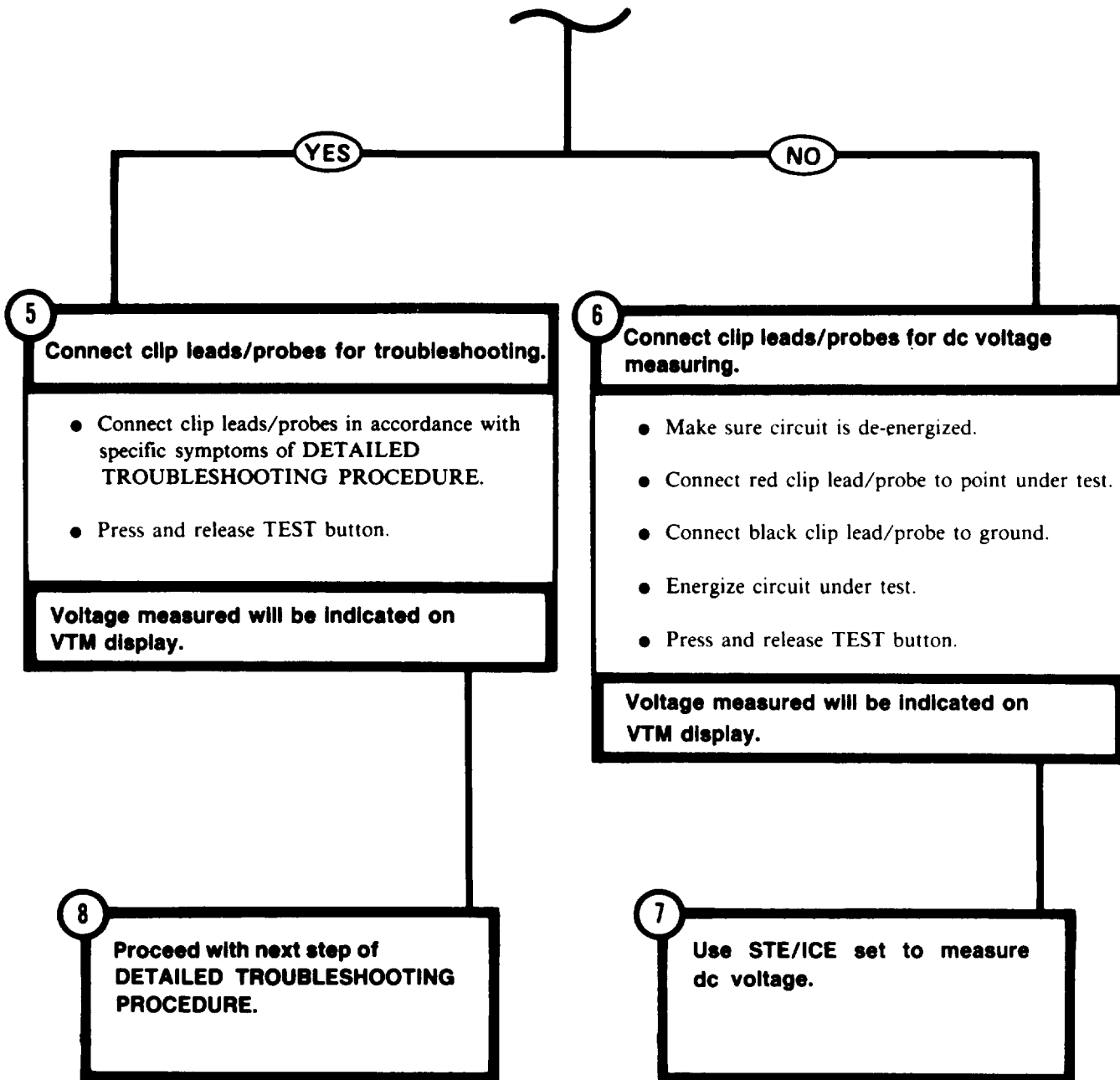
**3**  
**Replace STE/ICE set.**

**4**  
**Determine use of STE/ICE set.**

Check if STE/ICE set is to be used with DETAILED TROUBLESHOOTING PROCEDURES.

**Is STE/ICE set to be used with DETAILED TROUBLESHOOTING PROCEDURES?**

STE/ICE Test Procedures - Continued



## STE/ICE Test Procedures - Continued

## PRESSURE 0-4000 PSIG TEST 51.

### NOTE

**This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.**

1

Perform VTM GENERAL SET UP (page 2-42) and CONFIDENCE TEST NO. 66 (page 2-44).

2

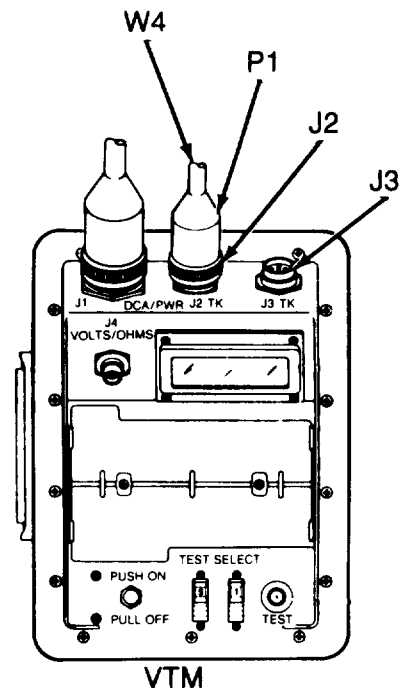
**Connect test cables and pressure transducer. Do OFFSET test.**

#### First Technician (Operator's Station)

- If engaged, disengage hydraulic clutch.
- Relieve hydraulic pressure (page 3-71).
- Connect P1 of transducer cable W4 to J2 or J3 on VTM.
- Connect P2 of transducer cable W4 adapter MS3119E14-19.
- Connect P1 of second transducer cable W4 to adapter MS3119E14-19.

#### Second Technician (Relief Valve Being Tested)

- Place suitable container under relief valve to be tested (see page 2-49 for locator views).
- Remove gage plug from relief valve.
- Install 0-10,000 PSIG transducer (12258956) in gage port.



VTM

TA251344

STEP 2 CONTINUED

STE/ICE Test Procedures - Continued

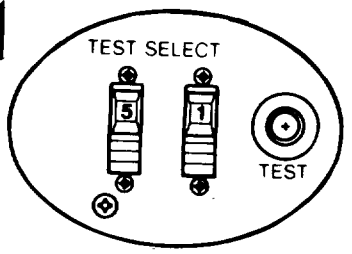
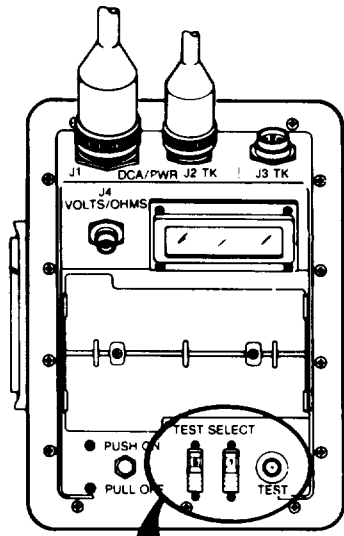
- Connect P2 of second transducer cable W4 to connector on transducer.

**NOTE**  
When performing the OFFSET test, make sure system to be tested, is not pressurized.

First Technician (Operator's Station)

- Dial TEST SELECT switches to 51.
- Press and hold TEST button until VTM display indicates **CAL**.
- Release TEST button.
- Check that OFFSET measurement on VTM display indicates between **-1500** to **+1500**.

Does VTM display indicate between **-1500** to **+1500** ?



3 Perform OFFSET FAULT ISOLATION (TM 9-4910-571-12 & P)

4 Perform pressure test.

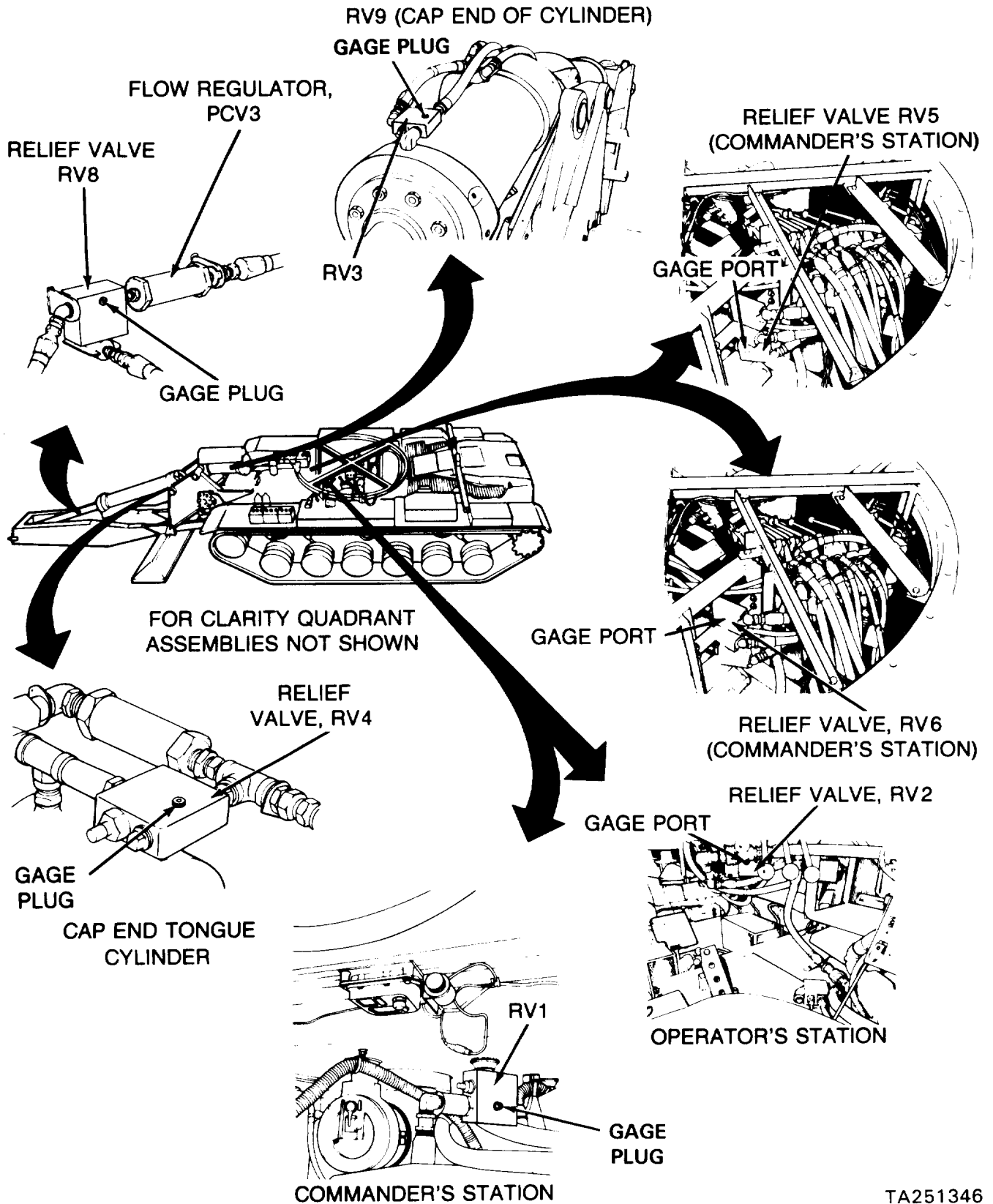
First Technician (Operator's Station)

- The next step to be performed depends on which relief valve is being tested.
- FOR RELIEF VALVE - GO TO STEP
 

• RV1	(5)
• RV2	(20)
• RV3	(8)
• RV4	(11)
• RV5	(14)
• RV6	(17)
• RV8	(23)
• RV9	(26)

STE/ICE Test Procedures - Continued

LOCATOR VIEWS:



TA251346

FROM STEP

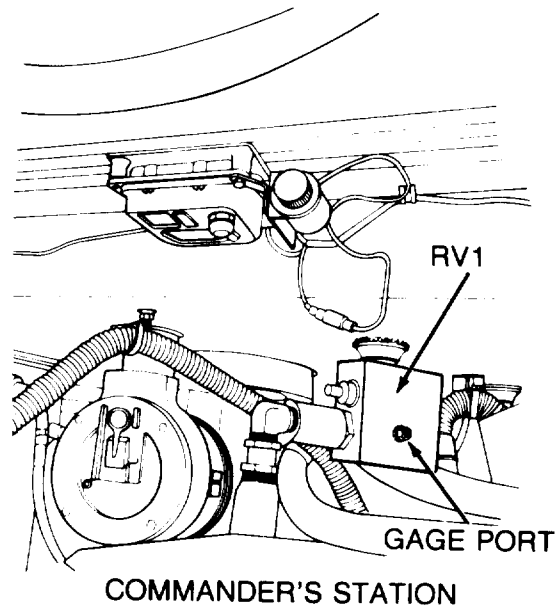
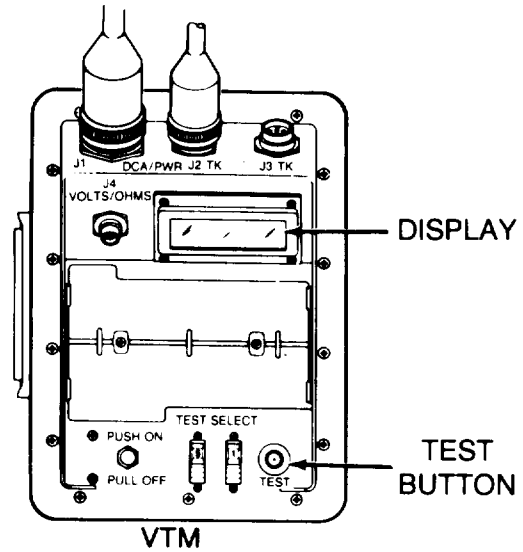
4

5 Check master relief valve RV1 for pressure setting of 3800 ± 50 psi.

First Technician (Operator's Station)

- Start engine.
- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Depress scissor cylinder control lever.
- Press and hold TEST BUTTON until readout displays "CAL", then release button.
- Release scissor cylinder control lever.
- Check if pressure indication on VTM display is between 3750 to 3850 psi.

Does VTM display indicate between 3750 to 3850 psi?



6

- Check relief valve RV9 for pressure setting of 3600 ± 50 psi.
- See Step 26 .

YES

NO

7

- Adjust master relief valve RV1 (page 3-76). Steps 8 through 14 .
- If relief valve setting cannot be brought to within tolerance, replace cartridge in relief valve (page 3-73).

TA251347



STE/ICE Test Procedures - Continued

FROM STEP

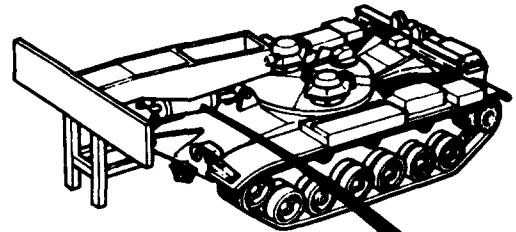
4

**8** Check relief valve RV3 for pressure setting of 3600 ± 50 psi.

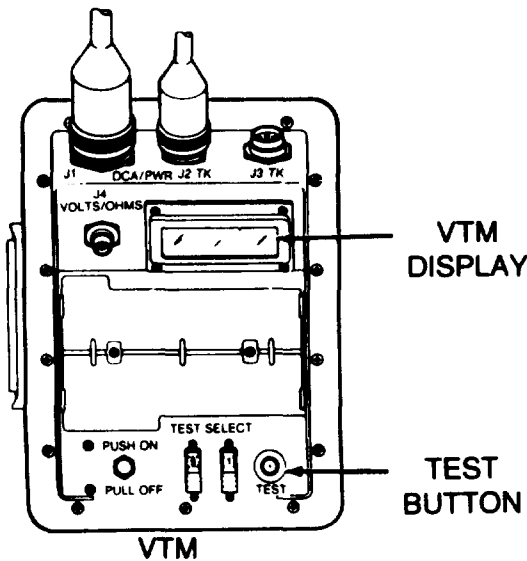
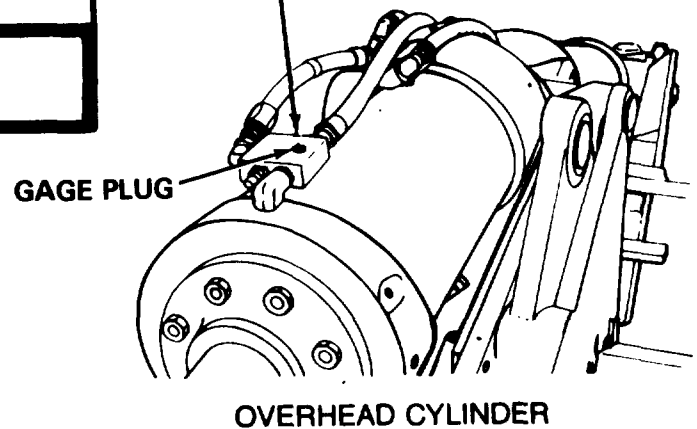
First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Depress overhead cylinder control lever.
- Press and hold TEST BUTTON until readout displays "CAL", then release button.
- Release overhead cylinder control lever.
- Check if pressure indication on VTM display is between 3550 to 3650 psi.

Does VTM display indicate between 3550 to 3650 psi?



RELIEF VALVE RV3



**9**

- System is operational.
- Perform launch and retrieve procedures (TM 5-5420-202-10).

YES

NO

**10**

- Adjust relief valve RV3 (page 3-81). Steps 8 through 15.
- If relief valve setting cannot be brought to within tolerance, replace cartridge in relief valve (page 3-80).

STE/ICE Test Procedures - Continued

FROM STEP

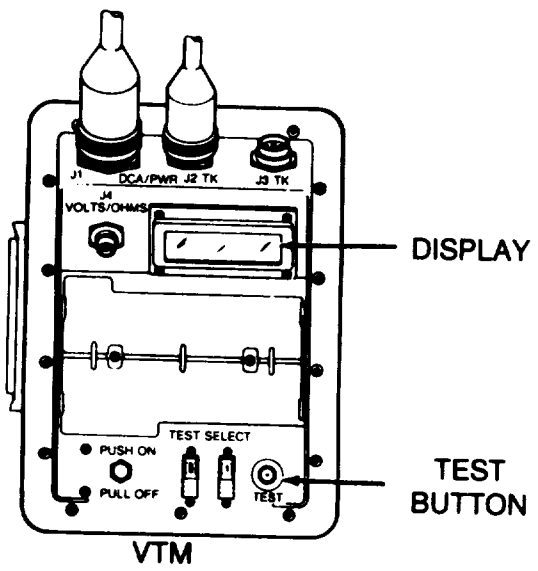
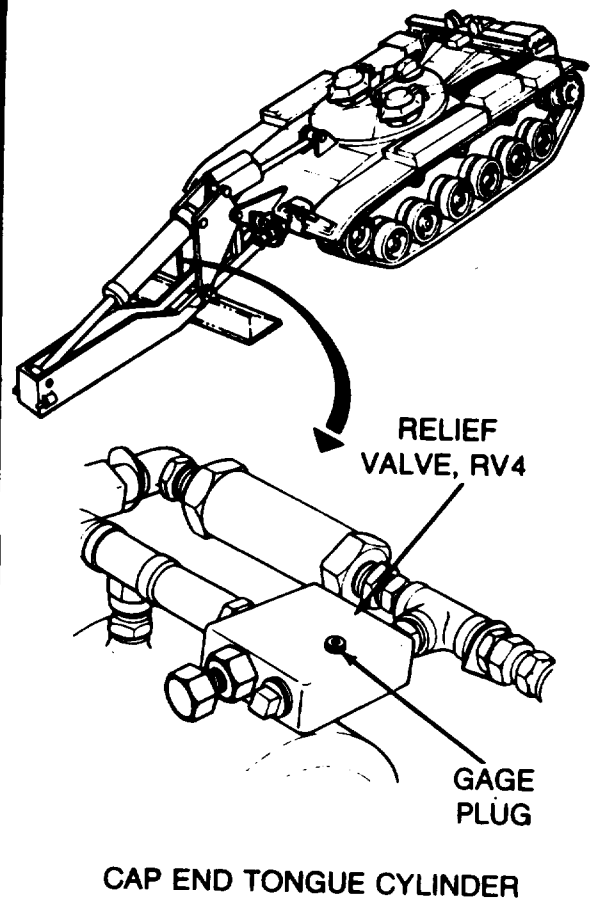
4

**11** Check relief valve RV4 for pressure setting of  $3600 \pm 50$  psi.

First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Press and hold TEST BUTTON until readout displays "CAL", then release button.
- Release tongue cylinder control lever.
- Check if pressure indication on VTM display is between **3550** to **3650** psi.

Does VTM display indicate between **3550** to **3650** psi?



**12**

- Remove transducer and install plug in gage port.
- Replace check valve CV4 (page 3-99).

YES

NO

**13**

- Adjust relief valve RV4 (page 3-84). Steps **8** through **15**.
- If relief valve setting cannot be brought to within tolerance, replace cartridge in relief valve (page 3-83).

STE/ICE Test Procedures - Continued

FROM STEP

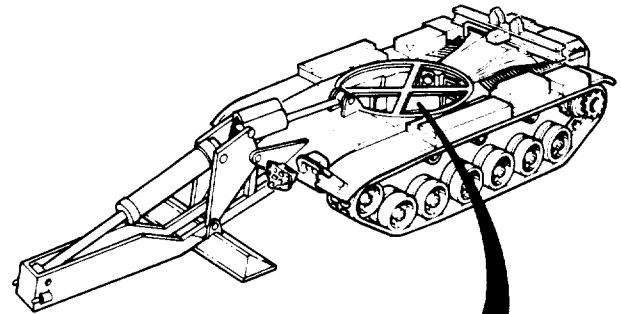
4

**14** Check relief valve RV5 for pressure setting of  $700 \pm 50$  psi.

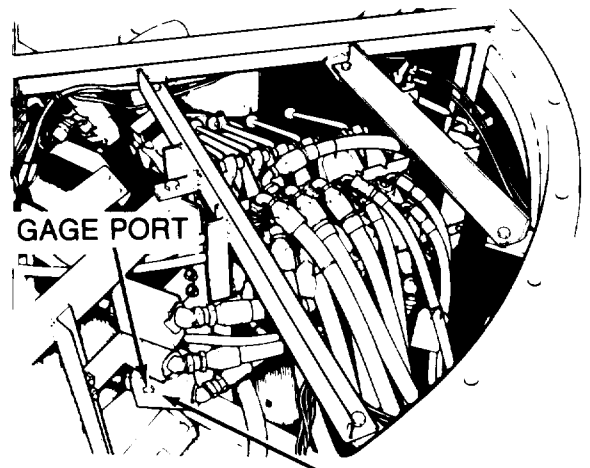
First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Raise tongue cylinder control lever.
- Press and hold TEST BUTTON until readout displays "CAL", then release button.
- Release tongue cylinder lever.
- Check if pressure indication on VTM display is between **650** to **750** psi.

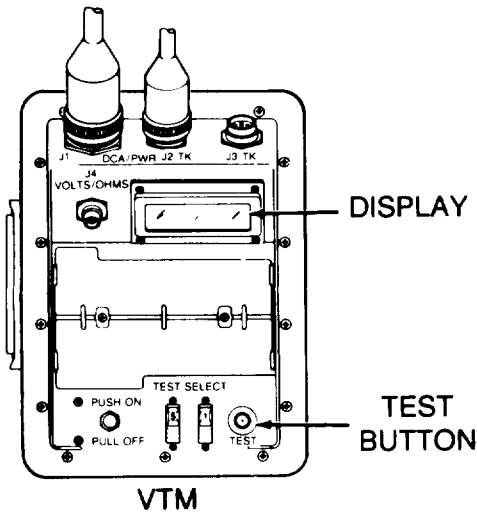
Does VTM display indicate between **650** to **750** psi?



QUADRANTS REMOVED FOR CLARITY



RELIEF VALVE RV5 (COMMANDER'S STATION)



**15** See DETAILED TROUBLESHOOTING PROCEDURES, Symptom-2 Step **3**.

YES

NO

**16**

- Adjust relief valve RV5 (page 3-86). Steps **8** through **14**.
- If relief valve setting cannot be brought to within tolerance, replace cartridge in relief valve (page 3-85).

TA251350

FROM STEP

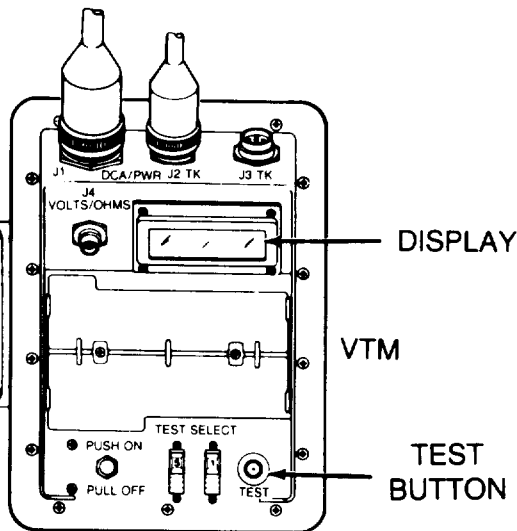
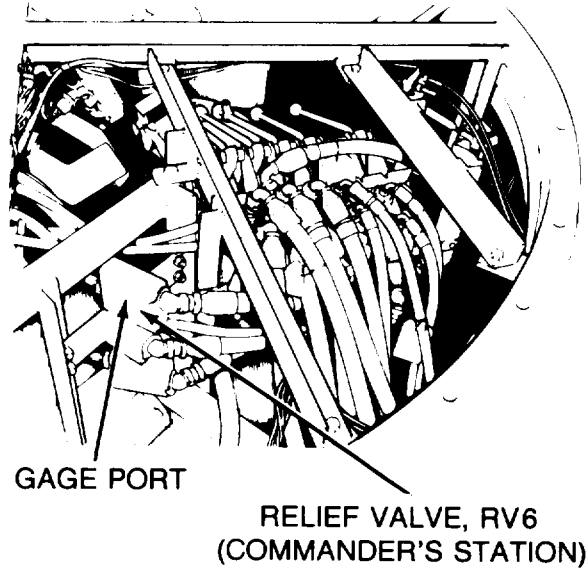
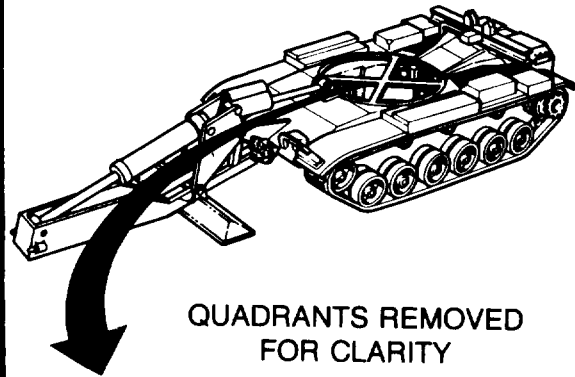
4

**17** Check relief valve RV6 for pressure setting of 500 ± 50 psi.

First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Depress locking cylinder control lever.
- Press and hold test button until readout displays "CAL", then release button.
- Release locking cylinder control lever.
- Check if pressure indication on VTM display is between **450** to **550** psi.

Does VTM display indicate between **450** to **550** psi?



**18** Check relief valve RV2 for pressure setting of 3200 ± 50 psi.  
See Step **20**.

YES

NO

**19**

- Adjust relief valve RV6 (page 3-87), Steps **8** through **14**.
- If relief valve setting cannot be brought to within tolerance, replace cartridge in relief valve (page 3-85).

STE/ICE Test Procedures - Continued

FROM STEP

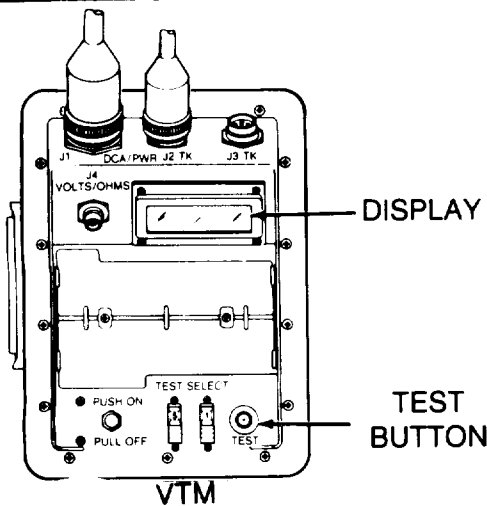
4 OR 18

**20** Check relief valve, RV2 for pressure setting of  $3200 \pm 50$  psi.

First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Raise and hold ejection cylinder and locking cylinder control levers.
- Press and hold TEST BUTTON until READOUT display "CAL", then release button.
- Release ejection cylinder and locking cylinder control levers.
- Check if pressure indication on VTM display is between 3150 to 3250 psi.

Does VTM display indicate between 3150 to 3250 psi?



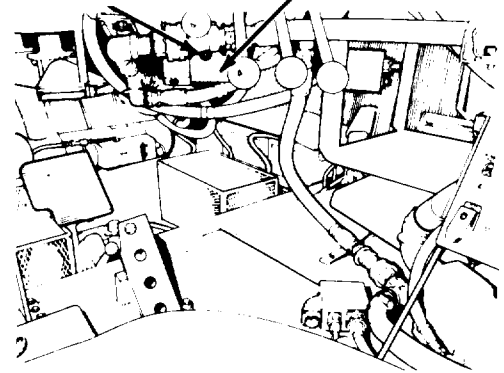
**21** Replace check valve, CV8 (page 3-118).

YES

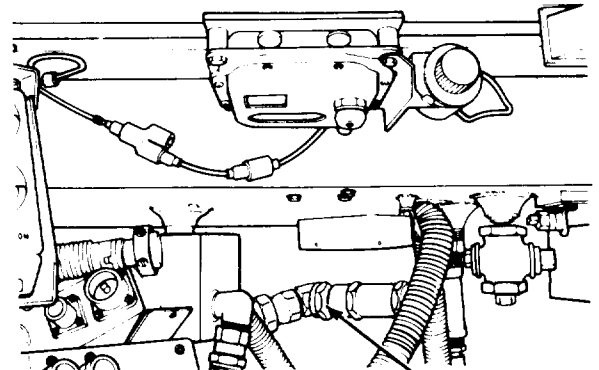
NO

- 22**
- Adjust relief valve RV2 (page 3-79), Steps 8 through 14.
  - If relief valve setting cannot be brought to within tolerance, replace valve bank assembly (page 4-53).

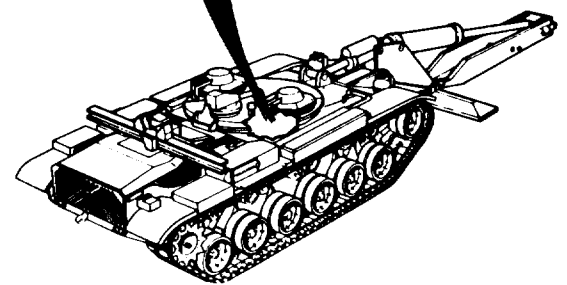
RELIEF VALVE, RV2  
GAGE PORT



OPERATOR'S STATION



CHECK VALVE CV8



FROM STEP

STE/ICE Test Procedures - Continued

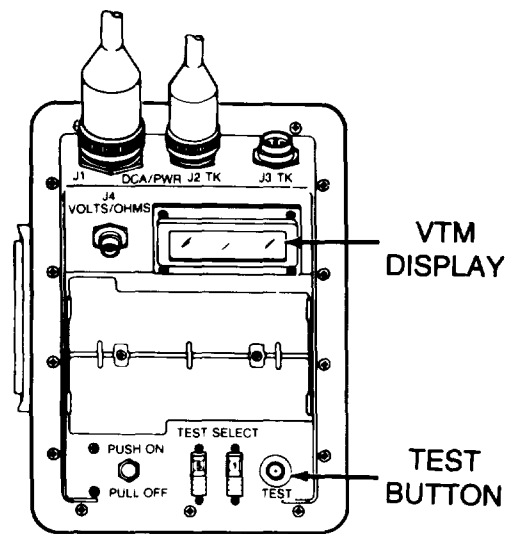
4

**23** Check relief valve, RV8 for pressure setting of 3400 ± 50 psi.

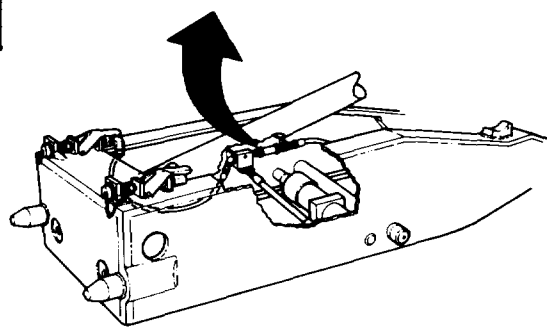
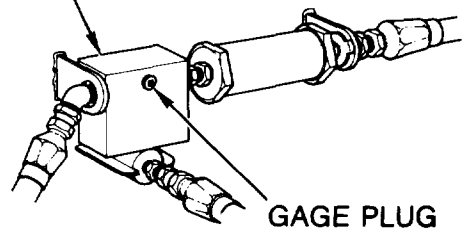
First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- If performing DETAILED TROUBLESHOOTING PROCEDURE Symptom-3, raise scissor cylinder control lever.
- If performing DETAILED TROUBLESHOOTING PROCEDURE Symptom-6, depress scissor cylinder control lever.
- Press and hold test button until readout displays "CAL", then release button.
- Release scissor cylinder control lever.
- Check if pressure indication on VTM display is between **3350** to **3450** psi.

**Does VTM display indicate between 3350 to 3450 psi?**



RELIEF VALVE, RV8



**24**

- If performing DETAILED TROUBLESHOOTING PROCEDURE Symptom-3, replace flow regulator PCV3 (page 3-106).
- If performing DETAILED TROUBLESHOOTING PROCEDURE Symptom-6, replace check valve CV7 (page 3-116).

YES NO

**25**

- Adjust relief valve RV8 (page 3-89), Steps 8 through 14
- If relief valve setting cannot be brought to within tolerance, replace cartridge in relief valve (page 3-88).

TA251353

## STE/ICE Test Procedures - Continued

FROM STEP

4 OR 6

26

**Check relief valve RV9 for pressure setting of  $3800 \pm 50$  psi.**

**First Technician (Operator's Station)**

- Disengage hydraulic clutch.
- Cycle bridge launching control levers.
- Stop engine.
- Remove transducer from inlet section of valve bank and install gage plug.

**Both Technicians (Outside Vehicle)**

- Have bridge removed from launcher (TM 5-5420-203-14).
- Remove overhead cylinder armor (page 3-223).

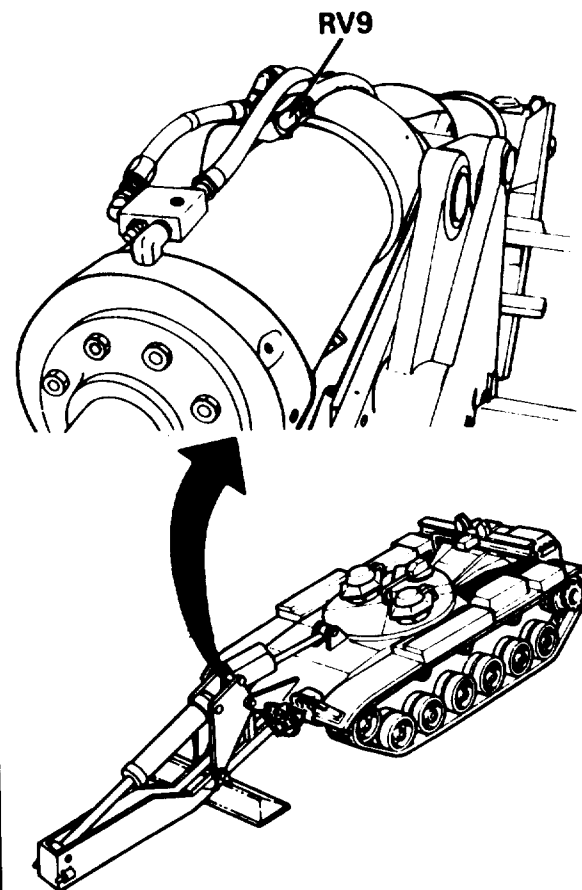
**Second Technician (Overhead Cylinder)**

- Place suitable fluid container under relief valve RV9.
- Remove gage plug from RV9 and install transducer.

**First Technician (Operator's Station)**

- Start engine.
- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Raise overhead cylinder control lever.

RV9 (CAP END OF CYLINDER)



STEP 26 CONTINUED

STE/ICE Test Procedures - Continued



First Technician (Operator's Station)

- Press and hold TEST BUTTON until readout displays "CAL", then release button.
- Release overhead cylinder control lever.
- Check if pressure indication on VTM display is between 3550 to 3650 psi.

Does VTM display indicate between 3550 to 3650 psi?

27 Return to DETAILED TROUBLESHOOTING PROCEDURES, Symptom-1, Step 13

YES

NO

28

- Adjust relief valve RV9 (page 3-82), Steps 8 through 15
- If relief valve setting cannot be brought to within tolerance, replace cartridges in relief valve RV9 (page 3-80).



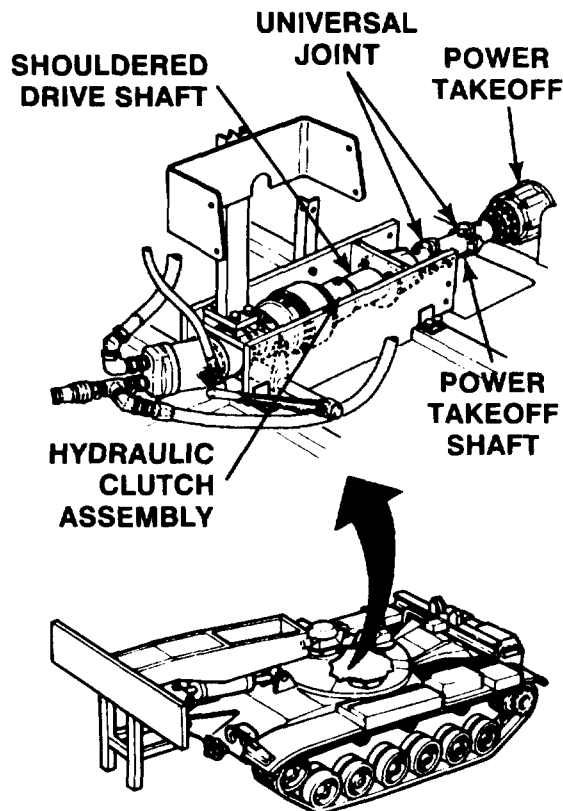
### DETAILED TROUBLESHOOTING PROCEDURE LAUNCHER OPERATION - HYDRAULICS

**Symptom-1**

**BRIDGE DOES NOT LIFT OFF BRIDGE SEAT.**

**NOTE**

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



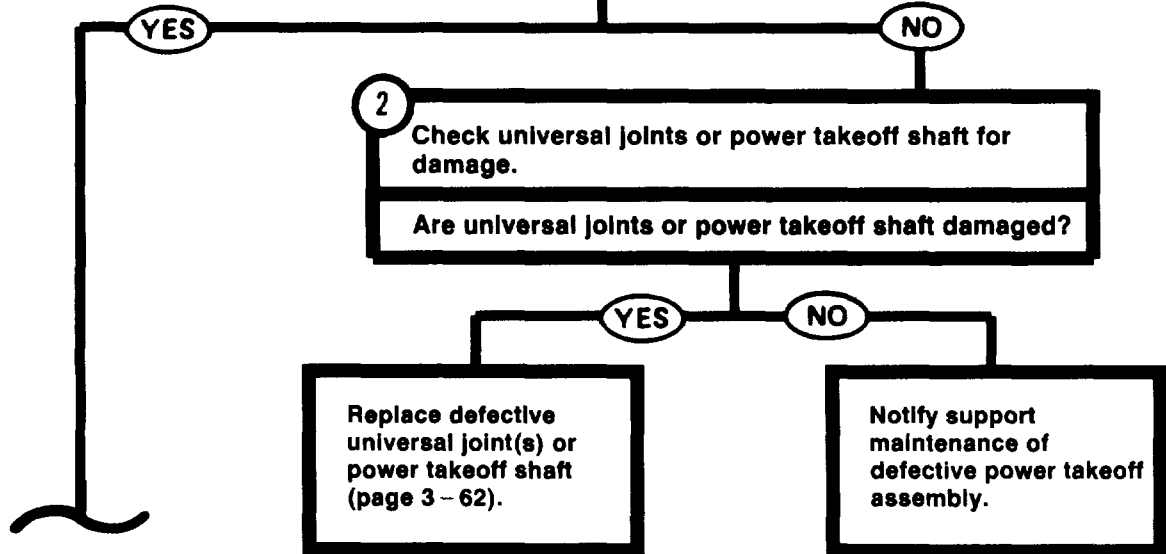
1

**Check shouldered drive shaft for rotation at hydraulic clutch assembly.**

Second Technician (Operator's Station)

- Disengage hydraulic clutch.
- Remove pump clutch cover plate (page 3 - 65).
- Start engine.
- Visually check shouldered drive shaft for rotation at hydraulic clutch assembly.

**Is shouldered drive shaft rotating at hydraulic clutch assembly?**



Symptom-1

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

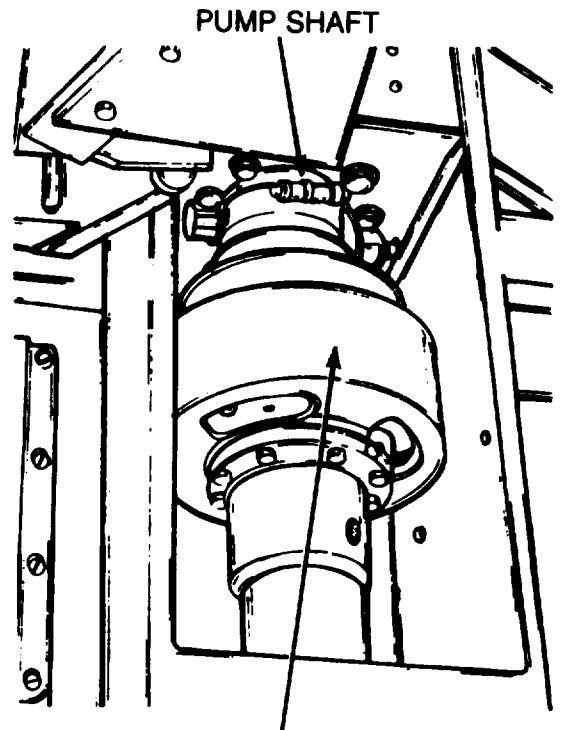
3

**Check clutch assembly for slippage.**

Second Technician (Inside Vehicle)

- Start engine.
- Engage and disengage hydraulic clutch lever several times. Clutch lever should have a distinct snap while being engaged.
- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Listen for hydraulic pump to start.
- Observe pump shaft turning.

**Does hydraulic clutch slip?**



**HYDRAULIC CLUTCH ASSEMBLY**

4

**Adjust clutch assembly (page 3-66).**

YES

NO

Symptom-1

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

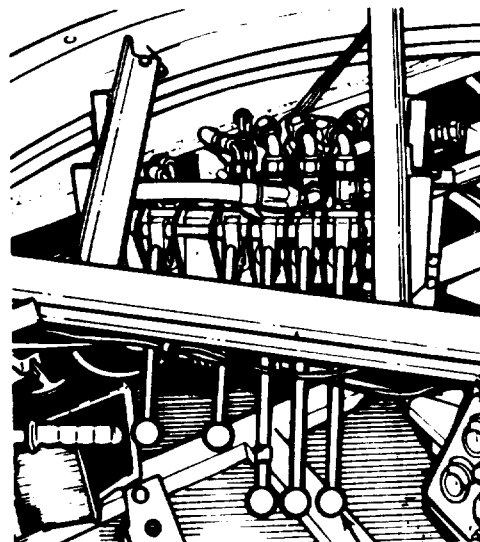
**5** Check hydraulic cylinder control levers on valve bank for broken or missing parts.

Second Technician (Operator's Station)

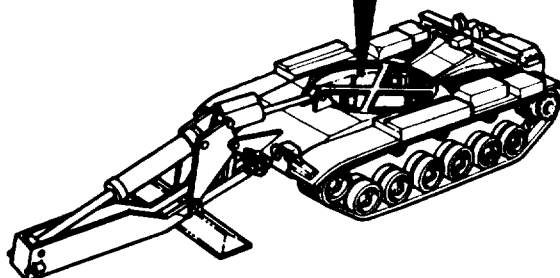
- Disengage hydraulic clutch.
- Stop engine.
- Cycle bridge launching control levers.
- Inspect control levers of valve bank for broken or missing parts.

Are any parts broken, missing, or leaking?

QUADRANTS REMOVED FOR CLARITY



LAUNCHER CONTROL LEVERS



**6** Replace defective or missing parts of control levers on valve bank (page 3-123).

NO YES

Symptom-1

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

7

**Check master relief valve RV1 for pressure setting of 3800 ± 50 psi.**

Second Technician (Operator's Station)

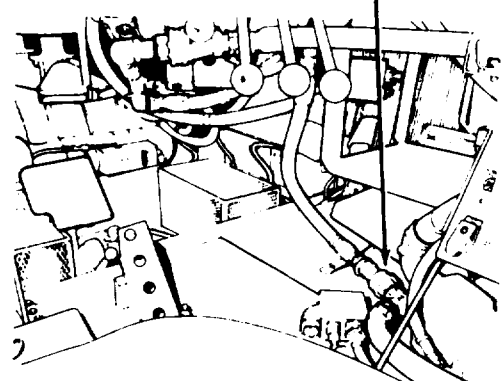
- Disconnect valve bank inlet hose at quick disconnect.
- Place suitable container under master relief valve RV1.
- If STE/ICE is available, proceed to Test No. 51 (page 2-47) to test master relief valve RV1.
- If STE/ICE is not available, remove gage plug from master relief valve RV1 and connect pressure gage.
- Start engine.
- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Check if pressure gage or STE/ICE indicates 3800 ± 50 psi.

**Is pressure 3800 ± 50 psi?**

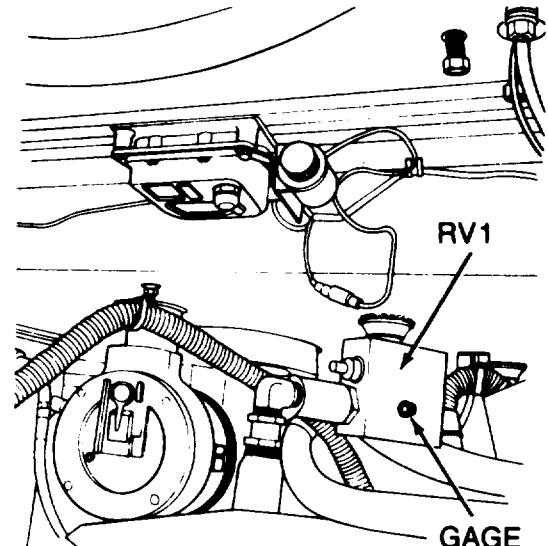
YES

NO

INLET HOSE  
QUICK DISCONNECT



OPERATOR'S STATION



RV1

GAGE  
PLUG

8

- Adjust master relief valve RV1 (page 3 - 76), steps 8 through 14.
- If relief valve setting cannot be brought to within tolerance, replace cartridge in relief valve (page 3 - 73).
- If relief valve setting still cannot be brought within tolerance, notify support maintenance of faulty hydraulic pump.

## Symptom-1

## DETAILED TROUBLESHOOTING PROCEDURE LAUNCHER OPERATION - HYDRAULICS (Continued)

9

**Check relief valve RV9 for pressure setting of  $3600 \pm 50$  psi.**

### Second Technician (Operator's Station)

- Disengage hydraulic clutch.
- Connect valve bank inlet hose.
- Stop engine.
- Remove pressure gage or STE/ICE from inlet section of valve bank and install gage plug.

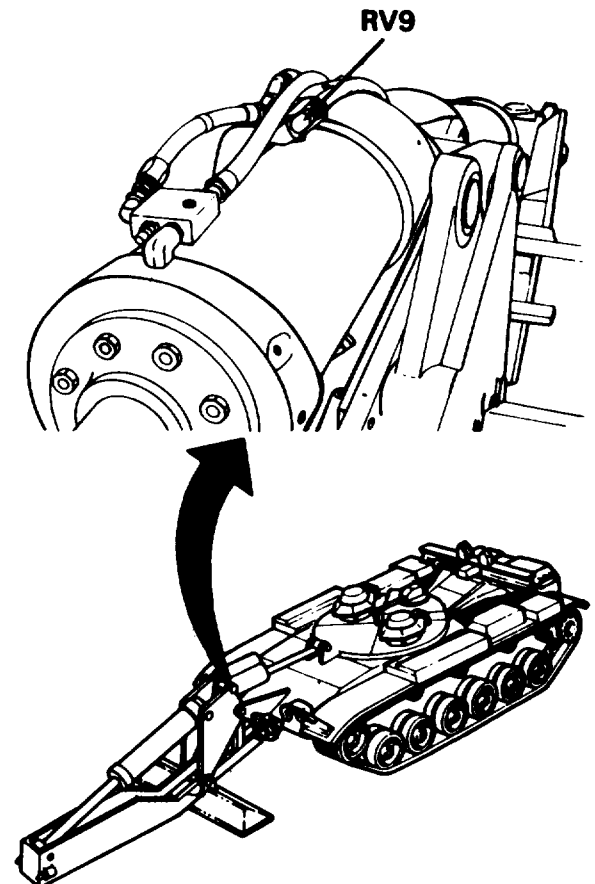
### Both Technicians (Outside Vehicle)

- Have bridge removed from launcher.  
(TM 5 - 5420 - 203 - 14)

### Second Technician (Operator's Station)

- Start engine.
- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Raise tongue cylinder control lever until tongue cylinder is fully extended
- Disengage hydraulic clutch.
- Stop engine.
- Depress overhead cylinder control lever and allow tongue to lower slowly to ground.

RV9 (CAP END OF CYLINDER)



Symptom-1

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

STEP 9 CONTINUED

**Both Technicians (Overhead Cylinder)**

- Remove overhead cylinder armor (page 3-223).

**First Technician (Overhead Cylinder)**

- Place suitable fluid container under relief valve RV9.
- If STE/ICE is available, proceed to Test No. 51 (page 2-47) to test relief valve RV-9.
- If STE/ICE is not available, remove gage plug from RV-9 and install pressure gage.

**Second Technician (Operator's Station)**

- Start engine.
- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Raise overhead cylinder control lever for five minutes.

**First Technician (Overhead Cylinder)**

- Check if pressure gage indicates  $3600 \pm 50$  psi.

**Is pressure  $3600 \pm 50$  psi?**

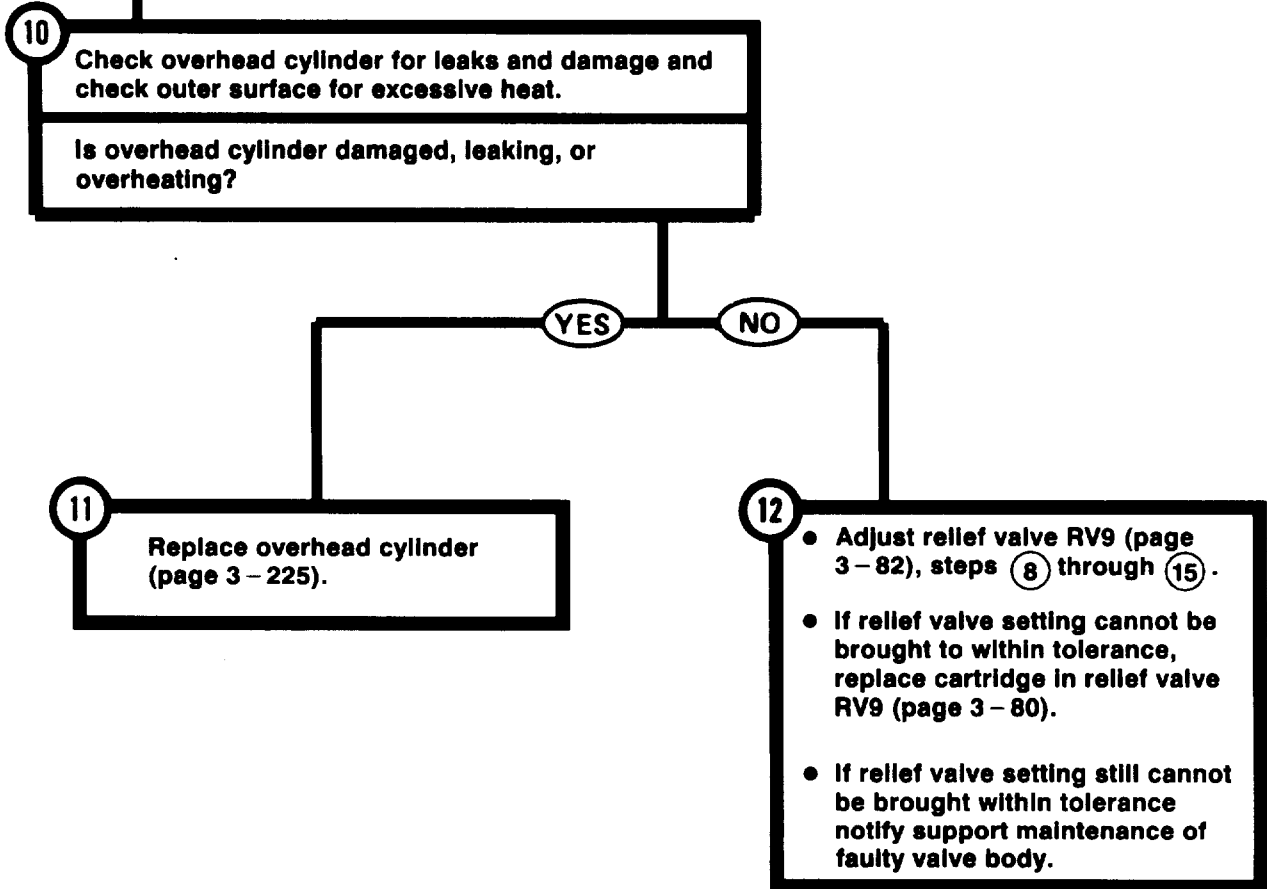
NO

YES

Go to step 13.

Symptom-1

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**



Symptom-1  
FROM STEP

9

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

**13** Check that hold down cylinder does release.

Second Technician (Operator's Station)

- Disengage hydraulic clutch.
- Cycle bridge launching control levers.

First Technician (Overhead Cylinder)

- Remove pressure gage or STE/ICE from relief valve RV9 and install gage plug.

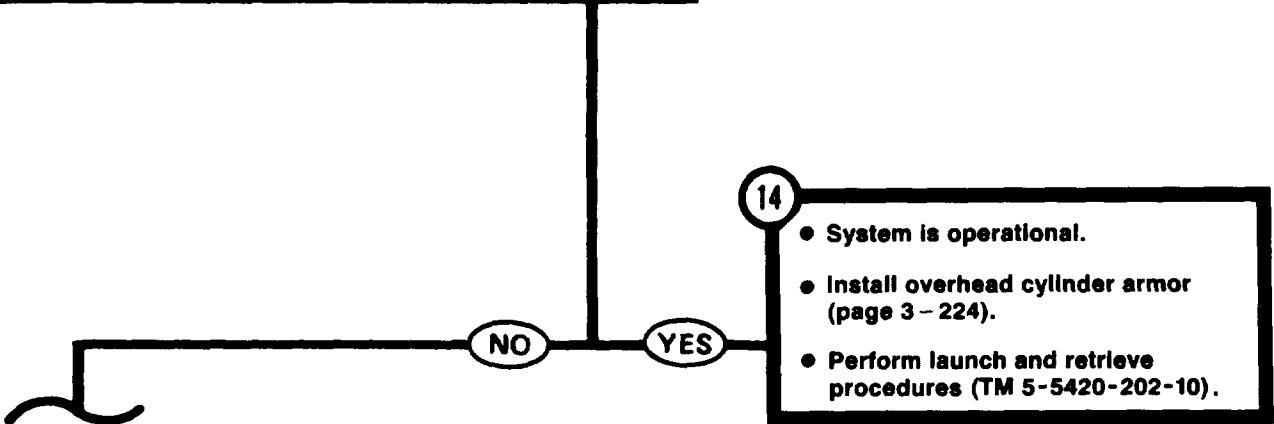
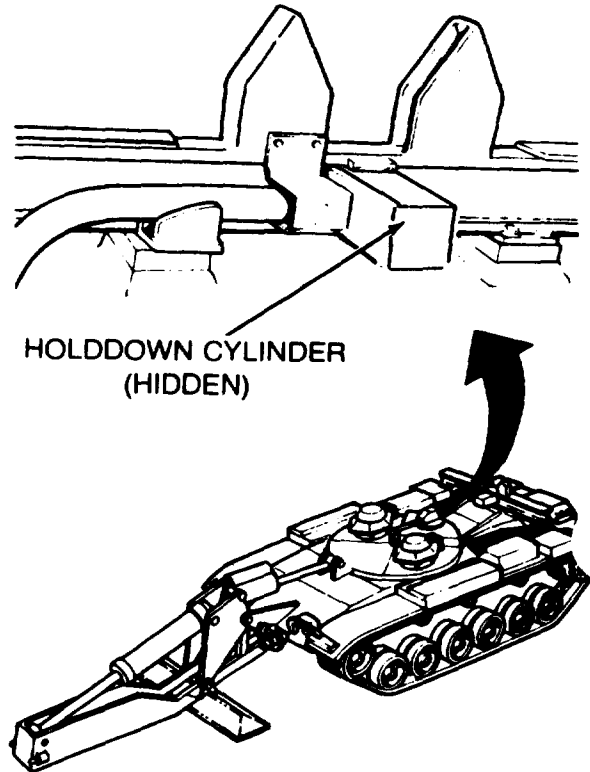
Second Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Raise overhead cylinder control lever momentarily.

First Technician (Top Deck)

- Visually check that holddown cylinder does release.

**Does holddown cylinder release?**



**14**

- System is operational.
- Install overhead cylinder armor (page 3 - 224).
- Perform launch and retrieve procedures (TM 5-5420-202-10).



Symptom-1

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

**15** Check holddown cylinder hydraulic lines and fittings for leaks or damage.

Second Technician (Operator's Station)

- Disengage hydraulic clutch.

First Technician (Top Deck)

- Remove holddown cylinder armor (page 3-253).

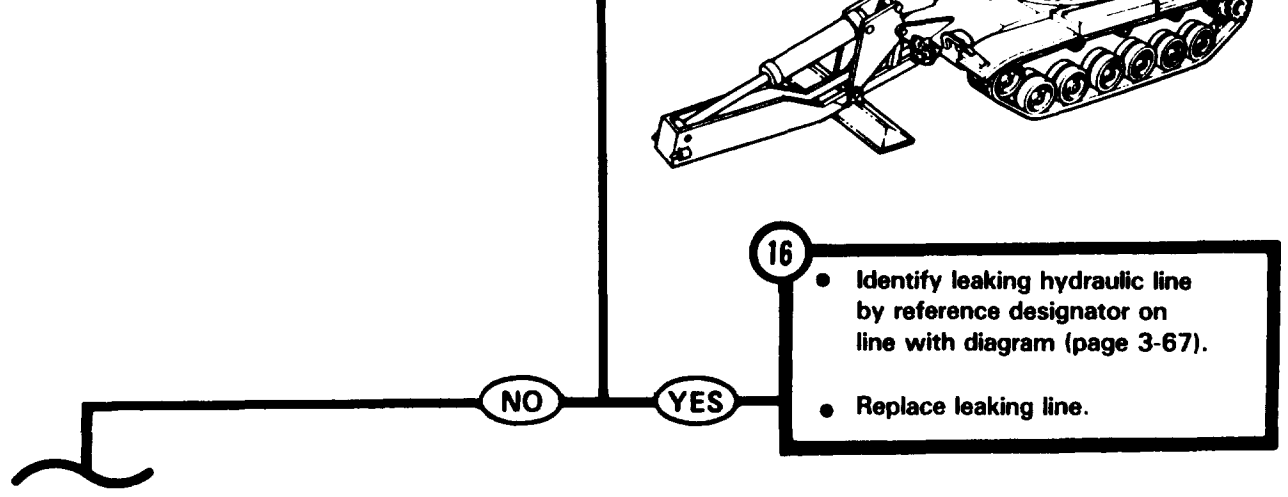
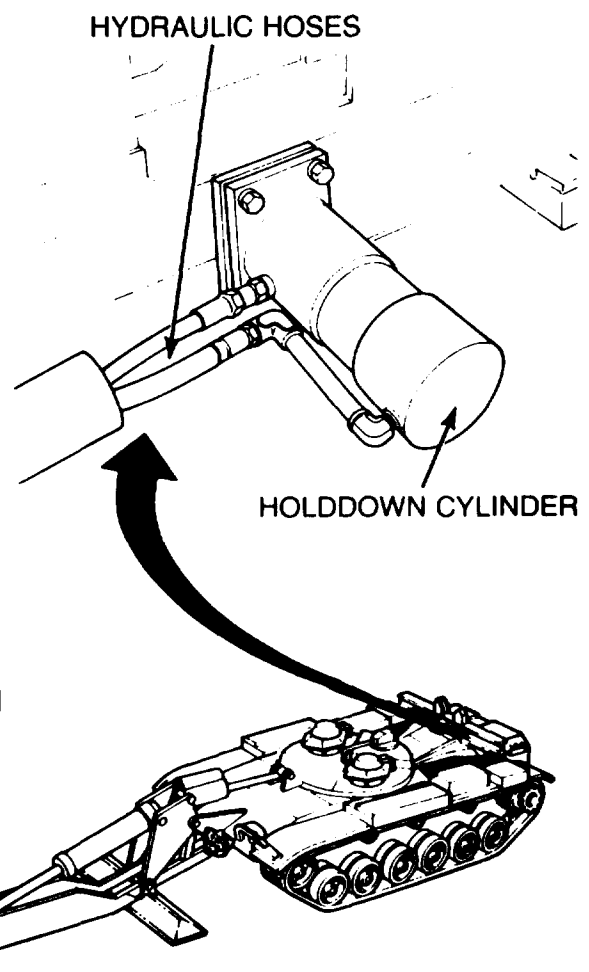
Second Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Momentarily raise overhead cylinder control lever.

First Technician (Top Deck)

- Visually check holddown cylinder hydraulic lines for leaks or damage.

**Are hydraulic lines leaking or damaged?**



Symptom-1

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

**17** Check overhead cylinder for leaks or damage.

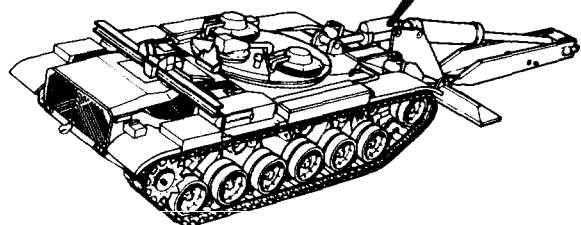
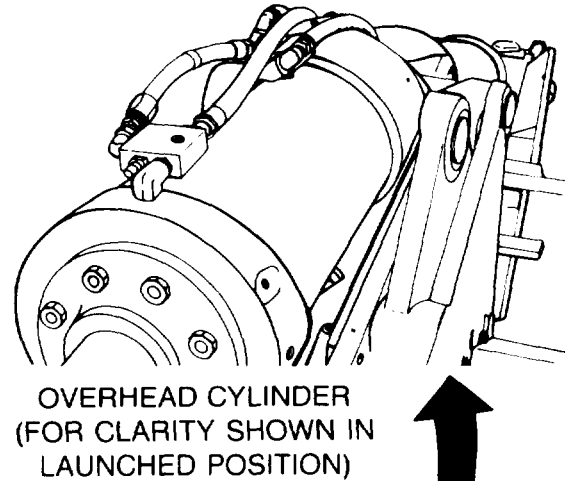
Second Technician (Operator's Station)

- Cycle overhead cylinder control lever.

First Technician (Top Deck)

- Visually check overhead cylinder for leaks or damage.

**Is overhead cylinder leaking or damaged?**



**18** Replace leaking or damaged overhead cylinder (page 3-225).

YES

**19**

- Notify support maintenance.
- Install overhead cylinder armor (page 3-224).

NO



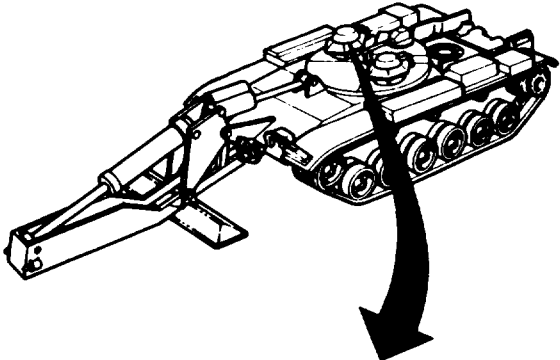
**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

Symptom-2

**BRIDGE DOES NOT LOWER SMOOTHLY FROM VERTICAL POSITION**

**NOTE**

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



**1** Check relief valve RV5 for pressure setting of  $700 \pm 50$  psi.

First Technician (Operator's Station)

- Disengage hydraulic clutch.
- Cycle bridge launching control levers.

Second Technician (Commander's Station)

- Place one gallon container under relief valve RV5.
- If STE/ICE is available, proceed to Test No. 51 (page 2-47) to test master relief valve RV5.
- If STE/ICE is not available, remove gage plug from relief valve RV5 gage port and install pressure gage.

First Technician (Operator's Station)

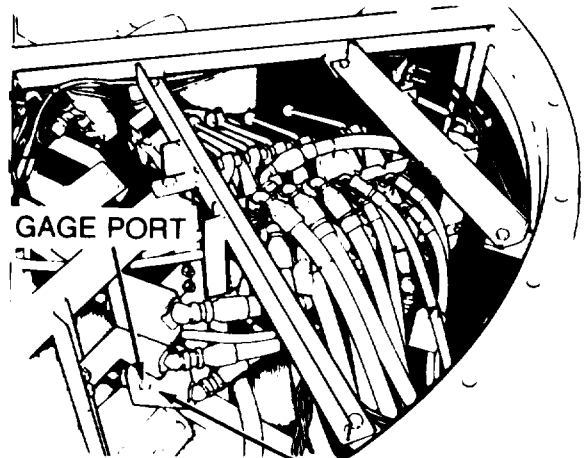
- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Raise tongue cylinder control lever.

Second Technician (Commander's Station)

- Check if pressure gage or STE/ICE indicates  $700 \pm 50$  psi.

**Is pressure  $700 \pm 50$  psi?**

QUADRANTS REMOVED FOR CLARITY



RELIEF VALVE RV5  
(COMMANDER'S STATION)

**2**

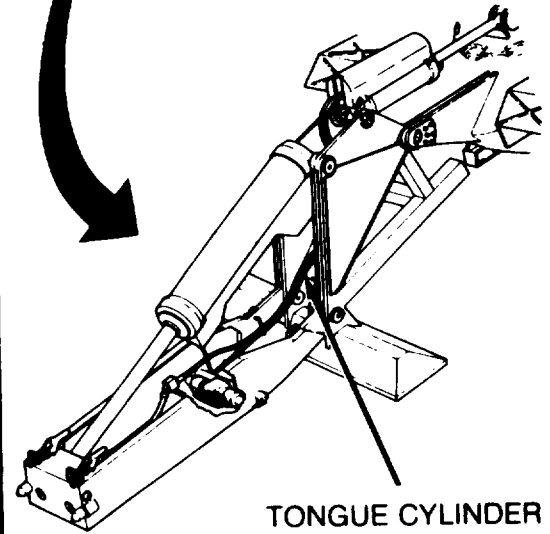
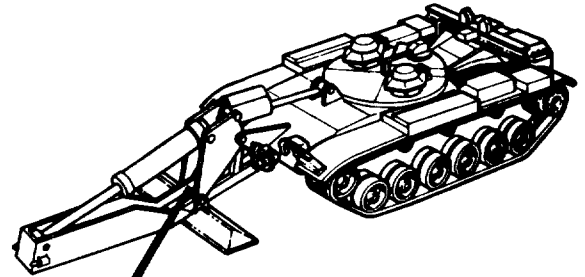
- Adjust relief valve RV5 (page 3-86), steps **8** through **14**.
- If relief valve setting cannot be brought to within tolerance, replace cartridge in relief valve (page 3-85).

YES

NO

Symptom-2

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**



TONGUE CYLINDER  
HYDRAULIC LINES

**3** Check tongue cylinder hydraulic lines and fittings for leaks or damage.

First Technician (Operator's Station)

- Disengage hydraulic clutch.
- Cycle bridge launching control levers.

Second Technician (Commander's Station)

- Remove pressure gage or STE/ICE from gage port and install gage plug.

First Technician (Operator's Station)

- Launch the bridge (TM 5-5420-202-10).
- Disengage hydraulic clutch.

Both Technicians (Launcher Tongue)

- Remove tongue cylinder armor (page 3-232).

First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Raise tongue cylinder control lever.

Second Technician (Launcher Tongue)

- Visually check hydraulic lines and fittings for leaks, crimping or other damage.

**Are hydraulic lines or fittings leaking or damaged?**

NO YES

**4**

- Identify leaking hydraulic line by reference on line with diagram (page 3-67).
- Replace leaking line.

TA251369

Symptom-2

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

TONGUE CYLINDER

5

**Check tongue cylinder for leaks, damage, or excessive heat.**

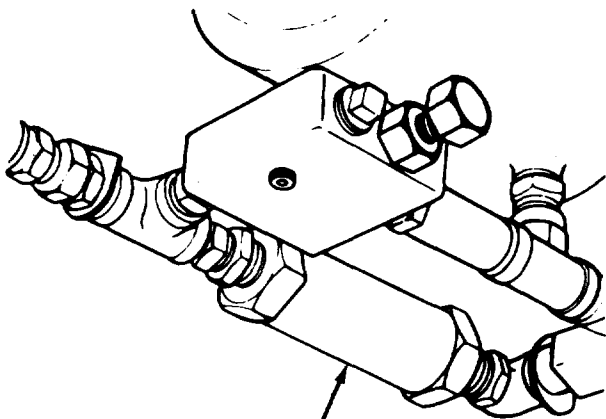
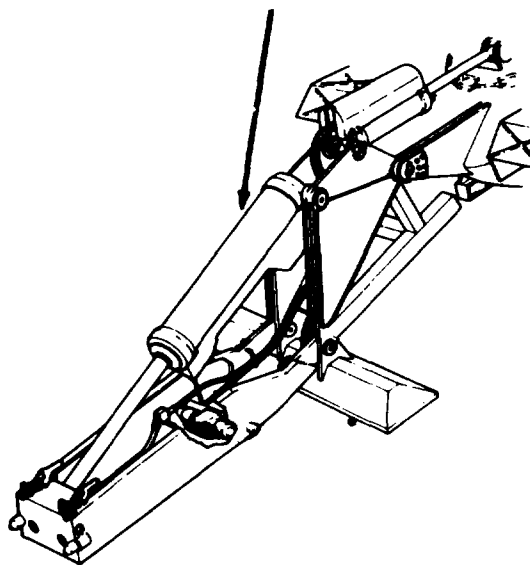
First Technician (Operator's Station)

- Raise tongue cylinder control lever for five minutes.

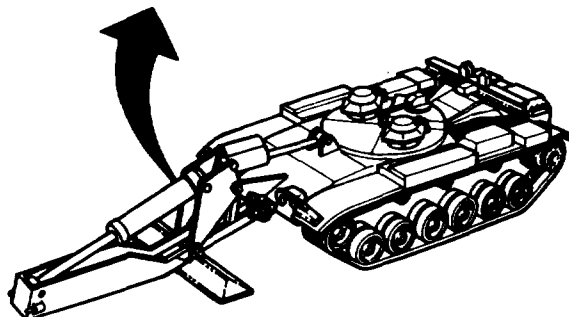
Second Technician (Launcher Tongue)

- Visually check tongue cylinder for leaks, or damage. Check outer surface for overheating.

**Is tongue cylinder leaking, damaged, or overheating?**



FLOW REGULATOR PCV2



6

**Replace tongue cylinder (page 3-234).**

YES

7

**Replace flow regulator PCV2  
(page 3-114).**

NO

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

Symptom-3

**BRIDGE DOES NOT SCISSOR OPEN OR DOES NOT OPEN SMOOTHLY**

**NOTE**  
This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

**1**  
**Check bridge quick disconnects for proper operation.**

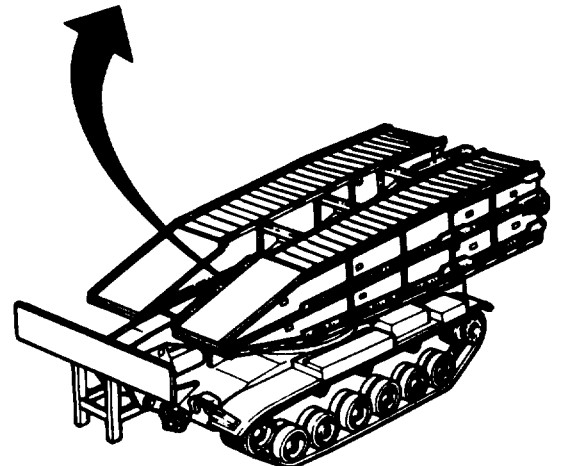
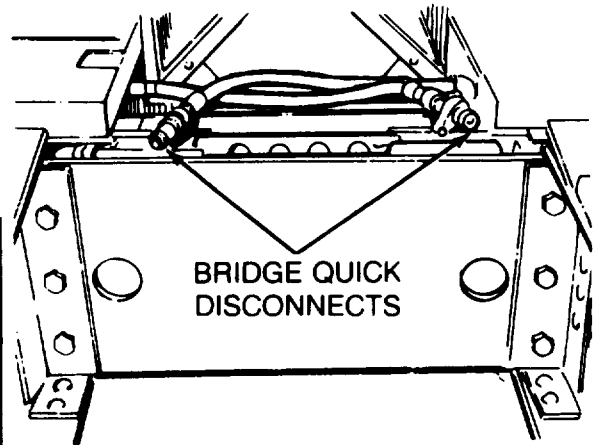
First Technician (Operator's Station)

- Return bridge to bridge seat (TM 5-5420-202-10).
- Disengage hydraulic clutch.
- Cycle bridge launching control levers.

Second Technician (Bridge)

- Check quick disconnects between bridge and launcher are connected and secure.

**Do quick disconnects operate properly?**



**2**  
**Replace quick disconnects (TM5-5420-203-14).**

NO

YES

Symptom-3

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

**3** Check scissoring cylinder bleed valves for proper operation.

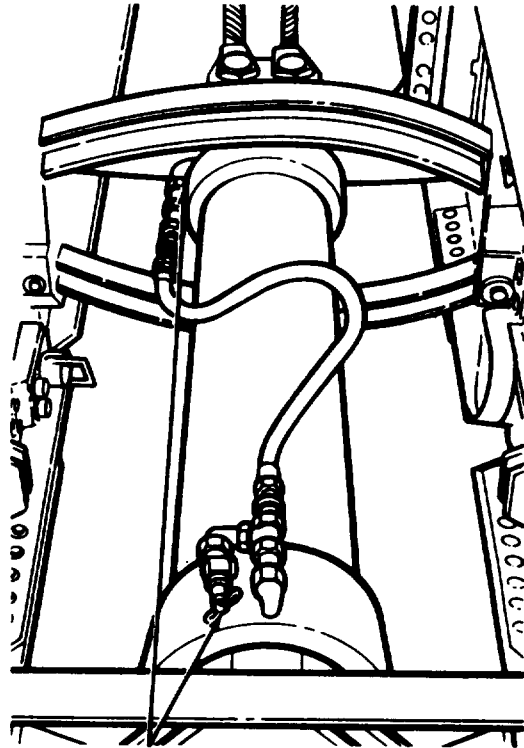
First Technician (Operator's Station)

- Cycle bridge launching control levers.

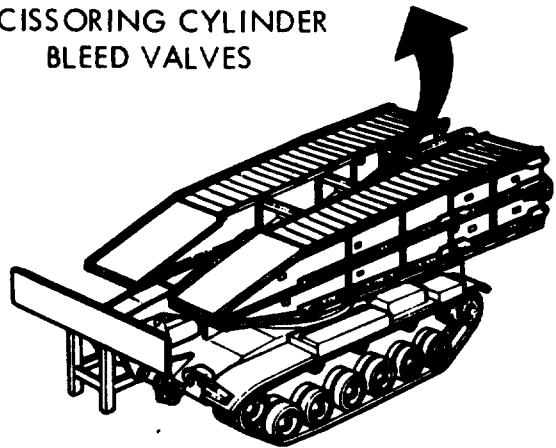
Second Technician (Bridge)

- Open and close both bleed valves (allow air to bleed out).
- Be sure both bleed valves are closed.

**Do both bleed valves operate properly?**



SCISSORING CYLINDER BLEED VALVES



**4** Replace defective bleed valves (TM5-5420-203-14).





Symptom-3

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

**5** Check bridge piping, hydraulic lines and fittings for leaks or damage.

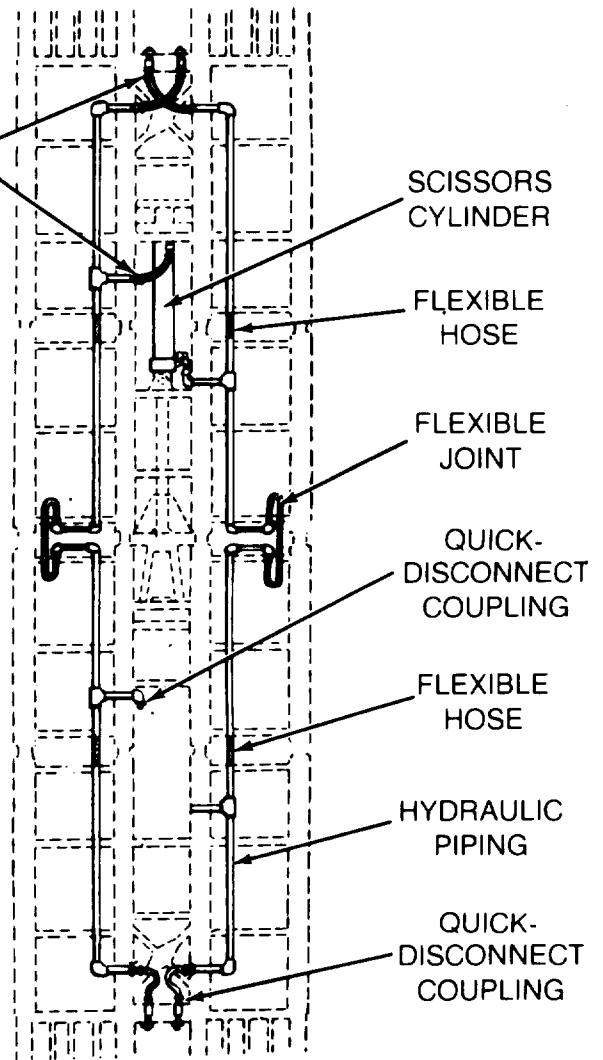
First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Cycle scissor cylinder control lever into retrieve and launch positions.

Second Technician (Bridge)

- Visually check bridge piping, hydraulic lines and fittings for leaks, crimping or other damage.

**Is bridge piping or hydraulic lines and fittings leaking or damaged?**



BRIDGE HYDRAULIC SYSTEM

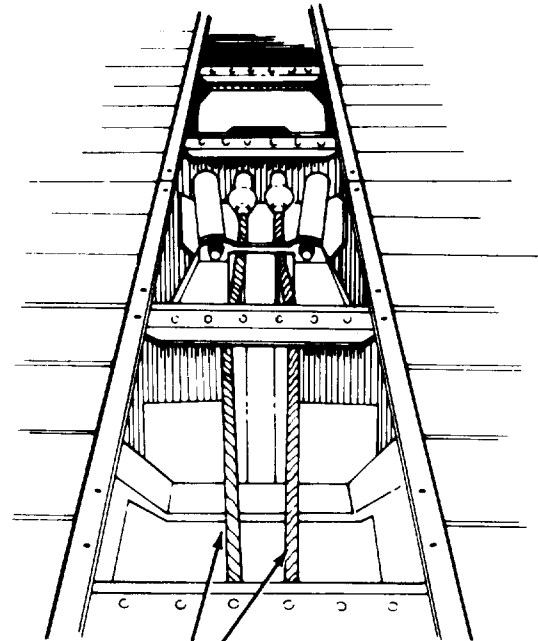
**6** Replace defective hydraulic lines or fittings (TM5-5420-203-14).

NO YES

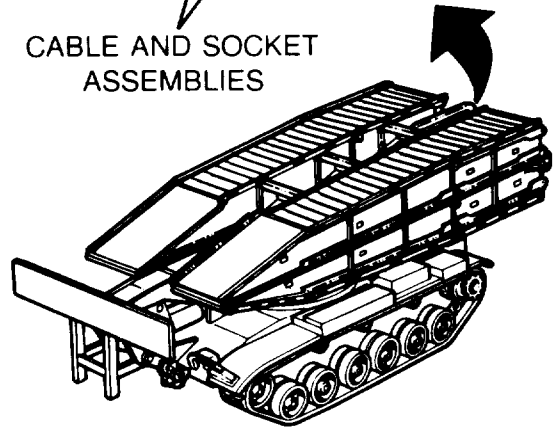
Symptom-3

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

QUADRANT ASSEMBLY



CABLE AND SOCKET ASSEMBLIES



7 Check quadrant and cable assemblies for proper operation.

Second Technician (Bridge)

- Visually check quadrant for loose or broken struts, misalignment or other damage.
- Visually check scissoring cable assembly for broken, loose or frayed condition.

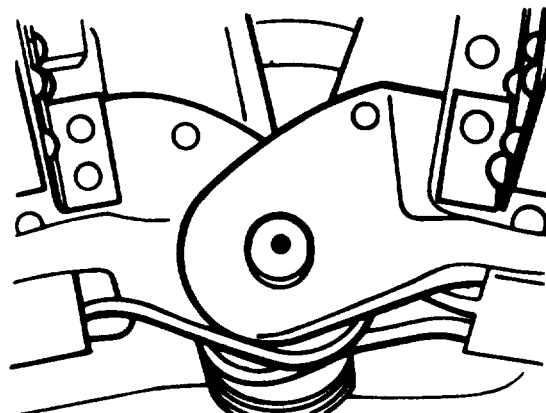
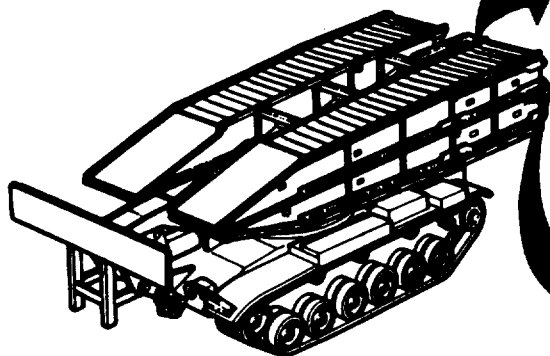
Is quadrant or scissoring cables damaged?

8 Replace scissoring cables and quadrant assembly (TM5-5420-203-14).

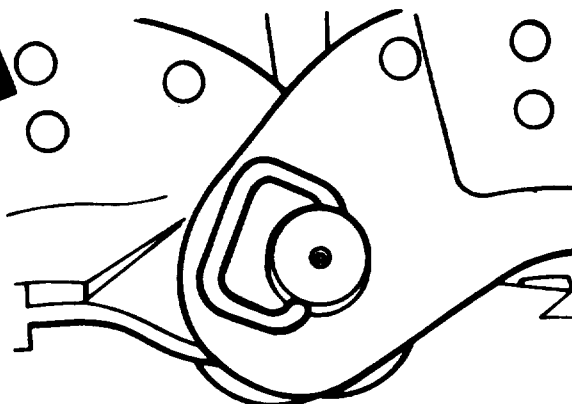
NO YES

Symptom-3

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**



INSIDE CENTER PIN



OUTSIDE CENTER PIN

**9**

**Check center section hinge pins for damage.**

Second Technician (Bridge)

- Visually check inside and outside center section hinge pins for broken or damaged condition.

**Are center section hinge pins broken or damaged?**

**10**

**Replace damaged center section hinge pins (TM5-5420-203-14).**

NO YES

Symptom-3

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

11

**Check scissoring cylinder for leaks, damage, or excessive heat.**

First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Set scissoring cylinder control lever in launch position for 5 minutes.

Second Technician (Bridge)

- Visually check hydraulic lines and cap end of scissoring cylinder for leaks or damage. Check outer surface of cylinder for overheating.

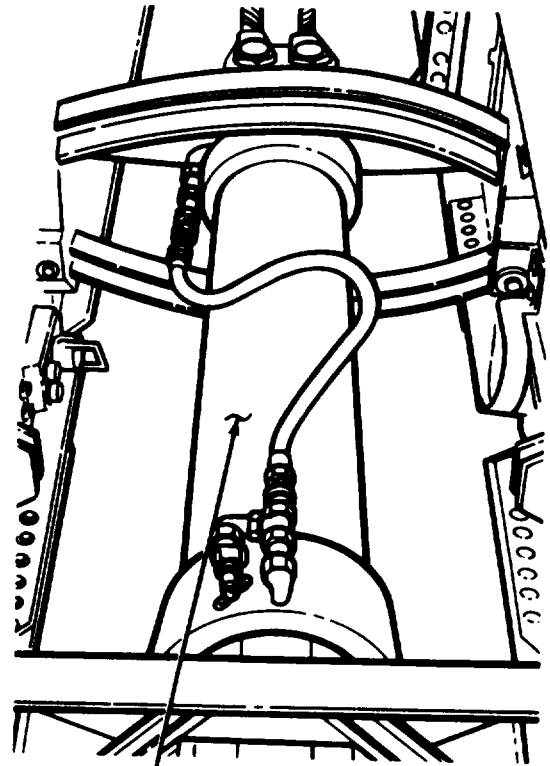
**Is scissoring cylinder leaking, damaged, or overheating?**

12

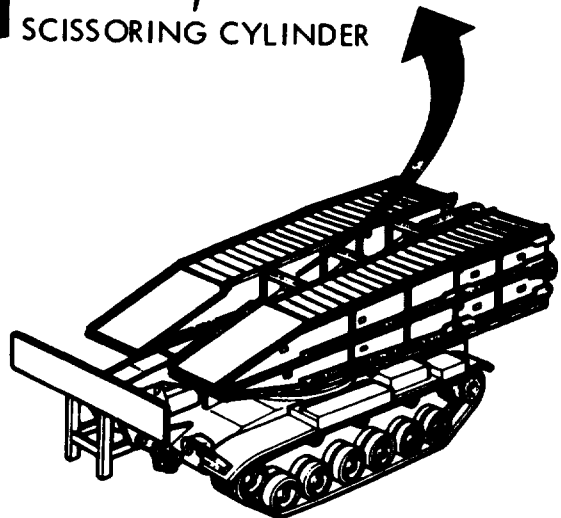
**Replace scissoring cylinder  
(TM5-5420-203-14).**

YES

NO



SCISSORING CYLINDER



Symptom-3

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

**13** Check relief valve, RV8 for pressure setting of  $3400 \pm 50$  psi.

**First Technician (Operator's Station)**

- Disengage hydraulic clutch.
- Cycle bridge launching control levers.

**Second Technician (Top Deck)**

- Place one gallon container under relief valve RV8.
- If STE/ICE is available, proceed to Test No. 51 (page 2-47) to test relief valve RV8.
- If STE/ICE is not available, remove gage plug from relief valve RV8 and install pressure gage port.

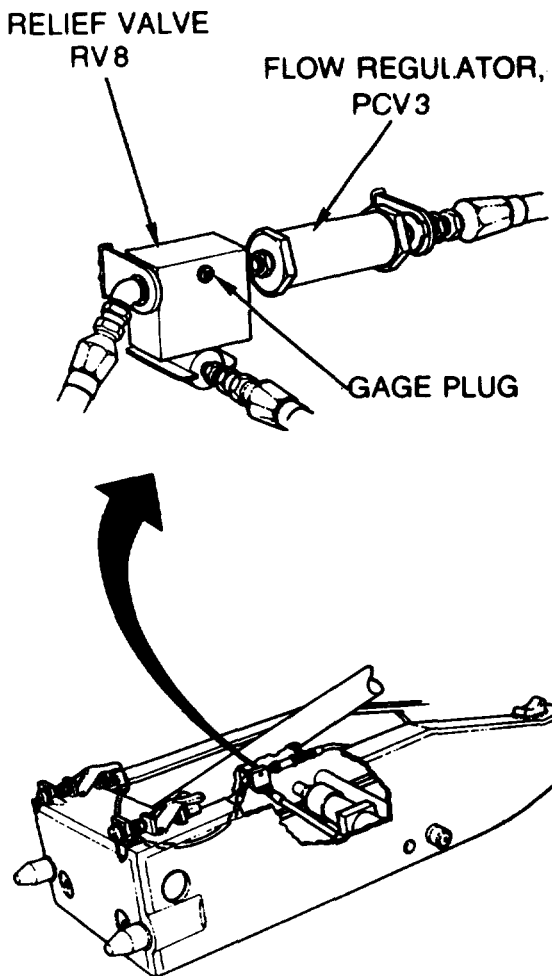
**First Technician (Operator's Station)**

- Engage hydraulic clutch.
- Set engine speed, at 1800 rpm.
- Raise scissor cylinder control lever.

**Second Technician (Top Deck)**

- Check if pressure gage indicates  $3400 \pm 50$  psi.

**Is pressure  $3400 \pm 50$  psi?**



**14**

- Adjust relief valve RV8 (page 3-89), steps 8 through 14.
- If relief valve setting cannot be brought to within tolerance, replace cartridge in relief valve (page 3-88).
- If relief valve setting still cannot be brought to within tolerance, notify support maintenance of defective valve bank.

NO YES

**15** Replace flow regulator, PCV3 (page 3-106).

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

Symptom-4

**LAUNCHER DOES NOT RELEASE/ENGAGE BRIDGE.**

**NOTE**

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

**1** Check locking cylinder hydraulic lines and fittings for leaks or damage.

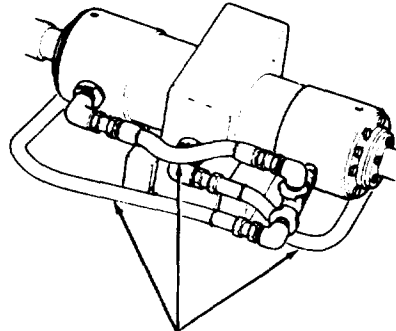
First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Cycle locking cylinder control lever.

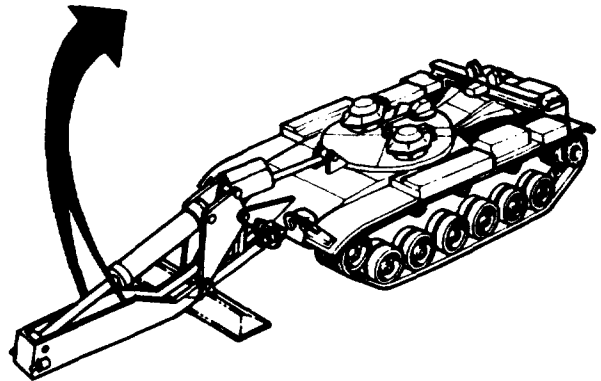
Second Technician (Launcher Tongue)

- Visually check locking cylinder hydraulic lines and fittings for leaks, crimping or other damage.

**Are hydraulic lines and fittings leaking or damaged?**



HYDRAULIC LINES



BRIDGE REMOVED FOR CLARITY

**2**

- Identify leaking hydraulic line by reference designator on line with diagram (page 3-67).
- Replace leaking line or fitting.



Symptom-4

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

3

**Check locking cylinder for leaks, damage, or excessive heat.**

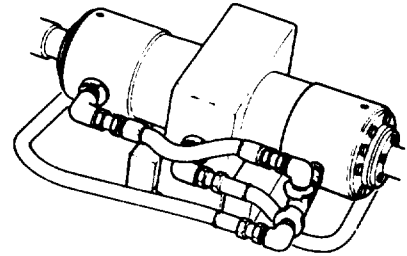
First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Cycle locking cylinder control lever for 5 minutes.

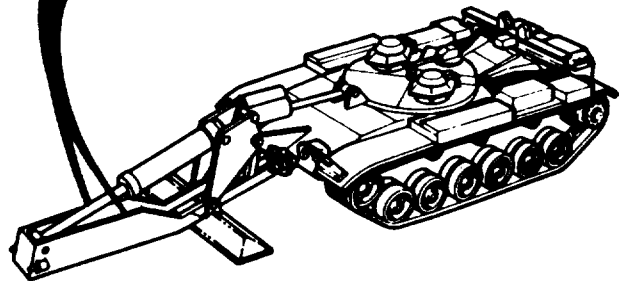
Second Technician (Launcher Tongue)

- Visually check locking cylinder for leaks or damage. Check outer surface of cylinder for overheating.

**Is locking cylinder leaking, damaged, or overheating?**



LOCKING CYLINDER



4

**Replace locking cylinder (page 3-240).**

NO

YES

Symptom-4

**DETAILED TROUBLESHOOTING PROCEDURE  
VEHICLE OPERATION - LAUNCHER SYSTEM  
(Continued)**

**5** Check ejection cylinders hydraulic lines and fittings for leaks or damage.

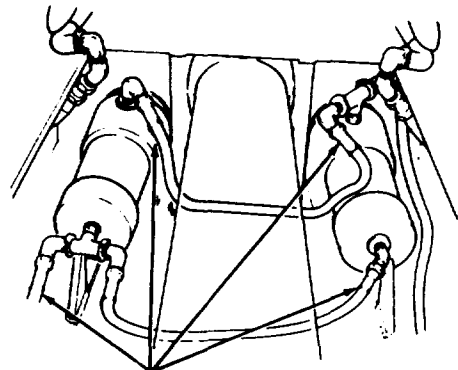
First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Cycle ejection cylinder control lever.

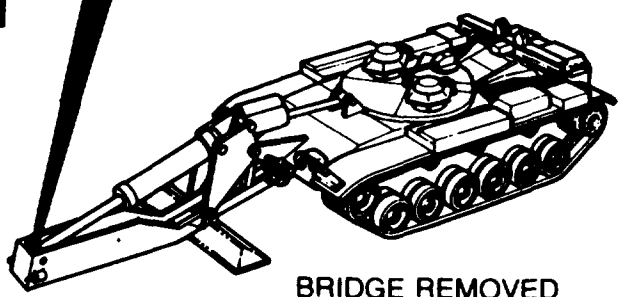
Second Technician (Launcher Tongue)

- Visually check hydraulic lines on both ejection cylinders for leaks, crimping or other damage.

**Are hydraulic lines or fittings leaking or damaged?**



**EJECTION CYLINDER  
HYDRAULIC LINES**



**BRIDGE REMOVED  
FOR CLARITY**

**6**

- Identify leaking hydraulic line by reference designator on line with diagram (page 3-67).
- Replace leaking line.

**NO**      **YES**



Symptom-4

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

**7** Check locking cylinder for leaks, damage, or excessive heat.

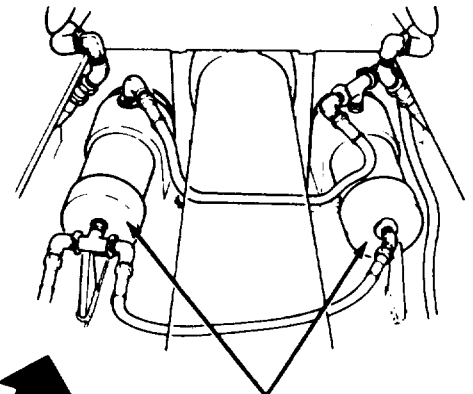
First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Cycle locking cylinder control lever for 5 minutes.

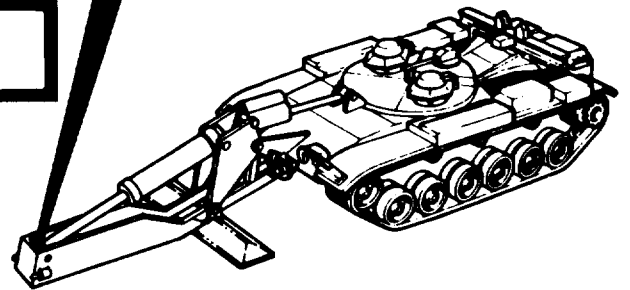
Second Technician (Launcher Tongue)

- Visually check both ejection cylinders for leaks or damage. Check outer surface of cylinder for overheating.

Are ejection cylinders leaking, damaged, or overheating?



EJECTION CYLINDERS



**8** Replace leaking or damaged ejection cylinders (pages 3-243 or 3-247).

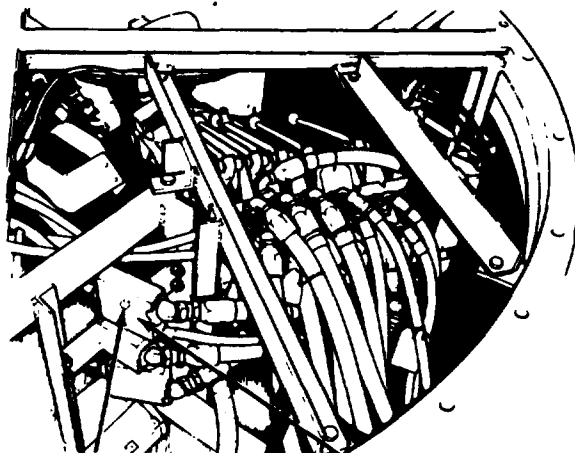
NO

YES

Symptom-4

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

QUADRANTS REMOVED  
FOR CLARITY



GAGE PORT

RELIEF VALVE, RV6  
(COMMANDER'S STATION)

**9** Check relief valve, RV6 for pressure setting of  $500 \pm 50$  psi.

Second Technician (Commander's Station)

- Place one gallon container under relief valve, RV6.

First Technician (Operator's Station)

- Disengage hydraulic clutch.
- Cycle all hydraulic control levers into launch and retrieve positions several times to relieve hydraulic system pressure.

Second Technician (Commander's Station)

- If STE/ICE is available, proceed to Test No. 51 (page 2-47) to test relief valve RV6.
- If STE/ICE is not available, remove gage plug from relief valve RV6 and install pressure gage.

First Technician (Operator's Position)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Depress locking cylinder control lever.

Second Technician (Commander's Station)

- Check if pressure gage or STE/ICE indicates  $500 \pm 50$  psi.

Is pressure  $500 \pm 50$  psi?

YES

NO

**10**

- Adjust relief valve RV6 (page 3-87), steps **8** through **14**.
- If relief valve setting cannot be brought to within tolerance, replace cartridge in relief valve (page 3-85).

Symptom-4

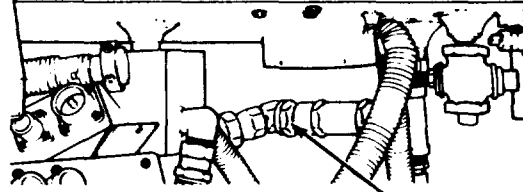
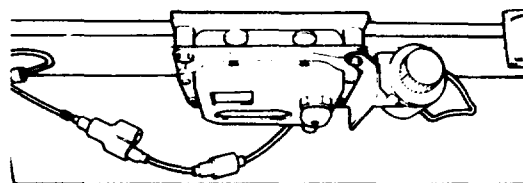
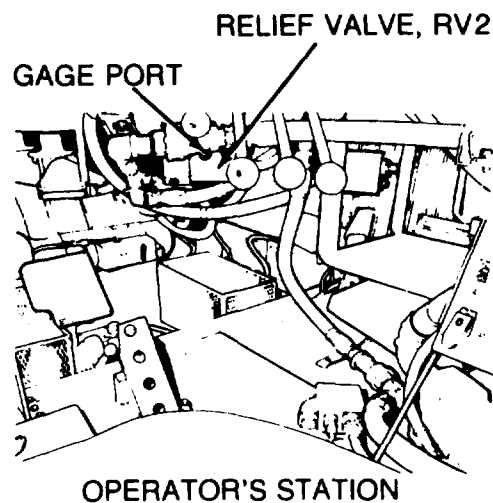
**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

**11** Check relief valve, RV2 for pressure setting of  $3200 \pm 50$  psi.

First Technician (Operator's Station)

- Disengage hydraulic clutch.
- Place one gallon container under relief valve, RV2.
- Cycle bridge launching control levers.
- If STE/ICE is available, proceed to Test No. 51 (page 2-47) to test relief valve RV2.
- If STE/ICE is not available, remove gage plug from relief valve RV2 and install pressure gage.
- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Depress ejection cylinder and locking cylinder control levers for 5 minutes.
- Check if pressure gage indicates  $3200 \pm 50$  psi.

**Is pressure  $3200 \pm 50$  psi?**



CHECK VALVE CV8

**12**

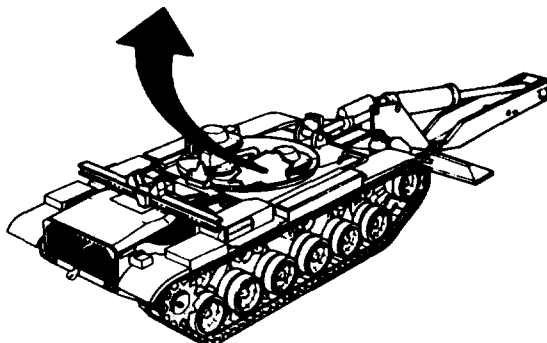
- Adjust relief valve RV2 (page 3-79), steps **8** through **14**
- If relief valve setting cannot be brought to within tolerance, replace valve cartridge (page 3-78).
- If relief valve RV2 is not faulty, notify support maintenance of faulty valve bank.

**NO**

**13**

Replace check valve, CV8 (page 3-118).

**YES**

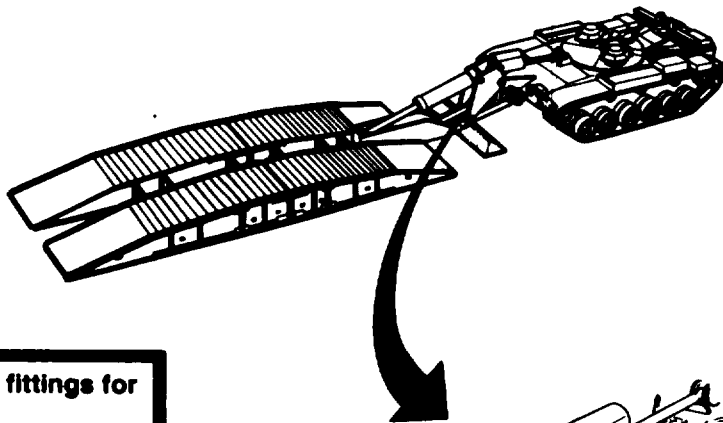


**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

**Symptom-5**

**BRIDGE DOES NOT RETRIEVE.**

**NOTE**  
This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



**1** Check tongue cylinder hydraulic lines and fittings for leaks, crimping or damage.

Second Technician (Launcher Tongue)

- Remove tongue cylinder armor (page 3-232).

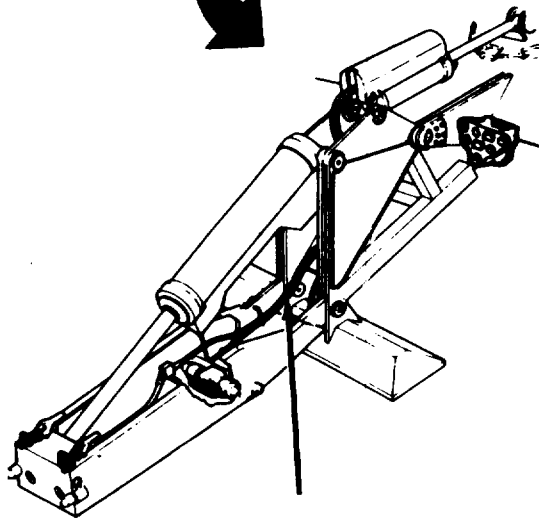
First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Cycle tongue cylinder control lever.

Second Technician (Launcher Tongue)

- Visually check hydraulic lines and fittings for leaks, crimping or other damage.

**Are hydraulic lines or fittings leaking or damaged?**



**TONGUE CYLINDER  
HYDRAULIC LINES**

**2**

- Identify leaking hydraulic line by reference designator on line with diagram (page 3-67).
- Replace leaking line.



Symptom-5

### DETAILED TROUBLESHOOTING PROCEDURE LAUNCHER OPERATION - HYDRAULICS (Continued)

**3** Check tongue cylinder for leaks, damage or excessive heat.

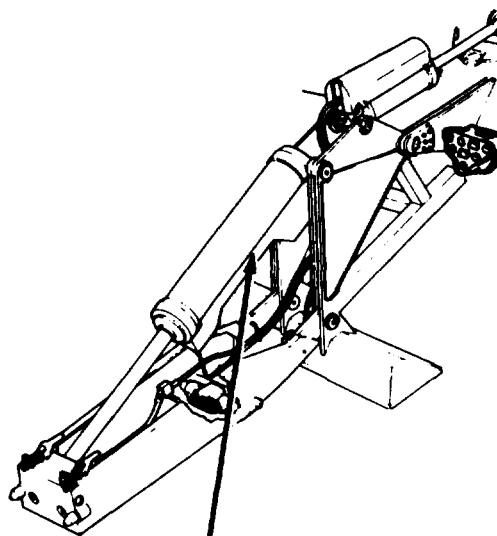
First Technician (Operator's Station)

- Cycle tongue cylinder control lever for 5 minutes.

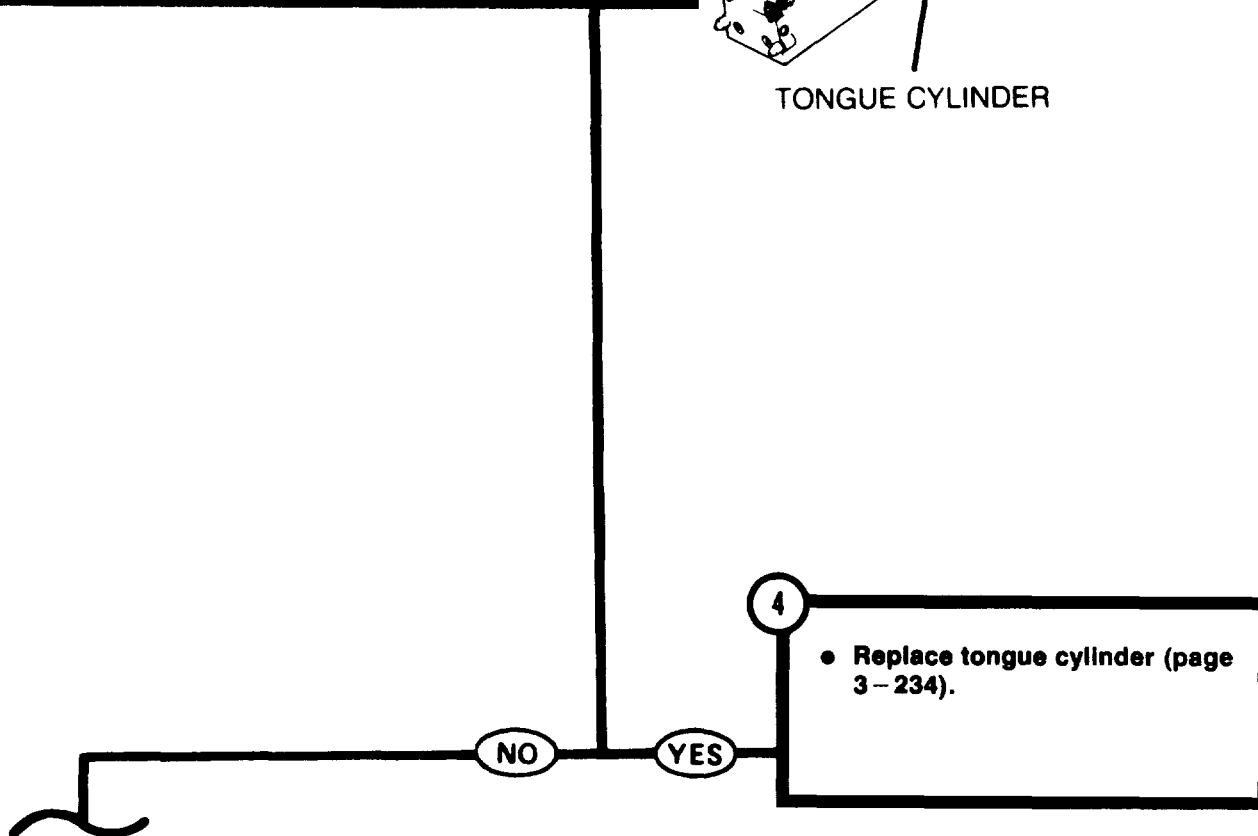
Second Technician (Launcher Tongue)

- Visually check tongue cylinder for leaks or other damage. Check outer surface for overheating.

**Is tongue cylinder leaking, damaged, or overheating?**

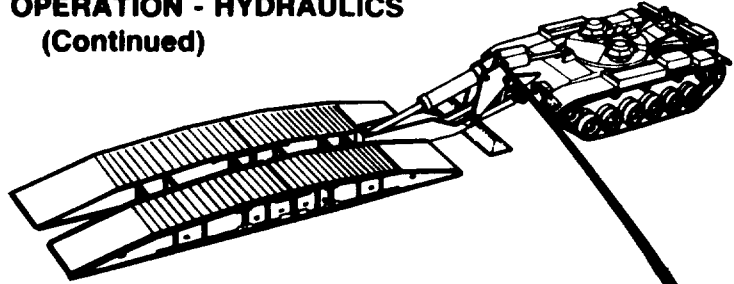


TONGUE CYLINDER



Symptom-5

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**



**5** Check relief valve RV4 for pressure setting of  $3600 \pm 50$  psi.

First Technician (Operator's Station)

- Disengage hydraulic clutch.
- Cycle bridge launching control levers.

Second Technician (Launcher Tongue)

- Place one gallon container under relief valve RV4.
- If STE/ICE is available, proceed to Test No. 51 (page 2-47) to test relief valve RV4.
- Remove gage plug from relief valve RV4, and install pressure gage in gage port.

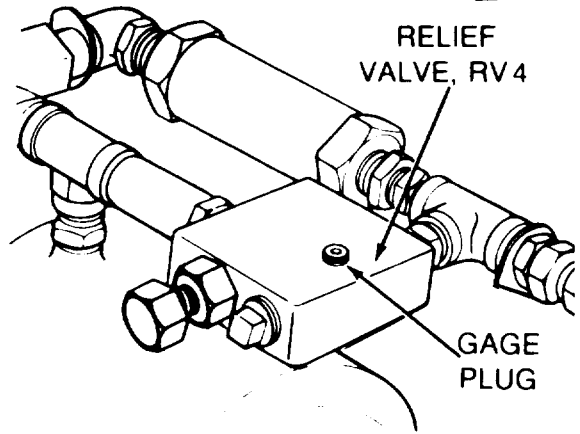
First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Raise tongue cylinder control lever.

Second Technician (Launcher Tongue)

- Check pressure gage or STE/ICE indicates  $3600 \pm 50$  psi.

Is pressure  $3600 \pm 50$  psi?



CAP END TONGUE CYLINDER

**6**

- Remove pressure gage and install plug in gage port.
- Replace check valve CV4 (page 3-99).

YES NO

**7**

- Adjust relief valve RV4 (page 3-84) steps 8 through 15.
- If relief valve setting cannot be brought to within tolerance, replace cartridge in relief valve (page 3-83).
- If relief valve setting still cannot be brought within tolerance, notify support maintenance of defective valve bank.

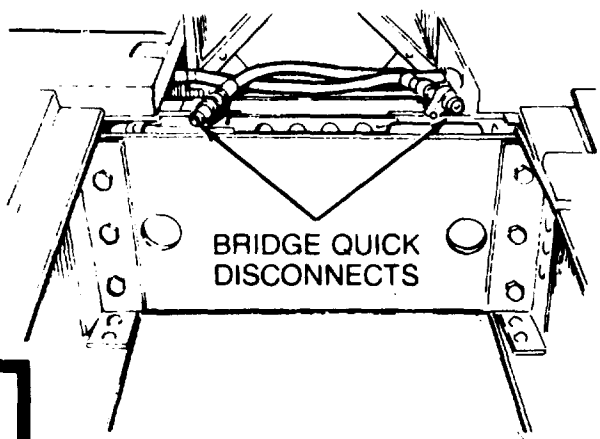
**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS**

Symptom-6

(Continued)

**BRIDGE DOES NOT SCISSOR CLOSED OR DOES NOT CLOSE SMOOTHLY.**

**NOTE**  
This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.



**1** Check bridge quick disconnects for proper operation.

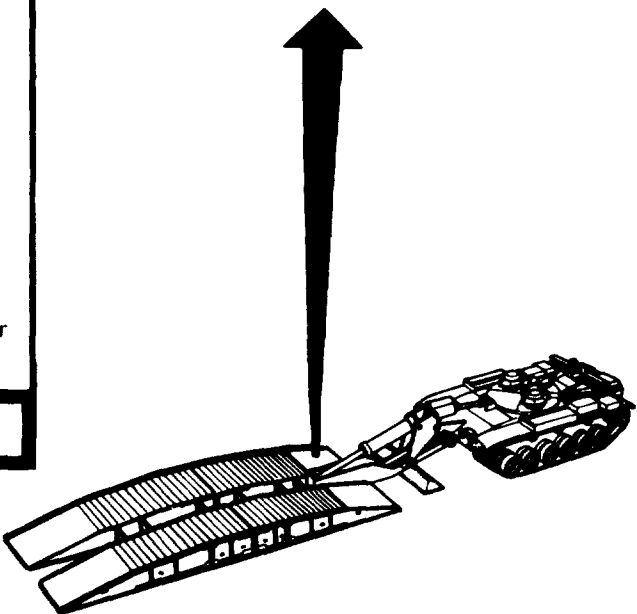
First Technician (Operator's Station)

- Return bridge to launched position (TM 5-5420-202-10).
- Disengage hydraulic clutch.
- Cycle bridge launching control levers.

Second Technician (Bridge)

- Check quick disconnects between bridge and launcher tongue are connected and secure.

**Do quick disconnects operate properly?**



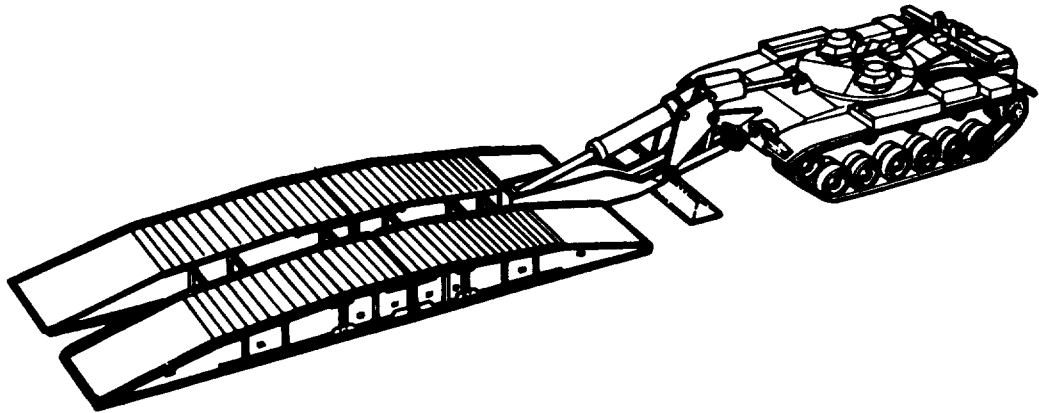
**2** Replace quick disconnects (TM5-5420-203-14).

NO

YES

Symptom-6

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**



**3** Check scissoring cylinder bleed valves for proper operation.

First Technician (Operator's Station)

- Cycle bridge launching control levers.

Second Technician (Bridge)

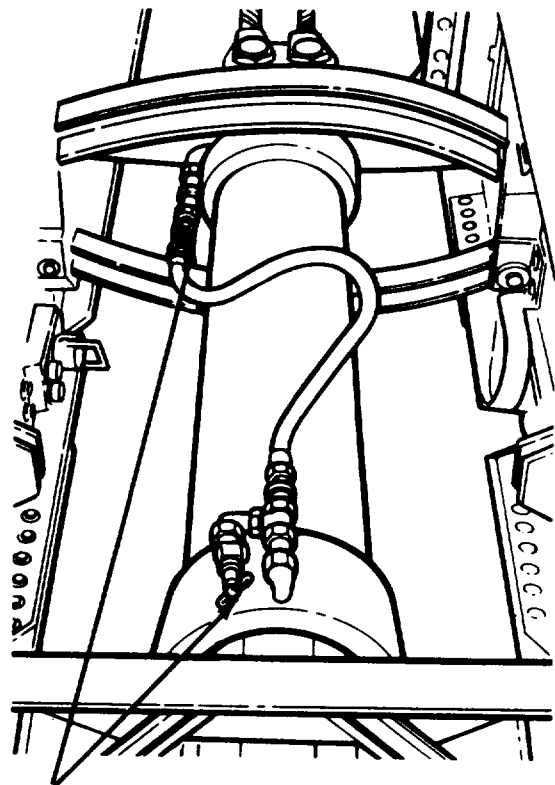
- Open both bleed valves to release air. Close both bleed valves.
- Be sure both bleed valves are closed.

**Do both bleed valves operate properly?**

**4** Replace defective bleed valves (TM5-5420-203-14).

NO

YES



SCISSORING CYLINDER  
BLEED VALVES



Symptom-6

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

**5** Check bridge piping, hydraulic lines and fittings for leaks or damage.

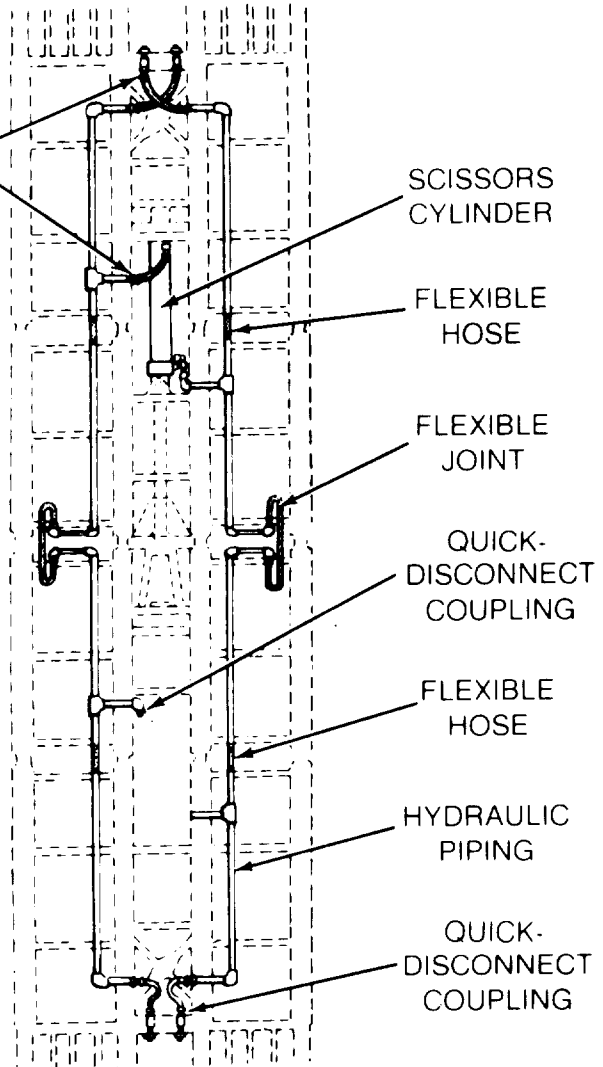
First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Cycle scissor cylinder control lever into retrieve and launch positions.

Second Technician (Bridge)

- Visually check bridge piping for leaks, crimping or other damage.

**Is bridge piping leaking or damaged?**



BRIDGE HYDRAULIC SYSTEM

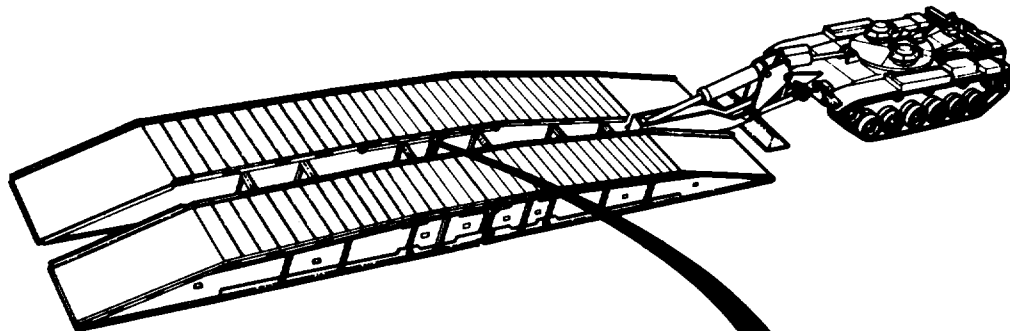
**6** Replace leaking or damaged bridge piping (TM5-5420-203-14).

YES

NO

Symptom-6

### DETAILED TROUBLESHOOTING PROCEDURE LAUNCHER OPERATION - HYDRAULICS (Continued)

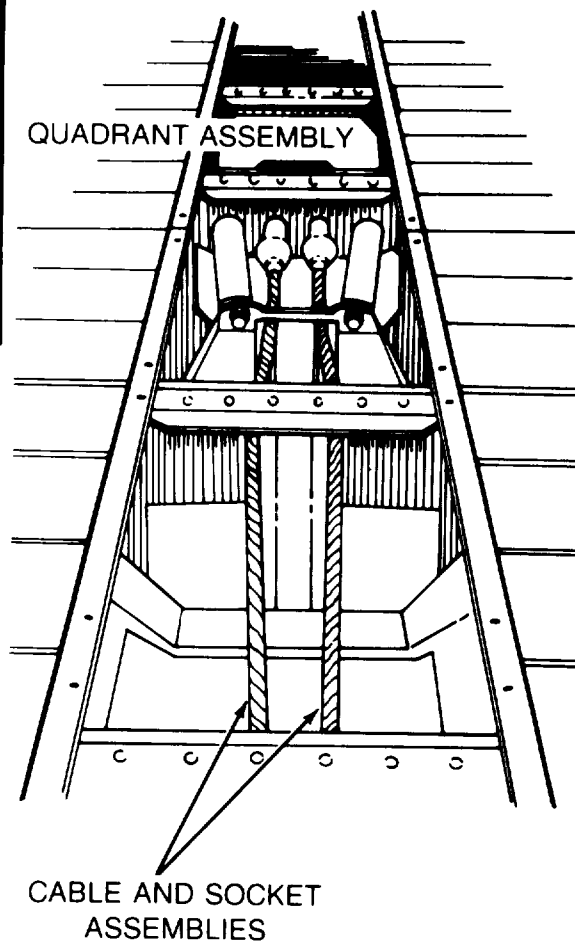


**7** Check quadrant and cable assemblies for proper operation.

Second Technician (Bridge)

- Visually check quadrant for loose or broken struts, misalignment or other damage.
- Visually check scissoring cable assembly for broken, loose or frayed condition.

**Is quadrant or scissoring cables damaged?**



**8** Replace scissoring cables and quadrant assembly (TM5-5420-203-14).

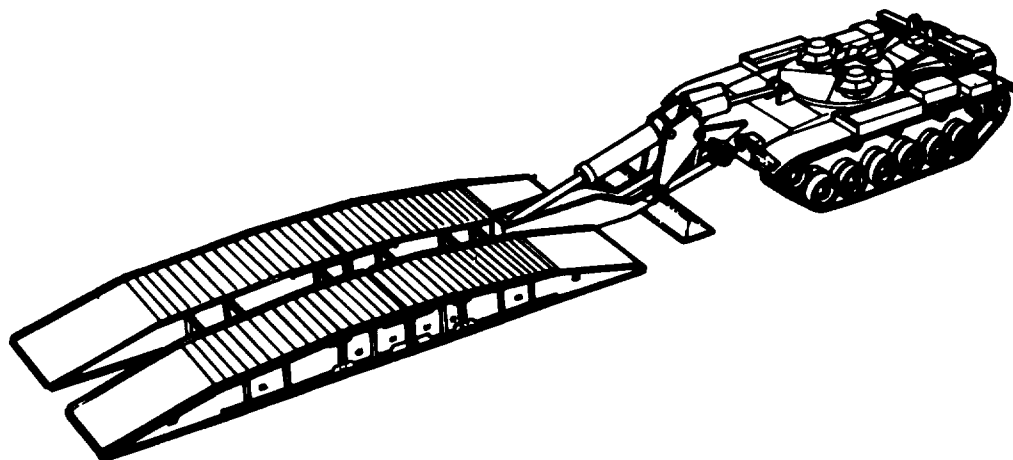
YES

NO

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Symptom-6

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

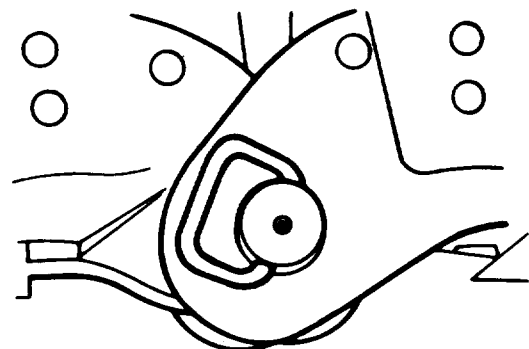


**9** Check center section hinge pins for damage.

Second Technician (Bridge)

Visually check inside and outside center section hinge pins for broken or damaged condition.

**Are center section hinge pins broken or damaged?**

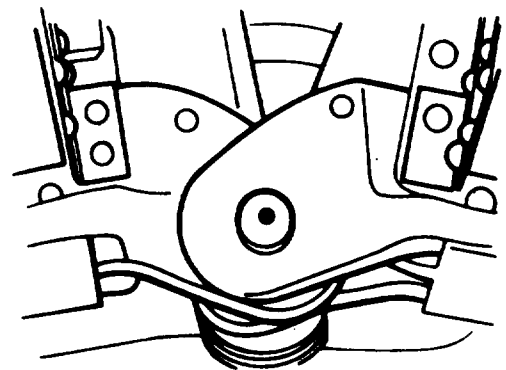


OUTSIDE CENTER PIN

**10** Replace damaged center section hinge pins (TM5-5420-203-14).

YES

NO



INSIDE CENTER PIN

Symptom-6

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

11

**Check scissoring cylinder for leaks, damage, or excessive heat.**

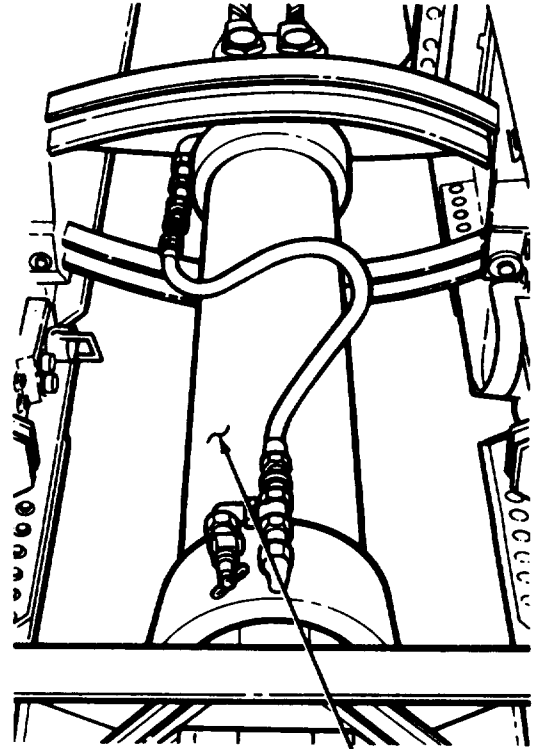
First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Set scissor cylinder control lever in retrieve position for 5 minutes.

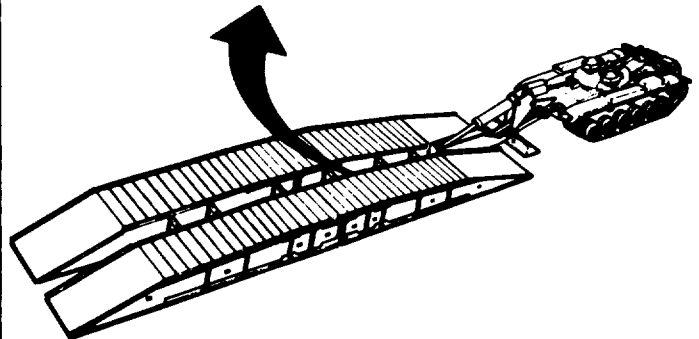
Second Technician (Bridge)

- Visually check hydraulic lines and rod end of scissor cylinder for leaks or damage. Check outer surface for overheating.

**Is scissoring cylinder leaking, damaged, or overheating?**



SCISSORING CYLINDER



12

**Replace scissoring cylinder  
(TM5-5420-203-14).**

NO

YES

Symptom-6

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

**13** Check relief valve, RV8 for pressure setting of 3400 ± 50 psi.

*First Technician (Operator's Station)*

- Disengage hydraulic clutch.
- Cycle bridge launching control levers.

*Second Technician (Launcher Tongue)*

- Place one gallon container under relief valve RV8.
- If STE/ICE is available, proceed to Test No. 51 (page 2-47) to test relief valve RV-8.
- If STE/ICE is not available, remove gage plug from relief valve RV-8 and install pressure gage.

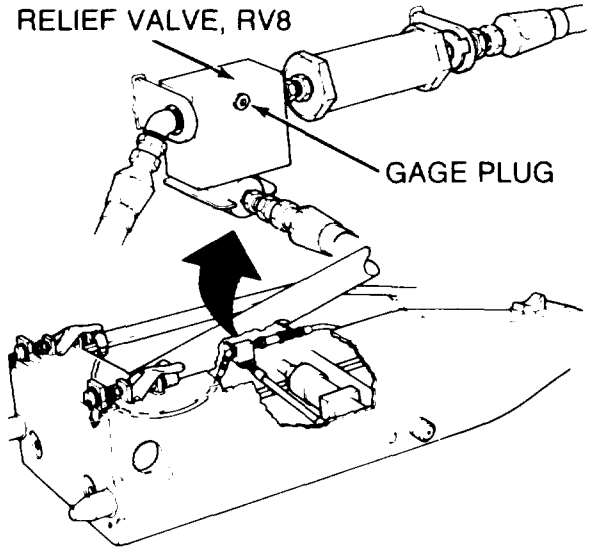
*First Technician (Operator's Station)*

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Lower scissor cylinder control lever.

*Second Technician (Launcher Tongue)*

- Check if pressure gage or STE/ICE indicates 3400 ± 50 psi.

**Is pressure 3400 ± 50 psi?**



**14**

- Adjust relief valve RV8 (page 3-89), steps 8 through 14.
- If relief valve setting cannot be brought to within tolerance, replace cartridge in relief valve (page 3-88).

**15**

Replace check valve, CV7 (page 3-116).

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

**Symptom-7**

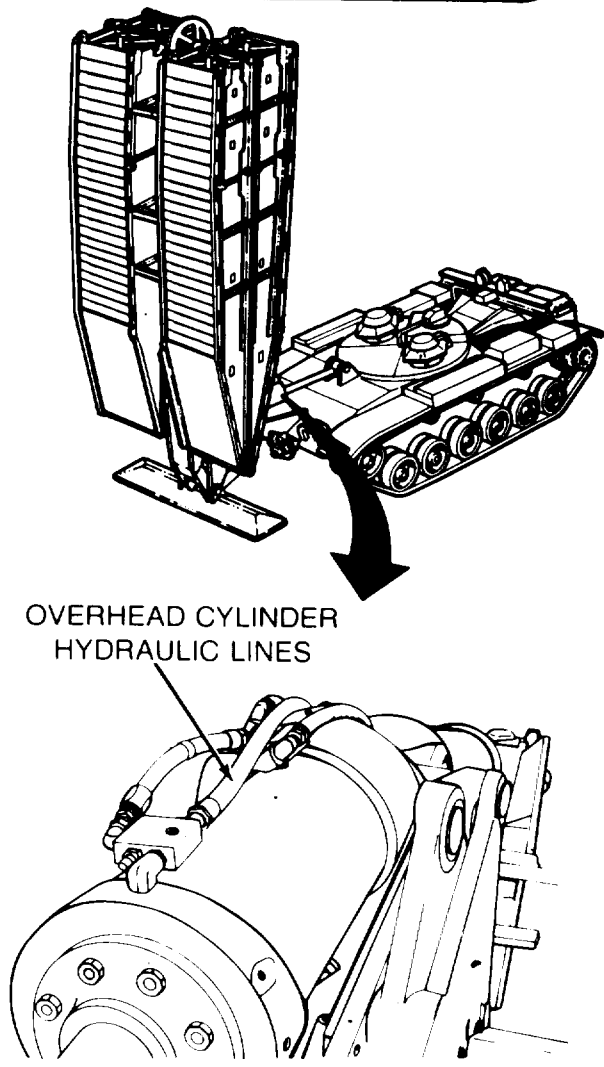
**BRIDGE DOES NOT RETRACT FROM VERTICAL POSITION OR DOES NOT RETRACT SMOOTHLY.**

**NOTE**

This procedure is to be performed by two persons. The lead person is referred to as the first technician and shall direct the activity of the second person called the second technician.

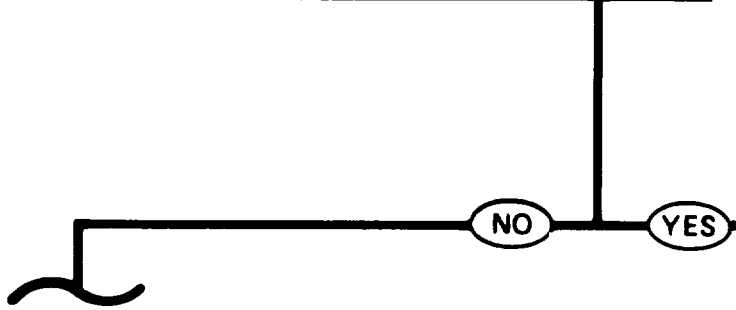
**1** Check overhead cylinder hydraulic lines and fittings for leaks or damage.

- First Technician (Operator's Station)**
- Engage hydraulic clutch.
  - Set engine speed at 1800 rpm.
  - Launch bridge (TM 5-5420-202-10).
  - Disengage hydraulic clutch.
- Both Technicians (Launcher)**
- Remove overhead cylinder armor. (page 3-223).
- First Technician (Operator's Station)**
- Engage hydraulic clutch.
  - Set engine speed at 1800 rpm.
  - Cycle overhead cylinder control lever.
- Second Technician (Launcher)**
- Visually check overhead cylinder hydraulic lines and fittings for leaks, crimping or damage.



OVERHEAD CYLINDER  
HYDRAULIC LINES

**Are hydraulic lines or fittings leaking or damaged?**



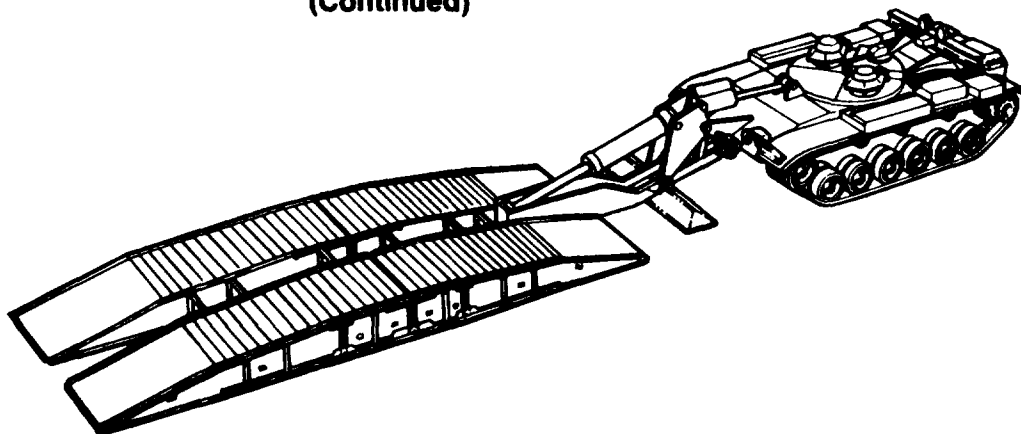
**2**

- Identify leaking hydraulic line by reference designator on line with diagram (page 3-67).
- Replace leaking line.

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Symptom-7

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**



**3** Check overhead cylinder for leaks, damage, or excessive heat.

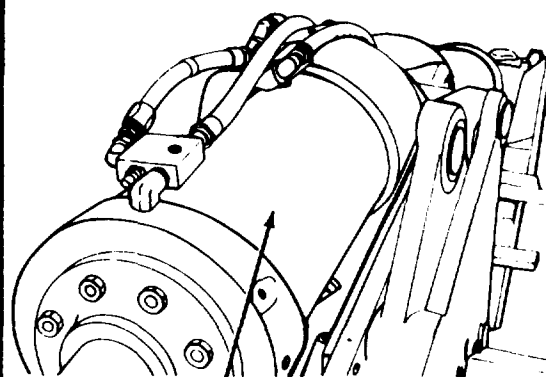
First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Cycle overhead cylinder control lever for 5 minutes.

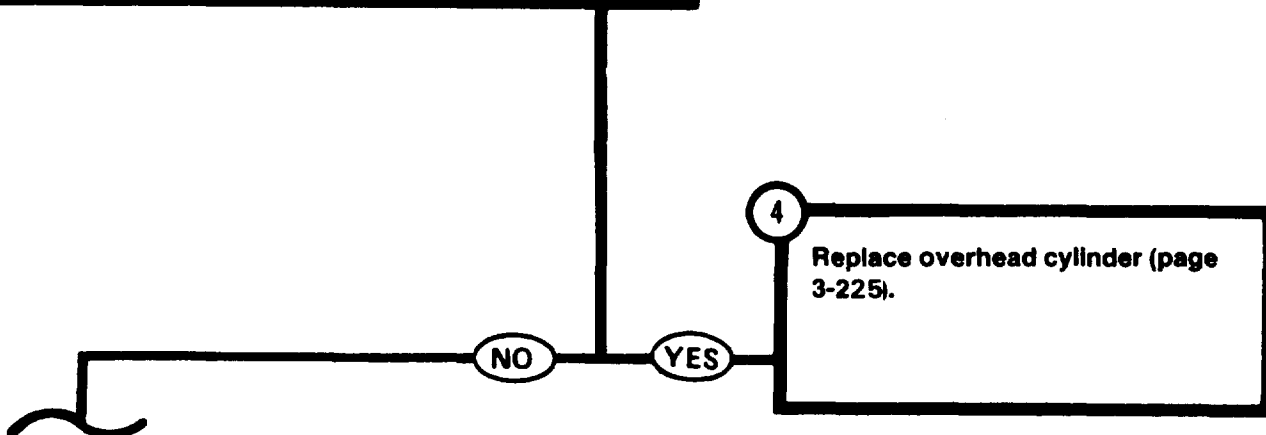
Second Technician (Launcher Tongue)

- Visually check overhead cylinder for leaks or damage. Check outer surface of cylinder for overheating.

**Is locking cylinder leaking, damaged, or overheating?**



OVERHEAD CYLINDER



**4** Replace overhead cylinder (page 3-225).

Symptom-7

**DETAILED TROUBLESHOOTING PROCEDURE  
LAUNCHER OPERATION - HYDRAULICS  
(Continued)**

**5** Check relief valve RV3 for pressure setting of  $3600 \pm 50$  psi.

Second Technician (Launcher)

- Place one gallon container under relief valve RV3.

First Technician (Operator Station)

- Disengage hydraulic clutch.
- Cycle bridge launching control levers.

Second Technician (Launcher)

- If STE/ICE is available, proceed to Test No. 51 (page 2-47) to test relief valve RV3.
- If STE/ICE is not available, remove gage plug RV3 and connect pressure gage in gage port.

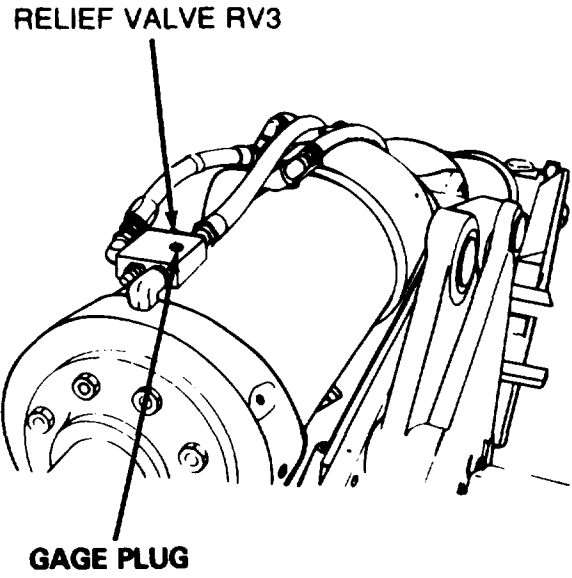
First Technician (Operator's Station)

- Engage hydraulic clutch.
- Set engine speed at 1800 rpm.
- Depress overhead cylinder control lever.

Second Technician (Launcher)

- Check if pressure gage or STE/ICE indicates  $3600 \pm 50$  psi.

**Is pressure  $3600 \pm 50$  psi?**



**6**

- System is operational.
- Perform launch and retrieve procedures (TM5-5420-202-10).

YES NO

**7**

- Adjust relief valve RV3 (page 3-81) steps 8 through 15.
- If relief valve setting cannot be brought to within tolerance, replace cartridge in relief valve (page 3-80).
- If relief valve setting still cannot be brought within tolerance, notify support maintenance of defective valve bank.



Symptom-8

**DETAILED TROUBLESHOOTING PROCEDURE  
SUPPORT SYSTEM - VENTILATION**

**VENTILATING BLOWER MOTOR DOES NOT WORK**

**1** Check CKT 159 harness connector at blower motor for electrical power.

Technician (Operator's Station)

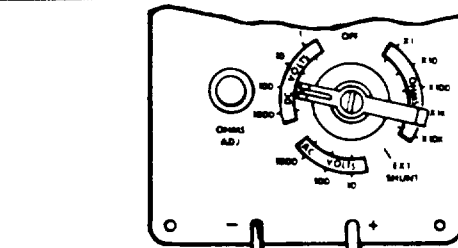
- Set MASTER BATTERY switch OFF.
- Disconnect CKT 159 harness connector from ventilating blower.
- Set multimeter to measure 18 to 30 volts dc, or use STE/ICE Test No. 89 (page 2-45).
- Connect red probe of meter to center contact of harness connector to ventilating blower and black probe to ground.
- Set MASTER BATTERY switch ON.
- Set VENTILATOR switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

**2** Replace ventilating blower assembly (page 3-2).

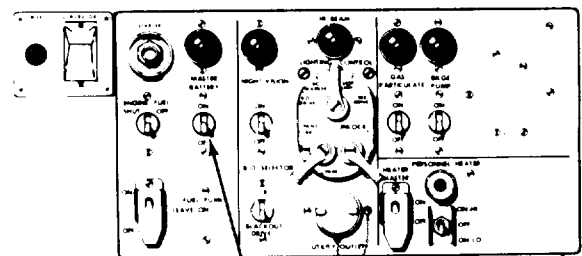
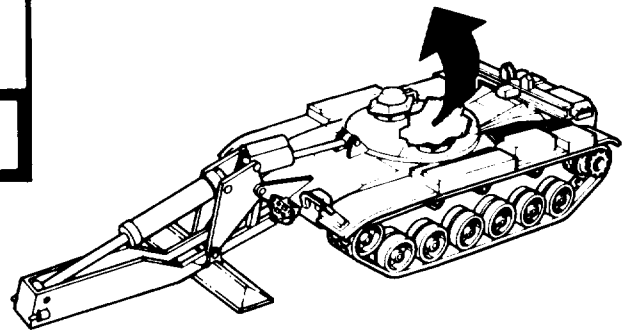
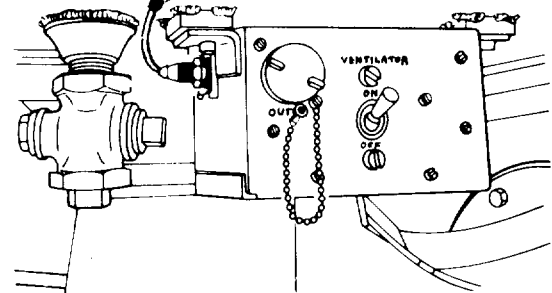
YES

NO



TO VEHICLE GROUND

CKT 159



MASTER BATTERY SWITCH

TA251398

Symptom-8

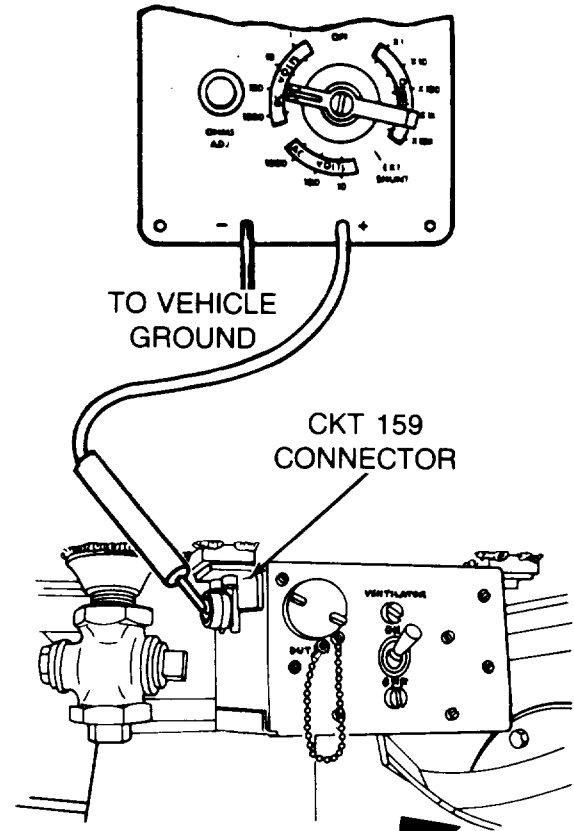
**DETAILED TROUBLESHOOTING PROCEDURE  
SUPPORT SYSTEM - VENTILATION  
(Continued)**

**3** Check output connector (CKT 159) of accessories control box for electrical power.

Technician (Operator's Station)

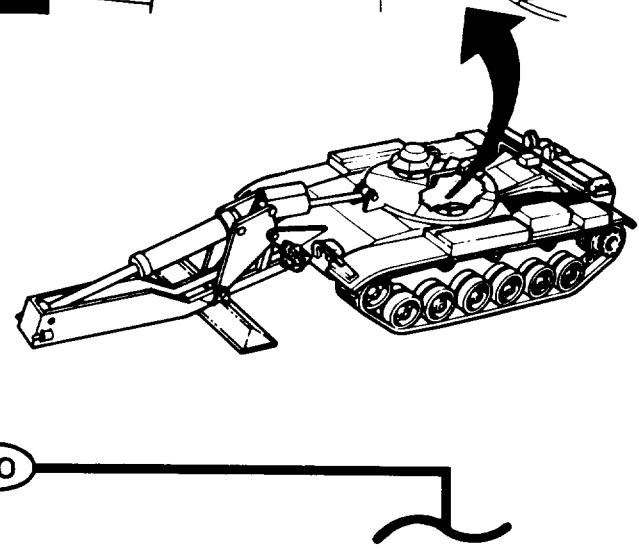
- Set MASTER BATTERY switch off.
- Reconnect CKT 159 harness connector to ventilating blower.
- Disconnect CKT 159 output harness connector from accessories control box.
- Connect red probe of meter to center contact of CKT 159 connector on accessories control box and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

Does meter indicate 18 to 30 volts dc?

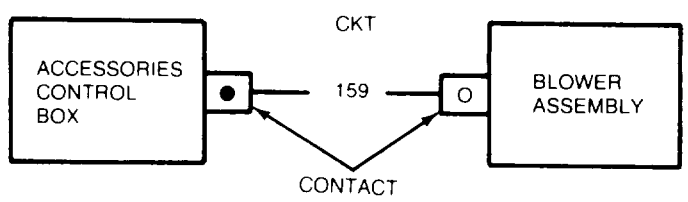


**4**

- Inspect CKT 159 harness for bent/broken harness connectors or loose CKT 159 wire at rear of connectors.
- Repair connectors if defective (TM5-5420-202-20).
- If connectors are not defective, replace CKT 159 harness between accessories control box and blower assembly (TM5-5420-202-20).



YES NO



TA251399

Symptom-8

**DETAILED TROUBLESHOOTING PROCEDURE  
SUPPORT SYSTEM - VENTILATION  
(Continued)**

5

**Check CKT 159 harness connector at input of accessories control box for electrical power.**

Technician (Operator's Station)

- Set MASTER BATTERY switch OFF.
- Reconnect CKT 159 harness connector to output connector of accessories control box.
- Disconnect CKT 159 harness connector from input connector of accessories control box.
- Connect red probe of meter to center contact of CKT 159 harness connector and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter reads 18 to 30 volts dc.

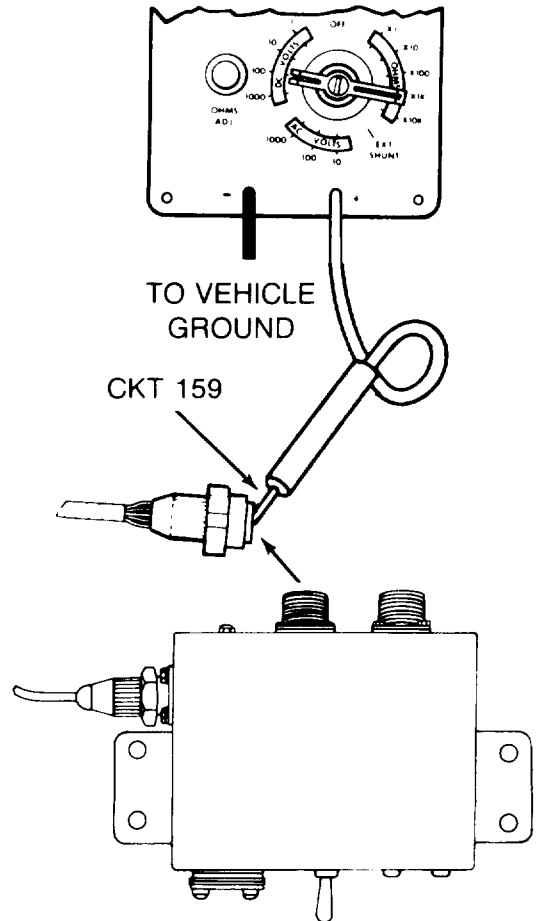
**Does meter read 18 to 30 volts dc?**

6

**Replace accessories control box (page 3-7).**

YES

NO



Symptom-8

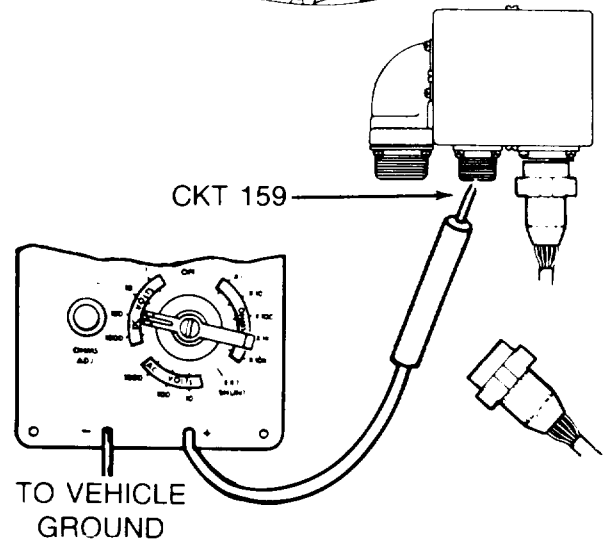
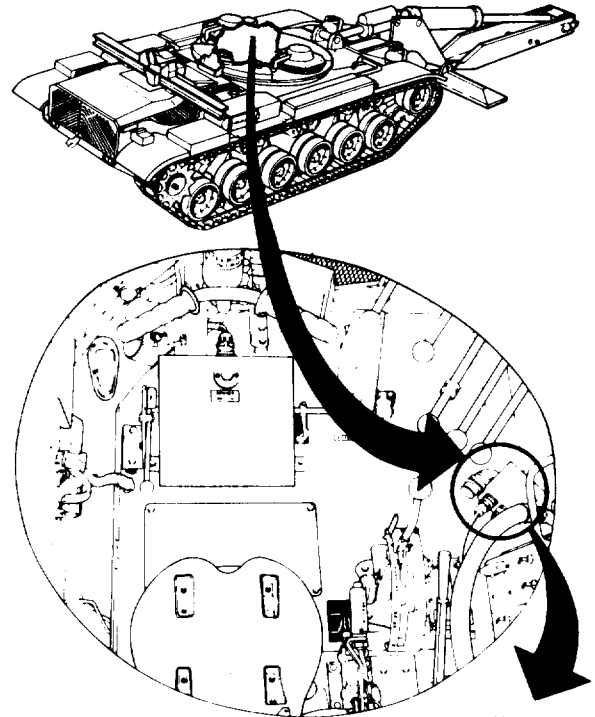
**DETAILED TROUBLESHOOTING PROCEDURE  
SUPPORT SYSTEM - VENTILATION  
(Continued)**

**7** Check output connector (CKT 159) of interconnecting box for electrical power.

Technician (Operator's Station)

- Set MASTER BATTERY switch OFF.
- Set VENTILATOR switch OFF.
- Reconnect CKT 159 harness connector to input connector of accessories control box.
- Disconnect CKT 159 harness connector from interconnecting box.
- Connect red probe of meter to center contact of CKT 159 connector on interconnecting box and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

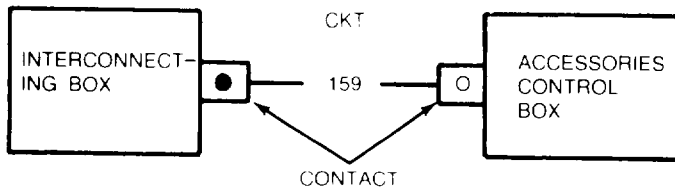
**Does meter indicate 18 to 30 volts dc?**



**8**

- Inspect CKT 159 harness for bent/broken harness connectors or loose CKT 159 wire at rear of connectors.
- Repair connectors if defective TM5-5420-202-20.
- If connectors are not defective, replace CKT 159 harness between interconnecting box and accessories control box.

YES NO



TA251401

Symptom-8

**DETAILED TROUBLESHOOTING PROCEDURE  
SUPPORT SYSTEM - VENTILATION  
(Continued)**

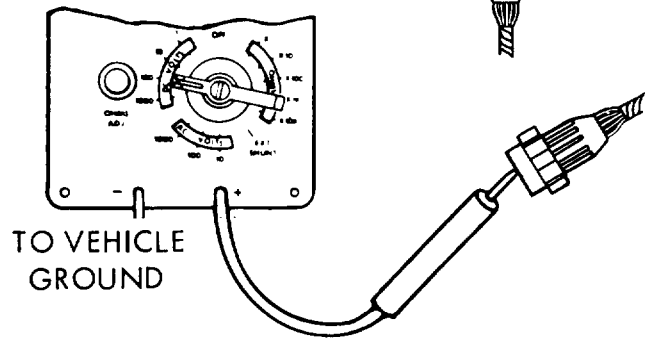
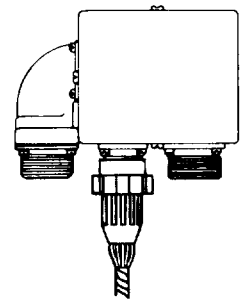
**9**

**Check interconnecting box cable for electrical power.**

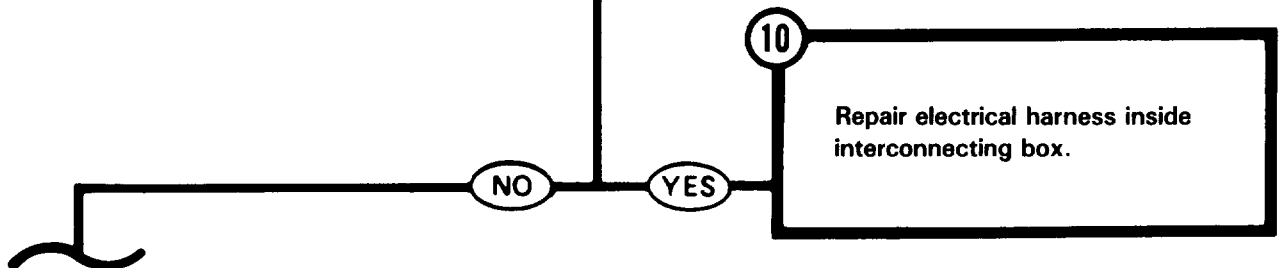
Technician (Operator's Station)

- Set MASTER BATTERY switch OFF.
- Reconnect CKT 159 harness connector to interconnecting box.
- Disconnect interconnecting box cable from interconnecting box.
- Connect red probe of meter to center contact of interconnecting box cable and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

**Does meter indicate 18 to 30 volts dc?**



TA251753



Symptom-8

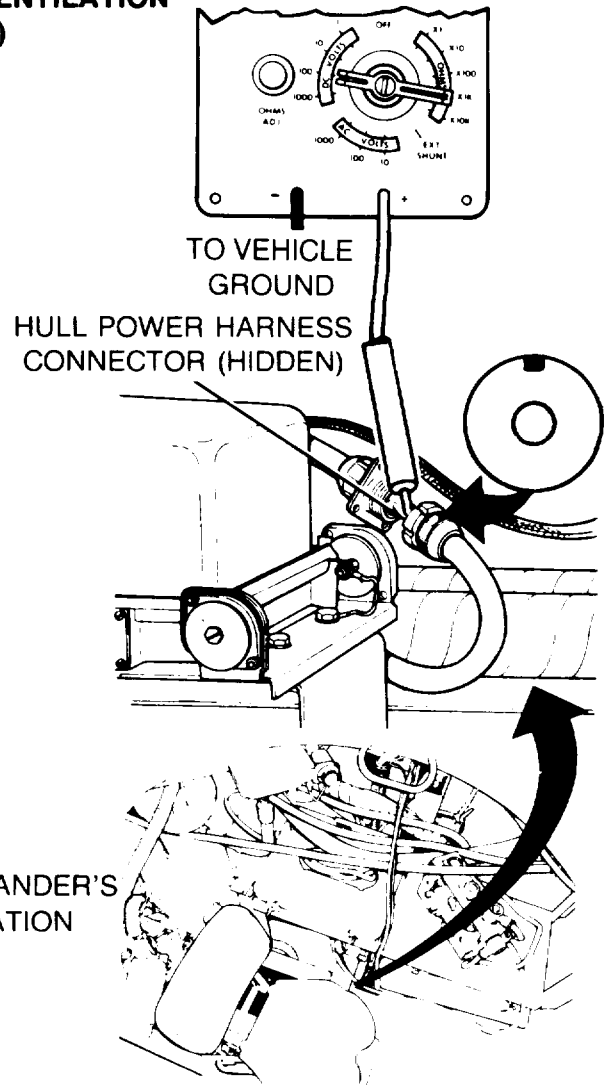
**DETAILED TROUBLESHOOTING PROCEDURE  
SUPPORT SYSTEM - VENTILATION  
(Continued)**

**11** Check hull power harness (CKT 47) for electrical power.

Technician (Operator's Station)

- Set MASTER BATTERY switch OFF.
- Reconnect interconnecting box cable connector to interconnecting box.
- Disconnect interconnecting box cable connector from hull power harness connector (CKT 47).
- Connect red probe of meter to center contact of hull power harness connector (CKT 47) and black probe to ground.
- Set MASTER BATTERY switch ON.
- Check if meter indicates 18 to 30 volts dc.

**Does meter indicate 18 to 30 volts dc?**



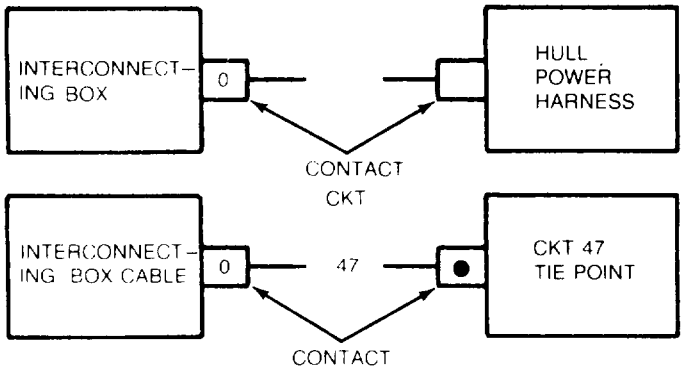
**12**

- Inspect interconnecting box cable for bent/broken connector contacts or loose wire at rear of connectors.
- Repair connectors if defective TM5-5420-202-20.
- If connectors are not defective, replace interconnecting box cable TM5-5420-202-20.

YES NO

**13**

- Inspect hull power harness for bent/broken connector contacts or loose CKT 47 wire at rear of connectors.
- Repair connectors if defective TM5-5420-202-20.
- If connectors are not defective, notify support maintenance of a defective hull power harness.
- Reconnect hull power harness connector to interconnecting box cable.



TA251402

**CHAPTER 3**  
**ORGANIZATIONAL MAINTENANCE INSTRUCTIONS**

INDEX

SECTION	PROCEDURES	PAGE
I	Mechanical and Miscellaneous Procedures	3-2
II	Valves and Associated Hydraulics (Hydraulic Diagram Index)	3-67
III	Filter, Hose Assemblies, and Associated Hydraulics	3-125
IV	Hydraulic Cylinders	3-223
v	Hydraulic Reservoir Components and Antenna Base Armor	3-257

Section 1. MECHANICAL AND MISCELLANEOUS PROCEDURES

RESERVOIR QUADRANT BLOWER ASSEMBLY REPLACEMENT (Sheet 1 of 5)

PROCEDURE INDEX

PROCEDURE	PAGE
Removal	3-2
Installation	3-4

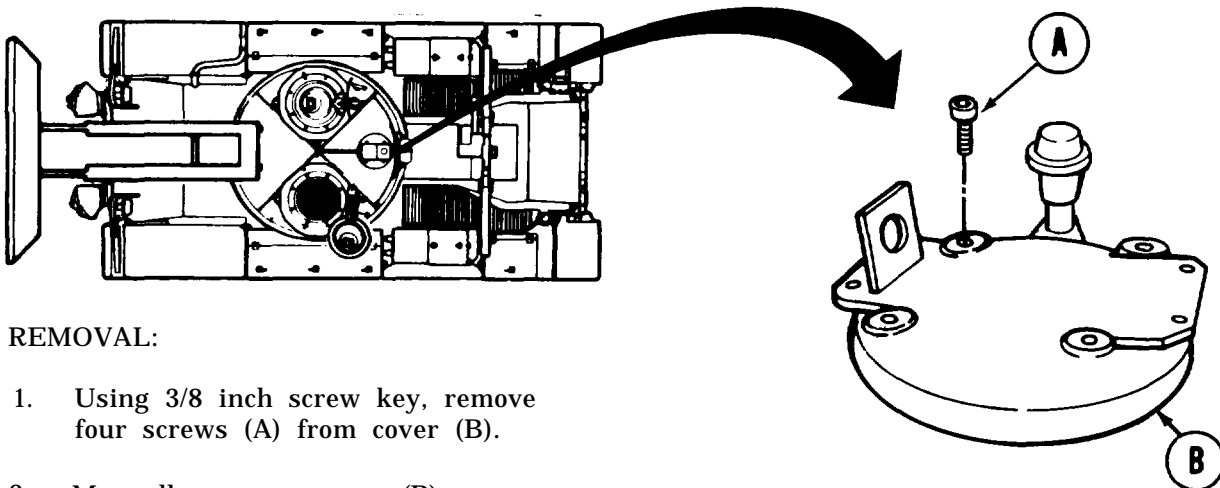
TOOLS: 3/16 in. socket head screw key (allen wrench)  
 5/16 in. socket head screw key (allen wrench)  
 3/8 in. socket head screw key (allen wrench)  
 7/16 in. combination box and open end wrench  
 3/4 in. socket with 1/2 in. drive  
 Ratchet with 1/2 in. drive  
 Flat-tip screwdriver  
 Cross-tip screwdriver  
 Putty knife  
 3/8 in. combination wrench  
 1-1/8 in. open end wrench  
 Hammer

SUPPLIES: Gasket  
 Lockwashers (10 required)

PERSONNEL: Two

REFERENCE: TM 5-5420-202-10

PRELIMINARY PROCEDURE: Remove antenna base armor (page 3-260)



REMOVAL:

1. Using 3/8 inch screw key, remove four screws (A) from cover (B).
2. Manually remove cover (B).

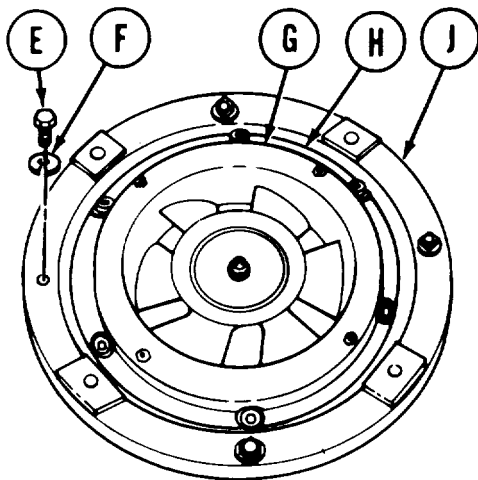
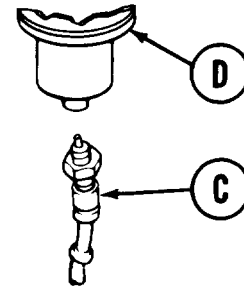
Go on to Sheet 2

TA251403



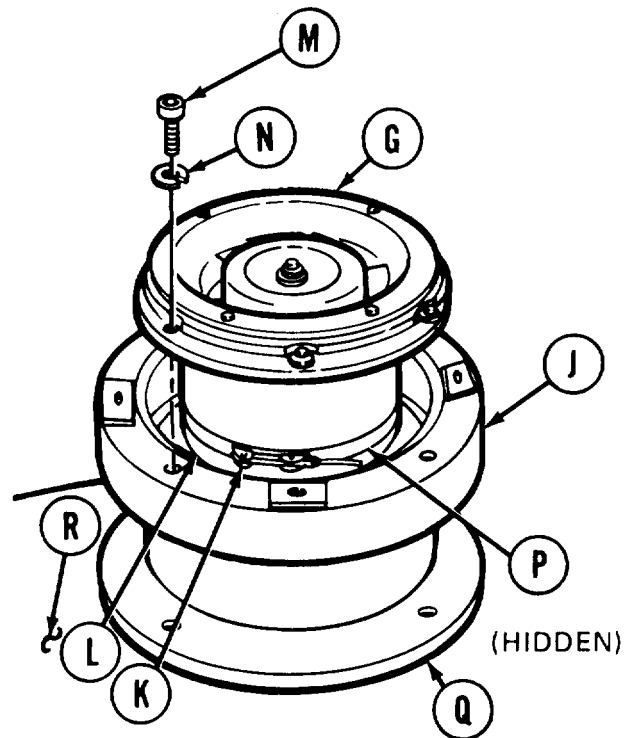
**RESERVOIR QUADRANT BLOWER ASSEMBLY REPLACEMENT (Sheet 2 Of 5)**

- Using 1-1/8 inch wrench inside vehicle, disconnect electrical lead (C) from blower assembly (D).



- Using 3/4 inch socket, remove four screws (E) and lockwashers (F).
- Using second technician, lift blower assembly (G) shock mount (H) and ring (J) from vehicle.

- Using 3/8 inch wrench, remove clamp (K) from motor silencer (L).
- Using one person to support ring (J), use 5/16 inch screw key to remove six screws (M) and lockwashers (N).
- Remove ring (J) from blower assembly (G).
- Using flat-tip screwdriver, bend tabs (P) of silencer (L) away from blower assembly (G).
- Remove silencer (L) and ring (J) from blower assembly (G).
- Using putty knife, remove gasket (Q) from bottom of ring (J) or quadrant (R).

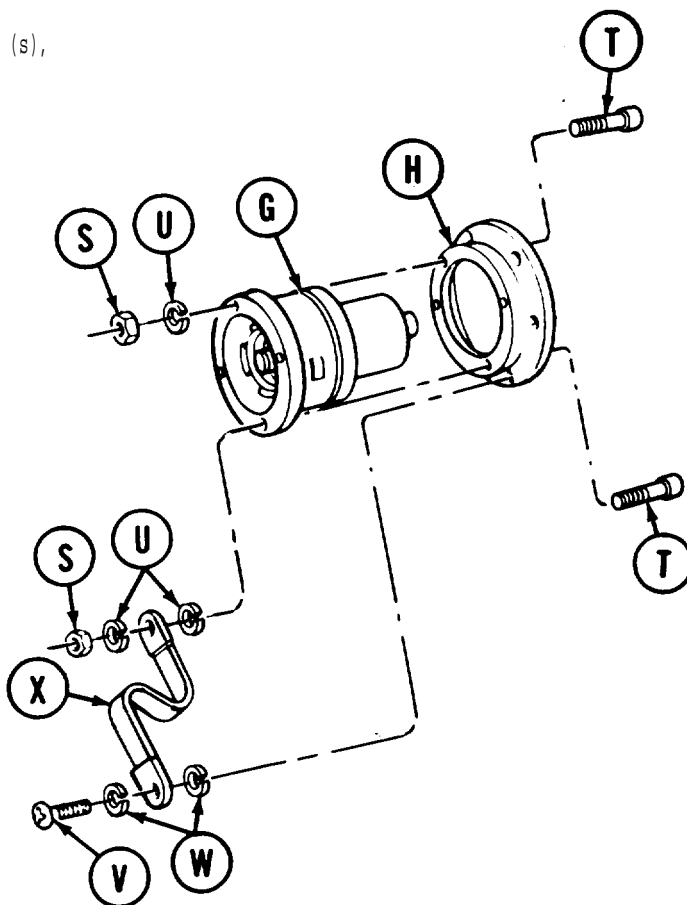


Go on to Sheet 3

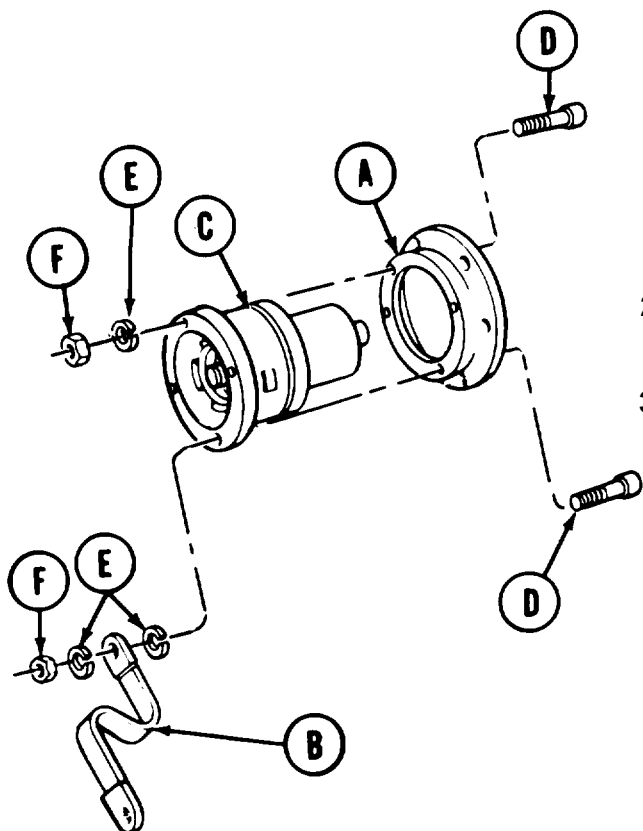
TA251404

RESERVOIR QUADRANT BLOWER ASSEMBLY REPLACEMENT (Sheet 3 of 5)

12. Using 7/16 inch wrench to hold four nuts (s), use 3/16 inch screw key to remove four screws (T) and five lockwashers (U).
13. Remove blower assembly (G) from shock mount (H).
14. Using cross- tip screwdriver, remove screw (V) and two lockwashers (W).
15. Remove ground strap (X).



INSTALLATION:



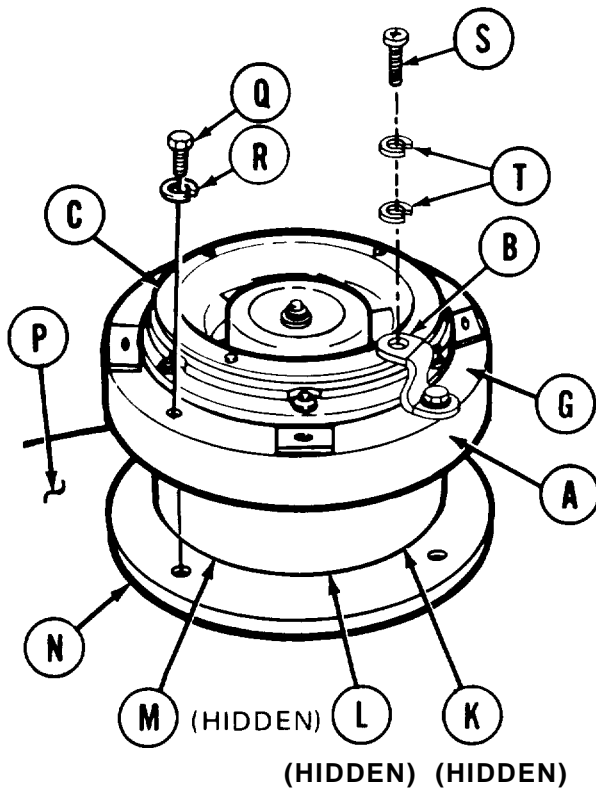
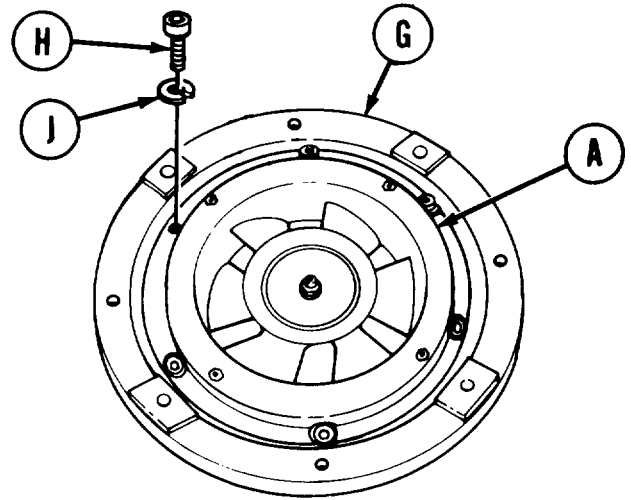
1. Place shock mount (A) and ground strap (B) in position on blower assembly (C).
2. Manually install four screws (D), five lockwashers (E), and four nuts (F).
3. Using 7/16 inch wrench to hold four nuts (F), use 3/16 inch screw key to tighten four screws (D) to secure blower assembly (C) and ground strap (B) to shock mount (A).

Go on to Sheet 4

TA251405

RESERVOIR QUADRANT BLOWER ASSEMBLY REPLACEMENT (Sheet 4 of 5)

4. Position ring (G) onto shock mount (A).
5. Using 5/16 inch socket head screw key, install six screws (H) and lockwashers (J) securing ring (G) to shock mount (A).
6. Manually position silencer (K) on blower assembly (C).
7. Using hammer, bend tabs (L) of silencer (K) against blower assembly (C).
8. Using 3/8 inch wrench, install clamp (M) on silencer (K).
9. Position gasket (N) on quadrant (P).



10. Using second person, position blower assembly (C), shock mount (A) and ring (G) in quadrant (P).
11. Using 3/4 inch socket, install four screws (Q) and lockwashers (R) to secure blower assembly (C) to quadrant (P).
12. Using cross- tip screwdriver, install screw (S), two lockwashers (T) and free end of ground strap (B) to shock mount (A).

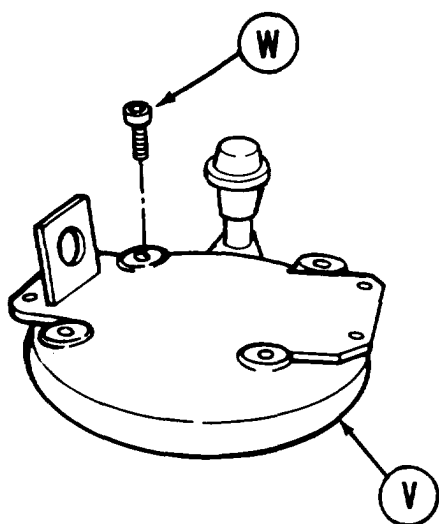
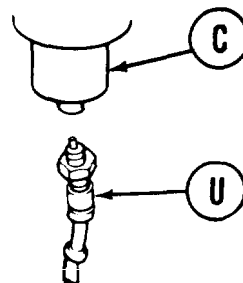
Go on to Sheet 5

(HIDDEN) (HIDDEN)

TA251406

## RESERVOIR QUADRANT BLOWER ASSEMBLY REPLACEMENT (Sheet 5 of 5)

13. Using 1-1/8 inch wrench, connect electrical lead (U) on blower assembly (C).



14. From outside vehicle, place cover (V) in position over blower assembly (C).
15. Using 3/8 inch socket head screw key, install four screws (W).

16. Install antenna base armor (page 3-262).

End of Task

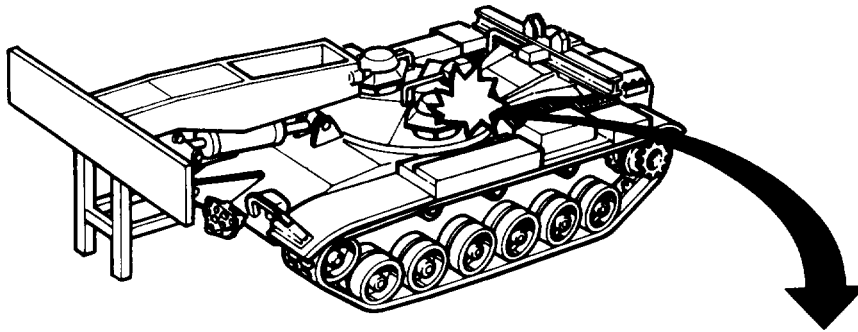
TA251407

**ACCESSORIES CONTROL BOX REPLACEMENT (Sheet 1 of 1)**

**TOOLS:** 5 in. extension with 1/2 in. drive  
 Spanner wrench  
 7/16 in. socket with 1/2 in. drive  
 Ratchet with 1/2 in. drive

**SUPPLIES:** Lock washers (4 required)

**REFERENCE:** TM 5-5420-202-10

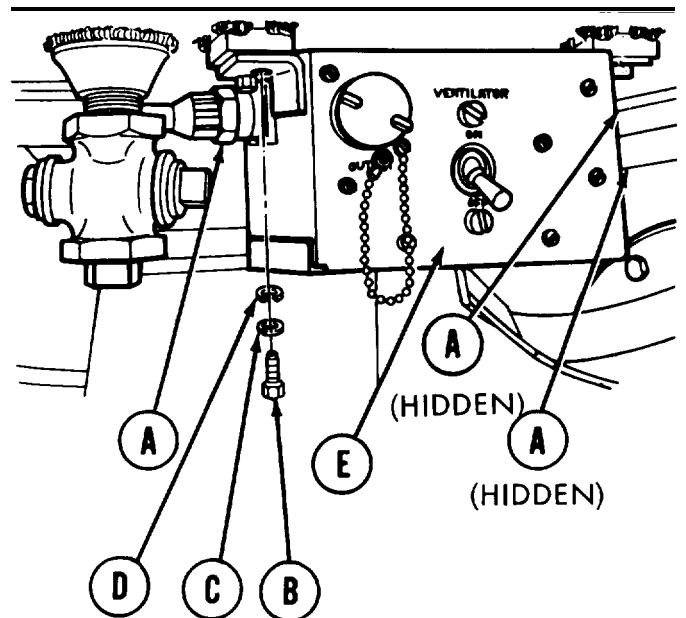


**REMOVAL:**

1. Using spanner wrench, remove three electrical connectors (A).
2. Using 7/16 inch socket and extension, remove four screws (B), washers (C) and lockwashers (D).
3. Remove accessories control box (E).

**INSTALLATION:**

1. Place accessories control box (E) in position in vehicle.
2. Using 7/16 inch socket and extension, install four screws (B), washers (C) and lockwashers (D).
3. Using spanner wrench, install three electrical connectors (A).
4. Do operational test (TM 5-5420-202-10).



End of Task

TA251408

**CUPOLA COVER REPLACEMENT (sheet 1 of 2)**

- TOOLS:** Roller head pry bar  
 Snap ring pliers  
 Hammer  
 Crowbar  
 5/16 in. socket head screw key (allen wrench)  
 Brass drift

- SUPPLIES:** Retaining rings (2 required)  
 Rope, 1/2 in. (approx. 10 ft.) (Item 24, Appendix D)

**PRELIMINARY PROCEDURES:** Remove periscope mount lid (page 3-28).

**PERSONNEL:** Two

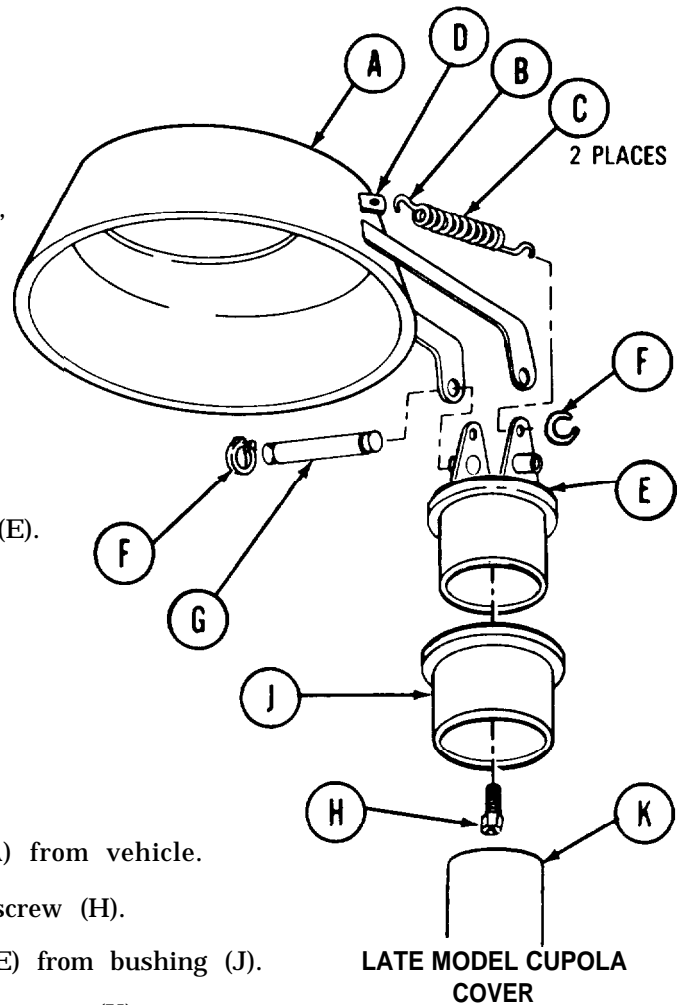
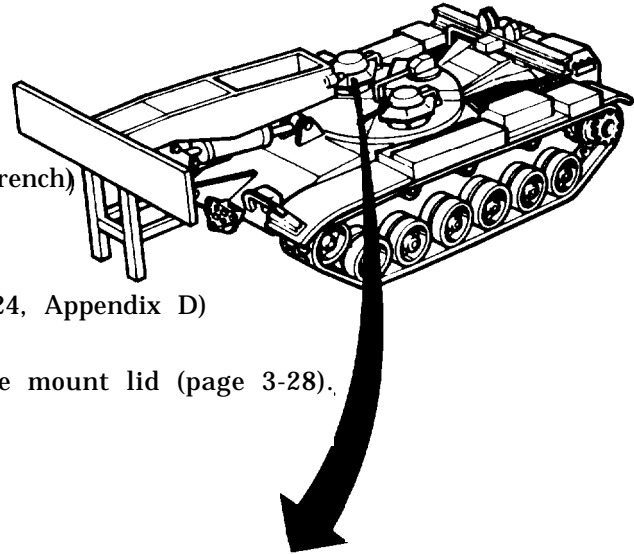
**REMOVAL:**

**NOTE**

- Left and right covers are identical.
- For cupola cover on early model cupola, start procedure at step 2.
- For cupola cover on late model cupola, start procedure at step 1.

1. Remove cupola cover handles (page 3-21),
2. Open cover (A).
3. Loop rope around forward eye (B) of spring (C) and while first technician pulls slowly forward and side to side with rope, second technician uses pry bar to pry forward eye (B) of spring (C) out of cover bracket (D).
4. Remove spring (C) from swing assembly (E).
5. Repeat steps 2 and 3 for opposite spring.
6. Close cover (A).
7. Using pliers, remove two retaining rings (F) from hinge pin (G).
8. Using hammer, and brass drift tap out hinge pin (G).
9. With second technician, remove cover (A) from vehicle.
10. From inside vehicle, use key to remove screw (H).
11. Using crowbar, pry out swing assembly (E) from bushing (J).
12. Using crowbar, pry out bushing (J) from mount (K).

**Go on to Sheet 2**



TA251409

**CUPOLA COVER REPLACEMENT (Sheet 2 of 2)****INSTALLATION:**

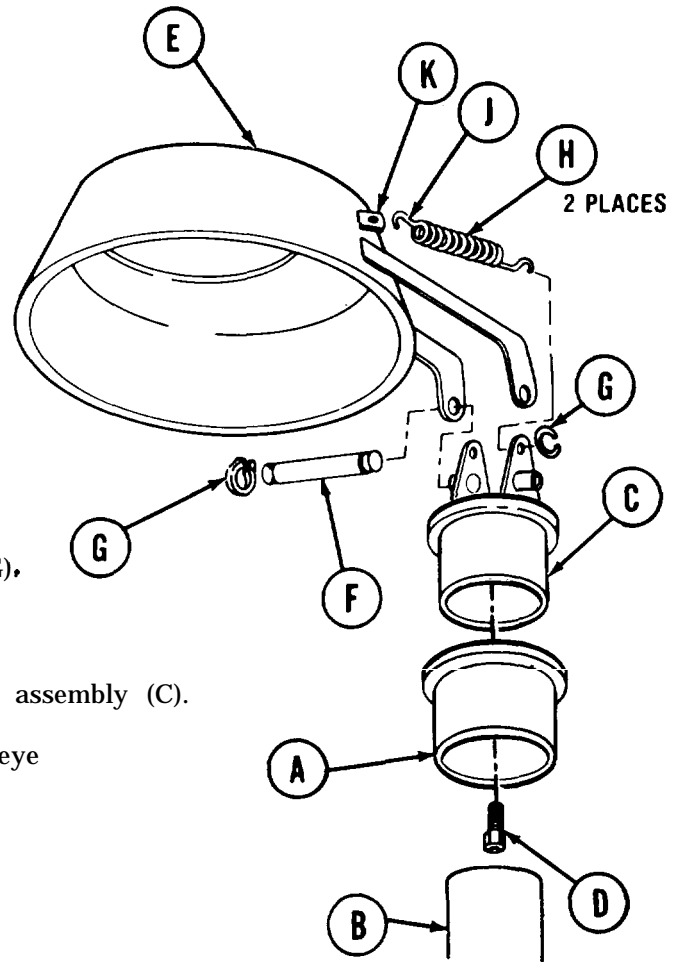
1. Manually install bushing (A) on mount (B).
2. Using hammer as needed, install swing assembly (C) until firmly positioned and seated on vehicle in bushing (A).
3. From inside vehicle, use key to install screw (D) into swing assembly (C).
4. With second technician, position cover (E) on vehicle in closed position.
5. Using hammer, tap in hinge pin (F).
6. Using pliers, install two retaining rings (G),
7. Lock cover (E) in open position.
8. Place two springs (H) in position on swing assembly (C).
9. Using pry bar and hammer guide forward eye (J) of springs (H) into cover eye (K).
10. Install periscope mount lid (page 3-29).

