

TECHNICAL MANUAL
DIRECT SUPPORT
AND GENERAL SUPPORT
MAINTENANCE MANUAL

CHAPTERS 15 THRU 18	
MAINTENANCE INSTRUCTIONS	15-1
FOLDOUTS	
EQUIPMENT LOCATION DIAGRAMS	

PART 4
MAINTENANCE

TURRET
FOR
COMBAT ENGINEER VEHICLE,
M728
(2350-00-795-1797)

This copy is a reprint which includes current pages from Changes 1 through 3.

WARNING

BE CAREFUL: CARBON MONOXIDE IS A GAS THAT CAN KILL YOU

Carbon monoxide always comes when something gets hot or burns - such as heaters, engines, etc. To keep carbon monoxide from making anyone sick or drowsy, there must be plenty of fresh air in the place where the heating or burning takes place. This gas has no color and no *smell*. but it is deadly poisonous. It can damage your brain, or kill you. if you do not have enough fresh air coming in to push the carbon monoxide out.

Follow these rules to keep from getting poisoned:

1. Do not operate engine or heater inside a building unless there is plenty of fresh air coming in.
2. Do not idle an engine unless you are sure there is plenty of fresh air in personnel compartments.
3. Do not drive a vehicle which has inspection plates, cover plates, or engine compartment doors taken off, except for very short maintenance times when necessary.
4. When operating vehicle, always be on the lookout for personnel who seem to be getting sick or drowsy. If you notice this happening, immediately get fresh air into personnel compartments. If this does not help, **remove** sick or drowsy personnel from vehicle and do following:
 - a. Put him into fresh air.
 - b. Keep him covered warm
 - c. Keep him still. Do not let him exercise. (Exercise will make him worse.)
 - d. Give him artificial respiration, if necessary.
 - e. Get medical help.

CHANGE

No. 3

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington D.C., 5 June 1991

DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL
PART 4
MAINTENANCE
TURRET
FOR
COMBAT ENGINEER VEHICLE,
M728
(2350-00-795-1797)

TM 9-2350-222-34-2-4, 10 October 1980, is changed as follows:

1. Remove old pages and insert new pages as indicated below.
2. New or changed material is indicated by a vertical bar in the margin of the page.

Remove Pages

17-29 and 17-30

17-37 and 17-38

Insert Pages

17-29 and 17-30

17-37 and 17-38

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

By Order of the Secretary of the Army:

CARL E. VUONO
General, United States Army
Chief of Staff

Official:

PATRICIA P. HICKERSON
Colonel, United States Army
The Adjutant General

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Direct and General Support Maintenance Requirements for TM 9-2350-222-34-2-4.

CHANGE
NO. 2

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DEPARTMENT OF THE ARMY
Washington, D. C., 21 January 1988

DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL

PART 4
MAINTENANCE

TURRET
FOR
COMBAT ENGINEER VEHICLE,
M728
(2350-00-795-1797)

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Remove Pages	Insert Pages
A and B	None
i and ii	i and ii
15-5 and 15-6	15-5 and 15-6
16-3 and 16-4	16-3 and 16-4
17-3 and 17-4	17-3 and 17-4
None	17-4.1 thru 17-4.4
18-23 and 18-24	18-23 and 18-24
18-25 thru 18-30	None
18-55 and 18-56	18-55 and 18-56
18-59 thru 18-66	18-59 thru 18-66
18-87 and 18-88	18-87 and 18-88
18-91 thru 18-98	18-91 thru 18-98
1 8-107/(1 8-108 blank)	18-107/(18-108 blank)
18-113 and 18-114	18-113 and 18-114
18-171 and 18-172	18-171 and 18-172
18-197 and 18-198	18-197 and 18-198
18-255 and 18-256	18-255 and 18-256
18-259 and 18-260	18-259 and 18-260
18-263 thru 18-266	18-263 thru 18-266
18-285 thru 18-308	18-285 thru 18-308
18-325 thru 18-328	18-325 thru 18-328
18-353 thru 18-355/(1 8-356 blank)	18-353 thru 18-355/(1 8-356 blank)

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By Order of the Secretary of the Army:

CARL E. VUONO
General United States Army
Chief of Staff

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R. L. DILWORTH
Brigadier General, United States Army
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To be distributed in accordance with DA Form 12-37, Direct Support and General Support Maintenance requirements for Vehicle, Combat Engineer, Full-Tracked, M728.

CHANGE NO.1

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington, D.C. 19 August 1985

**DIRECT SUPPORT
AND GENERAL SUPPORT
MAINTENANCE MANUAL**

**PART 4
MAINTENANCE**

**TURRET
FOR**

**COMBAT ENGINEER VEHICLE,
M728**

(2350-00-795-1797)

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Remove Pages	Insert Pages
<p>A and B 17-3 and 17-4 18-3 and 18-4 18-9(18-10 blank) 18-13 and 18-14 18-17 through 18-24 18-29 through 18-32 18-35 and 18-36 NONE</p> <p>18-69 and 18-70 18-73 and 18-74 18-125 through 18-144 NONE</p> <p>18-175 through 18-181/(18-182 blank) 18-259 and 18-260 18-265 through 18-268 18-287 through 18-289/(18-290 blank) 18-293 through 18-295/(18-296 blank) 18-299 through 18-301/(18-302 blank) 18-305 through 18-308 18-333 and 18-334 18-349 through 18-351/(18-352 blank) FO-2 FO-5</p>	<p>NONE</p> <p>17-3 and 17-4 18-3 and 18-4. 18-9(18-10 blank) 18-13 and 18-14 18-17 through 18-24 18-29 through 18-32 18-35 and 18-36 (184\$ 6.1 blank) /18-46.2 through 18-46.6 18-09 and 18-70 18-73 and 18-74 18-125 through 18-144 (18-172.1 blank) /18-172.2 through 18-172.19(18-172.20 blank) 18-175 through 18-181/(18-182 blank) 18-259 and 18-260 18-265 through 18-268 18-287 through 18-289/(18-290 blank) 18-293 through 18-295/(1 8-296 blank) 18-299 through 18-301/(1 8-302 blank) 18-305 through 18-308 18-333 and 18-334 18-349 through 18-351/(18-352 blank) FO-2 FO-5</p>

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By Order of the Secretary of the Army:

JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

Of ficia 1:

DONALD J. DELANDRO
Brigadier General, United States Army
The Adjutant General

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Technical Manual
No. 9-2350 -222-34-2-4

HEADQUARTERS,
DEPARTMENT OF THE ARMY
Washington, D. C., 10 October 1980

**Technical Manual
Direct Support and General Support
Maintenance Manual**

**Part 4
Maintenance**

**TURRET
FOR
COMBAT ENGINEER VEHICLE,
M728
{2350-00-795-1797}**

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know.

Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual directly to:

Commander

U. S. Army Armament, Munitions and Chemical Command

ATTN: AMSMC-MAS

Rock Island, IL 61299-6000

A reply will be furnished to you.

*This manual in conjunction with TM 9-2350-222-34-2-1, TM 9-2350-222-34-2-2, TM 9-2350-222-34-2-3, and TM 9-2350-222 -34-2-5 supersedes so much of the DS/GS portion of TM 9-2300-378-35/2, January 1968, as pertains to the M728 CEV, so much of the DS/GS Portion of TM 9-2350-222-35/2, October 1965, as pertains to the M728 CEV, and so much of the DS/GS portion of TM 9-2300-378-35/1, January 1968, as pertains to the Slipring Assembly, Turret and Miscellaneous Components for the M728 CEV, including all changes.

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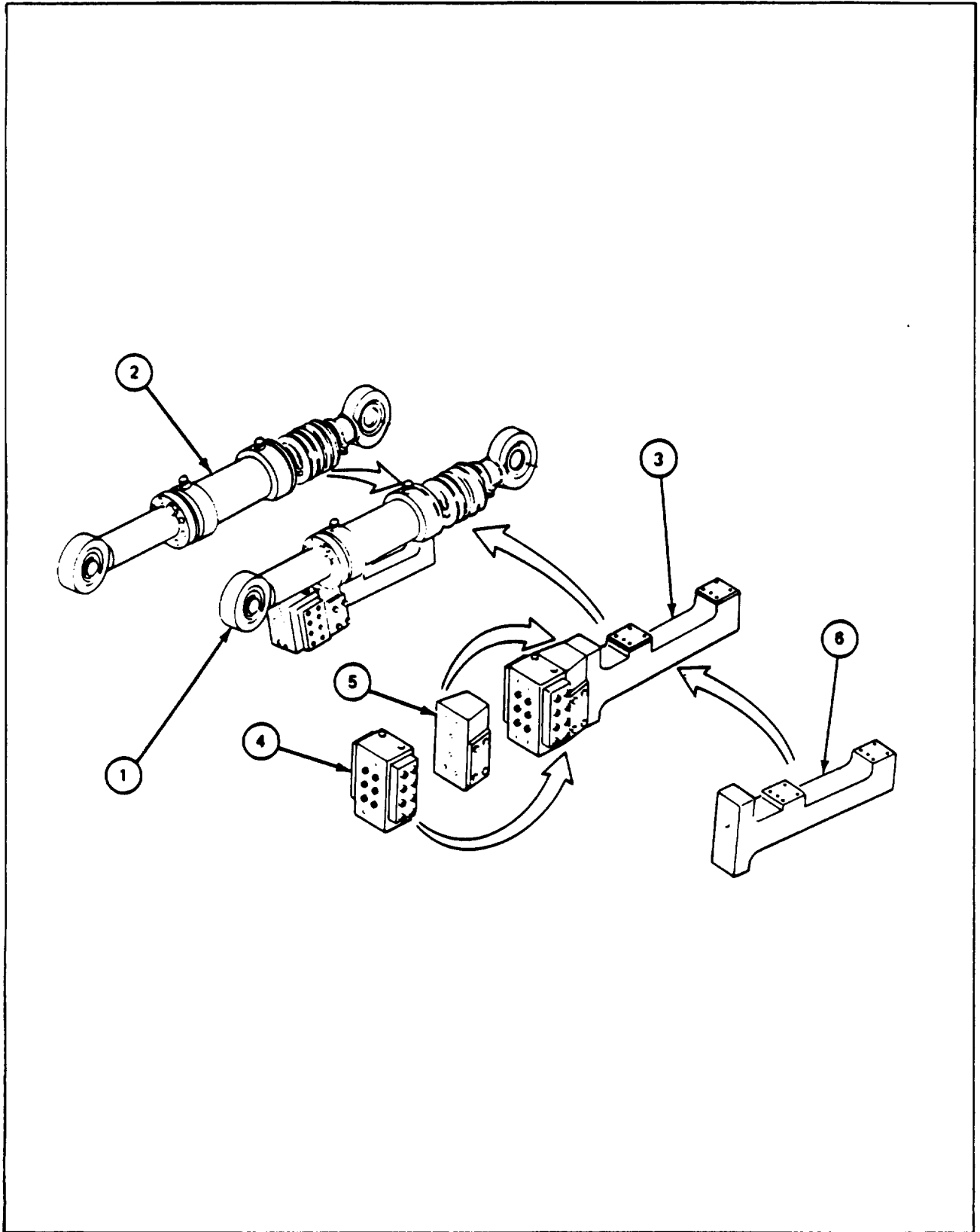
CHAPTER 1 5
ELEVATING MECHANISM

15-1. MAINTENANCE PROCEDURES INDEX

Equipment Item	Tasks						
	Inspection	Repair	Test	Removal	Installation	Disassembly	Assembly
1. Elevating Mechanism	15-2		15-3	15-4
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6. Manifold	15-11	15-12

Para 15-1

15-2



15-2. ELEVATING MECHANISM TEST PROCEDURE

TEST EQUIPMENT: Hydraulic test kit (NSN 1015-01-151-6441) (9337932)
M3 oil pump (NSN 4933-00-449-7166) (7550134)
Watch with sweep second hand

TOOLS: 3/4 in. combination wrench
3/8 in. combination wrench

SUPPLIES: Rags (item 21, App. A)

PERSONNEL: One

REFERENCES: TM 9-2350-222-202-3 for procedure to remove elevating mechanism

EQUIPMENT CONDITION: Elevating mechanism removed (TM -20-2-3)

PRELIMINARY PROCEDURE: Assemble elevating mechanism (para 15-4)

GENERAL INSTRUCTIONS:

WARNING

Hydraulic fluid under pressure can hurt or kill you. This test is done with high pressure hydraulic fluid. Follow procedure carefully.

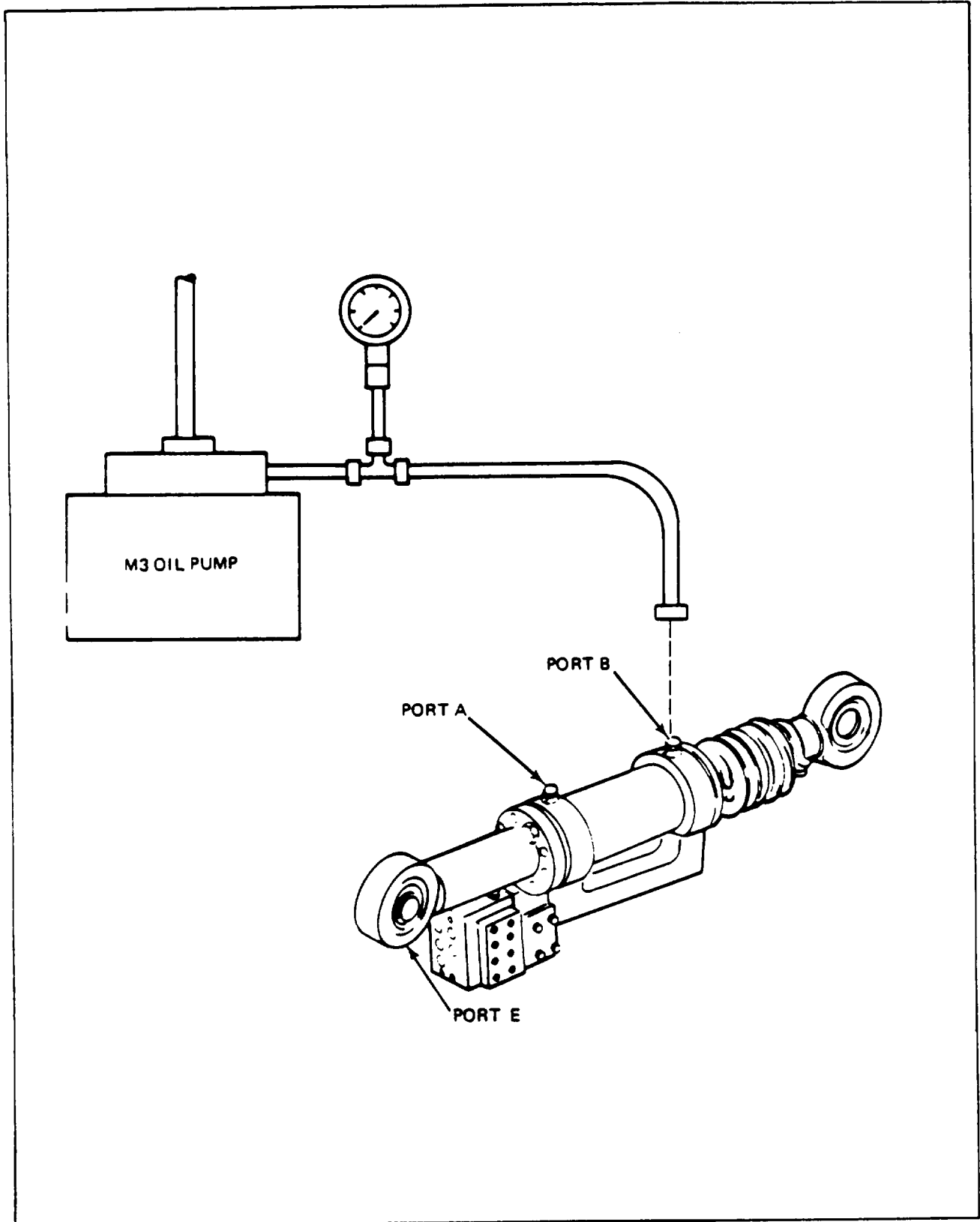
NOTE

Suitable fittings, lines, and tools should be used to connect test equipment to parts being tested.

If normal indication is not obtained, elevating mechanism is bad. Disassemble bad elevating mechanism (para 15-3).

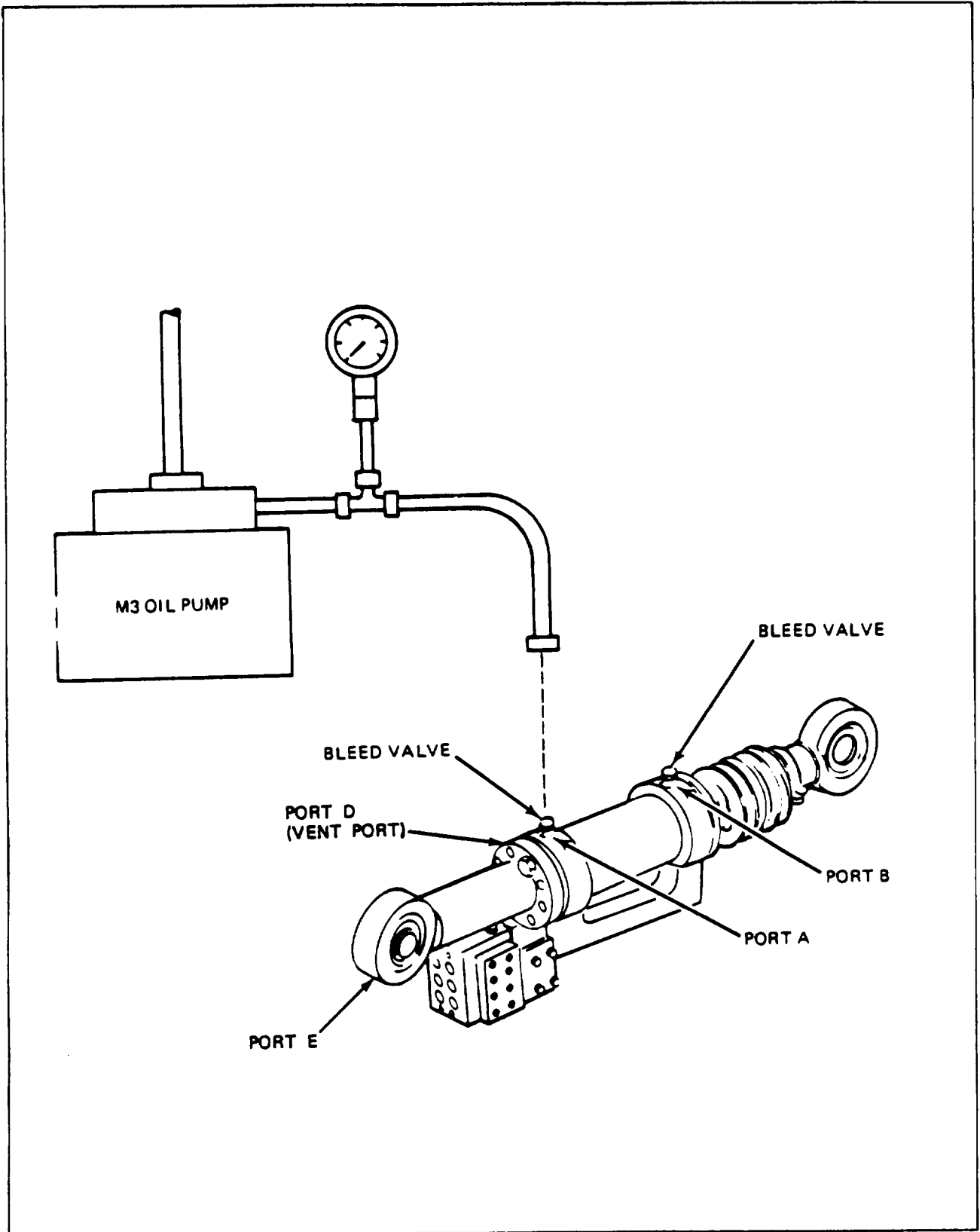
15-2. ELEVATING MECHANISM TEST PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Plug all ports except Port E. Close bleed valves at ports A and B.
2.	Using 3/4" wrench, remove bleed valve from port B.
3.	Assemble M3 oil pump with pressure gauge.
4.	Connect M3 oil pump to port B.
5.	Using M3 oil pump, pump oil in elevating mechanism until pressure gauge indicates about 50 psi.
6.	Using M3 oil pump, reduce pressure to 0 psi.
7.	Disconnect M3 oil pump from port B.
8.	Using 3/4" wrench, put bleed valve in port B .
9.	Using 3/4" wrench, remove bleed valve from port A.
10.	Connect M3 oil pump to port A.
11.	Using M3 oil pump, pump oil in elevating mechanism until pressure gauge indicates about 200 psi.
	GO TO FRAME 2



15-2. ELEVATING MECHANISM TEST PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	Using 3/8" wrench, open bleed valve at port B until oil flows without air and then close bleed valve at port B.
2.	Using rags, wipe all oil from outside of elevating mechanism.
3.	Using M3 oil pump, pressurize elevating mechanism until pressure gauge indicates between 2500 and 2550 psi (JPG).
	NOTE
	No oil should leak out of elevating mechanism.
4.	Using watch, check elevating mechanism for leaks for three minutes.
5.	Using M3 oil pump, reduce pressure in elevating mechanism to 0 psi (JPG).
6.	Disconnect M3 oil pump from port A .
7.	Using 3/4" wrench, put bleed valve in port A .
8.	Open all ports.
9.	Connect M3 oil pump to port E .
10.	Using M3 oil pump, pressurize elevating mechanism through port E until pressure gauge indicates between 2500 and 2550 psi (JPG).
11.	Using watch, check port D for leaks for three minutes. No leakage allowed.
12.	Using M3 oil pump, reduce pressure in elevating mechanism to 0 psi (JPG).
13.	Disassemble M3 oil pump and pressure gauge.
	NOTE
	If normal indication was obtained in frames 1 and 2, elevating mechanism is good.
	END OF TASK



15-3. ELEVATING CYLINDER REMOVAL AND ELEVATING MECHANISM DISASSEMBLY PROCEDURE

TOOLS: 3/8" **combination** wrench
 Vise with brass caps

SUPPLIES: Small container (two)
 Rags (item 21, App. A)

PERSONNEL: One

REFERENCES: TM 9-2350-222 -20-2-3 for procedure to remove elevating mechanism

EQUIPMENT CONDITION: Elevating mechanism removed (TM-20-2-3)

GENERAL INSTRUCTIONS:

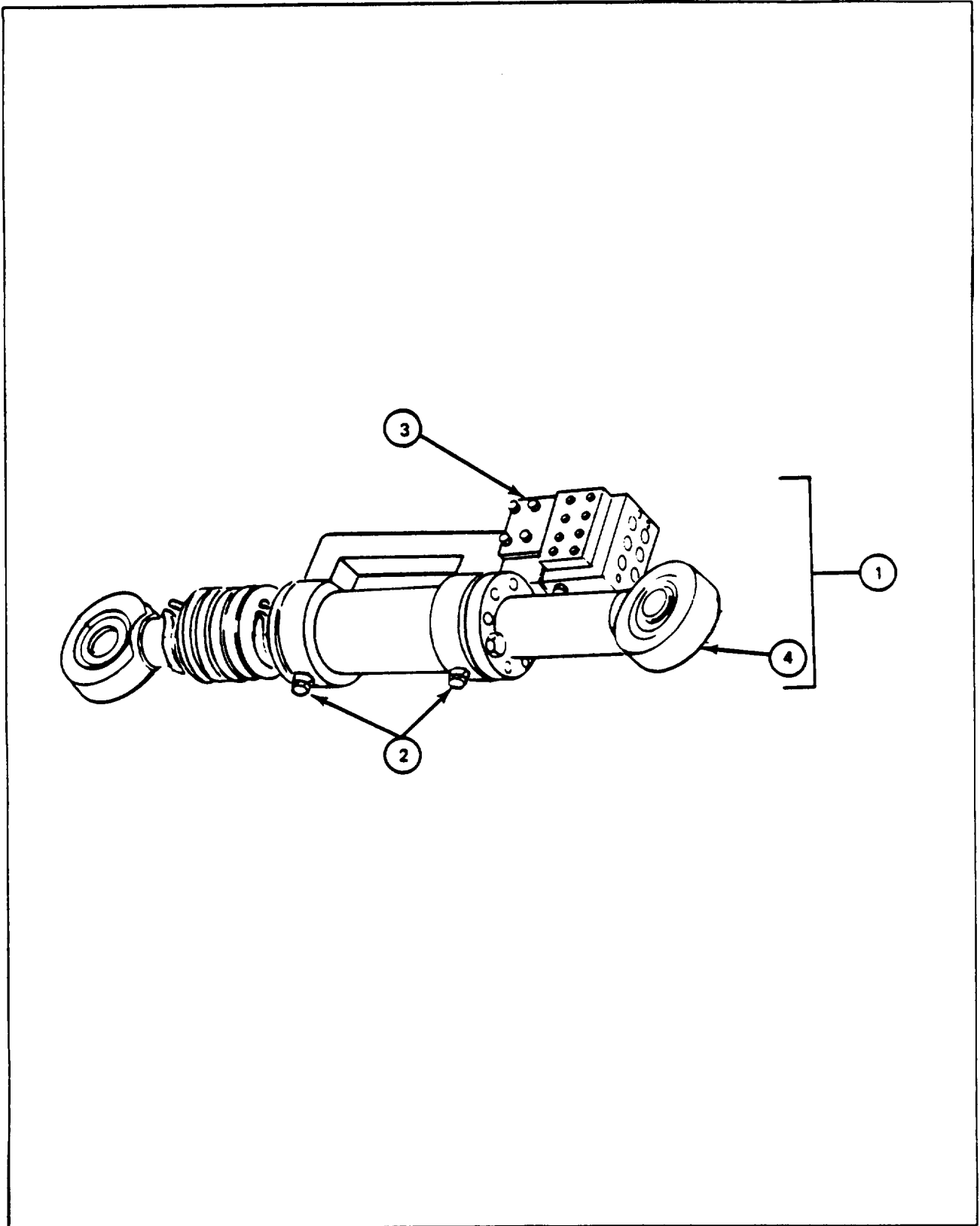
CAUTION

Keep dirt from getting in parts. Dirt **can** damage equipment

NOTE

Use rags to clean up spilled hydraulic fluid.

FRAME 1	
Step	Procedure
1.	Put elevating mechanism (1) in vise with drain cocks (2) down.
2.	Using wrench and two small containers <i>to</i> catch hydraulic fluid, open two drain <i>cocks</i> (2). Close two drain cocks when fluid stops draining.
3.	Remove elevation valve (3) (para 15-9).
4.	Remove elevating cylinder (4) from vise.
5.	Disassemble elevating cylinder (4) (para 15-6).
6.	Disassemble elevation valve (3) (para 15- 11).
	END OF TASK



15-4. ELEVATING CYLINDER INSTALLATION AND ELEVATING MECHANISM ASSEMBLY PROCEDURE

SUPPLIES: Rags (item 21, App. A)

PERSONNEL: One

GENERAL INSTRUCTIONS:

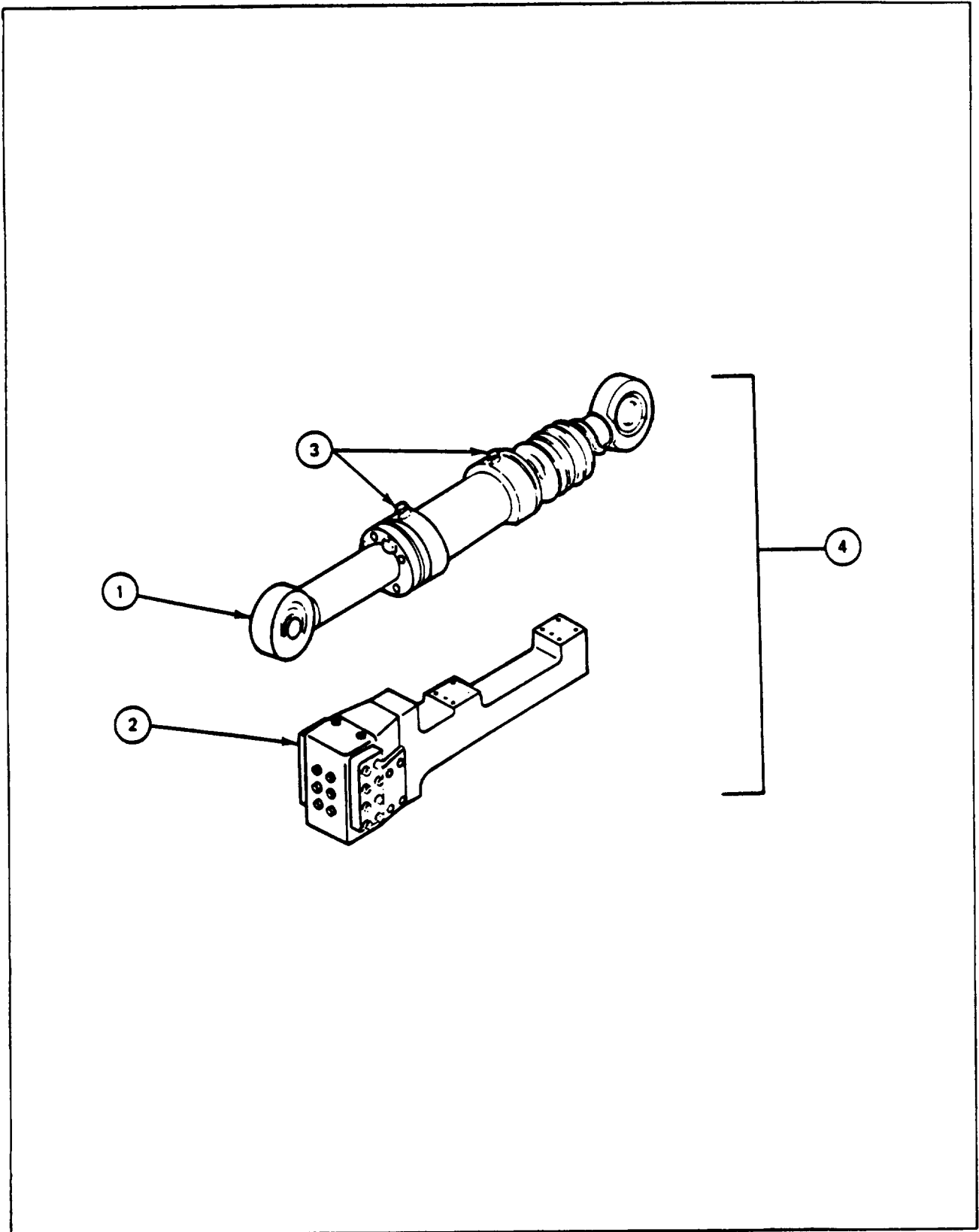
CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

NOTE

Use rags to **clean** up spilled hydraulic fluid.

FRAME 1	
Step	Procedure
1.	Assemble elevating cylinder (1) (para 15-7).
2.	Assemble elevation valve (2) (para 15-12).
3.	Put elevating cylinder (1) in vise with drain cocks (3) down.
4.	Install elevation valve (2) (para 15- 10).
5.	Remove elevating mechanism (4) from vise.
	END OF TASK



15-5. ELEVATING CYLINDER INSPECTION PROCEDURE

PERSONNEL: One

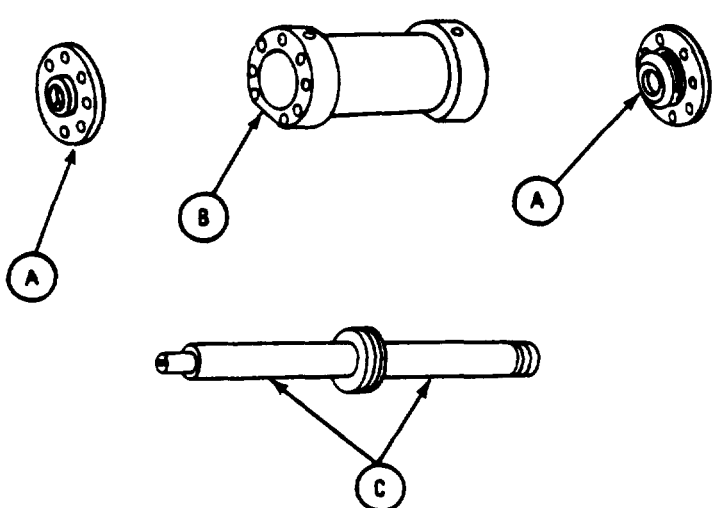
PRELIMINARY PROCEDURES: Disassemble elevating cylinder (para 15-6)

GENERAL INSTRUCTIONS:

NOTE

If part is bad, order repair part or next higher assembly as required.