**NOTE**

**Do step 11 only when installing cupola cover on late model cupola.**

11. Install cupola cover handles (page 3-22).

End of Task



**LATE MODEL CUPOLA COVER**

**VISION BLOCK REPLACEMENT (EARLY MODEL CUPOLA) (Sheet 1 of 3).**

**TOOLS:** Screwdriver (flat tip) 7/8 in. socket with 1/2 in. drive  
Putty knife 5 in. extension with 1/2 in. drive  
Diagonal cutting pliers Pliers, slip joint  
Handle with 1/2 in. drive Torque wrench with 1/2 in. drive  
(0-175 lb-ft)

**SUPPLIES:** Dry cleaning solvent (Item 15, Appendix D)  
Rag, wiping (Item 12, Appendix D)  
Vision block  
Locking wire (Item 20 Appendix D)  
Sealing compound (Item 21, Appendix D)  
Gloves (Item 27, Appendix D)

**PERSONNEL:** One

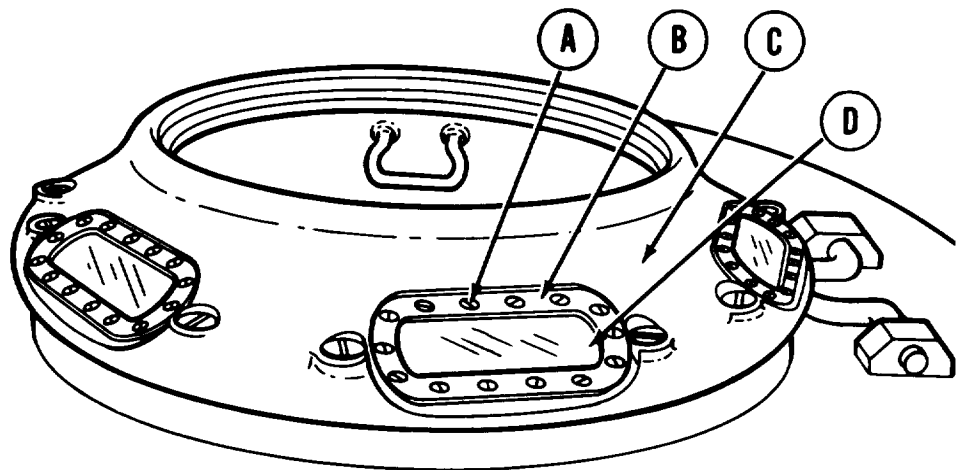
**REFERENCE:** TM 5-5420-202-10

**PRELIMINARY PROCEDURE:** Open cupola cover.

**REMOVAL:**

1. Using flat-tip screwdriver remove fourteen screws (A).
2. Using flat-tip screwdriver pry up on bezel (B) to break sealant and remove bezel from cupola body (C).
3. Using putty knife scrape sealing compound from cupola body (C) vision block (D) and bezel (B).

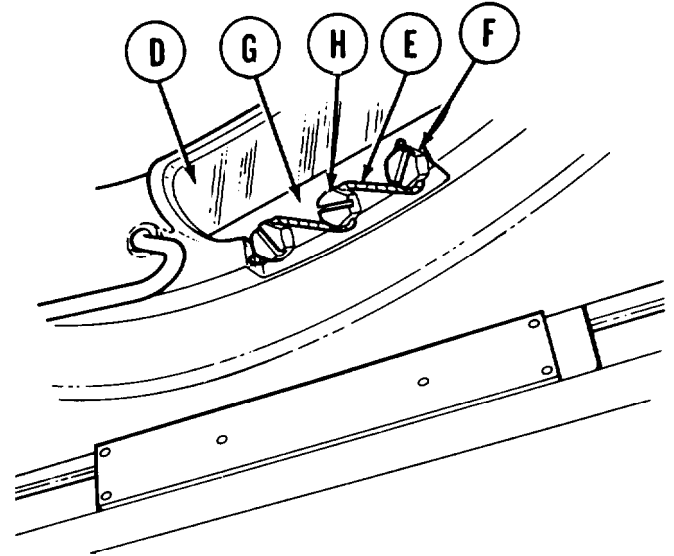
Go on to Sheet 2





**VISION BLOCK REPLACEMENT (EARLY MODEL CUPOLA) (Sheet 2 of 3).**

4. Using diagonal cutting pliers cut lock wire (E) and remove it from three screws (F) holding prism lock wedge (G).
5. Using 7/8 inch socket remove two screws from outer holes in wedge (G).
6. Using 7/8 inch socket turn jackscrew (H) to force wedge (G) from lock position.
7. Remove wedge (G) jackscrew (H) and vision block (D).

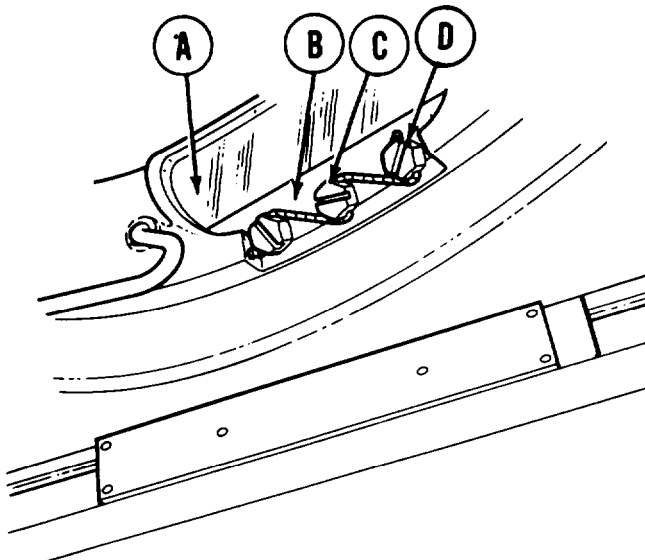


**WARNING**

Cleaning agent specified is flammable. Use only in well ventilated areas. Keep away from flames, sparks, or heat. Do not smoke while using. Prevent contact with eyes, mouth, and/or skin. Wear rubber gloves when performing cleaning procedures.

8. Clean all exposed surfaces with dry cleaning solvent and wipe dry with cotton rags.

**INSTALLATION:**

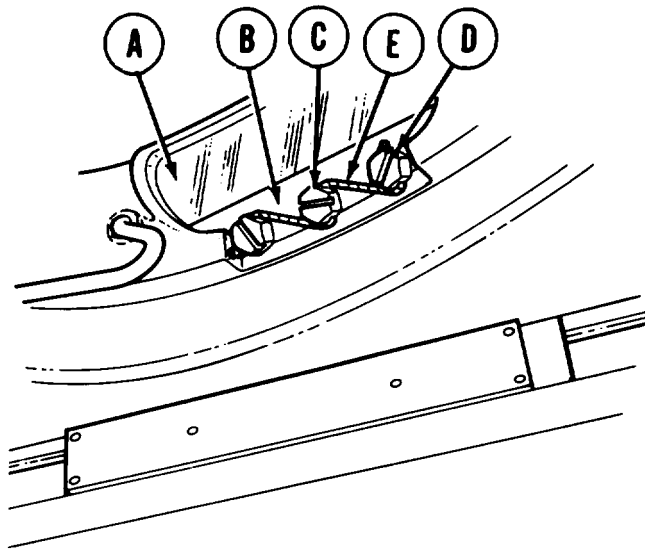


1. Insert vision block (A) in cupola body with outside surface flush with cupola surface.
2. Position wedge (B) slot down with jackscrew (C) in slot.
3. Insert wedge (B) with jackscrew (C) and two outer screws (D) in cupola body until screws are finger tight.

Go on to Sheet 3

VISION BLOCK REPLACEMENT (EARLY MODEL CUPOLA) (Sheet 3 of 3)

4. Using 7/8 inch socket, tighten jackscrew (C) to seat vision block (A) in place.
5. Using 7/8 inch socket, alternately tighten two outer screws (D) to 10 lb-ft (13 N m).
6. Using locking wire (E) and slipjoint pliers, lockwire three screws holding wedge (B).
7. Using sealing compound kit, apply sealant around outer circumference of vision block (A) to obtain a waterproof seal between vision block (A) and cupola (F).

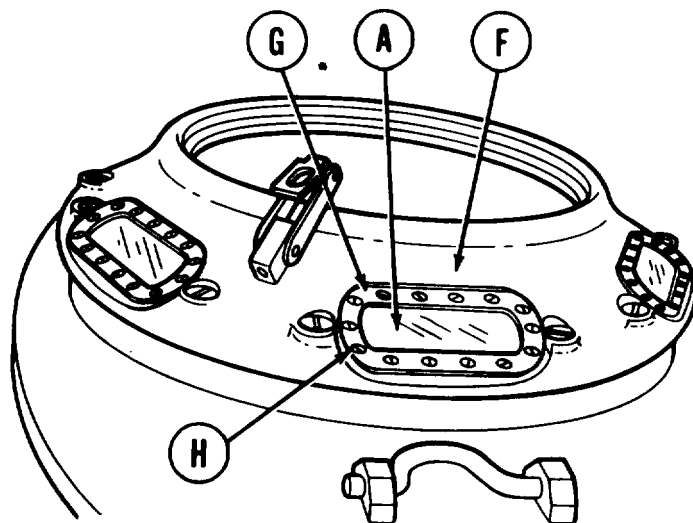


**NOTE**

Sealant will be tacky when applied but will harden to form a hard rubber like seal.

8. Align bezel (G) with holes in cupola.
9. Using flat-tip screwdriver, insert and tighten fourteen screws (H).

End of Task



**CUPOLA BODY ASSEMBLY REPLACEMENT (EARLY MODEL CUPOLA) (Sheet 1 of 3)**

**TOOLS:** Sling, lifting cupola  
 Lifting device  
 Handle with 1/2 in. drive  
 Screwdriver bit with 1/2 in. drive  
 Crowbar  
 Sledge hammer  
 Putty knife  
 Brush  
 Aligning punch

**SUPPLIES:** Cupola body  
 Adhesive, synthetic rubber (Item 2, Appendix D)  
 Wood blocks (make from Item 25, Appendix D) (4 required)  
 Dry cleaning solvent (Item 15, Appendix D)  
 Rags (Item 12, Appendix D)  
 Gloves (Item 27, Appendix D)

**PERSONNEL:** Three including crane operator

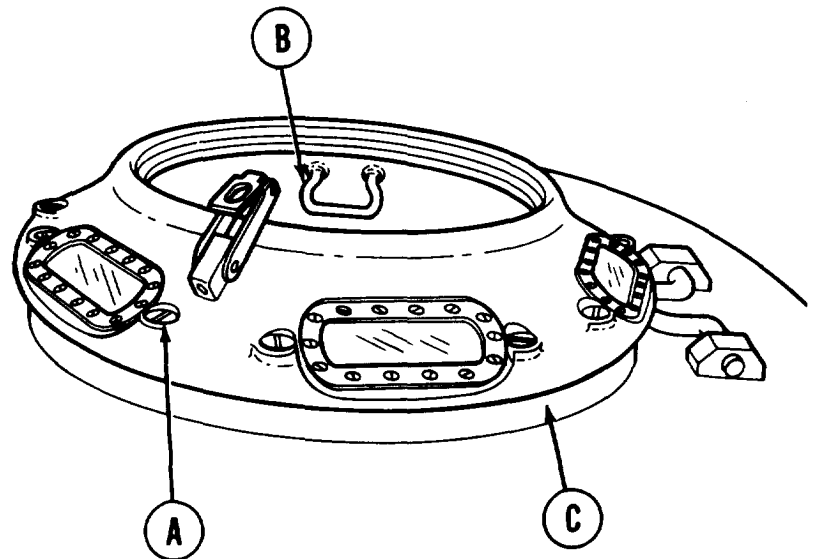
**REFERENCE:** TM 5-5420-202-10

**PRELIMINARY PROCEDURES:** Unlock security latch  
 Open cupola cover  
 Safety latch cupola cover

**REMOVAL:**

1. Using screwdriver bit remove ten screws (A).
2. Attach cupola lifting sling to loops (B).
3. Using crowbar, pry up on cupola bottom (C) while second technician taps edge of cupola body with sledge hammer to loosen it.

**Go on to Sheet 2**



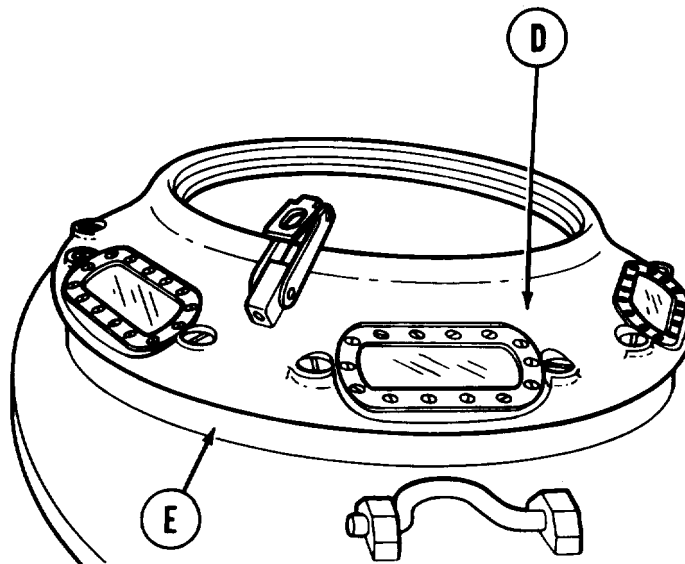
CUPOLA BODY ASSEMBLY REPLACEMENT (EARLY MODEL CUPOLA) (Sheet 2 of 3)

4. With help from second technician, direct crane operator to lift cupola body (D) from quadrant (E).
5. Lower cupola body assembly on to wooden blocking material.
6. Using putty knife scrape sealant from exposed surface of quadrant (E).

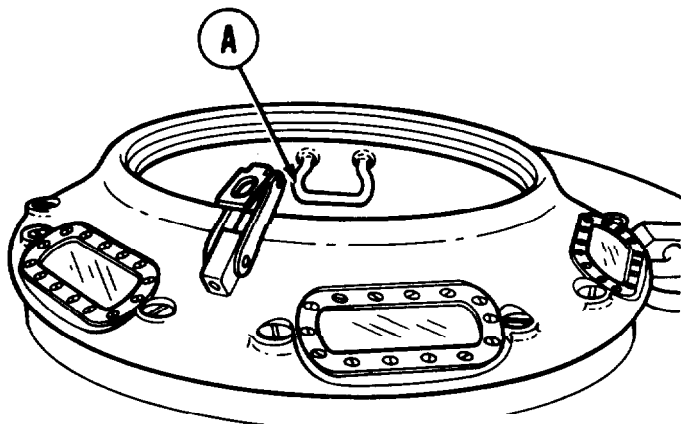
**WARNING**

Cleaning agent specified is flammable. Use only in well ventilated areas. Keep away from flames, sparks, or heat. Do not smoke while using. Prevent contact with eyes, mouth, and/or skin. Wear rubber gloves when performing cleaning procedures.

7. Clean all exposed surfaces with dry cleaning solvent and wipe dry with cotton rags.



INSTALLATION:



1. Attach cupola lifting sling to loops (A).
2. With help from second technician, direct crane operator to lift cupola body so that mating surface can be inspected.

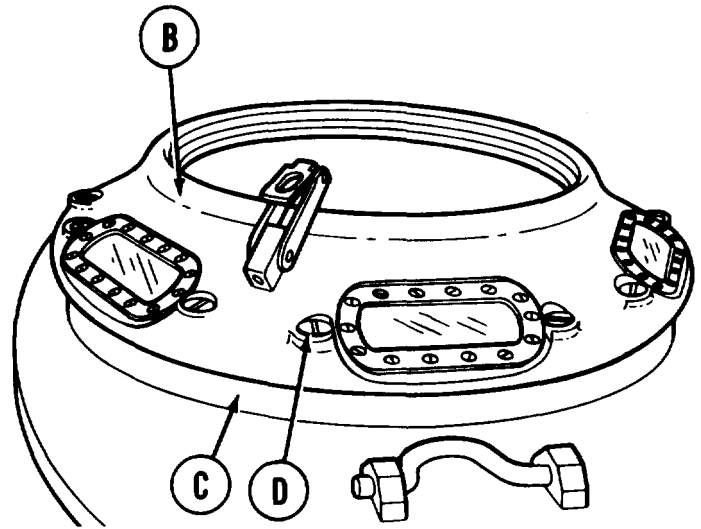
**NOTE**

If dirty clean mating surface with dry cleaning solvent and wipe dry with cotton rags.

Go on to Sheet 3

## CUPOLA BODY ASSEMBLY REPLACEMENT (EARLY MODEL CUPOLA) (Sheet 3 of 3)

3. Using brush, coat mating surfaces of the cupola body (B) and quadrant (C) with adhesive.
4. With help from second technician, direct crane operator to position cupola body (B) over quadrant (C).
5. Using punch, aline screw holes in cupola body (B) and quadrant (C) and direct crane operator to lower body onto quadrant .
6. Using brush apply adhesive to ten screws (D).
7. Using screwdriver bit install ten *screws* (D).
8. Close and latch cupola cover.



END OF TASK

TA251416

CUPOLA TOP AND VISION BLOCK REPLACEMENT (LATE MODEL CUPOLA) (Sheet 1 of 3)

TOOLS: Diagonal cutting pliers (side cutters)  
1-1/8 in. socket with 1/2 in. drive  
3/4 in. socket with 1/2 in. drive  
Crowbar  
Sledge hammer  
Putty knife  
1/2 in. combination wrench

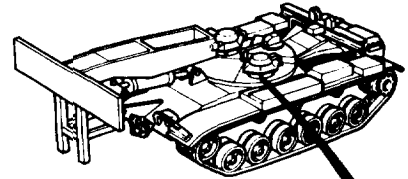
Chisel  
Hammer  
Ratchet with 1/2 in. drive  
1-1/8 in. socket with 3/4 in. drive  
Pliers, slip joint  
Torque wrench 0 to 600 lb-ft 3/4 in. drive  
(0 to 813 N.m)

SUPPLIES: Adhesive (Item 2, Appendix D)  
Lockwire (Item 20, Appendix D)  
Seal  
Brush (Item 4, Appendix D)

PERSONNEL: Two

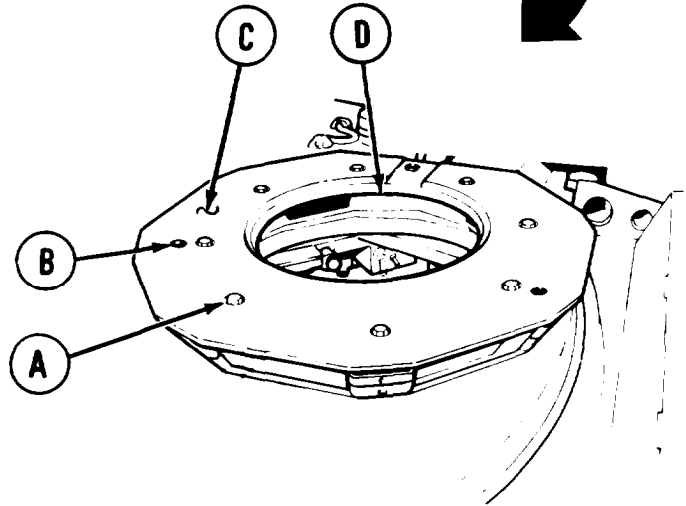
REFERENCE: TM 5-5420-202-10

PRELIMINARY PROCEDURE: Open cupola  
cover (TM 5-5420-202-10)



REMOVAL:

1. Using 1-1/8 inch socket, remove eight screws (A).
2. Using 3/4 inch socket, remove three screws (B).
3. Using crowbar, pry up on edge of cupola top (C) while second technician taps edge of cupola top (C) with sledge hammer to loosen it.
4. With help from second technician, remove cupola top (C) from vehicle.
5. Using putty knife, remove seal (D).



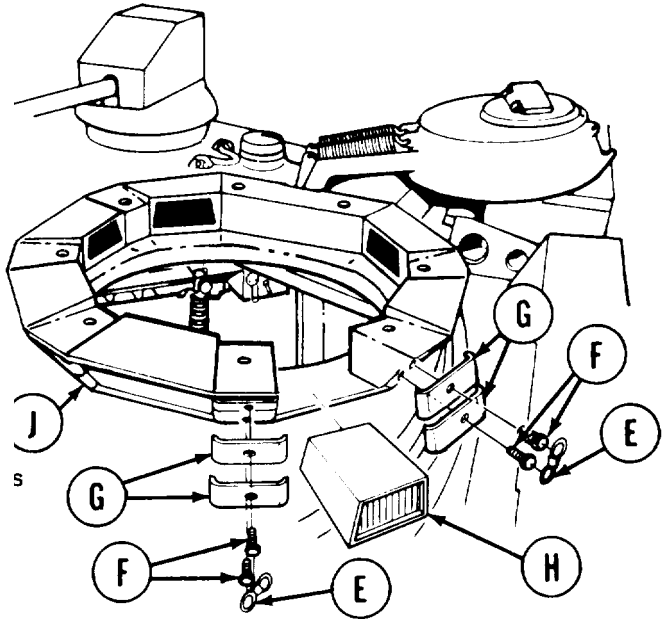
Go on to Sheet 2

**CUPOLA TOP AND VISION BLOCK REPLACEMENT (LATE MODEL CUPOLA) (Sheet 2 of 3)**

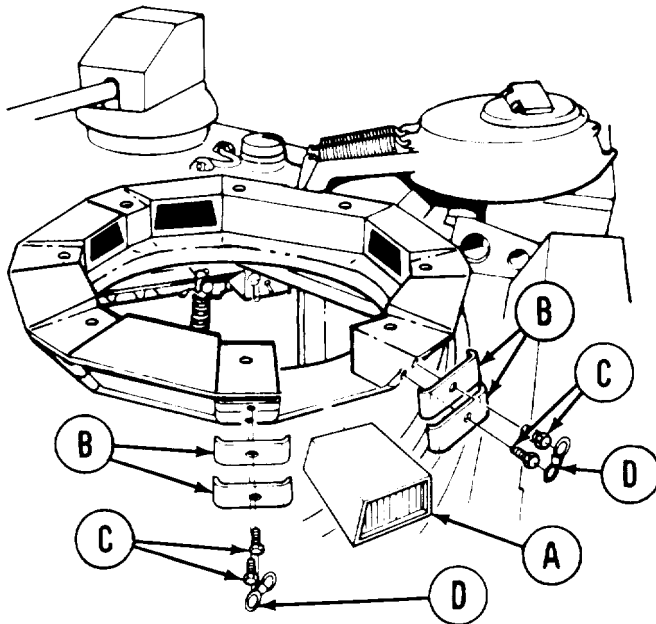
**NOTE**

Removal and installation are the same for all seven blocks except two rear blocks. Rear blocks have only three retainers.

6. Using side cutters, remove lockwire (E).
7. Using 1/2 inch wrench, remove four screws (F) and retainers (G).
8. Using chisel and hammer, remove vision block (H).
9. Using putty knife, remove sealant from vision block (H) and cupola body (J).



**INSTALLATION:**



1. Using brush, coat sides, top, and bottom of vision block (A) with adhesive.
2. Place vision block (A) in position.
3. Place retainers (B) in position.
4. Manually install four screws (C) to secure vision block (A).
5. Using 1/2 inch wrench, tighten screws (c).
6. Using pliers, install lockwire (D).

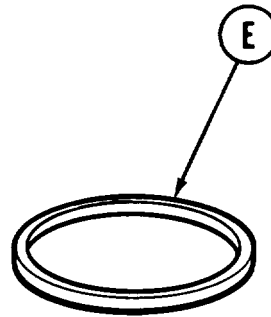
Go on to Sheet 3

TA251418

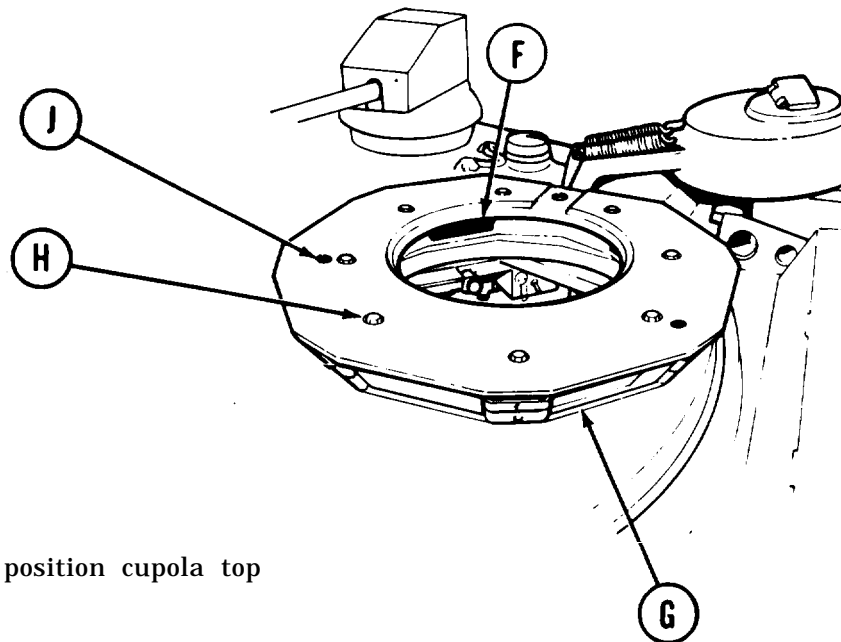
CUPOLA TOP AND VISION BLOCK REPLACEMENT (LATE MODEL CUPOLA) (Sheet 3 of 3)

7. Using putty knife, apply adhesive to new seal (E) and around cupola top (F).

8. Install seal (E) on to cupola top (F).



9. Using brush, coat underside mating surface of cupola top (F) with adhesive.



10. With second technician, position cupola top (F) on body (G).

11. Using brush, apply adhesive to eight screws (H).

12. Using 1-1/8 inch socket, install eight screws (H).

13. Using torque wrench, tighten eight screws (H) to 280-310 lb-ft (379-420 N.m).

14. Using brush, apply adhesive to three screws (J).

15. Using 3/4 inch socket, install three screws (J).

END OF TASK



**CUPOLA BODY REPLACEMENT (LATE MODEL CUPOLA) (Sheet 1 of 2)**

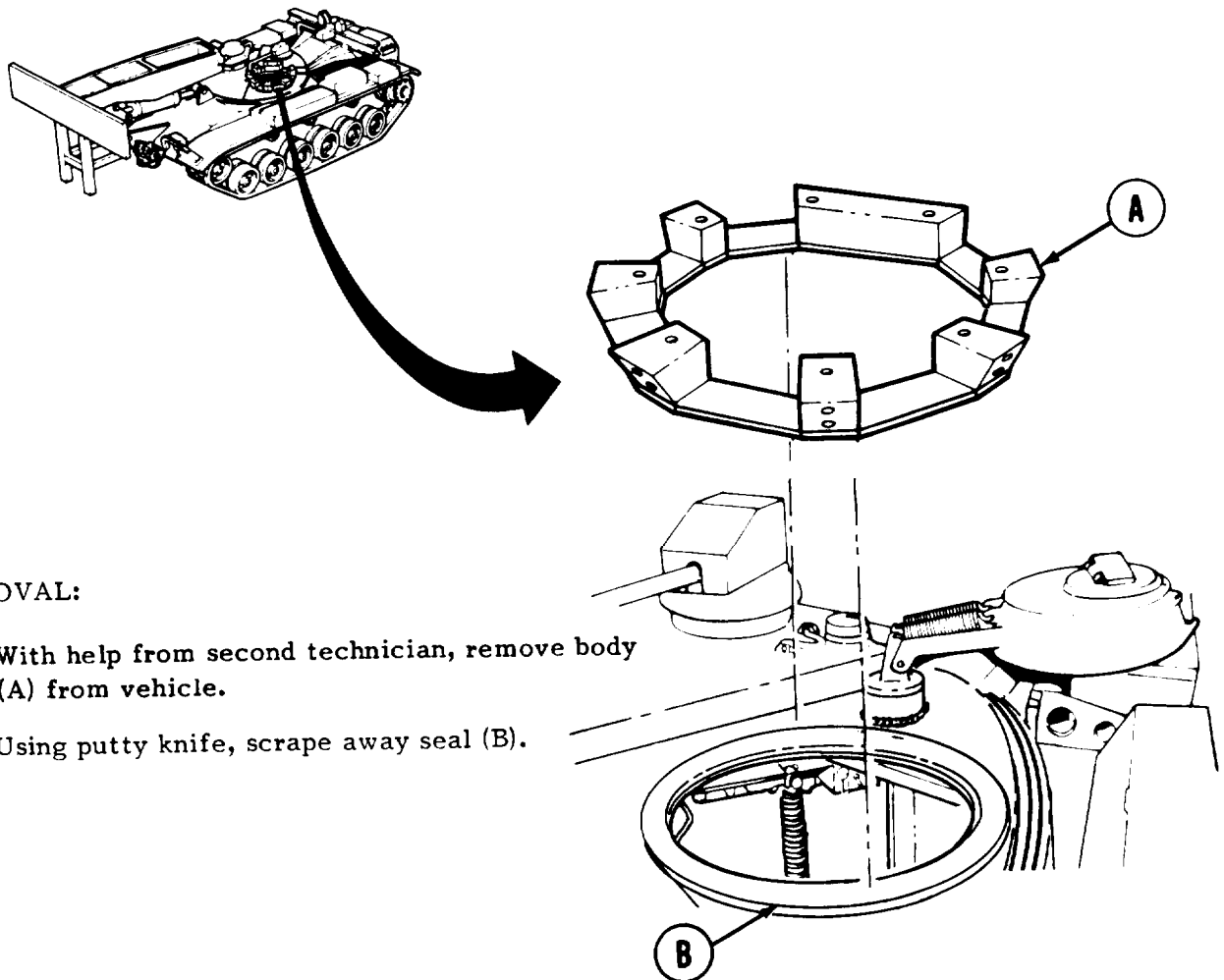
**TOOLS:** Putty knife

**SUPPLIES:** Seal  
 Adhesive (Item 2, Appendix D)  
 Brush (Item 4, Appendix D)

**PERSONNEL:** Two

**REFERENCE:** TM 5-5420-202-10

**PRELIMINARY PROCEDURE:** Remove cupola top and vision blocks (page 3-16).



**REMOVAL:**

1. With help from second technician, remove body (A) from vehicle.
2. Using putty knife, scrape away seal (B).

Go on to Sheet 2

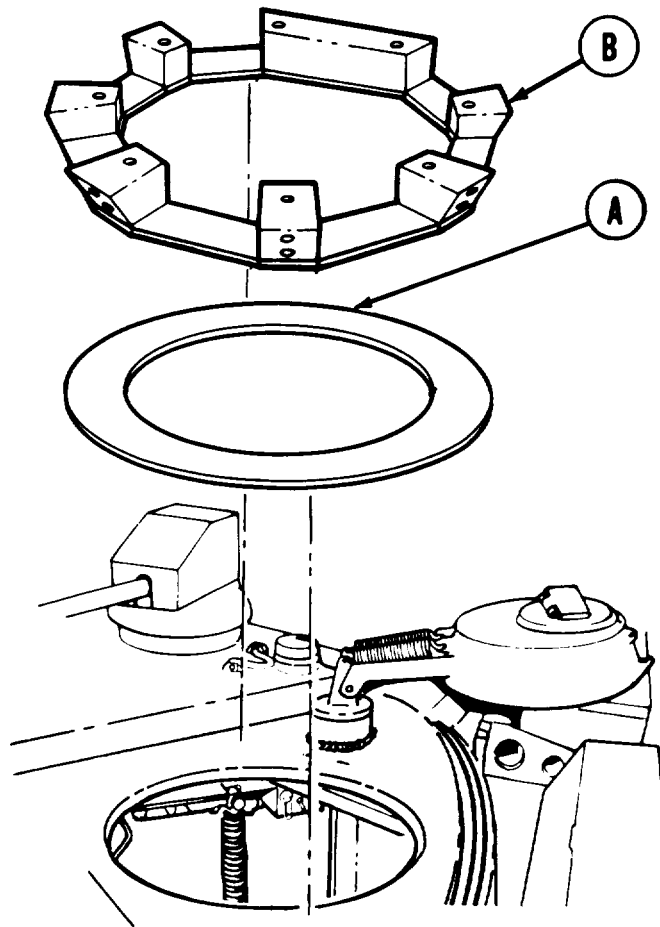
TA251420

CUPOLA BODY REPLACEMENT (LATE MODEL CUPOLA) (Sheet 2 of 2)

INSTALLATION:

1. Using putty knife, apply adhesive to new seal (A).
2. Install seal (A).
3. Using brush, coat bottom of body (B) with sealant.
- 4\* With second technician, position body (B) on vehicle.
5. Install vision blocks and cupola top (page 3-17).

End of Task



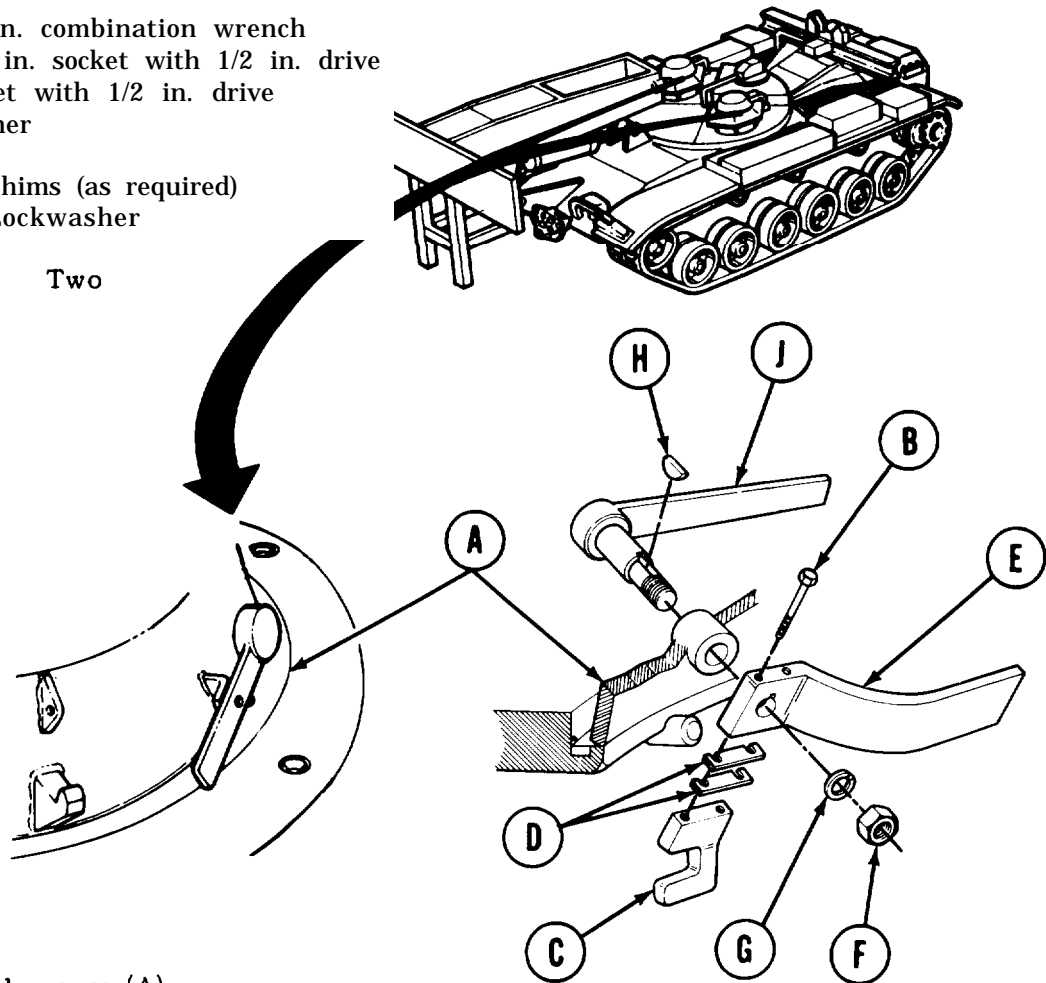
TA251421

**CUPOLA COVER HANDLES REPLACEMENT (LATE MODEL CUPOLA) (Sheet 1 of 2)**

**TOOLS:** 7/16 in. combination wrench  
 15/16 in. socket with 1/2 in. drive  
 Ratchet with 1/2 in. drive  
 Hammer

**SUPPLIES:** Shims (as required)  
 Lockwasher

**PERSONNEL:** Two



**REMOVAL:**

1. Open cupolala cover (A).

**NOTE**

**If replacing only outside handle,  
 go to step 4.**

2. Using wrench, remove two screws (B).
3. Remove hook (C) and shims (D), if any, from inside handle (E). Retain shims (D) for installation.
4. Using 15/16 inch socket, remove nut (F) and lockwasher (G).
5. Manually pull off inside handle (E).
6. Manually remove woodruff key (H) and retain for installation.
7. Using hammer, tap out outside handle (J).

Go on to Sheet 2

TA251422

**CUPOLA COVER HANDLES REPLACEMENT (LATE MODEL CUPOLA) (Sheet 2 of 2)**

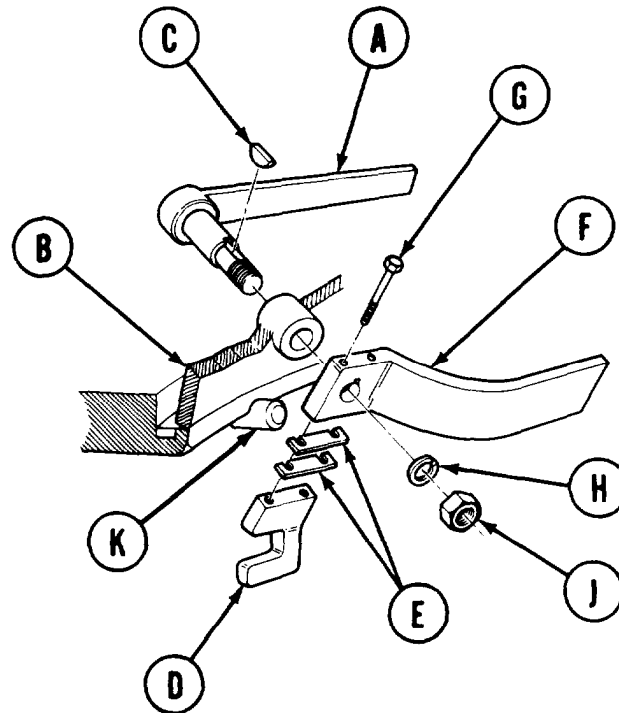
**INSTALLATION:**

1. Manually slide outside handle (A) through cupola cover (B),
2. Manually install woodruff key (C).

**NOTE**

**If only outside handle was replaced, go to step 6.**

3. Place hook (D) and shims (E), if any, in position on inside handle (F).
4. Manually install two screws (G).
5. Using wrench, tighten two screws (G).



6. Manually slide inside handle (F) into position on shaft of outside handle (A).
7. Manually install lockwasher (H) and nut (J).
8. Using 15/16 inch socket, tighten nut (J).
9. From inside vehicle, close cupola cover (B).
10. Have second technician hold down cover (R) from outside of vehicle while performing next step.
11. Latch inside handle (F) to see that hook (D) properly contacts locking lug (K) and seals cupola cover (B). If hook (D) does not contact lug (K) or seal properly, add or remove shims (E) as needed between hook (D) and inside handle (F).

End of Task

TA251423

**CUPOLA COVER SAFETY LATCH REPLACEMENT (Sheet 1 of 2)**

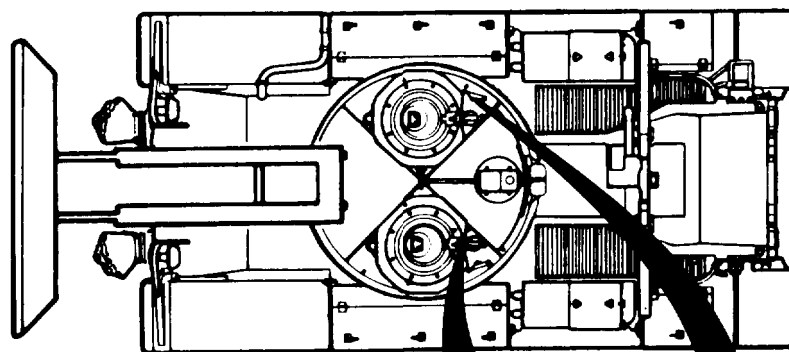
**TOOLS:** 3/4 in. socket with 1/2 in. drive  
 Ratchet with 1/2 in. drive  
 3/4 in. combination wrench  
 1/8 in. drive pin punch  
 Hammer  
 Long round nose pliers

**SUPPLIES:** Cotter pin  
 Lockwasher  
 Spring pin

**PERSONNEL:** One

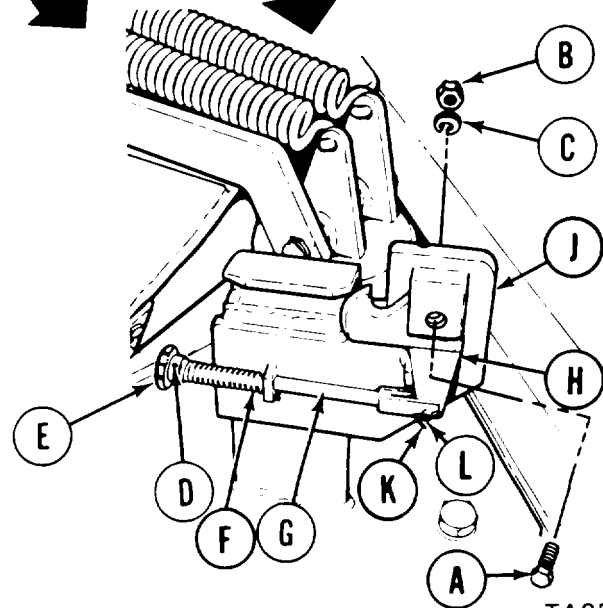
**REFERENCE:** TM 5-5420-202-10

**PRELIMINARY PROCEDURE:** Close cupola cover (TM 5-5420-202-10)



**REMOVAL:**

1. Holding screw (A) with wrench, use socket-to remove nut (B) and lockwasher (C).
2. Remove screw (A).
3. Using hammer and punch, drive out spring pin (D).
4. Manually remove knob (E) and spring (F).
5. Remove rod (G) with latch (H) from mounting bracket (J).
6. Using pliers, remove cotter pin (K).
7. Using pliers if necessary, remove headed pin (L).



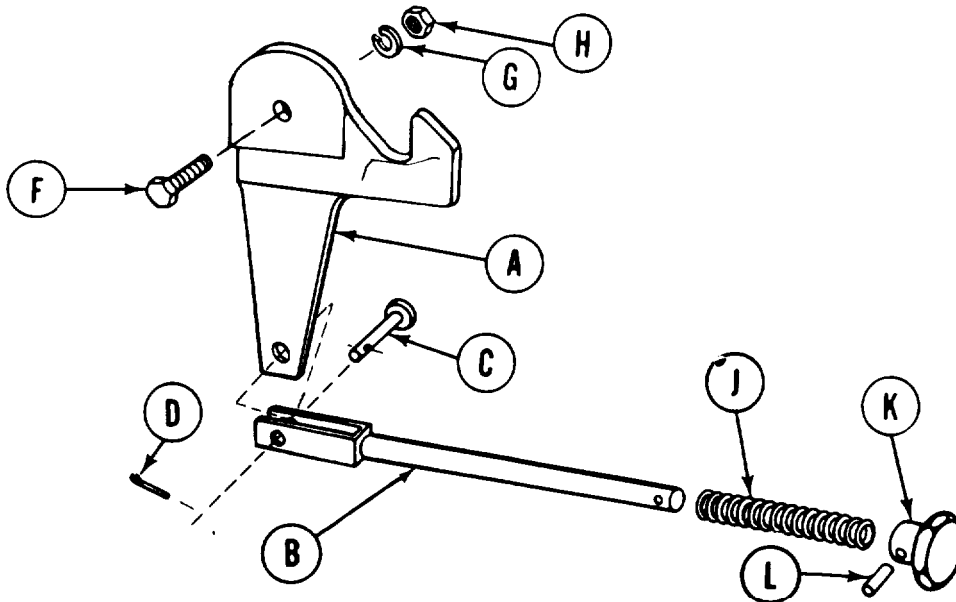
TA251424

Go on to Sheet 2

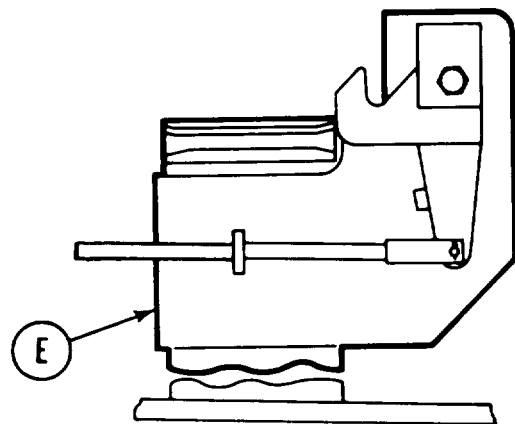
**CUPOLA COVER SAFETY LATCH REPLACEMENT (sheet 2 of 2)**

**INSTALLATION:**

1. Position latch (A) in rod (B) with holes alined.
2. Manually insert headed pin (C) through holes with head in direction shown.
3. Using pliers, install cotter pin (D).
4. Place rod (B) with latch (A) in position on mounting bracket (E).



5. Manually install screw (F), new lockwasher (G), and nut (H).
6. Holding screw (F) with wrench, use socket to tighten nut (H) so that latch (A) can move freely.
7. Place spring (J) on end of rod (B).
8. Place knob (K) in position on rod (B).
9. Using punch, aline holes in knob (K) and rod (B).
10. Using hammer and punch, install spring pin (L).
11. Do operational check (TM 5-5420-202-10).



End of Task

TA251425

PERISCOPE MOUNT REPLACEMENT (Sheet 1 of 3)

PROCEDURE INDEX

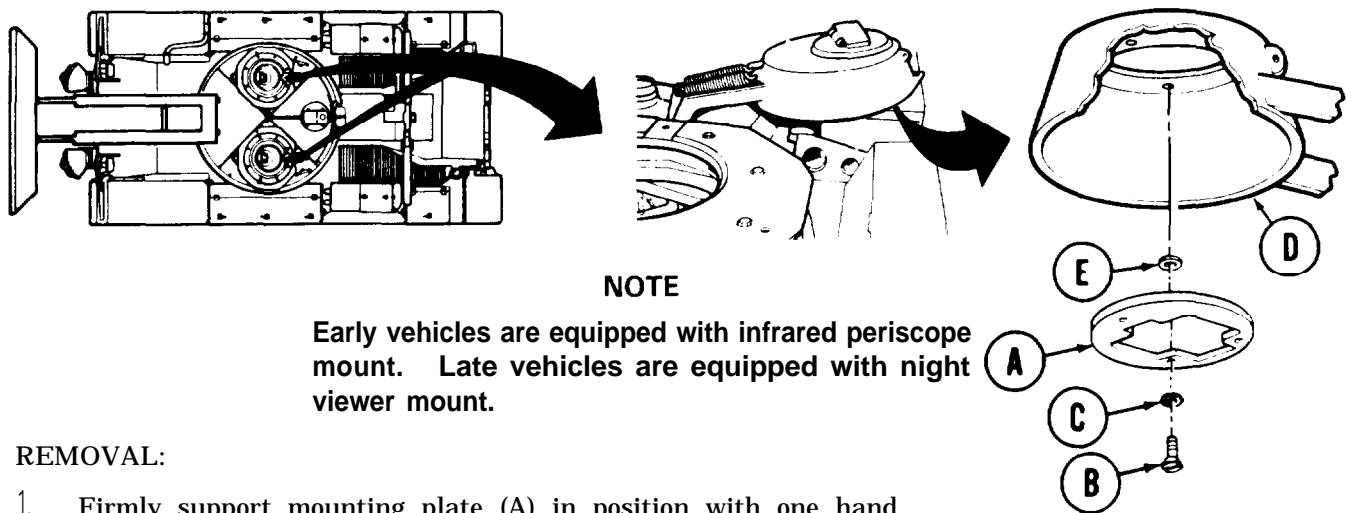
PROCEDURE	PAGE
Removal	3-25
Cleaning and Inspection	3-26
Installation	3-26

TOOLS: Flat-tip screwdriver

SUPPLIES: Crocus cloth (Item 5, Appendix D)  
 Steel wool (Item 16, Appendix D)  
 Pencil and paper (Items 22 and 23, Appendix D)  
 Bearing, teflon  
 Lockwashers (3 required)

REFERENCE: TM 5-5420-202-10

PRELIMINARY PROCEDURE: Close hatch cover (TM 5-5420-202-10).



NOTE

Early vehicles are equipped with infrared periscope mount. Late vehicles are equipped with night viewer mount.

REMOVAL:

1. Firmly support mounting plate (A) in position with one hand.
2. With other hand, use screwdriver to remove three screws (B) and three lockwashers (C) from lower side of plate (A).

NOTE

Shims (E) are positioned on top of mounting plate (A). Keep mount plate (A) as level as possible when removing.

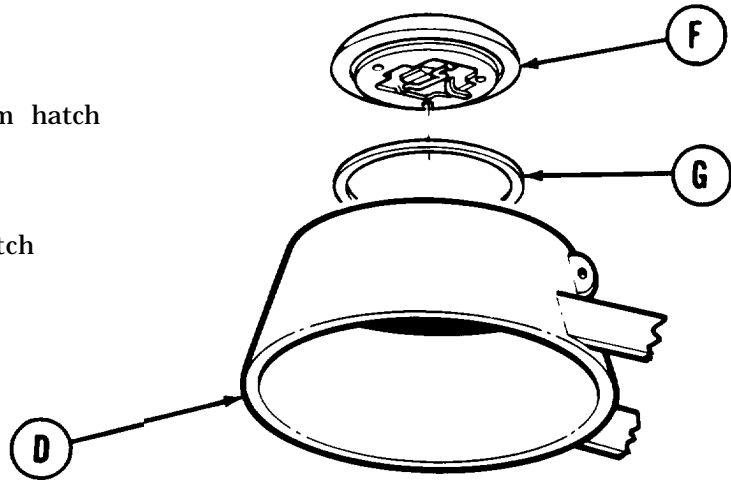
3. With both hands firmly supporting mounting plate (A), lower mounting plate from cover (D).
4. Remove shims (E) from upper side of plate (A). Record number of shims positioned at each location for installation purposes.

Go on to Sheet 2

TA251426

PERISCOPE MOUNT REPLACEMENT (Sheet 2 of 3)

5. Pushup mount (F) and separate from hatch cover (D).
6. Remove bearing (G) from top of hatch cover (D). Throw bearing (G) away.

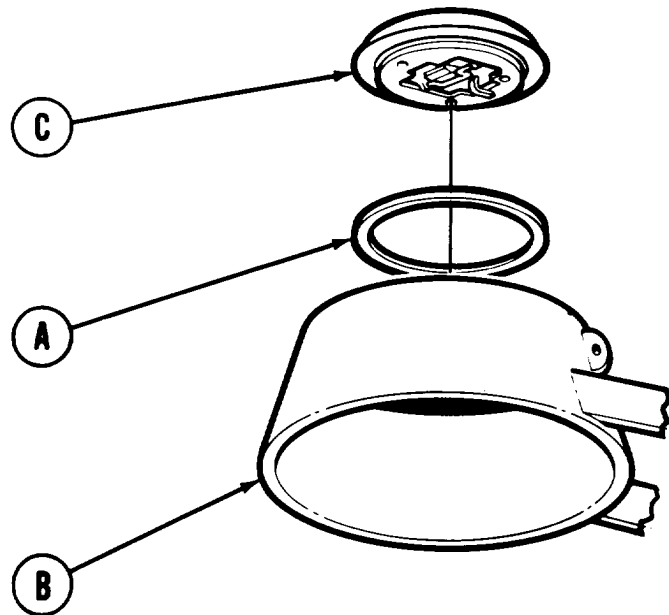


CLEANING AND INSPECTION:

1. Visually inspect all parts for damage or wear. All damaged or worn parts must be replaced.
2. Visually inspect all parts for corrosion. Corroded metallic parts which cannot be cleaned with crocus cloth or steel wool must be replaced.

INSTALLATION:

1. Place new bearing (A) on cover (B) at mount opening.
2. Place mount (C) on hatch cover (B).



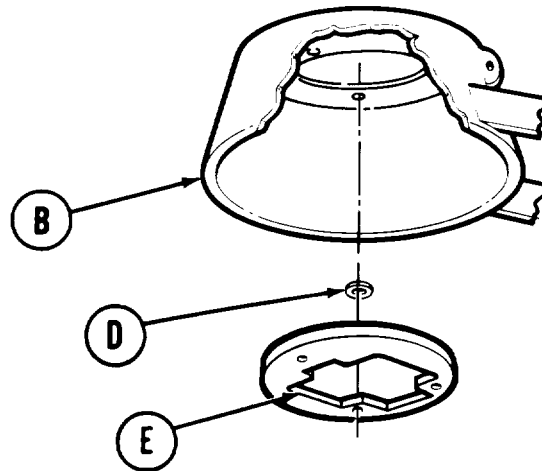
Go on to Sheet 3

TA251427

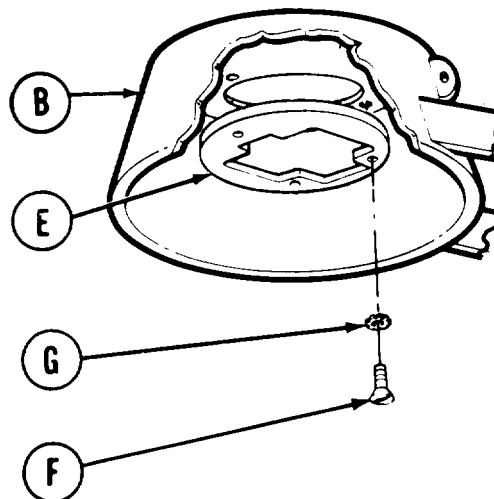


PERISCOPE MOUNT REPLACEMENT (Sheet 3 of 3)

3. Position shims (D) on top side of plate (E) in exact order as recorded.
4. Raise plate (E) with shims (D) to aline plate with holes in hatch cover (B).



5. Hold plate (E) in alined position and manually install three screws (F) and lockwashers (G) to hatch cover (B).
6. Using screwdriver, tighten screws (F).
7. Open hatch cover TM 5-5420-202-10



End of Task

TA251428

**PERISCOPE MOUNT LID REPLACEMENT (Sheet 1 of 3)**

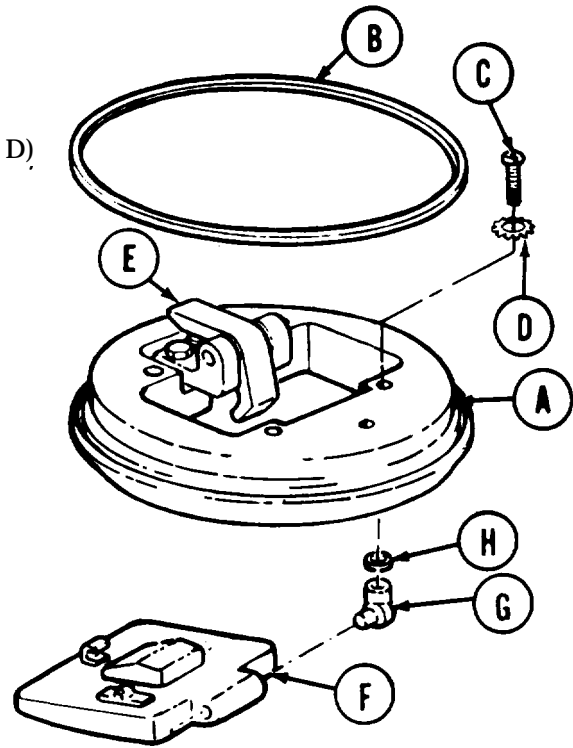
**TOOLS:** Flat-tip screwdriver  
Putty knife

**SUPPLIES:** Pencil (Item 22, Appendix D)  
Paper (Item 23, Appendix D)  
Adhesive (Item 1, Appendix D)  
Crocus cloth (Item 5, Appendix D)  
Steel wool (Item 16, Appendix D)  
Dry cleaning solvent (Item 15, Appendix D)  
Lockwashers (2 required)  
Seal, lid  
Goggles (Item 26, Appendix D)  
Gloves (Item 27, Appendix D)

**PRELIMINARY PROCEDURE:** Remove periscope mount (page 3-25)

**REMOVAL:**

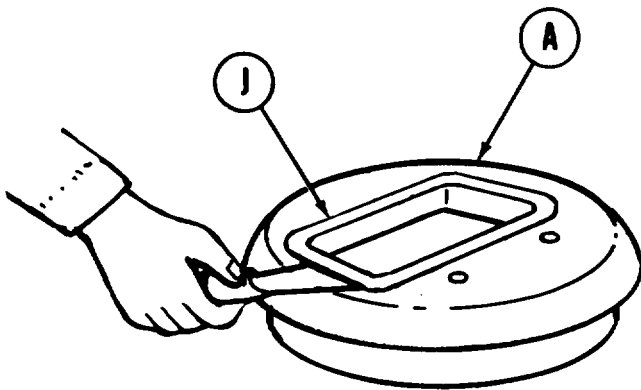
1. Position mount (A) bottom side up.
2. Remove seal (B).
3. Using screwdriver, remove two screws (C) and lockwashers (D) from mount (A).
4. Press latch (E) to free lid (F).
5. Position mount (A) top side up.



**NOTE**

**Record quantity and location of shims during removal for correct lid alignment during installation.**

6. Remove lid (F), two hinges (G), and shims (H) from mount (A).
7. Separate two hinges (G) from lid (F).



8. Using putty knife, remove lid seal (J) from mount (A). Throw lid seal (J) away.

Go on to Sheet 2

TA251429

**PERISCOPE MOUNT LID REPLACEMENT (Sheet 2 of 3)****CLEANING AND INSPECTION:**

1. Visually inspect all parts for cracks. All cracked parts must be replaced.
2. Visually inspect all parts for mechanical damage or wear. All damaged or worn parts must be replaced.
3. Visually inspect all parts for corrosion. Corroded parts which cannot be cleaned with crocus cloth or steel wool must be replaced.
4. Using putty knife, remove paint and other debris from lid seal mounting surface.

**WARNING**

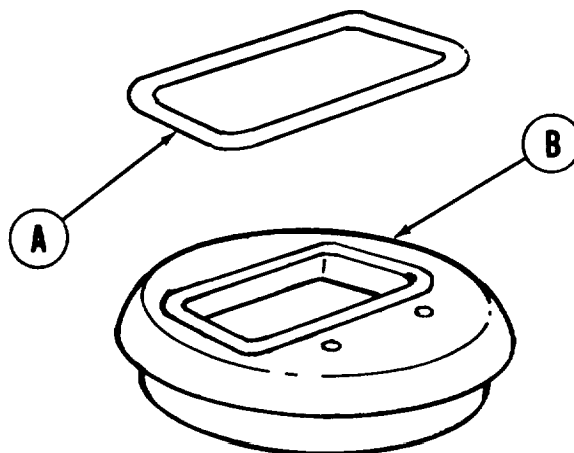
**Dry cleaning solvent P-D-680 is toxic and flammable. To prevent personal injury, wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point for Type #1 Dry Cleaning Solvent is 100°F (38°C) and for Type S2 is 138°F (50°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eye-s with water and get medical aid immediately.**

5. Clean mounting surface with clean cloth soaked in dry cleaning solvent.

**INSTALLATION:****NOTE**

**Minimum room temperature for bonding is 65° F. Do not use tape to hold parts in place.**

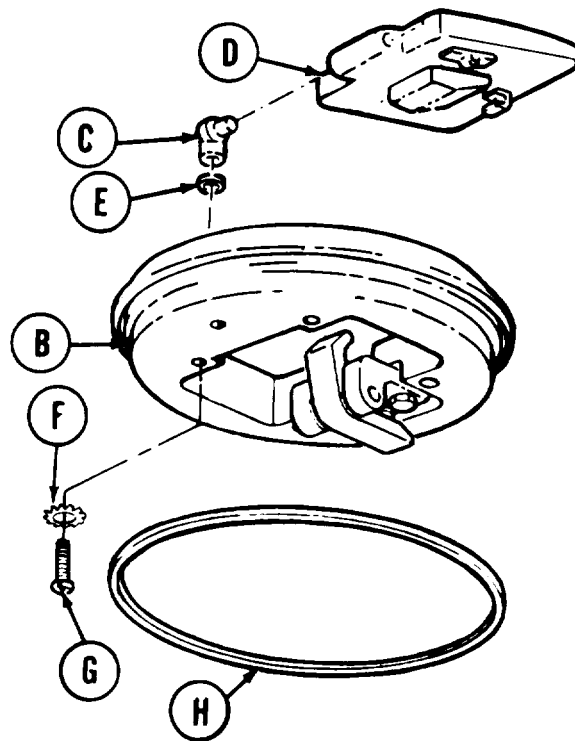
1. Apply thin coat of adhesive to lid seal groove.
2. Allow adhesive to set for 15 minutes.
3. Place lid seal (A) in groove in mount (B).



Go on to Sheet 3

PERISCOPE MOUNT LID REPLACEMENT (Sheet 3 of 3)

4. Position two hinges (C) into lid (D).
5. Position shims (E) on mount in same order as at removal.
6. Position lid (D) with attached hinges (C) on top side of mount (B).
7. Place two lockwashers (F) onto two screws (G).
8. Using screwdriver, install two screws (G).
9. Press seal (H) in groove of mount (B).
10. Install periscope mount (page 3-26).



End of Task

TA251431

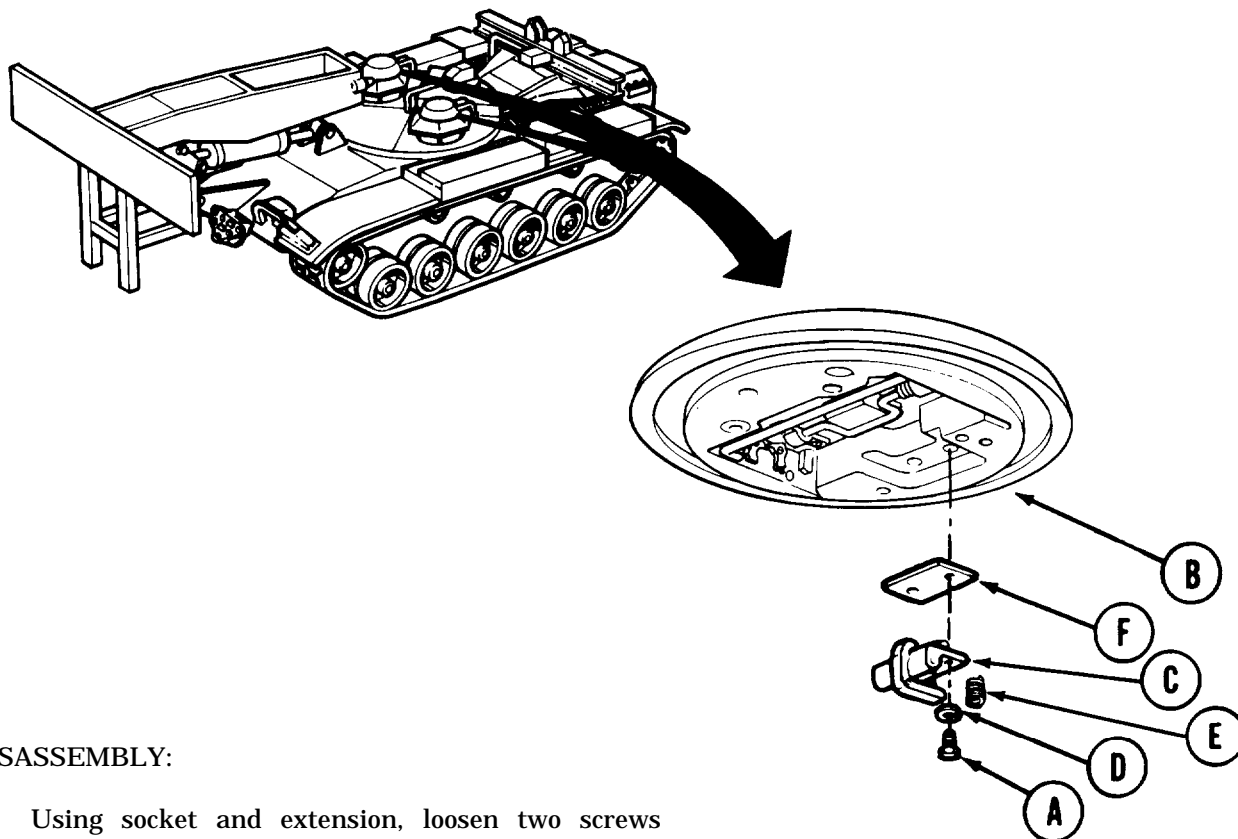
**PERISCOPE MOUNT LID LATCH REPAIR (Sheet 1 of 2)**

**TOOLS:** 7/16 in. socket with 1/2 in. drive  
 5 in. extension with 1/2 in. drive  
 Ratchet with 1/2 in. drive

**SUPPLIES:** Crocus cloth (Item 5, Appendix D)  
 Steel wool (Item 16, Appendix D)  
 Lockwashers (2 required)

**REFERENCE:** **TM 5-5420-202-10**

**PRELIMINARY PROCEDURE:** Close driver's or commander's hatch (TM 5-5420-202-10)

**DISASSEMBLY:**

1. Using socket and extension, loosen two screws (A) on underside of mount (B) at latch (C).
2. Supporting latch (C) with one hand, remove two screws (A) and two lockwashers (D).
3. Lower latch (C) from mount (B) together with latch spring (E) and shim (F).
4. With latch (C) removed from mount (B), separate latch (C) from shim (F) and remove spring (E).

**Go on to Sheet 2**

**TA251432**

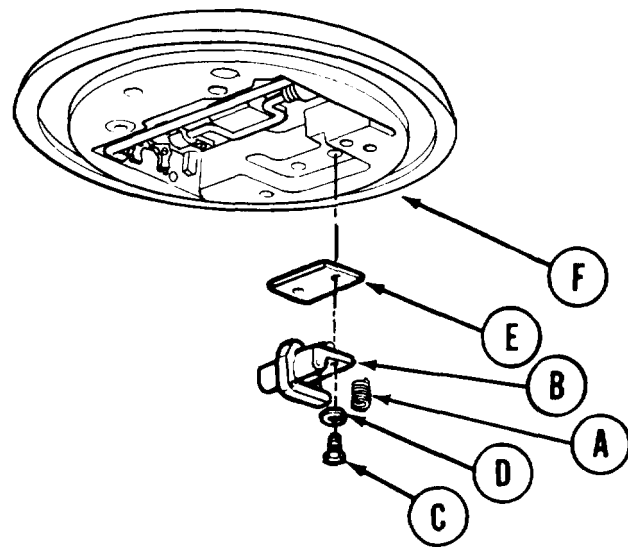
PERISCOPE MOUNT LID LATCH REPAIR (Sheet 2 of 2)

CLEANING AND INSPECTION:

1. Visually inspect all parts for damage or wear. All damaged or worn parts must be replaced.
2. Visually inspect all parts for corrosion. All corroded parts which cannot be cleaned with crocus cloth or steel wool must be replaced.

ASSEMBLY:

1. Place spring (A) on seat provided in latch (B).
2. Put screws (C) and lockwashers (D) in latch (B).
3. Position shim (E) on screws [C].
4. Place latch (B) in position on mount (F).
5. Manually start screws (C).
6. Using 7/16 inch socket and extension, tighten screws (C).
7. Open driver's or commander's hatch (TM5-5420-202-10).



End of Task

**PERISCOPE MOUNT RETAINER REPAIR (Sheet 1 of 3)**

**TOOLS:** Flat-tip screwdriver

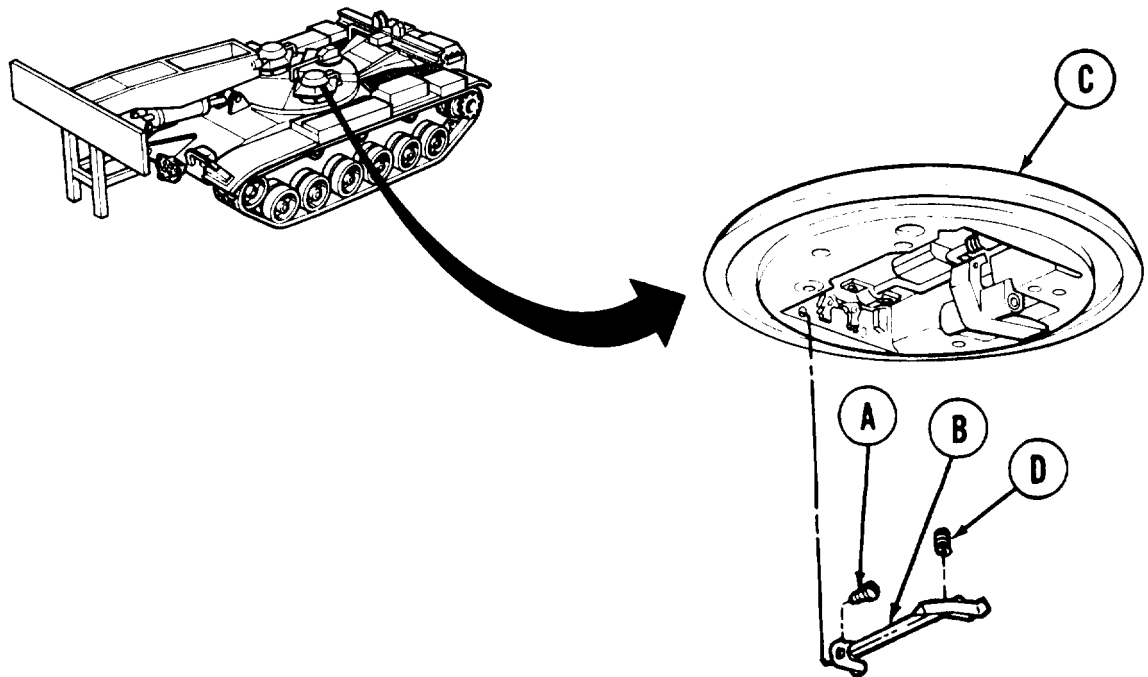
**SUPPLIES:** Crocus cloth (Item 5, Appendix D)  
Steel wool (Item 16, Appendix D)

**REFERENCE:** TM 5-5420-202-10

**PRELIMINARY PROCEDURE:** Close hatch cover (TM 5-5420-202-10)

**DISASSEMBLY:**

1. Using screwdriver, remove two screws (A) securing latch (B) while holding it to mount (C).
2. Remove latch (B) together with two springs (D).

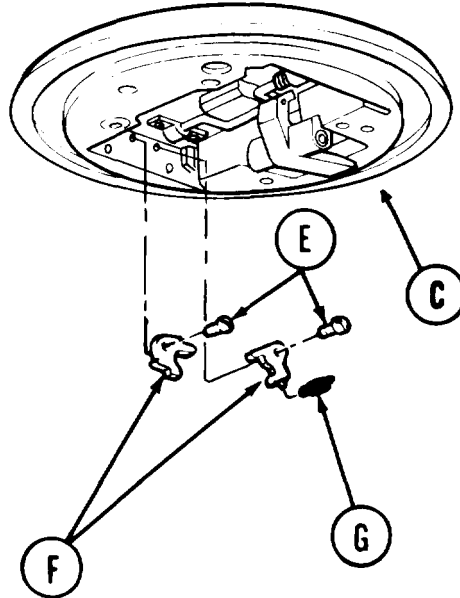


**Go on to Sheet 2**

TA251434

PERISCOPE MOUNT RETAINER REPAIR (Sheet 2 of 3)

3. Using screwdriver, remove four shoulder screws (E).
4. Remove four retainers (F) together with two extension springs (G) from mount (C).



CLEANING AND INSPECTION:

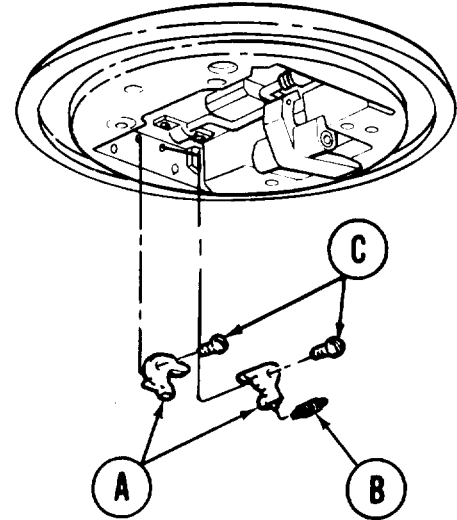
1. Visually inspect all parts for damage or wear. All damaged or worn parts must be replaced.
2. **Visually inspect parts for corrosion. All corroded parts which cannot be cleaned with crocus cloth or steel wool must be replaced.**



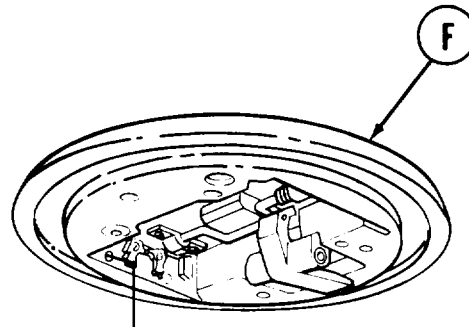
**PERISCOPE MOUNT RETAINER REPAIR (Sheet 3 of 3)**

**ASSEMBLY:**

1. Position four retainers (A) with one extension spring (B) for each two retainers (A).
2. Manually install each of the four retainers (A) with shoulder screw (C).
3. Using screwdriver, tighten four screws (C).



4. Using both hands, install two latch compression springs (D) in latch (E).
5. Position latch (E) with springs on mount (F) and attach two screws (G) through latch (E) into mount (F).
6. Using screwdriver, tighten two screws (G).
7. Open hatch cover (TM 5-5420-202-10).



End of Task

**PERISCOPE MOUNT LID ASSEMBLY REPAIR (Sheet 1 of 3)**

**TOOLS:** 1/2 in. portable electric drill  
3/8 in. drill bit  
Cross-tip screwdriver

Vise  
Welding equipment  
Electric grinder

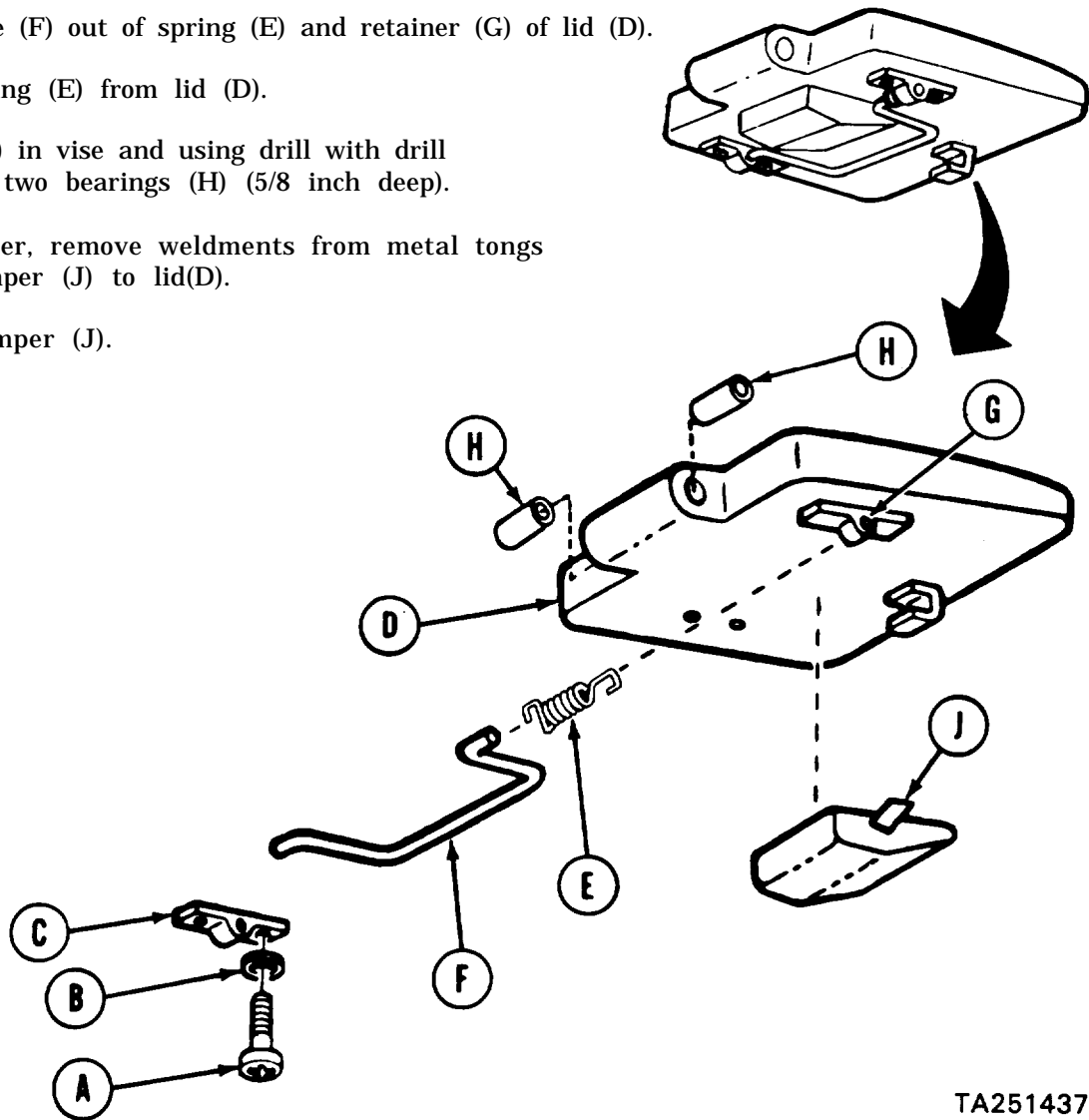
**SUPPLIES:** Dry cleaning solvent (Item 15, Appendix D)  
Steel wool (Item 16, Appendix D)  
Asbestos (Item 3, Appendix D)

Water  
Lockwashers (2 required)  
Bearings (2 required)  
Gloves (Item 27, Appendix D)

**PRELIMINARY PROCEDURE:** Remove lid assembly from mount (page 3-28)

**DISASSEMBLY:**

1. Using screwdriver, remove two screws (A), lockwashers (B), and strap (C) from lid (D).
2. Pull lightly on loop of spring (E) to release loop from handle (F).
3. Slide handle (F) out of spring (E) and retainer (G) of lid (D).
4. Remove spring (E) from lid (D).
5. Place lid (D) in vise and using drill with drill bit, remove two bearings (H) (5/8 inch deep).
6. Using grinder, remove weldments from metal tongs holding bumper (J) to lid(D).
7. Remove bumper (J).



Go on to Sheet 2

TA251437

PERISCOPE MOUNT LID ASSEMBLY REPAIR (Sheet 2 of 3)

CLEANING AND INSPECTION:

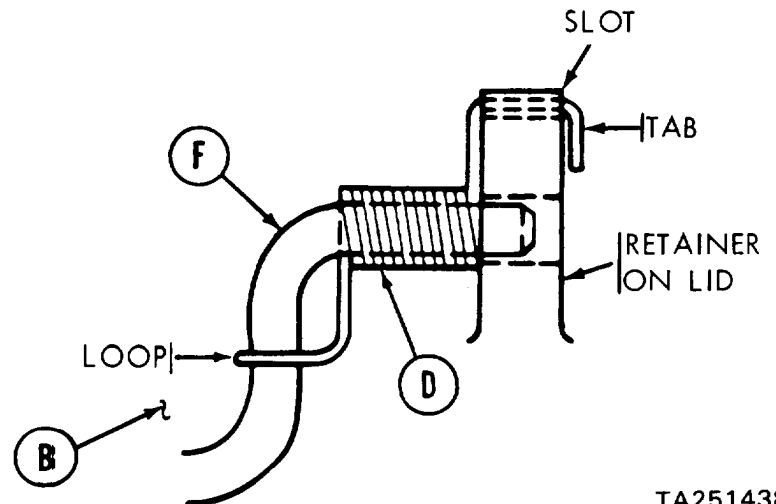
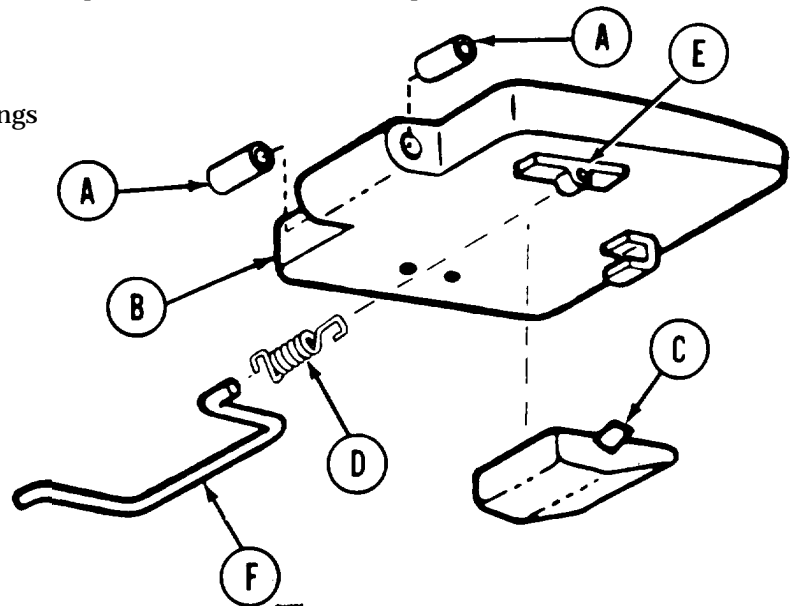
**WARNING**

**Dry cleaning solvent PD-680 is toxic and flammable. To prevent personal injury, wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point for Type #1 Dry Cleaning Solvent is 100°F (38°C) and for Type #2 is 138°F (50°C). If you become dizzy using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.**

1. Clean all parts using dry cleaning solvent and steel wool.
- 2\* Inspect all parts for damage or wear. Replace all unserviceable parts.

ASSEMBLY:

1. Using vise, squeeze two new bearings (A) into lid (B).
2. Position bumper (C) on lid (B) and cover rubber portion with wet asbestos.
3. Using welding equipment, weld metal tongs of bumper (C) to lid (B).
4. Remove asbestos from bumper (c).
5. Position tab of spring (D) in slot of retainer (E) on lid (B).
6. Insert end of handle (F) through center of spring (D) into hole in retainer (E) on lid (B).
7. Pull loop end of spring (D) beyond handle (F) and release spring over handle to allow spring to hold handle against lid (B).

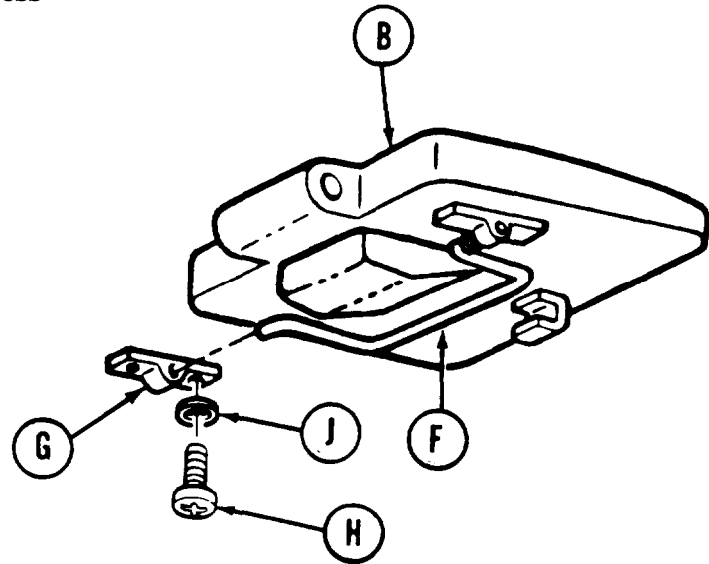


Go on to Sheet 3

TA251438

PERISCOPE MOUNT LID ASSEMBLY REPAIR (Sheet 3 of 3)

8. Position other end of handle (F) in recess of strap (G).
9. Position strap (G) on lid (B).
10. Using screwdriver, install two screws (H) and lockwashers (J).
11. Install lid assembly (page 3-29).



End of Task

**LEFT CUPOLA QUADRANT REPLACEMENT (Sheet 1 of 2)**

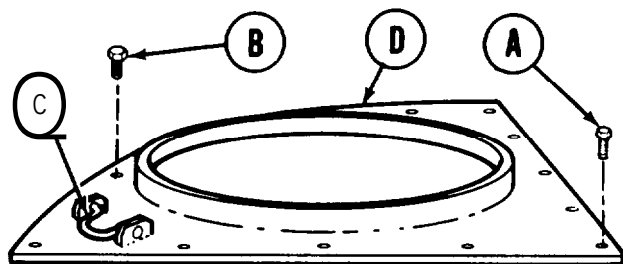
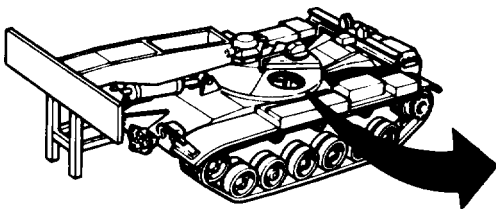
**TOOLS:** 3/4 in. socket with 3/4 in. drive  
 1-5/16 in. socket with 3/4 in. drive  
 Ratchet with 3/4 in. drive  
 Lifting device (500 lbs capacity)  
 Putty knife

**SUPPLIES:** Sealing compound (Item 21, Appendix D)  
 Brush (Item 4, Appendix D)

**PERSONNEL:** Three

**REFERENCE:** TM 5-5420-202-10

**PRELIMINARY PROCEDURES:** Remove cupola cover (page 3-8)  
 Remove cupola body (page 3-13 and 3-19)  
 Remove cupola cover safety latch (page 3-23)

**REMOVAL:**

1. Using 3/4 inch socket, remove seven screws (A).
2. Using 1-5/16 inch socket, remove six screws (B).
3. Attach lifting device to handle (C).
4. Using lifting device, lift quadrant (D) slowly from vehicle.
5. Have technician operating lifting device slowly lower quadrant (D) to desired location.
6. Remove lifting device from handle (C).
7. Using putty knife, remove old sealant from mating surfaces of vehicle and quadrant (D).

Go on to Sheet 2

**TA251440**

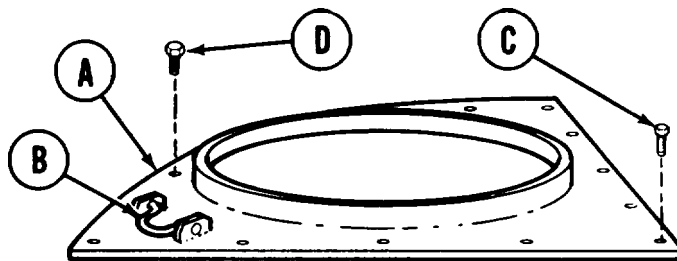
LEFT CUPOLA QUADRANT REPLACEMENT (Sheet 2 of 2)

INSTALLATION:

**NOTE**

**Sealant will be tacky when applied, but will harden to form a hard rubber like seal.**

1. Using brush, apply sealant to mating surfaces of vehicle and quadrant (A).
2. Attach lifting device to handle (B).
3. Have technician operating lifting device slowly lift quadrant (A) into position over vehicle.
4. While two technicians guide quadrant (A) have person operating lifting device slowly lower quadrant (A) into position on vehicle.
5. Remove lifting device from handle (B).
6. Using 3/4 inch socket, install seven screws (C).
7. Using 1-5/16 inch socket, install six screws (D).
8. Install cupola body (page 3-14 and 3-20)
9. Install cupola cover (page 3-9).



End of Task

**RIGHT CUPOLA QUADRANT REPLACEMENT (Sheet 1 of 4)**

**PROCEDURE INDEX**

PROCEDURE	PAGE
Removal	3-41
Installation	3-43

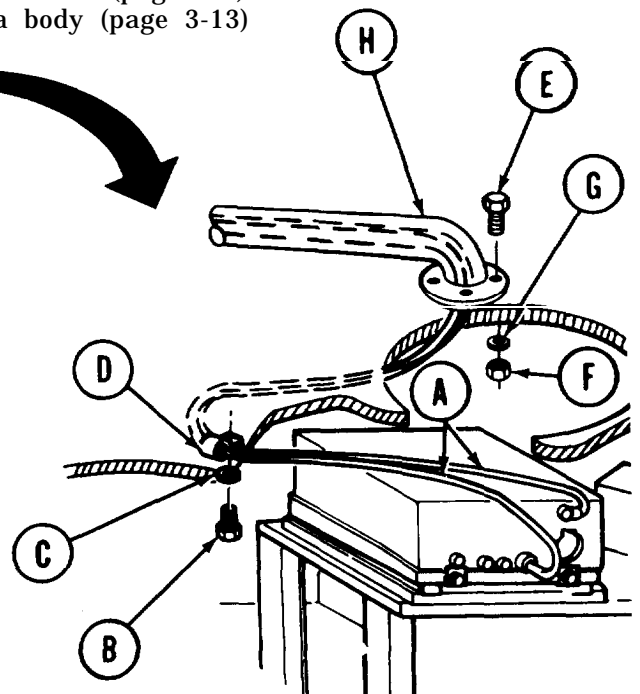
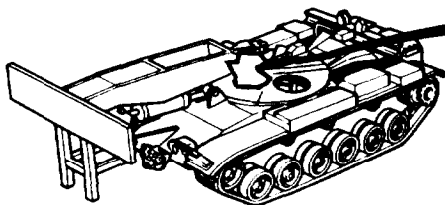
**TOOLS:** 3/4 in. socket with 3/4 in. drive  
 1-5/16 in. socket with 3/4 in. drive  
 Ratchet with 3/4 in. drive  
 Lifting device (500 lbs capacity)  
 Putty knife  
 1/4 in. combination box and open end wrench  
 1/4 in. socket with 3/8 in. drive  
 Ratchet with 3/8 in. drive  
 Sling

**SUPPLIES:** Sealing compound (Item 13, Appendix D)      Lockwashers  
 Brush (Item 4, Appendix D)                                      Masking tape (Item 18, Appendix D)  
 Gasket

**PERSONNEL:** Three

**REFERENCE:** TM 5-5420-226-10

**PRELIMINARY PROCEDURES:** Remove cupola cover (page 3-8)  
 Remove cupola body (page 3-13)



**REMOVAL:**

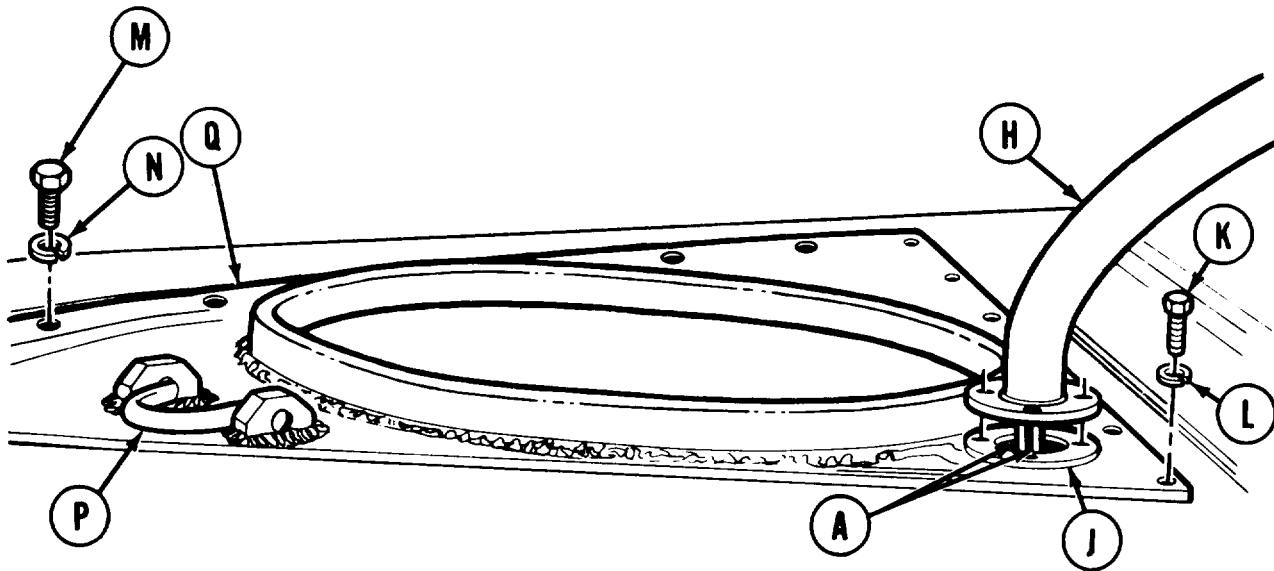
1. From inside commander's area, remove two wires (A) from radio and tag with tape.
2. Using 1/4 inch socket, remove screw (B) and lockwasher (C).
3. **Manually remove clamp (D).**
4. Using 1/4 inch socket on screws (E) and wrench on nuts (F), remove four nuts (F):
5. Manually, remove four screws (E) and lockwashers (G) from conduit (H).

Go on to Sheet 2

TA251442

RIGHT CUPOLA QUADRANT REPLACEMENT (Sheet 2 of 4)

6. Place conduit (H) and wires (A) on reservoir quadrant where it will not interfere with right quadrant removal.
7. Using putty knife, remove gasket (J).



8. Using 3/4 inch socket, remove seven screws (K) and lockwashers (L).
9. Using 1-5/16 inch socket, remove six screws (M) and lockwashers (N).
10. Attach sling to handle (P) and use lifting device to remove right cupola quadrant (Q) from vehicle.
11. Using putty knife, remove old sealant from mating surfaces of vehicle and quadrant (Q).

Go on to Sheet 3

TA251443



## RIGHT CUPOLA QUADRANT REPLACEMENT (Sheet 3 of 4)

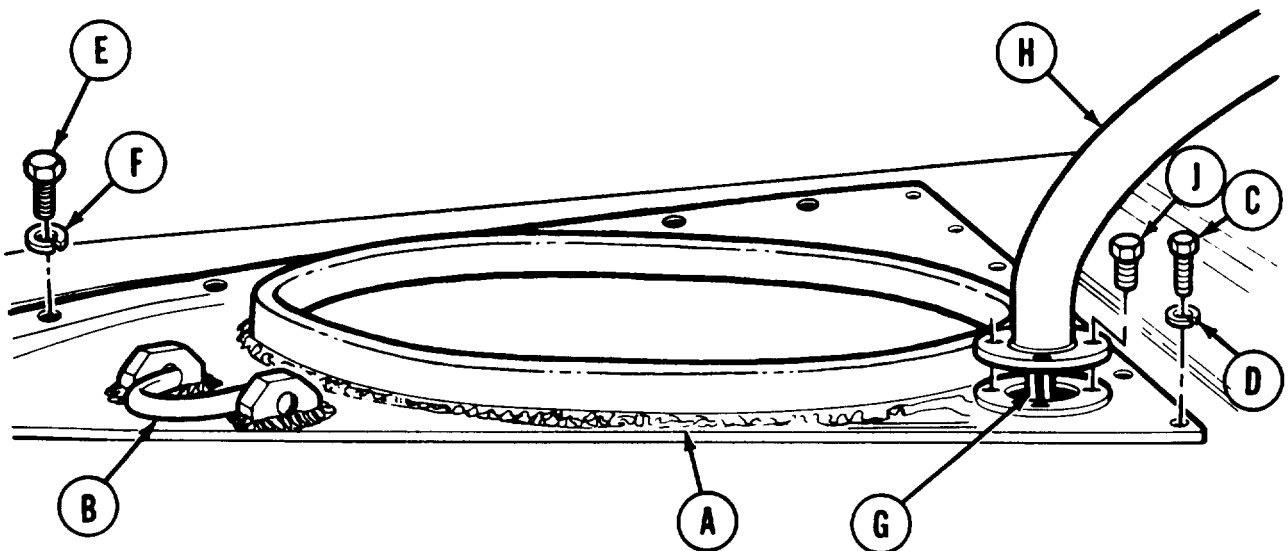
**INSTALLATION:**

- Using brush, apply sealant to mating surfaces of vehicle and quadrant (A).

**WARNING**

**Keep personnel clear and out from under *lifting* device during *lifting* operation. Failure to do so could result in personnel being struck and seriously injured.**

- Attach sling to handle (B).
- Have technician operating lifting device slowly lift quadrant (B) into position over vehicle.
- While two technicians guide quadrant (A), have person operating lifting device slowly lower quadrant (A) into position on vehicle.
- Remove sling from handle (B).
- Using 3/4 inch socket, install seven screws (C) and lockwashers (D).
- Using 1-5/16 inch socket, install six screws (E) and lockwashers (F).



- Position wires (G) and conduit (H) onto quadrant (A).
- Place four screws (J) in position through conduit (H).

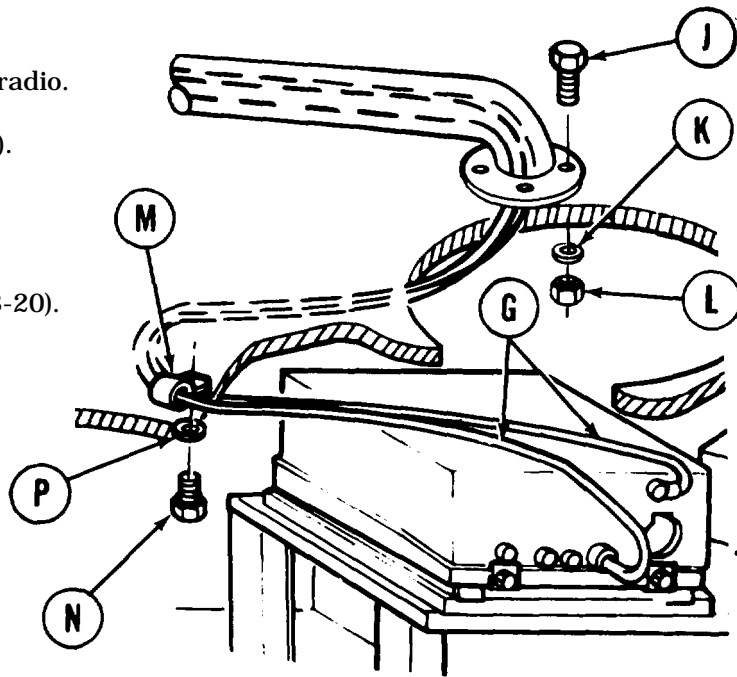
Go on to Sheet 4

TA251444

RIGHT CUPOLA QUADRANT REPLACEMENT (sheet 4 of 4)

10. From inside vehicle, manually install four lockwashers (K) and four nuts (L)
11. Using 1/4 inch socket on screws (J) and wrench on nuts (L), tighten four nuts (L).
12. Manually, install two wires (G) on radio.
13. Place clamp (M) over two wires (G).
14. Using 1/4 inch socket, install screw (N) and lockwasher (P).
15. Install cupola body (page 3-14 and 3-20).
16. Install cupola cover (page 3-9).

End of Task

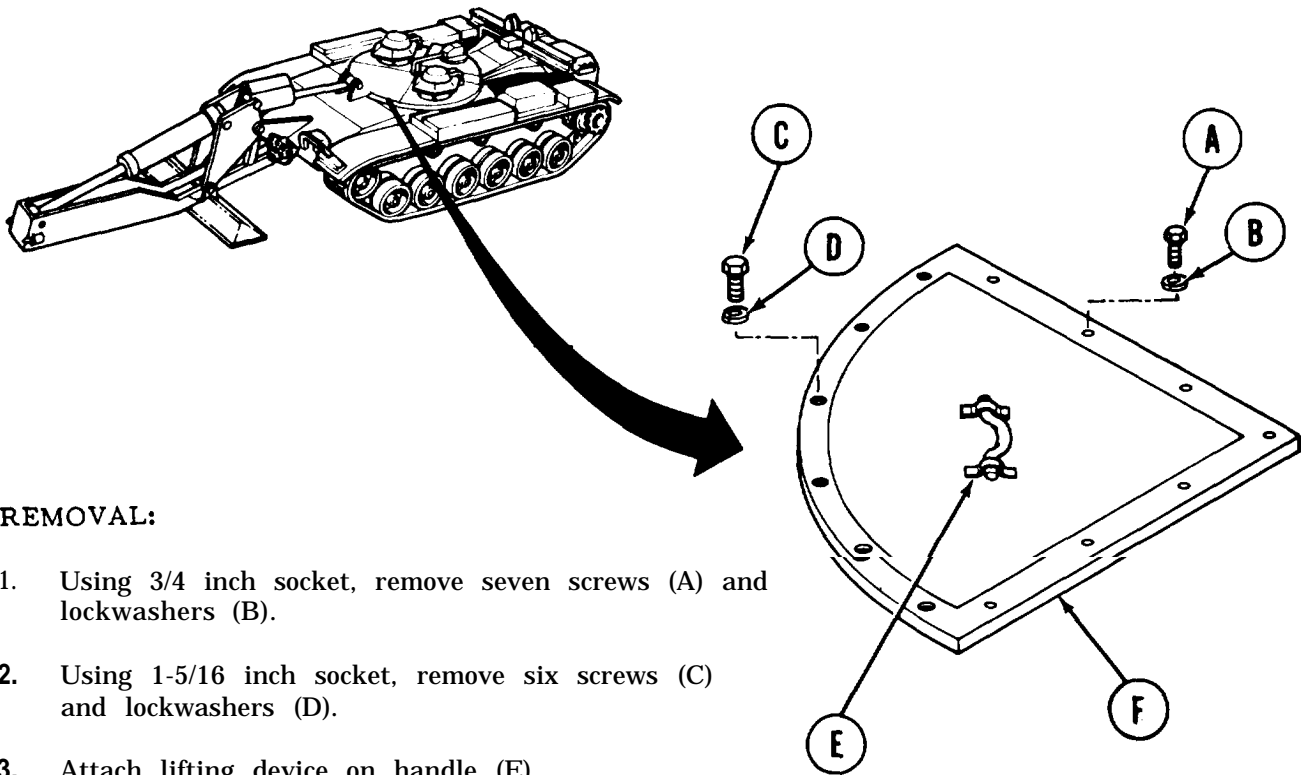


**FRONT QUADRANT REPLACEMENT (Sheet 1 of 2)**

**TOOLS:** Ratchet with 1/2 in. drive  
 3/4 in. socket with 1/2 in. drive  
 1-5/16 in. socket with 3/4 in. drive  
 Ratchet with 3/4 in. drive  
 Lifting device (400 lbs minimum capacity)

**SUPPLIES:** Sealing compound (Item 13, Appendix D)  
 Lockwashers

**PERSONNEL:** Three

**REMOVAL:**

1. Using 3/4 inch socket, remove seven screws (A) and lockwashers (B).
2. Using 1-5/16 inch socket, remove six screws (C) and lockwashers (D).
3. Attach lifting device on handle (E).
4. Have technician operating lifting device, lift quadrant (F) slowly from vehicle.
5. Remove lifting device from handle (E).
6. Using putty knife remove old sealant from matting surfaces of vehicle and quadrant (F).

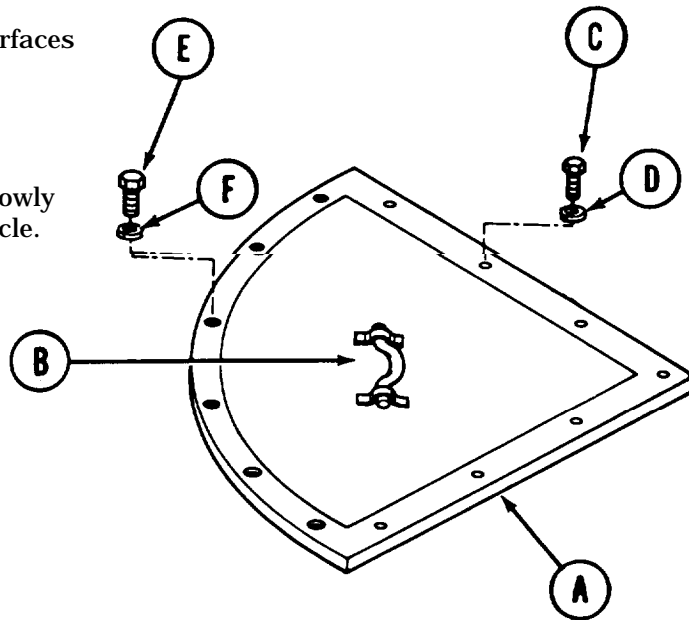
Go on to Sheet 2

TA251446

FRONT QUADRANT REPLACEMENT (Sheet 2 of 2)

**INSTALLATION:**

1. Using brush, apply sealant to mating surfaces of vehicle and quadrant (A).
2. Attach lifting device to handle (B).
3. Have person operating lifting device, slowly lift quadrant (A) into position over vehicle.



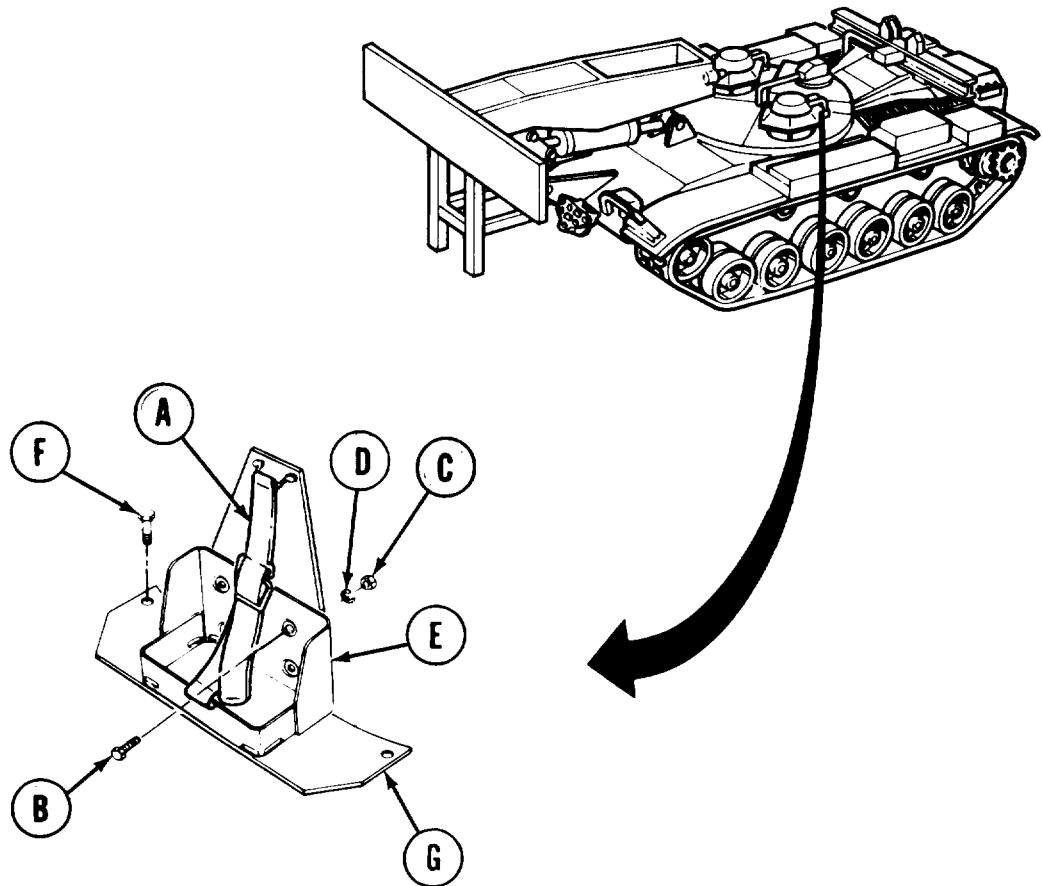
4. While two technicians guide quadrant (A), have technician operating lifting device slowly lower quadrant (A) into position on vehicle.
5. Remove lifting device from handle (B).
6. Using 3/4 inch socket, install seven screws (C) and lockwashers (D).
7. Using 1-5/16 inch socket, install six screws (E) and lockwashers (F).

End of Task

## WATER CAN STORAGE BRACKET AND MOUNT REPLACEMENT (Sheet 1 of 2)

**TOOLS:** 9/16 in. socket with 1/2 in. drive  
 Ratchet with 1/2 in. drive  
 9/16 in. open end wrench  
 1-5/16 in. socket with 3/4 in. drive  
 Ratchet with 3/4 in. drive

**SUPPLIES:** Lockwashers (4 required)



### REMOVAL:

1. Manually remove strap (A).
2. Using 9/16 inch socket on screws (B) and wrench on nuts (C), remove four nuts (C), lockwashers (D), and screws (B).
3. Remove water can bracket assembly (E).
4. Using 1-5/16 inch socket, remove two screws (F).
5. Remove mount bracket (G).

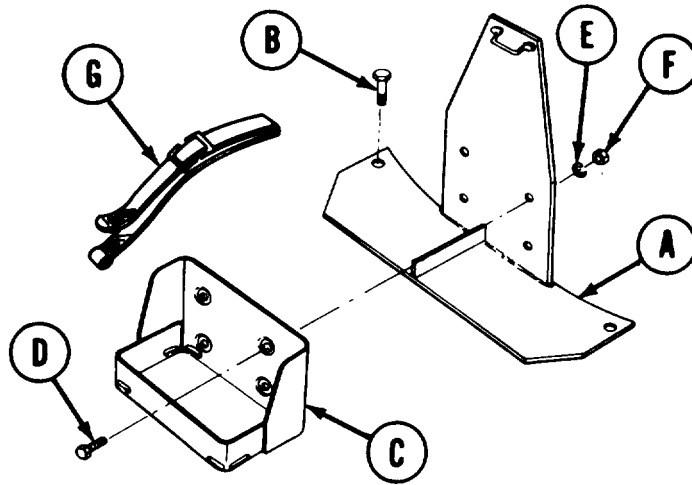
**Go on to Sheet 2**

TA251448

WATER CAN STORAGE BRACKET AND MOUNT REPLACEMENT (Sheet 2 of 2)

**INSTALLATION:**

1. Place mount bracket (A) in position on vehicle.
2. Using 1-5/16 inch socket, install two screws (B).
3. Place water can bracket assembly (C) in place on mount bracket (A).
4. Manually install four screws (D), lockwashers (E), and nuts (F).



5. Using 9/16 inch socket and wrench, tighten four nuts (F).
6. Manually install strap (G).

End of Task

**BRIDGE SEAT ASSEMBLY REPLACEMENT (Sheet 1 of 4)**

PROCEDURE INDEX

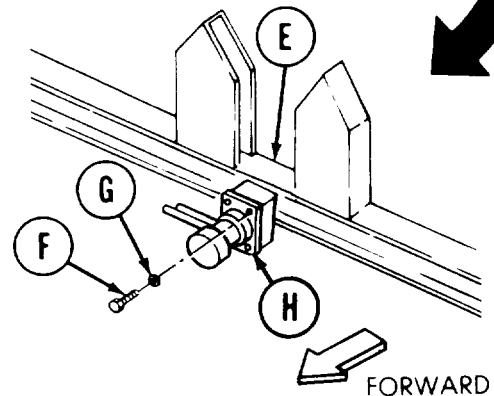
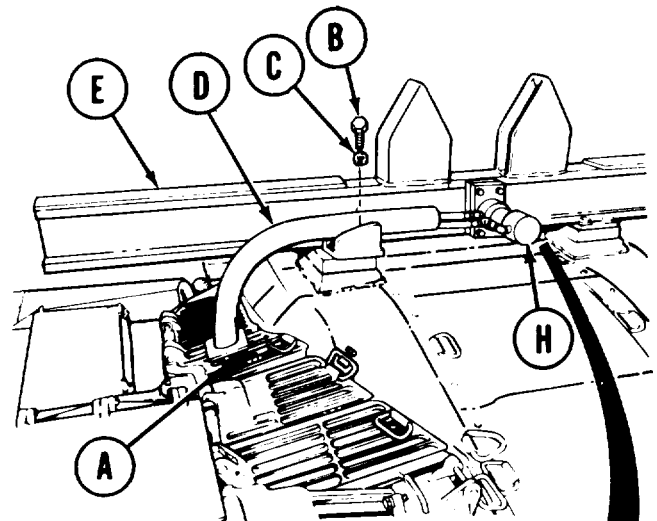
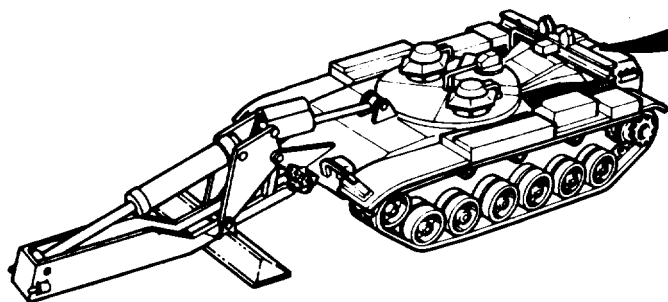
PROCEDURE	PAGE
Removal	3-49
Installation	3-51

**TOOLS:** Ratchet with 3/4 in. drive  
 Ratchet with 1/2 in. drive  
 9/16 in. socket with 1/2 in. drive  
 1-1/2 in. socket with 3/4 in. drive  
 Sling  
 Lifting device (500 lb min capacity)  
 15/16 in. socket with 1/2 in. drive

**SUPPLIES:** Lockwashers (32 required)

**PERSONNEL:** Three

**PRELIMINARY PROCEDURE:**  
 Remove hold-down cylinder armor (page 3-253)



**REMOVAL:**

1. Using 15/16 inch socket, loosen setscrew securing No. 3 right top grille door (A).
2. Open No. 3 top grille door (A).
3. **Using 1-1/2 inch socket, remove two screws (B) and lockwashers (C) securing hose guard pipe (D) and bridge seat (E) to vehicle.**

**NOTE**

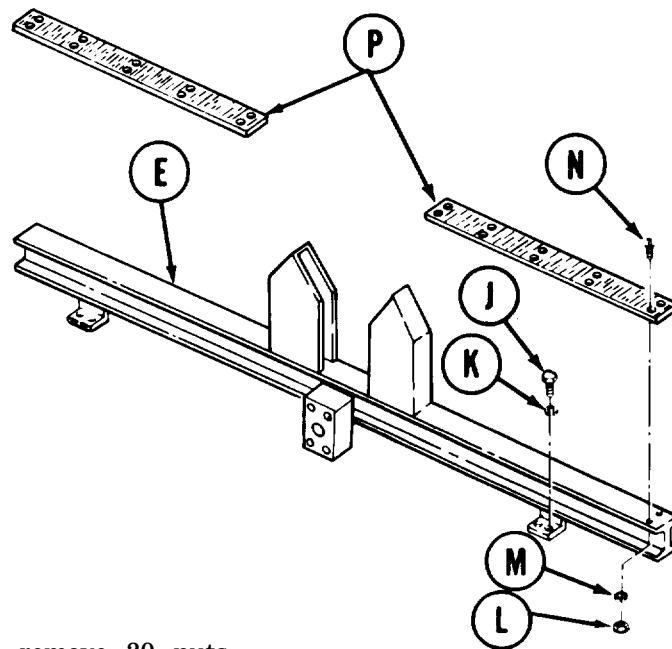
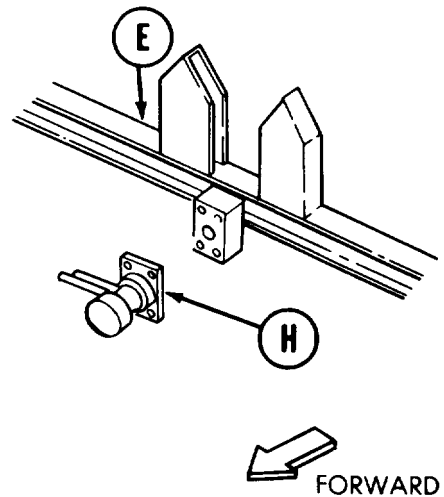
- Have second technician carefully support hold-down cylinder while screws are being removed.**
4. Using 15/16 inch socket, remove four screws (F) and lockwashers (G) securing hold-down cylinder (H) to bridge seat (E).

Go on to Sheet 2

TA251449

**BRIDGE SEAT ASSEMBLY REPLACEMENT (Sheet 2 of 4)**

5. Carefully pull hold-down cylinder (H) toward front of vehicle until cylinder plug clears bridge seat (E).
6. Carefully lay hold-down cylinder (H) with attached parts on top deck.
7. Position sling on bridge seat (E) and attach lifting device.
8. Using 1-1/2 inch socket, remove remaining six screws (J) and lockwashers (K) securing bridge seat (E) to vehicle.
9. Using lifting device and two technicians, guide bridge seat (E) away from vehicle and lower to resting place.



10. Using 9/16 inch socket, remove 20 nuts (L), lockwashers (M), and screws (N) securing two belts (P) to bridge seat (E).
11. Remove two belts (P).

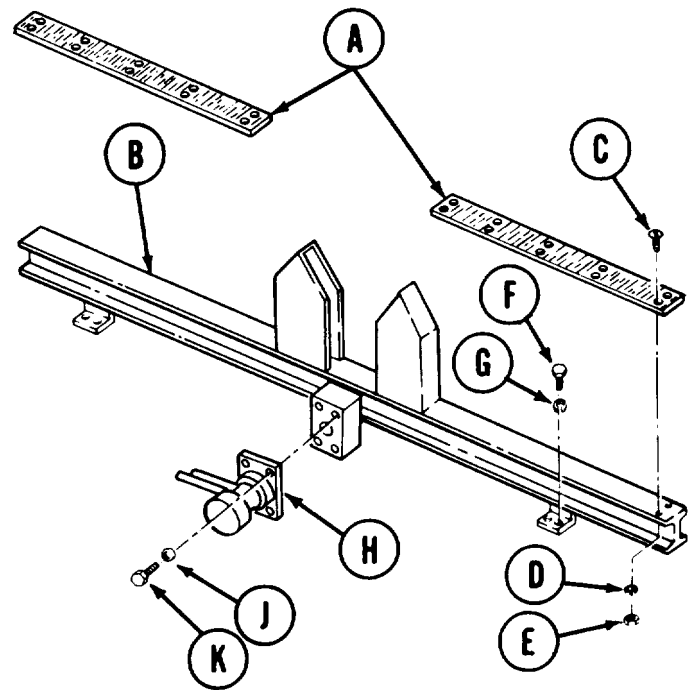
Go on to Sheet 3

TA251450



**BRIDGE SEAT ASSEMBLY REPLACEMENT (Sheet 3 of 4)****INSTALLATION:**

1. Place two belts (A) in position on bridge seat (B).
2. Manually install 20 screws (C), new lockwashers (D), and nuts (E) securing two belts (A) to bridge seat (B).
3. Using 9/16 inch socket, tighten 20 nuts (E).
4. Position sling on bridge seat (B).



5. Using lifting device and two technicians, lift bridge seat (B) and place in position on vehicle.
6. Using 1-1/2 inch socket, install six shorter screws (F) and lockwashers (G) securing left forward, left rear, and right rear bridge seat (B) mounts to vehicle.
7. Carefully lift hold-down cylinder (H) and push into bridge seat (B).

**NOTE**

**Have second technician support holddown cylinder (H) while screws are being installed.**

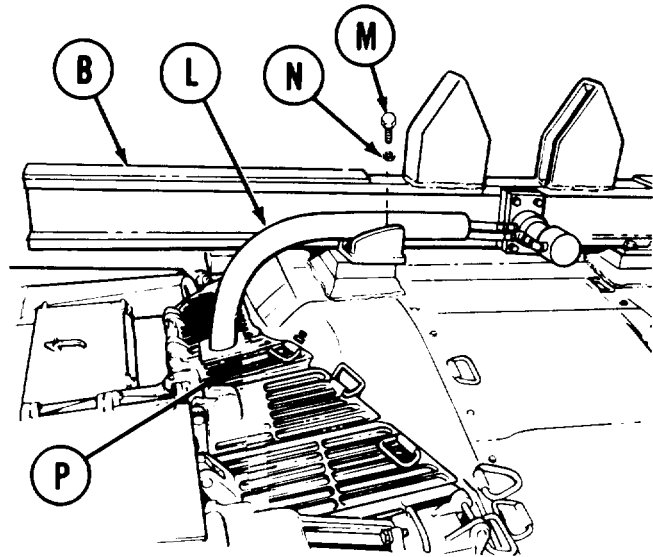
8. Using 15/16 inch socket, install four screws (J) and lockwashers (K) securing hold-down cylinder (H) to bridge seat (B).

Go on to Sheet 4

TA251451

**BRIDGE SEAT ASSEMBLY REPLACEMENT (Sheet 4 of 4)**

9. Close top deck grille door (P).
10. Using 15/16 inch socket, tighten setscrew securing No. 3 right top grille door (P).
11. Place hose guard pipe (L) in position on bridge seat (B) mount.
12. Using 1-1/2 inch socket, install two longer screws (M) and lockwashers (N).
13. Install hold-down cylinder armor (page 3-253).

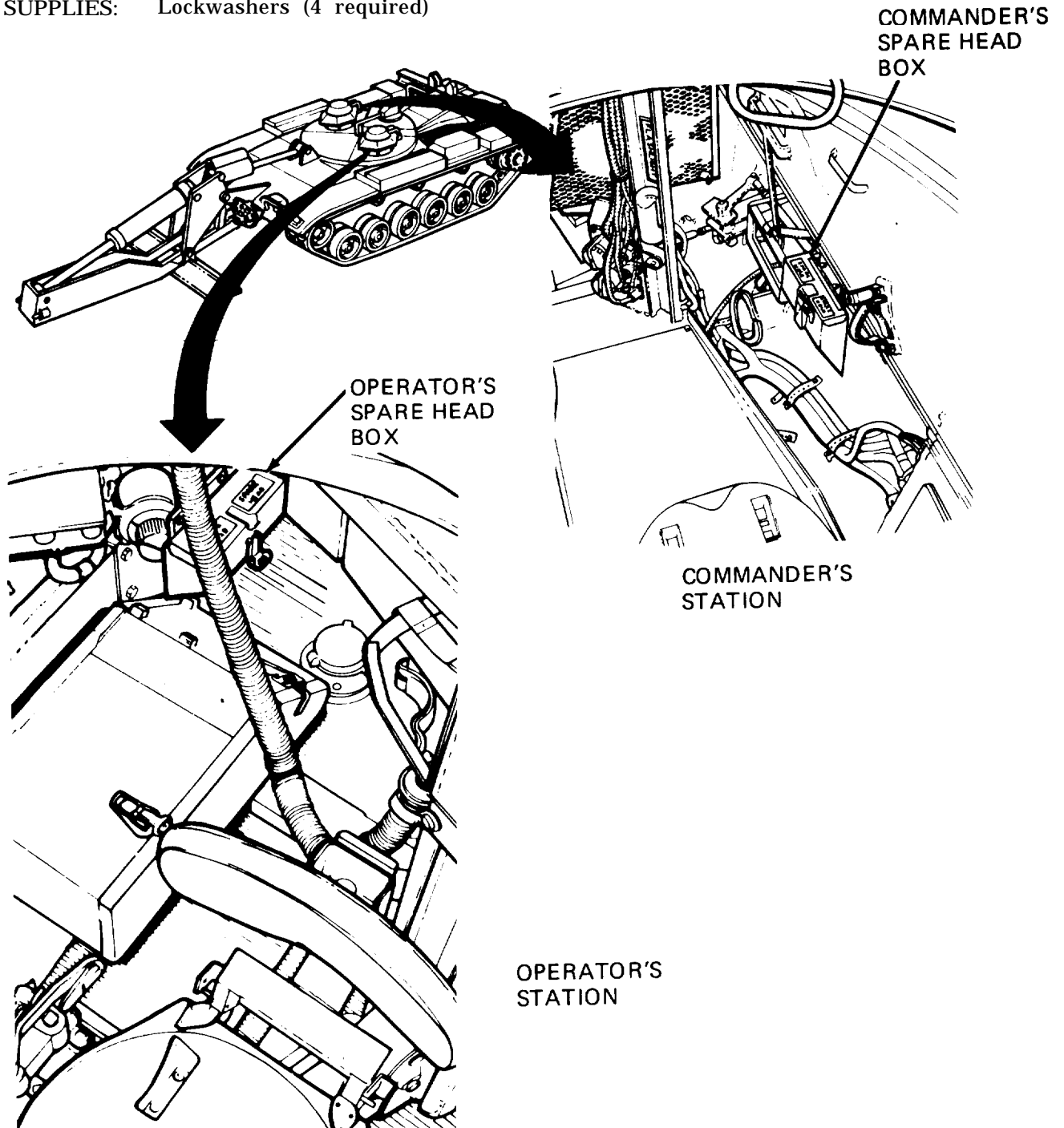


End of Task

**SPARE HEAD STOWAGE BOXES REPLACEMENT (Sheet 1 of 2)**

**TOOLS:** 7/16 in. socket with 3/8 in. drive  
Ratchet with 3/8 in. drive  
5 in. extension with 3/8 in. drive

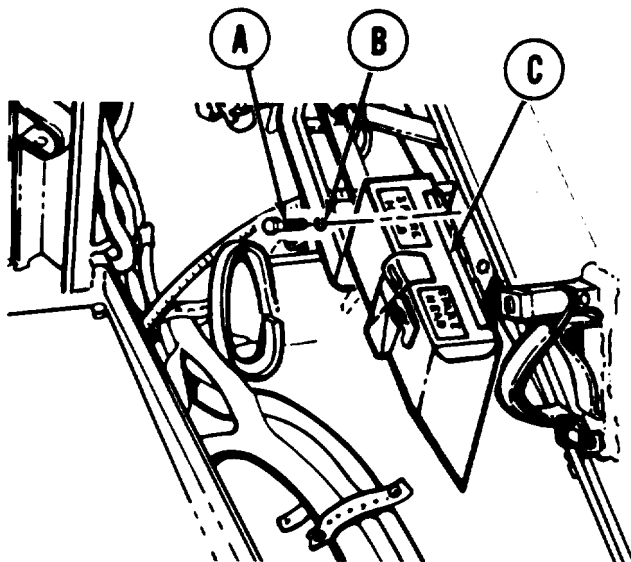
**SUPPLIES:** Lockwashers (4 required)



Go on to Sheet 2

TA251453

**SPARE HEAD STOWAGE BOXES REPLACEMENT (Sheet 2 of 2)**



**COMMANDER'S SPARE  
HEAD BOX SHOWN:  
OPERATOR'S BOX SIMILAR**

**REMOVAL:**

1. Using socket and extension remove four screws (A) and lockwashers (B).
2. Remove spare head stowage box (C).

**INSTALLATION:**

1. Place spare head stowage box (C) in position.
2. Using socket and extension, install four screws (A) and lockwashers (B).

End of Task

**TA251454**

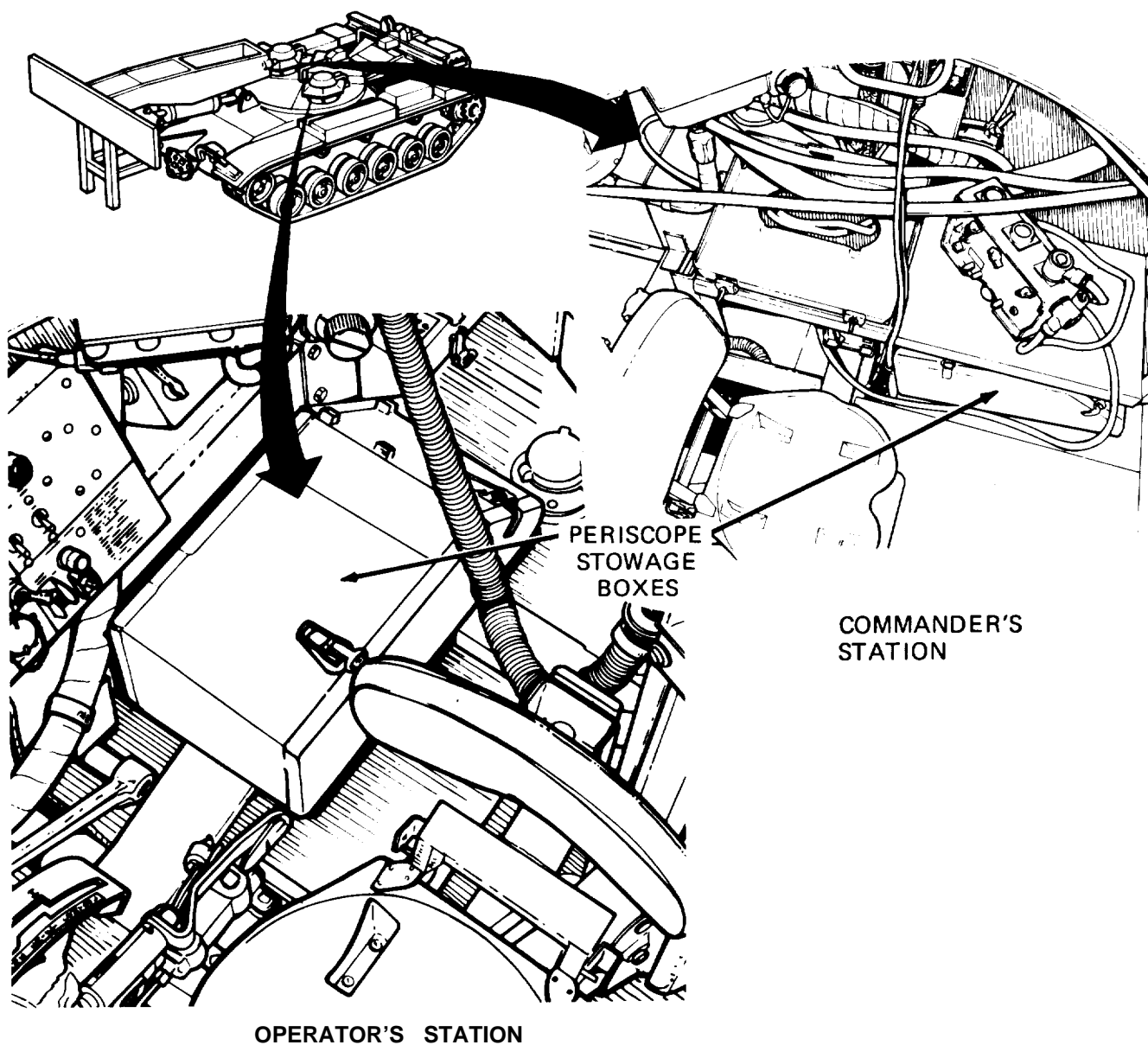
**PERISCOPE STOWAGE BOXES REPLACEMENT (Sheet 1 of 2)**

**TOOLS:** 1/2 in. socket with 3/8 in. drive  
 Ratchet with 3/8 in. drive  
 9/16 in. socket with 3/8 in. drive  
 9/16 in. combination box and open end wrench

**SUPPLIES:** Lockwashers (9 required)

**REFERENCE:** TM 5-5420-202-10

**PRELIMINARY PROCEDURE:** Remove periscopes from stowage boxes (TM 5-5420-202-10)



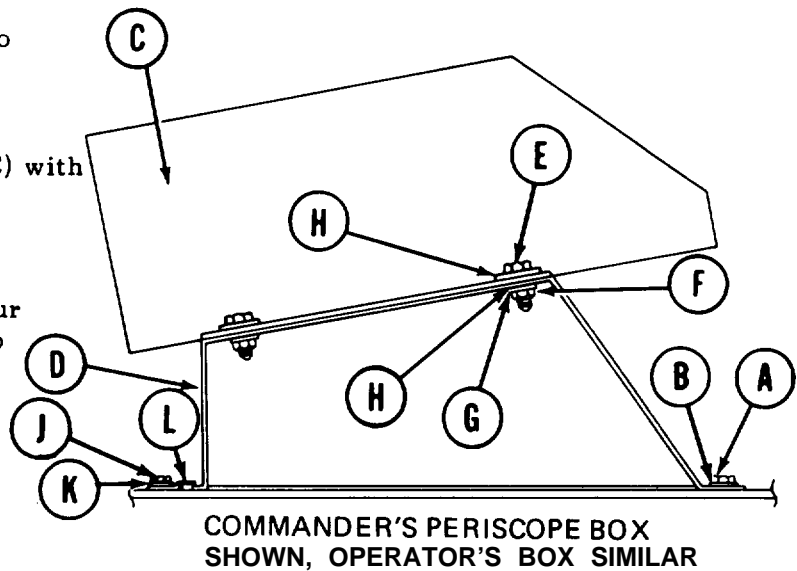
Go on to Sheet 2

TA251455

**PERISCOPE STOWAGE BOXES REPLACEMENT (Sheet 2 of 2)**

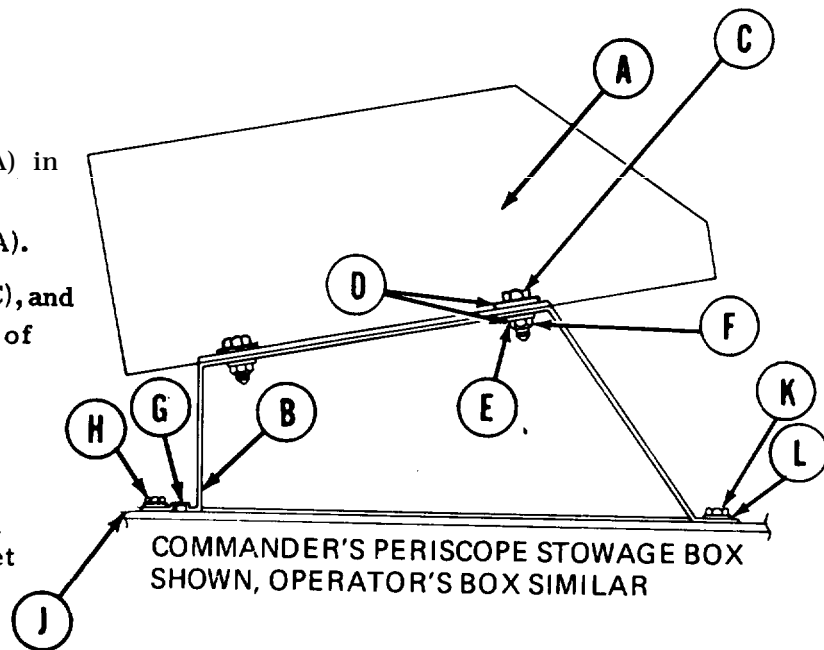
**REMOVAL:**

1. Using 1/2 inch socket, remove two screws (A) and lockwashers (B).
2. Remove periscope stowage box (C) with bracket (D) from vehicle.
3. Open periscope stowage box (C).
4. Using 9/16 inch wrench to hold four screws (E), use 9/16 inch socket to remove four nuts (F), lockwashers (G), and flat washers (H).
5. Manually remove four screws (E), eight flat washers (H).
6. Remove periscope stowage box (C) from bracket (D).
7. Using 1/2 inch socket, remove remaining three screws (J) and lockwashers (K) from clip (L).
8. Remove clip (L) from vehicle.



**INSTALLATION:**

1. Place periscope stowage box (A) in position on bracket (B).
2. Open periscope stowage box (A).
3. Manually install four screws (C), and flat washers (D) through inside of stowage box (A).
4. Install four flat washers (D), lockwashers (E), and nuts (F) on screws (C).
5. Using 9/16 inch wrench to hold screws (C), use 9/16 inch socket to tighten four nuts (F).
6. Place clip (G) in position in vehicle.
7. Using 1/2 inch socket, install three screws (H) and lockwashers (J).
8. Slide bracket (B) with periscope stowage box (A) into clip (G).
9. Using 1/2 inch socket, install two screws (K) and new lockwashers (L).
10. Stow periscopes in stowage boxes TM 5-5420-202-10).



End of Task

TA251456

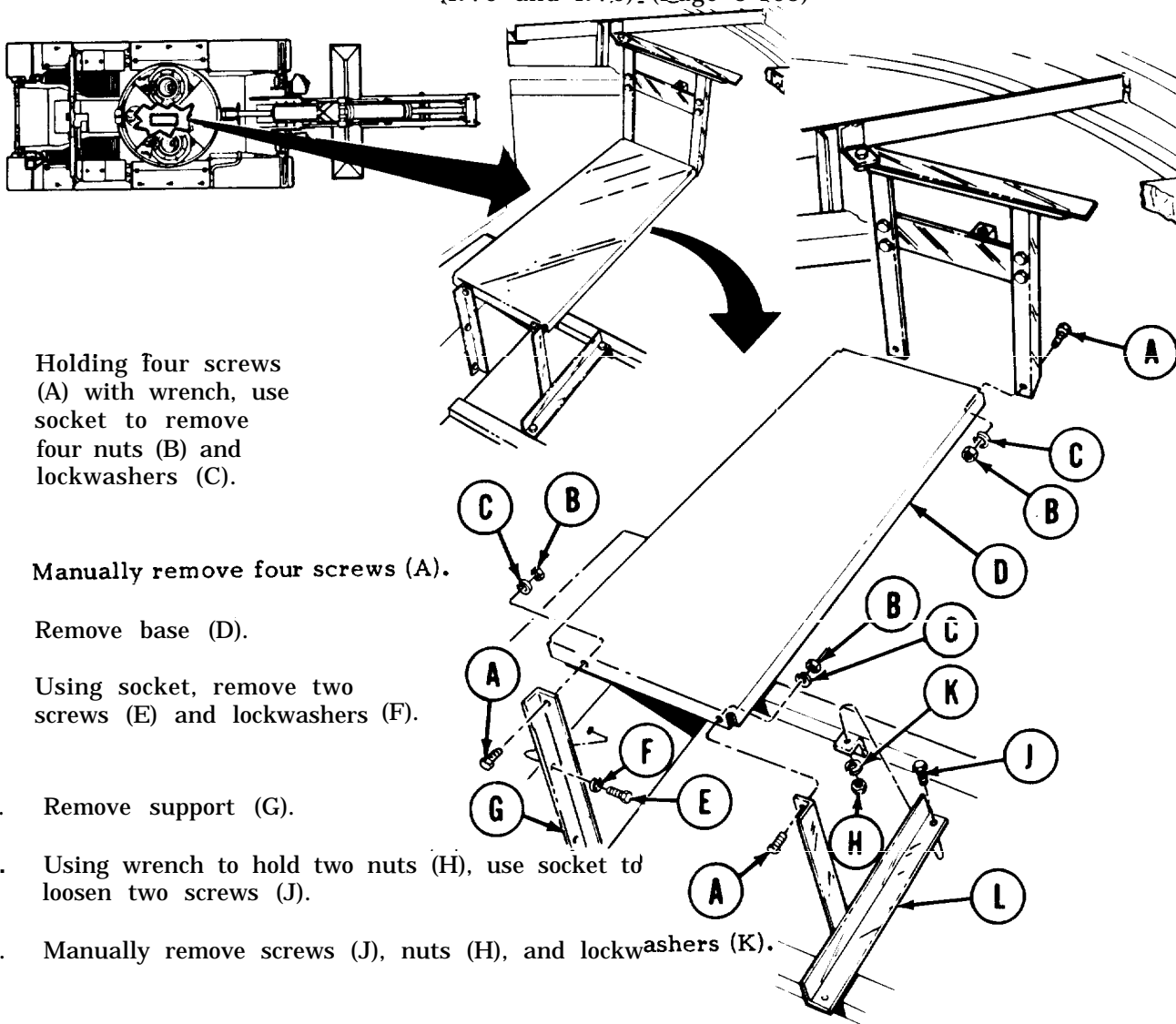
**RADIO INSTALLATION MOUNT REPLACEMENT (Sheet 1 of 3)**

**TOOLS:** 3/4 in. socket with 1/2 in. drive  
 Ratchet with 1/2 in. drive  
 3/4 in. combination box and open end wrench

**SUPPLIES:** Lockwashers (14 required)

**REFERENCES:** TM 11-5820-401-12  
 TM 11-5820-498-12

**PRELIMINARY PROCEDURES:** Remove radio equipment (TM 11-5820-401-12 or  
 TM11-5820-98-12)  
 Remove commander's periscope storage box (page 3-55 )  
 Remove sequence and locking cylinder relief valves  
 (RV5 and RV6). (Page 3-103)



1. Holding four screws (A) with wrench, use socket to remove four nuts (B) and lockwashers (C).
2. Manually remove four screws (A).
3. Remove base (D).
4. Using socket, remove two screws (E) and lockwashers (F).
5. Remove support (G).
6. Using wrench to hold two nuts (H), use socket to loosen two screws (J).
7. Manually remove screws (J), nuts (H), and lockwashers (K).
8. Remove support (L).

Go on to Sheet 2

TA251457

**RADIO INSTALLATION MOUNT REPLACEMENT (Sheet 2 of 3)**

9. Using socket, remove screw (M) and lockwasher (N).

10. Using wrench to hold screw (P), use socket to remove nut (Q) and lockwasher (R).

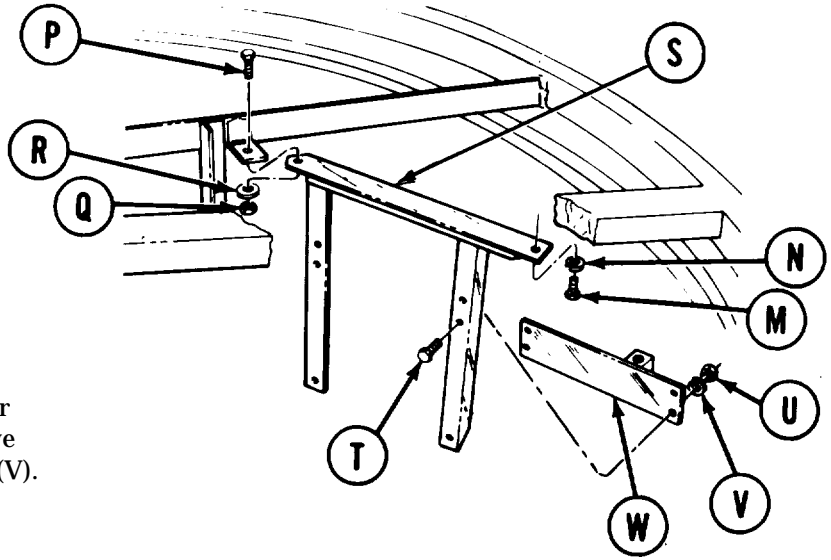
11. Remove screw (P).

12. Remove radio mount frame (S).

13. Using wrench to hold four screws (T), use socket to remove four nuts (U) and lockwashers (V).

14. Remove four screws (T).

15. Remove valve mount (W).



**INSTALLATION:**

1. Place valve mount (A) in position on radio mount frame (B).

2. Manually install four screws (C), lockwashers (D), and nuts (E).

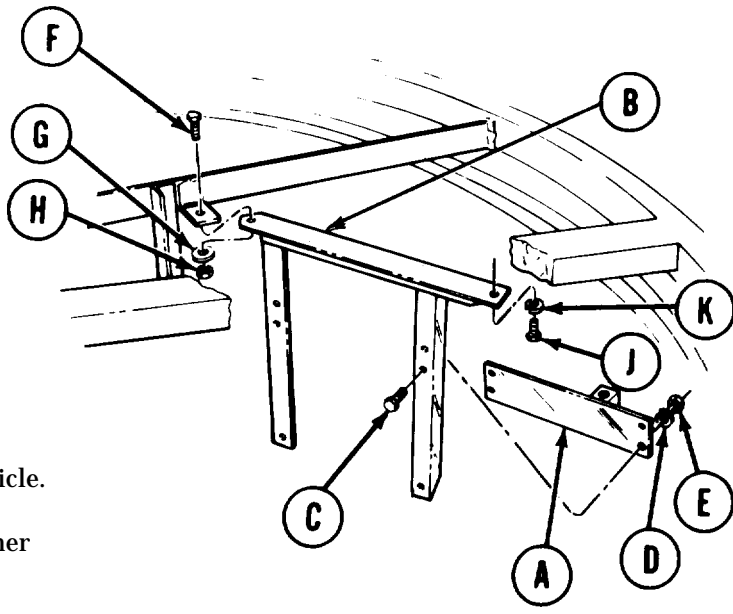
3. Using wrench to hold screws (C), use socket to tighten nuts (E).

4. Place radio mount frame (B) in vehicle.

5. Manually install screw (F), lockwasher (G), and nut (H).

6. Using wrench to hold screw (F), use socket to tighten nut (H).

7. Using socket, install screw (J) and lockwasher (K).



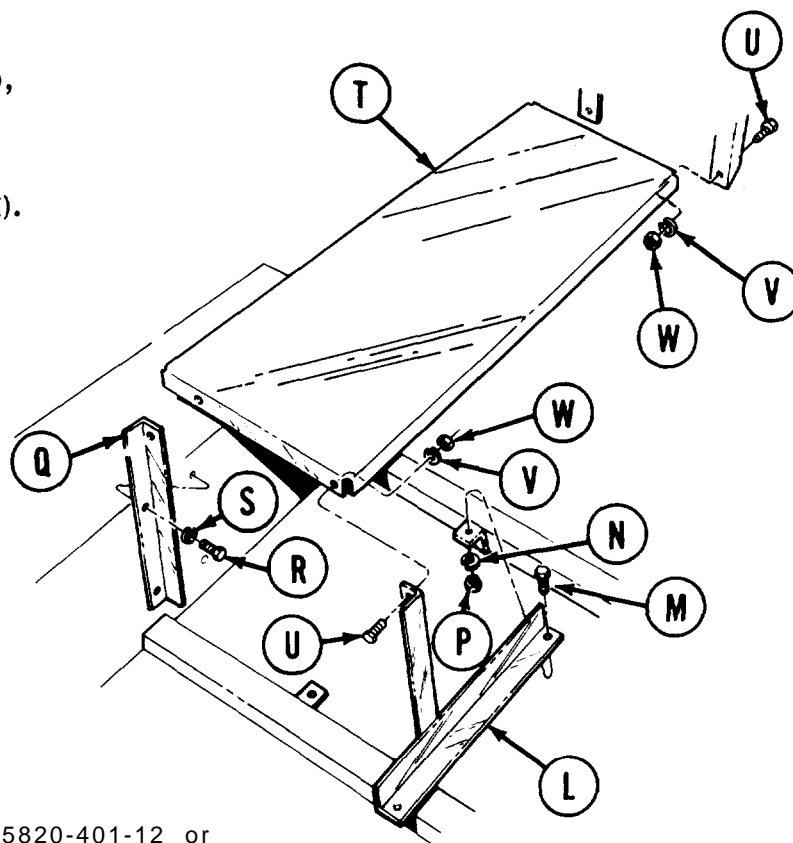
Go on to Sheet 3

TA251458



## RADIO INSTALLATION MOUNT REPLACEMENT (Sheet 3 of 3)

8. Place support (L) in position.
9. Manually install two screws (M), lockwashers (N), and nuts (P).
10. Using wrench to hold nuts (P), use socket to tighten screws (M).
11. Place support (Q) in position.
12. Using socket, install two screws (R) and lockwashers (S).
13. Place base (T) in position.
14. Manually install four screws (U), lockwashers (V), and nuts (W).
15. Using wrench to hold nuts (W), use socket to tighten screws (U).
16. Install periscope storage box (page 3-56).
17. Install radio equipment (TM 11-5820-401-12 or TM 11-5820498-12).
18. Install sequence and locking relief valves (RV5 and RV6) (page 3-104).

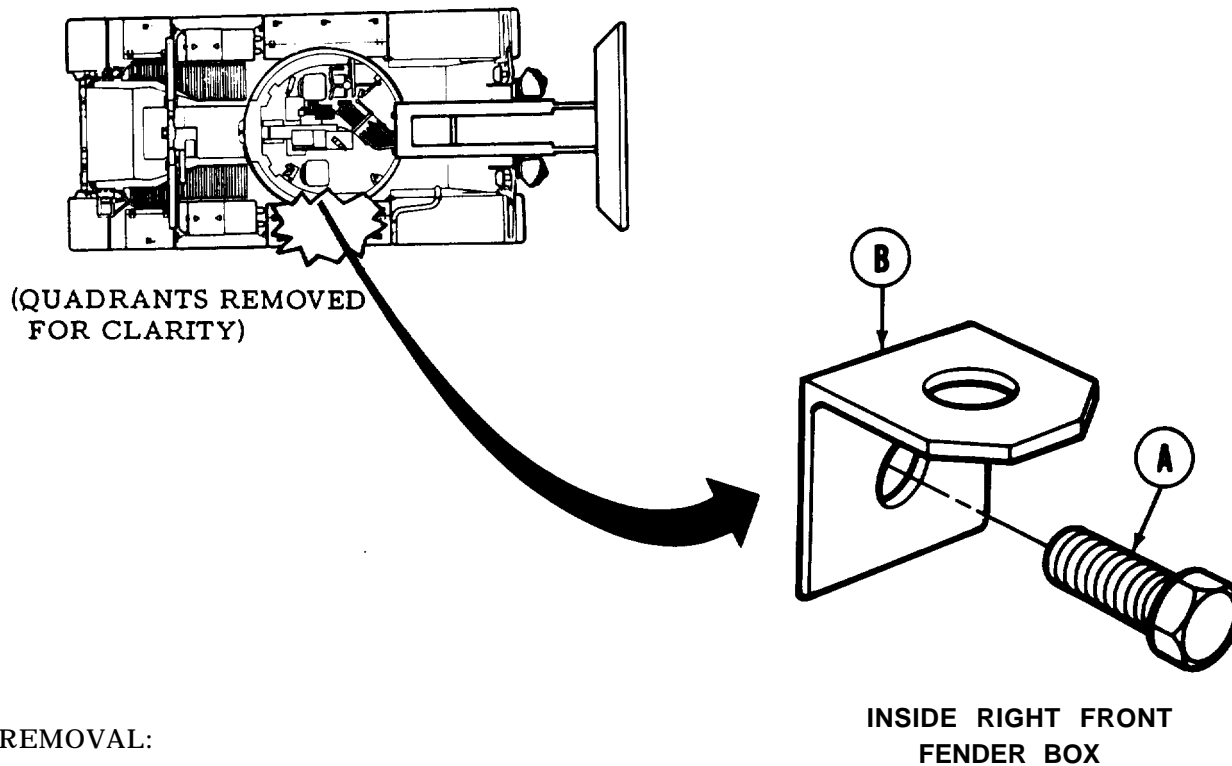


End of Task

TA251459

**TIE DOWN ANGLE REPLACEMENT** (sheet 1 of 1)

**TOOLS:** 9/16 in. socket with 1/2 in. drive  
Ratchet with 1/2 in. drive



**REMOVAL:**

1. Using socket, remove screw (A).
2. Remove tie down angle bracket (B).

**INSTALLATION:**

1. Place tie down angle bracket (B) in position on stowage box.
2. Using socket, install screw (A).

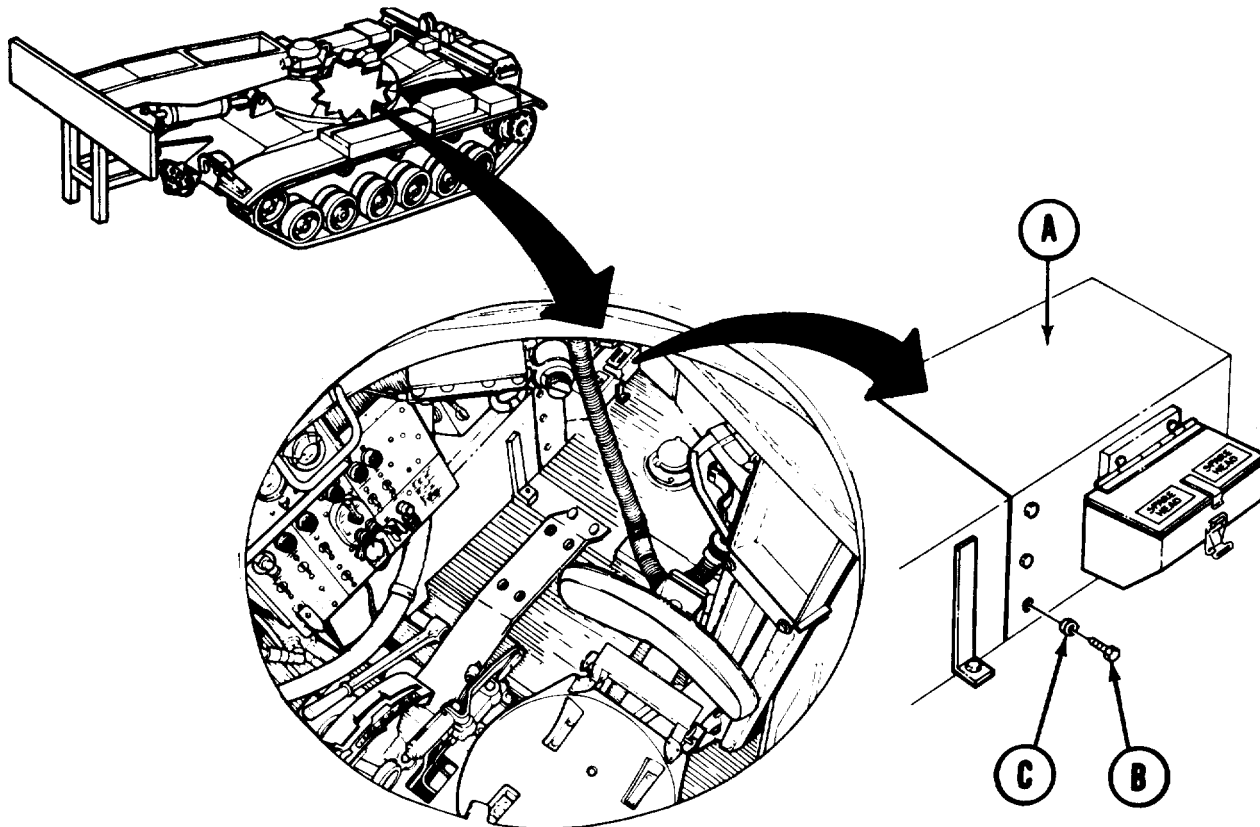
End of Task

**UNIVERSAL JOINT COVER REPLACEMENT (Sheet 1 of 1)**

TOOLS: 9/16 in. socket with 1/2 in. square drive  
Ratchet with 1/2 in. square drive

SUPPLIES: Lockwashers (6 required)

PRELIMINARY PROCEDURE: Remove periscope stowage box (page 3-55)

**REMOVAL:**

1. If universal joint cover (A) is to be turned in, remove spare head stowage box (page 3-53).
2. Using socket, remove six screws (B) and lockwashers (C).
3. Remove universal joint cover (A).

**INSTALLATION:**

1. Position universal joint cover (A) and aline holes.
2. Using socket, install six lockwashers (C) and screws (B).
3. Install periscope stowage box (page 3-56).
4. Install spare head stowage box if it was removed (page 3-54).

End of Task

TA251461

**UNIVERSAL JOINT REPLACEMENT (Sheet 1 of 3)**

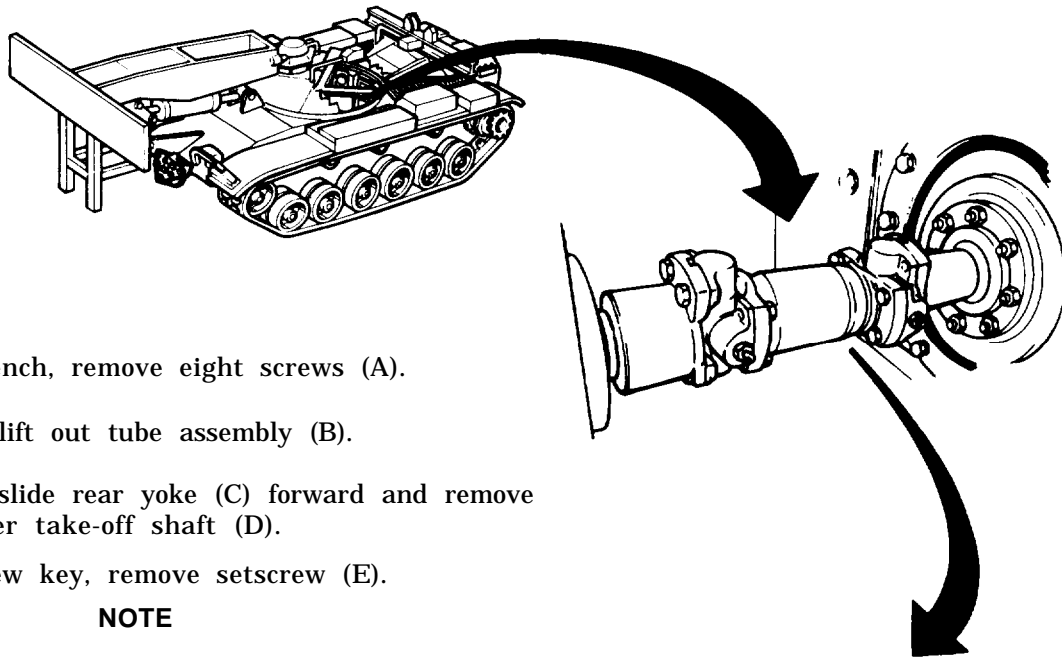
**TOOLS:** 7/16 in. combination box and open end wrench  
1/4 in. socket head screw key  
Torque wrench with 3/8 in. drive (0-600 lb-in)

**SPECIAL TOOL:** 7/16 in. crowfoot wrench with 3/8 in. drive

**SUPPLIES:** Universal joint parts kit  
Dry cleaning solvent (Item 15, Appendix D)  
Gloves (Item 27, Appendix D)

**PRELIMINARY PROCEDURE:** Remove universal joint cover (page 3-61)

**REMOVAL:**

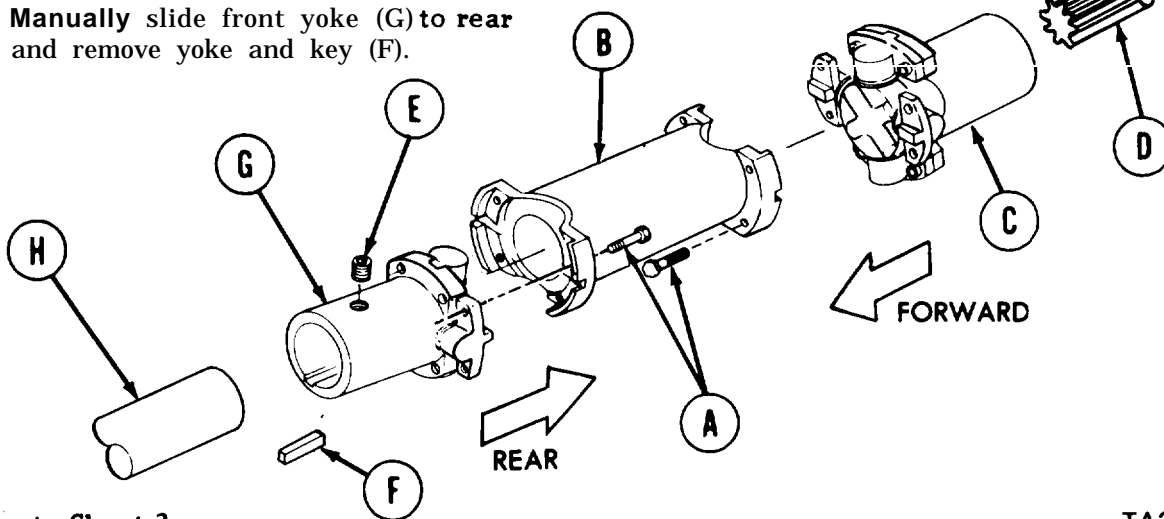


1. Using wrench, remove eight screws (A).
2. Manually lift out tube assembly (B).
3. Manually slide rear yoke (C) forward and remove from power take-off shaft (D).
4. Using screw key, remove setscrew (E).

**NOTE**

Use care not to lose key (F) between front yoke (G) and shaft (H).

5. Manually slide front yoke (G) to rear and remove yoke and key (F).

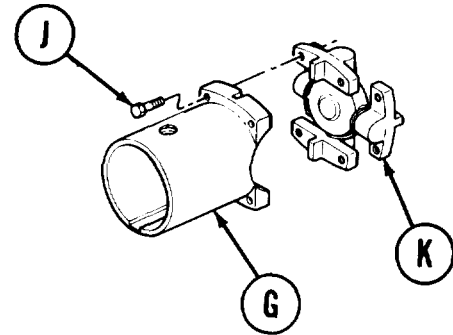
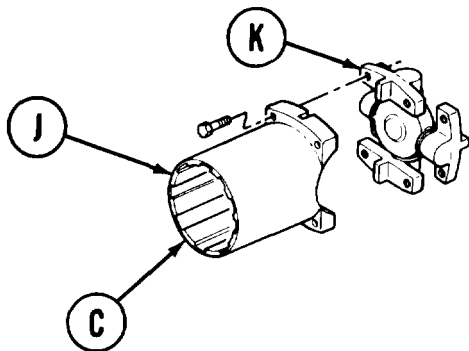


Go on to Sheet 2

TA251462

**UNIVERSAL JOINT REPLACEMENT (Sheet 2 of 3)**

6. Using wrench, remove four screws(J) and universal joint (K) from yoke (G).



7. Using wrench, remove four screws (J) and universal joint (K) from yoke (C).

**CLEANING AND INSPECTION:**

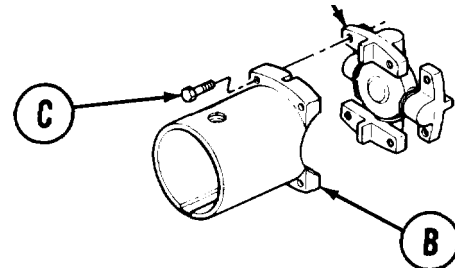
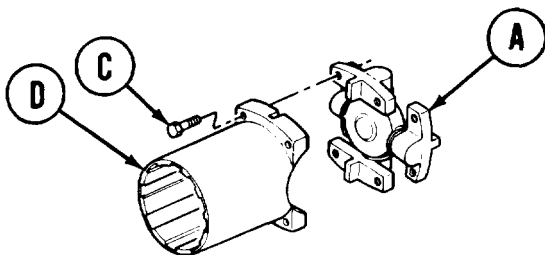
**WARNING**

**Cleaning agent specified is flammable. Use only in well ventilated areas. Keep away from flames, sparks, or heat. Do not smoke while using. Prevent contact with eyes, mouth, and/or skin. Wear rubber gloves when performing cleaning procedures.**

1. Clean all parts to be reused in dry cleaning solvent.
2. Inspect all parts for damage. Replace all unserviceable parts.

**INSTALLATION:**

1. Position universal joint (A) on yoke (B) and manually install four screws (C) in universal joint.



2. Position universal joint (A) on yoke (D) and manually install four screws (C) in universal joint (A).

3. Using torque wrench and 7/16 inch crowfoot wrench, tighten all screws (C) in both yokes (B and D) to 265 to 325 lb-in (30-36 NŹm).

**CAUTION**

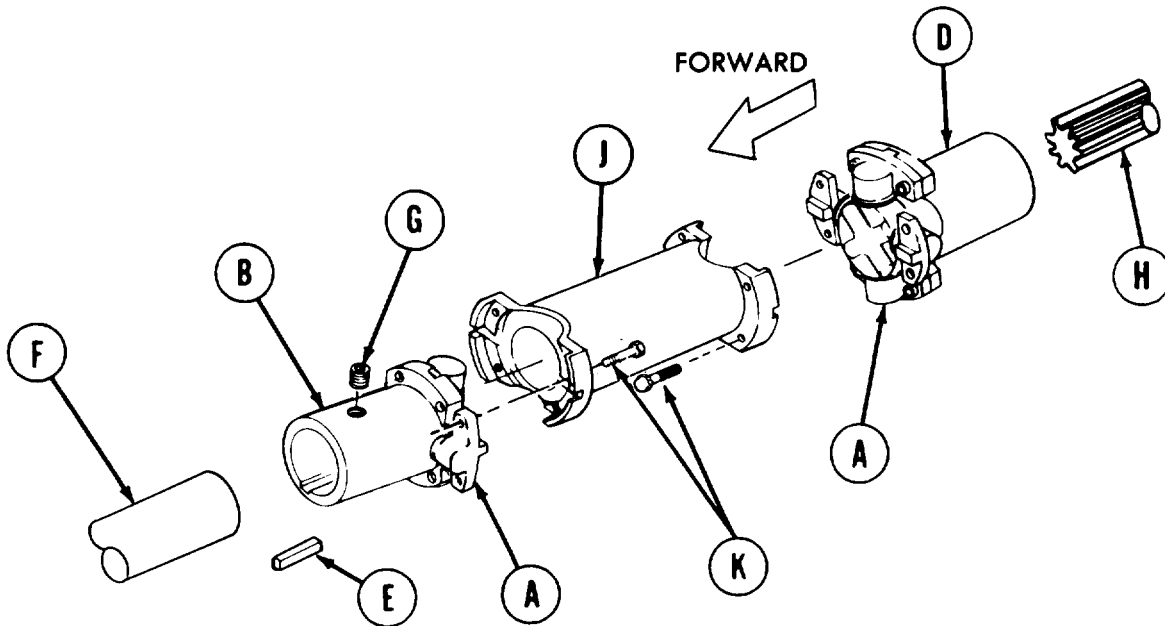
**Replace any screws (C) which have been over torqued beyond 325 lb.-in. (36 NŹm).**

Go on to Sheet 3

TA251463

**UNIVERSAL JOINT REPLACEMENT (Sheet 3 of 3)**

4. Position key (E) between front yoke (B) and shaft (F) and slide yoke (B) forward on shaft (F) until it bottoms out.
5. Using screw key, install setscrew (G).



6. Aline splines of yoke (D) and shaft (H), and slide yoke (D) on shaft (H).
7. Position tube assembly (J) between yokes (B and D). Rotate yoke (B) until both universal joints (A) are alined, then slide yoke (D) forward.
8. Aline holes and manually start four screws (K) on each end of tube assembly (J).
9. Using torque wrench and 7/16 inch crowfoot wrench, tighten eight screws (K) to 265 to 325 lb-in (30 to 36 N•m).

**NOTE**

**Replace any screws (K) which have been over torqued beyond 325 lb-in (36 N•m).**

10. Lubricate per LO 5-5420-202-12.
11. Install universal joint cover (page 3-61).

End of Task

TA251464

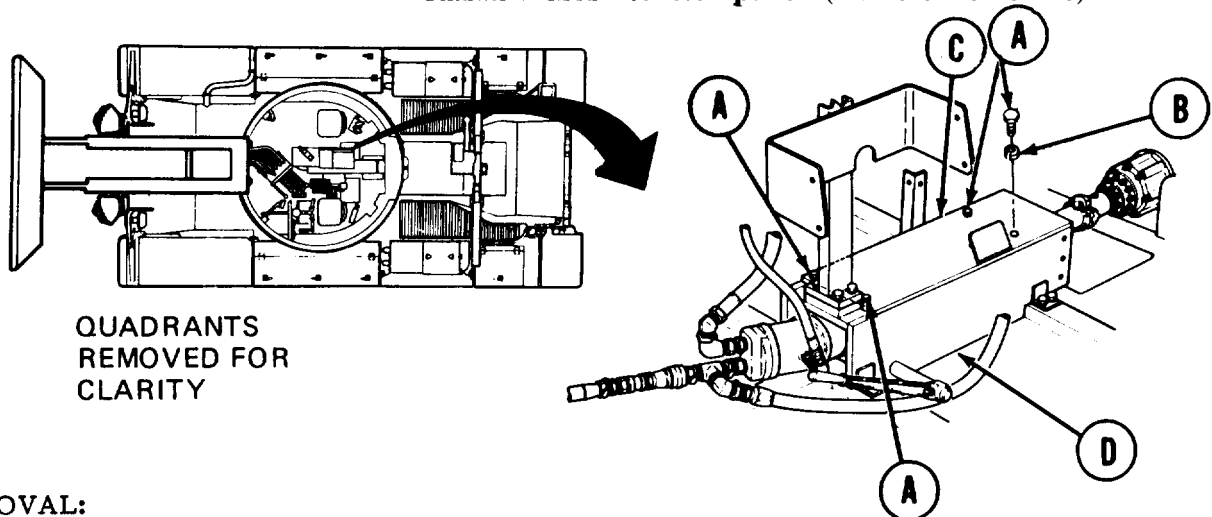
**PUMP-CLUTCH COVER PLATE REPLACEMENT (Sheet 1 of 1)**

**TOOLS:** 7/16 in. socket with 1/2 in. drive  
Ratchet with 1/2 in. drive

**SUPPLIES:** Lockwashers (4 required)

**REFERENCE:** TM 5-5420-202-20

**PRELIMINARY PROCEDURES:** Remove driver's intercommunication control  
(TM 5-5420-202-20)  
Remove master control panel (TM 5-5420-202-20)

**REMOVAL:**

1. Using socket, remove four screws (A) and lockwashers (B).
2. Manually remove cover plate (C) from support (D).

**INSTALLATION:**

1. Manually position cover plate (C) on support (D).
2. Using socket, install four screws (A) and lockwashers (B).
3. Install master control panel (TM 5-5420-202-20).
4. Install driver's intercommunication control (TM 5-5420-202-20).

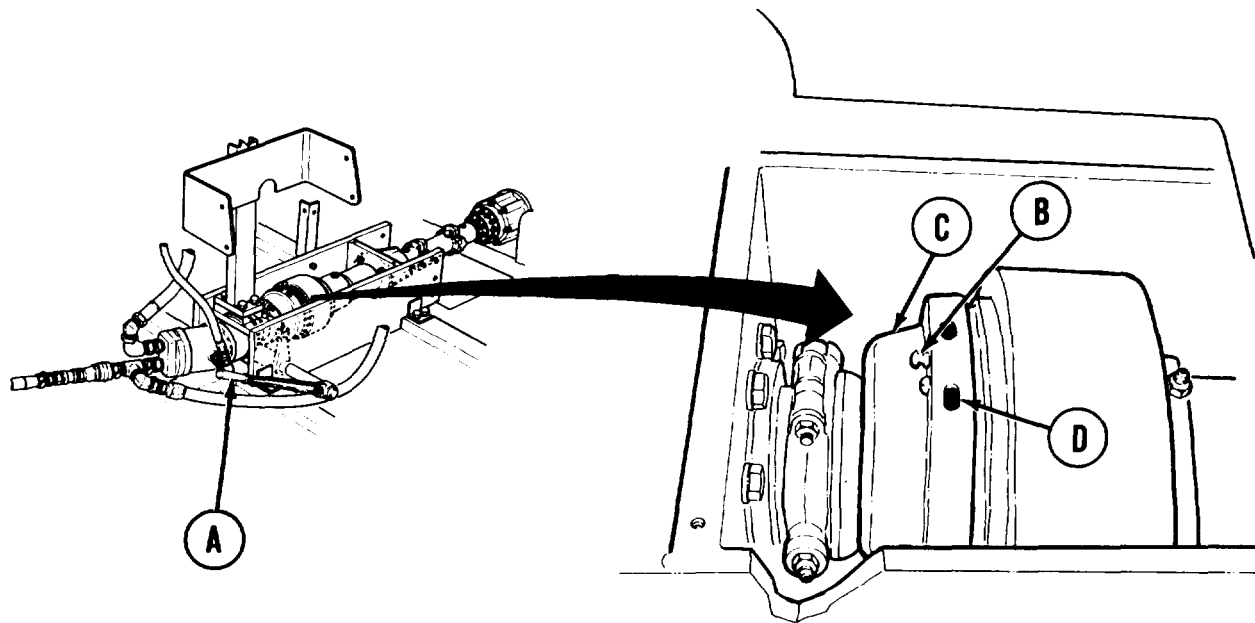
End of Task

## HYDRAULIC CLUTCH ADJUSTMENT (Sheet 1 of 1)

SUPPLIES: Lockwire

REFERENCE: TM 5-5420-202-10

PRELIMINARY PROCEDURE: Remove pump-clutch cover plate (page 3-65).



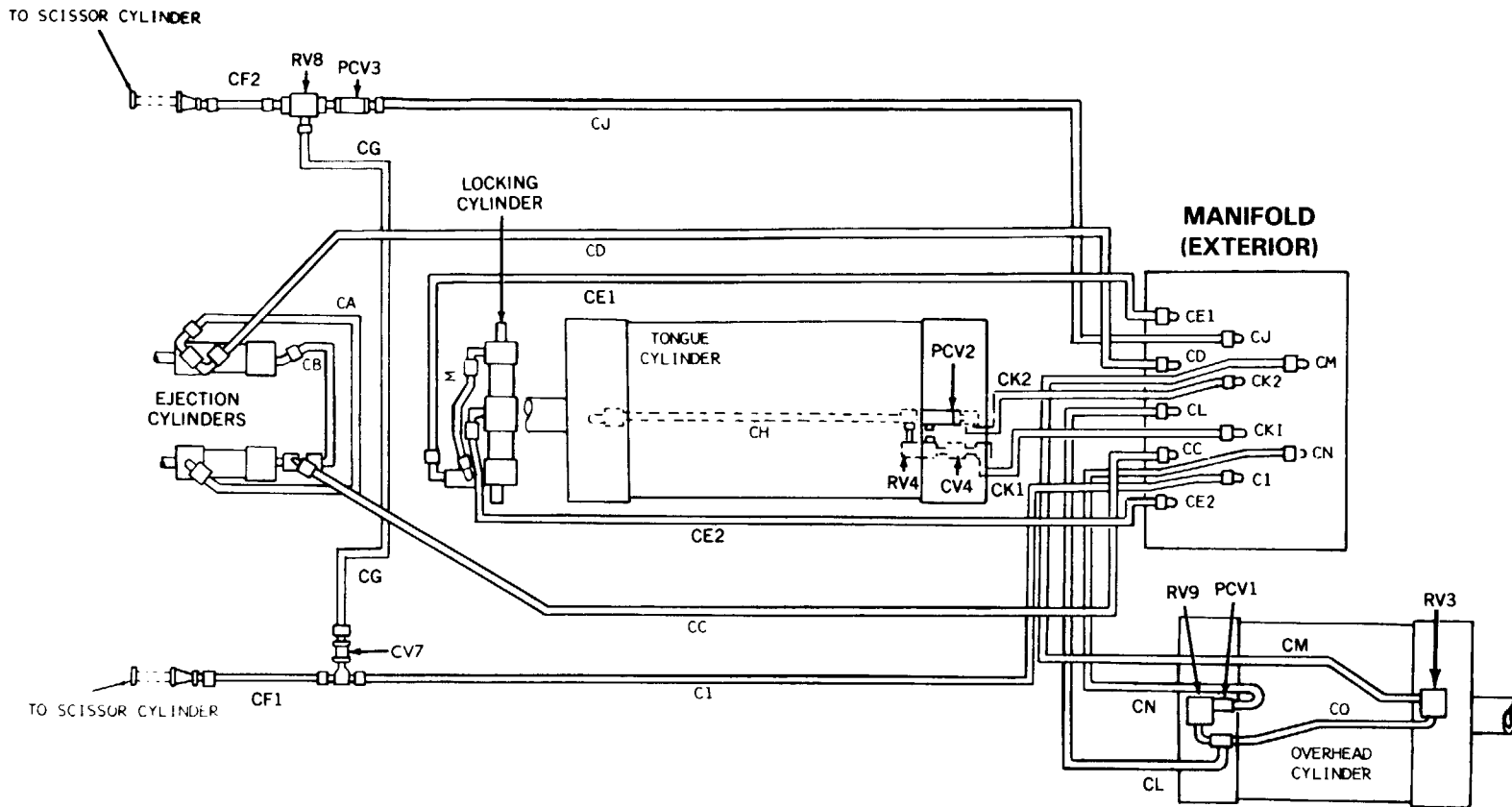
### ADJUSTMENT:

1. Push clutch control lever (A) downward to disengage.
2. Turn clutch manually until pin (B) can be reached.
3. Pull pin (B) out and lock by inserting lockwire through hole in pin (B).
4. Turn cover (C) clockwise one or two adjusting holes (D).
5. Pull clutch control lever (A) up to engage.
6. Repeat steps 4 and 5 until clutch control lever (A) requires definite force to engage clutch.
7. Remove lockwire from pin (B) and push pin in.
8. Install pump-clutch cover (page 3-65)
9. Operate pump-clutch to insure proper operation (TM 5-5420-202-10).

End of Task

TA251466





**NOTE**

Reference designators (letters on diagrams) are used to identify parts on the vehicle and to find the maintenance procedure in this manual. Find the reference designator on the diagram, then look on the next page for the maintenance procedure, part number, and page number where the task is detailed. Reference designators will be found stamped on the vehicle components as follows:  
 Stamped on tab of collars (large flat washers with a tab) located at each end of hose assemblies;  
 Stamped on hull manifold where hose assemblies connect.

**OUTSIDE HYDRAULICS**

TA251467

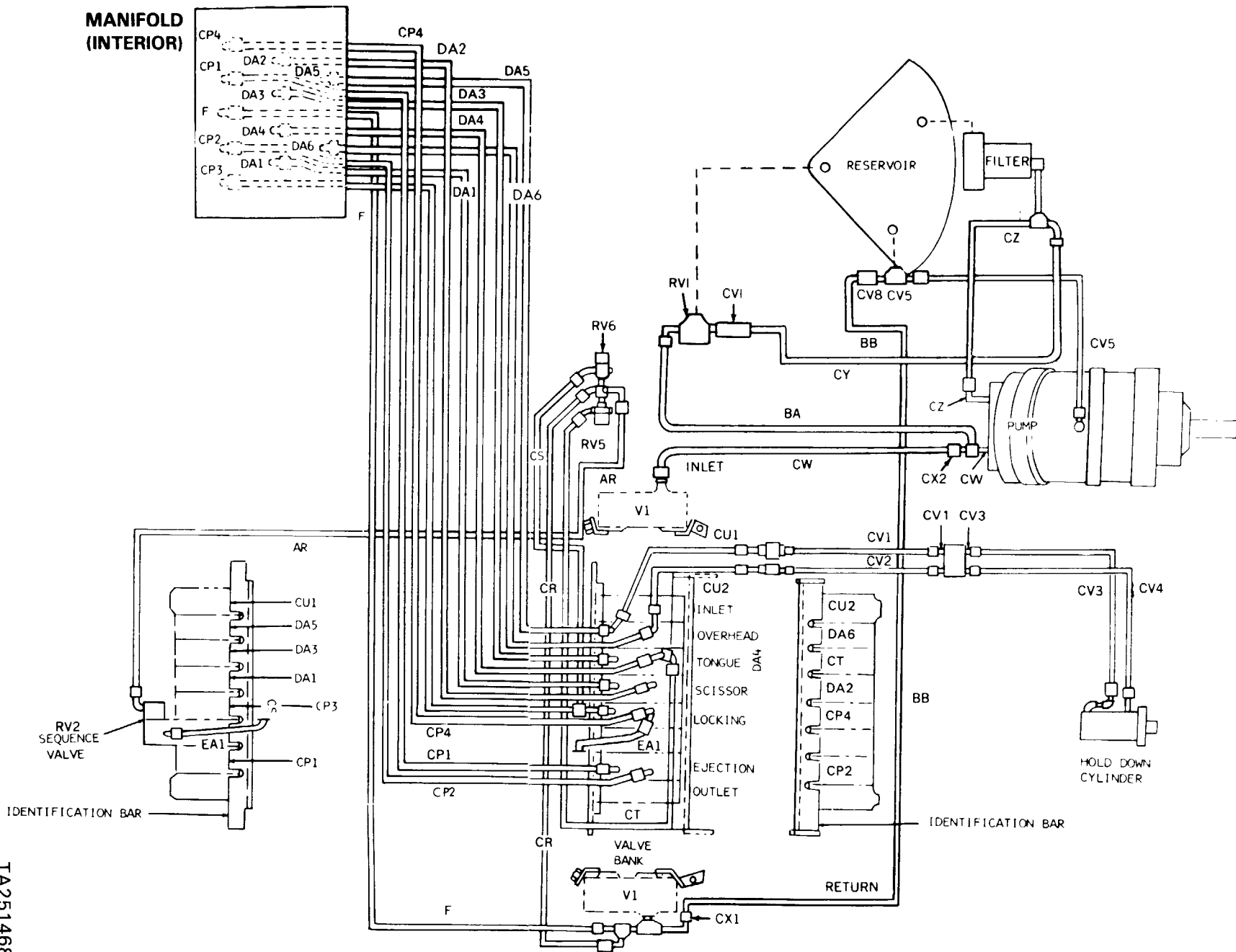
OUTSIDE HYDRAULICS  
HOSE ASSEMBLIES

Reference Designator		Part No.	Page No.
CA	Ejection Cylinder Hose Assy Replacement	C13211E3036-5	3-155
CB	Ejection Cylinder Hose Assy Replacement	C13211E3036-2	3-155
CC	Ejection Cylinder Hose Assy Replacement	C13211E3036-7	3-155
CD	Ejection Cylinder Hose Assy Replacement	C13211E3036-8	3-155
CE1 & CE2	Locking Cylinder Hose. Assy Replacement	C13211E3036-6	3-151
CF1 & CF2	Scissors Cylinder Hose Assy Replacement	C13211E3148-5	3-139
CG	Scissors Cylinder Hose Assy Replacement	C13211E3148-2	3-139
CH	Tongue Cylinder Hose Assy Replacement	C13211E3148-1	3-135
CI	Scissors Cylinder Hose Assy Replacement	C13211E3148-13	3-139
CJ	Scissors Cylinder Hose Assy Replacement	C13211E3148-12	3-139
CK1 & CK2	Tongue Cylinder Hose Assy Replacement	C13211E3148-11	3-135
CL	Overhead Cylinder Hose Assy Replacement	C13211E3148-8	3-125
CM	Overhead Cylinder Hose Assy Replacement	C13211E3148-10	3-125
CN	Overhead Cylinder Hose Assy Replacement	C13211E3148-9	3-125
CO	Overhead Cylinder Hose Assy Replacement	C13211E3148-3	3-125
M	Locking Cylinder Hose Assy Replacement	C13211E3036-1	3-151

VALVES AND REGULATORS

CV4	Tongue Cylinder Relief Valve & Check Valve Replacement	B13211E3214	3-99
CV7	Scissors Cylinder Check Valve Replacement	B13211E3222-1	3-116
PCVL	Overhead Cylinder Relief Valve & Flow Regulator Replacement	C13211E3217-2	3-110
PCV2	Tongue Cylinder Flow Regulator Replacement	C13211E3217-2	3-114
PCV3	Scissors Cylinder Relief Valve Elbow Regulator Replacement	C13211E3217-1	3-106
RV3	Overhead Cylinder Relief Valve (Rod End) Cartridge Replacement		3-80
	Overhead Cylinder Relief Valve (Rod End) Adjustment		3-81
	Overhead Cylinder Relief Valve (Rod End) Replacement	C13211E3210-1	3-95
RV4	Tongue Cylinder Relief Valve (Rod End) Cartridge Replacement		3-83
	Tongue Cylinder Relief Valve (Rod End) Adjustment		3-84
	Tongue Cylinder Relief Valve (Rod End) Replacement	C13211E3210-1	3-99
RV8	Scissors Cylinder Relief Valve (Rod End) Cartridge Replacement		3-88
	Scissors Cylinder Relief Valve (Rod End) Adjustment		3-89
	Scissors Cylinder Relief Valve (Rod End) Replacement	C13211E3210-4	3-106
RV9	Overhead Cylinder Relief Valve (Cap End) Cartridge Replacement		3-80
	Overhead Cylinder Relief Valve (Cap End) Adjustment		3-92
	Overhead Cylinder Relief Valve (Cap End) Replacement	C13211E3210-1	3-95

**MANIFOLD  
(INTERIOR)**



**INSIDE HYDRAULICS**

INSIDE HYDRAULICS  
HOSE ASSEMBLIES

Reference Designator		Part No.	Page No.
AR	Sequence Valve Hose Assy Replacement t	C13211E3037	3-165
BA	Master Relief Valve to Pump Hose Assy Replacement	C13211E3280-5	3-197
BB	Reservoir to Valve Bank Return Hose Assy Replacement	C13211E3280-4	3-191
CP1 & CP2	Ejection Cylinder Hose Assy Replacement	C13211E3025	3-178
CP3 & CP4	Locking Cylinder Hose Assy Replacement	C13211E3025	3-180
CR	Outlet to Relief Valve Mount Hose Assy Replacement	C13211E3148-4	3-162
CS	Locking Cylinder Hose Assy Replacement t	C13211E3153-1	3-180
CT	Tongue Cylinder Hose Assy Replacement t	C13211E3153-2	3-166
CU1 & CU2	Hold Down Cylinder Hose Assy Replacement	C13211E3036-4	3-173
CV1 & CU2	Hold Down Cylinder Hose Assy Replacement	C13211E3036-3	3-173
CV5	Reservoir to Pump Hose Assy Replacement	C13211E3036-3	3-194
CW	Pump to Valve Bank Hose Assy Replacement	C13211E3280-2	3-189
CY	Reservoir Filter Bypass Hose Assy Replacement	C13211E3280-1	3-203
CZ	Filter to Pump Hose Assy Replacement	C13211E3281	3-200
DA1 & DA2	Scissors Cylinder Hose Assy Replacement	C13211E3153-3	3-184
DA3 & DA4	Tongue Cylinder Hose Assy Replacement t	C13211E3153-3	3-166
DA5 & DA6	Overhead Cylinder Hose Assy Replacement	C13211E3153-3	3-180
EA1	Locking Cylinder Tube Assy Replacement t	C13211E3263	3-170
F	Overhead Cylinder Return Hose Assy Replacement	C13211E3148	3-163

VALVES, REGULATORS, AND DISCONNECTS

CV1	Check Valve	B13211E3225-2	3-90
CV5	Check Valve	B13211E3225-1	3-120
CV8	Check Valve	B13211E3222-2	3-118
CX1	Quick Disconnect (Return)		3-191
CX2	Quick Disconnect (Inlet)		3-189
RV1	Relief Valve (Master) Cartridge Replacement		3-73
	Relief Valve (Master) Adjustment		3-76
	Relief Valve (Master) Replacement	C13211E3218	3-90
RV2	Relief Valve (Sequence) Cartridge Replacement		3-78
	Relief Valve (Sequence) Adjustment		3-79
RV5	Tongue Cylinder Relief Valve (Cap End) Cartridge Replacement		3-85
	Tongue Cylinder Relief Valve (Cap End) Adjustment		3-86
	Tongue Cylinder Relief Valve (Cap End) Replacement	B13211E3210-2	3-103
RV6	Locking Cylinder Relief Valve (Cap End) Cartridge Replacement		3-85
	Locking Cylinder Relief Valve (Cap End) Adjustment		3-87
	Locking Cylinder Relief Valve (Cap End) Replacement	B13211E3210-3	3-103
V1	Valve Bank Replacement	D13211E3255	4-59

## RELIEVING HYDRAULIC PRESSURE (Sheet 1 of 1)

SUPPLIES: Rags (Item 12, Appendix D)  
 Gloves (Item 27, Appendix D)  
 Goggles (Item 26, Appendix D)  
 Shield (Item 33, Appendix D)

**WARNING**

Serious injury could result from high pressure hydraulic fluid spray, if this procedure is not followed when disconnecting any hydraulic lines or fittings.

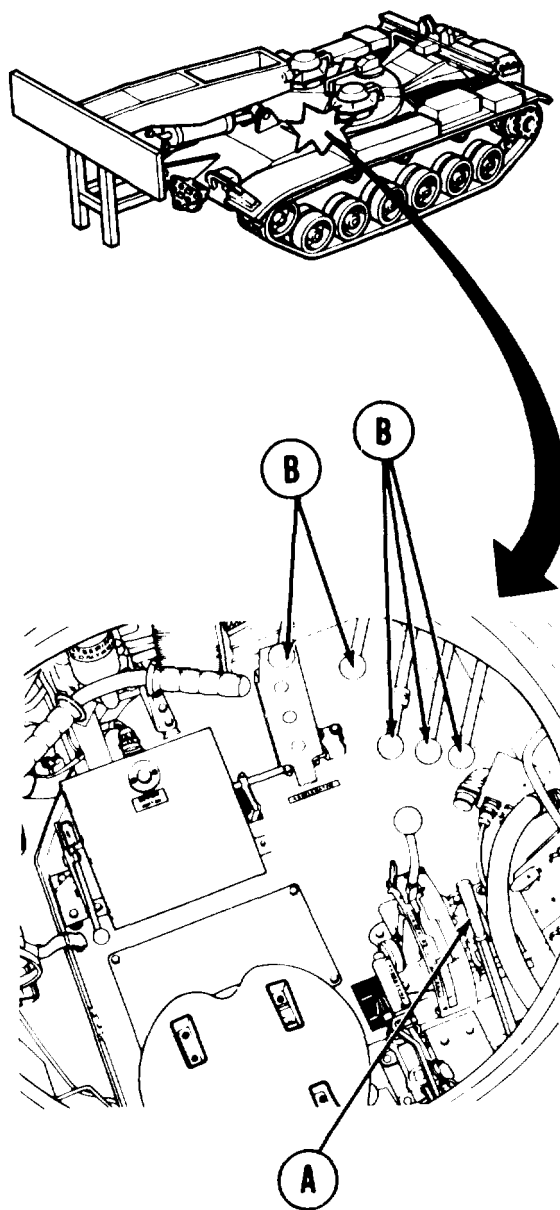
1. Push down clutch lever (A).
2. Pull up, then push down on all hydraulic control levers (B) at least three times.