15-5. ELEVATING CYLINDER INSPECTION PROCEDURE (CONT)

FRAME 1													
Step	Procedure												
<p>1. Take two guides, cylinder, and piston to shop where inspection equipment is available.</p> <p>2. Make dimensional checks.</p>	<p style="text-align: center;">SUPPORT SHOP WORK</p> <table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 15%;">Reference Letter</th> <th style="text-align: left; width: 45%;">Point of Measurement</th> <th style="text-align: left; width: 40%;">Measurement</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>ID of piston guides</td> <td>1.2500 to 1.2505 inches</td> </tr> <tr> <td>B</td> <td>ID of cylinder bore</td> <td>2.7500 to 2.7510 inches</td> </tr> <tr> <td>c</td> <td>OD of piston, both ends</td> <td>1.2480 to 1.2485 inches</td> </tr> </tbody> </table> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Tag parts that are out of tolerance.</p>	Reference Letter	Point of Measurement	Measurement	A	ID of piston guides	1.2500 to 1.2505 inches	B	ID of cylinder bore	2.7500 to 2.7510 inches	c	OD of piston, both ends	1.2480 to 1.2485 inches
Reference Letter	Point of Measurement	Measurement											
A	ID of piston guides	1.2500 to 1.2505 inches											
B	ID of cylinder bore	2.7500 to 2.7510 inches											
c	OD of piston, both ends	1.2480 to 1.2485 inches											
<p>3, After support shop work, return parts to turret shop.</p> <p>END OF TASK</p>	 <p>The diagram shows three technical drawings. The top row consists of three views: a front view of a piston guide with a circular arrow labeled 'A' pointing to its inner diameter; a side view of a cylinder with a circular arrow labeled 'B' pointing to its bore; and a front view of another piston guide with a circular arrow labeled 'A' pointing to its inner diameter. The bottom row shows a side view of a piston with a circular arrow labeled 'C' pointing to its outer diameter.</p>												

15-6. ELEVATING CYLINDER DISASSEMBLY PROCEDURE

TOOLS: Vise with brass caps
 Machinist scriber
 6" machinist steel rule
 3/4" combination wrench
 1/4" flat tip screwdriver
 5 /16" open end wrench
 3 / 16" socket head screw key (Allen wrench)
 1-1 / 8" open end wrench
 Adjustable face type spanner wrench, 1/4" pins, 3/4" spacing
 O-ring extractor tool
 Soft faced hammer
 3/4" socket (1/2" drive)
 1/2" drive ratchet
 20 ounce ball peen hammer
 1 /4" brass drift pin
 Scraper
 External retaining ring pliers
 Adjustable face type spanner, 1/2" pins

SUPPLIES: Small container (two)
 Rags (item 21, App A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
 Remove retaining rings
 Clean parts
 Inspect and repair pans
 Remove preformed packings
 TM 9-2350-222 -20-2-3 for procedure to remove elevating mechanism

EQUIPMENT CONDITION: Elevating mechanism removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Test elevating mechanism (para 15-2)
 Remove elevation valve (para 15-9)

GENERAL INSTRUCTIONS:

CAUTION

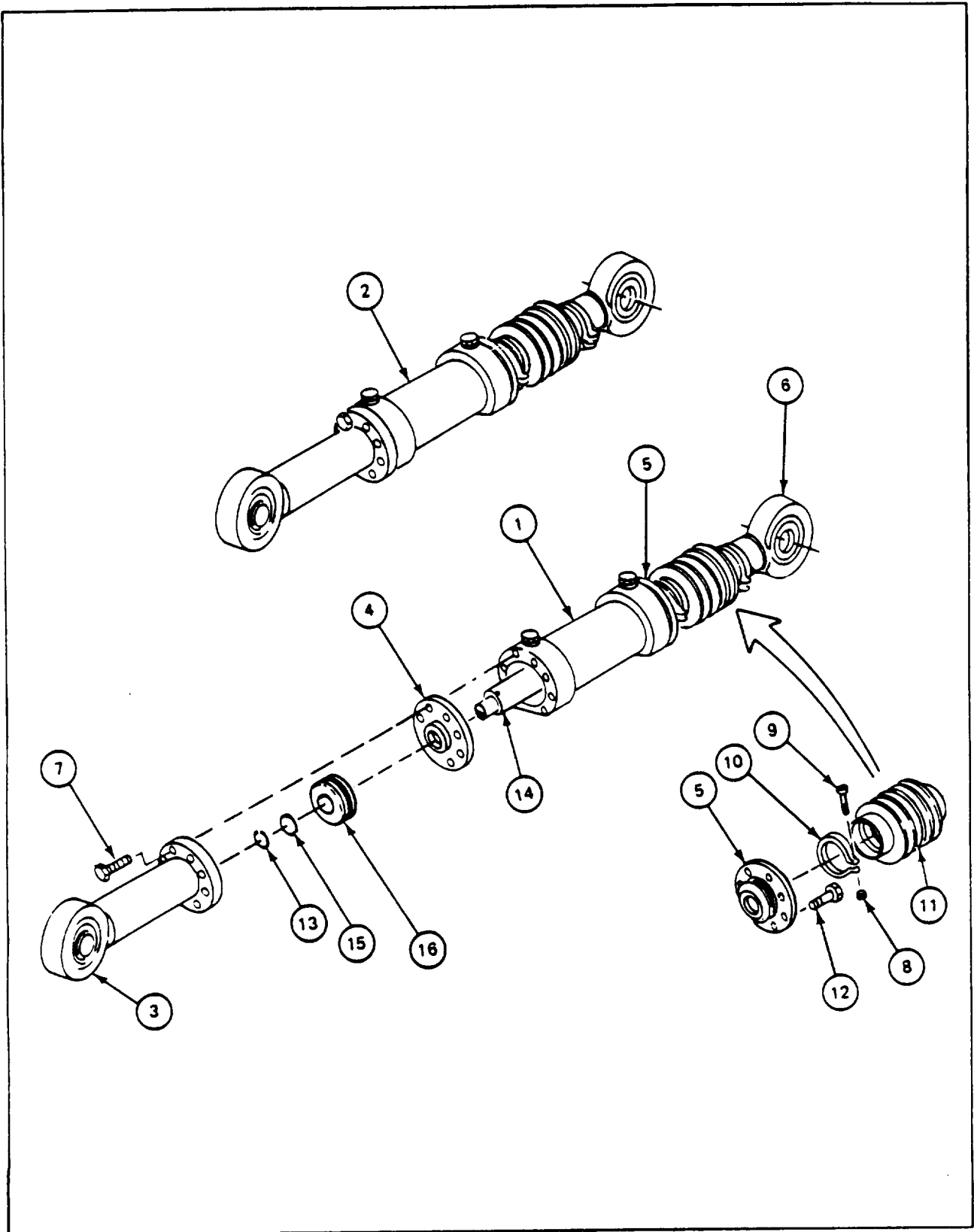
Keep dirt from getting in parts. Dirt can damage equipment.

NOTE

Use rags to clean up spilled hydraulic fluid.

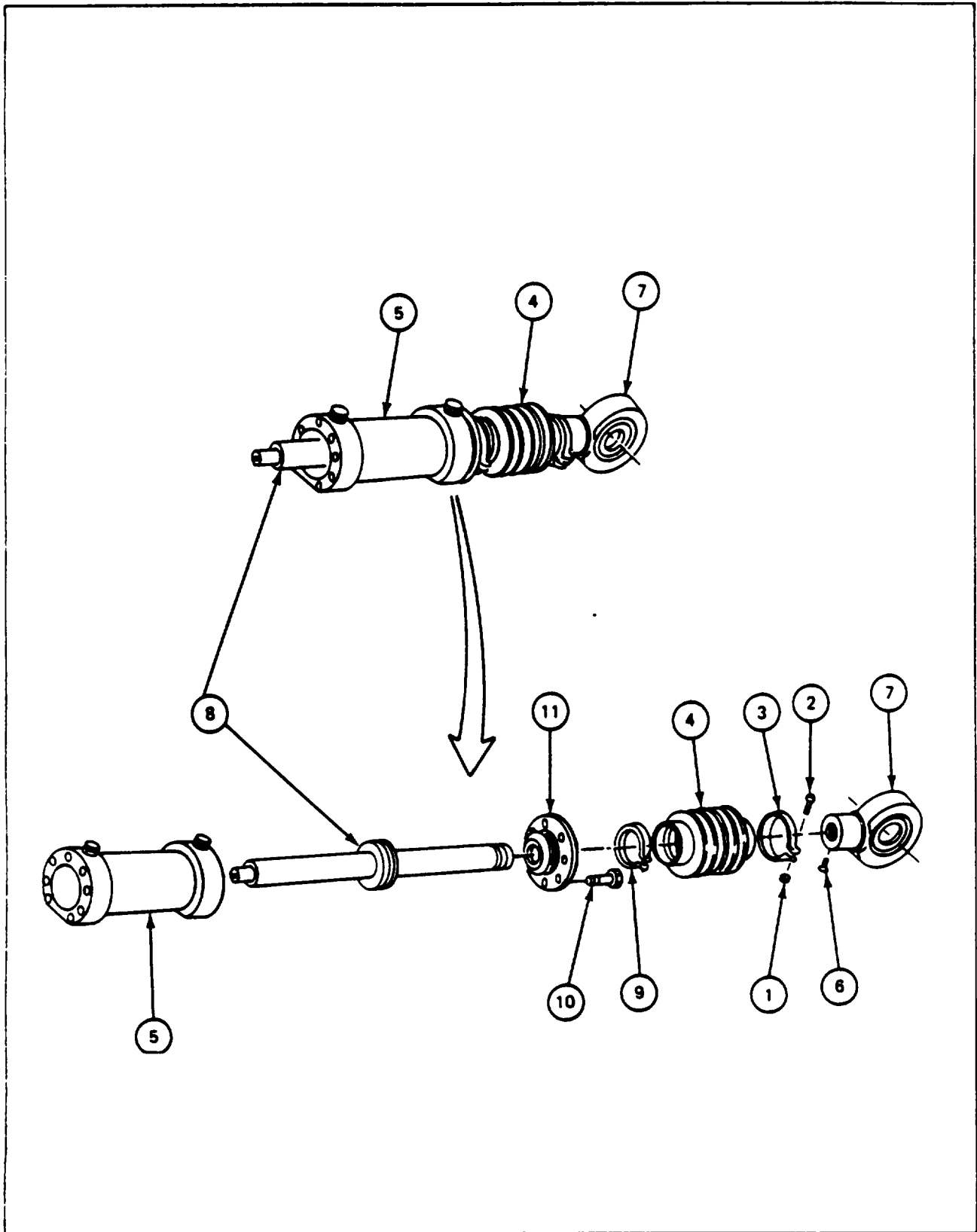
15-6. ELEVATING CYLINDER DISASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	NOTE
	Lines are scribed on elevation mechanism assembly before disassembly so ports can be lined up during assembly.
1.	Put cylinder (1) of elevating cylinder (2) in vise.
2.	Using scribe and steel rule, scribe line across sleeve assembly (3), guide (4) and cylinder (1).
3.	Using scribe and steel rule, scribe line across cylinder (1) and guide (5) of eye assembly (6).
4.	Using socket wrench, loosen eight bolts (7) holding sleeve assembly (3) and guide (4) to cylinder (1). Do not remove eight bolts.
5.	Using screwdriver and 5/ 16" wrench, loosen nut (8) and screw (9) from clamp (10).
6.	Using fingers, push bellows (11) toward eye assembly (6) until eight bolts (12) can be reached.
7.	Using 3/4" combination wrench, loosen eight bolts (12) holding guide (5) to cylinder (1).
8.	Using socket wrench, remove eight bolts (7) holding sleeve assembly (3) and guide (4 to cylinder (1). Throw bolts away.
9.	Remove sleeve assembly (3) from cylinder (1).
10.	Using pliers, remove retaining ring (13) from shaft (14) JPG).
11.	Remove washers (15) and piston (16) from shaft (14).
	NOTE
	It may be necessary to tap guide (4) with soft faced hammer to loosen.
12.	Remove guide (4) from cylinder (1).
	GO TO FRAME 2



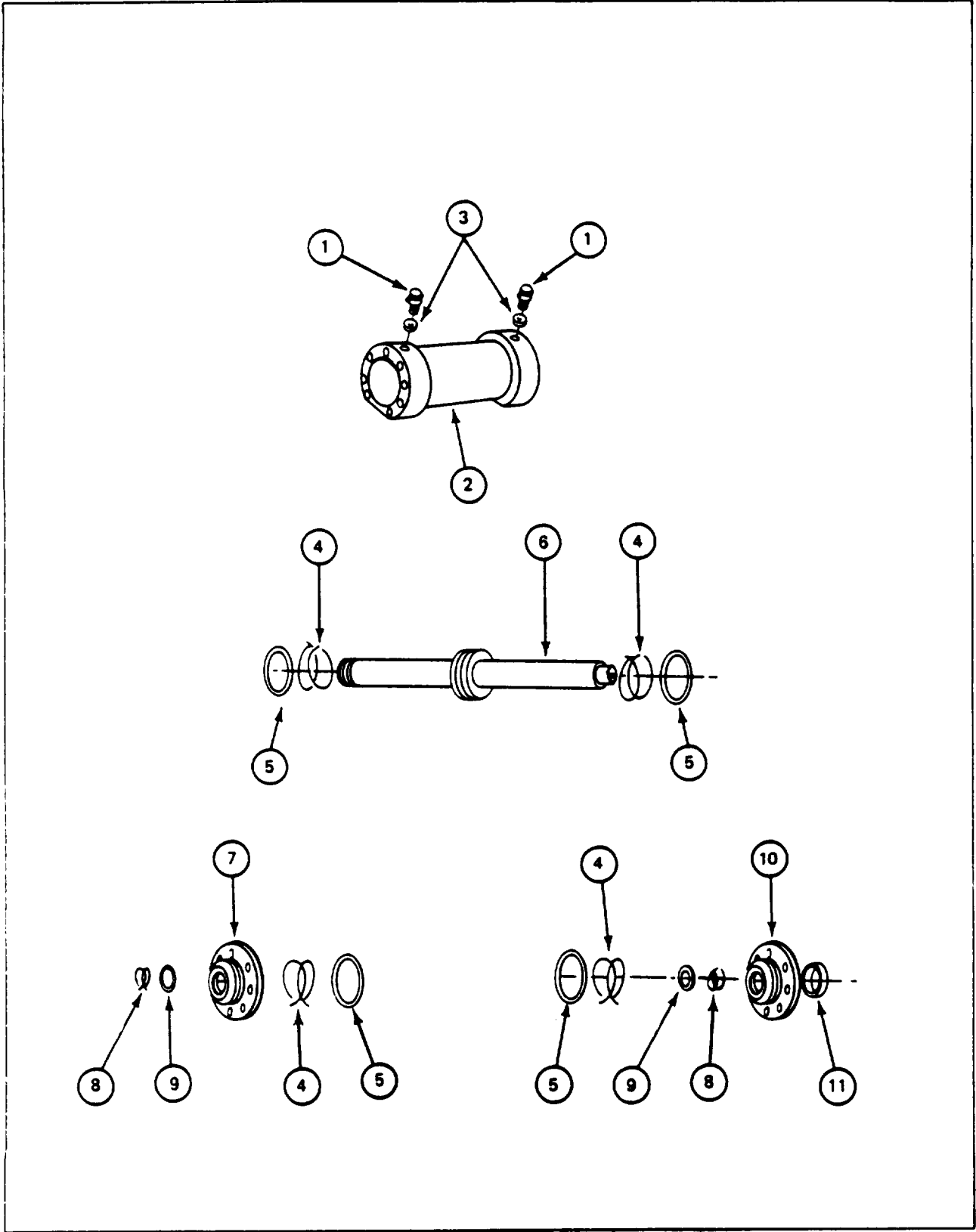
15-6. ELEVATING CYLINDER DISASSEMBLY PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	Using screwdriver and 5/16" wrench, loosen nut (1) and screw (2) on clamp (3).
2.	Using fingers, push bellows (4) toward cylinder (5) until setscrew (6) can be reached .
3.	Using Allen wrench, loosen setscrew (6) from eye assembly (7).
4.	Using 1- I /8" wrench on eye assembly (7) and 1 /4" pin spanner wrench on end of piston (8), unscrew eye assembly from piston.
5.	Remove eye assembly (7), two clamps (3) and (9), and bellows (4) from piston (8).
6.	Using 3/4" combination wrench, remove eight bolts (10) holding guide (1 1) to cylinder (5). Throw bolts away.
7.	Remove guide (11) from piston (8) and cylinder (5).
8.	Remove piston (8) from cylinder (5).
	GO TO FRAME 3



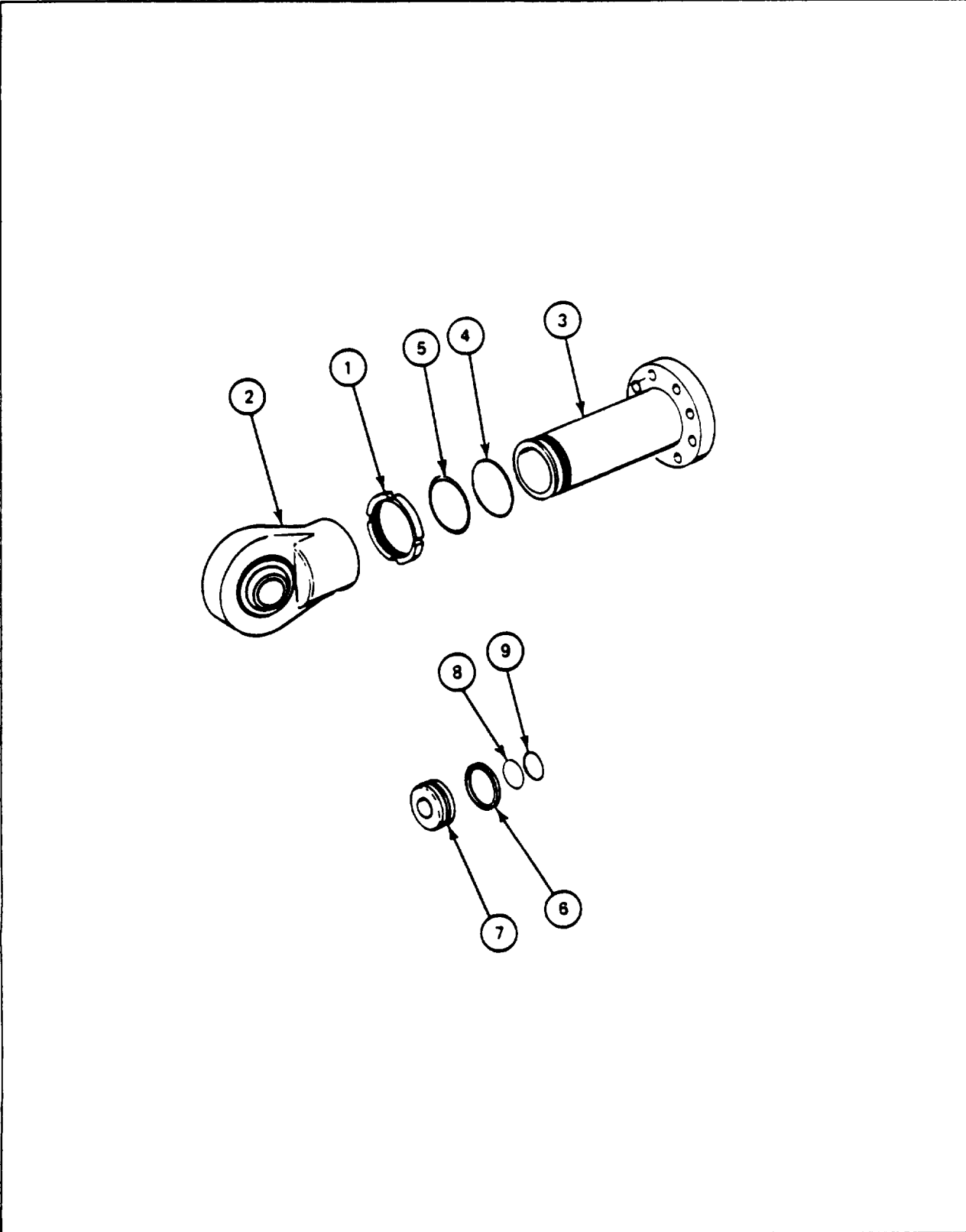
15-6. ELEVATING CYLINDER DISASSEMBLY PROCEDURE (CONT)

FRAME 3	
Step	Procedure
1.	Using 3/4" combination wrench, remove two drain cocks (1) from cylinder (2).
2.	Remove cylinder (2) from vise.
3.	Using O-ring extractor tool, remove two preformed packings (3) from two drain cocks (1) (JPG). Throw preformed packings away.
4.	Using O-ring extractor tool, remove two packing retainers (4) and- two preformed packings (5) from piston (6) (JPG). Throw packing retainers and preformed packing away.
5.	Using O-ring extractor tool, remove packing retainer (4) and preformed packing (5 from guide (7) (JPG). Throw packing retainer and preformed packing away.
6.	Using O-ring extractor tool, remove packing retainer (8) and preformed packing (9' from guide (7) (JPG). Throw packing retainer and preformed packing away.
7.	Repeat steps 4 and 5 for guide (10).
8.	Using ball peen hammer and drift pin, remove seal (11) from guide (10). Throw seal away.
	GO TO FRAME 4



15-6. ELEVATING CYLINDER DISASSEMBLY PROCEDURE (CONT)

FRAME 4	
Step	Procedure
	NOTE
	It may be necessary to put sleeve assembly in vise.
1.	Using 1 /2" pin spanner wrench, loosen nut (1) from eye (2).
2.	Remove eye (2) from sleeve (3).
3.	Using O-ring extractor tool, remove packing retainer (4) and preformed packing (5) from sleeve (3) (JPG). Throw packing retainer and preformed packing away.
4.	Remove nut (1) from sleeve (3).
5.	Using O-ring extractor tool, remove preformed packing (6) from outside diameter of piston (7), and preformed packing (8) and ring (9) from face of piston (7) (JPG). Throw preformed packings away.
	NOTE
	Follow-on Maintenance Action Required:
	Clean all parts (JPG).
	Inspect and repair all parts (JPG).
	Do detail inspection of parts (para 15-5).
	END OF TASK



15-7. ELEVATING CYLINDER ASSEMBLY PROCEDURE

TOOLS: 3/4" combination wrench
1/4" flat tip screwdriver
5/16" combination wrench
3/16" socket head screw key (Allen wrench)
Adjustable face type spanner wrench, 1/4" pins, 3/4" spacing
3/4" socket
1/2" drive torque wrench (0 to 150 foot-pounds)
3/8" drive torque wrench (0 to 600 inch-pounds)
3/16" hex head socket (3/8" drive)
O-ring extractor kit
20 ounce **ball peen hammer**
1-1/8" **open** end wrench
Vise with brass caps
External retaining ring pliers
Adjustable face type spanner wrench, 1/2" pins
Feeler gauge

SUPPLIES: Elevating cylinder repair kit (59 11020)
Rags (item 21, App A)
Hydraulic fluid (item 10, App A)
Bolts (MS35764-1068) (eight)
Bolts (MS35764-1071) (eight)
Preformed packing (MS28775-230) (four)
Preformed packing (MS28775-218) (two)
Packing retainer (MS28783-8) (four)
Packing retainer (MS28782-23) (two)
Packing retainer (1 1608081)
Preformed packing (MS28775- 137)
Preformed packing (MS28775-021)
Washers (10951663-1 through -5)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Use feeler gauge
Use torque wrench
Install preformed packings, retainer rings, and seals
Install retaining rings

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

NOTE

Use rags to clean up spilled hydraulic fluid.

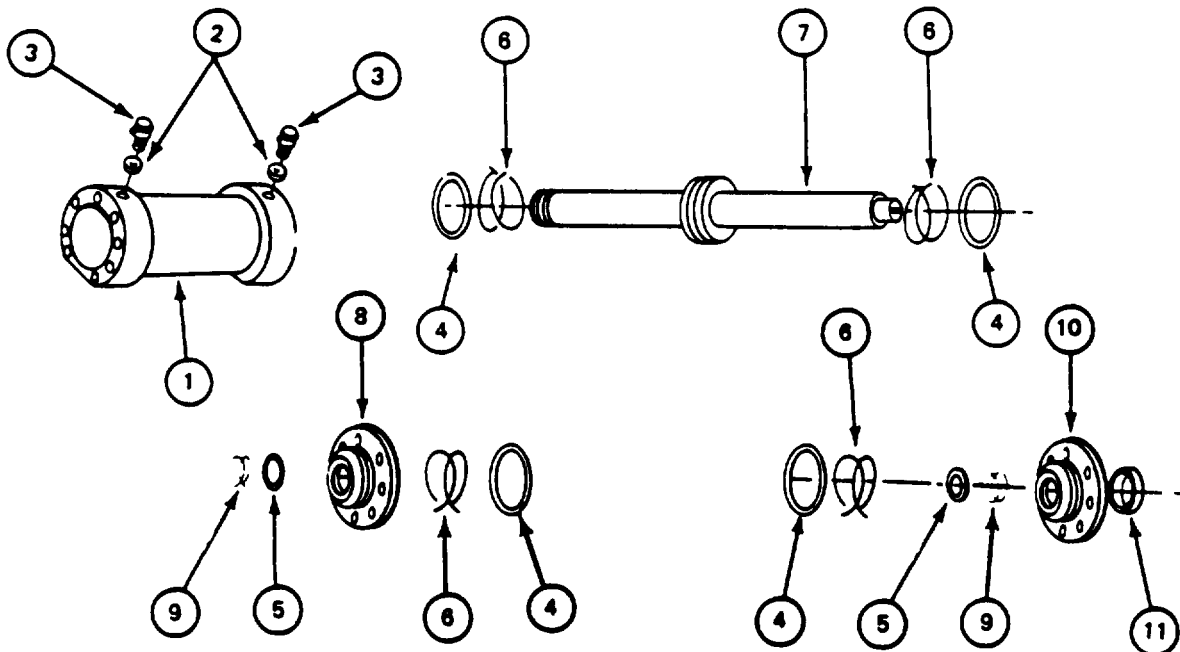
Para 15-7

15-26

15-7. ELEVATING CYLINDER ASSEMBLY PROCEDURE (CONT)

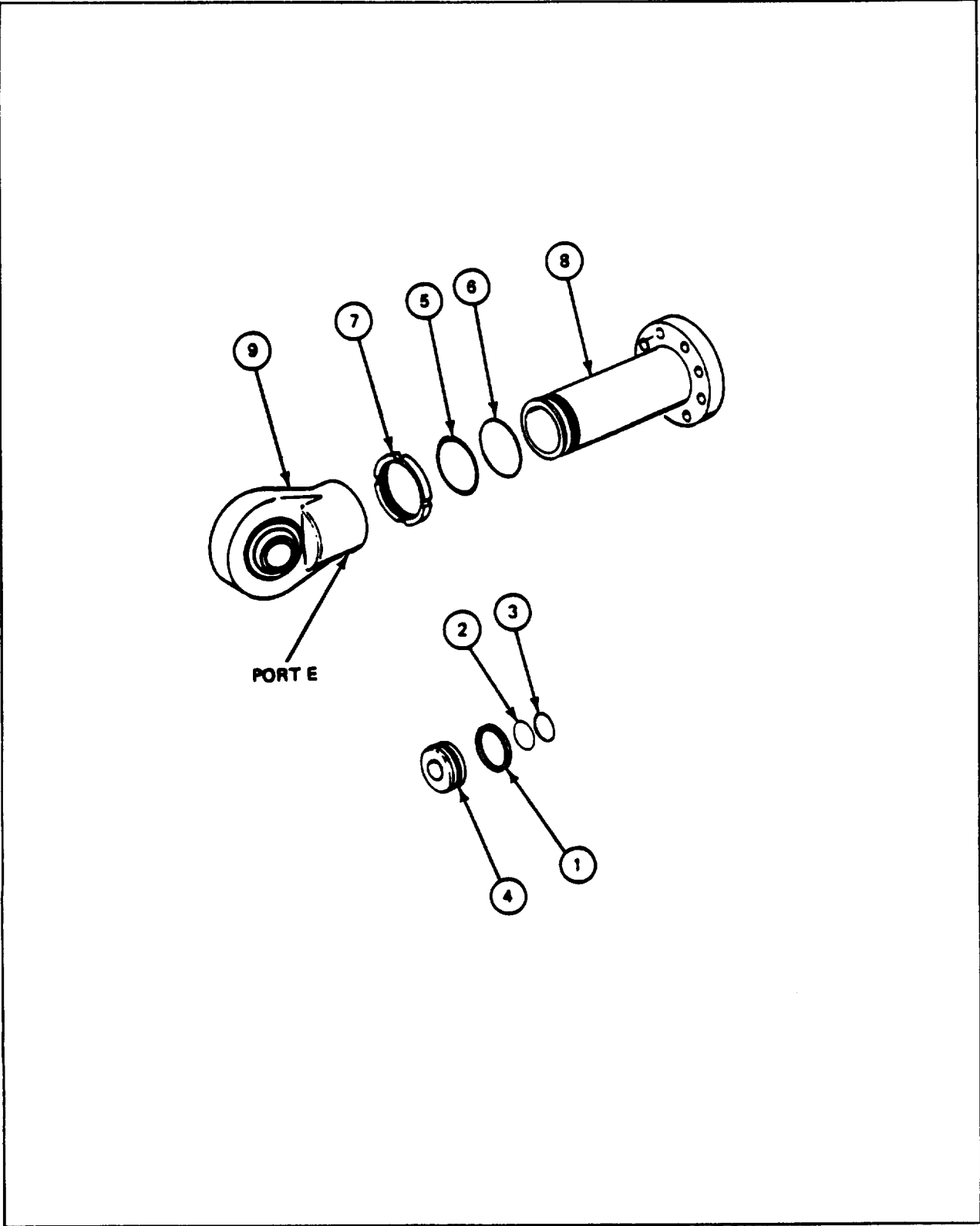
FRAME 1

Step	Procedure
1.	Put cylinder (1) in vise.
2.	Lightly coat two preformed packings (2) (MS 28778-4) with hydraulic fluid.
3.	Using O-ring extractor tool, put two preformed packings (2) on two drain cocks (3) (JPG).
4.	Using 3/4" combination wrench, attach two drain cocks (3) to cylinder (1).
5.	Lightly coat four preformed packings (4) (MS 28775-230) and two preformed packings (5) (MS 28775-2 18) with hydraulic fluid.
6.	Using O-ring extractor tool, put two packing retainers (6) (MS 28783-8) and two preformed packings (4) on piston (7) (JPG).
7.	Using O-ring extractor tool, put packing retainer (6) and preformed packing (4) on guide (8) (JPG).
8.	Using O-ring extractor tool, put packing retainer (9) (MS 28782-23) and preformed packing (5) on guide (8) (JPG).
9.	Repeat steps 7 and 8 for guide (10).
10.	Lightly coat seal (11) with hydraulic fluid.
11.	Using ball peen hammer, put seal (11) in guide (10) (JPG). GO TO FRAME 2



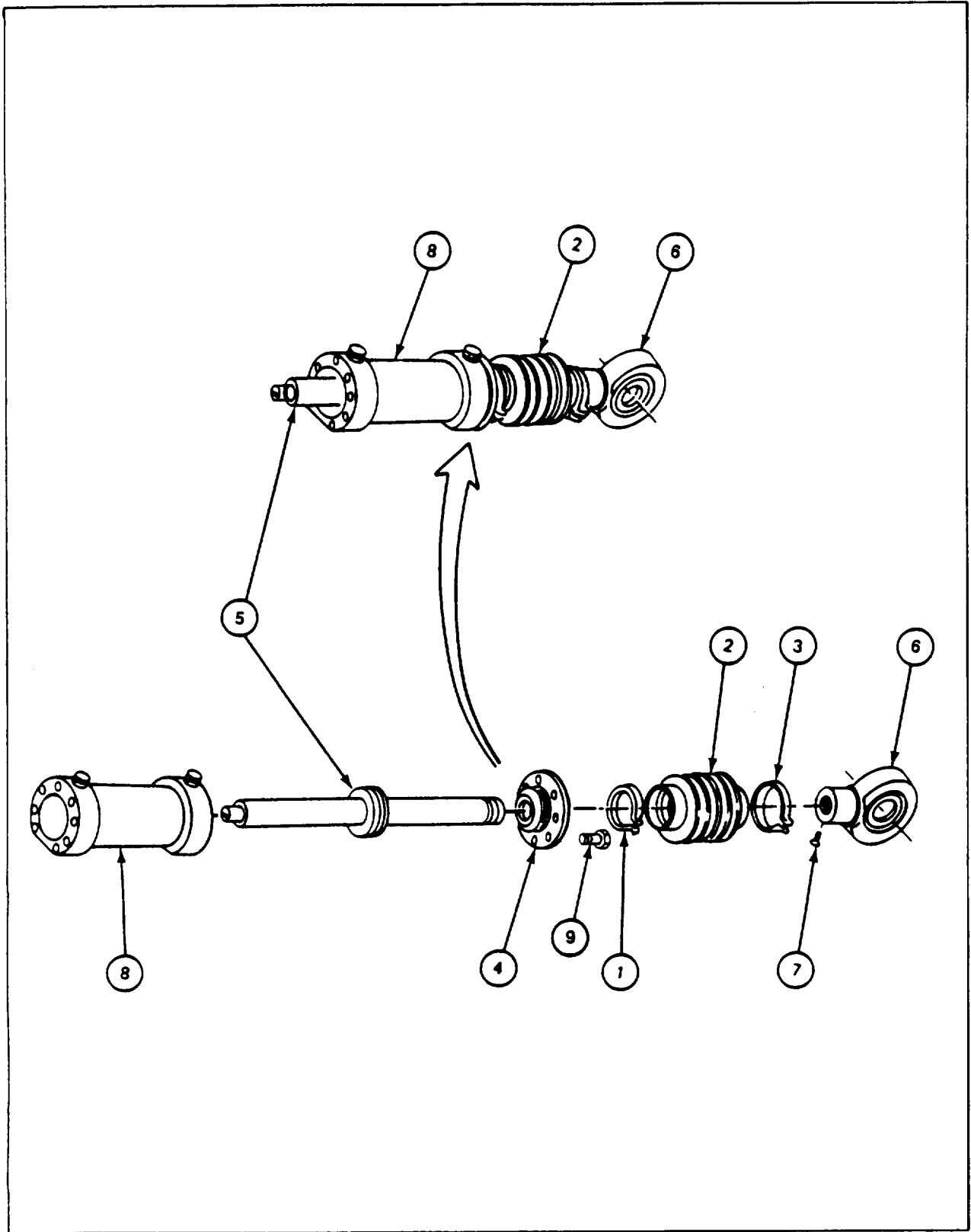
15-7. **ELEVATING CYLINDER ASSEMBLY PROCEDURE (CONT)**

FRAME 2	
Step	Procedure
1.	Lightly coat preformed packing (1), preformed packing (2) and ring (3) with hydraulic fluid.
2.	Using O-ring extractor tool, put preformed packing (1) in outside diameter of piston (4) and preformed packing (2) and ring (3) in face of piston (4) (JPG).
3.	Lightly coat preformed packing (5) and packing retainer (6) with hydraulic fluid.
4.	Put nut (7) on sleeve (8).
5.	Using O-ring extractor tool, put preformed (5) and packing retainer (7) on sleeve (8) (JPG).
NOTE	
It may be necessary to put sleeve in vise,	
6.	Screw eye (9) on sleeve (8) and bottom.
7.	Using 1 /2" pin spanner wrench, tighten nut (7) to eye (9).
GO TO FRAME 3	



15-7. ELEVATING CYLINDER ASSEMBLY PROCEDURE (CONT)

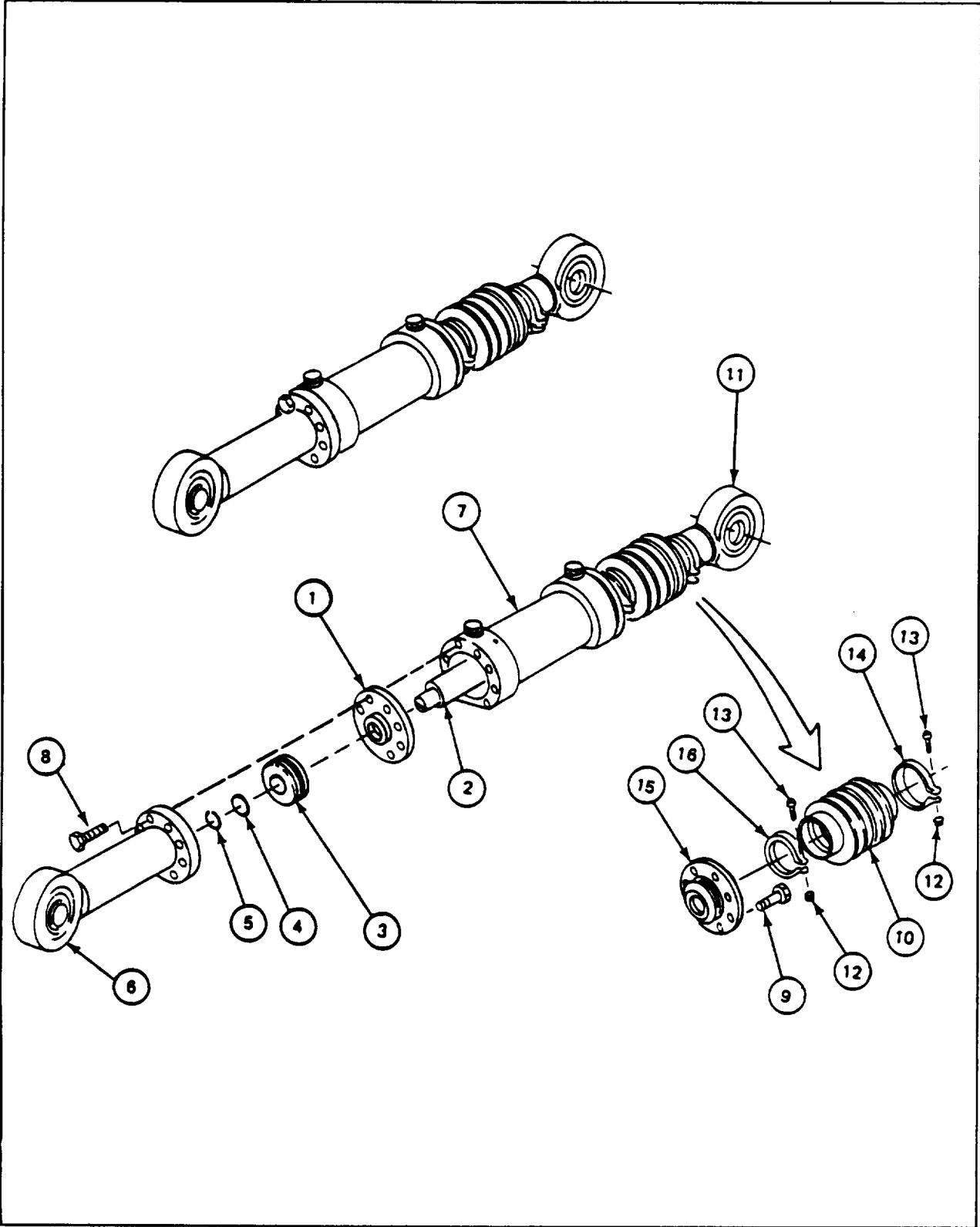
FRAME 3	
Step	Procedure
1.	Put clamp (1) on bellows (2). Do not tighten clamp.
2.	Put clamp (3) on bellows (2). Do not tighten clamp.
3.	Slide larger hole of bellows (2) on guide (4).
4.	Slide guide (4) and bellows (2) on shaft (5).
5.	using 1-1 / 8" wrench and spanner wrench, screw eye (6) on shaft (5) until setscrew hole in eye is lined up with setscrew hole in piston.
6.	Using Allen wrench, put setscrew (7) in eye (6).
7.	Using hex head socket and 3/8" drive torque wrench, torque setscrew (7) to between 180 and 200 inch-pounds (JPG).
8.	Slide shaft (5), guide (4) and eye (6) in cylinder (8).
9.	Line up scribed lines on guide (4) and cylinder (8).
10.	Using 3/4" combination wrench, attach guide (4) to cylinder (8) with eight new bolts (9) (MS 35764-1068).
	GO TO FRAME 4



Para 15-7 Cont

15-7. ELEVATING CYLINDER ASSEMBLY PROCEDURE (CONT)

FRAME 4	
Step	Procedure
1.	Put guide (1) on shaft (2).
2.	Put piston (3) on shaft (2) with preformed packing side toward shaft.
3.	Put washers (4) on shaft (2).
4.	Using pliers, put retaining ring (5) on shaft (2) (JPG).
5.	Using feeler gauge, check for clearance of 0.0005 to 0,0040 between guide (1) and shaft (2) (JPG). Change washers (4) as required.
6.	Put sleeve (6) on shaft (2).
7.	Line up two scribed lines on sleeve (6), guide (1), and cylinder (7).
8.	Using 3/4" wrench, attach sleeve (6) and guide (1) to cylinder (7) with eight new bolts (MS 35764-1071).
9.	Using 3/4" socket and 1 /2"" drive torque wrench, torque eight bolts (8) to between 90 and 95 foot-pounds (JPG).
10.	Using 3/4" socket and 1/2" drive torque wrench. torque eight bolts (9) to between 90 and 95 foot-pounds (JPG).
11.	Slide bellows (10) on eye (11) as far as it will go.
12.	Using screwdriver and 5/ 16" wrench, tighten nut (12) and screw (13) on clamp (14).
13.	Slide bellows (10) on guide (15) as far as it will go.
14.	Using screwdriver and 5/ 16" wrench, tighten nut (12) and screw (13) on clamp (16).
15.	Remove elevating cylinder (7) from vise.
NOTE	
Follow -on Maintenance Action Required:	
Install elevation valve (para 15- 10).	
Test elevating mechanism (para 15-2).	
END OF TASK	



15-8. ELEVATING CYLINDER REPAIR PROCEDURE

SUPPLIES: Bearing (two) 8376373

PERSONNEL: One

PRELIMINARY PROCEDURES: Disassemble elevating cylinder (para 15-6)

GENERAL INSTRUCTIONS:

NOTE

Procedure is used to replace bad bearings in eye assemblies.

FRAME 1	
Step	Procedure
1.	<p>Take eye assembly (1), eye assembly (2), and new bearings to shop where press is available.</p> <p>a. Remove bad bearings. b. Install new bearings.</p>
2.	<p>After support shop work, return eye assembly (1) and eye assembly (2) to turret shop.</p> <p>END OF TASK</p>

15-9. ELEVATION VALVE REMOVAL PROCEDURE

TOOLS: 5/8" open end wrench
 11/16" open end wrench
 7/32" socket head screw key (Allen wrench)
 1" open end wrench
 1-1/8" open end wrench
 O-ring extractor kit

SUPPLIES: Plugs for hydraulic **tubes** and manifold ports (twelve)
 Plugs for elevation mechanism and manifold ports (twelve)
 Small container
 Rags (item 21, App A)
 Masking tape (1" wide) (item 36, App A)
 Pen
 Wood block (4" x 4" x 10" long)

PERSONNEL One

REFERENCES: TM 9-2350-222 -20-2-3 for procedure to lower hydraulic pressure
 JPG for procedures to:
 Disconnect electrical connectors
 Remove preformed packings
 Tag hydraulic tubes
 TM 9-2350-222-10 for procedure to elevate and depress gun

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Elevating Mechanism	FO-4	8
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
 Gunner's control box ELEV/TRAV POWER switch set to OFF
 Turret traverse lock set to LOCKED
 Position main gun to O elevation

GENERAL INSTRUCTIONS:



Keep dirt from getting in tubing or parts. **Dirt can damage equipment.**

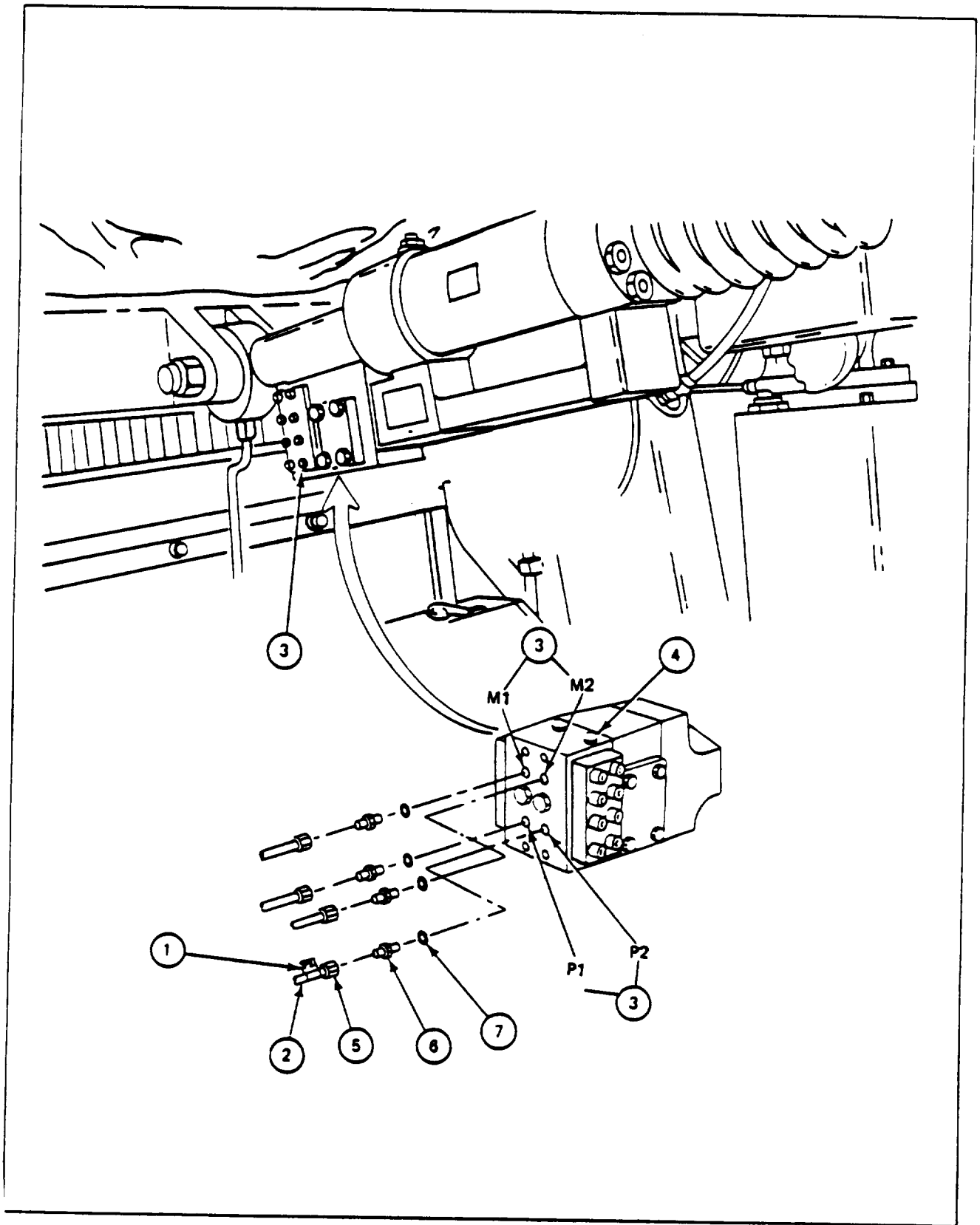
NOTE

Use small container to catch hydraulic fluid which leaks when hydraulic lines are disconnected. Use rags to wipe up spilled hydraulic fluid.

Equipment condition applies only if task is being done on vehicle.

15-9. ELEVATION VALVE REMOVAL PROCEDURE (CONT)

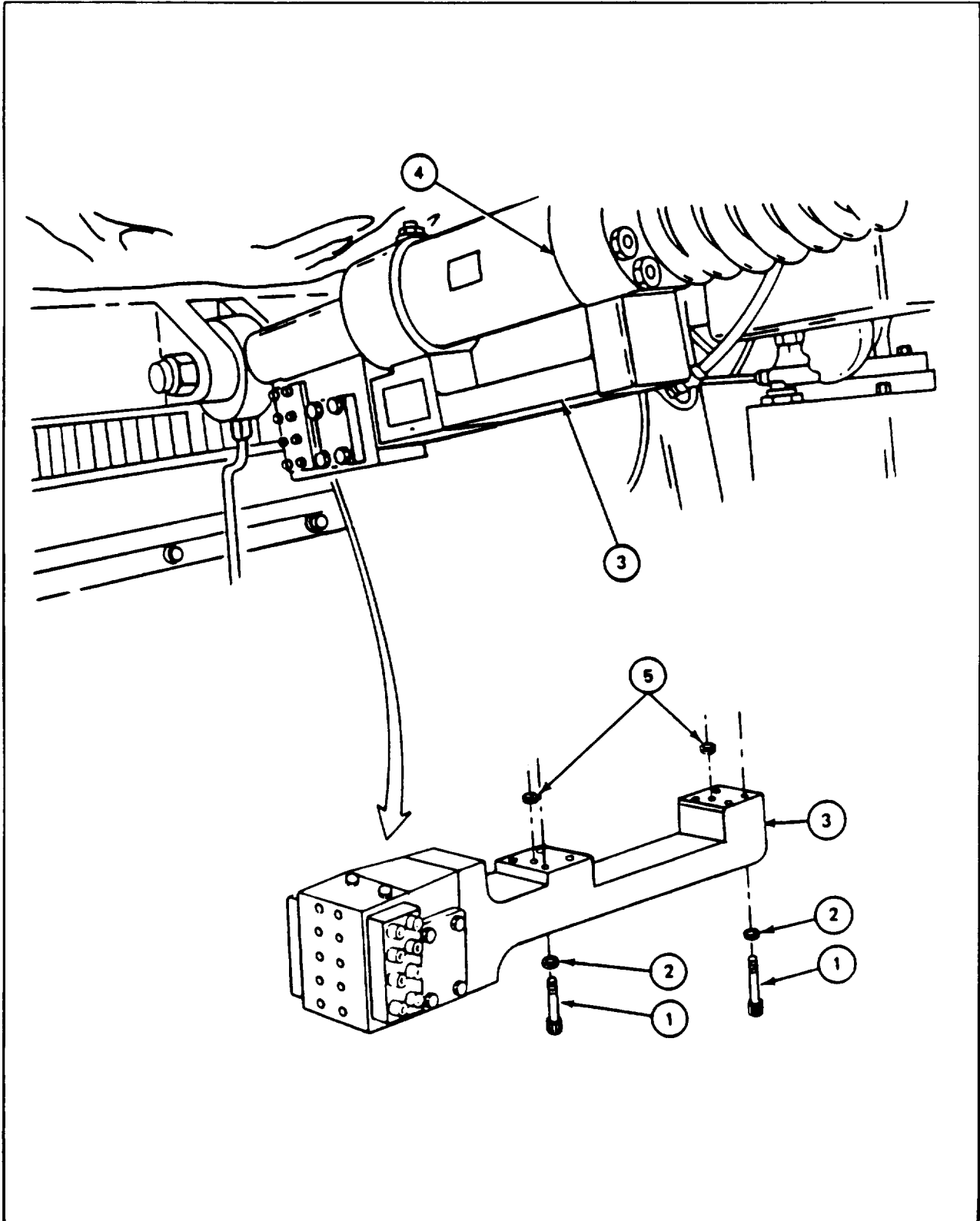
FRAME 1	Procedure
1.	<p>Place wood block between main gun and turret floor.</p> <div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>WARNING</p> </div> <p style="text-align: center;">Before removing hydraulic tubes or parts, hydraulic system pressure must be lowered to 0 psi. Hydraulic fluid under pressure can hurt you.</p>
2.	<p>Lower hydraulic pressure to 0 psi (TM-20-2-3).</p>
3.	<p>Using masking tape (1), tag each of four hydraulic tubes (2) with port identification markings (3) on lock valve (4) (JPG).</p>
	<div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>WARNING</p> </div>
	<p style="text-align: center;">Ports M 1 and M2 in elevation lock valve (4) may have hydraulic oil under pressure from manual accumulator. Loosen hydraulic tube until oil under pressure comes out before disconnecting hydraulic tubes.</p>
4.	<p>Using 5/8” wrench on tube assembly nut (5) and 11/ 16" wrench on nipple (6), remove four tube nuts (5) from four nipples.</p>
5.	<p>Separate four tube assemblies (2) from four nipples (6).</p>
	<p style="text-align: center;">NOTE</p>
	<p style="text-align: center;">Do steps 6 and 7 only if elevation valve is replaced.</p>
6.	<p>Using 11/ 16" wrench, remove four nipples (6) from lock valve (4).</p>
7.	<p>Using O-ring extractor tool, remove four preformed packings (7) from four nipples (6) (JPG). Throw preformed packings away.</p>
8.	<p>Plug tube assembly nuts (5) and lock valve (4) ports eight places.</p>
	<p>GO TO FRAME 2</p>



15-9. ELEVATION VALVE REMOVAL PROCEDURE (CONT)

FRAME 2

Step	Procedure
1.	Using Allen wrench, remove eight screws (1) and eight lockwashers (2) holding elevation valve (3) to elevating cylinder (4).
2.	Separate and remove elevation valve (3) from elevating cylinder (4).
3.	Using O-ring extractor tool, remove two preformed packings (5) from elevating cylinder (4) (JPG). Throw preformed packings away.
4.	Plug elevating cylinder (4) ports and elevation valve (3), four places. END OF TASK



15-10. ELEVATION VALVE INSTALLATION PROCEDURE

TOOLS: 7/32" socket head screw key (Allen wrench)
 1" open end wrench
 1-1/8" open end wrench
 7/32" hex head socket (3/8" drive)
 11/ 16" open end wrench
 3/8" drive torque wrench (0-150 inch-pounds)
 O-ring extractor kit
 5/8" open end wrench
 7/32" hex head socket (3/8" drive)

SUPPLIES: Preformed packings, 546925 (two)
 Preformed packings, MS 28778-4 (two)
 Hydraulic fluid (item 10, App. A)
 Rags (item 21, App. A)

PERSONNEL: Two

REFERENCES: JPG for procedures to:
 Connect electrical connectors
 Use torque wrench
 Install preformed packings
 TM 9-2350-222-10 for procedure to balance gun, elevate gun and traverse turret
 TM 9-2350-222-20-2-3 for procedures to:
 Service turret hydraulic system filter
 Bleed turret hydraulic system

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Elevating Mechanism	FO-4	8
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
 Gunner's control box ELEV/TRAV POWER switch set to OFF
 Turret traverse lock set to LOCKED

GENERAL INSTRUCTIONS:



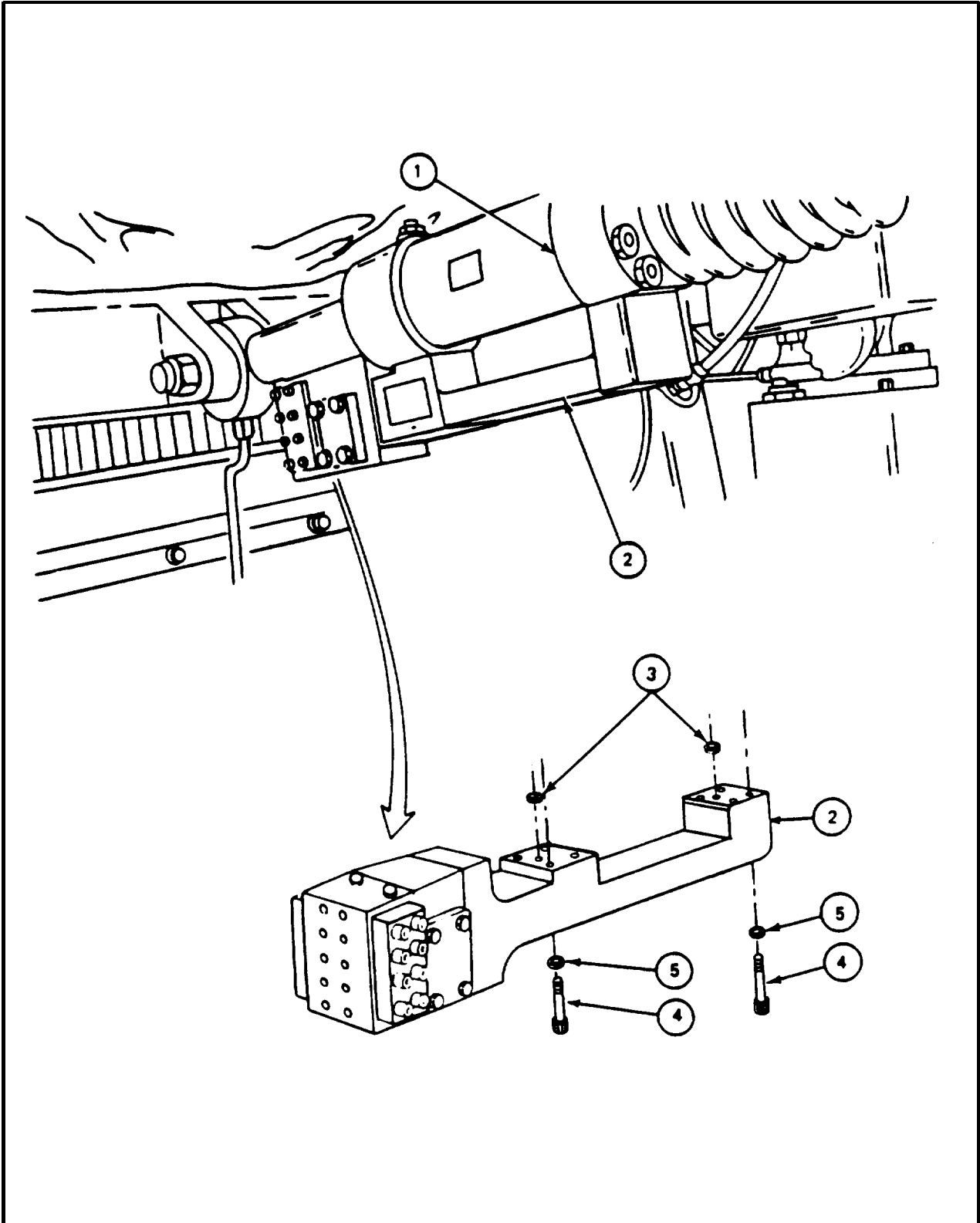
Keep dirt from getting in tubing or parts. Dirt can damage equipment. Hydraulic lines must be connected to port as marked on tags to keep from damaging equipment.

NOTE

Equipment condition applies only if task is being done on vehicle.
 Use rags to wipe up spilled hydraulic fluid.

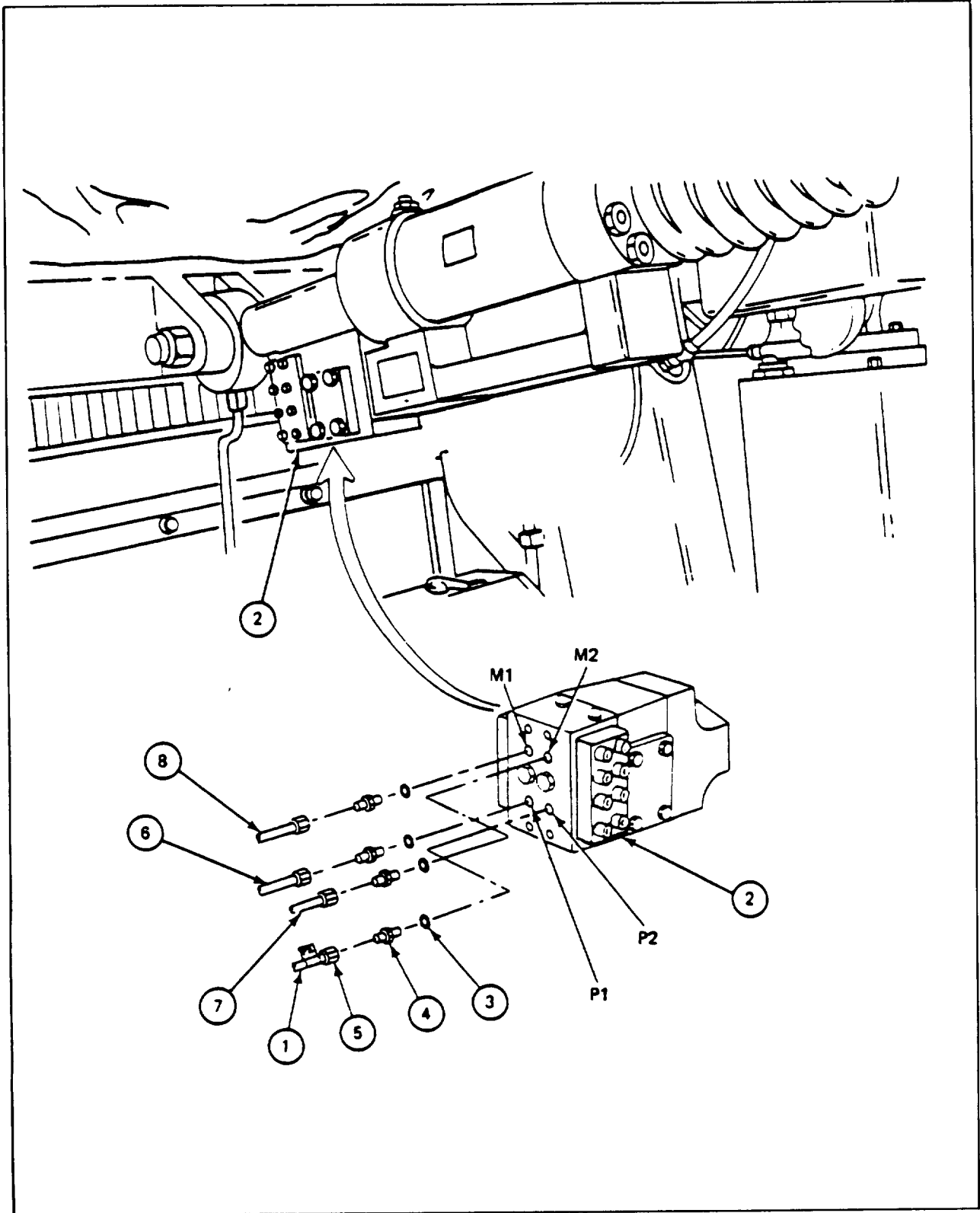
15-10. ELEVATION VALVE INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Remove two plugs from elevating cylinder (1) and two plugs from elevation valve (2).
2.	Lightly coat two new preformed packings (546925) (3) with hydraulic fluid.
3.	Put two preformed packings (3) in elevating cylinder (1) ports (JPG).
NOTE	
Soldier A: Hold elevation valve (2) in place. Soldier B: Put in screw (4).	
4.	Using Allen wrench, attach elevation valve (2) to elevating cylinder (1) with eight screws (4) and eight lockwashers (5).
5.	Using hex head socket with torque wrench, torque eight screws (4) to between 60 and 65 inch-pounds.
GO TO FRAME 2	



15-10. ELEVATION VALVE INSTALLATION PROCEDURE (CONT)

FRAME 3	
Step	Procedure
1.	<p>Remove plugs from tube assembly (1) tagged P2 and from port hole marked P2 in elevation valve (2).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do steps 2 thru 4 only if elevation valve (2) was replaced.</p>
2.	Lightly coat new preformed packing (3) with hydraulic fluid.
3.	Using O-ring extractor tool, put preformed packing (3) on nipple (4) (JPG).
4.	Using 11/16" wrench, attach nipple (4) to port marked P2 on elevation valve (2).
5.	Using 5/8" wrench on tube assembly nut (5), and 11/16" wrench on nipple (4), attach tube assembly (1) to nipple (4).
6.	<p>Repeat steps 1 through 5 for tube assemblies:</p> <ul style="list-style-type: none"> (6) tagged P1 (7) tagged M2 (8) tagged M1.
7.	Remove four tags from four tube assemblies (1).
8.	Raise and balance gun with equilibrator system (TM- 10).
9.	Remove wood block between gun and turret floor.
	<p style="text-align: center;">NOTE</p> <p>Do following tasks if this procedure completes maintenance of hydraulic system. If other maintenance must be done, omit following tasks.</p> <p>Follow-on Maintenance Action Required:</p> <p>Bleed turret hydraulic system (TM-20-2-3). Check gun elevation and turret traversing operation (TM-10).</p> <p>END OF TASK</p>



**15-11. ELEVATION VALVE DISASSEMBLY AND MANIFOLD REMOVAL
PROCEDURE**

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove elevation valve (para 15-9)

FRAME 1	
Step	Procedure
1.	Remove lock valve and relief valve (para 15-14). END OF TASK

**15-12. ELEVATION VALVE ASSEMBLY AND MANIFOLD INSTALLATION
PROCEDURE**

PERSONNEL: One

FRAME 1	
Step	Procedure
1.	<p>Install lock valve and relief valve (para 15-15).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required: Install elevation valve (para 15-10).</p> <p>END OF TASK</p>

15-13. LOCK VALVE INSPECTION PROCEDURE

TOOLS: 6" machinist steel rule

PERSONNEL: One

PRELIMINARY PROCEDURES: Disassemble lock valve (para 15-16)

GENERAL INSTRUCTIONS:

NOTE

If any pan is bad, order repair part or next higher assembly as required.