**WARNING**

FRH hydraulic fluid may contain Tricresyl Phosphate which, if taken internally, can produce paralysis. Hydraulic fluid may be absorbed through the skin. Wear long sleeves, gloves, goggles, and face shield. If FRH gets in eyes, wash them immediately and get medical aid immediately. If FRH gets on skin, thoroughly wash with soap and water. Wash hands thoroughly prior to eating or smoking. Application of these measures is considered an effective control of the hazard

3. Cover line or fitting to be disconnected with a rag.

End of Task



TA251469

**BLEED HYDRAULIC SYSTEM (Sheet 1 of 1)**

REFERENCE: TM 5-5420-202-10

**NOTE**

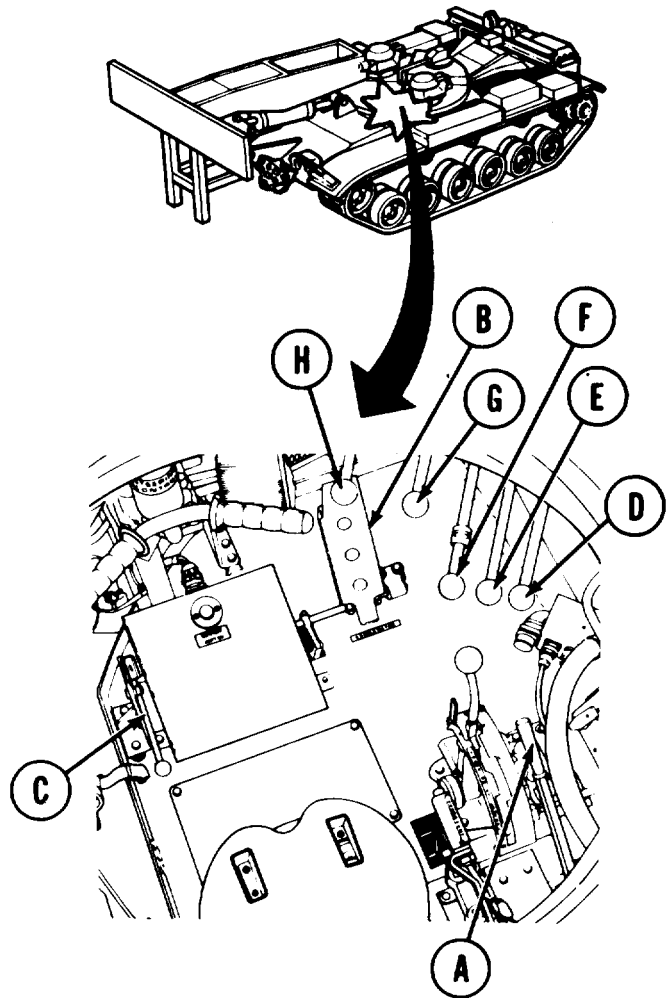
The vehicle hydraulic system is self bleeding, through operation it eliminates air from the hydraulic fluid. Whenever hydraulic components are removed or replaced this procedure should be followed after maintenance.

1. Start engine (TM 5-5420-202-10).

**CAUTION**

Do not pull up clutch lever (A) with engine running over idle rpm, since power take off components could be damaged.

2. Pull up clutch lever (A).
3. Press accelerator (B) until engine is running at 1800 rpm.
4. Pull up accelerator lock (C).
5. Pull up then push down on all levers, (D thru H) one at a time to actuate each cylinder. Generally actuating just the cylinder to which hoses or fittings have been removed will be enough. In addition consider the following:
  - a. To actuate the hold down cylinder, move overhead cylinder lever (D).
  - b. To actuate the ejection cylinders you must pull up and hold locking lever (G) then move ejection lever (H) up (eject) or down (retract).



End of Task

TA251470

**MASTER RELIEF VALVE (RV1) CARTRIDGE REPLACEMENT (Sheet 1 of 1)**

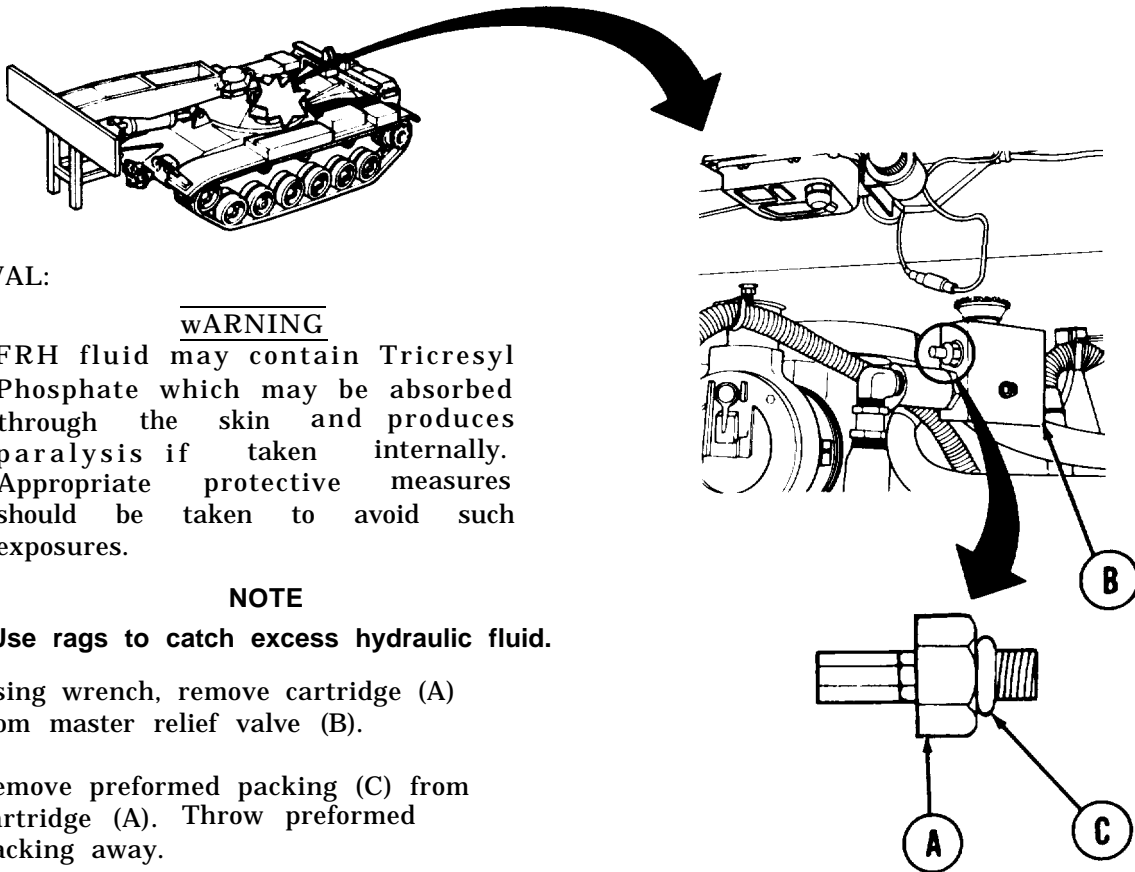
**TOOLS:** 1-1/8 in. open end wrench

**SUPPLIES:** Rags (Item 12, Appendix D)  
 Preformed packing

**Goggles (Item 26, Appendix D)**  
**Gloves (Item 27, Appendix D)**

**REFERENCE:** LO 5-5420-202-12

**PRELIMINARY PROCEDURE:** Drain hydraulic reservoir (page 3-74)



**REMOVAL:**

**wARNING**

FRH fluid may contain Tricresyl Phosphate which may be absorbed through the skin and produces paralysis if taken internally. Appropriate protective measures should be taken to avoid such exposures.

**NOTE**

**Use rags to catch excess hydraulic fluid.**

1. Using wrench, remove cartridge (A) from master relief valve (B).
2. Remove preformed packing (C) from cartridge (A). Throw preformed packing away.

**INSTALLATION:**

1. Install new preformed packing (C) on cartridge (A).
2. Using wrench, install cartridge (A) into master relief valve (B).
3. Refill hydraulic reservoir (LO 5-5420-202-12).
4. Bleed hydraulic system (page 3-72).
5. Check for hydraulic leaks and correct as necessary.
6. Refill hydraulic reservoir (LO 5-5420-202-12).
7. Adjust master relief valve (RV1) pressure (page 3-76).

End of Task

**TA251471**

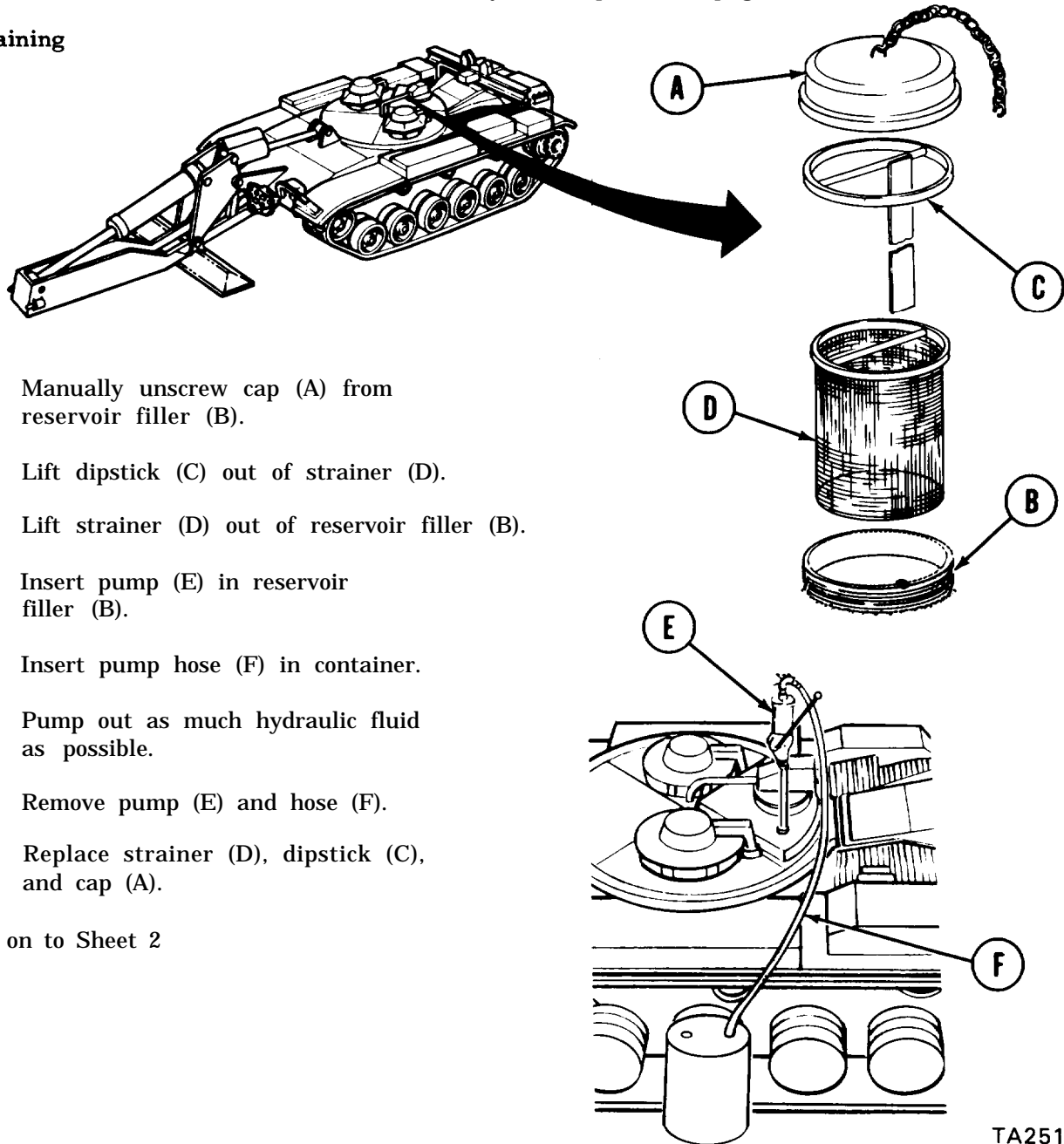
**DRAINING HYDRAULIC RESERVOIR (Sheet 1 of 2)**

**TOOLS:** 15 in. adjustable wrench  
5/8 in. combination wrench  
3/4 in. combination wrench  
Dispensing pump

**SUPPLIES:** Container (open 5 gallon capacity)  
Containers (55 gallon capacity 2 required)

**PRELIMINARY PROCEDURE:** Relieve hydraulic pressure (page 3-71)

**Draining**



1. Manually unscrew cap (A) from reservoir filler (B).
2. Lift dipstick (C) out of strainer (D).
3. Lift strainer (D) out of reservoir filler (B).
4. Insert pump (E) in reservoir filler (B).
5. Insert pump hose (F) in container.
6. Pump out as much hydraulic fluid as possible.
7. Remove pump (E) and hose (F).
8. Replace strainer (D), dipstick (C), and cap (A).

Go on to Sheet 2

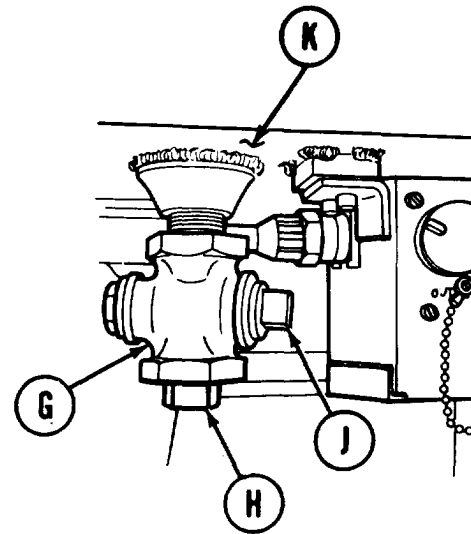
TA251472



**DRAINING HYDRAULIC RESERVOIR (Sheet 2 of 2)**

9. Position container to catch hydraulic fluid.
10. Holding drain valve (G) with adjustable wrench, use 5/8 inch wrench to remove plug (H) .
11. Using 3/4 inch wrench, turn valve (J) and allow hydraulic fluid to drain from reservoir. (K) into open 5 gallon container.
12. After reservoir has drained, use 3/4 inch wrench to turn valve (J) to off position.
13. Holding drain valve (G) with adjustable wrench, use 5/8 inch wrench to install plug (H).

End of Task



OPERATOR'S  
STATION

**MASTER RELIEF VALVE (RV1) ADJUSTMENT (Sheet 1 of 2)**

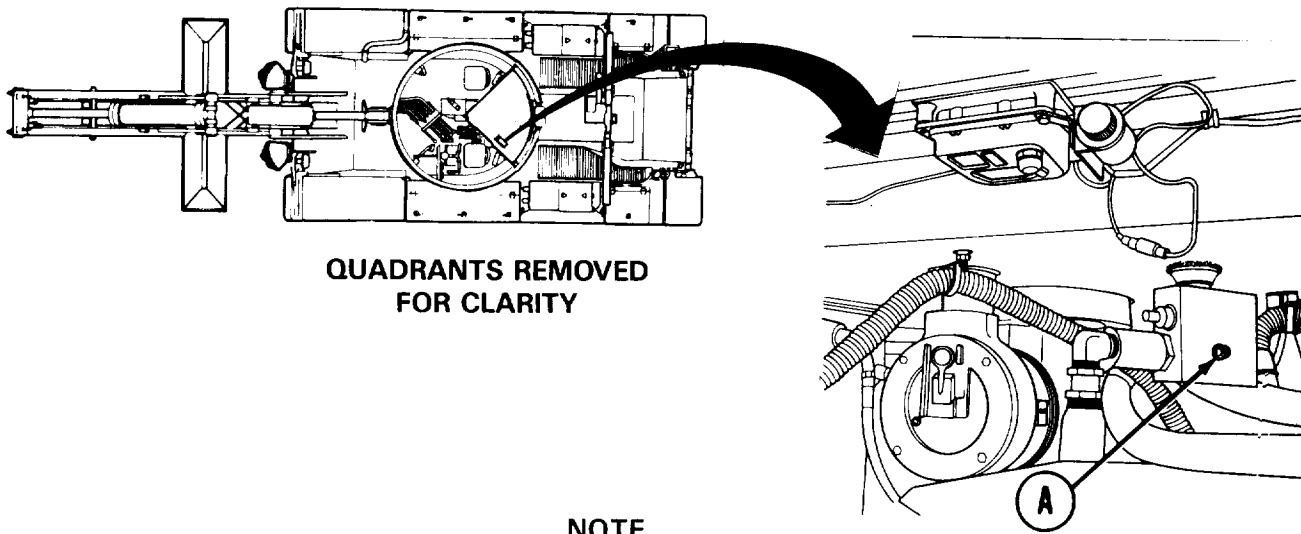
TOOLS: 1/4 in. socket head screw key  
3/16 in. socket head screw key  
9/16 in. open end wrench

SPECIAL TOOL: Gage, pressure (item 3, sec III, app B)

PERSONNEL: Two

REFERENCE: TM 5-5420-202-10

PRELIMINARY PROCEDURE: Relieve hydraulic pressure (page 3-71)



If STE/ICE is available, go to STE/ICE test 51 (page 2-47).

**ADJUSTMENT:**

1. Using 1/4 inch screw key, remove plug (A).
2. Manually install pressure gage in opening left by removal of plug (A).
3. Engage hydraulic pump (TM 5-5420-202-10).
4. Set engine speed at 1800 rpm.
5. Slowly press down scissor cylinder control lever all the way and hold in that position.
6. Have second technician observe pressure gage reading.
7. Return scissor cylinder control lever to neutral position.

Go on to Sheet 2

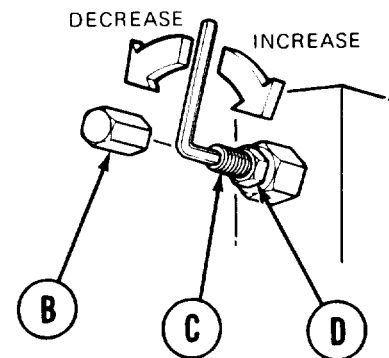
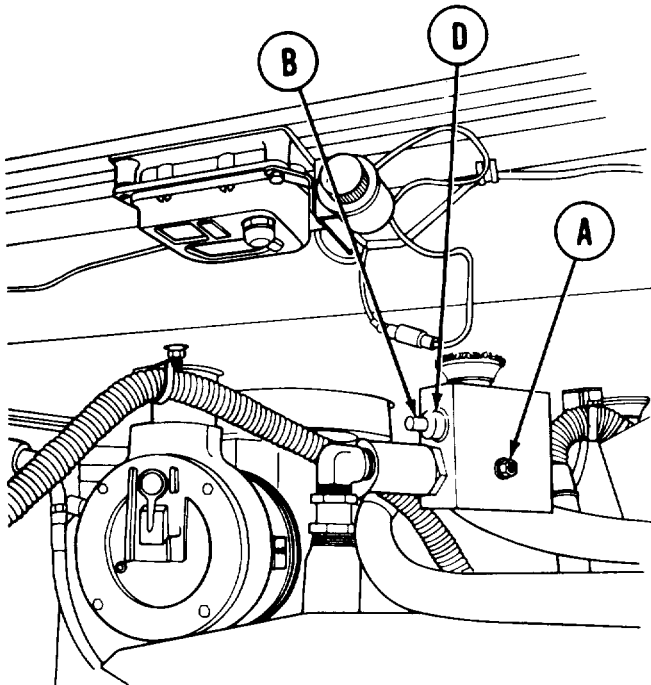
TA251474

## MASTER RELIEF VALVE (RV1) ADJUSTMENT (Sheet 2 of 2)

## NOTE

Correct pressure is  $3800 \pm 50$  psi ( $26220 \pm 340$  kPa).

8. Using wrench, remove adjusting screw cap (B).
9. To adjust relief valve pressure, hold adjusting screw (C) with 3/16 inch screw key and use wrench to loosen jamnut (D). Using 3/16 inch screw key, turn adjusting screw (C) clockwise to increase pressure or counterclockwise to decrease pressure.
10. Repeat steps 3 through 9 until pressure gage shows reading of  $3800 \pm 50$  Psi ( $26220 \pm 340$  kPa).
11. Holding adjusting screw (C) with 3/16 inch screw key, use wrench to tighten jamnut (D).
12. Using wrench, install adjusting screw cap (B).
13. Remove pressure gage.
14. Using 1/4 inch screw key, install plug (A).



End of Task

TA251475

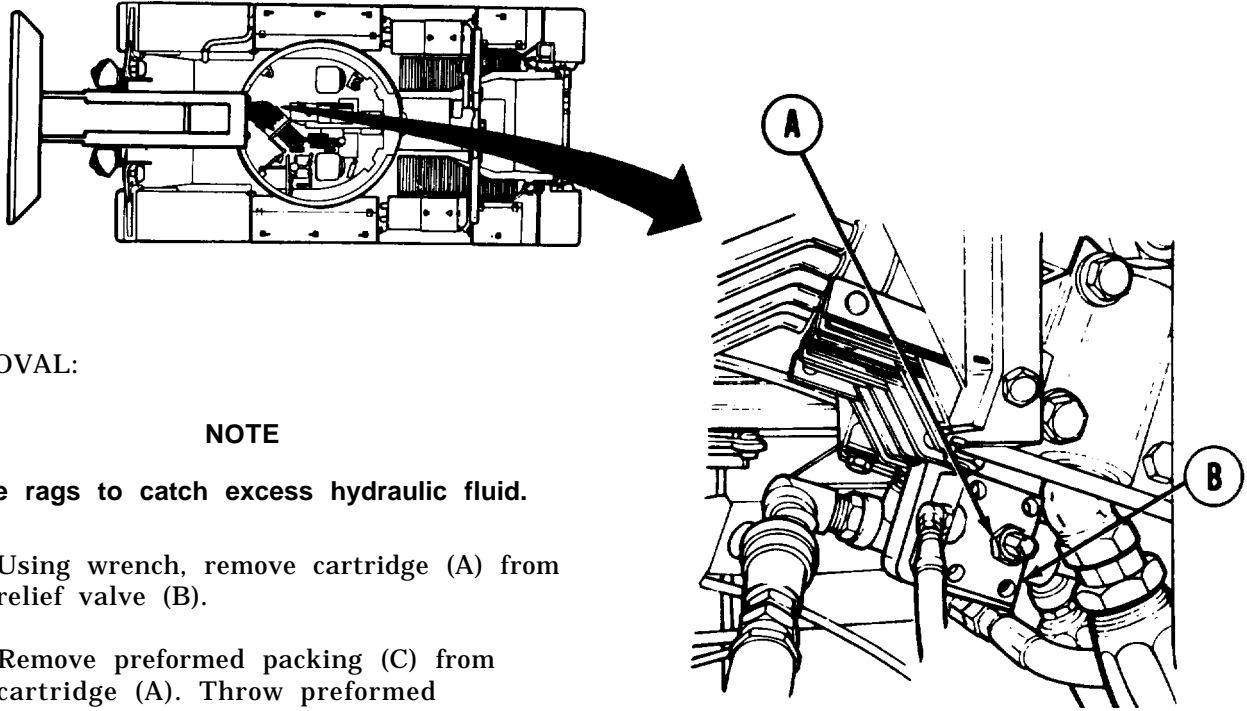
**SEQUENCE VALVE (RV2) CARTRIDGE REPLACEMENT (Sheet 1 of 1)**

**TOOLS:** 1-1/8 in. open end wrench

**SUPPLIES:** Rags (Item 12, Appendix D)  
Preformed packing

**PRELIMINARY PROCEDURE:** Relieve hydraulic pressure (page 3-71)

QUADRANTS REMOVED FOR CLARITY



**REMOVAL:**

**NOTE**

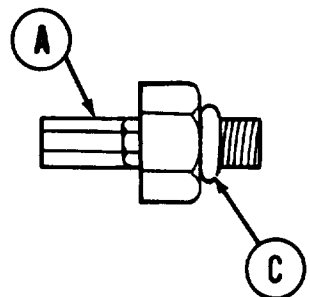
Use rags to catch excess hydraulic fluid.

1. Using wrench, remove cartridge (A) from relief valve (B).
2. Remove preformed packing (C) from cartridge (A). Throw preformed packing (C) away.

**INSTALLATION:**

1. Install preformed packing (C) on cartridge (A).
2. Using wrench, install cartridge (A) into relief valve (B).
3. Adjust relief valve pressure (page 3-79).

End of Task



**SEQUENCE VALVE (RV2) ADJUSTMENT (Sheet 1 of 1)**

**TOOLS:** 3/16 in. socket head screw key  
 5/16 in. socket head screw key  
 9/16 in. open end wrench

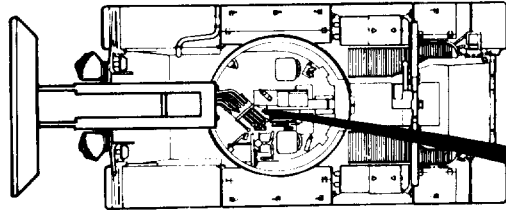
**SPECIAL TOOL:** Gage, pressure (item 3, sec III, app B)

**PERSONNEL:** Two

**REFERENCE:** TM 5-5420-202-10

**PRELIMINARY PROCEDURE:** Relieve hydraulic pressure (page 3-71)

**QUADRANTS REMOVED FOR CLARITY**

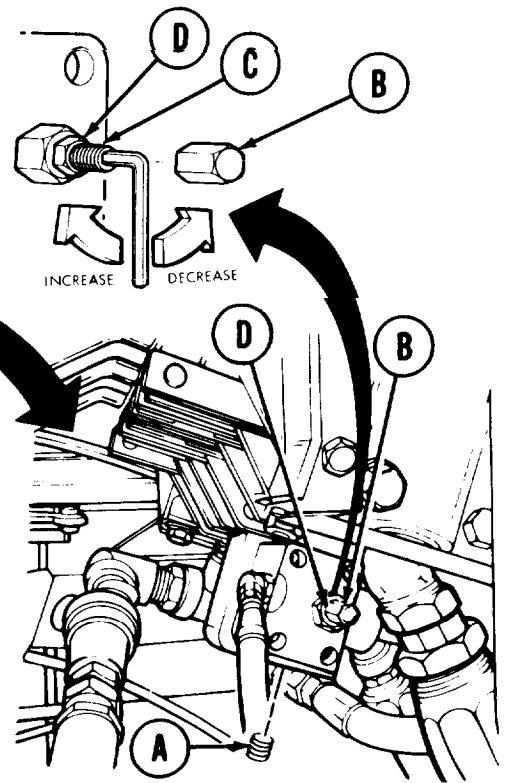


**NOTE**

If STE/ICE is available, go to STE/ICE Test 51 (page 2-47).

**ADJUSTMENT:**

1. Using 5/16 inch screw key, remove plug (A).
2. Manually install pressure gage in opening left by removal of plug (A).
3. Engage hydraulic pump (TM 5-5420-202-10).
4. Set engine speed at 1800 rpm.
5. Pull up on locking cylinder control and ejection cylinder levers.
6. Have second technician observe pressure gage reading.
7. Return locking and ejection cylinder control levers to neutral position.
8. Remove adjusting screw cap (B) using wrench.
9. To adjust pressure, hold adjusting screw (C) with 3/16 inch screw key and use wrench to loosen jamnut (D). Using 3/16 inch screw key, turn adjusting screw (C) clockwise to increase pressure or counterclockwise to decrease pressure.
10. Repeat steps 3 through 9 until pressure gage shows reading of  $3200 \pm 50 \text{ Ps}^1$  ( $22064 \pm 340 \text{ kPa}$ ).
11. Holding adjusting screw (C) with 3/16 inch screw key, use wrench to tighten jamnut (D).
12. Install adjusting screw cap (B) using wrench.
13. Remove pressure gage.
14. Using 5/16 inch screw key, install plug (A) and tighten.



**UNDER VALVE BANK**

End of Task

TA251477

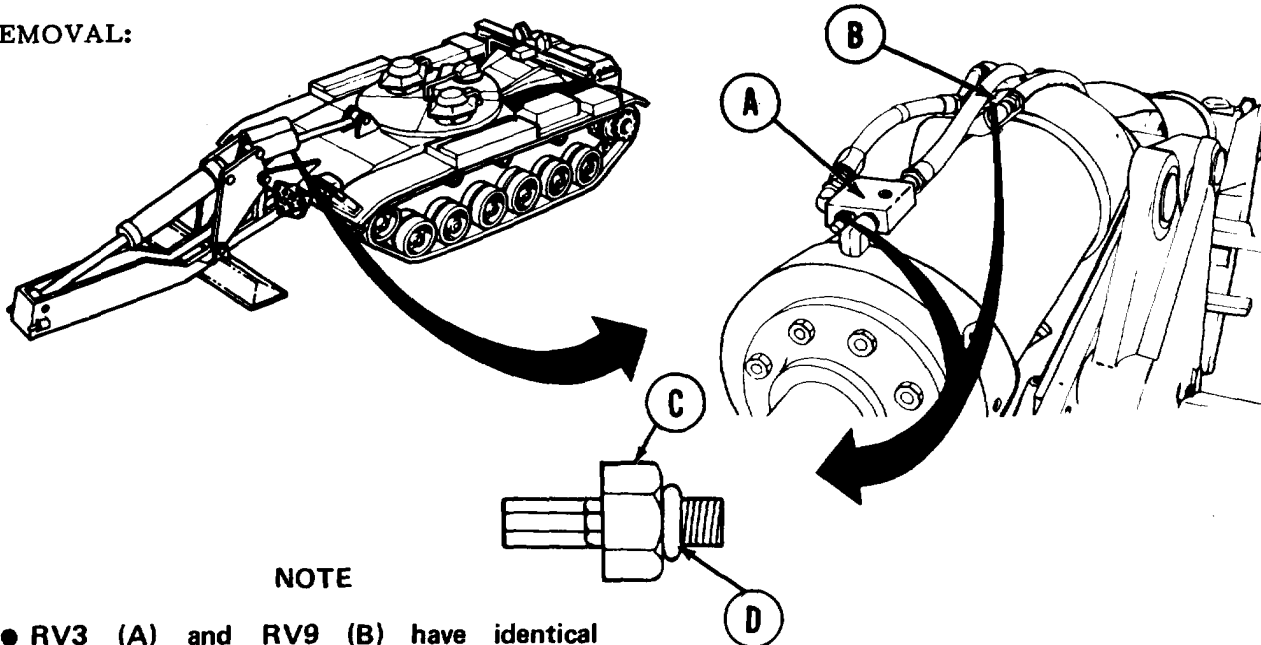
**OVERHEAD CYLINDER RELIEF VALVES (RV3 and RV9) CARTRIDGE REPLACEMENT  
(Sheet 1 of 1)**

TOOLS: 1-1/8 in. open end wrench

SUPPLIES: Rags (Item 12, Appendix D)  
Reformed packing

PRELIMINARY PROCEDURES: Remove overhead cylinder armor (page 3-223)  
Relieve hydraulic pressure (page 3-71)

**REMOVAL:**



**NOTE**

- RV3 (A) and RV9 (B) have identical configuration. Use the same procedure for both cartridges.
- Use rags to catch excess hydraulic fluid.

1. Using wrench, remove cartridge (C) from relief valve (RV3) (A) or (RV9) (B).
2. Remove preformed packing (D) from cartridge (C). Throw preformed packing away.

**INSTALLATION:**

1. Install new preformed packing (D) on cartridge (C).
2. Using wrench, install cartridge (C) into relief valve (RV3) (A) or (RV9) (B).
3. Adjust relief valve pressure (RV3) (page 3-81), (RV9) (page 3-82).
4. Install overhead cylinder armor (page 3-224).

End of Task

TA251478

**OVERHEAD CYLINDER RELIEF VALVE (RV3) ADJUSTMENT (Sheet 1 of 1)**

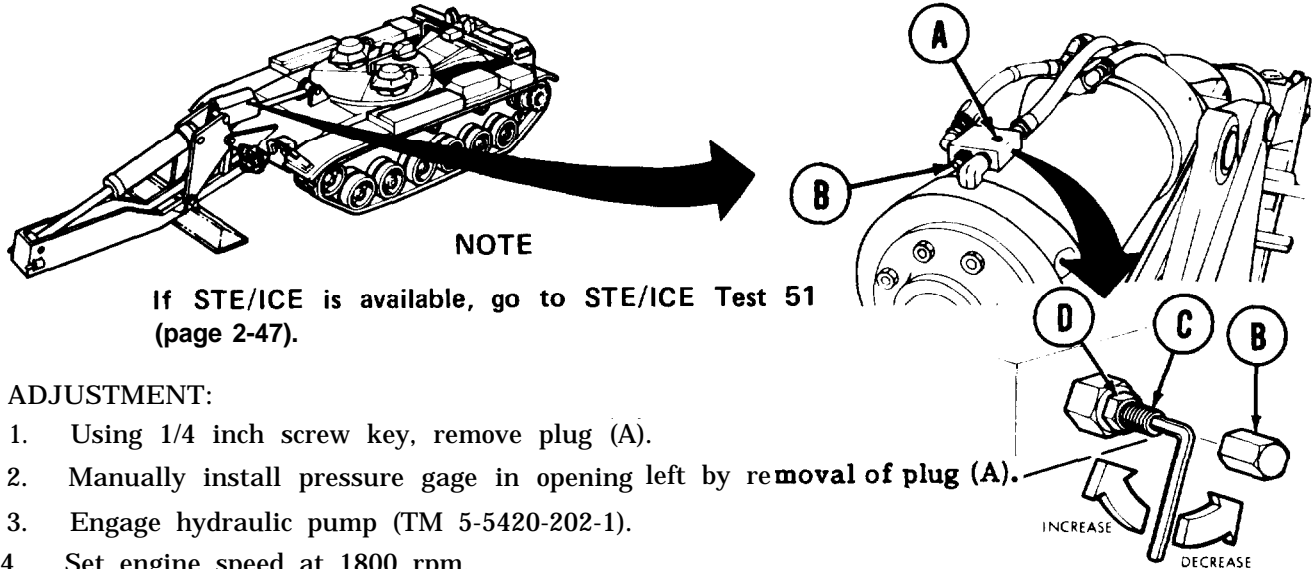
TOOLS: 1/4 in. socket head screw key  
 3/16 in. socket head screw key  
 9/16 in. open end wrench

SPECIAL TOOL: Gage, pressure (item 3, sec III, app B)

PERSONNEL: Two

REFERENCE: TM 5-5420-202-10

PRELIMINARY PROCEDURES: Remove overhead cylinder armor (page 3-223)  
 Relieve hydraulic pressure (page 3-71)



**NOTE**  
 If STE/ICE is available, go to STE/ICE Test 51 (page 2-47).

**ADJUSTMENT:**

1. Using 1/4 inch screw key, remove plug (A).
2. Manually install pressure gage in opening left by removal of plug (A).
3. Engage hydraulic pump (TM 5-5420-202-1).
4. Set engine speed at 1800 rpm.
5. Slowly push down overhead cylinder control lever all the way and hold in that position.
6. When overhead cylinder is fully retracted, have second technician observe pressure gage reading.
7. Return overhead cylinder control lever to neutral position.
8. Remove adjusting screw cap (B) using wrench.

**NOTE**

**Correct pressure is 3600 ± 50 psi (24822 ± 340 kPa).**

9. To adjust relief valve pressure, hold adjusting screw (C) with 3/16 inch screw key and use wrench to loosen jamnut (D). Using screw key, turn adjusting screw (C) clockwise to increase pressure or counterclockwise to decrease pressure.
10. Repeat steps 3 through 9 until pressure gage shows reading of 3600 ± 50 Psi (24822± 340 kPa).
11. Holding adjusting screw (C) with 3/16 inch screw key, use wrench to tighten jamnut (D).
12. Install adjusting screw cap (B) using wrench.
13. Remove pressure gage.
14. Using 1/4 inch screw key, install plug (A) and tighten.
15. Install overhead cylinder armor (page 3-224).

End of Task

TA25179

**OVERHEAD CYLINDER RELIEF VALVE (RV9) ADJUSTMENT (Sheet 1 of 1)**

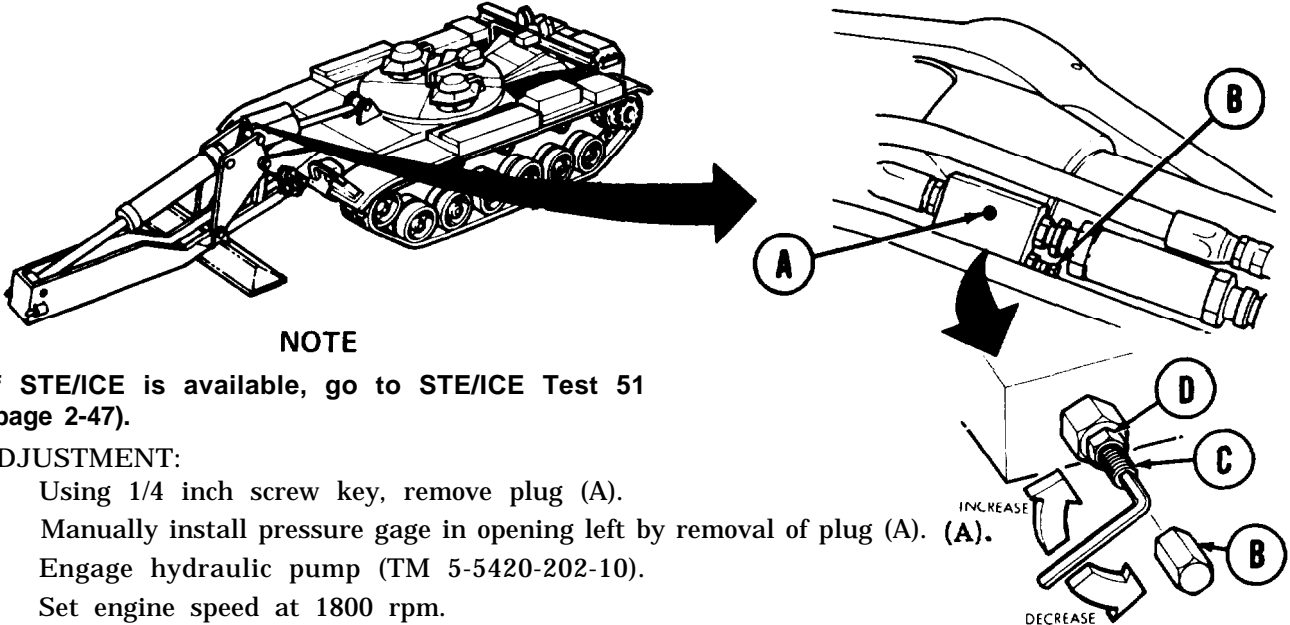
TOOLS: 1/4 in. socket head screw key  
 3/16 in. socket head screw key  
 9/16 in. open end wrench

SPECIAL TOOL: Gage, pressure (item 3, sec III, app B)

PERSONNEL: Two

REFERENCE: TM 5-5420-202-10

PRELIMINARY PROCEDURES: Remove overhead cylinder armor (page 3-223)  
 Relieve hydraulic pressure (page 3-71)



**NOTE**

If STE/ICE is available, go to STE/ICE Test 51 (page 2-47).

**ADJUSTMENT:**

1. Using 1/4 inch screw key, remove plug (A).
2. Manually install pressure gage in opening left by removal of plug (A). (A).
3. Engage hydraulic pump (TM 5-5420-202-10).
4. Set engine speed at 1800 rpm.
5. Slowly push up overhead cylinder control lever all the way and hold in that position.
6. Have second technician observe pressure gage reading.
7. Return overhead cylinder control lever to neutral position.
8. Remove adjusting screw cap (B) using wrench.

**NOTE**

**Correct pressure is 3600 ± 50 psi (24622 ± 340 kPa).**

9. To adjust relief valve pressure, hold adjusting screw (C) with 3/16 inch screw key and use wrench to loosen jamnut (D). Using 3/16 inch screw key, turn adjusting screw (C) clockwise to increase pressure or counterclockwise to decrease pressure.
10. Repeat steps 3 through 9 until pressure gage shows reading of 3600 ± 50 psi (24822 ± 340 kPa).
11. Holding adjusting screw (C) with 3/16 inch screw key, use wrench to tighten jamnut (D).
12. Install adjusting screw cap (B) using wrench.
13. Remove pressure gage.
14. Using 1/4 inch screw key, install plug (A) and tighten.
15. Install overhead cylinder armor (page 3-224).

End of Task

TA251480

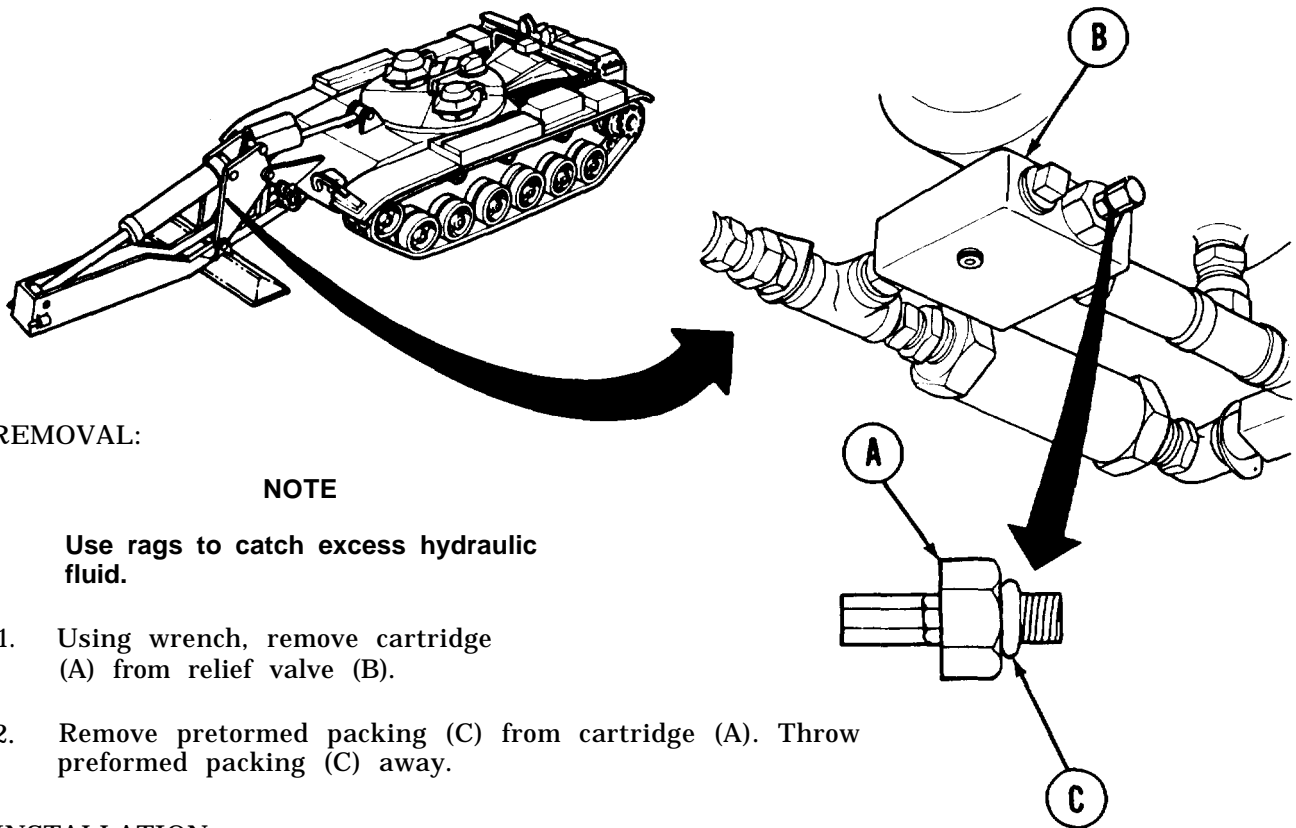


**TONGUE CYLINDER RELIEF VALVE (RV4) CARTRIDGE REPLACEMENT (Sheet 1 of 1)**

**TOOLS:** 1-1/8 in. open end wrench

**SUPPLIES:** Rags (Item 12, Appendix D)  
Preformed packing

**PRELIMINARY PROCEDURES:** Remove tongue cylinder armor (page 3-232)  
Relieve hydraulic pressure (page 3-71)

**REMOVAL:****NOTE**

Use rags to catch excess hydraulic fluid.

1. Using wrench, remove cartridge (A) from relief valve (B).
2. Remove pretormed packing (C) from cartridge (A). Throw pretormed packing (C) away.

**INSTALLATION:**

1. Install new preformed packing (C) on cartridge (A).
2. Using wrench, install cartridge (A) into relief valve (B).
3. Adjust relief valve pressure (page 3-84).
4. Install tongue cylinder armor (page 3-233).

End of Task

TA251481

**TONGUE CYLINDER RELIEF VALVE (RV4) ADJUSTMENT (Sheet 1 of 1)**

**TOOLS:** 3/16 in. socket head screw key  
 1/4 in. socket head screw key  
 9/16 in. open end wrench

**SPECIAL TOOLS:** Adapter ell (item 1, sec III, app B)  
 Adapter straight (item 2, sec III, app B)  
 Gage, pressure (item 3, sec III, app B)  
 Hose assembly (item 4, sec III, app B)

**PERSONNEL:** Two

**REFERENCE:** TM 5-5420-202-10

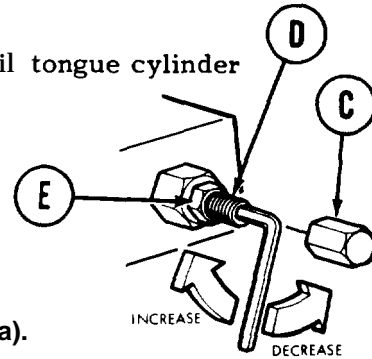
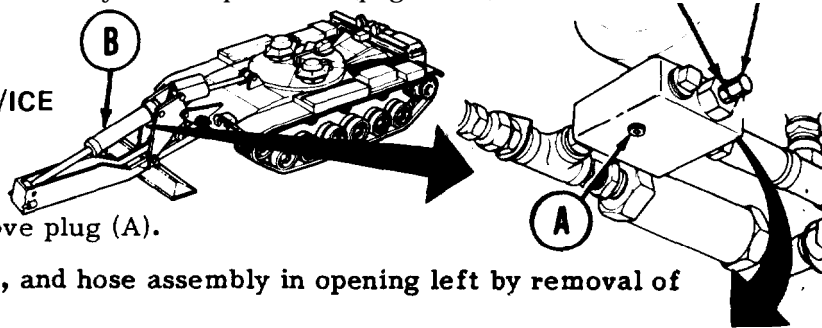
**PRELIMINARY PROCEDURES:** Remove tongue cylinder armor (page 3-232)  
 Relieve hydraulic pressure (page 3-71)

**NOTE**

If STE/ICE is available, go to STE/ICE Test 51 (page 2-47).

**ADJUSTMENT:**

1. Using 1/4 inch screw key, remove plug (A).
2. Manually install gage, adapters, and hose assembly in opening left by removal of plug (A).
3. Engage hydraulic pump (TM 5-5420-202-10).
4. Set engine speed at 1800 rpm.
5. Slowly push down tongue cylinder control lever all the way, until tongue cylinder (B) is in fully retracted position.
6. Have second technician observe pressure gage reading.
7. Return tongue cylinder control lever to neutral position.
8. Using wrench, remove adjusting screw cap (C).



**NOTE**

**Correct pressure is 3600 ± 50 psi (24822 ± 340 kPa).**

9. To adjust relief valve pressure, hold adjusting screw (D) with 3/16 inch screw key and use wrench to loosen jamnut (E). Using 3/16 inch screw key, turn adjusting screw (D) clockwise to increase pressure or counterclockwise to decrease pressure.
10. Repeat steps 3 through 9 until pressure gage shows reading of 3600 ±50 psi (24822 + 340 kPa).
11. Holding adjusting screw (D) with 3/16 inch screw key, use wrench to tighten jamnut (E).
12. Install adjusting screw cap (C) using wrench.
13. Remove gage, adapters, and hose assembly.
14. Using 1/4 inch screw key, install plug (A) and tighten.
15. Install tongue cylinder armor (page 3-233).

End of Task

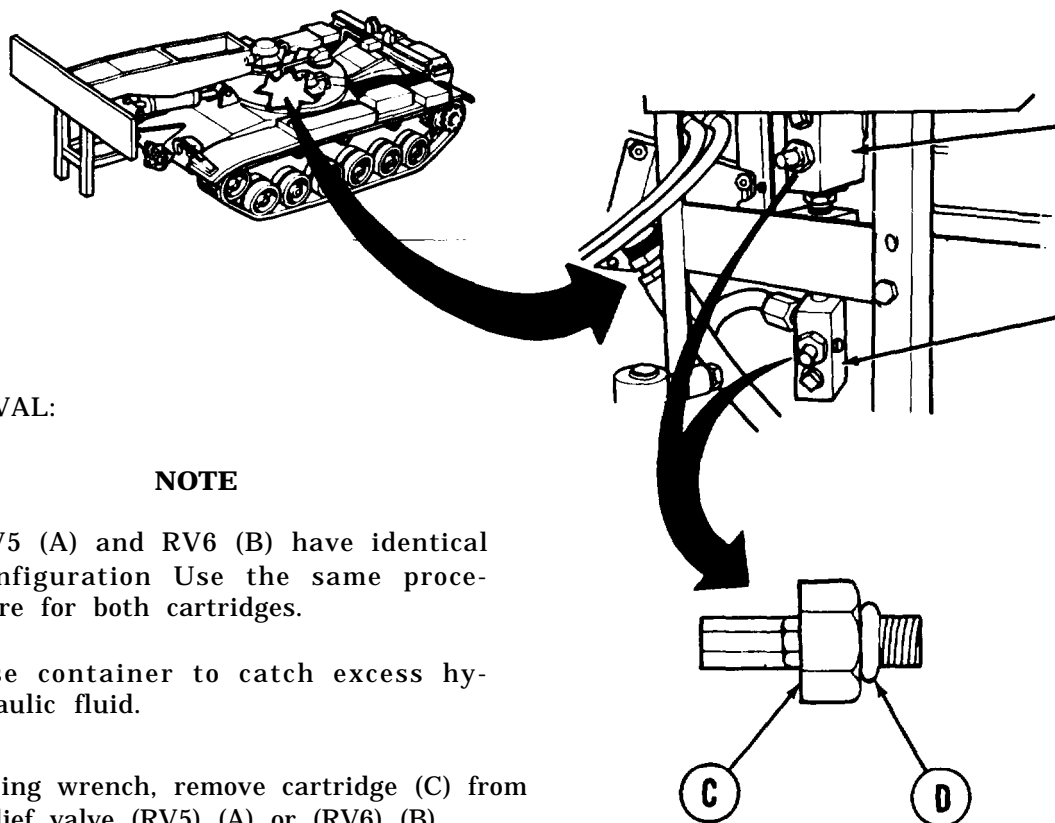
TA251482

## SEQUENCE AND LOCKING RELIEF VALVES (RV5 AND RV6) CARTRIDGE REPLACEMENT (Sheet 1 of 1)

TOOLS: 1-1/8 in. open end wrench

SUPPLIES: Drip pans (suitable containers)  
Preformed packing

PRELIMINARY PROCEDURE: Relieve hydraulic pressure (page 3-71)



### REMOVAL:

#### NOTE

- RV5 (A) and RV6 (B) have identical configuration Use the same procedure for both cartridges.
  - Use container to catch excess hydraulic fluid.
1. Using wrench, remove cartridge (C) from relief valve (RV5) (A) or (RV6) (B).
  2. Remove preformed packing (D) from cartridge (C). Throw preformed packing (D) away.

### INSTALLATION:

1. Install new preformed packing (D) on cartridge (C).
2. Using wrench, install cartridge (C) into relief valve (RV5) (A) or (RV6) (B).
3. Adjust relief valve pressure, (RV5) (page 3-86), (RV6) (page 3-87).

End of Task

TA251483

**SEQUENCE RELIEF VALVE (RV5) ADJUSTMENT (Sheet 1 of 1)**

TOOLS: 3/16 in. socket head screw key  
 1/4 in. socket head screw key  
 9/16 in. open end wrench

SPECIAL TOOL: Gage, pressure (item 3, sec III, app B)

PERSONNEL: Two

REFERENCE: TM 5-5420-202-10

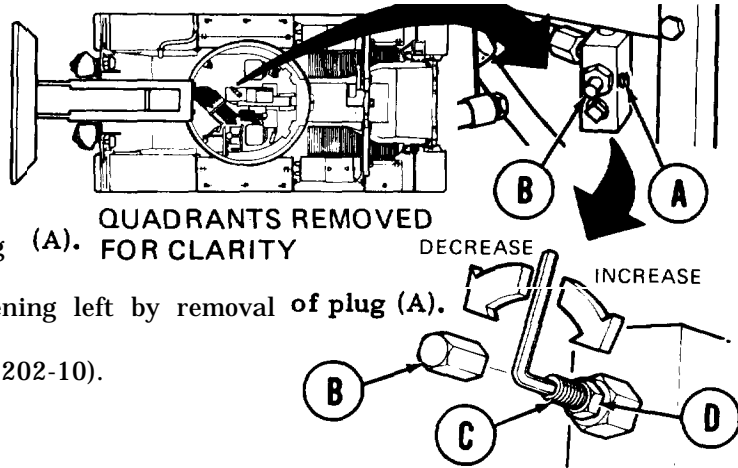
PRELIMINARY PROCEDURE: Relieve hydraulic pressusre (page 3-71)

**NOTE**

If STE/ICE is available, go to STE/ICE Test 51 (page 2-47).

**ADJUSTMENT:**

1. Using 1/4 inch screw key, remove plug (A).
2. Manually install pressure gage in opening left by removal of plug (A).
3. Engage hydraulic pump (TM 5-5420-202-10).
4. Set engine speed at 1800 rpm.
5. Slowly push up tongue cylinder control lever all the way to extend and hold in that position.
6. Have second technician observe pressure gage reading.
7. Return tongue cylinder control lever to neutral position.
8. Remove adjusting screw cap (B) using wrench.



**NOTE**

**Correct pressure is 700 ± 50 psi (4826 ± 340 kPa).**

9. To adjust relief valve pressure, hold adjusting screw (C) with 3/16 inch screw key and use wrench to loosen jamnut (D). Using 3/16 inch screw key, turn adjusting screw (C) clockwise to increase pressure or counterclockwise to decrease pressure.
10. Repeat steps 3 through 9 until pressure gage shows reading of 700 ± 50 psi (4826 ± 340 kPa).
11. Holding adjusting screw (C) with 3/16 inch screw key, use wrench to tighten jamnut (D).
12. Install adjusting screw cap (B) using wrench.
13. Remove pressure gage.
14. Using 1/4 inch screw key, install plug (A) and tighten.

End of Task

TA251484

**LOCKING RELIEF VALVE (RV6) ADJUSTMENT (Sheet 1 of 1)**

TOOLS: 1/4 in. socket head screw key  
 3/16 in. socket head screw key  
 9/16 in. open end wrench

SPECIAL TOOLS: Gage, pressure (item 3, sec III, app B)

PERSONNEL: Two

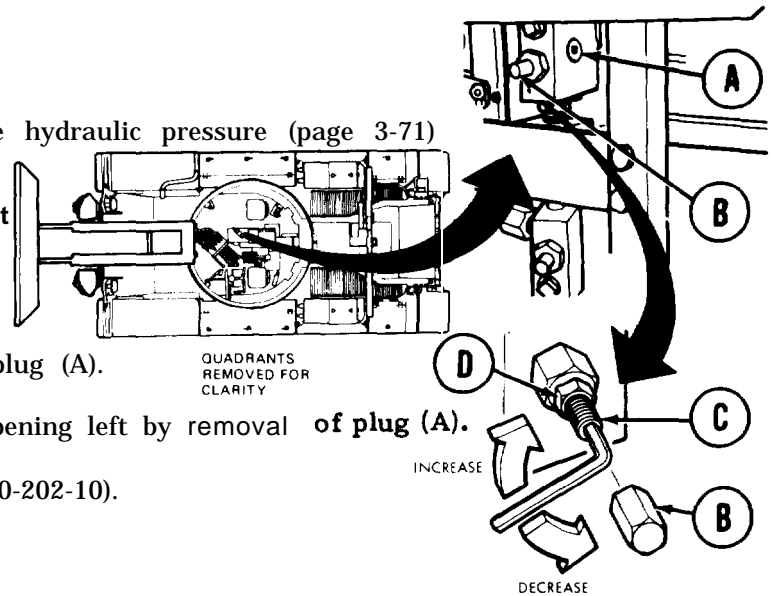
REFERENCE: TM 5-5420-202-10

PRELIMINARY PROCEDURE: Relieve hydraulic pressure (page 3-71)

**NOTE**  
 If STE/ICE is available, go to STE/ICE Test 51 (page 2-47).

**ADJUSTMENT:**

1. Using 1/4 inch screw key, remove plug (A).
2. Manually install pressure gage in opening left by removal of plug (A).
3. Engage hydraulic pump (TM 5-5420-202-10).
- 4\* Set engine speed at 1800 rpm.
5. Slowly push down locking cylinder control lever all the way and hold in that position.
6. Have second technician observe pressure gage reading.
7. Return locking cylinder control lever to neutral position.
8. Remove adjusting screw cap (B) using wrench.



- NOTE**  
 Correct pressure is  $500 \pm 50$  psi ( $3447 \pm 340$  kPa).
9. To adjust relief valve pressure, hold adjusting screw (C) with 3/16 inch screw key and use wrench to loosen jamnut (D). Using 3/16 inch screw key, turn adjusting screw (C) clockwise to increase pressure or counterclockwise to decrease pressure.
  10. Repeat steps 3 through 9 until pressure gage shows reading of  $500 \pm 50$  psi ( $3447 \pm 340$  kPa).
  11. Holding adjusting screw (C) with 3/16 inch screw key, use wrench to tighten jamnut (D).
  12. Install adjusting screw cap (B) using wrench.
  13. Remove pressure gage.
  14. Using 1/4 inch screw key, install plug (A) and tighten.

End of Task

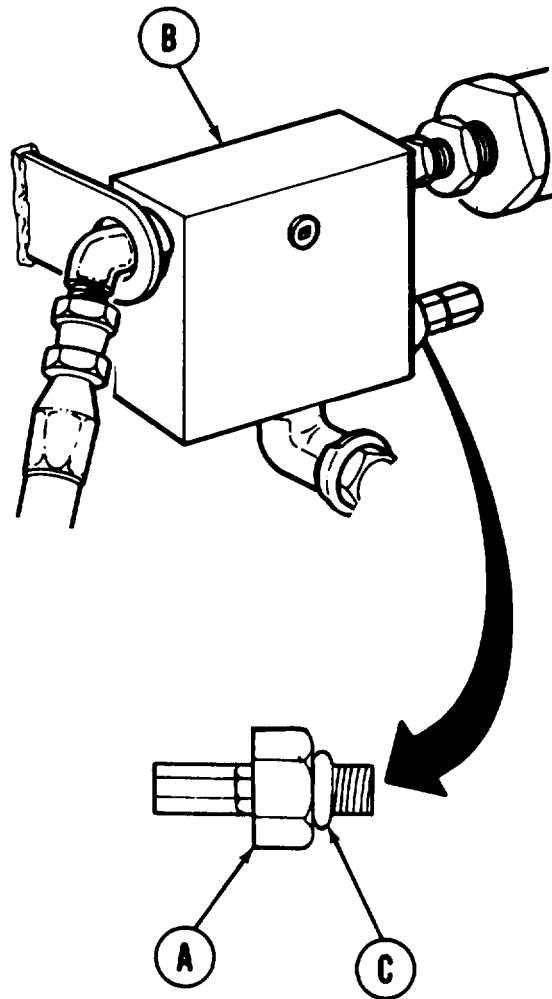
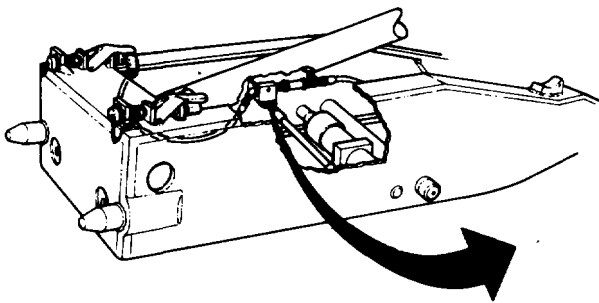
TA251485

**SCISSOR CYLINDER RELIEF VALVE (RV8) CARTRIDGE REPLACEMENT (Sheet 1 of 1)**

**TOOLS:** 1-1/8 in. open end wrench

**SUPPLIES:** Rags (Item 12, Appendix D)  
Preformed packing

**PRELIMINARY PROCEDURE:** Relieve hydraulic pressure (page 3-71).



**REMOVAL:**

**NOTE**

**Use rags to catch excess hydraulic fluid.**

1. Using wrench, remove cartridge (A) from relief valve (B).
2. Remove preformed packing (C) from cartridge (A). Throw preformed packing (C) away.

**INSTALLATION:**

1. Install new preformed packing (C) on cartridge (A).
2. Using wrench, install cartridge (A) in relief valve (B).
3. Adjust relief valve pressure (page 3-89).

End of Task

TA251486

**SCISSOR CYLINDER RELIEF VALVE (RV8) ADJUSTMENT (Sheet 1 of 1)**

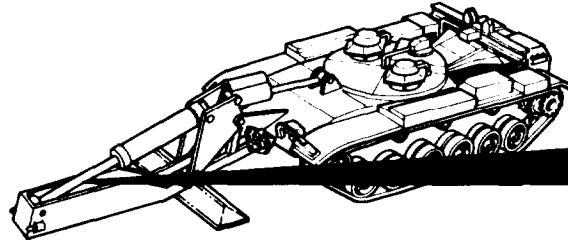
TOOLS: 3/16 in. socket head screw key  
 1/4 in. socket head screw key  
 9/16 in. open end wrench

SPECIAL TOOLS: Gage, pressure (item 3, sec III, app B)

PERSONNEL: Two

REFERENCE: TM 5-5420-202-10

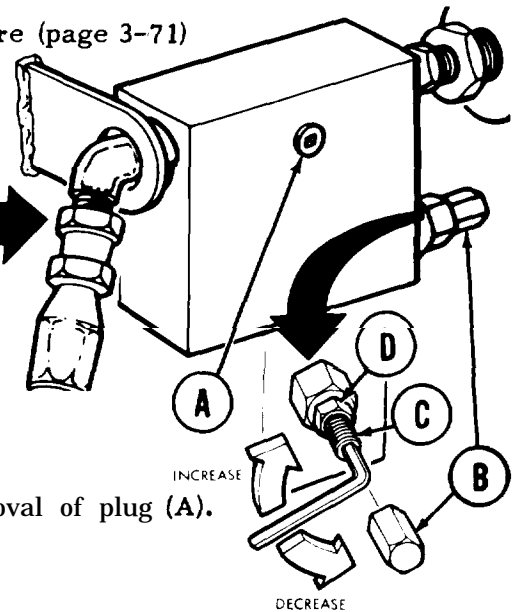
PRELIMINARY PROCEDURE: Relieve hydraulic pressure (page 3-71)



If STE/ICE is available, go to STE/ICE Test  
 51 (page -2-47)

**ADJUSTMENT:**

1. Using 1/4 inch screw key, remove plug (A).
2. Manually install pressure gage in opening left by removal of plug (A).
3. Engage hydraulic pump (TM 5-5420-202-10).
4. Set engine speed at 1800 rpm.
5. Slowly push up overhead cylinder control lever until outrigger contacts **ground'** and hold in that position.
6. Have second technician observe pressure gage reading.
7. Return overhead cylinder control lever to neutral position.
8. Remove adjusting screw cap (B) using wrench.

**NOTE**

**Correct pressure is 3400 ± 50 psi (23443 ± 340 kPa).**

9. To adjust relief valve pressure, hold adjusting screw (C) with 3/16 inch screw key and use wrench to loosen jamnut (D). Using 3/16 inch screw key, turn adjusting screw (C) clockwise to increase pressure or counterclockwise to decrease pressure.
10. Repeat steps 3 through 9 until pressure gage shows reading of 3400 ± 50 psi (23443 ± 340 kPa).
11. Holding adjusting screw (C) with 3/16 inch screw key, use wrench to tighten jamnut (D).
12. install adjusting screw cap (B) using wrench.
13. Remove pressure gage.
14. Using 1/4 inch screw key, install plug (A) and tighten.

End of Task

TA251487

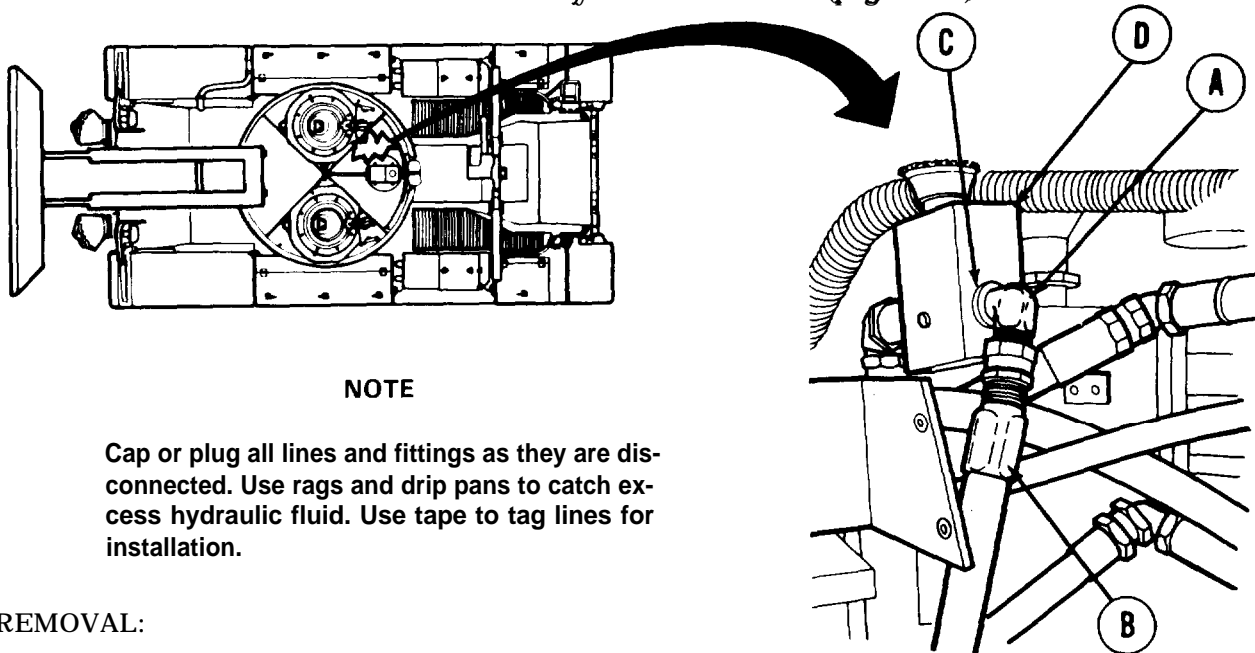
**MASTER RELIEF VALVE (RV1) AND CHECK VALVE (CV1) REPLACEMENT (Sheet 1 of 3)**

**TOOLS:** 1-7/16 in. open end wrench  
12 in. adjustable wrench  
15 in. adjustable wrench  
10 in. pipe wrench

**SUPPLIES:** Drip pans (suitable containers)  
Rags (Item 12, Appendix D)  
Pipe tape (Item 19, Appendix D)  
Masking tape (Item 18, Appendix D)  
Pencil (Item 22, Appendix D)  
Protective caps and plugs  
Nipple

**REFERENCES:** LO 5-5420-202-12                      TM 11-5820-498-12  
TM 5-5420-202-10

**PRELIMINARY PROCEDURES:** Relieve hydraulic pressure (page 3-71)  
Remove radio from mount (TM 11-5820-498-12)  
Drain hydraulic reservoir (page 3-74)



**NOTE**

Cap or plug all lines and fittings as they are disconnected. Use rags and drip pans to catch excess hydraulic fluid. Use tape to tag lines for installation.

**REMOVAL:**

1. Holding elbow (A) with 12 inch adjustable wrench, use 1-7/16 inch wrench to disconnect hose assembly "BA" (B).
2. Using 12 inch adjustable wrench, remove elbow (A) and collar "BA" (C) from master relief valve "RV1" (D).

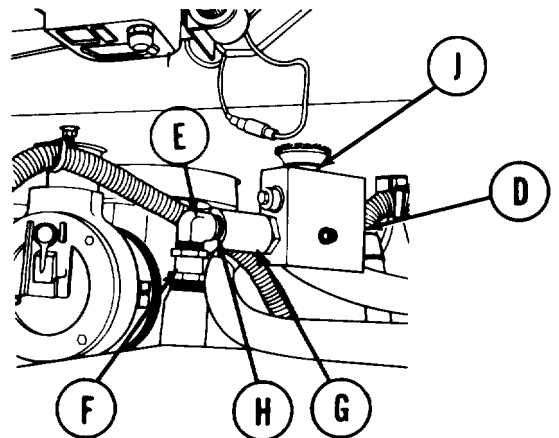
Go on to Sheet 2

TA251488



**MASTER RELIEF VALVE (RV1) AND CHECK VALVE (CV1) REPLACEMENT (Sheet 2 of 3)**

3. Holding elbow (E) with 12 inch adjustable wrench, use 1-7/16 inch wrench to disconnect hose assembly "CY" (F).
4. Holding check valve "CV1" (G) with 15 inch adjustable wrench, use 12 inch adjustable wrench to remove elbow (E) and collar "CY" (H).
5. Using 15 inch adjustable wrench, remove check valve "CV1" (G).
6. Using 15 inch adjustable wrench, remove master relief valve "RV1" (D).
7. If nipple (J) was removed with master relief valve "RV1" (D), use pipe wrench to remove nipple (J) and throw it away.



**INSTALLATION:**

**NOTE**

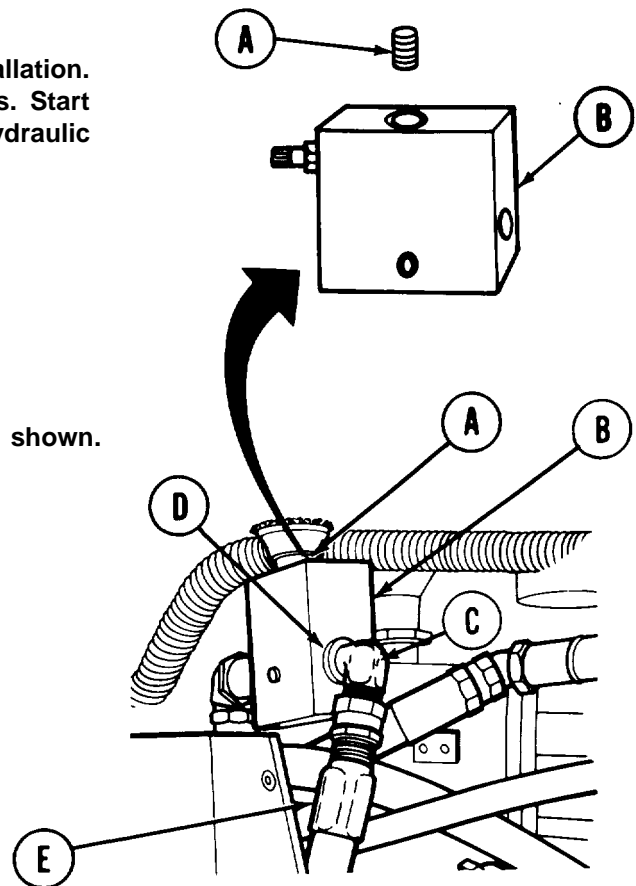
Remove all caps and plugs as necessary during installation. Before installing, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

1. If nipple (A) was removed, manually install nipple in top port of relief valve "RV1" (B).

**NOTE**

Be sure to install master relief valve "RV1" (B) as shown.

2. Using 15 inch adjustable wrench, install master relief valve "RV1" (B) and nipple (A) in base of reservoir.
3. Using 12 inch adjustable wrench, install elbow (C) and collar "BA" (D).
4. Holding elbow (C) with 12 inch adjustable wrench, use 1-7/16 inch wrench to install hose assembly "BA" (E).

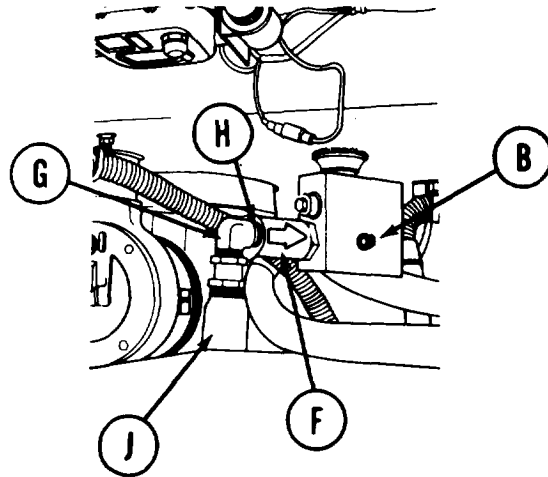


TA25148

**Go on to Sheet 3**

MASTER RELIEF VALVE (RV1) AND CHECK VALVE (CV1) REPLACEMENT (Sheet 3 of 3)

5. Using 15 inch adjustable wrench, install check valve "CV1" (F) with flow arrow pointing toward master relief valve "RV1" (B).
6. Holding check valve "CV1" (F) with 15 inch adjust able wrench, use 12 inch adjustable wrench to install elbow (G) and collar "CY" (H).
7. Holding elbow (G) with adjustable wrench, use 1-7/16 inch wrench to install hose assembly "CY" (J).
8. Service hydraulic reservoir (LO 5-5420-202-12).
9. Bleed hydraulic system (page 3-72).
10. Check for hydraulic leaks and correct as necessary.
11. Service hydraulic reservoir (LO 5-5420-202-12).
12. Adjust pressure in relief valve (page 3-76).
13. Install radio in mount (TM 11-5820-498-12).



End of Task

TA251490

**SEQUENCE RELIEF VALVE (RV2) REPLACEMENT (Sheet 1 of 2)**

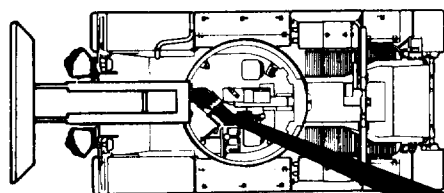
**TOOLS:** 5/16 in. socket head screw key  
 8 in. adjustable wrench  
 9/16 in. open end wrench

**SUPPLIES:** Pipe tape (Item 19, Appendix D)  
 Rags (Item 12, Appendix D)  
 Drip pans (suitable containers)  
 Protective caps and plugs (assorted sizes)  
 Preformed packing (2 required)

**REFERENCE:** LO 5-5420-202-12  
 TM 5-5420-202-10

**PRELIMINARY PROCEDURES:** Relieve hydraulic pressure (page 3-71)

QUADRANTS REMOVED FOR CLARITY

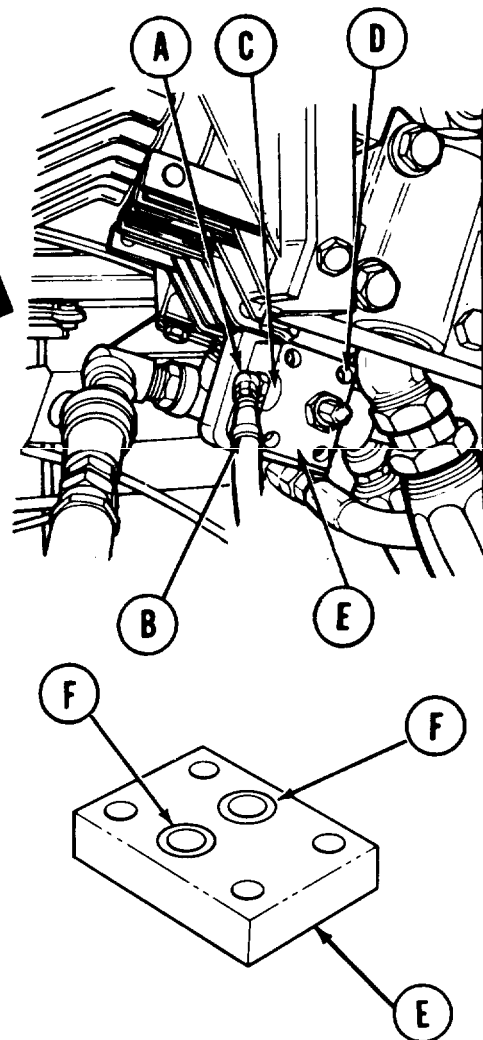


**REMOVAL:**

**NOTE**

Use rags and drip pans to catch excess hydraulic fluid. Cap or plug all lines and fittings as they are disconnected.

1. Holding elbow (A) with adjustable wrench, use open end wrench to remove hose assembly (B).
2. Using adjustable wrench, remove elbow (A) and collar (C).
3. Using screw key, remove four screws (D).
4. Remove sequence relief valve (E).
5. Manually remove two preformed packings (F) from relief valve (E). Throw preformed packings away.



Go on to Sheet 2

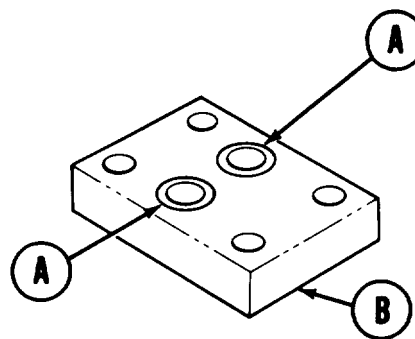
TA251491

**SEQUENCE VALVE (RV2) REPLACEMENT (Sheet 2 of 2)**

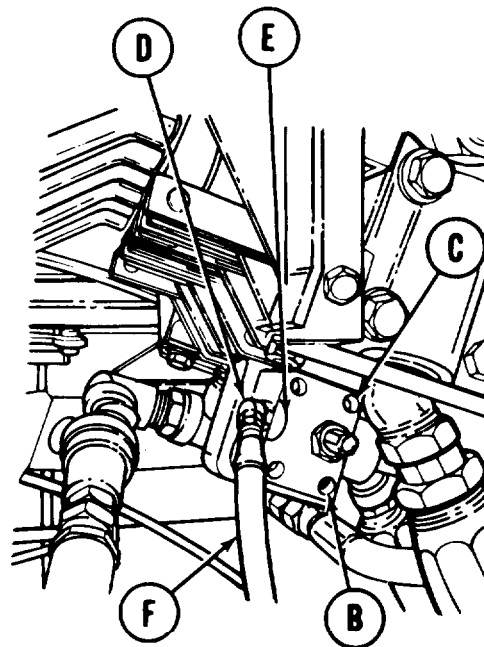
**INSTALLATION:**

**NOTE**

Remove all caps and plugs as necessary during installation. Before installing, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.



1. Manually install two new preformed packings (A) in grooves of relief valve (B).
2. Place relief valve (B) in position on valve bank.
3. Using screw key, install four screws (C).
4. Using adjustable wrench, install elbow (D) and collar (E).
5. Holding elbow (D) with adjustable wrench, use open end wrench to install hose assembly (F).
6. Bleed hydraulic system (page 3-72).
7. Check for hydraulic leaks and correct as necessary.
8. Refill hydraulic reservoir (LO 5-5420-202-12).
9. Adjust sequence valve pressure (page 3-79).



End of Task

**OVERHEAD CYLINDER RELIEF VALVE (RV3) REPLACEMENT (Sheet 1 of 4)**  
**PROCEDURE INDEX**

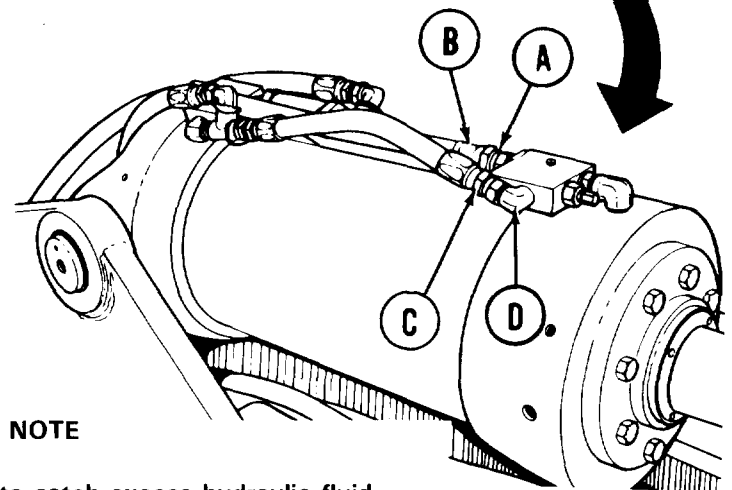
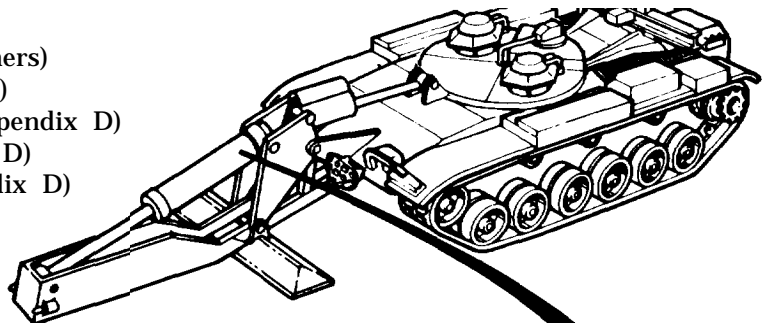
PROCEDURE	PAGE
Removal	3-95
Installation	3-97

**TOOLS:** 1-1/8 in. open end wrench  
 1-1/4 in. open end wrench  
 12 in. adjust able wrench  
 Vise

**SUPPLIES:** Drip pans (suitable containers)  
 Rags (Item 12, Appendix D)  
 Masking tape (Item 18, Appendix D)  
 Pencil (Item 22, Appendix D)  
 Pipe tape (Item 19, Appendix D)  
 Protective caps and plugs

**REFERENCES:** TM 5-5420-202-10  
 LO 5-5420-202-12

**PRELIMINARY PROCEDURES:** Remove overhead cylinder armor (page 3-223)  
 Relieve hydraulic pressure (page 3-71)



**REMOVAL:**

**NOTE**

**Use rags and drip pans to catch excess hydraulic fluid. Use masking tape to tag lines for installation. Cap or plug all lines and fittings as they are disconnected.**

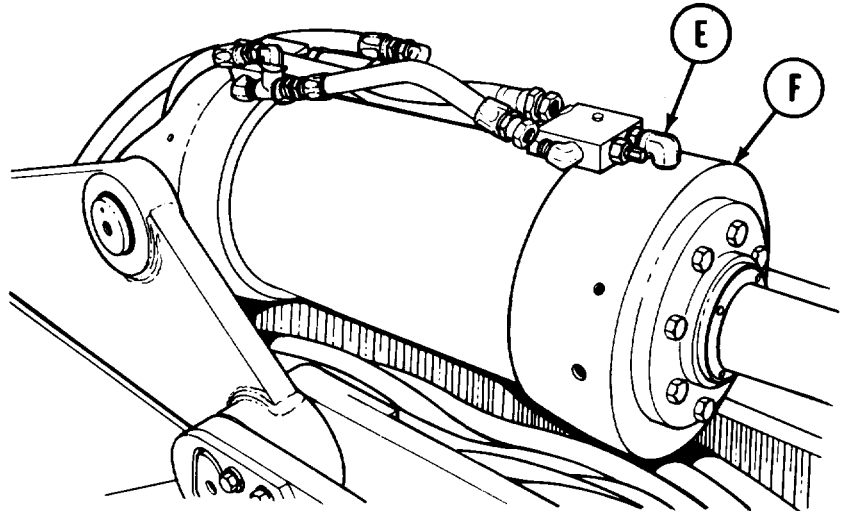
1. Holding adapter (A) with 1-1/8 inch wrench, use 1-1/4 inch wrench to remove hose assembly "CM" (B).
2. Using 1-1/4 inch wrench, remove hose assembly "CO" (C) from elbow (D).

Go on to Sheet 2

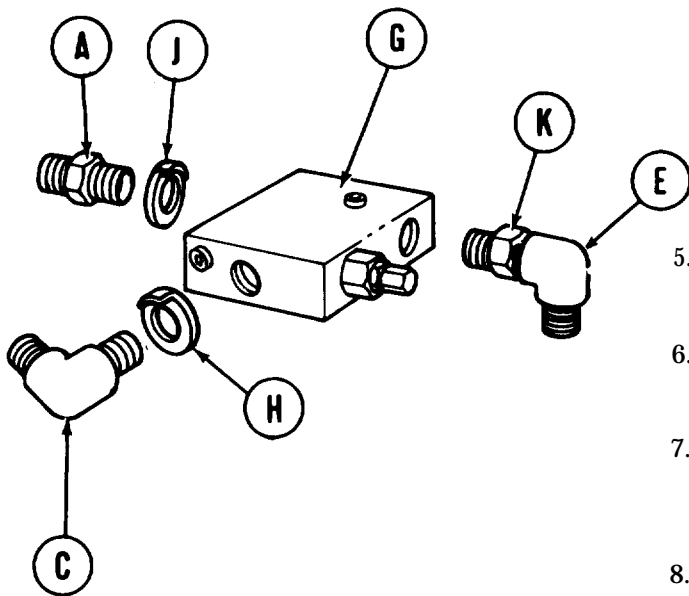
TA251493

OVERHEAD CYLINDER RELIEF VALVE (RV3) REPLACEMENT (Sheet 2 of 4)

- Using adjustable wrench, remove elbow (E) and attached parts from rod end of cylinder (F).



- Using care to prevent damage, clamp relief valve "RV3" (G) in vise.



- Using adjustable wrench, remove elbow (C) and collar "CO" (H).
- Using 1-1/4 inch wrench, remove adapter (A) and collar "CM" (J).
- Holding nipple (K) with 1-1/8 inch wrench, use an adjustable wrench to remove elbow (E).
- Using 1-1/8 inch wrench, remove nipple (K).
- Remove relief valve "RV3" (G) from vise.

Go on to Sheet 3

TA251494

OVERHEAD CYLINDER RELIEF VALVE (RV3) REPLACEMENT (Sheet 3 of 4)

INSTALLATION:

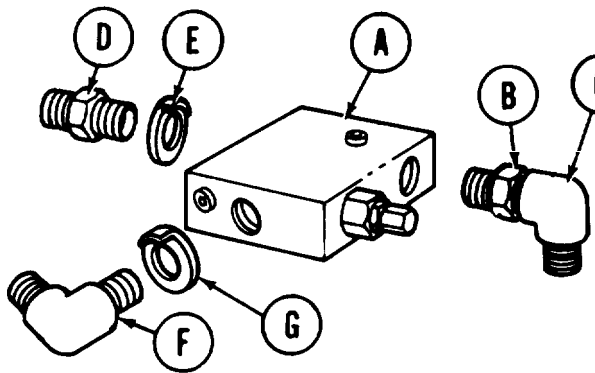
NOTE

Remove all caps and plugs as necessary during installation. Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

1. Using care to prevent damage, clamp relief valve "RV3" (A) in vise.

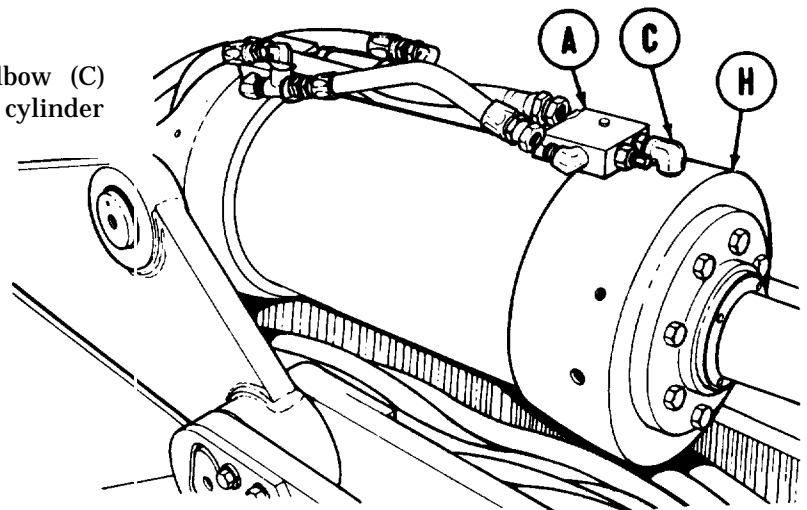
NOTE

Locate and align parts as shown in illustrations to make sure connecting parts mate at final assembly.



2. Using 1-1/8 inch wrench, install nipple (B) in relief valve (A).
3. Holding nipple (B) with 1-1/8 inch wrench, use an adjustable wrench to install elbow (C) on nipple (B).
4. Using 1-1/4 inch wrench, install adapter (D) and collar "CM" (E) in relief valve (A).

5. Using adjustable wrench, install elbow (F) and collar "CO" (G) in relief valve (A).
6. Remove relief valve "RV3" (A) and attached parts from vise.
7. Using adjustable wrench, install elbow (C) with attached parts in rod end of cylinder (H).

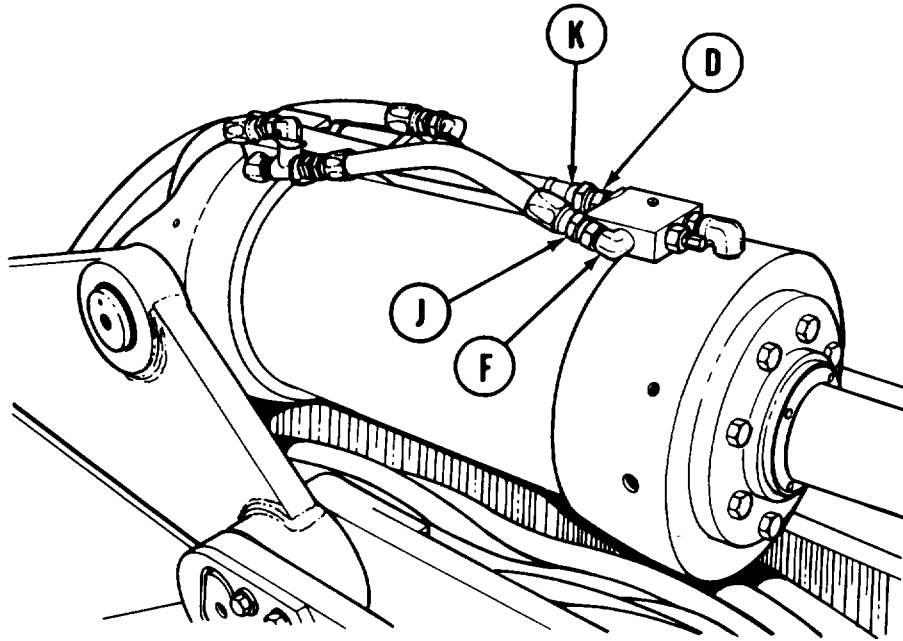


Go on to Sheet 4

TA251495

OVERHEAD CYLINDER RELIEF VALVE (RV3) REPLACEMENT (Sheet 4 of 4)

- Using 1-1/4 inch wrench, install hose assembly "CO" (J) on elbow (F).



- Holding adapter (D) with 1-1/8 inch wrench, use 1-1/4 inch wrench to install hose assembly "CM" (K) to adapter (D).
- Bleed hydraulic system (page 3-72).
- Check for hydraulic leaks and correct as necessary.
- Service hydraulic reservoir (LO 5-5420-202-12).
- Adjust relief valve pressure (page 3-81).
- Install overhead cylinder armor (page 3-224).

End of Task



**TONGUE CYLINDER HYDRAULICS, RELIEF VALVE (RV4),  
AND CHECK VALVE (CV4) REPLACEMENT (Sheet 1 of 4)**

**PROCEDURE INDEX**

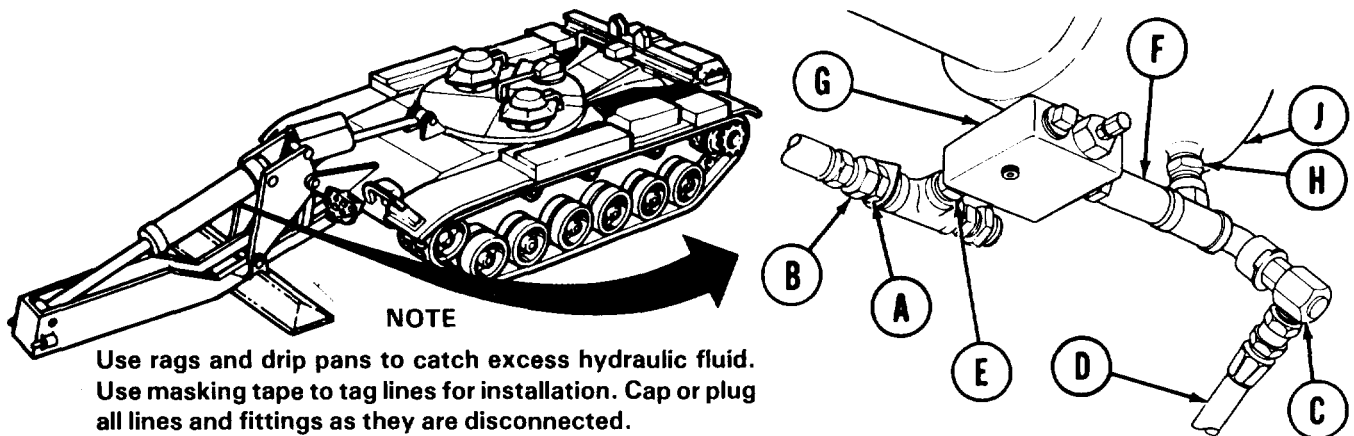
PROCEDURE	PAGE
Removal	3-99
Installation	3-100

**TOOLS:** 1-1/8 in. open end wrench                    12 in. adjustable wrench  
               1-3/8 in. open end wrench                15 in. adjustable wrench  
               1-1/4 in. open end wrench                Vise

**SUPPLIES:** Drip pans [suitable containers]            Pencil (Item 22, Appendix D)  
                   Rags (Item 12, Appendix D)                    Pipe tape (Item 19, Appendix D)  
                   Masking tape (Item 18, Appendix D)        Protective caps and plugs

**REFERENCE:**     LO 5-5420-202-12

**PRELIMINARY PROCEDURES:** Remove tongue cylinder armor (page 3-232)  
                                           Relieve hydraulic pressure (page 3-71)  
                                           Remove tongue cylinder flow regulator (page 3-114)



**NOTE**  
 Use rags and drip pans to catch excess hydraulic fluid.  
 Use masking tape to tag lines for installation. Cap or plug  
 all lines and fittings as they are disconnected.

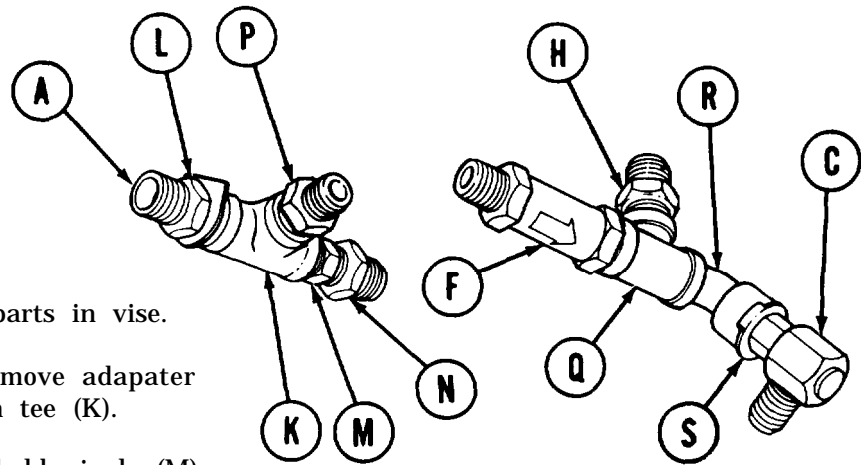
**REMOVAL:**

1. Holding nipple (A) with 1-1/8 inch wrench, use 1-1/4 inch wrench to disconnect hose assembly "CH" (B) from nipple (A).
2. Holding elbow (C) with 15 inch adjustable wrench, use 1-1/4 inch wrench to remove hose assembly "CK1" (D) from elbow (C).
3. Using 1-1/8 inch wrench, remove nipple (E) and attached parts as an assembly from relief valve "RV4" (G).
4. Holding check valve "CV4" (F) with 1-3/8 inch wrench, use 15 inch adjustable wrench to remove relief valve "RV4" (G) from check valve "CV4" (F).
5. Using 1-1/8 inch wrench, remove nipple (H) and its attached parts as an assembly from tongue cylinder (J).

Go on to Sheet 2

TA251497

**TONGUE CYLINDER HYDRAULICS, RELIEF VALVE (RV4),  
AND CHECK VALVE (CV4) REPLACEMENT (Sheet 2 of 4)**



6. Place tee (K) and attached parts in vise.
7. Using 1-1/8 inch wrench, remove adapter (A) and collar "CH" (L) from tee (K).
8. Using 1-1/8 inch wrench to hold nipple (M), use 1-3/8 inch wrench to remove bushing (N) from nipple (M).
9. Using 1-1/8 inch wrench, remove two nipples (M, P) from tee (K).
10. Remove tee (K) from vise.
11. Place tee (Q) and attached parts in vise.
12. Using 1-3/8 inch wrench, remove check valve "CV4" (F) from tee (Q).
13. Using 1-1/8 inch wrench, remove nipple (H) from tee (Q).
14. Holding elbow (R) with 12 inch adjustable wrench, use 1-1/8 inch wrench to remove elbow (C) and collar (S) from elbow (R).
15. Using 12 inch adjustable wrench, remove elbow (R) from tee (Q).
16. Remove tee (Q) from vise.

**INSTALLATION:**

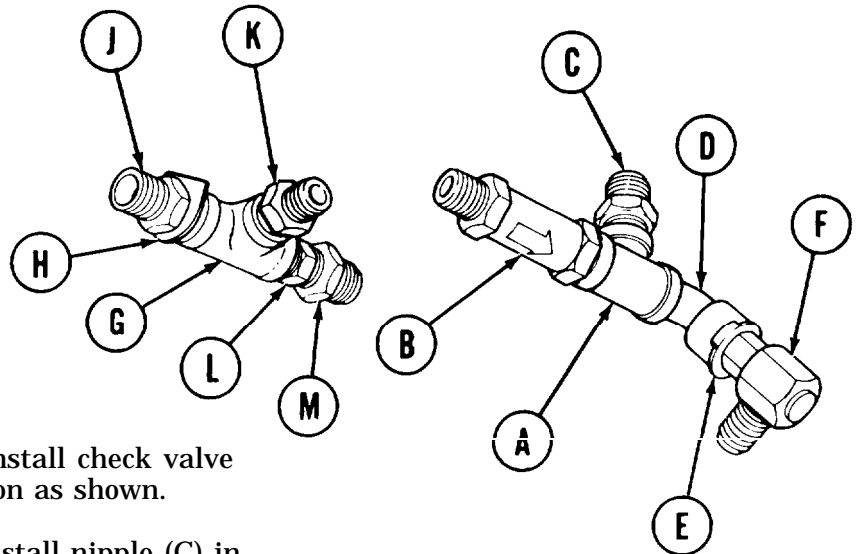
**NOTE**

**Remove all caps and plugs as necessary during installation. Before installation, use pipe tape on all male threads, Start tape on second thread so tape will not enter hydraulic system.**

Go on to Sheet 3

TA251498

**TONGUE CYLINDER HYDRAULICS, RELIEF VALVE (RV4),  
AND CHECK VALVE (CV4) REPLACEMENT (Sheet 3 of 4)**



1. Place tee (A) in vise.
2. Using 1-3/8 inch wrench, install check valve "CV4" (B) with flow direction as shown.
3. Using 1-1/8 inch wrench, install nipple (C) in tee (A).
4. Using 12 inch adjustable wrench, install elbow (D) into tee (A) and align as shown.
5. Holding elbow (D) with 12 inch adjustable wrench, use 1-1/8 inch wrench to install collar "CK1" (E) and elbow (F).
6. Remove tee (A) from vise.
7. Place tee (G) in vise.
8. Using 1-1/8 inch wrench, install collar "CH" (H) and nipple (J) in tee (G).
9. Using 1-1/8 inch wrench, install nipple (K) in tee (G).
10. Using 1-1/8 inch wrench, install nipple (L) in tee (G).
11. Holding nipple (L) with 1-1/8 inch wrench, use 1-3/8 inch wrench to install bushing (M) in nipple (L).
12. Remove tee (G) from vise.

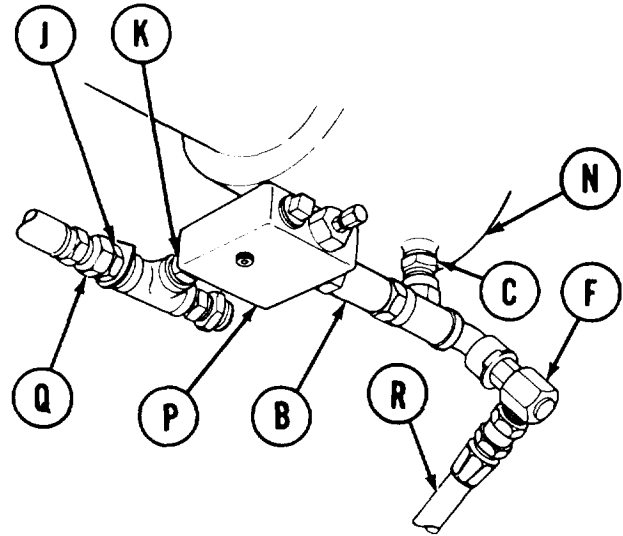
**TONGUE CYLINDER HYDRAULICS, RELIEF VALVE (RV4),  
AND CHECK VALVE (CV4) REPLACEMENT (Sheet 4 of 4)**

13. Using 1-1/8 inch wrench, install nipple (C) and attached parts as an assembly on tongue cylinder (N). Aline as shown.

14. Holding check valve "CV4" (B) with 1-1/8 inch wrench, use 15 inch adjustable wrench to install and aline relief valve "RV4" (P) as shown.

15. Using 1-1/8 inch wrench, install nipple (K) and attached parts as assembly to relief valve "RV4" (P).

16. Holding nipple (J) with 1-1/8 inch wrench, use 1-1/4 inch wrench to install hose assembly "CH" (Q).



17. Using 15 inch adjustable wrench to hold elbow (F), use 1-1/4 inch wrench to connect hose assembly "CK1" (R) to elbow (F).

18. Install tongue cylinder flow regulator valve (page 3-115).

19. Bleed hydraulic system (page 3-72).

20. Check for hydraulic leaks and correct as necessary.

21. Service hydraulic reservoir (LO 5-5420-202-12).

22. Adjust relief valve pressure (page 3-84).

23. Install tongue cylinder armor (page 3-2 33).

End of Task

**SEQUENCE AND LOCKING CYLINDER RELIEF VALVE (RV5 AND RV6) REPLACEMENT**  
 (Sheet 1 of 3)

**TOOLS:** 9/16 in. open end wrench  
 3/4 in. combination wrench  
 12 in. adjustable wrench (2)  
 3/4 in. socket with 1/2 in. drive  
 Ratchet with 1/2 in. drive  
 Vise  
 1-1/4 in. open end wrench  
 1-1/8 in. open end wrench

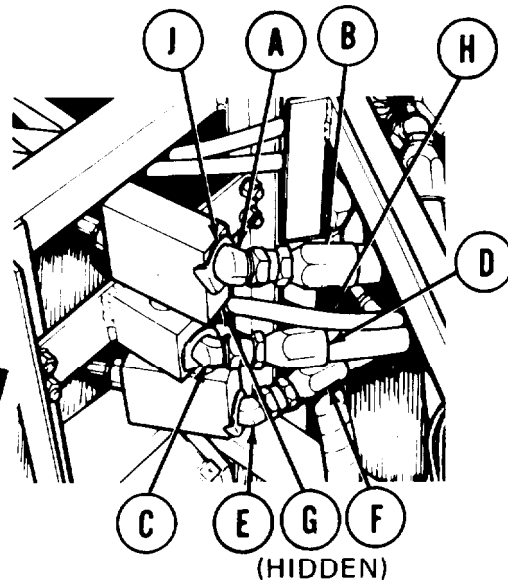
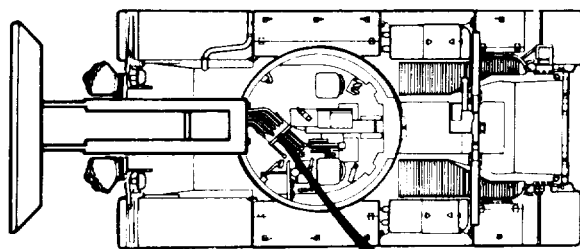
**SUPPLIES:** Pipe tape (Item 19, Appendix D)  
 Masking tape (Item 18, Appendix D)  
 Pencil (Item 22, Appendix D)

Drip pans (suitable containers)  
 Rags (Item 12, Appendix D)  
 Lockwashers (4)

**REFERENCES:** TM 5-5420-202-10  
 LO 5-5420-202-12

**PRELIMINARY PROCEDURES:** Remove front quadrant (page 3-45)  
 Relieve hydraulic pressure (page 3-71)

QUADRANTS REMOVED FOR CLARITY



**REMOVAL:**

**NOTE**

Use rags and drip pans to catch excess hydraulic fluid. Use masking tape to tag lines for installation.

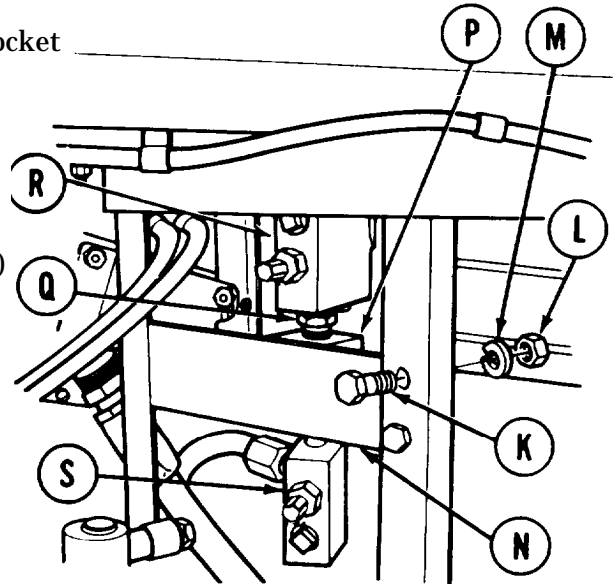
1. Holding elbow (A) with adjustable wrench, use 1-1/4 inch wrench to remove hose assembly "CS" (B).
2. Holding elbow (C) with adjustable wrench, use 1-1/4 inch wrench to remove hose assembly "CR" (D).
3. Holding elbow (E) with adjustable wrench, use 1-1/4 inch wrench to remove hose assembly "CT" (F).
4. Holding elbow (G) with adjustable wrench, use 9/16 inch wrench to remove hose assembly "AR" (H).
5. Using adjustable wrench, remove four elbows (A), (C), (E), and (G), and four collars (J).

Go on to Sheet 2

TA251501

**SEQUENCE AND LOCKING CYLINDER RELIEF VALVE (RV5 AND RV6) REPLACEMENT  
(Sheet 2 of 3)**

6. Holding screws (K) with 3/4 inch wrench, use socket to remove four nuts (L) and lockwashers (M).
7. Remove four screws (K) and bracket (N) with manifold (P) attached.
8. Using 1-1/8 inch wrench, remove two nipples (Q) with relief valves "RV6" (R) and "RV5" (S) from manifold (P).
9. Using vise to secure two relief valves (R) and (S), use 1-1/8 inch wrench to remove two nipples (Q) from relief valves (R) and (S).

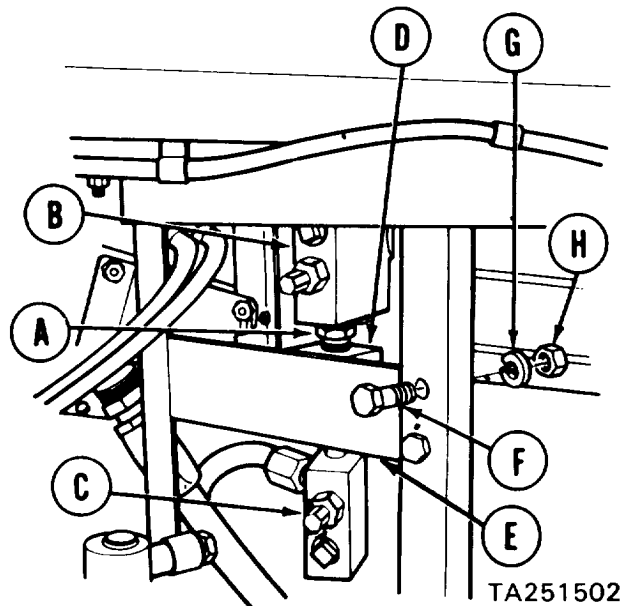


**INSTALLATION:**

**NOTE**

**Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.**

1. Using 1-1/8 inch wrench, install two nipples (A) in relief valves "RV6" (B) and "RV5" (C).
2. Using 1-1/8 inch wrench, install two nipples (A) with relief valves (B) and (C) in manifold (D).
3. Place bracket (E), with manifold (D) attached, in position in vehicle.
4. Manually install four screws (F), lockwashers (G), and nuts (H).
5. Holding screws (F) with 3/4 inch wrench, use socket to tighten four nuts (H).

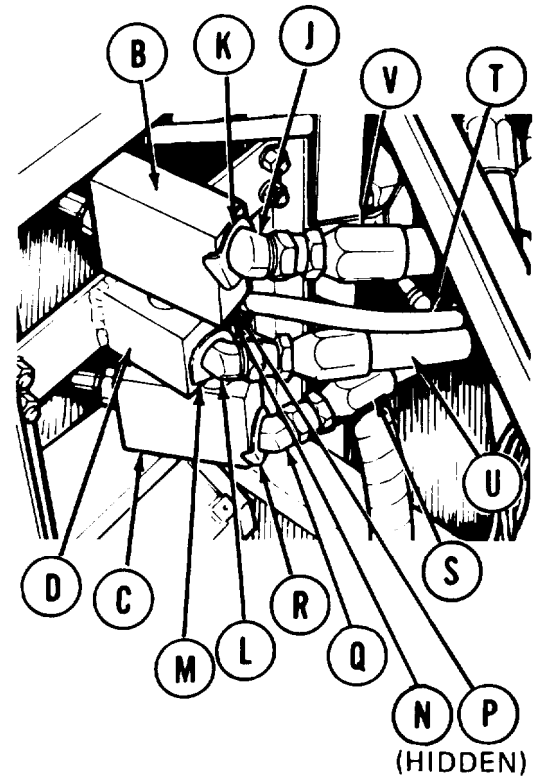


TA251502

Go on to Sheet 3

## SEQUENCE AND LOCKING CYLINDER RELIEF VALVE (RV5 AND RV6) REPLACEMENT (Sheet 3 of 3)

6. Using adjustable wrench, install elbow (J) and collar "CS" (K) on top relief valve "RV6" (B).
7. Using adjustable wrench, install elbow (L) and collar "CR" (M) on rear of manifold (D).
8. Using adjustable wrench, install elbow (N) and collar "AR" (P) on side of manifold (D).
9. Using adjustable wrench, install elbow (Q) and collar "CT" (R) on bottom relief valve "RV5" (C).
10. Using 1-1/4 inch wrench, install hose assembly "CT" (S) on elbow (Q).



11. Using 9/16 inch wrench, install hose assembly "AR" (T) on elbow (N).
12. Using 1-1/4 inch wrench, install hose assembly "CR" (U) on elbow (L).
13. Using 1-1/4 inch wrench, install hose assembly "C S" (V) on elbow (J).
14. Bleed hydraulic system (page 3-72).
15. Check for hydraulic leaks and correct as necessary.
16. Service hydraulic reservoir (LO 5-5420-202-12).
17. Adjust pressure in relief valves (pages 3-86 and 3-87).
18. Install front quadrant (page 3-46).

End of Task

**SCISSORS CYLINDER RELIEF VALVE (RV8) AND FLOW REGULATOR (PCV3) REPLACEMENT**  
 (Sheet 1 of 4)

PROCEDURE INDEX

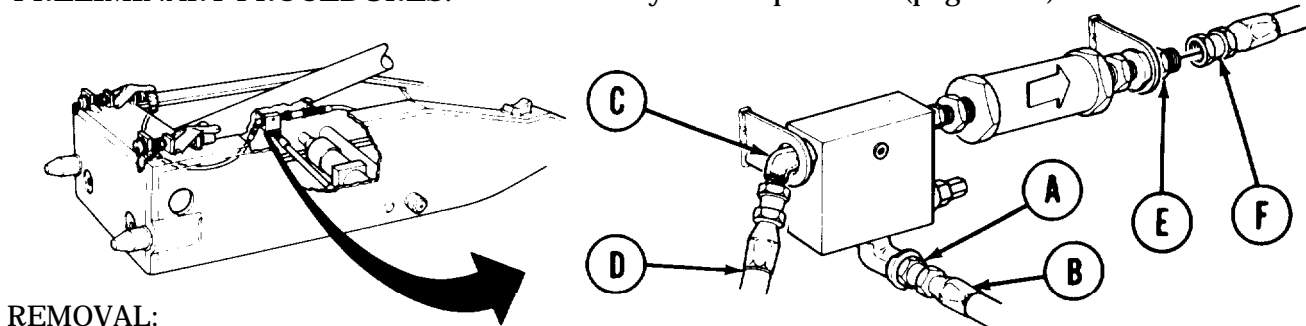
PROCEDURE	PAGE
Removal	3-106
Installation	3-108

TOOLS: 1-1/4 in. open end wrench (2)  
 1-1/8 in. open end wrench  
 1-3/8 in. open end wrench  
 12 in. adjustable wrench  
 15 in. adjustable wrench  
 Vice

SUPPLIES: Pipe tape (Item 19, Appendix D)  
 Masking tape (Item 18, Appendix D)  
 Pencil (Item 22, Appendix D)  
 Drip pans (suitable containers)  
 Rags (Item 12, Appendix D)  
 Protective caps and plugs

REFERENCE: LO 5-5420-202-12

PRELIMINARY PROCEDURES: Relieve hydraulic pressure (page 3-71)



REMOVAL:

**NOTE**

Use rags and drip pans to catch excess hydraulic fluid. Use masking tape to tag lines for installation. Cap or plug all lines and fittings as they are removed.

1. Holding adapter (A) with 1-1/8 inch wrench, use 1-1/4 inch wrench to remove hose assembly "CG" (B) from adapter (A).
2. Holding elbow (C) with 12 inch adjustable wrench, use 1-1/4 inch wrench to remove hose assembly "CF2" (D) from elbow (C).
3. Holding adapter (E) with 1-1/8 inch wrench, use 1-1/4 inch wrench to remove hose assembly "CJ" (F) from adapter (E).

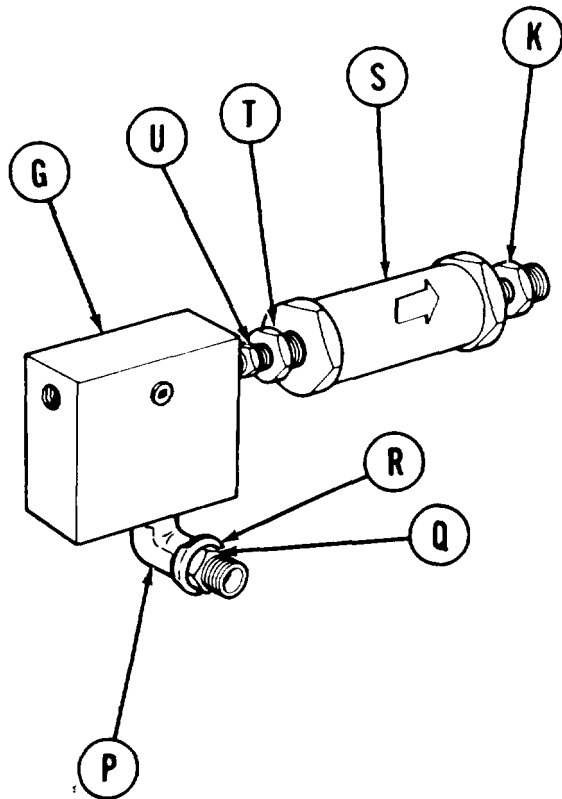
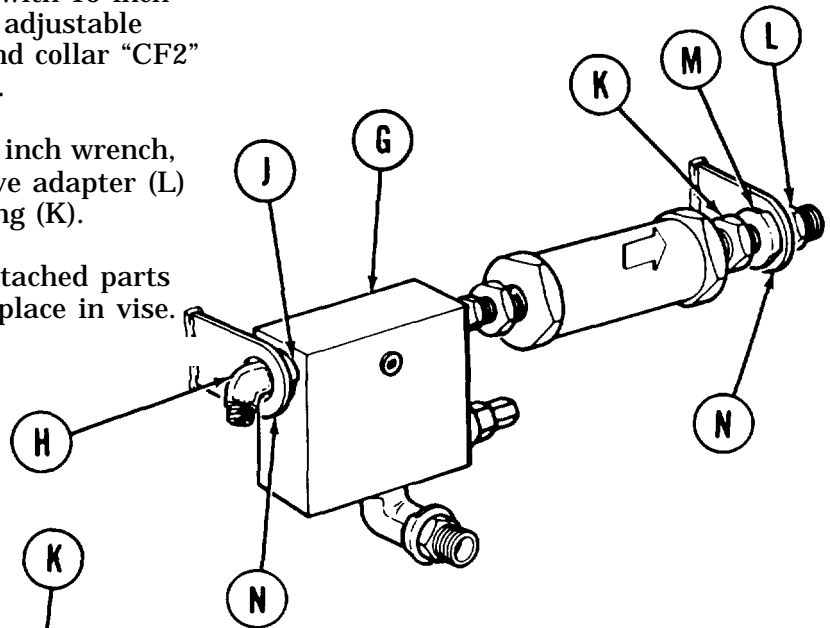
Go on to Sheet 2

TA251504



**SCISSORS CYLINDER RELIEF VALVE (RV8) AND FLOW REGULATOR (PCV3) REPLACEMENT  
(Sheet 2 of 4)**

4. Holding relief valve "RV8" (G) with 15 inch adjustable wrench, use 12 inch adjustable wrench to remove elbow (H) and collar "CF2" (J) from relief valve "RV8" (G).
5. Holding bushing (K) with 1-3/8 inch wrench, use 1-1/8 inch wrench to remove adapter (L) and collar "CJ" (M) from bushing (K).
6. Remove relief valve (G) and attached parts from welded brackets (N) and place in vise.



7. Holding elbow (P) with 12 inch adjustable wrench, use 1-1/8 inch wrench to remove adapter (Q) and collar "CG" (R) from elbow (P).
8. Using 12 inch adjustable wrench, remove elbow (P) from relief valve "RV8" (G).
9. Holding flow regulator "PCV3" (S) with 15 inch adjustable wrench, use 1-3/8 inch wrench to remove bushing (K) from flow regulator "PCV3" (s).
10. Holding bushing (T) with 1-3/8 inch wrench, use 15 inch adjustable wrench to remove flow regulator "PCV3" (S) from bushing (T).
11. Holding nipple (U) with 1-1/8 inch wrench, use 1-3/8 inch wrench to remove bushing (T) from nipple (U).
12. Using 1-1/8 inch wrench, remove nipple (U) from relief valve "RV8" (G).
13. Remove relief valve "RV8" (G) from vise.

Go on to Sheet 3

TA251505

**SCISSORS CYLINDER RELIEF VALVE (RV8) AND FLOW REGULATOR (PCV3) REPLACEMENT**  
(Sheet 3 of 4)

INSTALLATION:

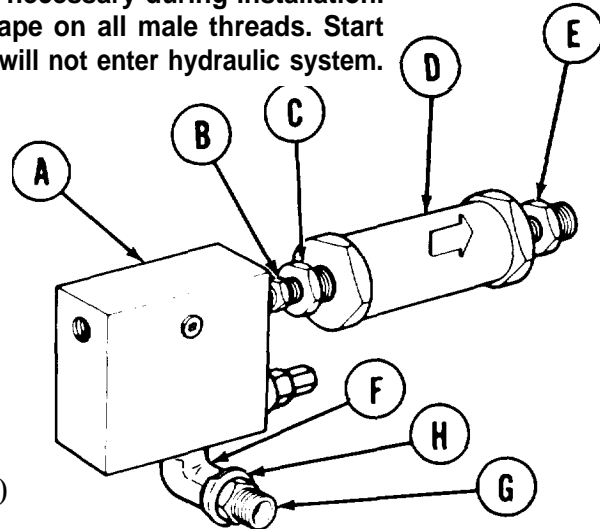
**NOTE**

Remove all caps and plugs as necessary during installation. Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

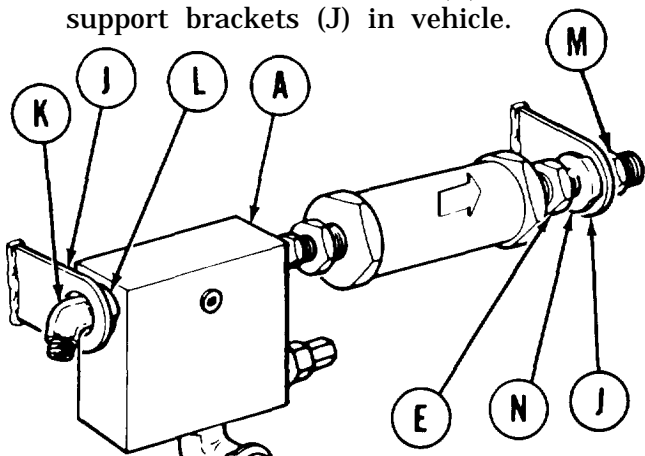
1. Place relief valve "RV8" (A) in vise.

**NOTE**

You must install parts in relief valve "RV8" (A) exactly as shown, or valve will not install or function properly.



2. Using 1-1/8 inch wrench, install nipple (B) on relief valve "RV8" (A).
3. Using 1-3/8 inch wrench, install bushing (C) on nipple (B).
4. Holding bushing (C) with 1-3/8 inch wrench, use 15 inch adjustable wrench to install flow regulator "PCV3" (D) on bushing (C) with flow arrow pointing away from relief valve "RV8" (A).
5. Holding flow regulator "PCV3" (D) with 15 inch adjustable wrench, use 1-3/8 inch wrench to install bushing (E) on flow regulator "PCV3" (D).
6. Using 12 inch adjustable wrench, install elbow (F) on relief valve "RV8" (A).
7. Holding elbow (F) with 12 inch adjustable wrench, use 1-1/8 inch wrench to install adapter (G) and collar "CG" (H) on elbow (F).
8. Remove relief valve "RV8" (A) and attached parts from vise and position between welded support brackets (J) in vehicle.



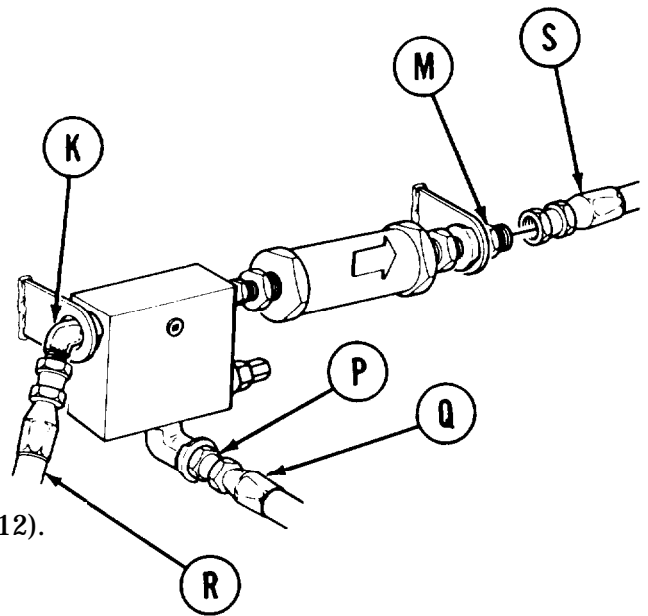
9. Manually install elbow (K) and collar "CF2" (L) to relief valve "RV8" (A).
10. Install adapter (M) and collar "CJ" (N) in bushing (E).
11. Holding relief valve "RV8" (A) with 15 inch adjustable wrench, use 12 inch adjustable wrench to tighten elbow (K).
12. Holding bushing (E) with 1-3/8 inch wrench, use 1-1/8 inch wrench to tighten adapter (M).

Go on to Sheet 4

TA251506

**SCISSORS CYLINDER RELIEF VALVE (RV8) AND FLOW REGULATOR (PCV3) REPLACEMENT**  
 (Sheet 4 of 4)

13. Holding adapter (P) with 1-1/8 inch wrench, use 1-1/4 inch wrench to install hose assembly "CG" (Q) to adapter (P).
14. Holding elbow (K) with 12 inch adjustable wrench, use 1-1/4 inch wrench to install hose assembly "CF2" (R) to elbow (K).
15. Holding adapter (M) with 1-1/8 inch wrench, use 1-1/4 inch wrench to install hose assembly "CJ" (S) to adapter (M).
16. Service hydraulic reservoir (LO 5-5420-202-12).
17. Bleed hydraulic system (page 3-72).
18. Check for hydraulic leaks and correct as necessary.
19. Service hydraulic reservoir (LO 5-5420-202-12).
20. Adjust relief valve pressure (page 3-89).



End of Task

OVERHEAD CYLINDER RELIEF VALVE (RV9) AND FLOW REGULATOR (PCV1)  
REPLACEMENT (Sheet 1 of 4)

PROCEDURE INDEX

PROCEDURE	PAGE
Removal	3-110
Installation	3-112

TOOLS: 12 in. adjustable wrench (2) SUPPLIES: Pipe tape (Item 19, Appendix D)  
 1-1/8 in. open end wrench Masking tape (Item 18, Appendix D)  
 1-1/4 in. open end wrench Pencil (Item 22, Appendix D)  
 1-3/8 in. open end wrench Drip pan (suitable containers)  
 15 in. adjustable wrench Rags (Item 12, Appendix D)  
 Protective caps and plugs

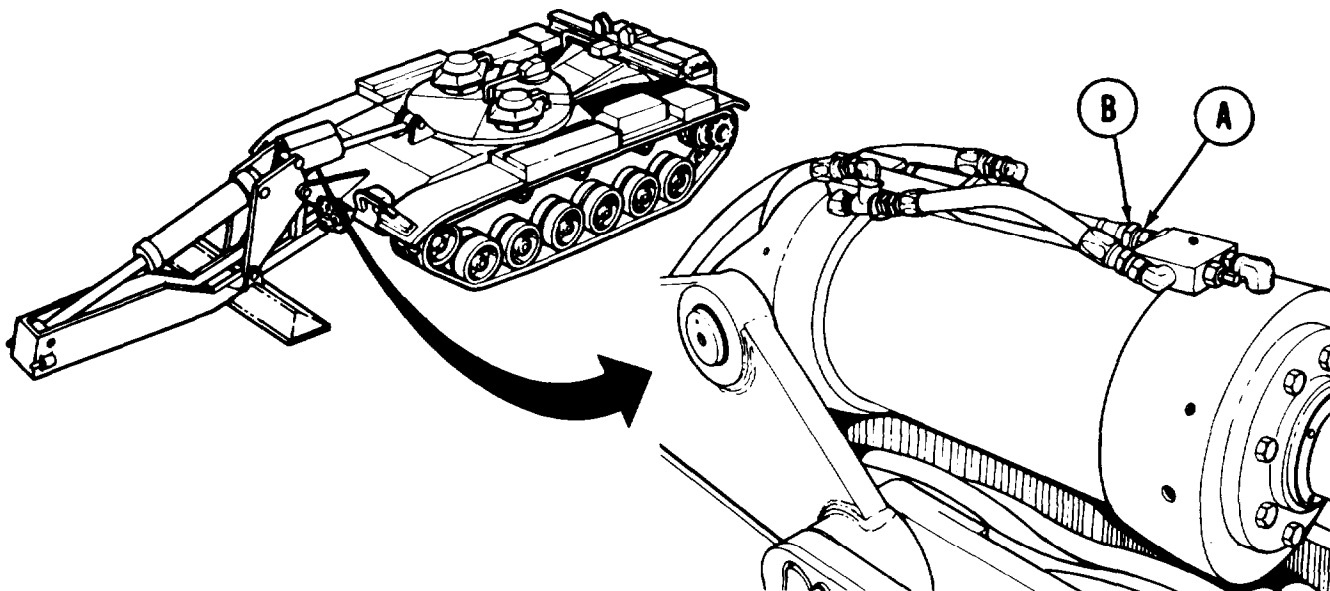
REFERENCES: (LO 5-5420-202-12).

PRELIMINARY PROCEDURES: Remove overhead cylinder armor (page 3-223)  
 Relieve hydraulic pressure (page 3-71)

REMOVAL:

NOTE

- Use rags and drip pans to catch excess hydraulic fluid. Use masking tape to tag lines for installation. Cap or plug all lines and fittings as they are disconnected.
- Lay hose assemblies aside, as they are disconnected, to provide clear work area around relief valve (RV9) and connected parts.



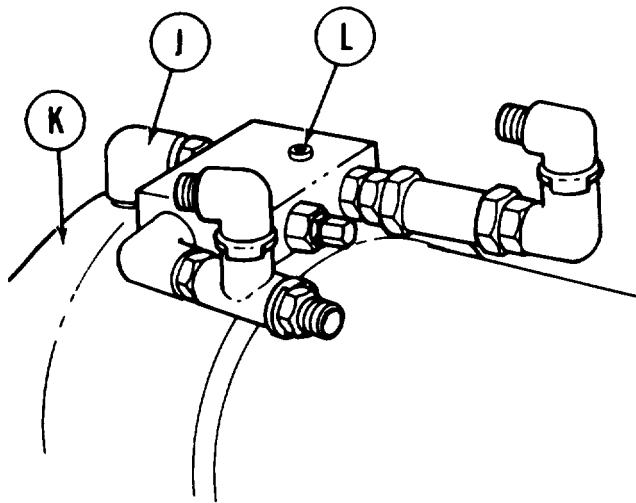
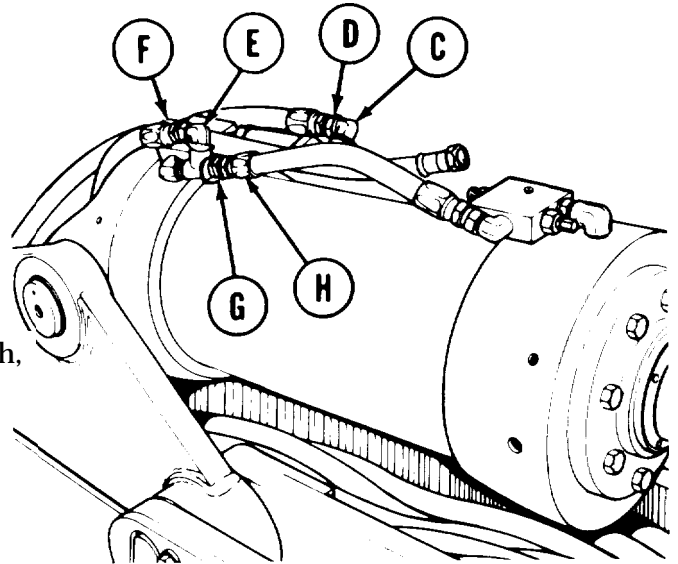
1. Holding adapter (A) with 1-1/8 inch wrench, use 1-1/4 inch wrench to remove hose assembly "CM" (B).

Go on to Sheet 2

TA251508

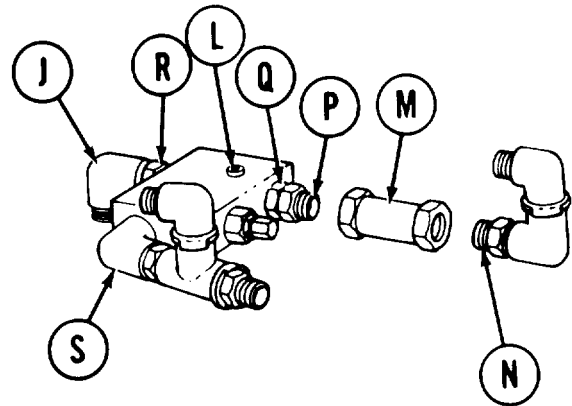
**OVERHEAD CYLINDER RELIEF VALVE (RV9) AND FLOW REGULATOR (PCV1) REPLACEMENT (Sheet 2 of 4)**

2. Holding elbow (C) with 12 inch adjustable wrench, use 1-1/4 inch wrench to remove hose assembly "CN" (D).
3. Holding elbow (E) with 12 inch adjustable wrench, use 1-1/4 inch open end wrench to remove hose assembly "CL" (F).
4. Holding adapter (G) with 1-1/8 inch wrench, use 1-1/4 inch wrench to remove hose assembly "CO" (H).



5. Using adjustable wrench, remove elbow (J) and attached parts from cap end of cylinder (K).
6. Using care to prevent damage, clamp relief valve (L) in vise.

7. Holding regulator (M) with 15 inch adjustable wrench, use 1-3/8 inch wrench to remove bushing (N) and attached fittings.
8. Holding bushing (P) with 1-3/8 inch wrench, use 15 inch adjustable wrench to remove regulator (M).
9. Using 1-1/8 inch wrench, remove nipple (Q) and attached bushing (P).
10. Using 1-1/8 inch wrench, remove nipple (R) and attached elbow (J).
11. Using 12 inch adjustable wrench, remove elbow (S) and attached fittings.
12. Remove relief valve (L) from vise.



Go on to Sheet 3

TA251509

**OVERHEAD CYLINDER RELIEF VALVE (RV9) AND FLOW REGULATOR (PCV1)  
REPLACEMENT (Sheet 3 of 4)**

**INSTALLATION:**

**NOTE**

Remove all caps and plugs as necessary during installation. Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

1. Using care to prevent damage, clamp relief valve (A) in vise.

**NOTE**

Locate and aline parts as shown in illustrations to make sure connecting parts mate at final assembly.

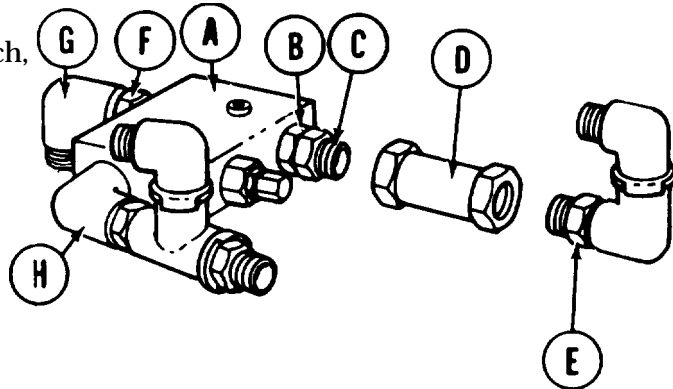
2. Using 1-1/8 inch wrench, install nipple (B) and attached bushing (C) in hole next to pressure adjustment fitting.

3. Holding bushing (C) with 1-3/8 inch wrench, use 15 inch adjustable wrench to install regulator (D) on bushing (C).

4. Using 1-3/8 inch wrench, install bushing (E) and attached parts in regulator (D).

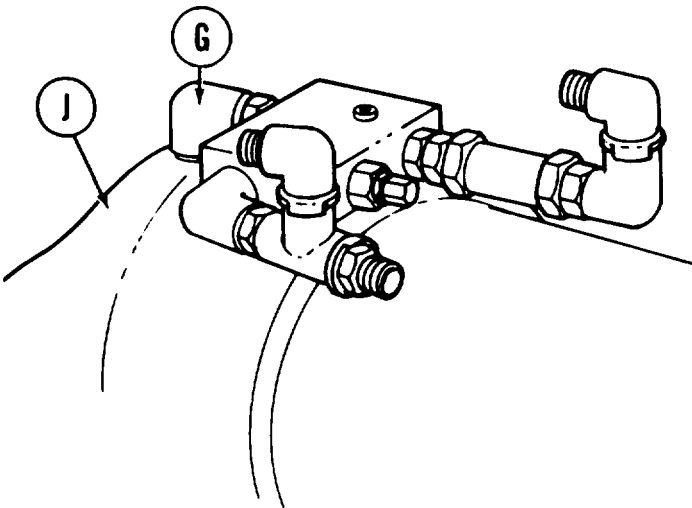
5. Using 1-1/8 inch wrench, install nipple (F) and attached elbow (G) in relief valve (A).

6. Using 12 inch adjustable wrench, install elbow (H) and attached parts in relief valve (A).



7. Remove relief valve (A) and attached parts from vise.

8. Using adjustable wrench, install elbow (G) and attached parts in cap end of cylinder (J).

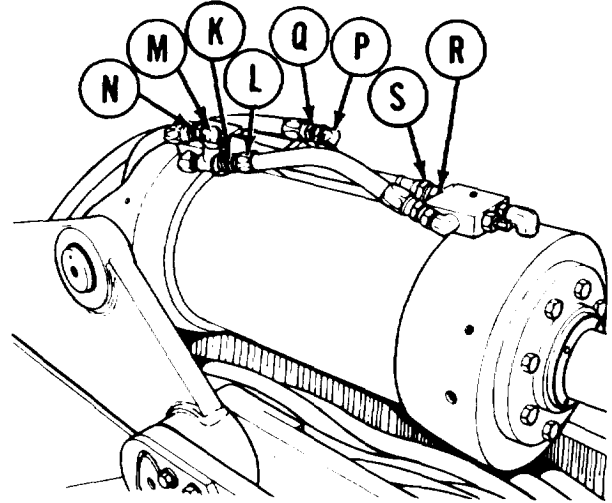


Go on to Sheet 4

TA251510

## OVERHEAD CYLINDER RELIEF VALVE (RV9) AND FLOW REGULATOR (PCV1) REPLACEMENT (Sheet 4 of 4)

9. Holding adapter (K) with 1-1/8 inch open end wrench, use 1-1/4 inch wrench to install hose assembly "CO" (L).
10. Holding elbow (M) with 12 inch adjustable wrench, use 1-1/4 inch wrench to install hose assembly "CL" (N).
11. Holding elbow (P) with 12 inch adjustable wrench, use 1-1/4 inch wrench to install hose assembly "CN" (Q).
12. Holding adapter (R) with 1-1/8 inch wrench, use 1-1/4 inch wrench to install hose assembly "CM" (S).



13. Bleed hydraulic system (page 3-72).
14. Check for hydraulic leaks and correct as necessary.
15. Service hydraulic reservoir (LO 5-5420-202-12).
16. Adjust relief valve pressure (page 3-82).
17. Install overhead cylinder armor (page 3-224).

End of Task

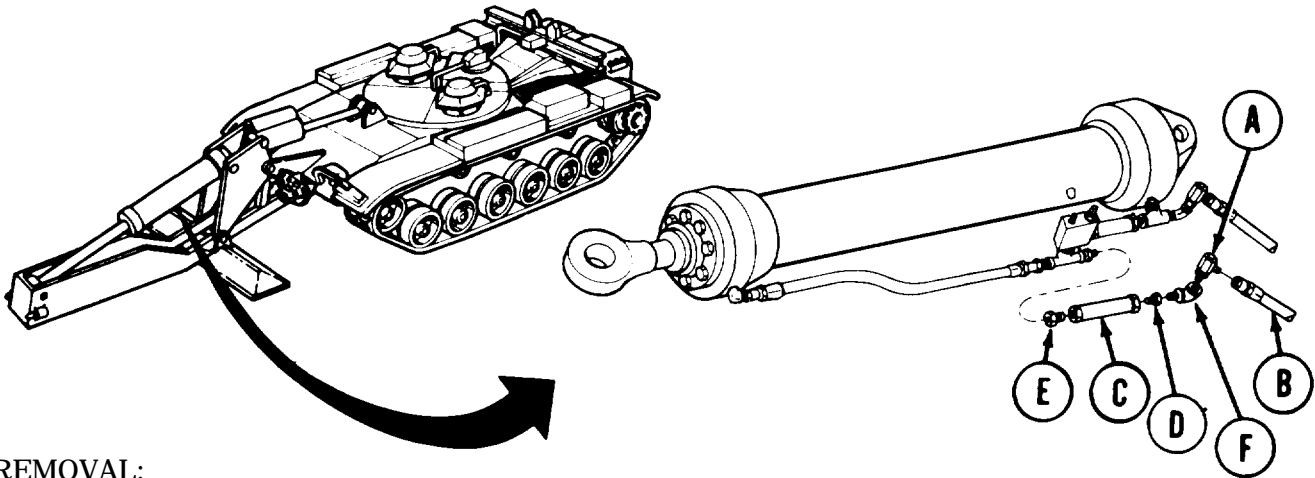
TONGUE CYLINDER FLOW REGULATOR (PCV2) REPLACEMENT (Sheet 1 of 2)

TOOLS: 1-1/4 in. open end wrench  
1-3/8 in. open end wrench  
15 in. adjustable wrench  
12 in. adjustable wrench

SUPPLIES: Drip pans (suitable containers)  
Rags (Item 12, Appendix D)  
Pipe tape (Item 19, Appendix D)  
Protective caps and plugs

REFERENCE: (LO 5-5420-202-12).

PRELIMINARY PROCEDURES: Remove tongue cylinder armor (page 3-232)  
Relieve hydraulic pressure (page 3-71)



REMOVAL:

NOTE

Use rags and drip pans to catch excess hydraulic fluid.  
Cap or plug all lines and fittings as they are disconnected.

1. Holding elbow (A) with 15 inch adjustable wrench, use 1-1/4 inch wrench to remove hose assembly "CK2" (B).
2. Holding flow regulator "PCV2" (C) with 15 inch adjustable wrench, use 1-3/8 inch wrench to remove reducer (D) with attached parts.
3. Holding bushing (E) with 1-3/8 inch wrench, use 15 inch adjustable wrench to remove flow regulator "PCV2" (C).
4. Holding reducer (D) with 1-3/8 inch wrench, use 12 inch adjustable wrench to remove elbow (F).
5. Holding elbow (F) with 12 inch adjustable wrench, use 15 inch adjustable wrench to remove elbow (A).

Go on to Sheet 2

TA251512

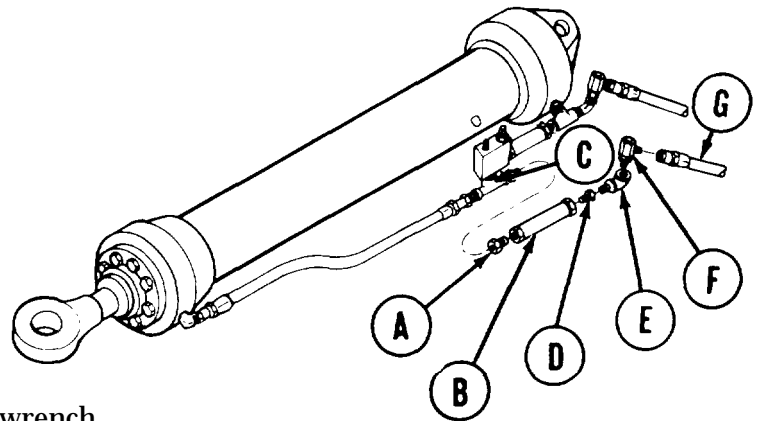


## TONGUE CYLINDER FLOW REGULATOR (PCV2) REPLACEMENT (Sheet 2 of 2)

## INSTALLATION:

## NOTE

Remove all caps and plugs as necessary during installation. Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.



1. Holding bushing (A) with 1-3/8 inch wrench, use 15 inch adjustable wrench to install flow regulator "PCV2" (B) with flow arrow pointing away from tee (C).
2. Holding flow regulator "PCV2" (B) with 15 inch adjustable wrench, use 1-3/8 inch wrench to install reducer (D).
3. Holding reducer (D) with 1-3/8 inch wrench, use 12 inch adjustable wrench to install elbow (E).
4. Holding elbow (E) with 12 inch adjustable wrench, use 15 inch adjustable wrench to install elbow (F).
5. Holding elbow (F) with 15 inch adjustable wrench, use 1-1/4 inch wrench to install hose assembly "CK2" (G).
6. Bleed hydraulic system (page 3-72).
7. Check for hydraulic leaks and correct as necessary.
8. Service hydraulic reservoir (LO 5-5420-202-12).
9. Install tongue cylinder armor (page 3-233).

End of Task

TA251513

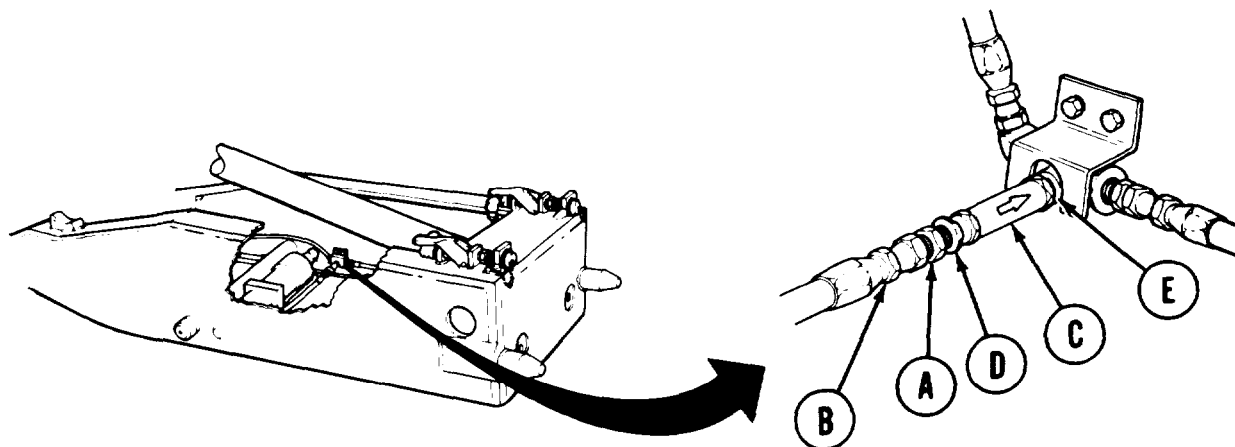
### SCISSORS CYLINDER CHECK VALVE (CV7) REPLACEMENT (Sheet 1 of 2)

TOOLS: 1-1/8 in. open end wrench  
1-1/4 in. open end wrench  
15 in. adjustable wrench

SUPPLIES: Pipe tape (Item 19, Appendix D)  
Rags (Item 12, Appendix D)  
Drip pan (suitable containers)  
Protective caps and plugs

REFERENCE: (LO 5-5420-202-12).

PRELIMINARY PROCEDURES: Relieve hydraulic pressure (page 3-71)



REMOVAL:

#### NOTE

Use drip pan and rags to catch excess hydraulic fluid. Cap or plug all lines and fittings as they are disconnected.

1. Holding adapter (A) with 1-1/8 inch wrench, use 1-1/4 inch wrench to remove hose assembly "CG" (B).
2. Holding check valve "CV7" (C) with 15 inch adjustable wrench, use 1-1/8 inch wrench to remove adapter (A) and collar "CG" (D).
3. Using 15 inch adjustable wrench, remove check valve "CV7" (C) from tee (E).

Go on to Sheet 2

TA251514

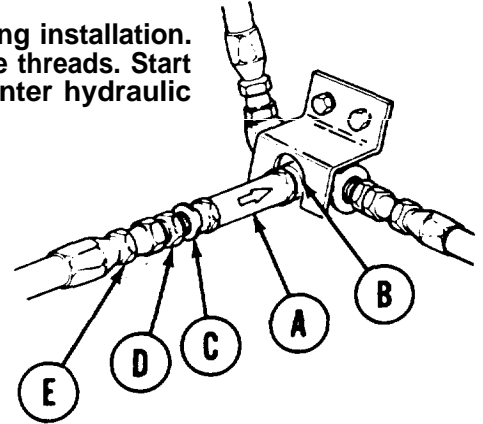
## SCISSORS CYLINDER CHECK VALVE (CV7) REPLACEMENT (Sheet 2 of 2)

## INSTALLATION:

## NOTE

Remove caps and plugs as necessary during installation. Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

1. Using 15 inch adjustable wrench, install check valve "CV7" (A) with flow arrow pointing toward tee (B).
2. Holding check valve "CV7" (A) with 15 inch adjustable wrench, use 1-1/8 inch wrench to install collar "CG" (C) and adapter (D).
3. Holding adapter (D) with 1-1/8 inch wrench, use 1-1/4 inch wrench to install hose assembly (E).
4. Bleed hydraulic system (page 3-72).
5. Check for hydraulic leaks and correct as necessary.
6. Service hydraulic reservoir (LO 5-5420-202-12).



End of Task

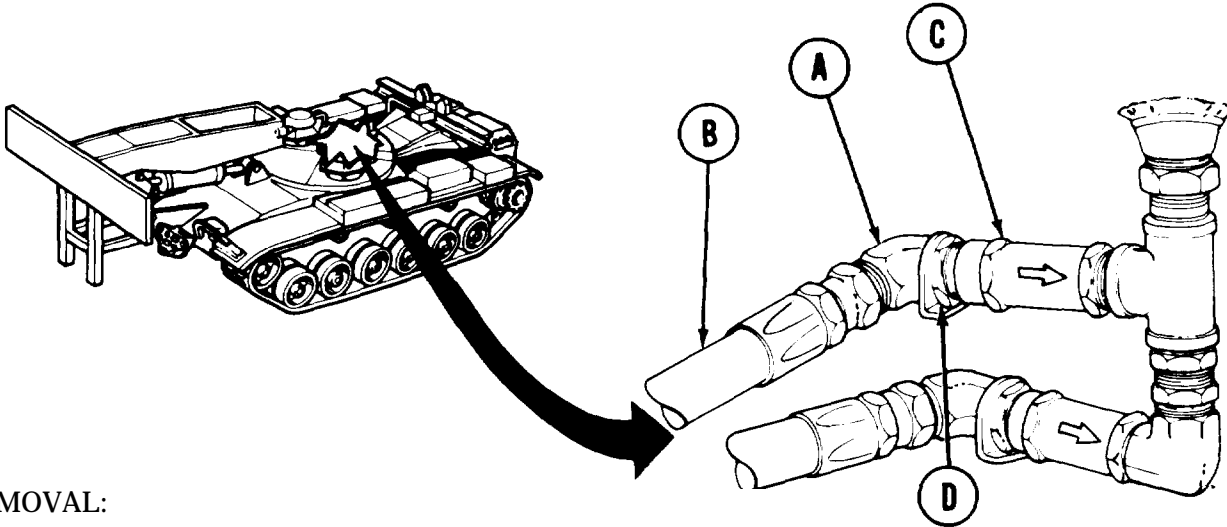
**RESERVOIR RETURN CHECK VALVE (CV8) REPLACEMENT (Sheet 1 of 2)**

TOOLS: 1-1/2 in. open end wrench  
1-3/4 in. open end wrench  
15 in. adjustable wrench

SUPPLIES: Pipe tape (Item 19, Appendix D)  
Drip pans (suitable containers)  
Rags (Item 12, Appendix D)

REFERENCE: LO 5-5420-202-12

PRELIMINARY PROCEDURE: Drain hydraulic reservoir (page 3-74)



REMOVAL:

UNDER RESERVOIR

**NOTE**

**Use rags and drip pens to catch hydraulic fluid trapped in lines.**

1. Holding elbow (A) with adjustable wrench, use 1-1/2 inch wrench to remove hose assembly "BB" (B).
2. Holding check valve "CV8" (C) with adjustable wrench, use 1-3/4 inch wrench to remove bushing (D) and attached parts.
3. Use adjustable wrench to remove check valve "CV8" (C).

Go on to Sheet 2

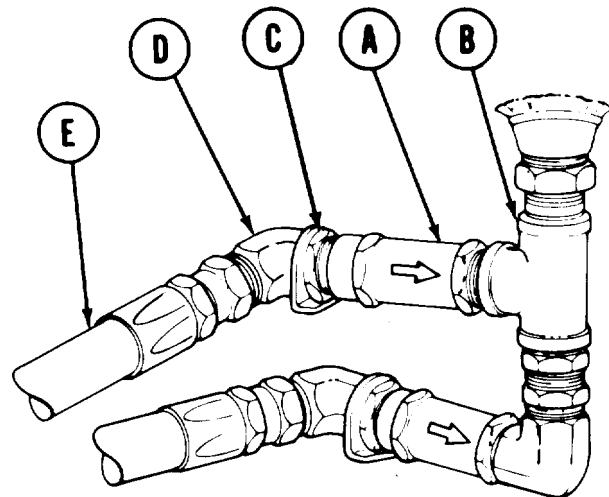
TA251516

## RESERVOIR RETURN CHECK VALVE (CV8) REPLACEMENT (Sheet 2 of 2)

## INSTALLATION:

## NOTE

Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.



1. Use adjustable wrench to install check valve "CV8" (A) with flow arrow pointing toward tee (B).
2. Holding check valve "CV8" (A) with adjustable wrench, use 1-3/4 inch wrench to install bushing (C) and attached parts.
3. Holding elbow (D) with adjustable wrench) use 1-1/2 inch wrench to install hose assembly "BB" (E).
4. Service hydraulic reservoir (LO 5-5420-202-12).
5. Bleed hydraulic system (page 3-72).
6. Check for hydraulic leaks and correct as necessary.
7. Service hydraulic reservoir (LO 5-5420-202-12).

End of Task

TA251517

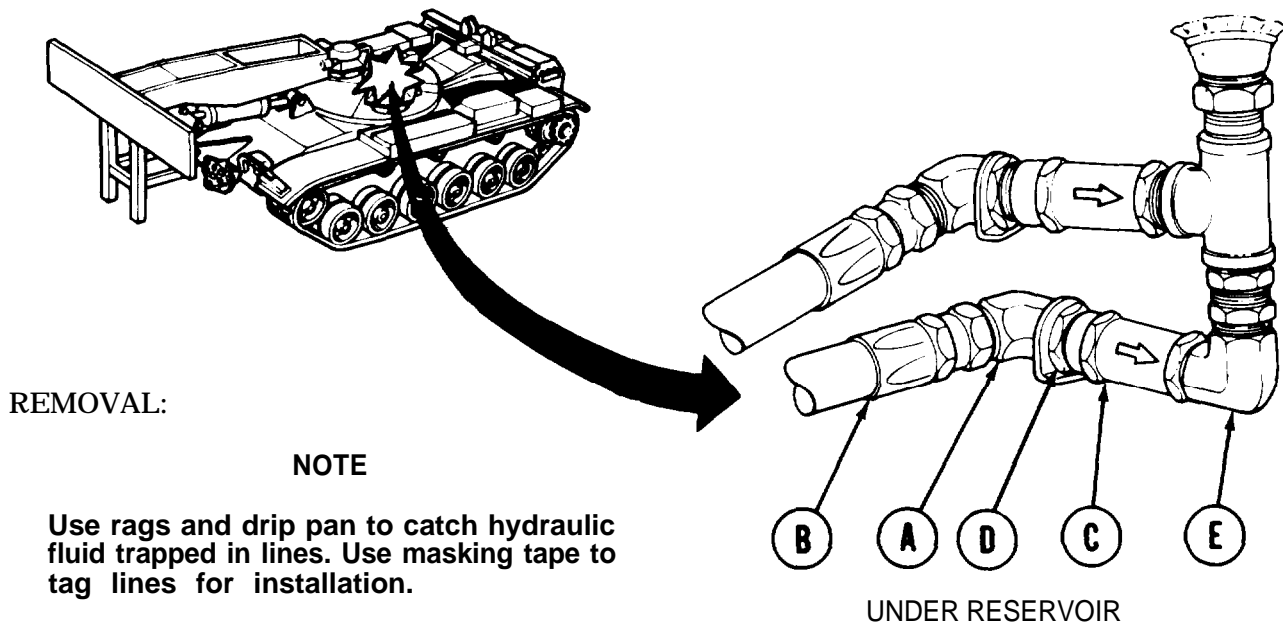
**PUMP RELIEF CHECK VALVE (CV5) REPLACEMENT (Sheet 1 of 2)**

**TOOLS:** 7/8 in. open end wrench  
1-1/8 in. open end wrench  
1-1/2 in. open end wrench  
12 in. adjustable wrench

**SUPPLIES:** Pipe tape (Item 19, Appendix D)  
Drip pans (suitable containers)  
Rags (Item 12, Appendix D)  
Masking tape (Item 18, Appendix D)  
Pencil (Item 22, Appendix D)

**REFERENCES:** LO 5-5420-202-12

**PRELIMINARY PROCEDURE:** Drain hydraulic reservoir (page 3-74)



1. Holding elbow (A) with adjustable wrench, use 7/8 inch wrench to remove hose assembly "CV5" (B).
2. Holding check valve "CV5" (C) with 1-1/2 inch wrench, use 1-1/8 inch wrench to remove bushing (D) and attached parts.
3. Holding elbow (E) with adjustable wrench, use 1-1/2 inch wrench to remove check valve "CV5" (C).

Go on to Sheet 2

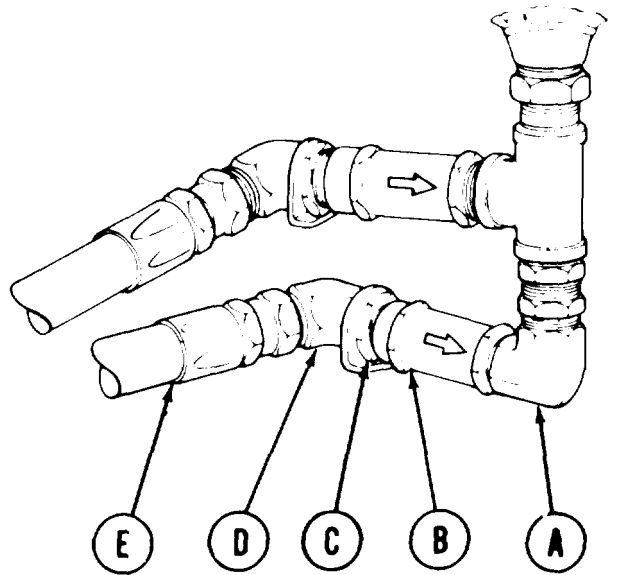
TA251518

## PUMP RELIEF CHECK VALVE (CV5) REPLACEMENT (Sheet 2 of 2)

## INSTALLATION:

## NOTE

Before installing, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.



1. Holding elbow (A) with adjustable wrench, using 1-1/2 inch wrench to install check valve "CV5" (B) with flow arrow pointing toward elbow (A).
2. Holding check valve "CV5" (B) with 1-1/2 inch wrench, use 1-1/8 inch wrench to install bushing (C) with attached parts.
3. Holding elbow (D) with adjustable wrench, use 7/8 inch wrench to install hose assembly "CV5" (E).
4. Service hydraulic reservoir (LO 5-5420-202-12).
5. Bleed hydraulic system (page 3-72).
6. Check for hydraulic leaks and correct as necessary.
7. Service hydraulic reservoir (LO 5-5420-202-12).

End of Task

TA251519

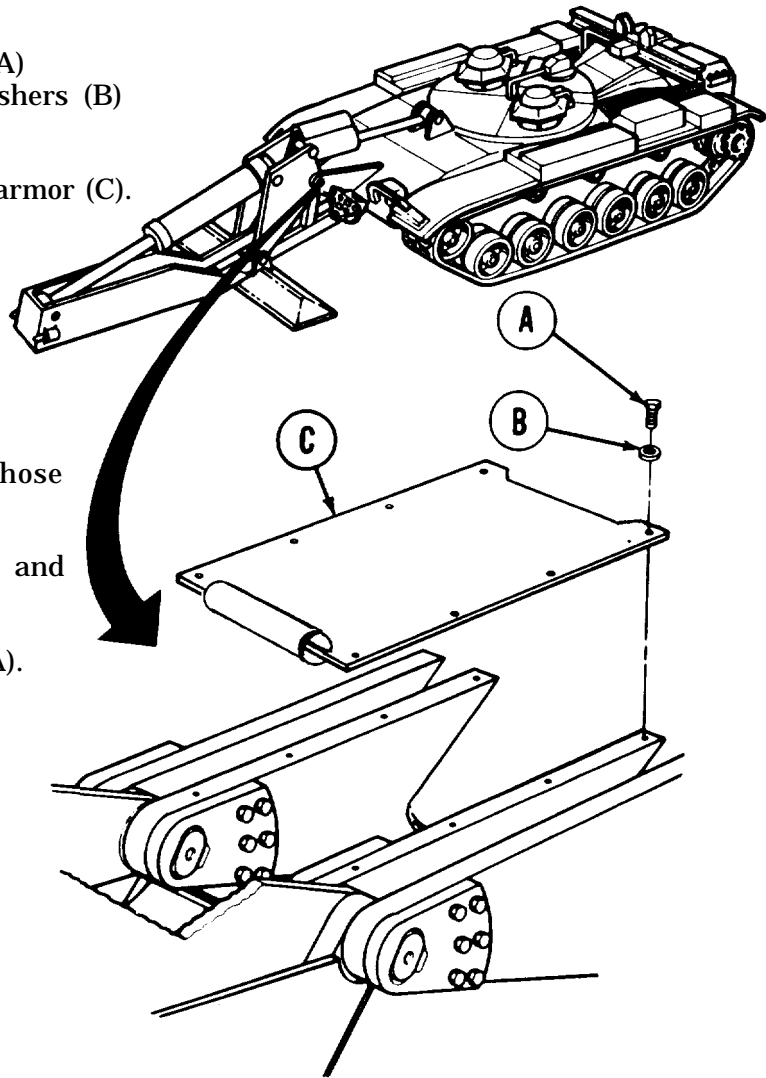
BOOM MOUNT HOSE ARMOR REPLACEMENT (Sheet 1 of 1)

TOOLS: 9/16 in. socket with 1/2 in. drive  
Ratchet with 1/2 in. drive

SUPPLIES: Lockwashers (8 required)

REMOVAL:

1. Using socket, remove eight screws (A) and lockwashers (B). Throw lockwashers (B) away.
2. Manually remove boom mount hose armor (C).



INSTALLATION:

1. Manually position boom mount hose armor (C) on vehicle.
2. Manually install eight screws (A) and lockwashers (B).
3. Using socket, tighten eight screws (A).

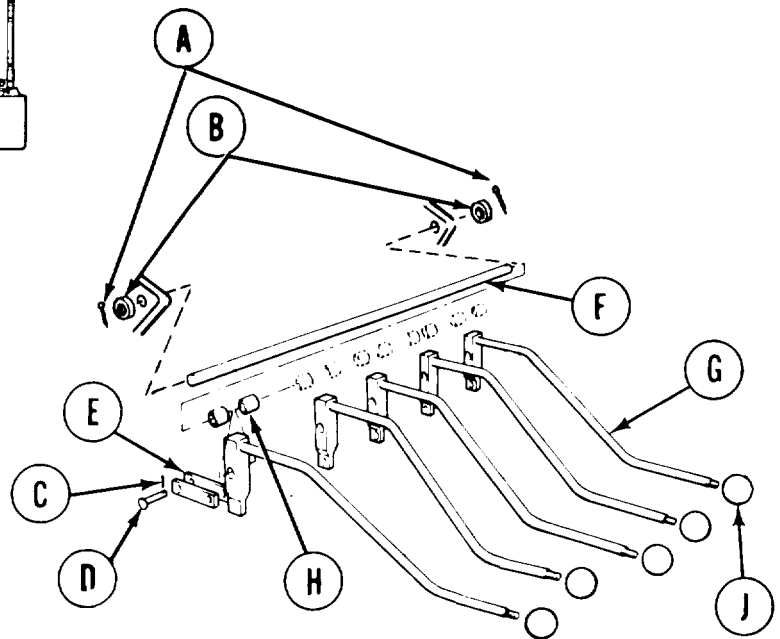
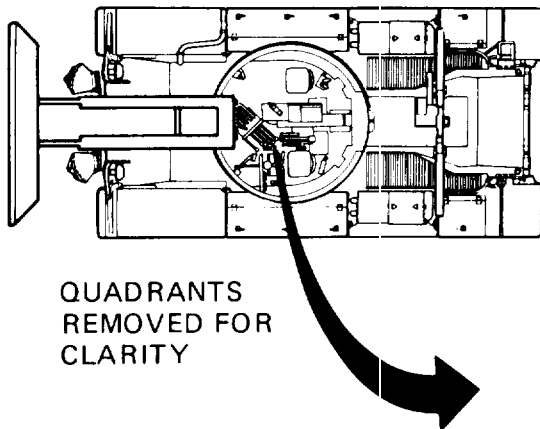


**VALVE BANK ASSEMBLY CONTROLS REPLACEMENT (Sheet 1 of 2)**

**TOOLS:** Slip joint pliers  
Hammer  
Punch

**SUPPLIES:** Cotter pins (12 required)

**REFERENCE:** TM 5-5420-202-10



**REMOVAL:**

1. Using pliers, remove two cotter pins (A) and washers (B). Throw pins (A) away.
2. Using pliers, remove ten cotter pins (C).
3. Remove 10 straight pins (D) and links (E).
5. Using pliers, slowly pull out pin (F).
6. Remove five control levers (G) and 10 spacers (H).
7. Manually remove five knobs (J) by unscrewing.

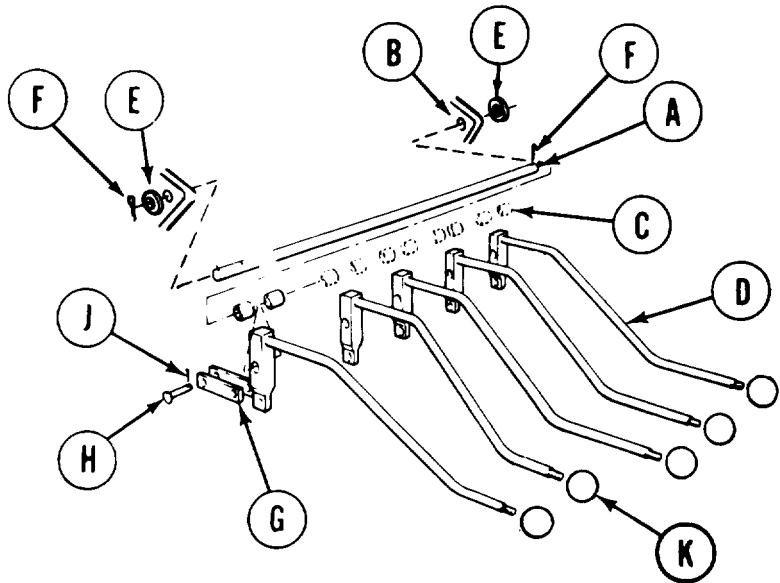
Go on to Sheet 2

TA251521

VALVE BANK ASSEMBLY CONTROLS REPLACEMENT (Sheet 2 of 2)

INSTALLATION:

1. Manually start pin (A) through valve bank (B).
2. While tapping pin (A), install ten spacers (C) and five control levers (D) as shown.
3. Using pliers, install two washers (E) and cotter pins (F).
4. Place ten links (G) in position.
5. Manually install ten straight pins (H).
6. Using pliers, install ten cotter pins (J).
7. Manually screw five knobs (K) onto five control levers (D).
8. Operate each control lever (D) to insure proper operation (TM 5-5420-202-10).



End of Task

**Section III. FILTER, HOSE ASSEMBLIES, AND ASSOCIATED HYDRAULICS  
OVERHEAD CYLINDER HOSE ASSEMBLIES (CL, CM, CN, AND CO) AND HYDRAULICS  
REPLACEMENT (Sheet 1 of 8)**

**PROCEDURE INDEX**

PROCEDURE	PAGE
Removal	3-125
Installation	3-129

**TOOLS:** 12 in. adjustable wrench  
1-1/4 in. open end wrench  
1-1/8 in. open end wrench  
1-3/8 in. open end wrench  
15 in. adjustable wrench

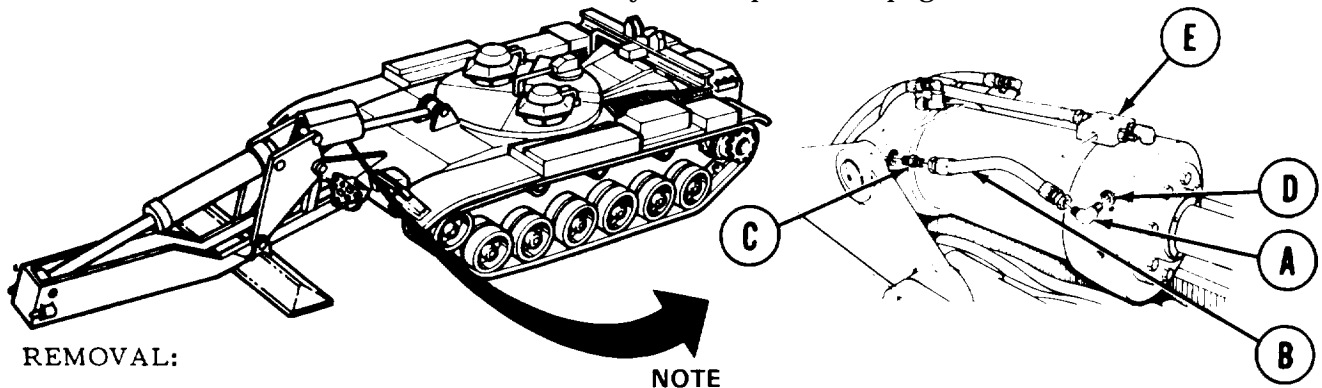
9/16 in. socket with 1/2 in. drive  
Ratchet with 1/2 in. drive  
Vise

**SUPPLIES:** Drip pans (suitable containers)  
Rags (Item 12, Appendix D)  
Masking tape (Item 18, Appendix D)  
Preformed packing (3 required)

Pencil (Item 22, Appendix D)  
Pipe tape (Item 19, Appendix D)  
Protective caps and plugs (assorted sizes)  
Lockwashers (8 required)

**REFERENCE:** LO 5-5420-202-12

**PRELIMINARY PROCEDURES:** Remove overhead cylinder armor (page 3-223)  
Remove front fixed and moveable hose armor (page 3-133)  
Relieve hydraulic pressure (page 3-71)



**Use rags and drip pans to catch excess hydraulic fluid. Use masking tape to tag lines for installation. Cap or plug all lines and fittings as they are disconnected.**

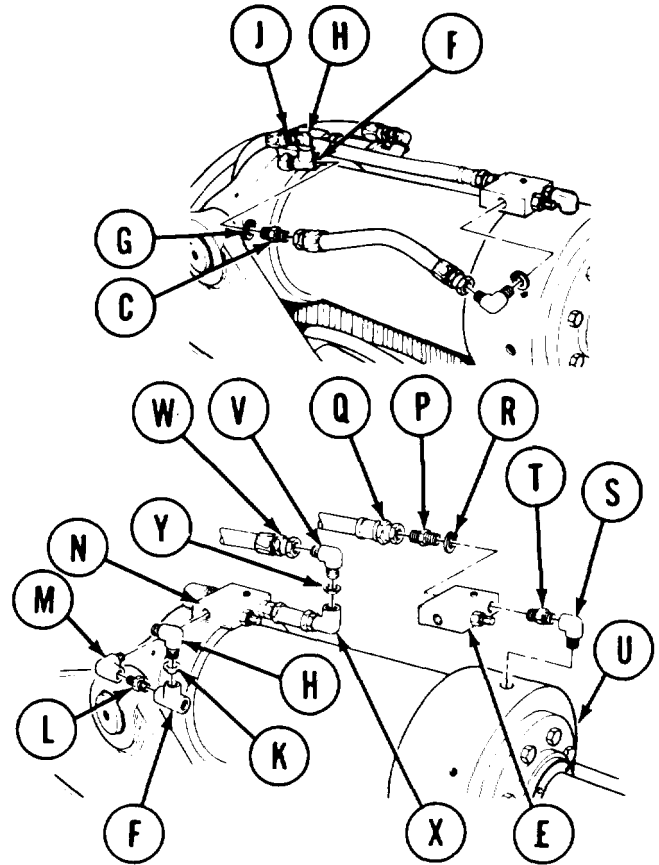
1. Holding elbow (A) with 12 inch adjustable wrench, use 1-1/4 inch wrench to disconnect hose assembly (B) from elbow (A).
2. Holding adapter (C) with 1-1/8 inch wrench, use 1-1/4 inch wrench to remove hose assembly (B) from adapter (C).
3. Using 12 inch adjustable wrench, remove elbow (A) and collar (D) from relief valve (E).

Go on to Sheet 2

TA251523

OVERHEAD CYLINDER HOSE ASSEMBLIES (CL, CM, CN, AND CO) AND HYDRAULICS  
REPLACEMENT (Sheet 2 of 8)

4. Holding tee (F) with 12 inch adjustable wrench, use 1-1/8 inch wrench to remove adapter (C) and collar (G) from tee (F).
5. Holding elbow (H) with 1-1/8 inch wrench, use 1-1/4 inch wrench to remove hose assembly (J) from elbow (H).
6. Holding tee (F) with 12 inch adjustable wrench, use 1-1/8 inch wrench to remove elbow (H) and collar (K).
7. Holding nipple (L) with 1-1/8 inch wrench, use 12 inch adjustable wrench to remove tee (F) from nipple (L).
8. Holding elbow (M) with 12 inch adjustable wrench, use 1-1/8 inch wrench to remove nipple (L) from elbow (M).
9. Using 12 inch adjustable wrench, remove elbow (M) from relief valve (N).
10. Holding adapter (P) with 1-1/8 inch wrench, use 1-1/4 inch wrench to remove hose assembly (Q).
11. Holding relief valve (E) with 15 inch adjustable wrench, use 1-1/8 inch wrench to remove adapter (P) and collar (R).
12. Using 12 inch adjustable wrench, remove elbow (S) and attached nipple (T) and relief valve (E) from overhead cylinder (U).
13. Using care not to cause damage, clamp relief valve (E) in vise.
14. Holding nipple (T) with 1-1/8 inch wrench, use 12 inch adjustable wrench to remove elbow (S) from nipple (T).
15. Using 1-1/8 inch wrench, remove nipple (T) from relief valve (E).
16. Remove relief valve (E) from vise.
17. Holding elbow (V) with 12 inch adjustable wrench, use 1-1/4 inch wrench to remove hose assembly (W) from elbow (V).
18. Holding elbow (X) with 15 inch adjustable wrench, use 12 inch adjustable wrench to remove elbow (V) and collar (Y).

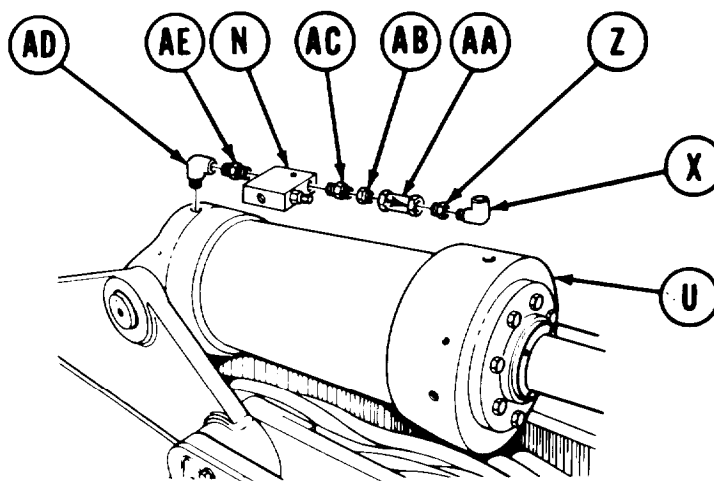


Go on to Sheet 3

TA251524

## OVERHEAD CYLINDER HOSE ASSEMBLIES (CL, CM, CN, AND CO) AND HYDRAULICS REPLACEMENT (Sheet 3 of 8)

19. Holding bushing (Z) with 1-1/8 inch wrench, use 12 inch adjustable wrench to remove elbow (X) from bushing (Z).
20. Holding regulator (AA) with 15 inch adjustable wrench, use 1-3/8 inch wrench to remove bushing (Z) from regulator (AA).
21. Holding bushing (AB) with 1-3/8 inch wrench, use 15 inch adjustable wrench to remove regulator (AA) from bushing (AB).
22. Holding nipple (AC) with 1-1/8 inch wrench) use 1-3/8 inch wrench to remove bushing (A-B) from nipple (AC).

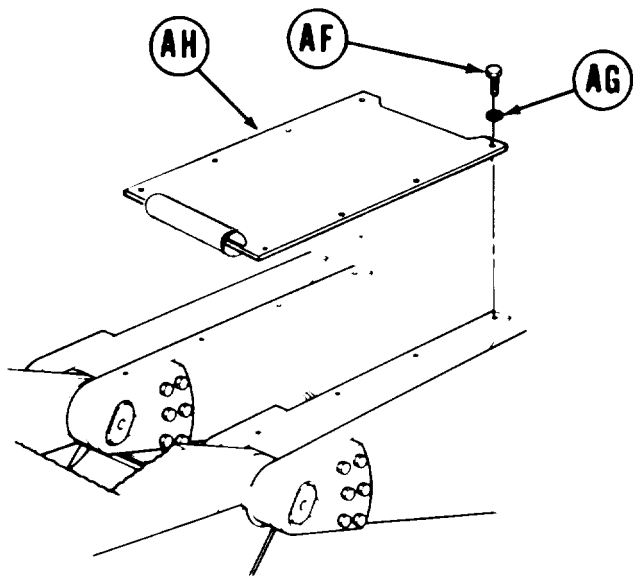


23. Holding relief valve (N) with 15 inch adjustable wrench, use 1-1/8 inch wrench to remove nipple (AC) from valve (N).
24. Using 12 inch adjustable wrench, remove elbow (AD) with attached nipple (AE) and relief valve (N) from overhead cylinder (U).
25. Using care not to cause damage, clamp relief valve (N) in vise.
26. Holding nipple (AE) with 1-1/8 inch wrench, use 12 inch adjustable wrench to remove elbow (AD) from nipple (AE).
27. Using 1-1/8 inch wrench, remove nipple (AE) from relief valve (N).
28. Remove relief valve (N) from vise.

Go on to Sheet 4

TA251525

OVERHEAD CYLINDER HOSE ASSEMBLIES (CL, CM, CN, AND CO) AND HYDRAULICS REPLACEMENT (Sheet 4 of 8)



29. Using socket, remove eight screws (AF) and lockwashers (AG).

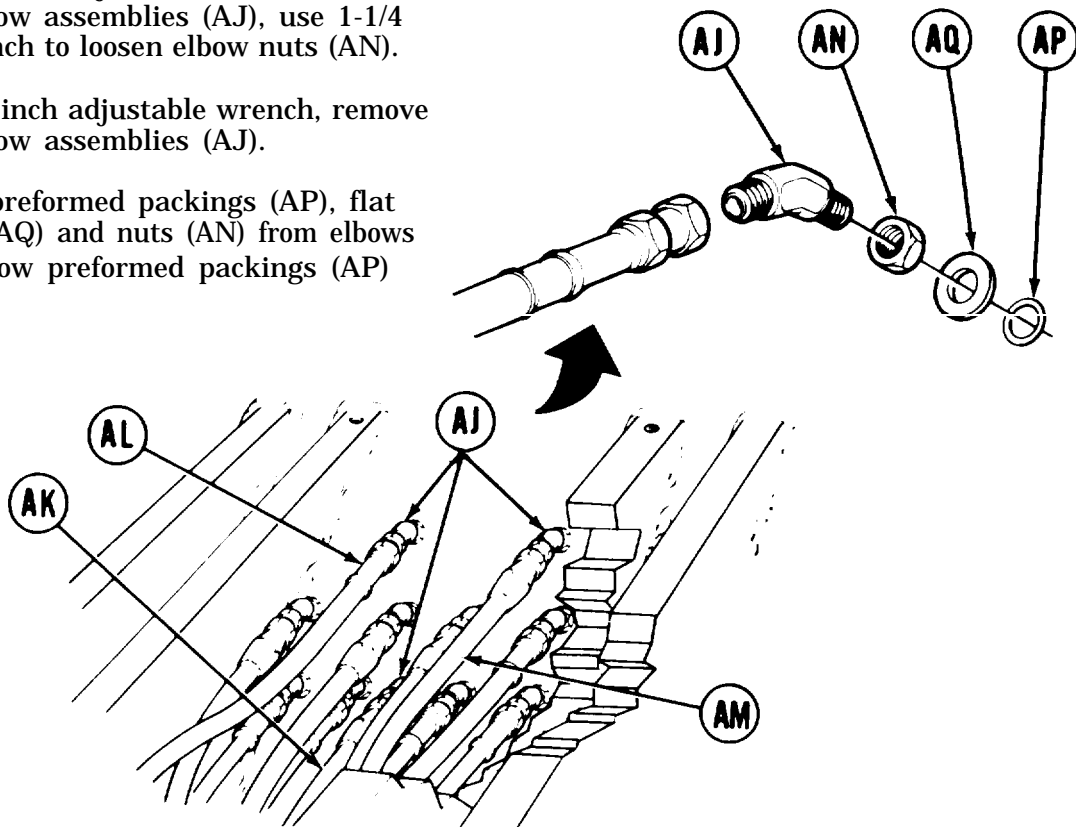
30. Manually remove front hose armor (AH) from vehicle.

31. Using 12 inch adjustable wrench to hold three elbow assemblies (AJ), USE 1-1/4 inch wrench to remove three hose assemblies (AK, AL, AM).

32. Using 12 inch adjustable wrench to hold three elbow assemblies (AJ), use 1-1/4 inch wrench to loosen elbow nuts (AN).

33. Using 12 inch adjustable wrench, remove three elbow assemblies (AJ).

34. Remove preformed packings (AP), flat washers (AQ) and nuts (AN) from elbows (AJ). Throw preformed packings (AP) away.



Go on to Sheet 5

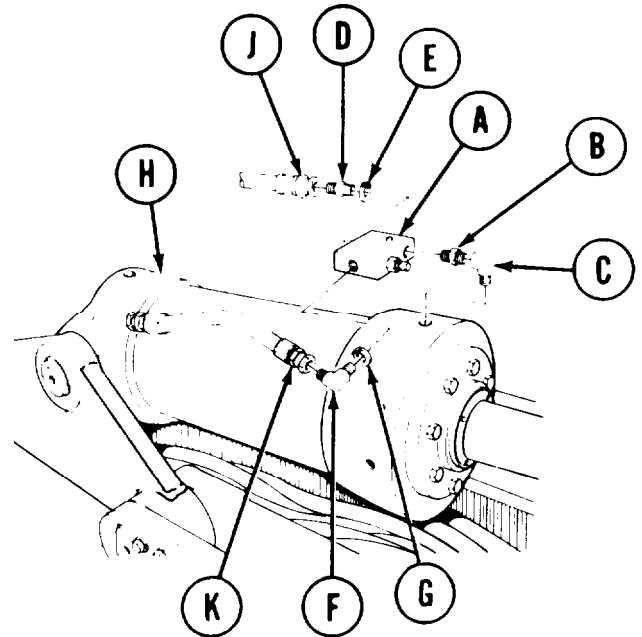
TA251526

## OVERHEAD CYLINDER HOSE ASSEMBLIES (CL, CM, CN, AND CO) AND HYDRAULICS REPLACEMENT (Sheet 5 of 8)

### INSTALLATION:

#### NOTE

Remove all caps and plugs as necessary during installation. Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system. Locate and align parts as shown in illustrations to make sure connecting parts mate at final assembly.

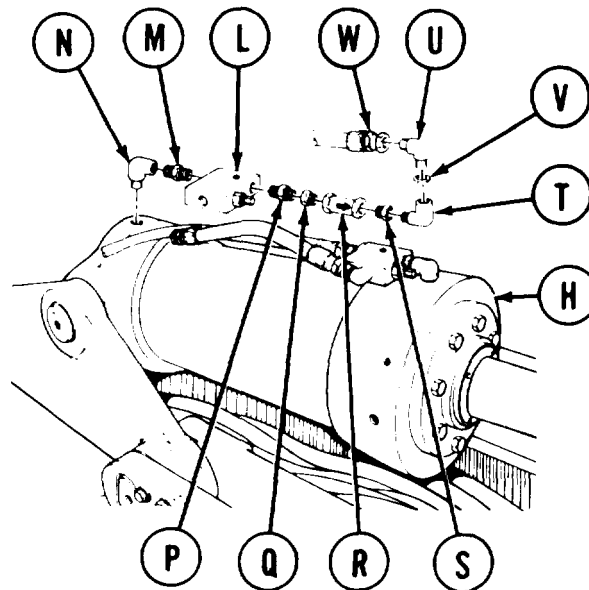


1. Using care to prevent damage, clamp relief valve (A) in vise.
2. Using 1-1/8 inch wrench, install nipple (B) into valve (A).
3. Holding nipple (B) with 1-1/8 inch wrench, use 12 inch adjustable wrench to install elbow (C) on nipple (B).
4. Using 1-1/8 inch wrench, install adapter (D) and collar (E) on relief valve (A).
5. Using 12 inch adjustable wrench, install elbow (F) and collar (G) into relief valve (A).
6. Remove relief valve (A) and attached parts from vise.
7. Using 12 inch adjustable wrench, install elbow (C) and attached parts on rod end of cylinder (H).
8. Holding adapter (D) with 1-1/8 inch wrench, use 1-1/4 inch wrench to install hose assembly (J) on adapter (D).
9. Holding elbow (F) with 12 inch adjustable wrench, use 1-1/4 inch wrench to connect hose assembly (K) to elbow (F).

Go on to Sheet 6

TA251527

OVERHEAD CYLINDER HOSE ASSEMBLIES (CL, CM, CN, AND CO) AND HYDRAULICS  
REPLACEMENT (Sheet 6 of 8)



10. Using care to prevent damage, clamp relief valve (L) in vise.
11. Using 1-1/8 inch wrench, install nipple (M) into relief valve (L).
12. Using 12 inch adjustable wrench, install elbow (N) onto nipple (M).
13. Using 1-1/8 inch wrench, install nipple (P) into relief valve (L).
14. Holding nipple (P) with 1-1/8 inch wrench, use 1-3/8 inch wrench to install bushing (Q) onto nipple (P).

**NOTE**

**Install regulator (R) with flow arrow pointing away from relief valve (L).**

15. Holding bushing (Q) with 1-3/8 inch wrench, use 15 inch adjustable wrench to install regulator (R) onto bushing (Q).
16. Holding regulator (R) with 15 inch adjustable wrench, use 1-3/8 inch wrench to install bushing (S) in regulator (R).
17. Holding bushing (S) with 1-3/8 inch wrench, use 12 inch adjustable wrench to install elbow (T) into bushing (S).
18. Holding elbow (T) with 15 inch adjustable wrench, use 12 inch adjustable wrench to install elbow (U) and collar (V) into elbow (T).
19. Remove relief valve (L) and attached parts from vise.
20. Using 12 inch adjustable wrench, install elbow (N) and attached parts in cap end of cylinder (H).
21. Holding elbow (U) with 12 inch adjustable wrench, use 1-1/4 inch wrench to install hose assembly (W) onto elbow (U).