FRAME 1	
Step	Procedure
1.	Using steel rule, measure free overall length of six large diameter springs. If any spring is less than 3/4", spring is bad.
2.	Using steel rule, measure free overall length of six small diameter springs. If any spring is less than 7/8", spring is bad.
	END OF TASK

15-14. LOCK VALVE AND RELIEF VALVE REMOVAL PROCEDURE

TOOLS: 7/32" hex head socket (3/8" drive)
 5/8" open end wrench
 11/16" open end wrench
 3/8" drive ratchet
 4" extension (3/8" drive)
 O-ring extractor kit

SUPPLIES: Masking tape (1" wide) (item 36, App A)
 Plugs for hydraulic tubes and lock valve (twelve)
 Plugs for lock valve and relief valve (four)
 Plugs for relief valve and manifold (four)
 Small container
 Rags (item 21, App A)
 Pencil
 Wood block (4" x 4" x 30" long)

PERSONNE: One

REFERENCES: TM 9-2350-222-20-2-3 for procedure to lower hydraulic pressure
 JPG for procedures to:
 Remove preformed packings
 Tag hydraulic tubes
 TM 9-2350-222-10 for procedure to elevate and depress main gun

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Elevating Mechanism	FO-4	8
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
 Gunner's control box ELEV/TRAV POWER switch set to OFF
 Turret traverse lock set to LOCKED
 Position main gun to 0 elevation

GENERAL INSTRUCTIONS:



Keep dirt from getting in tubing or parts. Dirt can damage equipment.

NOTE

Use small container to catch hydraulic fluid which leaks when hydraulic lines are disconnected. Use rags to wipe up spilled hydraulic fluid.

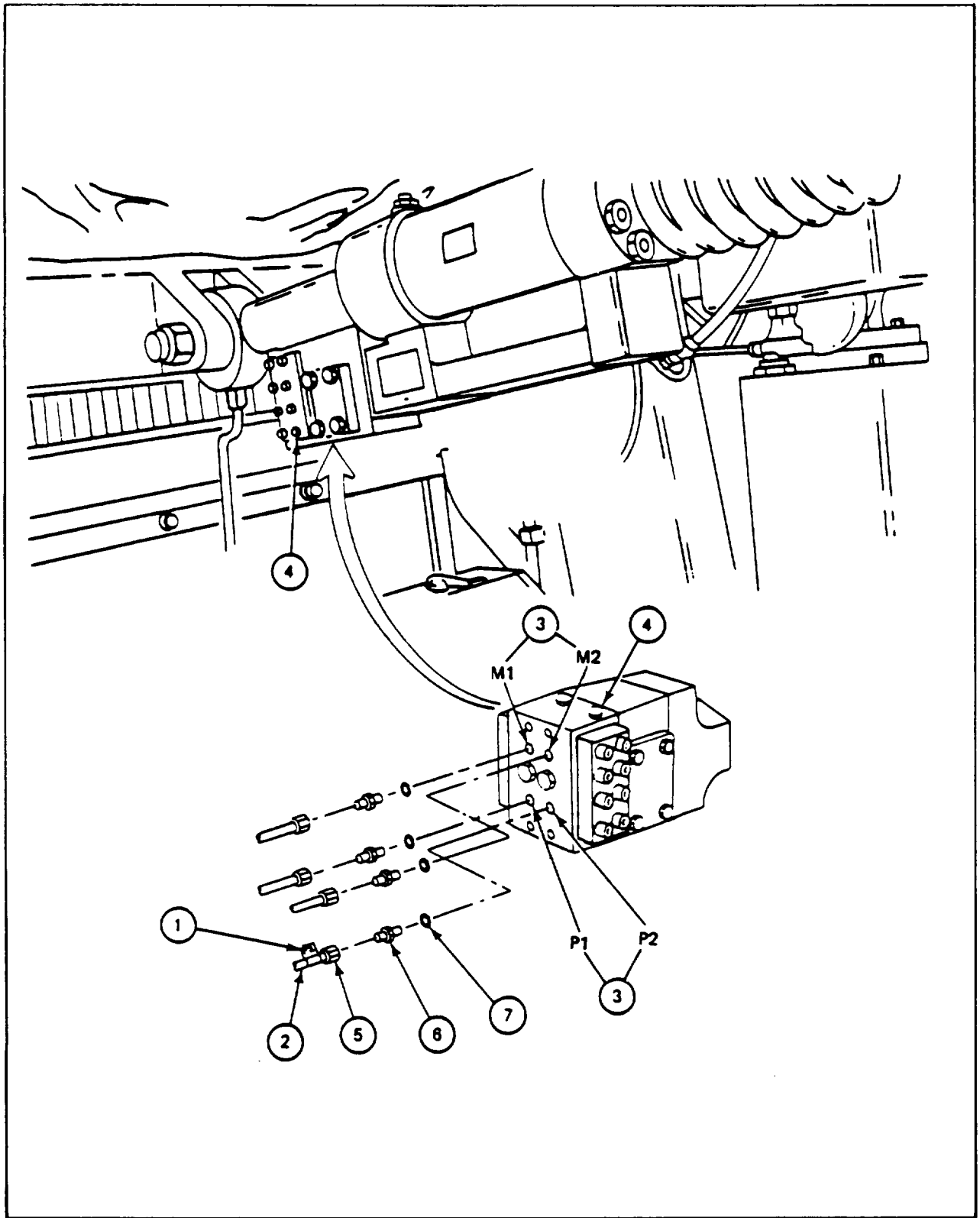
Go to Frame 2 if elevation valve is removed from vehicle.

Equipment condition applies only if task is being done on vehicle.

15-14. LOCK VALVE AND RELIEF VALVE REMOVAL PROCEDURE (CONT)

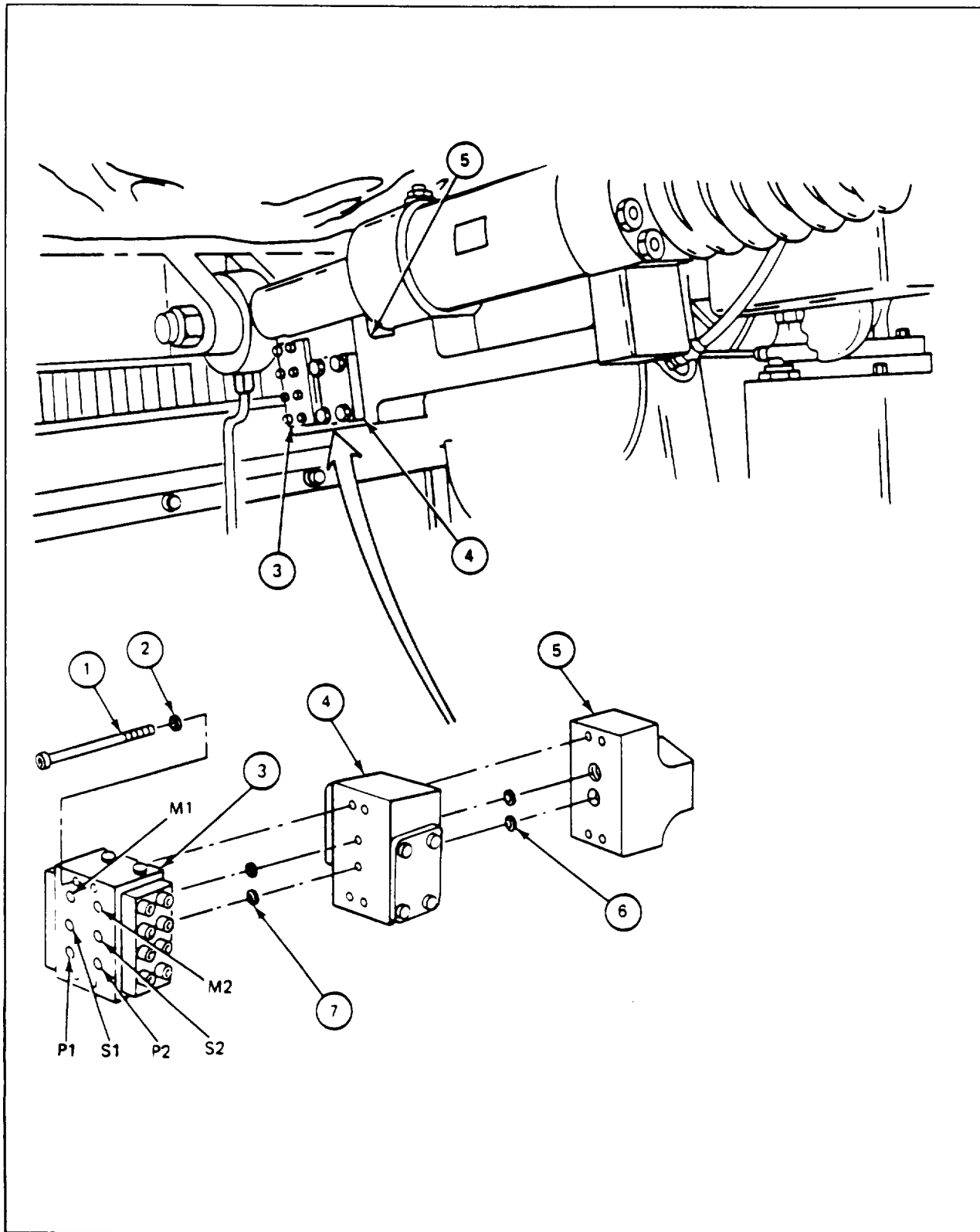
FRAME 1

Step	Procedure
1.	Place wood block between main gun and turret floor.
<p>WARNING</p>	
<p>Before removing hydraulic tubes or parts, hydraulic system pressure must be lowered to 0 psi. Hydraulic fluid under pressure can hurt you.</p>	
2.	Lower hydraulic system pressure to 0 psi (TM-20-2-3).
3.	Using masking tape (1), tag each of four hydraulic tubes (2) with port identification markings (3) on lock valve (4) (JPG).
<p>WARNING</p>	
<p>Ports M1 and M2 in elevation lock valve (4) may have hydraulic oil under pressure from manual accumulator. Loosen hydraulic tube until oil under pressure comes out before disconnecting hydraulic tubes.</p>	
4.	Using 5/8" wrench on tube assembly nut (5), and 11/16" wrench on nipple (6), remove four tube assembly nuts (5) from four nipples (6).
5.	Separate four tube assemblies (2) from four nipples (6).
<p>NOTE</p>	
<p>Do steps 6 and 7 only if lock valve is bad.</p>	
6.	using 11/16" wrench, remove four nipples (6) from lock valve (4).
7.	Using O-ring extractor tool, remove four preformed packings (7) from four nipples (6) (JPG). Throw preformed packings away.
8.	Plug tube assembly nuts (5) and lock valve (4) ports eight places.
<p>GO TO FRAME 2</p>	



15-14. LOCK VALVE AND RELIEF VALVE REMOVAL PROCEDURE (CONT)

FRAME 2	
Step	Procedure
	<div style="border: 1px dashed black; padding: 2px; display: inline-block;">CAUTION</div> <p>Lock valve (3) and relief valve (4) are both held to manifold (5) by screws (1). When screws are removed, both valves come off.</p>
1.	Using hex head socket wrench, remove four screws (1) and four lockwashers (2) holding lock valve (3) and relief valve (4) to manifold (5).
2.	Separate lock valve (3) and relief valve (4) from manifold (5).
3.	Using O-ring extractor tool, remove two preformed packings (6) from relief valve (4) (JPG). Throw preformed packings away.
4.	Remove lock valve (3) from relief valve (4).
5.	Using O-ring extractor tool, remove two preformed. packings (7) from lock valve (3) (JPG). Throw preformed packings away.
6.	Plug lock valve (3) ports and relief valve (4) ports.
7.	Plug manifold (5) ports.
	END OF TASK



15-15. LOCK VALVE AND RELIEF VALVE INSTALLATION PROCEDURE

TOOLS: 7/32" socket head screw key (Allen wrench)
 7/32" hex head socket (3/8" drive)
 5/8" open end wrench
 11/16" open end wrench
 3/8" drive torque wrench (0 to 150 inch-pounds)
 4" extension (3/8" drive)
 O-ring extractor kit

SUPPLIES: Preformed packings (MS28778-4) (six)
 Preformed packings (MS28775-014) (two)
 Preformed packings (546925) (two)
 Hydraulic fluid (item 10, App A)
 Rags (item 21, App A)

PERSONNEL: One

REFERENCES: TM 9-2350-222-10 for procedures to elevate gun and traverse turret
 TM 9-2350-20-2-3 for procedures to:
 Bleed hydraulic system
 JPG for procedure to install preformed packings

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Elevating Mechanism	FO-4	8
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
 Gunner's control box ELEV/TRAV POWER switch set to OFF
 Turret traverse lock set to LOCKED

GENERAL INSTRUCTIONS:

CAUTION

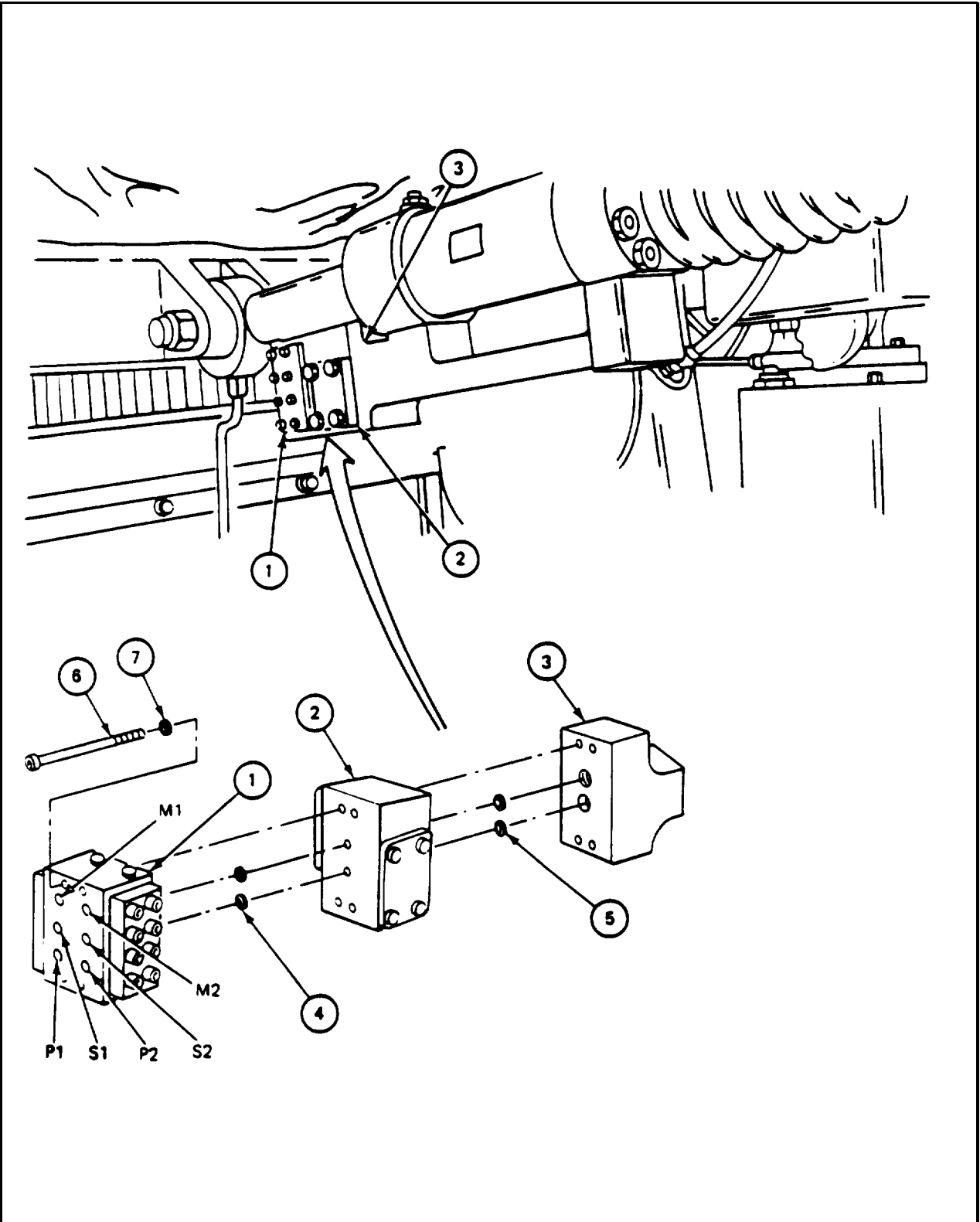
Keep dirt from getting in tubing or parts. Dirt can damage equipment. Hydraulic lines must be connected to port as marked on tags to keep from damaging equipment.

NOTE

Equipment condition applies only if task is being done on vehicle.

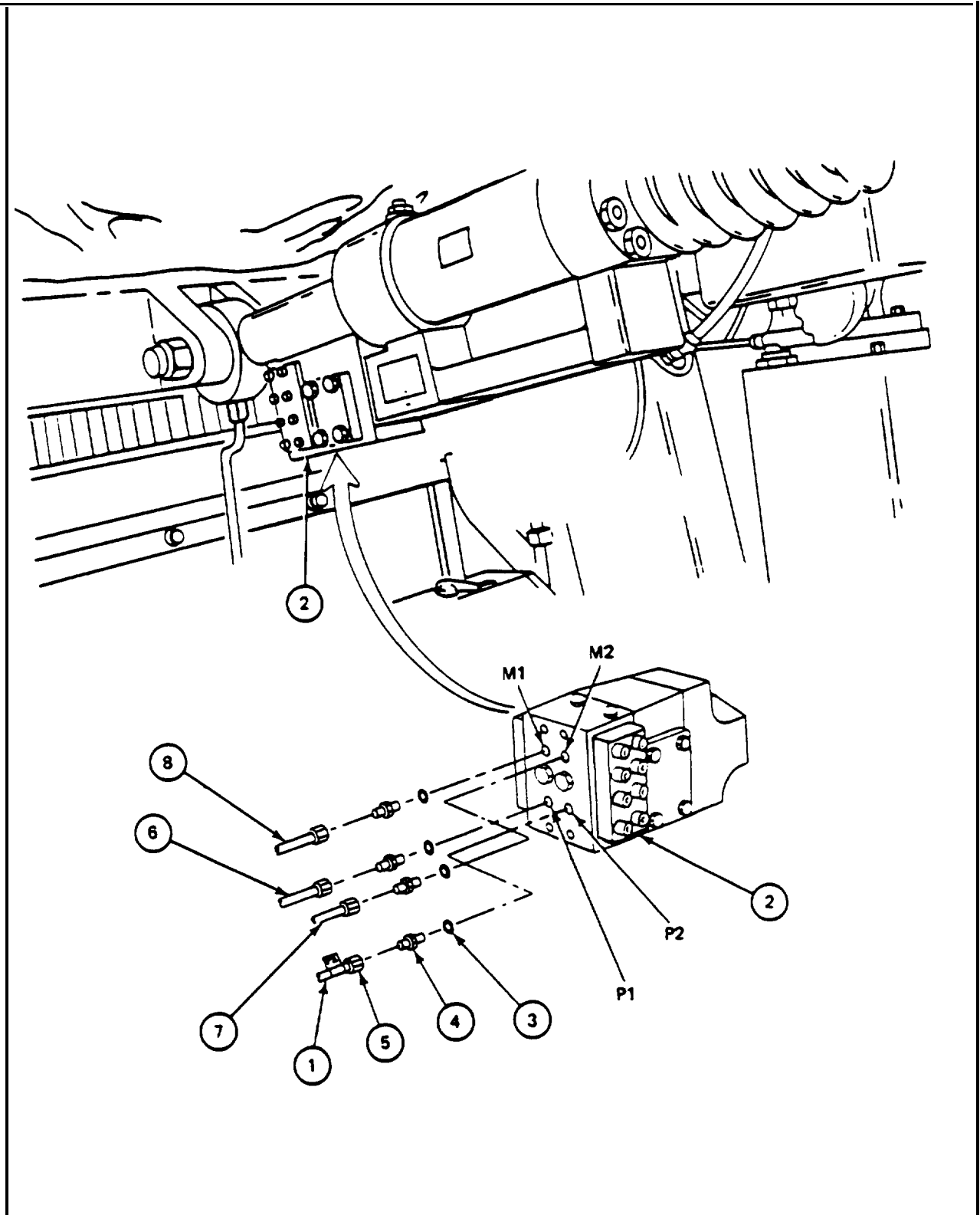
15-15. LOCK VALVE AND RELIEF VALVE INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	NOTE
	Lock valve (1) and relief valve (2) are both held to manifold (3) by screws (6). Both valves are attached to manifold (3) together.
1.	Remove two plugs from lock valve (1), four plugs from relief valve (2). and two plugs from manifold (3).
2.	Lightly coat two new preformed packings (4) (546925) with hydraulic fluid.
3.	Put two preformed packings (4) in lock valve (1) pens (JPG).
4.	Lightly coat two new preformed packings (5) (MS 28775-014) with hydraulic fluid.
5.	Put two preformed packings (5) in relief valve (2) ports (JPG).
6.	Using four screws (6) and four lockwashers (7), join relief valve (2) to lock valve (1).
7.	Using Allen wrench, attach joined lock valve (1) and relief valve (2) to manifold (3) with four screws (6) and four lockwashers (7).
8.	Using hex head socket with torque wrench, torque four screws (6) to between 100 and 125 inch-pounds (JPG).
	NOTE
	Go to frame 2 only if task is being done on vehicle.
	GO TO FRAME 2



15-15. LOCK VALVE AND RELIEF VALVE INSTALLATION PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	<p>Remove plugs from tube assembly (1) tagged P2 and from port hole marked P2 in lock valve (2).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do steps 2 thru 4 only if lock valve (2) was replaced.</p>
2.	Lightly coat new preformed packing (3) with hydraulic fluid.
3.	Using O-ring extractor tool, put preformed packing (3) on nipple (4) (JPG).
4.	Using 11/16" wrench, attach nipple (4) to port marked P2 on lock valve (2).
5.	Using 5/8" wrench on tube assembly nut (5), and 11/16" wrench on nipple (4), attach tube assembly (1) to nipple (4).
6.	<p>Repeat steps 1 through 5 for tube assemblies:</p> <ul style="list-style-type: none"> (6) tagged P1 (7) tagged M2 (8) tagged M1.
7.	Remove four tags from four tube assemblies (1).
8.	Raise and balance gun with equilibrator system (TM-10).
9.	Remove wood block between gun and turret floor.
	<p>NOTE</p> <p>Do following tasks if this procedure completes maintenance of hydraulic system. If other maintenance must be done, omit following tasks.</p> <p>Follow-on Maintenance Action Required:</p> <p>Bleed turret hydraulic system (TM-20-2-3). Check gun elevation and turret traversing operation (TM-10).</p> <p>END OF TASK</p>



15-16. LOCK VALVE DISASSEMBLY PROCEDURE

TOOLS: 3/16" socket head screw key (Allen wrench)
9/16" combination wrench
Slip joint pliers
O-ring extractor kit
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Lint-free cloth (item 21, App. A)
Screws (MS 35225-21) (three)
Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts
Remove preformed packings

PRELIMINARY PROCEDURES: Remove lock valve (para 15-14)

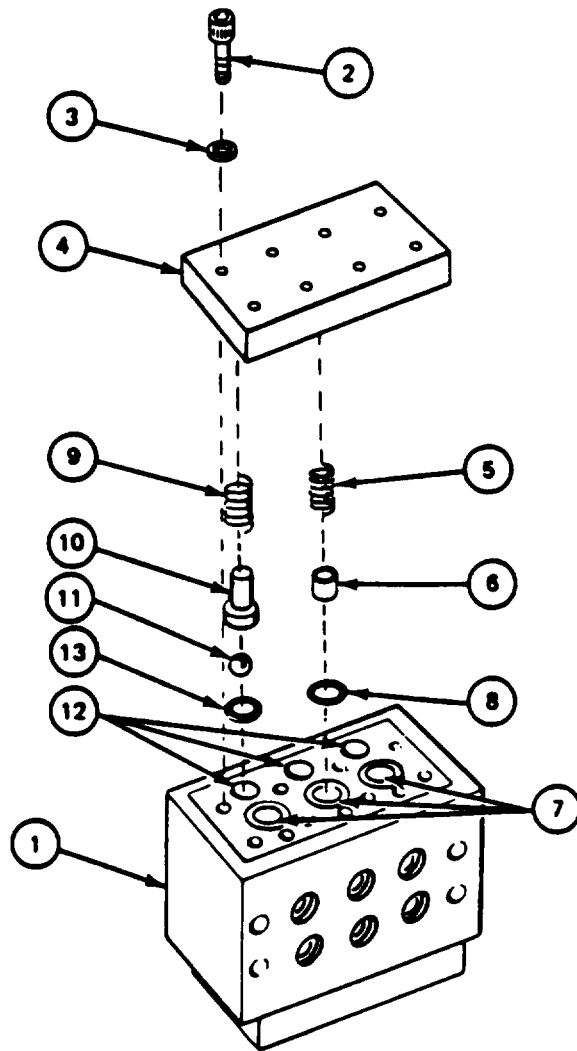
GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

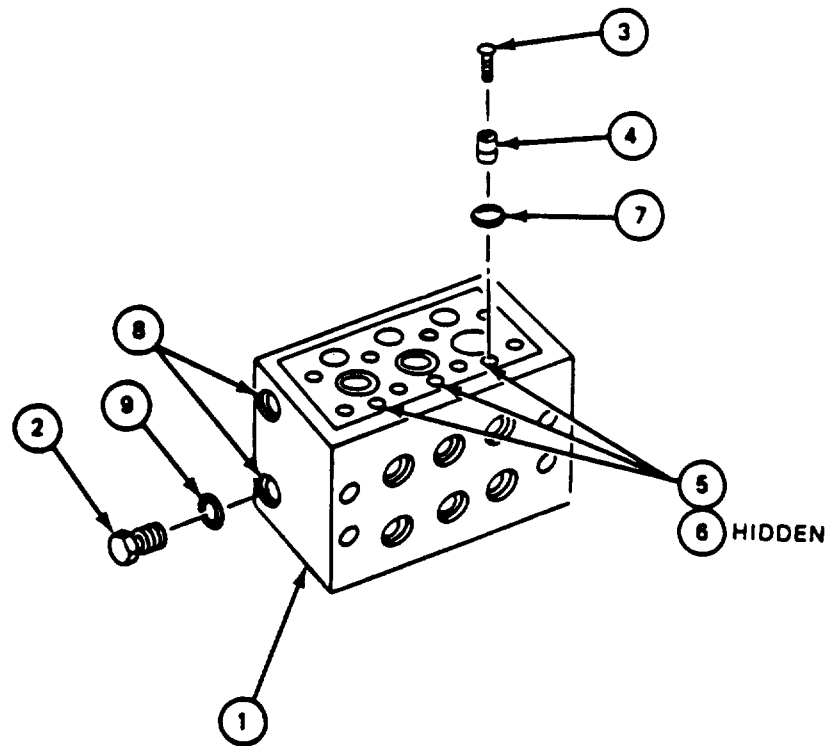
15-16. LOCK VALVE DISASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p>Hold plate (4) to body (1) when removing eight screws (2). Springs (5) and (9) are under tension. Springs and plate can fly out and hurt you.</p>
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">CAUTION</div> <p>Three spools and three sleeves in three holes (7) of body (1) are matched pairs. Spools are not removed from body (1). If they fall out, put them back the way they were.</p>
<ol style="list-style-type: none"> 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. 	<p>Put body (1) on work surface with six ports facing you and side without plugs to left.</p> <p>Using Allen wrench, remove eight screws (2) and eight lockwashers (3) holding plate (4) to body (1).</p> <p>Separate plate (4) from body (1).</p> <p>Remove three springs (5) and three cups (6) from three holes (7) in body (1).</p> <p>Using O-ring extractor tool, remove three preformed packings (8) from three holes (7) in body (1) (JPG). Throw preformed packings away.</p> <p>Put parts removed in step 4 on clean lint-free cloth.</p> <p>Remove three springs (9), three guides (10), and three ball bearings (11) from three holes (12) in body (1).</p> <p>Throw ball bearings away.</p> <p>Using O-ring extractor tool, remove three preformed packings (13) from three holes (12) in body (1) (JPG). Throw preformed packings away.</p> <p>Put parts removed in step 7 on clean lint-free cloths.</p> <p>GO TO FRAME 2</p>



15-16. LOCK VALVE DISASSEMBLY PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	Turn body (1) upside down with plugs (2) facing to the left.
2.	Repeat Frame 1 for second plate on top of body (1).
	NOTE
	Three plugs (4) have tapped hole in end. Screw (3) is put in tapped hole and plug is pulled out to remove. Three screws (MS 35225-2 1), are used to do this.
3.	Put three screws (3) in three plugs (4) located in three holes (5) of body (1).
4.	Using pliers, pull three plugs (4) out of body (1). Do not remove three pins (6).
5.	Using O-ring extractor tool, remove three preformed packings (7) from three plugs (4) (JPG). Throw preformed packings away.
	NOTE
	Do not remove three screws (3) from three plugs (4).
6.	Put three plugs (4) and three screws (3) on lint-free cloth.
7.	Using combination wrench, remove two plugs (2) from two plug holes (8) in body (1).
8.	Using O-ring extractor tool, remove two preformed packings (9) from two plugs (2) (JPG). Throw preformed packings away.
9.	Put two plugs (2) on clean lint-free cloth.
	NOTE
	Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 15-13).
	END OF TASK



15-17. LOCK VALVE ASSEMBLY PROCEDURE

TOOLS: 3/16" socket head screw key (Allen wrench)
9/16" combination wrench
Slip joint pliers
O-ring extractor kit

SUPPLIES: Lint-free cloth (item 21, App. A)
Lock valve repair kit, NSN 1015-00-928-6192
Hydraulic fluid (item 10, App. A)

PERSONNEL: One

REFERENCES: JPG for procedure to install preformed packings

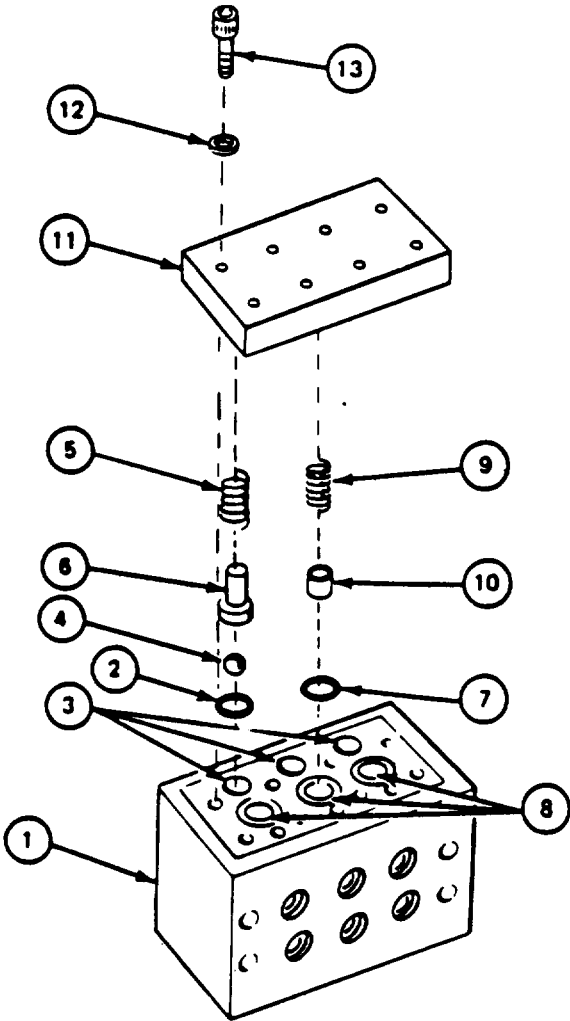
GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in parts. Dirt can damage equipment. Sweat will corrode internal parts. Use lint-free cloth to wipe off internal parts and to put them in place.