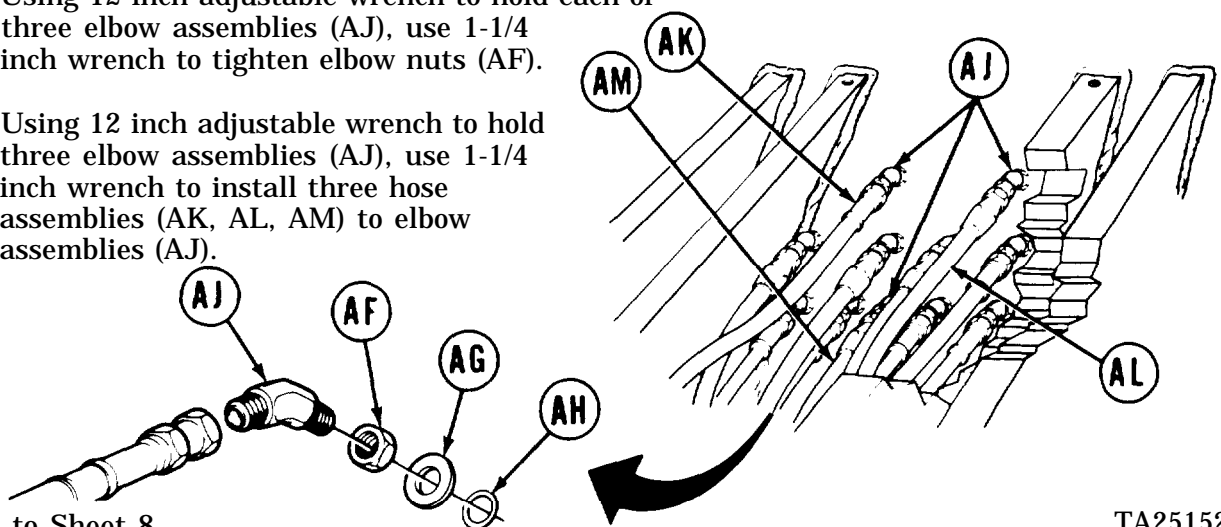
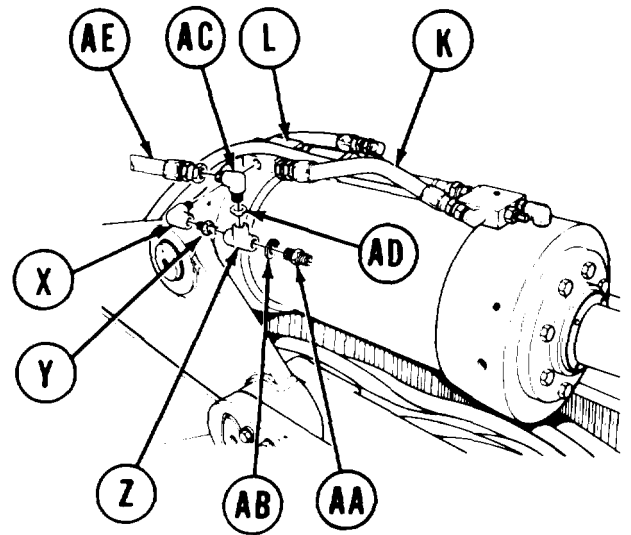
Go on to Sheet 7

TA251528



**OVERHEAD CYLINDER HOSE ASSEMBLIES (CL, CM, CN, AND CO) AND HYDRAULICS REPLACEMENT (Sheet 7 of 8)**

22. Holding relief valve (L) with 15 inch adjustable wrench, use 12 inch adjustable wrench to install elbow (X) into relief valve (L).
23. Holding elbow (X) with 12 inch adjustable wrench, use 1-1/8 inch wrench to install nipple (Y) into elbow (X).
24. Holding nipple (Y) with 1-1/8 inch wrench, use 12 inch adjustable wrench to install tee (Z) onto nipple (Y).
25. Holding tee (Z) with 12 inch adjustable wrench, use 1-1/8 inch wrench to install adapter (AA) and collar (AB) into tee (Z).
26. Holding adapter (AA) with 1-1/8 inch wrench, use 1-1/4 inch wrench to install hose assembly (K) onto adapter (AA).
27. Holding tee (Z) with 15 inch adjustable wrench, use 12 inch adjustable wrench to install elbow (AC) and collar (AD) into tee (Z).
28. Holding elbow (AC) with 15 inch adjustable wrench, use 1-1/4 inch wrench to install hose assembly (AE) onto elbow (AC).
29. Install nuts (AF), flat washers (AG), and new preformed packings (AH) on three elbows (AJ).
30. Manually install and position three elbow assemblies (AJ) hand tight on vehicle as shown.
31. Using 12 inch adjustable wrench to hold each of three elbow assemblies (AJ), use 1-1/4 inch wrench to tighten elbow nuts (AF).
32. Using 12 inch adjustable wrench to hold three elbow assemblies (AJ), use 1-1/4 inch wrench to install three hose assemblies (AK, AL, AM) to elbow assemblies (AJ).

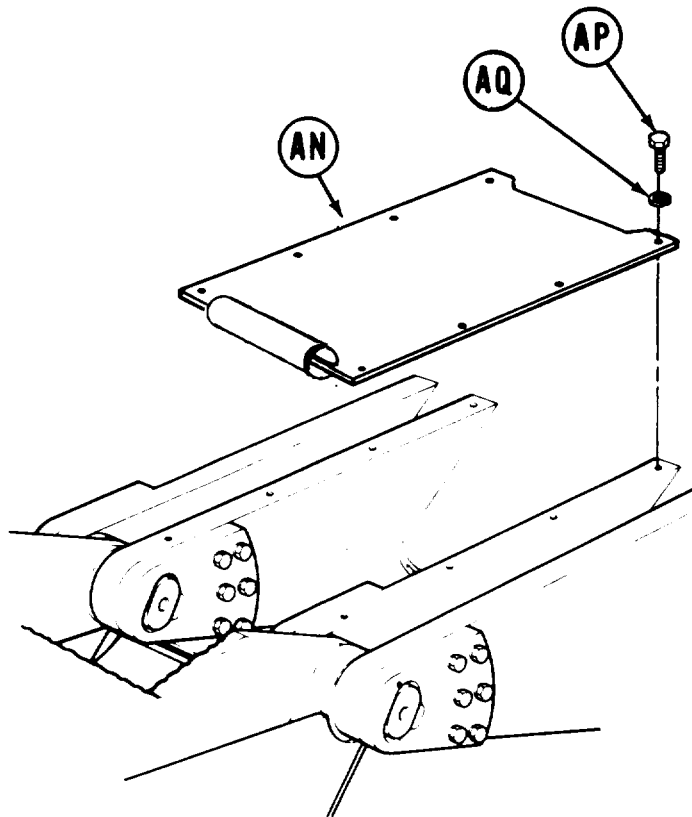


Go on to Sheet 8

TA251529

**OVERHEAD CYLINDER HOSE ASSEMBLIES (CL, CM, CN, AND CO) AND HYDRAULICS REPLACEMENT (Sheet 8 of 8)**

33. Bleed hydraulic system (page 3-72).
34. Check for hydraulic leaks and correct as necessary.
35. Service hydraulic reservoir as needed (LO 5-5420-202-12).
36. Adjust relief valve pressure (RV3 and RV9) (pages 3-81 and 3-82).
37. Place front hose armor (AN) in position.
38. Using socket, install eight screws (AP) and lockwashers (AQ).
39. Install front fixed and moveable hose armor (page 3-134).
40. Install overhead cylinder armor (page 3-224).



End of Task

TA251530

**FRONT FIXED AND MOVEABLE HOSE ARMOR REPLACEMENT (Sheet 1 of 2)**

**TOOLS:** 3/4 in. socket with 1/2 in. drive  
 Ratchet with 1/2 in. drive  
 Slip joint pliers  
 Hammer  
 Brass drift

**SUPPLIES:** Cotter pins (2 required)  
 Lockwashers (6 required)

**PERSONNEL:** Two

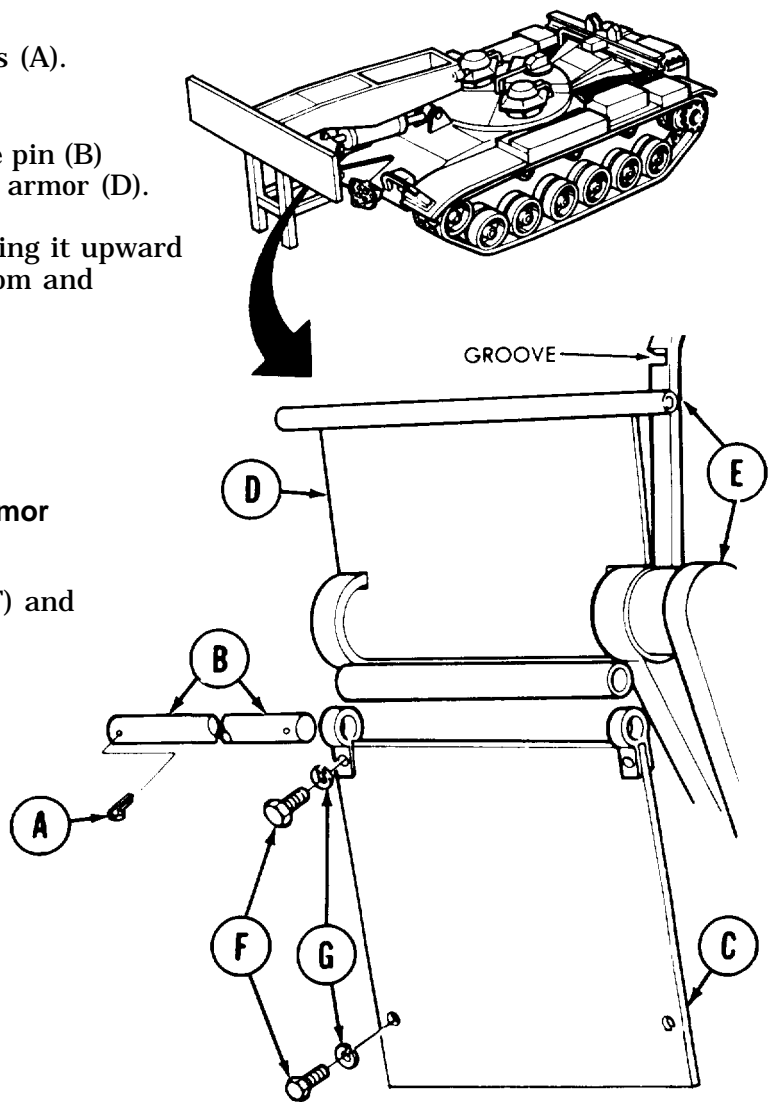
**REMOVAL:**

1. Using pliers, remove two cotter pins (A).
2. Using hammer and brass drift, drive pin (B) from fixed armor (C) and moveable armor (D).
3. Remove moveable armor (D) by sliding it upward until bar comes out of groove of boom and outrigger assembly (E).

**NOTE**

Have second technician hold fixed armor (C) while performing step 4.

4. Using socket, remove four screws (F) and lockwashers (G).
5. Remove fixed armor (C).



Go on to Sheet 2

TA251531

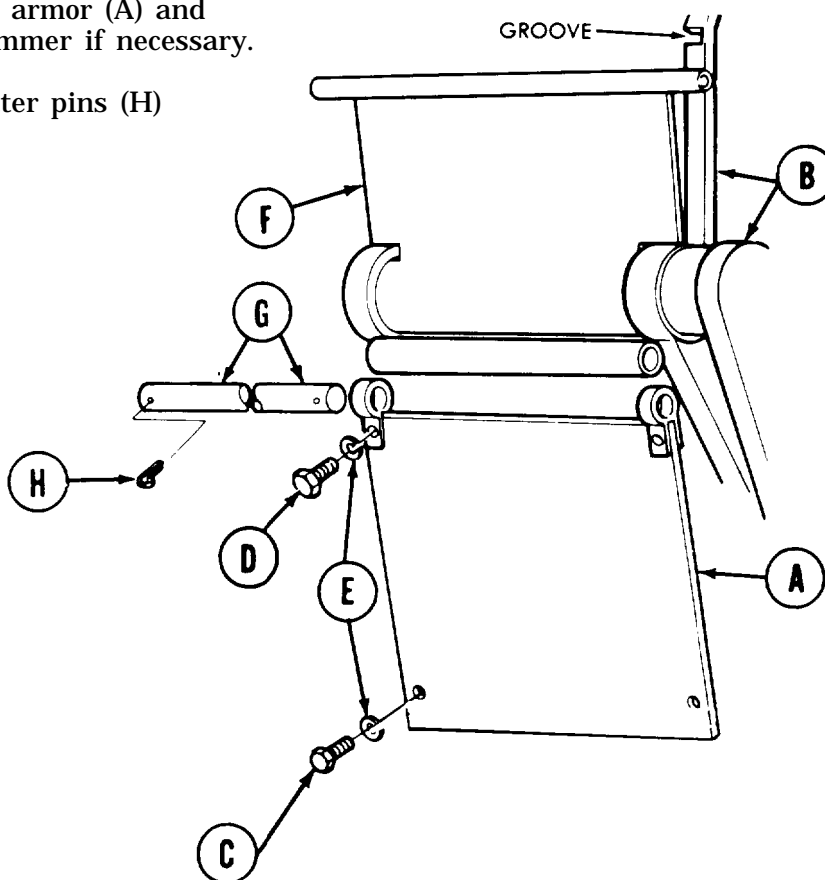
FRONT FIXED AND MOVEABLE HOSE ARMOR REPLACEMENT (Sheet 2 of 2)

INSTALLATION:

NOTE

Have second technician hold armor in alignment during step 3.

1. Have second technician hold fixed armor (A) in place on boom and outrigger assembly (B), with holes alined.
2. Manually install two screws (C) two screws (D) and four lockwashers (E).
3. Position moveable armor (F) with bar in grooves of boom and outrigger assembly (E). Slide moveable armor down grooves until alined with fixed armor (A).
4. Using socket, tighten two screws (C) and two screws (D).
5. Insert pin (G) through fixed armor (A) and movable armor (F). Use hammer if necessary.
6. Using pliers, install two cotter pins (H) through holes in pin



End of Task

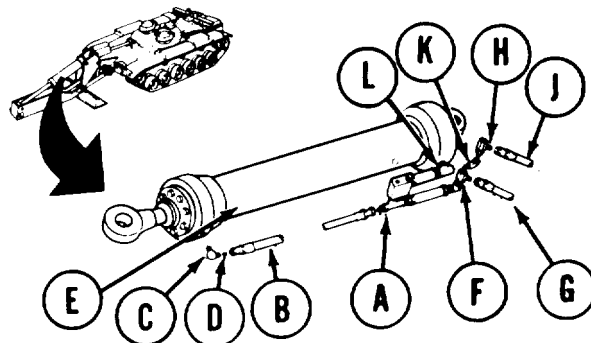
TA251532

**TONGUE CYLINDER HOSE ASSEMBLIES REPLACEMENT (CH, CK1, AND CK2) (Sheet 1 of 4)**  
**PROCEDURE INDEX**

PROCEDURE	PAGE
Removal	3-135
Installation	3-137

**TOOLS:** 1-1/8 in. open end wrench  
 9/16 in. socket with 1/2 in. drive  
 10 in. extension with 1/2 in. drive  
 1-1/4 in. open end wrench (2)  
 12 in. adjustable wrench (2)  
 3/4 in. socket with 1/2 in. drive  
 Ratchet with 1/2 in. drive  
 15 in. adjustable wrench

**SUPPLIES:** Pipe tape (Item 19, Appendix D)  
 Drip pans (suitable containers)  
 Rags (Item 12, Appendix D)  
 Masking tape (Item 18, Appendix D)  
 Pencil (Item 22, Appendix D)  
 Protective caps and plugs  
 Preformed packings  
 Lockwashers (10 required)



**REFERENCE:** LO 5-5420-202-12

**PRELIMINARY PROCEDURES:** Remove tongue cylinder armor (page 3-232)  
 Relieve hydraulic pressure (page 3-71)

**REMOVAL:**

**NOTE**

**Use rags and drip pans to catch excess hydraulic fluid. Use masking tape to tag lines for installation. Cap or plug all lines and fittings as they are disconnected.**

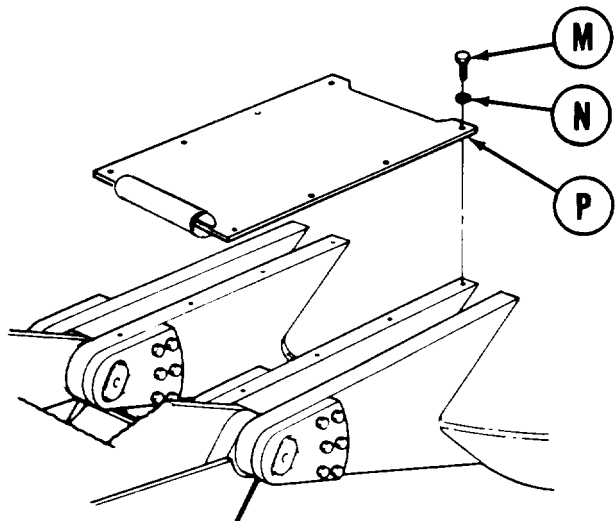
1. Holding adapter (A) with 1-1/8 inch wrench, use 1-1/4 inch wrench to disconnect hose assembly "CH" (B) from adapter (A).
2. Holding elbow (C) with 12 inch adjustable wrench, use 1-1/4 inch wrench to remove hose assembly "CH" (B) and collar "CH" (D) from elbow (C).
3. Using 12 inch adjustable wrench, remove elbow (C) from tongue cylinder (E).
4. Holding elbow (F) with 15 inch adjustable wrench, use 1-1/4 inch wrench to remove hose assembly "CK2" (G) from elbow (F).
5. Holding elbow (H) with 15 inch adjustable wrench, use 1-1/4 inch wrench to remove hose assembly "CK1" (J) from elbow (H).
6. Holding elbow (K) with 12 inch adjustable wrench, use 15 inch adjustable wrench to remove elbow (H) from elbow (K).
7. Using 12 inch adjustable wrench, remove elbow (K) from tee (L).

Go on to Sheet 2

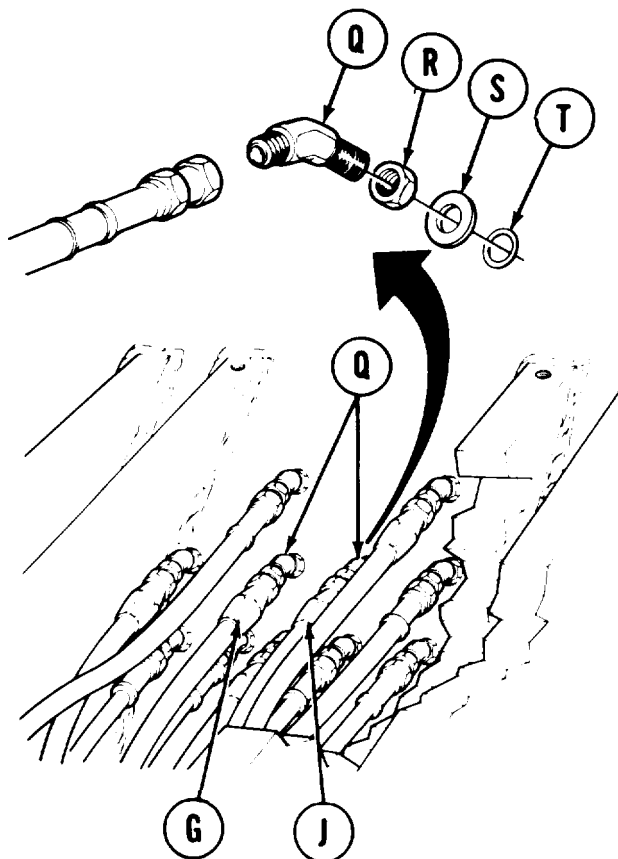
TA251533

TONGUE CYLINDER HOSE ASSEMBLIES REPLACEMENT (CH, CK1, AND CK2) (Sheet 2 of 4)

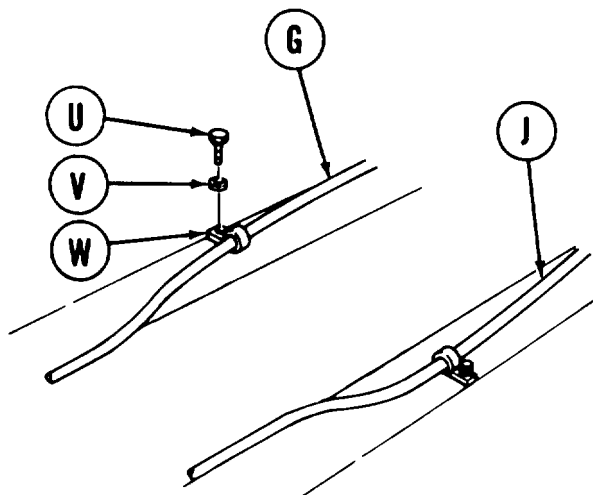
8. Using 9/16 inch socket, remove eight screws (M) and lockwashers (N).



9. Manually remove boom mount hose armor (P) from vehicle.



10. Holding two elbows (Q) with 12 inch adjustable wrench, use 1-1/4 inch wrench to disconnect hose assemblies "CK1" (J) and "CK2" (G) from elbows (Q).



11. Using 12 inch adjustable wrench to hold two elbows (Q), use 1-1/4 inch wrench to loosen elbow nut (R).

12. Manually remove two elbow nuts (R), flat washers (S) and packings (T) from elbows (Q). Throw packings (T) away.

13. Using 3/4 inch socket and extension, remove two screws (U) and lockwashers (V).

14. Manually remove two clamps (W).

15. Remove two hose assemblies (G) and (J) from vehicle.

Go on to Sheet 3

TA251534

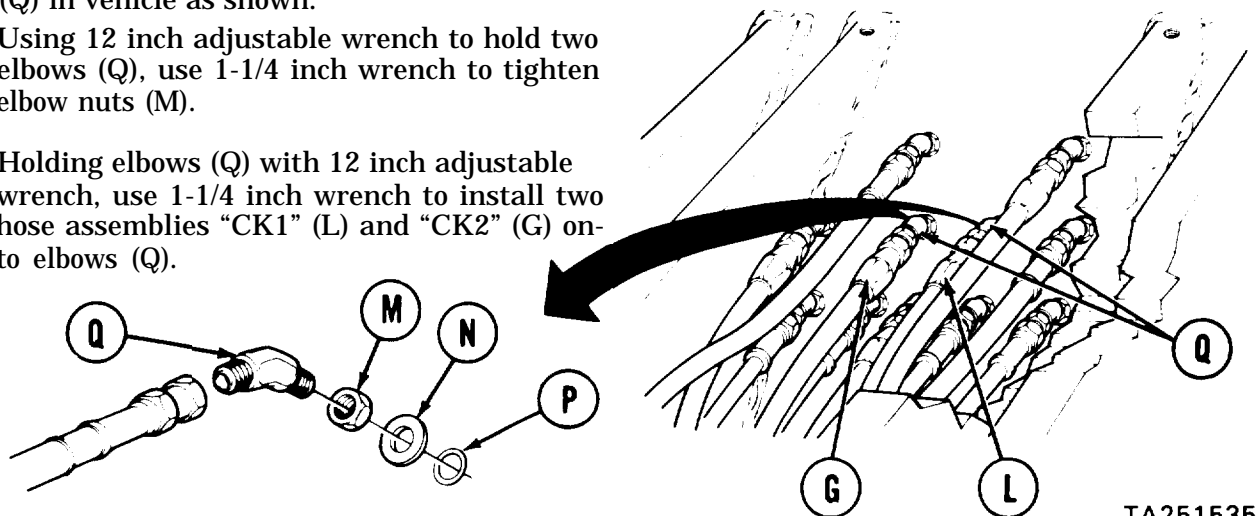
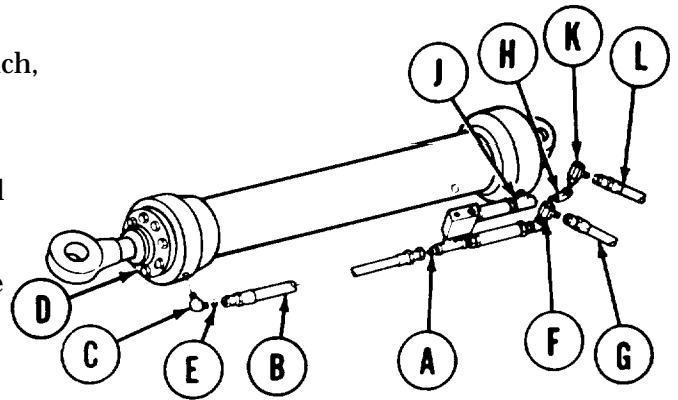
TONGUE CYLINDER HOSE ASSEMBLIES REPLACEMENT (CH, CK1, AND CK2) (Sheet 3 of 4)

INSTALLATION:

NOTE

Remove all caps and plugs as necessary during installation. Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

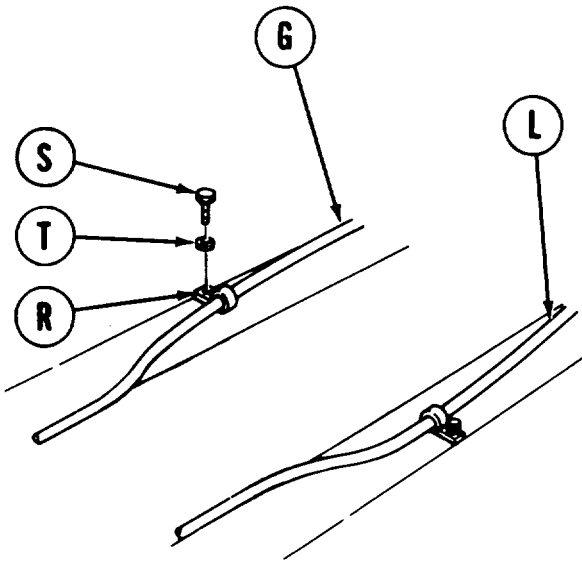
1. Holding adapter (A) with 1-1/8 inch wrench, use 1-1/4 inch wrench to install hose assembly "CH" (B) on adapter (A).
2. Using 12 inch adjustable wrench, install elbow (C) in tongue cylinder (D).
3. Holding elbow (C) with 12 inch adjustable wrench, use 1-1/4 inch wrench to install hose assembly "CH" (B) and collar (E) in elbow (C).
4. Holding elbow (F) with 15 inch adjustable wrench, use 1-1/4 inch wrench to install hose assembly "CK2" (G) on elbow (F).
5. Using 12 inch adjustable wrench, install elbow (H) in tee (J).
6. Holding elbow (H) with 12 inch adjustable wrench, use 15 inch adjustable wrench to install elbow (K) into elbow (H).
7. Holding elbow (K) with 15 inch adjustable wrench, use 1-1/4 inch wrench to install hose assembly "CK1" (L) on elbow (K).
8. Install nuts (M), flat washers (N) and new preformed packings (P) on elbows (Q).
9. Manually install two elbow assemblies (Q) in vehicle as shown.
10. Using 12 inch adjustable wrench to hold two elbows (Q), use 1-1/4 inch wrench to tighten elbow nuts (M).
11. Holding elbows (Q) with 12 inch adjustable wrench, use 1-1/4 inch wrench to install two hose assemblies "CK1" (L) and "CK2" (G) onto elbows (Q).



Go on to Sheet 4

TA251535

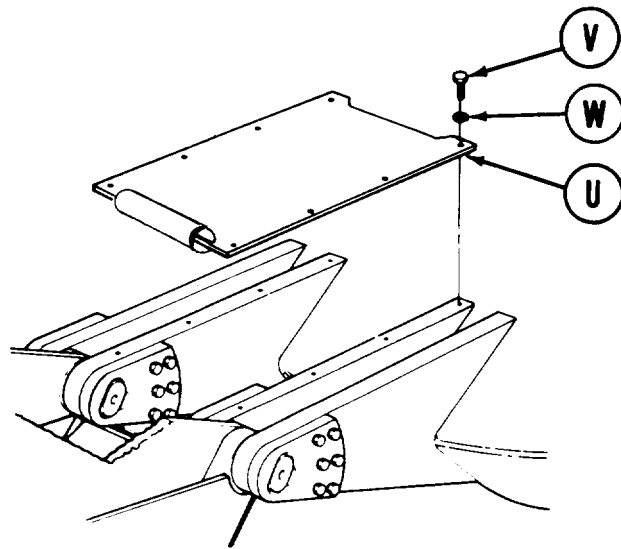
TONGUE CYLINDER HOSE ASSEMBLIES REPLACEMENT (CH, CK1, AND CK2) (Sheet 4 of 4)



12. Position two hose assemblies (G) and (L) as shown.
13. Place two clamps (R) in position.
14. Using 3/4 inch socket with extension, install two screws (S) and lockwashers (T).
15. Bleed hydraulic system (page 3-72).
16. Check for hydraulic leaks and correct as necessary.
17. Service hydraulic reservoir. (LO 5-5420-202-12).

18. Place boom mount hose armor (U) in position.
19. Using 9/16 inch socket, install eight screws (V) and lockwashers (W).
20. Install tongue cylinder armor (page 3-233).

End of Task





**SCISSORS CYLINDER HOSE ASSEMBLIES (CF1, CF2, CG, CI, AND CJ) AND HYDRAULICS REPLACEMENT (Sheet 1 of 12)**

**PROCEDURE INDEX**

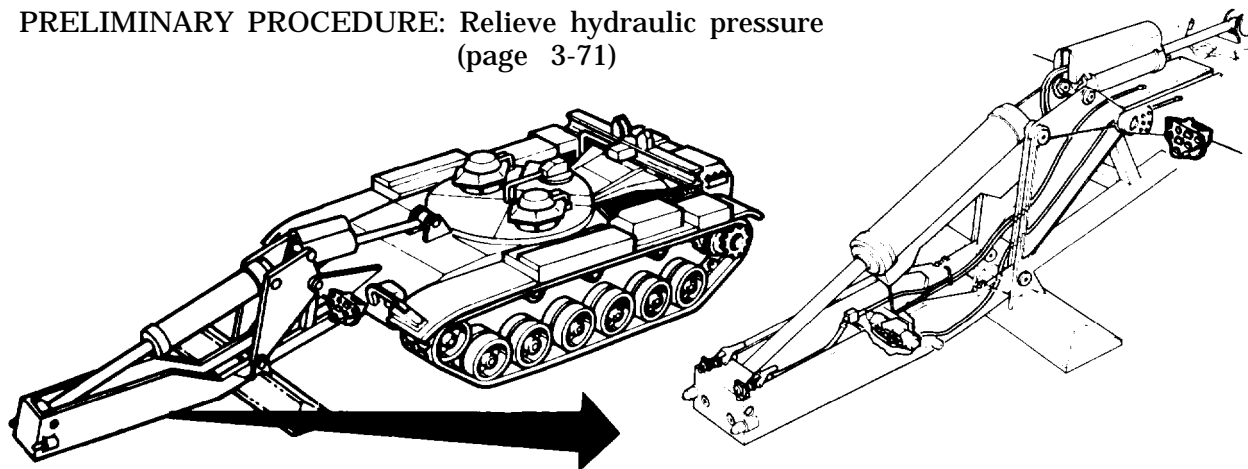
PROCEDURE	PAGE
Removal	3-139
Installation	3-145

- TOOLS:** 12 in. adjustable wrench (2)      9/16 in. socket with 1/2 in. drive  
 1-1/4 in. open end wrench (2)      Hammer  
 1/2 in. socket with 1/2 in. drive      Pliers, long round nose  
 Ratchet with 1/2 in. drive  
 3/8 in. socket with 1/2 in. drive  
 14 in. pipe wrench  
 Vise  
 1-5/16 in. open end wrench  
 1-1/8 in. open end wrench  
 1-3/8 in. open end wrench  
 15 in. adjustable wrench

- SUPPLIES:** Pipe tape (Item 19, Appendix D)      Lockwashers (2 required)  
 Masking tape (Item 18, Appendix D)      Preformed packings (2 required)  
 Pencil (Item 22, Appendix D)      Cotter pins (4 required)  
 Rags (Item 12, Appendix D)  
 Drip pans (suitable containers)  
 Protective caps and plugs

**REFERENCES:** LO 5-5420-202-12

**PRELIMINARY PROCEDURE:** Relieve hydraulic pressure (page 3-71)



**NOTE**

Use rags and drip pans to catch excess hydraulic fluid. Use masking tape to tag lines for installation. Cap or plug all lines and fittings as they are disconnected.

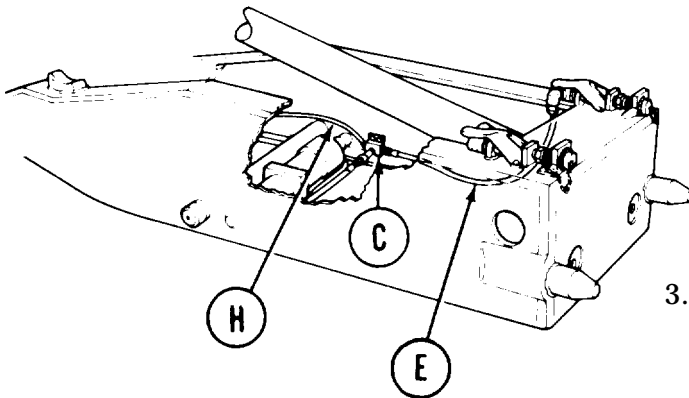
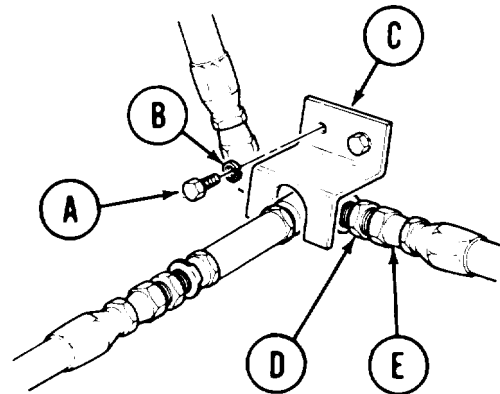
Go on to Sheet 2

TA251537

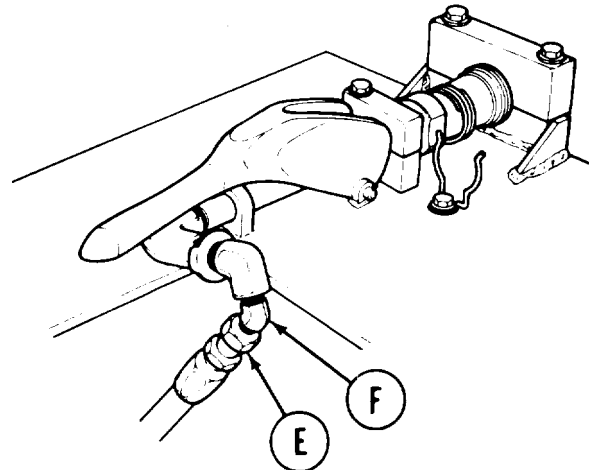
SCISSORS CYLINDER HOSE ASSEMBLIES (CF1, CF2, CG, CI, AND CJ) AND HYDRAULICS REPLACEMENT (Sheet 2 of 12)

REMOVAL:

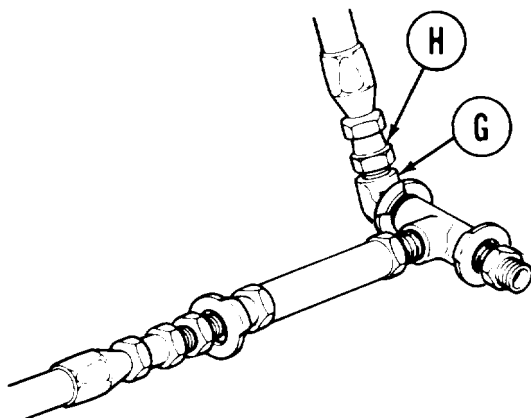
1. Using 9/16 inch socket, remove two screws (A) and lockwashers (B).
2. Remove bracket (C).



3. Holding adapter (D) with 1-1/8 inch wrench, use 1-1/4 inch wrench to disconnect hose assembly "CF1" (E) from adapter (D).



4. Holding elbow (F) with 12 inch adjustable wrench, use 1-1/4 inch wrench to remove hose assembly "CF1" (E) from elbow (F).



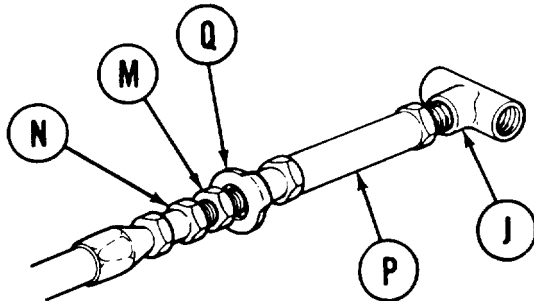
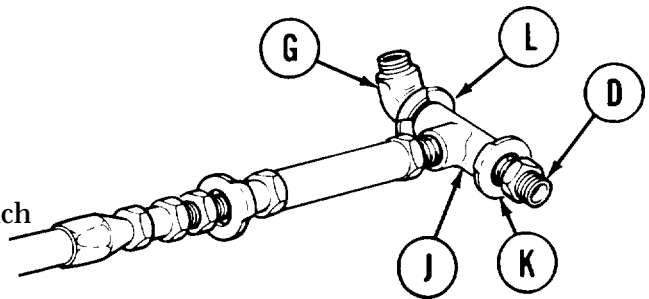
5. Holding elbow (G) with 12 inch adjustable wrench, use 1-1/4 inch wrench to disconnect hose assembly "C1" (H) from elbow (G).

Go on to Sheet 3

TA251538

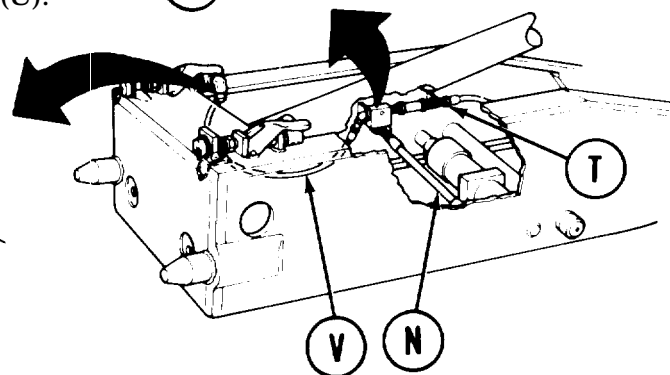
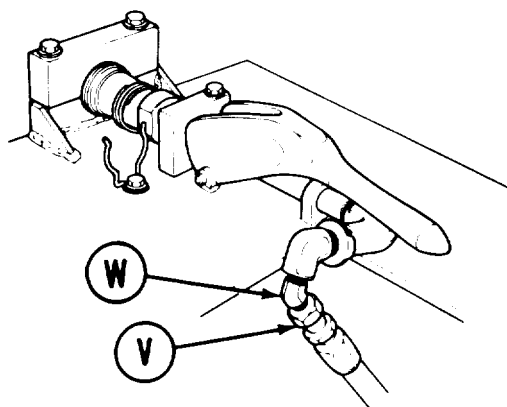
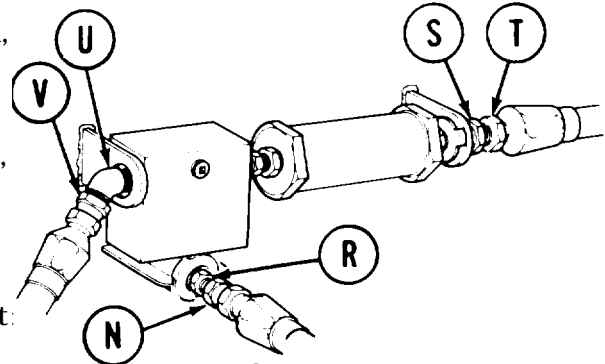
**SCISSORS CYLINDER HOSE ASSEMBLIES (CF1, CF2, CG, CI, AND CJ) AND HYDRAULICS REPLACEMENT (Sheet 3 of 12)**

6. Holding tee (J) with 12 inch adjustable wrench, use 1-1/8 inch wrench to remove adapter (D) and collar "CF1" (K) from tee (J).
7. Holding tee (J) with 12 inch adjustable wrench, use other 12 inch adjustable wrench to remove elbow (G) and collar "CI" (L).



8. Holding adapter (M) with 1-1/8 inch wrench, use 1-1/4 inch wrench to disconnect hose assembly "CG" (N) from adapter (M).
9. Holding check valve "CV7" (P) with 15 inch adjustable wrench, use 1-1/8 inch wrench to remove adapter (M) and collar "CG" (Q) from check valve (P).
10. Holding tee (J) with 12 inch adjustable wrench, use 15 inch adjustable wrench to remove check valve "CV7" (P) from tee (J).

11. Holding adapter (R) with 1-1/8 inch wrench, use 1-1/4 inch wrench to remove hose assembly "CG" (N) from adapter (R).
12. Holding adapter (S) with 1-1/8 inch wrench, use 1-1/4 inch wrench to disconnect hose assembly "CJ" (T) from adapter (S).
13. Holding elbow (U) with 12 inch adjustable wrench, use 1-1/4 inch wrench to disconnect hose assembly "CF2" (V) from elbow (U).



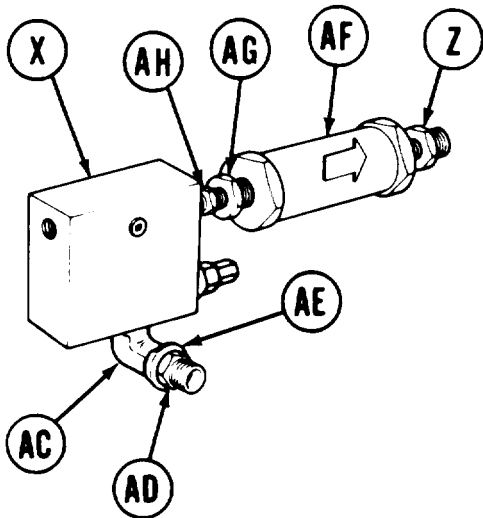
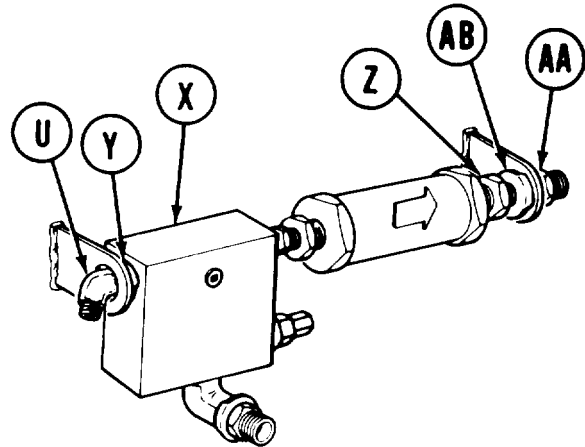
14. Holding elbow (W) with 12 inch adjustable wrench, use 1-1/4 inch wrench to remove hose assembly "CF2" (V) from elbow (W).

Go on to Sheet 4

TA251539

SCISSORS CYLINDER HOSE ASSEMBLIES (CF1, CF2, CG, CI, AND CJ) AND HYDRAULICS REPLACEMENT (Sheet 4 of 12)

15. Holding relief valve "RV8" (X) with 15 inch adjustable wrench, use 12 inch adjustable wrench to remove elbow (U) and collar "CF2" (Y) from relief valve (X).
16. Holding bushing (Z) with 1-3/8 inch wrench, use 1-1/8 inch wrench to remove adapter (AA) and collar "CJ" (AB) from bushing (Z).
17. Remove relief valve "RV8" (X) and attached parts from brackets and place in vise.



18. Holding elbow (AC) with 12 inch adjustable wrench, use 1-1/8 inch wrench to remove adapter (AD) and collar "CG" (AE) from elbow (AC).
19. Using 12 inch adjustable wrench, remove elbow (AC) from relief valve (X).
20. Holding flow regulator "PCV3" (AF) with 15 inch adjustable wrench, use 1-3/8 inch wrench to remove bushing (Z) from flow regulator (AF).
21. Holding bushing (AG) with 1-3/8 inch wrench, use 15 inch adjustable wrench to remove flow regulator "PCV3" (AF) from bushing (AG).
22. Holding nipple (AH) with 1-1/8 inch wrench, use 1-3/8 inch wrench to remove bushing (AG) from nipple (AH).

23. Using 1-1/8 inch wrench, remove nipple (AH) from relief valve (X).
24. Remove relief valve "RV8" (X) from vise.

Go on to Sheet 5

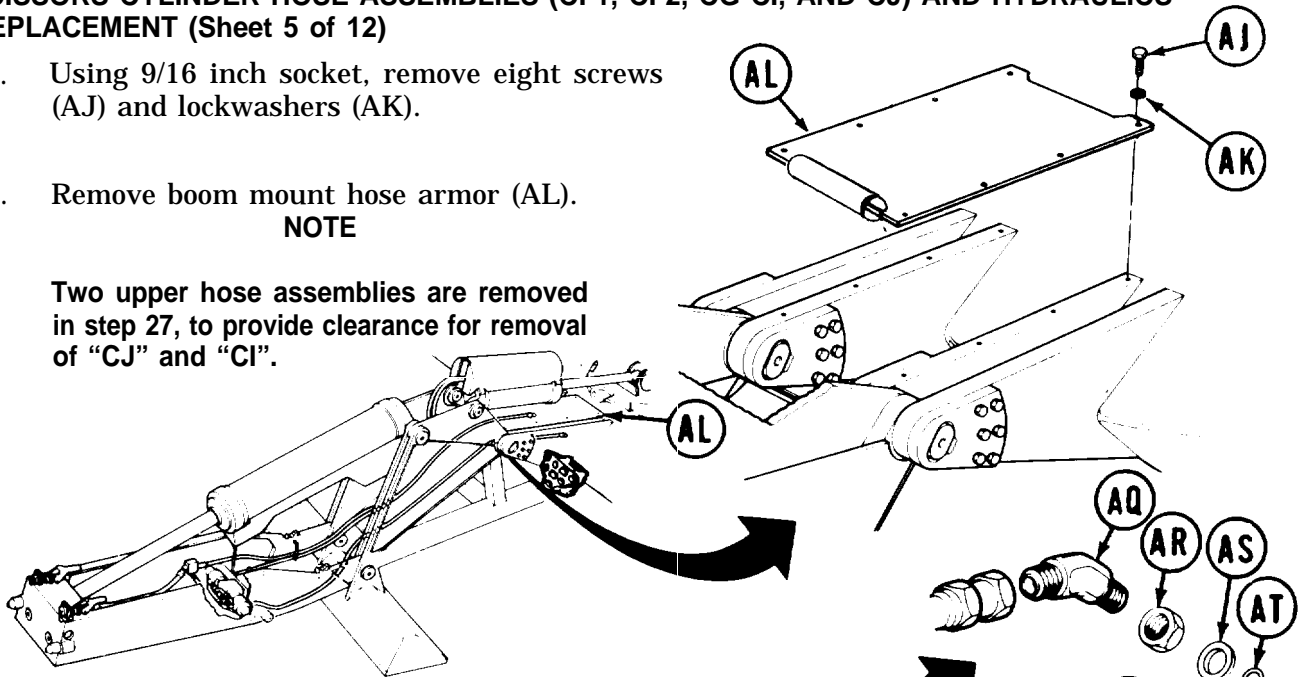
TA251540

**SCISSORS CYLINDER HOSE ASSEMBLIES (CF1, CF2, CG CI, AND CJ) AND HYDRAULICS REPLACEMENT (Sheet 5 of 12)**

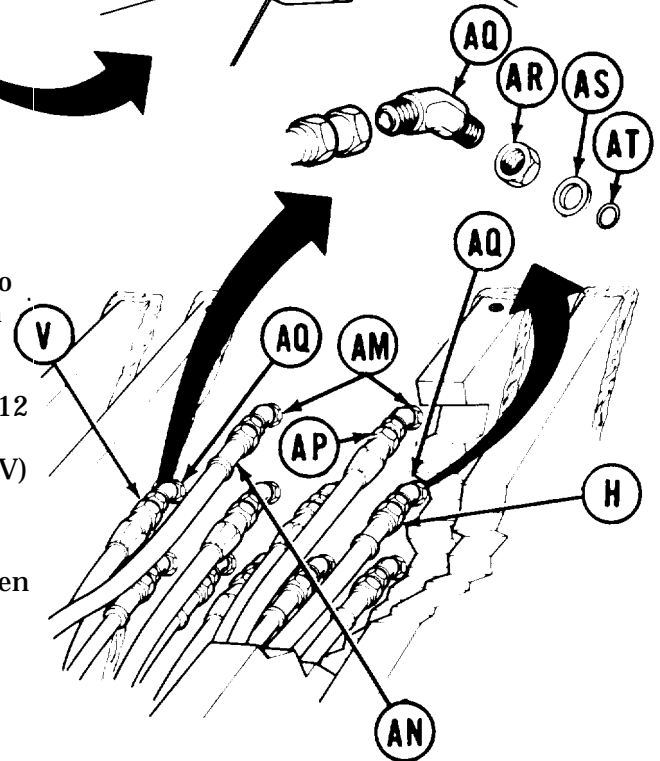
25. Using 9/16 inch socket, remove eight screws (AJ) and lockwashers (AK).
26. Remove boom mount hose armor (AL).

**NOTE**

Two upper hose assemblies are removed in step 27, to provide clearance for removal of "CJ" and "CI".

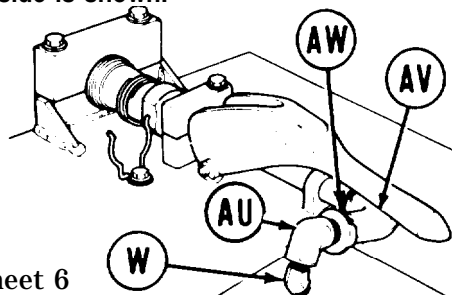


27. Holding two elbows (AM) with 12 inch adjustable wrench, use 1-1/4 inch wrench to remove hose assemblies (AN) and (AP) from two elbows (AM).
28. Holding two elbow assemblies (AQ) with 12 inch adjustable wrench, use 1-1/4 inch wrench to remove hose assemblies "CJ" (V) and "CI" (H) from elbows (AQ).
29. Using 12 inch adjustable wrench on two elbows (A Q), use 1-1/4 inch wrench to loosen elbow nuts (AR).
30. Using 12 inch adjustable wrench, remove elbows (AQ), elbow nuts (AR), flat washers (AS) and preformed packings (AT). Throw away preformed packings (AT).



**NOTE**

Procedure for removal of right side components and left side components is identical. Right side is shown.



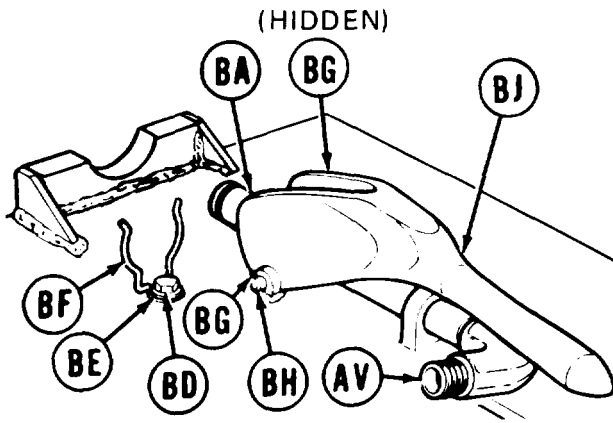
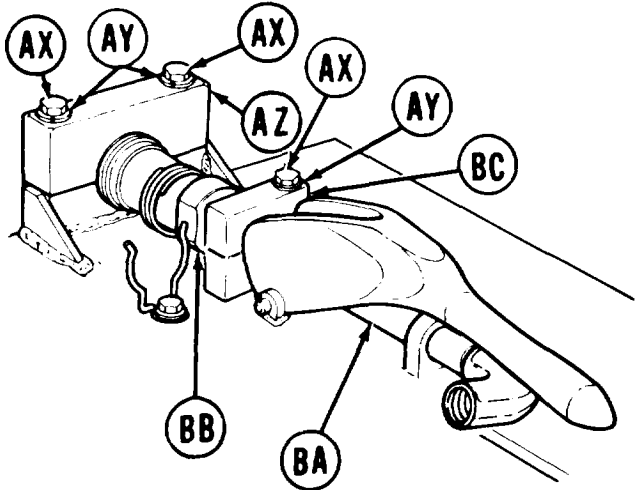
31. Holding elbow (AU) with 12 inch adjustable wrench, use 12 inch adjustable wrench to remove elbow (W) from elbow (AU).
32. Holding elbow (AV) with 12 inch adjustable wrench, use 12 inch adjustable wrench to remove elbow (AU) and collar "CF2" (AW) from elbow (AV).

Go on to Sheet 6

TA251541

SCISSORS CYLINDER HOSE ASSEMBLIES (CF1, CF2, CG, CI, AND CJ) AND HYDRAULICS REPLACEMENT (Sheet 6 of 12)

33. Using 1/2 inch socket, remove three screws (AX) and lockwashers (AY) from clamp (AZ).
34. Remove clamp (AZ) from vehicle.
35. Holding nipple (BA) with pipe wrench, use 1-5/16 inch wrench to remove quick disconnect socket (BB).
36. Remove clamp (BC) from nipple (BA).



37. Manually remove nipple (BA) with elbow (AV) from vehicle.
38. Holding nipple (BA) with pipe wrench, use 12 inch adjustable wrench to remove elbow (AV).
39. Using 3/8 inch socket, remove screw (BD) and lockwasher (BE).

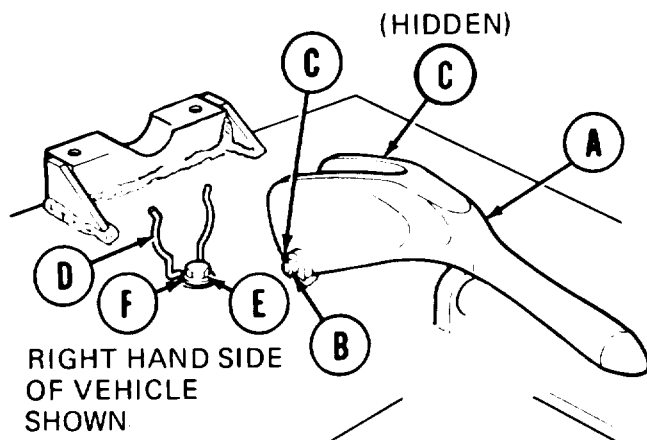
40. Manually remove spring retainer (BF) from vehicle.
41. Using long round nose pliers, remove two cotter pins (BG) from pins (BH).
42. Using hammer, tap out pin (BH) while holding handle (BJ).
43. Manually remove handle (BJ) from vehicle.
44. Repeat steps 31 through 43 for left side.

**SCISSORS CYLINDER HOSE ASSEMBLIES (CF1, CF2, CG, CI, AND CJ) AND HYDRAULICS REPLACEMENT (Sheet 7 of 12)**

**INSTALLATION:**

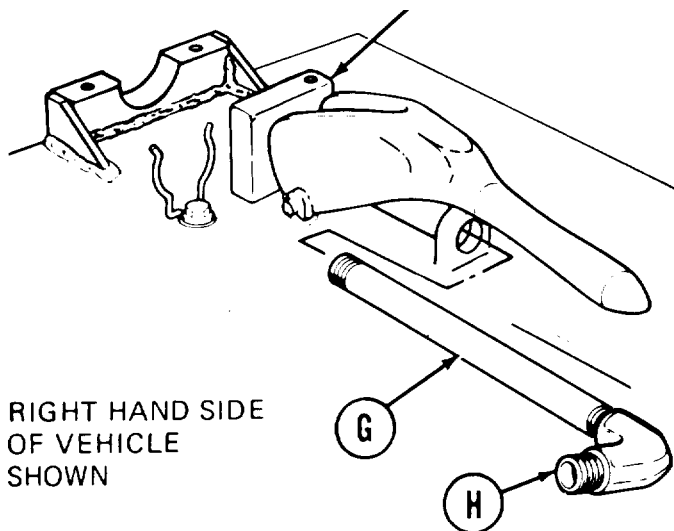
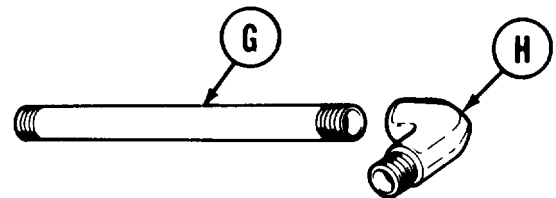
**NOTE**

- Remove all caps and plugs as necessary during installation. Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.
- Procedure for installation of right side components and left side components is identical. Right side shown.



1. Place handle (A) in position.
2. Using hammer, tap pin (B) into position.
3. Using long round nose pliers, install two cotter pins (C) to secure pin (B).
4. Place spring retainer (D) into position.

5. Using 3/8 inch socket, install screw (E) and lockwasher (F) securing spring retainer (D).
6. Holding nipple (G) with pipe wrench, use 12 inch adjustable wrench to install elbow (H).



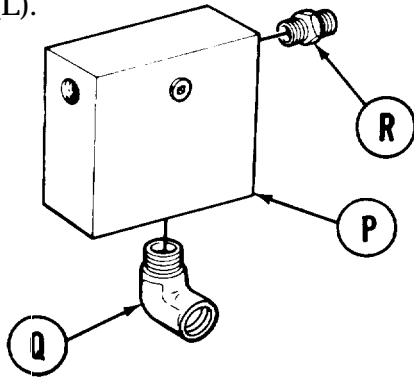
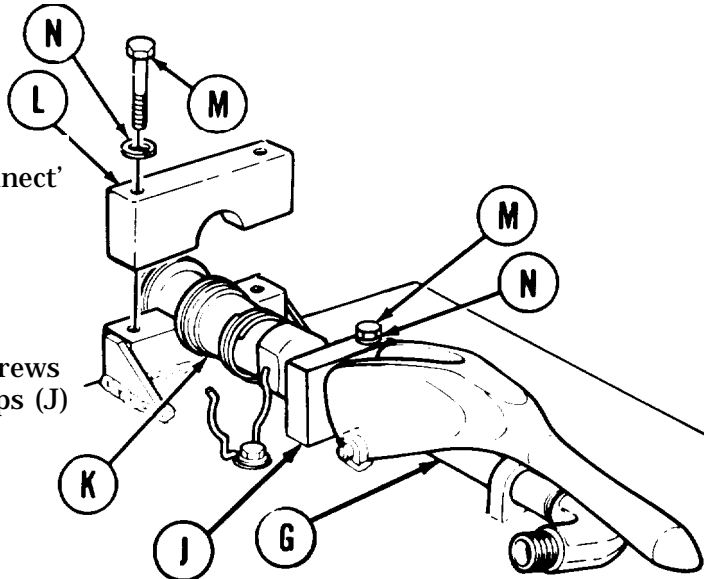
7. Manually install nipple (G) with elbow (H) in position.
8. Manually install clamp (J) in position on nipple (G).

Go on to Sheet 8

TA251543

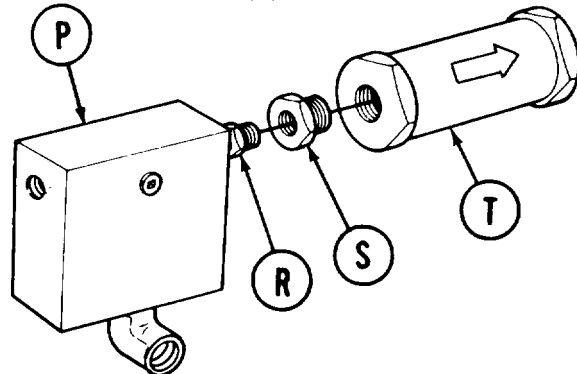
SCISSORS CYLINDER HOSE ASSEMBLIES (CF1, CF2, CG, CI, AND CJ) AND HYDRAULICS REPLACEMENT (Sheet 8 of 12)

9. Holding nipple (G) with pipe wrench, use 1-5/16 inch wrench to install quick disconnect socket (K) to nipple (G).
10. Place clamp (L) in position over quick disconnect socket (K).
11. Using 1/2 inch socket, install three screws (M) and lockwashers (N) securing clamps (J) and (L).



12. Place relief valve "RV8" (P) in vise.
13. Using 12 inch adjustable wrench, install elbow (Q) into relief valve (P).
14. Using 1-1/8 inch wrench, install nipple (R) into relief valve (P).

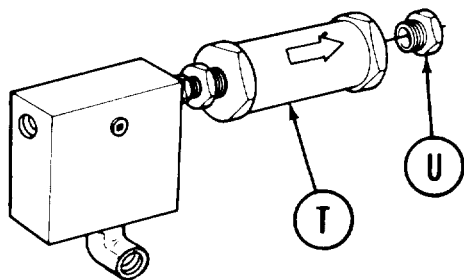
15. Holding nipple (R) with 1-1/8 inch wrench, use 1-3/8 inch wrench to install bushing (S) onto nipple (R).



**NOTE**

Install regulator "PCV3" (T) with flow arrow pointing away from relief valve (P).

16. Holding bushing (S) with 1-3/8 inch wrench, use 15 inch adjustable wrench to install regulator "PCV3" (T) onto bushing (S).



17. Holding regulator "PCV3" (T) with 15 inch adjustable wrench, use 1-3/8 inch wrench to install bushing (U) into regulator (T).

Go on to Sheet 9

TA251544

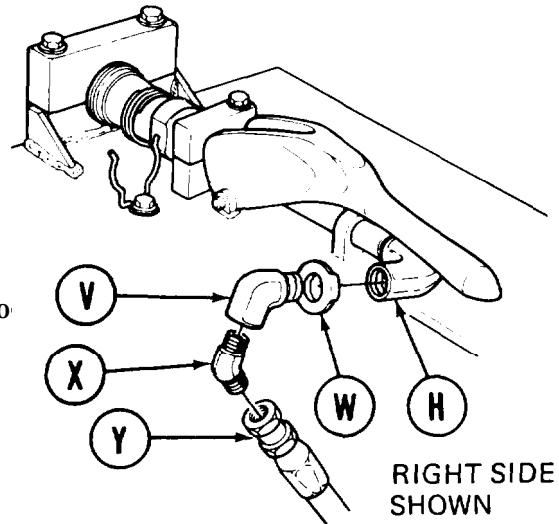


**SCISSORS CYLINDER HOSE ASSEMBLIES (CF1, CF2, CG, CI, AND CJ) AND HYDRAULICS REPLACEMENT (Sheet 9 of 12)**

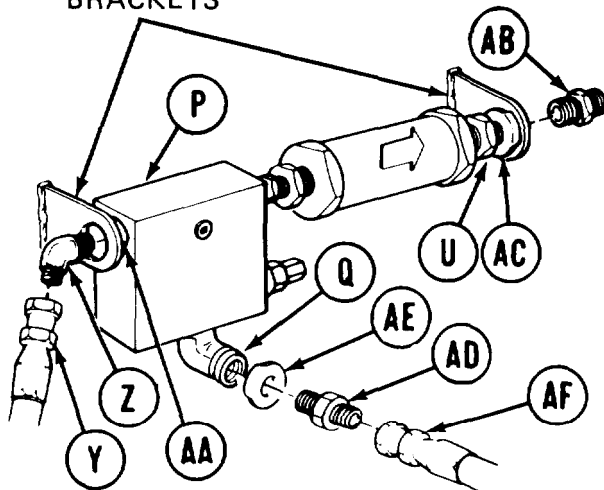
**NOTE**

Collar marked "CF1" goes on left side. Collar marked "CF2" goes on right side.

18. Holding elbow (H) with 12 inch adjustable wrench, use other 12 inch adjustable wrench to install elbow (V) and collar "CF2" (W).
19. Holding elbow (V) with 12 inch adjustable wrench, use other 12 inch adjustable wrench to install elbow (X).
20. Repeat steps 1 through 19 for left side.
21. Holding elbow (X) with 12 inch adjustable wrench, use 1-1/4 inch wrench to install hose assemblies "CF2" (Y) on elbow (X).



**MOUNTING BRACKETS**



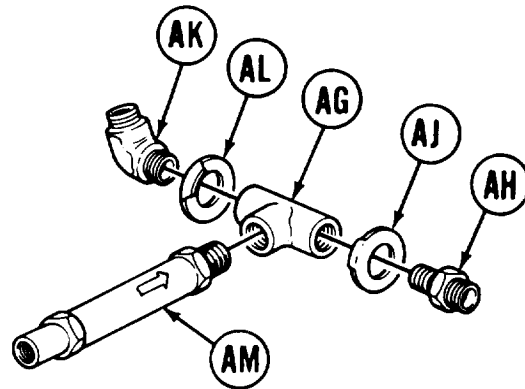
22. Manually position relief valve "RV8" (P) and attached parts between mounting brackets.
23. Manually install elbow (Z) and collar "CF2" (AA), in relief valve (P).
24. Install adapter (AB) and collar "CJ" (AC) in bushing (U).
25. Holding relief valve "RV8" (P) with 15 inch adjustable wrench, use 12 inch adjustable wrench to tighten elbow (Z).
26. Holding bushing (U) with 1-3/8 inch wrench, use 1-1/8 inch wrench to tighten adapter (AB).
27. Holding elbow (Z) with 12 inch adjustable wrench, use 1-1/4 inch wrench to install hose assembly "CF2" (Y) on elbow (Z).
28. Holding elbow (Q) with 12 inch adjustable wrench, use 1-1/8 inch wrench to install adapter (AD) and collar "CG" (AE) onto elbow (Q).
29. Holding adapter (AD) with 1-1/8 inch wrench, use 1-1/4 inch wrench to install hose assembly "CG" (AF) on adapter (AD).

Go on to Sheet 10

TA251545

SCISSORS CYLINDER HOSE ASSEMBLIES (CF1, CF2, CG, CI, AND CJ) AND HYDRAULICS REPLACEMENT (Sheet 10 of 12)

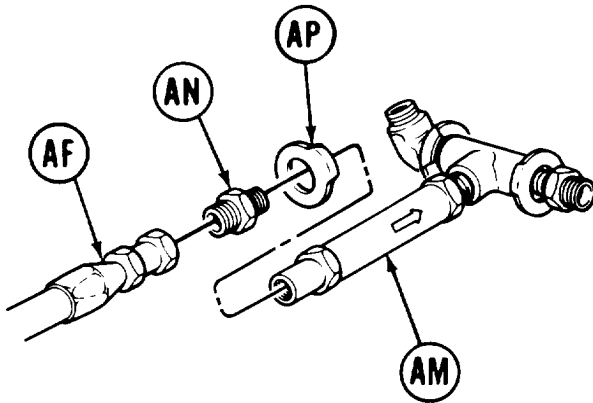
30. Holding tee (AG) with 12 inch adjustable wrench, use 1-1/8 inch wrench to install adapter (AH) and collar "CF1" (AJ) onto tee (AG).
31. Holding tee (AG) with 12 inch adjustable wrench, use 12 inch adjustable wrench to install elbow (AK) and collar "C1" (AL) onto tee (AG).



NOTE

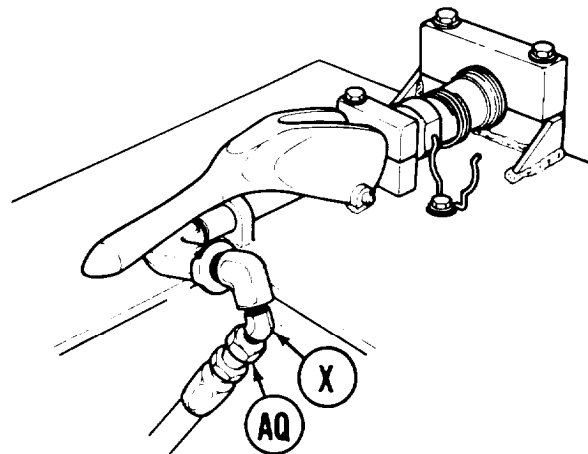
Install check valve "CV7" (AM) so that flow arrow points toward tee (AG).

32. Holding tee (AG) with 12 inch adjustable wrench, use 15 inch adjustable wrench to install check valve "CV7" (AM) into tee (AG).



33. Holding check valve "CV7" (AM) with 15 inch adjustable wrench, use 1-1/8 inch wrench to install adapter (AN) and collar "CG" (AP) into check valve (AM).
34. Holding adapter (AN) with 1-1/8 inch wrench, use 1-1/4 inch wrench to install hose assembly "CG" (AF) onto adapter (AN).

35. Holding elbow (X) with 12 inch adjustable wrench, use 1-1/4 inch wrench to install hose assembly "CF1" (AQ) on elbow (X).



LEFT SIDE SHOWN

**SCISSORS CYLINDER HOSE ASSEMBLIES (CF1, CF2, CG, CI, AND CJ) AND HYDRAULICS REPLACEMENT (Sheet 11 of 12)**

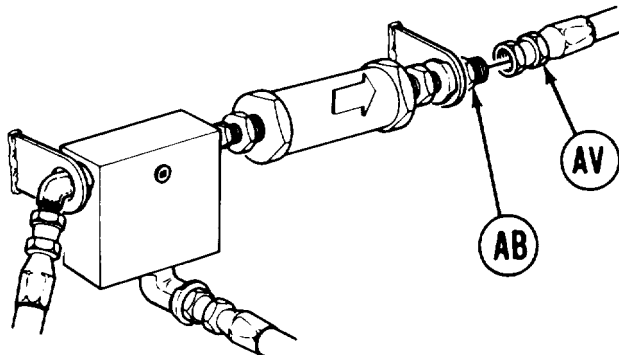
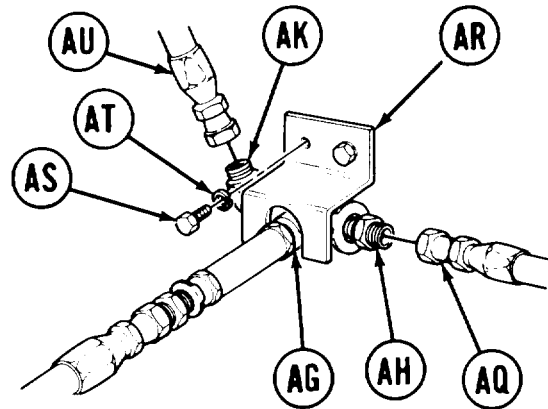
36. Holding adapter (AH) with 1-1/8 inch wrench, use 1-1/4 inch wrench to install hose assembly "CF1" (AQ).

37. Manually position tee (AG).

38. Place bracket (AR) over tee (AG).

39. Using 1/2 inch socket, install two screws (AS) and lockwashers (AT).

40. Holding elbow (AK) with 12 inch adjustable wrench, use 1-1/4 inch wrench to install hose assembly "C1" (AU).



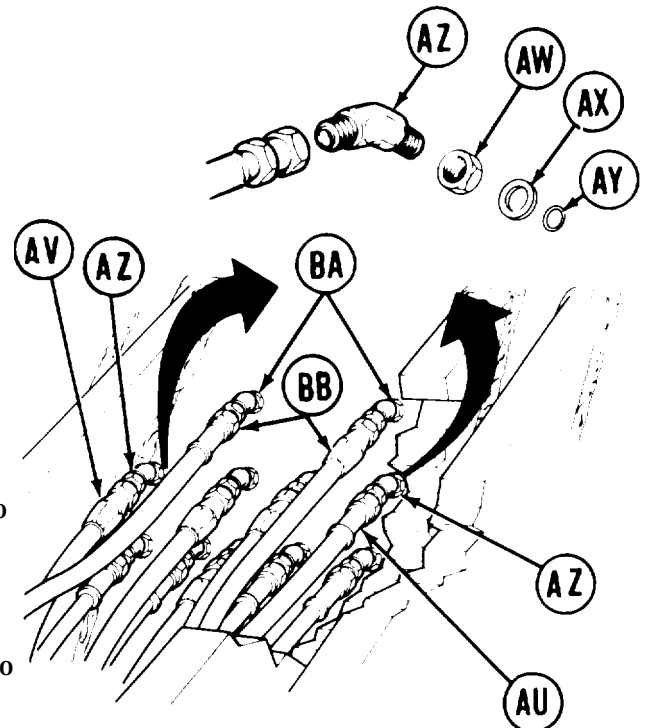
41. Holding adapter (AB) with 1-1/8 inch wrench, use 1-1/4 inch wrench to install hose assembly "CJ" (AV).

42. Manually install nuts (AW), flat washers (AX), packing new preformed Packings (AY) on elbows (AZ).

43. Manually install and position two elbows (AZ) on vehicle.

44. Using 12 inch adjustable wrench to hold two elbows (AZ), use 1-1/4 inch wrench to tighten elbow nuts (AW).

45. Holding two elbows (AZ) with 12 inch adjustable wrench, use 1-1/4 inch wrench to install two hose assemblies "C1" (AU) and "CJ" (AV).



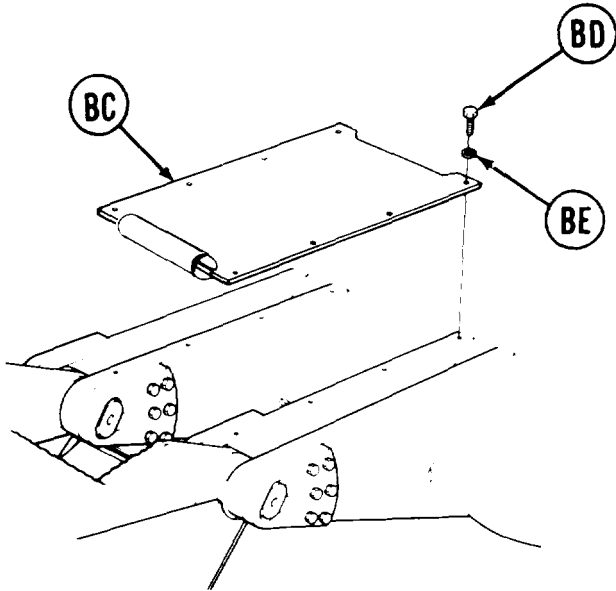
46. Holding two elbows (BA) with 12 inch adjustable wrench, use 1-1/4 inch wrench to install two hose assemblies (BB).

Go on to Sheet 12

TA251547

**SCISSORS CYLINDER HOSE ASSEMBLIES (CF1, CF2, CG, CI, AND CJ) AND HYDRAULICS REPLACEMENT (Sheet 12 of 12)**

47. Bleed hydraulic system (page 3-72)
48. Check for hydraulic leaks and correct as necessary.

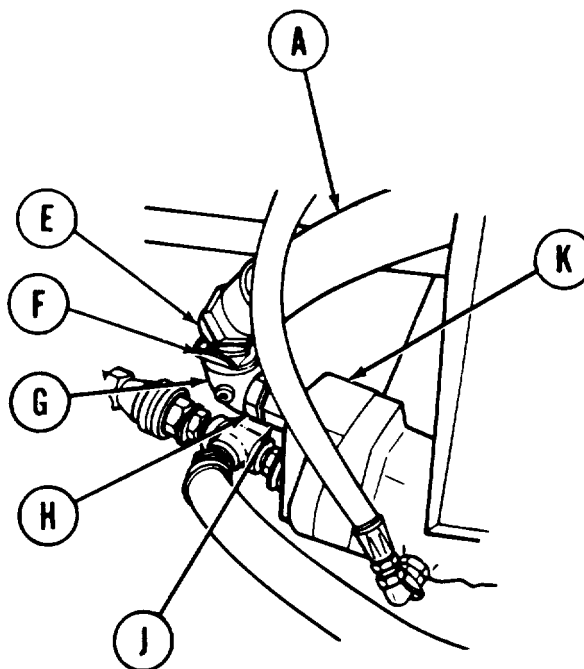


49. Service hydraulic reservoir (LO 5-5420-202-12).
50. Manually place boom mount hose armor (BC) in position.
51. Using 9/16 inch socket, install eight screws (BD) and lockwashers (BE).

End of Task

FILTER-TO-PUMP HOSE ASSEMBLY (CZ) REPLACEMENT (Sheet 2 of 3)

3. Use adjustable wrench to remove hose assembly "CZ" (A) from elbow (E).
4. Using adjustable wrench, remove elbow (E) and collar (F) from elbow (G).
5. Holding bushing (H) with adjustable wrench, use pipe wrench to remove elbow (G) from bushing (H).
6. Using adjustable wrench, remove bushing (H).



NOTE

Nipple (J) may come out with bushing (H). If it does, nipple (J) may be used again.

7. Using pipe wrench, remove nipple (J) from pump (K) and throw nipple (J) away.

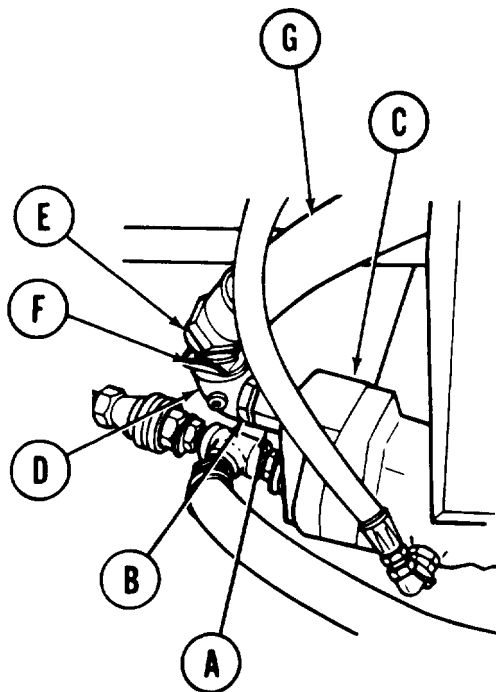
INSTALLATION:

NOTE

. Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

. If nipple (A) was not thrown out during removal, start this procedure at step 2.

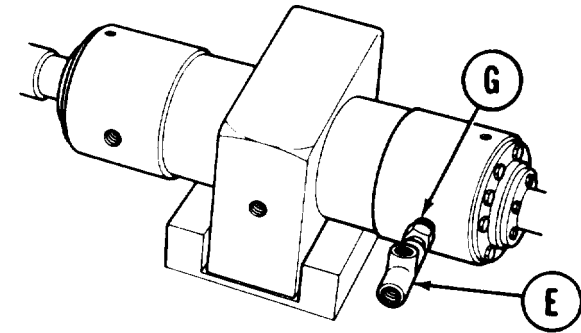
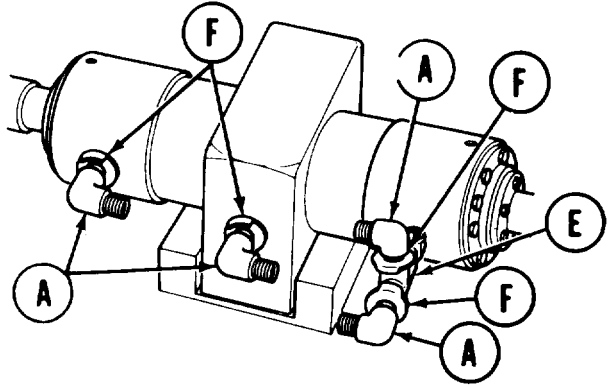
1. Manually install new nipple (A) in bushing (B).
2. Using adjustable wrench, install bushing (B) and nipple (A) in pump (C).
3. Using adjustable wrench to hold bushing (B), use pipe wrench to install elbow (D) on bushing (B).
4. Using adjustable wrench, install elbow (E) and collar (F) on elbow (D).
5. Using adjustable wrench, install hose assembly "CZ" (G) on elbow (E).



Go on to Sheet 3

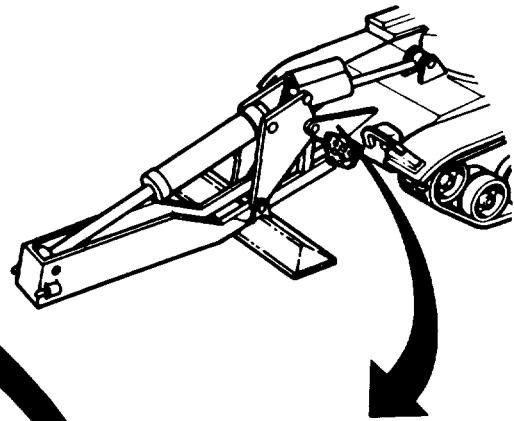
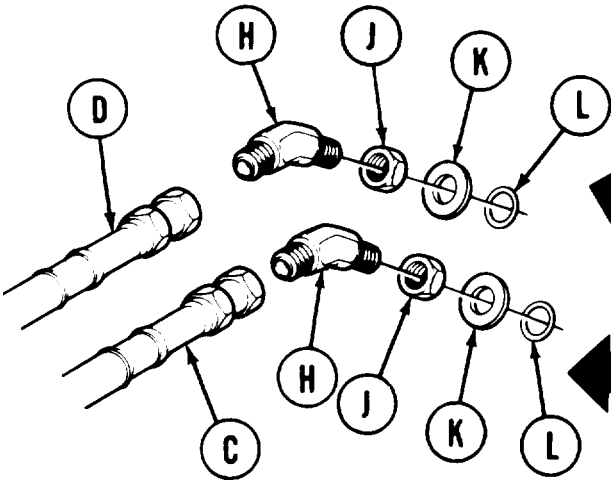
**LOCKING CYLINDER HOSE ASSEMBLIES (CE1, CE2, AND M) AND HYDRAULICS REPLACEMENT  
(Sheet 2 of 4)**

2. Holding tee (E) with adjustable wrench, use adjustable wrench to remove four elbows (A) and four collars (F).

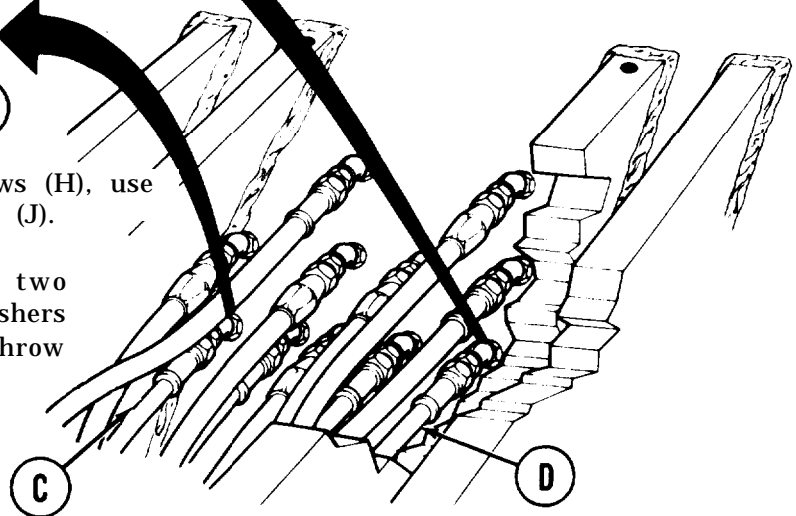


3. Holding nipple (G) with 3/4 inch wrench, use adjustable wrench to remove tee (E).
4. Using 3/4 inch wrench, remove nipple (G).

5. Using 3/4 inch wrench to hold two elbows (H), use 7/8 inch wrench to remove hose assemblies "CE1" (C) and "CE2" (D).



6. Using 3/4 inch wrench to hold elbows (H), use 7/8 inch wrench to loosen elbow nuts (J).
7. Using 3/4 inch wrench, remove two elbows (H), elbow nuts (J), flat washers (K), and preformed packings (L). Throw away preformed packings (L).



Go on to Sheet 3.

TA251550

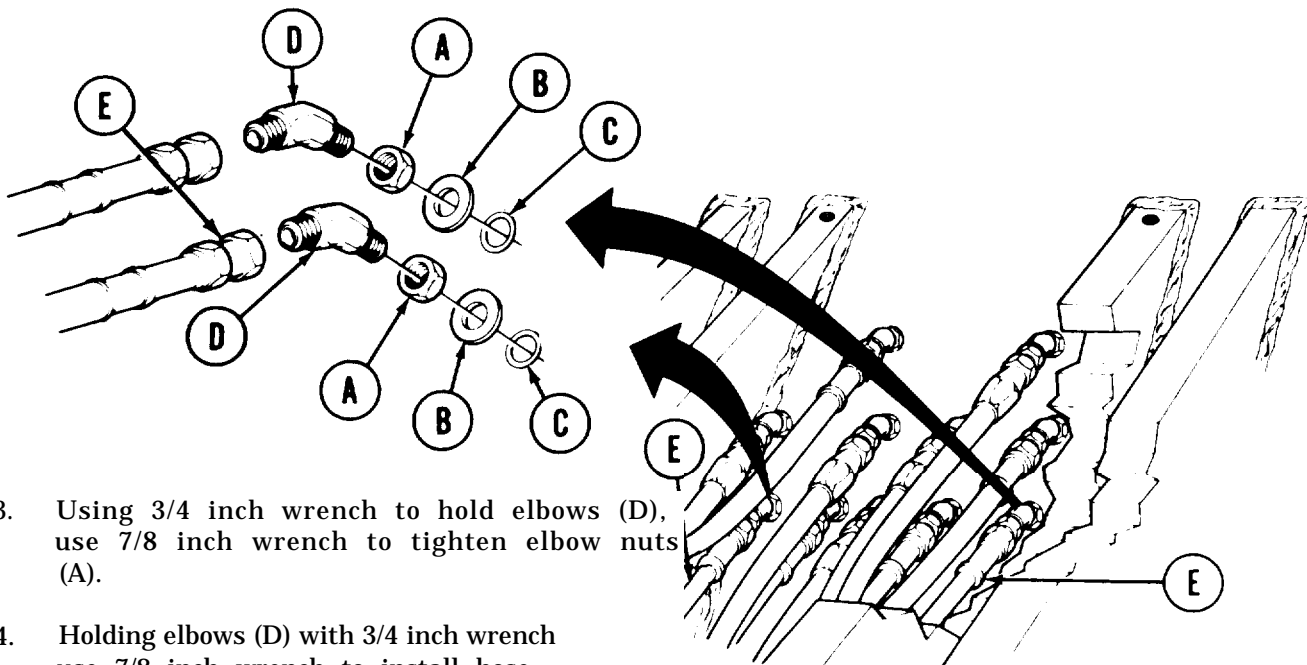
**LOCKING CYLINDER HOSE ASSEMBLIES (CE1, CE2, AND M) AND HYDRAULICS REPLACEMENT (Sheet 3 of 4)**

**INSTALLATION:**

**NOTE**

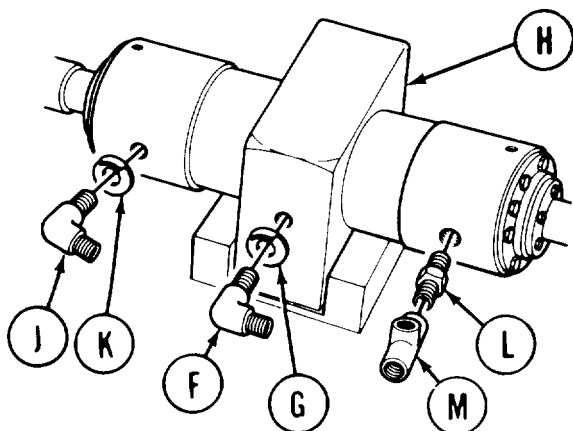
Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

1. Manually install nuts (A), flat washers (B), and new preformed packings (C) on elbows (D).
2. Install and aline two elbows (D) in vehicle as shown.



3. Using 3/4 inch wrench to hold elbows (D), use 7/8 inch wrench to tighten elbow nuts (A).
4. Holding elbows (D) with 3/4 inch wrench use 7/8 inch wrench to install hose assemblies "CE1" and "CE2" (E).

5. Using adjustable wrench, install elbow (F) and collar "CE2" (G) in middle port of locking cylinder (H).



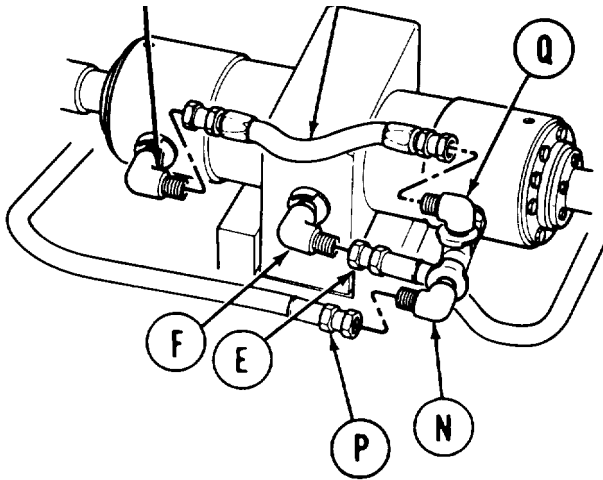
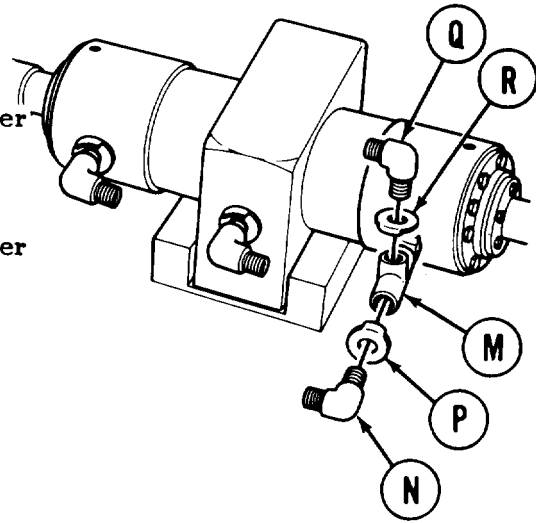
6. Using adjustable wrench, install elbow (J) and collar "M" (K) in right port of locking cylinder (H).
7. Using 3/4 inch wrench, install nipple (L) in left port of locking cylinder (H).
8. Holding nipple (L) with 3/4 inch wrench, use adjustable wrench to install tee (M) on nipple (L).

Go on to Sheet 4

TA251551

**LOCKING CYLINDER HOSE ASSEMBLIES (CE1, CE2, AND M) AND HYDRAULICS REPLACEMENT  
(Sheet 4 of 4)**

- 9. Holding tee (M) with adjustable wrench, use other adjustable wrench to install elbow (N) and collar "CE1" (P).
- 10. Holding tee (M) with adjustable wrench, use other adjustable wrench to install elbow (Q) and collar "M" (R).



- 11. Holding elbow (F) with adjustable wrench, use 7/8 inch wrench to install hose assembly "CE2" (E).
- 12. Holding elbow (N) with adjustable wrench, use 7/8 inch wrench to install hose assembly "CE1" (P).
- 13. Holding elbows (Q) and (J) with adjustable wrench, use 7/8 inch wrench to install hose assembly "M" (S).

- 14. **Bleed** hydraulic system (page 3-72).
- 15. Check for hydraulic leaks and correct as necessary.
- 16. Service hydraulic reservoir (LO 5-5420-202-12).
- 17. Install front fixed and movable hose armor (page 3-134).
- 18. Install boom mount hose armor (page 3-122).

End of Task

TA251553



**EJECTION CYLINDER HOSE ASSEMBLIES (CA, CB, CC, AND CD) AND HYDRAULICS REPLACEMENT (Sheet 1 of 7)**

**PROCEDURE INDEX**

PROCEDURE	PAGE
Removal	3-155
Installation	3-158

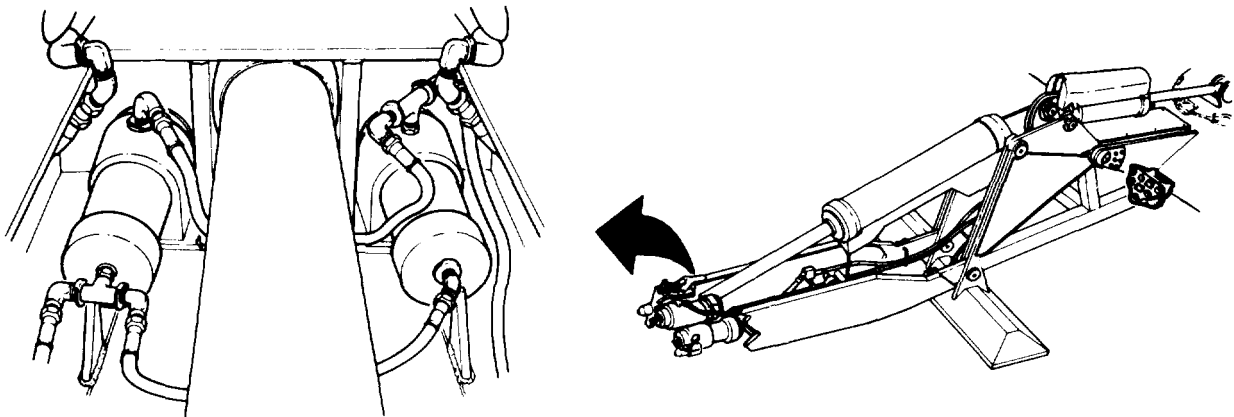
**TOOLS:** 12 in. adjustable wrench (2)  
 7/8 in. open end wrench  
 9/16 in. socket with 1/2 in. drive  
 Ratchet with 1/2 in. drive  
 3/4 in. open end wrench

**SUPPLIES:** Pencil (Item 22, Appendix D)  
 Rags (Item 12, Appendix D)  
 Pipe tape (Item 19, Appendix D)  
 Drip pans (suitable containers)  
 Masking tape (Item 18, Appendix D)  
 Preformed packing (2 required)  
 Lockwashers (8 required)

**REFERENCE:** LO 5-5420-202-12

**PRELIMINARY PROCEDURES:** Remove front fixed and movable hose armor (page 3-133)  
 Relieve hydraulic pressure (page 3-71)

**REMOVAL:**



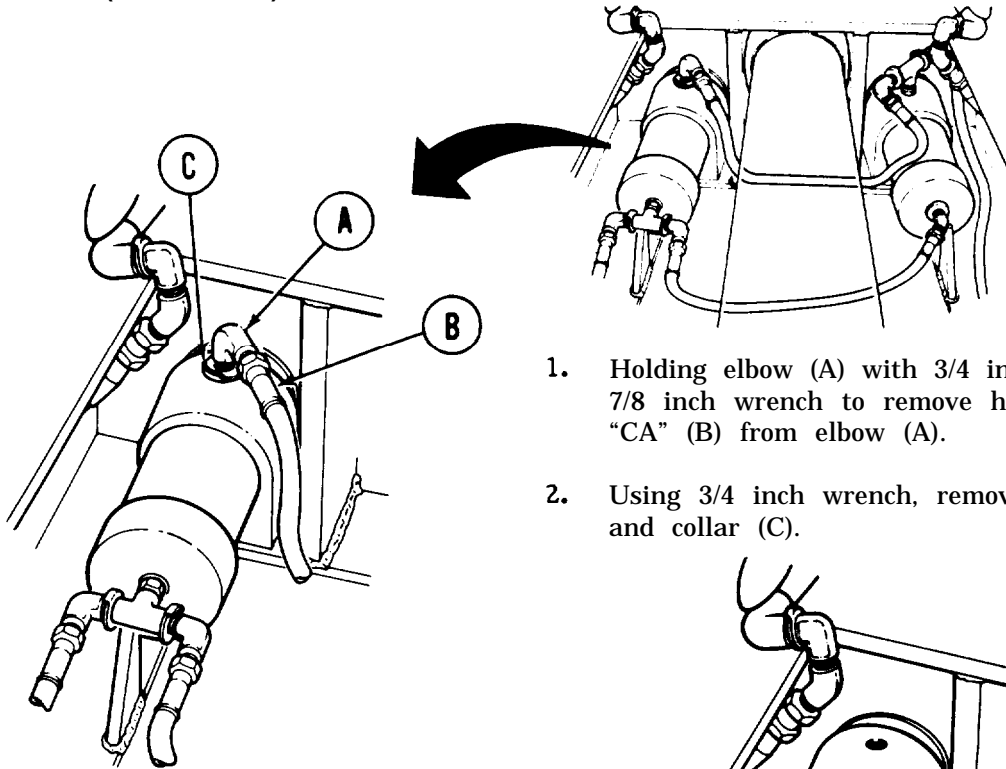
**NOTE**

Use rags and drip pans to catch excess hydraulic fluid. Use masking tape to tag lines for installation.

Go on to Sheet 2

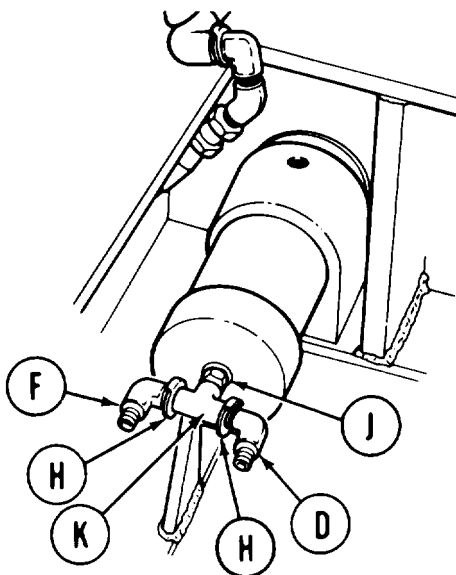
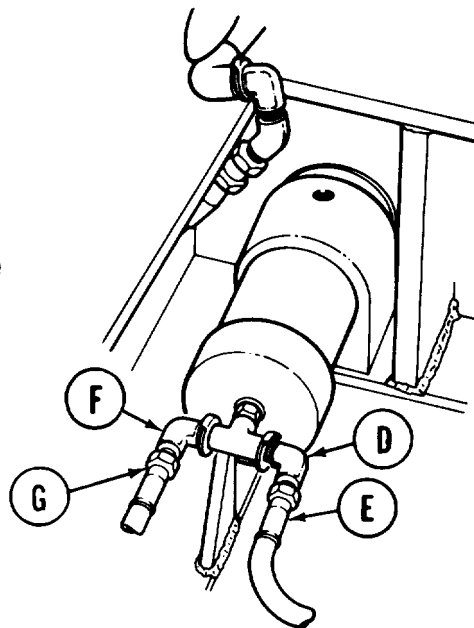
TA251554

**EJECTION CYLINDER HOSE ASSEMBLIES (CA, CB, CC, AND CD) AND HYDRAULICS REPLACEMENT (Sheet 2 of 7)**



1. Holding elbow (A) with 3/4 inch wrench, use 7/8 inch wrench to remove hose assembly "CA" (B) from elbow (A).
2. Using 3/4 inch wrench, remove elbow (A) and collar (C).

3. Holding elbow (D) with 3/4 inch wrench, use 7/8 inch wrench to remove hose assembly "CB" (E).
4. Holding elbow (F) with 3/4 inch wrench, use 7/8 inch wrench to remove hose assembly "CC" (G).

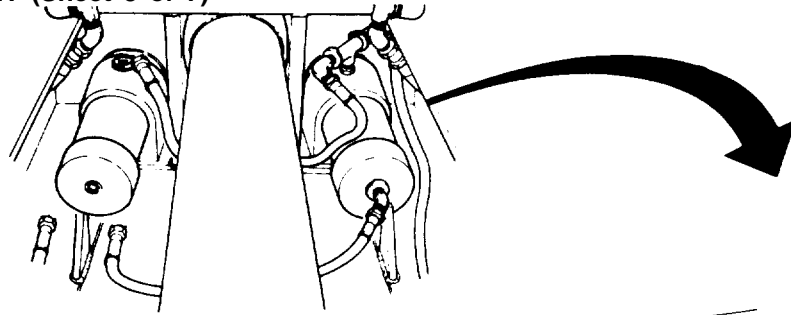


5. Using 3/4 inch wrench, remove two elbows (D) and (F) and two collars (H).
6. Holding nipple (J) with 3/4 inch wrench, use adjustable wrench to remove tee (K).
7. Using 3/4 inch wrench, remove nipple (J).

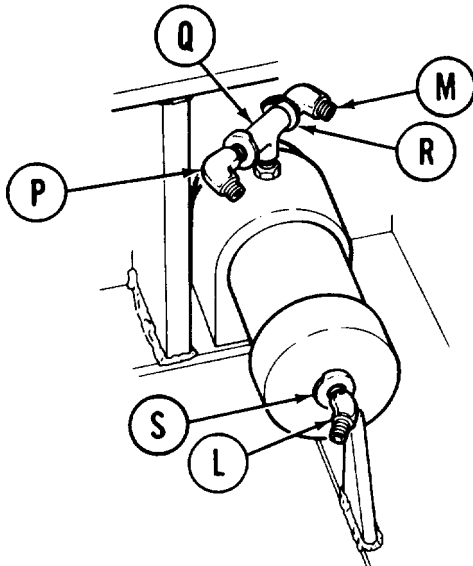
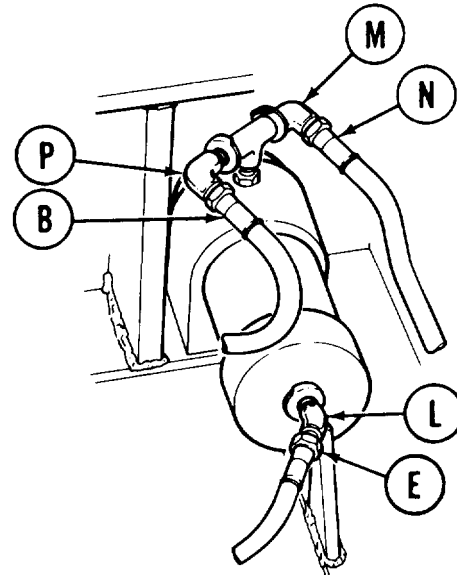
Go on to Sheet 3

TA251555

**EJECTION CYLINDER HOSE ASSEMBLIES (CA, CB, CC, AND CD) AND HYDRAULICS REPLACEMENT (Sheet 3 of 7)**

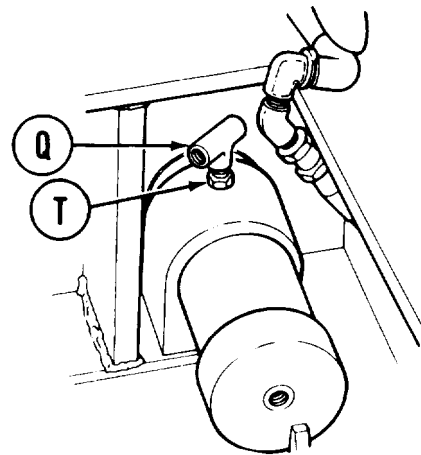


8. Holding elbow (L) with 3/4 inch wrench, use 7/8 inch wrench to remove hose assembly "CB" (E).
9. Holding elbow (M) with 3/4 inch wrench, use 7/8 inch wrench to remove hose assembly "CD" (N).
10. Holding elbow (P) with 3/4 inch wrench, use 7/8 inch wrench to remove hose assembly "CA" (B).



11. Using adjustable wrench to hold tee (Q), use 3/4 inch wrench to remove elbows (M) and (R) and collars (P).
12. Using 3/4 inch wrench, remove elbow (L) and collar (S).

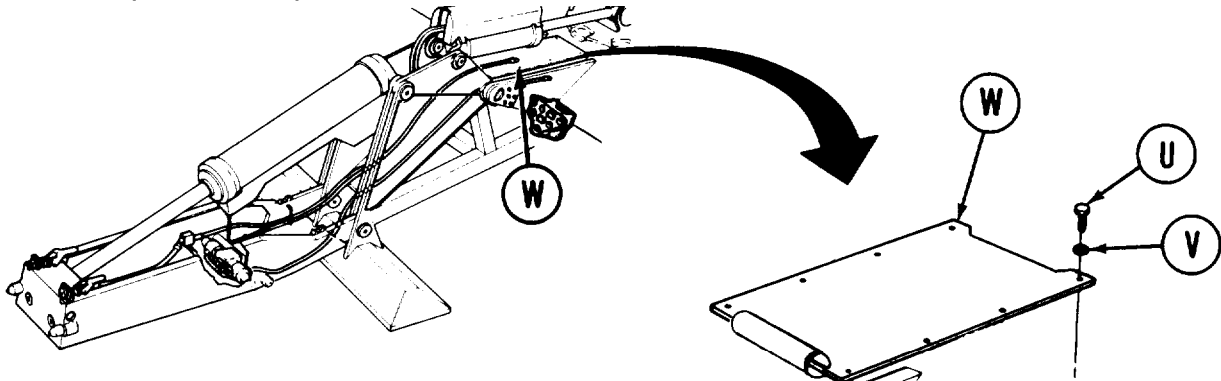
13. Holding nipple (T) with 3/4 inch wrench, use adjustable wrench to remove tee (Q).
14. Using 3/4 inch wrench, remove nipple (T).



Go on to Sheet 4

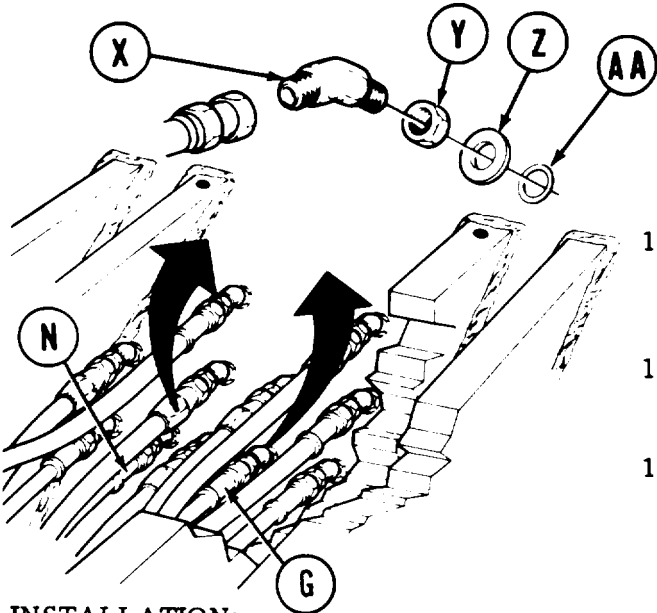
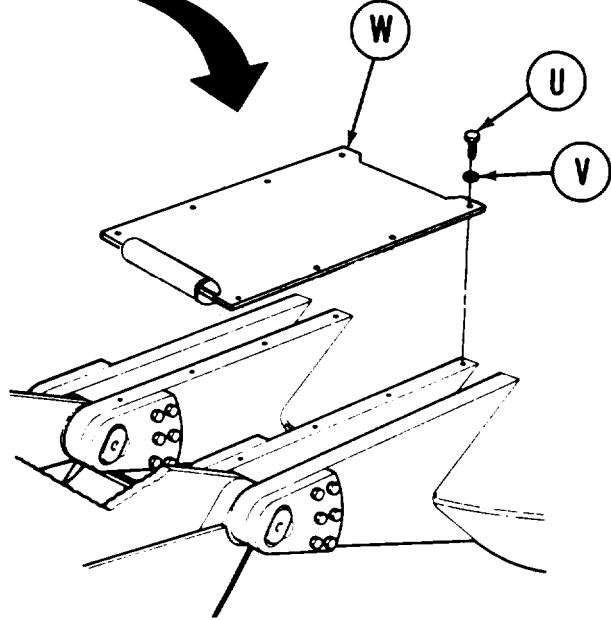
TA251556

**EJECTION CYLINDER HOSE ASSEMBLIES (CA, CB, CC, AND CD) AND HYDRAULICS REPLACEMENT (Sheet 4 of 7)**



15. Using socket, remove eight screws (U) and lockwashers (V).

16. Remove boom mount hose armor (W).



17. Holding two elbows (X) with 3/4 inch wrench, use 7/8 inch wrench to remove hose assemblies "CD" (N) and "CC" (G).

18. Using 3/4 inch wrench on elbows (X), use 7/8 inch wrench to loosen elbow nuts (Y).

19. Using adjust able wrench, remove two elbows (X), elbow nuts (Y), flat washers (Z) and preformed packings (AA). Throw away preformed packings (AA) away.

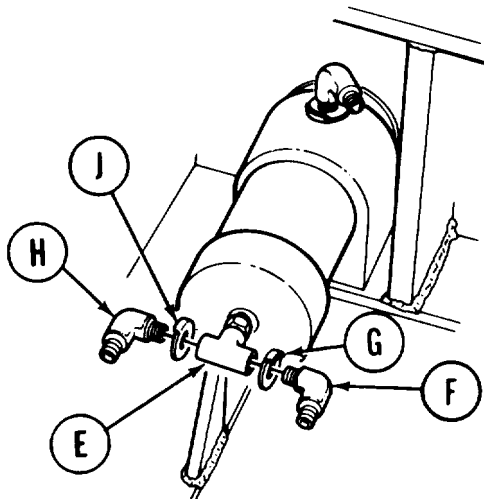
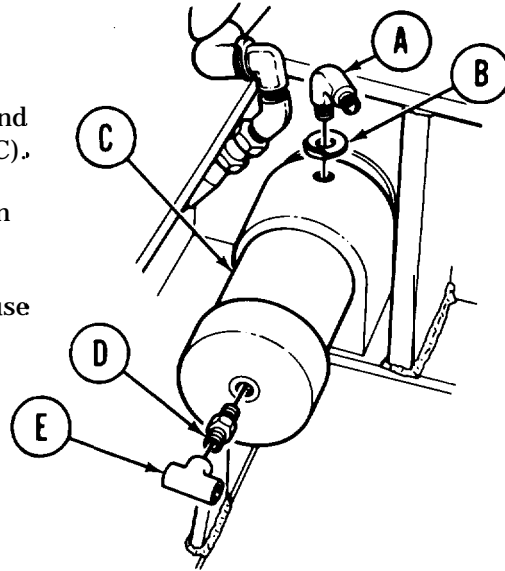
**INSTALLATION:**

**NOTE**

**Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.**

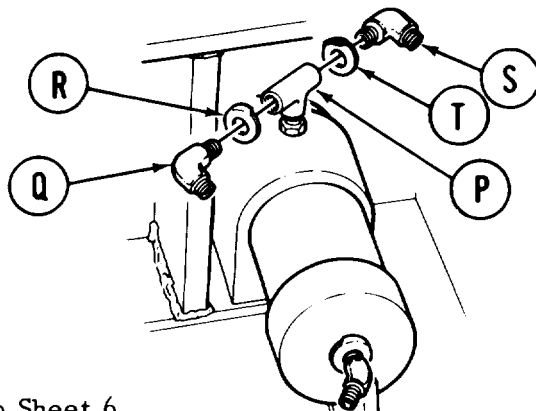
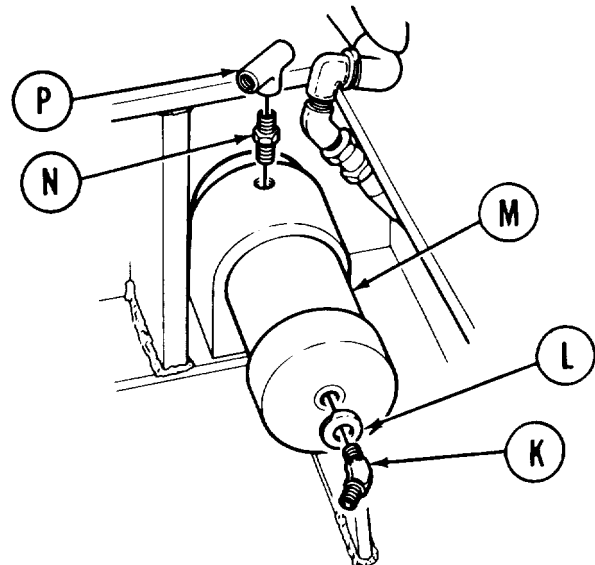
**EJECTION CYLINDER HOSE ASSEMBLIES (CA, CB, CC, AND CD) AND HYDRAULICS REPLACEMENT (Sheet 5 of 7)**

1. Using 3/4 inch wrench, install elbow (A) and collar "CA" (B) in left ejection cylinder (C).
2. Using 3/4 inch wrench, install nipple (D) in left ejection cylinder (C).
3. Holding nipple (D) with 3/4 inch wrench, use adjustable wrench to install tee (E).



4. Holding tee (E) with adjustable wrench, use 3/4 inch wrench to install elbow (F) and collar "CB" (G).
5. Holding tee (E) with adjustable wrench, use 3/4 inch wrench to install elbow (H) and collar "CC" (J).

6. Using 3/4 inch wrench, install elbow (K) and collar "CB" (L) in right ejection cylinder (M).
7. Using 3/4 inch wrench, install nipple (N) in right ejection cylinder (M).
8. Holding nipple (N) with 3/4 inch wrench, use adjustable wrench to install tee (P).



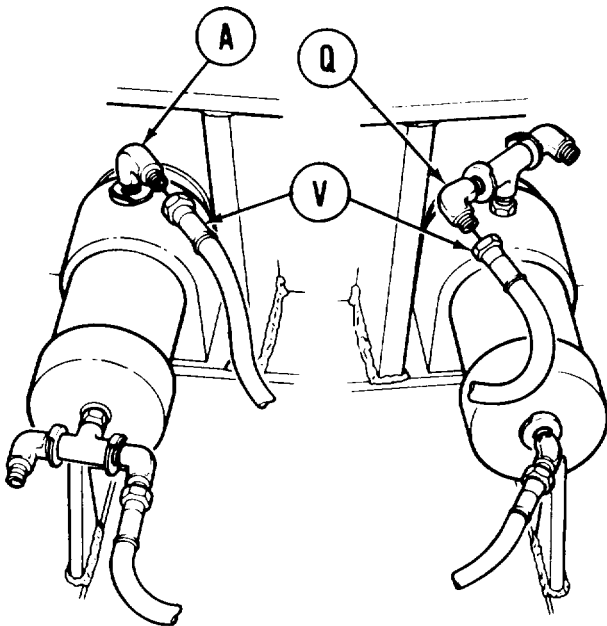
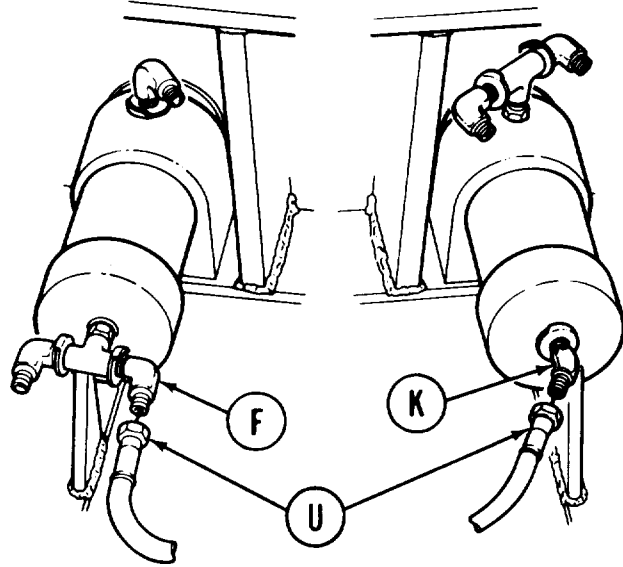
9. Holding tee (P) with adjustable wrench, use 3/4 inch wrench to install elbow (Q) and collar "CA" (R).
10. Holding tee (P) with adjustable wrench, use 3/4 inch wrench to install elbow (S) and collar "CD" (T).

Go on to Sheet 6

TA251558

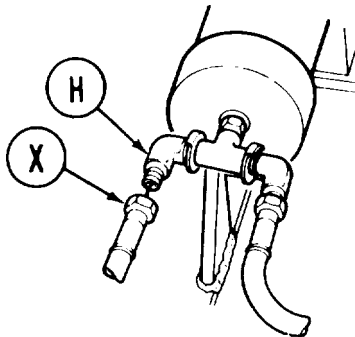
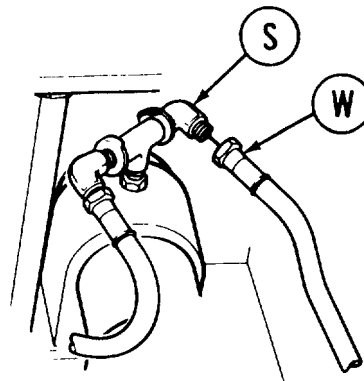
**EJECTION CYLINDER HOSE ASSEMBLIES (CA, CB, CC, AND CD) AND HYDRAULICS REPLACEMENT (Sheet 6 of 7)**

11. Holding elbow (K) with 3/4 inch wrench, use 7/8 inch wrench to install hose assembly "CB" (U).
12. Holding elbow (F) with 3/4 inch wrench, use 7/8 inch wrench to install hose assembly "CB" (U).



13. Holding elbow (A) with 3/4 inch wrench, use 7/8 inch wrench to install hose assembly "CA" (V).
14. Holding elbow (Q) with 3/4 inch wrench, use 7/8 inch wrench to install hose assembly "CA" (V).

15. Holding elbow (S) with 3/4 inch wrench, use 7/8 inch wrench to install hose assembly "CD" (W).



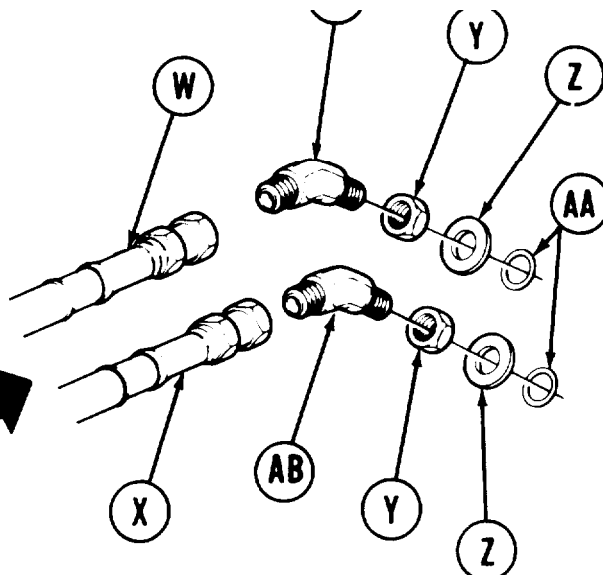
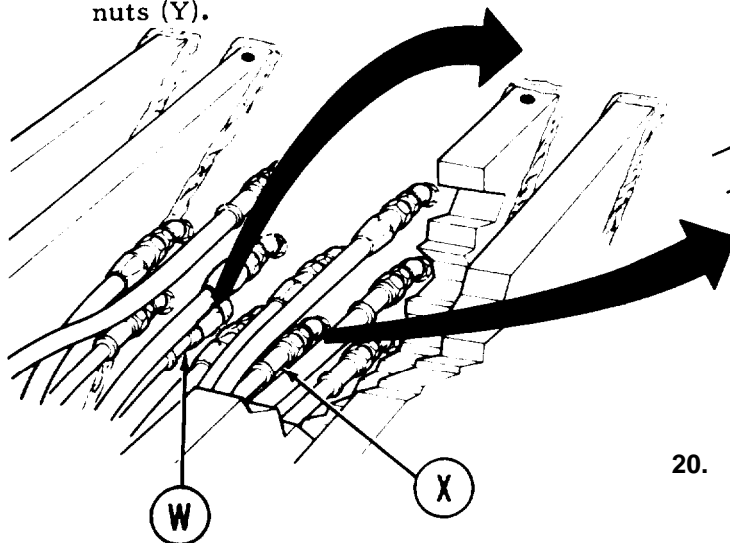
16. Holding elbow (H) with 3/4 inch wrench, use 7/8 inch wrench to install hose assembly "CC" (X).

Go on to Sheet 7

TA251559

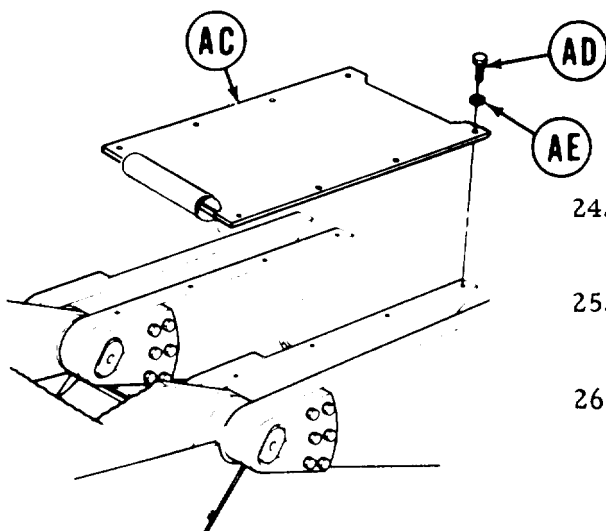
**EJECTION CYLINDER HOSE ASSEMBLIES (CA, CB, CC, AND CD) AND HYDRAULICS REPLACEMENT (Sheet 7 of 7)**

17. Manually installs nuts (Y), flat washers (Z), and new preformed packings (AA) on elbows (AB).
18. Manually install two elbows (AB) on vehicle and aline elbows (AB) as shown.
19. Using 3/4 inch wrench to hold elbows (AB), use 7/8 inch wrench to tighten elbow nuts (Y).



20. Holding elbows (AB) with 3/4 inch wrench, use 7/8 inch wrench to install hose assemblies "CD" (W) and "CC" (X).

21. Bleed hydraulic system (page 3-66).
22. Check for hydraulic leaks and correct as necessary.
23. Service hydraulic reservoir (LO 5-5420-202-12).



24. Install front fixed end movable hose armor (page 3-128).
25. Place boom mount hose armor (AC) in position.
26. Using socket, install eight screws (AD) and lockwashers (AE).

End of Task

TA251560

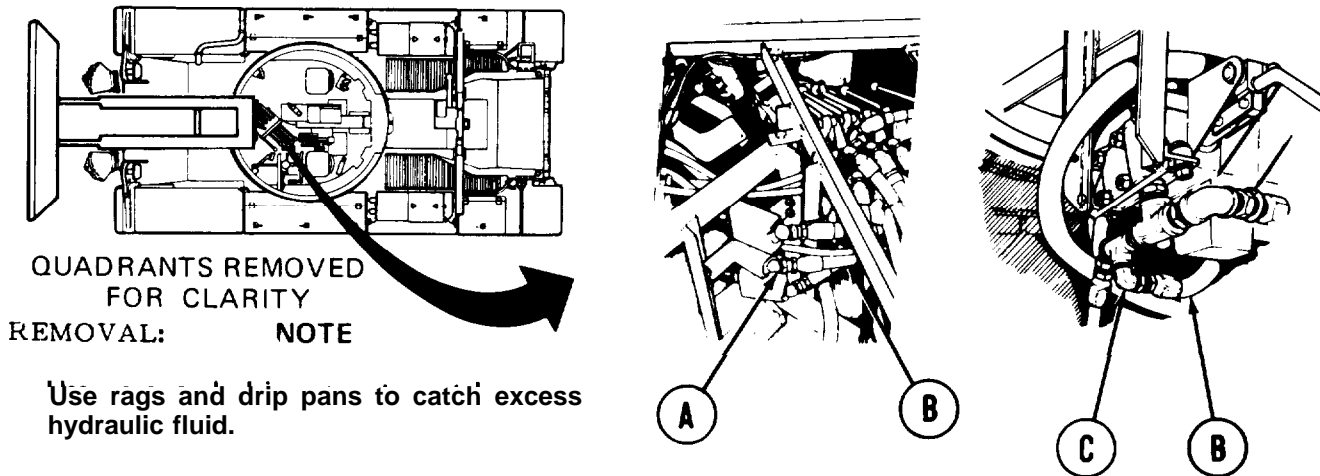
## OUTLET TO RELIEF VALVE MOUNT HOSE ASSEMBLY (CR) REPLACEMENT (Sheet 1 of 1)

TOOLS: 12 in. adjustable wrench  
1-1/4 in. open end wrench

SUPPLIES: Drip pans (suit able containers)  
Rags (Item 12, Appendix D)  
Pipe tape (Item 19, Appendix D)

REFERENCE: LO 5-5420-202-12

PRELIMINARY PROCEDURES: Remove front quadrant (page 3-45)  
Relieve hydraulic pressure (page 3-71)



1. Holding elbow (A) with adjustable wrench, use 1-1/4 inch wrench to remove hose assembly "CR" (B).
2. Holding elbow (C) with adjustable wrench, use 1-1/4 inch wrench to remove hose assembly "CR" (B).

INSTALLATION: **NOTE**

**Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.**

1. Holding elbow (A) with adjustable wrench, use 1-1/4 inch wrench to install hose assembly "CR" (B).
2. Holding elbow (C) with adjustable wrench, use 1-1/4 inch wrench to install hose assembly "CR" (B).
3. Bleed hydraulic system (page 3-72).
4. Check for hydraulic leaks and correct as necessary.
5. Install front quadrant (page 3-46).
6. Service hydraulic reservoir (LO 5-5420- 202-12).

End of Task

TA251561



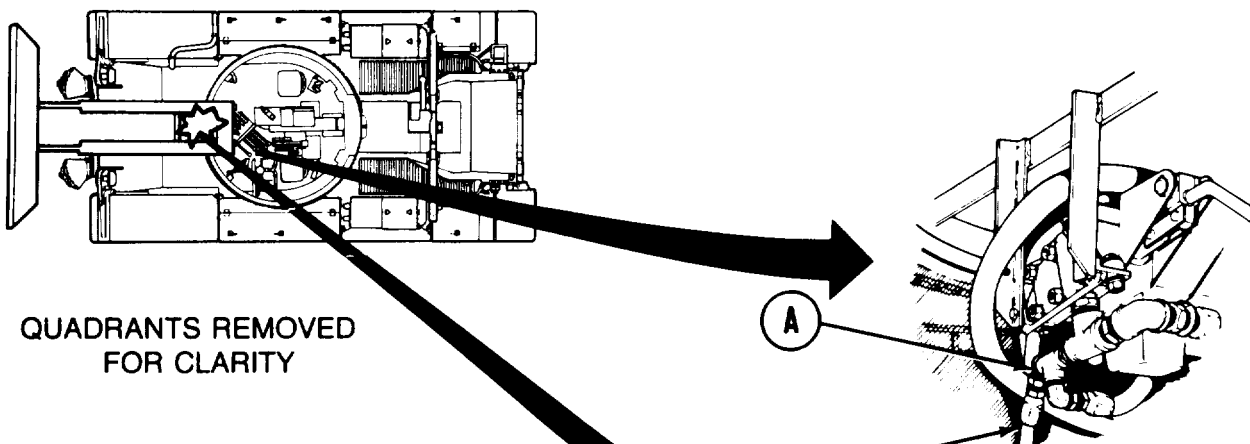
**OVERHEAD CYLINDER RETURN HOSE ASSEMBLY (F) REPLACEMENT (Sheet 1 of 2)**

**TOOLS:** 1-1/4 in. open end wrench  
12 in. adjustable wrench

**SUPPLIES:** Drip pans (suitable containers)  
Rags (Item 12, Appendix D)  
Pipe tape (Item 19, Appendix D)  
Preformed packing

**REFERENCE:** LO 5-5420-202-12

**PRELIMINARY PROCEDURE:** Relieve hydraulic pressure (page 3-71)



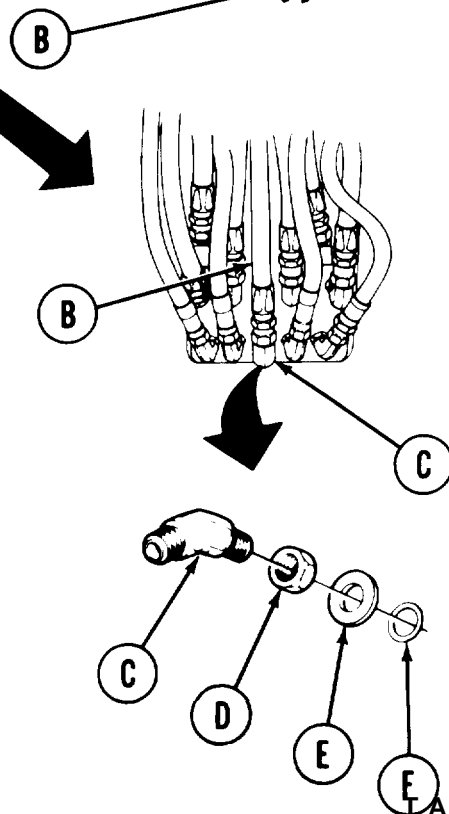
QUADRANTS REMOVED FOR CLARITY

**REMOVAL:**

**NOTE**

Use rags and drip pans to catch excess hydraulic fluid.

1. Using adjustable wrench to hold elbow (A), use 1-1/4 inch wrench to disconnect hose assembly "F" (B).
2. Using adjustable wrench to hold elbow (C), use 1-1/4 inch wrench to remove hose assembly "F" (B).
3. Using adjustable wrench to hold elbow (C), use 1-1/4 inch wrench to loosen elbow nut (D).
4. Using adjustable wrench, remove elbow (C), elbow nut (D), flat washer (E) and preformed packing (F). Throw preformed packing (F) away.



Go on to Sheet 2

A 251562

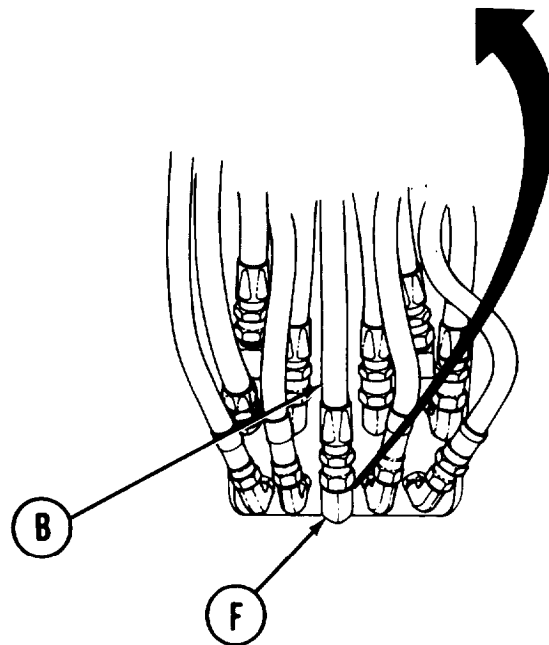
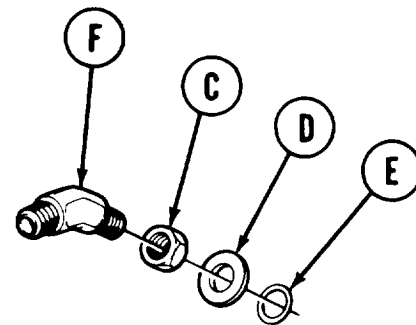
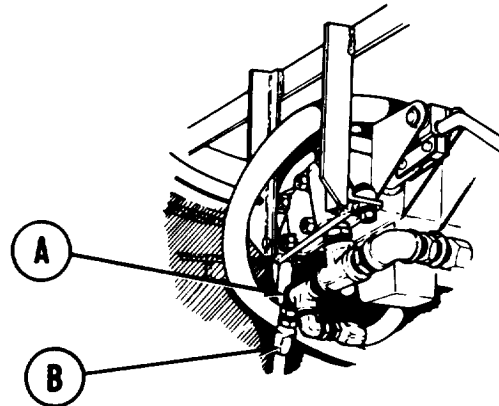
**OVERHEAD CYLINDER RETURN HOSE ASSEMBLY (F) REPLACEMENT (Sheet 2 of 2)**

**INSTALLATION:**

**NOTE**

**Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.**

1. Using adjustable wrench to hold elbow (A), use 1-1/4 inch wrench to install hose assembly "F" (B).
2. Manually place elbow nut (C), flat washer (D) and new preformed packing (E) on elbow (F).
3. Manually install elbow (F) on vehicle. Aline elbow (F) as shown.
4. Using adjustable wrench to hold elbow (F), use 1-1/4 inch wrench to tighten elbow nut (C).
5. Using adjustable wrench to hold elbow (F), use 1-1/4 inch wrench to install hose assembly "F" (B).
6. Bleed hydraulic system (page 3-72).
7. Check for hydraulic leaks and correct as necessary.
8. Service hydraulic reservoir as needed (LO 5-5420-202-12).



End of Task

TA251563

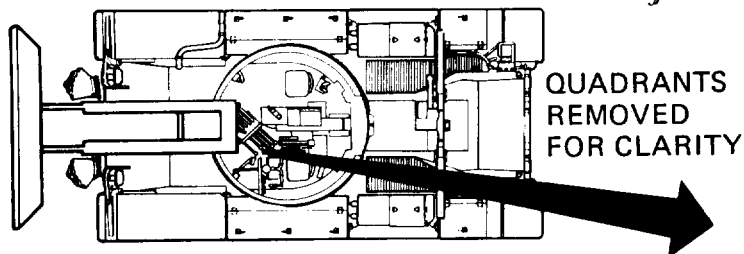
**SEQUENCE VALVE HOSE ASSEMBLY (AR) REPLACEMENT (Sheet 1 of 1)**

**TOOLS:** 9/16 in. open end wrench  
12 in. adjustable wrench

**SUPPLIES:** Drip pans (suitable containers)  
Rags (Item 12, Appendix D)  
Pipe tape (Item 19, Appendix D)

**REFERENCE:** LO 5-5420-202-12

**PRELIMINARY PROCEDURES:** Remove front quadrant (page 3-45)  
Relieve hydraulic pressure (page 3-71)

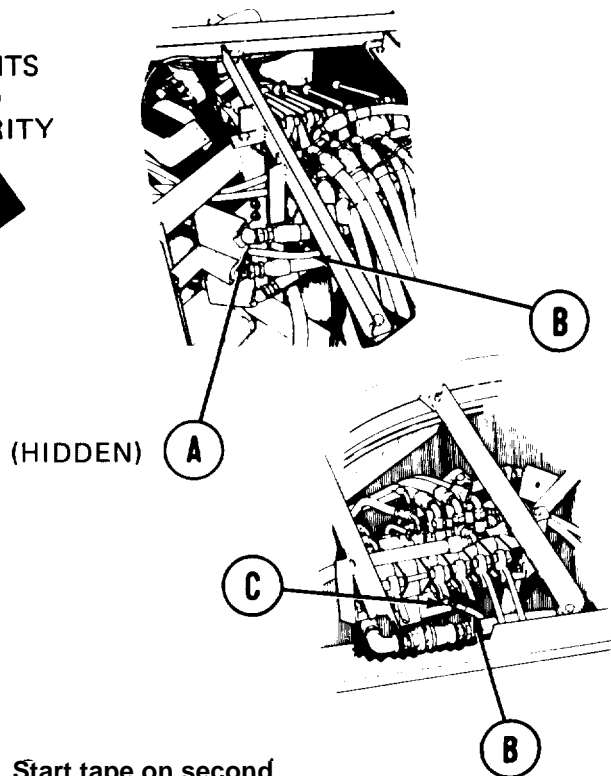


**REMOVAL:**

**NOTE**

Use rags and drip pans to catch excess hydraulic fluid.

1. Using adjustable wrench to hold elbow assembly (A), use open end wrench to disconnect hose assembly "AR" (B).
2. Using adjustable wrench to hold elbow assembly (C), use open end wrench to remove hose assembly "AR" (B).



**INSTALLATION:**

**NOTE**

Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

1. Using adjustable wrench to hold elbow assembly (A), use open end wrench on hose assembly "AR" (B) and connect hose.
2. Using adjustable wrench to hold elbow assembly (C), use open end wrench on hose assembly "AR" (B) and install hose.
3. Bleed hydraulic system (page 3-72).
4. Check for hydraulic leaks and correct as necessary.
5. Install front quadrant (page 3-46).
6. Refill hydraulic reservoir (LO 5-5420-202-12).

End of Task

TA251564

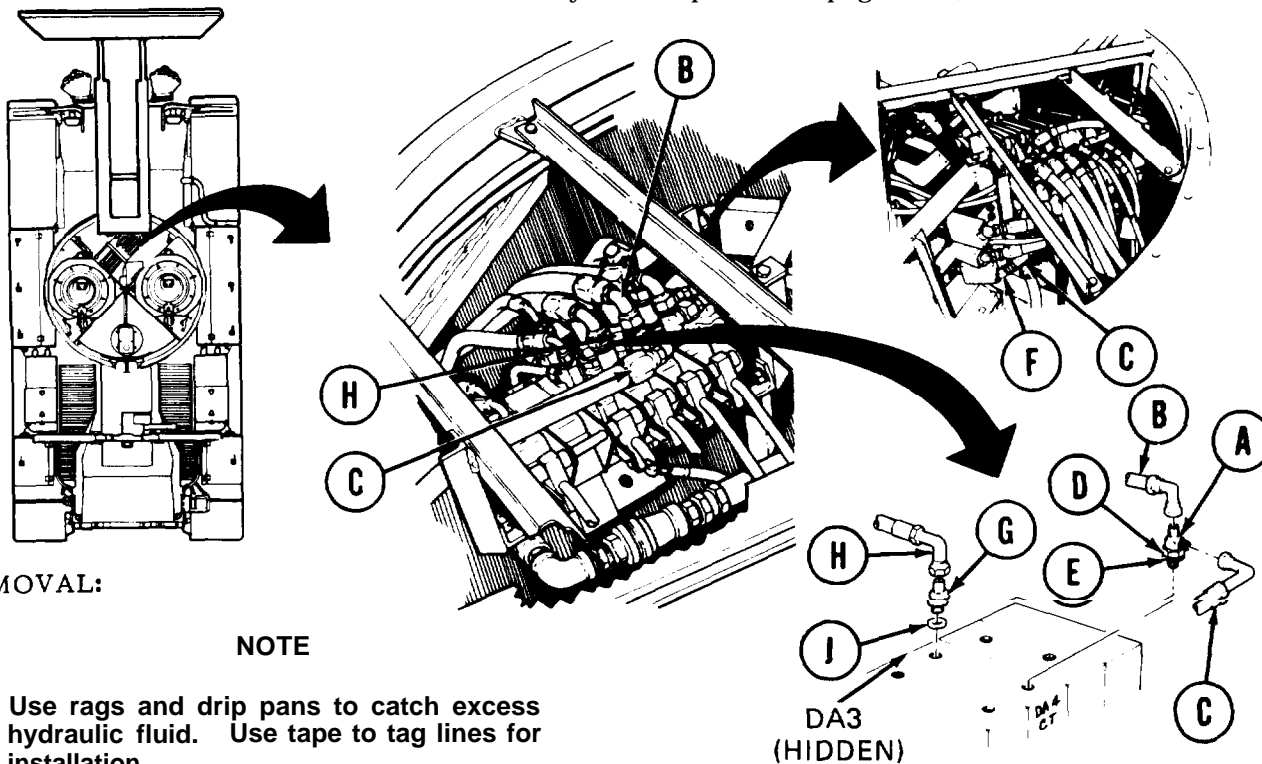
**TONGUE CYLINDER HOSE ASSEMBLIES (CT, DA3, AND DA4) AND HYDRAULICS REPLACEMENT (Sheet 1 of 4)**

**TOOLS:** 1-1/4 in. open end wrench (2)  
12 in. adjustable wrench

**SUPPLIES:** Preformed packings (4 required) Pipe tape (Item 19, Appendix D)  
Drip pans (suitable containers) Pencil (Item 22, Appendix D)  
Rags (Item 12, Appendix D) Masking tape (Item 18, Appendix D)

**REFERENCE:** LO 55420-202-12

**PRELIMINARY PROCEDURES:** Remove front quadrant (page 3-45)  
Relieve hydraulic pressure (page 3-71)



**REMOVAL:**

**NOTE**

Use rags and drip pans to catch excess hydraulic fluid. Use tape to tag lines for installation.

1. Using adjust able wrench to hold tee (A), use 1-1/4 inch wrench to disconnect hose assembly "DA4" (B) and hose assembly "CT" (C).
2. Using adjustable wrench, hold tee (A), use 1-1/4 inch wrench to loosen nut (D).
3. using ajdustable wrench, remove tee (A), nut (D), and preformed packing (E). Throw preformed packing (E) away.
4. Using 1-1/4 inch wrench, remove hose assembly "CT" (C) from elbow (F).
5. Using 1-1/4 inch wrench to hold adapter (G), use 1-1/4 inch wrench to remove hose assembly "DA3" (H).
6. Using 1-1/4 inch wrench, remove adapter (G) and preformed packing (J). Throw preformed packing (J) away.

Go on to Sheet 2

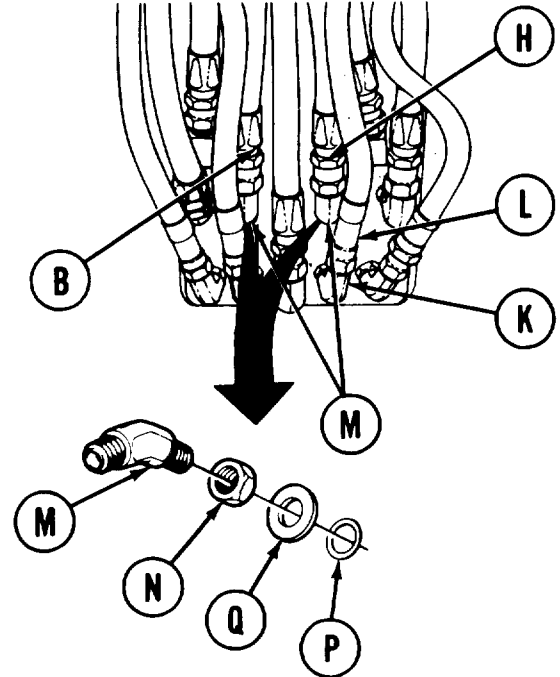
TA251565

**TONGUE CYLINDER HOSE ASSEMBLIES (CT, DA3, AND DA4) AND HYDRAULICS REPLACEMENT (Sheet 2 of 4)**

**NOTE**

Hose assembly in step 7 is being removed to provide wrench clearance for removal of parts in the following steps

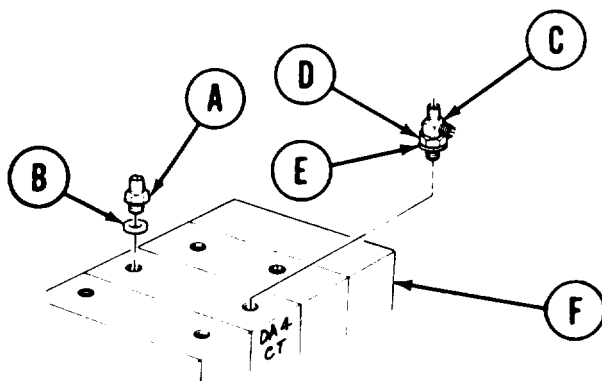
7. Using adjustable wrench to hold elbow (K), use 1-1/4 inch wrench to disconnect hose assembly "CP1" (L).
8. Using adjustable wrench to hold elbows (M), use 1-1/4 inch wrench to disconnect hose assemblies "DA3" (H) and "DA4" (B) from elbows (M).
- 9\* Using adjustable wrench to hold elbows (M), use 1-1/4 inch wrench to loosen nuts (N).
10. Using adjustable wrench, remove two elbows (M).
11. Manually remove preformed packings (P), flat washers (Q), and nuts (N) from elbows (M). Throw preformed packing (P) away.



**INSTALLATION:**

**NOTE**

Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

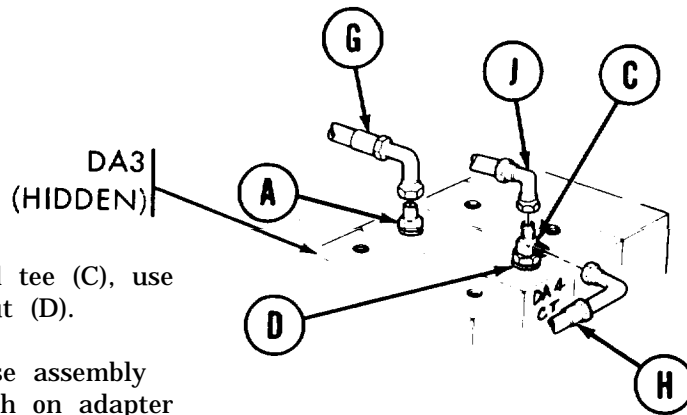


1. Using 1-1/4 inch wrench, install adapter (A) and new preformed packing (B).
2. Manually install tee (C), nut (D), and new preformed packing (E) in valve body (F).

Go on to Sheet 3

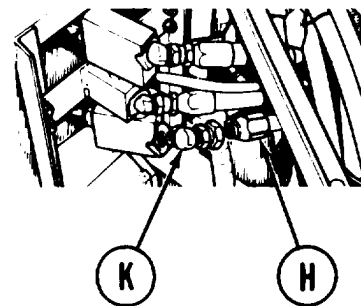
TA251566

**TONGUE CYLINDER HOSE ASSEMBLIES (CT, DA3, AND DA4) AND HYDRAULICS REPLACEMENT (Sheet 3 of 4)**

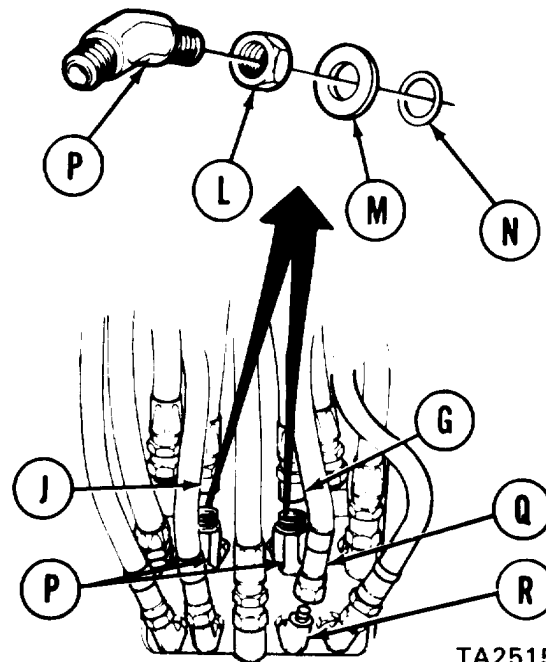


3. Using adjustable wrench to hold tee (C), use 1-1/4 inch wrench to tighten nut (D).
4. Using 1-1/4 inch wrench on hose assembly "DA3" (G) and 1-1/4 inch wrench on adapter (A), install hose (G).
5. Using 1-1/4 inch wrench on hose assembly "CT" (H) and adjustable wrench on tee (C), install hose assembly (H).
6. Using 1-1/4 inch wrench on hose assembly "DA4" (J) and adjustable wrench on tee (C), install hose assembly (J).

7. Using 1-1/4 inch wrench on hose assembly "CT" (H) and adjustable wrench on elbow (K), install hose assembly (H).
8. Manually install nuts (L), flat washers (M) and new preformed packings (N) on elbows (P).
- 9\* Manually install two elbows (P) in vehicle and sine elbows as shown.



10. Using adjustable wrench to hold elbows (P), use 1-1/4 inch wrench to tighten nuts (L).
11. Using 1-1/4 inch wrench on hose assemblies (J) and (G) and adjustable wrench on elbows (P), install hose assembly "DA4" (J) and hose assembly "DA3" (G).
12. Using 1-1/4 inch wrench on hose assembly "CP1" (Q) and adjustable wrench on elbow (R), install hose assembly (Q).



Go on to Sheet 4

TA251567

**TONGUE CYLINDER HOSE ASSEMBLIES (CT, DA3, AND DA4) AND HYDRAULICS  
REPLACEMENT (Sheet 4 of 4)**

13. Bleed hydraulic system (page 3-72).

14. Check for hydraulic leaks and correct as necessary.

15. Install front quadrant (page 3-46).

16. Service hydraulic reservoir (LO 5-5420-202-12).

End of Task

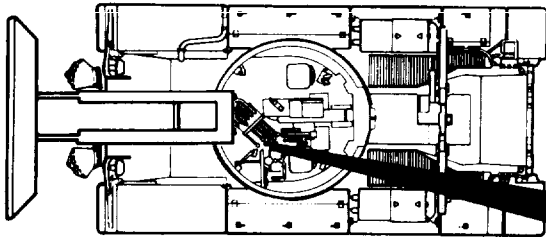
**OVERHEAD CYLINDER HOSE ASSEMBLIES (DA5 AND DA6) AND HYDRAULICS REPLACEMENT (Sheet 1 of 3)**

**TOOLS:** 7/8 in. combination wrench  
 1-1/4 in. open end wrench  
 12 in. adjustable wrench

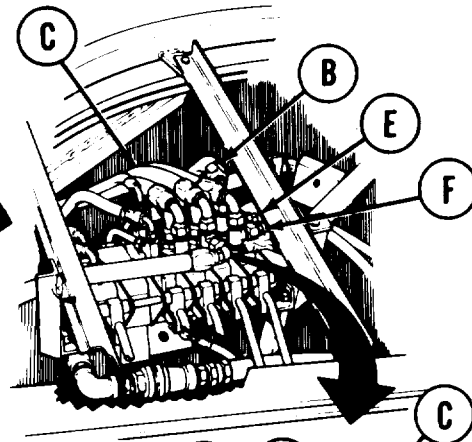
**SUPPLIES:** Drip pans (suit able containers)  
 Rags (Item 12, Appendix D)  
 Pipe tape (Item 19, Appendix D)  
 Pencil (Item 22, Appendix D)  
 Masking tape (Item 18, Appendix D)  
 Preformed packing (4 required)  
 Protective caps and plugs

**REFERENCE:** LO 5-5420-202-12

**PRELIMINARY PROCEDURES:** Remove front quadrant (page 3-45)  
 Relieve hydraulic pressure (page 3-71)



**QUADRANTS REMOVED FOR CLARITY**

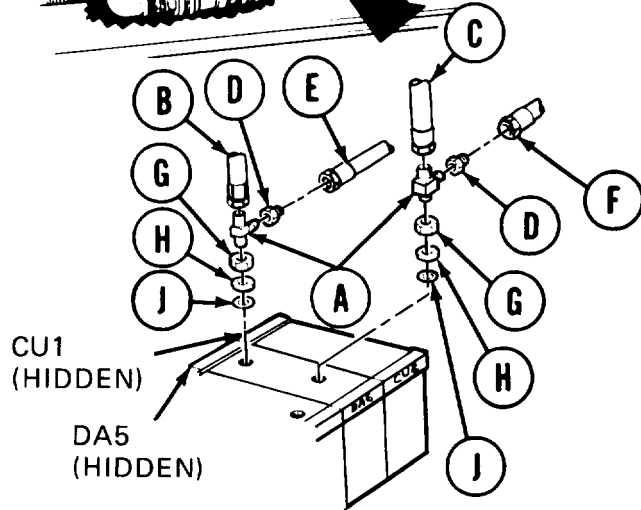


**REMOVAL:**

**NOTE**

Cap or plug all lines and fittings as they are disconnected. Use rags and drip pans to catch excess hydraulic fluid. Use tape to tag lines for installation.

1. Using adjustable wrench to hold tees (A), use 1-1/4 inch wrench to remove hose assemblies "DA5" (B) and "DA6" (C).
2. Using 1-1/4 inch wrench to hold adapters (D), use 7/8 inch wrench to remove hose assemblies "CU1" (E) and "CU2" (F).
3. Using 1-1/4 inch wrench, remove two adapters (D).
4. Using adjustable wrench to hold tees (A), use 1-1/4 inch wrench to loosen nuts (G).
5. Using adjustable wrench, remove two tees (A), nuts (G), flat washers (H) and preformed packings (J). Throw preformed packings (J) away.



Go on to Sheet 2

TA251568

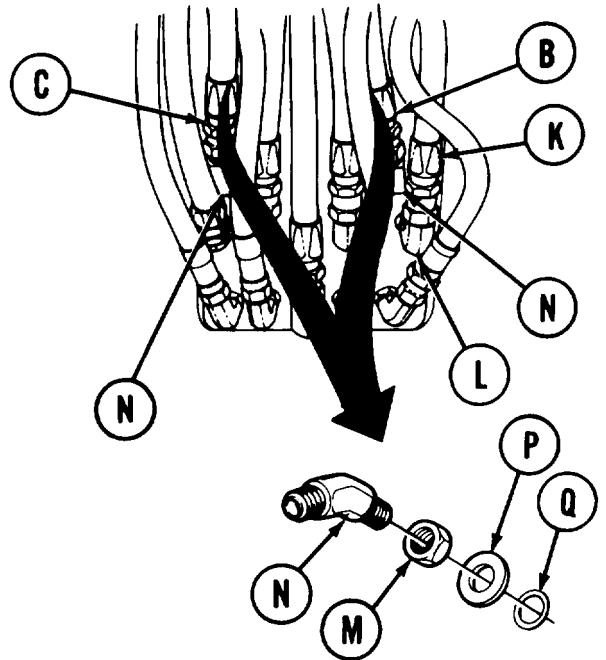


**OVERHEAD CYLINDER HOSE ASSEMBLIES (DA5 AND DA6) AND HYDRAULICS REPLACEMENT**  
 (Sheet 2 of 3)

**NOTE**

Hose assembly in step 6 is being removed to provide wrench clearance for removal of parts in the following steps.

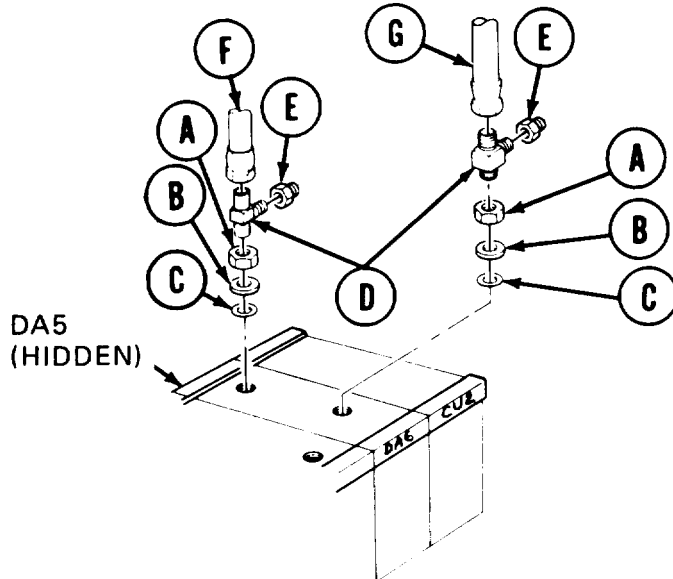
6. Using 1-1/4 inch wrench remove hose assembly "DA2" (K) from elbow (L).
7. Using 1-1/4 inch wrench, remove hose assemblies "DA6" (C) and "DA5" (B).
8. Using 1-1/4 inch wrench, loosen elbow nuts (M) on elbows (N).
9. Using adjustable wrench, remove elbows (N), nuts (M), flatwashers (P), and packings preformed (Q). Throw preformed packings (Q) away.



**INSTALLATION:**

**NOTE**

Remove caps and plugs as necessary during installation. Tape all male threads before installation with pipe tape:



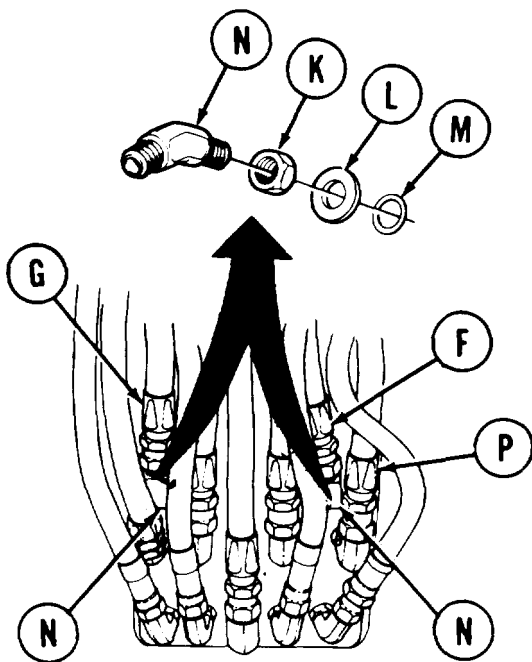
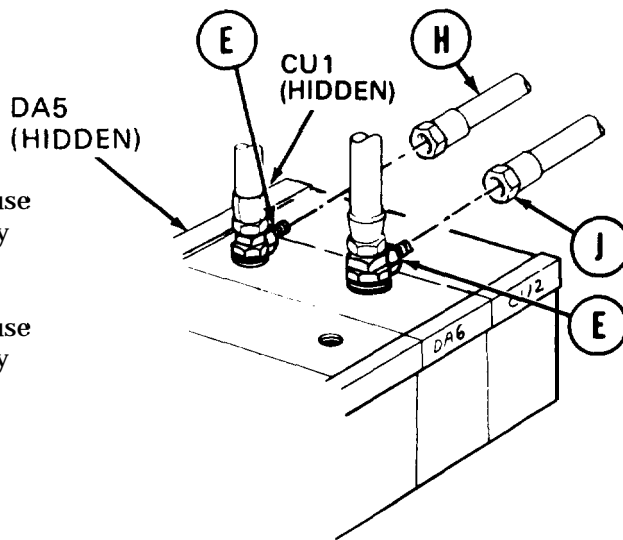
1. Manually install nuts (A), flat washers (B), and new preformed packings (C) onto tees (D).
2. Manually install and align tees (D).
3. Using adjustable wrench to hold tees (D), use 1-1/4 inch wrench to tighten nuts (A).
4. Using adjustable wrench to hold tees (D), use 1-1/4 inch wrench to install adapters (E).
5. Using adjustable wrench to hold tee (D), use 1-1/4 inch wrench to install hose assembly "DA5" (F).
6. Using adjustable wrench to hold tee (D), use 1-1/4 inch wrench to install hose assembly "DA6" (G).

Go on to Sheet 3

TA251569

**OVERHEAD CYLINDER HOSE ASSEMBLIES (DA5 AND DA6) AND HYDRAULICS REPLACEMENT  
(Sheet 3 of 3)**

7. Using 1-1/4 inch wrench on adapter (E), use 7/8 inch wrench to connect hose assembly "CU1" (H).
8. Using 1-1/4 inch wrench on adapter (E), use 7/8 inch wrench to connect hose assembly "CU2" (J).



9. Manually install nuts (K), flat washers (L), and new preformed packings (M) onto elbows (N).
10. Manually install and aline elbows (N).
11. Using adjust able wrench on elbows (N), use 1-1/4 inch wrench to tighten nuts (K).
12. Using adjust able wrench on elbow (N), use 1-1/4 inch wrench to connect hose assembly "DA5" (F).
13. Using adjustable wrench on elbow (N), use 1-1/4 inch wrench to connect hose assembly "DA6" (G).

14. Using 1-1/4 inch wrench, connect hose assembly "DA2" (P).
15. Bleed hydraulic system (page 3-72).
16. Check for hydraulic leaks and correct as necessary.
17. Install front quadrant (page 3-46).
18. Service hydraulic reservoir (LO 5-5420-202-12).

End of Task

TA251570

**HOLD DOWN CYLINDER HOSE ASSEMBLIES (CU1, CU2, CV1 THRU CV4) AND HYDRAULICS REPLACEMENT (Sheet 1 of 5)**

**PROCEDURE INDEX**

PROCEDURE	PAGE
Removal	3-173
Installation	3-175

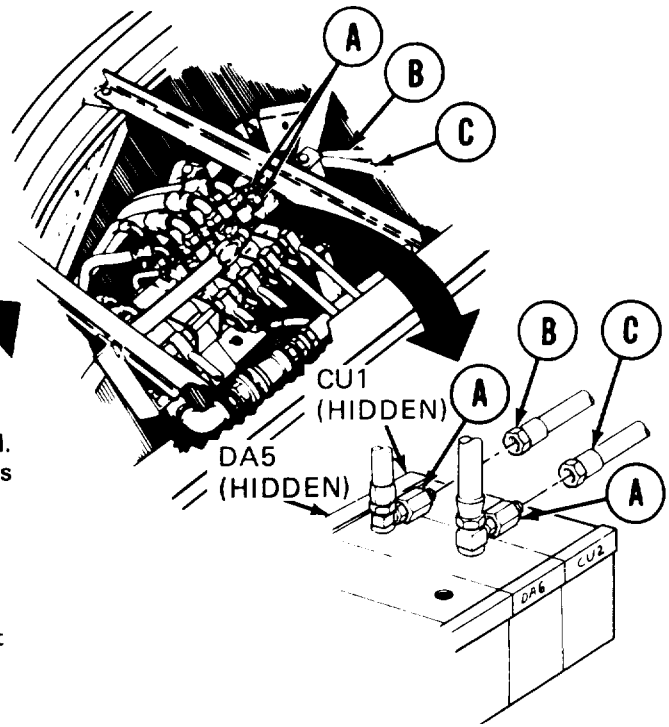
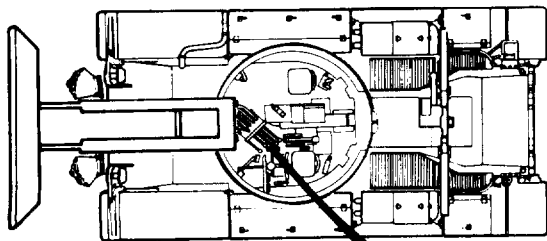
**TOOLS:** 7/8 in. open end wrench      13/16in. combination box and open end wrench  
 12 in. adjustable wrench      1-1/4 in. open end wrench  
 Vise

**SUPPLIES:** Drip pans (suitable containers)      Pencil (Item 22, Appendix D)  
 Rags (Item 12, Appendix D)      Masking tape (Item 18, Appendix D)  
 pipe tape (Item 19, Appendix D)      Protective caps and plugs

**REFERENCES:** TM 5-5420-202-10  
 LO 5-5420-202-12

**PRELIMINARY PROCEDURES:** Relieve hydraulic pressure (page 3-71)  
 Remove front quadrant (page 3-45) CU1 and CU2 hose assemblies only  
 Remove powerplant (TM 5-5420-202-20) CV1 and CV2 hose assemblies only  
 Remove holddown cylinder armor (page 3-253) CV3 and CV4 hose assemblies only

**QUADRANTS REMOVED FOR CLARITY**



**REMOVAL:**

**NOTE**

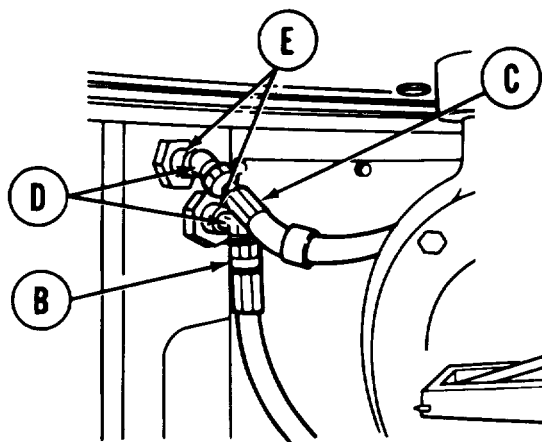
Use rags and drip pans to catch excess hydraulic fluid. Use tape to tag lines for installation. Cap or plug all lines and fittings as they are disconnected.

1. Holding two adapters (A) with 1-1/4 inch wrench, use 7/8 inch wrench to disconnect hose assemblies "CU1" (B) and "CU2" (C).

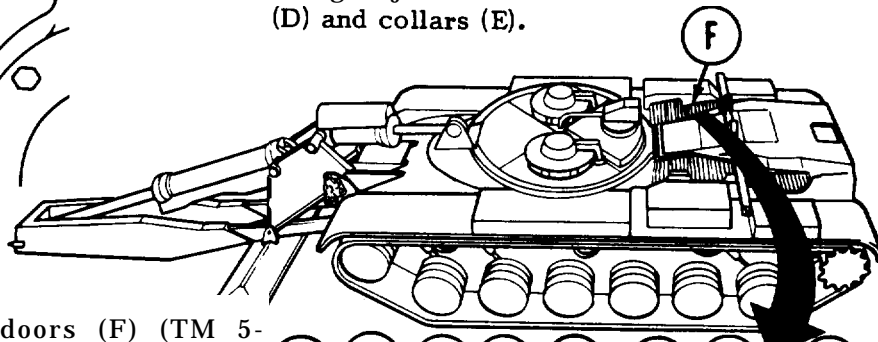
Go on to Sheet 2

T A 2 5 1 7 5 6

**HOLD DOWN CYLINDER HOSE ASSEMBLIES (CU1 CU2, CV1 THRU CV4) AND HYDRAULICS REPLACEMENT (Sheet 2 of 5)**



2. Using adjustable wrench to hold two elbows (D), use 7/8 inch wrench to disconnect hose assemblies "CU1" (B) and "CU2" (C).
3. Using adjustable wrench, remove two elbows (D) and collars (E).



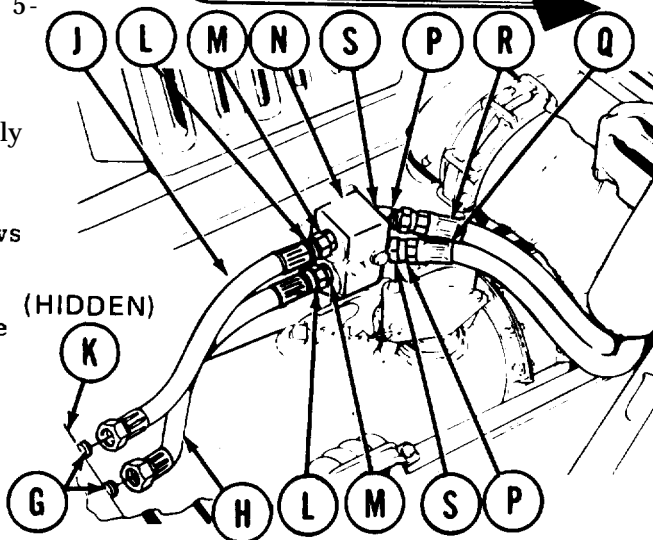
4. Open right side grille doors (F) (TM 5-5420-202-10).

5. Using adjustable wrench on elbows (G), use 7/8 inch wrench to disconnect hose assembly "CV1" (H) and "CV2" (J).

6. Using adjustable wrench, remove two elbows (G) and collars (K).

7. Using 13/16 inch wrench on adapter (L), use 7/8 inch wrench to remove hose assemblies "CV1" (H) and "CV2" (J).

8. Using 13/16 inch wrench, remove two adapters (L) and collars (M) from manifold (N).



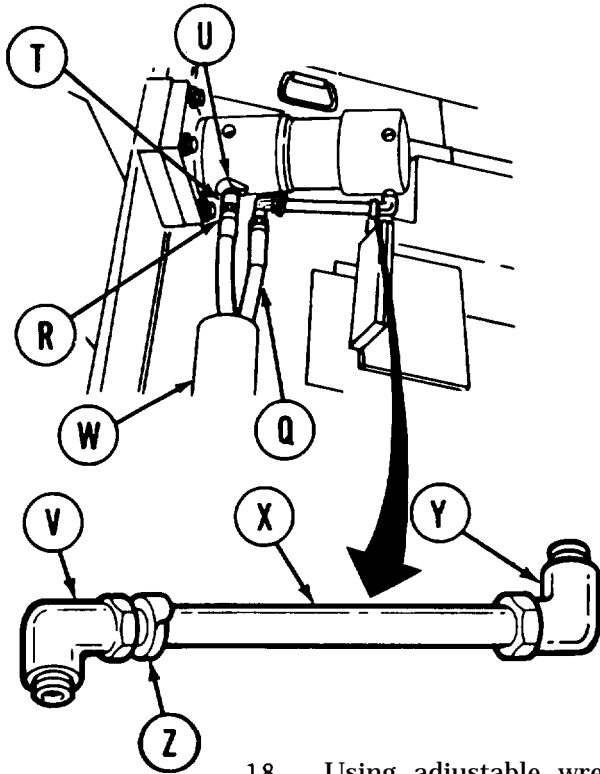
9. Using adjustable wrench on elbows (P), use 7/8 inch wrench to disconnect hose assemblies "CV3" (Q) and "CV4" (R).

10. Using adjustable wrench, remove two elbows (P) and collars (S) from manifold (N).

Go on to Sheet 3

TA251571

**HOLD DOWN CYLINDER HOSE ASSEMBLIES (CU1, CU2, CV1 THRU CV4) AND HYDRAULICS REPLACEMENT (Sheet 3 of 5)**



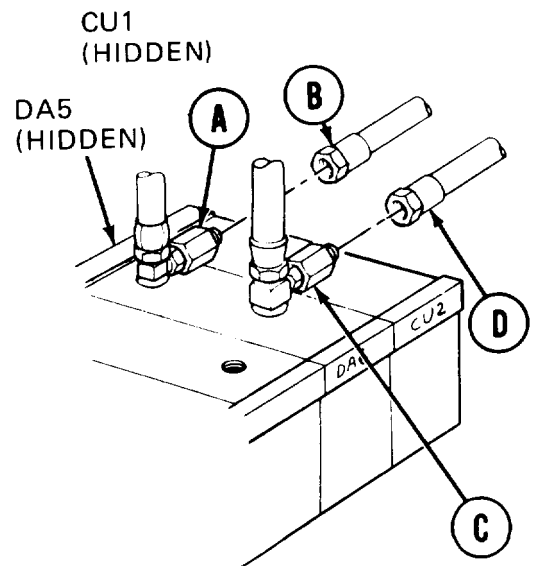
11. Using 13/16 inch wrench on adapter (T), use 7/8 inch wrench to remove hose assembly "CV4" (R).
12. Using 13/16 inch wrench, remove adapter (T) and collar (U).
13. Using adjustable wrench on elbow (V), use 7/8 inch wrench to remove hose assembly "CV3" (Q).
14. Remove hose assemblies (Q) and (R) from armor (W).
15. Using adjustable wrench, remove elbow (V) nipple (X), and elbow (Y) as an assembly.
16. Place nipple (X) in a vise.
17. Using adjust able wrench, remove elbow (Y).
18. Using adjustable wrench, remove elbow (V) and collar [Z] from nipple (x).

**INSTALLATION:**

**NOTE**

Remove caps and plugs as necessary during installation. Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

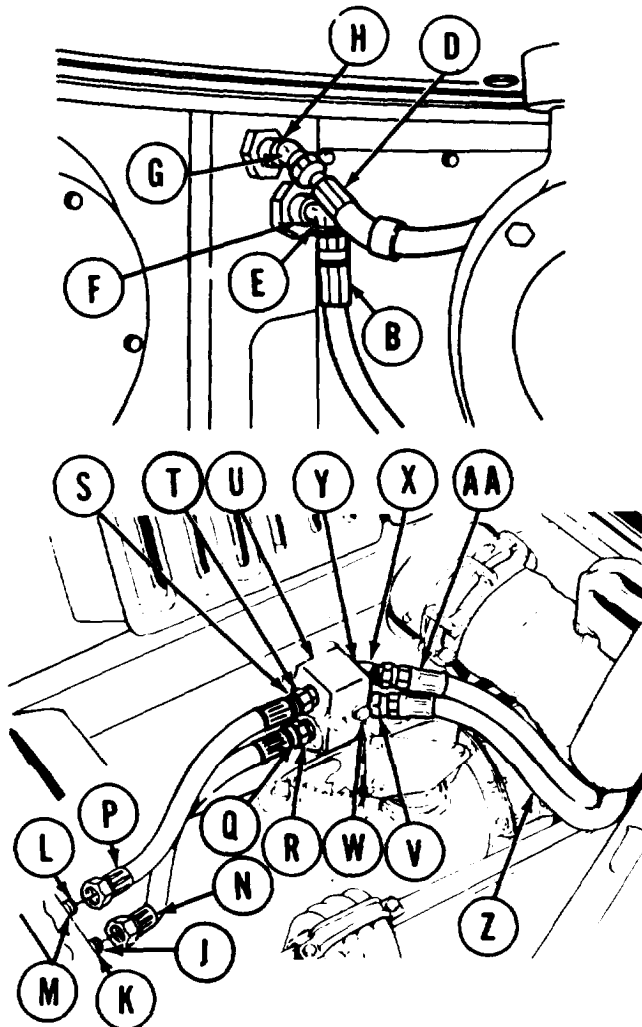
1. Holding adapter (A) with 1-1/4 inch wrench, use 7/8 inch wrench to connect hose assembly "CU1" (B).
2. Holding adapter (C) with 1-1/4 inch wrench, use 7/8 inch wrench to connect hose assembly "CU2" (D).



Go on to Sheet 4

TA251572

**HOLD DOWN CYLINDER HOSE ASSEMBLIES (CU1, CU2, CV1 THRU CV4) AND HYDRAULICS REPLACEMENT (Sheet 4 of 5)**



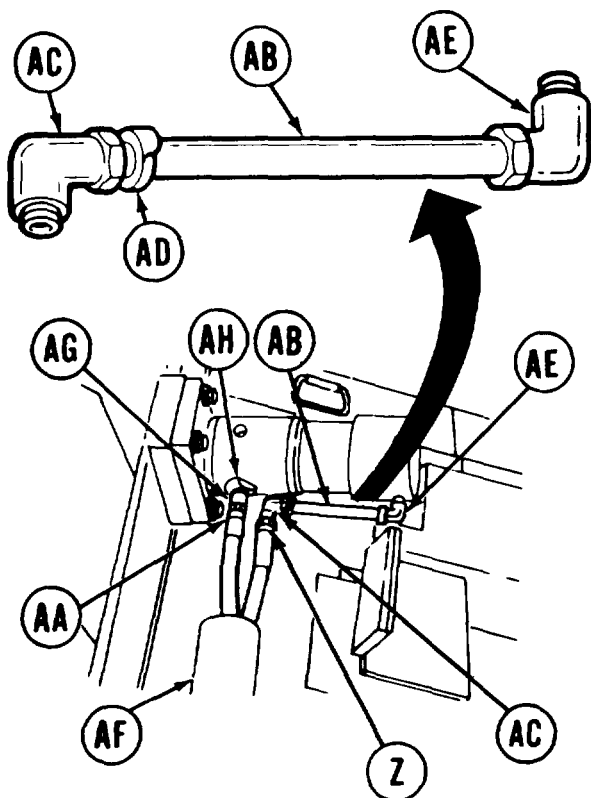
3. Using adjustable wrench, install elbow (E) and collar "CU1" (F) and elbow (G) and collar "CU2" (H).
4. Using adjustable wrench on elbow (E), use 7/8 inch wrench to install hose assembly "CU1" (B).
5. Using adjustable wrench on elbow (G), use 7/8 inch wrench to install hose assembly "CU2" (D).
6. Using adjustable wrench, install elbow (J) and collar "CV1" (K) and elbow (L) and collar "CV2" (M).
7. Using adjust able wrench on elbow (J), use 7/8 inch wrench to install hose assembly "CV1" (N).
8. Using adjust able wrench on elbow (L), use 7/8 inch wrench to install hose assembly "CV2" (P).

9. Using 13/16 inch wrench, install adapter (Q) and collar "CV1" (R) and adapter (S) and collar "CV2" (T) on manifold (U).
10. Using 13/16 inch wrench on adapter (Q), use 7/8 inch wrench to install hose assembly "CV1" (N).
11. Using 13/16 inch wrench on adapter (S), use 7/8 inch wrench to install hose assembly "CV2" (P).
12. Using adjustable wrench, install elbow (V) and collar "CV3" (W) and elbow (X) and collar "CV4" (Y) on manifold (U).
13. Using adjust able wrench on elbow (V), use 7/8 inch wrench to install hose assembly "CV3" (z).
14. Using adjustable wrench on elbow (X), use 7/8 inch wrench to install hose assembly "CV4" (AA).

Go on to Sheet 5

TA251573

## HOLD DOWN CYLINDER HOSE ASSEMBLIES (CU1, CU2, CV1 THRU CV4) AND HYDRAULICS REPLACEMENT (Sheet 5 of 5)



15. Place nipple (AB) in vise.
16. Using adjustable wrench, install elbow (AC) **and collar** "CV3" (AD) on nipple (AB).
17. Using adjustable wrench to install elbow (AE) on nipple (AB). Aline elbows facing in opposite directions as shown.
18. Using adjustable wrench, install elbow (AC), nipple collar (AD), nipple (AB), and elbow (AE) as an assembly. Aline as shown.
19. Insert hose assemblies "CV3" (Z) and "CV4" (AA) through armor (AF).
20. Using adjustable wrench on elbow (AC), use 7/8 inch-wrench to install hose assembly "CV3" (Z).
21. Using 13/16 inch wrench, install adapter (AG) and collar "CV4" (AH).
22. Using 13/16 inch wrench on adapter (AG), use 7/8 inch wrench to install hose assembly "CV4" (AA).
23. Bleed hydraulic system (page 3-72).
24. Check for hydraulic leaks and correct as necessary.
25. Service hydraulic reservoir (LO 5-5420-202-12).
26. Close right side grille doors (TM 5-5420-202-10).
27. Install front quadrant (page 3-46) "CU1" and "CU2" hose assemblies only.
28. Install powerplant (TM 5-5420-202-20) "CV1" and "CV2" hose assemblies only.
29. Install holddown cylinder armor (page 3-253) "CV3" and "CV4" hose assemblies only.

End of Task

TA251574

**EJECTION CYLINDER HOSE ASSEMBLIES (CP1 AND CP2) AND HYDRAULIC REPLACEMENT**

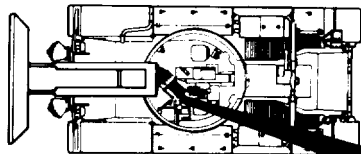
(Sheet 1 of 2)

**TOOLS:** 7/8 in. combination wrench  
 11/16 in. open end wrench  
 12 in. adjustable wrench  
 1-1/4 in. open end wrench

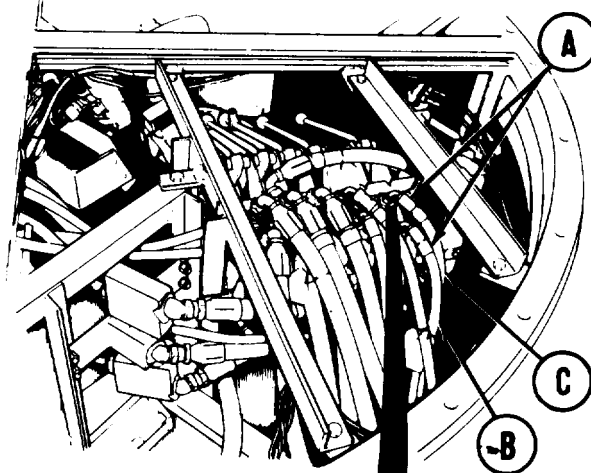
**SUPPLIES:** Drip pans (suitable containers)  
 Rags (Item 12, Appendix D)  
 Pipe tape (Item 19, Appendix D)  
 Pencil (Item 22, Appendix D)  
 Preformed packing (4 required)  
 Masking tape (Item 18, Appendix D)

**REFERENCE:** LO 5-5420-202-12

**PRELIMINARY PROCEDURES:** Remove front quadrant (page 3-45)  
 Relieve hydraulic pressure (page 3-71)



**QUADRANTS  
 REMOVED  
 FOR CLARITY**

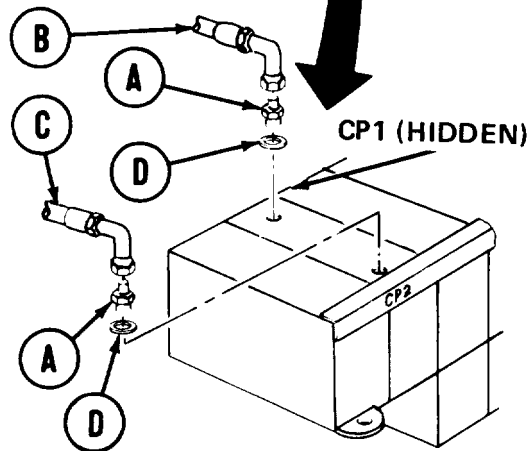


**REMOVAL:**

**NOTE**

Use rags and drip pans to catch excess hydraulic fluid. Use masking tape to tag lines for installation.

1. Using 1-1/4 inch wrench to hold adapters (A), use 11/16 inch wrench to remove two hose assemblies "CP1" (B) and "CP2" (C).
2. Using 1-1/4 inch wrench, remove two adapters (A) and preformed packings (D). Throw preformed packings (D) away.



ROTATED 180°

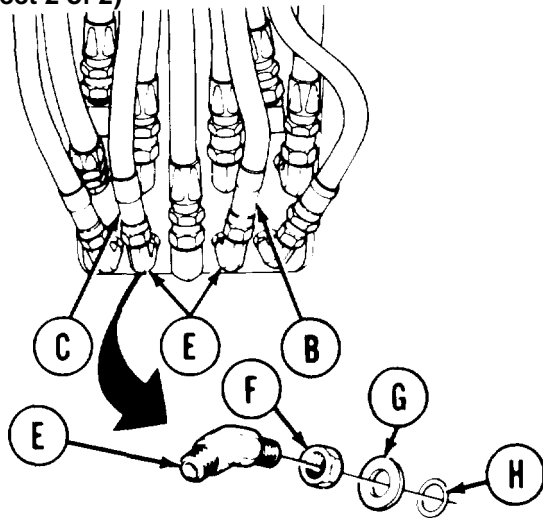
Go on to Sheet 2

TA251575



**EJECTION CYLINDER HOSE ASSEMBLIES (CP1 AND CP2) AND HYDRAULIC REPLACEMENT**

(Sheet 2 of 2)



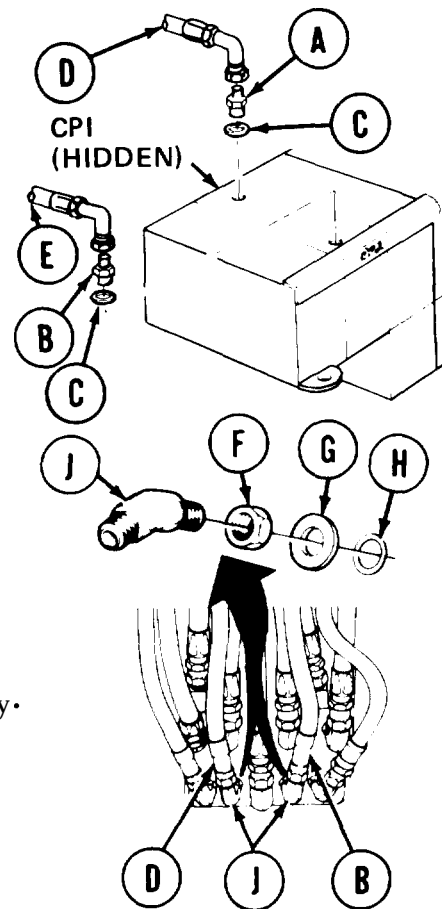
3. Using adjustable wrench to hold elbows (E), use 7/8 inch wrench to remove hose assemblies "CP1" (B) and "CP2" (C).
4. Using adjustable wrench to hold elbows (E), use 7/8 inch wrench to loosen elbow nuts (F).
5. Using adjustable wrench, remove elbows (E), flat washers (G), nut (F), and preformed packings (H). Throw preformed packings (H) away.

**INSTALLATION:**

**NOTE**

**Before installation, use pipe tape on all male threads. Start on second thread so tape will not enter hydraulic system.**

1. Using 1-1/4 inch wrench, install adapters (A) and (B) and new preformed packings (C).
2. Using 1-1/4 inch wrench on adapters (A) and (B), use 11/16 inch wrench to install hose assemblies "CP1" (D) and "CP2" (E).
3. Manually install nuts (F), flat washers (G), and new preformed packings (H) on elbows (J).
4. Manually install elbows (J) in vehicle and align elbows as shown.
5. Using adjustable wrench on elbows (J), use 7/8 inch wrench to tighten elbow nuts (F).
6. Using adjustable wrench on elbows (J), use 7/8 inch wrench to install hose assemblies "CP1" (D) and "CP2" (E).
7. Bleed hydraulic system (page 3-72).
8. Check for hydraulic leaks and correct as necessary.
9. Install front quadrant (page 3-46).
10. Service hydraulic reservoir (LO 5-5420-202-12).



End of Task

TA251576

**LOCKING CYLINDER HOSE ASSEMBLIES (EA1, CP3, CP4 and CS) AND HYDRAULICS REPLACEMENT (Sheet 1 of 4)**

**PROCEDURE INDEX**

PROCEDURE	PAGE
Removal	3-180
Installation	3-181

**TOOLS:** 12 in. adjustable wrench (2)  
8 in. pipe wrench  
11/16 in. open end wrench

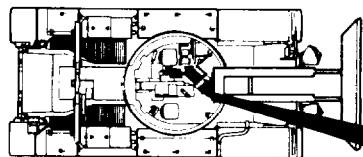
15/16 in. open end wrench  
1-1/4 in. open end wrench  
7/8 in. open end wrench

**SUPPLIES:** Drip pans (suitable containers)  
Rags (Item 12, Appendix D)  
Pipe tape (Item 19, Appendix D)

Pencil (Item 22, Appendix D)  
Masking tape (Item 18, Appendix D)  
Prefomed packing (4 required)

**REFERENCE:** LO 5-5420-202-12

**PRELIMINARY PROCEDURES:** Remove front quadrant (page 3-45)  
Relieve hydraulic pressure (page 3-71)



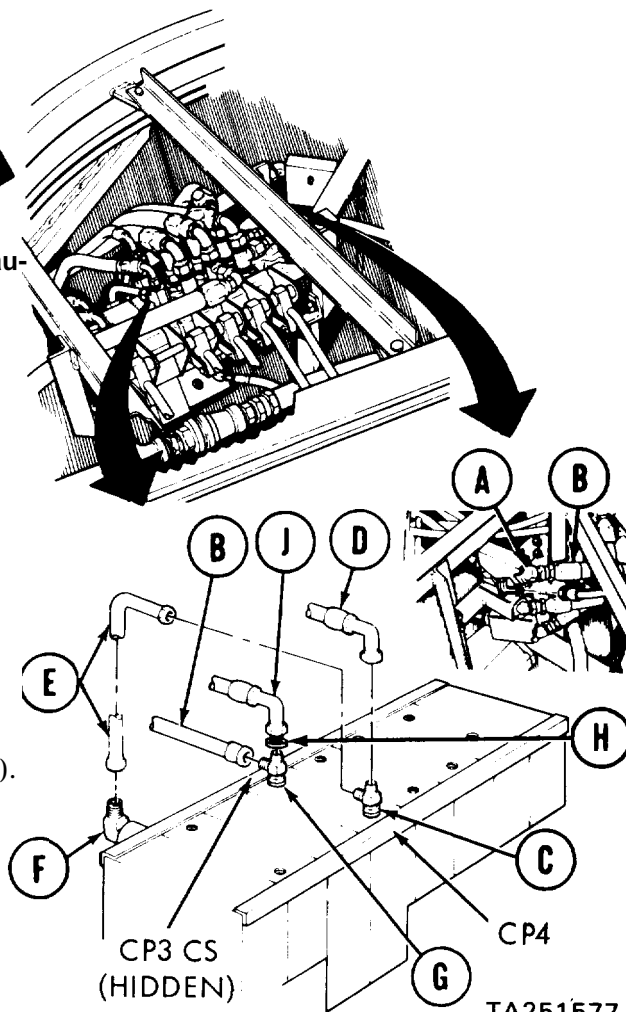
**QUADRANTS REMOVED FOR CLARITY**

**REMOVAL:**

**NOTE**

Use rags and drip pans to catch excess hydraulic fluid. Use masking tape tags to tag lines for installation.

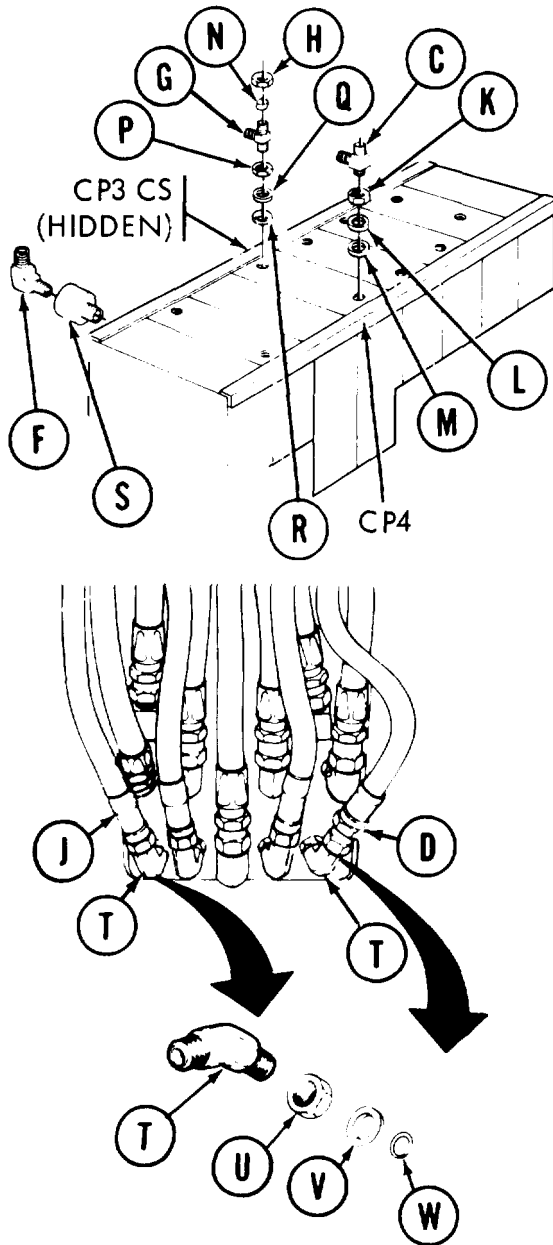
- Using adjustable wrench on elbow (A), use 1-1/4 inch wrench to remove hose assembly "CS" (B).
- Using adjustable wrench on tee (C), use adjustable wrench to disconnect hose assemblies "CP4" (D) and "EA1" (E).
- Using adjustable wrench on elbow (F), use 15/16 inch wrench to remove hose assembly "EA1" (E).
- Using adjustable wrench on tee (G), use 1-1/4 inch wrench to remove hose assembly "CS" (B).
- Using 1-1/4 inch wrench on nut (H), use 11/16 inch wrench to remove hose assembly "CP3" (J).