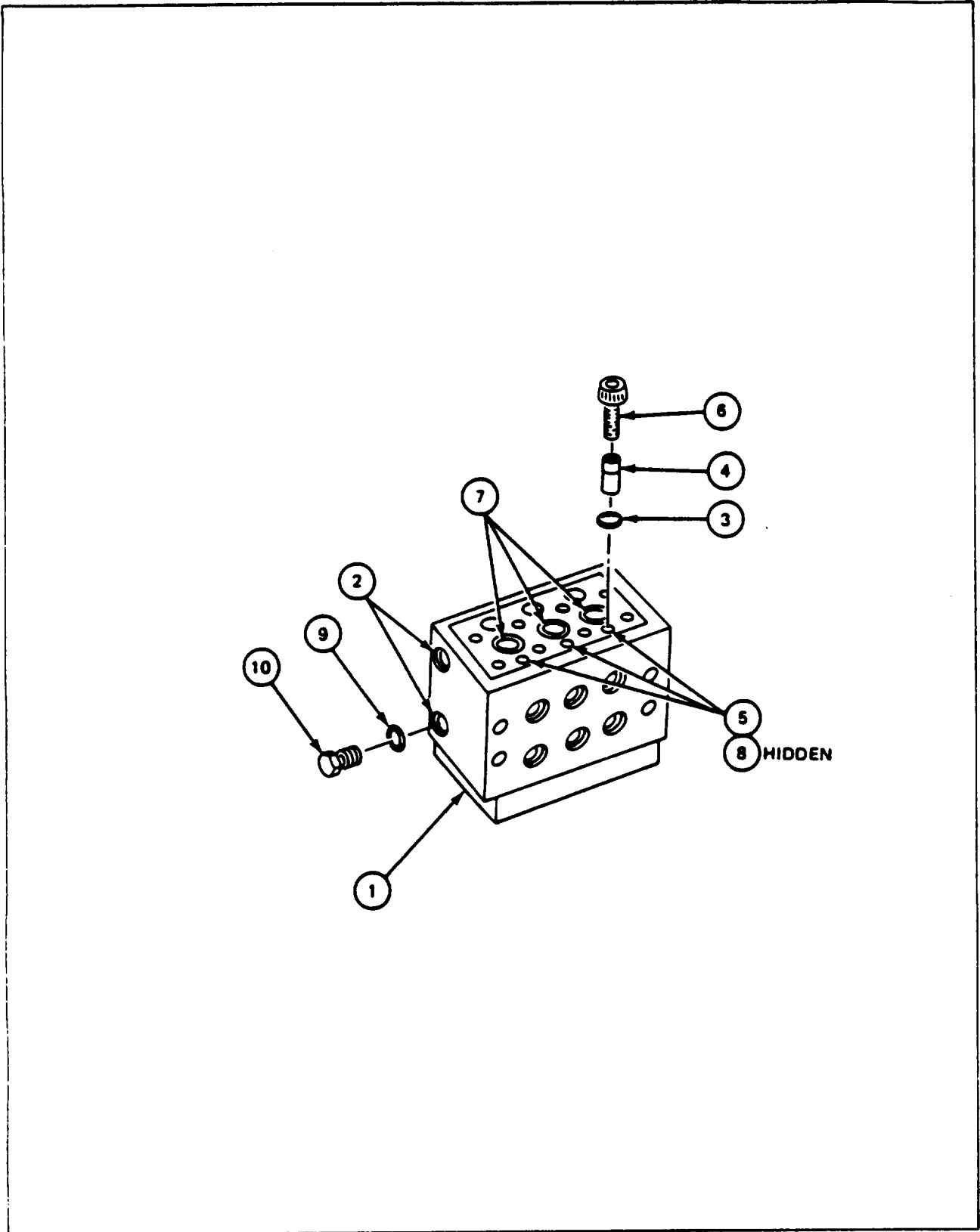
15-17. LOCK VALVE ASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Put body (1) on work surface with six ports facing you and side without plugs to left.
2.	Lightly coat three preformed packings (2) (546926) with hydraulic fluid.
3.	Put three preformed packings (2) in three holes (3) in body (1) (JPG).
4.	Using lint-free cloth, put three ball bearings (4) in three holes (3) in body (1).
5.	Using lint-free cloth, put three springs (5) on three guides (6).
6.	Using lint-free cloth, put three guides (6) with three springs (5) in three holes (3) in body (1).
7.	Lightly coat three preformed packings (7) (546928) with hydraulic fluid.
8.	Put three preformed packings (7) in three holes (8) in body (1) (JPG).
9.	Using lint-free cloth, put three springs (9) in three cups (10).
10.	Using lint-free cloth, put three cups (10) with three springs (9) in three holes (8) in body (1).
NOTE	
When plate (11) is attached to body (1), three springs (5) and three springs (9) must be placed in six counterbores in plate.	
11.	Using Allen wrench, attach plate (11) to body (1) with eight lockwashers (12) and eight screws (13).
GO TO FRAME 2	



15-17. LOCK VALVE ASSEMBLY PROCEDURE (CONT)

FRAME 2		
Step	Procedure	
1.	<p>Turn body (1) upside down with two plug holes (2) facing to the left.</p> <div style="text-align: center;"> <p>CAUTION</p> <p>Do not remove three spools (7) or three pins (8) from three holes (5) in body (1). If they fall out, put them back the way they were.</p> <p>NOTE</p> <p>Three plugs (4) have tapped holes in end. Three screws (6),. used during disassembly (para 15-16), are used to push three plugs in body (1).</p> </div> <p>2. Lightly coat three preformed packings (3) (MS 28775-006) with hydraulic fluid.</p> <p>3. Using O-ring extractor tool, put three preformed packings (3) in groove on three plugs (4) (JPG).</p> <p>4. Using hands, push three plugs (4) in three holes (5) in body (1) as far as they will go.</p> <p>5. Remove three screws (6) from three plugs (4).</p> <p>6. Repeat Frame 1 for second plate to be installed on top of body (1).</p> <p>7. Lightly coat two preformed packings (9) (7602960) with hydraulic fluid.</p> <p>8. Using O-ring extractor tool, put two preformed packings (9) on two plugs (10) (JPG).</p> <p>9. Using wrench, put two plugs (10) in two plug holes (2) in body (1).</p> <div style="text-align: center;"> <p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Install lock valve (para 15-15).</p> </div> <p>END OF TASK</p>	



15-18. RELIEF VALVE INSPECTION PROCEDURE

TOOLS: 6" machinist steel rule

PRELIMINARY PROCEDURES: Disassemble relief valve (para 15-19)

GENERAL INSTRUCTIONS:

NOTE

If any part is bad, order repair part or next higher assembly as required.

FRAME 1	
Step	Procedure
1.	Using steel rule, measure free overall length of two springs. If either spring is less than 1-1/2", spring is bad. END OF TASK

15-19. RELIEF VALVE DISASSEMBLY PROCEDURE

TOOLS: 9/16" combination wrench
O-ring extractor kit
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Lint-free cloth (item 21, App. A)
Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts
Remove preformed packings

PRELIMINARY PROCEDURES: Remove relief valve (para 15-14)

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

15-19. RELIEF VALVE DISASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <p>WARNING</p> </div> <p style="text-align: center;">Hold plate (3) to block (4) when removing four screws (1). Spring (6) is under pressure. Spring (6) and plate (3) can fly out and hurt you.</p> <ol style="list-style-type: none"> 1. Using wrench, remove four screws (1) and four lockwashers (2) that attach plate (3) to block (4). Remove plate. 2. Using O-ring extractor tool, remove preformed packing (5), spring (6), shims (7), guide (8), and ball bearing (9) from block (4) (JPG). Put parts on lint-free cloth. 3. Throw preformed packing (5) away. 4. Repeat steps 1 through 3 for parts installed under plate (3) in lower part of block (4). <div style="text-align: center; margin-top: 20px;"> <p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 15-18).</p> </div> <p>END OF TASK</p> <div style="text-align: center; margin-top: 20px;"> </div>

15-20. RELIEF VALVE ASSEMBLY PROCEDURE

TOOLS: 9/16" combination wrench

SUPPLIES: Lint-free cloth (item 21, App. A)
Hydraulic fluid (item 10, App. A)
Preformed packings (546940) (two)

PERSONNEL: One

REFERENCES: JPG for procedure to install preformed packings

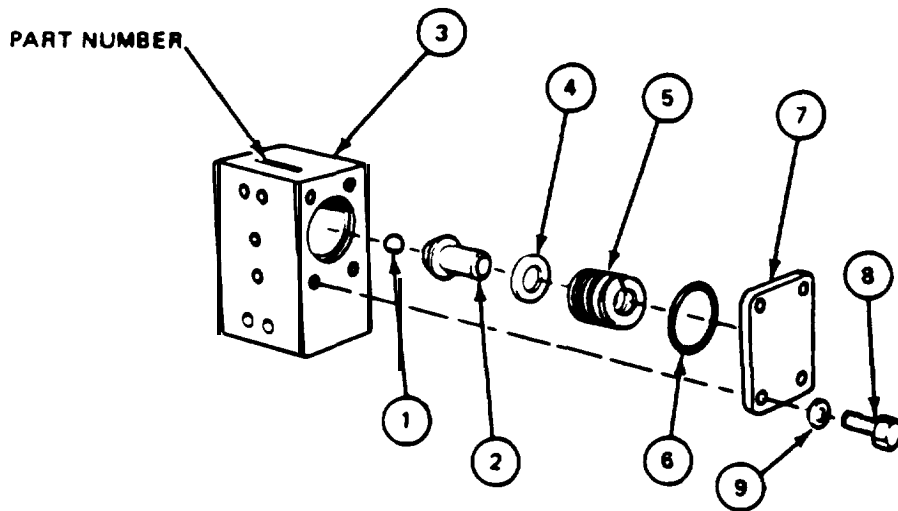
GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

15-20. RELIEF VALVE ASSEMBLY PROCEDURE (CONT)

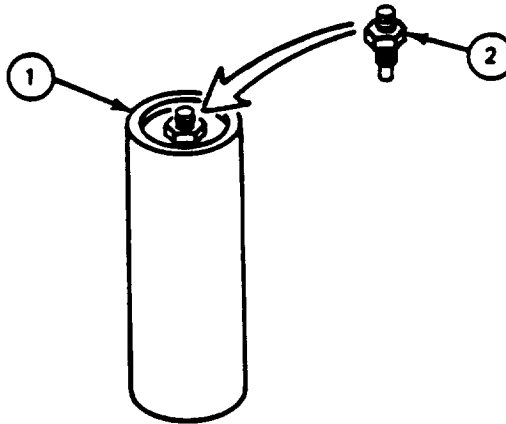
FRAME 1	
Step	Procedure
	<p style="text-align: center;">CAUTION</p> <p style="text-align: center;">Sweat will corrode internal parts. Use clean lint-free cloth to wipe off internal parts and put them in place.</p> <ol style="list-style-type: none"> 1. Put ball bearing (1) and guide (2) in upper part of block (3). 2. Put shim (4) and spring (5) on guide (2) in block (3). 3. Lightly coat new preformed packing (6) with hydraulic fluid. 4. Put preformed packing (6) in block (3) (JPG). 5. Put plate (7) on block (3) with part number showing. 6. Using wrench, attach plate (7) to block (3) with four screws (8) and four lockwashers (9). 7. Repeat steps 1 through 6 to install parts in lower part of block (3). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required: Install relief valve (para 15-15).</p> <p>END OF TASK</p>



CHAPTER 16 MAIN ACCUMULATOR

16-1. MAINTENANCE PROCEDURES INDEX

Equipment Item	Inspection	Test	Tasks			
			Removal	Installation	Disassembly	Assembly
1. Main Accumulator	16-2	16-3	...	...	16-4	16-5
2. Air Valve	...	16-6	16-7	16-8	16-7	16-8



16-2. MAIN ACCUMULATOR INSPECTION PROCEDURE

PERSONNEL: One

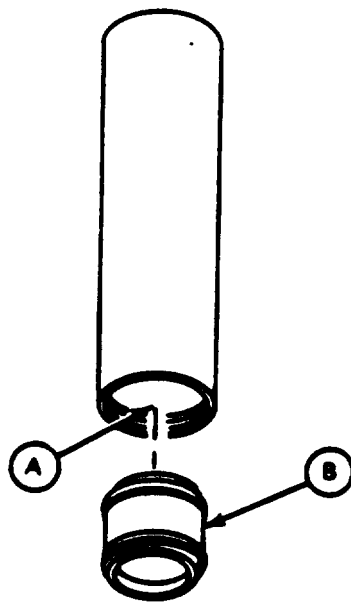
PRELIMINARY PROCEDURES: Disassemble main accumulator (para 16-4)

GENERAL INSTRUCTIONS:

NOTE

If part is bad, order repair part or next higher assembly as required.

FRAME 1			
Step	Procedure		
	SUPPORT SHOP WORK		
1.	Take main accumulator cylinder and piston to support shop where measuring equipment is available.		
2.	Make dimensional check.		
	Reference Letter	Point of Measurement	Measurement (in inches)
	A	ID of cylinder	6.543 to 6.545
	B	OD of piston	6.538 to 6.540
	NOTE		
	Tag parts that are out of tolerance.		
3.	After support shop work, return main accumulator cylinder and piston to turret shop.		
	END OF TASK		



16-3. MAIN ACCUMULATOR TEST PROCEDURE

TEST EQUIPMENT: Hydraulic test kit (NSN 1015-01-151-6441) (9337932)
M3 oil pump (NSN 4933-00-449-7166)
Watch with sweep second hand

TOOLS: 3/4 in. combination wrench
1/16 in. drive pin punch
3/4 in. combination wrench

SUPPLIES: Hydraulic fluid (item 10, App. A)
Container (2 ft. long x 1 ft. wide x 1 ft. deep, minimum)
Pan
Lint-free cloths (item 21, App. A)
Protective shield (metal plate, 1/2 in-. thick x 4 ft. square or wooden board 2 in. thick x 4 ft. square)

PERSONNEL: One

REFERENCES:
TM 9-2350-222-20-2-3 for procedures to:
Charge main accumulator
Remove main accumulator

EQUIPMENT CONDITION: Main accumulator removed (TM -20-2-3)

PRELIMINARY PROCEDURE: Assemble main accumulator (para 16-5)

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in tubing or parts. Dirt can damage equipment.

NOTE

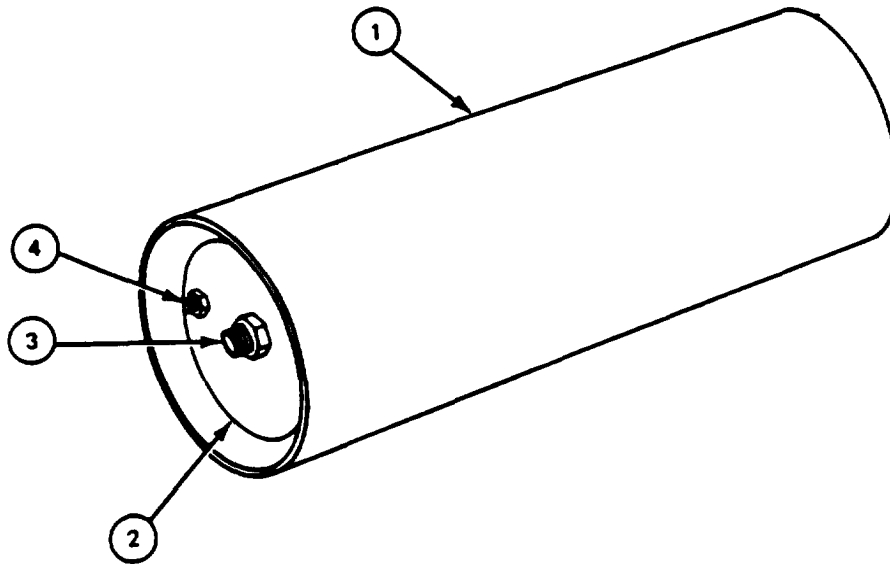
Suitable fittings, preformed packings, and tools should be used to connect test equipment to parts being tested.

If normal indication is not obtained, main accumulator is bad. Disassemble bad main accumulator (para 16-4).

16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

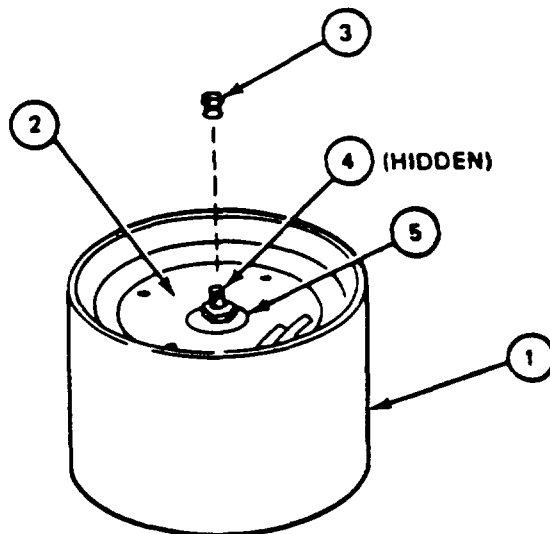
FRAME 1

Step	Procedure
<p>NOTE</p> <p>Fluid-end cap has two ports. Gas-end cap has one port.</p> <ol style="list-style-type: none"> 1. Turn accumulator (1) on end with fluid-end cap (2) up. 2. Remove protective plugs from port (3) and port (4). 3. Using funnel, pour hydraulic fluid in port (3) until fluid chamber of accumulator (1) is full. 4. Install test pressure plugs in port (3) and port (4). <p>GO TO FRAME 2</p>	



16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	Turn accumulator (1) on end with gas-end cap (2) up.
2.	Using 3/8" wrench, remove valve cap (3).
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p style="text-align: center;">Nitrogen under pressure can hurt you. Keep fingers and hands clear of valve while letting out nitrogen. Let nitrogen out slowly.</p>	
3.	Using punch, push in valve core (4) until no more nitrogen comes out of gas valve (5).
4.	Using 3/4" wrench, remove gas valve (5).
5.	Using funnel, pour hydraulic fluid in port for gas valve (5) until nitrogen chamber of accumulator (1) is full.
GO TO FRAME 3	



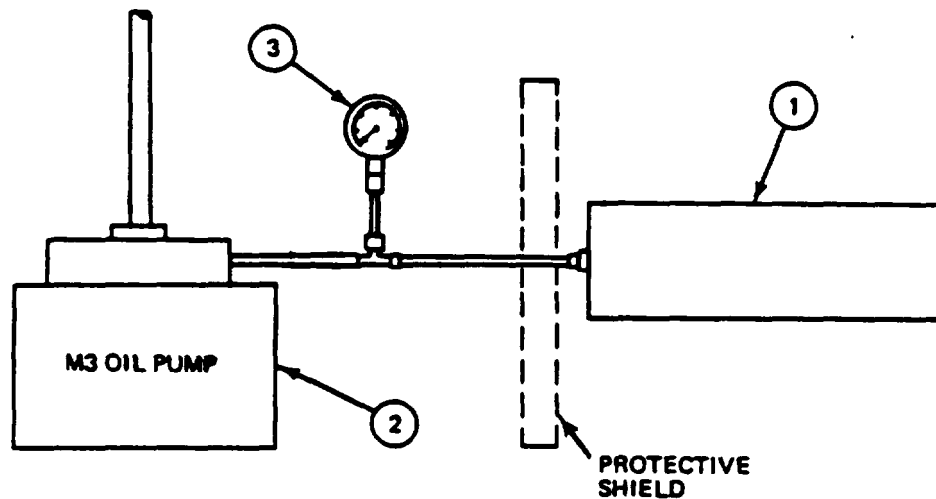
16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

FRAME 3	
Step	Procedure
1.	Connect M3 oil pump (1) and pressure gauge (2) to accumulator (3) at port (4) of gas-end cap (5). GO TO FRAME 4

The diagram illustrates the setup for testing the main accumulator. On the left is the 'M3 OIL PUMP' (1). A line connects it to a pressure gauge (2). This line then leads to the accumulator (3), which is a rectangular box. A specific port (4) on the accumulator is connected to the gas-end cap (5). A detailed view of the gas-end cap (5) is shown below, highlighting the port (4) where the connection is made.

16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

FRAME 4	Step	Procedure	Normal Indication	Probable Fault
<div style="border: 1px solid black; padding: 5px; display: inline-block;">WARNING</div> <p>Hydraulic fluid under pressure can hurt or kill you. Steps 2 thru 4 must be done at 3000 psi. Do not pressurize accumulator until protective shield is put between accumulator and you.</p>				
	1.	Put protective shield in front of accumulator (1).	...	...
	2.	Operate M3 oil pump (2) until pressure gauge (3) reads 3000 psi (JPG).	...	...
	3.	Using watch, check accumulator pressure for five minutes.	pressure gauge (3) reads 3000 psi.	Bad preformed packings or bad rings.
	4.	Using M3 oil pump, lower pressure until pressure gauge (3) reads 0 psi (JPG). GO TO FRAME 5	...	...



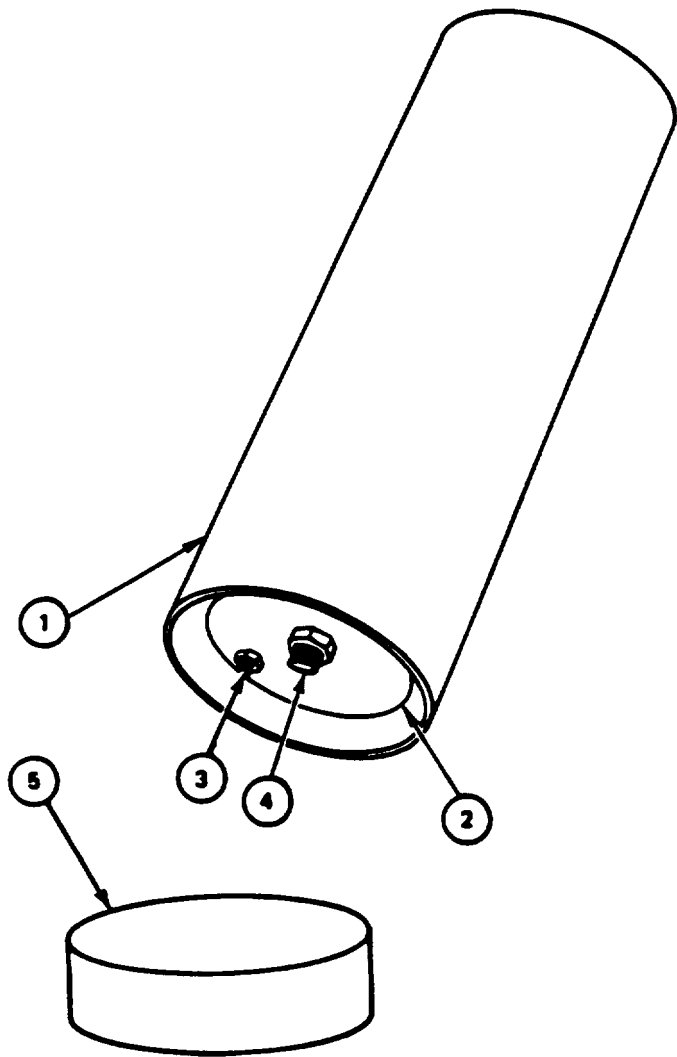
16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

Step	Procedure
	<div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <p>WARNING</p> </div> <p style="text-align: center;">Hydraulic fluid under pressure can hurt or kill you. Do not disconnect M3 oil pump from accumulator until pressure gauge reads 0 psi.</p> <ol style="list-style-type: none"> 1. Turn accumulator (1) on end with gas-end port (2) up. Disconnect M3 oil pump (3) and pressure gauge (4) from accumulator (1). 2. Turn accumulator (1) on end with gas-end port (2) down, so fluid will drain from nitrogen chamber into pan (5). 3. Allow accumulator (1) to stand on end for fifteen minutes and drain completely. 4. Turn accumulator (1) on end with gas-end port (2) up. 5. Using 3/4" wrench, put gas valve (6) in gas-end port (2). 6. Using 3/8" wrench, put valve cap (7) on gas valve (6). <p style="text-align: center;">GO TO FRAME 6</p>

16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

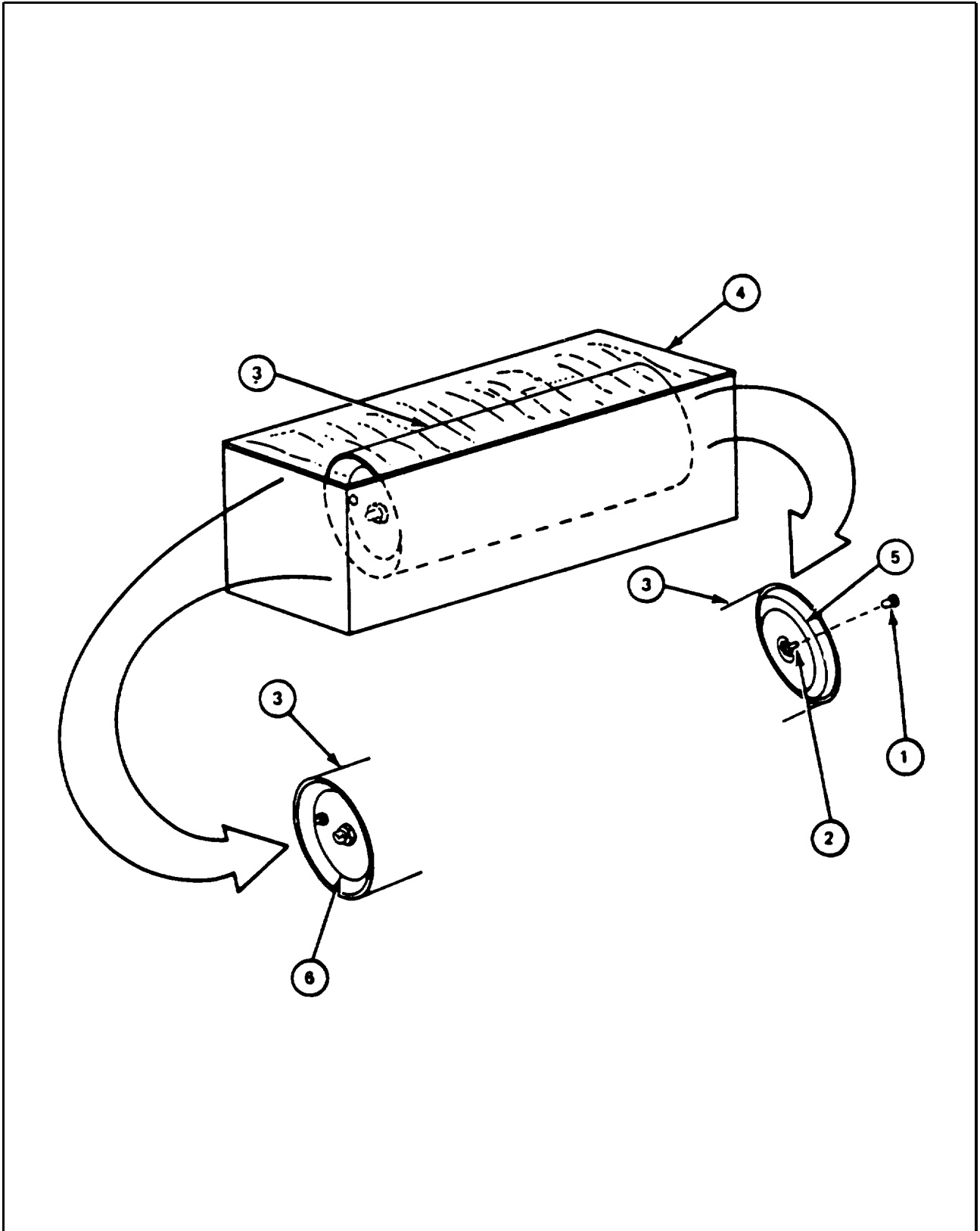
FRAME 6

Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 	<p>Turn accumulator (1) on end with fluid-end cap (2) up.</p> <p>Remove test pressure plugs from port (3) and port (4).</p> <p>Turn accumulator (1) on end with fluid-end cap (2) down, so fluid will drain fully from port (3) and port (4) into pan (5).</p> <p>GO TO FRAME 7</p>

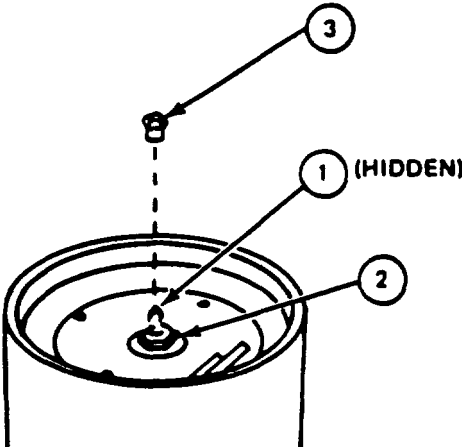


16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

FRAME 7			
Step	Procedure	Normal Indication	Probable Fault
1.	Using 3/8" wrench, remove valve cap (1) from gas valve (2).	. . .	. . .
2.	Charge accumulator (3) to between 165 and 185 psi (TM-20).	. . .	. . .
3.	Put accumulator (3) in container (4).	. . .	. . .
4.	Pour hydraulic fluid into container (4) until fluid completely covers accumulator (3).	. . .	. . .
<p>NOTE</p> <p>Bubbles coming out of accumulator indicate leakage.</p>			
5.	Using watch, check accumulator (3) for leaks for ten minutes:		
	a. At gas valve (2)	No bubbles coming from gas valve (2)	Bad preformed packing or bad valve core
	b. At gas-end cap (5) and fluid-end cap (6)	No bubbles coming from gas-end cap (5) or fluid-end cap (6)	Bad preformed packing or bad rings
6.	Remove accumulator (3) from container (4). Using lint-free cloths, wipe fluid from accumulator.	. . .	. . .
	GO TO FRAME 8		



16-3. MAIN ACCUMULATOR TEST PROCEDURE (CONT)

FRAME 8	
Step	Procedure
	<p style="text-align: center;">WARNING</p> <p>Nitrogen under pressure can hurt you. Keep fingers and hands clear of valve while letting out nitrogen. Let nitrogen out slowly.</p> <ol style="list-style-type: none">1. Using punch, push in valve core (1) until no more nitrogen comes out of gas valve (2).2. Using wrench, install valve cap (3) on gas valve (2). <p style="text-align: center;">NOTE</p> <p>If normal indication is obtained in frames 4, 7, and 8, main accumulator is good.</p> <p>END OF TASK</p>
	 <p>The diagram shows a top-down view of a circular main accumulator valve assembly. A central valve core is labeled '1 (HIDDEN)'. A gas valve is labeled '2'. A valve cap is labeled '3'. A dashed line indicates the vertical axis of the valve core.</p>

16-4. MAIN ACCUMULATOR DISASSEMBLY PROCEDURE

TOOLS: Vise with brass caps
Spanner wrench, NSN 5120-00-902-5536
End cap removal tool (fabricated tool, item 2, App. B)
Scraper
Stiff bristled brush
Fine stone
O-ring extractor kit

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)
Soft wood block (2"x4"x3')

PERSONNEL: One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts
Use spanner wrench
Remove preformed packing
TM 9-2350-222-20-2-3 for procedure to remove main accumulator

EQUIPMENT CONDITION: Main accumulator removed (TM-20-2-3)