TA251577

Go on to Sheet 2

**LOCKING CYLINDER HOSE ASSEMBLIES (EA1, CP3, CP4 and CS) AND HYDRAULICS  
REPLACEMENT (Sheet 2 of 4)**



6. Holding tee (C) with adjustable wrench, use 1-1/4 inch wrench to loosen nut (K).
7. Using adjustable wrench, remove tee (C), nut (K), flat washer (L), and preformed packing (M). Throw preformed packing (M) away.
8. Using 1-1/4 inch wrench, remove nut (H) and sleeve (N) as an assembly from tee (G).
9. Push sleeve (N) out of nut (H).
10. Using adjustable wrench, remove tee (G), nut (P), flat washer (Q), and preformed packing (R). Throw preformed packing (R) away.
11. Using adjustable wrench on elbow (F) and pipe wrench on coupling (S), remove elbow (F).
12. Using pipe wrench, remove coupling (S).
13. Using adjustable wrench on elbows (T), use 7/8 inch wrench to remove hose assemblies "CP3" (J) and "CP4" (D).
14. Using adjustable wrench to hold elbows (T), use 7/8 inch wrench to loosen nuts (U).
15. Using adjustable wrench, remove two elbows (T), nuts-(U), flat washers (V), and preformed packings (W). Throw preformed packings (W) away.

**INSTALLATION:**

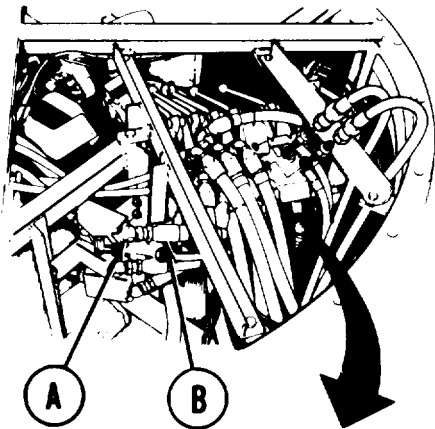
**NOTE**

Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

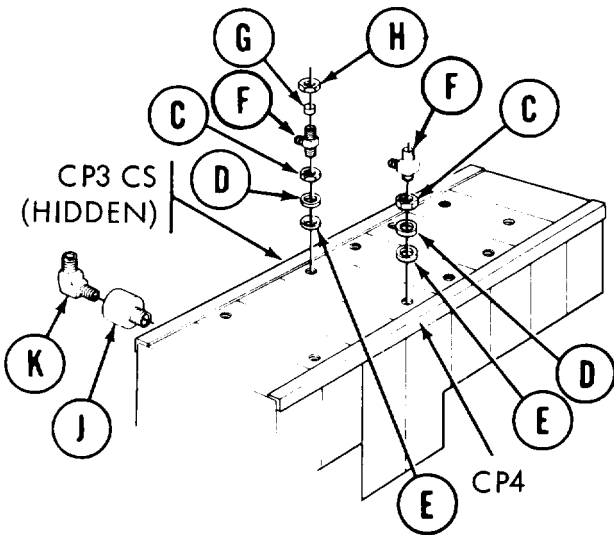
Go on to Sheet 3

TA251578

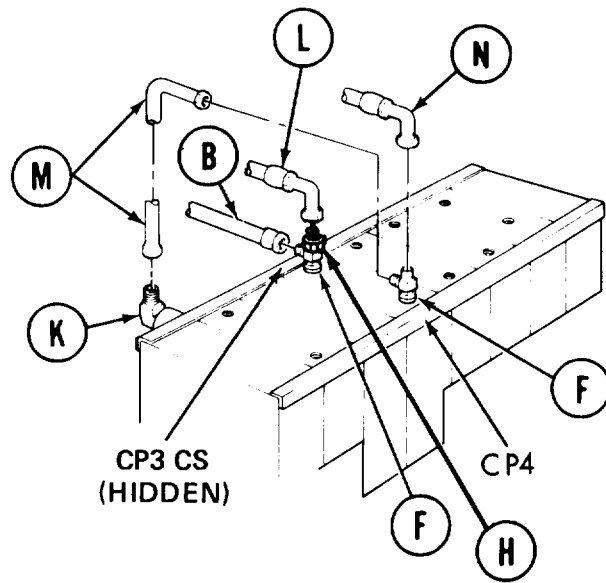
**LOCKING CYLINDER HOSE ASSEMBLIES (EA1, CP3, CP4 and CS) AND HYDRAULICS REPLACEMENT (Sheet 3 of 4)**



1. Using adjustable wrench on elbow (A), use 1-1/4 inch wrench to connect hose assembly "CS" (B).
2. Manually install nuts (C), flat washers (D), and new preformed packings (E) onto tees (F).
3. Using adjust able wrench, install tees (F). Aline tees (F) as shown.
4. Install sleeve (G) into nut (H).
5. Using 1-1/4 inch wrench, install nut (H) and sleeve (G) as an assembly on tee (F).
6. Using pipe wrench, install coupling (J).
7. Using pipe wrench on coupling (J), use adjustable wrench to install and aline elbow (K), as shown.



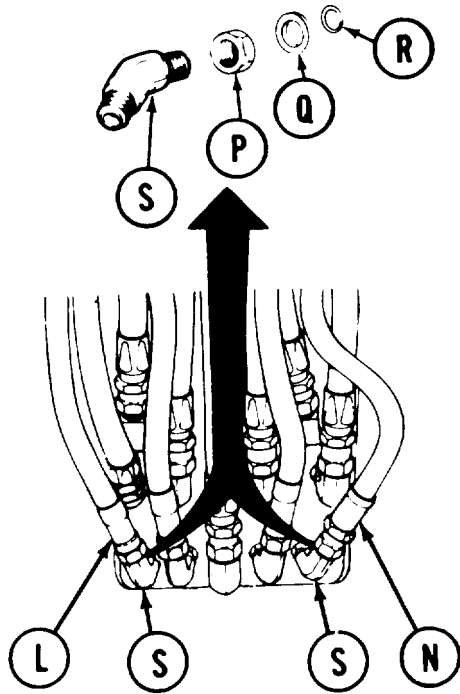
8. Using adjustable wrench to hold tee (F), use 1-1/4 inch wrench to install hose assembly "CS" (B).
9. Using 1-1/4 inch wrench on nut (H), use 11/16 inch open end wrench to connect hose assembly "CP3" (L).
10. Using adjustable wrench on tee (F), use adjustable wrench to connect hose assemblies "EA1" (M) and "CP4" (N).
11. Using adjust able wrench on elbow (K), use 15/16 inch wrench to install hose assembly "EA1" (M).



Go on to Sheet 4

TA251579

**LOCKING CYLINDER HOSE ASSEMBLIES (EA1, CP3, CP4 and CS) AND HYDRAULICS REPLACEMENT (Sheet 4 of 4)**



12. Manually install nuts (P), flat washers (O), and new preformed packings (R) on elbows (S).
13. Manually install and align elbows (S).
14. Using adjustable wrench to hold elbows (S), use 7/8 inch wrench to tighten nuts (P).
15. Using adjustable wrench on elbows (S), use 7/8 inch wrench to install hose assemblies "CP3" (L) and "CP4" (N).
16. Bleed hydraulic system (page 3-72).
17. Check for hydraulic leaks and correct as necessary.
18. Install front quadrant (page 3-46).
19. Service hydraulic reservoir (LO 5-5420-202-12).

End of Task

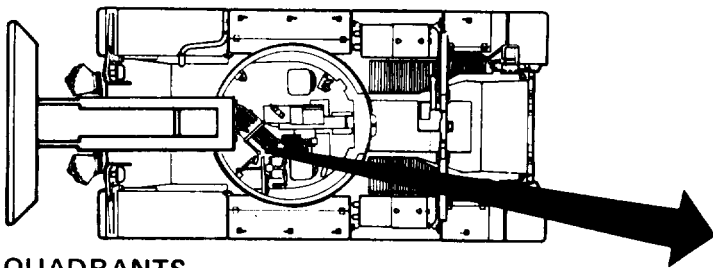
### SCISSORS CYLINDER HOSE ASSEMBLIES (DAI AND DA2) AND HYDRAULICS REPLACEMENT (sheet 1 of 2)

TOOLS: 1-1/4 in. open end wrench (2)  
12 in. adjustable wrench

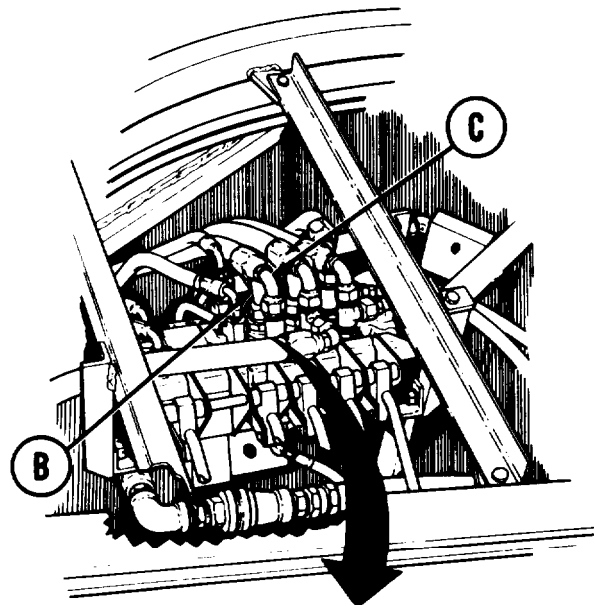
SUPPLIES: Drip pans (suitable containers)  
Rags (Item 12, Appendix D)  
Pipe tape (Item 19, Appendix D)  
Pencil (Item 22, Appendix D)  
Masking tape (Item 18, Appendix D)  
Preformed packings (4 required)

REFERENCE: LO 5-5420-202-12

PRELIMINARY PROCEDURES: Remove front quadrant (page 3-45)  
Relieve hydraulic pressure (Page 3-71)



QUADRANTS  
REMOVED FOR  
CLARITY

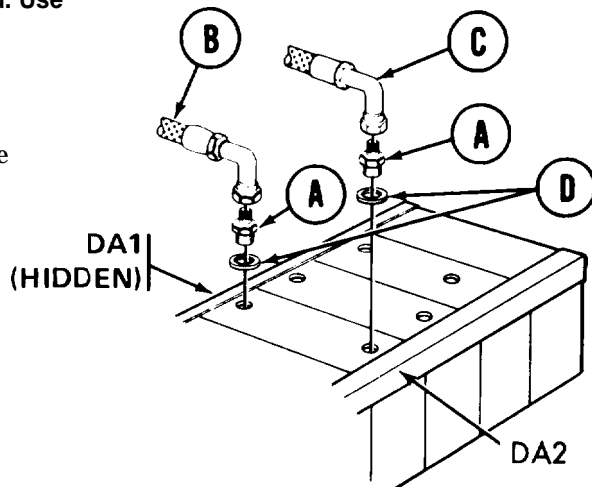


REMOVAL:

#### NOTE

Use rags and drip pans to catch excess hydraulic fluid. Use masking tape to tag lines for installation.

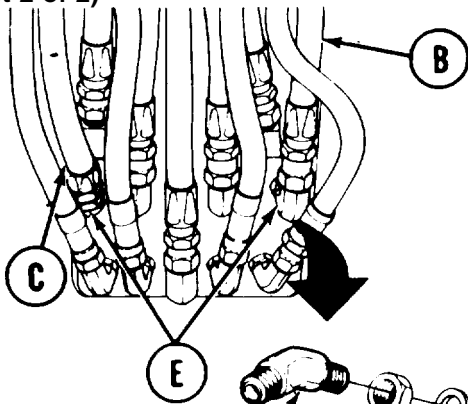
1. Using 1-1/4 inch wrench on adapters (A), use 1-1/4 inch wrench to disconnect hose assemblies "DA1" (B) and "DA2" (C).
2. Using 1-1/4 inch wrench, remove two adapters (A) and preformed packings (D). Throw preformed packings (D) away.



Go on to Sheet 2

TA251581

**SCISSORS CYLINDER HOSE ASSEMBLIES (DA1 AND DA2) AND HYDRAULICS REPLACEMENT**  
(sheet 2 of 2)



**INSTALLATION:**

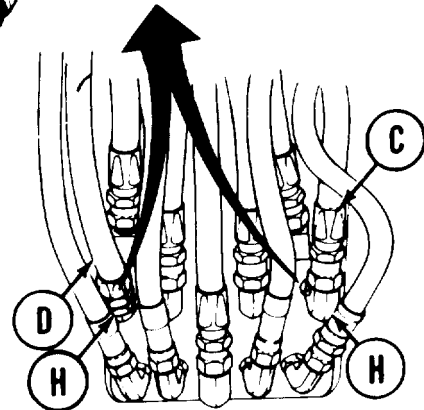
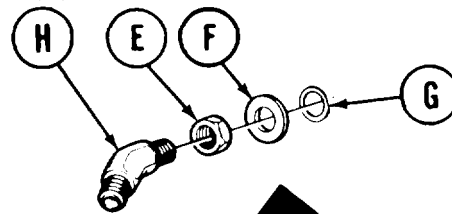
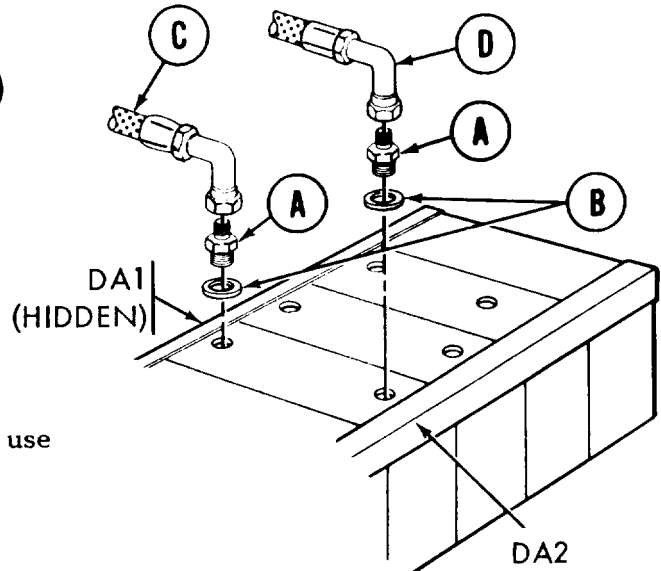


**NOTE**

Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

1. Using 1-1/4 inch wrench, install two adapters (A) and new preformed packings (B).
2. Using 1-1/4 inch wrench on adapters (A), use 1-1/4 inch wrench to connect hose assemblies "DA1" (C) and "DA2" (D).
3. Manually install nuts (E), flat washers (F), and new preformed packings (G) on elbows (H).
4. Manually install two elbows (H) and align elbows.
5. Using adjustable wrench to hold elbows (H), use 1-1/4 inch wrench to tighten elbow nuts (E).
6. Using adjustable wrench on elbows (H), use 1-1/4 inch wrench to install hose assemblies "DA1" (C) and "DA2" (D).
7. Bleed hydraulic system (page 3-72).
8. Check for hydraulic leaks and correct as necessary.
9. Install front quadrant (page 3-46).
10. Service hydraulic reservoir (LO 5-5420-202-12).

3. Using adjustable wrench on elbows (E), use 1-1/4 inch wrench to remove hose assemblies "DA1" (B) and "DA2" (C).
4. Using adjustable wrench to hold elbows (E), use 1-1/4 inch wrench to loosen elbow nuts (F).
5. Using adjustable wrench, remove two elbows (E), flat washers (G), nuts (F), and preformed packings (H). Throw away preformed packings (H).



End of Task

TA251582

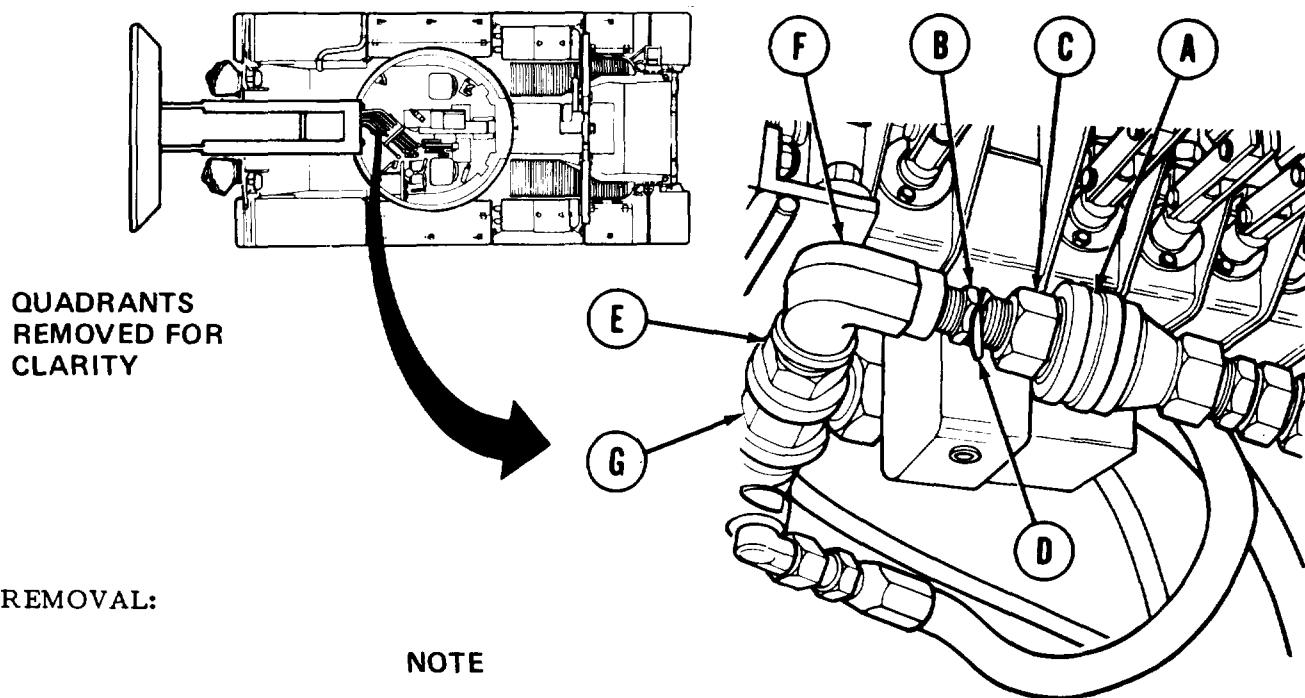
VALVE BANK RETURN PORT FITTINGS REPLACEMENT (Sheet 1 of 3)

TOOLS: 12 in. adjustable wrench  
1-1/4 in. open end wrench  
1-5/8 in. open end wrench  
1-1/8 in. open end wrench  
1-3/8 in. open end wrench  
15 in. adjustable wrench

SUPPLIES: Rags (Item 12, Appendix D)  
Drip pans (suitable containers)  
Pipe tape (Item 19, Appendix D)

REFERENCE: LO 5-5420-202-12

PRELIMINARY PROCEDURE: Relieve hydraulic pressure (page 3-71)



REMOVAL:

**NOTE**

Use rags and drip pans to catch excess hydraulic fluid.

1. Manually disconnect quick disconnect socket "BB" (A).
2. Using 1-3/8 inch wrench to hold nipple (B), use 1-5/8 inch wrench to remove quick disconnect plug (C) and collar (D).
3. Using 1-3/8 inch wrench, remove nipple (B).
4. Using 1-3/8 inch wrench to hold nipple (E), use 15 inch adjustable wrench to remove elbow (F).
5. Using 1-3/8 inch wrench, remove nipple (E) from tee (G).

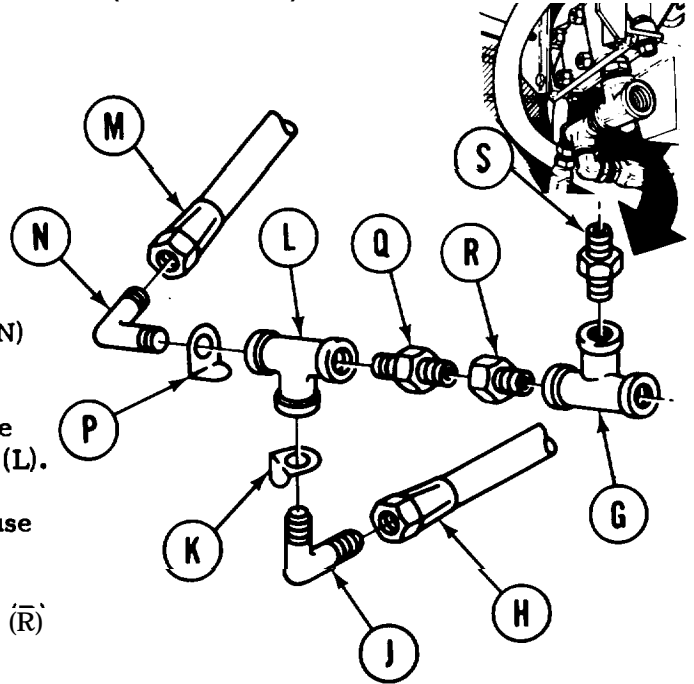
Go on to Sheet 2

TA251583



**VALVE BANK RETURN PORT FITTINGS REPLACEMENT (Sheet 2 of 3)**

6. Using 1-1/4 inch wrench, remove hose assembly, "CR" (H) from elbow (J).
7. Using 12 inch adjustable wrench, remove elbow (J) and collar (K) from tee (L).
8. Using 1-1/4 inch wrench, remove hose assembly "F" (M).
9. Using adjustable wrench, remove elbow (N) and collar (P).
10. Using 1-1/8 inch wrench on nipple (Q), use 12 inch adjustable wrench to remove tee (L).
11. Using 1-3/8 inch wrench on bushing (R), use 1-1/8 inch wrench to remove nipple (Q).
- 12\* Using 1-3/8 inch wrench, remove bushing (R) from tee (G).
13. While holding nipple (S) with 1-3/8 inch wrench, use 12 inch adjustable wrench to remove tee (G) from nipple (S).
14. Using 1-3/8 inch wrench, remove nipple (S) from valve bank.

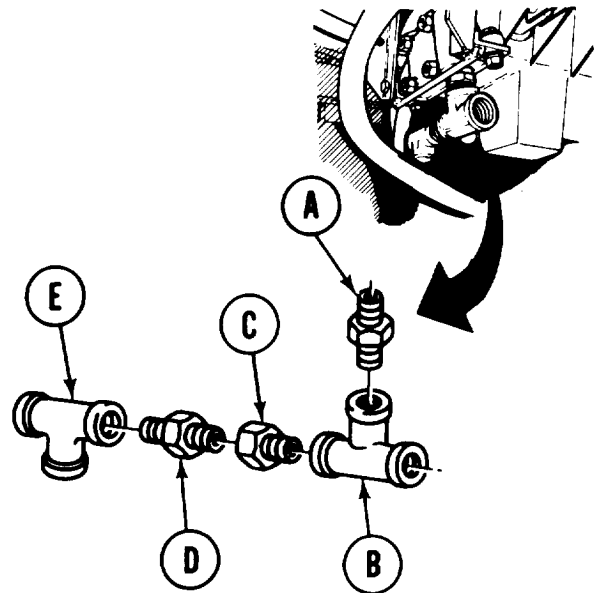


**INSTALLATION:**

**NOTE**

**Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.**

1. Using 1-3/8 inch wrench, install nipple (A) into valve bank.
2. Using 1-3/8 inch wrench to hold nipple (A), use 12 inch adjustable wrench to install tee (B).
3. Using 1-3/8 inch wrench, install bushing (C).
4. Using 1-3/8 inch wrench to hold bushing (C), use 1-1/8 inch wrench to install nipple (D).
5. Holding nipple (D) with 1-1/8 inch wrench~ use 12 inch adjustable wrench to install tee (E).

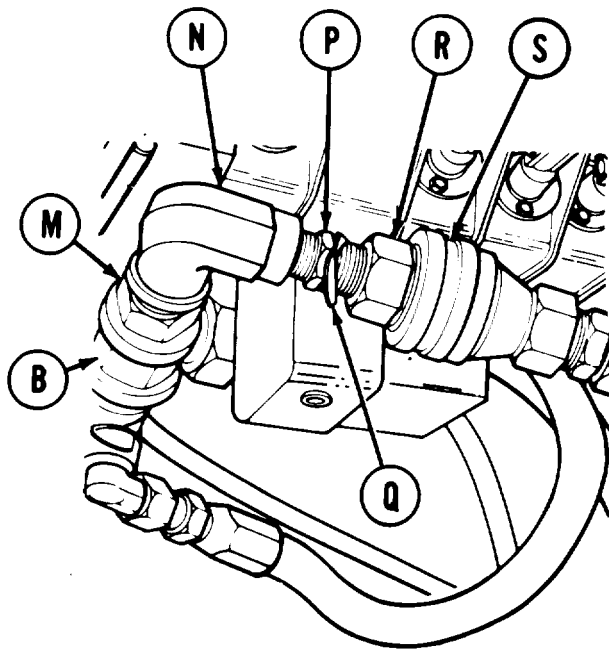
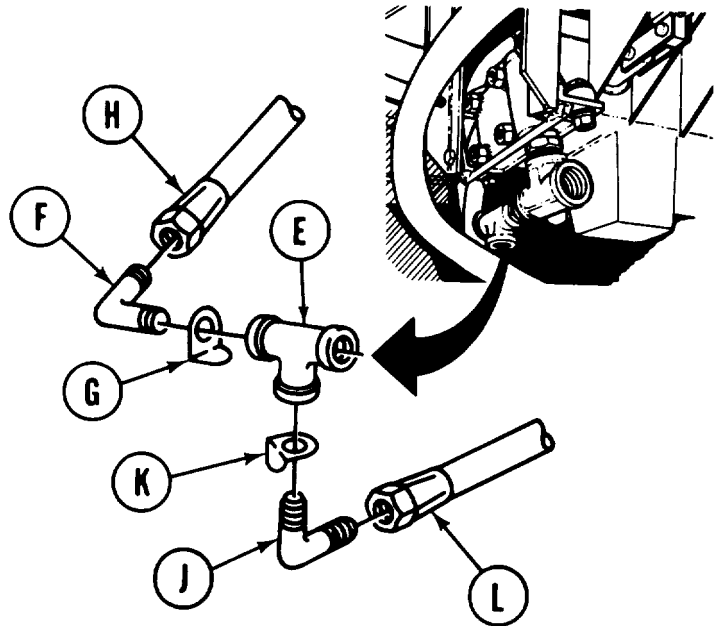


Go on to Sheet 3

TA251584

VALVE BANK RETURN PORT FITTINGS REPLACEMENT (Sheet 3 of 3)

6. Using 12 inch adjustable wrench, install elbow (F) and collar "F" (G) into tee (E).
7. Using 1-1/4 inch wrench, install hose assembly "F" (H).
8. Using 12 inch adjustable wrench, install elbow (J) and collar "CR" (K).
9. Using 1-1/4 inch wrench, install hose assembly "CR" (L).



10. Using 1-3/8 inch wrench, install nipple (M) on tee (B).
11. Holding nipple (M) with 1-3/8 inch wrench, use 15 inch adjustable wrench to install elbow (N) on nipple (M).
12. Using 1-3/8 inch wrench, install nipple (P) in elbow (N).
13. While holding nipple (P) with 1-3/8 inch wrench, use 1-5/8 inch wrench to install collar "BB" (Q) and quick disconnect plug (R) on nipple (P).
14. Manually connect quick disconnect socket "BB" (S) on plug (R).

15. Bleed hydraulic system (page 3-72).
16. Check for hydraulic leaks and correct as necessary.
17. Service hydraulic reservoir (LO 5-5420-202-12).

End of Task

TA251585

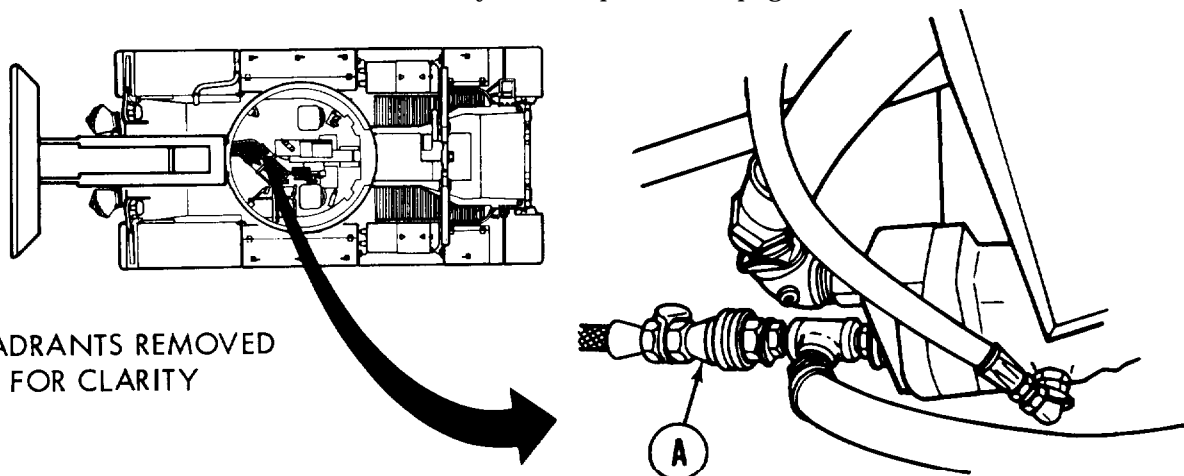
**PUMP-TO-VALVE BANK HOSE ASSEMBLY (CW) REPLACEMENT (Sheet 1 of 2)**

**TOOLS:** 1-1/2 in. open end wrench  
 1-5/8 in. open end wrench  
 12 in. adjustable wrench  
 1-3/8 in. open end wrench

**SUPPLIES:** Pipe tape (Item 19, Appendix D)  
 Rags (Item 12, Appendix D)  
 Drip pans (suitable containers)  
 Protective caps and plugs

**REFERENCE:** LO 5-5420-202-12

**PRELIMINARY PROCEDURE:** Relieve hydraulic pressure (page 3-71)

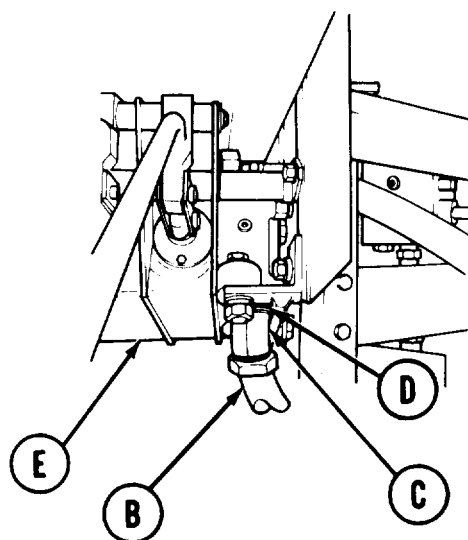


**REMOVAL:**

**NOTE**

Use drip pan and rags to catch excess hydraulic fluid. Cap or plug all lines and fittings as they are disconnected.

1. Using fingers, disconnect quick disconnect socket (A).
2. Using 1-1/2 inch wrench, remove hose assembly "CW" (B) from elbow (C).
3. Using adjustable wrench, remove elbow (C) and collar (D) from valve bank (E).

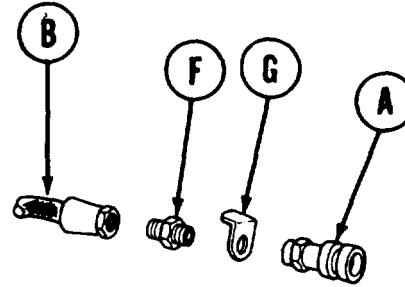


**Go on to Sheet 2**

TA251757

**PUMP-TO-VALVE BANK HOSE ASSEMBLY (CW) REPLACEMENT (Sheet 2 of 2)**

4. Using 1-1/2 inch wrench to hold adapter (F), use 1-5/8 inch wrench to remove quick disconnect (A).
5. Using 1-1/2 inch wrench to hold adapter (F), use 1-3/8 inch wrench to disconnect hose assembly (B) and collar (G).

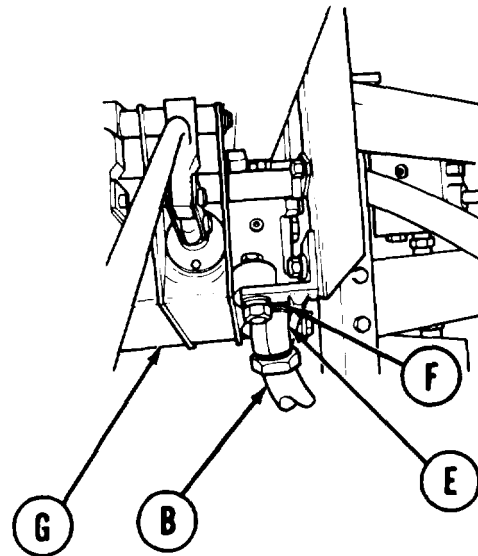
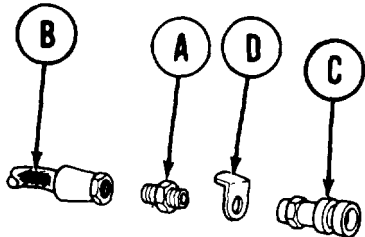


**INSTALLATION:**

**NOTE**

Before installation, use pipe tape on all male pipe threads. Start tape on second thread so tape will not enter hydraulic system. Remove all caps and plugs as necessary during installation.

1. Using 1-1/2 inch wrench to hold adapter (A), use 1-3/8 inch wrench to install hose assembly (B).
2. Using 1-1/2 inch wrench to hold adapter (A), use 1-5/8 inch wrench to install quick disconnect socket (C) and collar (D).
3. Using fingers, connect quick disconnect socket (C).



4. Using adjustable wrench, install elbow (E) and collar (F) on valve bank (G).
5. Using 1-1/2 inch wrench, connect end of hose assembly "CW" (B) on elbow (E).

6. Bleed hydraulic system (page 3-72).
7. Check for hydraulic leaks and correct as necessary.
8. Service hydraulic reservoir (LO 5-5420-202-12).

End of Task

TA251586

**RESERVOIR-TO-VALVE BANK RETURN HOSE ASSEMBLY (BB) REPLACEMENT (Sheet 1 of 3)**

**TOOLS:** 1-3/8 in. open end wrench  
 1-1/2 in. open end wrench  
 1-5/8 in. open end wrench

**SUPPLIES:** Pipe tape (Item 19, Appendix D)  
 Drip pans (suitable containers)  
 Rags (Item 12, Appendix D)

**REFERENCE:** LO 5-5420-202-12

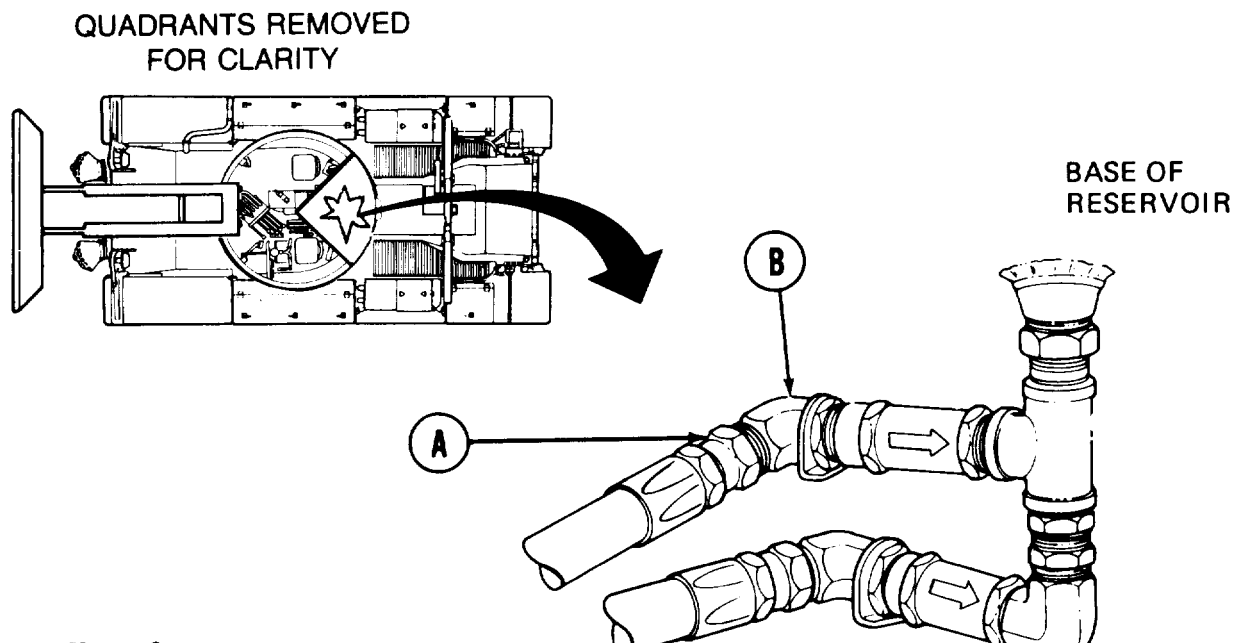
**PRELIMINARY PROCEDURE:** Drain hydraulic reservoir (page 3-74)

**REMOVAL:**

**NOTE**

Use rags and drip pans to catch hydraulic fluid trapped in line.

- Using 1-1/2 inch wrench, disconnect hose assembly "BB" (A) from elbow (B).

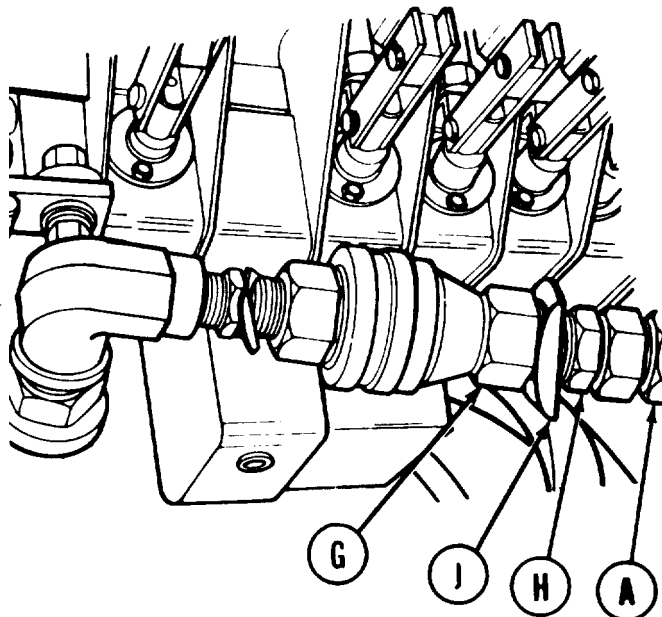


**Go on to Sheet 2**

TA251587

RESERVOIR-TO-VALVE BANK RETURN HOSE ASSEMBLY (BB) REPLACEMENT (Sheet 2 of 3)

- Using fingers, disconnect quick disconnect coupling half (G).
- Using 1-3/8 inch wrench on adapter (H), use 1-5/8 inch wrench to remove quick disconnect coupling half (G) and collar "BB" (J).
- Using 1-3/8 inch wrench on adapter (H), use 1-1/2 inch wrench on hose assembly "BB" (A) and remove adapter (H).

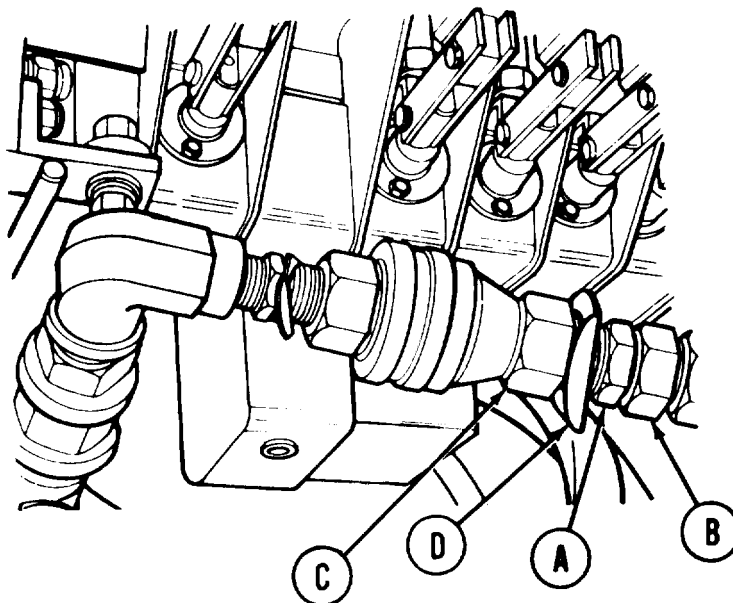


INSTALLATION:

NOTE

Before installation, use pipe tape on all male pipe threads. Start tape on second thread so tape will not enter hydraulic system.

- Using 1-3/8 inch wrench on adapter (A), use 1-1/2 inch wrench to connect hose assembly "BB" (B).
- Using 1-3/8 inch wrench on adapter (A), use 1-5/8 inch wrench to install quick disconnect coupling half (C) and collar "BB" (D).
- Using fingers, connect quick disconnect coupling half (C).

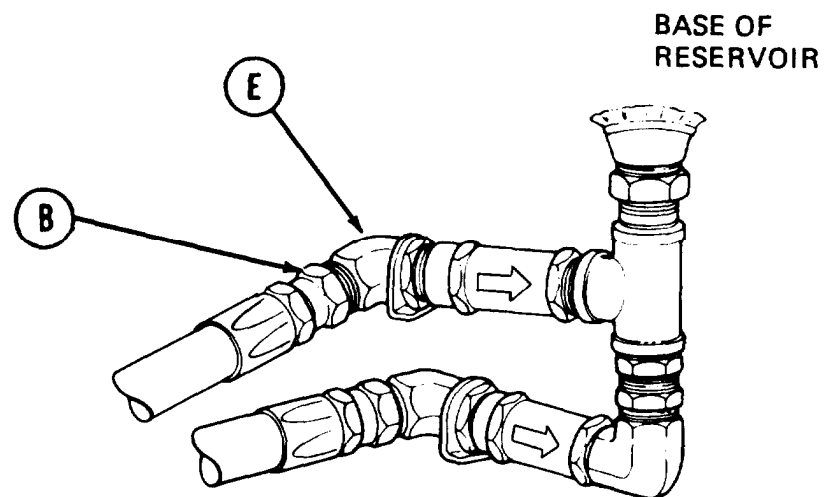


Go on to Sheet 3

TA251588

RESERVOIR-TO-VALVE BANK RETURN HOSE ASSEMBLY (BB) REPLACEMENT (Sheet 3 of 3)

4. Using 1-1/2 inch wrench, install hose assembly "BB" (B) on elbow (E).
5. Service hydraulic reservoir (LO 5-5420-202-12).
6. Bleed hydraulic system (page 3-72).
7. Check for hydraulic leaks and correct as necessary.
8. Service hydraulic reservoir (LO 5-5420-202-12).



End of Task

TA251589

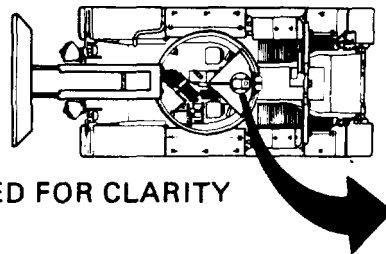
RESERVOIR-TO-PUMP HOSE ASSEMBLY (CV5) REPLACEMENT (Sheet 1 of 3)

TOOLS: 7/8 in. open end wrench  
1-1/8 in. open end wrench  
1-7/16 in. open end wrench  
1-3/4 in. open end wrench  
12 in. adjustable wrench

SUPPLIES: Pipe tape (Item 19, Appendix D)  
Drip pans (suit able containers)  
Rags (Item 12, Appendix D)  
Masking tape (Item 18, Appendix D)  
Pencil (Item 22, Appendix D)

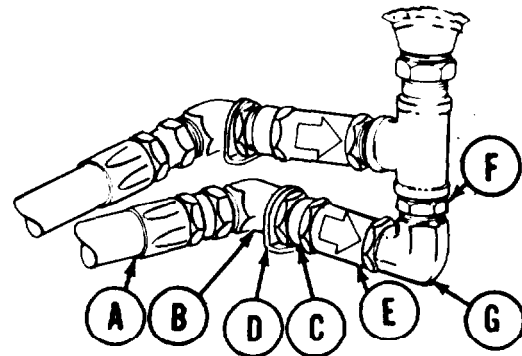
REFERENCE: LO 5-5420-202-12

PRELIMINARY PROCEDURE: Drain hydraulic reservoir (page 3-74)



QUADRANTS REMOVED FOR CLARITY

BASE OF RESERVOIR



REMOVAL:

NOTE

Use drip pan and rags to catch hydraulic fluid trapped in lines. Use masking tape to tag lines for installation.

1. Using 7/8 inch wrench, disconnect hose assembly "CV5" (A) from elbow (B).
2. Using 1-1/8 inch wrench to hold bushing (C), use adjustable wrench to remove elbow (B) and collar (D).
3. Using 1-7/16 inch wrench to hold check valve (E), use 1-1/8 inch wrench to remove bushing (C).
4. Using 1-7/16 inch wrench, remove check valve (E).
5. Using 1-3/4 inch wrench to hold bushing (F), use adjustable wrench to remove elbow (G).

Go on to Sheet 2

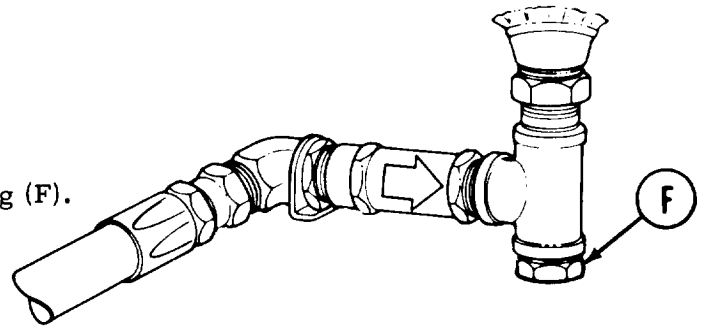
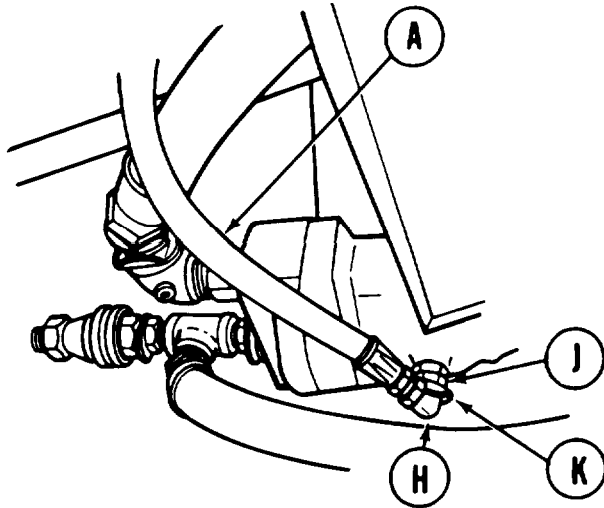
TA251590



RESERVOIR-TO-PUMP HOSE ASSEMBLY (CV5) REPLACEMENT (Sheet 2 of 3)

BASE OF RESERVOIR

6. Using 1-3/4 inch wrench, remove bushing (F).



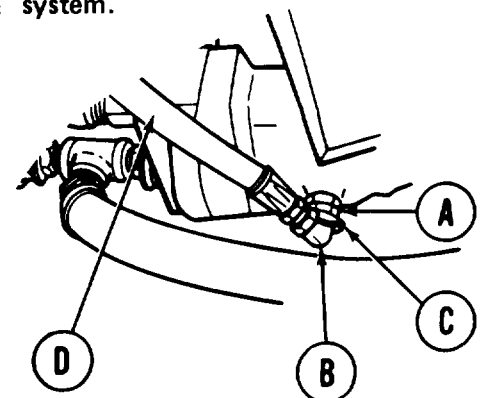
7. Using 7/8 inch wrench, remove hose assembly "CV5" (A) from elbow (H).
8. Using 1-1/8 inch wrench to hold bushing (J), use adjustable wrench to remove elbow (H) and collar (K).
9. Using 1-1/8 inch wrench, remove bushing (J).

INSTALLATION:

NOTE

Before installing fittings, use pipe tape on male threads. Start tape on second thread so tape will not enter hydraulic system.

1. Using 1-1/8 inch wrench, install bushing (A).
2. Using 1-1/8 inch wrench to hold bushing (A), use adjustable wrench to install elbow (B) and collar (C).
3. Using 7/8 inch wrench, connect hose assembly "CV5" (D) on elbow (B).

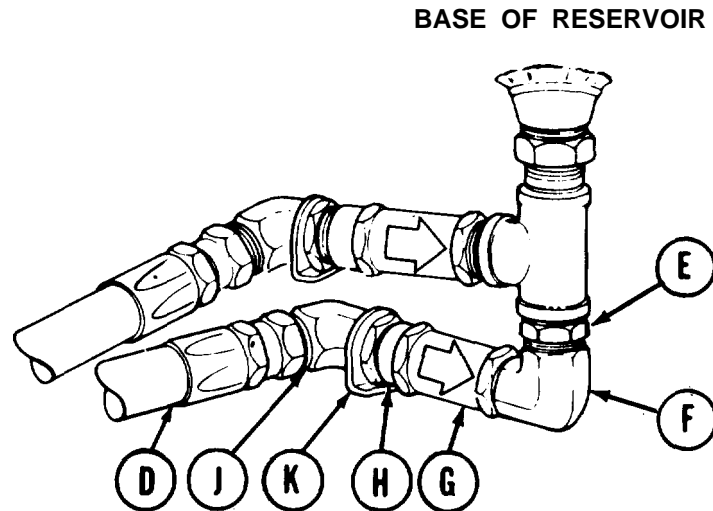


Go on to Sheet 3

TA251591

RESERVOIR-TO-PUMP HOSE ASSEMBLY (CV5) REPLACEMENT (Sheet 3 of 3)

4. Using 1-3/4 inch wrench, install bushing (E).
5. Using 1-3/4 inch wrench to hold bushing (E), use adjustable wrench to install elbow (F).



6. Using 1-7/16 inch wrench, install check valve (G) with flow arrow pointing to elbow (F).
7. Using 1-7/16 inch wrench to hold check valve (G), use 1-1/8 inch wrench to install bushing (H).
8. Using 1-1/8 inch wrench to hold bushing (H), use adjustable wrench to install elbow (J) and collar (K).
9. Using 7/8 inch wrench, install hose assembly "CV5" (D).
10. Service hydraulic reservoir (LO 5-5420-202-12).
11. Bleed hydraulic system (page 3-72).
12. Check for hydraulic leaks and correct as necessary.
13. Service hydraulic reservoir (LO 5-5420-202-12).

End of Task

TA251592

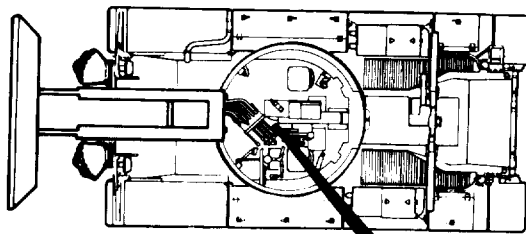
**MASTER RELIEF VALVE-TO-PUMP HOSE ASSEMBLY (6A) REPLACEMENT (Sheet 1 of 3)**

**TOOLS:** 1-1/2 in. open end wrench  
 12 in. adjustable wrench  
 7/16 in. combination wrench

**SUPPLIES:** Drip pans (suitable containers)  
 Rags (Item 12, Appendix D)  
 Pipe tape (Item 19, Appendix D)

**REFERENCES:** LO 5-5420-202-12

**PRELIMINARY PROCEDURE:** Drain hydraulic reservoir (page 3-74)



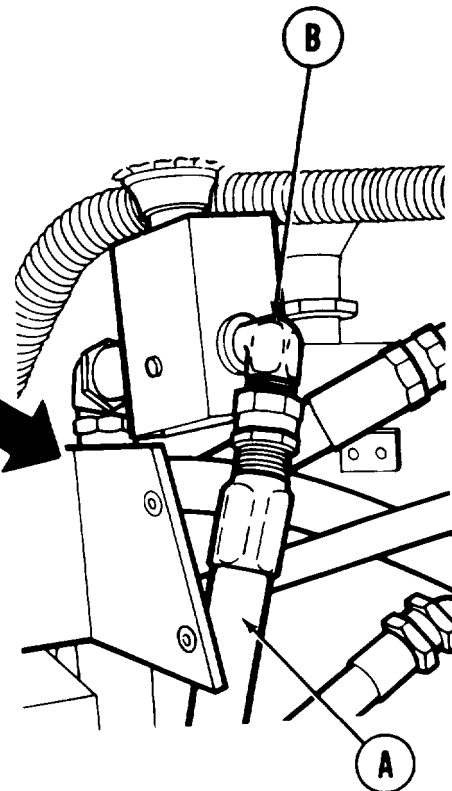
**QUADRANTS REMOVED FOR CLARITY**

**REMOVAL:**

**NOTE**

Use drip pan and rags to catch hydraulic fluid caught in lines.

1. Using 1-1/2 inch wrench, remove hose assembly "BA" (A) from elbow (B).

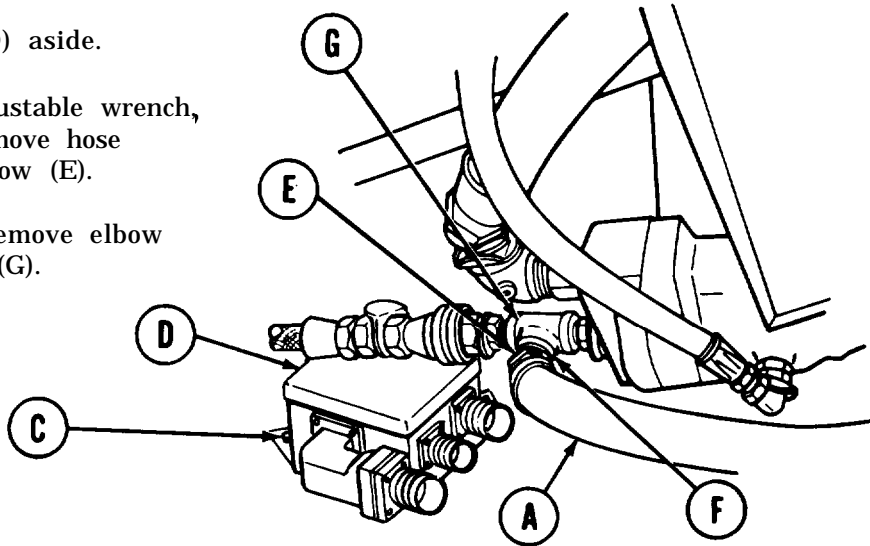


**Go on to Sheet 2**

**TA251593**

MASTER RELIEF VALVE-TO-PUMP HOSE ASSEMBLY (BA) REPLACEMENT (Sheet 2 of 3)

2. Using 7/16 inch wrench, remove two screws (C).
3. Move interconnector box (D) aside.
4. Holding elbow (E) with adjustable wrench, use open end wrench to remove hose assembly "BA" (A) from elbow (E).
5. Using adjustable wrench, remove elbow (E) and collar (F) from tee (G).

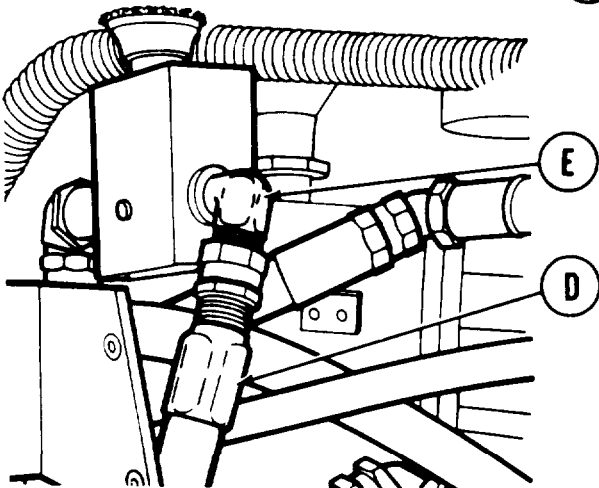
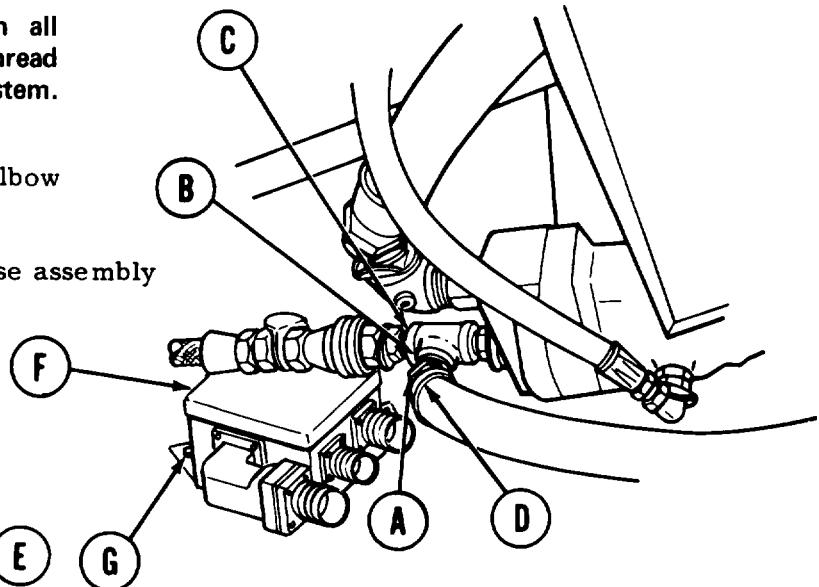


INSTALLATION:

NOTE

Before installing, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

1. Using adjustable wrench, install elbow (A) and collar (B) in tee (C).
2. Using open end wrench, install hose assembly "BA" (D) on elbow (A).



3. Using open end wrench, install hose assembly "BA" (D) on elbow (E).
4. Place interconnector box (F) in position.
5. Using 7/16 inch wrench, install two screws (G).
6. Service hydraulic reservoir (LO 5-5420-202-12).

Go on to Sheet 3

TA251594

**MASTER RELIEF VALVE-TO-PUMP HOSE ASSEMBLY (BA) REPLACEMENT (Sheet 3 of 3)**

7. Bleed hydraulic system (page 3-72).
8. Check for hydraulic leaks and correct as necessary.
9. Service hydraulic reservoir (LO 5-5420-202-12).

End of Task

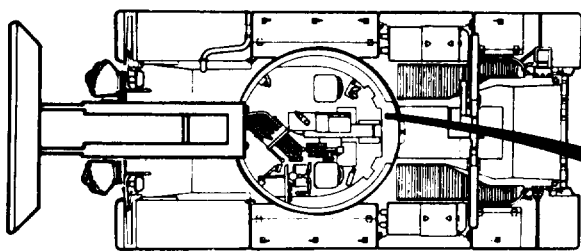
FILTER-TO-PUMP HOSE ASSEMBLY (CZ) REPLACEMENT (Sheet 1 of 3)

TOOLS: 15 in. adjustable wrench  
14 in. pipe wrench

SUPPLIES: Pipe tape (Item 19, Appendix D)  
Drip pans (suitable containers)  
Rags (Item 12, Appendix D)

REFERENCE: LO 5-5420-202-12

PRELIMINARY PROCEDURE: Drain hydraulic reservoir (page 3-74)



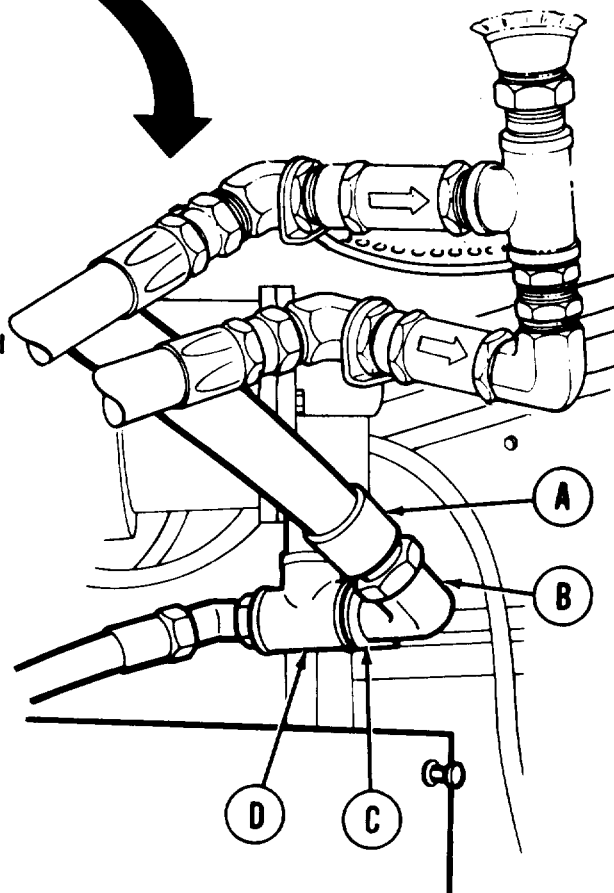
QUADRANTS REMOVED FOR CLARITY

REMOVAL:

NOTE

Use drip pans and rags to catch hydraulic fluid trapped in lines.

1. Using adjustable wrench, remove hose assembly "CZ" (A) from elbow (B).
2. Using adjustable wrench, remove elbow (B) and collar (C) from tee (D).



Go on to Sheet 2

TA251596

FILTER-TO-PUMP HOSE ASSEMBLY (CZ) REPLACEMENT (Sheet 2 of 3)

3. Use adjustable wrench to remove hose assembly "CZ" (A) from elbow (E).
4. Using adjustable wrench, remove elbow (E) and collar (F) from elbow (G).
5. Holding bushing (H) with adjustable wrench, use pipe wrench to remove elbow (G) from bushing (H).
6. Using adjustable wrench, remove bushing (H).

NOTE

Nipple (J) may come out with bushing (H). If it does, nipple (J) may be used again.

7. Using pipe wrench, remove nipple (J) from pump (K) and throw nipple (J) away.

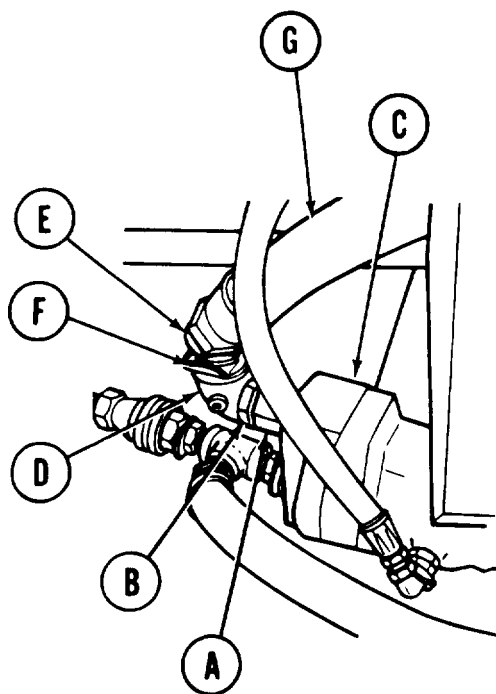
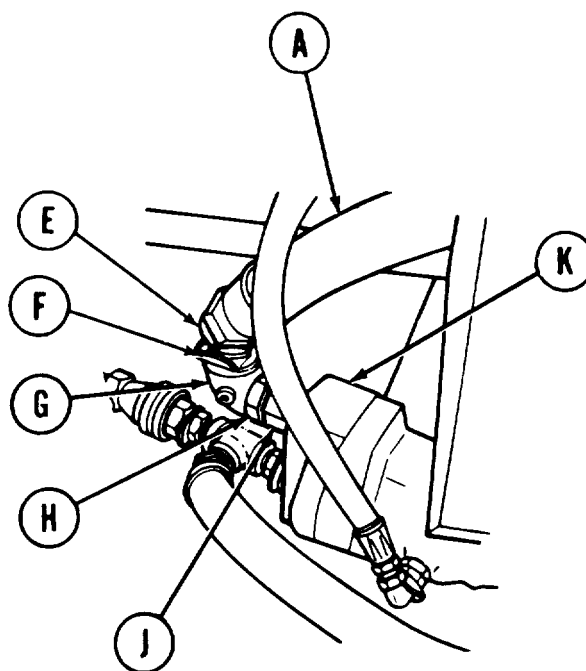
INSTALLATION:

NOTE

. Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

. If nipple (A) was not thrown out during removal, start this procedure at step 2.

1. Manually install new nipple (A) in bushing (B).
2. Using adjustable wrench, install bushing (B) and nipple (A) in pump (C).
3. Using adjustable wrench to hold bushing (B), use pipe wrench to install elbow (D) on bushing (B).
4. Using adjustable wrench, install elbow (E) and collar (F) on elbow (D).
5. Using adjustable wrench, install hose assembly "CZ" (G) on elbow (E).

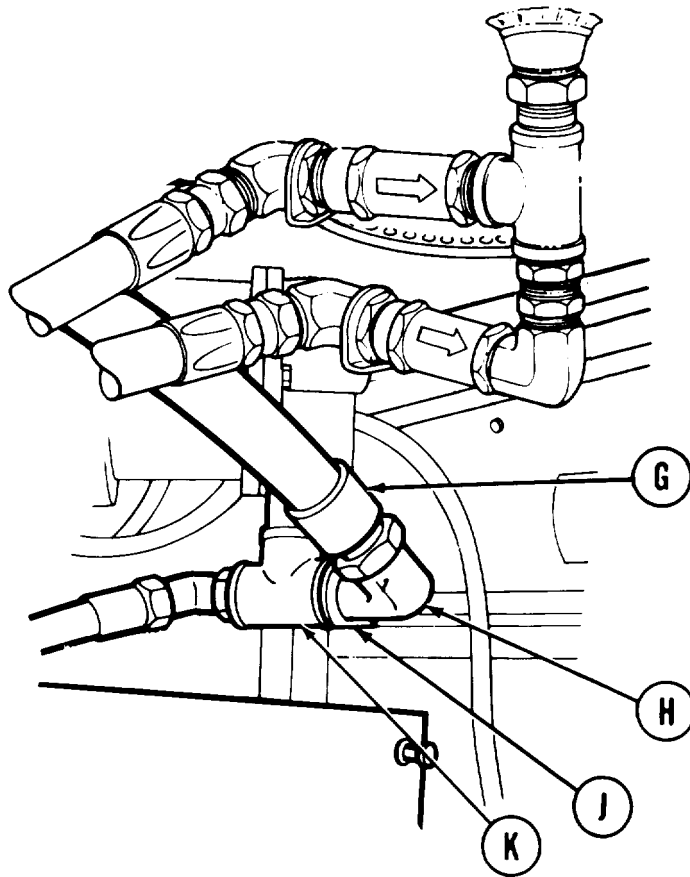


Go on to Sheet 3

## TM 5-5420-228-24

FILTER-TO-PUMP HOSE ASSEMBLY (CZ) REPLACEMENT (Sheet 3 of 3)

6. Using adjustable wrench, install elbow (H) and collar (J) on tee (K).
7. Using adjustable wrench, install hose assembly "CZ" (G) on elbow (H).
8. Service hydraulic reservoir (LO 5-5420-202-12).
9. Bleed hydraulic system (page 3-72).
10. Check for hydraulic leaks and correct as necessary.
11. Service hydraulic reservoir (LO 5-5420-202-12).



End of Task

TA251597



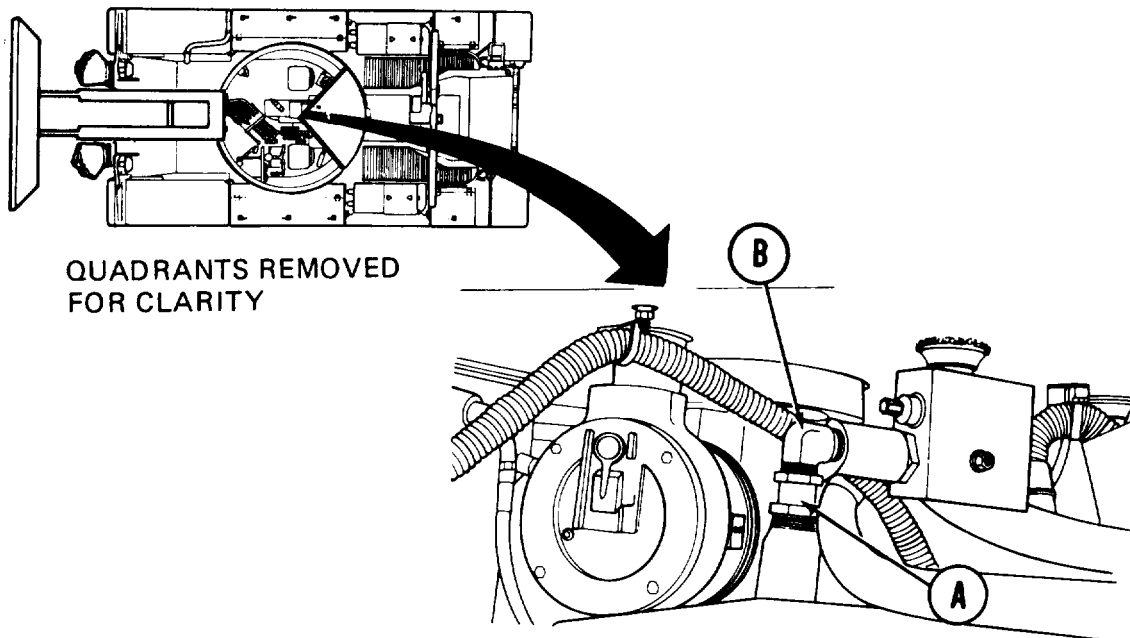
RESERVOIR-TO-FILTER HOSE ASSEMBLY (CY) REPLACEMENT (Sheet 1 of 3)

TOOLS: 1-1/2 in. open end wrench  
 15 in. adjustable wrench  
 12 in. adjustable wrench

SUPPLIES: Drip pans (suitable containers)  
 Rags (Item 12, Appendix D)  
 Pipe tape (Item 19, Appendix D)

REFERENCE: LO 5-5420-202-12

PRELIMINARY PROCEDURE: Drain hydraulic reservoir (page 3-74)



REMOVAL:

NOTE

Use drip pan and rags to catch hydraulic fluid trapped in lines.

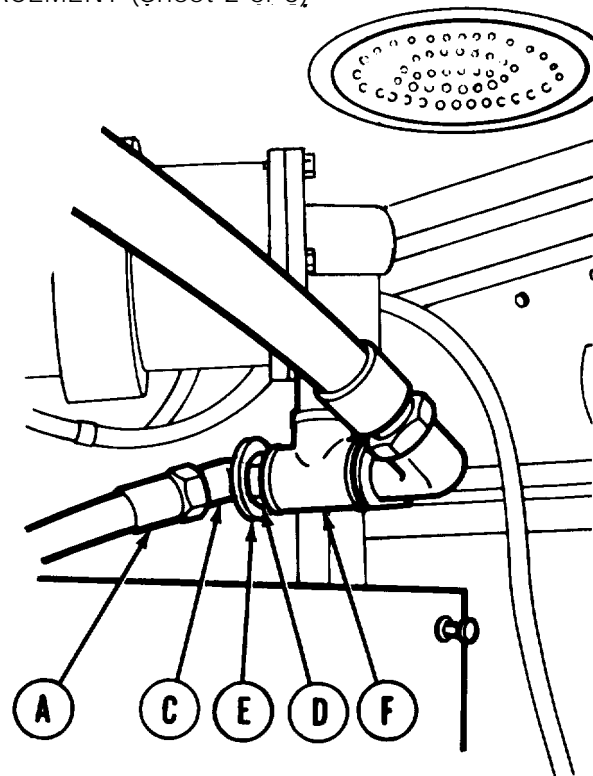
1. Using 1-1/2 inch wrench, disconnect hose assembly "CY" (A) from elbow (B).

Go on to Sheet 2

TA251598

RESERVOIR-TO-FILTER HOSE ASSEMBLY (CY) REPLACEMENT (Sheet 2 of 3)

2. Using 1-1/2 inch wrench, remove hose assembly "CY" (A) from elbow (C).
3. Using 15 inch adjustable wrench to hold bushing (D), use 12 inch adjustable wrench to remove elbow (C) and collar (E) from bushing (D).
4. Using 15 inch adjustable wrench, remove bushing (D) from tee (F).

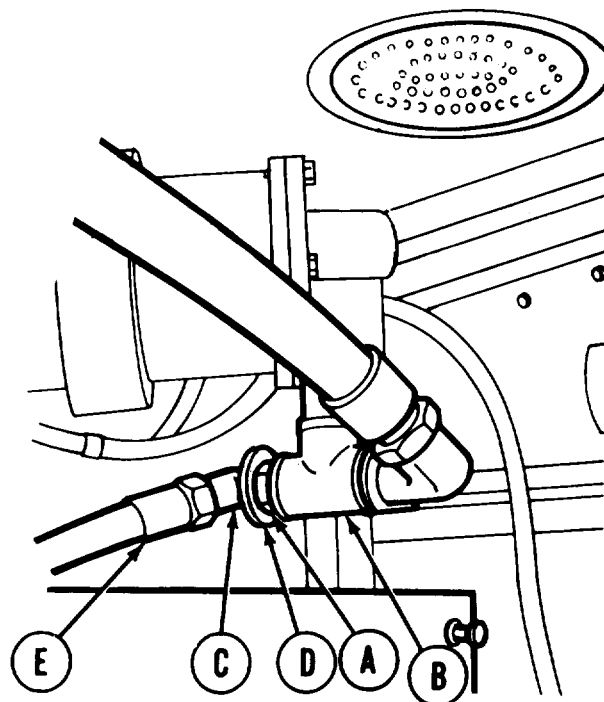


**INSTALLATION:**

**NOTE**

Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

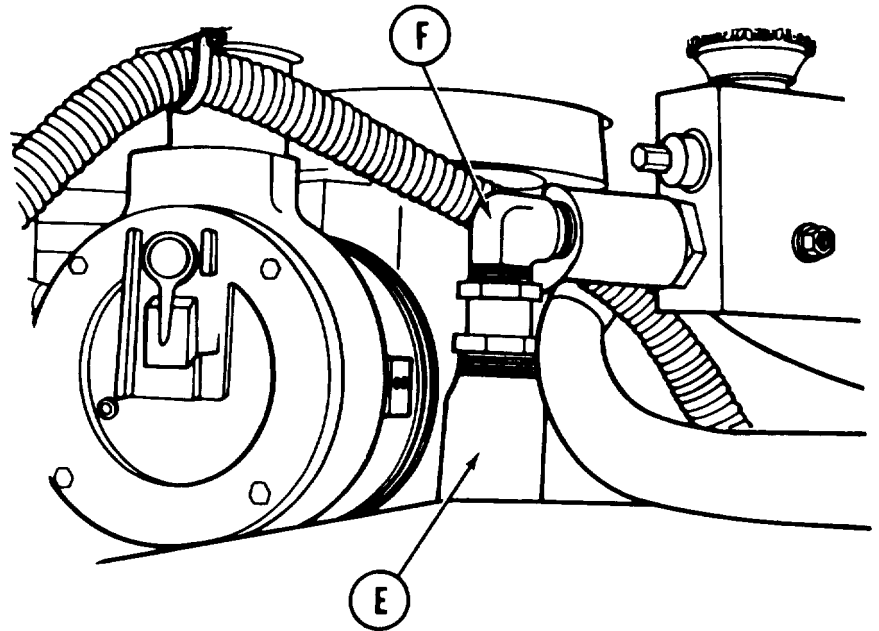
1. Using 15 inch adjustable wrench, install bushing (A) in tee (B).
2. Using 15 inch adjustable wrench to hold bushing (A), use 12 inch adjustable wrench to install elbow (C) and collar (D) in bushing (A).
3. Using 1-1/2 inch wrench, install hose assembly "CY" (E) on elbow (C).



Go on to Sheet 3

TA251599

RESERVOIR-TO-FILTER HOSE ASSEMBLY (CY) REPLACEMENT (Sheet 3 of 3)



4. Using 1-1/2 inch wrench, install hose assembly "CY" (E) on elbow (F).
5. Service hydraulic reservoir (LO 5-5420-202-12).
6. Bleed hydraulic system (page 3-72).
7. Check for hydraulic leaks and correct as necessary.
8. Service hydraulic reservoir (LO 5-5420-202-12).

End of Task

SERVICING HYDRAULIC RESERVOIR FILTER ASSEMBLY (Sheet 1 of 2)

**TOOLS:** Flat-tip screwdriver (small)  
1/2 in. socket with 1/2 in. drive  
Ratchet with 1/2 in. drive

**SUPPLIES:** Reformed packings  
Container (approx. 2 gal.)  
Lockwashers (4 required)  
Rags (Item 12, Appendix D)  
Dry cleaning solvent (Item 15, Appendix D)  
Gloves (Item 27, Appendix D)

**REFERENCE:** LO 5-5420-202-12

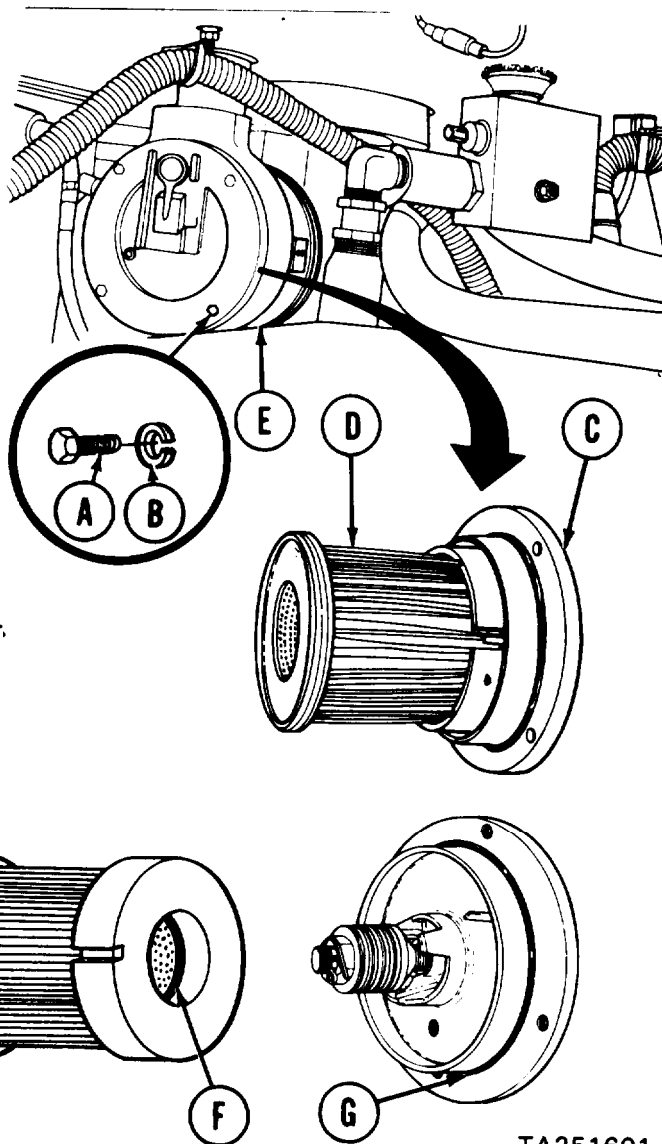
**PRELIMINARY PROCEDURE:** Relieve hydraulic pressure (page 3-71)

**REMOVAL:**

**NOTE**

- . A built in shut off will block the flow of fluid from reservoir when filter element is removed.
- . Use container to catch hydraulic fluid trapped in line.

1. Using socket, remove four screws (A) and lockwashers (B).
2. Pull cover (C) and attached filter element (D) from housing (E).
3. Pull filter element (D) loose from cover (C).
4. Using screwdriver, remove and throw away two preformed packings (F and G).



Go on to Sheet 2

TA251601

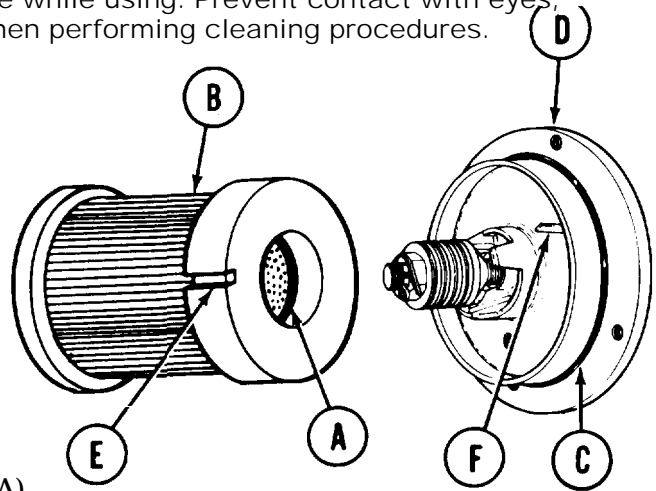
SERVICING HYDRAULIC RESERVOIR FILTER ASSEMBLY (Sheet 2 of 2)

CLEANING AND INSPECTION:

**WARNING**

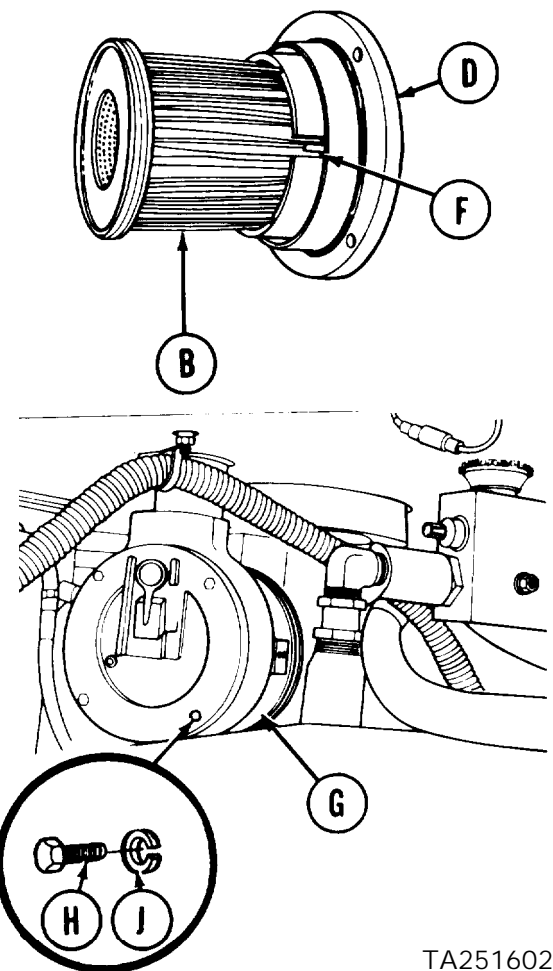
Cleaning agent specified is flammable. Use only in well ventilated areas. Keep away from flames, sparks, or heat. Do not smoke while using. Prevent contact with eyes, mouth, and/or skin. Wear rubber gloves when performing cleaning procedures.

1. Using rags and dry cleaning solvent, clean all parts.
2. Inspect filter element for damage, cracks, or deterioration. Replace filter element if defective (page 3-211).
- 3.



INSTALLATION:

1. Manually install new preformed packing (A) in filter element (B).
2. Manually install new preformed packing (C) in cover (D).
3. Align groove (E) of filter element (B) with tab (F) on cover (D) and press filter element (B) on cover (D) until tab (F) snaps in place.
4. Insert assembled filter element (B) and cover (D) in housing (G) and align screw holes.
5. Manually install four screws (H) and new lockwashers (J).
6. Using socket, tighten four screws (H).
7. Service hydraulic reservoir (LO 5-5420-202-12).
8. Bleed hydraulic system (page 3-72).
9. Check for hydraulic leaks and correct as necessary.
10. Service hydraulic reservoir (LO 5-5420-202-12).



End of Task

TA251602

## TM 5-5420-228-24

### HYDRAULIC FLUID FILTER ASSEMBLY REPLACEMENT (Sheet 1 of 3)

**TOOLS:** 7/16 in. open end wrench  
1-1/2 in. open end wrench  
15 in. adjustable wrench

1/4 in. socket head screw key  
18 in. pipe wrench  
Vise

**SUPPLIES:** Drip pan (suitable containers)  
Rags (Item 12, Appendix D)  
Lockwasher  
Pipe tape (Item 19, Appendix D)

**REFERENCE:** LO 5-5420-202-12

**PRELIMINARY PROCEDURE:** Drain hydraulic reservoir (page 3-74)

#### REMOVAL:

##### NOTE

Use drip pan to catch hydraulic fluid trapped in filter assembly (A).

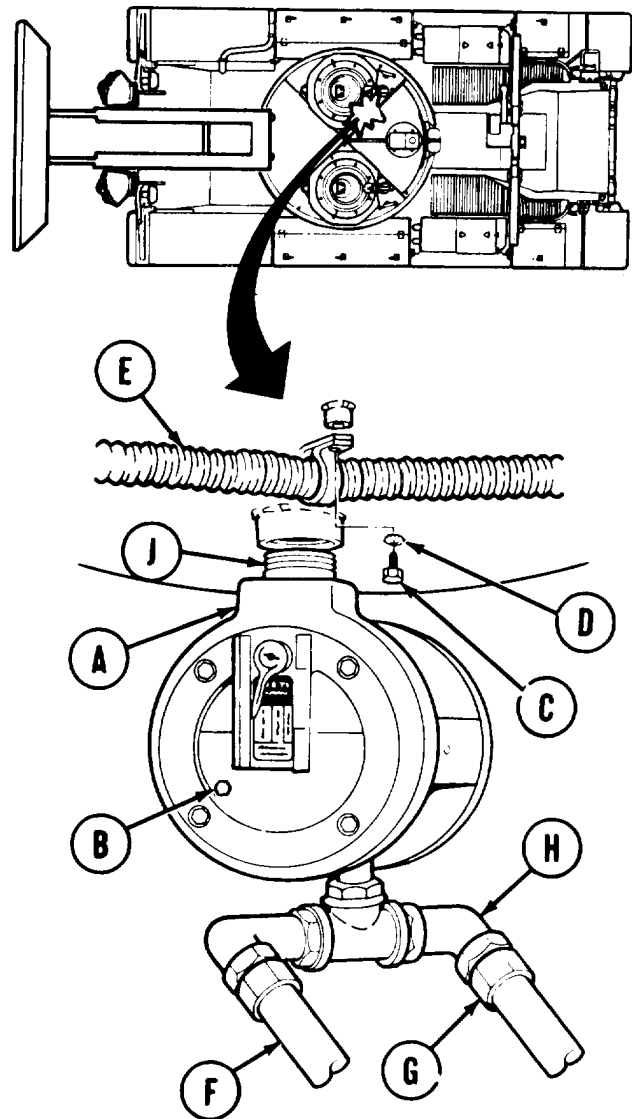
1. Using 1/4 inch screw key, remove pipe plug (B).
2. After hydraulic fluid has stopped draining from filter assembly (A), use 1/4 inch screw key to install plug (B) in filter assembly (A).
3. Using 7/16 inch wrench, remove screw (C) and lockwasher (D).
4. Lower hose (E) to allow access to filter assembly (A).

##### NOTE

Use rags and drip pan to catch hydraulic fluid trapped in hoses (F and G).

5. Using 1-1/2 inch wrench, remove hose assembly "CY" (F).
6. Using adjustable wrench, remove collar and hose assembly "CZ" (G).
7. Using adjustable wrench, remove elbow (H).
8. Using pipe wrench, remove nipple (J) with filter assembly (A) attached.
9. Place filter assembly (A) in vise.

Go on to Sheet 2



TA251603

HYDRAULIC FLUID FILTER ASSEMBLY Replacement (Sheet 2 of 3)

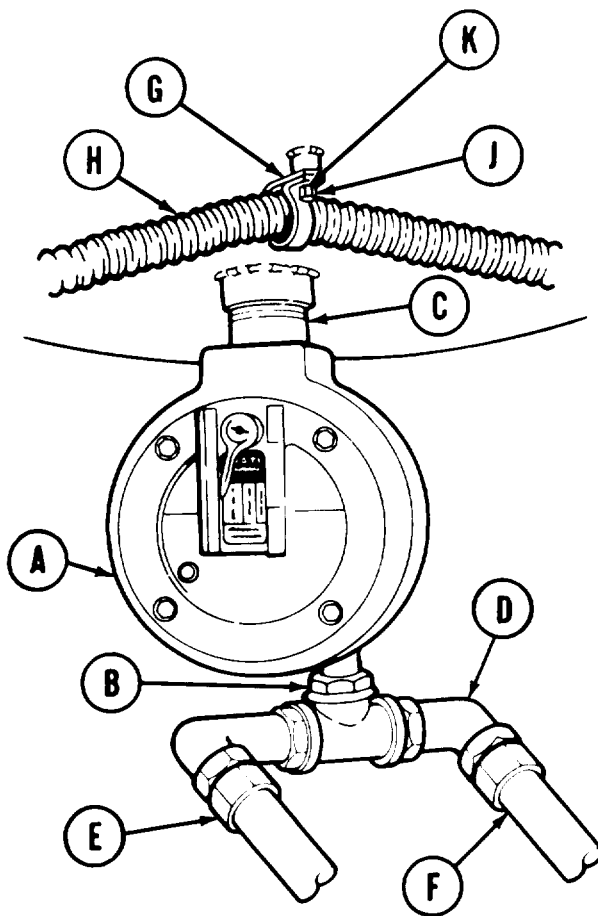
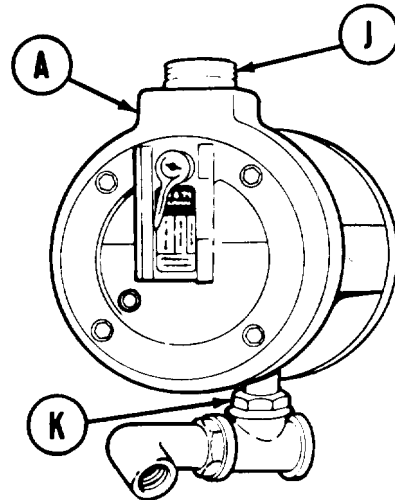
10. Using adjustable wrench, remove reducer (K) and attached parts from filter assembly (A).

11. Use pipe wrench to remove nipple (J).

INSTALLATION:

NOTE

Before installing, use pipe tape on all male threads. Start tape on second thread so tape does not enter hydraulic system.



1. Place filter assembly (A) in vise.
2. Using adjustable wrench, install reducer (B) and attached parts.
3. Use pipe wrench to install nipple (C) in filter assembly (A).
4. Using pipe wrench, install nipple (C) with attached filter assembly (A) in vehicle.
5. Using adjustable wrench, install and aline elbow (D).
6. Using 1-1/2 inch wrench, install hose assembly "CY" (E).
7. Using adjustable wrench, install collar and hose assembly "CZ" (F).
8. Place clamp (G) with hose (H) in position.
9. Using 7/16 inch wrench, install screw (J) and lockwasher (K).

10. Service hydraulic reservoir [L] 5-5420-202-12).

Go on to Sheet 3

TA251604

**TM 5-5420-228-24**

HYDRAULIC FLUID FILTER ASSEMBLY REPLACEMENT (Sheet 3 of 3)

11. Bleed hydraulic system (page 3-72).
12. Check for hydraulic leaks and correct as necessary.
13. Service hydraulic reservoir (LO 5-5420-202-12).

End of Task



HYDRAULIC FLUID FILTER ASSEMBLY REPAIR (Sheet 1 of 8)

PROCEDURE INDEX

PROCEDURE	PAGE
Disassembly	3-211
Cleaning and Inspection	3-215
Assembly	3-215

TOOLS: 18 in. pipe wrench  
 Hammer  
 9/64 in. socket head screw key (allen wrench)  
 1/4 in. socket head screw key (allen wrench)  
 Flat-tip screwdriver  
 1/2 in. socket with 1/2 in. drive  
 Ratchet with 1/2 in. drive  
 Slip joint pliers  
 15/16 in. open end wrench

SUPPLIES: Cotter pin  
 Gasket  
 Preformed packings (3 required)  
 Rags (Item 12, Appendix D)  
 Dry cleaning solvent (Item 15, Appendix D)  
 Ring, wiper  
 Drive screws (4 required)  
 Lockwashers (8 required)

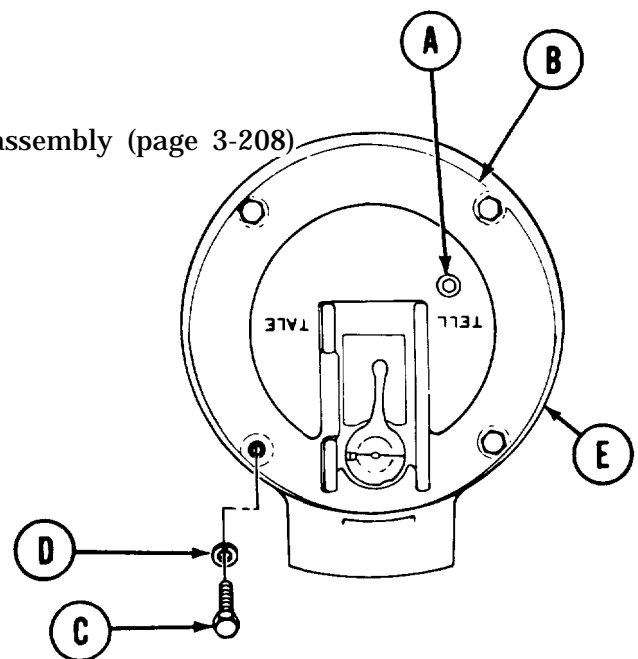
Gloves (Item 27, Appendix D)

PERSONNEL: Two

PRELIMINARY PROCEDURE: Remove filter assembly (page 3-208)

DISASSEMBLY:

1. Using 1/4 inch screw key, remove plug (A) from cover (B).
2. Using socket, remove four screws (C) and lockwashers (D).
3. Manually remove cover (B) and attached parts as an assembly from housing (E).

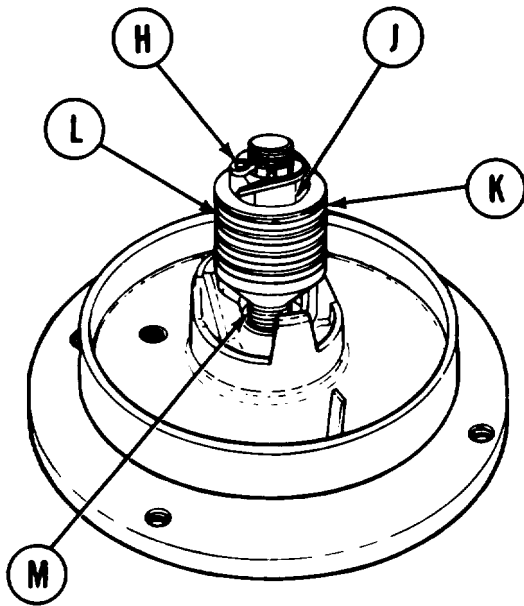
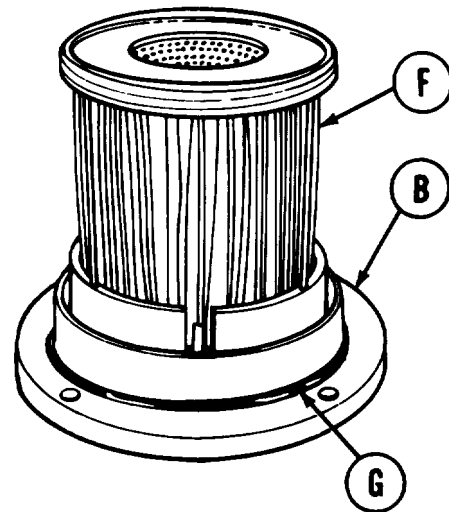


Go on to Sheet 2

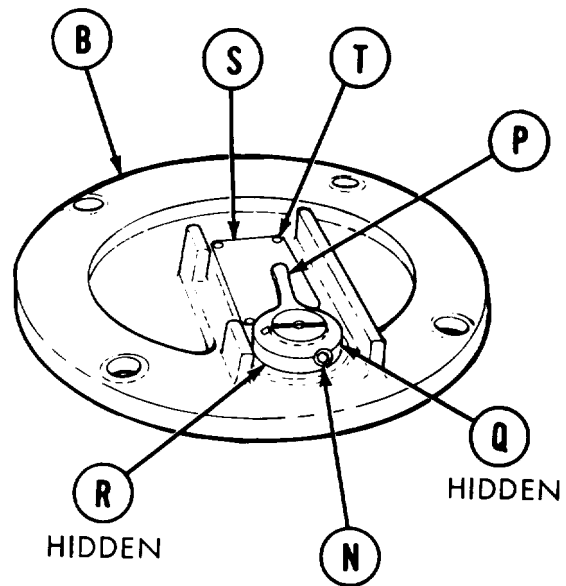
TA251606

HYDRAULIC FLUID FILTER ASSEMBLY REPAIR (Sheet 2 of 8)

4. Manually remove filter (F) from cover (B).
5. Manually remove preformed packing (G) from cover (B).



6. Using pliers, remove cotter pin (H).
7. Using 15/16 inch wrench, remove nut (J).
8. Manually remove four magnetic washers (K) and five spacers (L).
9. Using pipe wrench, remove shaft (M).

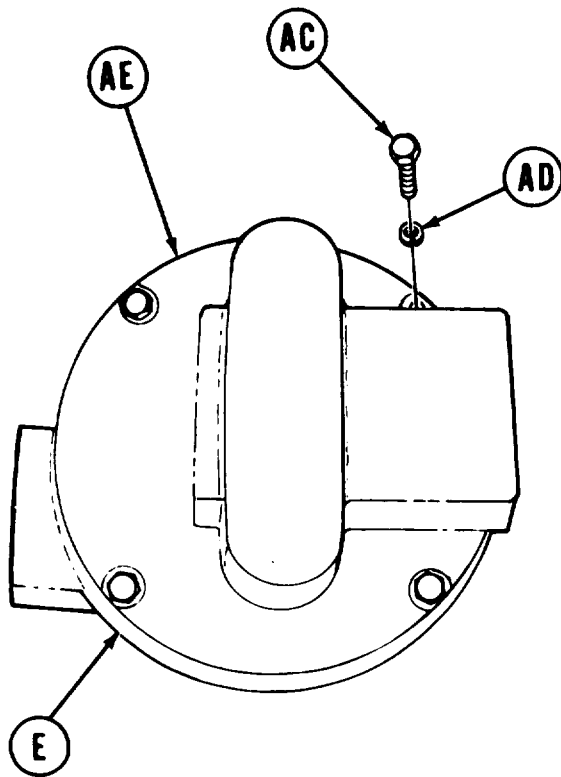
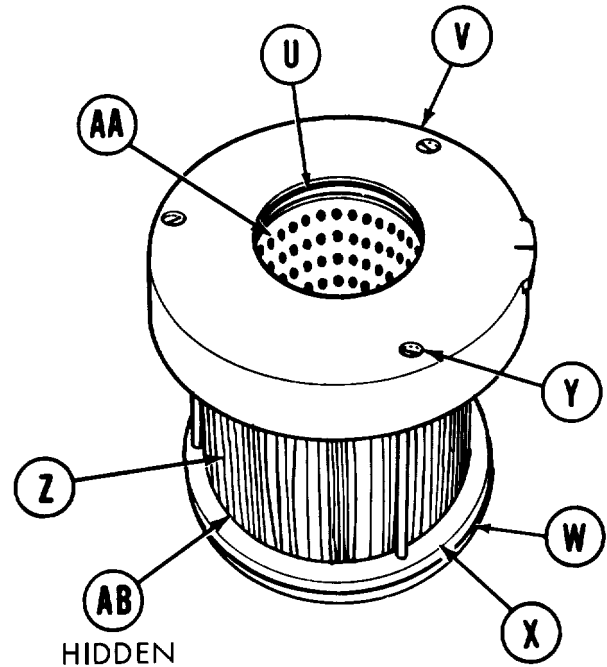


10. Using 9/64 inch screw key, remove setscrew (N).
11. Manually remove indicator arm (P) and washer (Q).
12. Manually remove shaft (R) from cover (B).
13. Using flat-tip screwdriver, remove indicator plate (S) and four drive screws (T).

Go on to Sheet 3

HYDRAULIC FLUID FILTER ASSEMBLY REPAIR (Sheet 3 of 8)

14. Manually remove preformed packing (U) from cap (V).  
Throw away preformed packing (U).
15. Manually remove wiper ring (W) from plate (x).
16. Using flat-tip screwdriver, remove three screws (Y).
17. Lift cap (V) from filter element (Z).
18. Manually remove filter element (Z).
19. Manually remove strainer (AA).
20. Manually remove gasket (AB). Throw away gasket (AB).

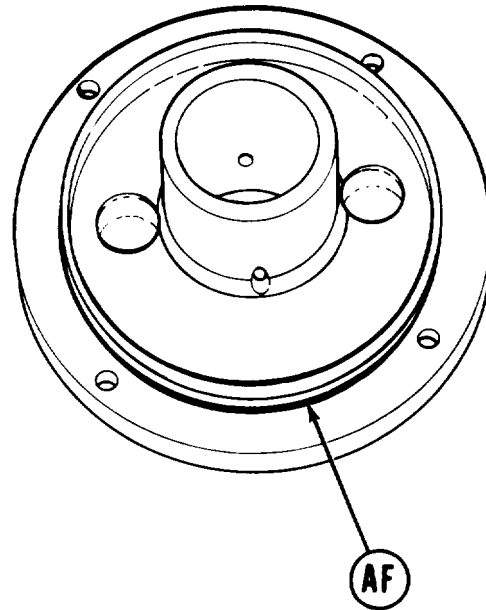
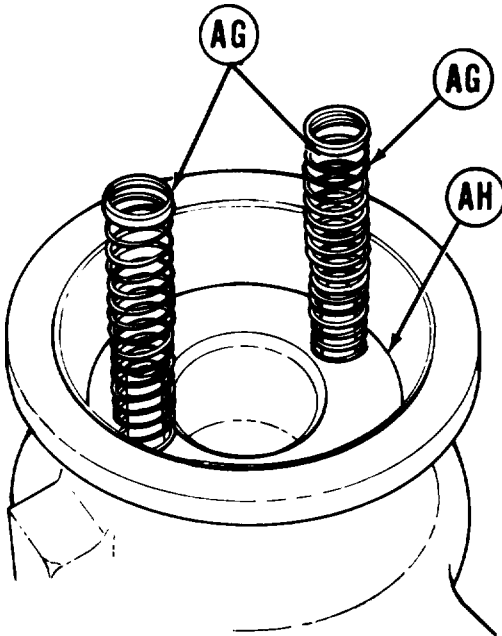


21. Using socket, remove four screws (AC) and lockwashers (AD).
22. Manually remove cover (AE) from housing (E).

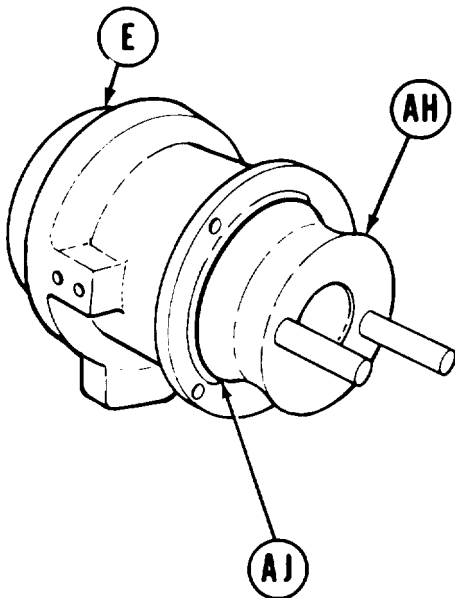
Go on to Sheet 4

TA251608

23. Manually remove preformed packing (AF).  
Throw away preformed packing (AF).
24. Manually remove two springs (AG) from piston (AH).



25. Pull piston (AH) from housing (E).
26. Manually remove wiper ring (AJ) from piston (AH).



Go on to Sheet 5

TA251609

HYDRAULIC FLUID FILTER ASSEMBLY REPAIR (Sheet 5 of 8)

CLEANING AND INSPECTION:

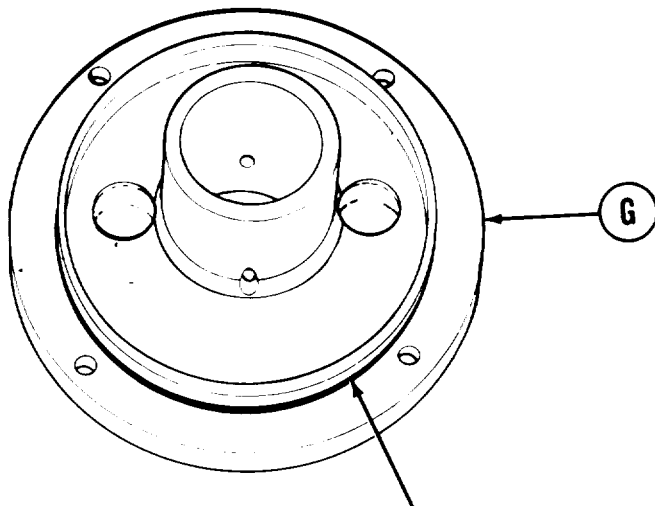
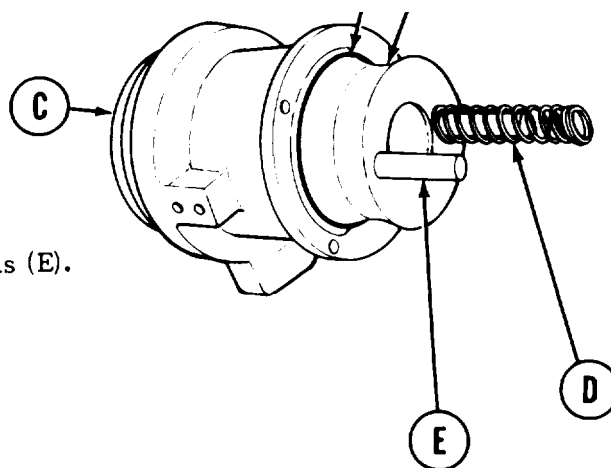
**WARNING**

Cleaning agent specified is flammable. Use only in well ventilated areas. Keep away from flames, sparks, or heat. Do not smoke while using. Prevent contact with eyes, mouth, and/or skin. Wear rubber gloves when performing cleaning procedures.

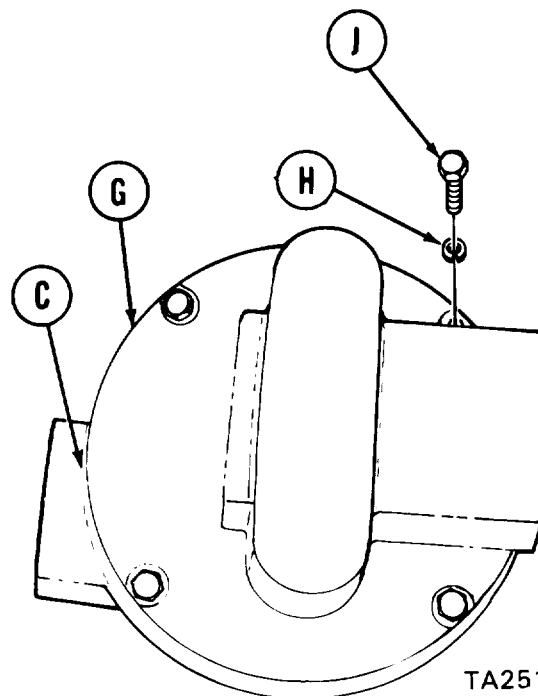
1. Using rags and dry cleaning solvent, clean all parts.
2. Inspect parts for damage, wear, cracks, or deterioration. Replace all defective parts.

ASSEMBLY:

1. Manually install wiper ring (A) on piston (B).
2. Manually install piston (B) in housing (C) as far as possible.
3. Manually install two springs (D) on piston studs (E).



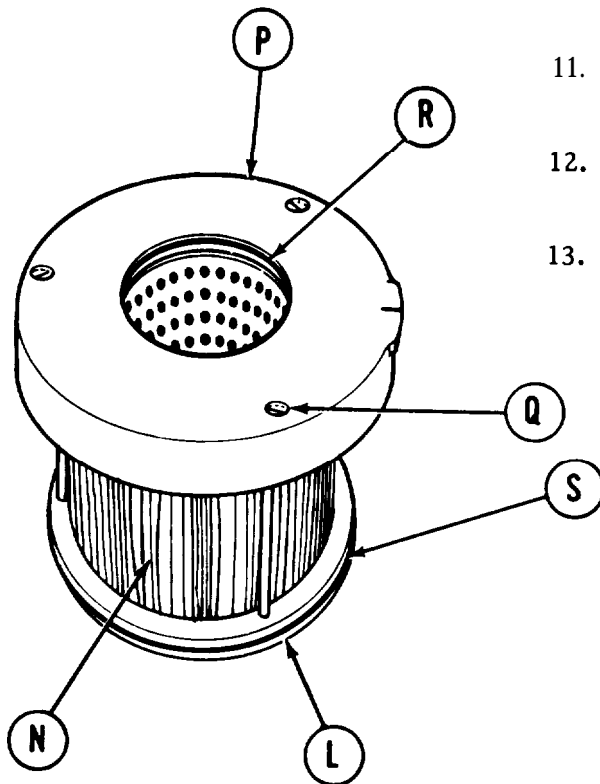
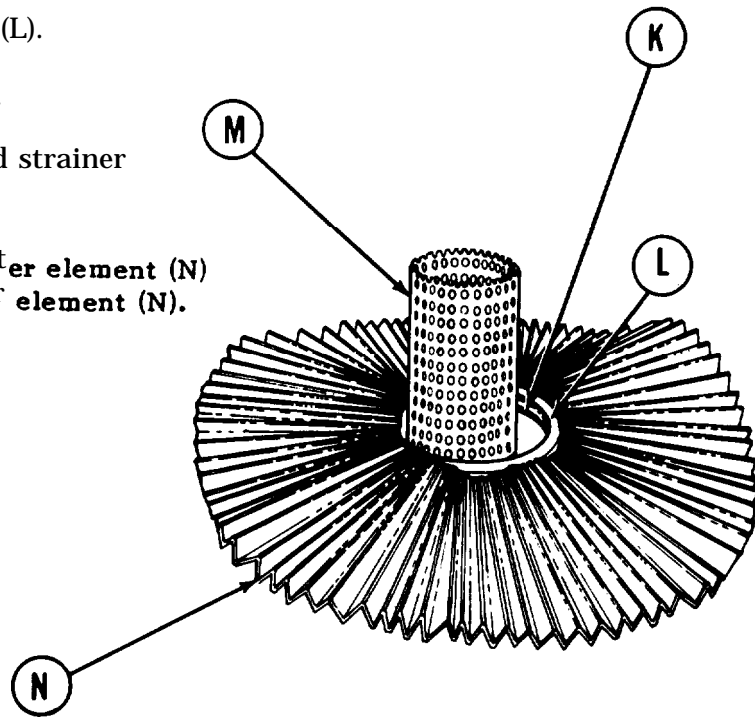
4. Manually install new preformed packing (F) on cover (G).
5. position cover (G) on housing (C).
6. Using socket, install four lockwashers (H) and screws (J) securing cover (G) to housing (C).



Go on to Sheet 6

TA251610

7. Position new gasket (K) on plate (L).
8. Position strainer (M) on plate (L).
9. Position filter element (N) around strainer (M).
10. While second technician holds filter element (N) in position, place cap (P) on filter element (N).

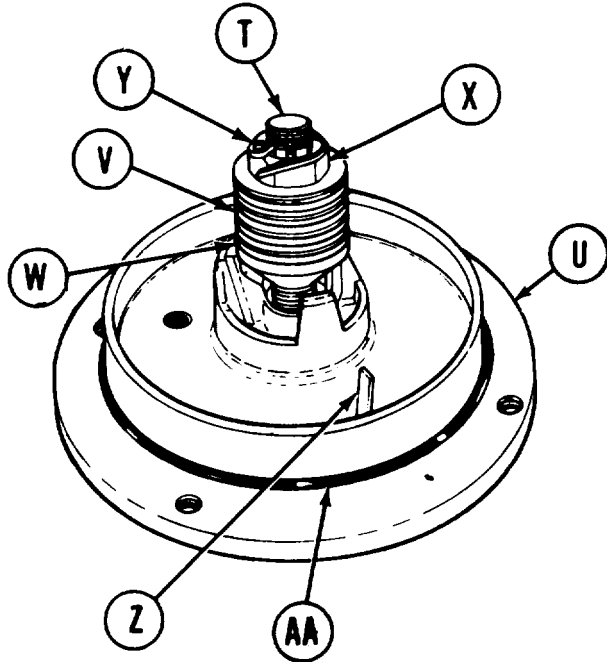


11. Using flat-tip screwdriver, install three screws (Q).
12. Manually install new preformed packing (R) in cap (P).
13. Manually install wiper ring (S) on plate (L).

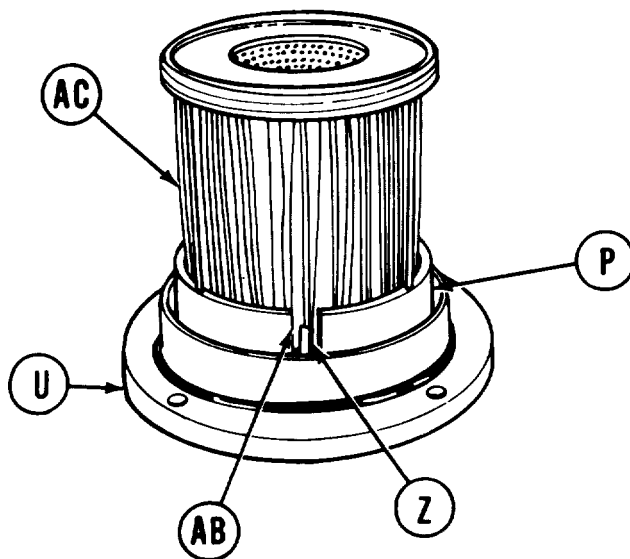
Go on to Sheet 7

TA251611

HYDRAULIC FLUID FILTER ASSEMBLY REPAIR (Sheet 7 of 8)



14. Using pipe wrench, install shaft (T) in cover (U).
15. Manually install four magnetic washers (V) and five spacers (W) on shaft (T).
16. Using 15/16 inch wrench, install nut (X) on shaft (T).
17. Using pliers, install cotter pin (Y) through nut (X) and shaft (T).
18. Manually install tab (Z) in cover (U)
19. Manually install new preformed packing (AA) in cover (U).



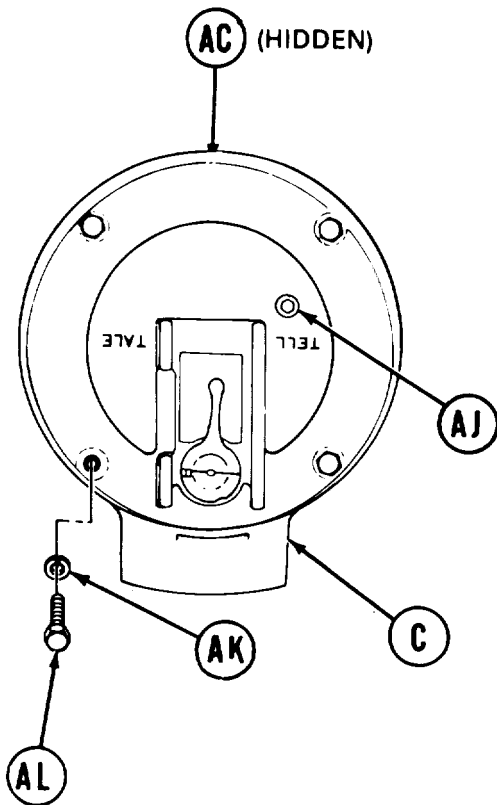
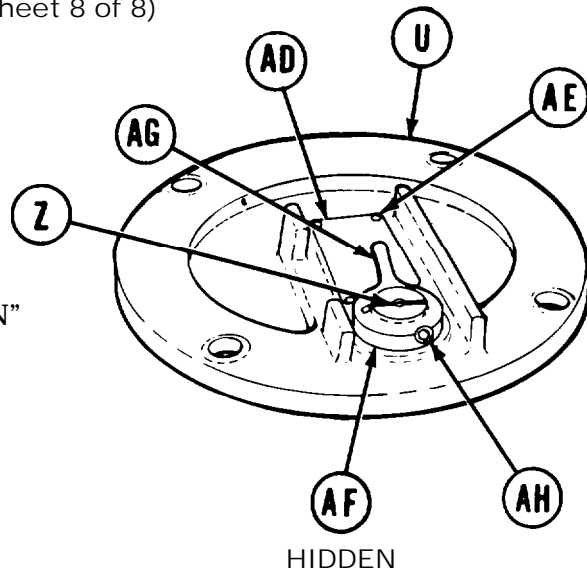
20. Aline groove (AB) of filter element (AC) with tab (Z) on cover (U). Press filter element (AC) on cover (U) until tab (Z) snaps in place.

Go onto Sheet 8

TA251612

HYDRAULIC FLUID FILTER ASSEMBLY REPAIR (Sheet 8 of 8)

21. Manually place indicator plate (AD) in position on cover (U).
22. Using hammer, install four new drive screws (AE).
23. Manually place washer (AF) and indicator lever (AG) on shaft (Z) over "FILTER CLEAN" on indicator plate (AD).
24. Using 9/64 inch screw key, install setscrew (AH).



25. Using 1/4 inch screw key, install pipe plug (AJ).
26. Position filter assembly (AC) in housing (C) and align holes.
27. Manually install four lockwashers (AK) and screws (AL).
28. Using 1/2 inch socket, tighten four screws (AL).
29. Install filter assembly (page 3-209).

End of Task

TA251613



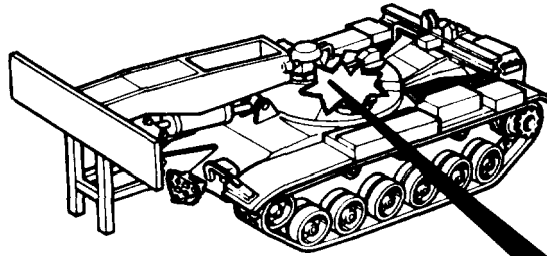
RESERVOIR DRAIN VALVE REPLACEMENT (Sheet 1 of 2)

TOOLS: 1-1/2 in. open end wrench  
 5/8 in. combination wrench  
 15 in. adjustable wrench  
 14 in. pipe wrench

SUPPLIES: Rags (Item 12, Appendix D)  
 Pipe tape (Item 19, Appendix D)  
 Nipple

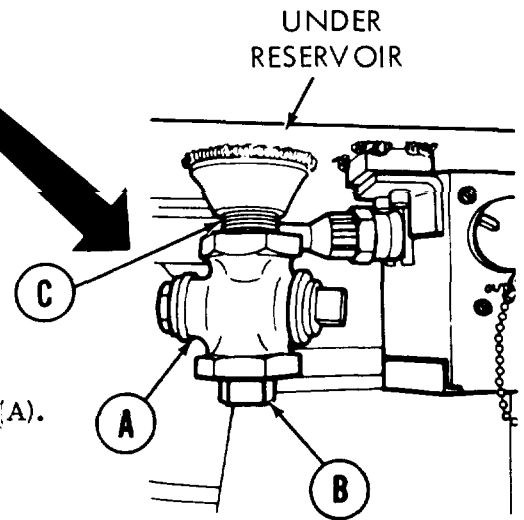
REFERENCE: LO 5-5420-202-12

PRELIMINARY PROCEDURE: Drain reservoir (page 3-74)



**NOTE**

Use rags to catch hydraulic fluid left in line.



REMOVAL:

1. Using adjustable wrench on flats, remove drain valve (A).
2. Place drain valve (A) in vise.
3. Using 5/8 inch wrench, remove pipe plug (B).
4. Using pipe wrench, remove nipple (C) from either drain valve (A) or reservoir. Throw nipple (C) away.
5. Remove drain valve (A) from vise.

Go on to Sheet 2

TA251614

## TM 5-5420-228-24

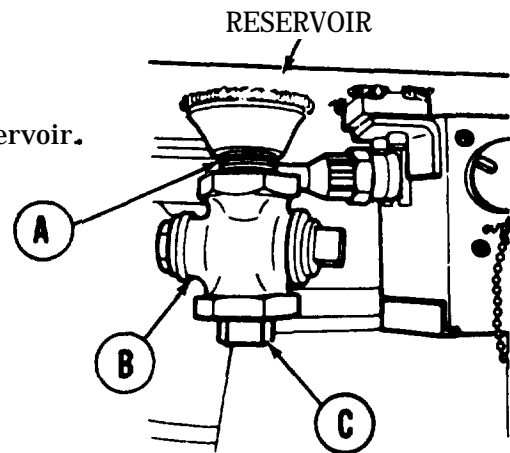
### RESERVOIR DRAIN VALVE REPLACEMENT (Sheet 2 of 2)

#### INSTALLATION:

#### NOTE

Before installing, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.

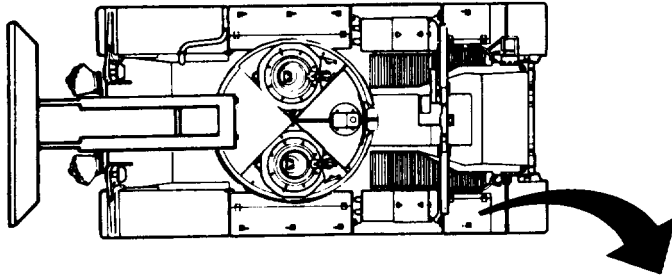
1. Manually install new nipple (A) in drain valve (B).
2. Using 5/8 inch wrench, install pipe plug (C).
3. Using adjustable wrench, install drain valve (A) on reservoir. install nipple (A) with drain valve (B) in reservoir.
4. Fill reservoir (LO 5-5420-202-12).
5. Bleed hydraulic system (Page 3-72).
6. Check for hydraulic leaks and correct as necessary..
7. Refill hydraulic reservoir (LO 5-5420-202-12).



End of Task

HYDRAULIC SLAVE HOSE ASSEMBLY REPAIR (Sheet 1 of 2)

TOOLS: 15 in. adjustable wrench (2)  
Vise



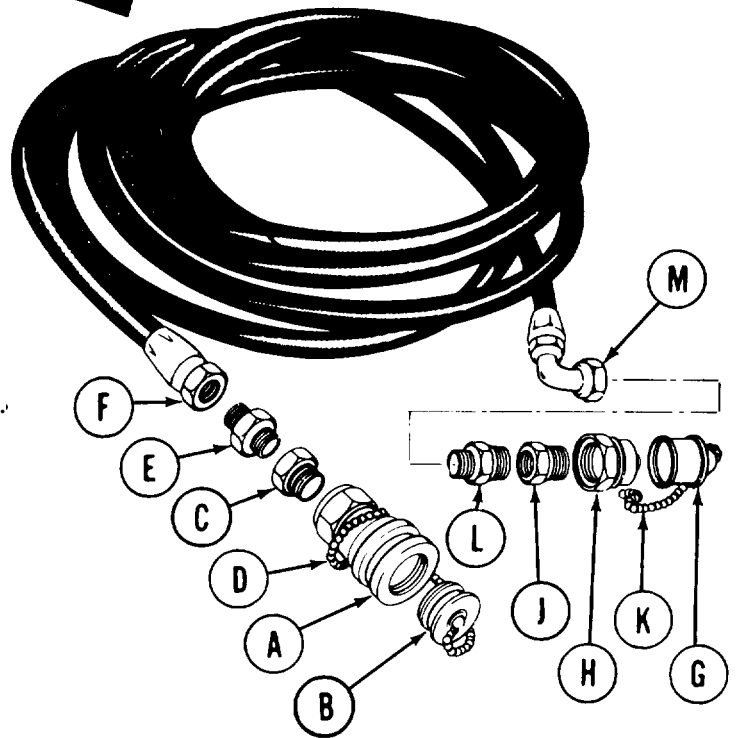
DISASSEMBLY:

1. Manually pull back quick-disconnect coupling (A) and pull socket dust cap (B) from coupling (A).

NOTE

It may be necessary to use a vise to remove parts from slave hose assembly.

2. Using wrench to hold pipe fitting (C), use wrench to remove coupling (A).
3. Manually slide chain (D) off socket (B).
4. Using wrench to hold tube fitting (E), use wrench to remove pipe fitting (C).
5. Using wrench to hold hose fitting (F), use wrench to remove tube fitting (E).
6. Manually pull plug dust cap (G) from plug (H).
7. Using wrench to hold pipe fitting (J), use wrench to remove plug (H).
8. Manually slide chain (K) off plug (H).
9. Using wrench to hold tube fitting (L), use wrench to remove pipe fitting (J).
10. Using wrench to hold hose fitting (M), use wrench to remove tube fitting (L).

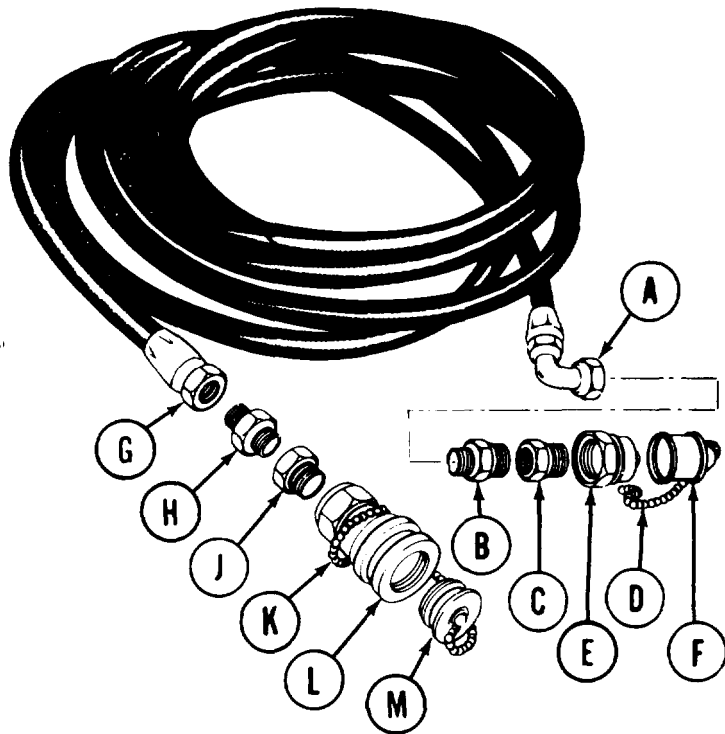


Go on to Sheet 2

TA251615

**ASSEMBLY:**

1. Using wrench to hold hose fitting (A), use wrench to install tube fitting (B).
2. Using wrench to hold tube fitting (B), use wrench to install pipe fitting (C).
3. Manually slip chain (D) onto plug (E).
4. Using wrench to hold pipe fitting (C), use wrench to install plug (E).
5. Manually install plug dust cap (F) on plug (E).
6. Using wrench to hold hose fitting (G), use wrench to install pipe fitting (H).
7. Using wrench to hold tube fitting (H), use wrench to install pipe fitting (J).
8. Manually slip chain (K) onto socket (L).
9. Using wrench to hold pipe fitting (J), use wrench to install quick-disconnect coupling (L).
10. Pull back quick-disconnect coupling (L) and push in dust cap (M), then release coupling (L).



End of Task

Section IV. HYDRAULIC CYLINDERS

OVERHEAD CYLINDER ARMOR REPLACEMENT (Sheet 1 of 2)

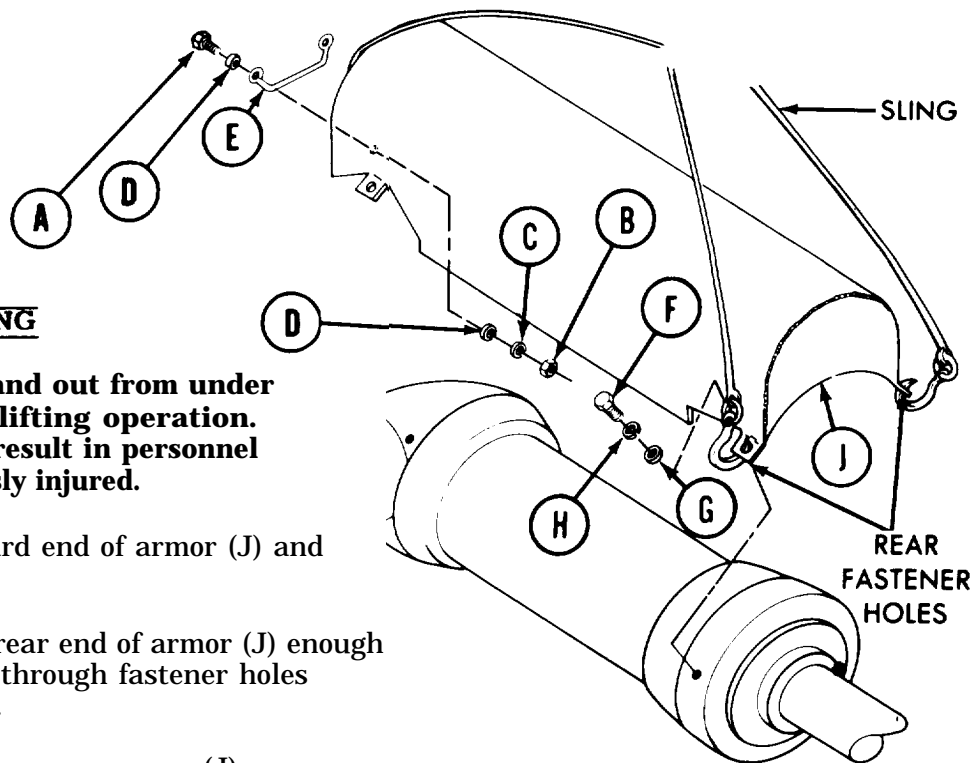
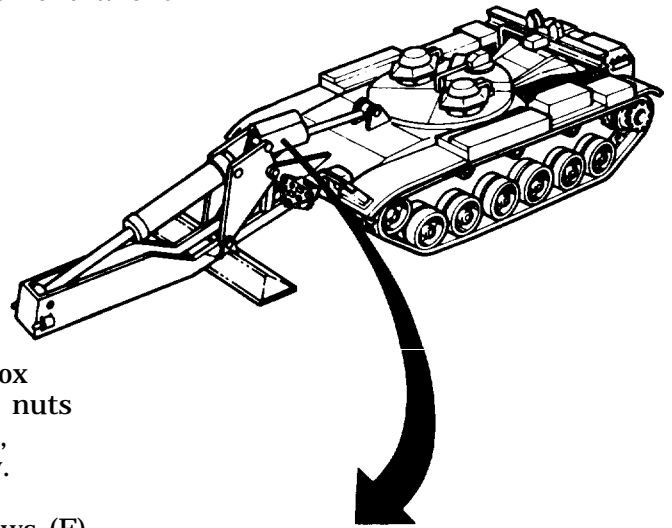
- TOOLS: 9/16 in. socket with 1/2 in. drive  
 15/16 in. socket with 1/2 in. drive  
 Ratchet with 1/2 in. drive  
 9/16 in. combination box end and open end wrench  
 Pry bar  
 Sling  
 Lifting device (200 lbs capacity)

SUPPLIES: Lockwashers (6 required)

REFERENCE: TM 5-5420-202-10

REMOVAL:

- Using 9/16 inch socket on screw (A) and box wrench on nut (B), remove two screws (A), nuts (B), lockwashers (C), four flat washers (D), and stop (E). Throw lockwashers (C) away.
- Using 15/16 inch socket, remove four screws (F), flat washers (G), and lockwashers (H).



**WARNING**

**Keep personnel clear and out from under lifting device during lifting operation. Failure to do so could result in personnel being struck and seriously injured.**

- Attach sling to forward end of armor (J) and attach lifting device.
- Using pry bar, raise rear end of armor (J) enough to get hooks of sling through fastener holes at rear end of armor.
- Using lifting device, remove armor (J).
- Remove sling from armor (J).

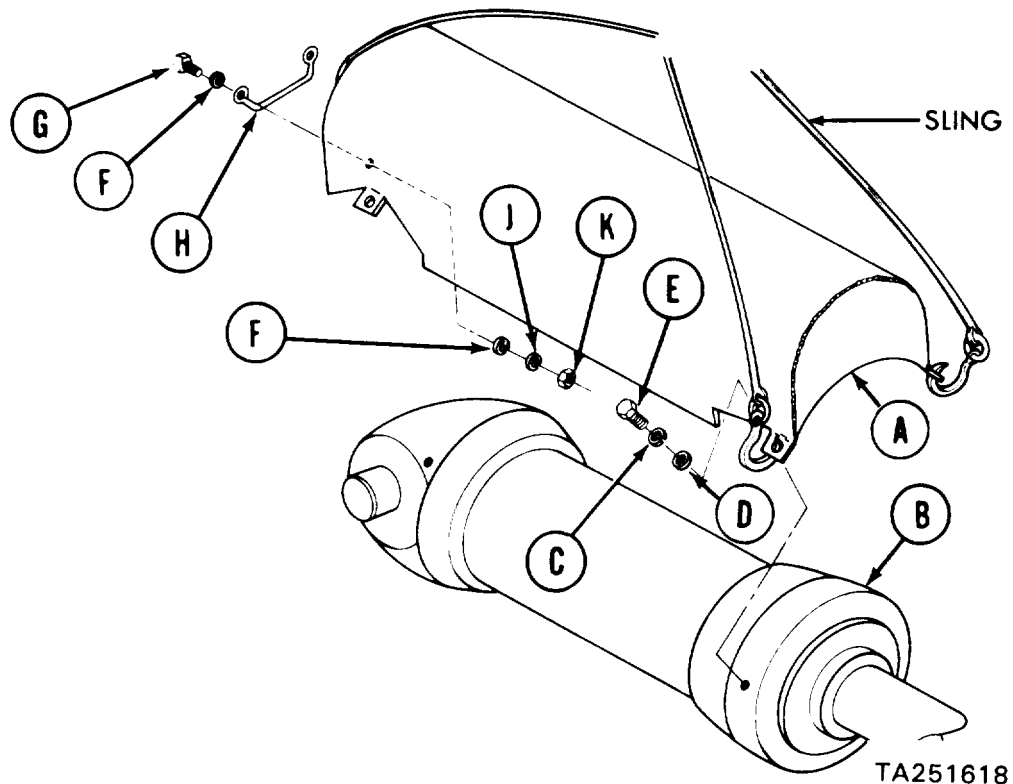
TA251617

Go on to Sheet 2

OVERHEAD CYLINDER ARMOR REPLACEMENT (Sheet 2 of 2)

INSTALLATION:

1. Attach sling to armor (A).
2. Using lifting device, position armor (A) on overhead cylinder (B).
3. Remove sling from armor (A); use pry bar to aid removal of hooks at rear of armor.
4. Place lockwashers (C) and flat washers (D) on four screws (E).
5. Using pry bar, align holes of armor (A) with those in overhead cylinder (B).
6. Manually install four screws (E), lockwashers (C), and flat washers (D).
7. Using 15/16 inch socket, tighten four screws (E).
8. Place flat washer (F) on two screws (G).
9. Position stop (H) on armor (A) and insert two screws (G).
10. Place flat washers (F), lockwashers (J), and nuts (K) on two screws (G).
11. Using 9/16 inch socket on screw (G) and wrench on nut (K), tighten two screws.



End of Task

TA251618

OVERHEAD CYLINDER REPLACEMENT (Sheet 1 of 7)  
 PROCEDURE INDEX

PROCEDURE	PAGE
Removal	3-225
Installation	3-228

**TOOLS:** 12 in. adjustable wrench  
 1 -1/4 in. open end wrench  
 7/16 in. socket with 3/8 in. drive  
 Snap ring pliers (outside)  
 Hammer  
 Lifting device (2000 lb capacity)  
 Punch, drive pin 3/4 in. x 10 in.

Ratchet with 3/8 in. drive  
 5 in. extension with 3/8 in. drive  
 1-5/16 in. socket with 3/4 in. drive  
 Ratchet with 3/4 in. drive  
 Crow bar  
 Sling  
 Cylinder rod wrench, 4-9/16 in.  
 1-1/8 in. open end wrench

**SUPPLIES:** Pencil (Item 22, Appendix D)  
 Drip pans (suitable containers)

Protective caps and plugs  
 Pipe tape (Item 19, Appendix D)

**PERSONNEL:** Three

**REFERENCES:** LO 5-5420-202-12  
 TM 5-5420-202-10

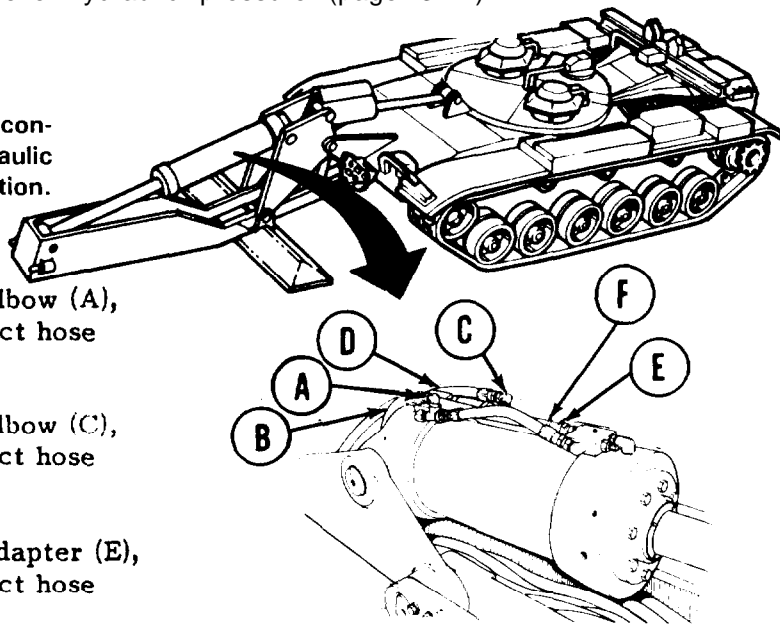
**PRELIMINARY PROCEDURES:** Extend tongue (TM 5-5420-202-10)  
 Remove overhead cylinder armor (page 3-223)  
 Relieve hydraulic pressure (page 3-71)

**REMOVAL:**

**NOTE**

Cap or plug all lines and fittings as they are disconnected. Use drip pans to catch excess hydraulic fluid. Use masking tape to tag lines for installation.

- Using adjustable wrench to hold elbow (A), use 1-1/4 inch wrench to disconnect hose assembly (B).
- Using adjustable wrench to hold elbow (C), use 1-1/4 inch wrench to disconnect hose assembly (D).
- Using 1-1/8 inch wrench to hold adapter (E), use 1-1/4 inch wrench to disconnect hose assembly (F).

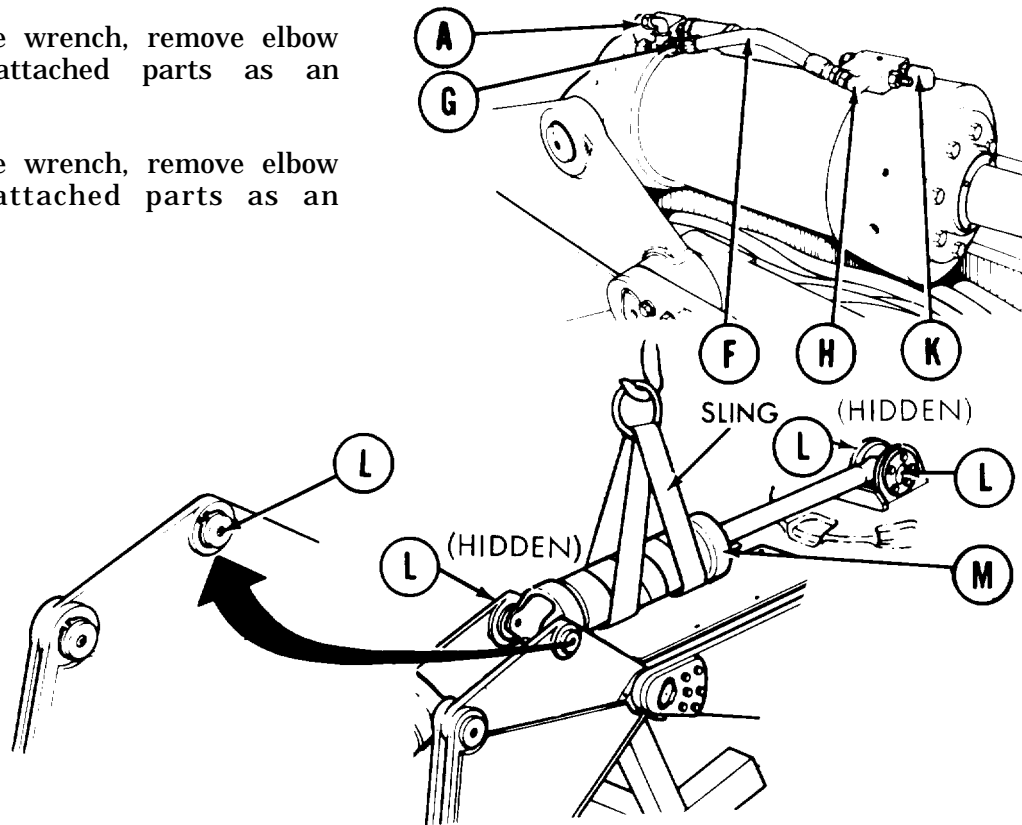


Go on to Sheet 2

TA251759

OVERHEAD CYLINDER REPLACEMENT (Sheet 2 of 7)

4. Using adjustable wrench to hold adapter (G) and adapter elbow (H), use 1-1/4 inch wrench to remove assembly (J).
5. Using adjustable wrench, remove elbow (A) and its attached parts as an assembly.
6. Using adjustable wrench, remove elbow (K) and its attached parts as an assembly.



7. Using 7/16 inch socket, remove four grease fittings (L).

NOTE

If necessary, use spreader when attaching sling and lifting device to overload cylinder (M).

8. Position sling around overhead cylinder (M) and attach lifting device.

WARNING

Make sure sling is wrapped on overhead cylinder (M) so that it cannot slide loose. Personnel could be injured if cylinder comes loose during removal.

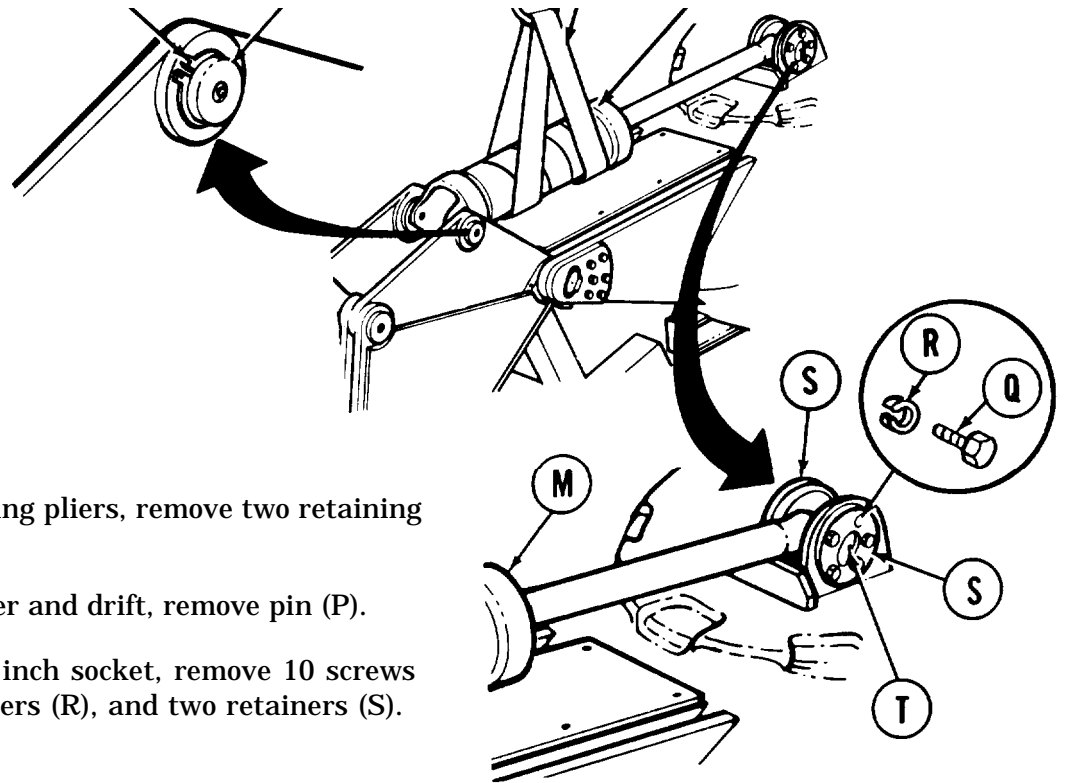
9. Raise lifting device until sling is tight enough to support overhead cylinder (M).

Go on to Sheet 3

TA251619



OVERHEAD CYLINDER REPLACEMENT (Sheet 3 of 7)



10. Using snap ring pliers, remove two retaining rings (N).
11. Using hammer and drift, remove pin (P).
12. Using 1-5/16 inch socket, remove 10 screws (Q), lockwashers (R), and two retainers (S).
13. Using hammer and drift, remove pin (T).
14. Using lifting device, remove overhead cylinder (M) from vehicle.
15. Move overhead cylinder (M) to suitable work area.
16. Remove sling.

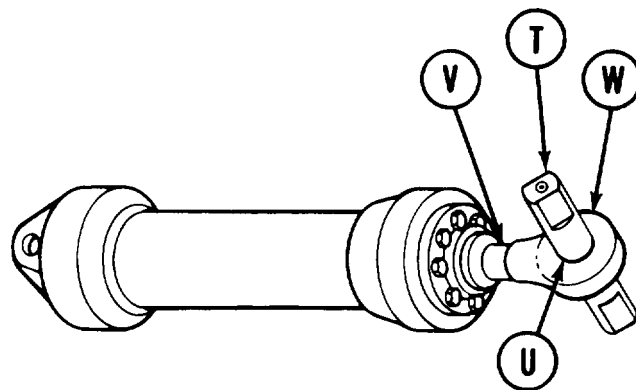
Go on to Sheet 4

TA251620

## TM 5-5420-228-24

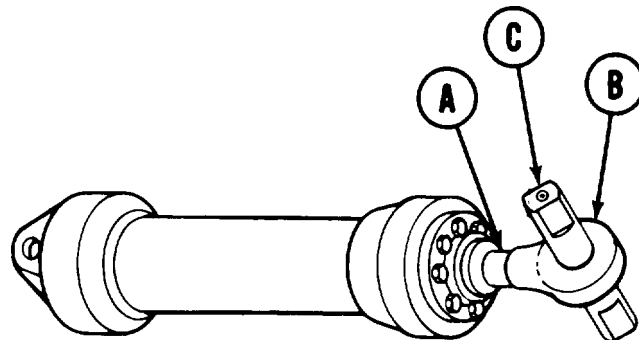
### OVERHEAD CYLINDER REPLACEMENT (Sheet 4 of 7)

17. Insert pin (T) through rod end connector eye (U).
18. Have another technician use cylinder rod wrench on flats of cylinder rod (V) to keep rod from turning.
19. While second technician holds cylinder rod (V) from turning, use pin (T) as a lever to unscrew and remove rod end connector (W).
20. Remove pin (T) from rod end connector (w).
21. Using masking tape, tape threads of cylinder rod (V).



### INSTALLATION:

1. Remove tape from threads of cylinder rod (A).
2. Start rod end connector (B) on rod (A) by hand.
3. Insert pin (C) through eye of rod end connector (B).
4. Have another technician use cylinder rod wrench on flats of cylinder rod (A) to keep rod from turning.
5. While second technician holds cylinder rod (A) from turning, use pin (C) as a lever to turn rod end connector (B) clockwise and tighten.
6. Remove pin (C).

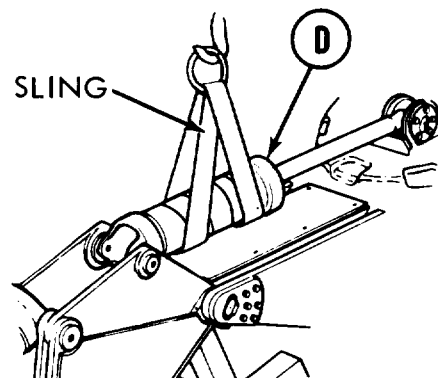


### NOTE

If necessary, use spreader when attaching sling and lifting device to overhead cylinder (D).

7. Position sling around overhead cylinder (D) and attach lifting device.

Go on to Sheet 5



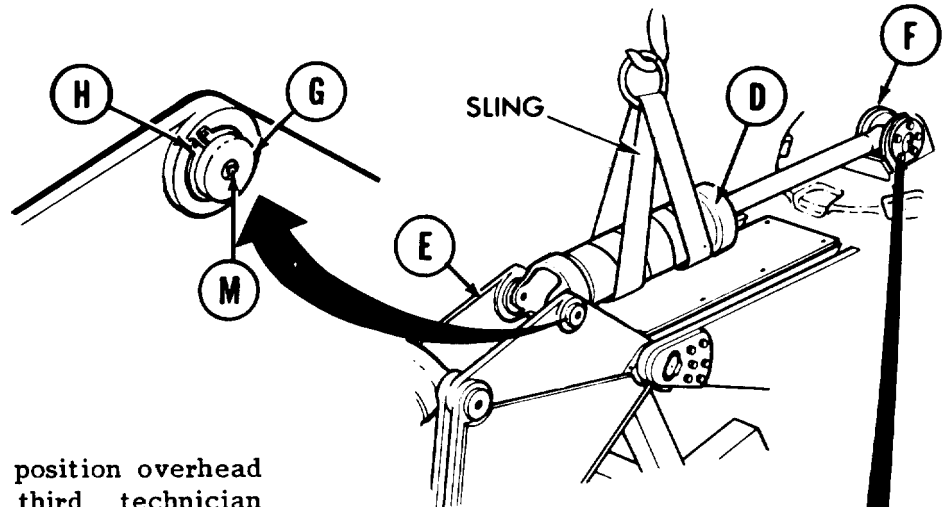
TA251760

OVERHEAD CYLINDER REPLACEMENT (Sheet 5 of 7)

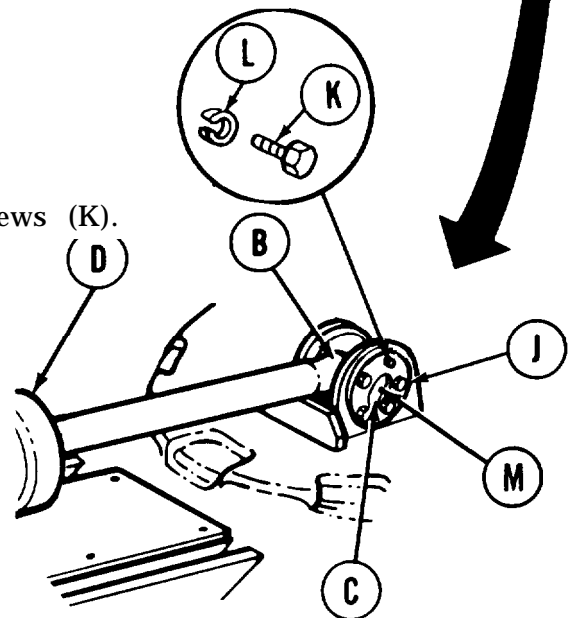
WARNING

Make sure sling is wrapped on overhead cylinder (A) so that it cannot slide loose.

8. Lift overhead cylinder (D) and position it between boom (E) and mount (F) with hydraulic openings facing up.



9. Have two technicians position overhead cylinder (D) while third technician inserts pin (G).
10. Using snap ring pliers, install two retaining rings (H).
11. Have two technicians position rod end connector (B) while third inserts pin (C).
- 12\* Position two retainers (J) (one on each side).
13. Install five screws (K) and lockwashers (L) in each retainer (J).
14. Using 1-5/16 inch socket, tighten 10 screws (K).



15. Using 7/16 inch socket, install four grease fittings (M).
16. Remove sling and lifting device.

Go on to Sheet 6

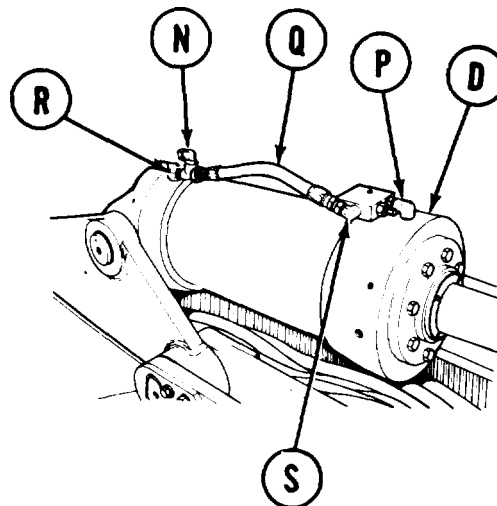
TA251621

OVERHEAD CYLINDER REPLACEMENT (Sheet 6 of 7)

NOTE

Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system. Remove all caps and plugs as necessary during installation.

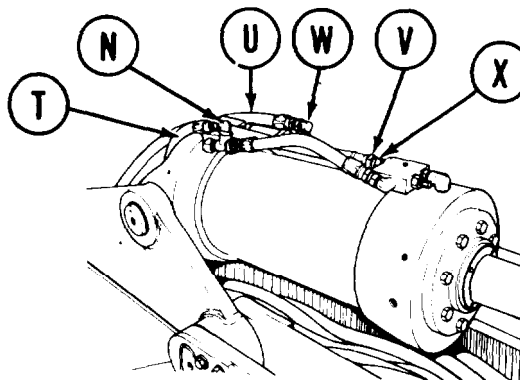
17. Manually install elbow (N) and attached parts on overhead cylinder (D).
18. Using adjustable wrench, tighten elbow (N).
19. Manually install elbow (P) and attached parts on overhead cylinder (D).
20. Using adjustable wrench, tighten elbow (P).
21. Using 1-1/4 inch wrench, install hose assembly "CO" (Q) on adapter (R) and elbow (S).



CAUTION

Make sure when connecting hose assemblies (T, U, and V) to check for matching tags. Hose (T) is marked "CL", hose (U) is marked "CN", hose (V) is marked "CM",

22. Using adjustable wrench to hold elbow (N), use 1-1/4 inch wrench to connect hose assembly "CL" (T).
23. Using adjustable wrench to hold elbow (W), use 1-1/4 inch wrench to connect hose assembly "CN" (U).
24. Using 1-1/8 inch wrench to hold adapter (X), use 1-1/4 inch wrench to connect hose assembly "CM" (V).



Go on to Sheet 7

TA251622

OVERHEAD CYLINDER REPLACEMENT (Sheet 7 of 7)

25. Service hydraulic reservoir (LO 5-5420-202-12).

26. Bleed hydraulic system (page 3-72).

27. Check for hydraulic leaks and correct as necessary.

28. Service hydraulic reservoir (LO 5-5420-202-12).

29. Install overhead cylinder armor (page 3-224).

End of Task

**TM 5-5420-22024**

TONGUE CYLINDER ARMOR REPLACEMENT (sheet 1 of 2)

**TOOLS:** 15/16 in. socket with 1/2 in. drive  
5 in. extension with 1/2 in. drive

Ratchet with 1/2 in. drive  
Paulin strap

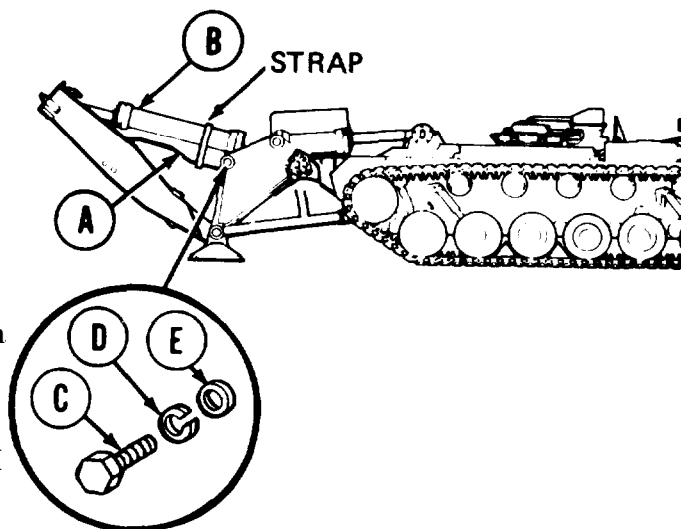
**SUPPLIES:** Wooden supports (2 x 4 x 36 inches 2 required)  
Lockwashers (4 required)

**PERSONNEL:** Five

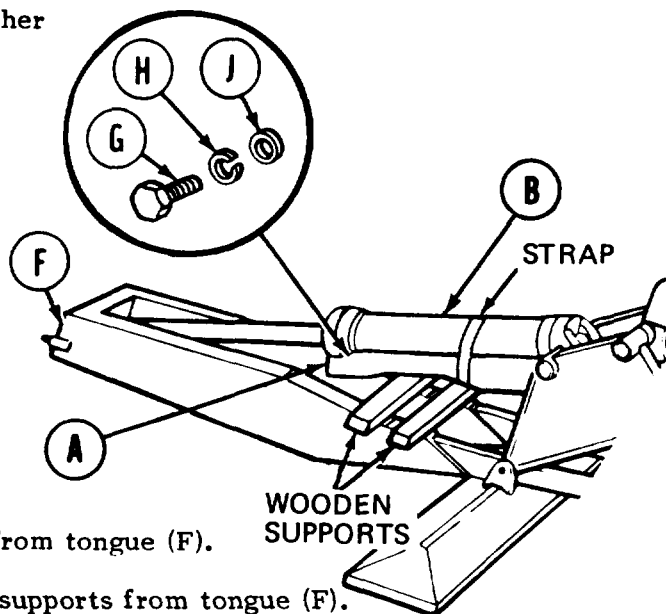
**REFERENCE:** TM 5-5420-202-10

**REMOVAL:**

1. Position tongue as shown (TM 5-5420-202-10).
2. Fasten strap around armor (A) and tongue cylinder (B) to hold armor in place while removing fasteners.
3. Using socket, remove two screws (C), lockwashers (D), and flat washers (E) from rear end of tongue cylinder (B).



4. Extend tongue fully to position shown (TM 5-5420-202-10).
5. Place two wooden supports on tongue (F).
6. Have one technician hold armor while another using socket removes two screws (G), lockwashers (H), and flat washers (J) from forward end of tongue cylinder (B).



7. Loosen strap and manually lower armor (A) down to rest on wooden supports with help from other technicians.
8. Using five technicians, remove armor (A) from tongue (F).
9. Remove strap from armor (A) and wooden supports from tongue (F).

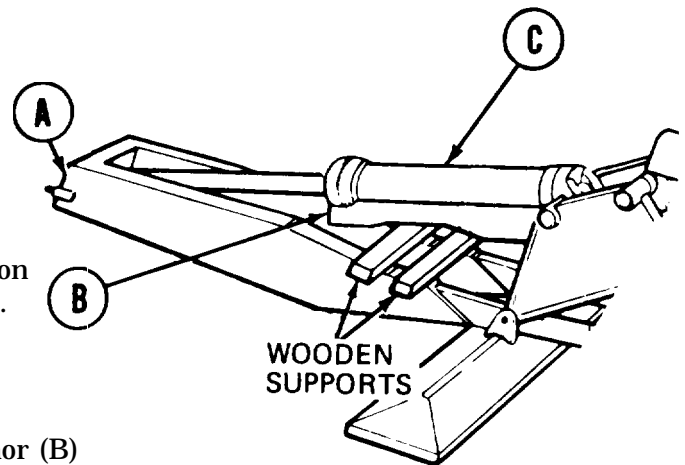
Go on to Sheet 2

TA251623

TONGUE CYLINDER ARMOR REPLACEMENT (Sheet 2 of 2)

INSTALLATION:

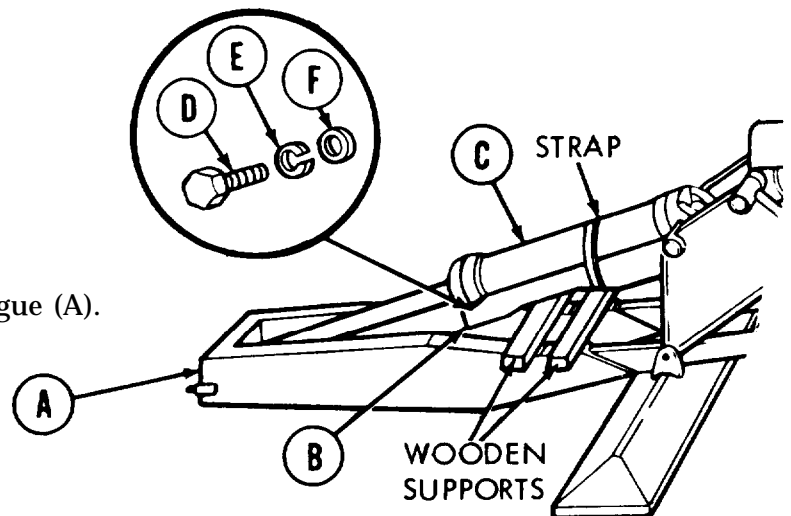
1. Place wooden supports on tongue (A).



2. Using five technicians, position armor (B) on wooden supports under tongue cylinder (C).

3. Using five technicians, manually raise armor (B) to position on tongue cylinder (C) and fasten strap around tongue cylinder and armor.

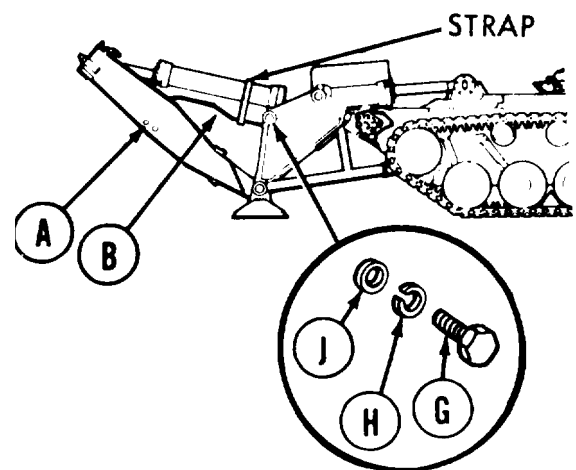
4. Using socket, install two screws (D), lockwashers (E), and flat washers (F).



5. Remove wooden supports from tongue (A).

6. Raise tongue (A) to position shown (TM 5-5420-202-10).

7. Using socket, install two screws (G), lockwashers (H), and flat washers (J).



8. Remove strap holding armor (B).

End of Task

TA251624

TONGUE CYLINDER REPLACEMENT (Sheet 1 of 6)  
**PROCEDURE INDEX**

PROCEDURE	PAGE
Removal	3-234
Installation	3-237

**TOOLS:** 10 in. adjustable wrench  
 1-1/4 in. open end wrench  
 7/16 in. socket with 1/2 in. drive  
 Snap ring pliers (outside)  
 Ratchet with 1/2 in. drive  
 Hammer  
 Drift  
 Lifting device (2000 lb capacity)  
 Sling

1-1/8 in. open end wrench  
 Cylinder rod wrench

**SUPPLIES:** Wooden blocks (make from Item 25, Appendix D)  
 Drip pans (suitable containers)  
 Masking tape (Item 18, Appendix D)  
 Protective caps and plugs  
 Pipe tape (Item 19, Appendix D)  
 Pencil (Item 22, Appendix D)

**PERSONNEL:** Three

**REFERENCES:** TM 5-5420-202-10  
 LO 5-5420-202-12

**PRELIMINARY PROCEDURE:** Remove tongue cylinder armor (page 3-232)

**REMOVAL:** NOTE

Cap or plug all lines and fittings as they are disconnected. Use drip pans to catch excess hydraulic fluid. Use masking tape to tag lines for installation.

- Using socket, remove two grease fittings (A).

NOTE

If necessary, use spreader when attaching sling and lifting device to tongue cylinder (B).

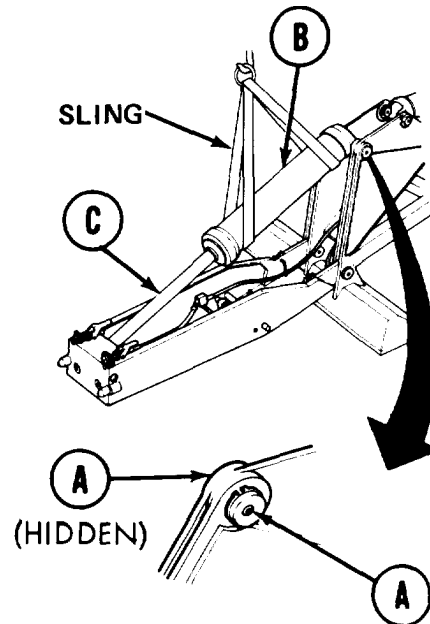
- Position sling around tongue cylinder (B) and attach lifting device (use spreader if necessary).

WARNING

Make sure sling is routed under hydraulic lines and tongue cylinder (B) so that it cannot dip.

- Raise lifting device until sling is tight enough to support tongue cylinder (B), then raise slightly to take load off forward end of tongue cylinder rod (C).

Go on to Sheet 2

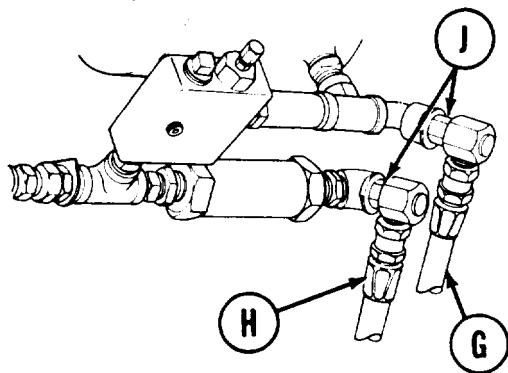
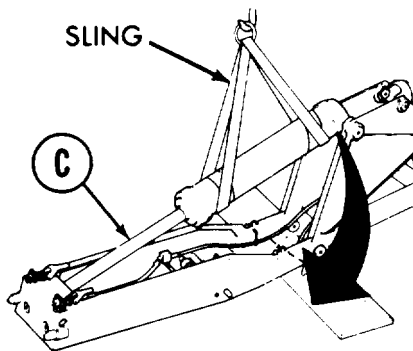
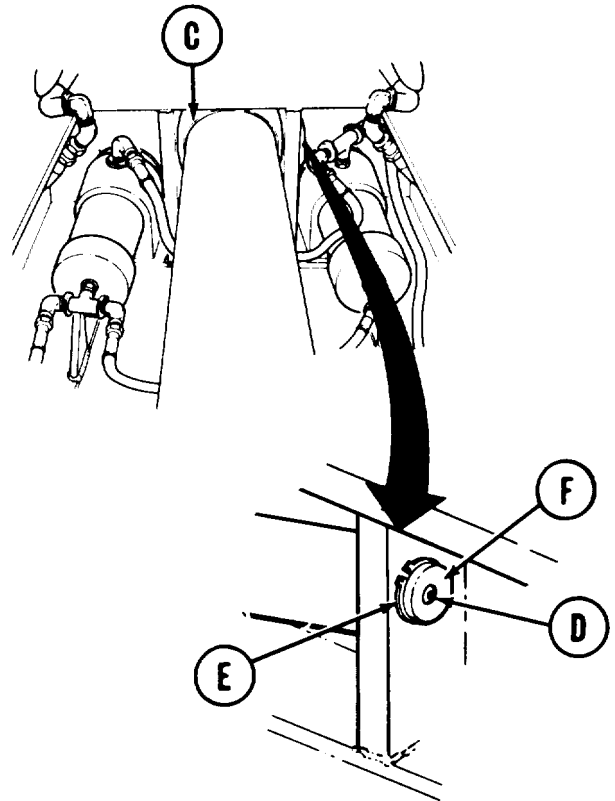


TA251625



TONGUE CYLINDER REPLACEMENT (Sheet 2 of 6)

4. Using socket, remove two grease fittings (D).
5. Using snap ring pliers, remove two retaining rings (E).
6. Using hammer and drift, remove pin (F).
7. Retract tongue cylinder rod (C) (TM 5-5420-202-10).

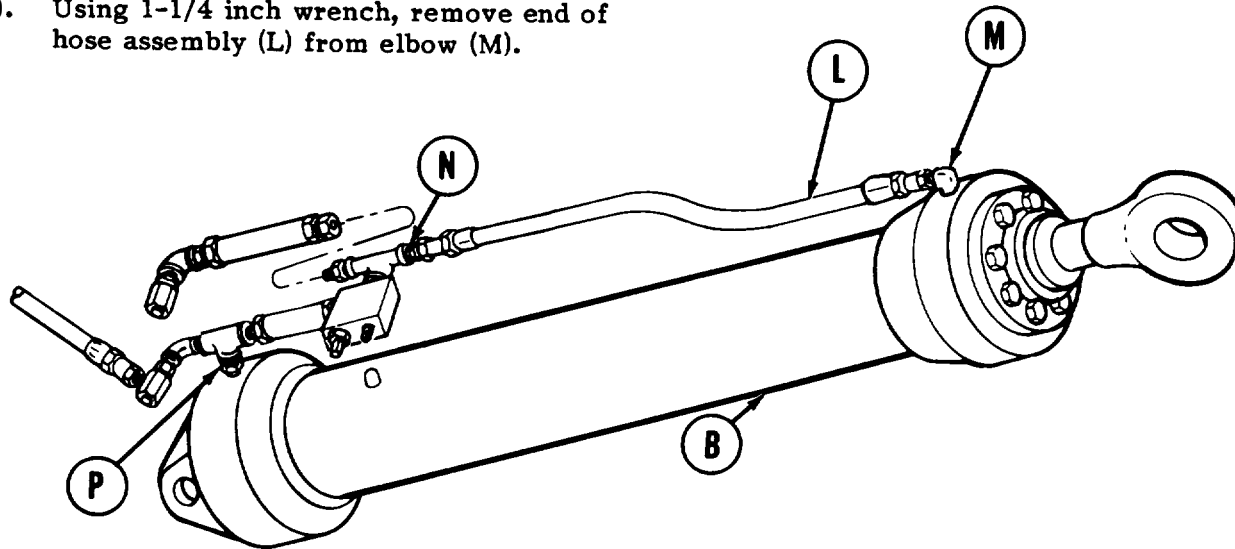


8. While holding elbow (G) with adjustable wrench, use 1-1/4 inch wrench to disconnect hose assembly (M).
9. While holding elbow (J) with adjustable wrench, use 1-1/4 inch wrench to disconnect hose assembly (K).

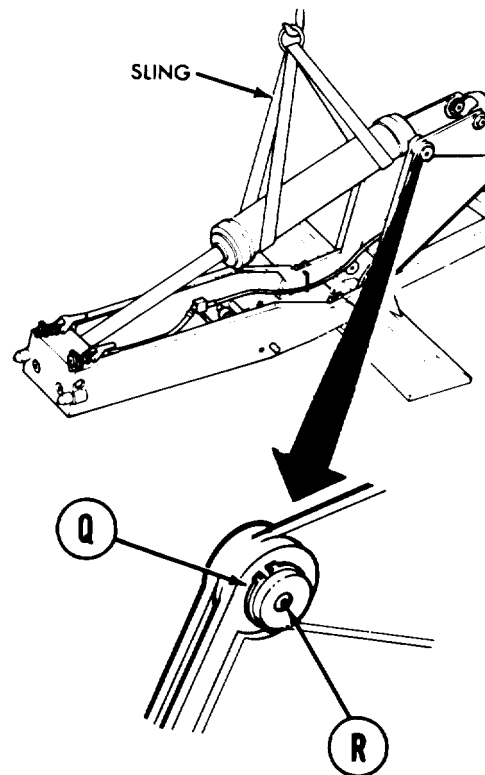
Go on to Sheet 3

TA251626

10. Using 1-1/4 inch wrench, remove end of hose assembly (L) from elbow (M).



11. Using 1-1/8 inch wrench to hold adapter (N), use 1-1/4 inch wrench to remove hose assembly (L).
12. Using adjustable wrench, remove elbow (M).
13. Using 1-1/8 inch wrench, remove nipple (P) and its attached parts as a unit.
14. Using snap ring pliers, remove two retaining rings (Q).
15. Using hammer and drift, remove pin (R).

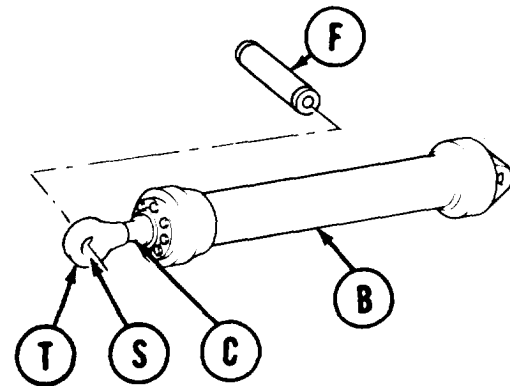


Go on to Sheet 4

TA251627

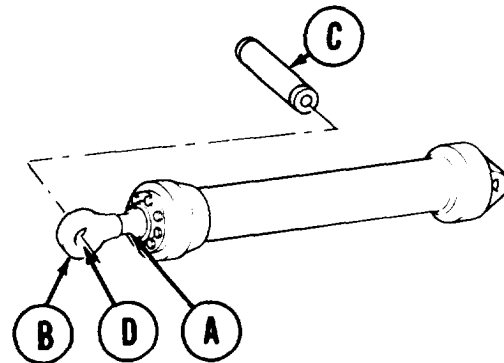
## TONGUE CYLINDER REPLACEMENT (Sheet 4 of 6)

16. Using lifting device carefully lift tongue cylinder (B) and place it on suitable work area.
17. Insert pin (F) through rod end connector eye (S).
18. Have another technician use cylinder rod wrench on flats of cylinder rod (C) to keep rod from turning.
19. While second technician holds cylinder rod (O) from turning, use pin (F) as a lever to unscrew and remove rod end connector (T).
20. Remove pin (F) from rod connector (T).
21. Using masking tape, tape threads of cylinder rod (C).



## INSTALLATION:

1. Remove tape from threads of cylinder rod (A).
2. With help from second technician, start rod end connector (B) on cylinder rod (A) by hand.
3. Insert pin (C) through rod end connector eye (D).
4. Have another technician use cylinder rod wrench on flats of cylinder rod (A) to keep rod from turning.
5. While second technician holds cylinder rod (A) from turning, use pin (C) as a lever to turn rod end connector (B) clockwise and tighten.
6. Remove pin (C).



Go on to Sheet 5

TA251628

TONGUE CYLINDER REPLACEMENT (Sheet 5 of 6)

**CAUTION**

Use care **when attaching** sling and when positioning tongue cylinder (E) to not damage attached fittings.

**NOTE**

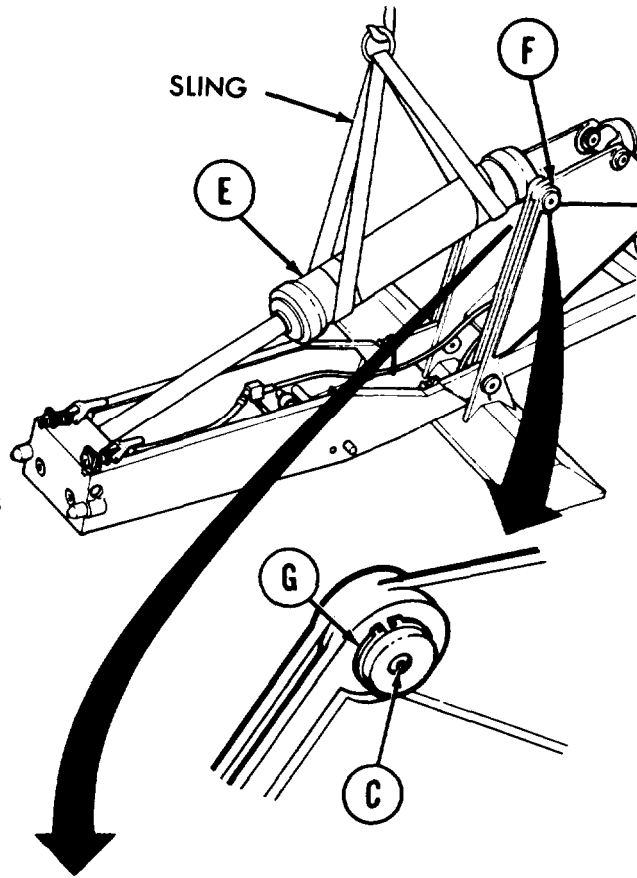
If necessary, use spreader when attaching sling and lifting device to tongue cylinder (E).

7. Position sling around tongue cylinder (E) and attach lifting device.

**WARNING**

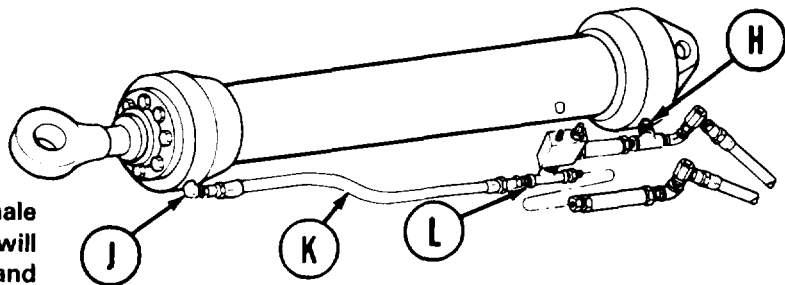
Make sure sling is routed under hydraulic lines and around tongue cylinder (E) so that it cannot slip. Personnel could be injured if cylinder slips during installation.

8. Raise tongue cylinder (E) into position and align mounting hole with boom (F).
9. Have two technicians align tongue cylinder (E) while third technician inserts pin (C).
10. Using snap ring pliers, install two retaining rings (G).



**NOTE**

Before installation, use pipe tape on all **male** threads, Start tape on second thread so **tape will not enter hydraulic system**. Remove all caps and **plugs as necessary during installation**.



11. Manually start nipple (H) and attached parts in tongue cylinder (E) by hand.
12. Using 1-1/8 inch wrench, tighten nipple (H) and align parts as shown.
13. Using adjustable wrench, install adapter elbow (J).
14. Using 1-14 inch wrench, install hose assembly (K) on elbow (J) and adapter (L).

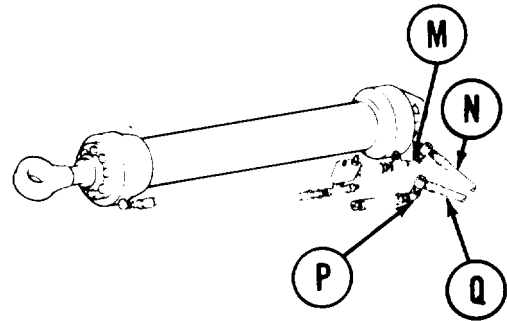
Go on to Sheet 6

TA251629

TONGUE CYLINDER REPLACEMENT (Sheet 6 of 6)

NOTE

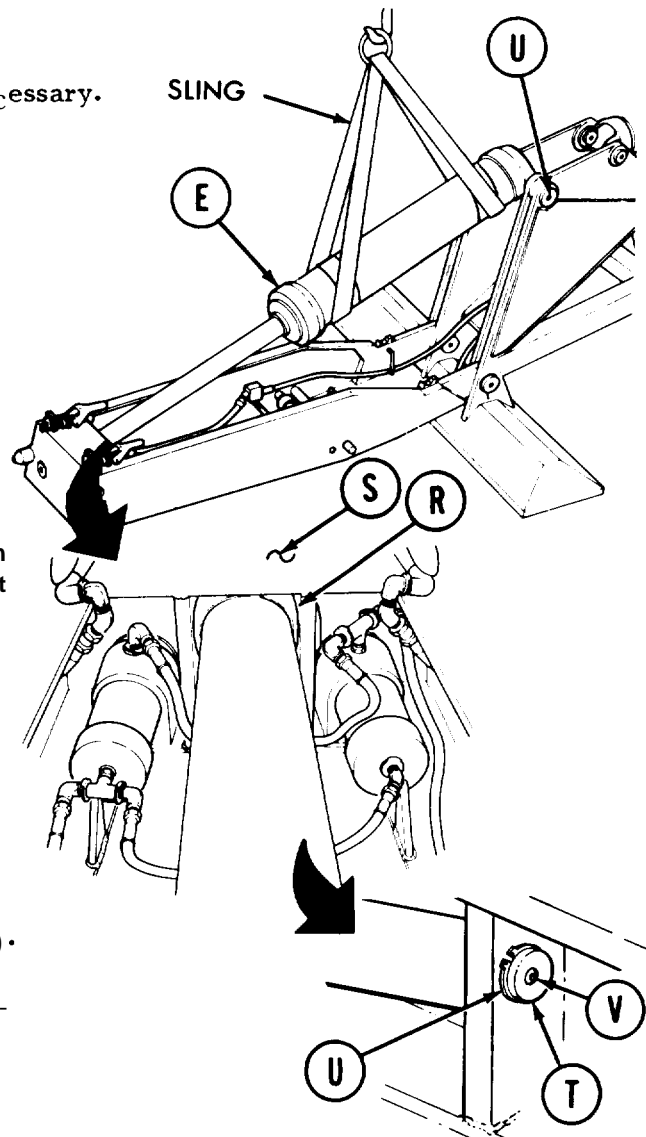
Make sure hose marked "CK1" is on vehicle left side and hose marked "CK2" is on right side.



15. Using adjustable wrench to hold elbow (M), use 1-1/4 inch wrench to install hose assembly (N).
16. Using adjustable wrench to hold elbow (P), use 1-1/4 inch wrench to install hose assembly (A).
17. Service hydraulic reservoir (LO 5-5420-202-12).
18. Bleed hydraulic system (page 3-72).
19. Check for hydraulic leaks and correct as necessary.
20. Extend tongue cylinder (E) and position rod end connector (R) in support of tongue (S) (TM 5-5420-202-10).
21. Have one technician hold rod end connector (R) in position while another inserts pin (T).

NOTE

It may be necessary to use hammer and drift on pin (T) after it has been started through both the support of tongue (S) and rod end connector (R).



22. Using snap ring pliers, install two retaining rings (U).
23. Remove sling and lifting device.
24. Using socket, install four grease fittings (V).
25. Service hydraulic reservoir (LO 5-5420-202-12).
26. Install tongue cylinder armor (page 3-233).

End of Task

TA 251630

**TM 5-5420-228-24**

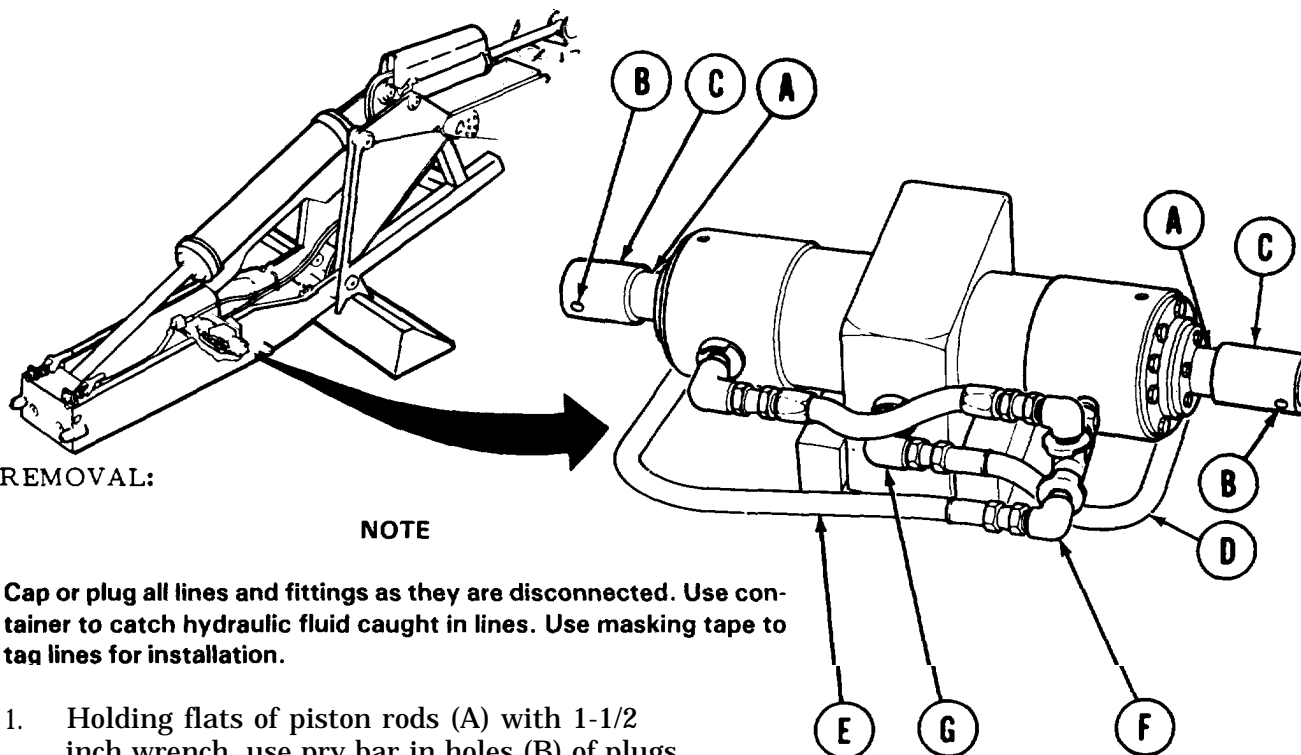
LOCKING CYLINDER REPLACEMENT (Sheet 1 of 3)

**TOOLS:** 10 in. adjustable wrench  
1-1/2 in. cylinder rod wrench (stowed right fender box)  
7/8 in. open end wrench  
3/4 in. combination wrench  
Roller head pry bar

**SUPPLIES:** Drip pans (suitable containers)      Protective caps and plugs  
Pencil (Item 22, Appendix D)      Pipe tape (Item 19, Appendix D)  
Masking tape (Item 18, Appendix D)

**REFERENCES:** LO 5-5420-202-12  
TM 5-5420-202-10

**PRELIMINARY PROCEDURE:** Extend locking cylinder (TM 9-5420-202-10).



**REMOVAL:**

**NOTE**

Cap or plug all lines and fittings as they are disconnected. Use container to catch hydraulic fluid caught in lines. Use masking tape to tag lines for installation.

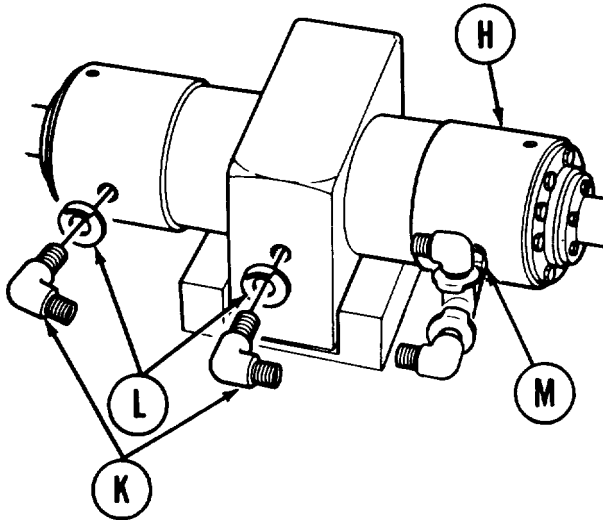
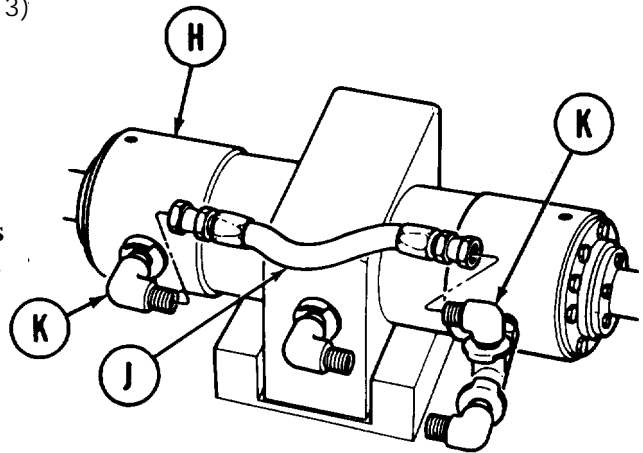
1. Holding flats of piston rods (A) with 1-1/2 inch wrench, use pry bar in holes (B) of plugs (C) to remove two plugs (C) from piston rods (A).
2. Retract locking cylinders (TM 9-5420-202-10).
3. Relieve hydraulic pressure (page 3-71).
4. Using 7/8 inch wrench, disconnect hose assemblies "CE2" (D) and "CE1" (E) from elbows (F and G).