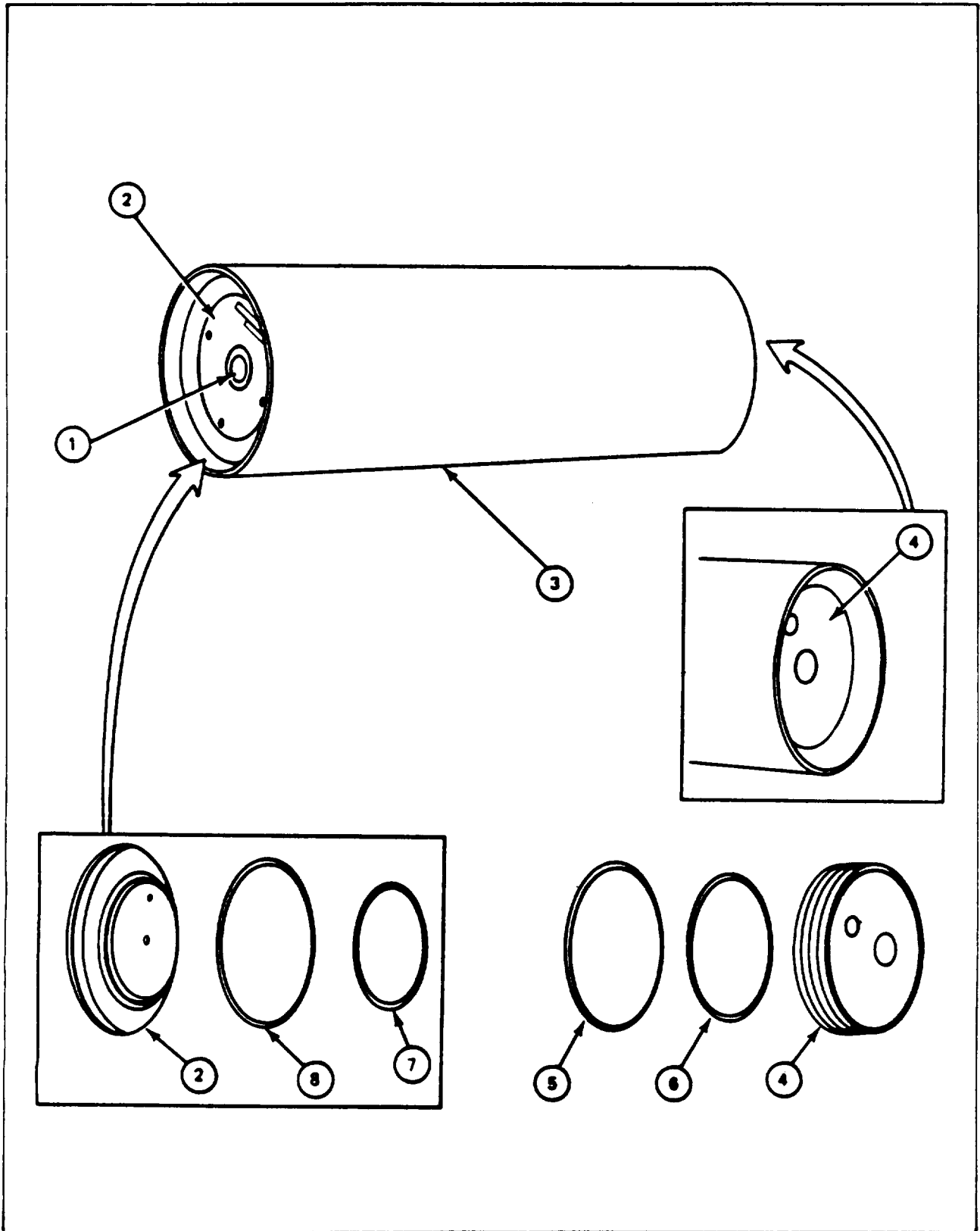
PRELIMINARY PROCEDURES: Test main accumulator (para 16-3)
Remove and disassemble accumulator air valve (para 16-7)

16-4. MAIN ACCUMULATOR DISASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
<ol style="list-style-type: none"> 1. Put accumulator cylinder (1) in vise. 2. Using spanner wrench, unscrew retaining ring (2) from fluid-end (3) of accumulator cylinder (1) (JPG). 3. Using spanner wrench, unscrew retaining ring (4) from gas-end (5) of accumulator cylinder (1) (JPG). <p>GO TO FRAME 2</p>	

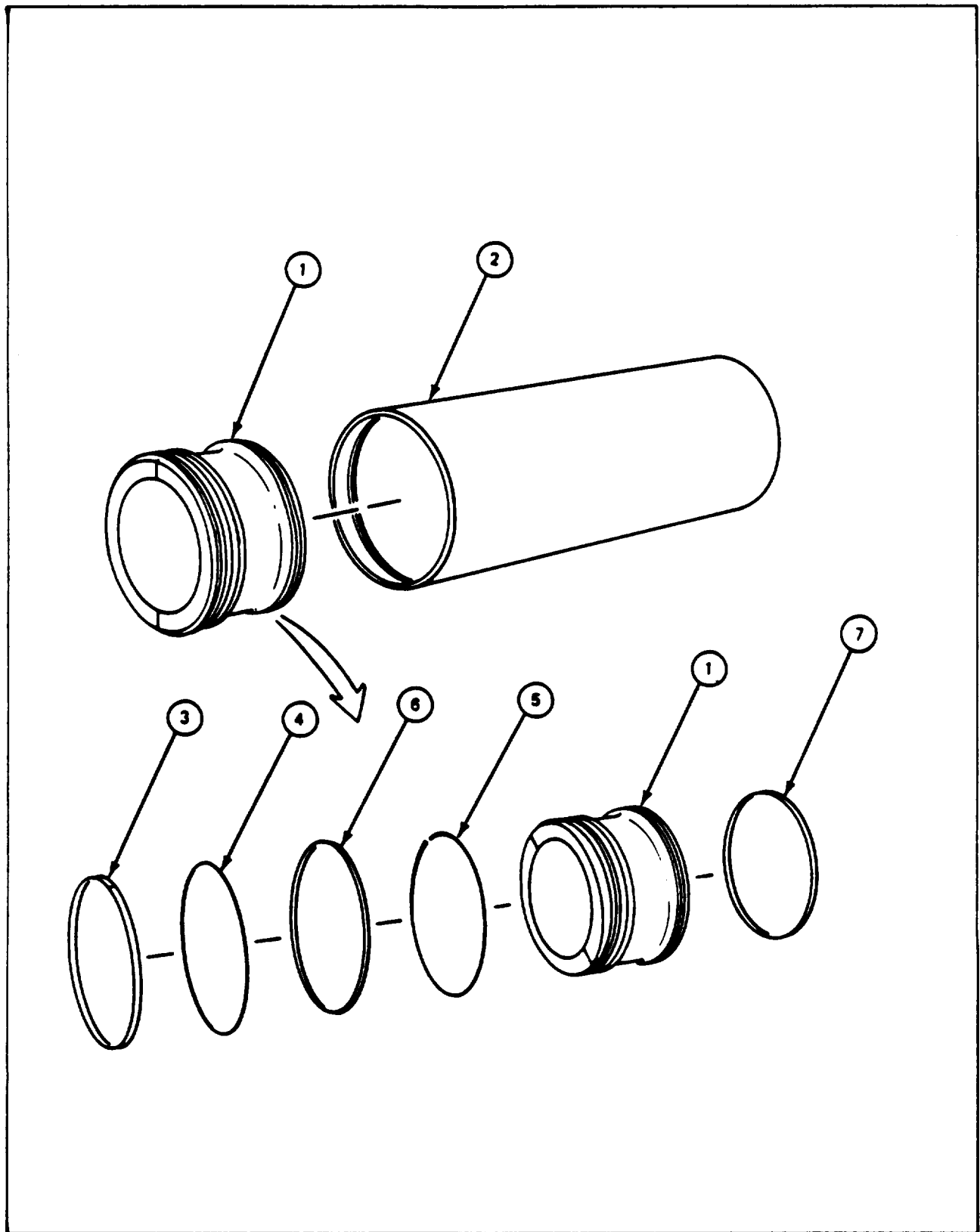
16-4. MAIN ACCUMULATOR DISASSEMBLY PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	Using end-cap removal tool, screw tool three turns into air valve (1) hole of gas-end cap (2).
2.	Pull on end-cap removal tool and remove gas-end cap (2) from accumulator cylinder (3).
<p>NOTE</p> <p>If step 3 cannot be done, go to step 4.</p>	
3.	Using hands, remove fluid-end (bottom) cap (4) from accumulator cylinder (3).
4.	Using soft wood block, push or lightly tap out fluid-end cap (4) from other end of accumulator cylinder (3).
5.	Using O-ring extractor tool, remove preformed packing (5) and backup ring (6) from hid-end cap (4) (JPG).
6.	Using O-ring extractor tool, remove preformed packing (7) and backup ring (8) from gas-end cap (2) (JPG).
GO TO FRAME 3	



16-4. MAIN ACCUMULATOR DISASSEMBLY PROCEDURE (CONT)

FRAME 3	
Step	Procedure
1.	Using wood block, push piston (1) out of accumulator cylinder (2). Do not drop piston.
2.	Remove ring guide (3) from piston (1) (JPG).
3.	Remove seal ring (4) from piston (1) (JPG).
4.	Remove seal ring (5) from piston (1) (JPG).
5.	Remove seal packing ring (6) from piston (1) (JPG),
6.	Remove ring guide (7) from piston (1) (JPG).
7.	Remove accumulator cylinder (2) from vise.
<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Clean all parts (JPG).</p> <p>Inspect and repair all parts (JPG).</p> <p>Do detail inspection of parts (para 16-2).</p>	
<p>END OF TASK</p>	



16-5. MAIN ACCUMULATOR ASSEMBLY PROCEDURE

TOOLS: Vise with brass caps
 Spanner wrench, NSN 5120-00-902-5536

SUPPLIES: Soft wood block (2"x4"x3"
 Parts kit (5703042)
 Preformed packing (MS 28778-5)
 Hydraulic fluid (item 10, App. A)

PERSONNEL: One

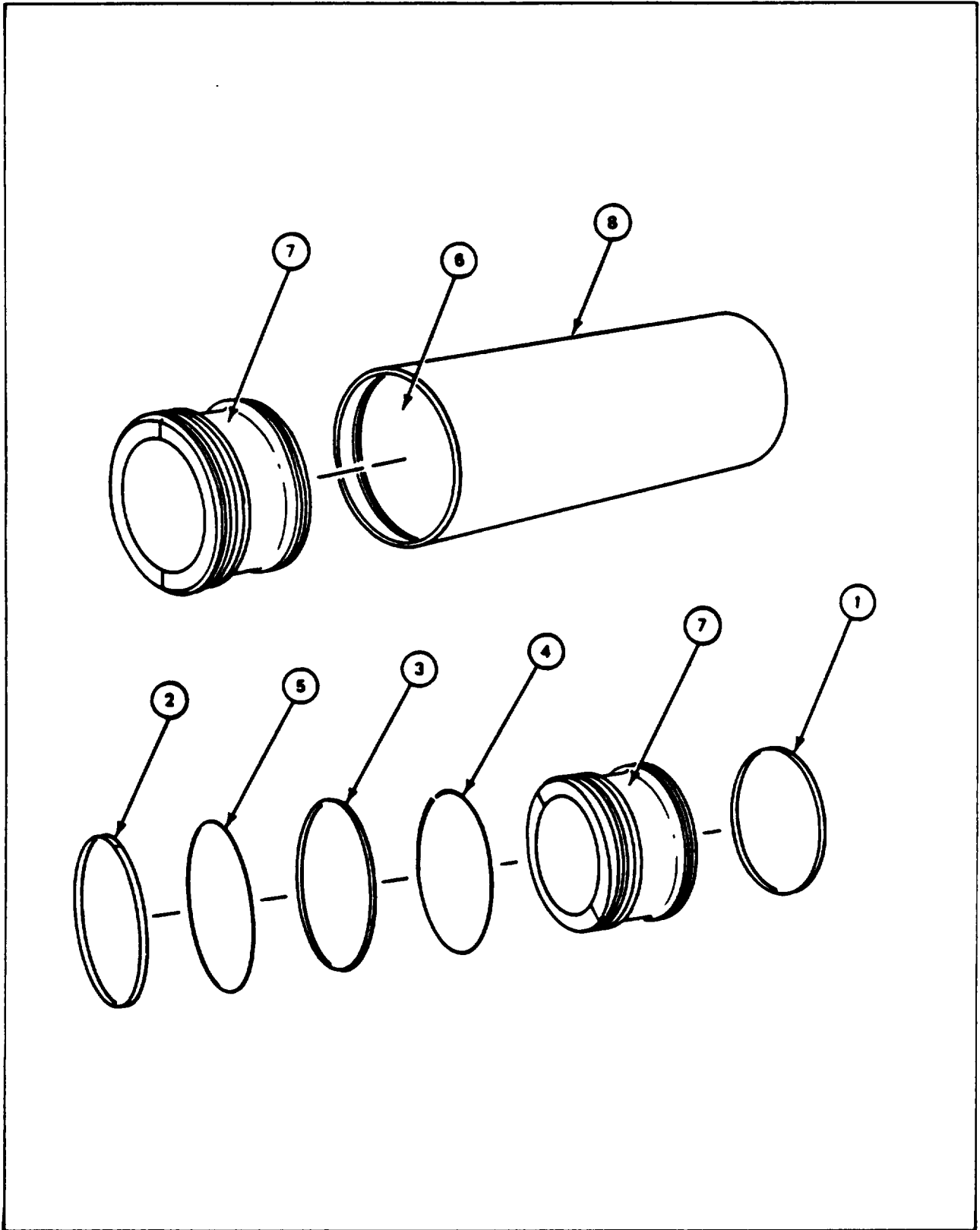
REFERENCES: JPG for procedures to:
 Use spanner wrench
 Install preformed packing

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in tubing or parts. Dirt can damage equipment.

FRAME 1	
Step	Procedure
1.	Coat new ring guides (1) and (2), seal rings (3), (4). and (5), cylinder bore (6) and machined surfaces of piston (7) with hydraulic fluid.
2.	Put new ring guide (1) in groove of piston (7) (JPG).
3.	Put new seal packing ring (3) in groove on piston (7) (JPG).
4.	Put new seal ring (4) in groove on piston (7) (JPG).
5.	Put new seal ring (5) in groove on piston (7) (JPG).
6.	Put new ring guide (2) in groove on piston (7) (JPG).
7.	Put cylinder (8) in vise.
8.	Using hands, start piston (7) in cylinder bore (6). Using wood block, tap piston (7) in cylinder bore (6).
9.	Using hands, push piston (7) in, at least 3 inches, from either end of cylinder (8).
GO TO FRAME 2	



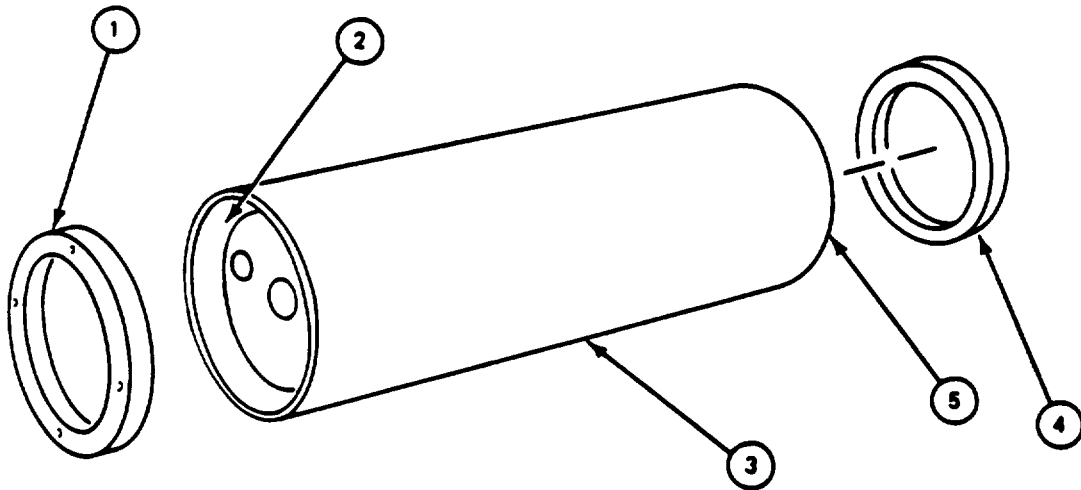
Para 16-5 Cont

16-5. MAIN ACCUMULATOR ASSEMBLY PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	Put preformed packing (1) in groove on fluid-end cap (2) (JPG).
2.	Put backup ring (3) in groove on fluid-end cap (2) (JPG).
3.	Using hand, put fluid-end cap (2) in hydraulic fluid end of accumulator (4).
4.	Put preformed packing (5) in groove on gas-end cap (6) (JPG).
5.	Put backup ring (7) in groove on gas-end cap (6) (JPG).
6.	Using hands, put gas-end cap (6) in nitrogen end of accumulator (4).
GO TO FRAME 3	

16-5. MAIN ACCUMULATOR ASSEMBLY PROCEDURE (CONT)

FRAME 3	
Step	Procedure
1.	Using spanner wrench, screw retaining ring (1) on fluid-end (bottom) (2) of accumulator cylinder (3) (JPG).
2.	Using spanner wrench, screw retaining ring (4) on gas-end (top) (5) of accumulator cylinder (3) (JPG).
3.	Remove accumulator cylinder (3) from vise.
<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Test main accumulator (para 16-3).</p> <p>Assemble and install air valve (para 16-8).</p>	
END OF TASK	



16-6. AIR VALVE TEST PROCEDURE

TOOLS: 3/8" combination wrench
Paint brush
Flashlight
Inspection mirror

SUPPLIES: Soap solution

PERSONNEL: One

REFERENCES: JPG for procedures to check for gas leaks
TM 9-2350-222-20-2-3 for procedures to:
Lower hydraulic system pressure
Check main accumulator nitrogen pressure
Charge main accumulator

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Turret Traverse Lock	FO-3	7
Main Accumulator	FO- 1	16
Gunner's Control Box	FO- 1	2
Pressure Gauge	FO- 1	22
Driver's Master Control Panel	FO-3	11

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Gunner's control box ELEV/TRAV POWER switch set to OFF
Turret traverse lock set to LOCKED

GENERAL INSTRUCTTIONS:

NOTE

If normal indication is not obtained, disassemble air valve (para 16-7) and replace bad part listed in Probable Fault column.

16-6. AIR VALVE TEST PROCEDURE (CONT)

FRAME 1			
Step	Procedure	Normal Indication	Probable Fault
1.	Check nitrogen pressure in main accumulator (1) (TM-20-2-3).		
2.	Using wrench, remove valve cap (2) from gas valve (3) on gas-end cap (4).		
3.	Using paint brush, put soap solution around gas valve (3) and valve core (5) (JPG).		
4.	Using flashlight and mirror, check gas valve (3) and valve core (5) for leaks (JPG).	No bubbles at: a. gas valve (3) b. valve core (5)	Bad packing (6) Bad valve core (5)
NOTE			
If normal indication was obtained in step 4, part is good.			
5.	Using wrench, install valve cap (2) on gas valve (3).		
END OF TASK			

16-7. AIR VALVE REMOVAL AND DISASSEMBLY PROCEDURE

TOOLS: Valve core tool
 3/4" socket (1/2" drive)
 1/2" drive ratchet
 3/8" combination wrench
 O-ring extractor kit

PERSONNEL One

REFERENCES: TM 9-2350-222-20-2-3 for procedure to lower hydraulic system pressure
 JPG for procedures to:
 Remove preformed packings
 Use valve core tool

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Main Accumulator	FO- 1	16
Gunner's Control Box	FO- 1	2
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
 Gunner's control box ELEV/TRAV POWER switch set to OFF
 Turret traverse lock set to LOCKED

GENERAL INSTRUCTIONS:**CAUTION**

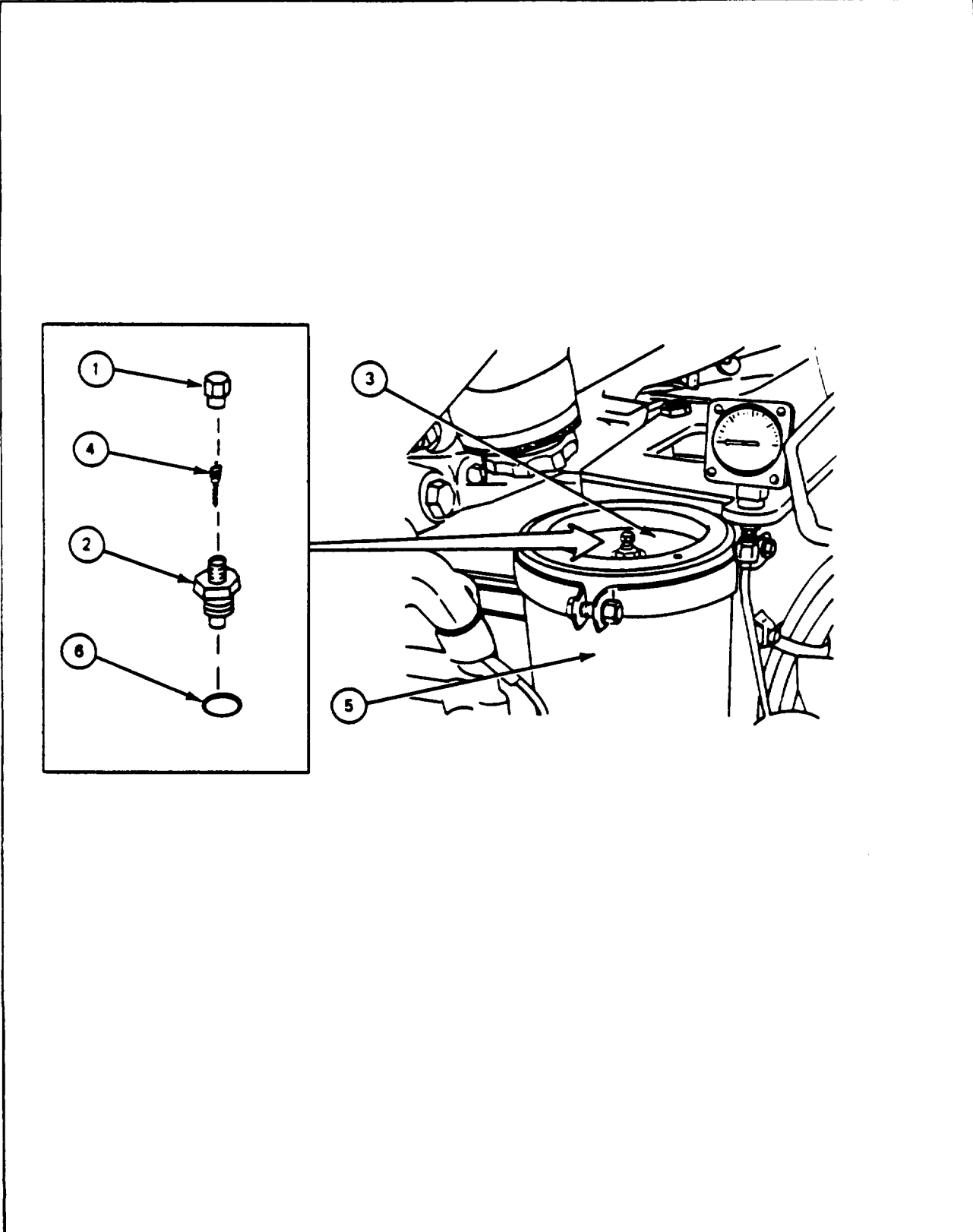
Keep dirt from getting in parts. Dirt can damage equipment.

NOTE

Equipment conditions apply only if task is being done on vehicle.

16-7. AIR VALVE REMOVAL AND DISASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <p>WARNING</p> </div> <p style="text-align: center;">Before removing air valve (2), hydraulic system pressure must be lowered to 0 psi. Hydraulic system under pressure can hurt you.</p> <ol style="list-style-type: none"> 1. Lower hydraulic system pressure to 0 psi (TM-20-2-3). 2. Using 3/8" wrench, remove valve cap (1) from air valve (2) in gas-end cap (3) <div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;"> <p>CAUTION</p> </div> <p style="text-align: center;">Lower nitrogen pressure slowly to keep valve core (4) from freezing.</p> <ol style="list-style-type: none"> 3. Using valve core tool, lower accumulator (5) nitrogen pressure to 0 psi by pushing down on valve core (4) pin (JPG). 4. Using valve core tool, remove valve core (4) (JPG). 5. Using socket wrench, remove air valve (2) and packing (6) from gas-end cap (3) of accumulator (5). 6. Using O-ring extractor tool, remove preformed packing (6) from air valve (2) (JPG). <p>END OF TASK</p>



16-8. AIR VALVE ASSEMBLY AND INSTALLATION PROCEDURE

TOOLS: 3/4" socket (1/2" drive)
1/2" drive ratchet
3/8" combination wrench
Valve core tool
O-ring extractor kit

SUPPLIES: Preformed packing (MS 28778-5)

PERSONNEL: One

REFERENCES: TM 9-2350-222-20-2-3 for procedure to charge main accumulator
JPG for procedures to:
Install preformed packing
Use valve core tool

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Main Accumulator	FO-1	16
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Gunner's control box ELEV/TRAV POWER switch set to OFF
Turret traverse lock set to LOCKED

GENERAL INSTRUCTIONS:

CAUTION

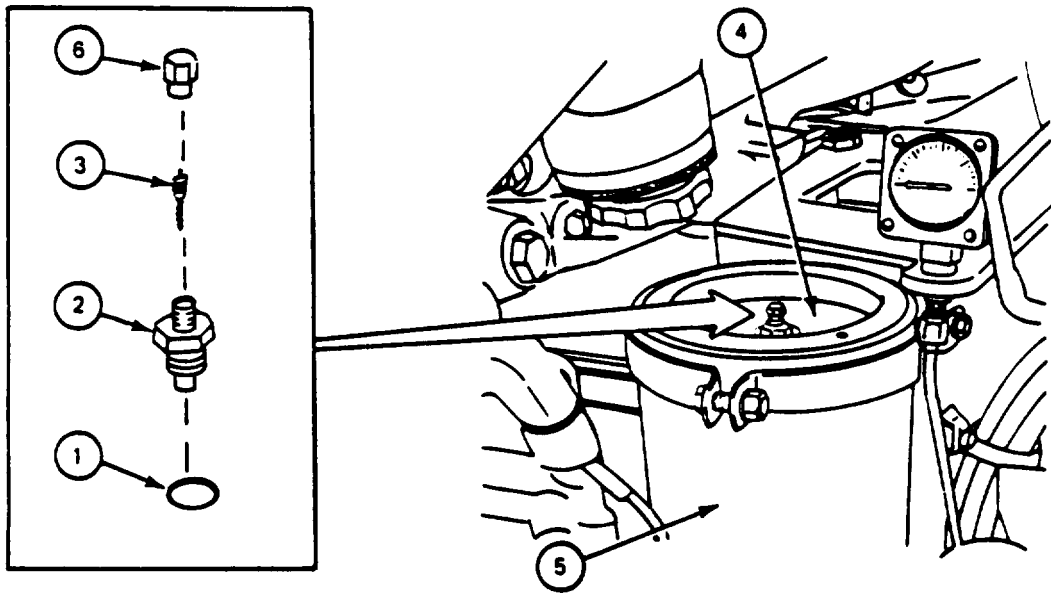
Keep dirt from getting in parts. Dirt can damage equipment.

NOTE

Equipment conditions and follow-on maintenance apply only if task is being done on vehicle.

16-8. AIR VALVE ASSEMBLY AND INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 4. 	<p>using O-ring extractor tool, put new preformed packing (1) on air valve (2) (JPG).</p> <p>using valve core tool, put valve core (3) in air valve (2) (JPG).</p> <p>using socket wrench, put air valve (2) in gas-end cap (top) 4) of main accumulator (5).</p> <p>using 3/8" wrench, put valve cap (6) on air valve (2).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Required:</p> <p style="text-align: center;">Charge main accumulator (TM-20-2-3).</p> <p style="text-align: center;">Test air valve (para 16-6).</p> <p>END OF TASK</p>



CHAPTER 17
TURRET RACE RING

17-1. MAINTENANCE PROCEDURES INDEX

Equipment Item	Inspection	Test	Tasks			
			Removal	Installation	Disassembly	Assembly
Turret Race Ring	17-2	17-3	17-4	17-5	17-6	17-7

17-2. TURRET RACE RING INSPECTION PROCEDURE

TOOLS: 1" micrometer

PERSONNEL: One

PRELIMINARY PROCEDURES: Disassemble turret race ring (para 17-6)

GENERAL INSTRUCTIONS:

NOTE

If part is bad, order repair part or next higher assembly, as required.

FRAME 1	
Step	Procedure
1.	Using micrometer, check that free length of each spring is between 0.812" and 0.842". END OF TASK

17.3. TURRET RACE RING FRICTION TEST PROCEDURE

TOOLS: Jack, hydraulic (20 ton capacity) (NSN 5120-00-595-8387) (two required) or,
 Jack, hydraulic (30 ton capacity) (NSN 5120-00-188-1790) (two required)
 M1A1 Quadrant, gunner's (NSN 1290-00-891-9999) or
 M1A2 Quadrant, gunner's (NSN 1290-00-169-1937)
 Scale, dial indicating spring (NSN 6670-00-254-4634)

SUPPLIES: 1/2" diameter rope (about 30 feet long)
 Wood blocks (as required to level vehicle)

PERSONNEL: Two

REFERENCES: TM 9-2350-222-10 for procedure to elevate 165-mm gun
 TM 9-2350-222-20-2-3 for procedure to adjust anti-backlash

EQUIPMENT CONDITION: Park vehicle on level surface
 Traverse turret and position gun tube over center of driver's hatch
 Place gun tube at zero elevation (TM -10)
 Turret traverse lock set to UNLOCKED
 Pinion drive gears removed using anti-backlash adjustment procedure
 (TM -20-2-3)

GENERAL INSTRUCTIONS:

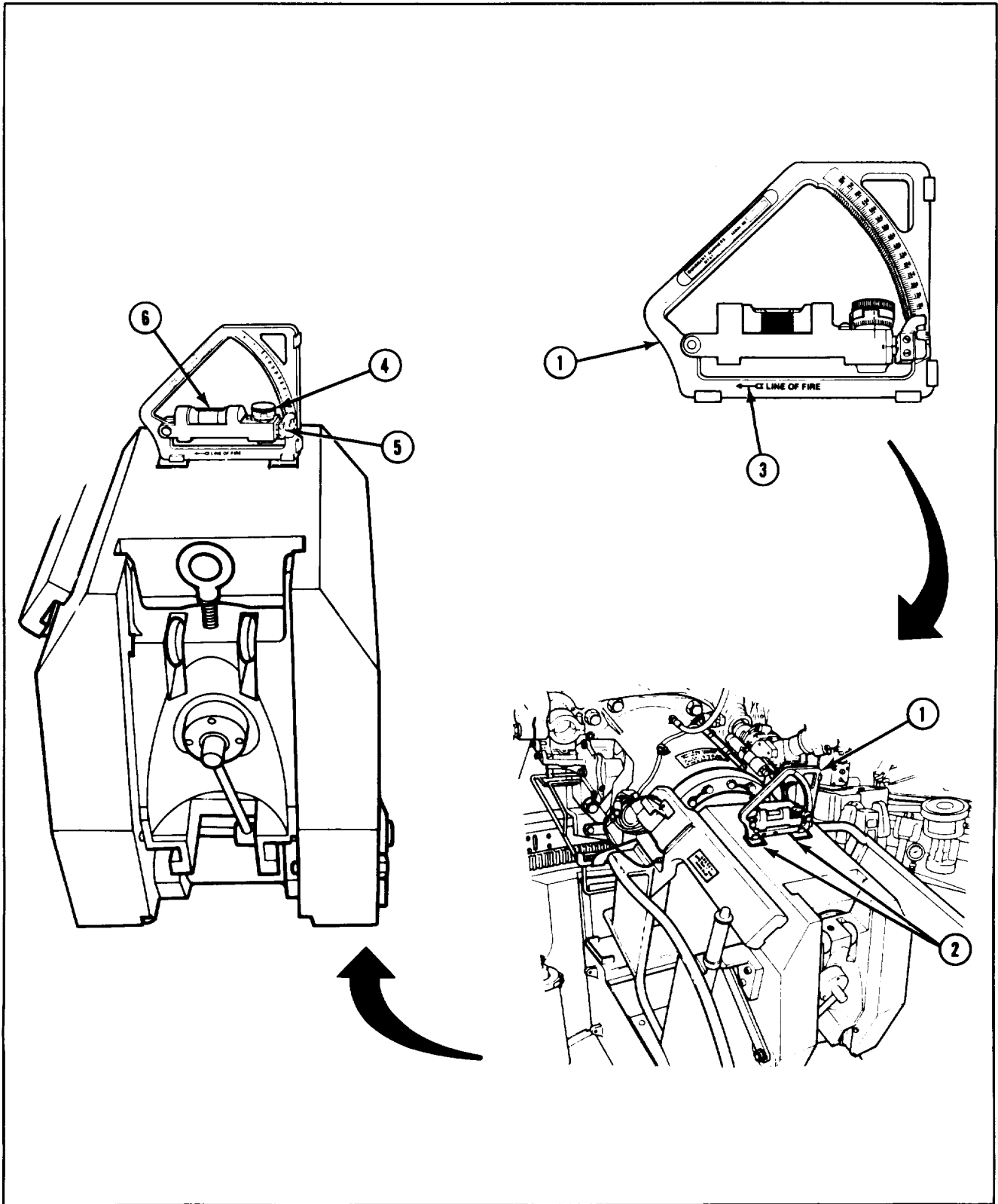
NOTE

If normal indication is not obtained, turret race ring is bad. Disassemble turret race ring (para 17-6).