Go on to Sheet 2

TA251631

LOCKING CYLINDER REPLACEMENT (Sheet 2 of 3)

5. Remove locking cylinder (H) from vehicle.
6. Using 7/8 inch wrench, remove hose assembly (J) from two elbows (K).
7. Using 3/4 inch wrench, remove two elbows (K) and collars (L) from locking cylinder (H).



8. Using 3/4 inch wrench, remove nipple (M) and its attached parts from locking cylinder (H).

INSTALLATION:

NOTE

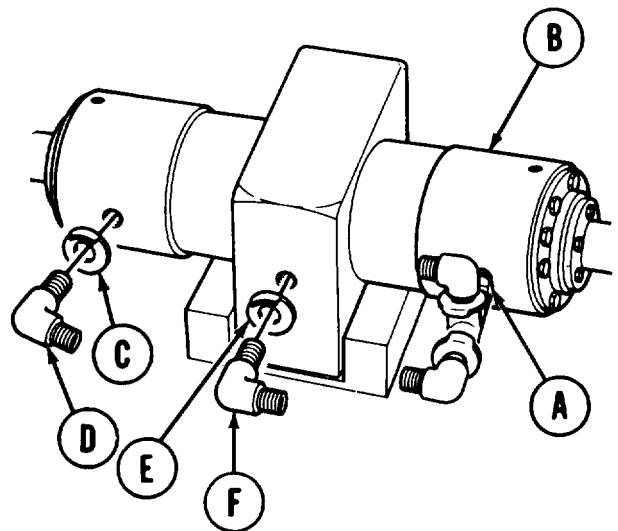
Before installation, use pipe tape on all male pipe threads. Start tape on **second thread so tape will not enter hydraulic system. Remove all caps and plugs as necessary during installation.**

1. Using 3/4 inch wrench, install nipple (A) and its attached parts on locking cylinder (B).

NOTE

Collar (C), marked "M" is used with elbow (D) and collar (E), marked "CE2" is used with elbow (F).

2. Using 3/4 inch wrench, install two elbows (D, F) and collars (C, E).

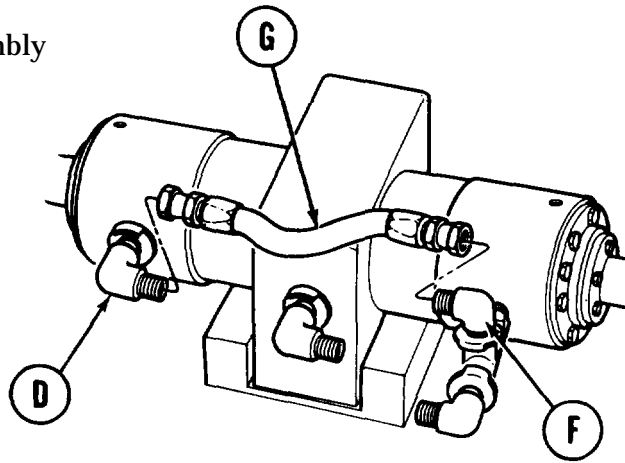


Go on to Sheet 3

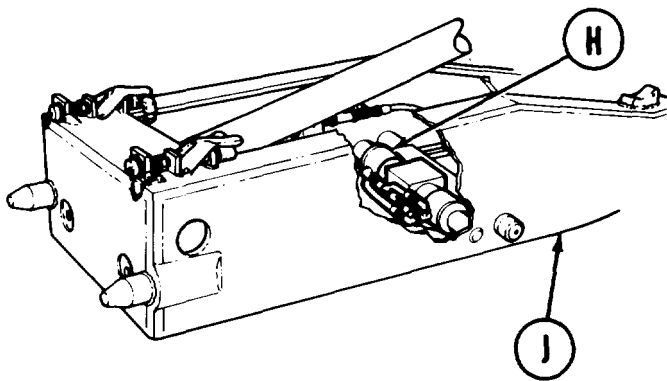
TA251632

LOCKING CYLINDER REPLACEMENT (Sheet 3 of 3)

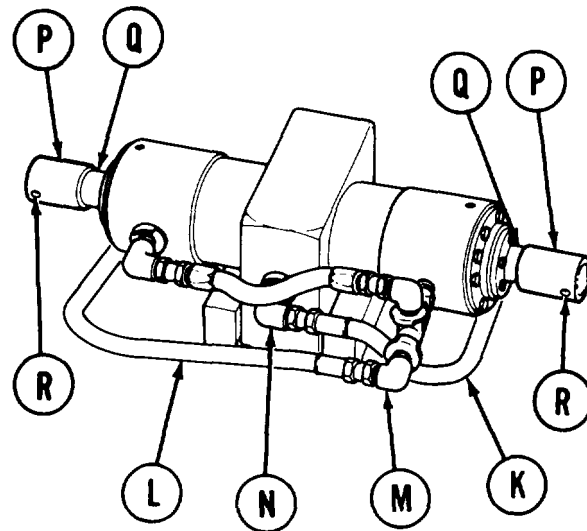
- Using 7/8 inch wrench, install hose assembly (G) to elbows (D, F).



- Position locking cylinder (H) in launcher tongue (J) with all hydraulic ports facing forward.



- Manually install two hose assemblies (K, L) as follows: hose assembly (L) marked "CE1" to elbow (M) and hose assembly (K) marked "CE2" to elbow (N).



- Using 7/8 inch wrench, tighten nuts of hose assemblies (K, L).
- Service hydraulic reservoir (LO 5-5420-202-12).
- Bleed hydraulic system (page 3-72).
- Check for hydraulic leaks and correct as necessary.
- Service hydraulic reservoir (LO 5-5420-202-12).
- Extend locking cylinder (TM 55420-202-10).
- Manually install plugs (P) on piston rod (Q).
- Using pry bar through holes (R) in plugs (P) and 1-1/2 inch wrench on flats of piston rods (Q), tighten two plugs (P).

End of Task

TA251633



EJECTION CYLINDER REPLACEMENT (LEFT) (Sheet 1 of 4)

PROCEDURE INDEX

PROCEDURE	PAGE
Removal	3-243
Installation	3-245

**TOOLS:** 3/8 in. drift punch  
 Sledge hammer  
 Flat-tip screwdriver (3/4 to 1 in. across flats)  
 10 in. adjustable wrench  
 3/4 in. open end wrench  
 1-1/2 in. open end wrench  
 7/8 in. open end wrench

**SUPPLIES:** Pipe tape (Item 19, Appendix D)  
 Drip pans (suitable containers)  
 Pencil (Item 22, Appendix D)  
 Wooden block (make from Item 25, Appendix D)  
 Protective caps and plugs  
 Lockwashers (2 required)  
 Masking tape (Item 18, Appendix D)

**REFERENCES:** LO 5-5420-202-12  
 TM 5-5420-202-10

**PRELIMINARY PROCEDURE:** Extend ejection cylinders (TM 5-5420-202-10)

**REMOVAL: NOTE**

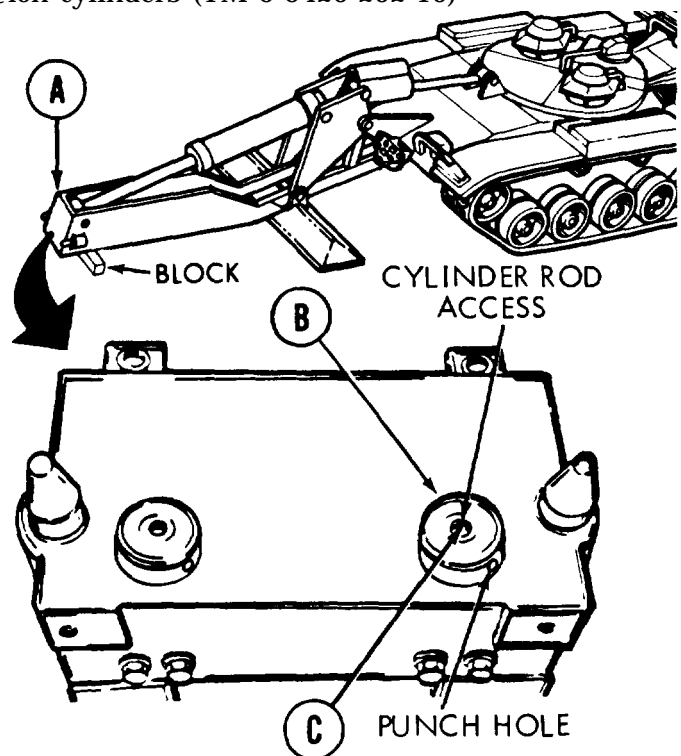
Use container to catch excess hydraulic fluid. Use masking tape to tag lines for installation. Cap or plug all lines and fittings as they are disconnected.

1. Place wooden block under tongue (A) and lower tongue (A) (TM 5-5420-202-10).

**NOTE**

It maybe necessary to hit plug (B) with sledge hammer to loosen plug (B).

2. Using punch in hole of plug (B), unscrew plug (B) while holding cylinder rod (C) from turning with screwdriver.
3. Remove plug (B) from tongue (A).
4. Relieve hydraulic pressure (page 3-71).



Go on to Sheet 2

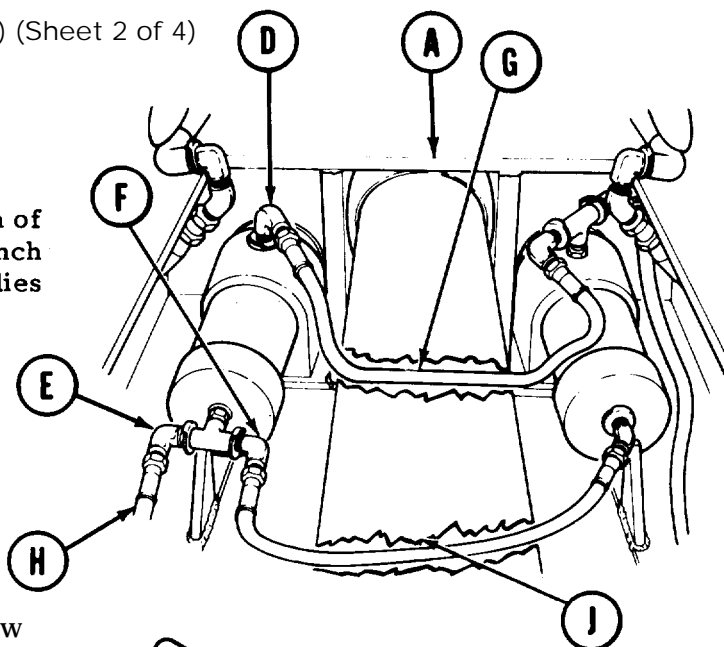
TA251634

EJECTION CYLINDER REPLACEMENT (LEFT) (Sheet 2 of 4)

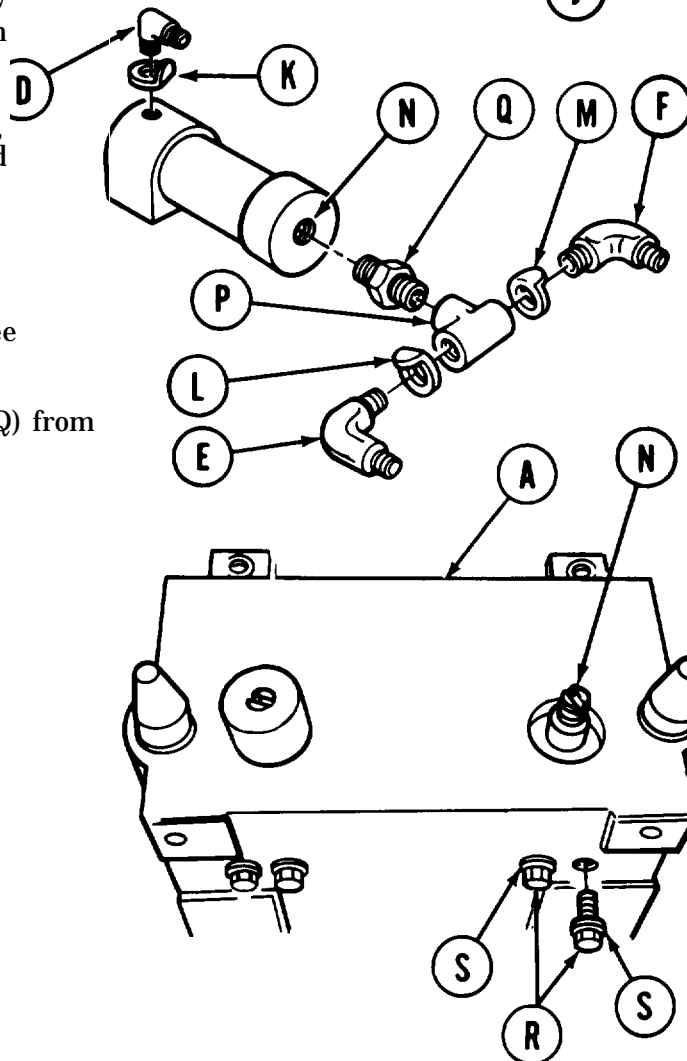
5. Using adjustable wrench to hold each of three elbows (D, E, F), use 7/8 inch wrench to disconnect hose assemblies "CA" (G), "CC" (H), and "CB" (J).

**NOTE**

When removing parts, be sure to keep collars "CA" (K), "CC" (L), and "CB" (M) with hose assemblies of same markings.



6. Using adjustable wrench, remove elbow (D) and collar "CA" (K) from eject ion cylinder (N).
7. Using adjustable. wrench, remove, elbows (E, F) and collars "CC" (L) and "CB" (M) from tee (P).
8. Using 3/4 inch wrench on nipple (Q) and adjustable wrench on tee (P), remove tee (P) from nipple (Q).
9. Using 3/4 inch wrench, remove nipple (Q) from ejection cylinder (N).
10. Using 1-1/2 inch wrench, remove two screws (R) and lockwashers (S) from bottom of tongue (A).
11. Manually remove ejection cylinder (N) from inside of tongue (A).



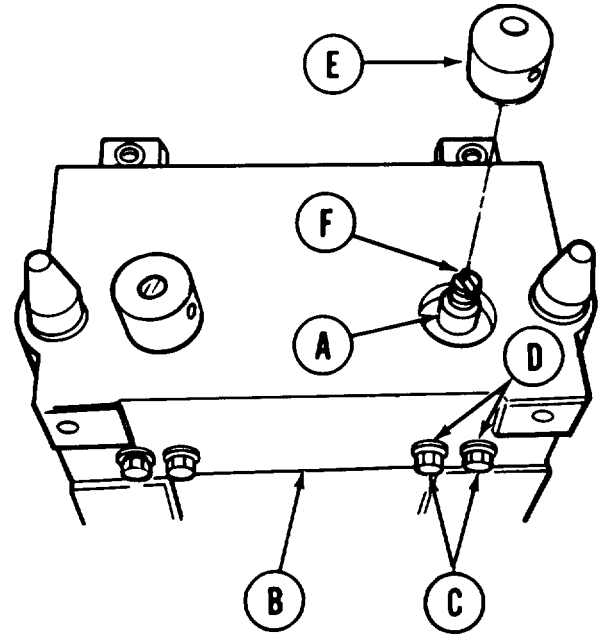
Go on to Sheet 3

TA251635

EJECTION CYLINDER REPLACEMENT (LEFT) (Sheet 3 of 4)

INSTALLATION:

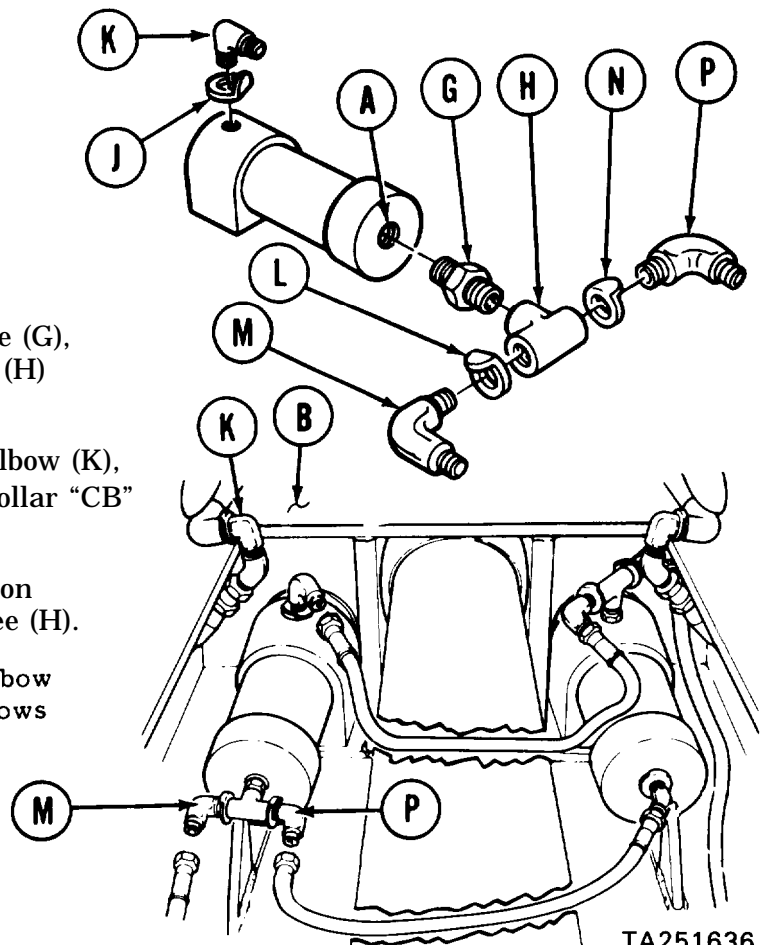
1. Position ejection cylinder (A) in tongue (B).
2. Manually install two screws (C) and lockwashers (D) in bottom of tongue (B) to secure ejection cylinder (A).
3. Using 1-1/2 inch wrench, tighten two screws (C) and lockwashers (D).
4. Manually start plug (E) on threads of cylinder rod (F).
5. Using punch in hole of plug (E), tighten plug (E) while holding cylinder rod (F) from turning with screwdriver.



NOTE

Before installation, use pipe tape on all male pipe threads. Start tape on second thread so tape will not enter hydraulic system. Remove all caps and plugs as necessary during installation.

6. Using 3/4 inch wrench, install nipple (G) in ejection cylinder (A).
7. Using 3/4 inch wrench to hold nipple (G), use adjustable wrench to install tee (H) on nipple (G).
8. Manually place collar "CA" (J) on elbow (K), collar "CC" (L) on elbow (M), and collar "CB" (N) on elbow (P).
9. Manually install elbow (K) on ejection cylinder (A) and elbows (M, P) on tee (H).
10. Using adjustable wrench, tighten elbow (K) on ejection cylinder (A) and elbows (M, P) on tee (H).



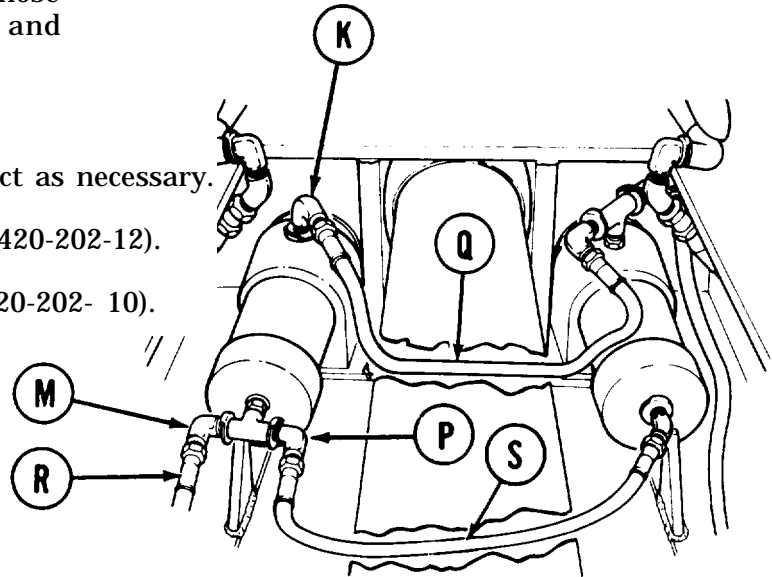
Go on to Sheet 4

TA251636

EJECTION CYLINDER REPLACEMENT (LEFT) (Sheet 4 of 4)

11. Using 7/8 inch wrench, install hose assemblies "CA" (Q), "CC" (R), and "CB" (S) to elbows (K, M, P).
12. Bleed hydraulic system (page 3-72).
13. Check for hydraulic leaks and correct as necessary.
14. Service hydraulic reservoir (LO 5-5420-202-12).
15. Retract ejection cylinders (TM 5-5420-202- 10).

**End of Task**



EJECTION CYLINDER REPLACEMENT (RIGHT) (Sheet 1 of 4)

PROCEDURE INDEX

PROCEDURE	Page
Removal	3-247
Installation	3-249

TOOLS: 3/8 in. drift punch  
 Sledge hammer  
 Flat-tip screwdriver (3/4 to 1 in. across flats)  
 10 in. adjustable wrench  
 1-1/2 in. combination box and open end wrench  
 7/8 in. open end wrench  
 3/4 in. open end wrench

SUPPLIES: Pipe tape (Item 19, Appendix D)  
 Drip pans (suitable containers)  
 Pencil (Item 22, Appendix D)  
 Wooden block (make from Item 25, Appendix D)  
 Protective caps and plugs  
 Lockwashers (2 required)  
 Masking tape (Item 18, Appendix D)

REFERENCES: LO 5-5420-202-12  
 TM 5-5420-202-10

PRELIMINARY PROCEDURE: Extend ejection cylinders (TM 5-5420-202-10)

REMOVAL:

NOTE

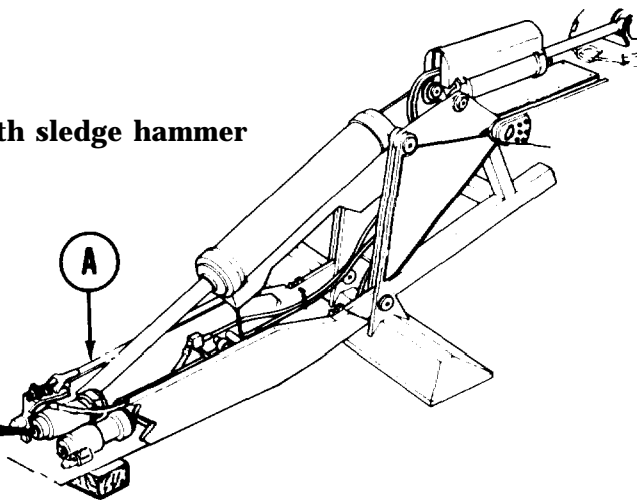
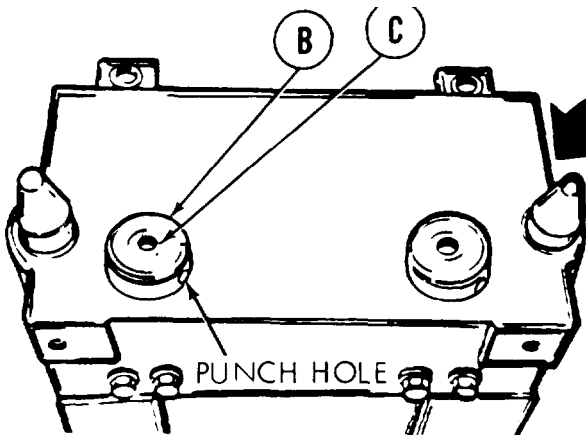
**Use container to catch excess hydraulic fluid. Use masking tape to tag lines for installation. Cap or plug all lines and fittings as they are disconnect**

1. Place wooden block under tongue (A) and lower tongue (A) (TM 5-5420-202-10).

NOTE

**It may be necessary to hit plug (B) with sledge hammer to loosen plug (B).**

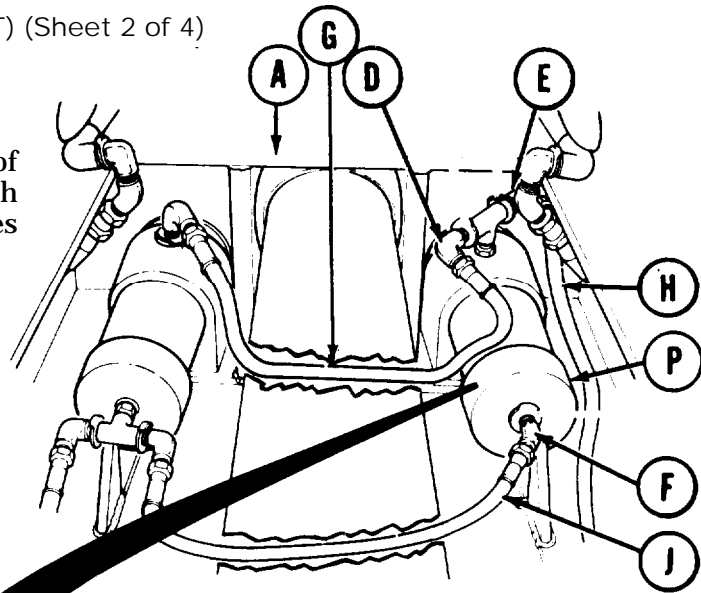
2. Using punch in hole of plug (B), unscrew plug (B) with screwdriver while holding cylinder rod (C) from turning.
3. Remove plug (B) from tongue (A).



4. Relieve hydraulic pressure (page 3-71).
5. Position container to catch hydraulic fluid in tongue (A).

EJECTION CYLINDER REPLACEMENT (RIGHT) (Sheet 2 of 4)

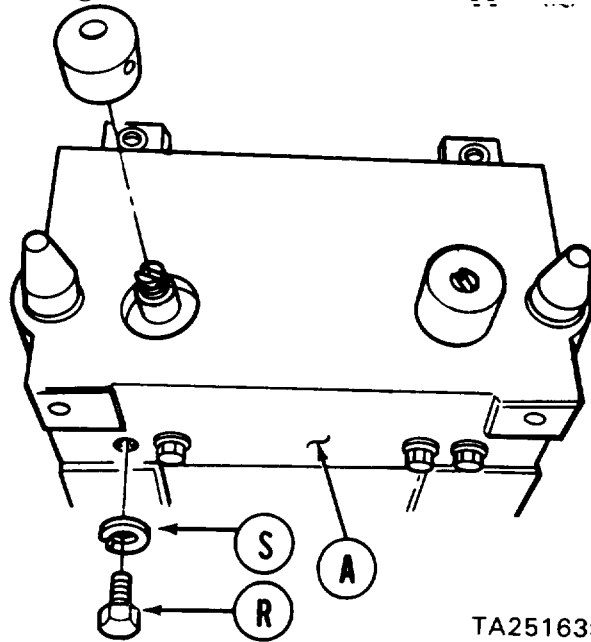
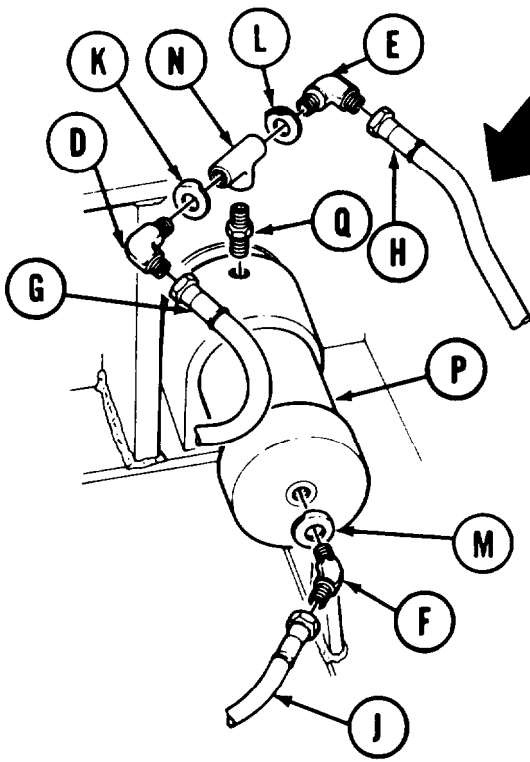
- Using adjustable wrench to hold each of three elbows (D, E, F) use 7/8 inch wrench to disconnect hose assemblies "CA" (G), "CD" (H), and "CB" (J).



NOTE

When removing parts, make sure to keep collars "CA" (K), "CD" (L), and "CB" (M) with hose assemblies of same markings.

- Using adjustable wrench, remove elbows (D, E) and collars "CA" (K) and "CD" (L) from tee (N).
- Using adjustable wrench, remove elbow (F) and collar "CB" (M) from ejection cylinder (P).
- Using 3/4 inch wrench on nipple (Q) and adjustable wrench on tee (N), remove tee (N).
- Using 3/4 inch wrench, remove nipple (Q).



- Using 1-1/2 inch wrench, remove two screws (R) and lockwashers (S) from bottom of tongue (A). Throw lockwashers (S) away.
- Manually remove ejection cylinder (P).

Go on to Sheet 3

TA251639

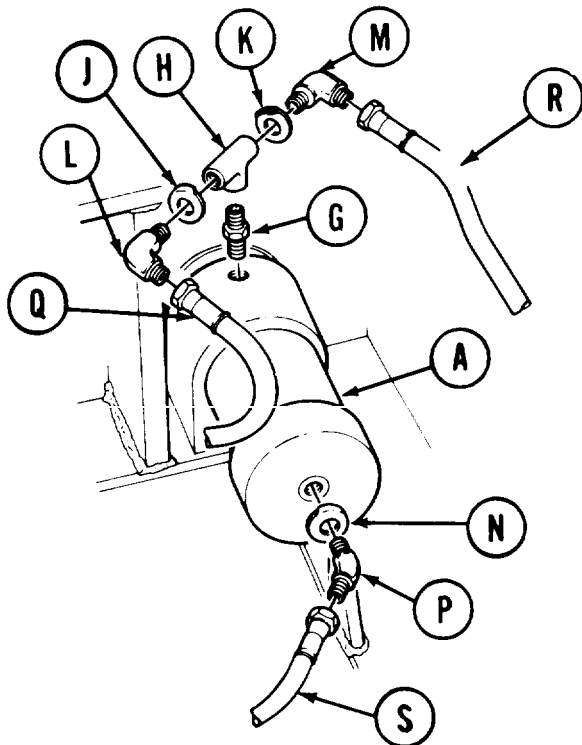
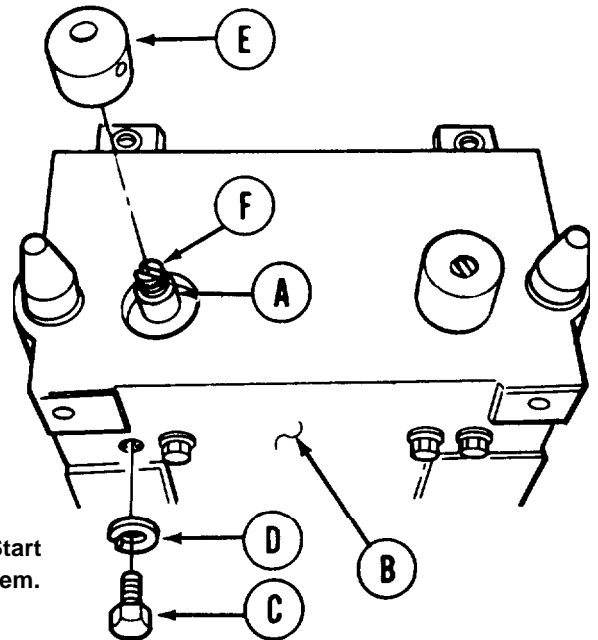
EJECTION CYLINDER REPLACEMENT (RIGHT) (Sheet 3 of 4)

INSTALLATION:

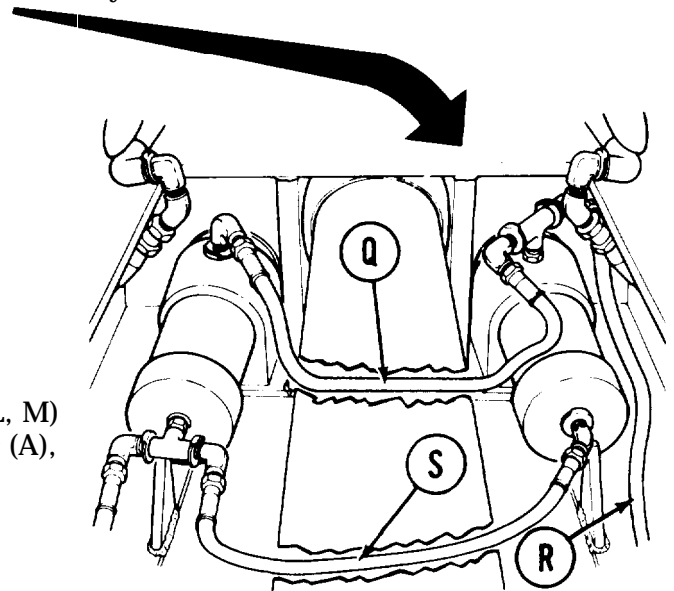
1. Position ejection cylinder (A) in tongue (B).
2. Manually install two screws (C) and lockwashers (D) in bottom of tongue to secure ejection cylinder (A).
3. Using 1-1/2 inch wrench, tighten two screws (C) and lockwashers (D).
4. Manually start plug (E) on threads of cylinder rod (F).
5. Using punch in hole of plug (E), tighten plug (E) while holding cylinder rod (F) from turning with screwdriver.

NOTE

Before installation, use pipe tape on all male pipe threads. Start tape on second thread so tape will not enter hydraulic system. Remove all caps and plugs as necessary during installation.



6. Using 3/4 inch wrench, install nipple (G) in ejection cylinder (A).
7. Using 3/4 inch wrench to hold nipple (G), use adjustable wrench to install tee (H).
8. Manually place collars "CA" (J) and "CD" (K) on elbows (L, M) and collar "CB" (N) on elbow (P).
9. Manually install elbow (P) on ejection cylinder (A) and elbows (L, M) on tee (H).



10. Using adjustable wrench, tighten elbows (L, M) to tee (H) and elbow (P) to ejection cylinder (A),
11. Using 7/8 inch wrench, install hose assemblies "CA" (Q), "CB" (S) on elbows (L, M, P).

Go on to Sheet 4

TA251640

12. Bleed hydraulic system (page 3-72).
13. Check for hydraulic leaks and correct as necessary.
14. Service hydraulic reservoir (LO 5-5420-202-12).
15. Retract ejection cylinders (TM 5-5420-202-10).

End of Task



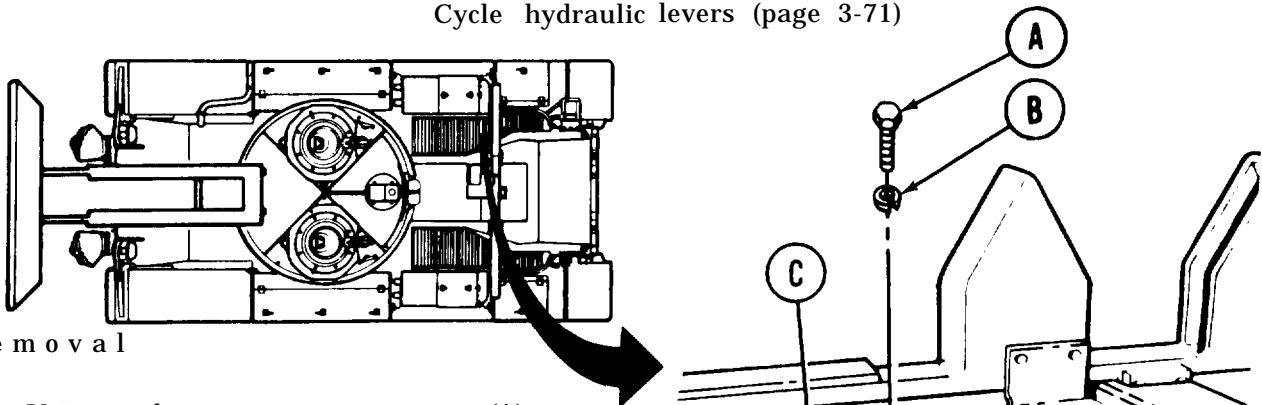
**HOLDDOWN CYLINDER HOSE GUARD REPLACEMENT (Sheet 1 of 2)**

**TOOLS:** 7/8 in. open end wrench  
 1-1/2 in. socket with 3/4 in. drive  
 Ratchet with 3/4 in. drive

**SUPPLIES:** Rags (Item 12, Appendix D)  
 Protective caps and plugs  
 Pipe tape (Item 19, Appendix D)  
 Pencil (Item 22, Appendix D)  
 Masking tape (Item 18, Appendix D)  
 Lockwashers (2 required)

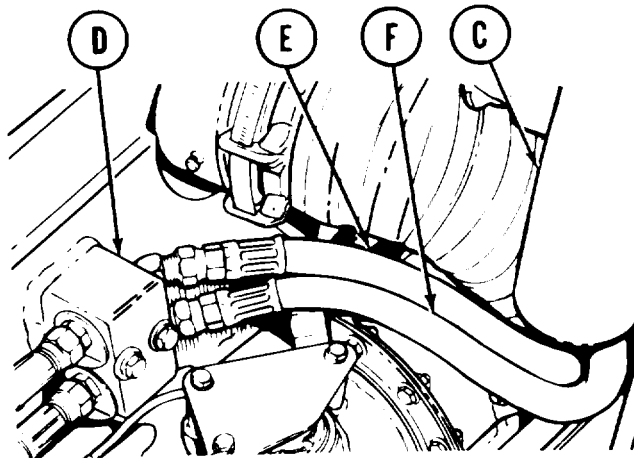
**REFERENCE:** TM 5-5420-202-10

**PRELIMINARY PROCEDURES:** Open No. 3 grille door (TM 5-5420-202-10)  
 Cycle hydraulic levers (page 3-71)



**Removal**

1. Using socket, remove two screws (A) and lockwashers (B) securing hose guard (C) to vehicle. Throw lockwashers (B) away.



**NOTE**

**Cap or plug all lines and manifold (D) when disconnected. Use masking tape to tag lines for installation. Use rags to catch excess hydraulic fluid.**

2. Using wrench, remove hose assemblies "CV3" (E) and "CV4" (F) from manifold (D).
3. Slide hose guard (C) off hose assemblies (E and F).

Go on to Sheet 2

TA251641

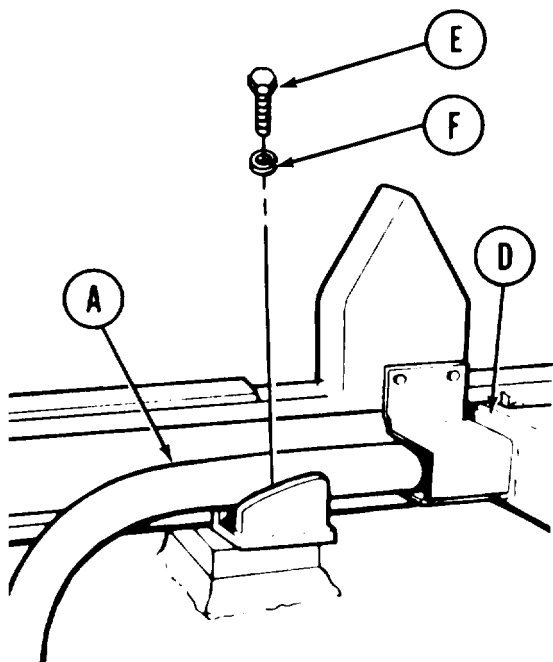
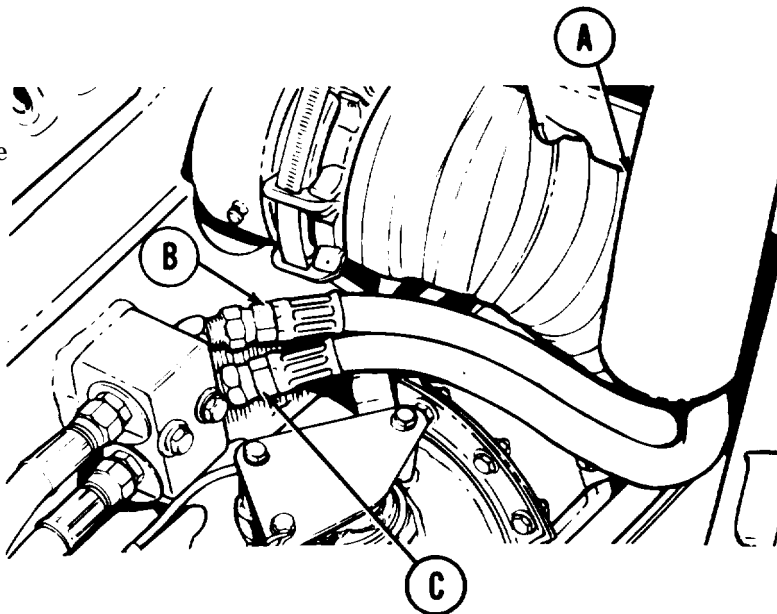
**HOLDDOWN CYLINDER HOSE GUARD REPLACEMENT (Sheet 2 of 2)**

**INSTALLATION:**

**NOTE**

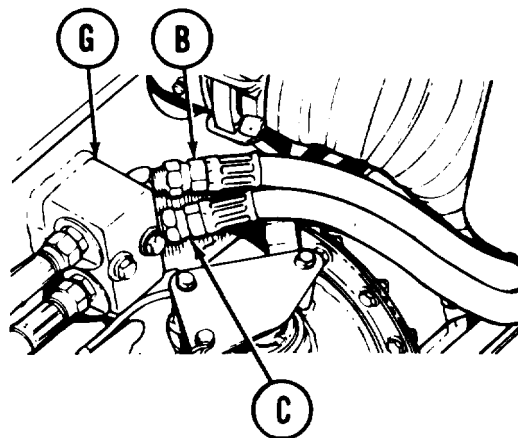
Use pipe tape on all male threads before installation. Start tape on second thread so tape will not enter hydraulic system. Remove all caps and plugs as necessary during installation.

1. Slide hose guard (A) over two hose assemblies (B) and (C).



2. Slip hose guard (A) into position against holddown cylinder armor (D).
3. Using socket, install two screws (E) and new lockwashers (F).

4. Using wrench, install hose assemblies "CV3" (C) and "CV4" (B) on manifold (G) as shown.
5. Close engine right No. 3 grille door (TM-5-5420-202-10).



End of Task

TA251642

**HOLD-DOWN CYLINDER ARMOR REPLACEMENT (Sheet 1 of 1)**

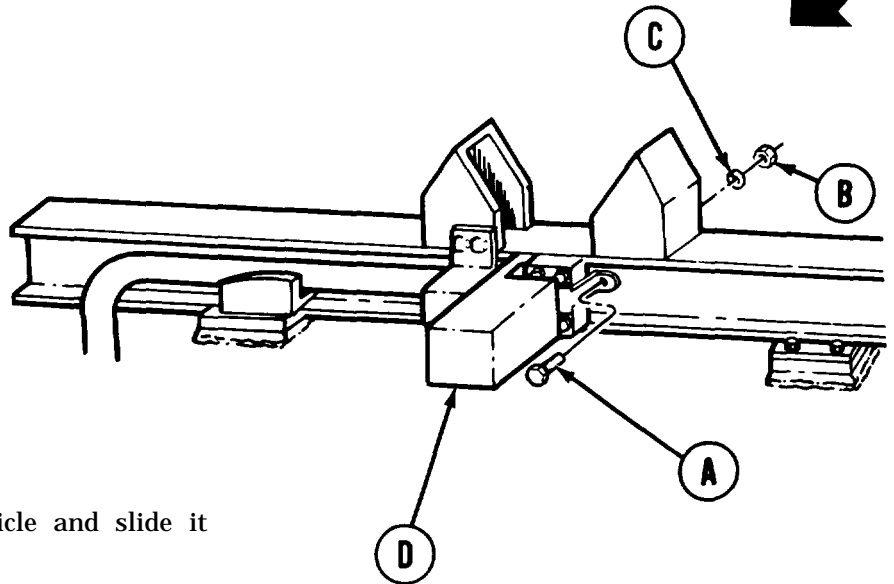
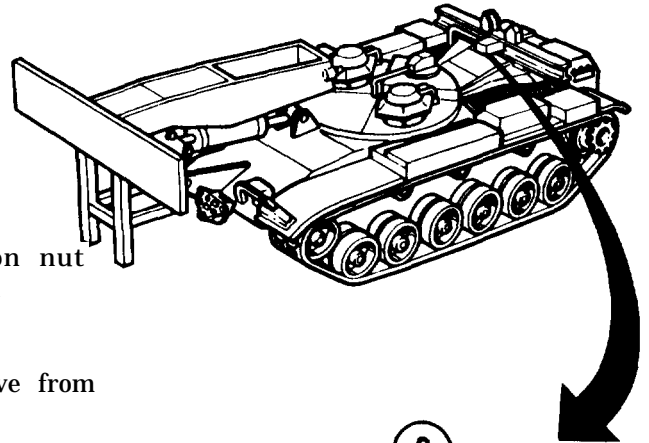
**TOOLS:** 3/4 in. combination box and open end wrench  
 3/4 in. socket with 1/2 in. drive  
 5 in. extension with 1/2 in. drive  
 Ratchet with 1/2 in. drive

**SUPPLIES:** Lockwashers (3 required)

**REFERENCE:** TM 5-5420-202-10

**REMOVAL:**

1. Using socket on screw (A) and wrench on nut (B), remove three screws (A), nuts (B), and lockwashers (C).
2. Pull armor (D) forward, then up, and remove from vehicle.

**INSTALLATION:**

1. Position armor (D) on vehicle and slide it rearward to align holes.
2. Insert three screws (A).
3. place lockwashers (C) and start nuts (B) on three screws (A).
4. Using socket on three screws (A) and wrench on nuts (B), tighten screws (A).

End of Task

**HOLD-DOWN CYLINDER REPLACEMENT (Sheet 1 of 3)**

**TOOLS:** Ratchet 3/4 in. drive  
Flat-tip screwdriver (large)  
1-1/2 in. cylinder rod wrench (stowed right fender box)  
7/8 in. open end wrench  
10 in. adjustable wrench  
Vise  
13/16 in. combination wrench  
15/16 in. socket 3/4 in. drive

**SUPPLIES:** Drip pans (suitable containers)  
Masking tape (Item 18, Appendix D)  
Protective caps and plugs  
Pipe tape (Item 19, Appendix D)  
Pencil (Item 22, Appendix D)

**REFERENCE:** LO 5-5420-202-12

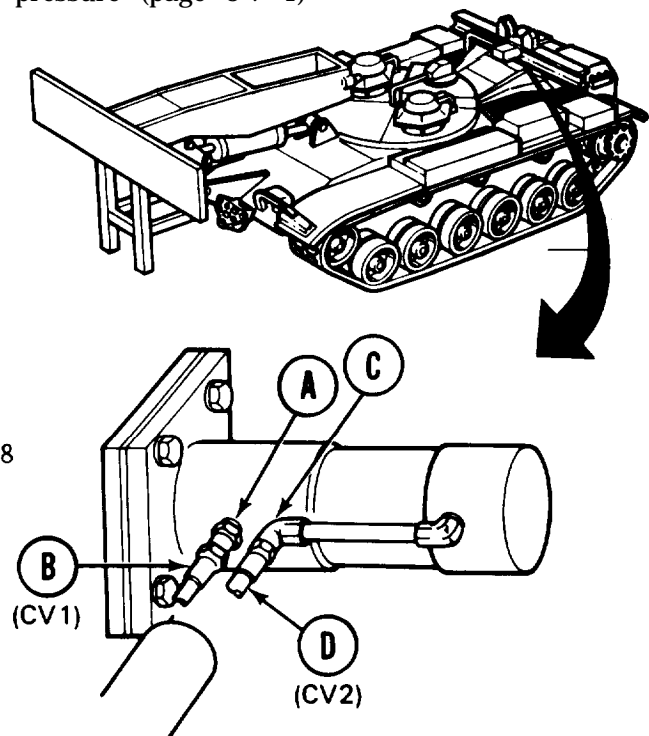
**PRELIMINARY PROCEDURES:** Remove hold-down cylinder armor (page 3-253)  
Relieve hydraulic pressure (page 3-7 1)

**REMOVAL:**

**NOTE**

Use drip pan to catch excess hydraulic fluid. Use masking tape to tag lines for installation. Cap or plug all lines and fittings as they are disconnected.

1. Using 13/16 inch wrench on adapter (A) and 7/8 inch wrench on nut of hose assembly (A), disconnect hose assembly (B).
2. Using adjustable wrench on elbow (C) and 7/8 inch wrench on nut of hose assembly (D), disconnect hose assembly (D).

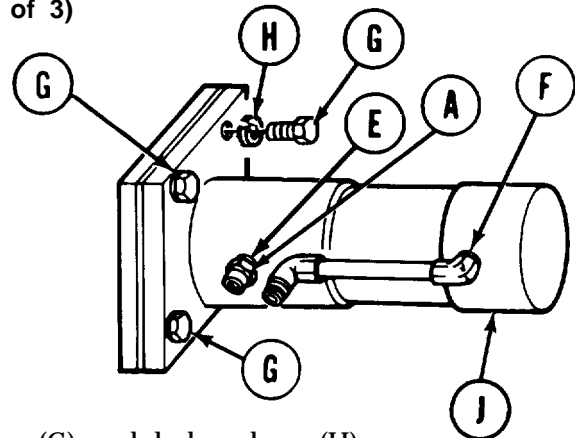


Go on to Sheet 2

TA251644

**HOLD-DOWN CYLINDER REPLACEMENT (Sheet 2 of 3)**

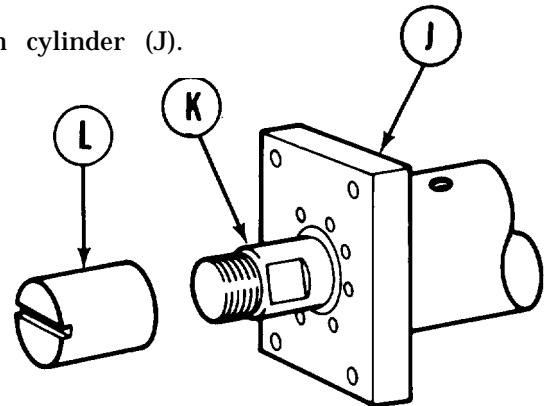
3. Using 7/8 inch wrench on adapter (C), remove adapter (A) and collar (E).
4. Using adjustable wrench, remove elbow (F) and its attached parts.



5. Using 15/ 16 inch wrench, remove four screws (G) and lockwashers (H).
6. Manually slide hold-down cylinder (J) forward and remove from vehicle.

7. Drain remaining hydraulic fluid from hold-down cylinder (J).
8. Place hold-down cylinder (J) in a vise.

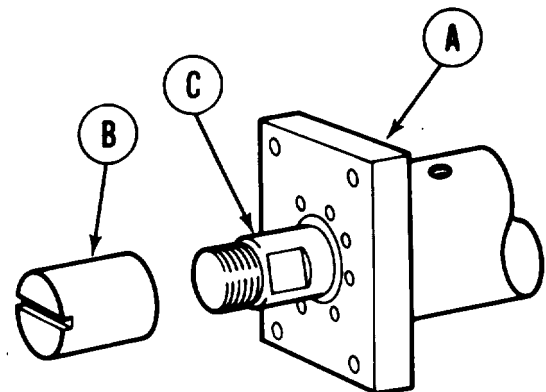
9. Using 1-1/2 inch wrench to hold rod (K) of hold-down cylinder (J), use screwdriver to remove plug (L).



10. Remove hold-down cylinder from vise.

**INSTALLATION:**

1. Place hold-down cylinder (A) in a vise.
2. Manually start plug (B) on rod (C) of hold-down cylinder (A).
3. Using 1-1/2 wrench to hold rod (C), use screwdriver to tighten plug (B).
4. Remove hold-down cylinder (A) from vise.



Go on to Sheet 3

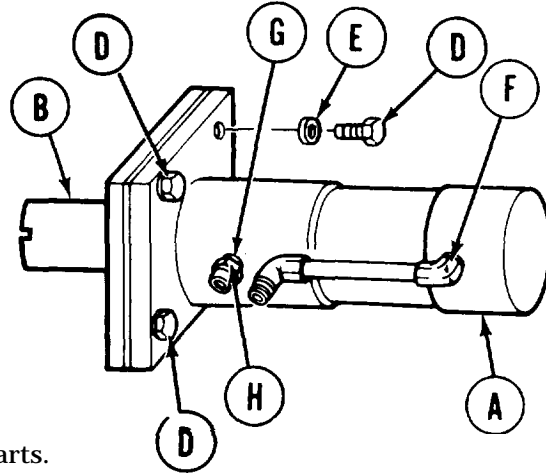
TA251645

**HOLD-DOWN CYLINDER REPLACEMENT (Sheet 3 of 3)**

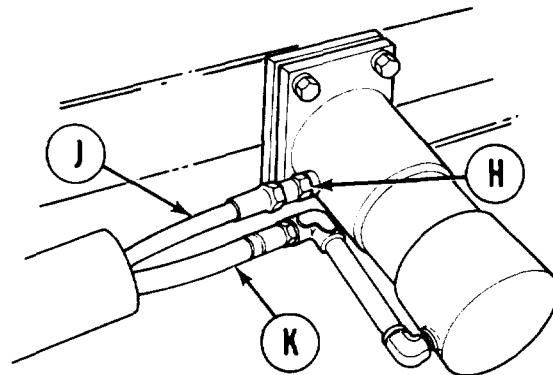
5. Position hold-down cylinder (A) and insert plug (B) through recess in bridge seat.
6. Using 15/16 inch wrench, install four screws (D) and lockwashers (E).

**NOTE**

**Before installation, use pipe thread tape on all male threads. Start tape on second thread so tape will not enter hydraulic system. Remove all caps and plugs as necessary during installation.**



7. Manually install elbow (F) with its attached parts.
8. Using adjustable wrench, tighten elbow (F).
9. Place collar (G) on adapter (H).
10. Using 13/16 inch wrench, install and tighten adapter (H).
11. Manually connect nuts of hose assemblies (J and K).
12. Using 7/8 inch wrench, tighten nuts of hose assemblies (J and K).
13. Fill hydraulic reservoir (LO 5-5420-202-12).
14. Bleed hydraulic system (page 3-72).
15. Check for hydraulic leaks and correct as necessary.
16. Refill hydraulic reservoir (LO 5-5420-202-12).
17. Install hold-down cylinder armor (page 3-253).



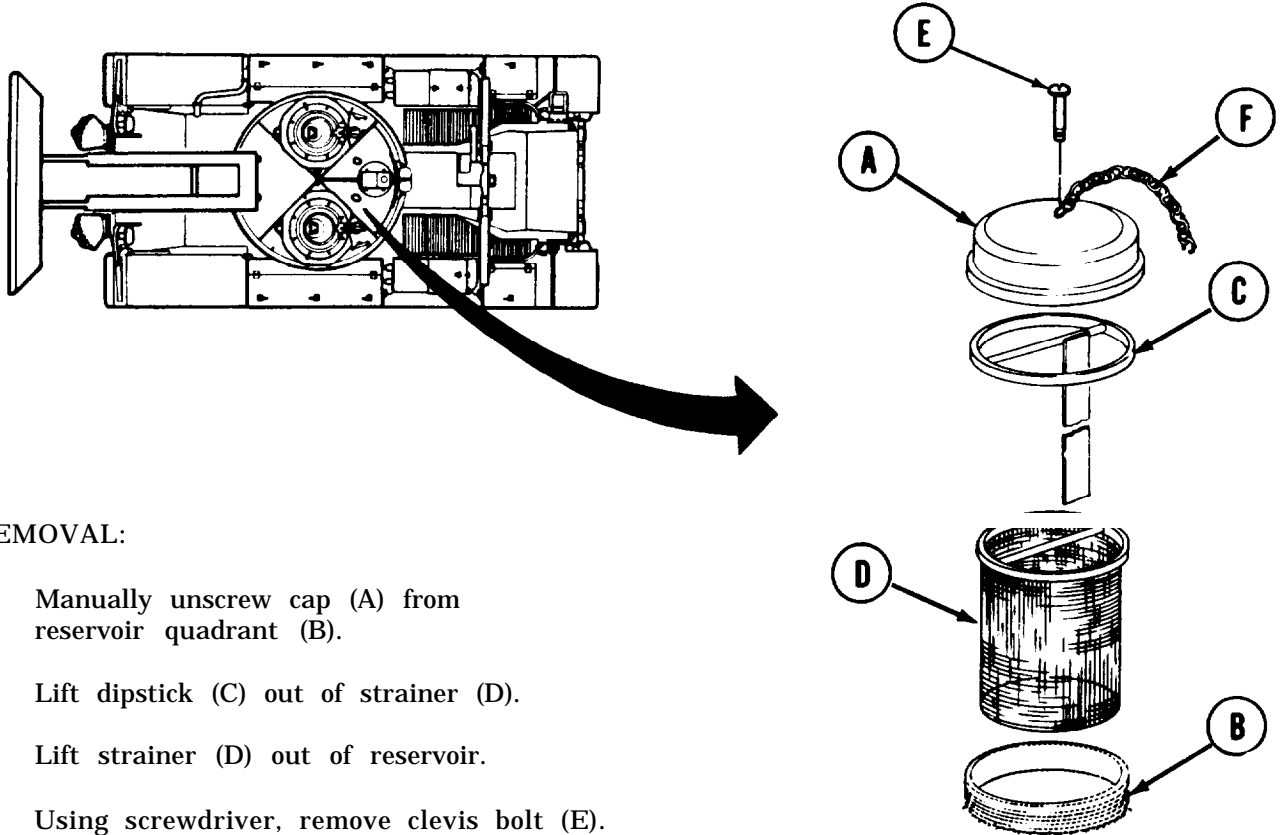
End of Task

TA251646

## Section V. HYDRAULIC RESERVOIR COMPONENTS AND ANTENNA BASE ARMOR

## RESERVOIR QUADRANT OIL STRAINER, CAP, AND DIPSTICK REPLACEMENT (Sheet 1 of 1)

TOOLS: Flat-tip screwdriver



## REMOVAL:

1. Manually unscrew cap (A) from reservoir quadrant (B).
2. Lift dipstick (C) out of strainer (D).
3. Lift strainer (D) out of reservoir.
4. Using screwdriver, remove clevis bolt (E).
5. Remove chain (F) from cap (A).

## INSTALLATION:

1. Place chain (F) in position on cap (A).
2. Using screwdriver, install clevis bolt (E) through chain (F) and into cap (A).
3. Place strainer (D) in reservoir.
4. Place dipstick (C) into strainer (D).
5. Manually screw cap (A) onto reservoir quadrant (B).

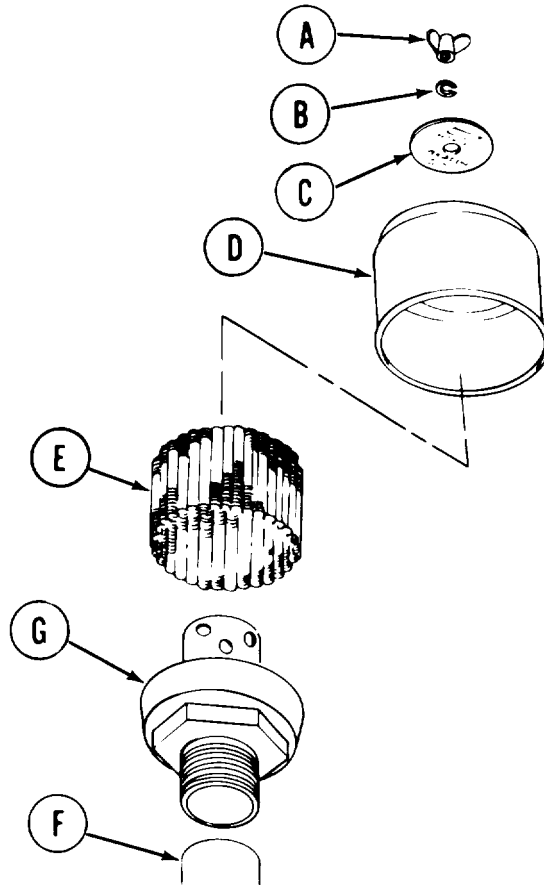
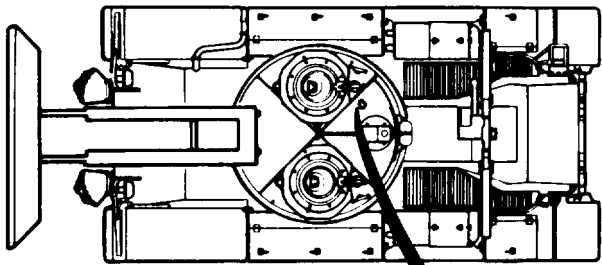
End of Task

TA251647

**RESERVOIR QUADRANT AIR FILTER REPLACEMENT (Sheet 1 of 2)**

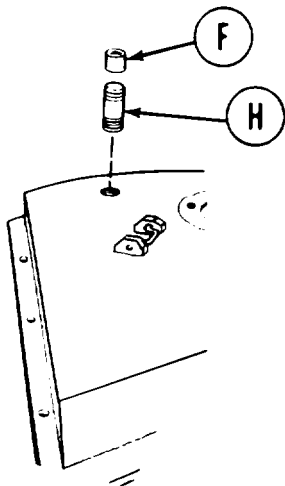
**TOOLS:** Slip joint pliers  
 15 in. adjustable wrench  
 14 in. pipe wrench (2 required)

**SUPPLIES:** Filter element  
 Lockwasher



**REMOVAL:**

1. Using pliers if needed, remove wing nut (A).
2. Manually remove lockwasher (B), nameplate (C), and hood (D).
3. Remove filter element (E).



4. Using pipe wrench to hold coupling (F), use adjustable wrench on flats to remove body (G).
5. Using pipe wrench to hold nipple (H), use pipe wrench to remove coupling (F).
6. Using pipe wrench, remove nipple (H).

Go on to Sheet 2

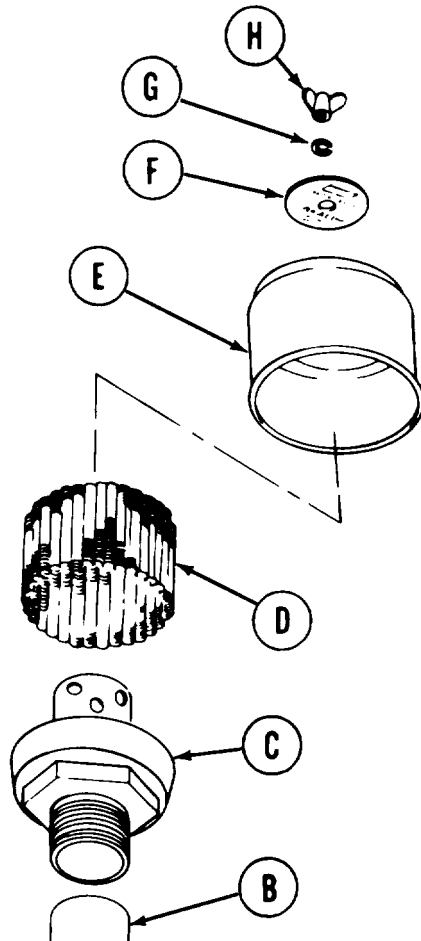
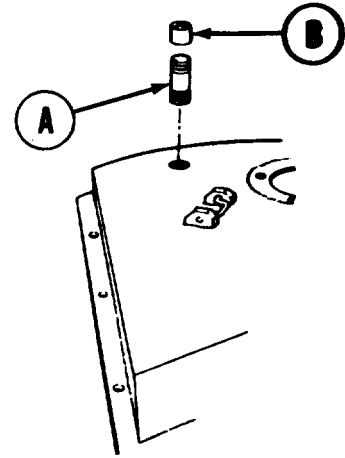
TA251648



## RESERVOIR QUADRANT AIR FILTER REPLACEMENT (Sheet 2 of 2)

## INSTALLATION:

1. Using pipe wrench, install nipple (A).
2. While holding nipple (A) with pipe wrench, use pipe wrench to install coupling (B).



3. While holding coupling (B) with pipe wrench, use adjustable wrench on flats to install body (C) on coupling (B).
4. Manually install new filter (D), hood (E), nameplate (F), lockwasher (G), and wing nut (H) on body (C).

End of Task

TA251649

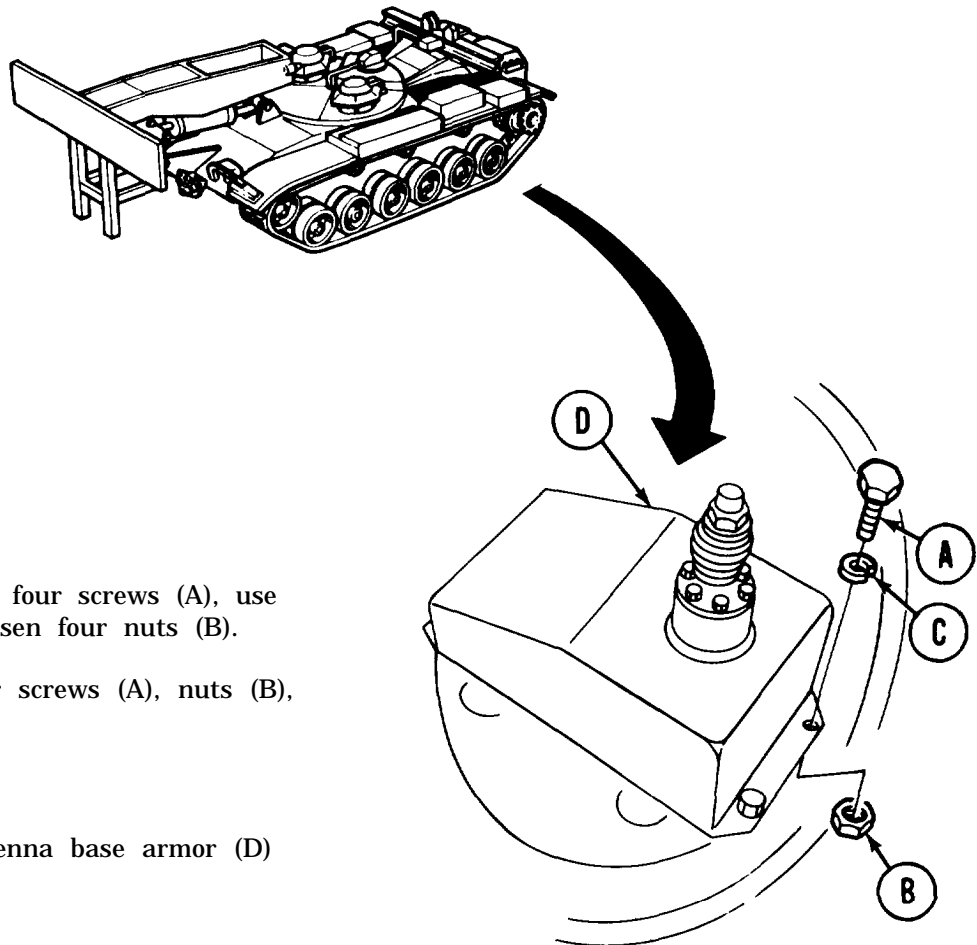
**ANTENNA BASE ARMOR AND CONDUIT REPLACEMENT (Sheet 1 of 5)**

**TOOLS:** 3/4 in. socket with 1/2 in. drive  
Ratchet with 1/2 in. drive  
3/4 in. combination box and open end wrench  
9/16 in. socket with 1/2 in. drive

**SUPPLIES:** Gasket  
Lockwashers (12 required)  
Spacer

**REFERENCE:** TM 9-5420-202-10

**"PRELIMINARY PROCEDURES:** Remove antenna (TM 5-5420-202-10)  
Open commander's hatch (TM 5-5420-202-10)



**REMOVAL:**

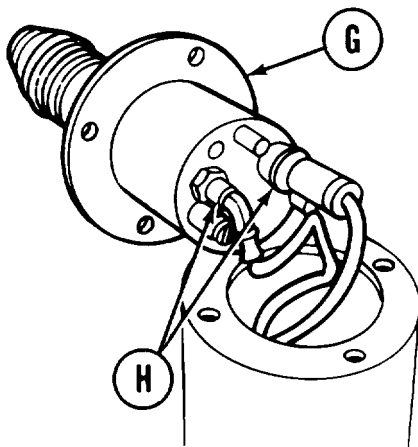
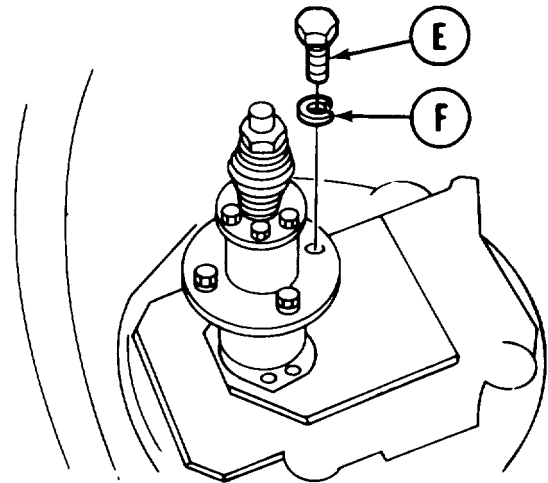
1. Using wrench to hold four screws (A), use 3/4 inch socket to loosen four nuts (B).
2. Manually remove four screws (A), nuts (B), and lockwashers (C).
3. Manually remove antenna base armor (D) from vehicle.

Go on to Sheet 2

TA251761

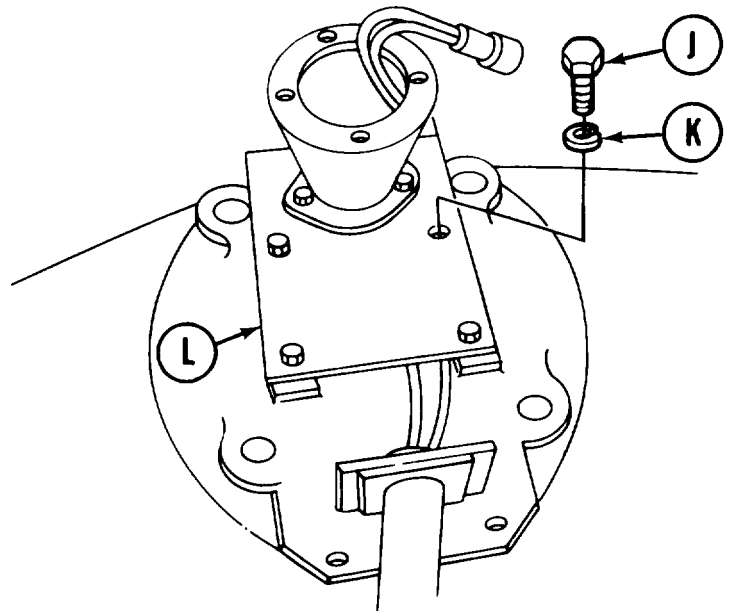
**ANTENNA BASE ARMOR AND CONDUIT REPLACEMENT (Sheet 2 of 5)**

4. Using 9/16 inch socket, remove four screws (E) and lockwashers (F).
5. Move antenna matching unit (G) aside.
6. Remove two connectors (H) from antenna matching unit (G).



7. Using 9/16 inch socket, remove four screws (J) and lockwashers (K).

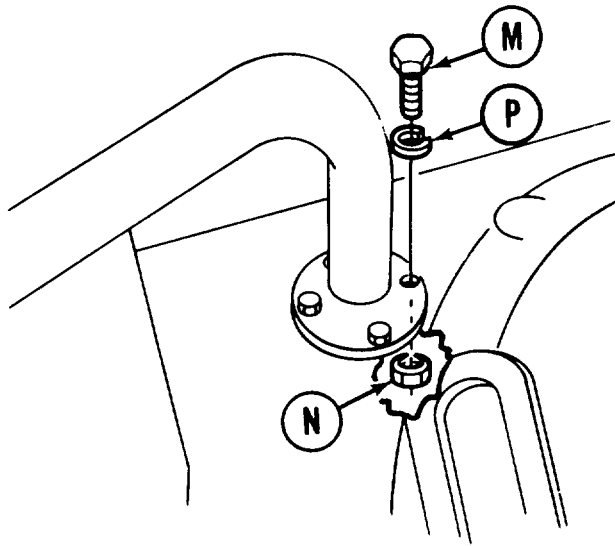
8. Manually remove mount (L).



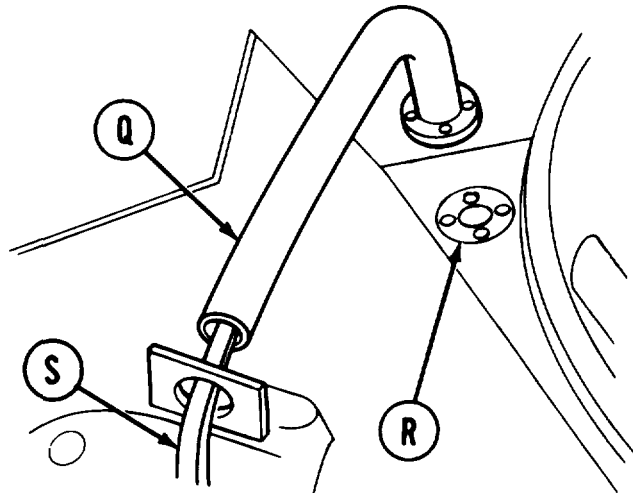
Go on to Sheet 3

TA251650

**ANTENNA BASE ARMOR AND CONDUIT REPLACEMENT (Sheet 3 of 5)**

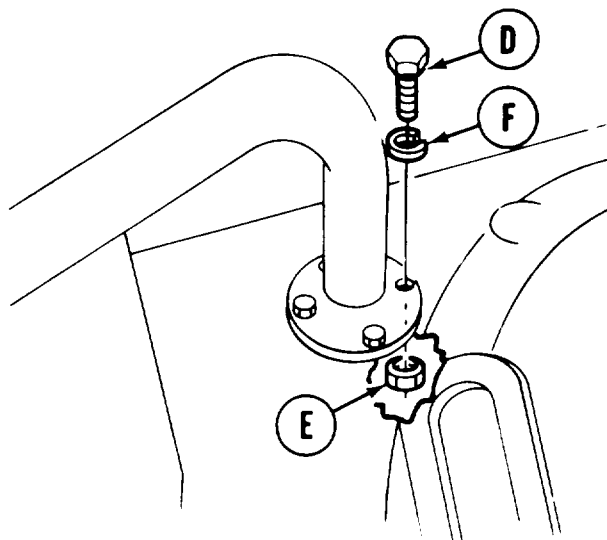
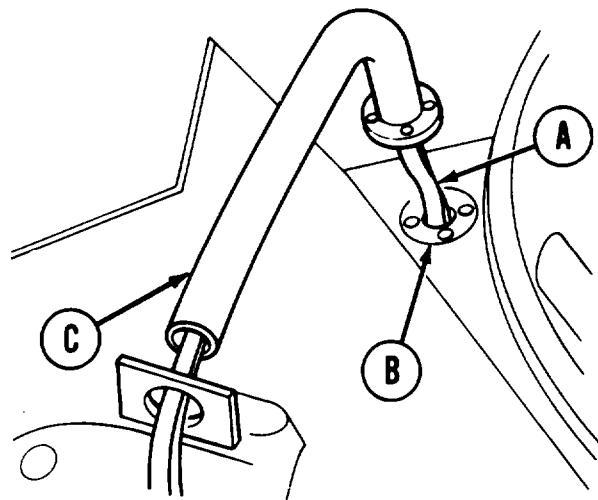


9. Standing on commander's seat, hold screw (M) with wrench and use 3/4 inch socket to remove four nuts (N). Remove four screws (M), lockwashers (P).
10. Carefully slide conduit (Q) and gasket (R) off antenna wires (S). Throw gasket (R) away.



**INSTALLATION:**

1. Thread antenna wires (A) through new gasket (B) and conduit (C).
2. Manually install four screws (D), nuts (E), and lockwashers (F) securing conduit (C) and gasket (B) to vehicle.
3. Holding screw (D) with wrench, use 3/4 inch socket to tighten nuts (E).

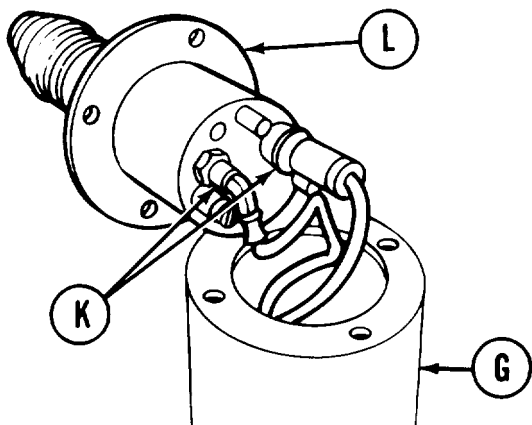
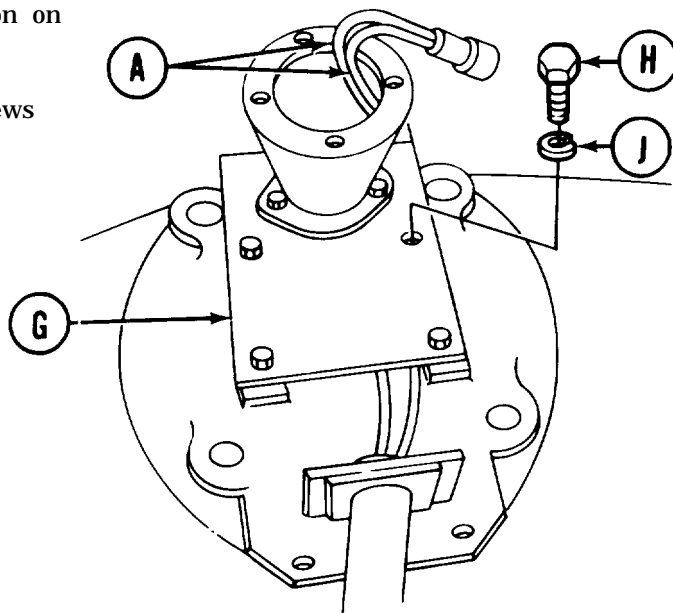


Go on to Sheet 4

TA251651

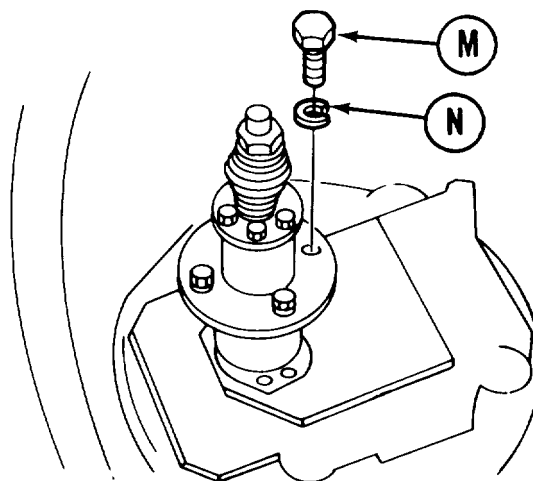
**ANTENNA BASE ARMOR AND CONDUIT REPLACEMENT (Sheet 4 of 5)**

4. Thread antenna wires (A) through mount (G) as shown, and place mount (G) in position on vehicle.
5. Using 9/16 inch socket, install four screws (H) and lockwashers (J).



6. Connect two connectors (K) to base of antenna matching unit (L).
7. Position matching unit (L) on mount (G).

8. Using 9/16 inch socket, install four screws (M) and lockwashers (N).



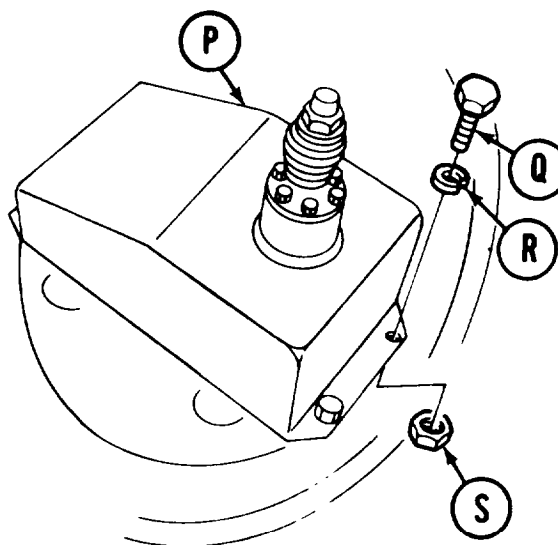
Go on to Sheet 5

TA251652

**ANTENNA BASE ARMOR AND CONDUIT REPLACEMENT (Sheet 5 of 5)**

9. Place antenna base armor (P) in position on vehicle.
10. Manually install four screws (Q), lockwashers (R), and nuts (S).
11. Using wrench to hold screws (Q), use 3/4 inch socket to tighten nuts (S).
12. Install antenna (TM 5-5420-202-10).
13. Close commander's hatch (TM 5-5420-202-10).

End of Task



DRIVER'S HATCH NIGHT VIEWER LATCH REPLACEMENT (Sheet 1 of 5)

PROCEDURE INDEX

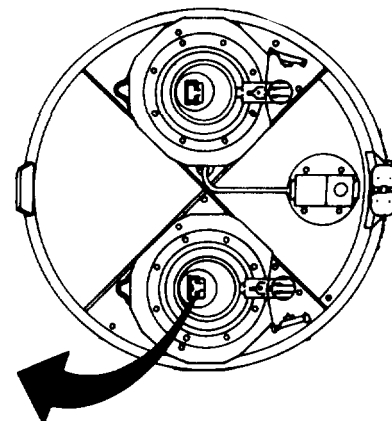
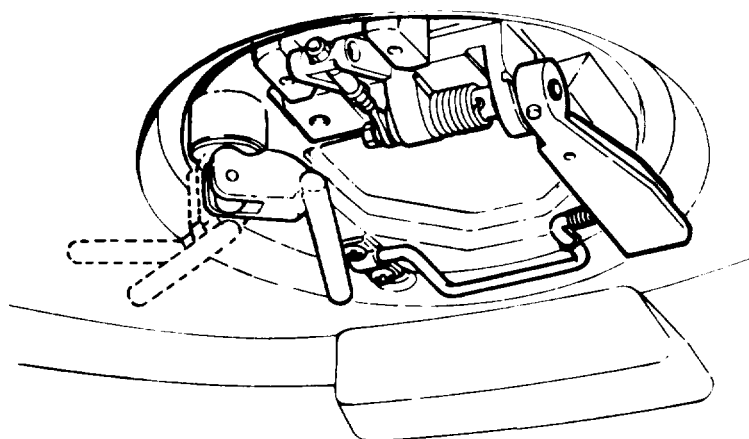
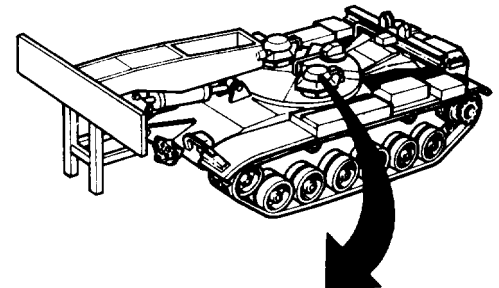
PROCEDURE	PAGE
Removal	3-266
Cleaning and Inspection	3-267
Installation	3-267

TOOLS: Ratchet with 1/2 in. drive  
 3/4 in. socket with 1/2 in. drive  
 Torque wrench with 1/2 in. drive (0-175 lb-ft) (0-237 N.m)  
 Spring scale  
 Putty knife  
 1/2 in. combination box and open end wrench  
 Flat-tip screwdriver  
 3 in. extension with 1/2 in. drive

SUPPLIES: Rags (Item 12, Appendix D)  
 Dry cleaning solvent (Item 15, Appendix D)  
 Adhesive (Item 2, Appendix D)  
 Adhesive (Item 28 Appendix D)  
 Gasket  
 Steel wool (Item 16, Appendix D)  
 Sealing compound (Item 29, Appendix D)  
 Sealing compound (Item 30, Appendix D)  
 Pad  
 Lockwasher (2 required)

PERSONNEL: Two

REFERENCE: TM 5-5420-202-10



Go on to Sheet 2

TA251762

**DRIVER'S HATCH NIGHT VIEWER LATCH REPLACEMENT (Sheet 2 of 5)**

**NOTE**

**Early vehicles are equipped with infrared periscope mount (page 3-25). Late vehicles are equipped with night viewer mount.**

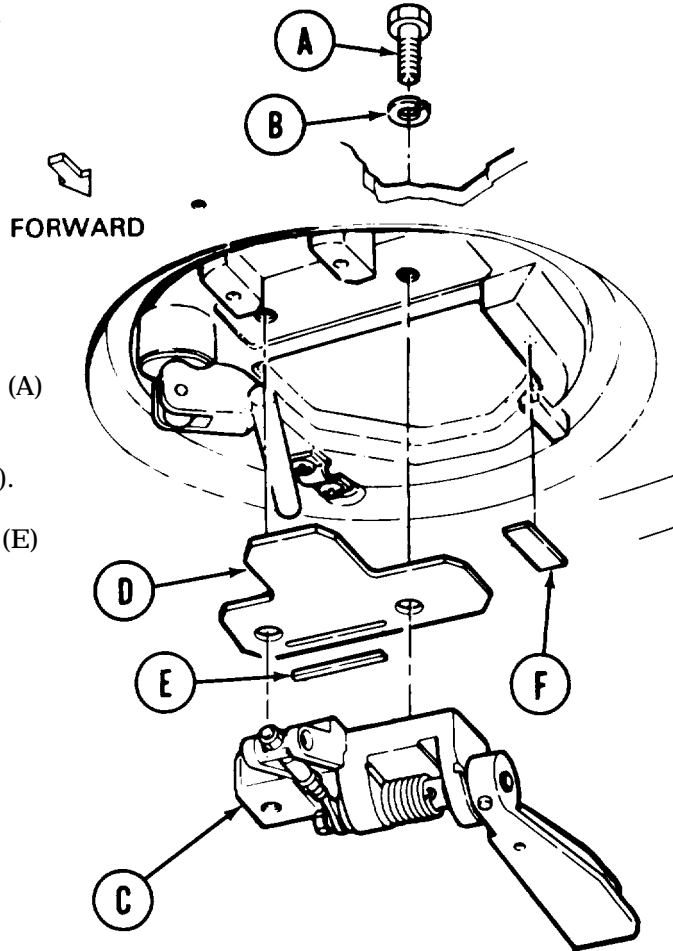
**REMOVAL:**

1. Position driver's hatch in closed but not latched position with night viewer latch in latched position.

**NOTE**

**Before performing step 2, get another person to hold inside components upon removal of screws (A).**

2. Using 3/4 inch socket, remove two screws (A) and lockwashers (B).
3. Remove latch mechanism (C) and plate (D).
4. Using flat-tip screwdriver, remove gasket (E) and pad (F).



Go on to Sheet 3

TA251763



**DRIVER'S HATCH NIGHT VIEWER LATCH REPLACEMENT (Sheet 3 of 5)****CLEANING AND INSPECTION:**

1. Using putty knife and steel wool, remove old sealant and adhesive from hatch and all parts.
2. Using dry cleaning solvent rags, remove remaining debris and dirt.
3. Inspect all parts for damage or wear. Replace defective parts.

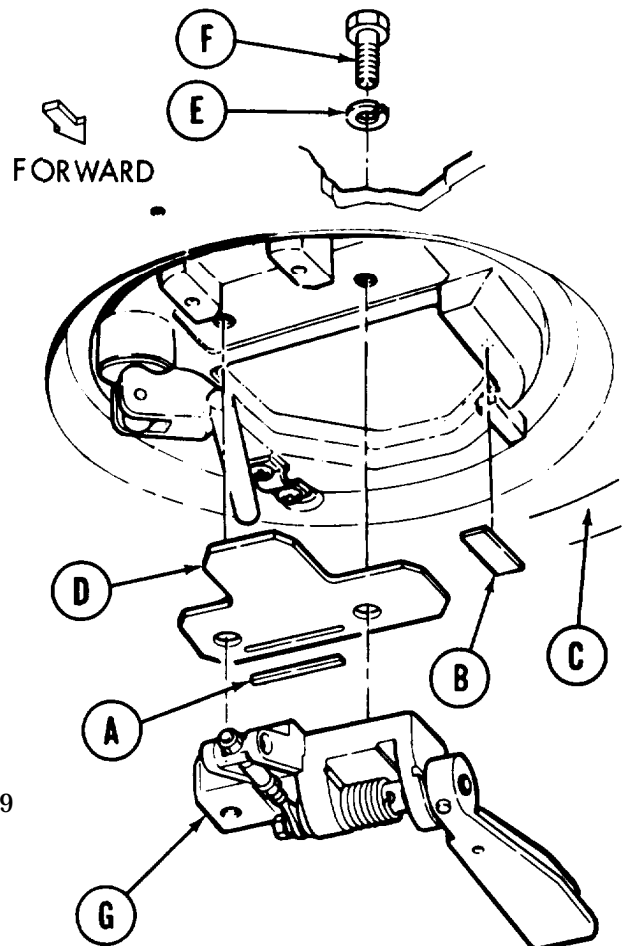
**INSTALLATION :**

1. With putty knife, apply adhesive (Item 4, Appendix D) to one side of new gaskets (A) and (B). Apply adhesive to mating surfaces on hatch (C) and plate (D).
2. When adhesive is tacky, align and apply new gasket and new pad (B).
3. Place new lockwashers (E) on two screws (F) and apply sealing compound to screw threads.

**NOTE**

**Before performing step 4, get another person to help align holes in plate (D) and latch mechanism (G) with holes in hatch (C).**

4. Using fingers, start screws (F) through hatch (C) into latch mechanism (G).
5. Using 3/4 inch socket and torque wrench, tighten two screws (F) to 95-125 lb-ft (128-169 N.m).



Go on to Sheet 4

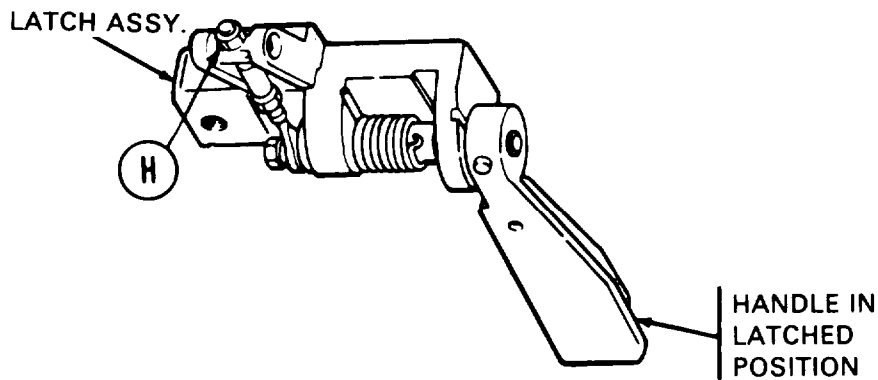
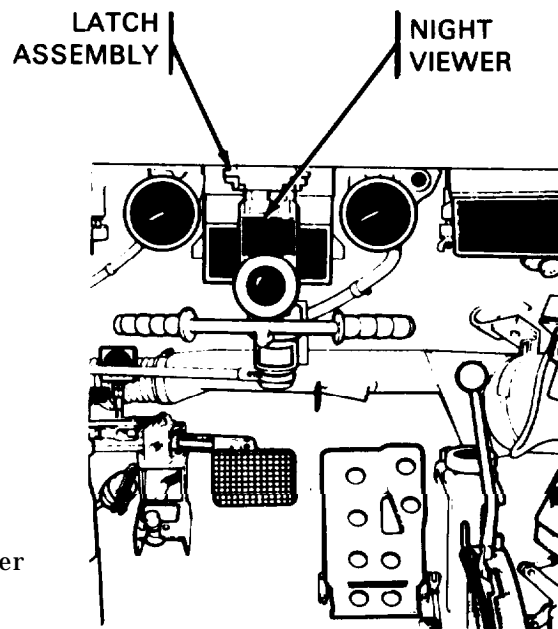
TA251764

DRIVER'S HATCH NIGHT VIEWER LATCH REPLACEMENT (Sheet 4 of 5)

**CAUTION**

**Keep night viewer switch in OFF position and covers on lenses. Do not expose night viewer to any bright light (spotlights, flares, full moon, sun, etc.).**

6. install night viewer in driver's hatch (TM 5-5420-202-10)
7. Check that latch assembly secures night viewer with no looseness with handle in latched position.
8. If adjustment is necessary, remove night viewer and perform steps 9 thru 11.
9. Using 1/2 inch wrench, loosen end nut (H).



Go on to Sheet 5

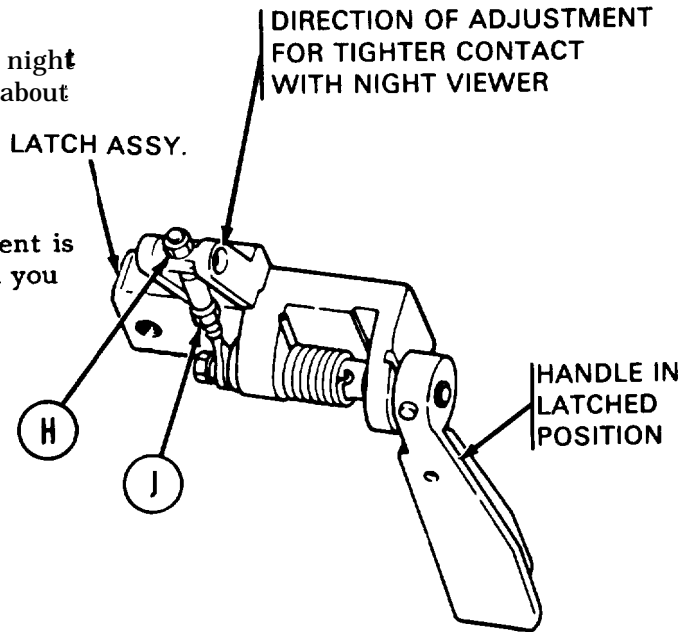
TA251765

**DRIVER'S HATCH NIGHT VIEWER LATCH REPLACEMENT (Sheet 5 of 5)**

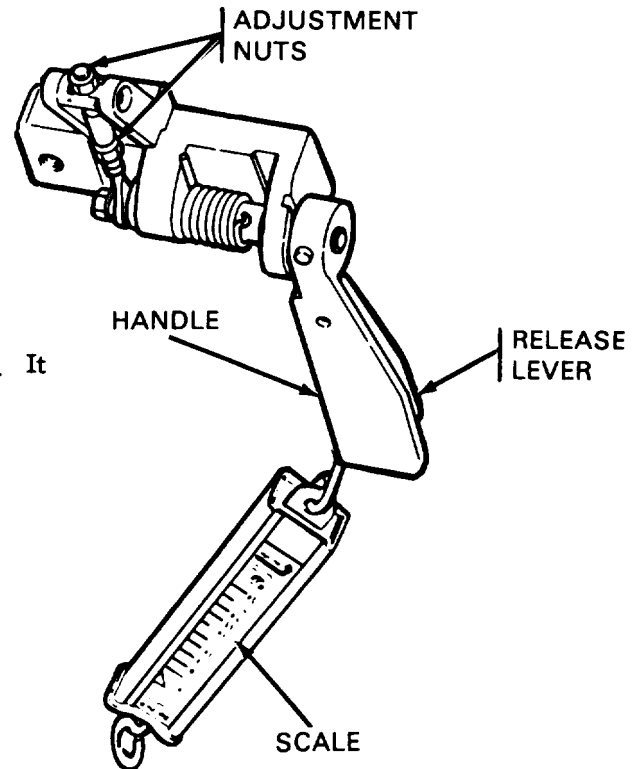
10. For tighter latch assembly contact with night viewer, back off (toward clevis) nut (J) about two threads, using 1/2 inch wrench.
11. Using 1/2 inch wrench, tighten nut (H):
12. Perform steps 6 and 7. If more adjustment is necessary, do steps 9 thru 11 again until you have a satisfactory fit.

**CAUTION**

**Have another person support night viewer and push release lever while performing the following step.**



13. Attach scale to end of latch handle and measure force to begin movement of handle. It should be 9.5 to 15.5 pounds.
14. If force to begin movement of handle is less than 9.5 pounds or more than 15.5 pounds, replace spring (page 3-273).



End of Task

TA251766

DRIVER'S HATCH NIGHT VIEWER LATCH REPAIR (Sheet 1 of 10)

PROCEDURE INDEX

PROCEDURE	PAGE
Disassembly	3-270
Cleaning and Inspection	3-274
Asembly	3-274

TOOLS: 7/16 in. combination box and open end wrench  
 3/16 in. drive punch  
 1/8 in. drive punch  
 Flat-tip) screwdriver  
 1/2 in; combination box and open end wrench  
 1/2 in. socket with 1/2 in. drive  
 Soft-jawed (padded) vise  
 3/32 in. alining pin  
 Hammer  
 Long round nose pliers  
 1/4 in. drill bit  
 Thickness gage  
 Ratchet with 1/2 in. drive  
 Knife

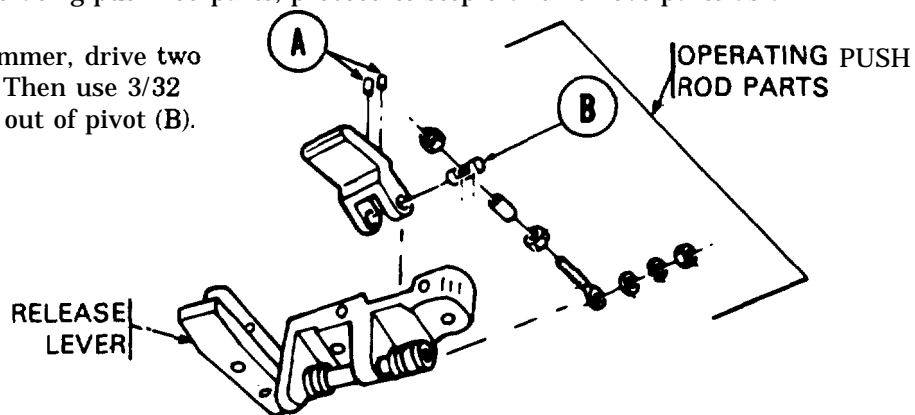
SUPPLIES: Dry cleaning solvent (Item 15, Appendix D)  
 Rags (Item 12, Appendix D)  
 Shims  
 Pencils (Item 22, Appendix D)  
 Cotter pin  
 Teflon washer  
 Lockwasher

PERSONNEL: Two

PRELIMINARY PROCEDURE: Remove right viewer latch (page 3-266)

DISASSEMBLY:

- Carefully press release lever and allow mechanism to unwind about one-half turn to latched position.
- If faulty part is not within operating push rod parts, proceed to step 9 and remove parts as an assembly.
- Using 1/8 inch punch and hammer, drive two pins (A) flush with pivot (B). Then use 3/32 inch alining pin to drive pins out of pivot (B).



Go on to Sheet 2

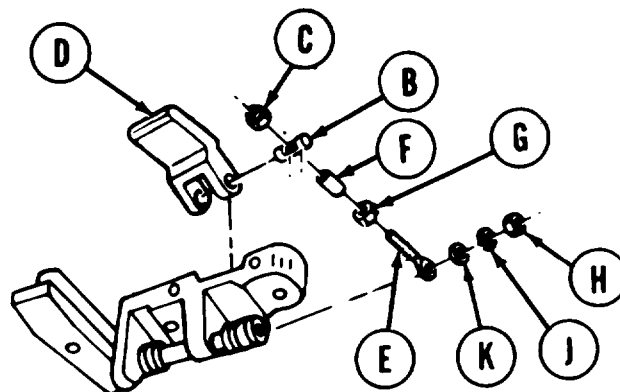
TA251767

**DRIVER'S HATCH NIGHT VIEWER LATCH REPAIR (Sheet 2 of 10)**

4. Using socket, remove nut (C).

5. Slide plunger (D) with pivot (B) off rod (E).

6. Remove pivot (B) from plunger (D).



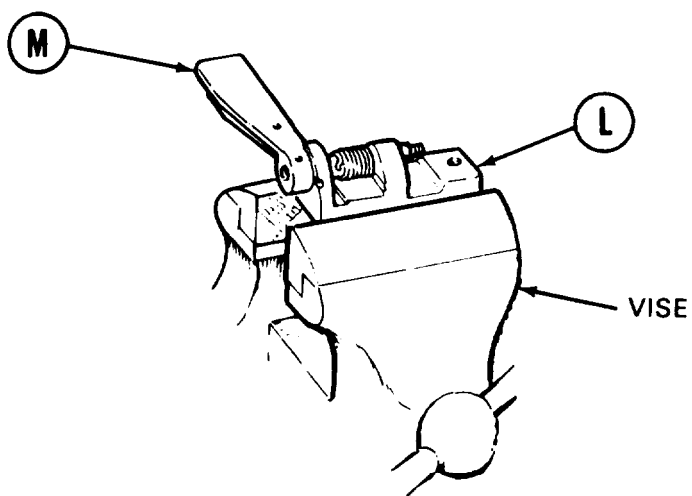
7. Slip sleeve (F) off rod (E).

8. Using 1/2 inch wrench, remove nut (G).

9. Using 7/16 inch wrench, remove nut (H), lockwasher (J), flat washer (K), and rod (E).

**NOTE**

**Put support (L) in vise with handle (M) and support positioned as shown.**



Go on to Sheet 3

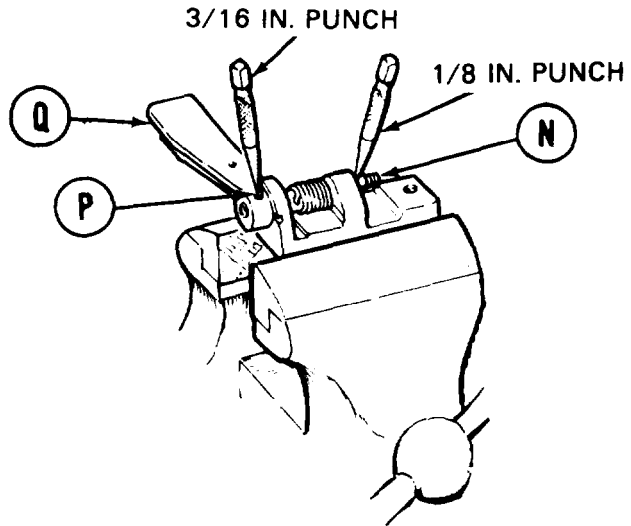
TA251768

DRIVER'S HATCH NIGHT VIEWER LATCH REPAIR (Sheet 3 of 10)

NOTE

**Insert 1/8 inch punch in tooling hole in flange of shaft (N). Push back on punch against spring pressure to aid in removal of pin (P). Have one person hold punch while another person does step 10.**

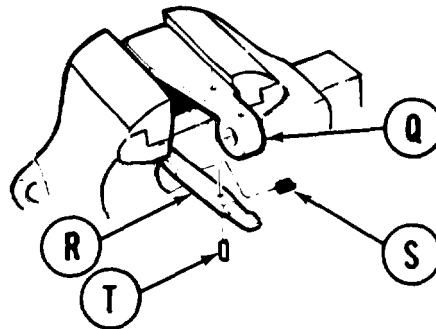
10. Using 3/16 inch punch and hammer, drive pin (P) out of handle (Q).
11. Using hand, work handle (Q) off shaft (N).
12. Carefully relieve pressure of spring by allowing 1/8 inch punch to come toward you about 1/4 turn.



NOTE

If handle (Q), lever (R), and spring (S) were operating good, you need not disassemble them. Proceed to step 15.

13. Place lever (R) in vise and, using 1/8 inch punch and hammer, drive pin out of lever (R), being careful not to loosen spring (S).
14. Remove lever (R), spring (S), and handle (Q).

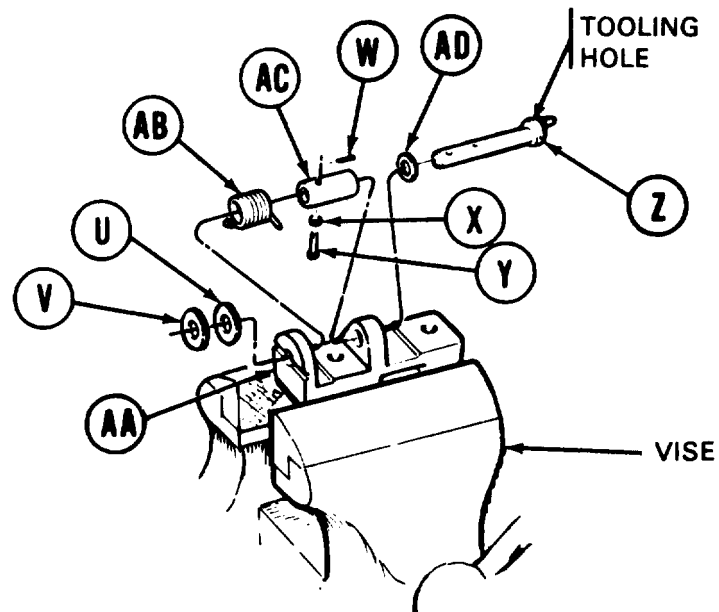


Go on to Sheet 4

TA251769

## DRIVER'S HATCH NIGHT VIEWER LATCH REPAIR (Sheet 4 of 10)

15. Using fingers, remove teflon washer (U) and spacer (V).



16. Using screwdriver and pliers, remove cotter pin (W). Remove washer (X) and pin (Y).

17. Slide shaft (Z) from holes in support (AA). Remove spring (AB), sleeve (AC), and teflon washer (AD) from shaft (Z).

18. Remove support (AA) from vise.

Go on to Sheet 5

TA251770

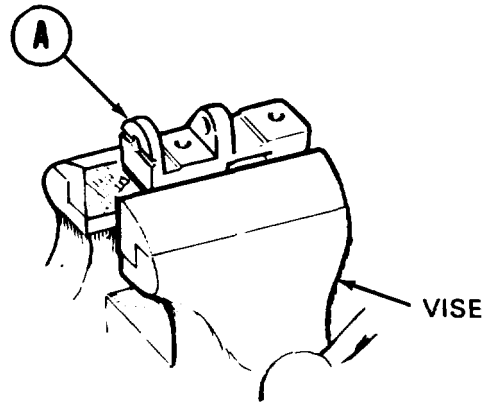
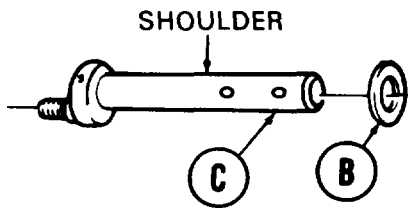
**DRIVER'S HATCH NIGHT VIEWER LATCH REPAIR (Sheet 5 of 10)**

**CLEANING AND INSPECTION:**

1. Using dry cleaning solvent and rags, remove debris and dirt from all parts.
2. Inspect all parts for damage or wear. Replace defective parts.

**ASSEMBLY:**

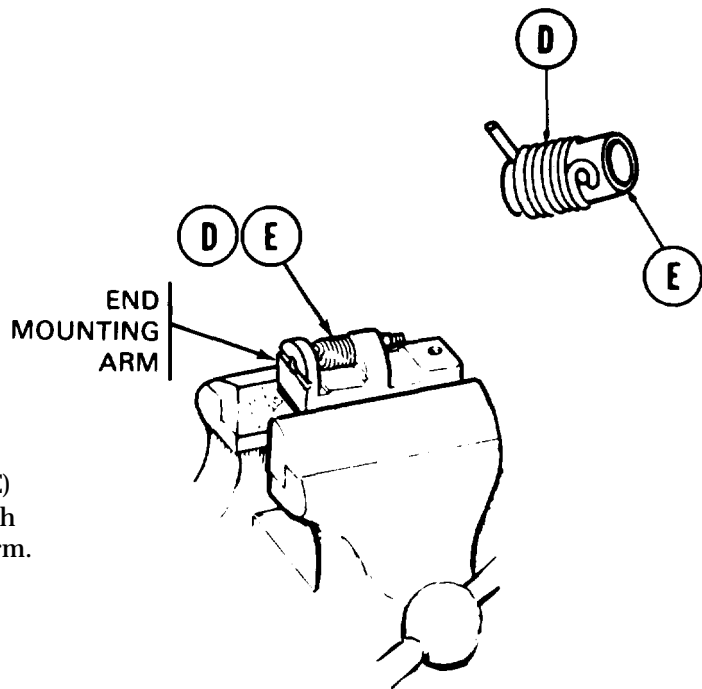
1. Secure support (A) in vise.
2. Using fingers, place new teflon washer (B) on shaft (C).



**NOTE**

**Using knife, remove sharp edge (chamfer) of teflon washer (B) at hole. If it does not fit flush against shoulder of shaft (C), remove washer, reverse it, and reinstall.**

3. Place spring (D) on sleeve (E) with loop of spring over hole in sleeve.



4. Position assembled spring (D) and sleeve (E) between mounting arms of support (A), with loop end of spring nearest end mounting arm.

Go on to Sheet 6

TA251771



**DRIVER'S HATCH NIGHT VIEWER LATCH REPAIR (Sheet 6 of 10)**

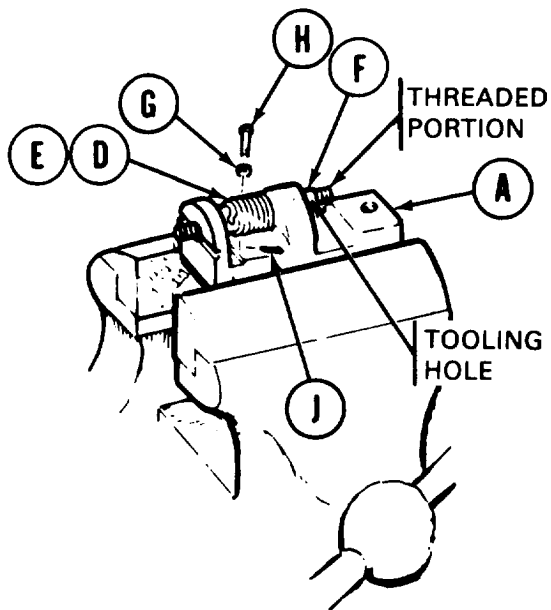
5. Insert shaft (F) with offset threaded portion in down position (nearest support (A) and tooling hole facing you).

6. Line up loop of spring (D) with holes of sleeve (E) and shaft (F).

7. Place washer (G) on pin (H) and insert pin from the back side.

8. Insert new cotter pin (J) through hole in pin (H).

9. Using screwdriver and pliers, bend legs of cotter pin (J).



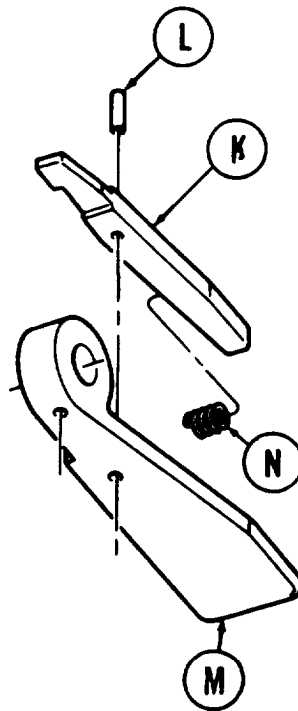
**NOTE**

**If handle was not disassembled, go to step 13.**

10. Place lever (K) on bench and, using hammer, drive pin (L) partly through lever.

11. Place handle (M) on bench and position spring (N) in recess of handle and lever (K).

12. Using hammer, drive pin (L) through lever (K) and handle (M).



Go on to Sheet 7

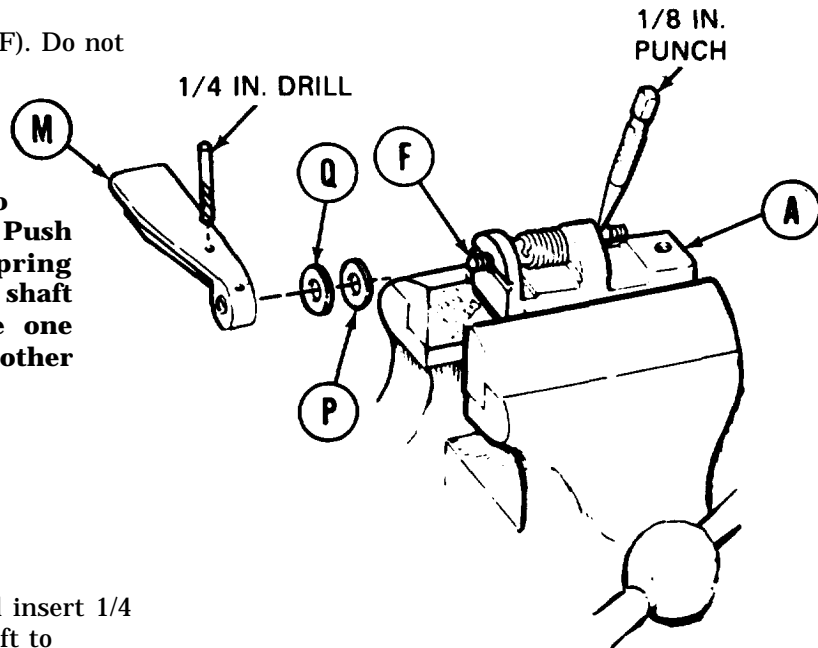
TA251772

DRIVER'S HATCH NIGHT VIEWER LATCH REPAIR (Sheet 7 of 10)

13. Place teflon washer (P) on shaft (F). Do not install spacer (Q) at this time.

NOTE

Insert 1/8 inch punch in to hole in flange of shaft (F). Push back on punch against spring pressure until hole in end of shaft (F) is up and down. Have one person hold punch while another does step 14.

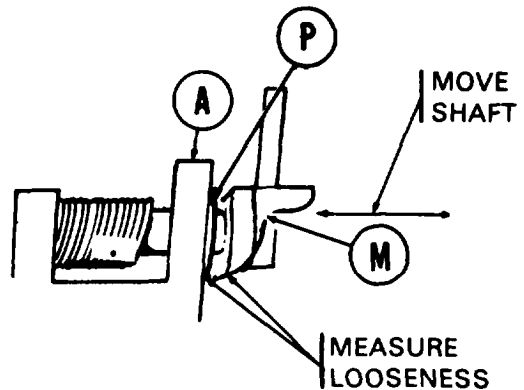


14. Place handle (M) on shaft (F), and insert 1/4 inch drill through handle and shaft to temporarily retain handle.

15. Move shaft back and forth. Using feeler gage, measure maximum looseness between handle (M) and teflon washer (P). Record distance.

NOTE

Spacer is 0.094 inch thick, and each lamination is 0.002 inch thick.



16. Peel off laminations of spacer (Q) to provide a looseness (step 15) of between 0.005 inch and 0.040 inch.

NOTE

Material thickness which must be removed from 0.094 inch stock spacer is found by subtracting required spacer size from 0.094 inch. Required spacer is found by:

- A. Measuring space between teflon washer (P) and handle (M).
- B. Subtracting 0.018 inch from space measured between teflon washer (P) and handle (M).

Go on to Sheet 8

TA25773

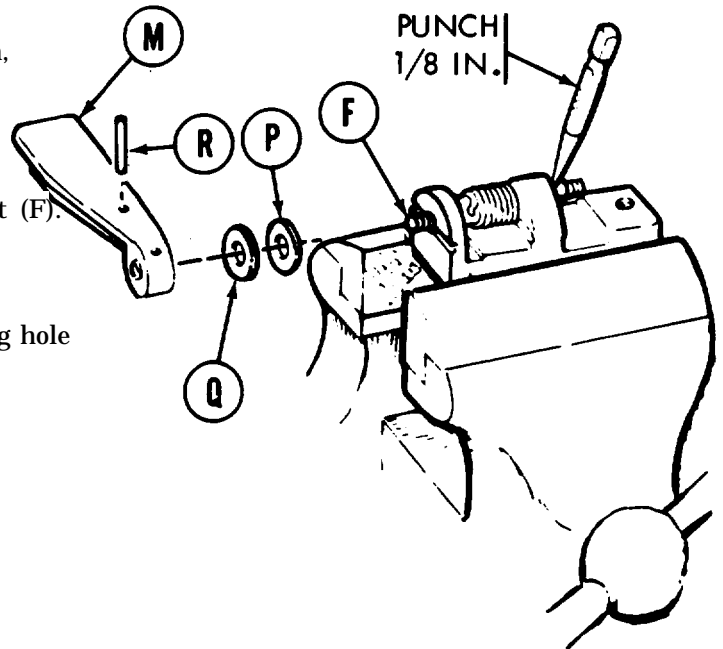
**DRIVER'S HATCH NIGHT VIEWER LATCH REPAIR (Sheet 8 of 10)**

17. With one person relieving load with punch, remove drill bit and handle (M).

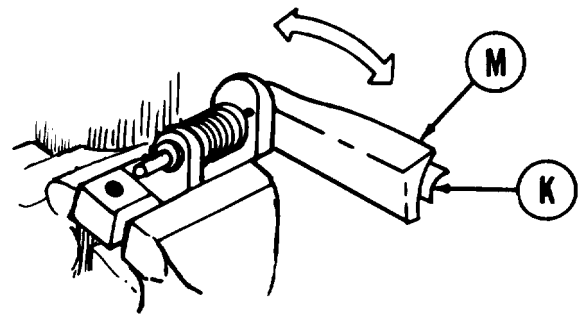
18. Place spacer (Q) and handle (M) on shaft (F).

19. Using hammer, drive pin (R) into retaining hole of handle (M) and shaft (F).

20. Remove punch



21. Release lever (K) and Push handle (M) forward 1/2 turn to locked position. Release and return to position shown.



**NOTE**

**Handle should lock in both forward and aft positions and should not bind during movement.**

22. Remove assembled parts from vise.

Go on to Sheet 9

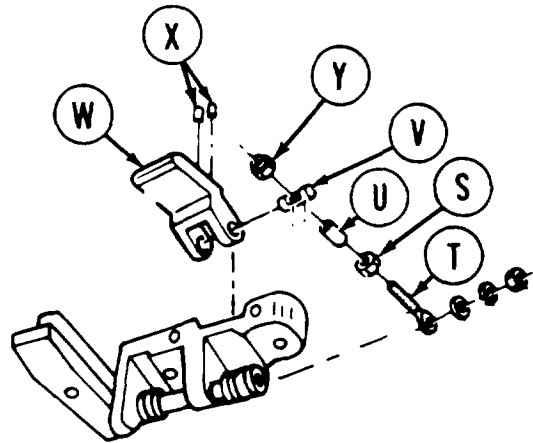
TA251774

**DRIVER'S HATCH NIGHT VIEWER LATCH REPAIR (Sheet 9 of 10)**

23. If operating push rod parts were not disassembled, proceed to step 29.

24. Start nut (S) onto rod (T) with locking collar first. Run it on to about 1/4 inch of end of threads. Use 1/2 inch wrench if locking collar is tight. Use vise if necessary.

25. Place sleeve (U) on rod (T).



26. Insert pivot (V) in plunger (W). Using hammer, drive in two pins (X) through pivot (V).

**NOTE**

**Position pins (X) through pivot (V) so that they each stick through pivot equally on both sides.**

27. Pivot (V) has flat faces on two surfaces. Rotate pivot so smaller flat face is facing sleeve (U). Slide pivot on rod (T).

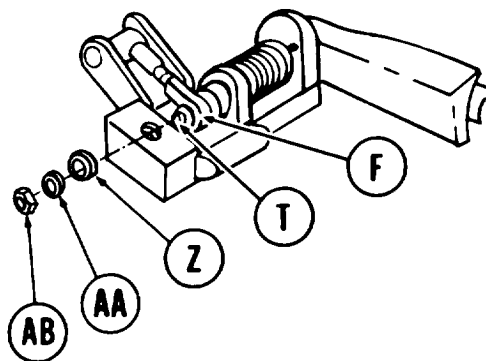
28. Using socket, install nut (Y) while holding nut (S) with 1/2 inch wrench.

Go on to Sheet 10

TA251775

## DRIVER'S HATCH NIGHT VIEWER LATCH REPAIR (Sheet 10 of 10)

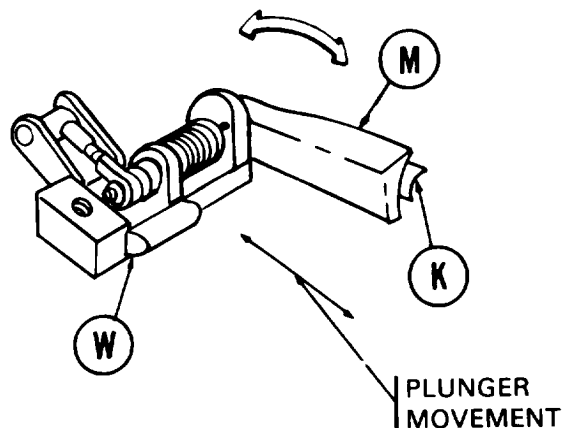
29. Position assembled parts as shown with rod (T) over threaded portion of shaft (F).



30. Place flat washer (Z), lockwasher (AA), and nut (AB) on shaft (F).

31. Using 7/16 inch wrench, tighten nut (AB).

32. Hold night viewer latch firmly on a flat surface. Release lever (K) and turn handle (M) forward 1/2 turn to locked position. Release and return to position shown.



## NOTE

**Handle should lock in both forward and rear positions and plunger (W) should not bind during movement.**

33. Install night viewer latch (page 3-267).

End of Task

TA251776



**CHAPTER 4****DIRECT SUPPORT AND GENERAL SUPPORT  
MAINTENANCE INSTRUCTIONS****INDEX**

<b>SECTION</b>	<b>PROCEDURES</b>	<b>PAGE</b>
I	Mechanical and Miscellaneous	4-2
II	Pump-Clutch and Valve Bank	4-23
III	Hydraulic Cylinders and Reservoir	4-70

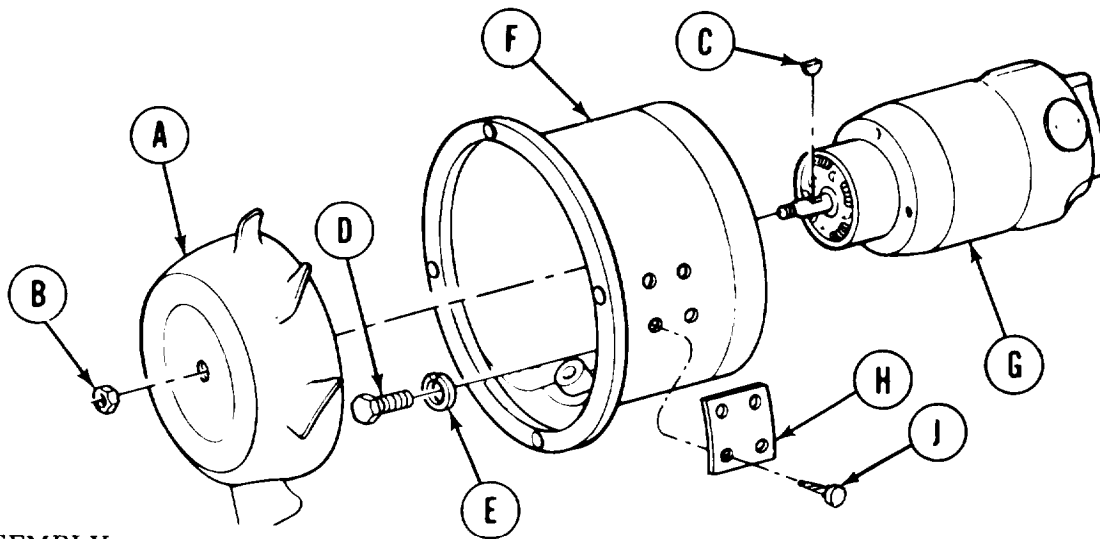
**Section I. MECHANICAL AND MISCELLANEOUS**

**RESERVOIR QUADRANT BLOWER ASSEMBLY REPAIR (Sheet 1 of 2)**

**TOOLS:** 12 in. extension 3/8 in. drive  
 Flat-tip screwdriver  
 Hammer  
 7/16 in. socket with 3/8 in. drive  
 3/4 in. socket with 3/8 in. drive  
 Punch 1-1/2 x 1/4 inch  
 Ratchet with 3/8 in. drive

**SUPPLIES:** Round head drive screws (4 required)  
 Lockwashers (4 required)

**PRELIMINARY PROCEDURE:** Remove blower assembly from vehicle (page 3-2).



**DISASSEMBLY:**

1. While holding impeller (A) stationary, use 3/4 inch socket and extension to remove nut (B).
2. Manually remove impeller (A).
3. Using hammer and punch, remove key (C) and set aside.
4. Using 7/16 inch socket and extension, remove four screws (D) and lockwashers (E).
5. Manually remove shroud (F) from motor (G).

**NOTE**

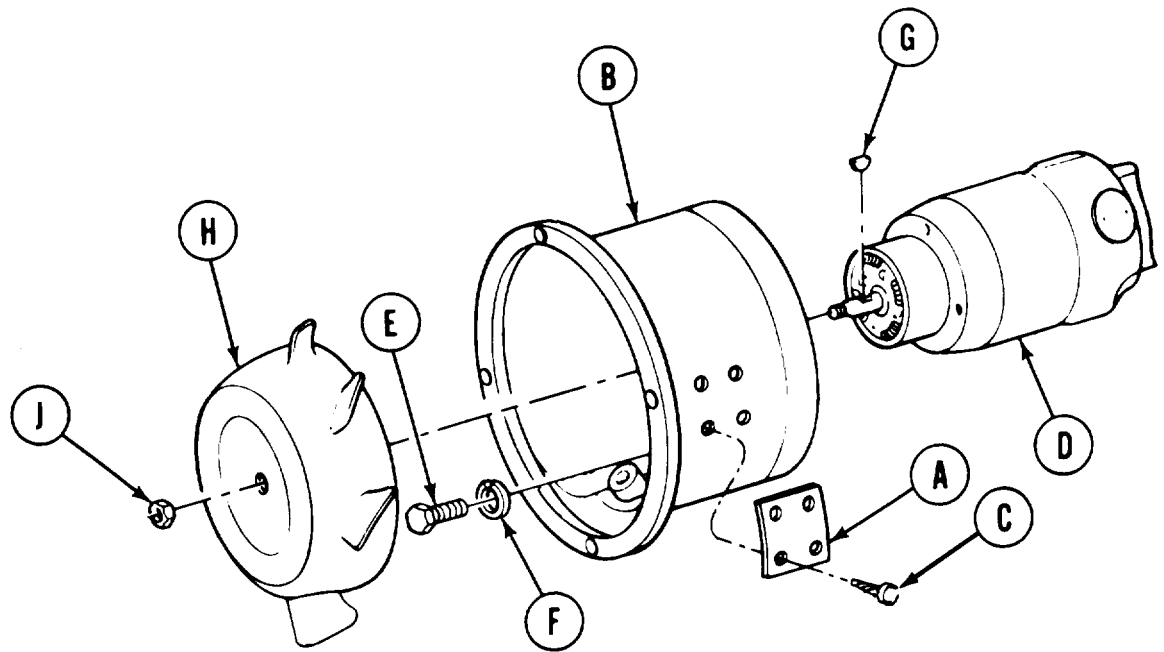
Do step 6 only if necessary.

6. Using screwdriver, pry up identification plate (H) and four drive screws (J). Throw drive screws (J) away.

Go on to Sheet 2

TA251654



**RESERVOIR QUADRANT BLOWER ASSEMBLY REPAIR (Sheet 2 of 2)****NOTE**

**Do steps 1 and 2 only if plate (A) was removed.**

**ASSEMBLY:**

1. Place identification plate (A) on shroud (B).
2. Using hammer, install four new drive screws (C).
3. Place motor (D) in shroud (B).
4. Using 7/16 inch socket and extension, install four screws (E) and lockwashers (F).
5. Place key (G) in position.
6. Place impeller (H) in position.
7. Manually holding impeller (H) stationary, use 3/4 inch socket and extension to install nut (J).
8. Install blower assembly in vehicle (page 3-4).

End of Task

TA251655

**RESERVOIR QUADRANT BLOWER MOTOR REPAIR (Sheet 1 of 4)**

PROCEDURE INDEX

PROCEDURE	PAGE
Disassembly	4-4
Cleaning and Inspection	4-5
Assembly	4-6

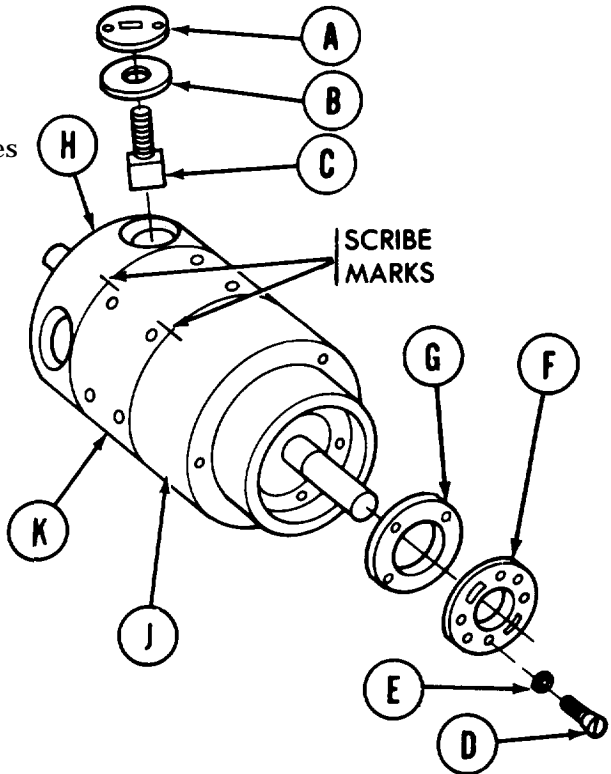
**TOOLS:** Flat-tip screwdriver  
 Spanner wrench  
 Scriber  
 10 in. adjustable wrench

**SUPPLIES:** Gaskets (8 required) Seal assembly  
 Dry cleaning solvent (Item 15, Appendix D) Brushes (4 required)  
 Lockwashers (9 required) Gloves (Item 27, Appendix D)  
 Rags (Item 12, Appendix D)

**PRELIMINARY PROCEDURE:** Remove blower motor (page 3-2).

**DISASSEMBLY:**

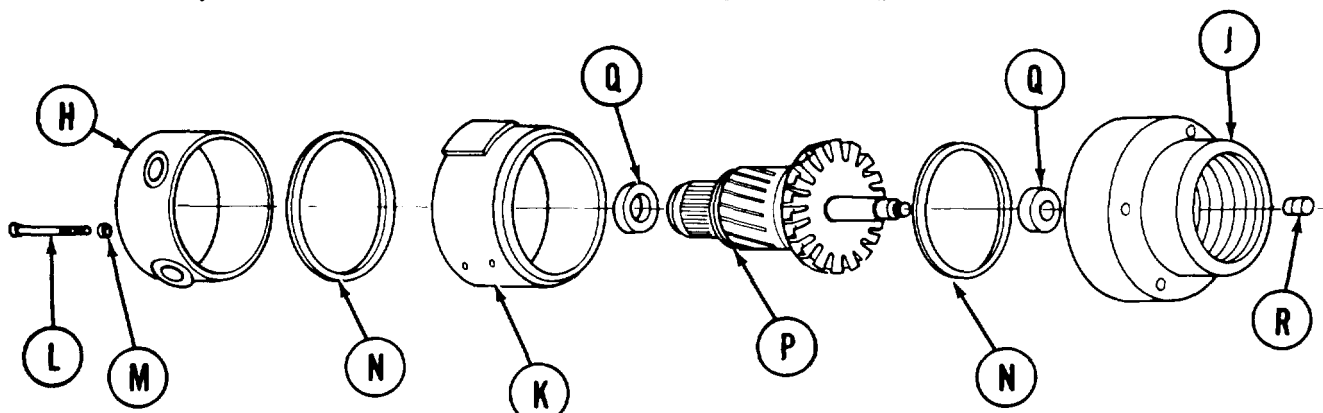
1. Using spanner wrench, remove four caps (A).
2. Manually remove four gaskets (B) and brushes (C) and throw brushes (C) and gaskets (B) away.
3. Using screwdriver, remove four screws (D) and washers (E).
4. Manually remove cap (F) and gasket (G). Throw gasket (G) away.
5. Using scriber, scribe locating mark across commutator head (H), fan head (J), and frame (K), and scribe frame (K) to indicate commutator end and fan end.



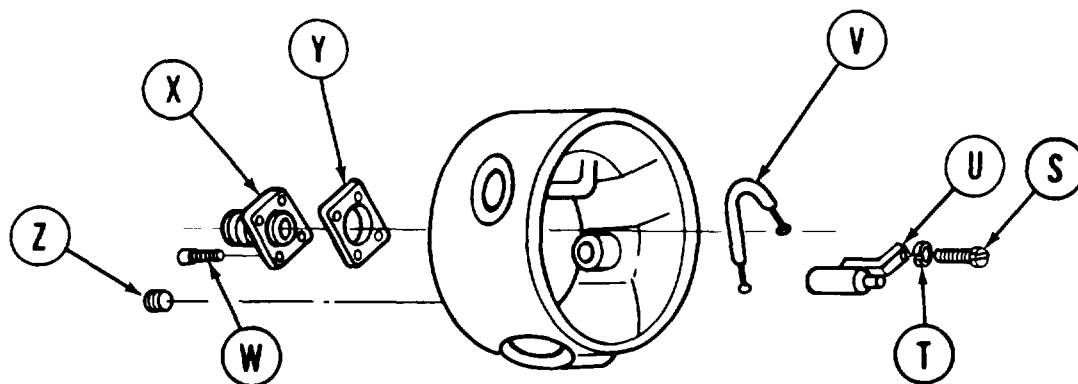
Go on to Sheet 2

TA251656

## RESERVOIR QUADRANT BLOWER MOTOR REPAIR (Sheet 2 of 4)



6. Using screwdriver, remove four screws (L) and lockwashers (M).
7. Manually separate commutator head (H), fan head (J), frame (K), two gaskets (N), armature (P), two bearings (Q), and seal assembly (R). Throw gaskets (N) and seal assembly (R) away.



8. Using screwdriver, remove five screws (S) and lockwashers (T).
9. Manually remove capacitor (U) and cable assembly (V).
10. Using screwdriver, remove four screws (W).
11. Manually remove receptacle assembly (X) and gasket (Y). Throw gasket (Y) away.
12. Using adjustable wrench, remove pipe plug (Z).

## CLEANING AND INSPECTION:

**WARNING**

**Dry cleaning solvent P-D-680 is toxic and flammable. To prevent personal injury, wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point for Type #1 Dry Cleaning Solvent is 100°F (38°C) and for Type #2 is 138°F (50°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.**

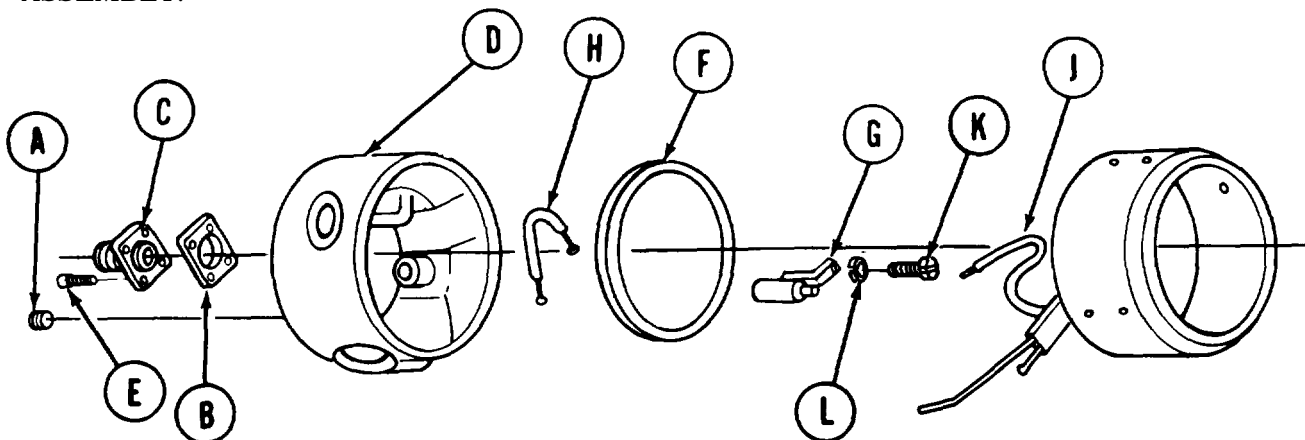
Go on to Sheet 3

TA251657

**RESERVOIR QUADRANT BLOWER MOTOR REPAIR (Sheet 3 of 4)**

1. Clean all metallic parts with rags and dry cleaning solvent.
2. Inspect all parts for damage and wear. Replace all unserviceable parts.

**ASSEMBLY:**

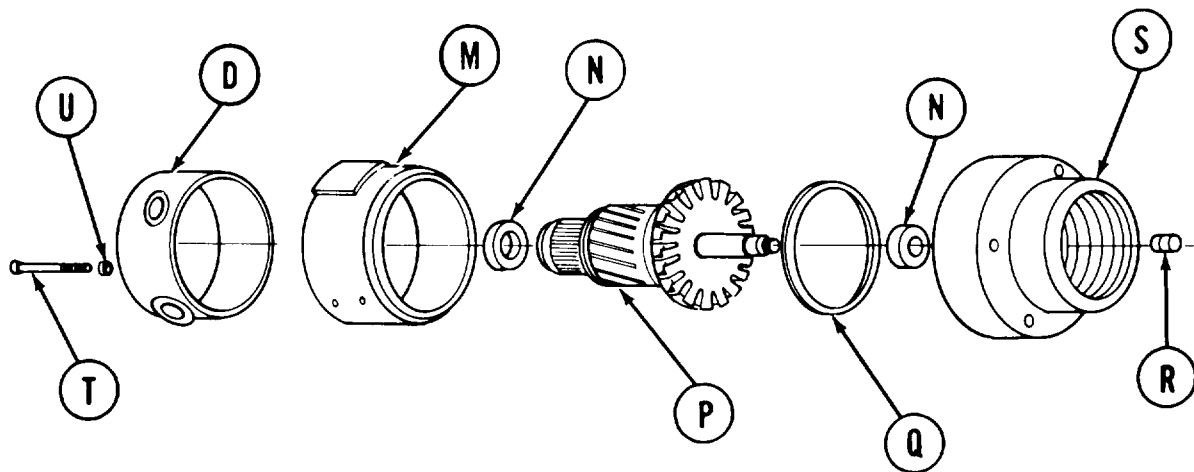


1. Using adjustable wrench, install pipe plug (A).
2. Place new gasket (B) and receptacle assembly (C) on commutator head (D).
3. Using screwdriver, install four screws (E).
4. Place new gasket (F) in position in commutator head (D).
5. Place capacitor (G), cable assembly (H), and leads of coil assembly (J) in position in commutator head (D).
6. Using screwdriver, install five screws (K) and lockwashers (L).

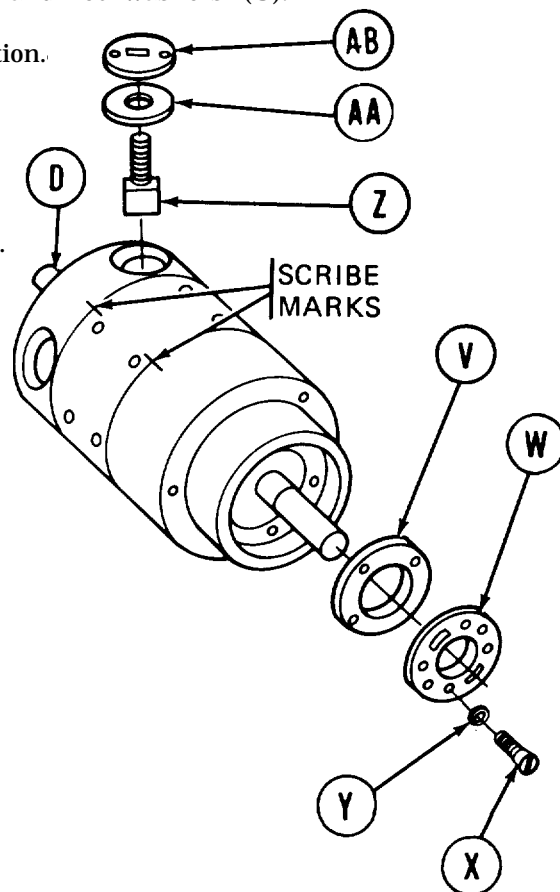
Go on to Sheet 4

TA251658

RESERVOIR QUADRANT BLOWER MOTOR REPAIR (Sheet 4 of 4)



7. Alining scribe marks, assemble commutator head (D), frame (M), two bearings (N), armature (P), new gasket (Q), new seal assembly (R), and fan head (S).
9. Using screwdriver, install four screws (T) and lockwashers (U).
9. Place new gasket (V) and cap (W) in position.
10. Using screwdriver, install four screws (X) and washers (Y).
11. Install four new brushes (Z) and four new-gaskets (AA) in commutator head (D).
12. Using spanner wrench, install four caps (AB).
13. Install blower motor (page 3-4).



End of Task

TA251659

ACCESSORIES CONTROL BOX REPAIR (Sheet 1 of 8)

PROCEDURE INDEX

PROCEDURE	PAGE
Disassembly	4-8
Assembly	4-11

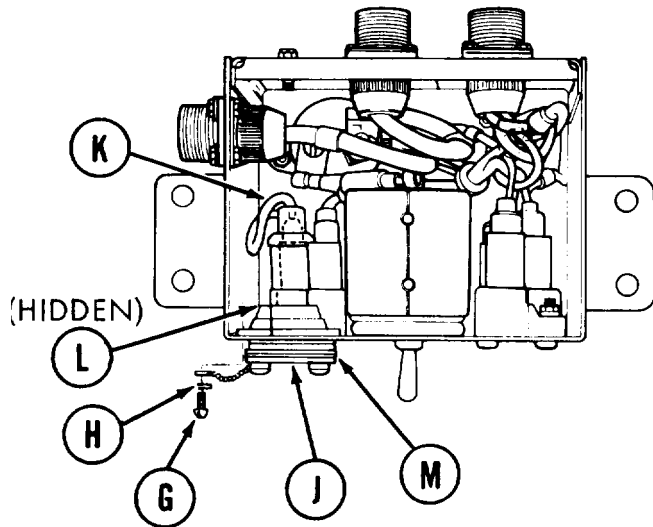
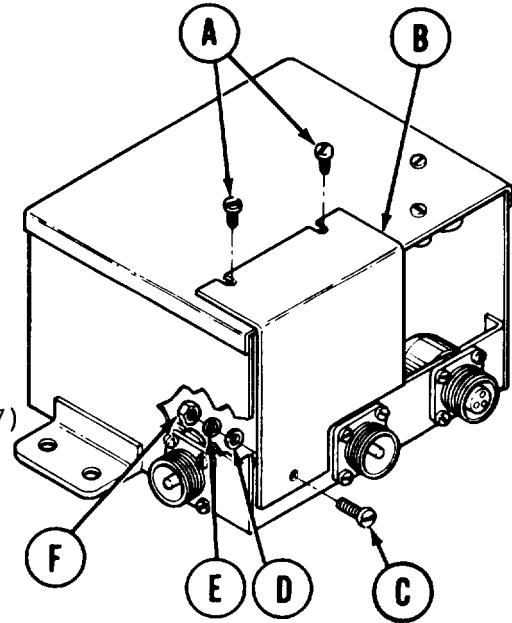
TOOLS: 3/8 in. open end wrench  
 7/16 in. open end wrench  
 11/32 in. open end wrench  
 5/16 in. open end wrench  
 Flat-tip screwdriver

SUPPLIES: Silicone compound (Item 7, Appendix D)  
 Lockwasher

PRELIMINARY PROCEDURE: Remove accessories control box (page 3-7)

DISASSEMBLY:

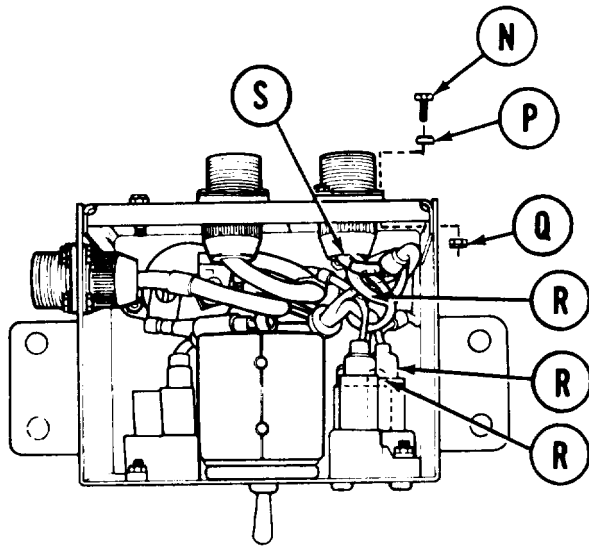
- Using flat-tip screwdriver, loosen two screws (A) at bottom of angle bracket (B).
- Using flat-tip screwdriver and 3/8 inch wrench, remove screw (C), flat washer (D), lockwasher (E), and nut (F).
- Manually remove angle bracket (B).
- Using flat-tip screwdriver, remove two screws (G) and lockwashers (H) from utility outlet cover (J).
- Manually remove utility outlet cover (J) with chain.
- Remove electrical connector (K) from circuit breaker (L).
- Remove socket assembly (M).



Go on to Sheet 2

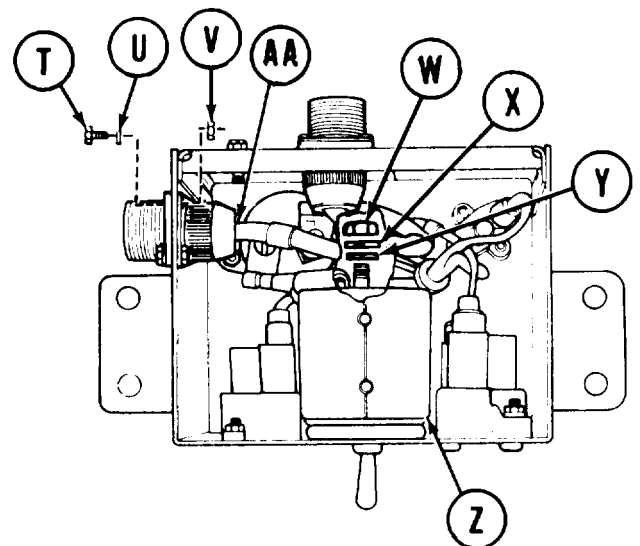
TA251660

ACCESSORIES CONTROL BOX REPAIR (Sheet 2 of 8)

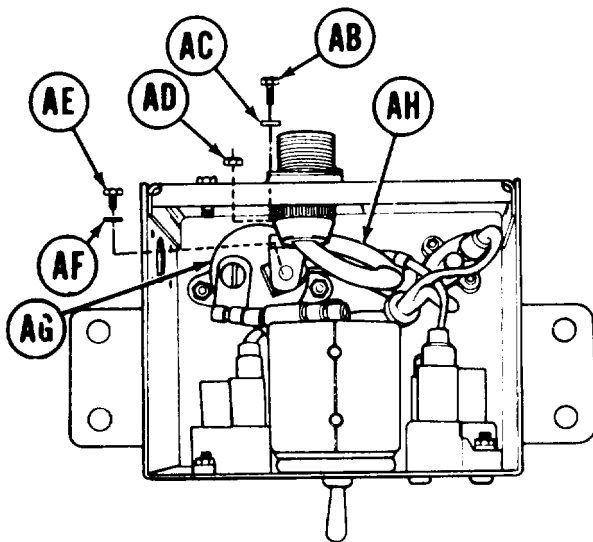


8. Using 5/16 inch wrench and flat-tip screwdriver, remove four screws (N), lockwashers (P), and nuts (Q).
9. Manually remove three electrical connectors (R).
10. Remove harness assembly (S).

11. Using flat-tip screwdriver and 5/16 inch wrench, remove four screws (T), lockwashers (U), and nuts (V).
12. Using 7/16 inch wrench, remove nut (W), lockwasher (X), and flat washer (Y) from rear of switch assembly (Z).
13. Remove cable assembly (AA).



14. Using flat-tip screwdriver and 5/16 inch wrench, remove four screws (AB), lockwashers (AC), and nuts (AD).
15. Using flat-tip screwdriver, remove screw (AE) and washer (AF) from circuit breaker (AG).
16. Remove cable assembly (AH).

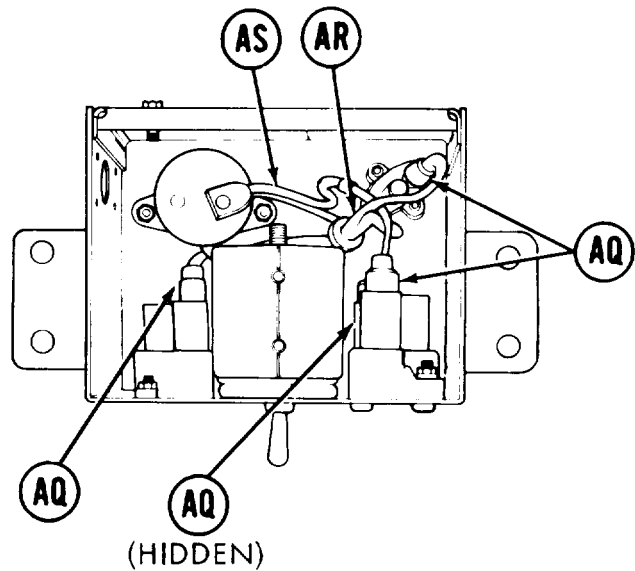
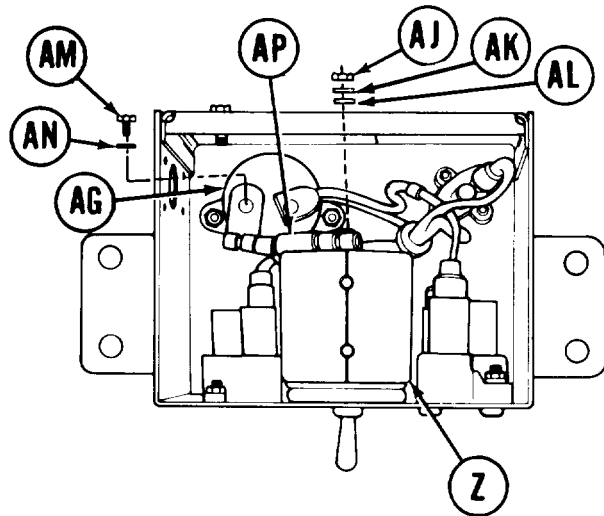


Go on to Sheet 3

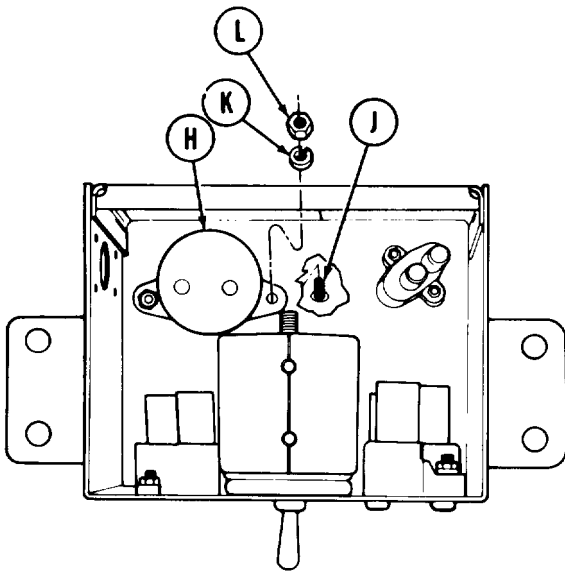
TA251661

ACCESSORIES CONTROL BOX REPAIR (Sheet 3 of 8)

17. Using 7/16 inch wrench, remove remaining nut (AJ), flat washer (AK), and lockwasher (AL) from rear of switch assembly (Z).
18. Using flat-tip screwdriver, remove remaining screw (AM) and washer (AN) from circuit breaker (AG).
19. Manually remove cable assembly (AP).
20. Manually remove four electrical connectors (AQ) by pulling out.
21. Remove harness assembly (AR) and cable assembly (AS).



22. Using flat-tip screwdriver, remove two screws (AT), lockwashers (AU), and nuts (AV).
23. Manually remove circuit breaker (AW).



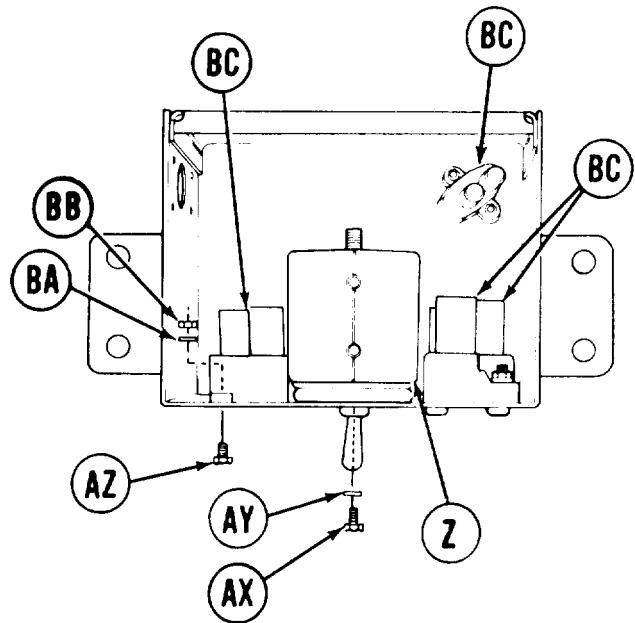
Go on to Sheet 4

TA251662



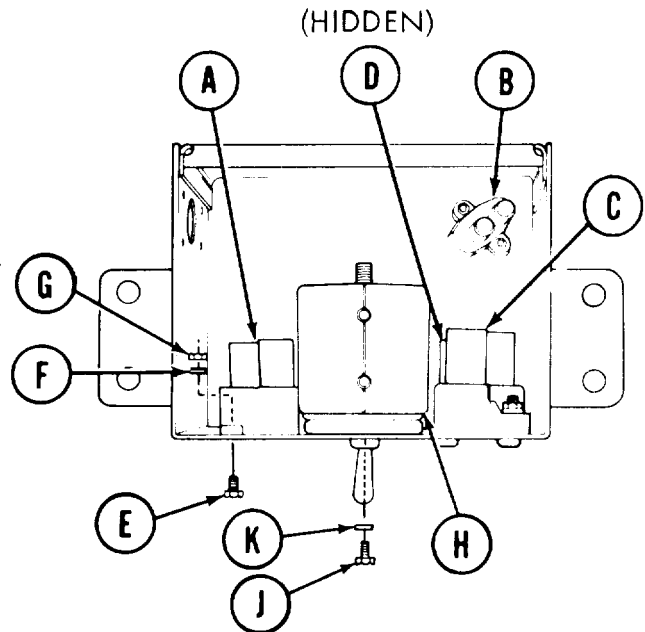
**ACCESSORIES CONTROL BOX REPAIR (Sheet 4 of 8)**

24. Using flat-tip screwdriver, remove two screws (AX) and lockwashers (AY).
25. Manually remove switch assembly (Z).
26. Using flat-tip screwdriver and 11/32 inch wrench, remove eight screws (AZ), lockwashers (BA), and nuts (BB) from four circuit breakers (BC).
27. Manually remove four circuit breakers (BC).



**ASSEMBLY:**

1. Place four circuit breakers (A, B, C, D) in position.
2. Using flat-tip screwdriver and 11/32 inch wrench, install eight screws (E), lockwashers (F), and nuts (G).
3. Place switch assembly (H) in position.
4. Using flat-tip screwdriver, install two screws (J) and lockwashers (K).



Go on to Sheet 5

TA251663

ACCESSORIES CONTROL BOX REPAIR (Sheet 5 of 8)

5. Place circuit breaker (L) in position.

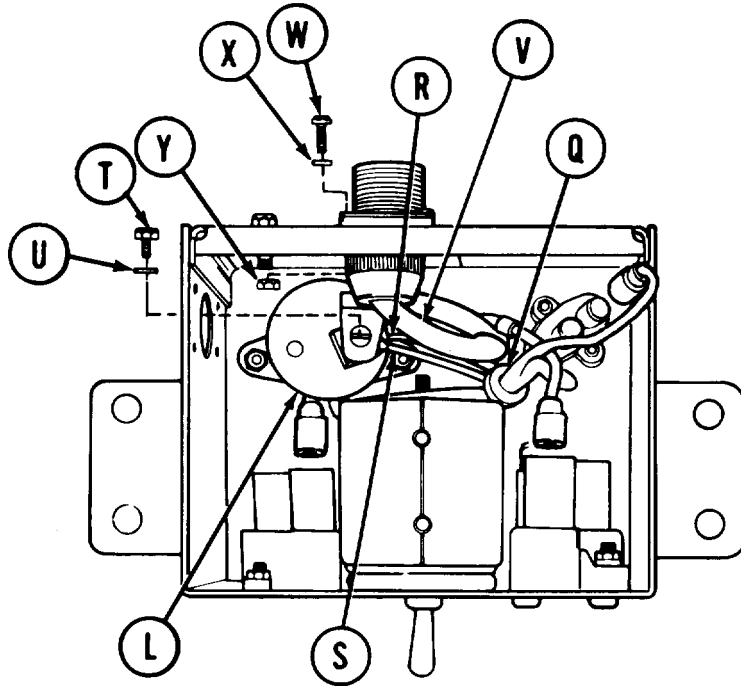
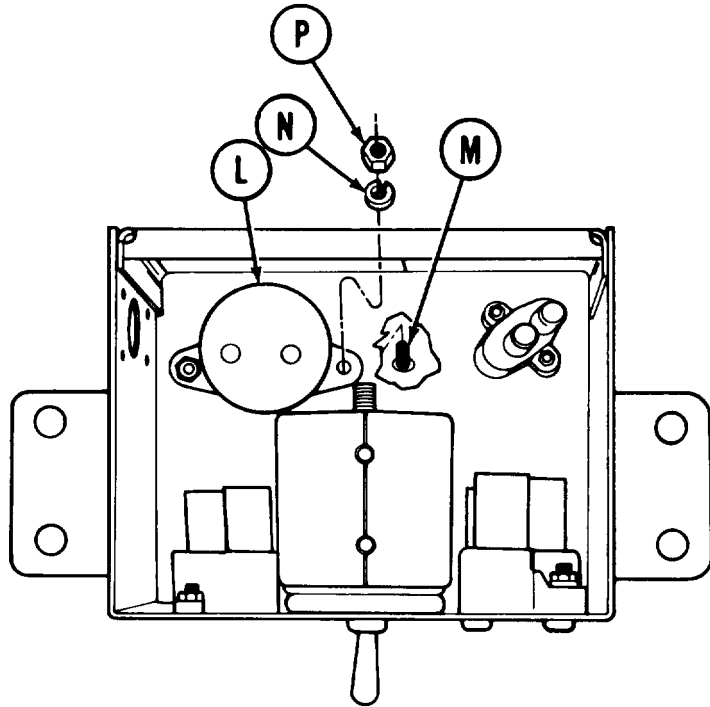
6. Manually install two screws (M), new lock-washers (N) and nuts (P).

7. Place flat ends of harness assembly (CKT 465)(Q) cable assembly (CKT 100A) (R) and cable assembly (CKT 625) (S) on circuit breaker (L).

8. Using flat-tip screwdriver, install screw (T) and washer (U) to secure wires to circuit breaker.

9. Place cable assembly (L) in position with alignment key at 12 o'clock.

10. Using flat-tip screwdriver and 5/16 inch wrench, install four screws (W), new lockwashers (X), and nuts (Y).



Go on to Sheet 6

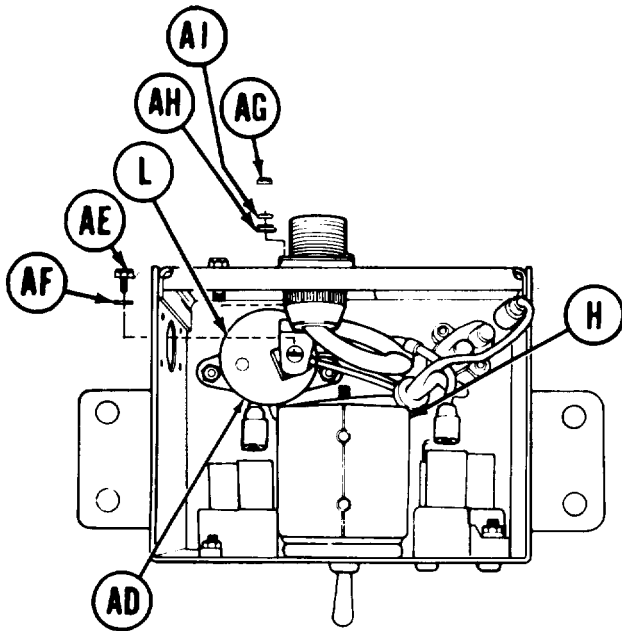
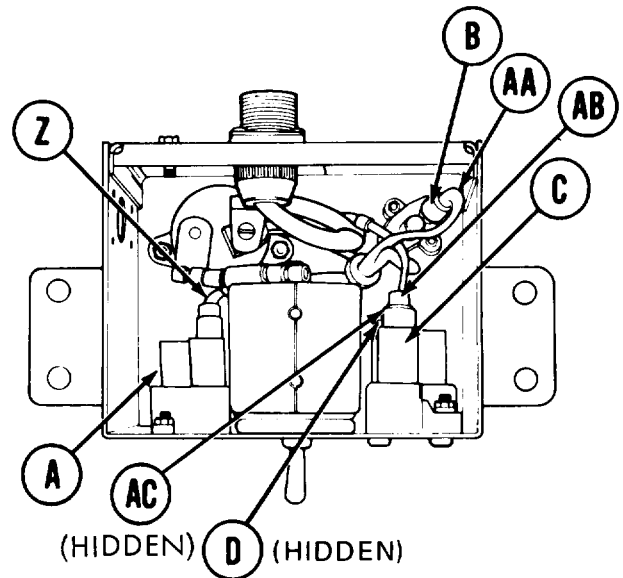
TA251664

ACCESSORIES CONTROL BOX REPAIR (Sheet 6 of 8)

NOTE

Apply silicone compound to all rubber electrical connectors before installation.

11. Manually connect electrical connector (CKT 137) (A) to circuit breaker (A).
12. Manually connect electrical connector (CKT 465) (AA) to circuit breaker (B).
13. Manually connect electrical connector (CKT 894) (AB) to circuit breaker (C).
14. Manually connect electrical connector (CKT 625) (AC) to circuit breaker (D).



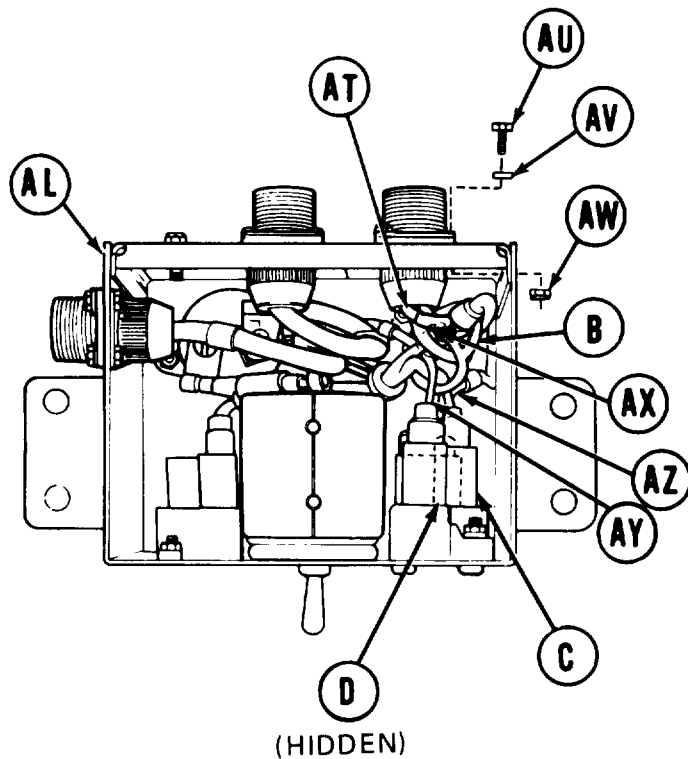
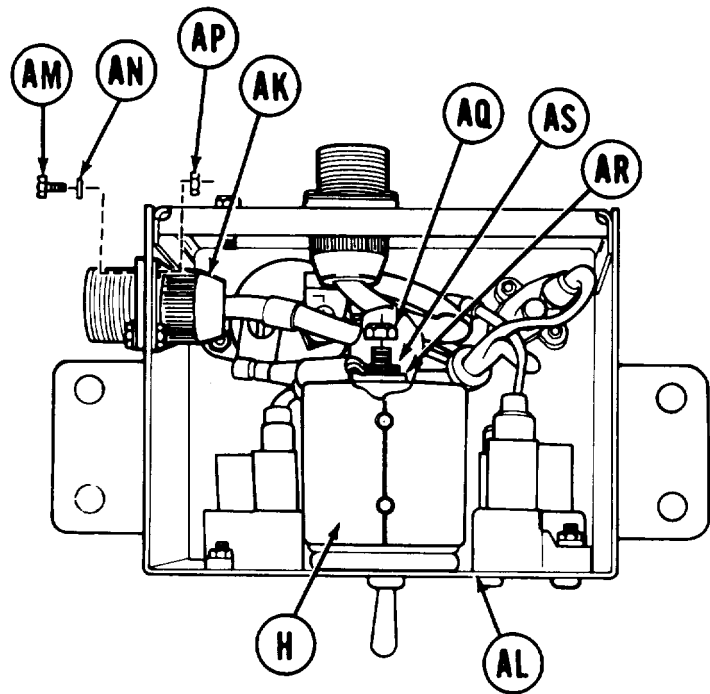
15. Place one end of cable assembly (CKT 159) (AD) on remaining terminal of circuit breaker (L).
16. Using flat-tip screwdriver, install screw (AE) and lockwasher (AF) to circuit breaker (L).
17. Place remaining end of cable assembly (CKT 159) (AD) on rear of switch assembly (H).
18. Using 7/16 inch wrench, install nut (AG), flat washer (AH), and lockwasher (AJ) to switch assembly (H).

Go on to Sheet 7

TA251665

ACCESSORIES CONTROL BOX REPAIR (Sheet 7 of 8)

19. Place cable assembly (CKT 159) (AK) in position on accessories control box (AL).
20. Using flat-tip screwdriver and 5/16 inch wrench, install four screws (AM), lockwashers (AN), and nuts (AP).
21. Place end of cable assembly (AK) on rear of switch assembly (H).
22. Using 7/16 inch wrench, install nut (AQ), flat washers (AR), and new lockwasher (AS).



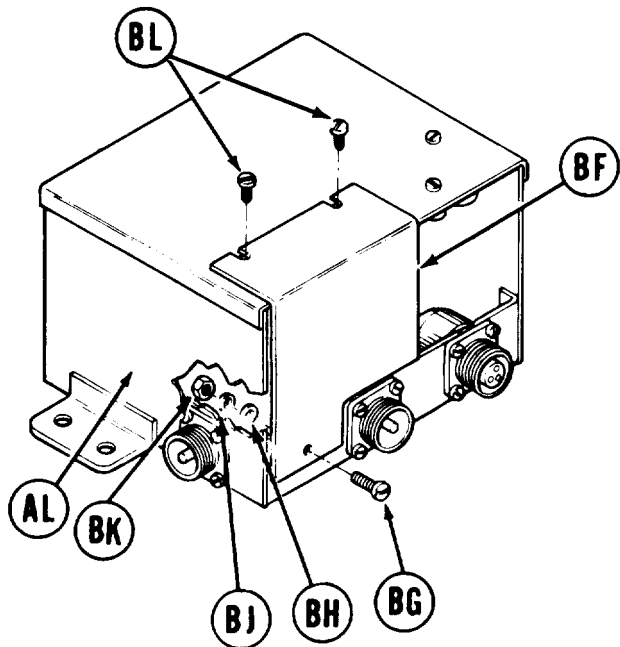
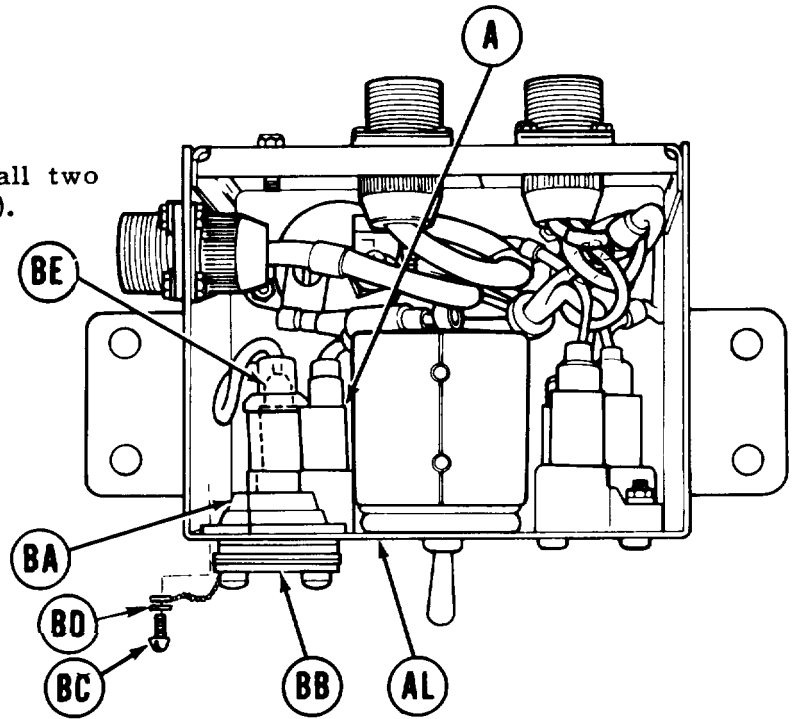
23. Place harness assembly (AT) in position on accessories control box (AL).
24. Using flat-tip screwdriver and 5/16 inch wrench, install four screws (AU), lockwashers (AV), and nuts (AW).
25. Manually connect electrical connector (CKT 465) (AX) to circuit breaker (B).
26. Manually connect electrical connector (CKT 625) (AY) to circuit breaker (D).
27. Manually connect electrical connector (CKT 894) (AZ) to circuit breaker (C).

Go on to Sheet 8

TA251666

ACCESSORIES CONTROL BOX REPAIR (Sheet 8 of 8)

28. Place socket assembly (BA) and outlet cover (BB) chain in position.
29. Using flat-tip screwdriver, install two screws (BC) and lockwashers (BD). new lockwashers (AW).
30. Manually install electrical connector (BE) to circuit breaker (A).
31. Install outlet cover (BB) on control box (AL).



32. Place access cover (BF) in position on control box (AL).
33. Using 3/8 inch wrench and flat-tip screwdriver, install screw (BG), flat washers (BH), lockwasher (BJ), and nut (BK).
34. Using flat-tip screwdriver, tighten two screws (BL).
35. Install accessories control box (page 3-7).

End of Task

TA251667

**TONGUE ASSEMBLY REPLACEMENT (Sheet 1 of 4)**

**PROCEDURE INDEX**

PROCEDURE	PAGE
Removal	4-16
Installation	4-18

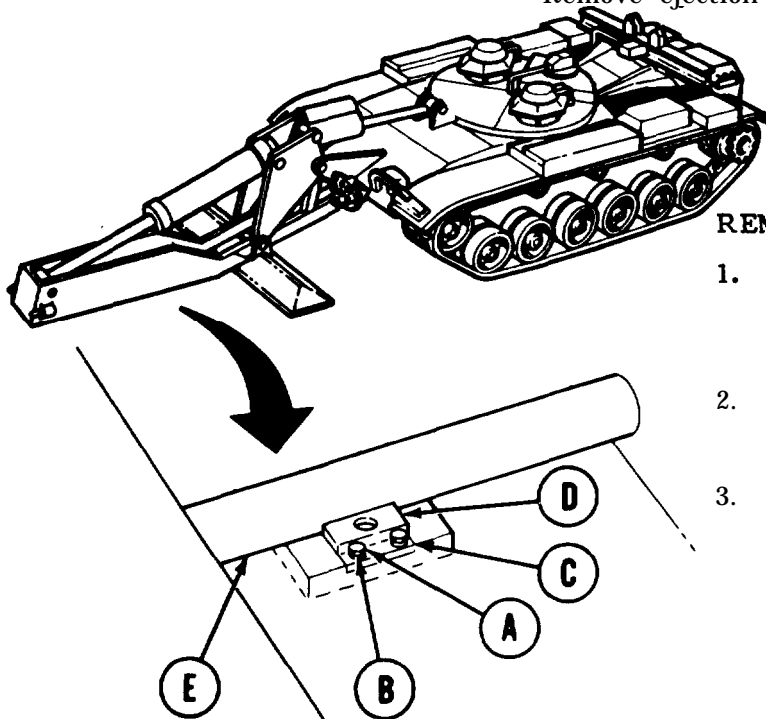
**TOOL:** 7/16 in. socket with 1/2in. drive  
 Ratchet with 1/2 in. drive  
 Sling  
 Sledge hammer  
 Lifting device (2000 lb. capacity)  
 Snap ring pliers  
 Brass drift

**SUPPLIES** Lockwashers (4 required)

**PERSONNEL:** Three

**REFERENCE:** LO 5-5420-202-12

**PRELIMINARY PROCEDURES:** Remove tongue cylinder (page 3-234 )  
 Remove locking cylinder (page 3-240)  
 Remove scissors cylinder hose assemblies (page 3-139)  
 Remove ejection cylinders (pages 3-243 and 3-247)



**Make sure all hydraulic lines are placed so they will not be damaged during tongue assembly removal.**

**REMOVAL:**

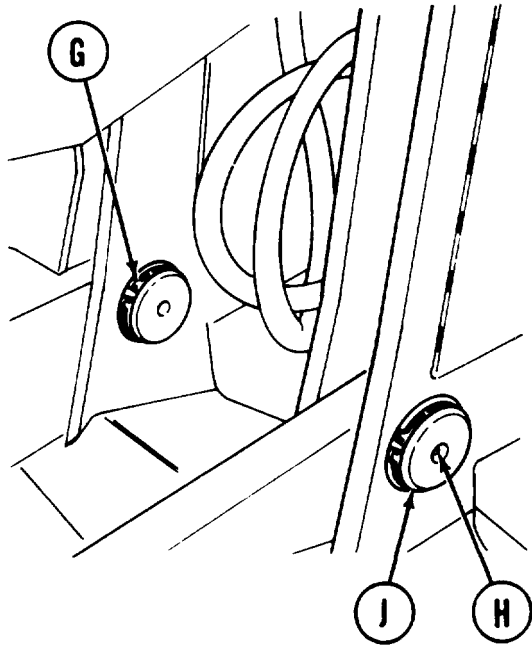
1. Using socket, remove four screws (A) and lockwashers (B). Throw lockwashers (B) away.
2. Manually remove two key retainers (C) and key (D).
3. Using hammer, tap out tongue cross pin (E).

Go on to Sheet 2

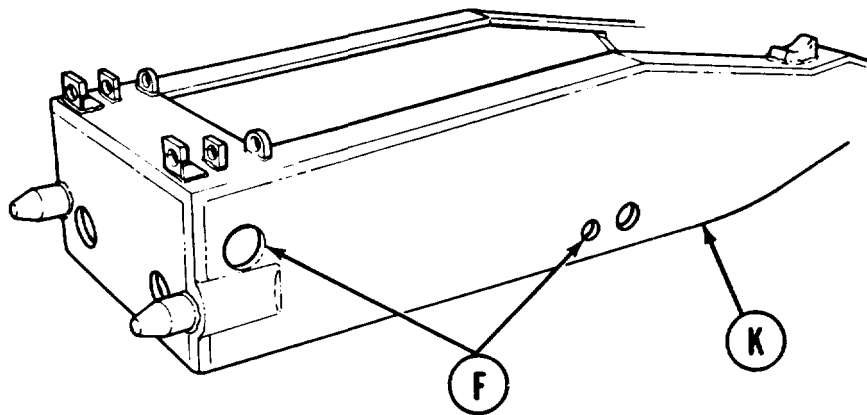
TA251668

**TONGUE ASSEMBLY REPLACEMENT (Sheet 2 of 4)**

4. Hook lifting device and sling through four holes (F).



5. Using snap ring pliers, remove four retaining rings (G).
6. Using socket, remove four grease fittings (H).
7. Using hammer and drive pin, tap out two shafts (J).



8. While two technicians guide tongue assembly (K), have third technician operate lifting device to slowly pull tongue assembly (K) away from vehicle.
9. Remove lifting device and sling.

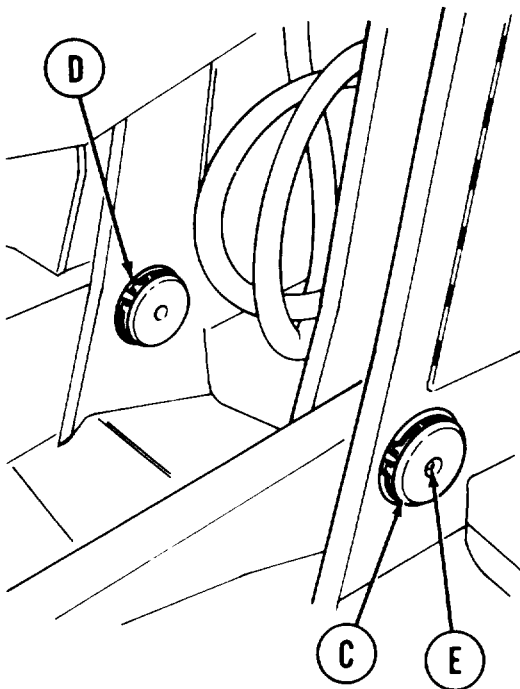
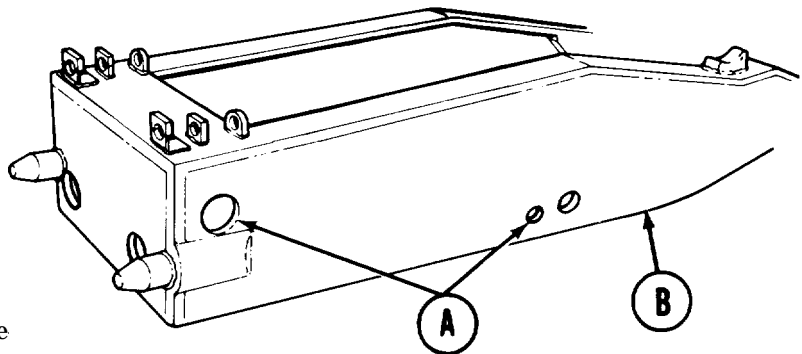
Go on to Sheet 3

TA251669

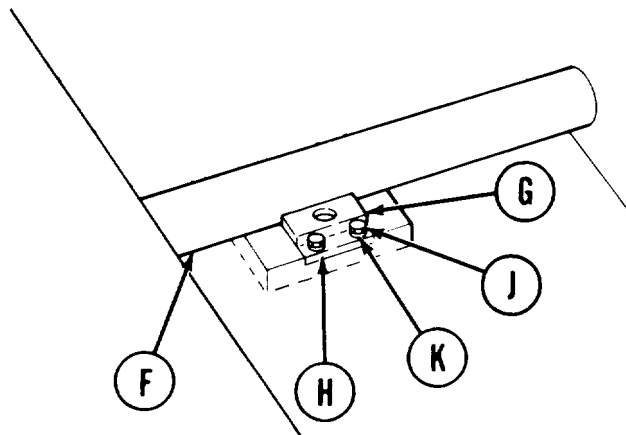
**TONGUE ASSEMBLY REPLACEMENT (Sheet 3 of 4)**

**INSTALLATION:**

1. Hook lifting device and sling through four holes (A).
2. While two technicians guide tongue assembly (B), have third technician operating lifting device slowly lower tongue assembly (B) into position on vehicle.
3. when mounting holes are alined, use hammer and drive pin to drive in two shafts (C).



4. Using snap ring pliers, install four retaining rings (D).
5. Manually remove lifting device.
6. Using socket, install four grease fittings (E).



7. Using hammer, tap in tongue cross pin (F) with notch down.
8. Position key (G) under notch in tongue cross pin (F).
9. Place two key retainers (H) in position.
10. Using socket, install four screws (J) and lockwashers (K).

TA251670



**TONGUE ASSEMBLY REPLACEMENT (Sheet 4 of 4)**

11. Install tongue cylinder (page 3-237).
12. Install locking cylinder (page 3-241).
13. Install scissors cylinder hose assemblies (page 3-145).
14. Install ejection cylinders (pages 3-245) and 3-249).
15. Lubricate (LO 5-5420-202-12).
16. Bleed hydraulic system (page 3-72).
17. Check for hydraulic leaks and correct as necessary.
18. Service hydraulic reservoir as needed (LO 5-5420-202-12).

End of Task

### BOOM-OUTRIGGER ASSEMBLY REPLACEMENT (Sheet 1 of 3)

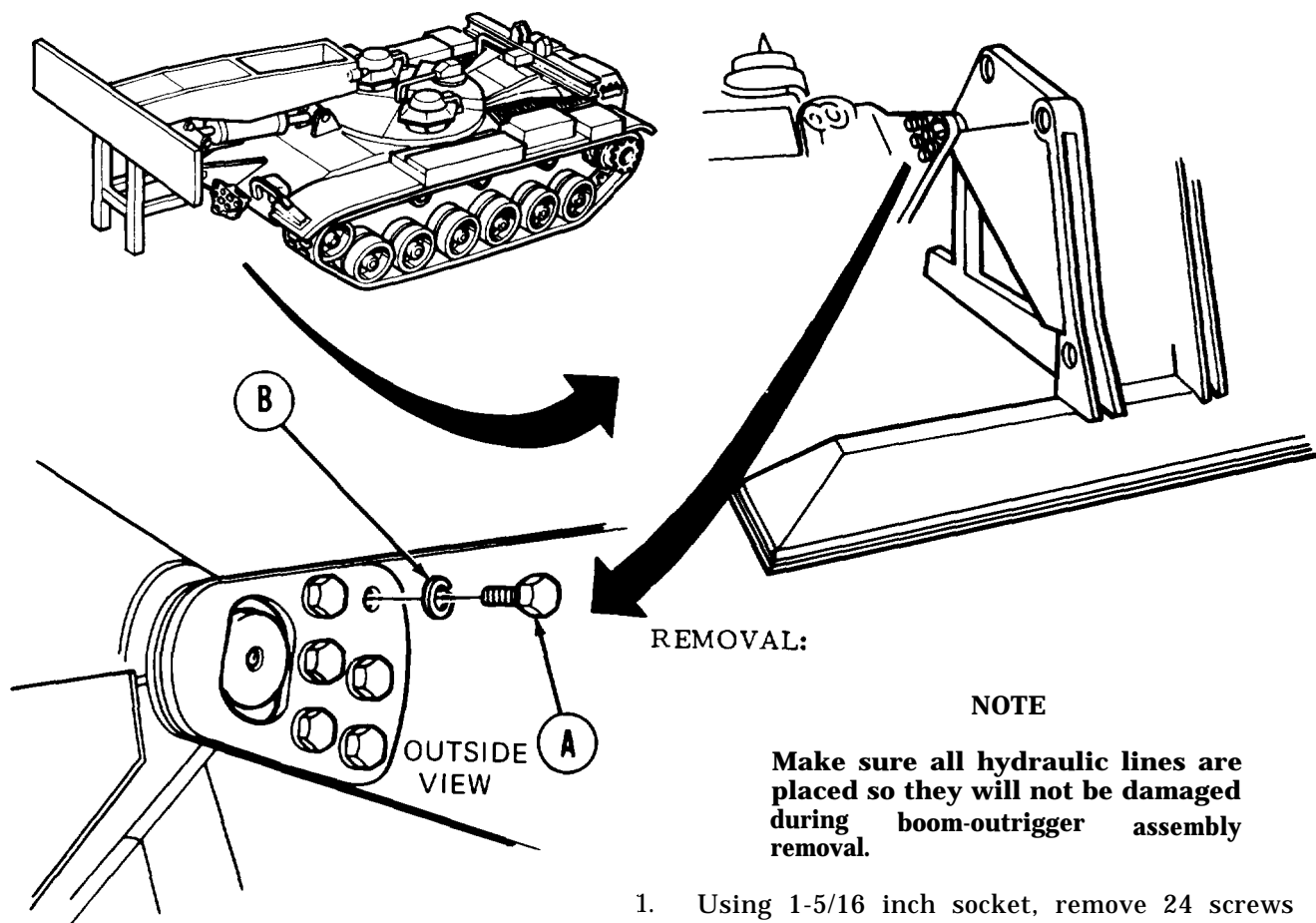
**TOOLS:** 1-5/16 in. socket with 3/4 in. drive  
Ratchet with 3/4 in. drive  
Hammer  
Lifting device (2000 lb. capacity)  
Sling  
7/16 in. socket with 1/2 in. drive  
Ratchet with 1/2 in. drive  
Brass drift

**SUPPLIES:** Lockwashers (24 required)  
Wooden block 10 x 10 in., 3 in. thick

**PERSONNEL:** Three

**REFERENCE:** LO 5-5420-202-12

**PRELIMINARY PROCEDURES:** Remove tongue assembly (page 4-16)  
Remove overhead cylinder (page 3-225)



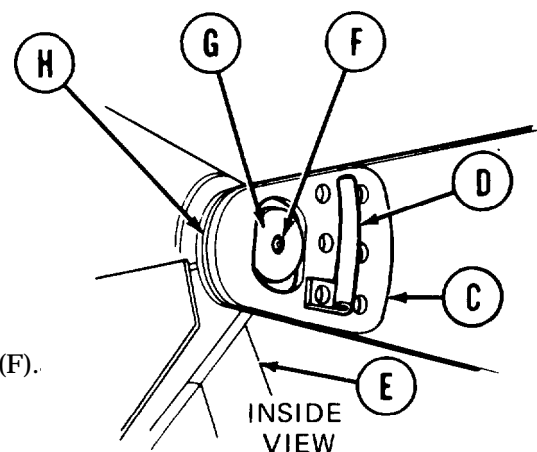
1. Using 1-5/16 inch socket, remove 24 screws (A) and lockwashers (B). Throw lockwashers (B) away.

Go on to sheet 2

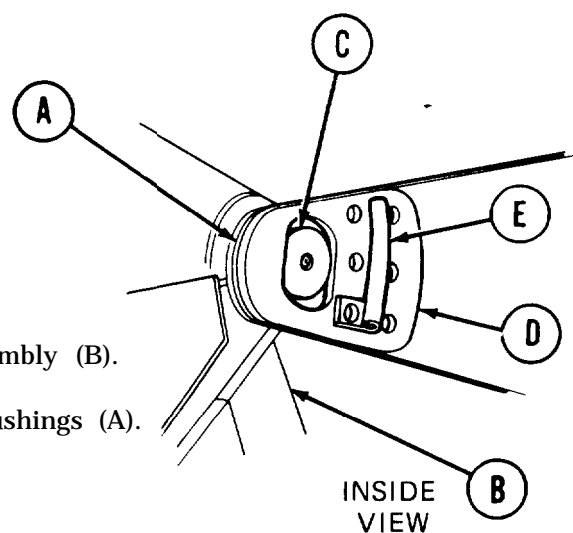
TA251671

**BOOM-OUTRIGGER ASSEMBLY REPLACEMENT (Sheet 2 of 3)**

2. Remove four pin retainers (C) and two brackets (D).
3. Attach lifting device and sling to boom-outrigger assembly (E).
4. Have technician operating lifting device raise sling to take up slack.
5. Using 7/16 inch socket, remove four grease fittings (F).
6. Using hammer and drive pin, tap out two pins (G).
7. While two technicians guide boom-outrigger assembly (E), have technician operating lifting device slowly lift boom-outrigger assembly (E).
8. Move boom-outrigger assembly (E) to desired location and remove lifting device.
9. Remove lifting device and sling.
10. Using hammer and drive pin, drive out six bushings (H).

**INSTALLATION:**

1. Position six bushings (A) in boom-outrigger assembly (B).
2. Using hammer and wooden block, drive in six bushings (A).
3. Attach sling and lifting device to boom-outrigger assembly (B).
4. While two technicians guide boom-outrigger assembly (B), use lifting device to move boom-outrigger assembly (B) into position on vehicle.
5. Using hammer and drift pin, drive two pins (C) into position.
6. Place four pin retainers (D) and two support brackets (E) on vehicle.

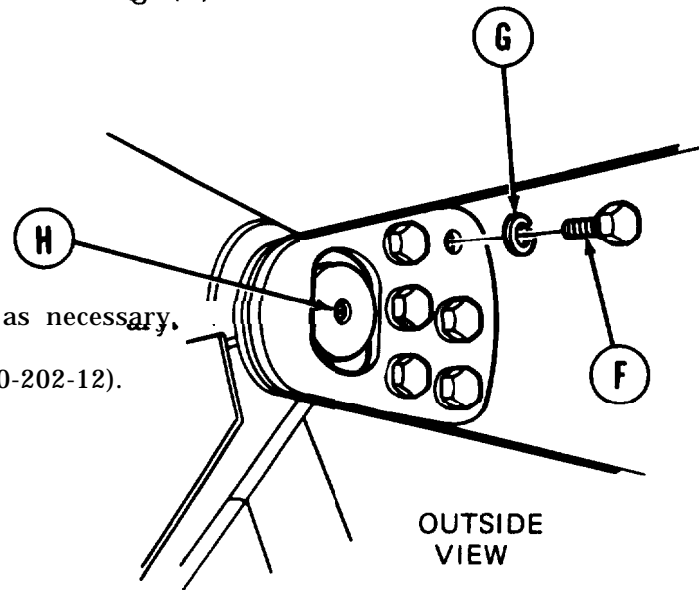


Go on to Sheet 3

TA251672

**BOOM-OUTRIGGER ASSEMBLY REPLACEMENT (Sheet 3 of 3)**

7. Using 1-5/16 inch socket, install 24 screws (F) and lockwashers (G).
8. Remove lifting device and sling.
9. Using 7/16 inch socket, install four grease fittings (H).
10. Install tongue assembly (page 4-18).
11. Install overhead cylinder (page 3-228).
12. Lubricate (LO 5-5420-202-12).
13. Bleed hydraulic system (page 3-72).
14. Check for hydraulic leaks and correct as necessary.
15. Service hydraulic reservoir (LO 5-5420-202-12).



End of Task

**Section II. PUMP-CLUTCH AND VALVE BANK**  
**PUMP-CLUTCH DRIVE REPLACEMENT (Sheet 1 of 4)**

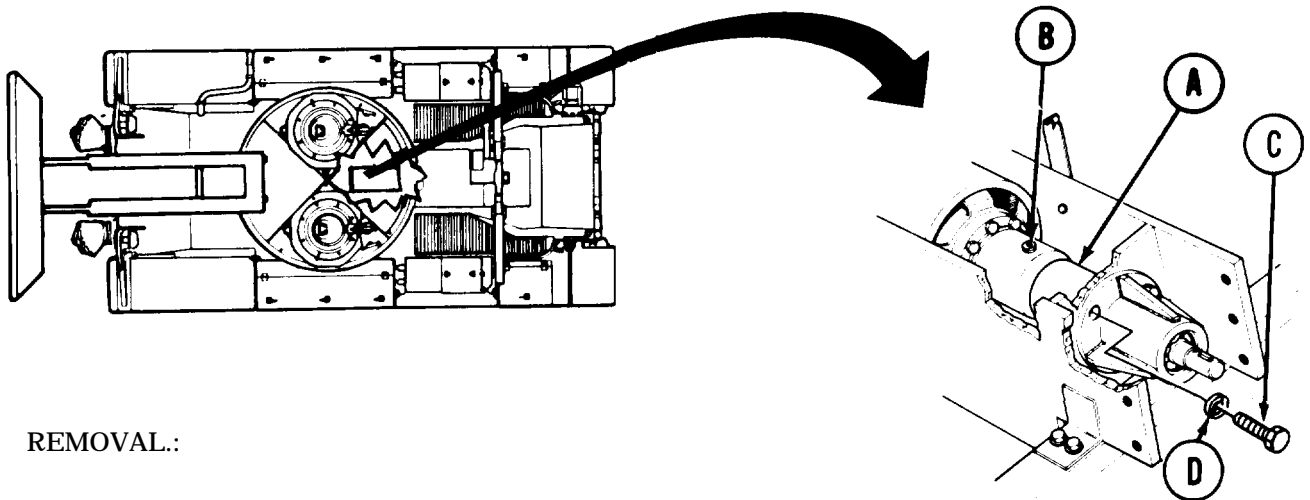
PROCEDURE	PAGE
Removal	4-23
Cleaning and Inspection	4-24
Installation	4-25

**TOOLS:** 3/4 in. socket with 1/2 in. drive  
 5" in. extension with 1/2 in. drive  
 Ratchet with 1/2 in. drive  
 Snap ring pliers (inside)  
 Puller kit  
 Arbor press  
 3/8 in. socket head screw key

**SUPPLIES:** Wooden block, 1 x 4 in., 3 in. long (make from Item 32, Appendix D)  
 Dry cleaning solvent (Item 15, Appendix D)  
 Lockwashers (4 required)  
 Rags (Item 12, Appendix D)  
 Gloves (Item 27, Appendix D)

**REFERENCES:** TM 5-5420-202-10

**PRELIMINARY PROCEDURES:** Remove universal joint (page 3-62)  
 Remove pump-clutch cover plate (page 3-65)



**REMOVAL.:**

1. Place wooden block under clutch (A).
2. Using screw key, remove setscrew (B).
3. Using socket, remove four screws (C) and lockwashers (D). Throw lockwashers (D) away.

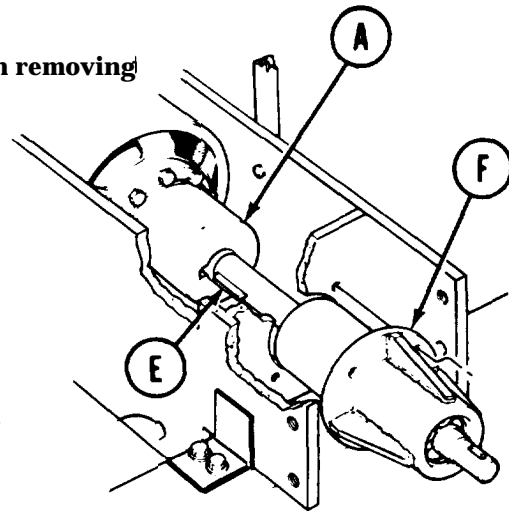
Go on to Sheet 2

TA251674

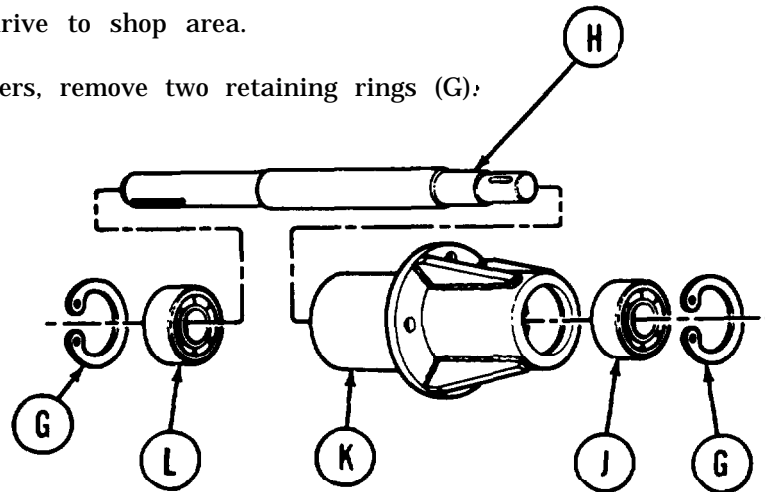
**PUMP-CLUTCH DRIVE REPLACEMENT (Sheet 2 of 4)**

**NOTE**

**Be careful to not lose key (E) When removing pump-clutch drive (F) from clutch.**



4. Slide pump-clutch drive (F) to rear out of clutch (A).
5. Remove key (E).
6. Take pump-clutch drive to shop area.
7. Using snap ring pliers, remove two retaining rings (G):



8. Using arbor press on long end of shaft (H), press shaft (H) and bearing (J) out of housing (K).
9. Using arbor press, remove bearing (J) from shaft (H).
10. Using puller, remove bearing (L) from housing (K).

**CLEANING AND INSPECTION:**

**WARNING**

**Cleaning agent specified is flammable. Use only in well ventilated areas. Keep away from flames, sparks, or heat. Do not smoke while using. Prevent contact with eyes, mouth, and/or skin. Wear rubber gloves when performing cleaning procedures.**

1. Clean all metallic parts with rags and dry cleaning solvent.

Go on to Sheet 3

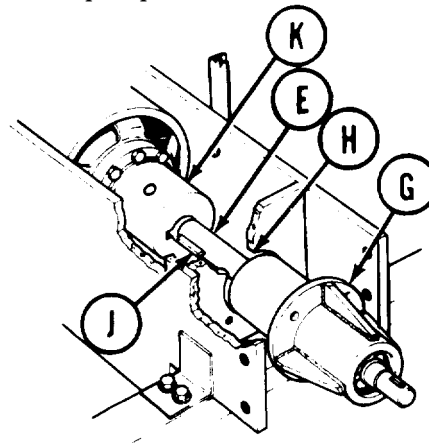
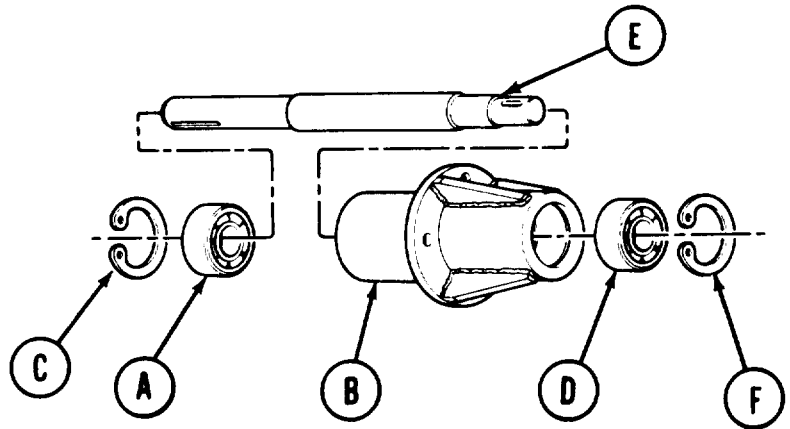
TA251675

**PUMP-CLUTCH DRIVE REPLACEMENT (Sheet 3 of 4)**

Inspect all parts for damage or wear. Replace all unserviceable parts.

**INSTALLATION**

1. Using arbor press, install bearing (A) in housing (B).
2. Using snap ring pliers, install retaining ring (C).
3. Using arbor press, install bearing (D) on shaft (E).
4. Using arbor press, install bearing (D) and shaft (E) in housing (B).
5. Using snap ring pliers, install retaining ring (F).
6. Take pump-clutch drive (G) to vehicle.
7. Slide pump-clutch drive (G) through opening in end of support (H).
8. Put key (J) in groove of shaft (E).
9. Aline key (J) with keyway in clutch (K), then slide pump-clutch drive (G) into clutch (K).

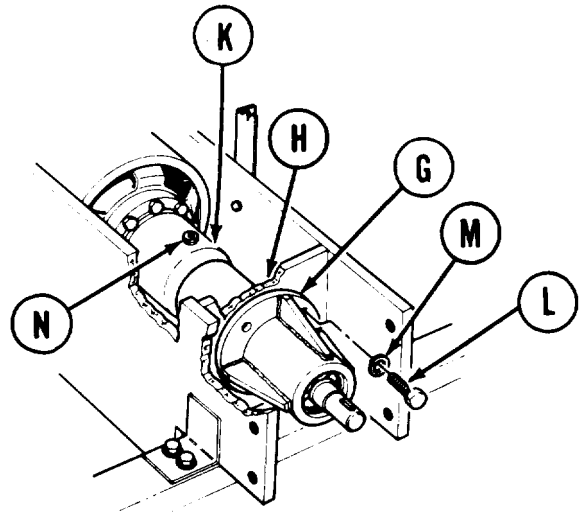


Go on to Sheet 4

TA251676

**PUMP-CLUTCH DRIVE REPLACEMENT (Sheet 4 of 4)**

10. Turn pump-clutch drive (G) to align with holes in support (H).
11. Using socket, install four screws (L) and lockwashers (M).
12. Using screw key, install setscrew (N) in clutch (K).
13. Remove wooden block from under clutch (K).
14. Install pump-clutch cover plate (page 3-65).
15. - Install universal joint (page 3-63).
16. Operate pump-clutch (TM 5-5420-202-10) to make sure unit is operational.



End of Task

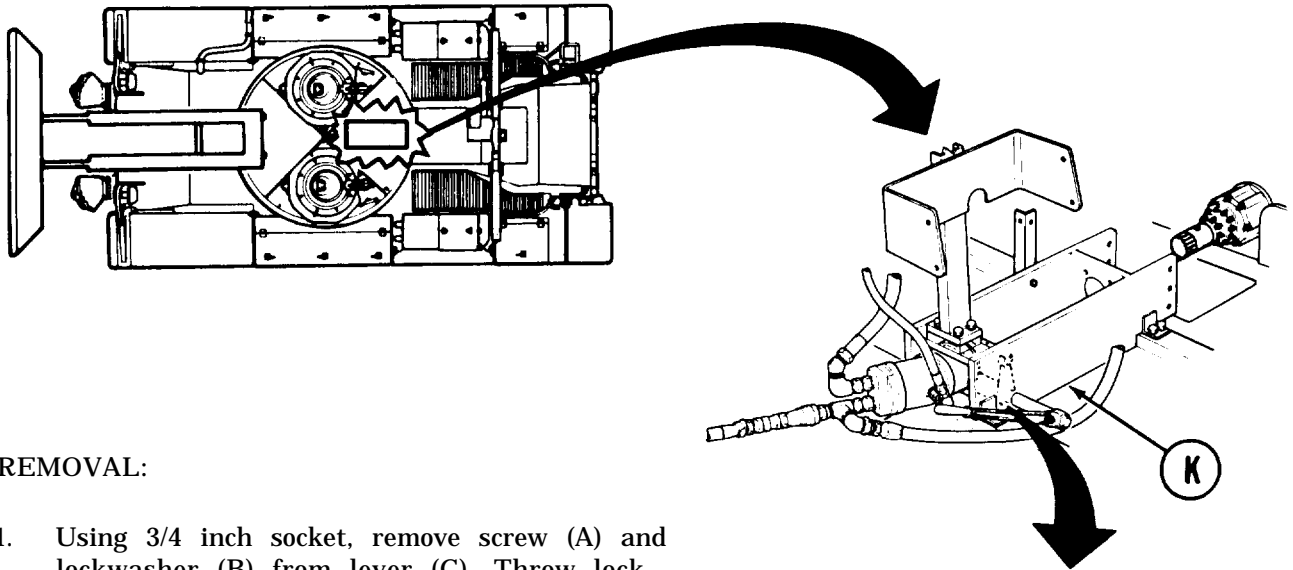


**CLUTCH CONTROLS REPLACEMENT (Sheet 1 of 2)**

**TOOLS:** 3/4 in. socket with 1/2 in. drive  
 9/16 in. socket with 1/2 in. drive  
 Ratchet with 1/2 in. drive

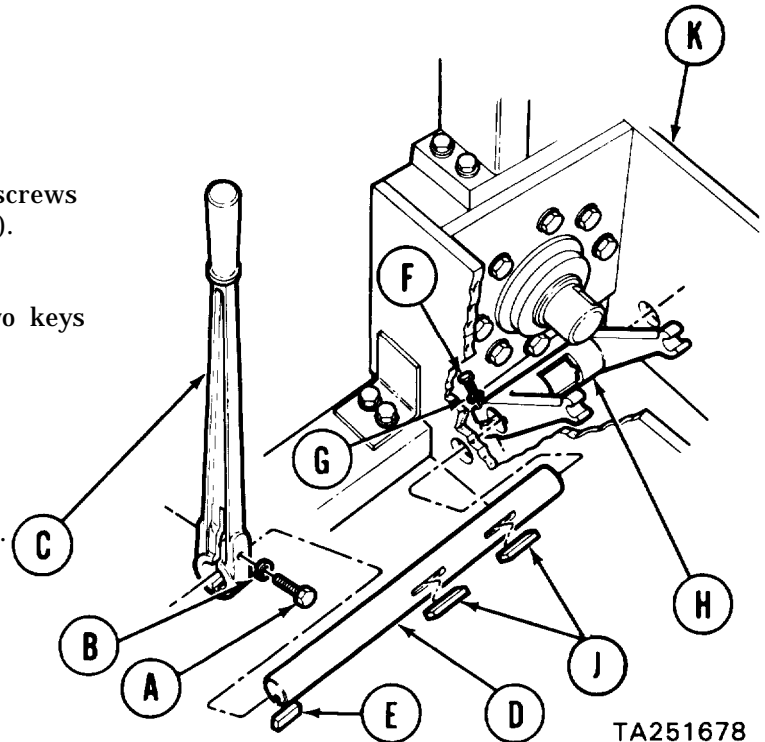
**SUPPLIES:** Lockwashers (3 required)

**PRELIMINARY PROCEDURE:** Remove clutch assembly (page 4-33)



**REMOVAL:**

1. Using 3/4 inch socket, remove screw (A) and lockwasher (B) from lever (C). Throw lockwasher (B) away.
2. Pull lever (C) off shaft (D).
3. Remove key (E).
4. Using 9/16 inch socket, remove two screws (F) and lockwashers (G) from yoke (H). Throw lockwashers (G) away.
5. Pull shaft (D) out of yoke (H) until two keys (J) are exposed.
6. Remove two keys (J).
7. Pull shaft (D) out of support (K).
8. Remove yoke (H) from support (K).



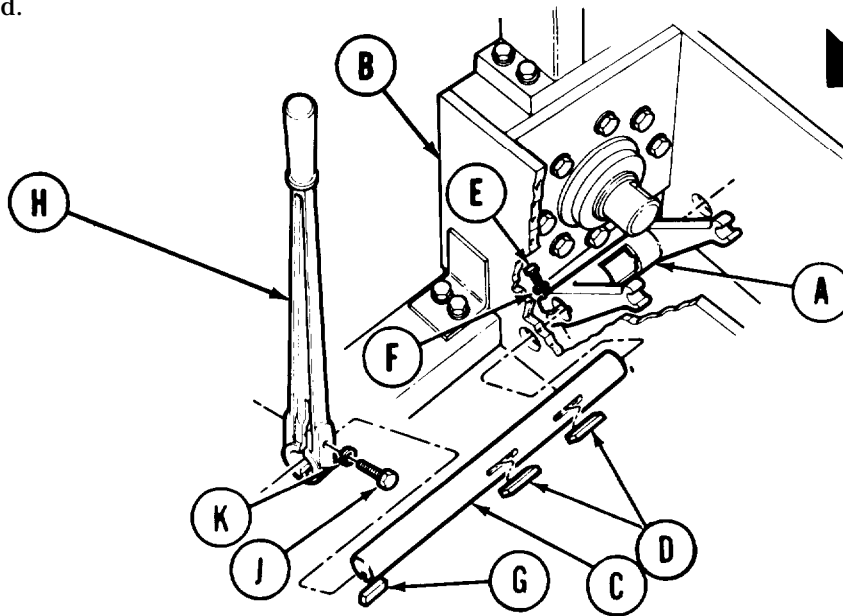
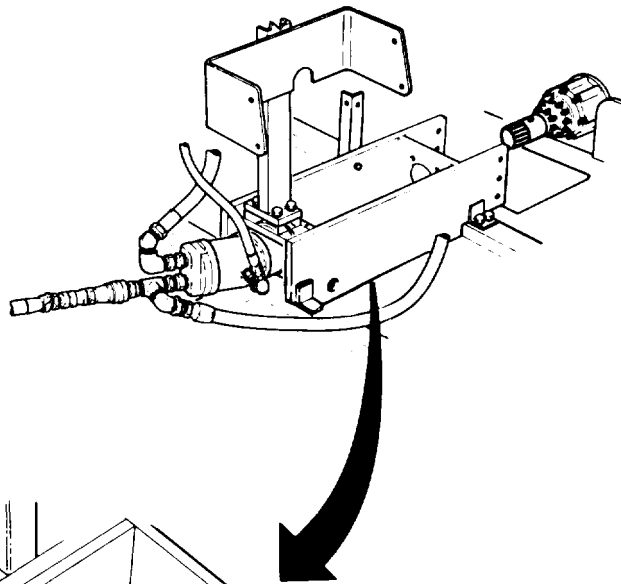
TA251678

Go on to Sheet 2

**CLUTCH CONTROLS REPLACEMENT (Sheet 2 of 2)**

**INSTALLATION:**

1. Place yoke (A) into bracket (B).
2. Slide shaft (C) through bracket (B) and into yoke (A) as shown.
3. Place two keys (D) in shaft (C).
4. Slide shaft (C) into yoke (A) until keys (D) are in yoke (A).
5. Using 9/16 inch socket, install two screws (E) and lockwashers (F).
6. Place key (G) on shaft (C).
7. Slide lever (H) onto shaft (C) so keyways are aligned.



8. Using socket, install screw (J) and lockwashers (K) so lever (H) is firmly attached to shaft (C).
9. Install clutch assembly (page 4-41).
10. Adjust clutch (page 3-66).

End of Task

TA251679

**HYDRAULIC PUMP REPLACEMENT (Sheet 1 of 3)**

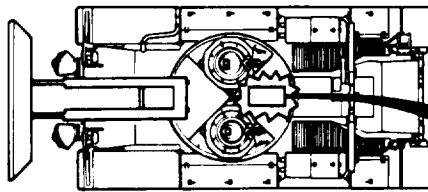
**TOOLS:** 7/16 in. open end wrench  
 7/8 in. open end wrench  
 1-1/8 in. open end wrench  
 1-1/2 in. open end wrench  
 1-3/4 in. open end wrench

15 in. adjustable wrench  
 Ratchet with 1/2 in. drive  
 12 in. adjustable wrench  
 3/4 in. socket with 1/2 in. drive  
 Vise

**SUPPLIES:** Pencil (Item 22, Appendix D)  
 Pipe tape (Item 19, Appendix D)  
 Rags (Item 12, Appendix D)  
 Masking tape (Item 18, Appendix D)

Drip pans (suitable containers)  
 Protective caps and plugs  
 Lockwashers (8 required)

**PRELIMINARY PROCEDURES:** Drain hydraulic reservoir (page 3-74)  
 Remove clutch assembly (page 4-33)

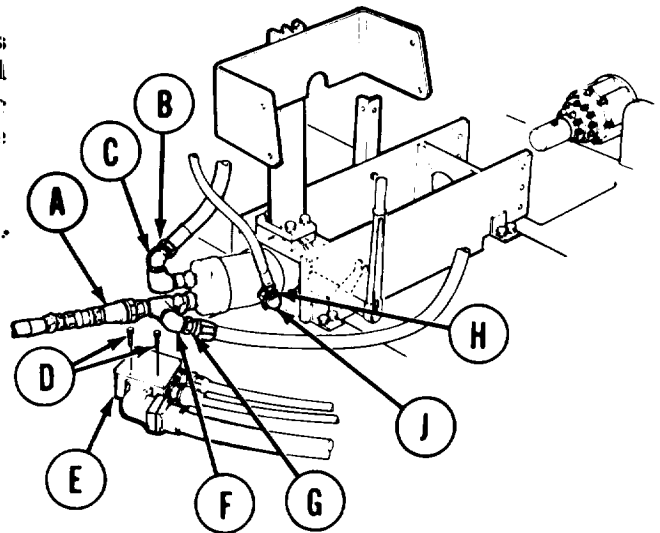


**REMOVAL:**

**NOTE**

Use rags and drip pans to catch excess hydraulic fluid. Use masking tape and pencil to tag lines for installation. Cap or plug all lines and fittings as they are disconnected.

1. Manually disconnect hose assembly "CW" (A).
2. Using 15 inch adjustable wrench, remove hose assembly "CZ" (B) from fitting (C).
3. Using 7/16 inch wrench, remove two screws (D).
4. Move box (E) aside.
5. Using adjustable wrench to hold elbow (F), use 1-1/2 inch wrench to remove hose assembly "BA" (G).
6. Using 7/8 inch wrench, remove hose assembly "CV5" (H) from elbow (J).

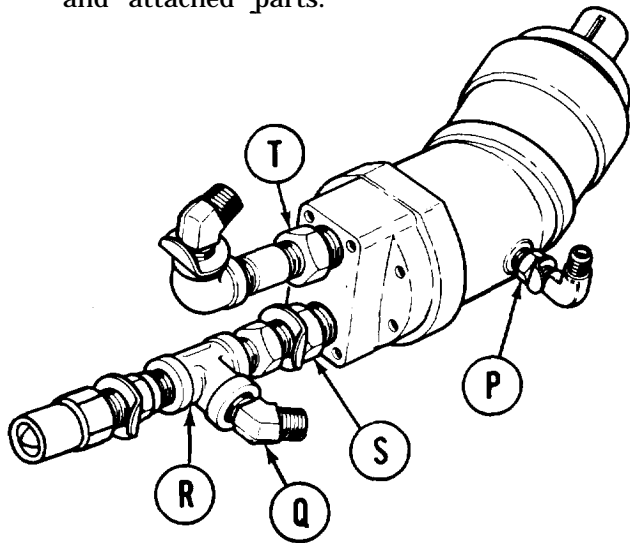
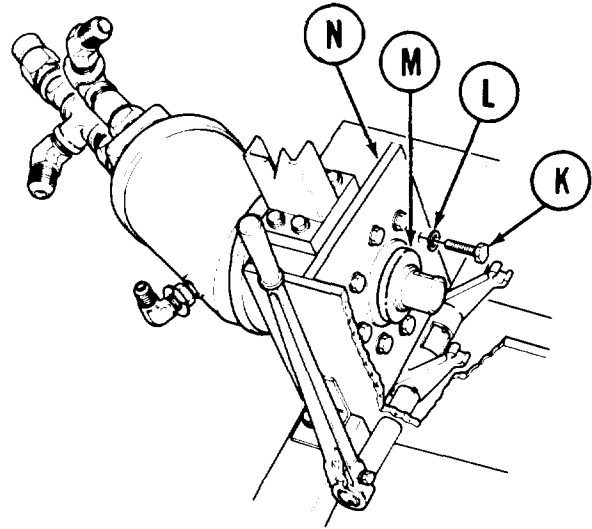


Go on to Sheet 2

TA251680

**HYDRAULIC PUMP REPLACEMENT (Sheet 2 of 3)**

7. Using socket, remove eight screws (K) and lockwashers (L) securing pump (M) to support (N). Throw lockwashers (L) away.
8. Remove pump (M) from vehicle and place in a vise.
9. Using 1-1/8 inch wrench, remove bushing (P) and attached parts.



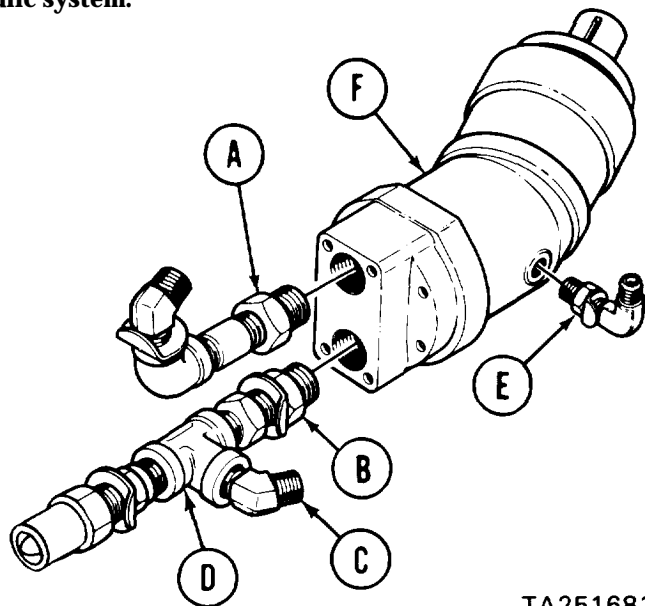
10. Using 12 inch adjustable wrench, remove elbow (Q) from tee (R).
11. Using 1-3/4 inch wrench, remove bushing (S) and attached parts.
12. Using 15 inch adjustable wrench, remove bushing (T) and attached parts.

**INSTALLATION:**

**NOTE**

**Remove caps and plugs as necessary during installation. Before installation, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.**

1. Using 15 inch adjustable wrench, install bushing (A) with attached parts. Tighten and aline parts to position shown.
2. Using 1-3/4 inch wrench, install bushing (B) with attached parts. Tighten and aline parts to position shown.
3. Using 12 inch adjustable wrench, install elbow (C) in tee (D).
4. Using 1-1/8 inch wrench, install bushing (E) (E) with attached parts. Tighten and aline parts to position shown.
5. Place pump (F) in position in vehicle.

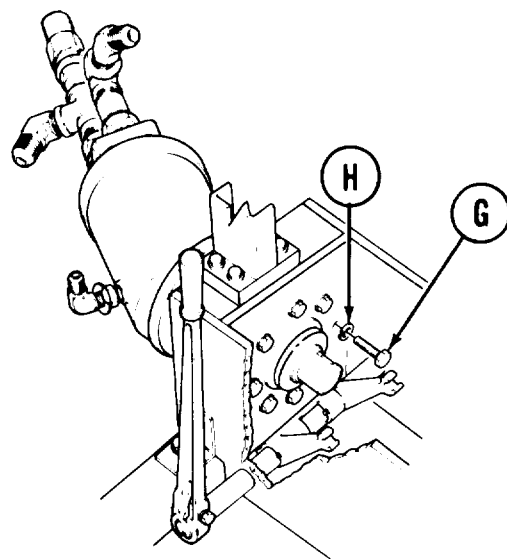


Go on to Sheet 3

TA251681

**HYDRAULIC PUMP REPLACEMENT (Sheet 3 of 3)**

6. Using socket, install eight screws (G) and lockwashers (H).

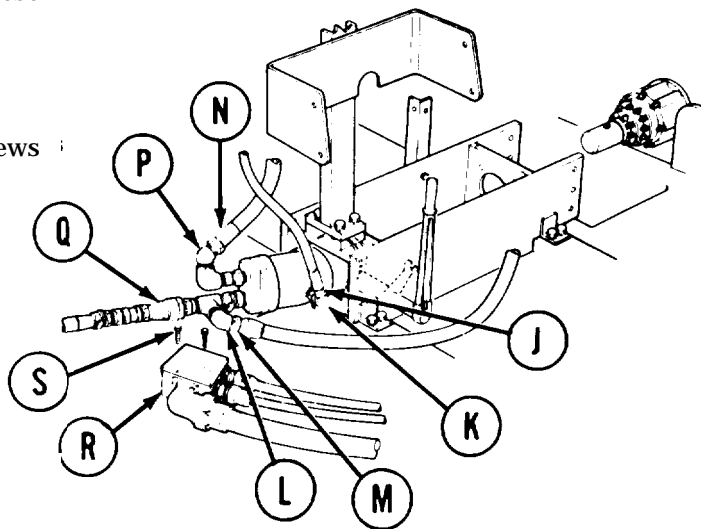


7. Using 7/8 inch wrench, install hose assembly "CV5" (J) on elbow (K).
8. Holding elbow (L) with adjustable wrench, use 1-1/2 inch wrench to install hose assembly "BA" (M).
9. Using 15 inch adjustable wrench, install hose assembly "CZ" (N) on fitting (P).

10. Manually install quick disconnect of hose assembly "CW" (Q).

11. Place box (R) in position.

12. Using 7/16 inch wrench, install two screws (S).



13. Install clutch assembly (page 4-41).
14. Service hydraulic reservoir (LO 5-5420-202-12).
15. Bleed hydraulic system (page 3-72).
16. Check for hydraulic leaks and correct as necessary.
17. Service hydraulic reservoir as needed (LO 5-5420-202-12).

End of Task

TA251682

## PUMP-CLUTCH SUPPORT REPLACEMENT (Sheet 1 Of 1)

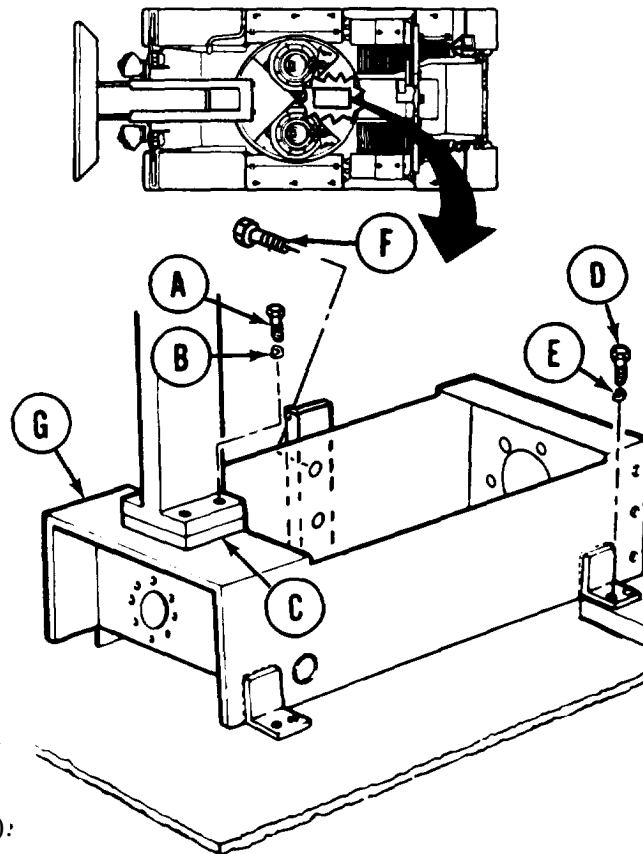
**TOOLS:** 9/16 in. socket with 1/2 in. drive  
Ratchet with 1/2 in. drive  
1/4 in. drive pin punch  
3/4 in. socket with 1/2 in. drive  
10 in. extension with 1/2 in. drive  
Hammer

**SUPPLIES:** Lockwashers (8 required)  
Lockwashers (4 required)

**PRELIMINARY PROCEDURES:** Remove pump (page 4-29)  
Remove clutch controls (page 4-27)

### REMOVAL:

1. Using 9/16 inch socket, remove four screws (A) and lockwashers (B). Throw lockwashers (B) away.
2. Using punch and hammer, tap out spacer (C).
3. Using 9/16 inch socket and extension) remove eight screws (D) and lockwashers (E). Throw lockwashers (E) away.
4. Using 3/4 inch socket, remove two screws (F).
5. Remove pump-clutch support (G).



### INSTALLATION:

1. Place pump-clutch support (G) in position in vehicle.
2. Using 3/4 inch socket, install two screws (F):
3. Using 9/16 inch socket, install eight screws (D) and lockwashers (E).
4. Using hammer and punch, tap spacer (C) into place.
5. Using 9/16 inch socket, install four screws (A) and lockwashers (B).
6. Install pump (page 4-30).
7. h-stall clutch controls (page 4-28).

End of Task

TA251683

**CLUTCH ASSEMBLY REPLACEMENT AND REPAIR (Sheet 1 of 9)**

**PROCEDURE INDEX**

PROCEDURE	PAGE
Removal	4-33
Disassembly	4-34
Cleaning and Inspection	4-37
Assembly	4-38
Installation	4-41

**TOOLS:** Flat-tip screwdriver  
 7/16 in. open end wrench  
 Hammer  
 9/16 in. socket with 1/2 in. drive  
 9/16 in. open end wrench (2)  
 3/8 in. socket head screw key  
 Arbor press

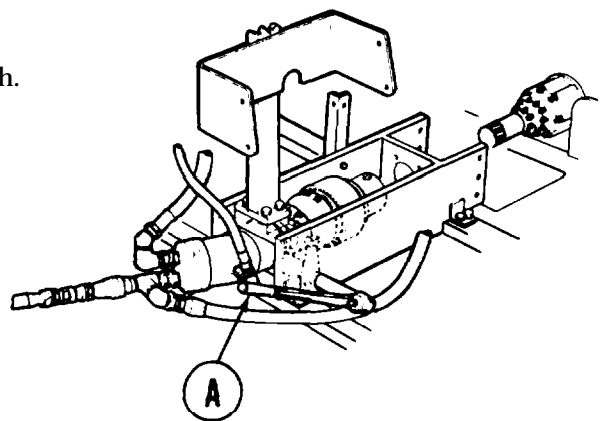
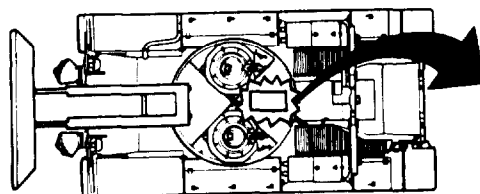
Chisel  
 Ratchet with 1/2 in. drive  
 3/16 in. drive pin punch  
 Long round nose pliers  
 1/4 in. socket head screw key  
 Bearing puller

**SUPPLIES:** Dry cleaning solvent (Item 15, Appendix D)      Gloves (Item 27, Appendix D)  
 Rags (Item 12, Appendix D)      Goggles (Item 26, Appendix D)  
 Compressed air source      Shield (Item 33, Appendix D)  
 1/16 in. locating pin  
 Paper (Item 23, Appendix D)  
 Grease (Item 9, Appendix D)  
 Drive screws (4 required)  
 Cotter pins (3 required)  
 Drive screws (4 required)

**PRELIMINARY PROCEDURES:** Remove pump-clutch drive (page 4-23)

**REMOVAL:**

1. Push down on hand lever (A) to make sure clutch is disengage



Go on to Sheet 2

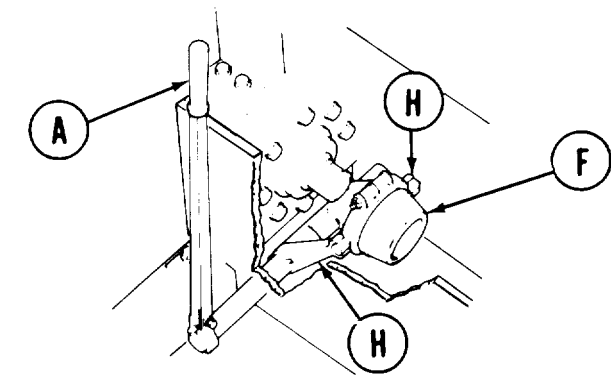
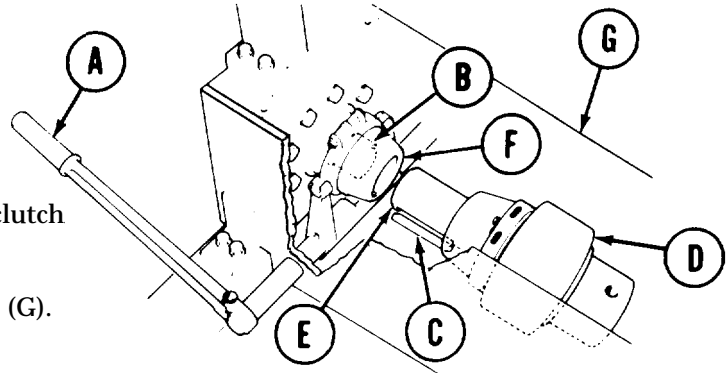
TA251684

**CLUTCH ASSEMBLY REPLACEMENT AND REPAIR (Sheet 2 of 9)**

**NOTE**

Be careful to not lose two keys (B and C) when removing clutch assembly (D).

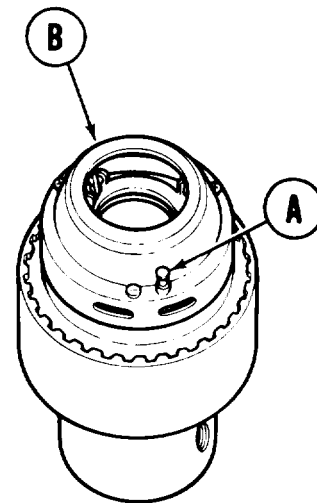
2. Pull clutch assembly (D) to rear until clutch shaft (E) clears ring (F).
3. Lift clutch assembly (D) out of support (G).
4. Remove two keys (B and C).



5. Pull up hand lever (A).
6. Lift ring (F) and its attached parts out of yoke (H) and remove from vehicle.

**DISASSEMBLY:**

1. Manually pull out pin (A) and lock in place by pushing locating pin through hole in pin (A).
2. Turn cover (B) counterclockwise until it comes off rest of assembly.



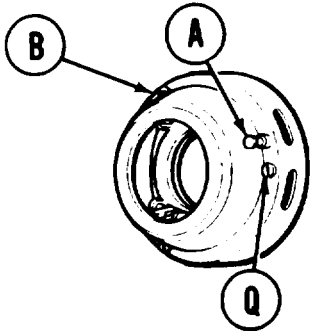
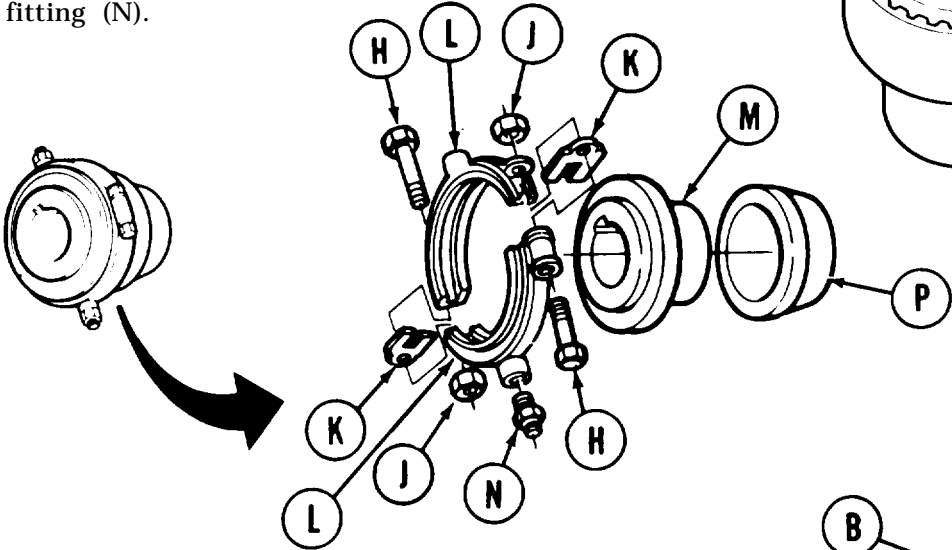
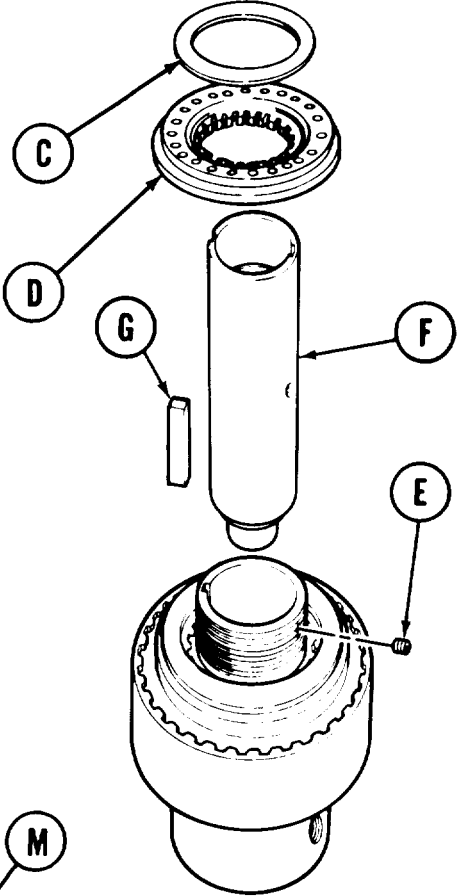
Go on to Sheet 3

TA251685



CLUTCH ASSEMBLY REPLACEMENT AND REPAIR (Sheet 3 of 9)

- 3. Manually remove bearing (C) and gear (D).
- 4. Using 1/4 inch screw key, loosen setscrew (E).
- 5. Manually pull out shaft (F).
- 6. Using pliers, remove key (G).
- 7. Holding two screws (H) with 9/16 inch wrench, use 9/16 inch wrench to remove two nuts (J).
- 8. Manually remove two screws (H) and shims (K).
- 9. Separate two halves of collar (L) and remove from sleeve (M).
- 10. Using 7/16 inch wrench, remove lubrication fitting (N).



- 11. Using arbor press, remove sleeve (M) from ring (P).
- 12. Remove locating pin from pin (A).
- 13. Using flat-tip screwdriver, remove three screws (Q) securing cover (B) to attached parts.

Go on to Sheet 4

TA251686

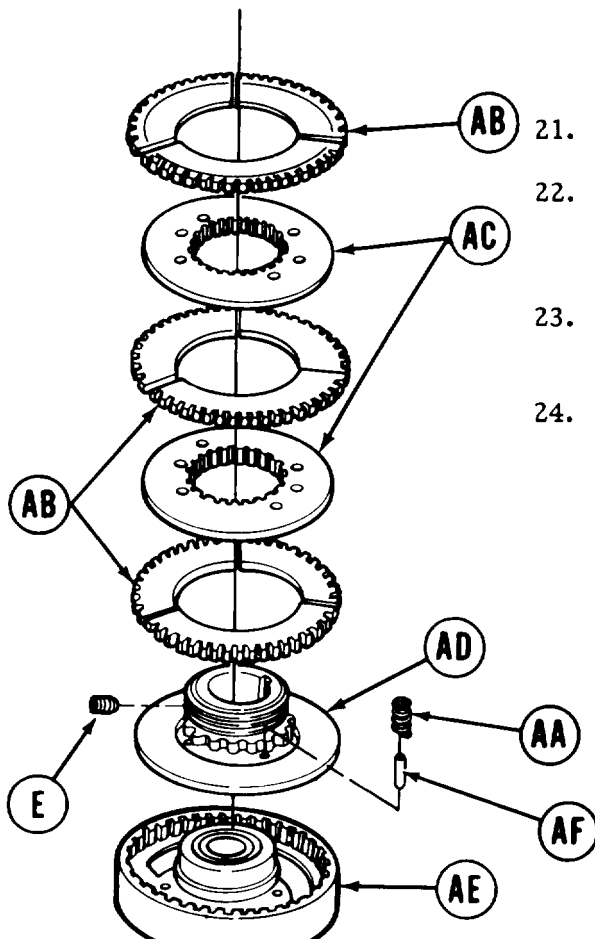
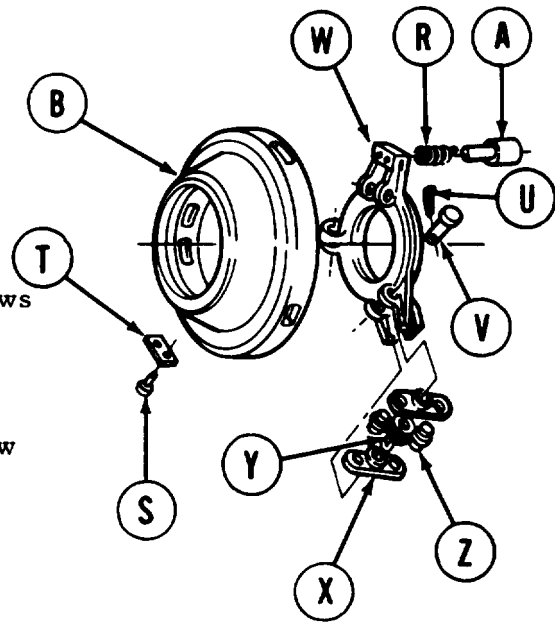
**CLUTCH ASSEMBLY REPLACEMENT AND REPAIR (Sheet 4 of 9)**

14. Remove cover (B).
15. Remove pin (A) and spring (R).

**NOTE**

Do steps 16 and 17 only if identification plate is defective.

16. Using hammer and chisel, tap out two drive screws (S). Throw drive screws (S) away.
17. Remove plate (T) from cover (B).
18. Using pliers, remove three cotter pins (U). Throw cotter pins (U) away.
19. Manually remove three pins (V) from yoke (W).
20. Separate six levers (X), three springs (Y), and six pins (z).



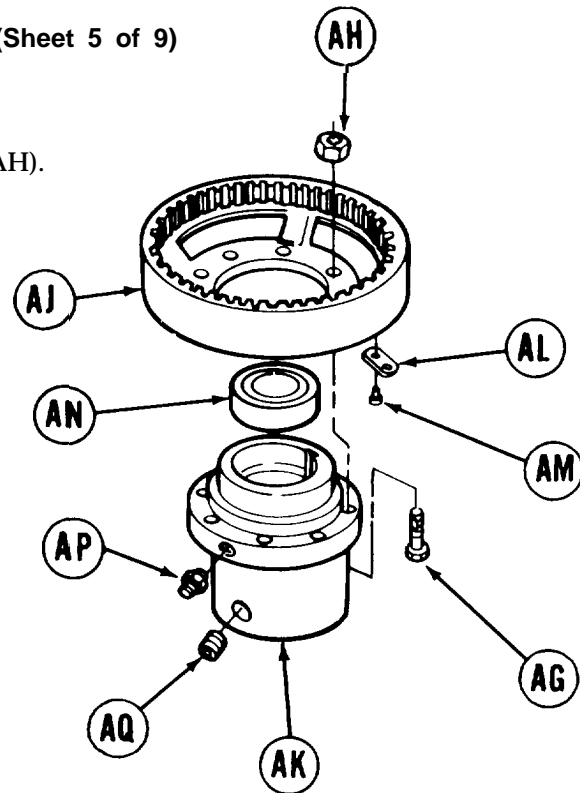
21. Manually remove six springs (AA).
22. Manually remove three sets of friction linings (AB), two clutch discs (AC), and hub and backplate (AD) from clutch spider assembly (AE).
23. Using 1/4 inch screw key, remove setscrew (E) from hub and backplate (AD).
24. Using hammer and punch, remove six pins (AF).

Go On to Sheet 5

TA251687

**CLUTCH ASSEMBLY REPLACEMENT AND REPAIR (Sheet 5 of 9)**

25. Using 9/16 inch wrench to hold screws (AG), use 9/16 inch socket to remove eight nuts (AH).
26. Using hammer, tap out screws (AG) from flange (AJ).
27. Remove flange (AJ) from hub (AK).



28. Using hammer and chisel, under nameplate (AL), remove two drive screws (AM) and nameplate (AL). Throw drive screws (AM) away.
29. Using bearing puller, remove bearing (AN) from hub (AK).
30. Using 7/16 inch wrench, remove lubrication fitting (AP).
31. Using 3/8 inch screw key, remove setscrew (AQ).

**CLEANING AND INSPECTION:****WARNING**

- **Cleaning agent specified is flammable. Use only in well ventilated areas. Keep away from flames, sparks, or heat. Do not smoke while using. Prevent contact with eyes, mouth, and/or skin. Wear rubber gloves when performing cleaning procedures.**

- **Compressed air used for cleaning purposes will not exceed 30 psi.**
- **Use only with effective chip guarding and personal protective equipment goggles/shield, gloves, etc.**

1. Using rags and dry cleaning solvent, clean all metal parts and dry with compressed air.
2. Lubricate bearings with grease and wrap in oiled paper.

Go on to Sheet 6

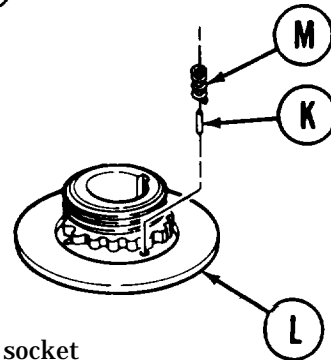
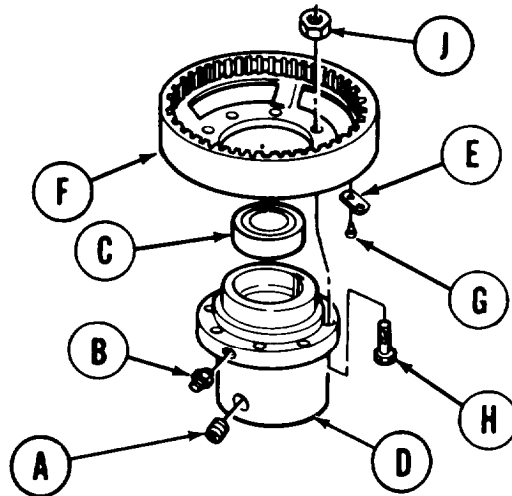
TA251688

**CLUTCH ASSEMBLY REPLACEMENT AND REPAIR (Sheet 6 of 9)**

3. Inspect parts for worn teeth, distortion, stripped threads, and indications of wear. Replace all worn or damaged parts.

**ASSEMBLY:**

1. Using 3/8 inch screw key, install setscrew (A).
2. Using 7/16 inch wrench, install lubrication fitting (B).
3. Using arbor press, install bearing (C) into hub (D).



4. Place nameplate (E) in position on flange (F).
5. Using hammer, install two new drive screws (G).
6. Place flange (F) in position on hub (D).
7. Manually install eight screws (H) and nuts (J).
8. Using 9/16 inch wrench to hold screws (H), use 9/16 inch socket to tighten nuts (J).
9. Using hammer, install six pins (K) in hub and backplate (L).
10. Manually install six springs (M) on pins (K).

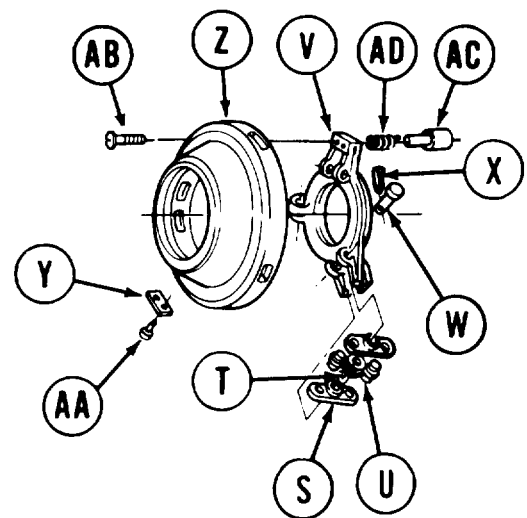
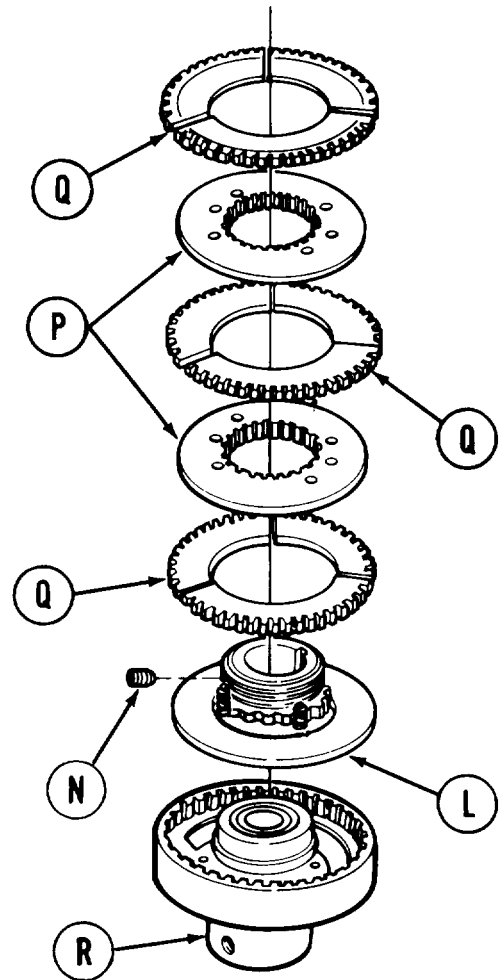
**CLUTCH ASSEMBLY REPLACEMENT AND REPAIR (Sheet 7 of 9)**

11. Using 1/4 inch screw key, loosely install setscrew (N) so it is below thread level of hub and backplate (L).
12. Manually install hub and backplate (L), two clutch discs (P), and three friction linings (Q) on clutch spider assembly (R) in order shown.
13. Assemble six levers (S), three springs (T), and six pins (U) into three assemblies as shown.
14. Place three assemblies in position on yoke (v).
15. Install three pins (W) securing three assemblies to yoke (V).
16. Using pliers, install three cotter pins (X) through pins (W).

**NOTE**

Do steps 17 and 18 if identification plate was removed.

17. Place plate (Y) in position on cover (Z).
18. Using hammer, tap in two new drive screws (AA).
19. Using flat-tip screwdriver, install three screws (AB) securing cover (Z) to yoke (V).
20. Place pin (AC) and spring (AD) in position through yoke (V) and cover (Z).
21. Manually pull out on pin (AC) and lock in place by pushing locating pin through hole in pin (AC).

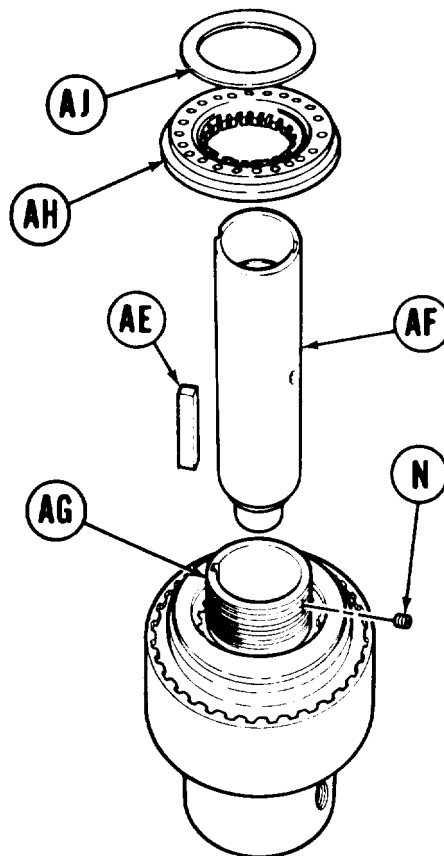


Go on to Sheet 8

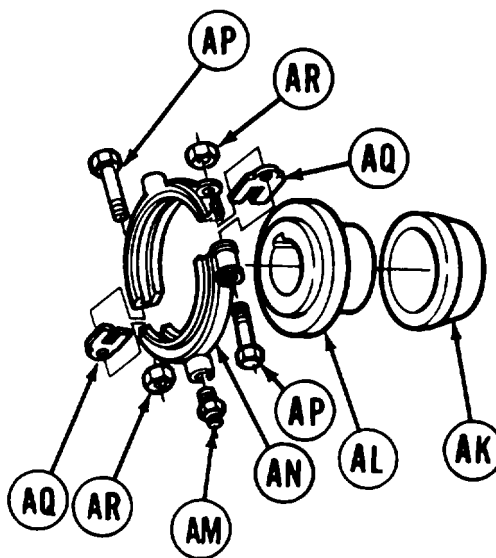
TA251690

**CLUTCH ASSEMBLY REPLACEMENT AND REPAIR (Sheet 8 of 9)**

22. Using 1/4 inch screw key, loosen setscrew (N).
23. Place key (AE) in shaft (AF).
24. Insert shaft (AF) in clutch assembly (AG) aligning recess in shaft with setscrew (N) and make sure shaft is seated in bearing.
25. Using 1/4 inch screw key, tighten set-screw (N).
26. Gently pull shaft (AF) to make sure it is firmly seated, being careful assembly does not separate.
27. Manually install gear (AH) and bearing (AJ) on clutch assembly (AG).



28. Using arbor press, press ring (AK) on sleeve (AL).
29. Using 7/16 inch wrench, install lubrication fitting (AM) on collar (AN).
30. Place two halves of collar (AN) on sleeve (AL).
31. Manually install two bolts (AP), shims (AQ), and nuts (AR).
32. Holding two bolts (AP) with 9/16 inch wrench, use 9/16 inch wrench to tighten two nuts (AR).

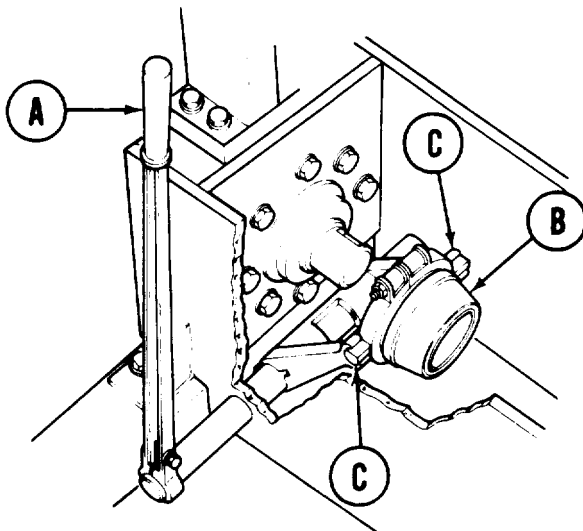
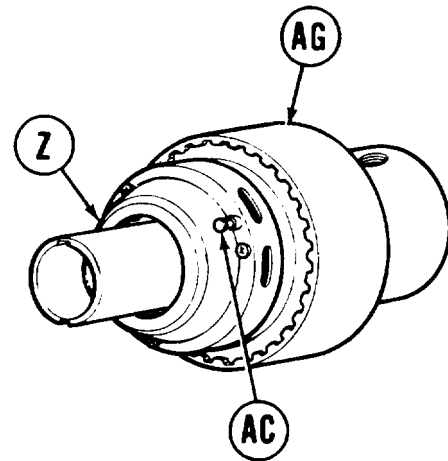


Go on to Sheet 9

TA251691

**CLUTCH ASSEMBLY REPLACEMENT AND REPAIR (Sheet 9 of 9)**

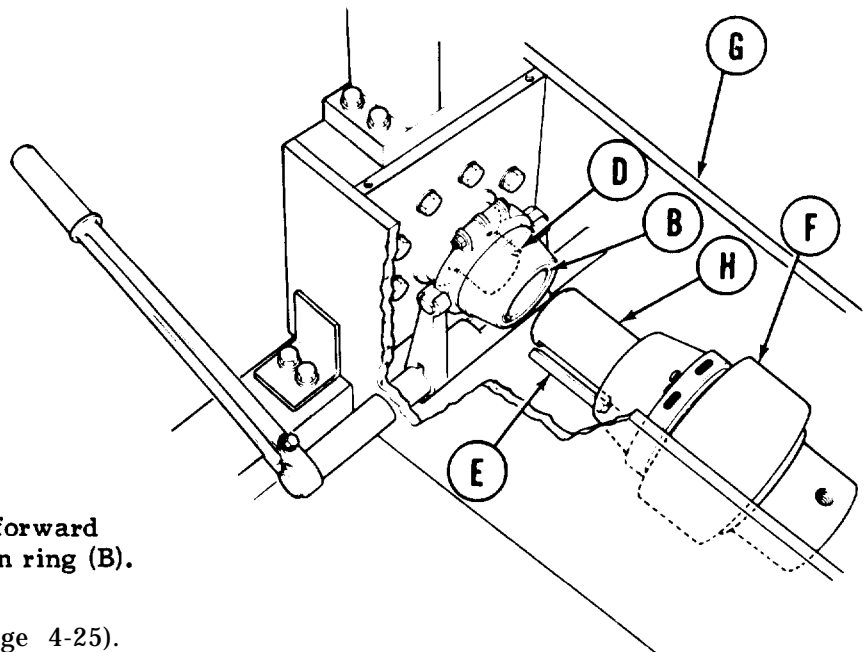
33. Place cover (Z) in clutch assembly (AG).
34. Turn cover (Z) clockwise until installed on assembly (AG).
35. Remove locating pin from pin (AC) to lock cover (Z) in place.



**INSTALLATION:**

1. Pull up lever (A).
2. Place ring (B) and attached parts in yoke (C).
3. Push down lever (A) to be sure clutch is disengaged.

4. Install two keys (D and E).
5. Place clutch assembly (F) in support (G).
6. Insert shaft (H) in ring (B).
7. Push clutch assembly (F) **forward** until shaft (H) is all the way **in ring (B)**.
8. Install pump-clutch drive (page 4-25).
9. Adjust clutch (page 3-66).



End of Task

TA251692

HYDRAULIC PUMP REPAIR (Sheet 1 of 11)

PROCEDURE INDEX

PROCEDURE	PAGE
Disassembly	4-42
Cleaning and Inspection	4-47
Assembly	4-48

TOOLS: Long round nose pliers  
 5/16 in. socket head screw key  
 Arbor press  
 1/4 in. drive pin punch  
 Hammer  
 3/4 in. open end wrench  
 Scriber  
 Puller kit  
 Spray gun with air filter and water separator  
 Gun, air blow  
 Flat- tip screwdriver

3/16 in. socket head screw key  
 9/16 in. socket head screw key

SUPPLIES: Dry cleaning solvent (Item 15, Appendix D)  
 Gasket  
 Cotter pin  
 Rags (Item 12, Appendix D)  
 Lapping compound (Item 6, Appendix D)  
 Compressed air source  
 Paper (Item 23, Appendix D)  
 Gloves (Item 27, Appendix D)  
 Goggles (Item 26, Appendix D)

Preformed packing  
 Protective caps and plugs  
 (assorted sizes)  
 Hydraulic fluid (Item 8, Appendix D)  
 Gasket kit  
 Crocus cloth (Item 5, Appendix D)  
 Oil seal  
 Shield (Item 33, Appendix D)

PERSONNEL: Two

PRELIMINARY PROCEDURE: Remove hydraulic pump (page 4-29)

Go on to Sheet 2

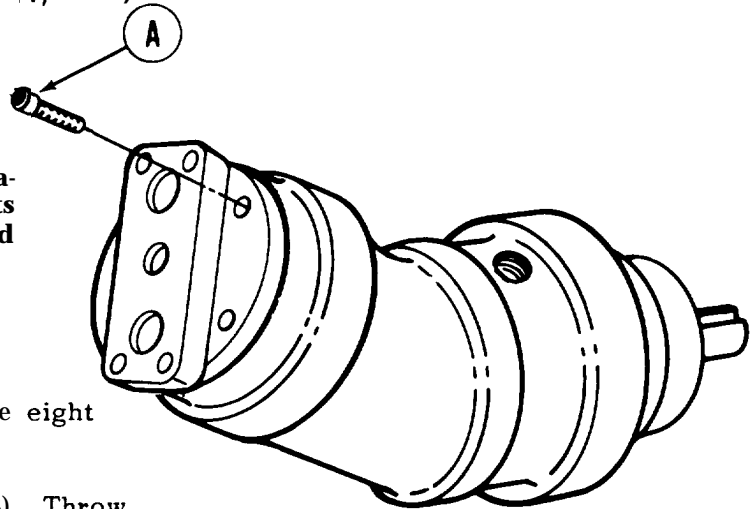


HYDRAULIC PUMP REPAIR (Sheet 2 of 11)

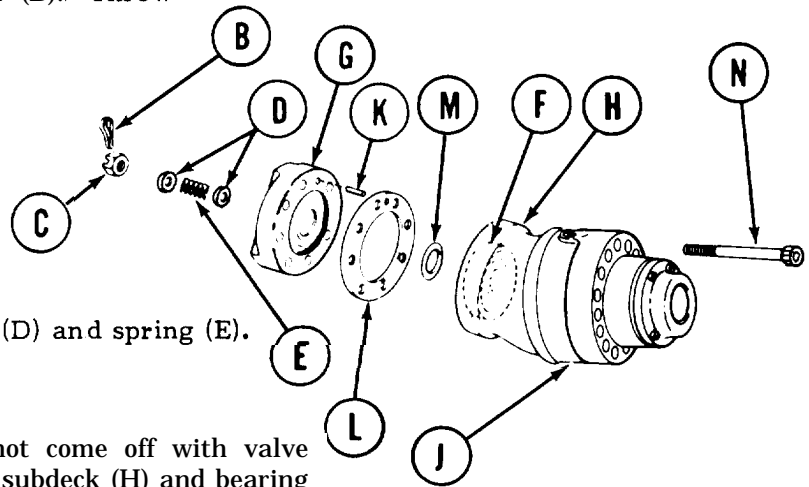
DISASSEMBLY:

**CAUTION**

The hydraulic pump is a finely machined device. "Do not damage parts during disassembly. Set removed parts carefully aside on rags.



1. Using 5/16 inch screw key, remove eight screws (A).
2. Using pliers, remove cotter pin (B).. Throw cotter pin (B) away.
3. Using wrench, remove nut (C).



4. Manually remove two washers (D) and spring (E).

NOTE

Make sure valve plate (F) does not come off with valve block (G). Using scriber, mark both subdeck (H) and bearing housing (J).

5. Using scriber, mark both subdeck (4) and bearing housing (J) for alinement during installation.
6. Lift valve block (G) off subdeck housing (H).
7. Using pliers, remove alinement pin (K).
8. Remove gasket (L) and packing (M). Throw gasket (L) and packing (M) away.
9. Remove gasket (L) and preformed packing (M). Throw gasket (L) and preformed packing (M) away.

Go on to Sheet 3

TA251693

HYDRAULIC PUMP REPAIR (Sheet 3 of 11)

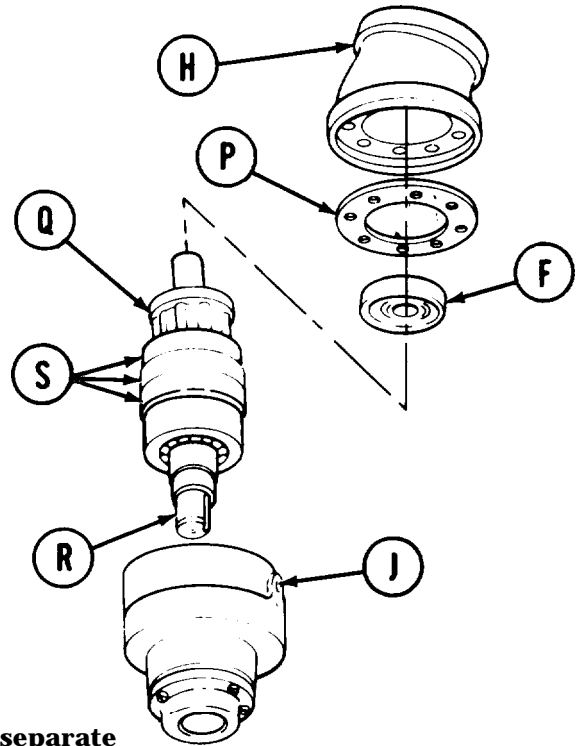
NOTE

**Do not allow parts to separate while placing pump upright.**

10. With help of second technician, carefully place pump in a vertical position with shaft end down.
11. While manually pushing down evenly on valve plate (F), ease subdeck housing (H) off bearing housing (J).

NOTE

**Note position of valve plate (F) for assembly.**



12. Manually remove valve plate (F) and gasket (P). Throw gasket (P) away.

**CAUTION**

**Do not pull up on cylinder block (Q), or it will separate from drive shaft (R) and damage piston surfaces.**

13. While manually pressing down on bearing housing (J), pull up on three bearings (S) to remove drive shaft (R) with cylinder block (Q) attached.
14. While holding three bearings (S), place other hand over cylinder block (Q) and turn drive shaft (R) and assembled parts up.

Go on to Sheet 4

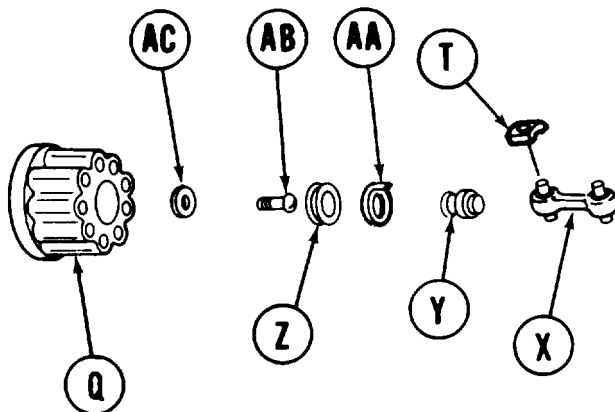
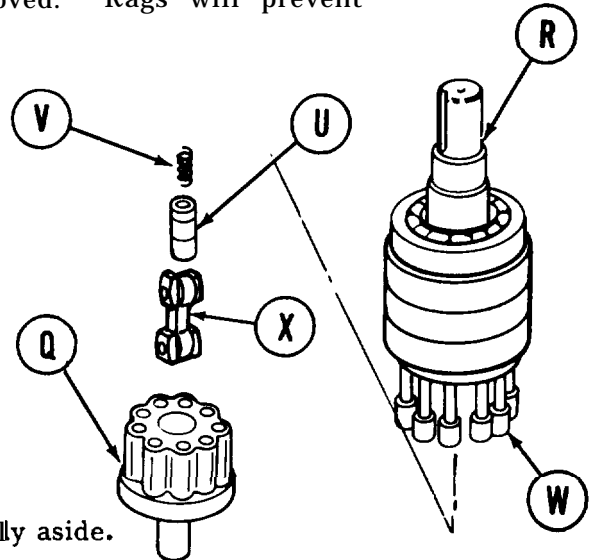
TA251694

HYDRAULIC PUMP REPAIR (Sheet 4 of 11)

NOTE

Do step 15 closely over a surface covered by rags. Knuckles (T), flex bearing (U), and spring (V) may fall out when cylinder block (Q) is removed. Rags will prevent impact damage to falling parts.

15. Have second technician slowly slip cylinder block (Q) off pistons (W) so pistons do not strike each other and lay cylinder block (Q) carefully on rag.
16. Have second technician cap nine pistons (W) with protective caps.
17. Manually remove flex bearing (U) and spring (V) from drive shaft (R).
18. Lay drive shaft (R) and attached parts carefully aside.
19. Remove universal link and pin assembly (X) from cylinder block (Q).



20. Remove four knuckles (T) from link and pin assembly (X).
21. Remove fixed bearing (Y) from fixed bearing retainer (Y).

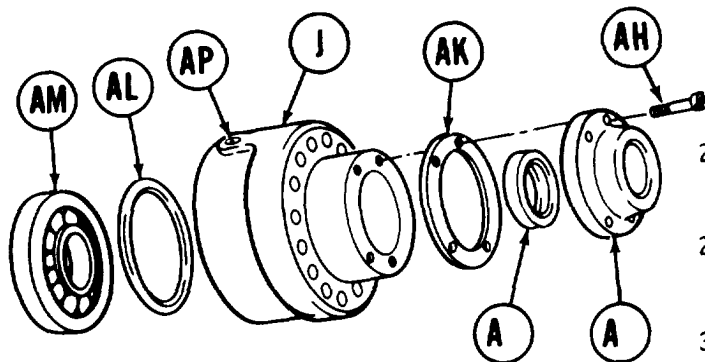
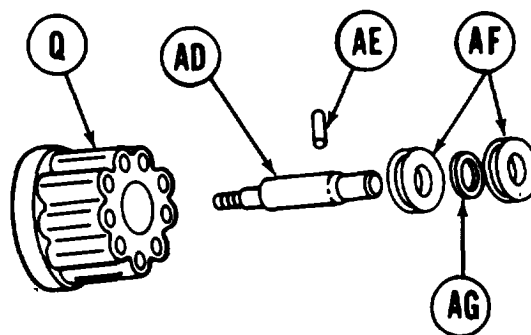
22. Using pliers, press ears of retaining ring (M) together and remove retaining ring (Z) and bearing retainer (Z).
23. Using screwdriver, remove screw (AB).
24. Manually remove washer (AC).

Go on to Sheet 5

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HYDRAULIC PUMP REPAIR (Sheet 5 of 11)

25. Push shaft (AD) out of cylinder block (Q).
26. Using pliers, remove pin (AE).
27. Using arbor press, remove two bearings (AF) and washer (AG).

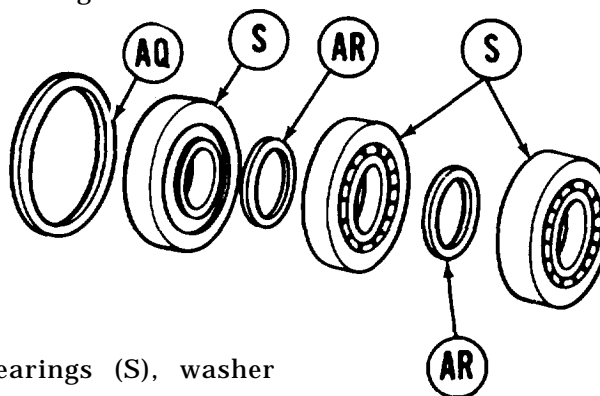


28. Using 3/16 inch screw key, remove four screws (AH) from bearing housing (J).
29. Manually remove retainer (AJ) and gasket (AK). Throw gasket (AK) away.
30. Manually remove ring (AL) and bearing (AM).

31. Using arbor press, press oil seal (AN) out of retainer (AJ). Throw oil seal (AN) away.
32. Using 9/16 inch screw key, remove drain plug (AP) from bearing housing (J).

NOTE

Three bearings (S) should not be removed from drive shaft (R) unless necessary. Visually check bearings for bluish discoloration or nicks, scratches, or burrs. Manually spin bearings on drive shaft to check for binding, pulling, or sluggishness. If any of these conditions are found, remove and replace bearings. Do not reuse.



33. Using puller, remove three bearings (S), washer (AQ), and spacers (AR).

Go on to Sheet 6

TA251696

## HYDRAULIC PUMP REPAIR (Sheet 6 of 11)

## CLEANING AND INSPECTION:

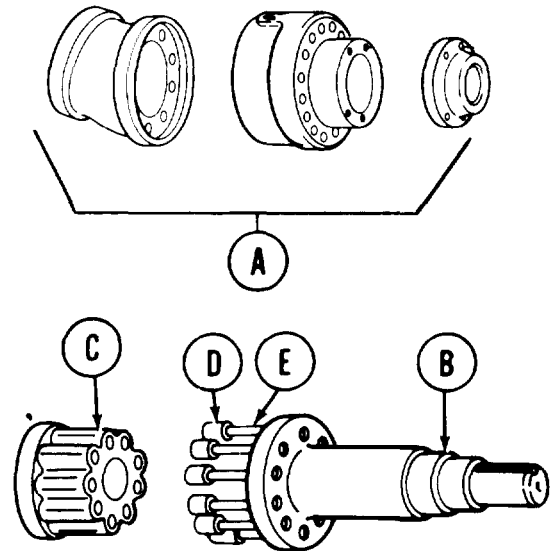
**WARNING**

- **Compressed air used for cleaning purposes will not exceed 30 psi. Use only with effective chip guarding and personal protective equipment goggles/shield, gloves, etc.**
  - **Dry cleaning solvent PD-680 is toxic and flammable. To prevent personal injury, wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point for Type #1 Dry Cleaning Solvent is 100°F (38°C) and for Type #2 is 138°F (50°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.**
1. Using rags and dry cleaning solvent, wash all metal parts and dry with compressed air.

## CAUTION

**Do not spin bearings by hand. This causes wear on parts when not lubricated.**

2. Check all inside and outside surfaces of pump housing (A) for nicks, scratches, gouges, warping, burrs, or dents. Small nicks, scratches, and burrs may be removed with crocus cloth. If other damage is found, replace housing (A).
3. Check threads of all attaching parts for stripping and wear. Replace as necessary.
4. Examine drive shaft (B), cylinder block (C), and each piston (D) for scratches and nicks. Make sure each connecting rod (E) turns freely at both ends. Test cylinder block (C) sockets by installing and removing each piston (D) in each socket. Fit should be firm and smooth. Check outside of drive shaft (B) and cylinder block (C) for burrs and nicks. Using lapping compound, dress down all tiny burrs and nicks. Replace drive shaft (B), cylinder block (C), or both, if anything more than tiny burrs or nicks are found.

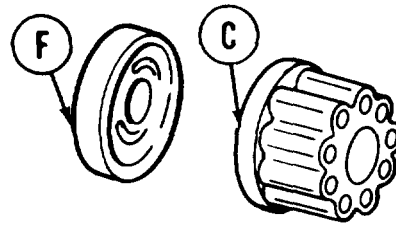


Go on to Sheet 7

TA251697

**HYDRAULIC PUMP REPAIR (Sheet 7 of 11)**

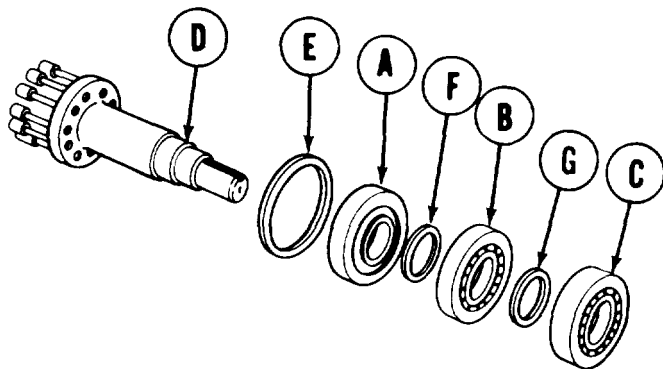
5. Valve plate (F) and cylinder block (C) must mate perfectly. Check mating surfaces for flat fit. If either surface is gouged, nicked, or damaged, replace part.
6. Examine all other parts for scratches, nicks, burrs, distortion, elongated holes, stripped threads, and firmness of fit. Replace defective parts.



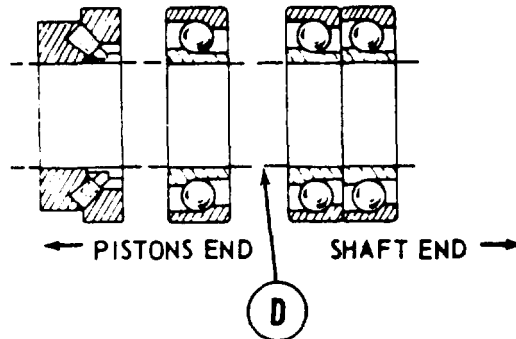
**ASSEMBLY:**

**NOTE**

Install bearings (A,B,C) on drive shaft (D) in order and position shown.



**NOTE WIDE SIDE OF OUTER RACE**



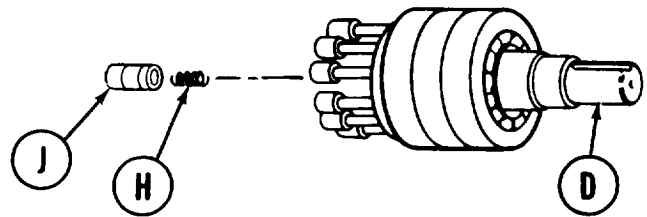
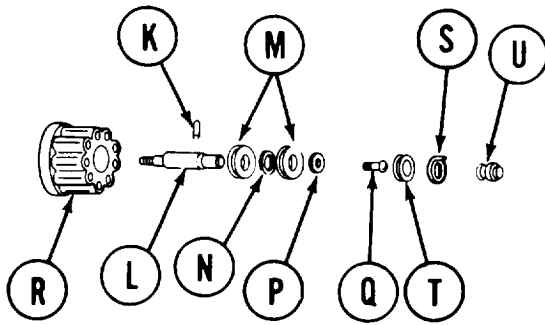
1. Manually place washer (E), bearing (A), and spacer (F) on drive shaft (D).

2. Using arbor press, install bearing(A) .
3. Manually place bearings (B) and (C) and spacer (G) on drive shaft (D) .
4. Using arbor press, install bearings (B) and (C).

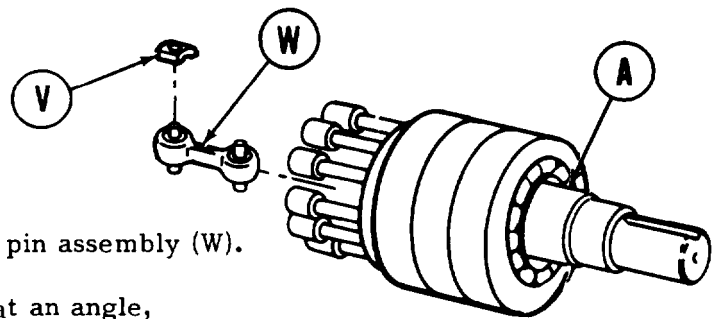
Go on to Sheet 8

TA251698

HYDRAULIC PUMP REPAIR (Sheet 8 of 11)



5. Manually install spring (H) and flex bearing (J) in drive shaft (D).
6. Using hammer and punch, install pin (K) in shaft (L).
7. Using arbor press, install two bearings (M) and washer (N) onto shaft (L).
8. Using screwdriver, install flat washer (P) and screw (Q).
9. Manually install shaft (L) into cylinder block (R).
10. Using pliers, place retaining ring (S) on retainer (T).
11. Using pliers, install retaining ring (S) with retainer (T) into cylinder block (R).
12. Manually install bearing (U) in retainer (T).



13. Place four knuckles (V) on link and pin assembly (W).
14. Holding link and pin assembly (W) at an angle, slide one knuckle (V) into drive shaft (D) with grooved end up.
15. Tilt link and pin assembly (W) forward and install second knuckle (V) in drive shaft (D) grooved end up.

Go on to Sheet 9

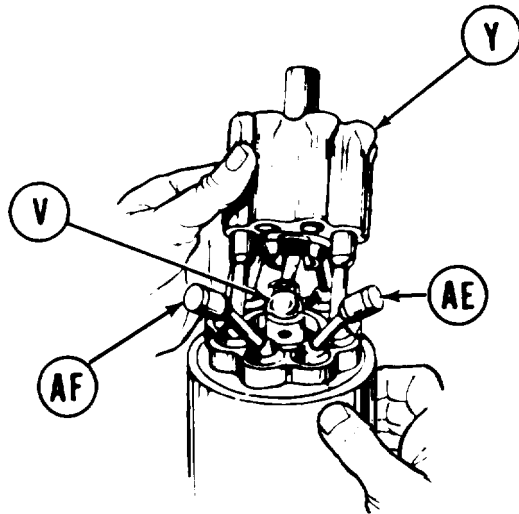
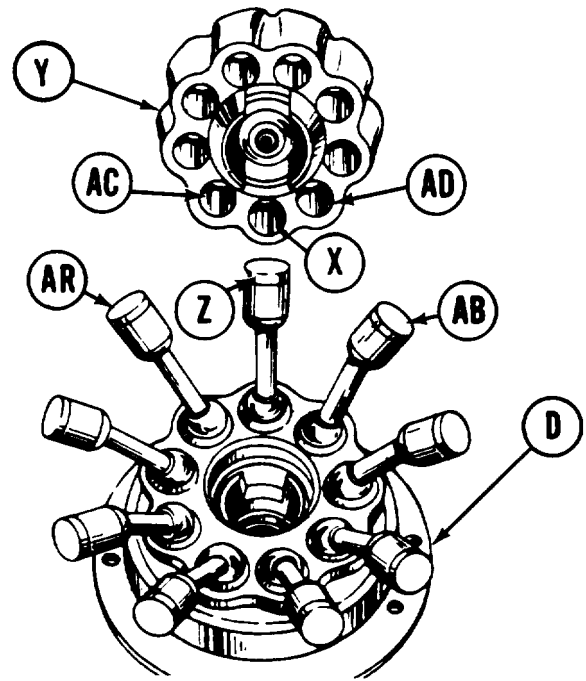
TA251699

HYDRAULIC PUMP REPAIR (Sheet 9 of 11)

**NOTE**

Cylinder bore (X) that is in line with cylinder block (Y) retainer slots is No. 1 cylinder bore. Piston (Z) that is in line with drive shaft (0) retainer slots is No. 1 piston. Remove protective caps as necessary.

16. Insert No. 1 piston (Z) in No. 1 cylinder bore (X).
17. Insert two pistons (AA, AB) closest to No. 1 position (Z) in their cylinder bores (AC, AD).



18. Continue inserting pistons, first on one side of No. 1 piston, then on other side, until only two pistons remain (AE, AF) uninstalled.
19. Tilt cylinder block (X) carefully back and slip rear knuckle (V) into cylinder block retainer with grooved end up.

20. Tilt cylinder block (Y) forward and slide remaining knuckle (V) into remaining retainer slot.
21. Install two remaining pistons (AE,AF).
22. Push cylinder block (Y) straight down to check installation. Action should be smooth and springy.

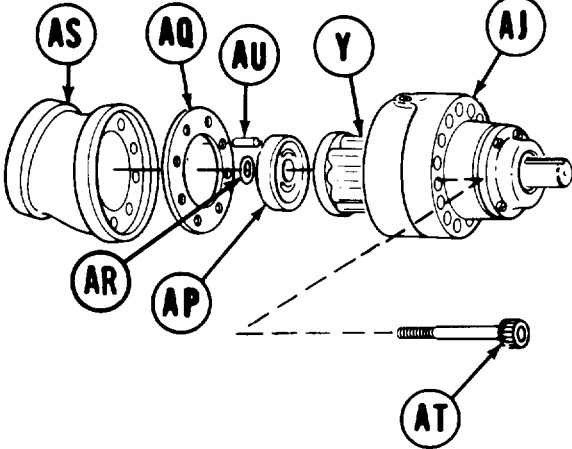
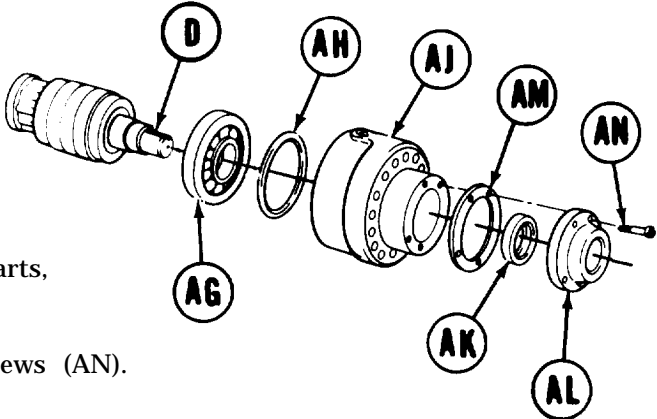
Go on to Sheet 10

TA251700



HYDRAULIC PUMP REPAIR (Sheet 10 of 11)

- 23. Supporting drive shaft (D) and attached parts so parts do not separate, carefully install bearing (AG), ring (AH), and bearing housing (AJ).
- 24. Using arbor press, press new oil seal (AK) into retainer (AL) with lip facing inside.
- 25. Supporting drive shaft (D) and attached parts, install new gasket (AM) and retainer (AL).
- 26. Using 3/16 inch screw key, install four screws (AN).



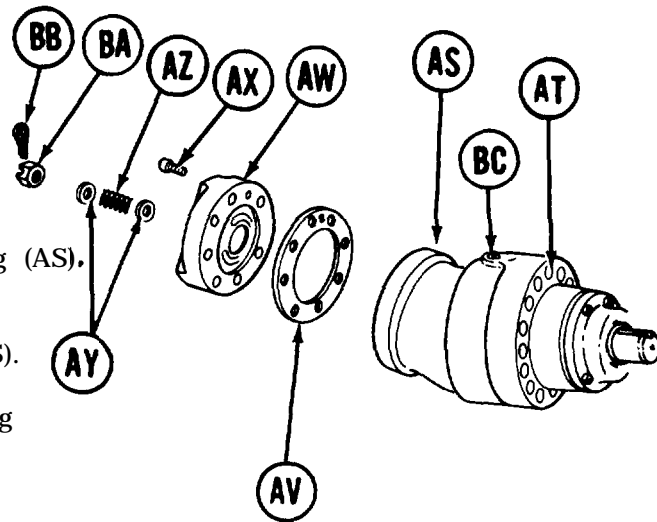
- 27. Have second technician lift bearing housing (AJ) with attached parts and hold vertical.

NOTE

Install valve plate (AP) as noted during disassembly.

- 28. Place valve plate (AP) on cylinder block (Y).
- 29. Place new gasket (AQ) and new preformed packing (AR) in position.
- 30. Place subdeck housing (AS) over assembled parts and onto bearing housing (AJ).
- 31. Aline screw holes and scribe marks on subdeck housing (AS) and bearing housing (AJ).
- 32. Using 5/16 inch screw key, loosely install eight screws (AT).
- 33. Manually install alinement pin (AU) into valve plate (AP).

HYDRAULIC PUMP REPAIR (Sheet 11 of 11)



34. Place new gasket (AV) on subdeck housing (AS).
35. Aline screw holes and scribe marks on valve block (AW) and subdeck housing (AS).
36. Place valve block (AW) on subdeck housing (AS) .
37. Using 5/16 inch screw key, install eight screws (AX).
38. Using 5/16 inch screw key, tighten eight screws (AT).
39. Install two washers (AY), spring (AZ), and nut (BA).
40. Using pliers, install cotter pin (BB).
41. Using 9/16 inch screw key, install drain plug (BC) in subdeck housing (AS).
42. Install hydraulic pump (page 4-30).

End of Task

## VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 1 of 17)

## PROCEDURE INDEX

PROCEDURES	PAGE
Removal	4-53
Cleaning and Inspection	4-61
Installation	4-62

TOOLS: 15 in. adjustable wrench  
 7/16 in. combination box and open end wrench  
 1/2 in. combination box and open end wrench  
 9/16 in. combination box and open end wrench  
 5/8 in. combination box and open end wrench  
 11/ 16 in. combination box and open end wrench  
 3/4 in. combination box and open end wrench  
 7/8 in. combination box and open end wrench  
 15/16 in. combination box and open end wrench  
 1-1/4 in. open end wrench  
 1-3/8 in. open end wrench  
 1-1/2 in. open end wrench  
 10 in. pipe wrench  
 Ratchet with 1/2 in. drive  
 7/16 in. socket with 1/2 in. drive  
 1/2 in. socket with 1/2 in. drive  
 3/4 in. socket with 1/2 in. drive  
 1/4 in. socket head screw key  
 5/16 in. socket head screw key  
 3/8 in. socket head screw key

SUPPLIES: Rags (Item 12, Appendix D)  
 Drip pans (suitable containers)  
 Pipe tape (Item 19, Appendix D)  
 Dry cleaning solvent (Item 15, Appendix D)  
 Preformed packing (11 required)  
 Protective caps and plugs  
 Masking tape (Item 18, Appendix D)  
 Lockwashers  
 Pencil (Item 22, Appendix D)  
 Gloves (Item 27, Appendix D)

PERSONNEL: Two

Go on to Sheet 2

**VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 2 of 17)**

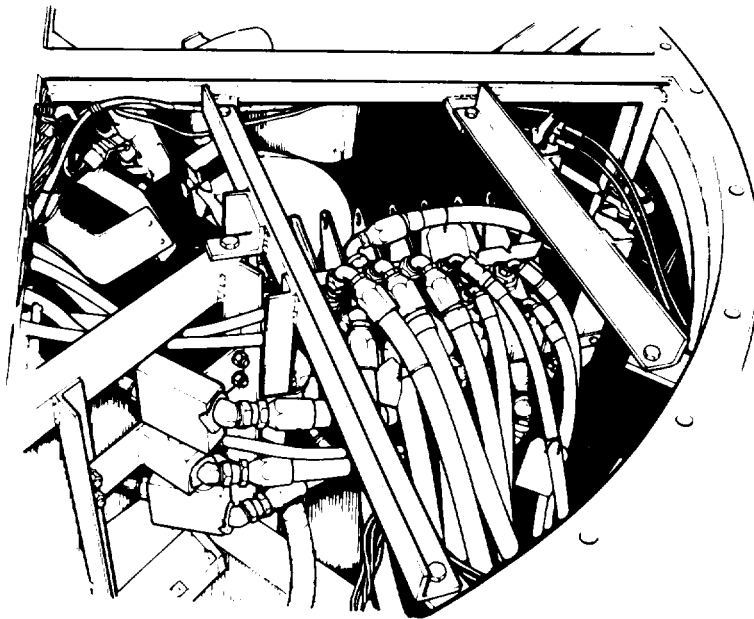
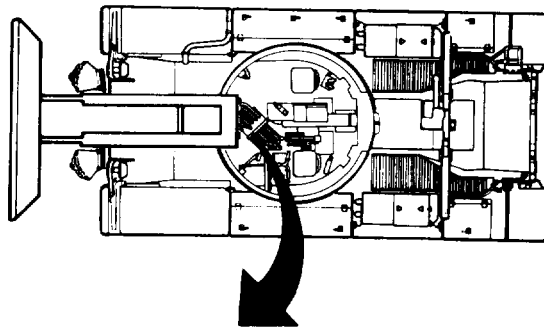
REFERENCE: LO 5-5420-202-12

PRELIMINARY PROCEDURES: Remove front quadrant (page 3-45)  
Remove valve bank assembly control levers (page 3-123)

REMOVAL:

**NOTE**

Cap or plug all lines and fittings as they are disconnected. Use rags and drip pans to catch hydraulic fluid trapped in lines. Use masking tape to tag lines for installation.

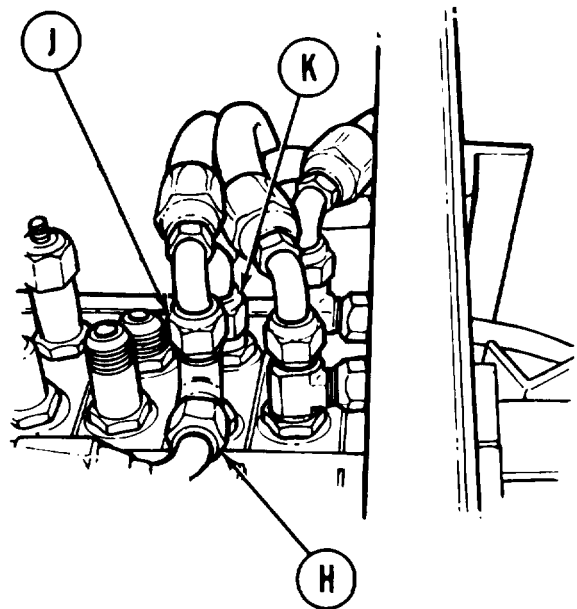
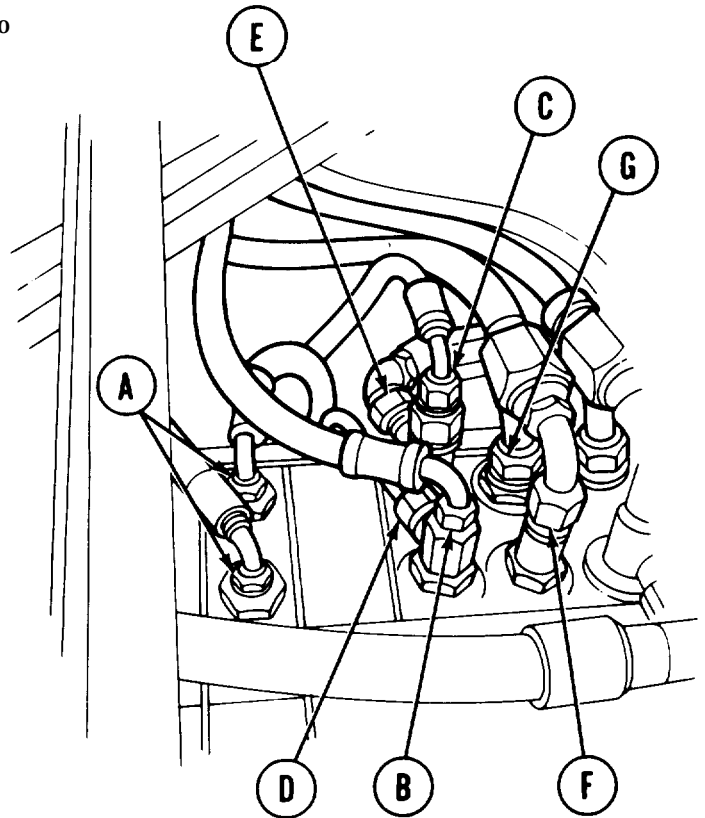


Go on to Sheet 3

TA251703

**VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 3 of 17)**

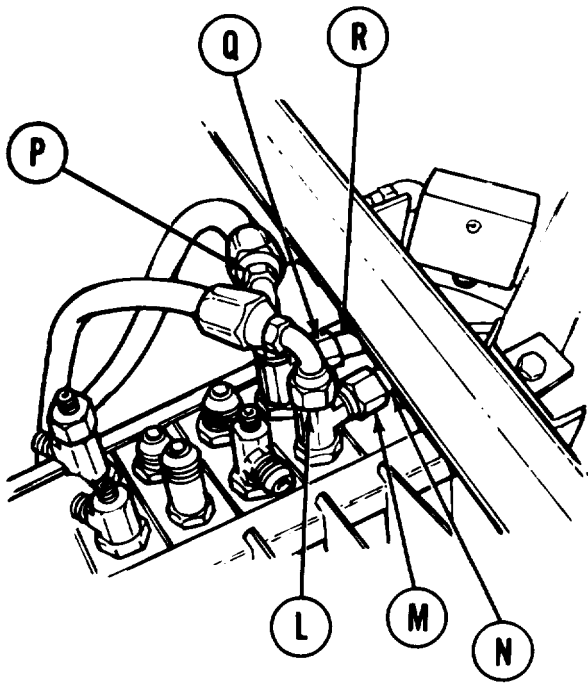
1. Using 11/16 inch wrench, disconnect two hose assemblies (A).
2. Using 11/16 inch wrench, disconnect hose assembly (B).
3. Using 11/16 inch wrench, disconnect hose assembly (C).
4. Using 15/ 16 inch wrench, disconnect both ends of tube assembly (D) and remove tube assembly (D) from the vehicle.
5. Using 1-1/4 inch wrench, disconnect hose assembly (E).
6. Using 1-1/4 inch wrench, disconnect hose assembly (F).
7. Using 1-1/4 inch wrench, disconnect hose assembly (G).
8. Using 1-1/4 inch wrench, disconnect hose assembly (H).
9. Using 1-1/4 inch wrench, disconnect hose assembly (J).
10. Using 1-1/4 inch wrench, disconnect hose assembly (K).



Go on to Sheet 4

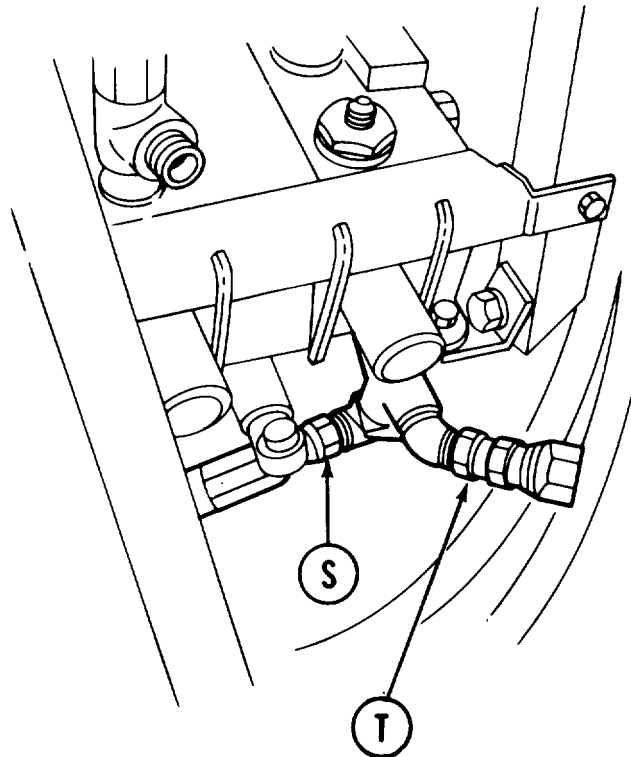
TA251704

VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 4 of 17)



11. Using 1-1/4 inch wrench, disconnect hose assembly (L).
12. Using 1-1/4 inch wrench to hold adapter (M), use 7/8 inch wrench to disconnect hose assembly (N).
13. Using 1-1/4 inch wrench, disconnect hose assembly (P).
14. Using 1-1/4 inch wrench to hold adapter (Q), use 7/8 inch wrench to disconnect hose assembly (R).

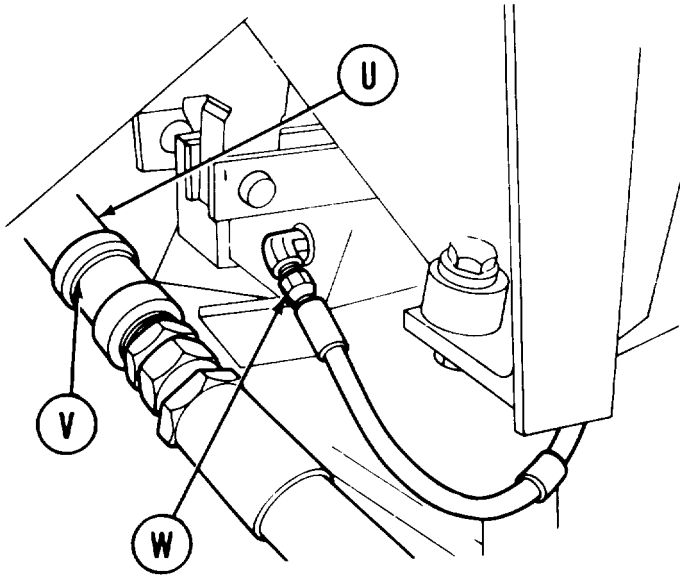
15. Using 1-1/4 inch wrench, disconnect hose assembly (S).
16. Using 1-1/4 inch wrench, disconnect hose assembly (T).



Go on to Sheet 5

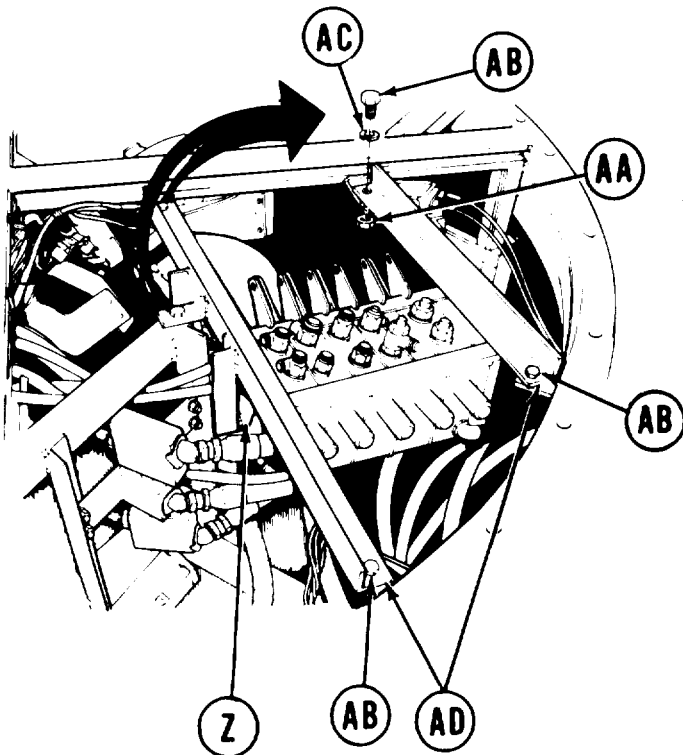
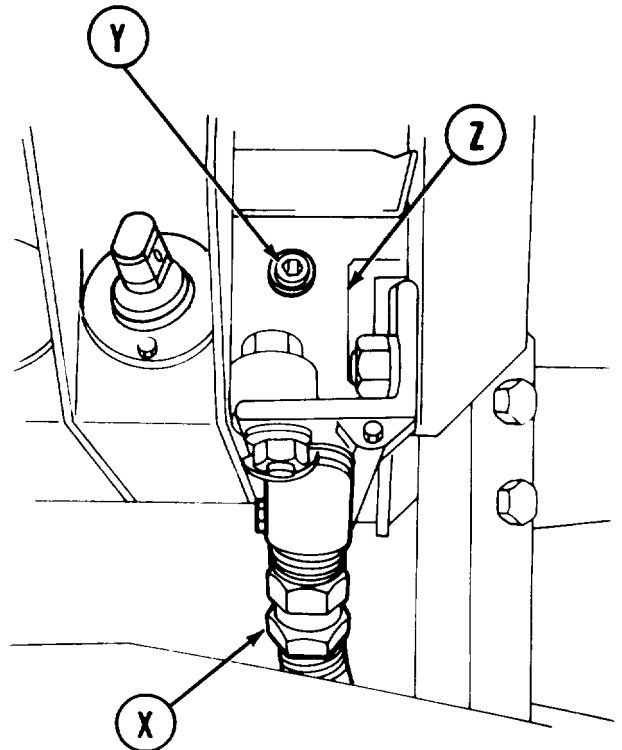
TA251705

VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 5 of 17)



17. Manually disconnect hose assembly (U) at quick disconnect (V).
18. Using 9/16 inch wrench, disconnect hose assembly (W).

19. Using 1-1/2 inch wrench, disconnect hose assembly (X).
20. Using 1/4 inch screw key, remove pipe plug (Y) from valve bank (Z).



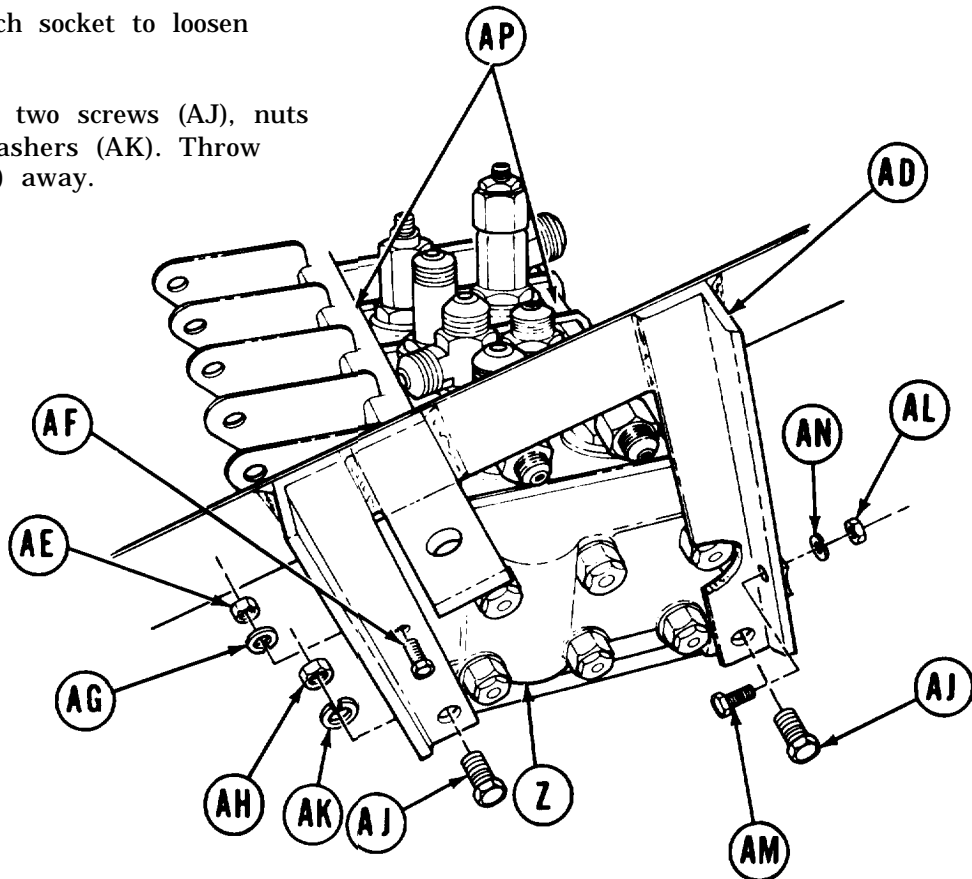
21. Using 3/4 inch wrench to hold five nuts (AA), use 3/4 inch socket to loosen five screws (AB).
22. Manually remove five screws (AB), nuts (AA), and lockwashers (AC). Throw lockwashers (AC) away.
23. Using second technician, remove valve bank (Z) and brackets (AD) to a suitable work area.

Go on to Sheet 6

TA251706

**VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 6 of 17)**

24. Using 7/16 inch wrench to hold nut (AE), use 7/16 inch socket to loosen screw (AF).
25. Manually remove screw (AF), nut (AE), and lock washer (AG). Throw lock washer (AG) away.
26. Using 3/4 inch wrench to hold nuts (AH), use 3/4 inch socket to loosen screws (AJ).
27. Manually remove two screws (AJ), nuts (AH), and lockwashers (AK). Throw lockwashers (AK) away.



28. Using 1/2 inch wrench to hold nut (AL), use 1/2 inch socket to loosen screw (AM).
29. Manually remove screw (AM), nut (AL), and lockwasher (AN). Throw lockwasher (AN) away.
30. Manually remove bracket (AD) from valve bank (Z).
31. Repeat steps 24 thru 30 for other end of valve bank (Z).
32. Manually remove identification plates (AP).

Go on to Sheet 7

TA251707



VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 7 of 17)

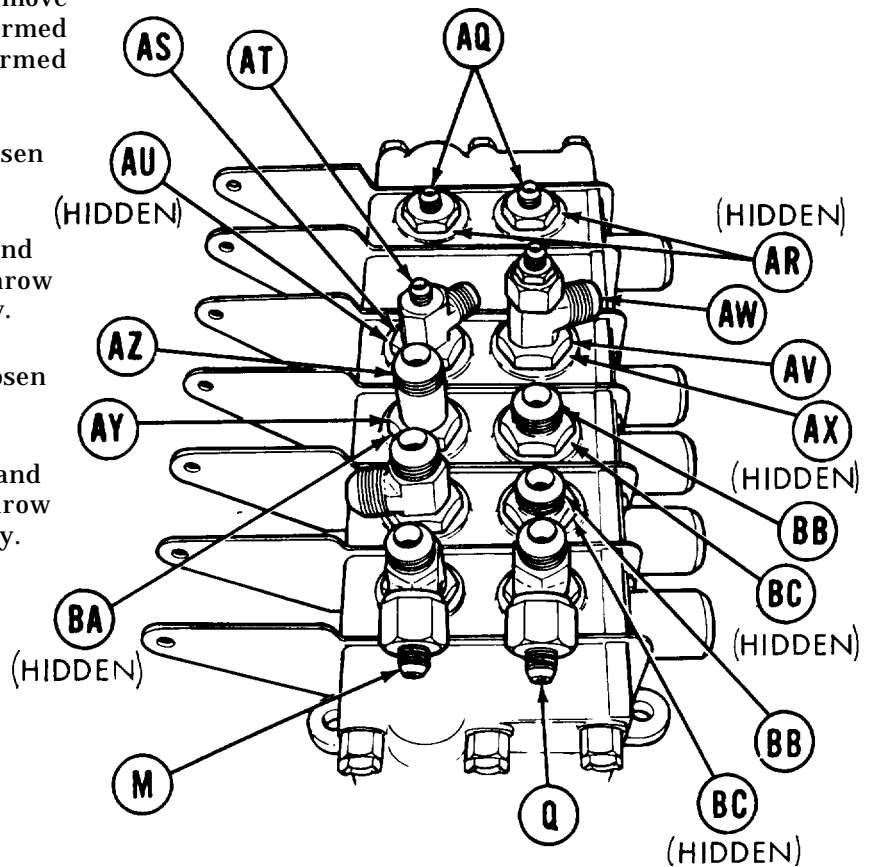
33. Using 1-1/4 inch wrench, remove two adapters (AQ) and preformed packings (AR). Throw preformed packings (AR) away.

34. Using 1-1/4 inch wrench, loosen jamnut (AS).

35. Manually remove tee (AT) and preformed packing (AU). Throw preformed packing (AU) away.

36. Using 1-1/4 inch wrench, loosen jamnut (AV).

37. Manually remove tee (AW) and preformed packing (AX). Throw preformed packing (AX) away.



38. Using 1-1/4 inch wrench, loosen jamnut (AY).

39. Manually remove nipple (AZ) and preformed packing (BA). Throw preformed packing (BA) away.

40. Using 1-1/4 inch wrench, remove two adapters (BB) and preformed packings (BC). Throw preformed packings (BC) away.

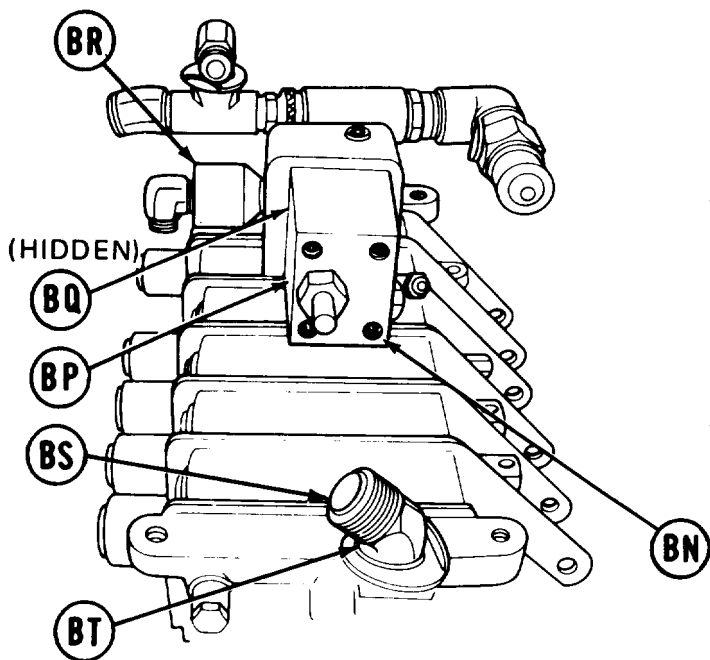
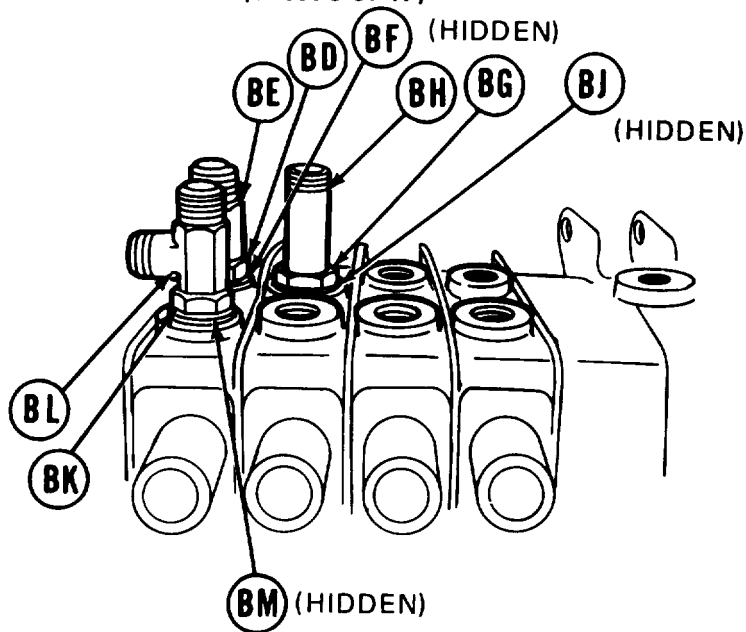
41. Using 1-1/4 inch wrench, remove two adapters (M and Q).

Go on to Sheet 8

TA251708

VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 8 of 17)

42. Using 1-1/4 inch wrench, loosen jamnut (BD).
43. Manually remove tee (BE) and preformed packing (BF). Throw preformed packing (BF) away.
44. Using 1-1/4 inch wrench, loosen jamnut (BG).
45. Manually remove tee (BH) and preformed packing (BJ). Throw preformed packing (BJ) away.
46. Using 1-1/4 inch wrench loosen jamnut (BK).
47. Manually remove tee (BL) and preformed packing (BM). Throw preformed packing (BM) away.



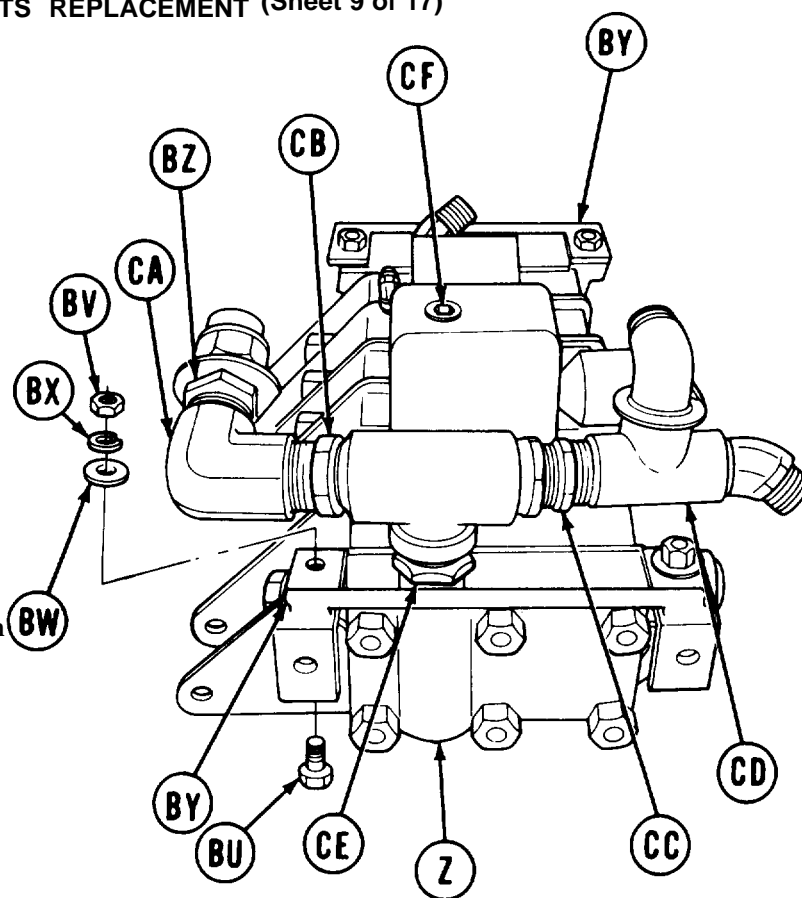
48. Using 5/16 inch screw key, remove four screws (BN).
49. Manually remove relief valve (BP) and preformed packings (BQ). Throw preformed packings (BQ) away.
50. Using pipe wrench, remove adapter and attached elbow (BR).
51. Using adjustable wrench, remove elbow (BS) and collar (BT).

Go on to Sheet 9

TA251709

## VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 9 of 17)

52. Using 5/8 inch wrench to hold four screws (BU), use 3/4 inch wrench to loosen four nuts (BV).
53. Manually remove four screws (BU), nuts (BV), flat washers (BW), and lockwashers (BX). Throw lockwashers (BX) away.
54. Remove two brackets (BY) from valve bank (Z).
55. Using 1-3/8 inch wrench, remove adapter (BZ) and attached parts from elbow (CA).
56. Holding adapter (CB) with 1-3/8 inch wrench, use adjustable wrench to remove elbow (CA).



57. Holding adapter (CC) with 1-1/4 inch wrench, use adjustable wrench to remove tee (CD) and attached parts from adapter (CC).
58. Using 1-3/8 inch wrench, remove adapter (CE) and attached parts from valve bank (Z).
59. Using 3/8 inch screw key, remove pipe plug (CF).

## CLEANING AND INSPECTION:

**WARNING**

**Cleaning agent specified is flammable. Use only in well ventilated areas. Keep away from flames, sparks, or heat. Do not smoke while using. Prevent contact with eyes, mouth, and/or skin. Wear rubber gloves when performing cleaning procedures.**

1. Using dry cleaning solvent, clean all parts.
2. Using rags, dry all parts.
3. Inspect all parts for breaks, cracks, and excessive wear. Replace bad parts.

Go on to Sheet 10

TA251710

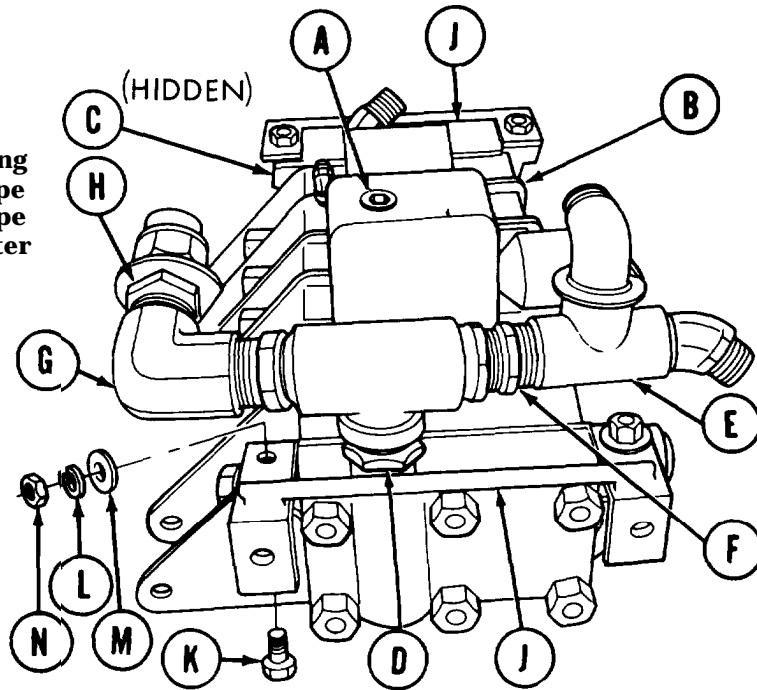
**VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 10 of 17)**

**INSTALLATION:**

**NOTE**

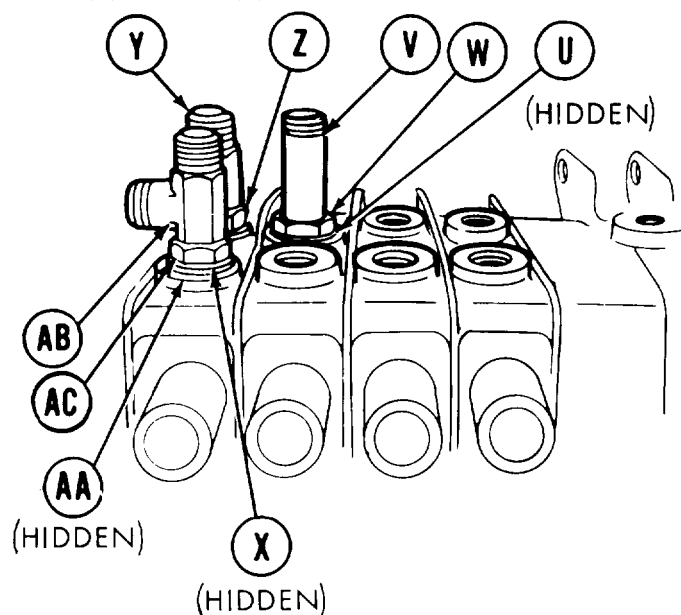
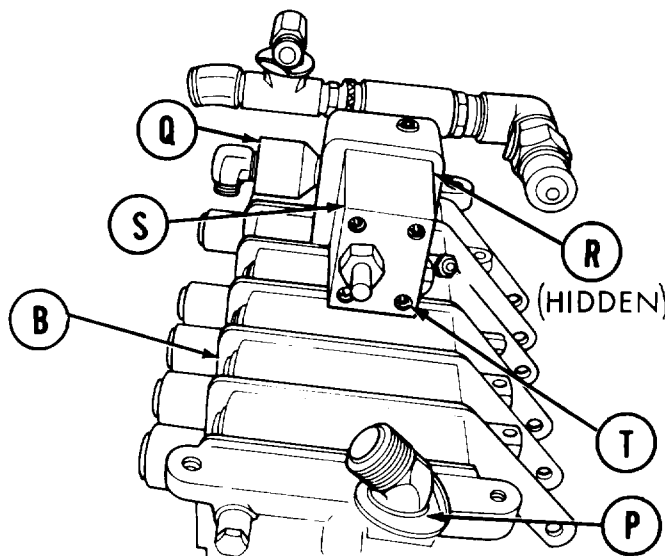
**Remove caps and plugs as necessary during installation. Before installation use pipe tape on all male threads. Start pipe tape on second thread so that tape will not enter hydraulic system.**

1. Using 3/8 inch screw key, install pipe plug (A) into valve bank (B).
2. Using 1/4 inch screw key, install pipe plug (C) into valve bank (B).
3. Using 1-3/8 inch wrench, install adapter (D) and attached parts into valve bank (B).
4. Using adjustable wrench, install tee (E) and attached parts on adapter (F).
5. Using adjustable wrench, install elbow (G).
6. Using 1-3/8 inch wrench, install adapter (H) and attached parts on elbow (G).
7. Position two brackets (J) on valve bank (B), one on each end.
8. Using 5/8 inch wrench on four screws (K), use 3/4 inch wrench to install lockwashers (L), flat washers (M), and nuts (N).



**VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 11 of 17)**

9. Using adjustable wrench, install and align collar "CW" and elbow (P).
10. Using pipe wrench, install and align adapter and attached elbow (Q).
11. Manually install new preformed packings (R) in relief valve (S).
12. Using 5/16 inch screw key, install four screws (T) securing relief valve (S) to valve bank (B).
13. Manually install new preformed packing (U) on tee (V).
14. Manually install and align tee (V).
15. Using adjustable wrench to hold tee (V), use 1-1/4 inch wrench to tighten jamnut (W).
16. Manually install new preformed packing (X) on tee (Y).



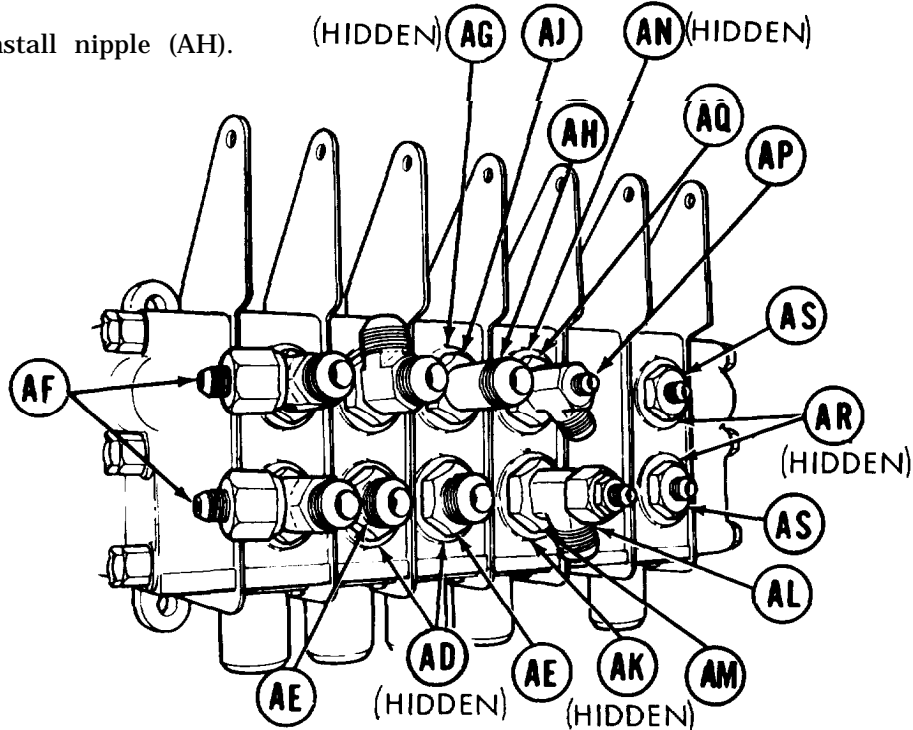
17. Manually install and align tee (Y).
18. Using adjustable wrench to hold tee (Y), use 1-1/4 inch wrench to tighten jamnut (Z).
19. Manually install new preformed packing (AA) on tee (AB).
20. Manually install and align tee (AB).
21. Using adjustable wrench to hold tee (AB), use 1-1/4 inch wrench to tighten jamnut (AC).

Go on to Sheet 12

TA251712

**VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 12 of 17)**

22. Manually install two new preformed packings (AD) on two adapters (AE).
23. Using 1-1/4 inch wrench, install two adapters (AE).
24. Using 1-1/4 inch wrench, install two adapters (AF).
25. Manually install new preformed packing (AG) on nipple (AH).
26. Manually install nipple (AH). (HIDDEN) (AG) (AJ) (AN) (HIDDEN)

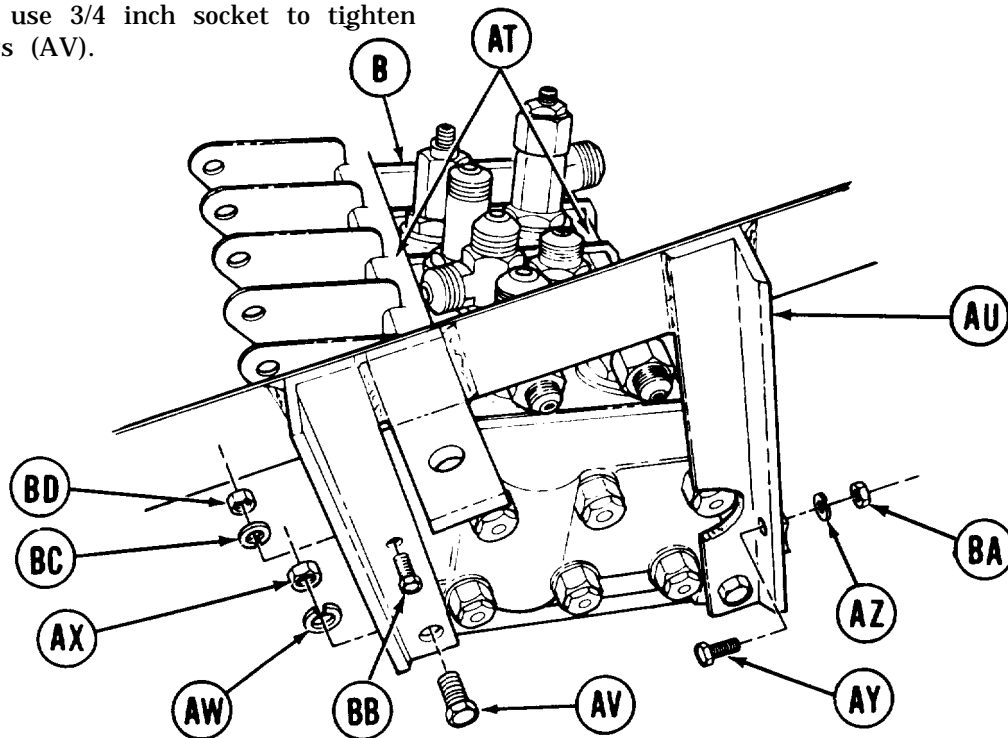


27. Using pipe wrench to hold nipple (AH), use 1-1/4 inch wrench to tighten jamnut (AJ).
28. Manually install new preformed packing (AK) on tee (AL).
29. Manually install and align tee (AL).
30. Using adjustable wrench to hold tee (AL), use 1-1/4 inch wrench to tighten jamnut (AM).
31. Manually install new preformed packing (AN) on tee (AP).
32. Manually install and align tee (AP).
33. Using adjustable wrench to hold tee (AP), use 1-1/4 inch wrench to tighten jamnut (AQ).
34. Manually install two new preformed packings (AR) on two adapters (AS).
35. Using 1-1/4 inch wrench, install two adapters (AS).

Go on to Sheet 13

## VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 13 of 17)

36. Manually position identification plates (AT) on valve bank (B).
37. Manually position two brackets (AU) on valve bank (B) (one on each end).
38. Manually install four screws (AV), lockwashers (AW), and nuts (AX).
39. Using 3/4 inch wrench to hold nuts (AX), use 3/4 inch socket to tighten screws (AV).



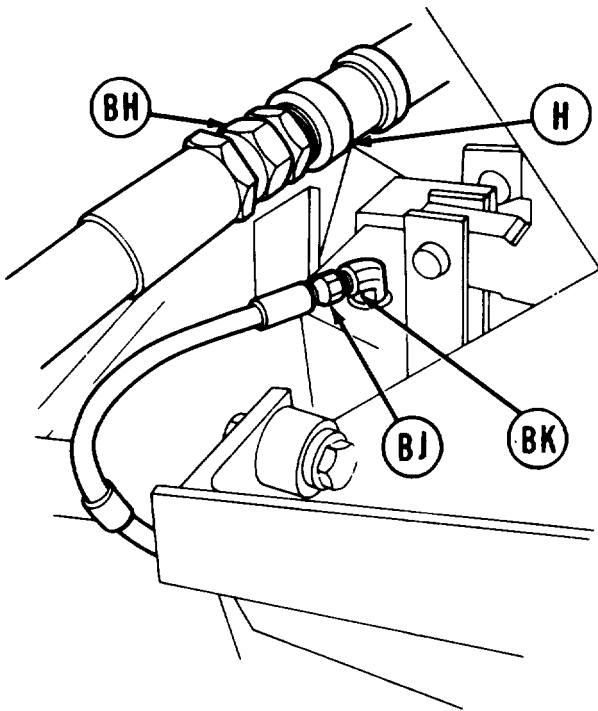
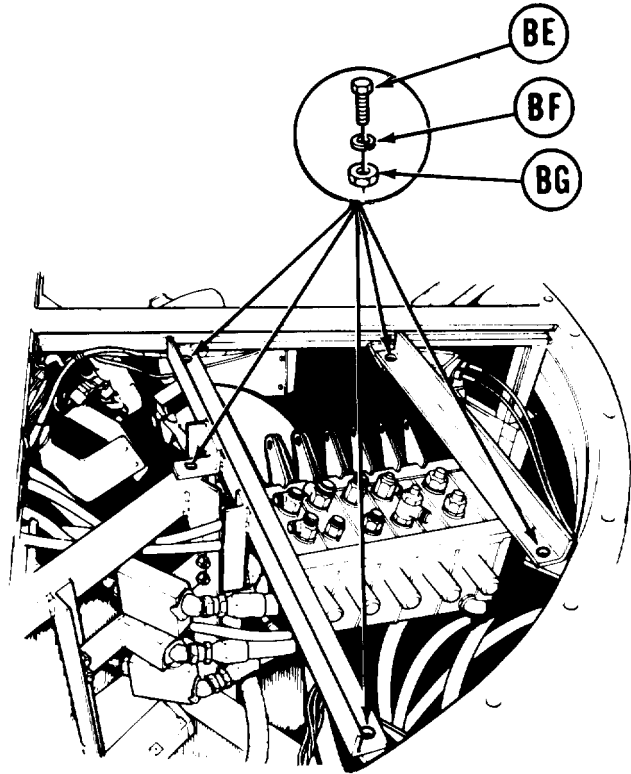
40. Manually install two screws (AY), lockwashers (AZ), and nuts (BA).
41. Using 1/2 inch wrench to hold screw (AY), use 1/2 inch socket to tighten nut (BA).
42. Manually install two screws (BB), lockwashers (BC), and nuts (BD).
43. Using 7/16 inch wrench to hold screws (BB), use 7/16 inch socket to tighten nuts (BD).
44. Using second technician, position valve bank assembly (B) and brackets (AU) in vehicle.

Go on to Sheet 14

TA251714

VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 14 of 17)

- 45. Manually install five screws (BE), lockwashers (BF), and nuts (BG).
- 46. Using 3/4 inch wrench to hold nuts (BG), use 3/4 inch socket to tighten screws (BE).



- 47. Manually install hose "BB" (BH) on adapter (H).
- 48. Using 9/16 inch wrench, install hose assembly "AR" (BJ) on elbow (BK).

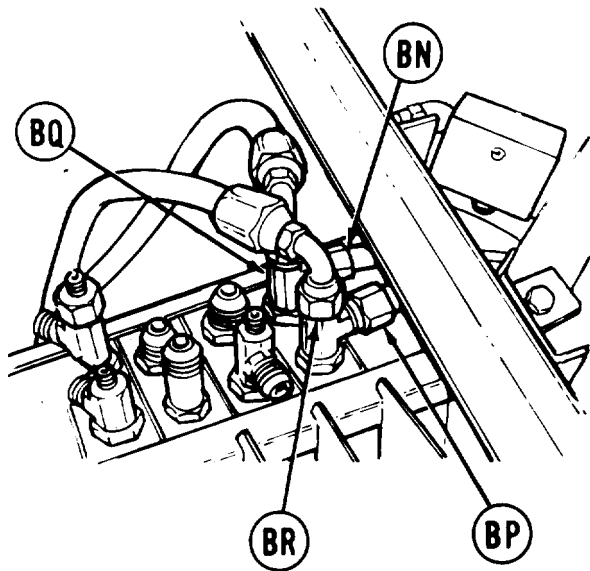
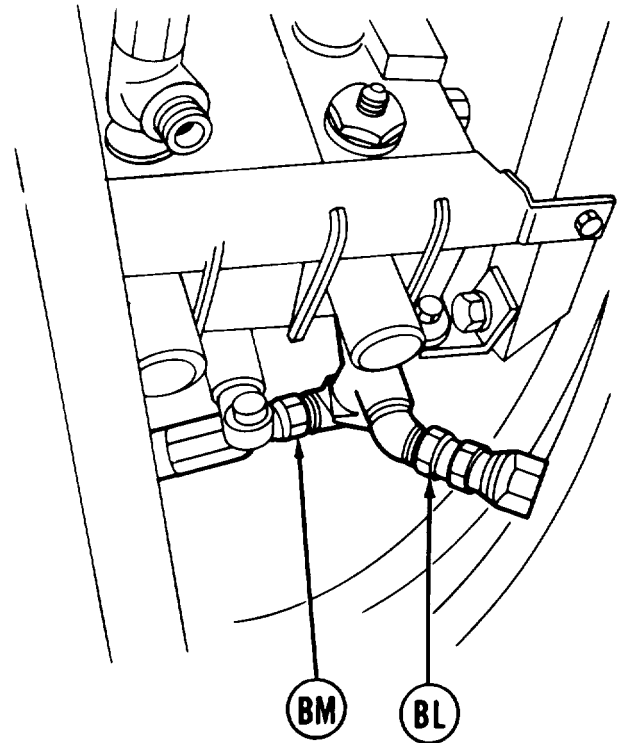
Go on to Sheet 15

TA251715



**VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 15 of 17)**

49. Using 1-1/4 inch wrench, install hose assembly "F" (BL).
50. Using 1-1/4 inch wrench, install hose assembly "BR" (BM).



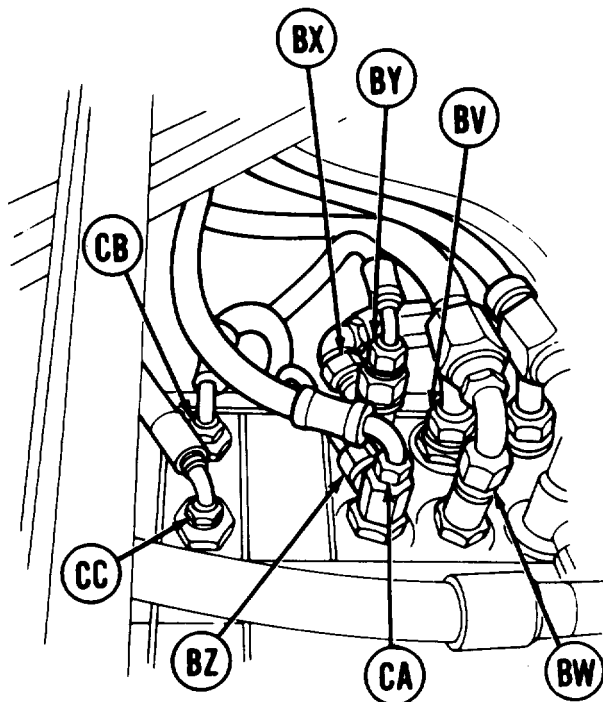
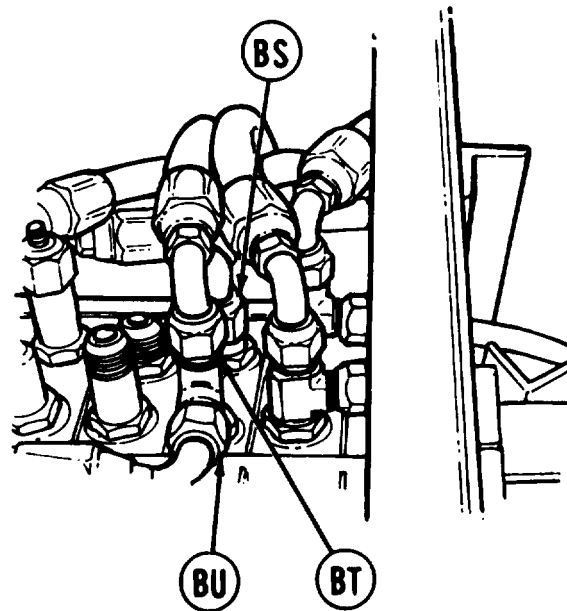
51. Using 7/8 inch wrench, install hose assembly "CU1" (BN).
52. Using 7/8 inch wrench, install hose assembly "CU2" (BP).
53. Using 1-1/4 inch wrench, install hose assembly "DA5" (BQ).
54. Using 1-1/4 inch wrench, install hose assembly "DA6" (BR).

Go on to Sheet 16

TA251716

**VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 16 of 17)**

55. Using 1-1/4 inch wrench, install hose assembly "DA3" (BS).
56. Using 1-1/4 inch wrench, install hose assembly "DA4" (BT).
57. Using 1-1/4 inch wrench, install hose assembly "CT" (BU).



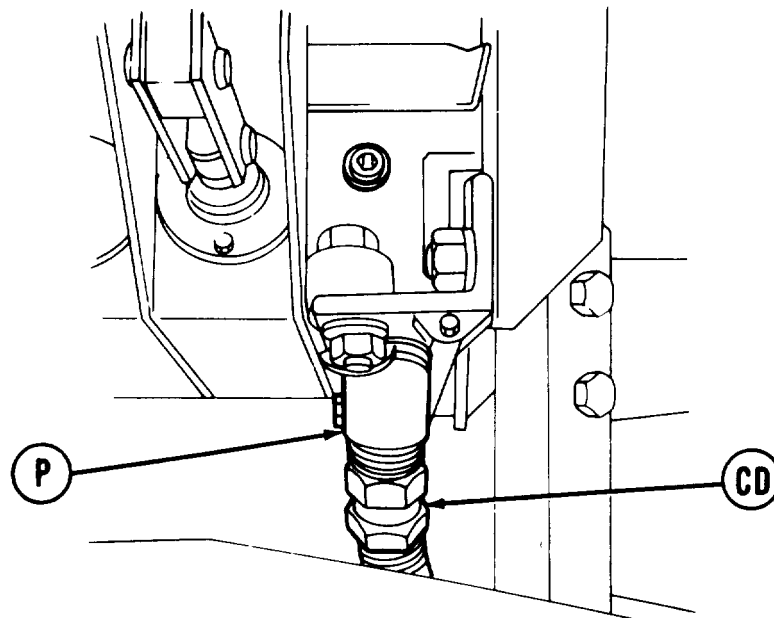
58. Using 1-1/4 inch wrench, install hose assembly "DA1" (BV).
59. Using 1-1/4 inch wrench, install hose assembly "DA2" (BW).
60. Using 1-1/4 inch wrench, install hose assembly "CS" (BX).
61. Using 11/16 inch wrench, install hose assembly "CP3" (BY).
62. Using 15/16 inch wrench, install both ends of tube assembly "EA1" (BZ).
63. Using 11/16 inch wrench, install hose assembly "CP4" (CA).
64. Using 11/16 inch wrench, install two hose assemblies "CP1" (CB) and "CP2" (CC).

Go on to Sheet 17

TA251717

**VALVE BANK ASSEMBLY AND BRACKETS REPLACEMENT (Sheet 17 of 17)**

65. Using 1-1/2 inch wrench, install hose assembly "CW" (CD) on elbow (P).
66. Service hydraulic reservoir (LO 5-5420-202-12).
67. Install valve bank assembly control levers (page 3-124).
68. Bleed hydraulic system (page 3-72).
69. Check for hydraulic leaks and correct as necessary.
70. Service hydraulic reservoir (LO 5-5420-202-12).
71. Install front quadrant (page 3-46).



End of Task

TA251718

**Section III. HYDRAULIC CYLINDERS AND RESERVOIR  
OVERHEAD CYLINDER REPAIR (Sheet 1 of 6)**

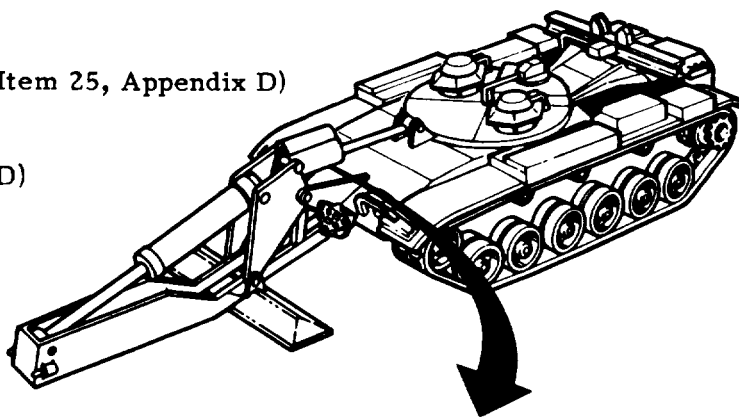
PROCEDURE INDEX	
PROCEDURE	PAGE
Disassembly	4-70
Cleaning and Inspection	4-72
Assembly	4-73

**TOOLS:** Ratchet with 3/4 in. drive  
 1-5/16 in. socket with 3/4 in. drive  
 Torque wrench with 3/4 in. drive (0 to 600 lb-ft capacity)  
 Spanner wrench with 0 - 6-1/2 in. span  
 Flat-tip screwdriver  
 4-9/16 in. cylinder rod wrench (stow right fender box)  
 Punch, drive pin 3/4 x 10 in.  
 Sledge hammer  
 Crowbar

**SUPPLIES:** Dry cleaning solvent (Item 15, Appendix D)      Gloves (Item 27, Appendix D)  
 Rags (Item 12, Appendix D)      Goggles (Item 26, Appendix D)  
 Masking tape (Item 18, Appendix D)  
 10/32 screw 1/2 in. long (4 required)  
 Packing assembly  
 Wiper ring (2 required)  
 Preformed packing  
 Spacer ring  
 Wooden block (make from Item 25, Appendix D)  
 Container (to catch fluid)  
 Lockwashers (10 required)  
 Pencil (Item 22, Appendix D)

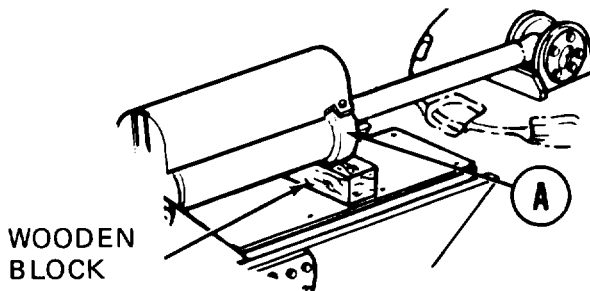
**PERSONNEL:** Two

**REFERENCES:** LO 5-5420-202-12  
 TM 5-5420-202-10



**DISASSEMBLY:**

1. Place wooden block under overhead cylinder (A).



Go on to Sheet 2

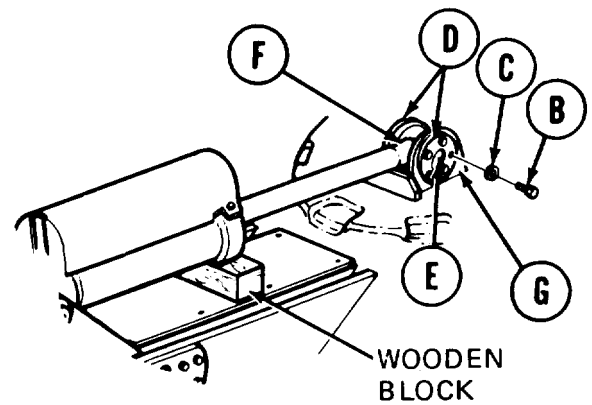
TA251719

OVERHEAD CYLINDER REPAIR (Sheet 2 of 6)

2. Using 1-5/16 inch socket, remove 10 screws (B), lockwashers (C), and two retainers (D).

**CAUTION**

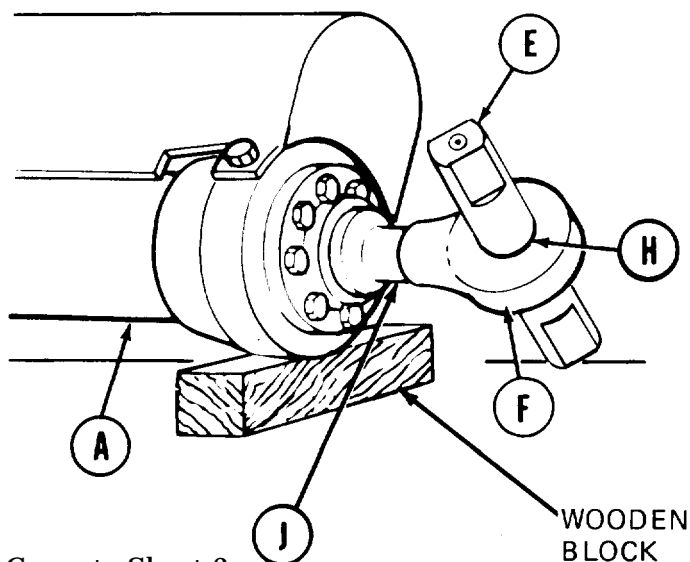
Do not hit grease fittings in pin (E) with hammer or punch. Grease fittings will be damaged if hit.



3. Using hammer and punch, remove pin (E).
4. Retract overhead piston until rod end (F) is clear of mount (G) (TM 5-5420-202-10).
5. Relieve hydraulic pressure (page 3-71).
6. Insert pin (E) through eye (W) of piston rod end (F).
7. Have another technician use cylinder rod wrench on flats of piston rod (J) to keep rod from turning.
8. Using pin (E) as a lever, turn rod end (F) counterclockwise and remove.
9. Using masking tape, tape threads of piston rod (J).
10. Remove pin (E).

**NOTE**

**Place container under overhead cylinder (A) to catch fluid.**

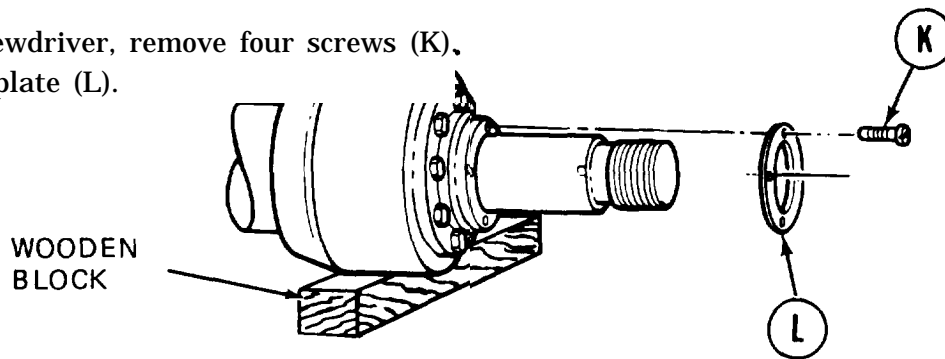


Go on to Sheet 3

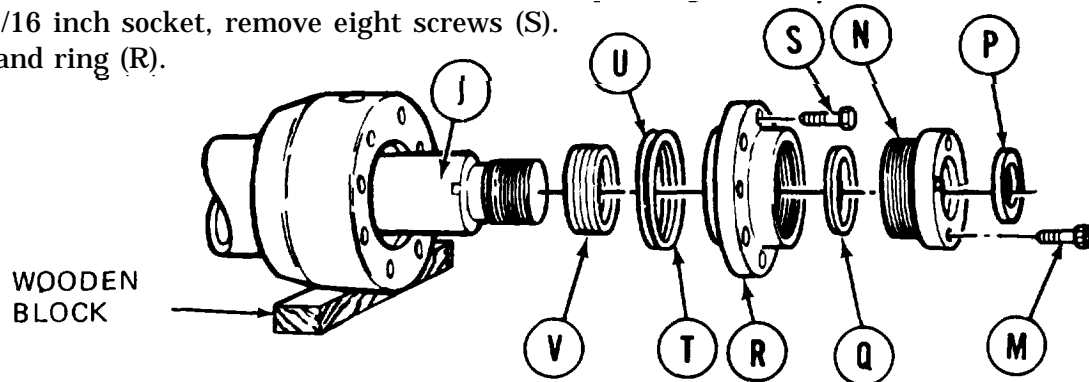
TA251720

OVERHEAD CYLINDER REPAIR (Sheet 3 of 6)

11. Using flat-tip screwdriver, remove four screws (K).
- 12.. Remove retainer plate (L).



13. Manually install four 10/32 screws (M) into threaded holes of bushing (N).
14. Use spanner wrench on screws (M), remove bushing (N) from piston rod (J).
15. Remove screws (M).
16. Remove wiper ring (P) from bushing (N). Throw wiper ring (P) away.
17. Remove wiper ring (Q) from land ring (R). Throw wiper ring (Q) away.
18. Using 1-5/16 inch socket, remove eight screws (S).
19. Remove land ring (R).



20. Remove preformed packing (T) from land ring (R). Throw preformed packing (T) away.
21. Remove spacer ring (U) from land ring (R). Throw spacer ring (U) away.

**NOTE**

Be careful when performing next step. Damage to piston rod (J) could occur when removing packing (V).

22. Using screwdriver, remove preformed packing assembly (V) from piston rod (J). Throw preformed packing assembly (V) away.

CLEANING AND INSPECTION:

**WARNING**

**Dry cleaning solvent P-D-680 is toxic and flammable. To prevent personal injury, wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point for Type #1 Dry Cleaning Solvent is 100°F (38°C) and for Type \$2 is 138°F (50°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.**

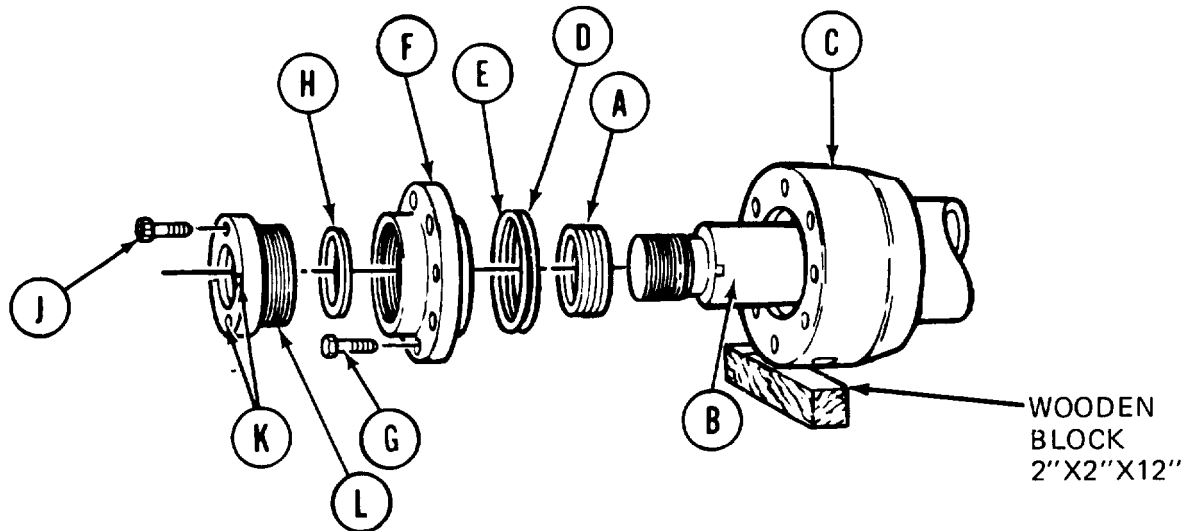
Go on to Sheet 4

TA251721

## OVERHEAD CYLINDER REPAIR (Sheet 4 of 6)

1. Using dry cleaning solvent, clean all metallic parts.
2. Using rags, dry all parts.
3. Inspect all parts for damage or wear. Replace all unserviceable parts.

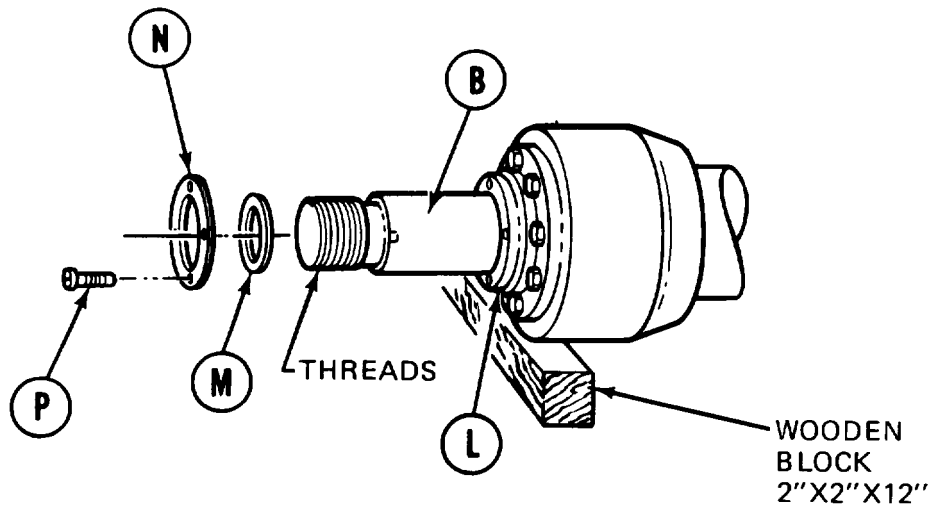
## ASSEMBLY:



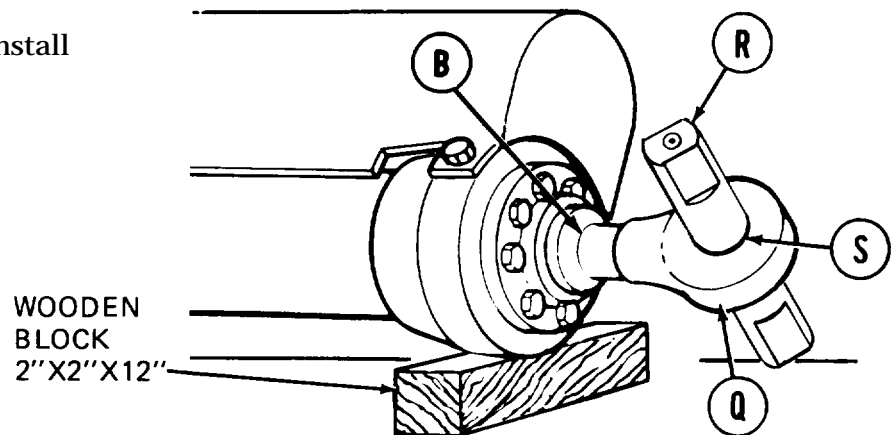
1. Install new preformed packing assembly (A) on piston rod (B) and push it into overhead cylinder (C).
2. Install new spacer ring (D) and new preformed packing (E) on land ring (F).
3. Position land ring (F) on piston rod (B) and align holes with overhead cylinder (C).
4. Manually install eight screws (G).
5. Using 1-5/16 inch socket and torque wrench, alternately tighten eight screws (G) to 320-330 lb-ft (440-445 N-m).
6. Manually install new wiper ring (H) in land ring (F).
7. Manually install four 10/32 screws (J) in threaded holes (K) of bushing (L).
8. Using spanner wrench on screws (J), tighten bushing (L) against land rings (F).
9. Manually remove screws (J) from bushing (L).

Go on to Sheet 5

TA251722



10. Install new wiper ring (M) on piston rod (B).
11. Install retaining plate (N) on piston rod (B) and align holes with bushing (L).
12. Using flat-tip screwdriver, install four screws (P).
13. Remove tape from threads of piston rod (B).
14. Using second technician, manually start rod end (O) on piston rod (B).
15. Have one technician use cylinder rod wrench on flats of piston rod (B), and second technician insert pin (R) through rod end eye (S).
16. Using pin (R) as a lever, install rod end (Q).
17. Remove pin (R).



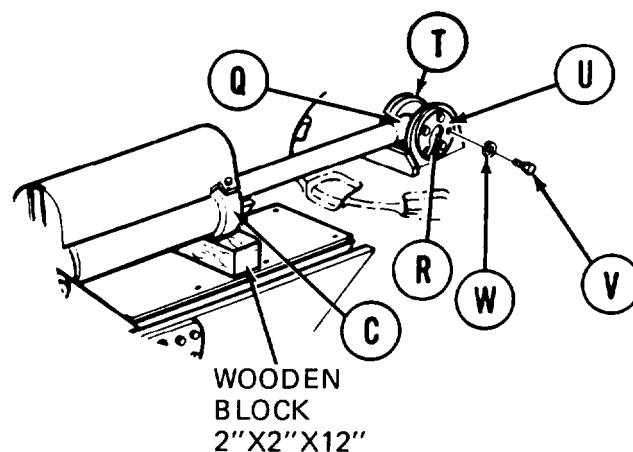
Go on to Sheet 6

TA251723



## OVERHEAD CYLINDER REPAIR (Sheet 6 of 6)

19. Service hydraulic reservoir (LO 5-5420-202-12).
20. Bleed hydraulic system (page 3-72).
21. Extend overhead piston until rod end (Q) is aligned with mount (T) (TM 5-5420-202-10).
22. Using crowbar, lift overhead cylinder and remove wooden block from beneath overhead cylinder (C).
23. Have one technician position rod end (Q) in mount (T) while another inserts pin (R).
24. Position two retainers (U), one on each side of mount (T).
25. Manually install 10 screws (V) and lockwashers (W) securing retainers (U) to mount (T).
26. Using 1-5/16 inch socket, tighten 10 screws (V).
27. Check for hydraulic leaks and correct as necessary.
28. Service hydraulic reservoir (LO 5-5420-202-1 2).



End of Task

ROD END CONNECTOR REPAIR (Sheet 1 of 1)

TOOLS: Arbor press

PRELIMINARY PROCEDURE: Remove rod end connector (pages 3-228 and 3-237)

DISASSEMBLY:

1. Place rod end connector (A) in arbor press.

2. Press out sleeve bearing (B).

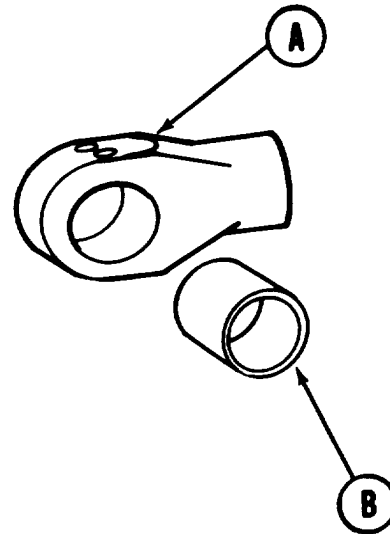
ASSEMBLY:

1. Position sleeve bearing (B) in alignment with hole in clevis of rod end connector (A).

2. Using arbor press, press sleeve bearing (B) into clevis of rod end connector (A).

3. Install rod end connector (pages 3-228 and 3-237).

End of Task



TONGUE CYLINDER REPAIR (Sheet 1 of 5)

PROCEDURE	PROCEDURE INDEX	PAGE
Disassembly		4-77
Cleaning and Inspection		4-79
Assembly		4-80

**TOOLS:**

Ratchet with 3/4 in. drive	Snap ring pliers
1-5/16 in. socket with 3/4 in. drive	7/16 in. socket with 1/2 in. drive
Torque wrench with 3/4 in. drive	Ratchet with 1/2 in. drive
(0 to 600 lb-ft capacity) (0 - 813 N-m)	Hammer
Spanner wrench with 0 - 6-1/2 in. span	Punch, drive pin 3/4 x 10 in.
Flat-tip screwdriver	
4-9/16 in. cylinder rod wrench (stow right fender box)	
Crowbar	

**SUPPLIES:**

- Dry cleaning solvent (Item 15, Appendix D)
- Rags (Item 12, Appendix D)
- Masking tape (Item 18, Appendix D)
- 10/32 screw 1/2 in. long (4 required)
- Preformed packing assembly
- Wiper ring (2 required)
- Preformed packing
- Spacer ring
- Wooden block 6 in. by 6 in. by 36 in. long (make from Item 31, Appendix D)
- Suit able container

**PERSONNEL:** Two

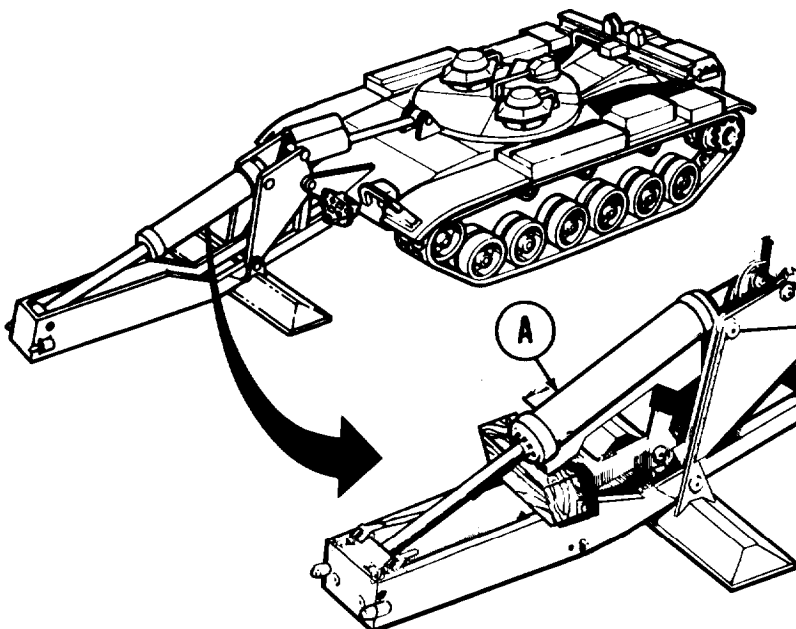
**REFERENCES:** LO 5-5420-202-12  
TM 5-5420-202-10

**DISASSEMBLY:**

**NOTE**

**Use container to catch excess hydraulic fluid.**

1. Place wooden block under forward end of tongue cylinder (A).

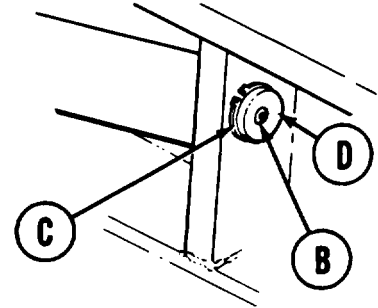
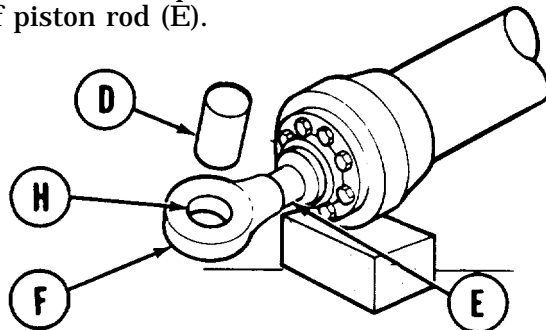
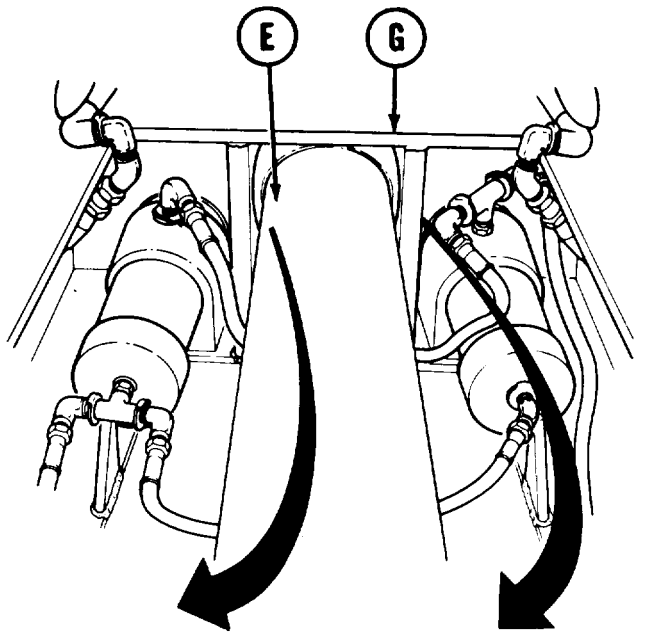


Go on to Sheet 2

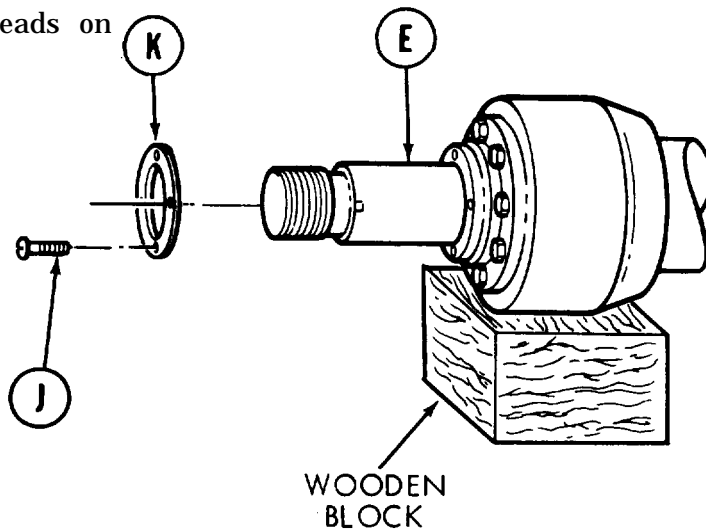
TA251726

TONGUE CYLINDER REPAIR (Sheet 2 of 5)

2. Using 7/16 inch socket, remove two grease fittings (B).
3. Using snap ring pliers, remove two retaining rings (C).
4. Using hammer and punch, remove pin (D).
5. Retract tongue piston rod (E) until rod end connector (F) is clear of support (G) (TM 5-5420-202-10).
6. Relieve hydraulic pressure (page 3-71).
7. Insert pin (D) through rod end connector eye (H).
8. Have another technician use piston rod wrench on flats of piston rod (E).



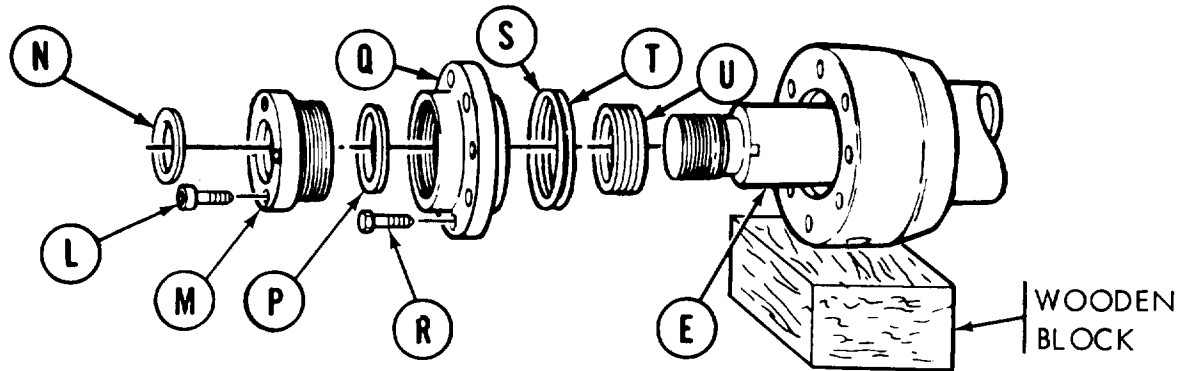
9. While second technician holds piston rod (E) from turning use pin (D) as a lever, turn rod end connector (F) counterclockwise and remove.
10. Remove pin (D).
11. Using masking tape, tape threads on end of piston rod (E).
12. Using flat-tip screwdriver, remove four screws (J).
13. Remove retainer plate (K).



Go on to Sheet 3

TA251727

## TONGUE CYLINDER REPAIR (Sheet 3 of 5)

**NOTE**

**Place container under tongue cylinder to catch fluid,**

14. Manually install four 10/32 screws (L) into threaded holes of bushing (M).
15. Using spanner wrench on screws (L), remove bushing (M) from piston rod (E).
16. Remove screws (L).
17. Remove wiper ring (N) from bushing (M). Throw wiper ring (N) away.
18. Remove wiper ring (P) from land ring (Q). Throw wiper ring (P) away.
19. Using 1-5/16 inch socket, remove eight screws (R).
20. Remove land ring (Q).
21. Remove preformed packing (S) from land ring (Q). Throw preformed packing (S) away.
22. Remove spacer ring (T) from land ring (Q). Throw spacer ring (T) away.

**CAUTION**

Be careful when performing step 20. Damage to piston rod (E) could occur during removal of packing assembly (U).

23. Using screwdriver, remove preformed packing assembly (U) from piston rod (E). Through preformed packing assembly (U) away.

**CLEANING AND INSPECTION:****WARNING**

**Cleaning agent specified is flammable. Use only in well ventilated areas. Keep away from flames, sparks, or heat. Do not smoke while using. Prevent contact with eyes, mouth, and/or skin. Wear rubber gloves when performing cleaning procedures.**

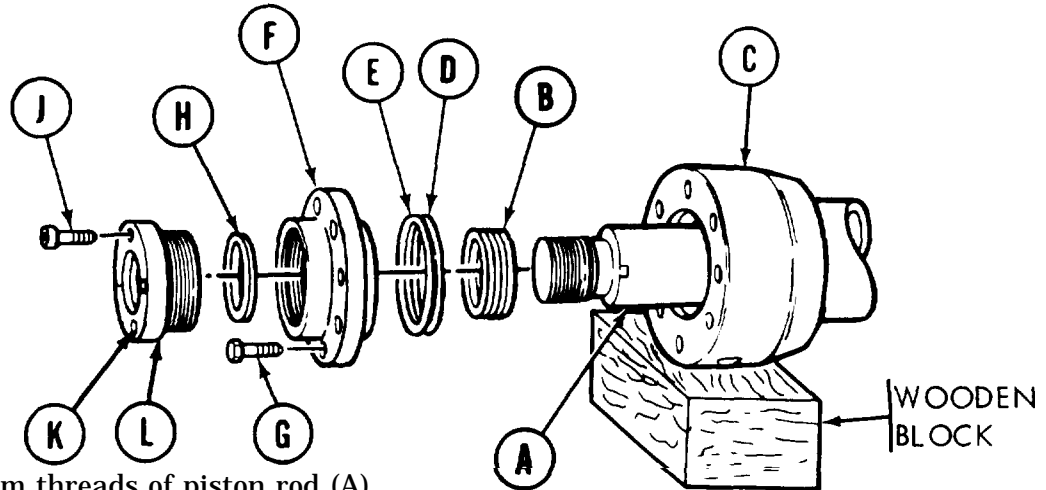
1. Using dry cleaning solvent, clean all metallic parts.
2. Using rags, dry all parts.
3. Inspect all parts for damage or wear. Replace all unserviceable parts.

Go on to Sheet 4

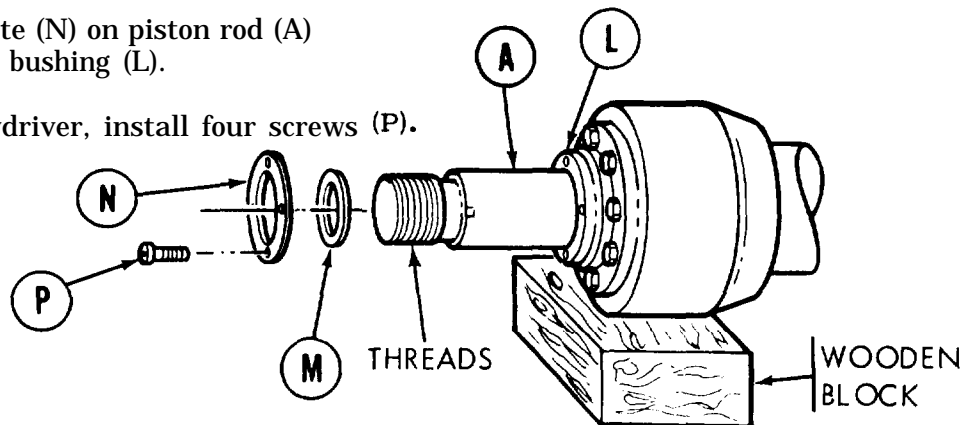
TA251728

TONGUE CYLINDER REPAIR (Sheet 4 of 5)

ASSEMBLY:



1. Remove tape from threads of piston rod (A).
2. Install new preformed packing assembly (B) on piston rod (A) and push it into tongue cylinder (C).
3. Install new spacer ring (D) and new preformed packing (E) on land ring (F).
4. Position land ring (F) on piston rod (A) and align holes with tongue cylinder (C).
5. Manually install eight screws (G).
6. Using 1-5/16 inch socket and torque wrench, alternately tighten eight screws (G) to 320-330 lb-ft (435 - 445 N-m).
7. Manually install new wiper ring (H) in land ring (F).
8. Manually install four 10/32 screws (J) in threaded holes (K) of bushing (L).
9. Using spanner wrench on screws (J), tighten bushing (L) to land ring (F).
10. Manually remove screws (J) from bushing (L).
11. Install new wiper ring (M) on piston rod (A).
12. Install retaining plate (N) on piston rod (A) and align holes with bushing (L).
13. Using flat-tip screwdriver, install four screws (P).

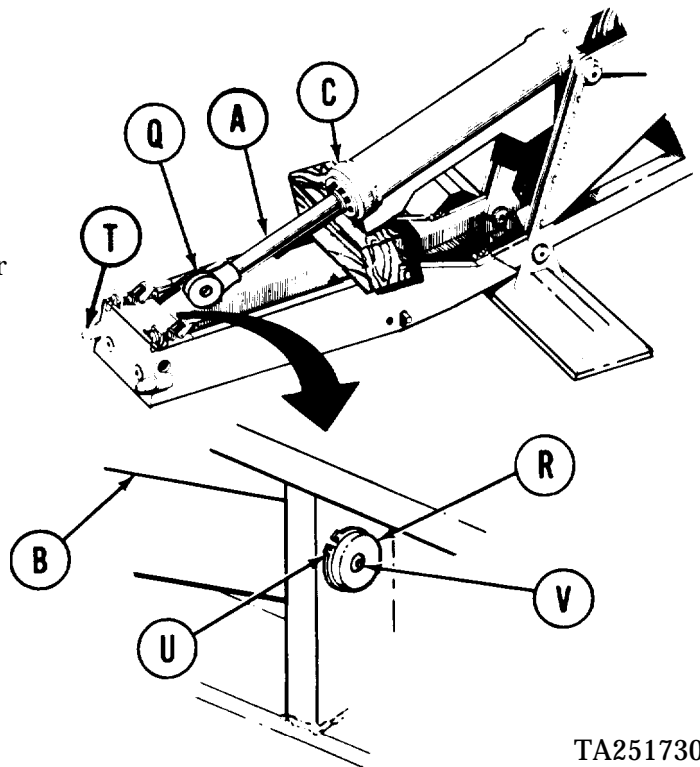
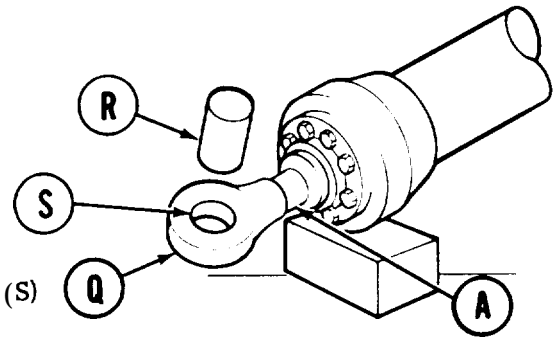


Go on to Sheet 5

TA251729

TONGUE CYLINDER REPAIR (Sheet 5 of 5)

14. Using second technician, manually start rod end connector (O) on piston rod (A).
15. Insert pin (R) through rod end connector eye (S).
16. Have one technician use piston rod wrench on flats of piston rod (A) to keep piston rod from turning.
17. While second technician holds piston rod (A) from turning, use pin (R) as a lever to turn rod end connector (Q) clockwise and tighten.
18. Remove pin (R).
19. Service hydraulic reservoir (LO 5-5420-202-12).
20. Bleed hydraulic system (page 3-72).
21. Extend tongue piston rod (A) and position rod end connector (O) into tongue (T) (TM 5-5420-202-10).
22. Have one technician hold rod end connector (O) in position while second technician inserts pin (R) through rod end connector (O).
23. Using snap ring pliers, install two retaining rings (U).
24. Using 7/16 inch socket, install two grease fittings (V).
25. Remove wooden block from under tongue cylinder (C).
26. Check for hydraulic leaks and correct as necessary.
27. Service hydraulic reservoir (LO 5-5420-202-12).



End of Task

TA251730

PROCEDURE INDEX

PROCEDURE	PAGE
Disassembly	4-82
Cleaning and Inspection	4-84
Assembly	4-84

TOOLS: 9/16 in. socket with 1/2 in. drive  
Ratchet with 1/2 in. drive  
Torque wrench with 1/2 in. drive (0-175 lb-ft capacity) (0 - 237 N•m)  
Spanner wrench (adjustable face type 0-2 in. capacity)  
Cross-tip screwdriver  
Flat-tip screwdriver

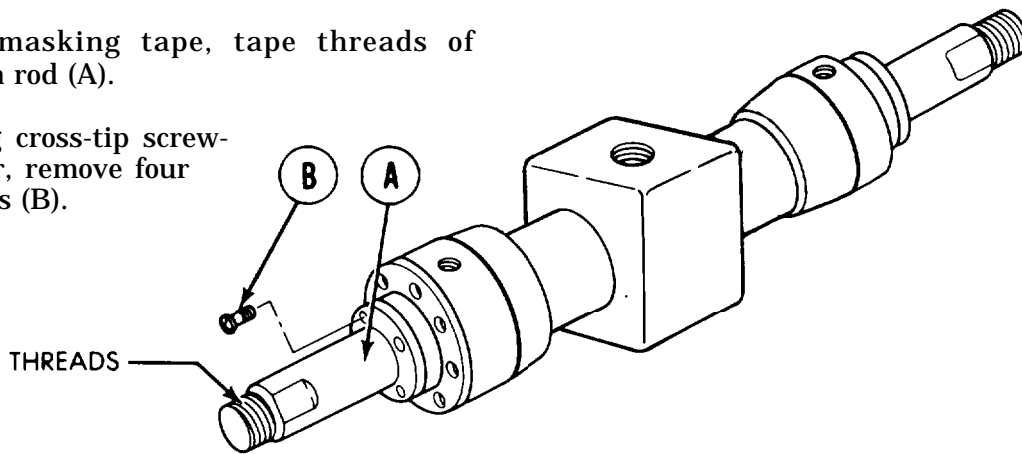
SUPPLIES: Rags (Item 12, Appendix D)                      Gloves (Item 27, Appendix D)  
Dry cleaning solvent (Item 15, Appendix D)  
Preformed packing assembly (2 required)  
Wiper ring (4 required)  
Preformed packing (2 required)  
Spacer ring (2 required)  
Friction tape (Item 17, Appendix D)

PRELIMINARY PROCEDURE: Remove locking cylinder (page 3-240)  
NOTE

Both ends of this cylinder are the same. Repair of only one end is shown in this task. Repair of opposite end is the same.