17-3. TURRET RACE RING FRICTION TEST PROCEDURE (CONT)

FRAME 1

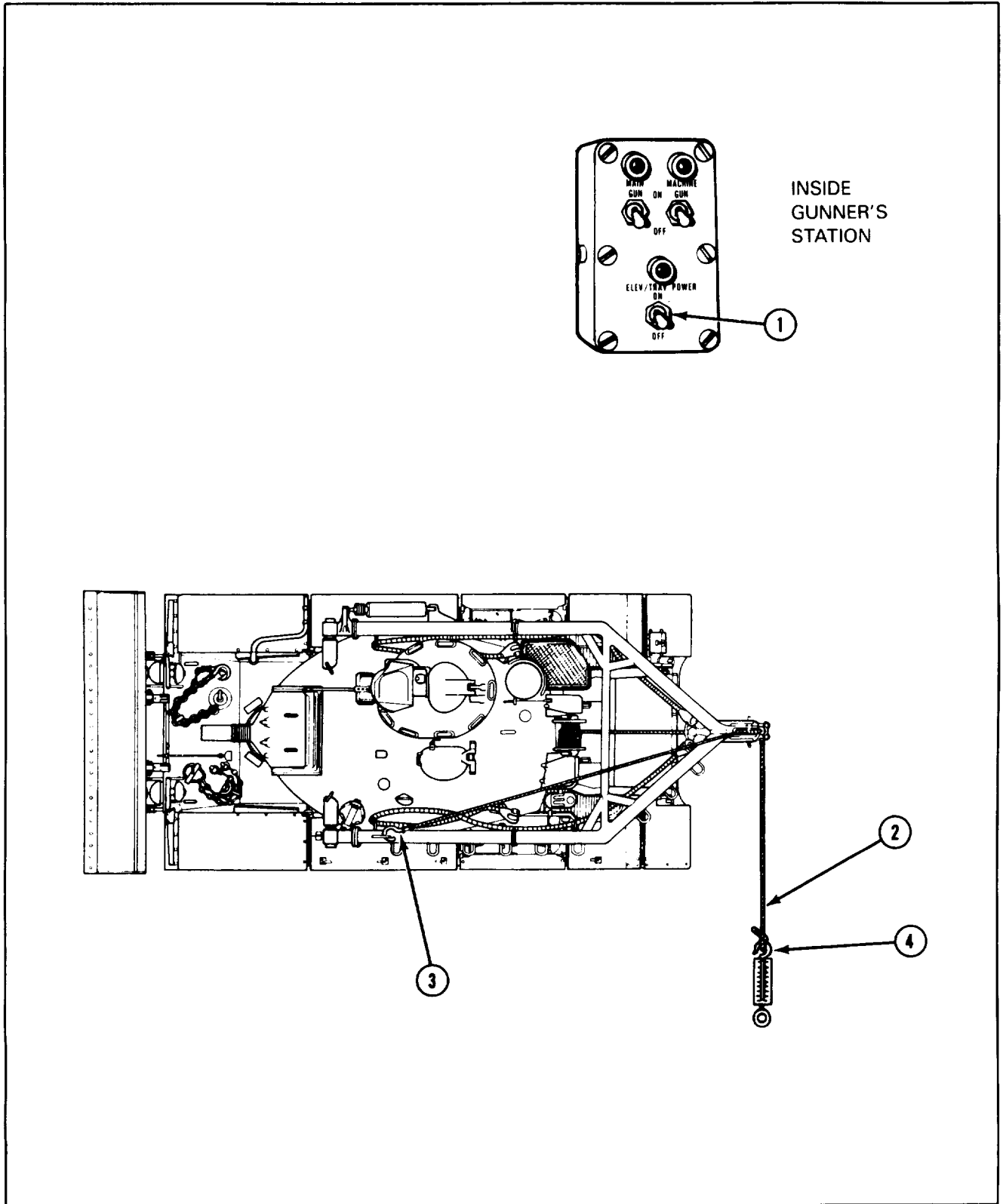
Step	Procedure
1.	Place M1A1 gunner's quadrant (1) in breechring quadrant seats (2). Make sure "Line of Fire" arrow (3) is perpendicular to gun tube.
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do not position gunner's quadrant 1) parallel to gun tube. This will not determine if vehicle is level.</p>
2.	Set micrometer knob (4) to "O" and place plunger (5) to "O" on gunner's quadrant (1).
3.	Look at quadrant vial (6) to see if bubble is centered or within 1 degree (17.78 mils) in vial (6). If bubble in vial (6) is not centered, do step 4. If vehicle is level, go to frame 2, step 2.
4.	Using wooden blocks and hydraulic jacks, raise and support lowest point of vehicle, as necessary, to level vehicle within 1 degree (17.78 mils) in vial (6).
5.	Traverse turret 90 degrees and check vial (6) again to make sure vehicle is level within 1 degree (17.78 mils). If vehicle is not level, do step 4 again.
	<p>GO TO FRAME 2</p>



7-3. TURRET RACE RING FRICTION TEST PROCEDURE(CONT)

FRAME 2

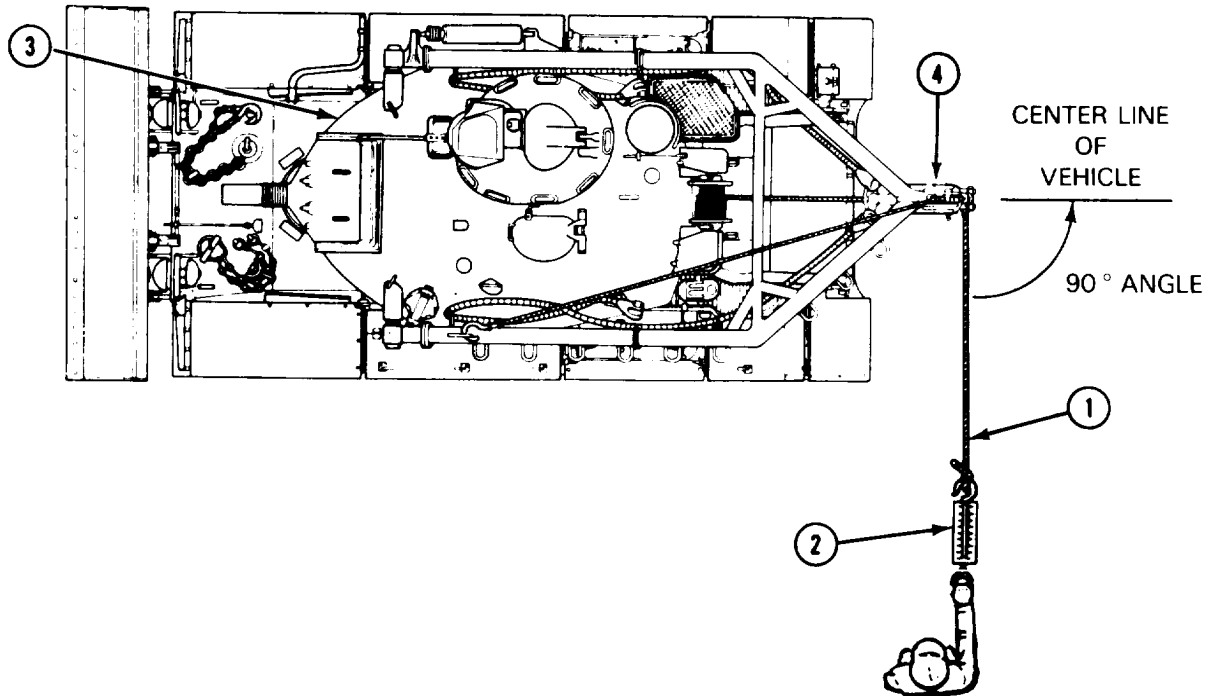
Step	Procedure
1.	Traverse turret so gun tube is over center of driver's hatch (TM-10). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Make sure area around turret race ring is clear of any obstruction and debris to ensure accurate readings are obtained during this test.</p>
2.	Set ELEV/TRAV POWER switch (1) to "ON". <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Turret must be traversed to make sure grease is spread on race rings and bearings.</p>
3.	Traverse turret three revolutions clockwise and then three revolutions counterclockwise returning gun tube over center of driver's hatch.
4.	Place turret in traverse "LOCKED" position (TM -10).
5.	Tie one end of rope (2) at end of boom (3) and opposite end of rope (2) to scale hook (4).
6.	Place turret in traverse "UNLOCKED" position (TM -10). GO TO FRAME 3



17-3. TURRET RACE RING FRICTION TEST PROCEDURE (CONT)

FRAME 3

Step	Procedure
	<p style="text-align: center;">NOTE</p> <ul style="list-style-type: none"> ● Do not jerk on rope (1) or scale (2). Pull scale (2) smoothly. Jerking can make scale (2) give wrong indication, ● Make sure M1A1 quadrant on gun tube is level within 1 degree while pulling turret (3) 360 degrees. <p>1. Holding scale (2) so that rope (1) and scale (2) are straight out about 90 degrees from boom (4), Pull turret (3) around one full turn (360 degrees). While pulling, watch scale (2) indication. Scale (2) must indicate under 20 pounds (after turret starts to turn),</p> <p>2. Repeat step 1, pulling turret (3) around in other direction.</p> <p style="text-align: center;">NOTE</p> <p>If scale (2) indication is over 20 pounds, turret ring must be replaced and repaired (para. 17-6).</p> <p>Follow-on Maintenance Action Required:</p> <p>Adjust anti-backlash (TM -20-2-3).</p> <p>END OF TASK</p>



17-4. TURRET RACE RING REMOVAL PROCEDURE

TOOLS: Hoist, capable of lifting 20 tons or more and capable of raising hook at least 20 feet above ground
 Turret lifting sling (NSN 4933-00-938-3008)
 1-1/8" combination wrench
 Turret stand (fabricated tool, item 5, App. B)
 1-1/8" socket (3/4" drive)
 3/4" drive hinged handle
 3/4" drive ratchet
 3" extension (3/4" drive)
 Hoist, 5 ton capacity
 Race ring sling (3 legs of 1 /4" steel cable x 6' long each leg)
 Eye bolts (NSN 5306-00-699- 1282)(three)

SUPPLIES: Masking tape (item 36, App A)
 Wood blocks (4" x 4" x 2") (three)

PERSONNEL: Five

REFERENCES: TM 9-2350-222-20-2-3 for procedures to remove:
 Loader's seat
 Commander's seat
 Turret traverse lock
 Azimuth indicator
 7.62-mm ready round ammunition box
 165-mm ammunition rack retainers
 Slipping
 Main accumulator and mounting bracket
 Elevating mechanism and mounting bracket
 Commander's filter hose
 TM 9-2350-222-10 for procedures to:
 Traverse turret
 Depress gun

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11

17-4. TURRET RACE RING REMOVAL PROCEDURE (CONT)

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF

- Gun traversed over front slope (TM- 10)
- Gun set at maximum depression (TM-10)
- Loader's seat removed (TM-20-2-3)
- Commander's seat removed (TM-20-2-3)
- Turret traverse lock removed (TM-20-2-3)
- Azimuth indicator removed (TM-20-2-3)
- 7.62-mm ready round ammunition box removed (TM-20-2-3)
- 165-mm ammunition racks retainer removed (TM-20-2-3)
- Slipring removed (TM-20-2-3)
- Accumulator and mounting bracket removed (TM 20-2-3)
- Elevating mechanism and mounting bracket removed (TM-20-2-3)
- Commander's filter hose removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Remove power pack and mounting bracket (para 13-3)
Remove turret traversing mechanism (para 18-3)
Remove boom (para 29-2)

GENERAL INSTRUCTIONS:

NOTE

Keep bolts and brackets for installation.

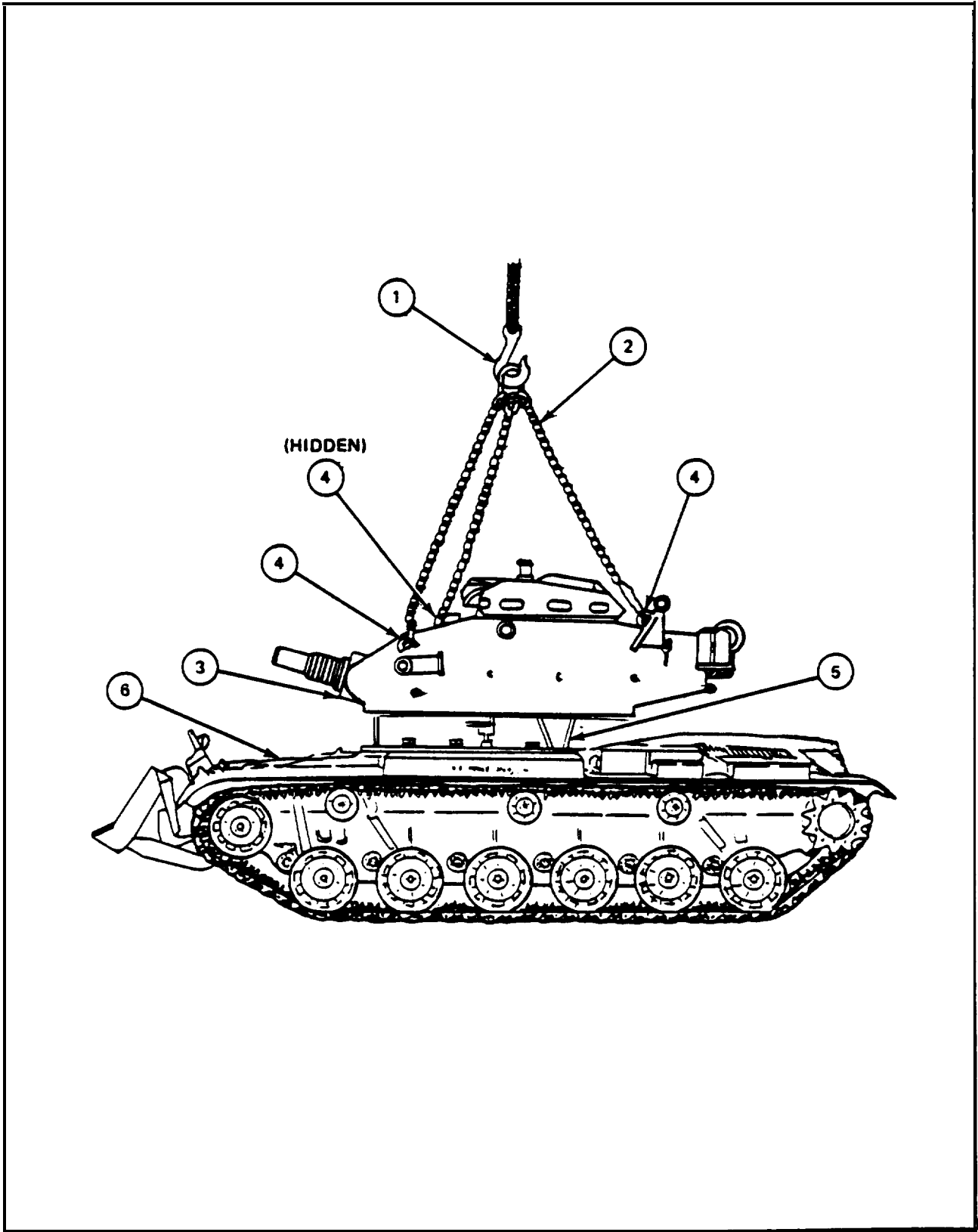
This procedure is for removal of complete race ring or for work on race ring. Race ring does not have to be removed from hull for disassembly (para 17-6).

17-4. TURRET RACE RING REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p>This procedure will allow the turret to be separated from race ring and leave race ring on hull. The turret can then be put on turret stand and race ring replaced or worked on while on hull.</p> <p>Putting a piece of tape (1), next to bolts (2) that hold turret (3) to race ring (4), will make it easier to put bolts in proper holes when installing turret race ring (para 17-5).</p> <ol style="list-style-type: none"> 1. Using masking tape, put a piece of tape (1), next to each of the bolts (2) that hold turret (3) to race ring (4). 2. Using socket wrench or combination wrench, remove 24 bolts (2) that hold turret (3) to race ring (4). <p>GO TO FRAME 2</p>
	<p>The diagram illustrates the removal of the turret race ring. It shows a cross-section of the hull with a race ring (4) mounted on it. A turret (3) is shown being separated from the race ring. A bolt (2) is shown being removed from the turret. A piece of tape (1) is shown being placed next to the bolt (2) to mark the hole in the race ring (4).</p>

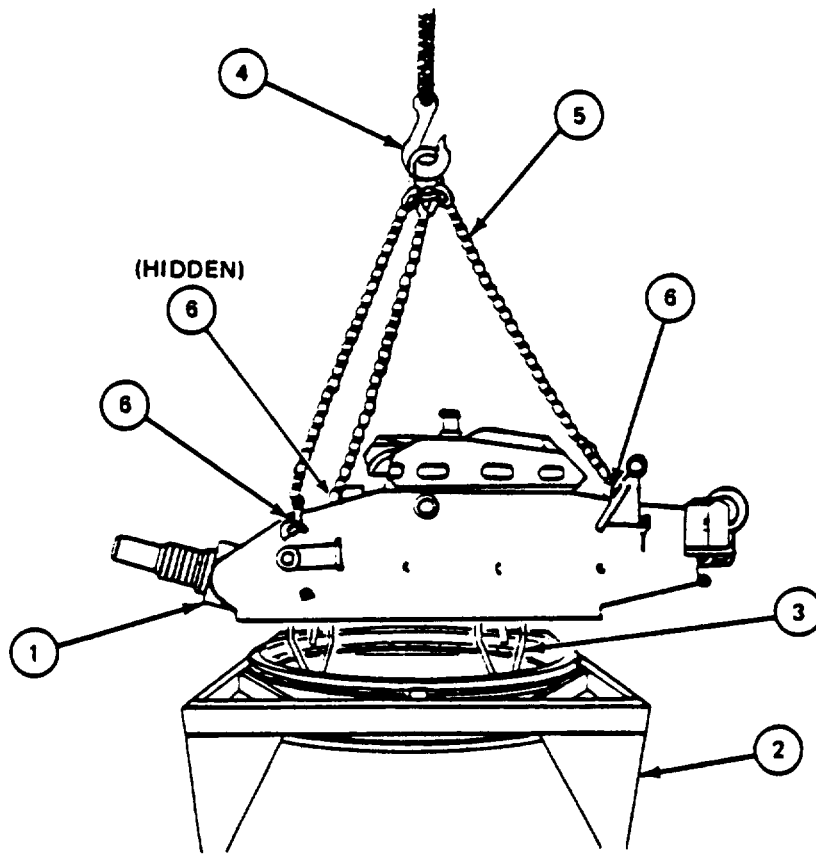
17-4. TURRET RACE RING REMOVAL PROCEDURE (CONT)

step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Turret sling (2) is heavy and awkward to handle. Hoist hook (1) should be used to lift sling.</p> <ol style="list-style-type: none"> 1. Using hoist, lower hoist hook (1) to sling (2) on floor. 2. Put sling (2) on hoist hook (1). 3. Raise hoist hook (1) with sling (2) and position hoist hook over center of turret (3). 4. Put three hooks of sling (2) through three turret lifting eyes (4). <div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 20px auto;">WARNING</div> <p style="text-align: center;">Turret weighs nearly 20 tons. Do not get under turret (3) while it is on hoist. Turret could fall and hurt or kill you.</p> <div style="text-align: center; border: 1px dashed black; padding: 5px; width: fit-content; margin: 20px auto;">CAUTION</div> <p style="text-align: center;">When liftin turret (3) from hull (6), do not let turet platform (5) bump against hull. Parts. could be damaged. Turret must be lifted level and straight up.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Soldier A will operate hoist. Soldiers B and C will be on each side of turret (3) to guide and check turret as it is lifted out of hull. Soldiers D and E will help where needed.</p> <ol style="list-style-type: none"> 5. Using hoist, lift turret (3) straight up until turret platform (5) is clear of hull (6). <p>GO TO FRAME 3</p>



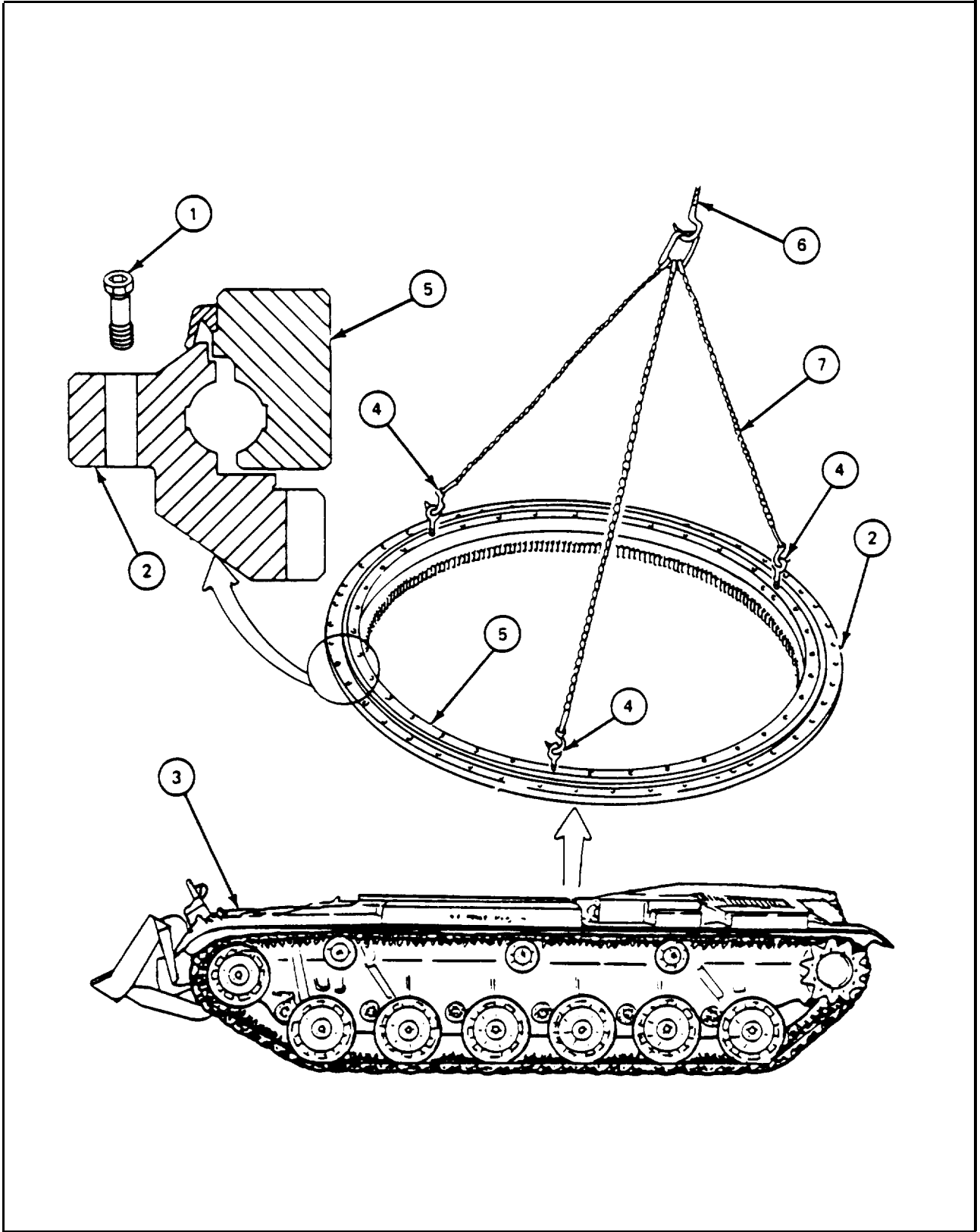
17-4. TURRET RACE RING REMOVAL PROCEDURE (CONT)

FRAME 3	
Step	Procedure
1.	<p>Using hoist, move turret (1) and position over turret stand (2).</p> <p style="text-align: center;">CAUTION</p> <p style="text-align: center;">When putting turret (1) on turret stand (2), do not let turret platform (3) bump against turret stand. Parts could be damaged.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Soldier B and C will be on each side of turret (1) to guide turret on turret stand (2). Soldiers D and E will help where needed.</p>
2.	Lower turret platform (3) into turret stand (2) until turret (1) is on turret stand.
3.	Lower hoist hook (4) until three hooks of sling (5) can be removed from three turret lifting eyes (6).
4.	Move hoist hook (4) with sling (5) over clear area on floor and lower sling (5) to floor.
5.	Remove sling (5) from hoist hook (4).
6.	Move hoist to clear area.
	GO TO FRAME 4



17-4. TURRET RACE RING REMOVAL PROCEDURE (CONT)

FRAME 4	
Step	Procedure
1.	Using socket wrench, remove 48 screws (1) that attach race ring (2) to hull (3).
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Three eyebolts (4) must be evenly spaced (every 2 holes) around inner race (5).</p>
2.	Put three eyebolts (4) in three threaded holes in inner race (5).
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Five ton hoist may be used to replace 20 ton hoist to lift race ring (2).</p>
3.	Using hoist, lower hoist hook (6) and put sling (7) on hoist hook.
4.	Position hoist hook (6) over center of race ring (2) and put three hooks of sling (7) through three eyebolts (4).
	<p style="text-align: center;">CAUTION</p> <p style="text-align: center;">Race ring (2) is sitioned on three dowel pins and must be lifted evenly to prevent damage.</p>
5.	Carefully lift race ring (2) from hull (3).
6.	Place three wood blocks on floor in circle.
7.	Using hoist, move race ring (2) and position over three wood blocks placed in circle on floor.
8.	Lower race ring (2) on three wood blocks.
9.	Remove sling (7) from three eyebolts (4) and hoist hook (6).
10.	Move hoist to clear area.
	END OF TASK



Para 17-4 Cont
17-13/(17-14 blank)

17-5. TURRET RACE RING INSTALLATION PROCEDURE

TOOLS: Hoist, capable of lifting 20 tons or more and capable of raising hook at least 20 feet above ground
Hoist, 5 ton capacity
Race ring sling (3 legs of 1/4" steel cable x 6' long, each leg)
Turret lifting sling (NSN 4933-00-938-3008)
1-1/8" combination wrench
3/4" drive torque wrench (0-420 foot-pounds)
1-1/8" socket (3/4" drive)
8" extension (3/4" drive)
3/4" drive ratchet

SUPPLIES: Grease (item 12, App. A)

PERSONNEL: Five

REFERENCES: TM 9-2350-222 -20-2-3 for procedures to:
Install turret traverse lock
Install azimuth indicator
Install commander's seat
Install loader's seat
Install 7.62-m ready round ammunition box
Install 165-mm ammunition rack retainer
Install slipring
Install main accumulator and mounting bracket
Install elevating mechanism and mounting bracket
Install commander's filter hose
TM 9-2350-222-10 for procedure to traverse and operate turret
JPG for procedure to use torque wrench

PRELIMINARY PROCEDURES: Assemble turret race ring (para 17-7)

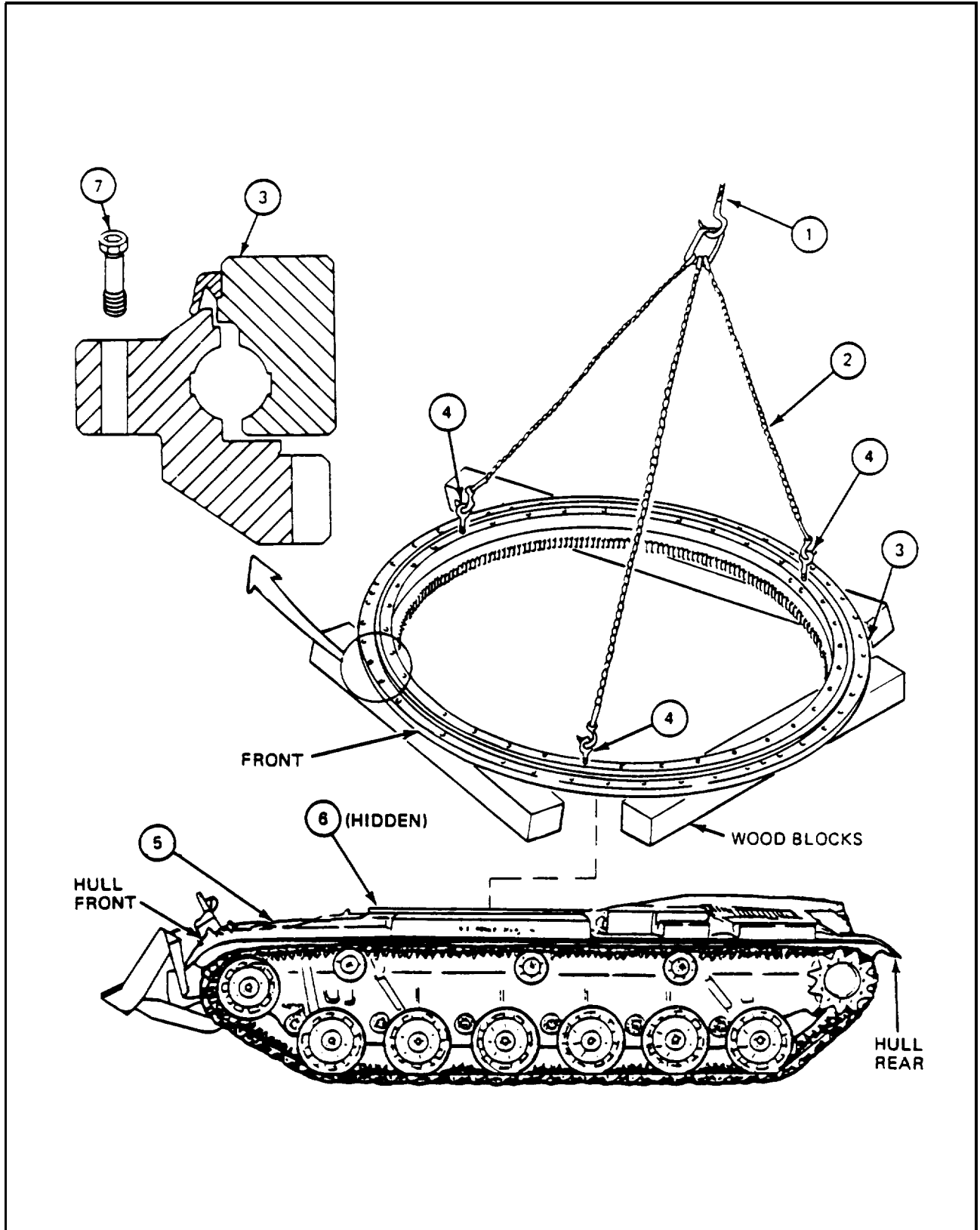
GENERAL INSTRUCTIONS:

NOTE

Light coat of grease should be applied to all bolt threads that attach turret to race ring.