DISASSEMBLY:

1. Use masking tape, tape threads of piston rod (A).
2. Using cross-tip screwdriver, remove four screws (B).

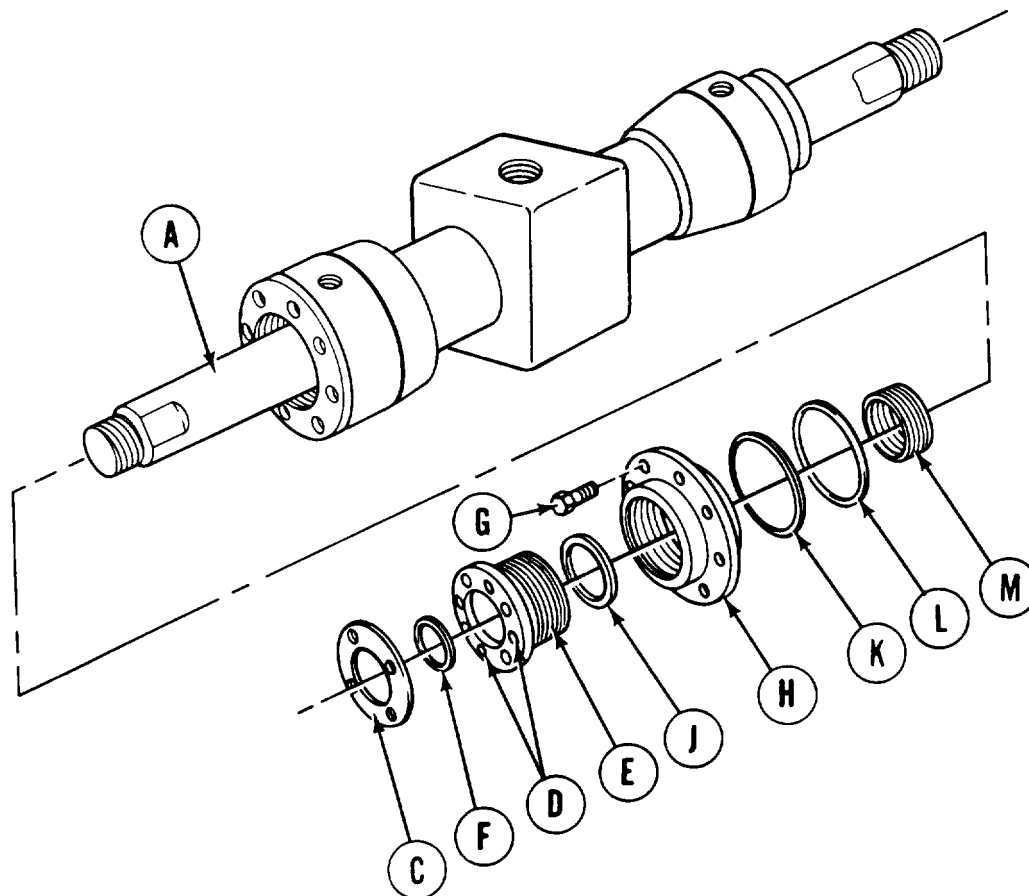


Go on to Sheet 2

TA251731



## LOCKING CYLINDER REPAIR (Sheet 2 of 4)



3. Remove retainer plate (C) from piston rod (A).
4. Using spanner wrench in unthreaded holes (D), remove bushing (E).
5. Remove wiper ring (F) from bushing (E). Throw wiper ring (F) away.
6. Using socket, remove eight screws (G).
7. Remove land ring (H) from piston rod (A).
8. Remove wiper ring (J) from land ring (H) and throw wiper ring (J) away.
9. Using flat-tip screwdriver, remove preformed packing (K) and spacer ring (L) from land ring (H). Throw preformed packing (K) and spacer ring (L) away.
10. Remove packing assembly (M) from piston rod (A). Throw preformed packing assembly (M) away.

Go on to Sheet 3

TA251732

LOCKING CYLINDER REPAIR (Sheet 3 of 4)

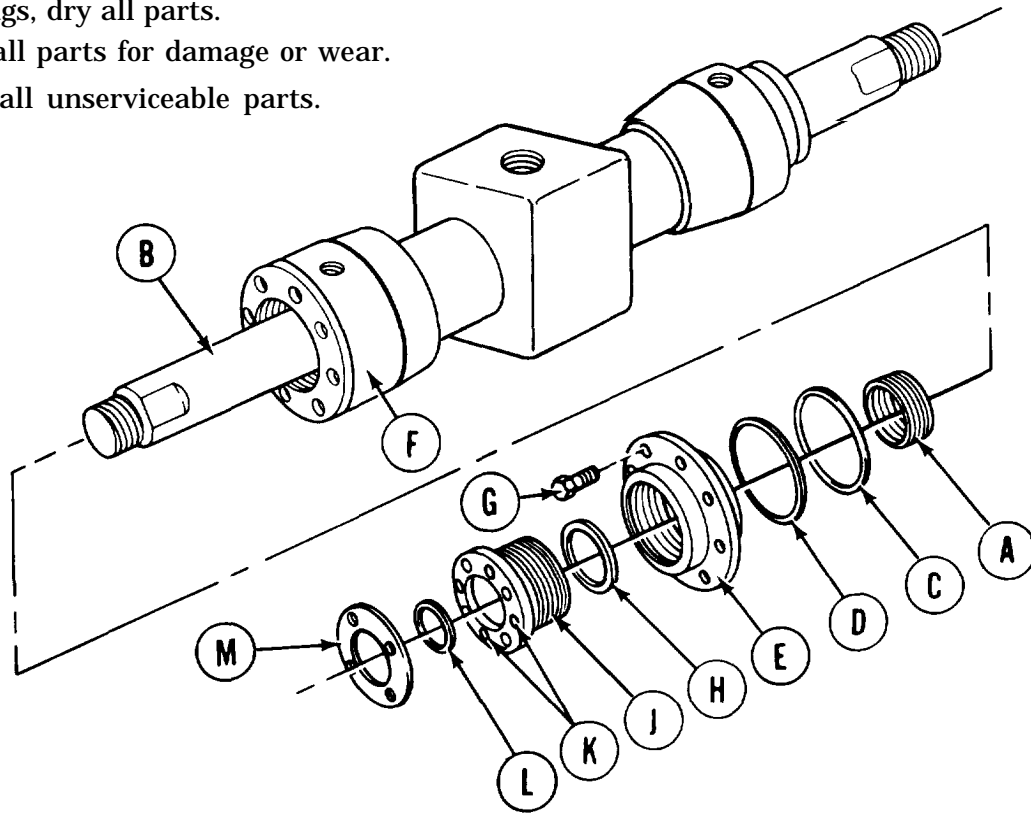
CLEANING AND INSPECTION:

**WARNING**

**Cleaning agent specified is flammable. Use only in well ventilated areas. Keep away from flames, sparks, or heat. Do not smoke while using. Prevent contact with eyes, mouth, and/or skin. Wear rubber gloves when performing cleaning procedures.**

1. Using dry cleaning solvent, clean all metallic parts.
2. Using rags, dry all parts.
3. Inspect all parts for damage or wear.  
Replace all unserviceable parts.

ASSEMBLY:

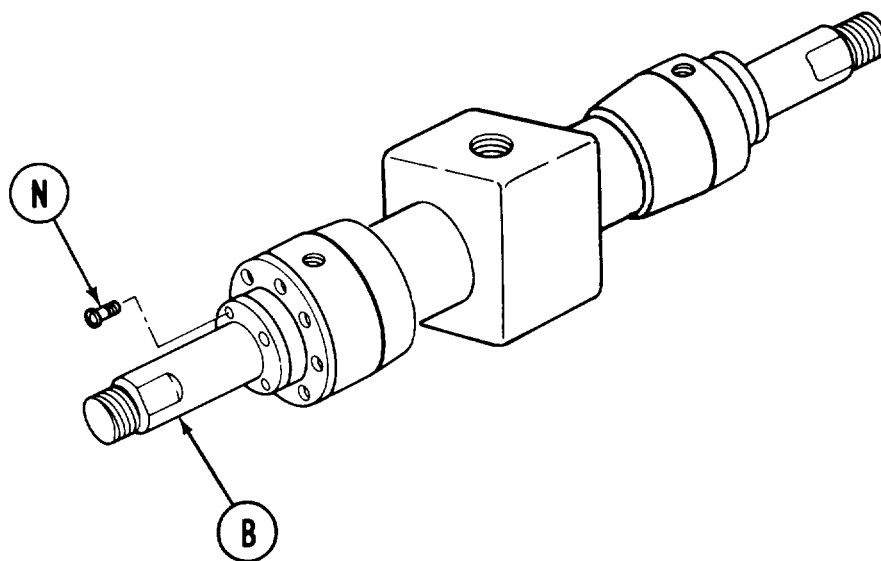


1. Install new preformed packing assembly (A) on piston rod (B).
2. Install new spacer ring (C) and new preformed packing (D) on land ring (E).
3. Position land ring (E) on head (F) with holes alined.
4. Using socket, loosely install eight screws (G).
5. Using torque wrench, tighten screws (G) 30 to 40 lb-ft (40.6 to 54.2 N•m).
6. Install new wiper ring (H) in bushing (J).
7. Using spanner wrench in unthreaded holes (K) of bushing (J), tighten bushing to land ring (E).
8. Install new wiper ring (L) on piston rod (B).
9. Position retainer plate (M) on piston rod (B) and aline holes with threaded holes of bushing (J).

Go on to Sheet 4

TA251733

LOCKING CYLINDER REPAIR (Sheet 4 of 4)



10. Using cross-tip screwdriver, install four screws (N).
11. Remove tape from threads of piston rod (B).
12. Install locking cylinder (page 3-241).

End of Task

## EJECTION CYLINDERS REPAIR (Sheet 1 of 2)

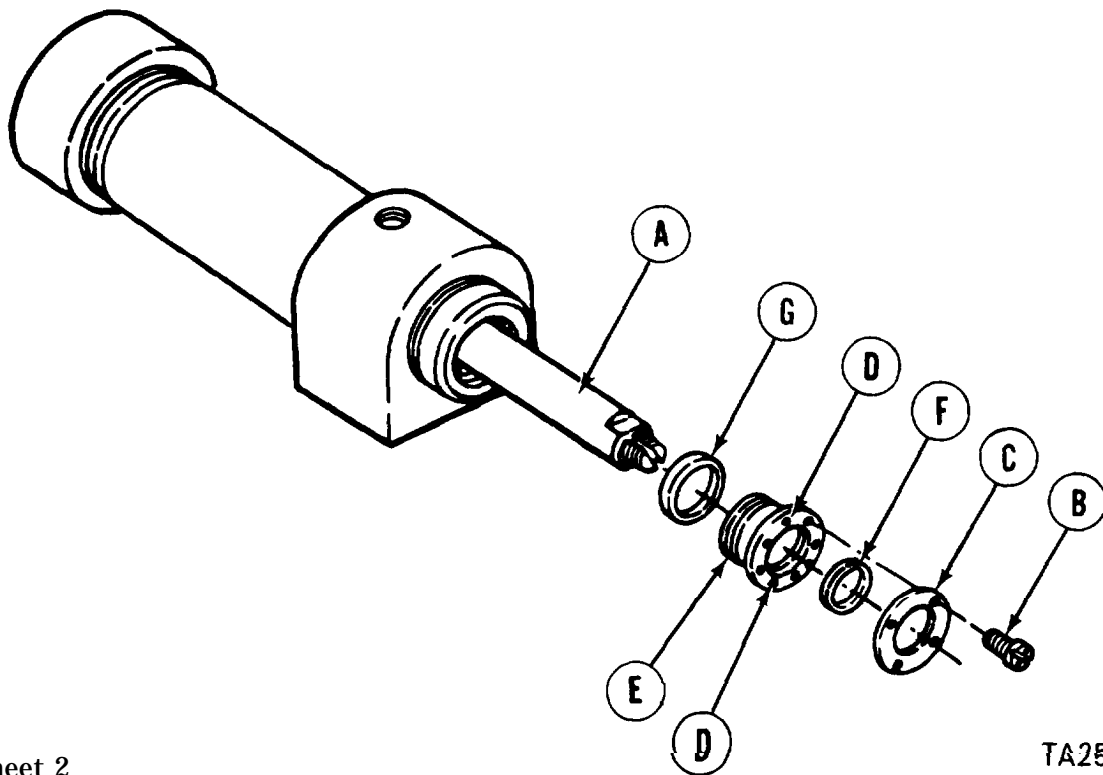
**TOOLS:** Spanner wrench (adjustable face type, 2 in. capacity)  
Cross-tip screwdriver  
Pliers, long round nose

**SUPPLIES:** Rags (Item 12, Appendix D)  
Friction tape (Item 17, Appendix D)  
Dry cleaning solvent (Item 15, Appendix D)  
Wiper ring (2 required)  
Gloves (Item 27, Appendix D)

**PRELIMINARY PROCEDURE:** Remove ejection cylinders (pages 3-243 and 3-247)

### DISASSEMBLY:

1. Place tape on threads of piston rod (A).
2. Using screwdriver, remove four screws (B).
3. Remove retainer plate (C) from piston rod (A).
4. Using spanner wrench in unthreaded holes (D), remove bushing (E).
5. Manually remove wiper ring (F) from bushing (E). Throw wiper ring (F) away.
6. Using pliers, remove wiper ring (G). Throw wiper ring (G) away.



Go on to Sheet 2

TA251735

## EJECTION CYLINDERS REPAIR (Sheet 2 of 2)

## CLEANING AND INSPECTION:

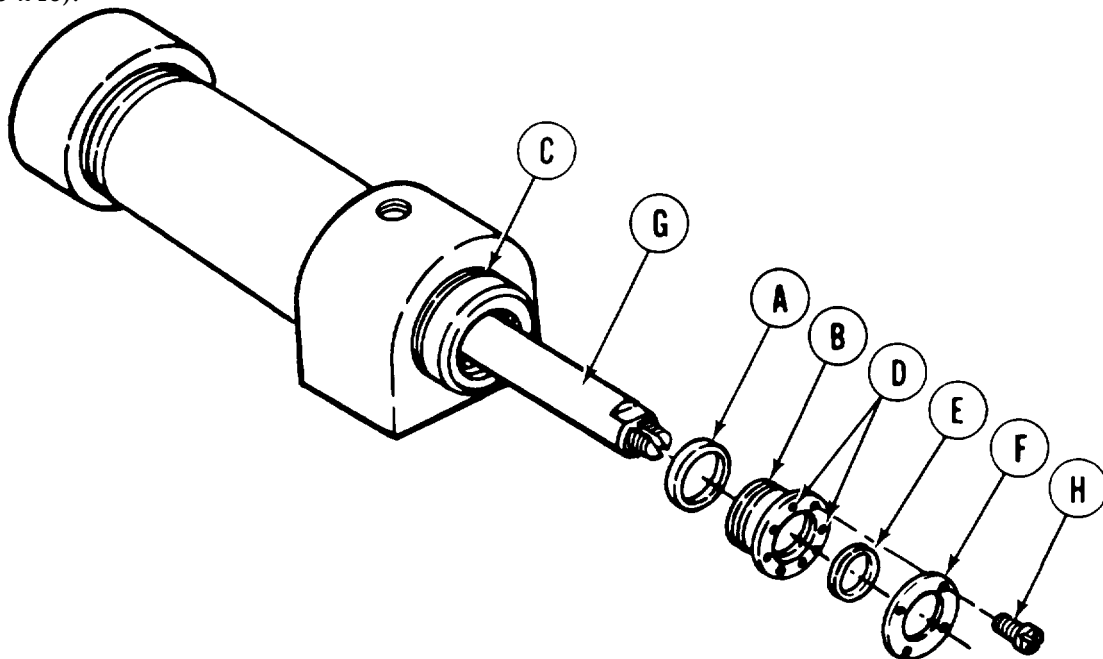
**WARNING**

**Cleaning agent specified is flammable. Use only in well ventilated areas. Keep away from flames, sparks, or heat. Do not smoke while using. Prevent contact with eyes, mouth, and/or skin. Wear rubber gloves when performing cleaning procedures.**

1. Using dry cleaning solvent, clean all metallic parts.
2. Using rags, dry all parts.
3. Inspect all parts for damage or wear. Replace all unserviceable parts.

## ASSEMBLY:

1. Install new wiper ring (A) in bushing (B).
2. Screw bushing (B) into retainer (C).
3. Using spanner wrench in unthreaded holes (D), tighten bushing (B) to retainer (C).
4. Install new wiper ring (E) in bushing (B).
5. Install retainer plate (F) on piston rod (G).
6. Using screwdriver, install four screws (H).
7. Remove tape from threads of piston rod (G).
8. Install ejection cylinders (pages 3-245 and 3-249).



TA251736

End of Task

PROCEDURE INDEX

PROCEDURE	PAGE
Disassembly	4-88
Cleaning and Inspection	4-90
Assembly	4-90

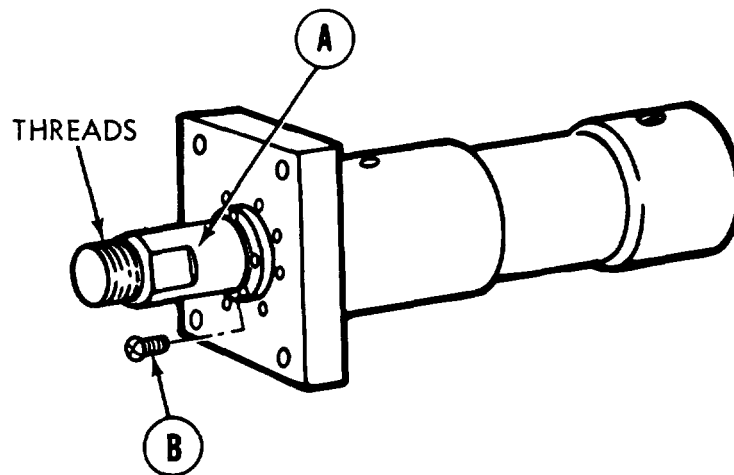
TOOLS: Cross-tip screwdriver  
 Ratchet with 3/8 in. drive  
 5/16 in. socket head screw attachment with 3/8 in. drive  
 Torque wrench with 1/2 in. drive (175 lb-ft capacity) (0 - 237 N-m)  
 Spanner wrench (adjustable face type 2 in. capacity)  
 Adapter 1/2 in. to 3/8 in. drive

SUPPLIES: Rags (Item 12, Appendix D)  
 Friction tape (Item 17, Appendix D)  
 Dry cleaning solvent (Item 15, Appendix D)  
 Preformed packing assembly  
 Wiper rings (2 required)  
 Spacer ring  
 Preformed packing  
 Gloves (Item 27, Appendix D)

PRELIMINARY PROCEDURE: Remove hold-down cylinder (page 3-254)

DISASSEMBLY:

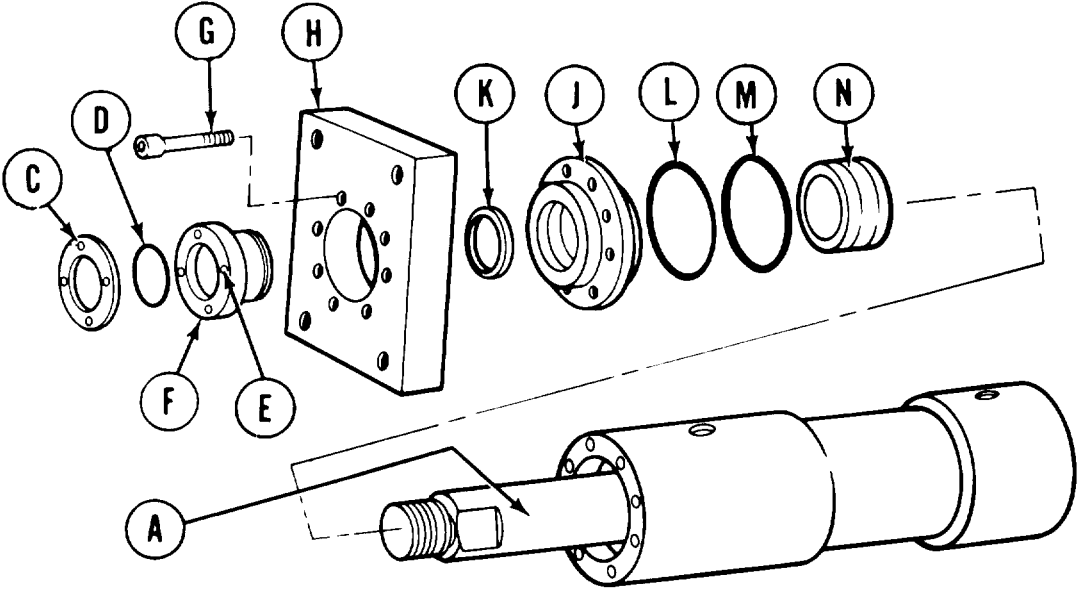
1. Cover threads of piston rod (A) with tape.
2. Using cross-tip screwdriver, remove four screws (B).



Go on to Sheet 2

TA251737

HOLD-DOWN CYLINDER REPAIR (Sheet 2 of 4)



- 3. Remove retainer plate (C) from piston rod (A).
- 4. Remove wiper ring (D) from piston rod (A). Throw wiper ring (D) away.
- 5. Using spanner wrench in unthreaded holes (E), remove bushing (F).
- 6. Using socket head screw attachment, remove eight screws (G).
- 7. Remove mount plate (H) and sleeve bushing (J).
- 8. Remove wiper ring (K) from sleeve bushing (J). Throw wiper ring (K) away.
- 9. Remove preformed packing (L) and spacer ring (M) from land ring (K). Throw preformed packing (L) and packing retainer (M) away.
- 10. Remove preformed packing assembly (N) from piston rod (A). Throw packing assembly (N) away.

Go on to Sheet 3

TA251738

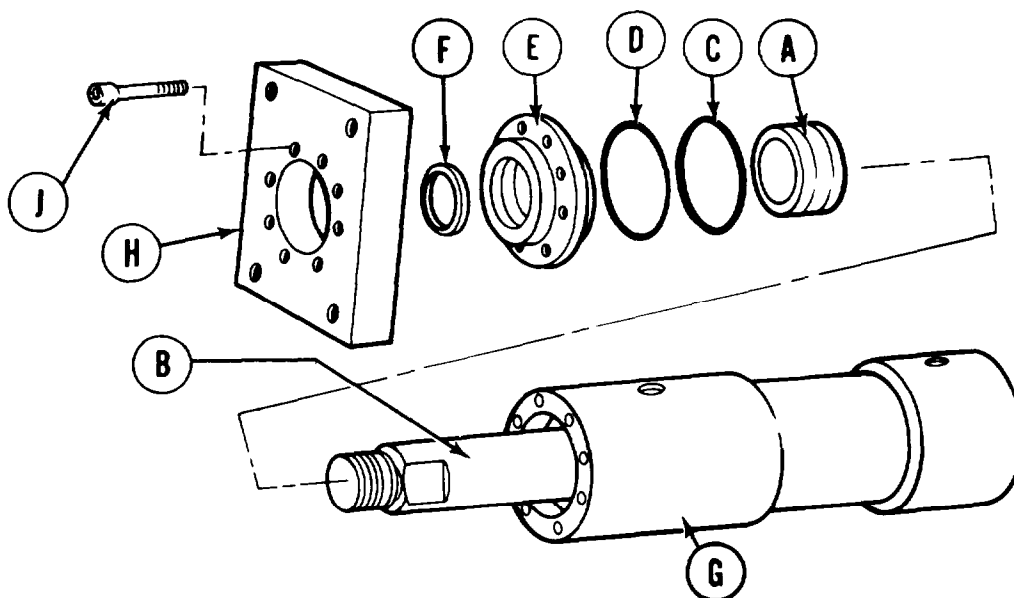
CLEANING AND INSPECTION:

**WARNING**

**Cleaning agent specified is flammable. Use only in well ventilated areas. Keep away from flames, sparks, or heat. Do not smoke while using. Prevent contact with eyes, mouth, and/or skin. Wear rubber gloves when performing cleaning procedures.**

1. Using dry cleaning solvent, clean all metallic parts.
2. Using rags, dry all parts.
3. Inspect all parts for damage or wear. Replace all unserviceable parts.

ASSEMBLY:



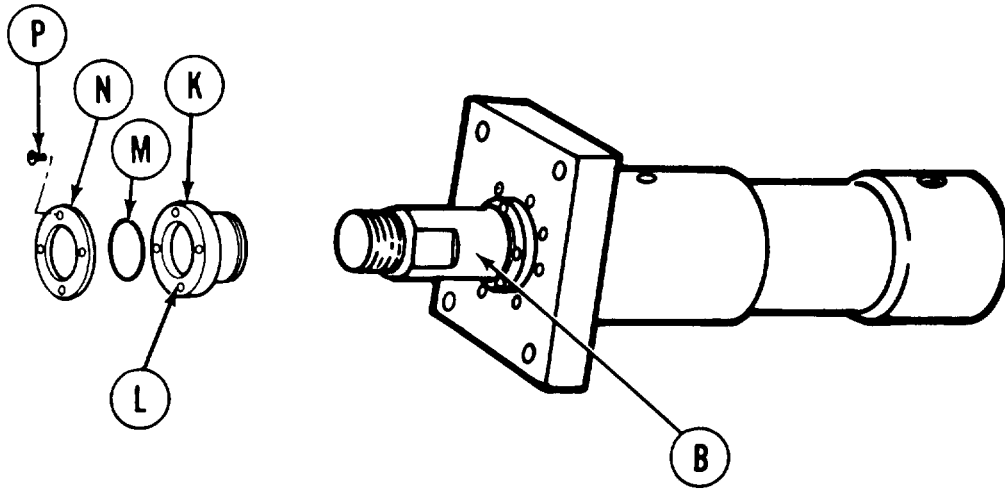
1. Install new preformed packing assembly (A) on piston rod (B).
2. Install new packing retainer (C) and new preformed packing (D) on land ring (E).
3. Install new wiper ring (F) in sleeve bushing (E).
4. , Install sleeve bushing (E) on piston rod (B) and aline holes with head (G).
5. Install mount plate (H) on piston rod (B) and aline holes with land ring (E) and head (G).
6. Using socket head screw attachment, loosely install eight screws (J).
7. Using torque wrench, adapter and socket head screw attachment, tighten screws (J) to 40 to 50 lb-ft (54-68 N-m).

Go on to Sheet 4

TA251739



HOLD-DOWN CYLINDER REPAIR (Sheet 4 of 4)



8. Install bushing (K) on piston rod (B).
9. Using spanner wrench in unthreaded holes (L), tighten bushing (K).
10. Install new wiper ring (M) on piston rod (B).
11. Install retainer plate (N) on piston rod (B) and align holes with threaded holes in bushing (K).
12. Using cross-tip screwdriver, install four screws (P).
13. Remove tape from threads of piston rod (B).
14. Install hold-down cylinder (page 3-255).

End of Task

TA251740

RESERVOIR QUADRANT REPLACEMENT (Sheet 1 of 4)

PROCEDURE INDEX

PROCEDURE	PAGE
Removal	4-92
Cleaning	4-94
Installation	4-94

TOOLS: 1-5/16 in. socket with 3/4 in. drive  
3/4 in. socket with 1/2 in. drive  
7/16 in. socket with 1/2 in. drive  
Ratchet with 3/4 in. drive  
Ratchet with 1/2 in. drive  
15 in. adjustable wrench  
Putty knife  
Lifting device (capable of lifting 500 lbs)  
Sling

SUPPLIES: Sealing compound (Item 13, Appendix D)  
Pipe tape (Item 19, Appendix D)  
Rags (Item 12, Appendix D)  
Dry cleaning solvent (Item 15, Appendix D)  
Lockwasher  
Star washer (2 required)  
Gloves (Item 27, Appendix D)

PERSONNEL: Three

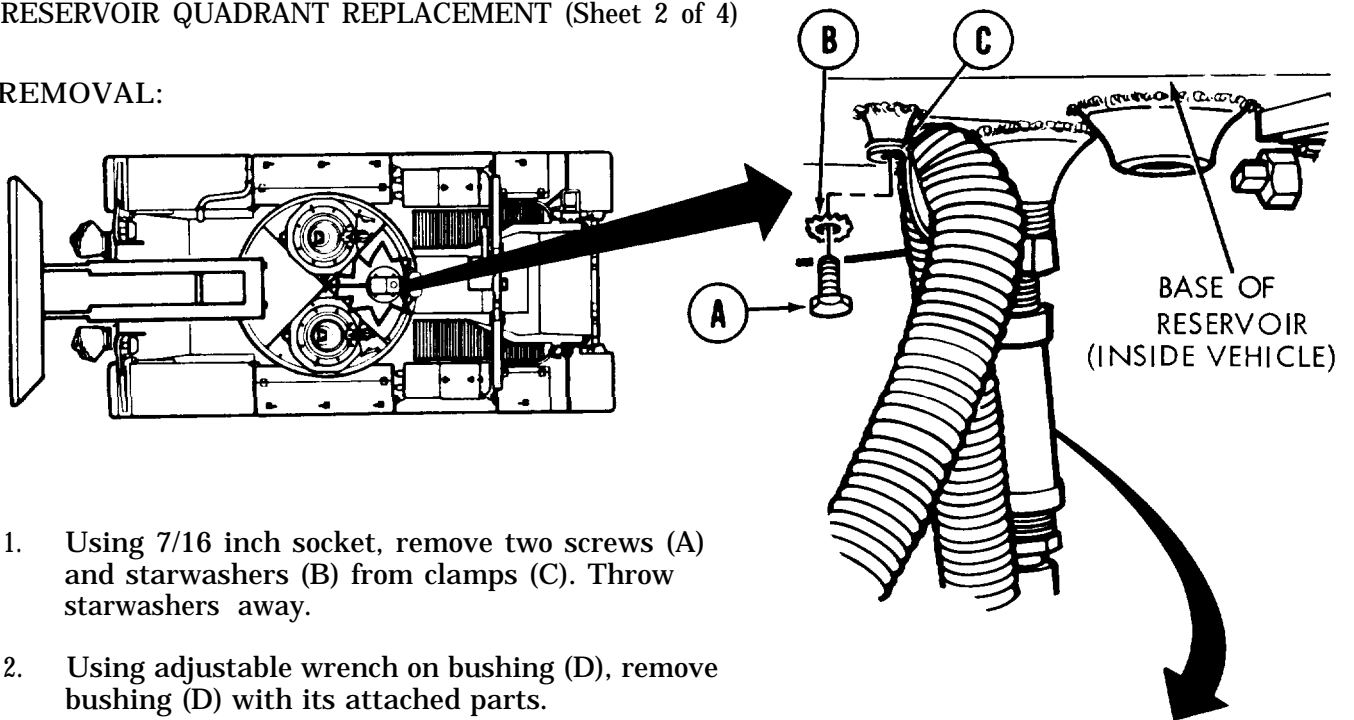
REFERENCE: LO 5-5420-202-12

PRELIMINARY PROCEDURES: Remove air filter (page 3-258)  
Remove oil strainer (page 3-257)  
Remove ventilator blower (page 3-2)  
Remove water can storage bracket (page 3-47)  
Remove accessories control box (page 3-7)  
Drain hydraulic reservoir (page 3-74)  
Remove drain valve (page 3-219)  
Remove master relief valve RV1 (page 3-90)  
Remove pump relief check valve CV5 (page 3-120)  
Remove reservoir return check valve CV8 (page 3-118)  
Remove hydraulic fluid filter assembly (page 3-208)

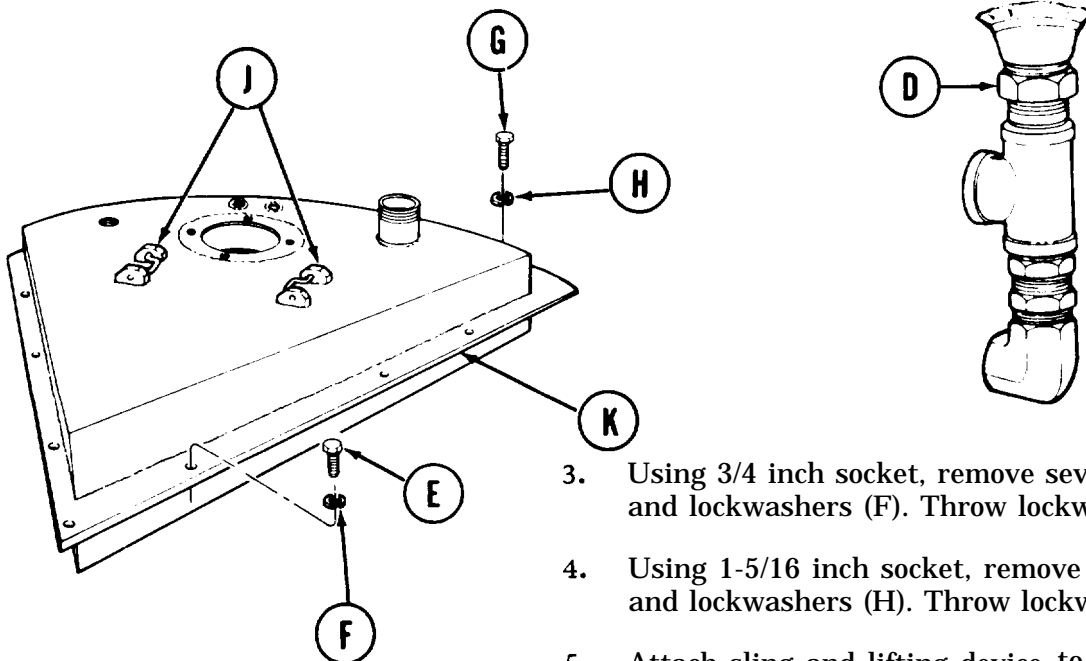
Go on to Sheet 2

RESERVOIR QUADRANT REPLACEMENT (Sheet 2 of 4)

REMOVAL:



1. Using 7/16 inch socket, remove two screws (A) and starwashers (B) from clamps (C). Throw starwashers away.
2. Using adjustable wrench on bushing (D), remove bushing (D) with its attached parts.



3. Using 3/4 inch socket, remove seven screws (E) and lockwashers (F). Throw lockwashers away.
4. Using 1-5/16 inch socket, remove four screws (G) and lockwashers (H). Throw lockwashers away.
5. Attach sling and lifting device to two handles (J).

CAUTION

Have a technician in vehicle watching while reservoir quadrant (K) is raised to insure hoses and wiring harnesses are not pulled out.

6. Have technician operating hoist lift reservoir quadrant (K) slowly from vehicle.

Go on to Sheet 3

TA251741

RESERVOIR QUADRANT REPLACEMENT (Sheet 3 of 4)

CLEANING:

1. Using putty knife, remove sealing compound from mating surfaces of reservoir quadrant and vehicle.

**WARNING**

**Cleaning agent specified is flammable. Use only in well ventilated areas. Keep away from flames, sparks, or heat. Do not smoke while using. Prevent contact with eyes, mouth, and/or skin. Wear rubber gloves when performing cleaning procedures.**

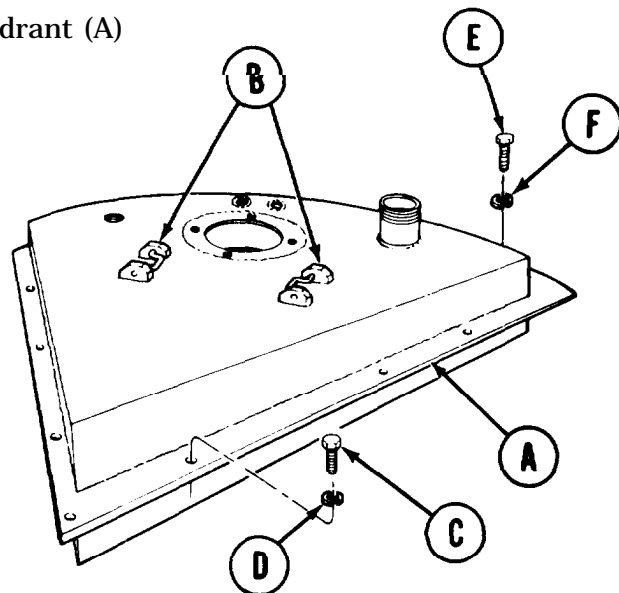
2. Clean using rags and dry cleaning solvent.

INSTALLATION:

**NOTE**

**Before installing, use pipe tape on all male threads. Start tape on second thread so tape will not enter hydraulic system.**

1. Using putty knife, apply sealant to mating surfaces of vehicle and reservoir quadrant (A).
2. Attach sling and lifting device to two handles (B).
3. Have technician operating hoist slowly lift quadrant (A) into position over vehicle.
4. While two technicians guide reservoir quadrant (A), have technician operating hoist slowly lower reservoir quadrant (A) into position on vehicle.
5. Remove lifting device and sling from two handles (B).
6. Using 3/4 inch socket, install seven screws (C) and lockwashers (D).
7. Using 1-5/16 inch socket, install four screws (E) and lockwashers (F).

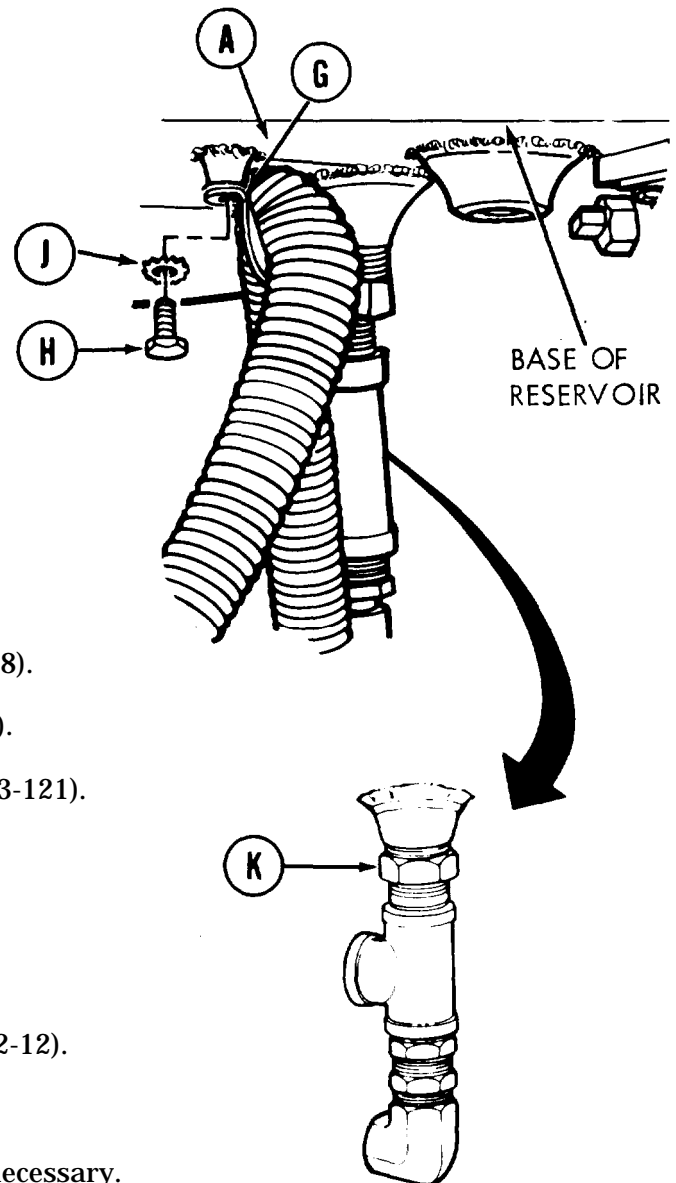


Go on to Sheet 4

TA251742

## RESERVOIR QUADRANT REPLACEMENT (Sheet 4 of 4)

8. Place two clamps (G) in position on reservoir quadrant (A).
9. Using 7/16 inch socket, install two screws (H) and starwashers (J).
10. Using adjustable wrench, install bushing (K) with its attached parts.
11. Install reservoir quadrant blower (page 3-4).
12. Install hydraulic reservoir filter assembly (page 3-207).
13. Install oil strainer (page 3-257).
14. Install air filter (page 3-259).
15. Install water can storage bracket (page 3-48).
16. Install return check valve CV8 (page 3-119).
17. Install pump relief check valve CV5 (page 3-121).
18. Install master relief valve RV1 (page 3-91).
19. Install drain valve (page 3-220).
20. Install accessories control box (page 3-7).
21. Service hydraulic reservoir (LO 5-5420-202-12).
22. Bleed hydraulic system (page 3-72).
23. Check for hydraulic leaks and correct as necessary.
24. Service hydraulic reservoir (LO 5-5420-202-12).



End of Task

TA251743

SMOKE GRENADE DISCHARGER WIRING HARNESS ASSEMBLY REPLACEMENT (Sheet 1 of 2)

TOOLS: 7/16 in. socket with 3/8 in. drive  
 Ratchet with 3/8 in. drive  
 Slip joint pliers, conduit style, with plastic jaw inserts

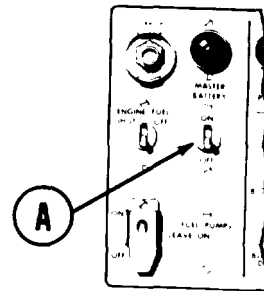
SUPPLIES: Lock washer

**WARNING**

**Make sure there are no smoke grenades in dischargers. Accidental firing of grenade could hurt or kill you**

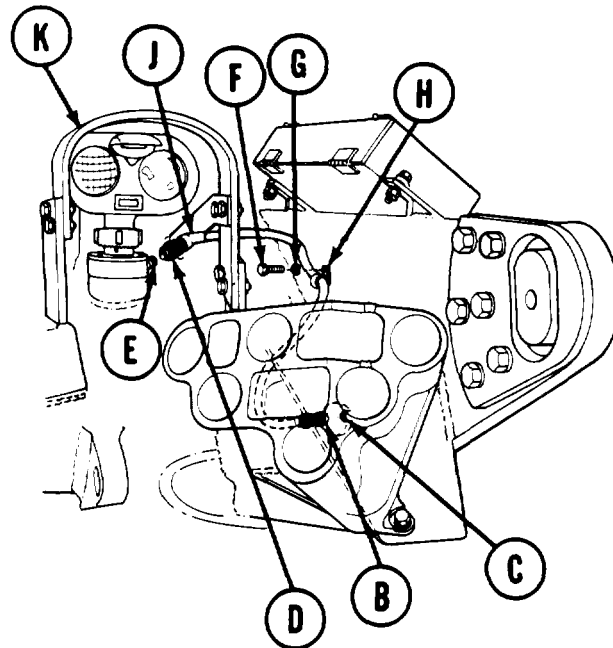
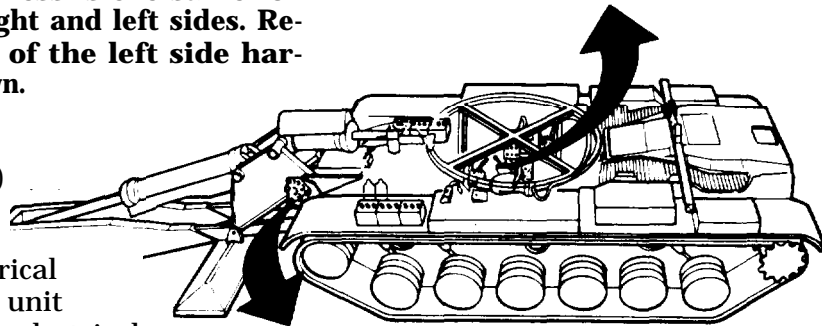
**NOTE**

**Replacement of the discharger wiring harness is the same for both the right and left sides. Replacement of the left side harness is shown.**



DRIVER'S STATION

1. Set MASTER BATTERY switch (A) to OFF.
2. Using pliers, disconnect electrical connector (B) from discharger unit receptacle (C) and disconnect electrical connector (D) from headlight adapter receptacle (E).
3. Using socket and ratchet, remove screw (F) and lockwasher (G) securing clamp (H) and harness (J) to headlamp guard (K).
4. Take clamp (H) off harness (J). Take harness (J) off vehicle.



Go on to Sheet 2

TA251744

## SMOKE GRENADE DISCHARGER WIRING HARNESS ASSEMBLY REPLACEMENT (Sheet 2 of 2)

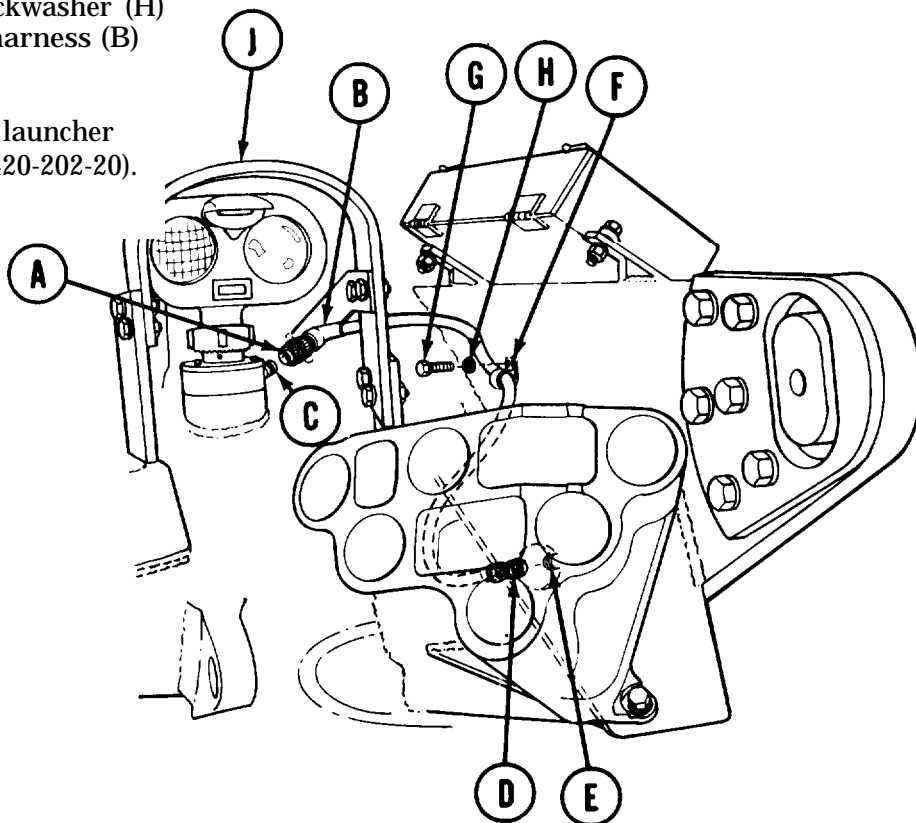
## INSTALLATION:

**WARNING**

**Make sure there are no smoke grenades in dischargers. Accidental firing of grenade could hurt or kill you.**

1. Connect electrical connector (A) of harness (B) to headlight adapter receptacle (C). Connect electrical connector (D) to discharger unit receptacle (E).
2. Put clamp (F) on harness (B).
3. Using socket and ratchet, install and tight-en screw (G) and lockwasher (H) to secure clamp (F) and harness (B) to headlamp guard (J).
4. Per form smoke grenade launcher functional check (TM 5-5420-202-20).

End of Task



TA251745

SMOKE GRENADE DISCHARGER REPLACEMENT (Sheet 1 of 2)

TOOLS: 3/4 in. socket with 1/2 in. drive  
6 in. extension with 1/2 in. drive  
Ratchet with 1/2 in. drive  
Slip joint pliers, conduit style, with plastic jaw inserts  
Torque wrench with 1/2 in. drive (0-175 lb-ft)

SUPPLIES: Thread locking compound (Item 7, Appendix D)

REMOVAL:

**WARNING**

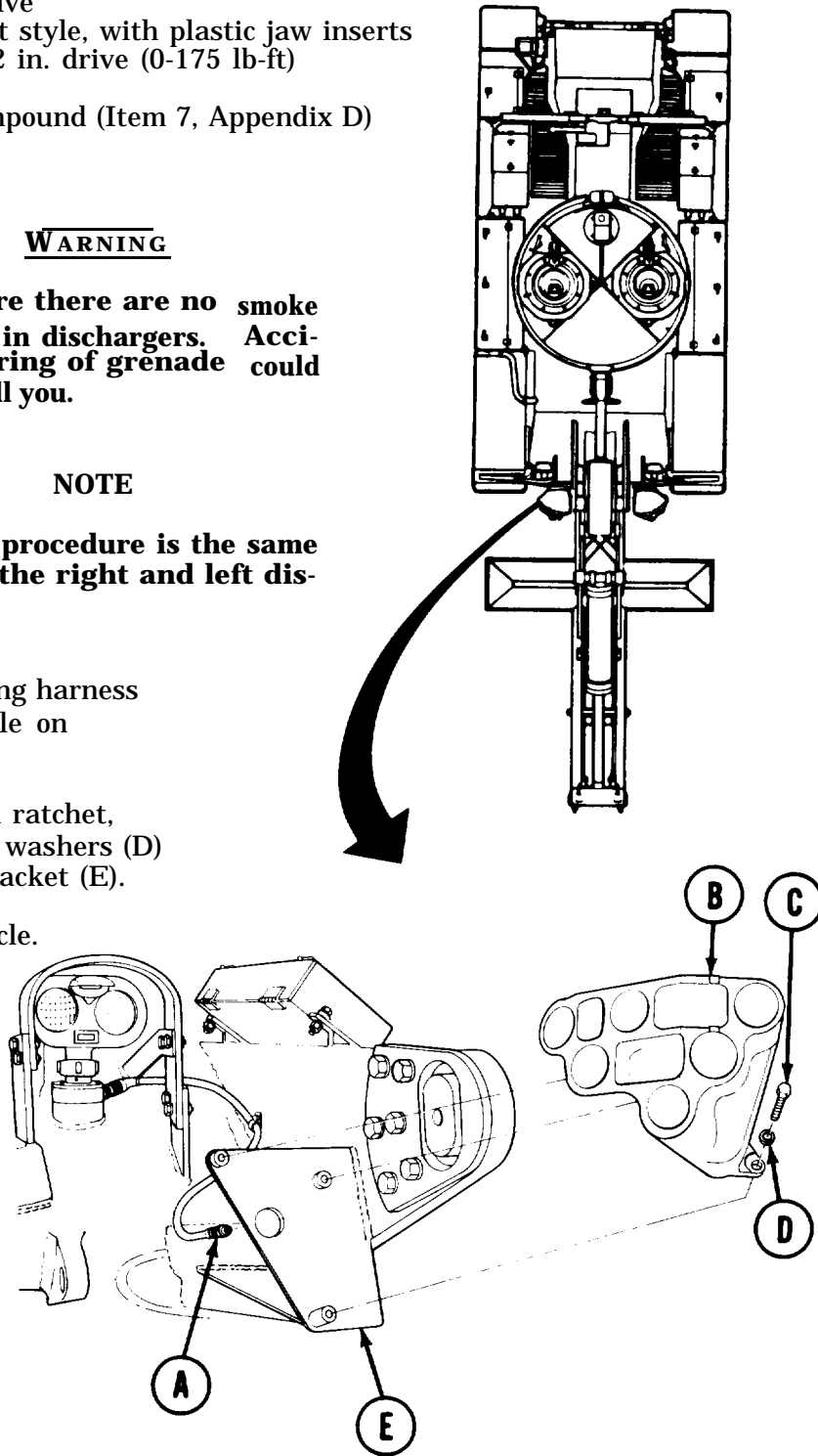
**Make sure there are no smoke grenades in dischargers. Accidental firing of grenade could hurt or kill you.**

**NOTE**

**Removal procedure is the same for both the right and left dischargers.**

1. Using pliers, disconnect wiring harness connector (A) from receptacle on back of discharger (B).
2. Using socket, extension, and ratchet, remove three screws (C) and washers (D) securing discharger (B) to bracket (E).
3. Take discharger (B) off vehicle.

Go on to Sheet 2



TA251746



## SMOKE GRENADE DISCHARGER REPLACEMENT (Sheet 2 of 2)

## INSTALLATION:

**WARNING**

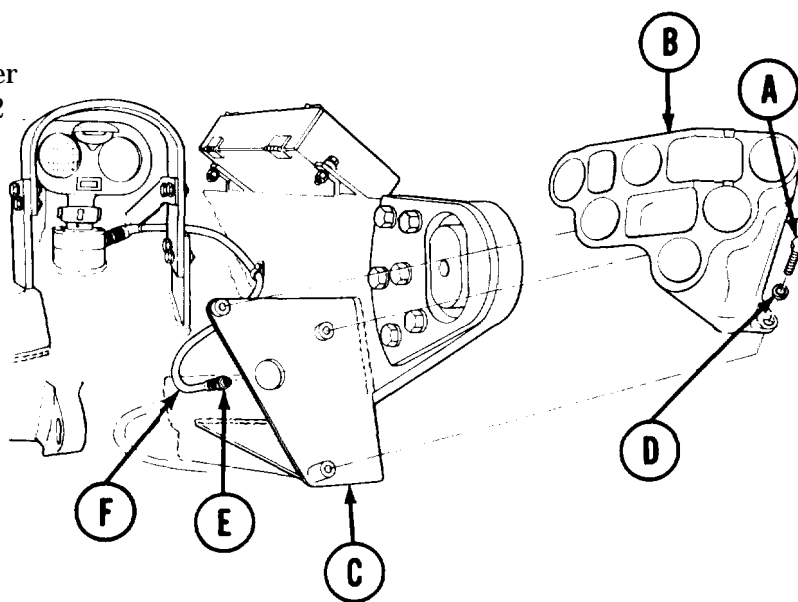
**Make sure there are no smoke grenades in dischargers. Accidental firing of grenade could hurt or kill you.**

**NOTE**

**Installation procedure is the same for both the right and left dischargers.**

1. Apply two to three drops of sealing compound to threads of three screws (A).
2. Put discharger (B) in position on bracket (C). Using socket, extension, and torque wrench, secure discharger (B) to bracket (C) with three screws (A) and washers (D). Tighten screws (A) to 55-74 lb-ft (75 to 100 N m).
3. Connect electrical connector (E) of discharger harness to receptacle on back of discharger (B).
4. Per form smoke grenade launcher functional check (TM 5-5420-202-2).

End of Task



TA251747

SMOKE GRENADE DISCHARGER BRACKET DUMMY RECEPTACLE REPLACEMENT  
(Sheet 1 of 2)

TOOLS: Slip joint pliers, conduit style, with plastic jaw inserts  
Flat-tip screwdriver

SUPPLIES: Lockwasher  
Gasket

REMOVAL:

**WARNING**

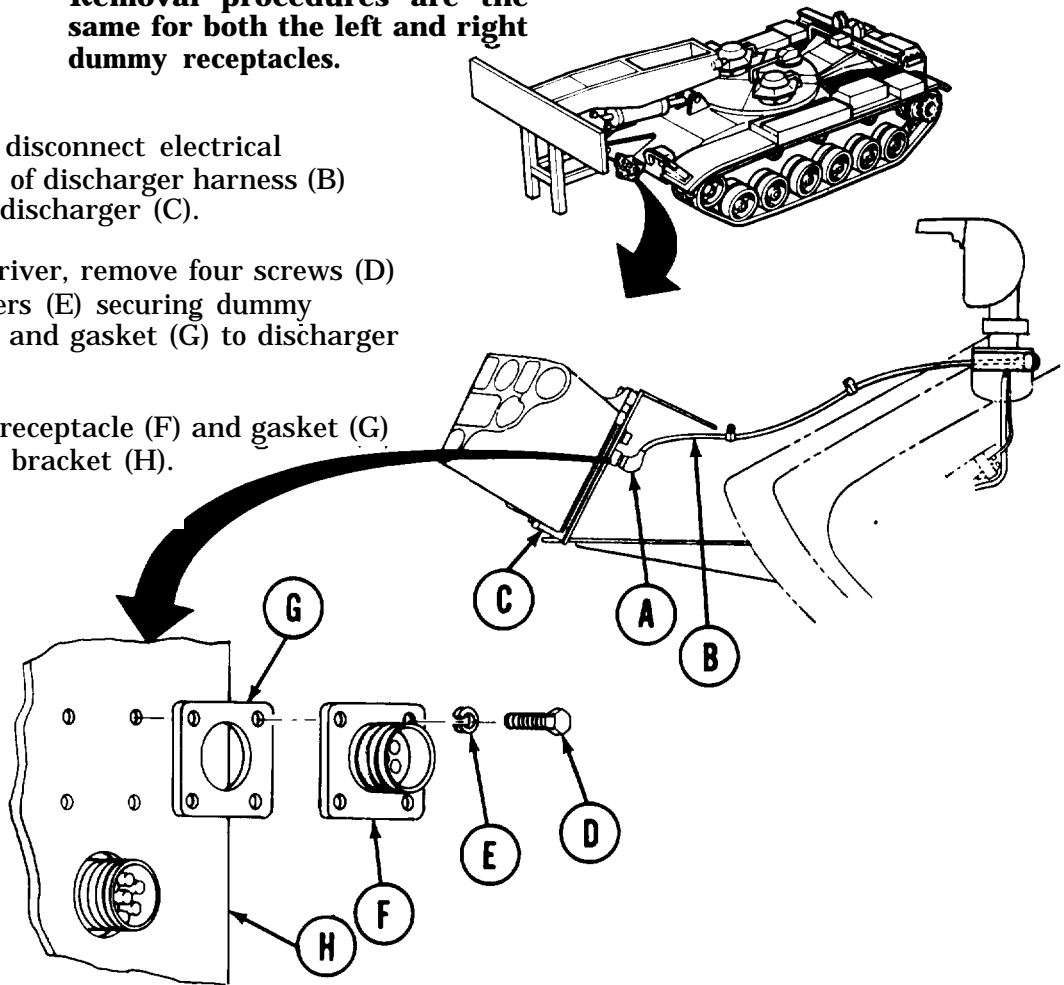
**Make sure there are no smoke grenades in dischargers. Accidental firing of grenade could hurt or kill you.**

**NOTE**

**Removal procedures are the same for both the left and right dummy receptacles.**

1. Using pliers, disconnect electrical connect or (A) of discharger harness (B) from back of discharger (C).
2. Using screwdriver, remove four screws (D) and lockwashers (E) securing dummy receptacle (F) and gasket (G) to discharger bracket (H).
3. Take dummy receptacle (F) and gasket (G) off discharger bracket (H).

Go on to Sheet 2



SMOKE GRENADE DISCHARGER BRACKET DUMMY RECEPTACLE REPLACEMENT  
(Sheet 2 of 2)

INSTALLATION:

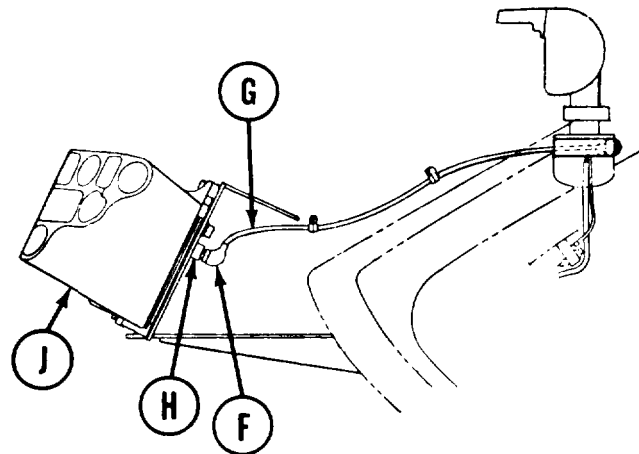
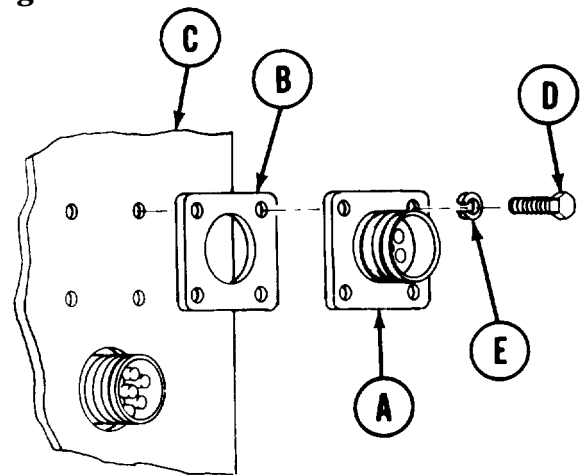
**WARNING**

**Make sure there are no smoke grenades in dischargers. Accidental firing of grenade could hurt or kill you.**

**NOTE**

**Installation procedures are the same for both the left and right dummy receptacles.**

1. Put dummy receptacle (A) and new gasket (B) in position on back of discharger bracket (C).
2. Using screwdriver, secure receptacle (A) and gasket (B) to discharger bracket (C) with four screws (D) and new lockwashers (E).
3. Connect electrical connector (F) of discharger harness (G) to receptacle (H) at back of discharger (J).
4. Perform smoke grenade launcher functional check (TM 5-5420-202-20).



End of Task

SMOKE GRENADE STOWAGE BOX REPLACEMENT (Sheet 1 of 1)

TOOLS: 9/16 in. combination box and open end wrench (2 required)

SUPPLIES: Lockwashers

**WARNING**

**Make sure smoke grenade stowage bin is empty before you replace it. Accidental discharge of smoke grenades could hurt or kill you**

**NOTE**

**Replacement procedure is the same for both left and right stowage boxes.**

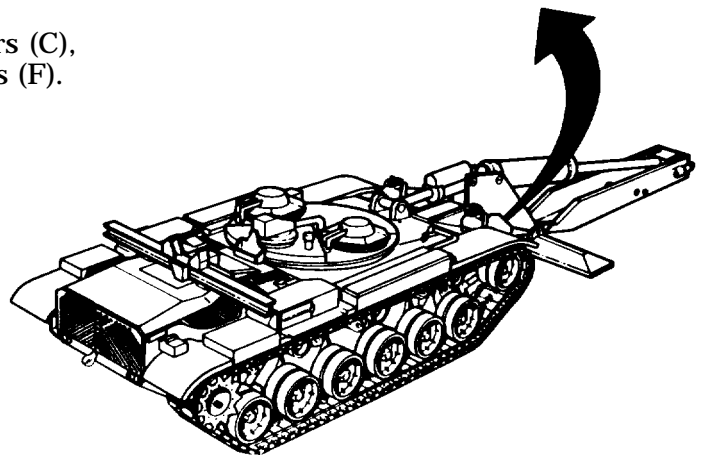
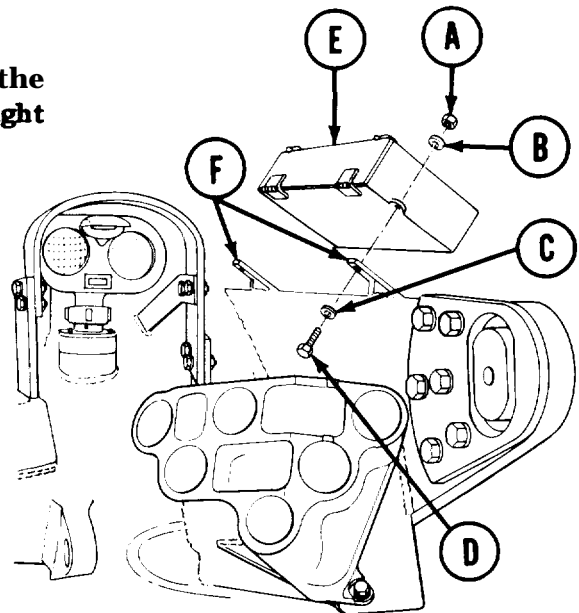
**REMOVAL:**

1. Using two wrenches, remove four screws (A), washers (B), lockwashers (C), and nuts (D) securing box (E) to two brackets (F).
2. Take box (E) off brackets (F).

**INSTALLATION:**

1. Put box (E) in position on two brackets (F).
2. Using two wrenches, install and tighten four screws (A), washers (B), lockwashers (C), and nuts (D) securing box (E) to brackets (F).

End of Task



## APPENDIX A

## REFERENCES

- AR 702-7 Reporting of Quality Deficiency Data
- LO 5-5420-202-12 Lubrication Order, Launcher and M60A1 Tank Chassis Transporting for Bridge, Armored-Vehicle-Launched, Scissoring Type, Class 60
- TM 5-5420-203-14 Operator's, Organizational, Direct Support and General Support Maintenance Manual, Bridge, Armored-Vehicle-Launched: Scissoring Type, Class 60
- TM 5-5420-202-10 Operator's Manual, Launcher and M60A1 Tank Chassis Transporting for Bridge, Armored-Vehicle-Launched, Scissoring Type, Class 60
- TM 5-5420-202-20 Organizational Maintenance Manual, M60A1 Tank Chassis, Transporting for Bridge, Armored-Vehicle-Launched, Scissoring Type, Class 60
- TM 5-5420-202-34 Direct Support and General Support Maintenance Manual, M60A1 Tank Chassis, Transporting for Bridge, Armored-Vehicle-Launched, Scissoring Type, Class 60
- TM 9-4910-571-12&P Operator, Organizational Maintenance Manual Including Repair Parts and Special Tools List for Simplified Test Equipment for Internal Combustion Engines (STE/ICE) (4910-00-124-2554)
- TM 11-5820-401-12 Operator's and Organizational Maintenance Manual Including Repair Parts and Special Tools Lists: Radio Sets AN/VRC-12 (5820-00-223-7412), AN/VRC-43 (5820-00-233-7415), AN/VRC-44 (5820-00-223-7417), AN/VRC-45 (5820-00-223-7418), AN/VRC-46 (5820-00-223-7433), AN/VRC-47 (5820-00-223-7434), AN/VRC-48 (5820-00-223-7435), AN/VRC-49 (5820-00-223-7437), AN/VRC-54 (5820-00-223-7567), and AN/VRC-55 (5820-00-402-2265); Mounting MT- 1029/VRC (5820-00-893-1323) and Mounting MT-1898/VRC (5820-00-893-1324); Antenna AT-912/VRC (5820-00-897-6357), Control Frequency Selector C-2742/VRC (5820-00-892-3343) and Control Radio Set C-2299/VRC (5820-00-892-3340)
- TM 11-5820-498-12 Operator's and Organizational Maintenance Manual Radio Sets AN/VRC-53 (NSN 5820-00-223-7467), AN/VRC-64 (5820-00-223-7475), AN/GRC-125 (5820-00-223-7411) and AN/GRC-160 (5820-00-223-7473) and Amplifier-Power Supply Groups OA-3633/GRC and OA-3633A/GRC (5820-00-973-3333)
- DA PAM 738-750 The Army Maintenance Management System (TAMMS)
- TM 740-90-1 Administrative Storage of Equipment
- TM 750-244-6 Procedures for Destruction of Tank-Automotive Equipment to Prevent Enemy Use



**APPENDIX B**  
**MAINTENANCE ALLOCATION CHART**  
**FOR**  
**LAUNCHER**  
**FOR BRIDGE, ARMORED-VEHICLE-LAUNCHED**  
**SCISSORING TYPE, CLASS 60**  
**NSN 5420-00-000-0000**

**SECTION L 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 responsibility for the performance of maintenance functions on the identified end item or component. The implementation of the maintenance functions upon the end item or component will be consistent with the assigned maintenance functions.
- c. Section III lists the special tools and test equipment required for each maintenance function as referenced from section II
- d. Section IV contains supplemental instructions and explanatory notes for a particular maintenance function.

**B-2. Maintenance functions.**

- a. **INSPECT.** To determine the serviceability of an item by comparing its physical, mechanical and/or electrical characteristics with established standards through examination.
- b. **TEST.** To verify serviceability and comparing those characteristics with prescribed standards.
- c. **SERVICE.** Operations required periodically to keep an item in proper operating condition, i.e., to clean (decontaminate) to preserve, to drain, to paint, or to replenish fuel, lubricants, hydraulic fluids, or compressed air supplies.
- d. **ADJUST.** To maintain, within prescribed limits, by bringing into proper or exact position, or by setting the operating characteristics to specified parameters.
- e. **ALIGN.** To adjust specified variable elements of an item to bring about optimum or desired performance.
- f. **CALIBRATE.** To determine and cause corrections to be made or to be adjusted on instruments or test measuring and diagnostic equipments used in precision measurement. Consists of comparisons of two instruments, one of which is a certified standard of known accuracy, to detect and adjust any discrepancy in the accuracy of the instrument being compared.
- g. **INSTALL.** The act of emplacing, seating, or fixing into position an item, part, or module (component or assembly) in a manner to allow the proper functioning of an equipment or system.
- h. **REPLACE.** The act of substituting of a serviceable like type part, subassembly, or module (component or assembly) for an unserviceable counterpart.
- i. **REPAIR.** The application of maintenance service or other maintenance actions to 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) necessary to restore an item to a completely serviceable/operational condition as prescribed by maintenance standards (i.e., DMWR) in appropriate technical publications. 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 service/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 equipments/components.

B.3. Column entries. Columns used in the maintenance allocation chart will be limited to those shown. Entries for these columns are explained below:

a. COLUMN 1. Group Number, Column 1 list group numbers, the purpose of which is to identify components, assemblies, subassemblies, and modules with the next higher assembly.

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

c. COLUMN 3. Maintenance Functions. Column 3 lists the functions to be performed on the item listed in Column 2.

d. COLUMN 4. Maintenance Category. Column 4 specifies, by the listing of a "work time" figure in the appropriate subcolumn(s), the lowest level of maintenance authorized to perform the function listed in Column 3. This figure represents the active time required to perform that maintenance function at the indicated category of maintenance. If the number or complexity of the tasks within the listed maintenance function vary at different maintenance categories, appropriate "work time" figures will be shown for each category. The number of man-hours specified by the "work time" figure represents the average time required to restore an item to a serviceable condition under typical field operating conditions. This time includes preparation time, troubleshooting 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.

e. COLUMN 5. Tools and Equipment. Column five (5) specifies by code, those common tool sets and special tools, test, and support equipment required to perform the designated function.

f. COLUMN 6. Remarks. Column six (6) contains an alphabetic code which leads to the remark in section IV, Remarks, which is pertinent to the item opposite the particular code.

B-4. Column Entries Used in *Tool and Test Equipment Requirements*.

a. COLUMN 1. Tool or Test Equipment Reference Code. The tool or test equipment reference code correlates with maintenance function on the identified end item or component.

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/NATO Stock Number. The National or NATO stock number of the tool or test equipment.

e. COLUMN 5. Tool Number. The manufacturer's part number.

B-5. Explanation of Columns in *Remarks, Section IV*.

a. COLUMN 1. Reference Code. The code recorded in column 4, section II.

b. COLUMN 2. Remarks. This column list information pertinent to the maintenance level being performed as indicated in the MAC, section II, column 4.



Section II. MAINTENANCE ALLOCATION CHART

(1) Group Number	(2) Component/ Assembly	(3) Maintenance function	(4) Maintenance Category *					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
0616	Blower Assy., Ventilating	Inspect Test Replace Repair		0.1  2.0	0.1  4.0			14, 18, 20 5 14, 18	
0616	Control, Box, Ventilating Blower	Inspect Test Replace Repair		0.2 0.5 0.5	0.5			5, 6, 8 5 14, 18	
1803	Hatches, Right & Left Sides	Inspect Service Replace Repair	0.1 0.1	0.5 0.5				5 5	
1803	Door, Periscope, Right & Left Side	Inspect Service Replace Repair	0.1 0.1	0.5 0.5				5 5	
1803	Cupola Assy., Right & Left Side	Inspect Service Adjust Replace Repair	0.1 0.1	0.5 1.4 0.8				5 5, 6, 8 5	
1803	Block, Prism	Inspect Replace	0.1	0.5				5	
1803	Latch, Safety Cover	Inspect Service Replace	0.1 0.1	0.5				5	
2400	Boom assembly	Inspect Service Replace Repair	0.1 0.1		3.0 6.0			5, 16, 17, 19 10, 13, 17	

\*The subcolumns are as follows:

C-operator/crew  
O-organizational  
F-direct support

H-general support  
D-Depot

\*\*Indicates WT/MH required

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Section 11. MAINTENANCE ALLOCATION CHART - Continued

(1) Group Number	(2) Component/ Assembly	(3) Maintenance function	(4) Maintenance Category *					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
2400	Tongue assembly	Inspect Service Replace Repair	0.1 0.1		0.0 6.0			5, 16, 17, 19 10, 13, 17	
2400	Seat, bridge assembly	Inspect Replace Repair	0.1	3.2 0.8	0.8			5, 6, 8 5, 10, 13, 17	A
2401	Pump & Clutch Support	Inspect Replace Repair		0.1	26.0 1.0			5, 17, 19 10, 13, 17	
2401	Clutch Assembly	Inspect Service Adjust Replace Repair Overhaul		0.1 0.1 0.5	26.0 6.0		24.0	6, 8 5 5, 17, 19 5, 17, 19 5, 11, 12	
2401	Controls, clutch	Service Replace	0.1		0.5			5, 17, 19	
2401	Universal joint	Inspect Service Replace Repair		0.1				5	
				1.6 2.0				5 5	
2401	Pump, hydraulic	Inspect Replace Repair Overhaul	0.1		26.0	6.0	6.0	5, 17, 19 5, 12, 17 11, 12	
2402	Valves, Check, flow & relief	Adjust Replace		0.5 3.0				1, 2, 3, 4, 5 5, 6, 8	
2402	Valve bank assy.	Inspect Replace Repair Overhaul	0.1		8.0 6.0		8.0	5, 17, 19 5, 16, 17 5, 11, 12, 16, 19	

\*The subcolumns are as follows:

C-operator/crew  
O-organizational  
F-direct support

H-general support  
D-Depot

\*\*Indicates WT/MH required

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Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) Group Number	(2) Component/ Assembly	(3) Maintenance function	(4) Maintenance Category *					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
2402	Manifold Armor	Inspect Replace Repair		0.2 0.5				5 5, 7, 8, 9, 10	
2403	Controls & lever:	Inspect Replace Repair	0.1	0.3 0.3				5 5, 7, 9, 10	
2406	Filter	Service Replace	1.0	10 3.8				5, 6, 8 5, 6, 8	
2406	Fitting, Tube & Pipe	Inspect Replace	0.1	0.5				5, 6, 8	
2406	Hose Assemblies	Inspect Replace	0.1	0.5				5, 6, 8	
2406	Hose Armor	Inspect Replace Repair	0.1	0.3 0.3				5 7, 8, 9, 10	
2407	Overhead Cylinder	Inspect Replace Repair Overhaul	0.1	4.0	6.0		8.0	5, 6, 8 16, 17, 19 11, 12, 16, 19	
2407	Tongue Cylinder	Inspect Replace Repair Overhaul	0.1	4.0	6.0		8.0	5, 6, 8 16, 17, 19 11, 12, 16, 19	
2407	Ejection Cylinder	Inspect Replace Repair Overhaul	1.0	2.0	4.0		6.0	5, 6, 8 16, 17, 19 11, 12, 16, 19	
2407	Holddown Cylinder	Inspect Replace Repair Overhaul	1.0	2.0	4.0		6.0	5,6, 8 16, 17, 19 11, 12, 16, 19	

\*The subcolumns are as follows:

C-operator/crew  
O-organizational  
F-direct support

H-general support  
D-Depot

\*\*Indicates WT/MH required

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Section II. MAINTENANCE ALLOCATION CHART - Continued

(1) Group Number	(2) Component/ Assembly	(3) Maintenance function	(4) Maintenance Category *					(5) Tools and equipment	(6) Remarks
			C	O	F	H	D		
2407	Locking Cylinder	Inspect Replace Repair Overhaul	1.0	2.0	4.0		6.0	5, 6, 8 16, 17, 19 11, 12, 16, 19	
2407	Cylinder Armor (Overhead)	Inspect Replace Repair	1.0	0.4 0.5				5 7, 8, 9, 10	
2407	Cylinder Armor (Tongue)	Inspect Replace Repair	1.0	0.4 0.5				5 7, 8, 9, 10	
2407	Cylinder Armor (Holddown)	Inspect Replace Repair	1.0	0.2 0.5				5 7, 8, 9, 10	
2408	Reservoir Hydraulic	Inspect Replace Repair	1.0		7.0 3.0			5, 17, 19 10, 11, 13	
2408	Breather hood	Service Replace	0.1	0.1				5	
6714	Antenna Base Armor	Inspect Replace Repair	0.1	0.2 0.5				5 7, 8, 9, 10	

\*The subcolumn are as follows:

C-operator/crew  
O-organizational  
F-direct support

H-general support  
D-Depot

l \*Indicates WT/MH required

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## SECTION III. SPECIAL TOOL AND TEST EQUIPMENT REQUIREMENTS

(1) Reference code	(2) Maintenance level	(3) Nomenclature	(4) National/NATO stock number	(5) Tool number
1	o	Adapter, Ell Male 90°	4730-00-580-7469	518428 (8D212)
2	0	Adapter, Straight	4730-00-994-8794	980693 (61848)
3	0	Gage, Pressure, Dial Indicating	6685-00-581-5186	980279 (61848)
4	0	Hose Assembly	4720-01-017-2241	981005 (61848)
COMMON TOOL SETS				
5	O,F,H,D	Tool Kit, General	5180-00-177-7033	
6	o	Shop Equipment, Automotive Maintenance, OM, Common # 1	4910-00-754-0654	
7	0	Shop Equipment, Automotive Maintenance, OM, Suppl. #1	4910-00-754-0653	
8	0	Shop Equipment, Automotive Maintenance, OM, Suppl. #2	4940-00-754-0743	
9	0	Shop Equipment, Automotive Maintenance, OM, Common #2	4910-00-754-0650	
10	O,F,H,D	Tool Kit, Welder's	5180-00-754-0661	
11	F,H,D	Shop Equipment, Machine Shop, FM	3470-00-754-0708	
12	H,D	Shop Equipment, General	4940-00-287-4894	
13	F,H,D	Shop Equipment, Welding, FM	4940-00-357-7268	
14	F,H,D	Tool Kit, Automotive Fuel and Electric	4910-00-754-0655	
15	o	Tool Kit, Electronic Equip.	5180-00-064-5178	

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SECTION III. SPECIAL TOOL AND TEST EQUIPMENT REQUIREMENTS - Continued

(1) Reference code	(2) maintenance level	(3) Nomenclature	(4) National/NATO stock number	(5) Tool number
		COMMON TOOL SETS (Continue		
16	F,H,D	Shop Equipment, Automotive Repair FM, Supplement # 1	4910-00-754-0706	
17	F,H,D	Shop Equipment, Contact Main.	4940-00-294-9518	
18	F,H,D	Shop Equipment, Electric Repair	4940-00-294-9542	
19	F,H,D	Shop Equipment, Automotive Maintenance, FM, Basic	4910-00-754-0705	
20	F,H,D	Shop Set, Fuel & Electric System, FM	4940-00-754-0714	

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## SECTION IV. REMARKS

Reference code	Remarks
A	Repair at Organizational Maintenance level is limited to procedures in TM 5-5420-228-24 and does not include welding.

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B-9/B-10 (blank)





## APPENDIX C

## GENERAL MAINTENANCE

<u>Procedure</u>	Page
Inspection and Repair of Welds	C-2
Inspection, Care, and Maintenance of Antifriction Bearings	C-2
Inspection and Repair of Cast Parts and Machined Surfaces	C-3
Inspection and Repair of Splines	C-5
Cleaning Threads and Nuts	C-7
Loosening and Removing Nuts	C-8
Cutting Nuts	C-9
Bolt Removal	C-10
Removal of Studs Broken at Surface	C-11
Removal of Studs Broken Below Surface	C-14
Removal of Studs Broken Above Surface	C-17
Installation of New Studs	C-18
Dowel Pin Removal	C-19
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Spring Pin Installation	C-22
Hand Lubrication of Bearings	C-23
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Inspection and Repair of Gears	C-27
Safety Wiring Procedures	C-28
Single Fastener Double-Twist Safety Wiring	C-30
Castellated Nuts on Undrilled Stud Double-Twist Safety Wiring	C-31
Multiple Fastener Double-Twist Safety Wiring	C-32
External Snap Ring Single Wire Safety Wiring	C-33
Small Screws In Closely Spaced, Closed Geometrical Pattern Single Wire Safety Wiring	C-34

**GENERAL MAINTENANCE - Continued**

**Inspection and Repair of Welds**

1. Inspect and repair welds in accordance with TM 9-237.
2. Military specifications referenced in this manual will be used as mandatory guidelines beyond the scope of TM 9-237 during welding processes.
3. When welding requirements are beyond organizational capabilities, notify support maintenance personnel.

**Inspection, Care, and Maintenance of Antifriction Bearings. Refer to TM 9-214**

## GENERAL MAINTENANCE (Sheet 2 of 33)

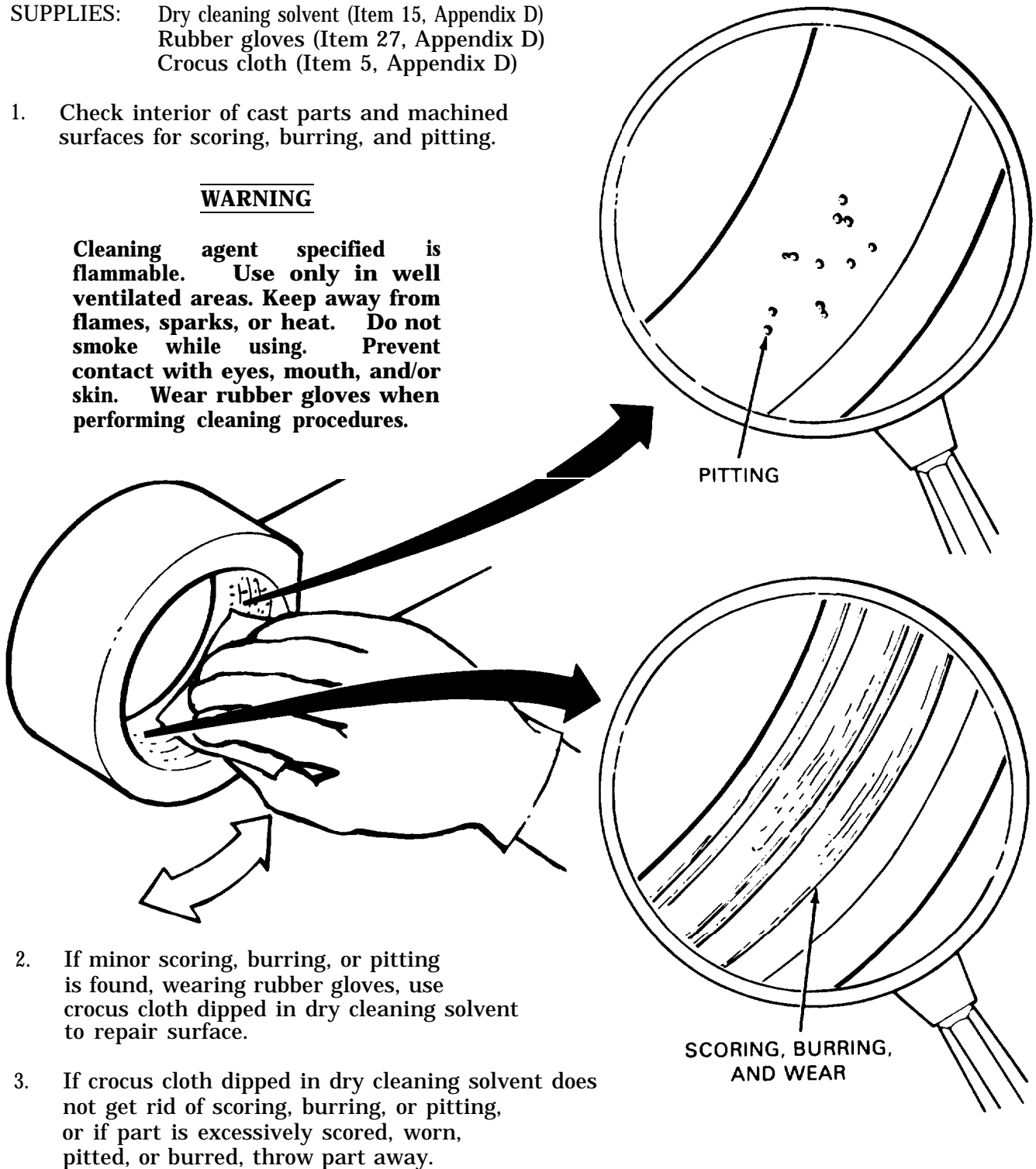
## Inspection and Repair of Cast Parts and Machined Surfaces (Sheet 1 of 2)

SUPPLIES: Dry cleaning solvent (Item 15, Appendix D)  
 Rubber gloves (Item 27, Appendix D)  
 Crocus cloth (Item 5, Appendix D)

1. Check interior of cast parts and machined surfaces for scoring, burring, and pitting.

**WARNING**

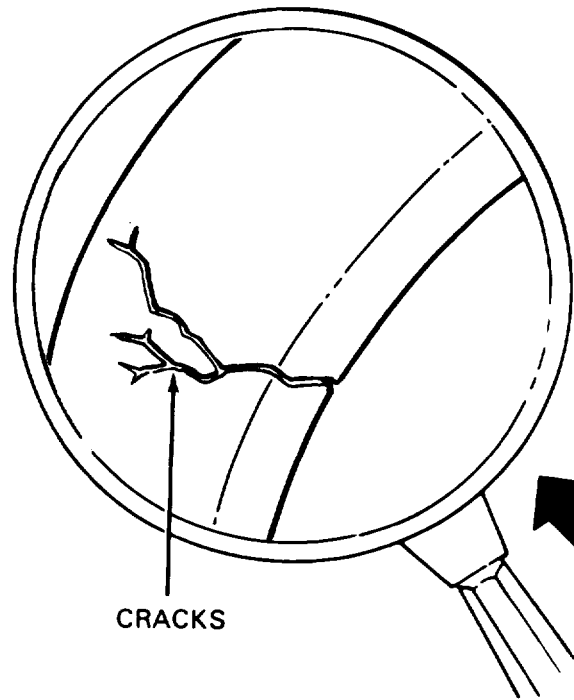
Cleaning agent specified is flammable. Use only in well ventilated areas. Keep away from flames, sparks, or heat. Do not smoke while using. Prevent contact with eyes, mouth, and/or skin. Wear rubber gloves when performing cleaning procedures.



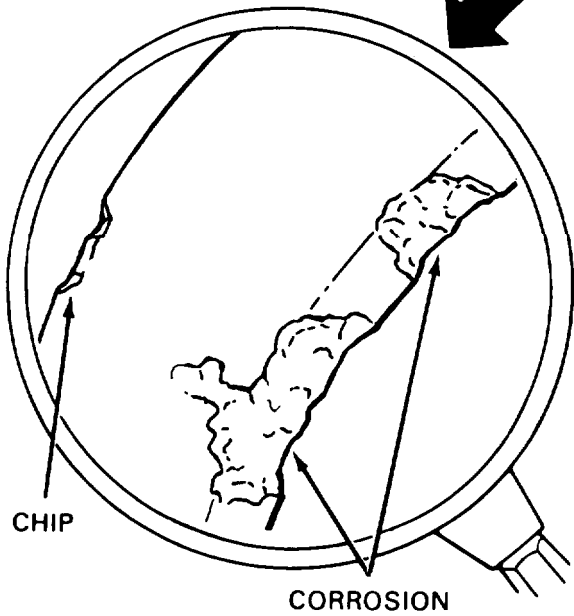
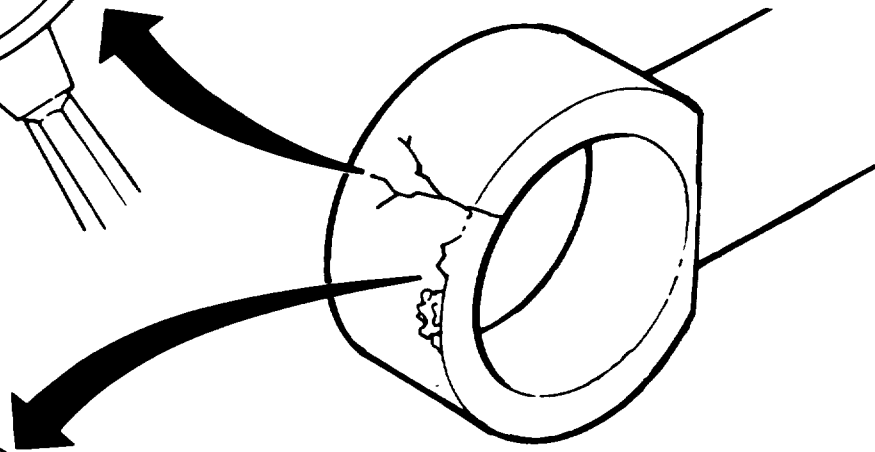
2. If minor scoring, burring, or pitting is found, wearing rubber gloves, use crocus cloth dipped in dry cleaning solvent to repair surface.
3. If crocus cloth dipped in dry cleaning solvent does not get rid of scoring, burring, or pitting, or if part is excessively scored, worn, pitted, or burred, throw part away.

Go on to Sheet 2

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Check exterior parts and machined surfaces for cracks, chipping, and corrosion.



5. Throw part away if cracked, chipped, or heavily corroded.

End of Task

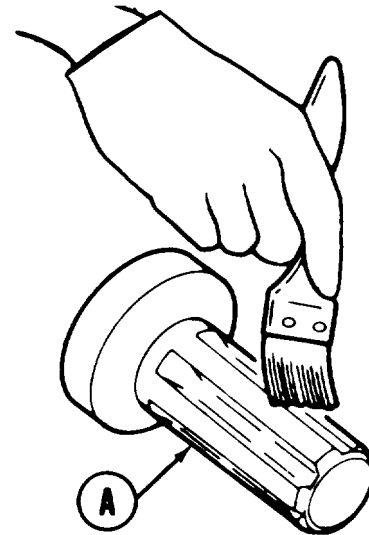
TA251274

GENERAL MAINTENANCE (Sheet 4 of 33)

Inspection and Repair of Splines (Sheet 1 of 2)

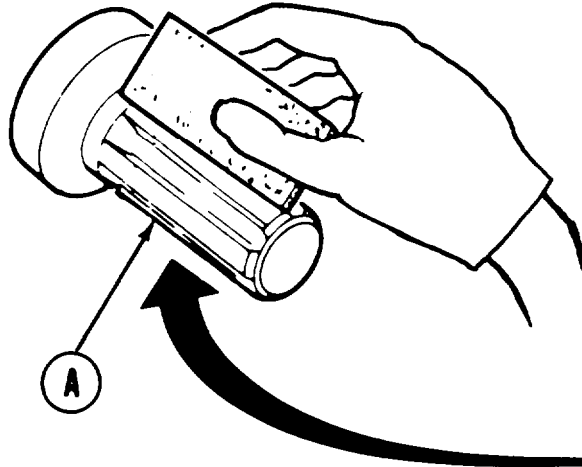
TOOLS: Hand file  
 Hand oiler  
 1/4 in. paint brush

SUPPLIES: Dry cleaning solvent (Item 15, Appendix D)  
 Rubber gloves (Item 27, Appendix D)  
 Crocus cloth (Item 5, Appendix D)  
 Clean rags (Item 12, Appendix D)  
 Lubricating oil (Item 10, Appendix D)  
 Protective wrapping (if required)



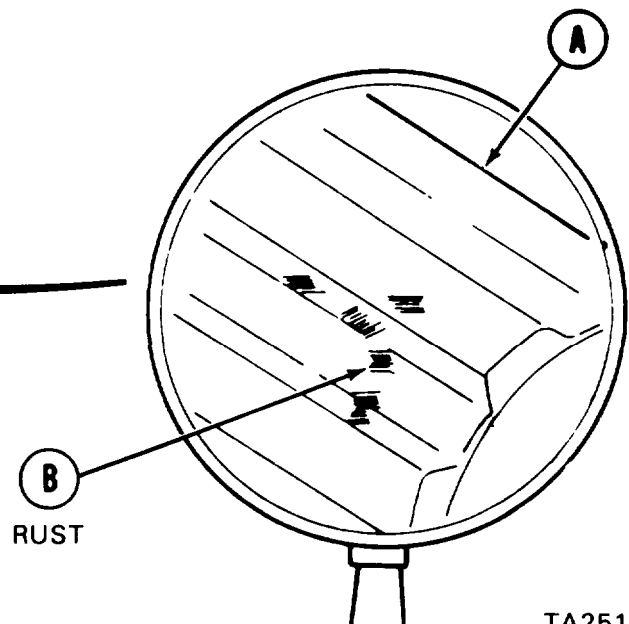
**WARNING**

**Dry cleaning solvent P-D-680 is toxic and flammable. To prevent personal injury, wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point for Type #1 Dry Cleaning Solvent is 100°F (38°C) and for Type #2 is 138°F (50°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.**



1. Wearing gloves, use dry cleaning solvent and brush to clean spline (A). Make sure all traces of grease and dirt are gone.

2. Using clean rag, wipe spline (A) dry.
3. Check spline (A) for signs of rust (B).
4. Using crocus cloth, rub rust (B) off spline (A).



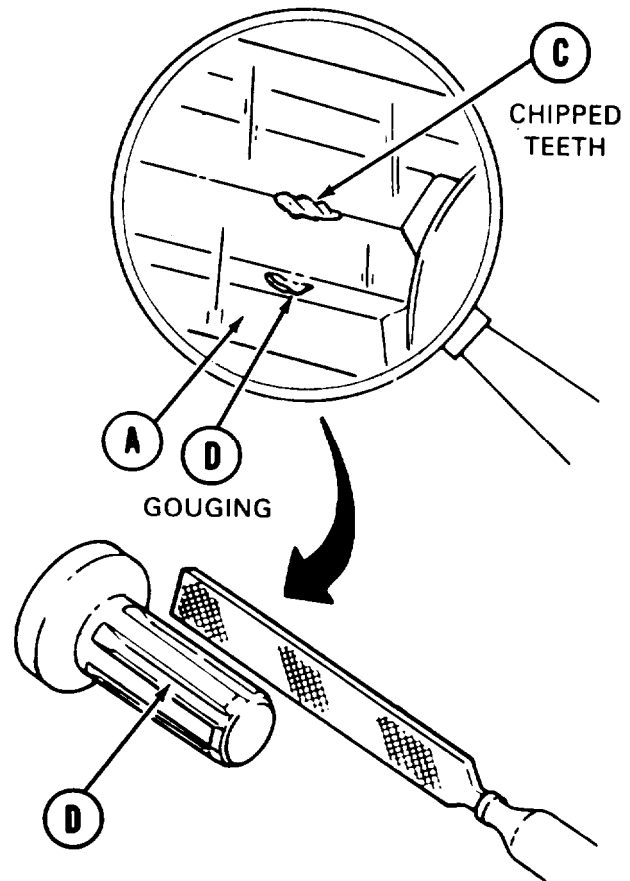
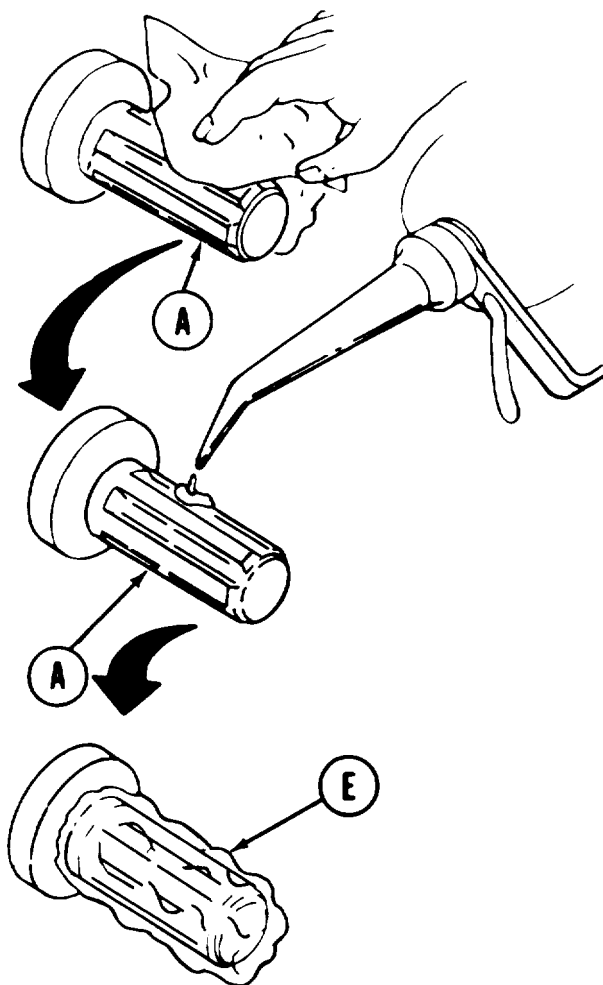
Go on to Sheet 2

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GENERAL MAINTENANCE (Sheet 5 of 33)

Inspection and Repair of Splines (Sheet 2 of 2)

5. Check for chipped teeth (C) and gouging (D) on face of spline (A).
6. Using hand file, get rid of sharp edges or light gouging (D).
7. Using rag dampened with dry cleaning solvent, wipe metal chips and metal dust from spline (A).



NOTE

Do steps 8 and 9 only if spline (A) will not be used right away,

8. Using oil, coat spline (A).
9. Using protective wrapping (E), wrap spline (A).

End of Task

TA251276

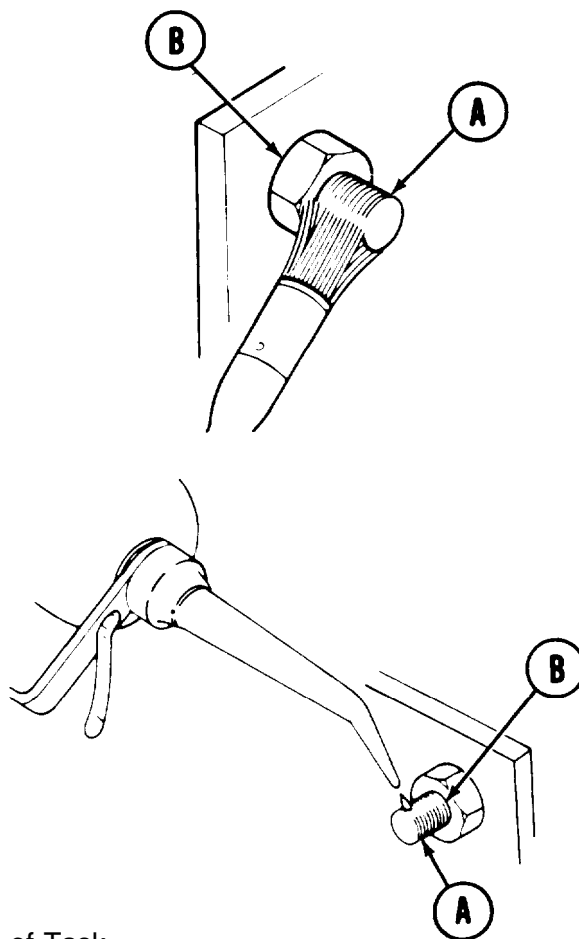
**GENERAL MAINTENANCE (Sheet 6 of 33)****Cleaning Threads and Nuts (Sheet 1 of 1)**

TOOLS: Wire brush  
 1/4 in. paint brush  
 Hand oiler

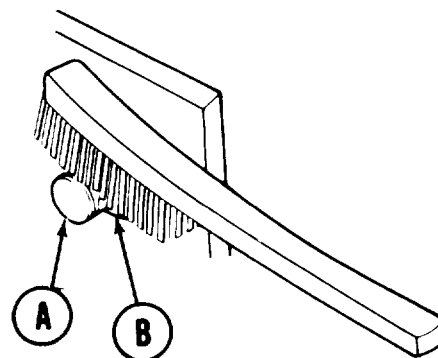
SUPPLIES: Dry cleaning solvent (Item 15, Appendix D)  
 Penetrating oil (Item 11, Appendix D)  
 Rubber gloves (Item 27, Appendix D)

**WARNING**

Dry cleaning solvent P-D-680 is toxic and flammable. To prevent personal injury, wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point for Type #1 Dry Cleaning Solvent is 100°F (38°C) and for Type #2 is 138°F (50°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.



1. Wearing gloves, use dry cleaning solvent and brush to clean threads (A) and nut (B).
2. Using wire brush, clean threads (A) and nut (B). Make sure all traces of rust and dirt are removed.



3. Using penetrating oil, lube threads (A) and nut (B). Let oil seep between threads (A) and nut (B).

End of Task

TA251277

**GENERAL MAINTENANCE (Sheet 7 of 33)**

**Loosening and Removing Nuts (Sheet 1 of 1)**

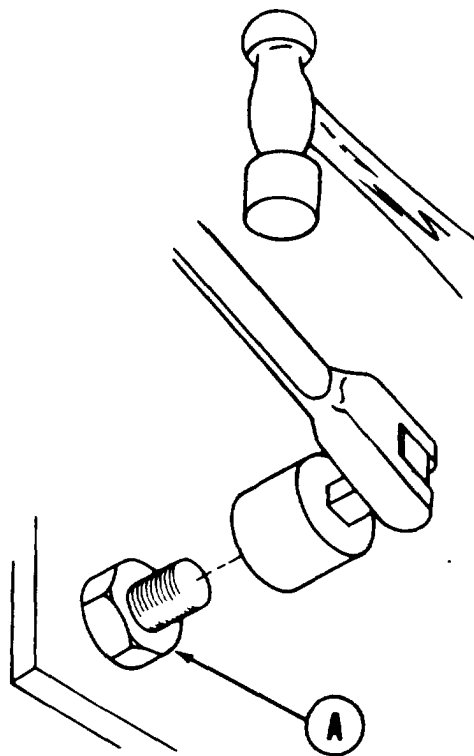
TOOLS: Ball peen hammer  
Wire Brush  
Socket

1. Using socket, try to remove nut (A).
2. If nut (A) will not turn, clean threads and nut (page C-7).
3. Using hammer, gently tap nut (A).
4. Using socket wrench handle with socket attempt to free nut.

**NOTE**

**If nut (A) cannot be freed by step 3 above, go to page C-9.**

4. Take off and throw away nut (A). If nut (A) was attached to a bolt, replace bolt.



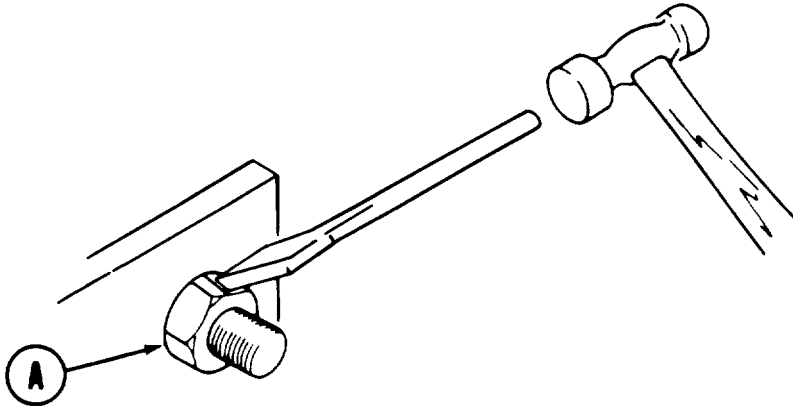


**GENERAL MAINTENANCE (Sheet 8 of 33)**

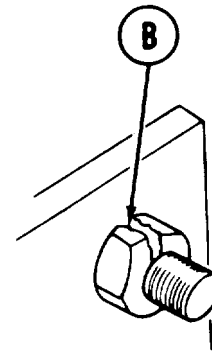
**Cutting Nuts (Sheet 1 of 1)**

TOOLS: Cape chisel  
 Screw threading set  
 Ball peen hammer  
 Adjustable wrench

1. Using hammer and cape chisel, cut flat side of nut (A).



2. Stop cutting when nut (A) spreads apart (B).

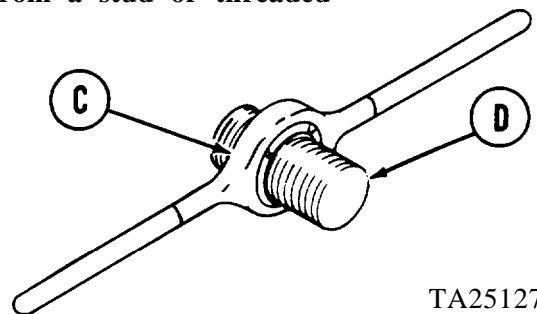


3. Using adjustable wrench remove nut (A).

**NOTE**

**If nut (A) was removed from end of a bolt, throw bolt away if damaged. If nut (A) was removed from a stud or threaded shaft, do step 4.**

4. Using die (C) from screw threading set, clean up threads (D).



End of Task

TA251279

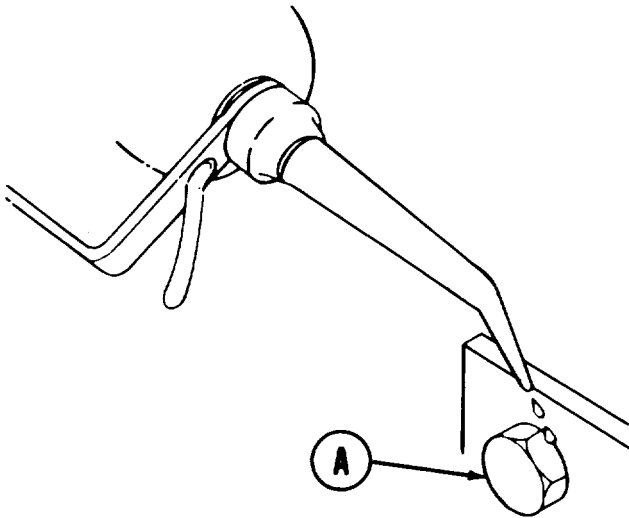
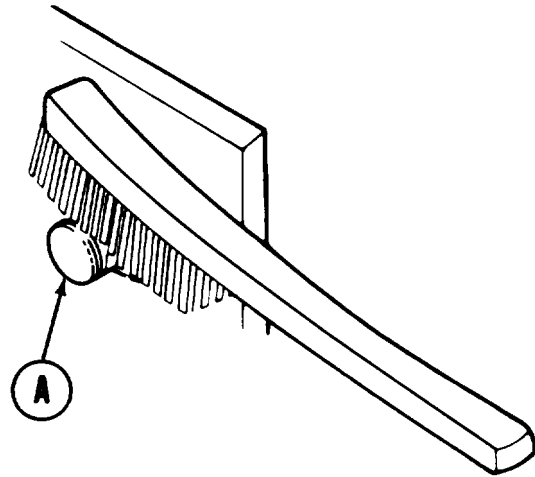
**GENERAL MAINTENANCE (Sheet 9 of 33)**

**Bolt Removal (Sheet 1 of 1)**

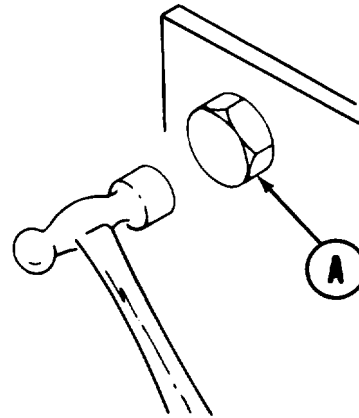
TOOLS: Ball peen hammer  
Wire brush  
Hand oiler

SUPPLIES: Penetrating oil (Item 11, Appendix D)

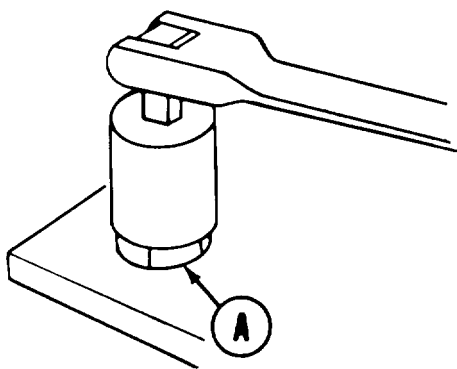
1. Using wire brush, clean head of bolt (A) and nearby area.



2. Using penetrating oil around head of bolt (A), allow oil to seep into threads.



3. Using hammer, lightly tap head of bolt (A).



4. Using socket wrench handle with socket, remove bolt (A). Throw away bolt (A) if damaged.

End of Task

TA251280

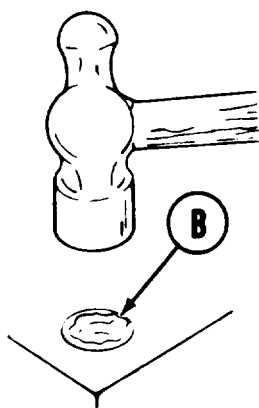
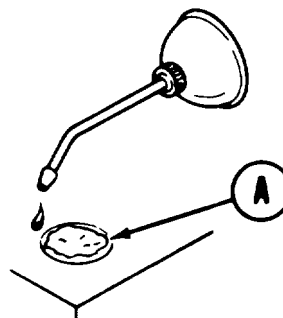
**GENERAL MAINTENANCE - Continued**

**Removal of Studs Broken at Surface (Sheet 1 of 3)**

**TOOLS:** Screw threading set  
 Portable electric drill  
 Twist drill set  
 Screw extractor set  
 Ball peen hammer  
 Prick punch  
 Hand oiler

**SUPPLIES:** Penetrating oil (Item 11, Appendix D)  
 Clean rags (Item 12, Appendix D)  
 Goggles (Item 26, Appendix D)

- Using penetrating oil, lube thread area (A).

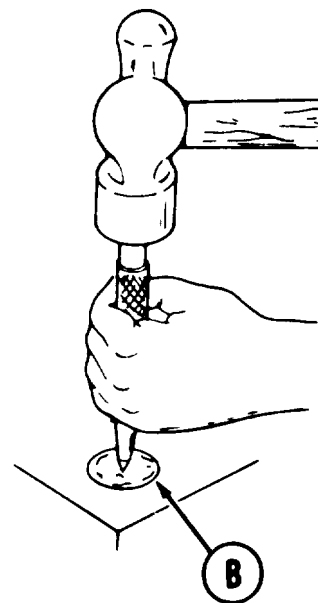


- Using hammer, lightly tap stud (B).

**NOTE**

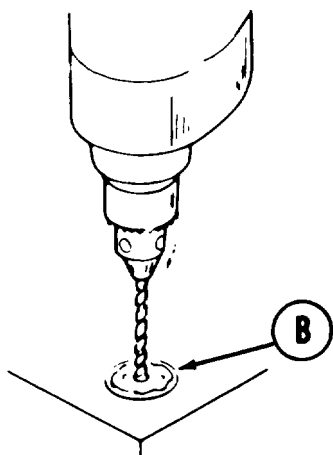
**It is very important to drill out broken stud on exact center line.**

- Using punch and hammer, punch center of broken stud (B).



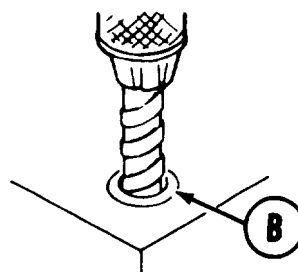
**WARNING**

**Safety goggles must be worn when using drill to prevent injury to eyes.**



- Using electric drill with pilot twist drill, drill center of stud (B).

- Using electric drill with twist drill slightly smaller than extractor, drill into stud (B).

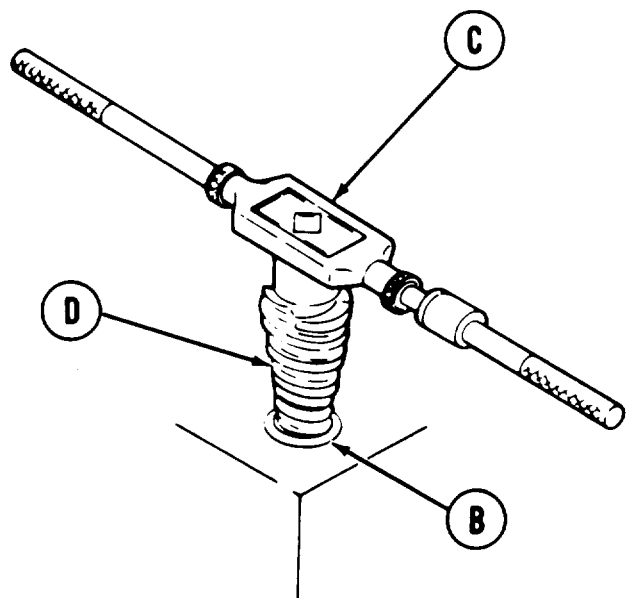


Go on to Sheet 2

TA251281

**GENERAL MAINTENANCE - Continued**

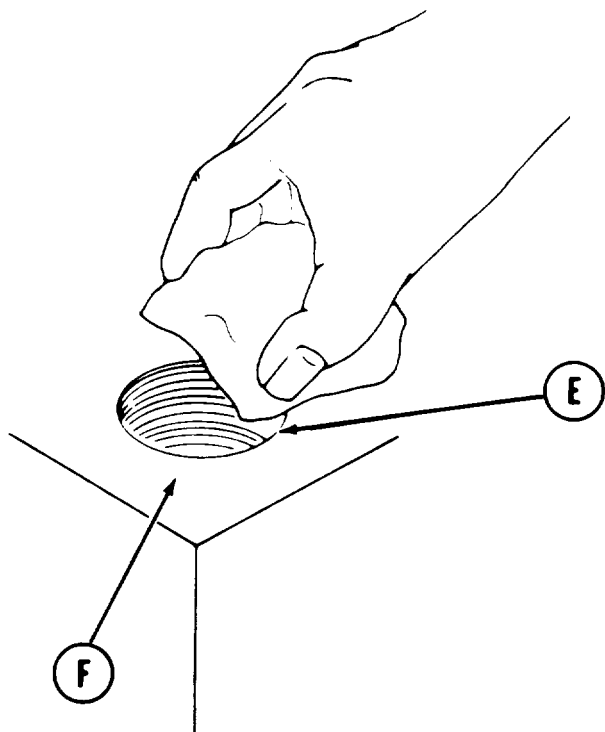
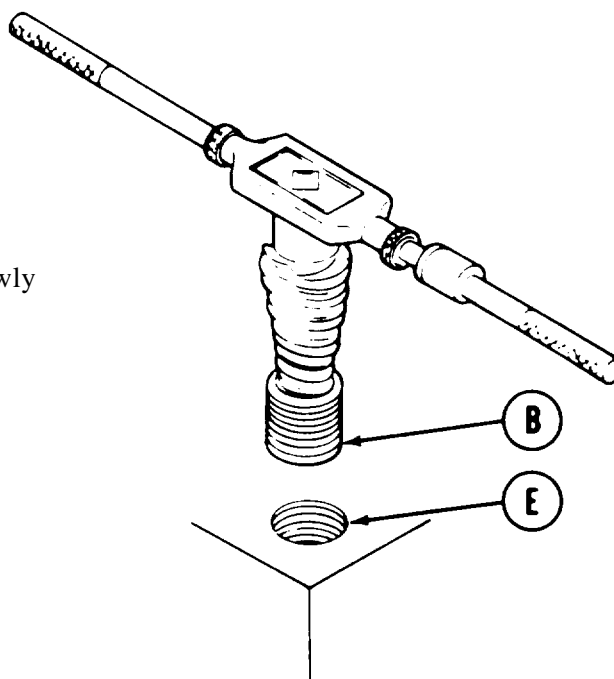
**Removal of Studs Broken at Surface (Sheet 2 of 3)**



**NOTE**

After being drilled, studs broken at a surface may be removed either by using a spiral tapered screw extractor or a fluted type extractor. If a spiral tapered screw extractor is used, go to step 6. If a fluted type extractor is used, go to step 9.

6. Using tap wrench handle (C) with screw extractor (D), turn tap wrench handle (C) slowly counterclockwise to screw extractor (D) into stud (B).



7. Keep turning extractor slowly counterclockwise until stud (B) is removed from threaded hole (E),
8. Using clean rag, wipe out threaded hole (E) and surface (F).

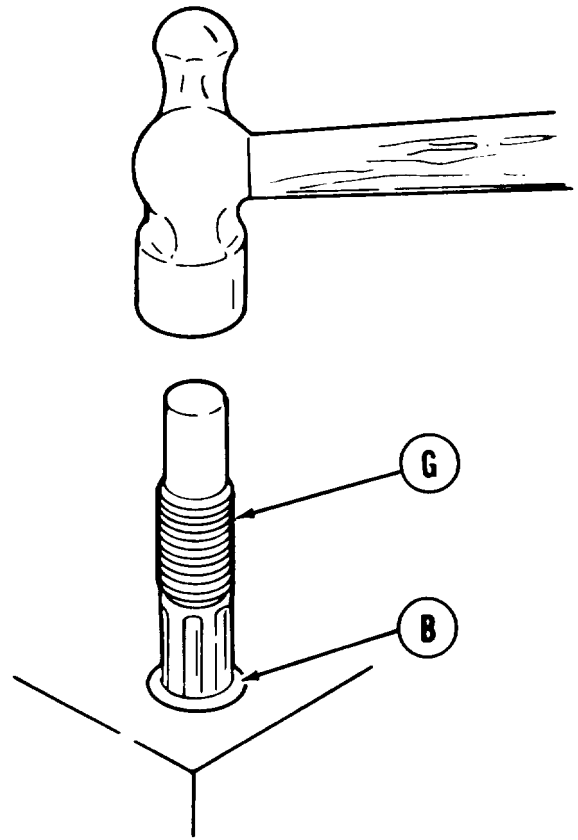
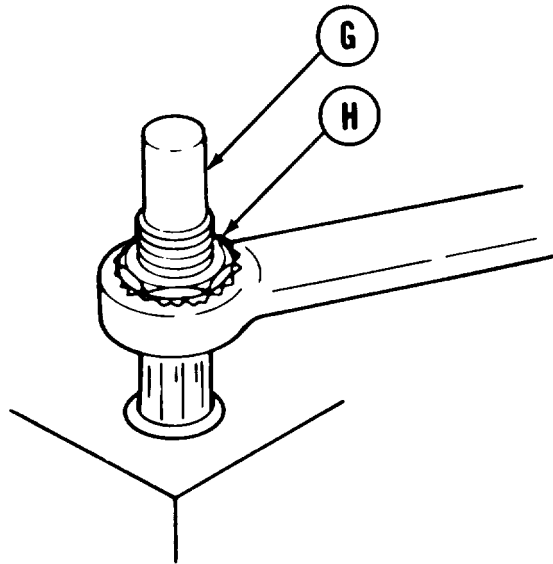
Go on to Sheet 3

TA251282

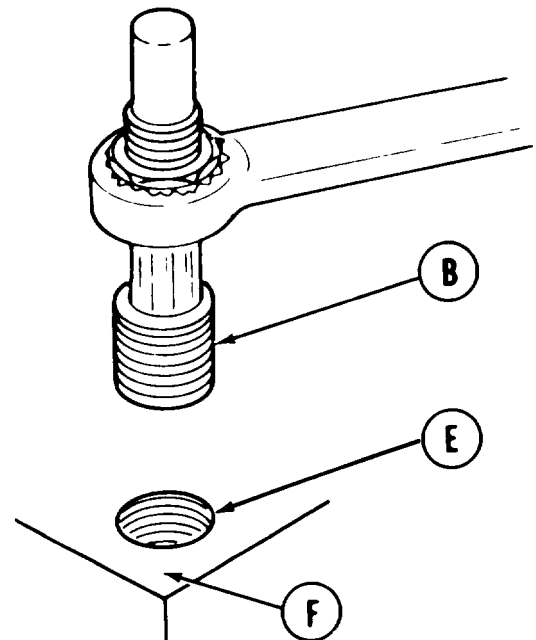
**GENERAL MAINTENANCE - Continued**

**Removal of Studs Broken at Surface (Sheet 3 of 3)**

9. Using hammer, drive fluted extractor (G) into stud (B).
10. Manually start nut (H) counterclockwise on extractor (G).



11. Using wrench, tighten nut (H) on extractor (G) by turning counterclockwise.
12. Using wrench, keep turning nut (H) counterclockwise until stud (B) is removed from threaded hole (E).
13. Using clean rag, wipe out threaded hole (E) and surface (F).



End of Task

TA251283

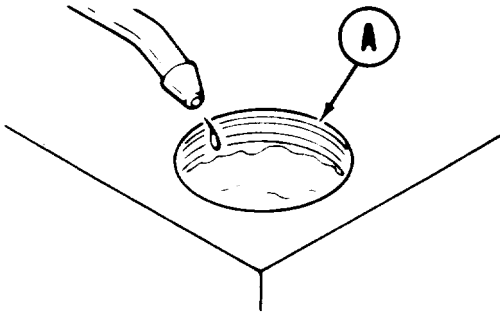
**GENERAL MAINTENANCE - Continued**

**Removal of Studs Broken Below Surface (Sheet 1 of 3)**

TOOLS: Screw extractor set  
Portable electric drill  
Twist drill set  
Hand oiler  
Ball peen hammer

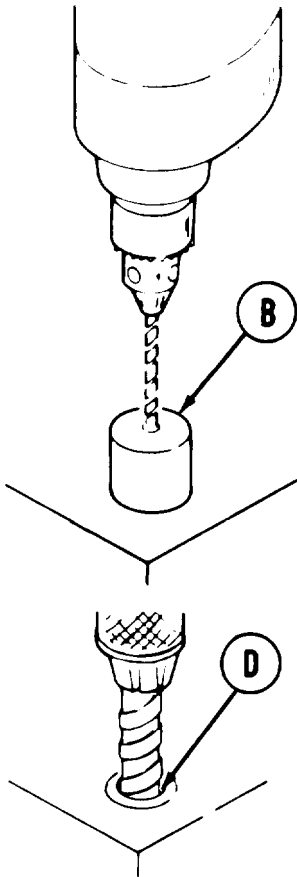
SUPPLIES: Penetrating oil (Item 11, Appendix D)  
Clean rags (Item 12, Appendix D)

Goggles (Item 26, Appendix D)



1. Using penetrating oil, lube thread area (A).
2. Choose right size guide (B) to fit hole (C).

3. Place guide (B) into hole (C).



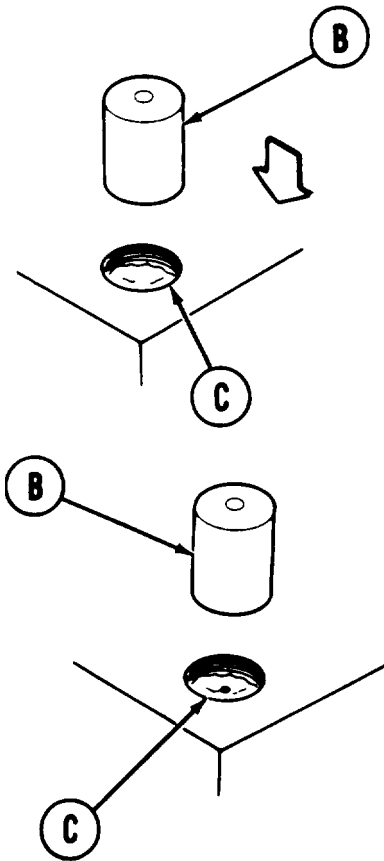
**WARNING**

**Safety goggles must be worn when using drill to prevent injury to eyes.**

4. Using electric drill with pilot twist drill, drill stud through center of guide (B).
5. Take guide (B) out of hole (C).
6. Using electric drill with twist drill slightly smaller than extractor, drill into stud (D).

**NOTE**

**Make sure all metal chips are removed from hole (C) before using extractor.**

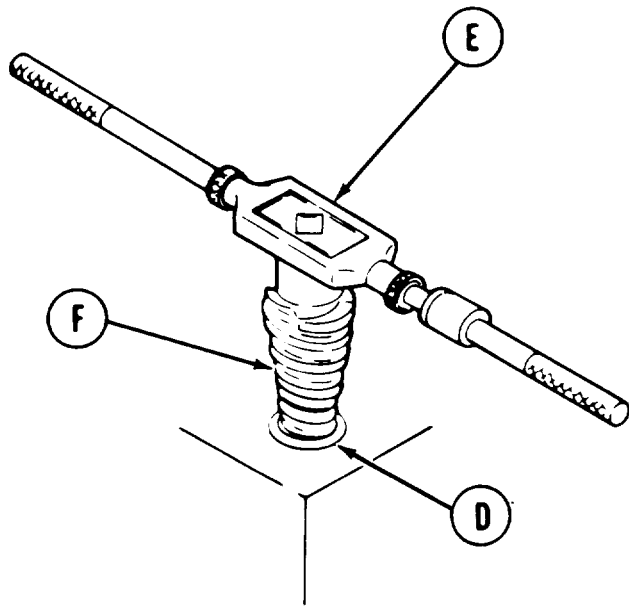


Go on to Sheet 2

TA251284

**GENERAL MAINTENANCE - Continued**

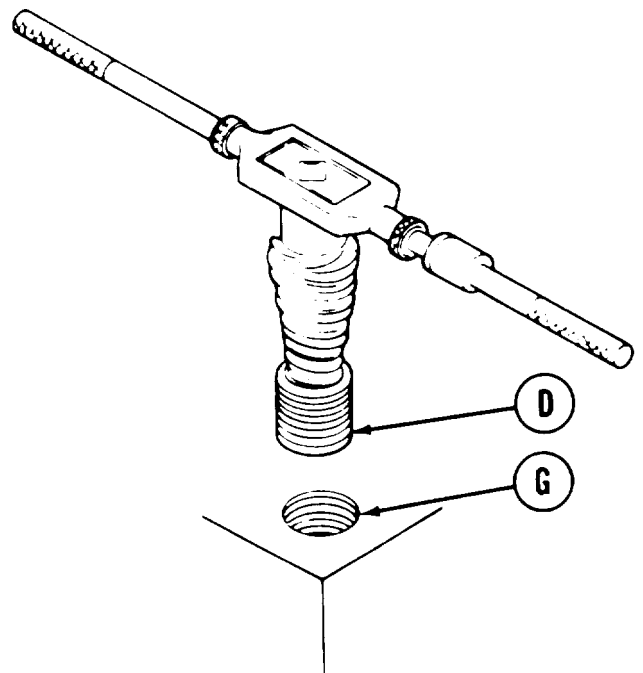
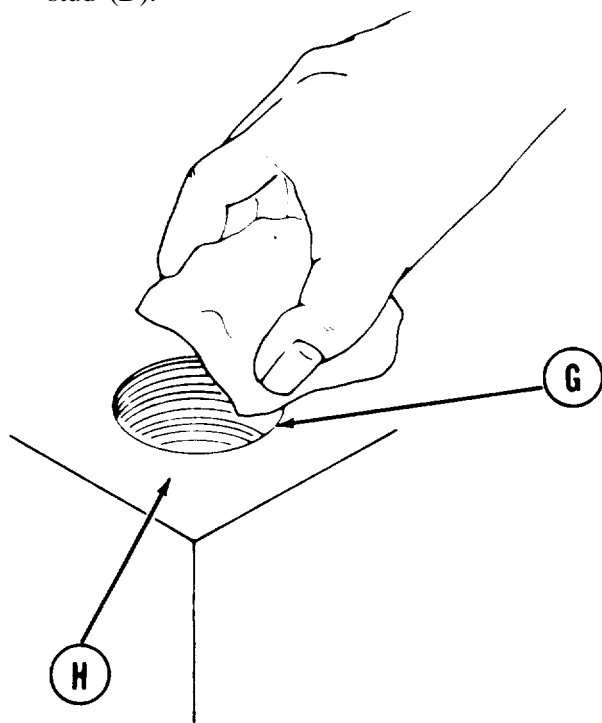
**Removal of Studs Broken Below Surface (Sheet 2 of 3)**



**NOTE**

After being drilled, studs broken below surface may be removed either by using a spiral tapered screw extractor or a fluted type. If a spiral tapered screw extractor is used, go to step 7. If a fluted type extractor is used, go to step 10.

7. Using tap wrench handle (E) with screw extractor (F), turn tap wrench handle (E) counterclockwise to screw extractor (F) into stud (D).



8. Keep turning extractor slowly counterclockwise until stud (D) is removed from threaded hole (G).
9. Using clean rag, wipe out threaded hole (G) and surface (H).

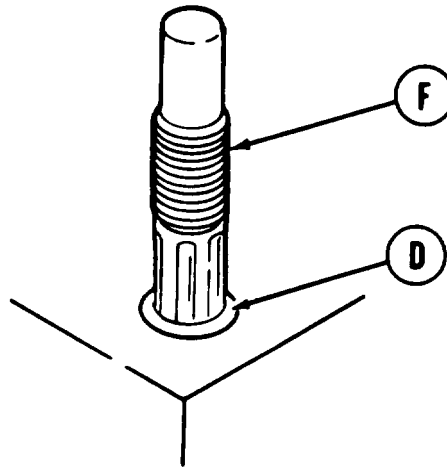
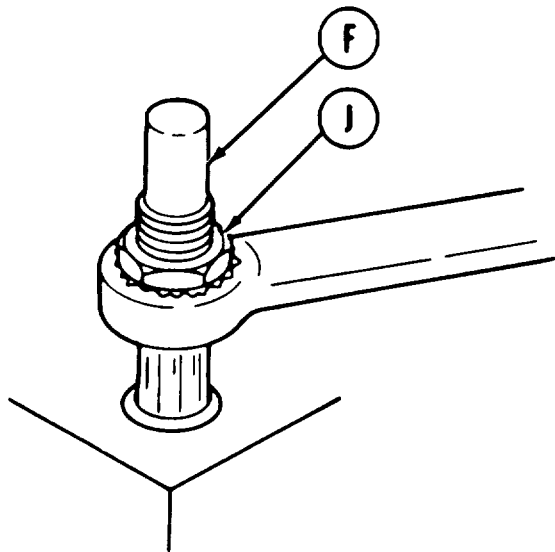
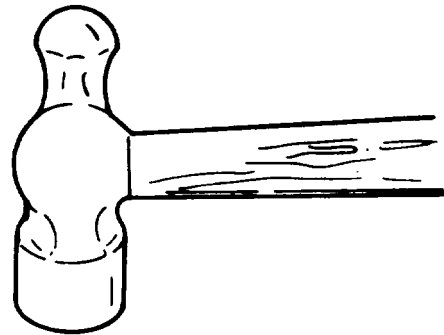
Go on to Sheet 3

TA251285

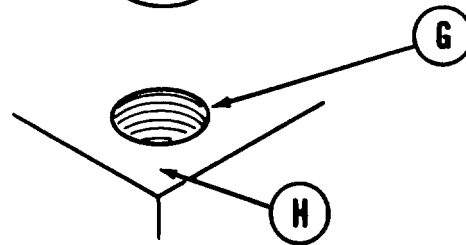
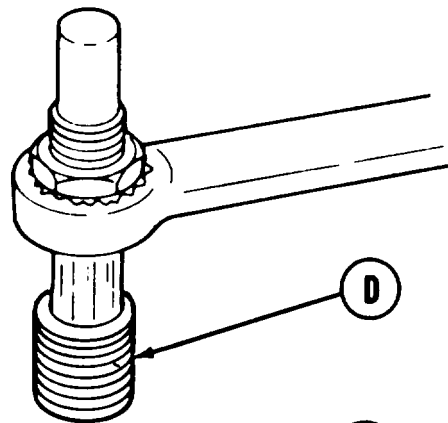
**GENERAL MAINTENANCE - Continued**

**Removal of Studs Broken Below Surface (Sheet 3 of 3)**

10. Using hammer, drive fluted extractor (F) into stud (D).
11. Manually start nut (J) counterclockwise on extractor (F).



12. Using wrench, tighten nut (J) on extractor (F) by turning counterclockwise.
13. Using wrench, keep turning nut (J) counterclockwise until stud (D) is removed from threaded hole (G).
14. Using clean rag, wipe out threaded hole (G) and surface (H).



End of Task

TA251286



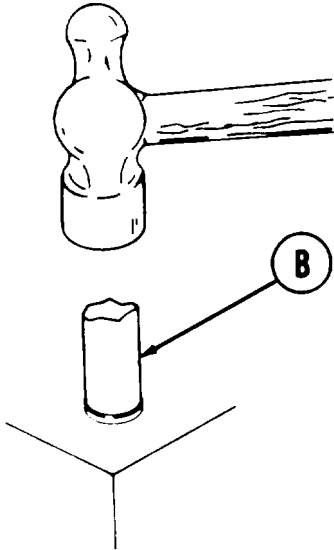
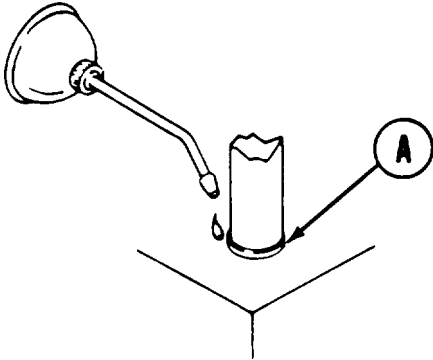
**GENERAL MAINTENANCE - Continued**

**Removal of Studs Broken Above Surface**

**TOOLS:** Ball peen hammer  
Screw extractor set  
Hand oiler

**SUPPLIES:** Penetrating oil (Item 11, Appendix D)  
Clean rags (Item 12, Appendix D)

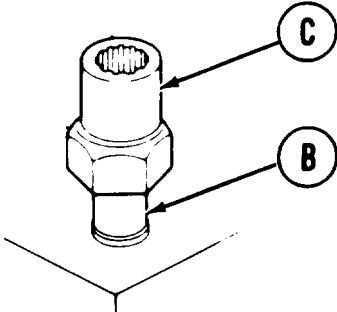
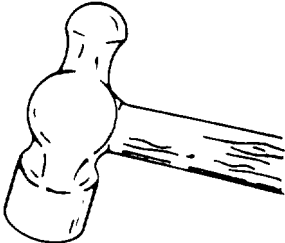
1. Using penetrating oil, lube threaded area (A).



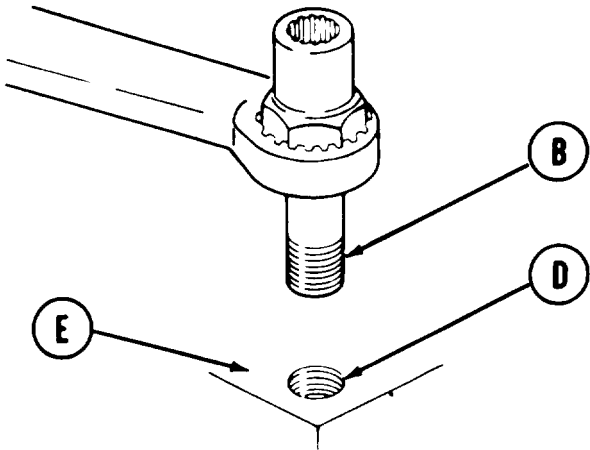
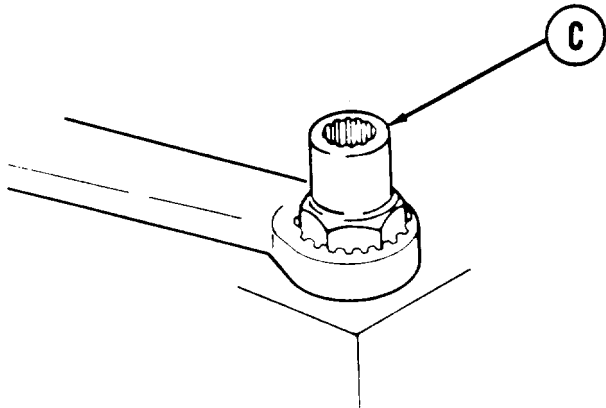
2. Using hammer, lightly tap stud (B).

3. Using hammer, tap stud remover (C) on stud (B).

4. Using wrench, turn stud remover (C) counterclockwise.



5. Using wrench, keep turning stud remover (C) counterclockwise until stud (B) is removed from threaded hole (D).



6. Using clean rag, wipe out threaded hole (D) and surface (E).

End of Task

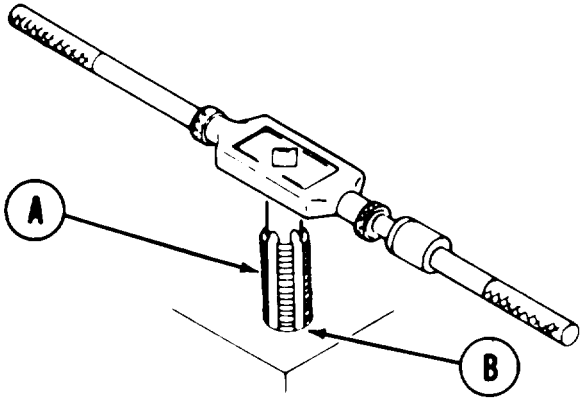
TA251287

**GENERAL MAINTENANCE - Continued**

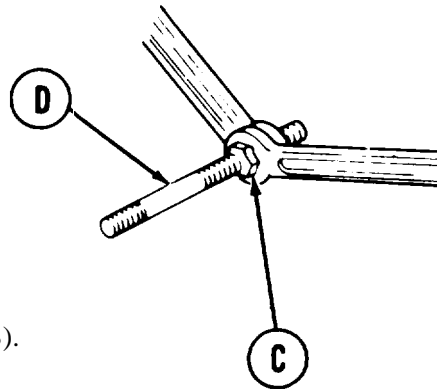
**Installation of New Studs**

TOOLS: Screw threading set

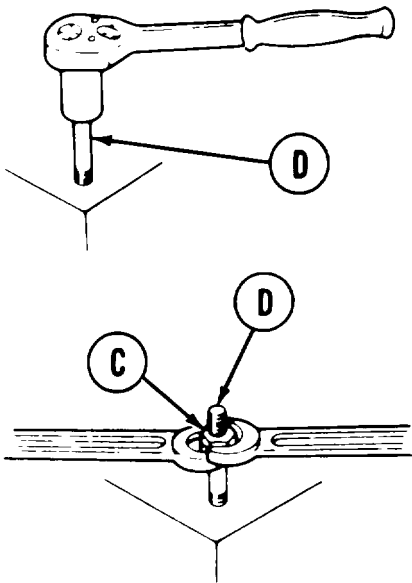
1. Using tap (A), clean out threads in hole (B).



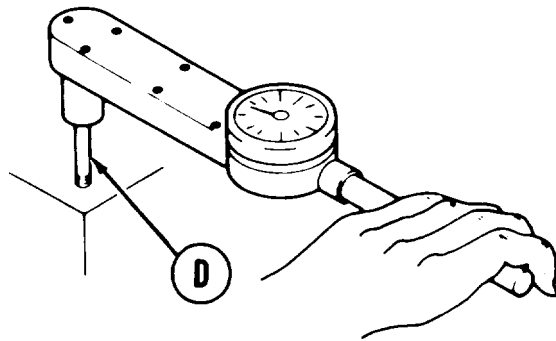
2. Using two wrenches, screw together and jam two nuts (C) onto end of new stud (D).



3. Using socket, loosely install new stud (D) into hole (B).



4. Using torque wrench, tighten new stud (D) to required value (refer to specific maintenance procedure).



5. Using two wrenches, remove two nuts (C) from new stud (D).

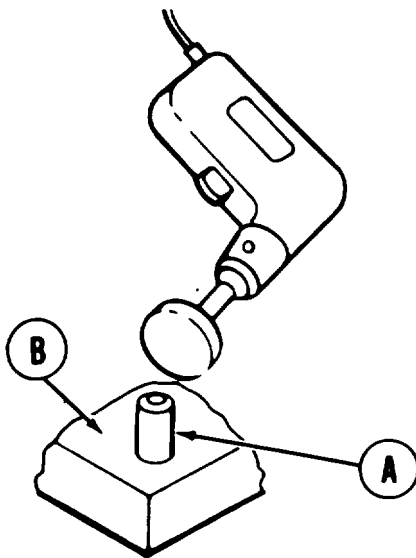
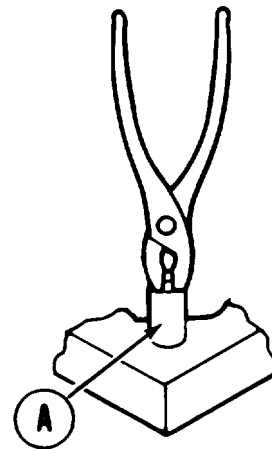
End of Task

TA251288

**GENERAL MAINTENANCE - Continued****Dowel Pin Removal**

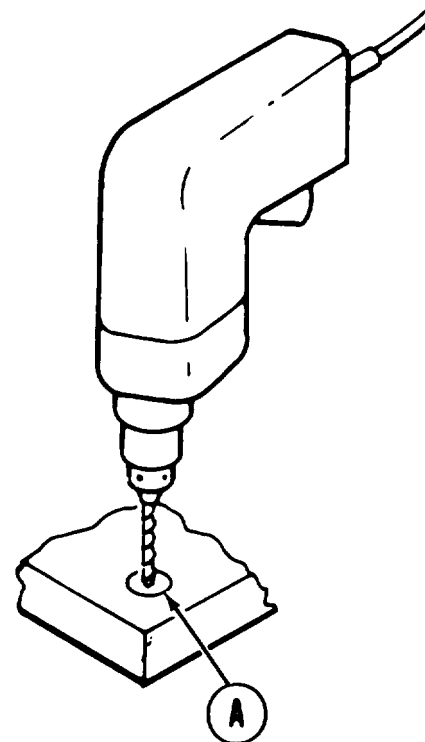
TOOLS: Slip joint pliers  
 Portable electric hand grinder (if required)  
 Portable electric drill (if required)  
 Twist drill set

1. Using pliers, grip pin (A).
2. Using pliers, pull out pin (A) with twisting motion.



3. If unable to pull out pin (A) with pliers, using hand grinder, grind pin (A) off flush with surface (B).

4. Using electric drill and twist drill, drill out rest of pin (A).



End of Task

TA251289

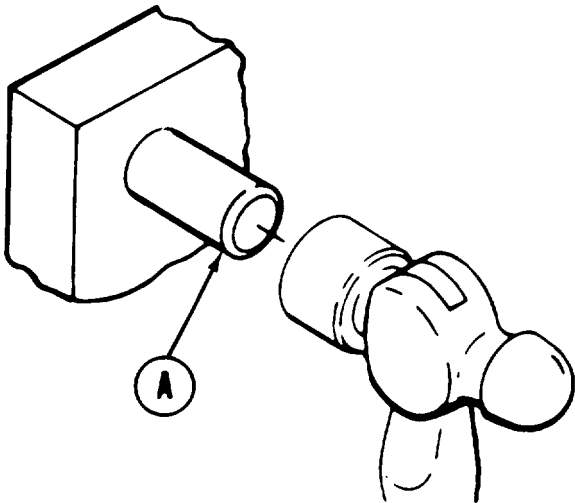
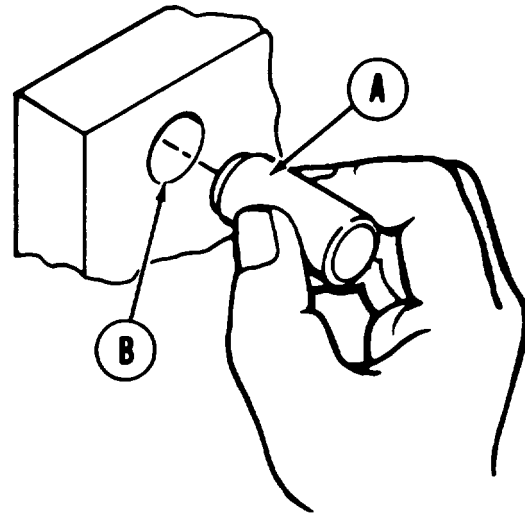
**GENERAL MAINTENANCE - Continued**

**Dowel Pin Installation**

TOOLS: Ball peen hammer

SUPPLIES: Wooden block (make from Item 25, Appendix D)

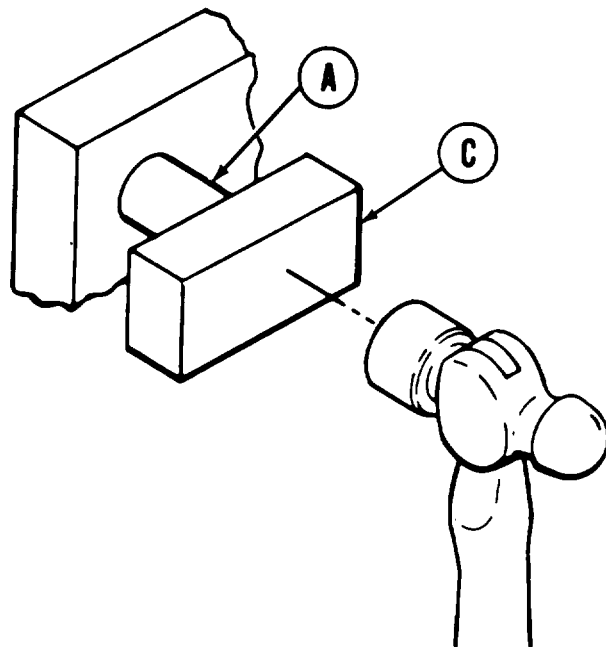
1. Place pin (A) into hole (B), keeping pin (A) as straight as possible.



**CAUTION**

**If pin (A) is tapped too hard, end will flatten out and pin (A) will not properly seat.**

2. Using hammer, lightly tap in pin (A) until seated.
3. If pin (A) cannot be driven by lightly tapping with hammer, using wooden block (C), put wooden block against pin (A) and hit with hammer until pin (A) is seated.



End of Task

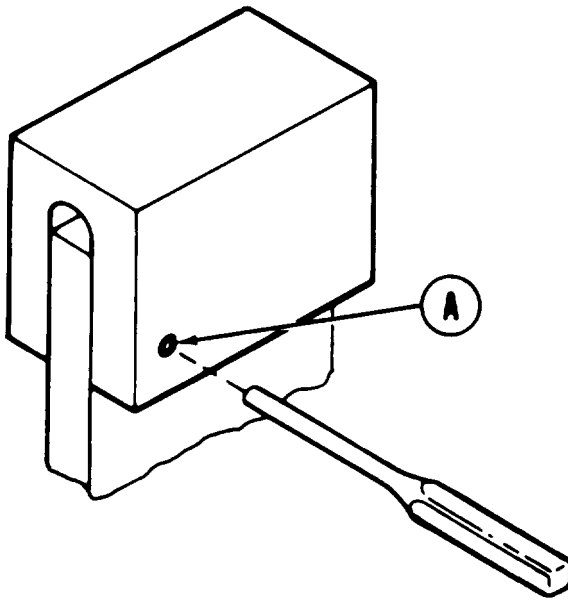
TA251290

**GENERAL MAINTENANCE - Continued****Spring Pin Removal**

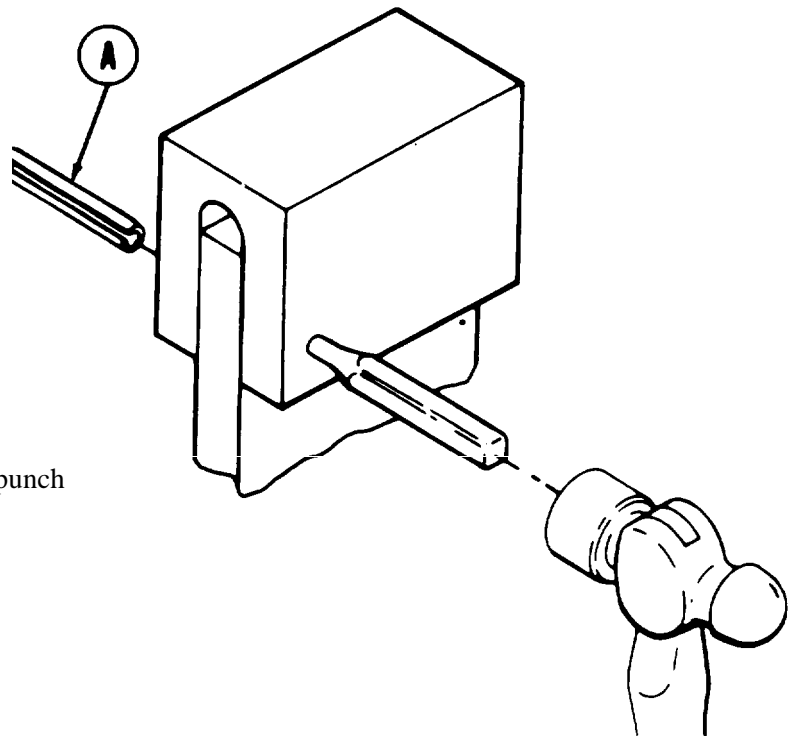
TOOLS: Ball peen hammer  
Drive pin punch

**NOTE**

Drive pin punch used to remove spring pin must be about 1/32 inch smaller than pin hole.



1. Put drive pin punch into spring hole and center on pin (A).



2. Using hammer, lightly tap drive pin punch until pin (A) is driven out of hole.

End of Task

TA251291

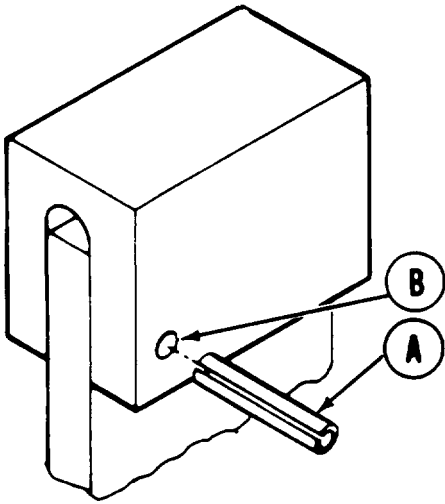
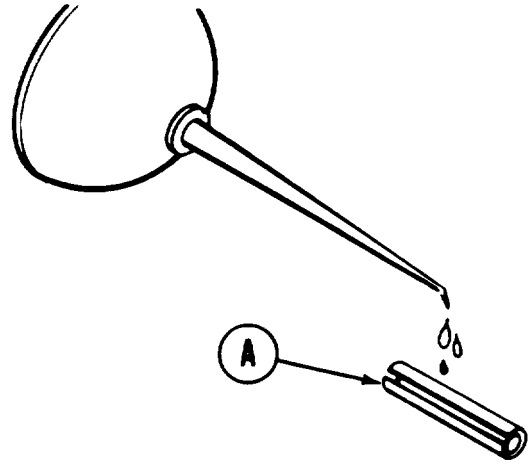
**GENERAL MAINTENANCE - Continued**

**Spring Pin Installation**

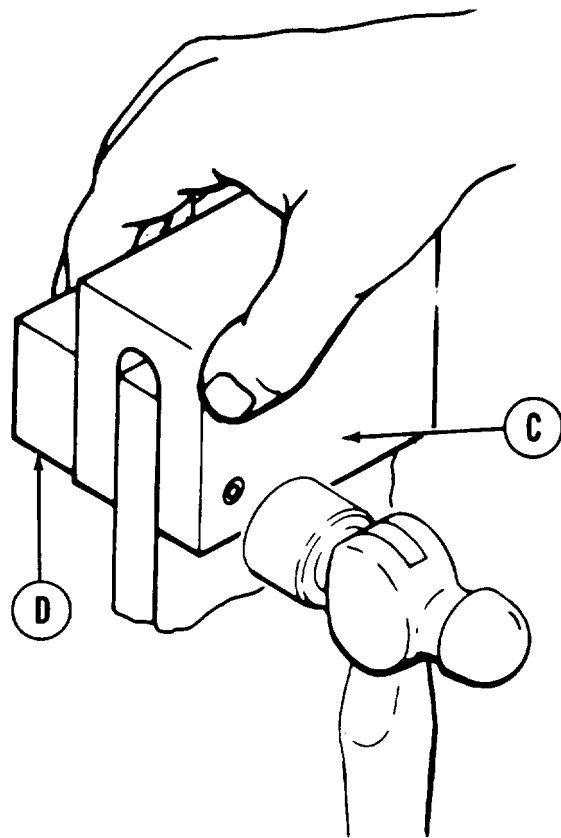
TOOLS: Ball peen hammer  
Hand oiler

SUPPLIES: Lubricating oil (Item 10, Appendix D)  
Wooden block

1. Using oil, lightly lube pin (A).



2. Putting spring pin (A) into hole (B), keep it as straight as possible.
3. Using hammer, tap pin (A) until flush with surface (C).



**NOTE**

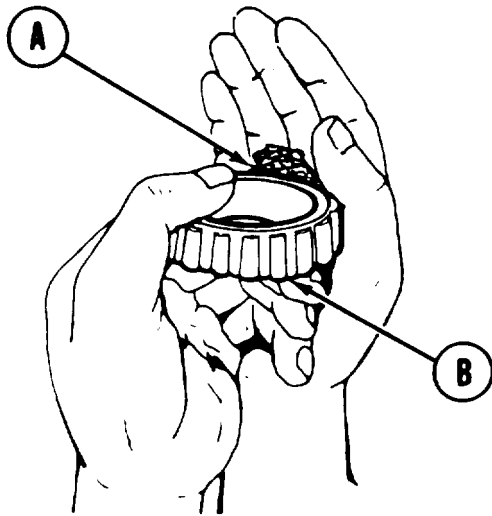
**If structure is not sturdy, support opposite end of hole with wooden block (D) while tapping pin (A) into place.**

End of Task

TA251292

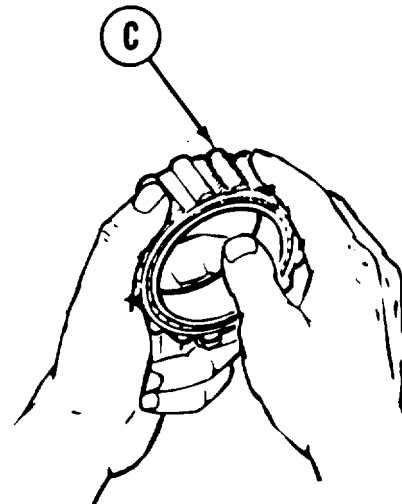
**GENERAL MAINTENANCE - Continued****Hand Lubrication of Bearings**

SUPPLIES: Grease (Item 9, Appendix D)  
Clean rags (Item 12, Appendix D)



1. Place about 1 ounce of grease (A) into palm of one hand.
2. Holding bearing (B) in other hand, force grease (A) between inner race and cage.
3. Press bearing (B) into grease until grease (A) appears on other side of bearing (B).

4. Turning bearing (B) over, repeat steps 1, 2, and 3.
5. Using light film of grease (A), lube rollers (C).
6. Using clean rags, cover bearing (B) until ready for assembly.



End of Task

TA251293

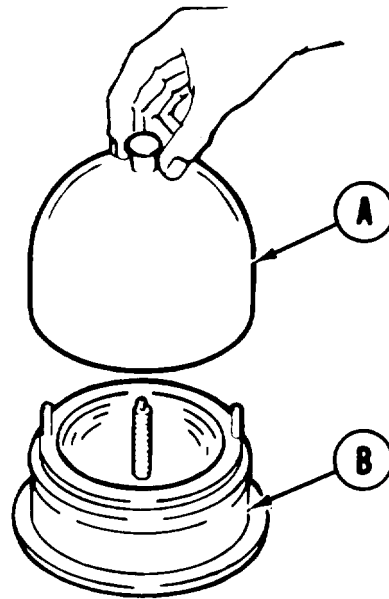
**GENERAL MAINTENANCE - Continued**

**Wheel Bearing Packer Lubrication of Bearings (Sheet 1 of 3)**

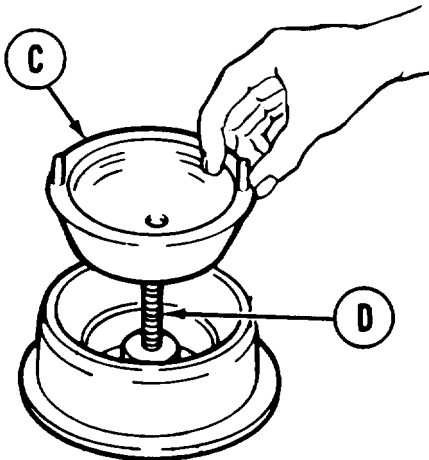
TOOLS: Wheel bearing packer  
Hand grease gun

SUPPLIES: Grease (Item 9, Appendix D)  
Clean rags (Item 12, Appendix D)

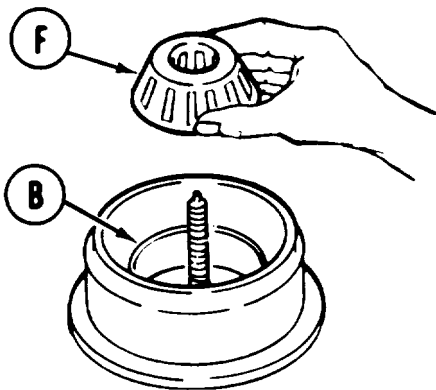
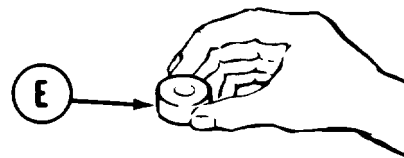
1. Take cover (A) off base (B).



2. Unscrew cap (C) from center post (D).

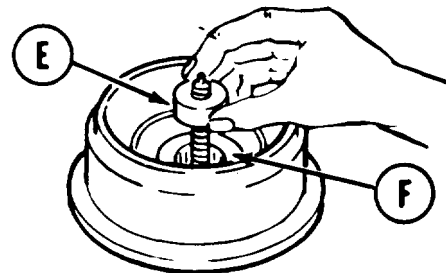


3. Take insert (E) from base (B).



4. Put bearing (F) into base (B).

5. Put insert (E) in center of bearing (F) to act as filler.



Go on to Sheet 2

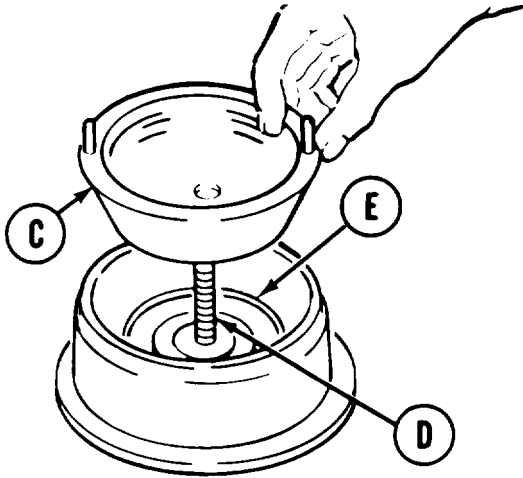
TA251294



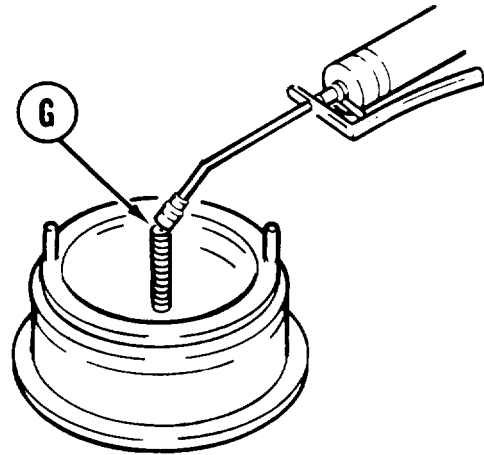
**GENERAL MAINTENANCE - Continued**

**Wheel Bearing Packer Lubrication of Bearings (Sheet 2 of 3)**

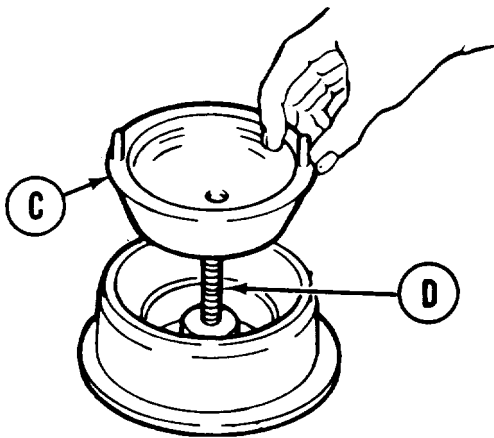
6. Screw cap (C) onto center post (D) to hold bearing (E) in position.



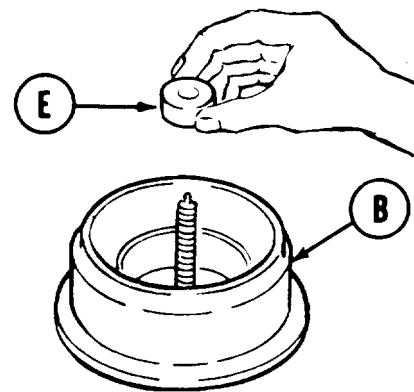
7. Using grease gun, pump grease into fitting (G) until resistance is felt.



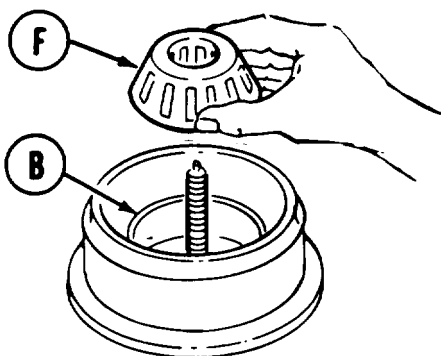
8. Unscrew cap (C) from center post (D).



9. Take insert (E) from base (B).



10. Remove bearing (F) from base (B).



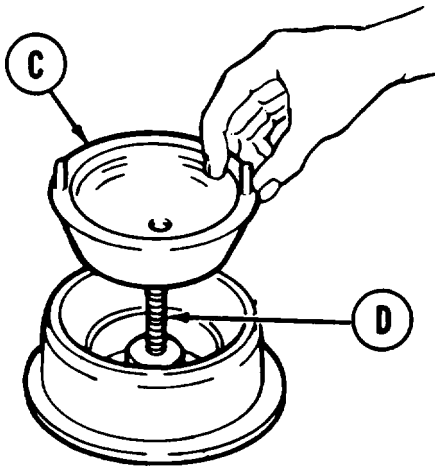
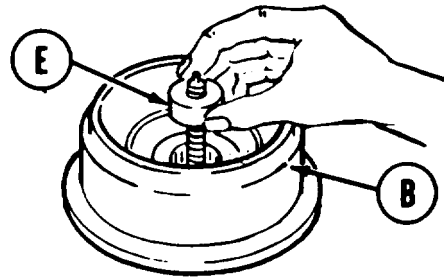
Go on to Sheet 3

TA251295

**GENERAL MAINTENANCE**

**Wheel Bearing Packer Lubrication of Bearings (Sheet 3 of 3)**

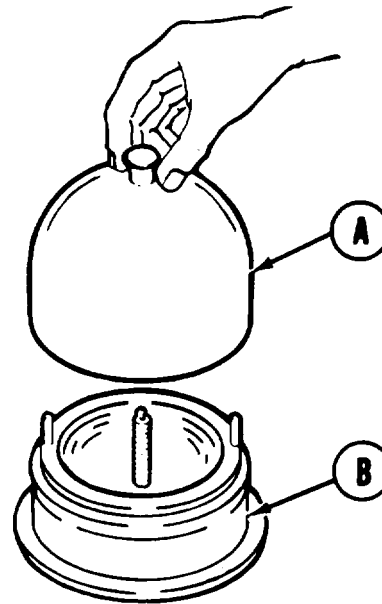
11. Put insert (E) into base (B).



12. Screw cap (C) onto center post (D).

13. Put cover (A) onto base (B).

14. Place clean rags over bearing until ready for assembly.

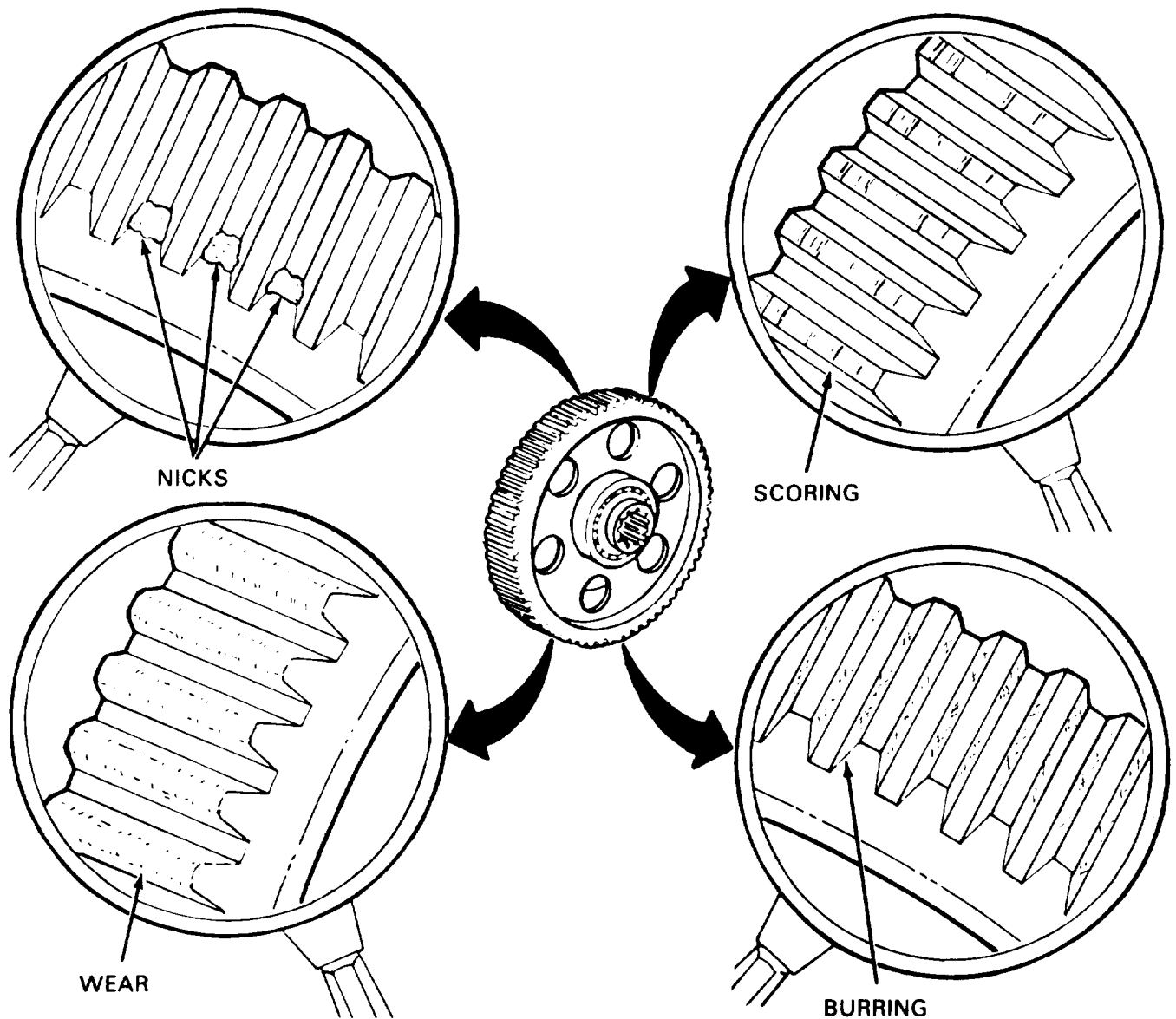


End of Task

TA251296

**GENERAL MAINTENANCE - Continued****Inspection and Repair of Gears**

SUPPLIES Crocus cloth (Item 5, Appendix D)



1. Check gears for wear, nicks, scoring, and burring.
2. Using crocus cloth, try to get rid of minor nicks or burring.
3. If minor nicks or burring cannot be removed with crocus cloth, or if any other damage is seen, replace gears.

TA251297

**GENERAL MAINTENANCE - Continued**

**Safety Wiring Procedures (Sheet 1 of 2)**

**NOTE**

- **The double-twist method of safety wiring is used as the common method of safety wiring. Use the double-twist method for screws in closed geometric patterns which secure hydraulic or air seals, hold hydraulic pressure, or are used in critical areas of clutch mechanisms.**
  
- **When safety wiring widely spaced multiple groups (fastenings from 4 to 6 inches apart) by the double-twist method, three units are the maximum number that may be wired in series, When safety wiring multiple groups, the maximum number of units that may be safety wired is limited to the number that can be wired with a 24 inch length of wire.**
  
- **The single-wire method is used in a closely spaced (maximum of 2 inches between centers), closed geometric pattern (triangle, square, rectangle, circle, etc.) on parts in electrical systems and in similar places that would make the single-wire method more feasible. Use the single wire method for shear and seal wiring applications.**
  
- **Use copper wire only for securing emergency devices and install so that it can be easily broken when required.**

Go on to Sheet 2

**GENERAL MAINTENANCE - Continued****Safety Wiring Procedures (Sheet 2 of 2)****NOTE**

Always use new lockwire.

**NOTE**

Drilled head bolts and screws installed with self-locking nuts or lockwashers usually do not require safety wiring.

**NOTE**

Do not use lockwire to secure fasteners or fittings together that are spaced more than 6 inches apart.

**NOTE**

Use care when installing lockwire to be sure it is tight but not overstressed.

**NOTE**

When safety wiring castellated nuts on drilled studs, tighten nut to low side of torque range (unless otherwise specified) and continue tightening until a slot aligns with hole.

**NOTE**

Safety wire drain plugs and cocks to adjacent (less than 6 inches away) bolts, nuts, or parts having a free lockhole.

**NOTE**

Safety wire electrical connectors which have threaded coupling rings or plugs which have screws to fasten the individual parts of the plug together. Safety wire connectors and plugs individually.

End of Task

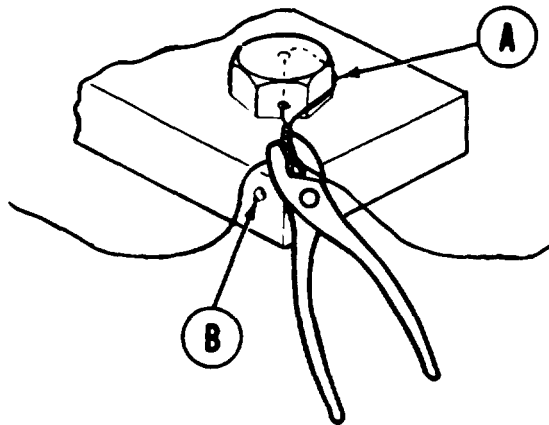
**GENERAL MAINTENANCE - Continued**

**Single Fastener Double-Twist Safety Wiring**

TOOLS: Slip joint pliers  
Diagonal cutting pliers

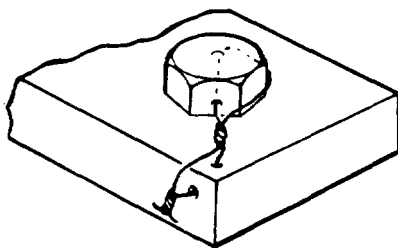
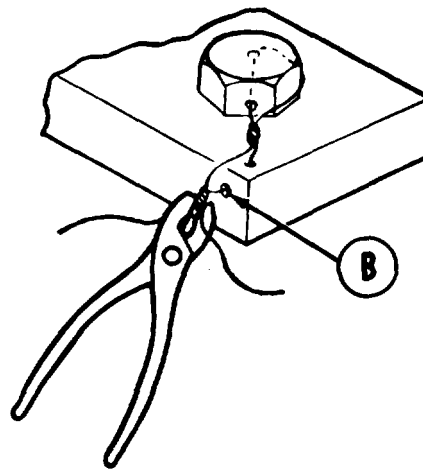
SUPPLIES: Lockwire

1. Using diagonal cutting pliers, cut piece of lockwire about 24 inches long.



2. Run wire through drilled bolt head (A), keeping length of free wire ends the same.
3. Using slip joint pliers, twist wire until wire twist almost reaches drilled hole (B) in plate.

4. Run one leg of wire through drilled hole (B) in plate.
5. Using slip joint pliers, twist wire at least six times.
6. Using diagonal cutting pliers, cut wire leaving a pigtail from 1/4 to 1/2 inch long.



7. Bend pigtail back under to prevent it from becoming a snag.

End of Task

TA251298

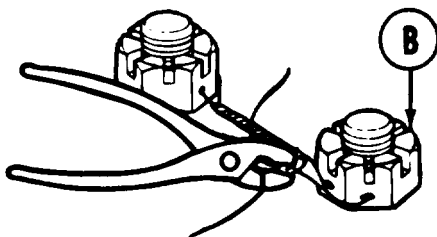
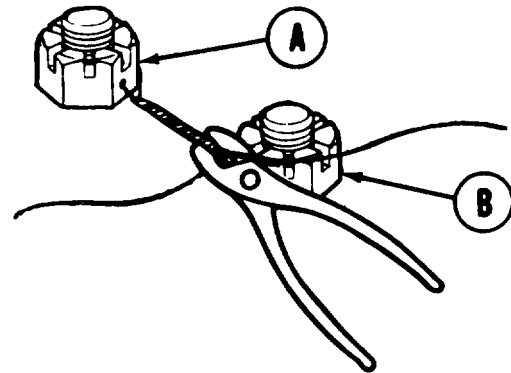
**GENERAL MAINTENANCE - Continued****Castellated Nuts on Undrilled Stud Double-Twist Safety Wiring**

TOOLS: Slip joint pliers  
Diagonal cutting pliers

SUPPLIES: Lockwire

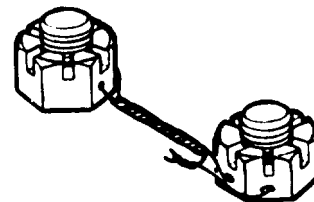
- Using diagonal cutting pliers, cut a piece of lockwire about 24 inches long.

- Run wire through nut (A) keeping length of free wire ends the same.
- Using slip joint pliers, twist wire until wire twist almost reaches next nut (B).
- Run one leg of wire through nut (B).



- Using slip joint pliers, twist wire at least six times.

- Using diagonal cutting pliers, cut wire leaving a pigtail from 1/4 to 1/2 inch long.
- Bend pigtail back under to prevent it from becoming a snag.



End of Task

TA251299

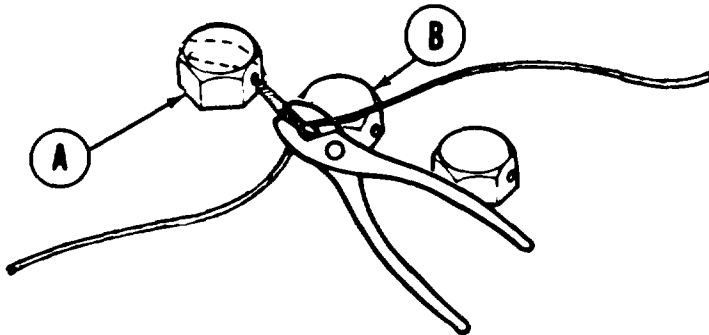
**GENERAL MAINTENANCE - Continued**

**Multiple Fastener Double-Twist Safety Wiring**

TOOLS: Slip joint pliers  
Diagonal cutting pliers

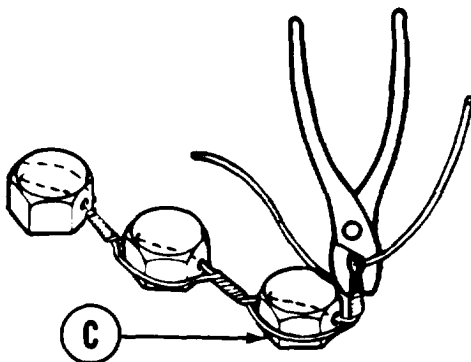
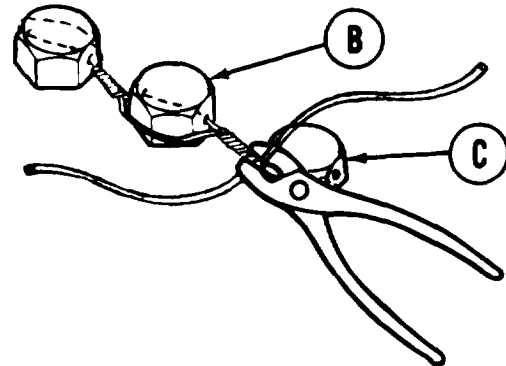
SUPPLIES: Lockwire

1. Using diagonal cutting pliers, cut a piece of lockwire about 24 inches long.



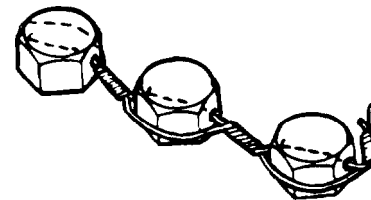
2. Run wire through drilled bolt (A) keeping length of free wire ends the same.

3. Using slip joint pliers, twist wire until twist almost reaches next bolt head (B).
4. Run one leg of wire through bolt head (B).
5. Using slip joint pliers, twist wire until wire twist almost reaches next bolt head (C).
6. Run one leg of wire through bolt head (C).



7. Using slip joint pliers, twist wire at least six times.
8. Using diagonal cutting pliers, cut wire leaving a pigtail from 1/4 to 1/2 inch long.

9. Bend pigtail back under to prevent it from becoming a snag.



End of Task

TA251300



**GENERAL MAINTENANCE - Continued****External Snap Ring Single Wire Safety Wiring**

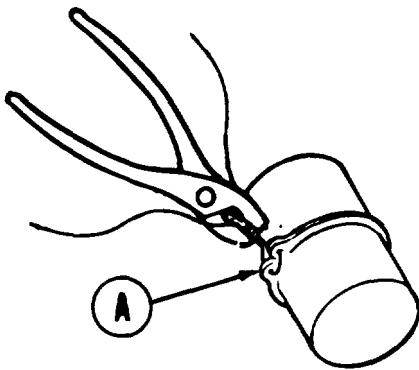
TOOLS: Slip joint pliers  
Diagonal cutting pliers

SUPPLIES: Lockwire

**NOTE**

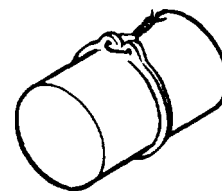
**Do not safety wire internal snap rings.**

1. Using diagonal cutting pliers, cut a piece of lockwire about 12 inches long.



2. Run wire through two holes in external snap ring (A), keeping length of free wire ends the same.
3. Using slip joint pliers, twist wire at least six times.

4. Using diagonal cutting pliers, cut wire leaving a pigtail from 1/4 to 1/2 inch long.
5. Bend pigtail back under to prevent it from becoming a snag.



End of Task

TA251301

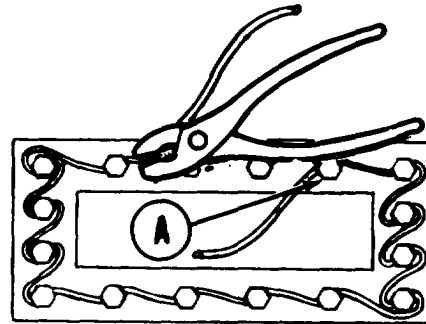
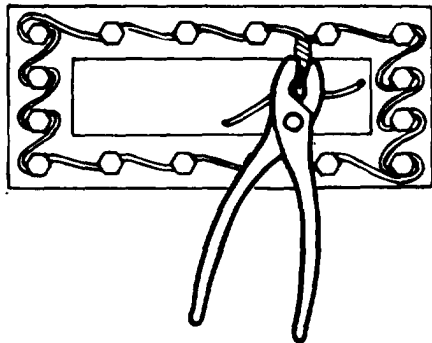
**GENERAL MAINTENANCE - Continued**

**Small Screws in Closely Spaced, Closed Geometrical Pattern Single Wire Safety Wiring**

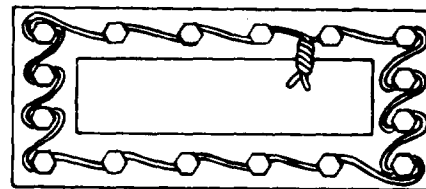
TOOLS: Slip joint pliers  
Diagonal cutting pliers

SUPPLIES: Lockwire

1. Using diagonal cutting pliers, cut a piece of lockwire long enough to hold the screws in the pattern being wired.
2. Using slip joint pliers, run wire through nuts, leaving enough wire pigtailling from nut (A) so completed lacing may be secured by twisting.



3. Using slip joint pliers, twist wire at least six times.



4. Using diagonal cutting pliers, cut wire leaving a pigtail from 1/4 to 1/2 inch long.
5. Bend pigtail back under to prevent it from becoming a snag.

End of Task

TA251302

## APPENDIX D

### EXPENDABLE SUPPLIES AND MATERIALS LIST

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#### SECTION I. INTRODUCTION

##### 1. SCOPE

This appendix lists expendable supplies and materials you will need to operate and maintain the launcher of the M60A1 AVLB. These items are authorized to you by CTA 50-970, Expendable Items (except Medical, Class V, Repair Parts, and Heraldic Items).

##### 2. EXPLANATION OF COLUMNS

a. Column 1 - Item number. This number is assigned to the entry in the listing and is referenced in the narrative instructions to identify the material (e.g., "Use cleaning compound, item 5, App. D").

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

- C - Operator/Crew
- O - Organizational Maintenance
- F - Direct Support Maintenance
- H - General Support Maintenance

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

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

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

**APPENDIX D  
EXPENDABLE SUPPLIES AND MATERIALS LIST**

ITEM	LEVEL	STOCK	DESCRIPTION	U/M
1.	C	8040-00-262-9025	Adhesive (MIL-A-5092, Type II)	PT
2.	C	8040-00-664-4318	Adhesive, General Purpose, Synthetic Rubber: 1 Pt. Can (81348) (MMA1617, Type ii)	PT
3.	O		Asbestos, Sheet	FT
4.	O	8020-00-178-8305	Brush, Paint, 4-inch	EA
5.	C	5350-00-221-0872	Cloth, Abrasive, Crocus, (CA), 50 Sheets (81348) PC458C1	SH
6.	O		Compound, Lapping	
7.	O	6850-00-880-7616	Compound, Silicone (MIL-S-8660)	OZ
8.	C	9150-00-111-6256	Fluid, Hydraulic, FRH, (MIL-H-46170) Amend.1 (81349)	QT
9.	C	9150-00-190-0904	Grease, GAA: 1 Lb. Can (81349) (MIL-G100924)	LB
10.	O		Oil, Lubricating, Grade 10 (OE/HDO 10), (MIL-L-2104)	QT
11.	O	9150-00-223-4119	Oil, Penetrating (W-P-216)	QT
12.	C	7920-00-205-1711	Rag, Wiping, Cotton, White: SOLB-DDDR 30GB	LB
13.	O	8030-00-322-6928	Sealing Compound (MIL-S-7124)	
14.	O		Sealing Compound (MIL-S-12158) Type II)	PT
15.	O	6850-00-660-5685	Solvent, Dry Cleaning (SD): 1 Gl. Can PD-680 T1 (81348)	GL
16.	C		Steel Wool	RL

**APPENDIX D**  
**EXPENDABLE SUPPLIES AND MATERIALS LIST (Continued)**

ITEM	LEVEL	STOCK	DESCRIPTION	U/M
17.	O	5790-00-419-4290	Tape, Insulation, Electrician's (81348) (MIL-1-243911)	RL
18.	O	7510-00-473-9513	Tape, Masking, Pressure Sensitive Adhesive, 2-inch (81349) (MIL-T-23397)	RL
19.	O	8030-00-889-3534	Tape, Antiseizing (Pipe Thread) 1/4-inch (81349) (MIL-T-27730)	RL
20.	O	9505-00-684-4843	Wire, Steel Carbon, MS20995-F41, 1 Lb. Roll	LB
21.		8030-00-275-8110	Sealing Compound Kit (MIL-S-11031)	EA
22.	O	7510-00-189-7881	Pencil, Writing, Package of 12 (81348) (MIL-SS-P-1605)	EA
23.	O	7530-00-285-5836	Paper, Writing, 3 x 5 inch Package of 100 (81348) (MIL-UU-P-121)	EA
24.	O	4020-00-289-8615	Rope, Manila, 1/2-inch diameter, 600-foot coil (81348) (MIL-T-R-605)	FT
25.	O	5510-00-962-7141	Lumber, Hardwood, Type II, 4 x 4 inch x 10 foot long (MIL-MM-L-736)	BF
26.	O	4240-00-017-9768	Goggles, Industrial	PR
27.	O	8415-00-641-4601	Gloves, Rubber	PR
28.	O	8040-00-118-2695	Adhesive, Rubber (MIL-A-46146), Type I	PT
29.	O	8030-00-148-9833	Compound, Sealing (MIL-S-46163), Type II	c c
30.	O	8030-01-158-6621	Compound, Sealing (MIL-S-22473), Grade N, Form R	PT
31.	O	5510-00-267-2049	Lumber, Hardwood, Type II, 6 x 6-inch x 10 foot long (MIL-MM-L-736)	BF
32.	O		Lumber, Softwood, 1 x 6 inch x 10 foot long (MIL-MM-L-751)	BF
33.	O	4240-00-542-2048	Shield, Face	EA



**GLOSSARY**

**ABBREVIATIONS**

AC	Alternating Current
DC	Direct Current
kPa	Kilopascals
N•m	Newton Meters
psi	pounds per square inch
STE/ICE	Simplified Test Equipment Internal Combustion Engine





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3		2	
109		51	
2-8			2-1
12	1-6a		

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

Item 10. Change illustration. Reason: Tube end shown assembled on wrong side of lever cam.

Item 3. The NSN and P/N are not listed on the AMDF nor the MCRL. Request correct NSN and P/N be furnished.

Preventive Maintenance Checks and Services. Item 7 under "Items to be inspected" should be changed to read as follows: Firing linkage and firing mechanism pawl.

Since there are both 20- and 30- round magazines for this rifle, data on both should be listed.

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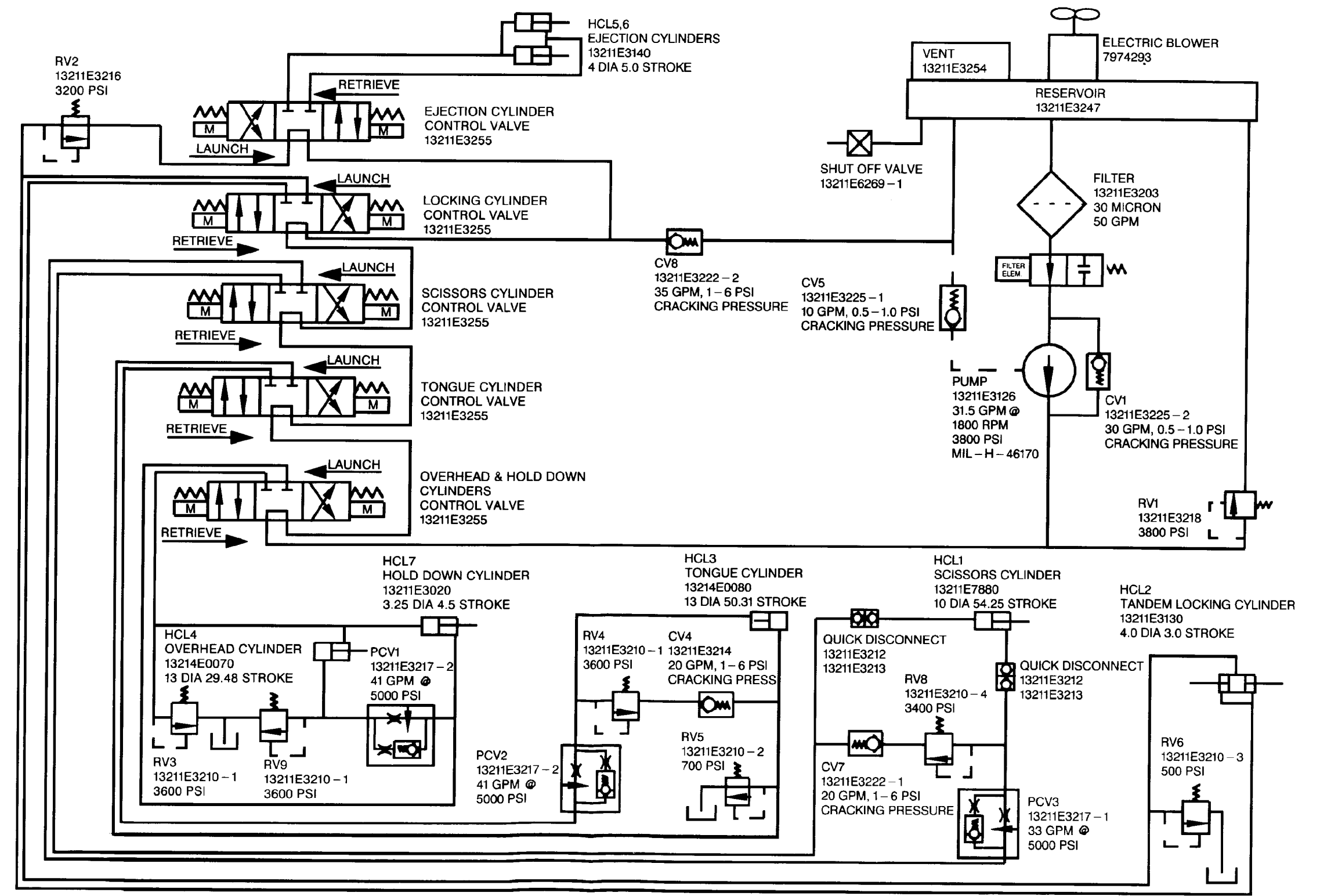


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FO. Launcher Hydraulic Schematic



## 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

### 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

### LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces  
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

### 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

### CUBIC MEASURE

1 Cu. Centimeter = 1000 Cu. Millimeters = 0.06 Cu. Inches  
 1 Cu. Meter = 1,000,000 Cu. Centimeters = 35.31 Cu. Feet

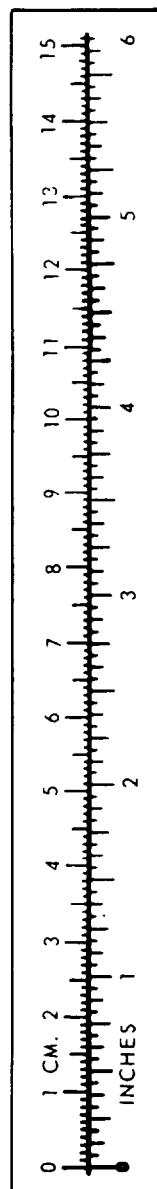
### TEMPERATURE

$\frac{5}{9}(^{\circ}\text{F} - 32) = ^{\circ}\text{C}$   
 212° Fahrenheit is equivalent to 100° Celsius  
 90° Fahrenheit is equivalent to 32.2° Celsius  
 32° Fahrenheit is equivalent to 0° Celsius  
 $\frac{9}{5}^{\circ}\text{C} + 32 = ^{\circ}\text{F}$

## APPROXIMATE CONVERSION FACTORS

TO CHANGE	TO	MULTIPLY BY
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

TO CHANGE	TO	MULTIPLY BY
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



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