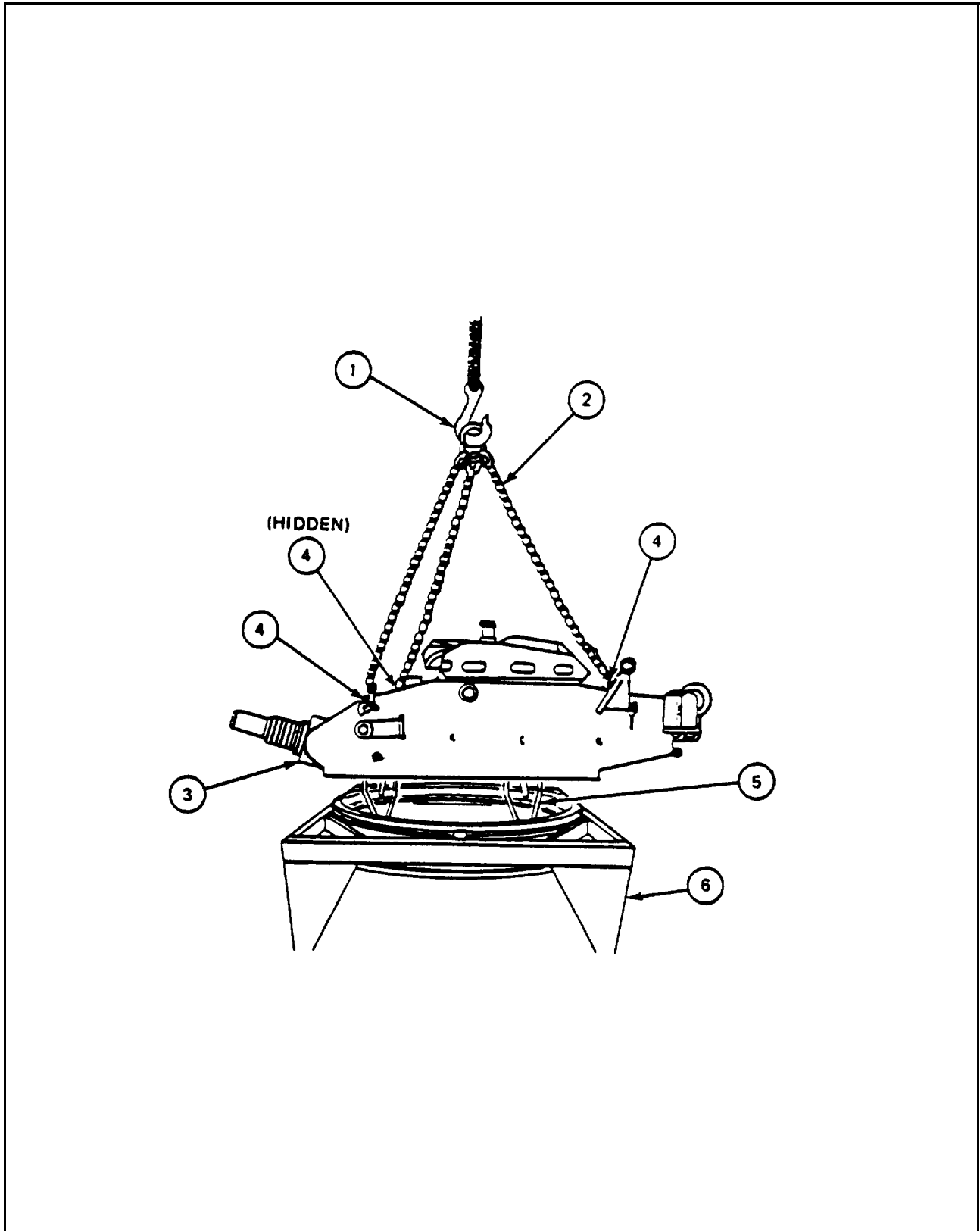
17-5. TURRET RACE RING INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<p>NOTE</p> <p>If race ring was disassembled on hull, go to frame 2. Five ton hoist may be used to lift race ring.</p>
1.	Using hoist, lower hoist hook (1) and put sling (2) on hoist hook.
2.	Position hoist hook (1) over center of race ring (3) on three wood blocks.
3.	Lower hoist hook (1) and put three hooks of sling (2) through three eyebolts (4).
4.	lift race ring (3) and check that race ring is lifted evenly. Move race ring over hull (5).
	<p>CAUTION</p> <p>Race ring (3) is positioned on three dowel pins in hull and must be lowered evenly to prevent damage.</p>
	<p>NOTE</p> <p>Outer ring of race ring (3) is marked "FRONT". Position toward front of hull.</p>
5.	Carefully lower race ring (3) on three dowel pins (6) in hull (5).
6.	Remove sling (2) from three eyebolts (4) and hoist hook (1).
7.	Move hoist to clear area.
8.	Remove three eyebolts (4) from race ring (3).
9.	Using socket wrench, attach race ring (3) to hull (5) with 48 screws (7).
10.	Using torque wrench, tighten 48 screws (7) to between 300 and 350 foot-pounds (JPG).
	GO TO FRAME 2



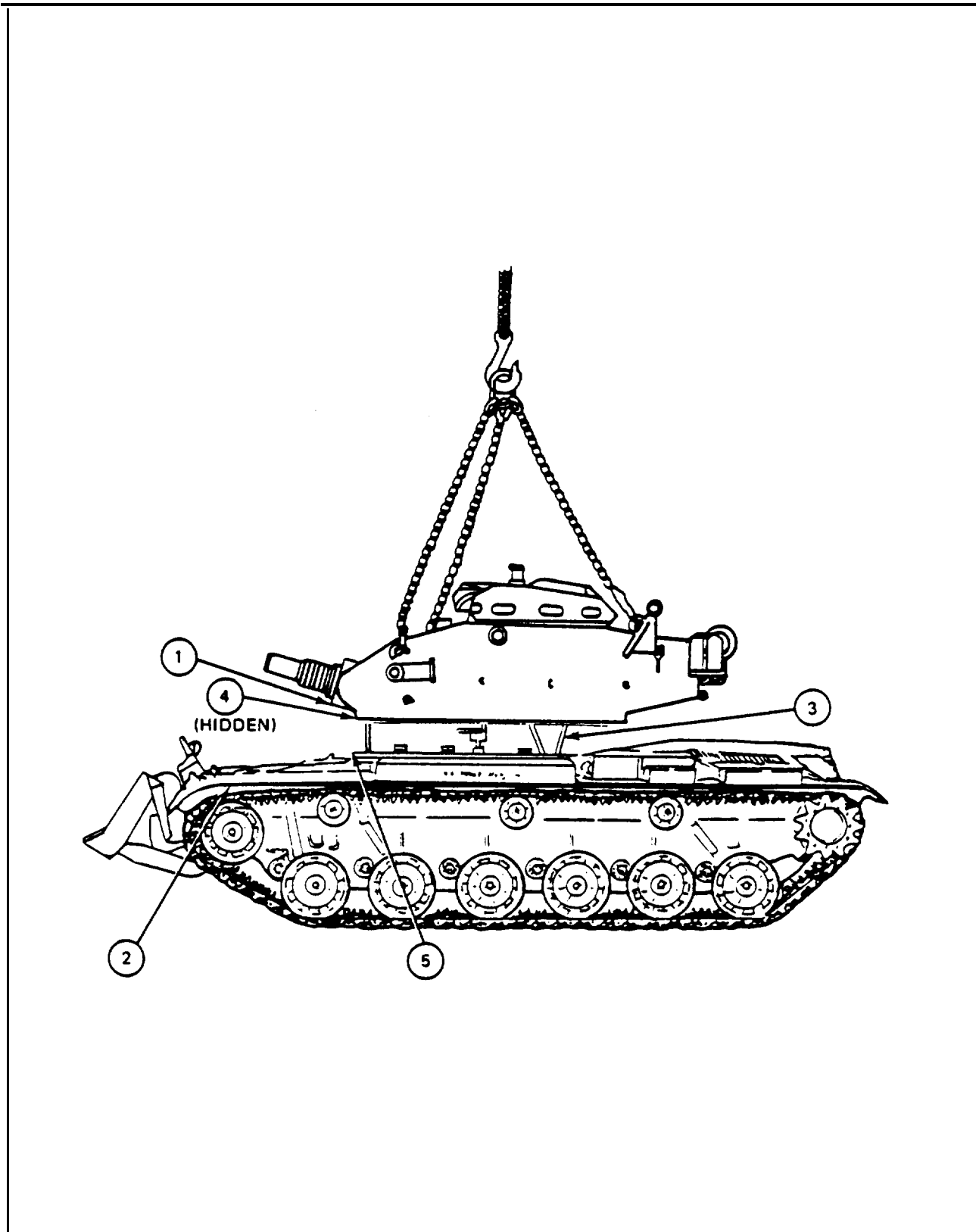
17-5. TURRET RACE RING INSTALLATION PROCEDURE (CONT)

FRAME 2	
Step	procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Turret sling (2) is heavy and awkward to handle. Hoist hook (1) should be used to lift sling.</p> <ol style="list-style-type: none"> 1. Using hoist, lower hoist hook (1) to sling (2) on floor. 2. Put sling (2) on hoist hook (1). 3. Raise hoist hook (1) with sling (2) and position hoist hook over center of turret (3). 4. Put three hooks of sling (2) through three turret lifting eyes (4). <div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 20px auto;">WARNING</div> <p style="text-align: center;">Turret weighs nearly 20 tons. Do not get under turret (3) while it is on hoist. Turret could fall and hurt or kill you.</p> <div style="text-align: center; border: 1px dashed black; padding: 5px; width: fit-content; margin: 20px auto;">CAUTION</div> <p style="text-align: center;">When lifting turret (3) from stand (6), do not let turret platform (8) bump against stand. Parts could be damaged. Turret must be lifted level and straight up.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Soldier A will operate hoist. Soldiers B and C will be on each side of turret (3) to guide and check turret as it is lifted out of stand. Soldiers D and E will help where needed.</p> <ol style="list-style-type: none"> 5. Using hoist, lift turret (3) straight up until turret platform (5) is clear of stand (6). <p>GO TO FRAME 3</p>



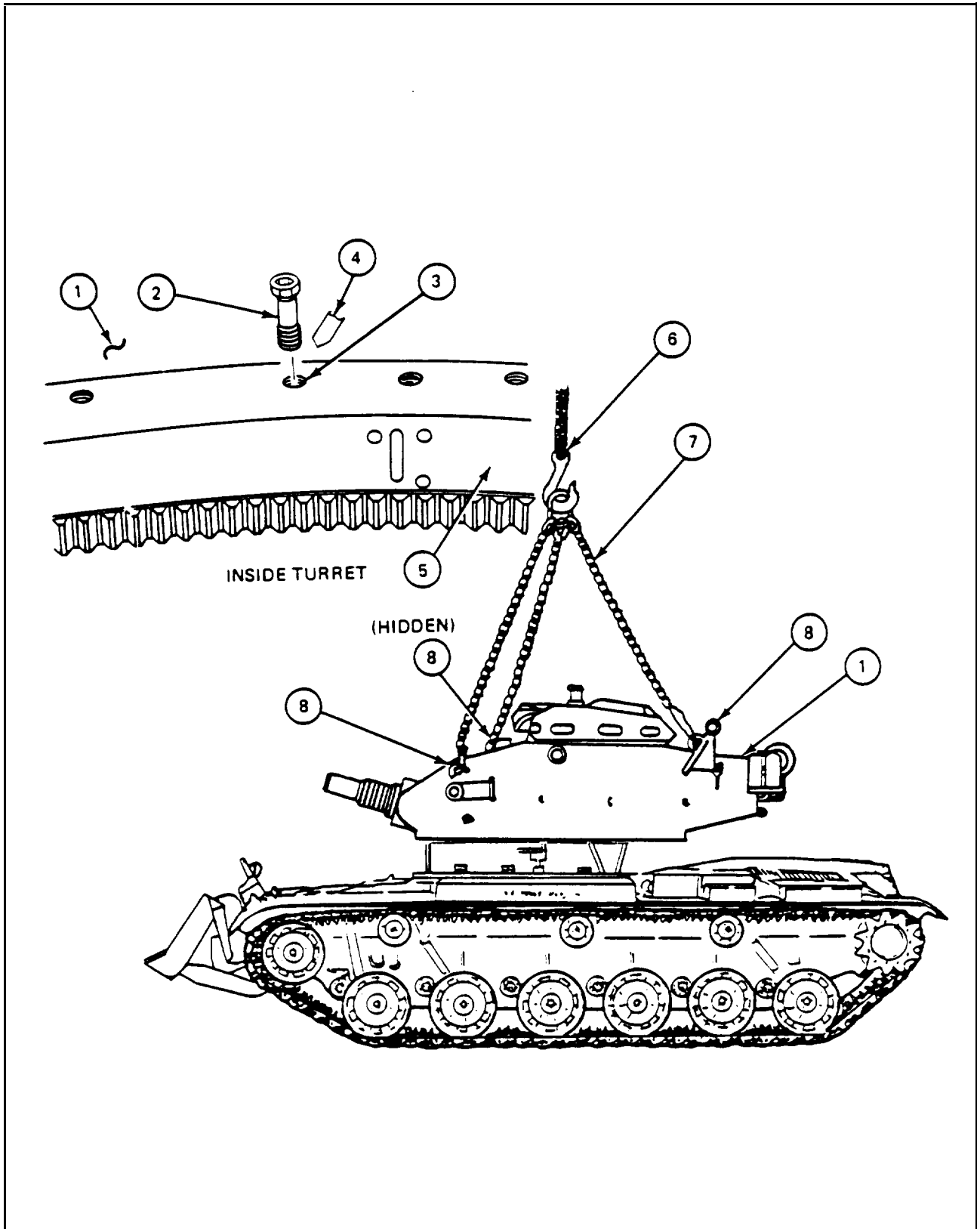
17-5. TURRET RACE RING INSTALLATION PROCEDURE (CONT)

FRAME 3	
Step	Procedure
1.	<p>Using hoist, move turret (1) and position over hull (2).</p> <div style="text-align: center; border: 1px solid black; padding: 2px; width: fit-content; margin: 10px auto;"> <p>CAUTION</p> </div> <p style="text-align: center;">When puttin turret (1) on hull (2), do not let turret platform (3) bump against hull. Parts could be damaged.</p> <div style="text-align: center; margin: 10px auto;"> <p>NOTE</p> </div> <p style="text-align: center;">Soldiers B and C will be on each side of turret (1) to guide and cheek turret as it is put in hull (2).</p>
2.	Using hoist, carefully lower turret (1) into hull (2) until turret is about 1" above hull.
3.	Line up alignment pin (4) of turret (1) with alignment hole (5) in race ring (6).
4.	Using hoist, lower turret (1) on to hull (2).
GO TO FRAME 4	



17-5. TURRET RACE RING INSTALLATION PROCEDURE (CONT)

Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Turret (1) may have to be lifted slightly with hoist to get better alignment of bolt holes. Approximately 24 holes were marked with tape during removal of turret or traversing race ring.</p> <ol style="list-style-type: none"> 1. Inside turret (1), put bolts (2) in holes (3) with matching tape (4) marks. Make sure each bolt can be started into threaded hole in race ring (5). 2. Using socket or combination wrench, tighten bolts (2). 3. Using torque wrench, torque each bolt (2) to between 300 and 350 foot-pounds (JPG). 4. Using hoist, lower hoist hook (6) until three hooks of sling (7) can be removed from three turret lifting eyes (8). 5. Using hoist, move hoist hook (6) with sling (7) over clear area on floor and lower hoist hook until sling is on floor. 6. Remove sling (7) from hoist hook (6) and move hoist to clear area. <p>GO TO FRAME 5</p>



17-5. TURRET RACE RING INSTALLATION PROCEDURE (CONT)

FRAME 5	
Step	Procedure
	<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Install turret traversing mechanism (para 18-4). Install power pack and mounting bracket (para 13-4). Install main accumulator and mounting bracket (TM-20-2-3). Install elevating mechanism and mounting bracket (TM-20-2-3). Install turret traverse lock (TM-20-2-3). Install azimuth indicator (TM-20-2-3). Install commander's seat (TM-20-2-3). Install loader's seat (TM-20-2-3). Install 7.62-mm ready round ammunition box (TM-20-2-3). Install 165-mm ammunition rack retainers (TM-20-2-3). Install slipring (TM-20-2-3). Install commander's filter hose (TM-20-2-3). Install boom (para 29-3). Test turret traversing race ring (para 18-3). Operate turret in manual and power modes to make sure it works properly (TM-10).</p>
	END OF TASK

17-6. TURRET RACE RING DISASSEMBLY PROCEDURE

TOOLS: Hoist, 5 ton capacity
Turret race lifting eye bolt (NSN 5306-00-699-1282) (three)
Race ring sling (3 legs of 1/4" steel cable x 6' long, each leg)
Fine stone
Scraper
Stiff bristled brush
Diagonal cutting pliers
1/2" drive ratchet
9/16" socket (1/2" drive)
Pan (9" diameter, 1-1/2" deep)
Spring wire hook tool (fabricated tool, item 6, App. B)
Knife
1/4" flat tip screwdriver

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App, A)

PERSONNEL Two

REFERENCES: JPG for procedures to:
Inspect and repair parts
Clean parts

PRELIMINARY PROCEDURES: Remove turret race ring (para 17-4) (see general instructions)

GENERAL INSTRUCTIONS:

NOTE

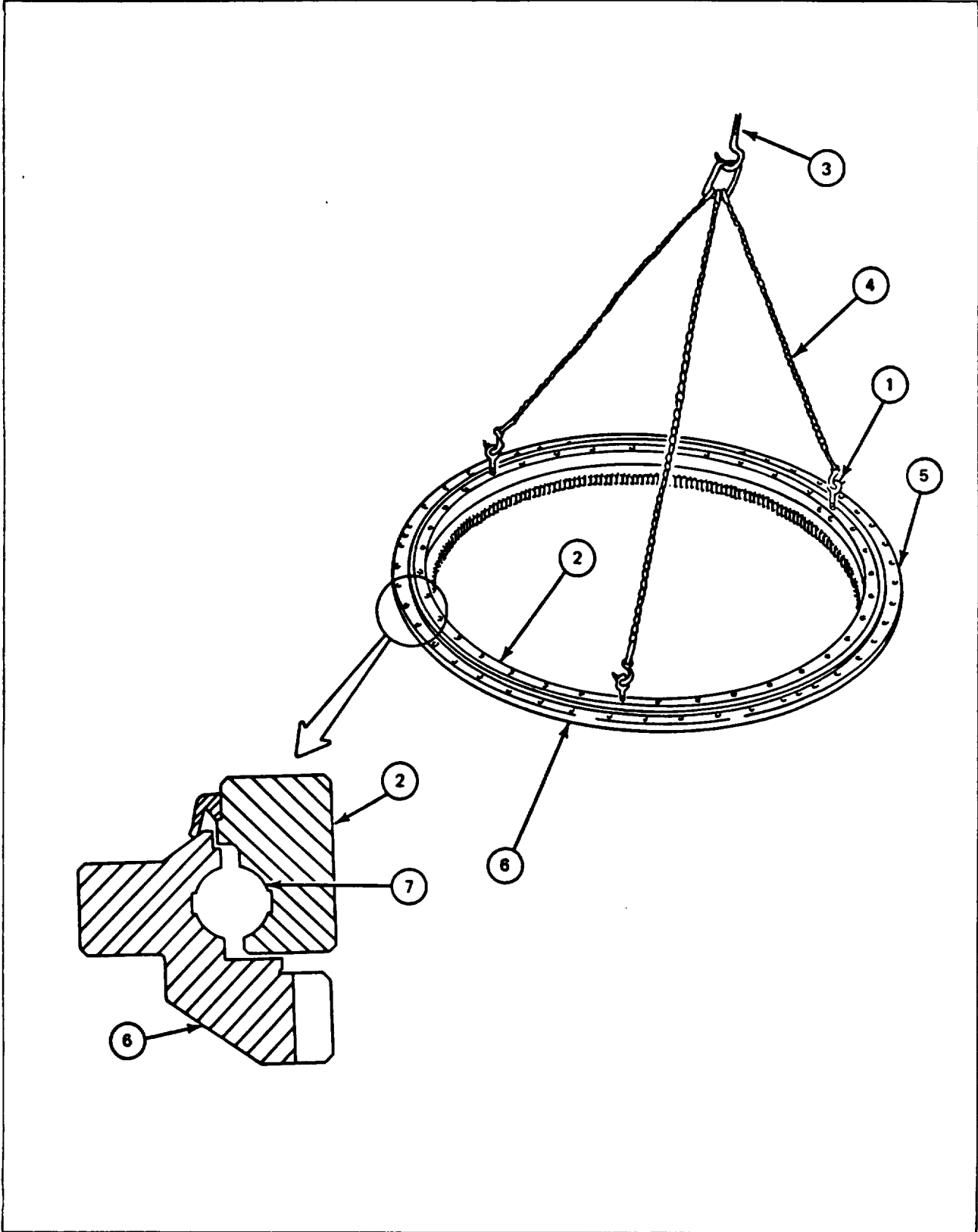
If outer race is going to be replaced, race ring should be disassembled after removal from vehicle (para 17-4).

If outer race is not going to be replaced, race ring could be disassembled while on vehicle.

17-6. TURRET RACE RING DISASSEMBLY PROCEDURE (CONT)

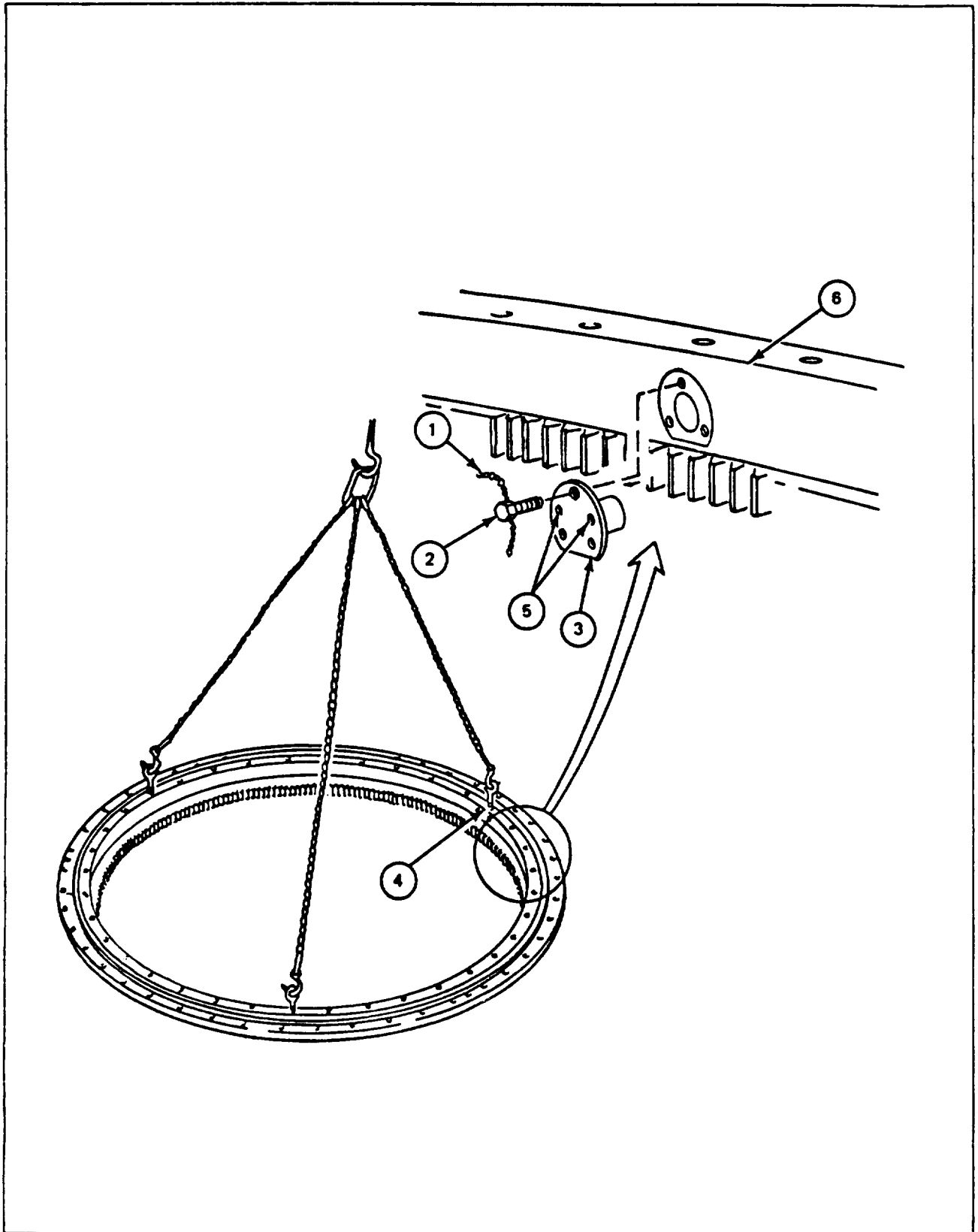
FRAME 1

Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Race ring (5) can be disassembled on or off vehicle. Go to step 2 if off vehicle because three eyebolts (1) should be installed.</p> <p style="text-align: center;">Three eye bolts (1) must be evenly spaced (every 12 holes) around inner race (2).</p> <p>1. Put three eyebolts (1) in three threaded holes in inner race (2).</p> <p>2. Using hoist, lower hoist hook (3) and put sling (4) on hoist hook.</p> <p>3. Position hoist hook (3) over center of race ring (5) and put three hooks of sling (4) through three eyebolts (1).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Weight of inner race (2) should be taken 05 outer race (6) to make it easier to take races apart. Do not overlift.</p> <p>4. Raise inner race (2) about 1/16", or just enough to take weight off outer race (6) and ball bearings (7).</p> <p>GO TO FRAME 2</p>



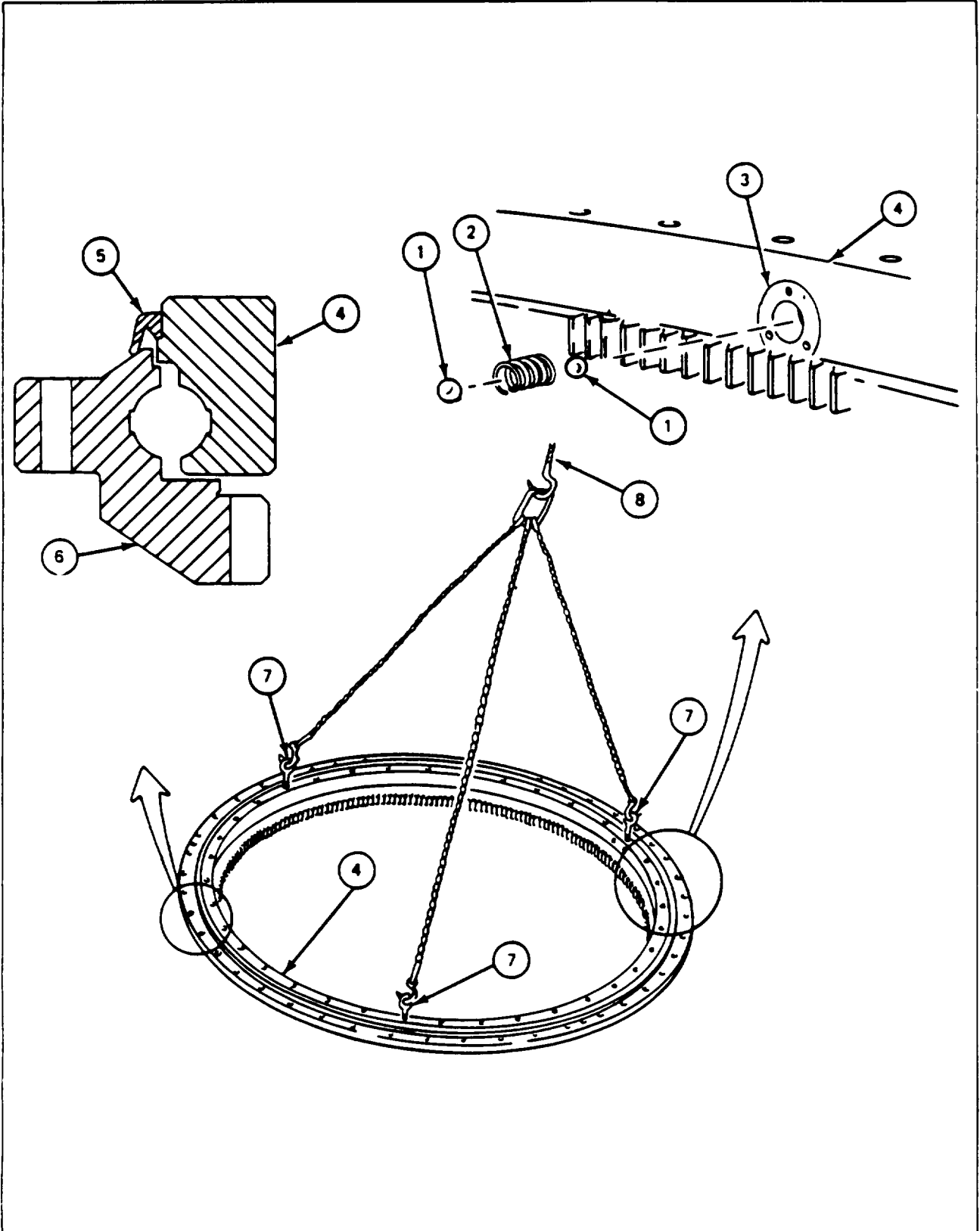
17-6. TURRET RACE RING DISASSEMBLY PROCEDURE (CONT)

FRAME 2	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Access hole for ball bearings and springs are covered with flanged plug (3) secured by three screws (2).</p> <p>1. Using pliers, cut and remove lockwire (1) from three screws (2).</p> <p>2. Using socket wrench, remove three screws (2) that attach flanged plug (3) to inner race (4).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Two of three screws (1) removed in step 2 will be used as jacking screws.</p> <p>3. Using hands, put two screws (1) in two jacking holes (5) in flanged plug (3).</p> <p style="text-align: center;">CAUTION</p> <p style="text-align: center;">When flanged plug is removed from inner race, do not let ball bearings or springs fall from access hole in inner race. Parts could get lost.</p> <p>4. Using socket wrench, tighten two screws (1) evenly to remove flanged plug (3) from inner race (6).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Flanged plug (3) and inner race (6) are matched set. Keep flanged plug with inner race.</p> <p>5. Remove two screws (2) from flanged plug (3).</p> <p>GO TO FRAME 3</p>



17-6. TURRET RACE RING DISASSEMBLY PROCEDURE (CONT)

FRAME 3	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p>Ball bearings are separated by coil springs. First ball bearing may be difficult to remove due to coil spring pressure. It may be necessary to use screwdriver to hold pressure on spring while removing ball bearing.</p> <p>On regular turret race ring assemblies, there are 180 ball bearings and 180 separator springs. On reclaimed assemblies, the letters "OSB" are stamped by the part number and there are 168 oversized ball bearings, and 168 separator springs.</p> <ol style="list-style-type: none"> 1. Using spring wire hook tool, remove ball bearing (1) and coil spring (2) from access hole (3) in inner race (4). Put parts in pan. 2. Turn race as required and repeat steps 1 to remove either 179 more ball bearings (1) and coil springs (2) or 167 more oversized ball bearings (1) and springs (2). 3. Using hoist, carefully lift inner race (4) with seal (5) out of outer race (6). 4. Using hoist, move inner race (4) and place on suitable work surface. 5. Remove sling from three eyebolts (7) and hoist hook (8). 6. Remove three eye bolts (7) from inner race (4).
7.	<p style="text-align: center;">CAUTION</p> <p>When removing seal (5), do not cut or scratch inner race (4).</p> <p style="text-align: center;">NOTE</p> <p>Do not remove seal except to replace.</p> <p>Using knife, cut seal (5) from inner race (4).</p> <p style="text-align: center;">NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection (para 18-2).</p> <p>END OF TASK</p>



Para 17-6 Cont

17-7. TURRET RACE RING ASSEMBLY PROCEDURE

TOOLS: Turret race lifting eye bolt (NSN 5306-00-699-1282) (three)
Hoist, 5 ton capacity
1/2" drive ratchet
9/16" socket (1/2" drive)
1/2" drive torque wrench (0 to 250 foot-pounds)
Slip joint pliers with cutter
1" brush (three)
Diagonal cutting pliers
1/4" flat tip screwdriver
Spring scale

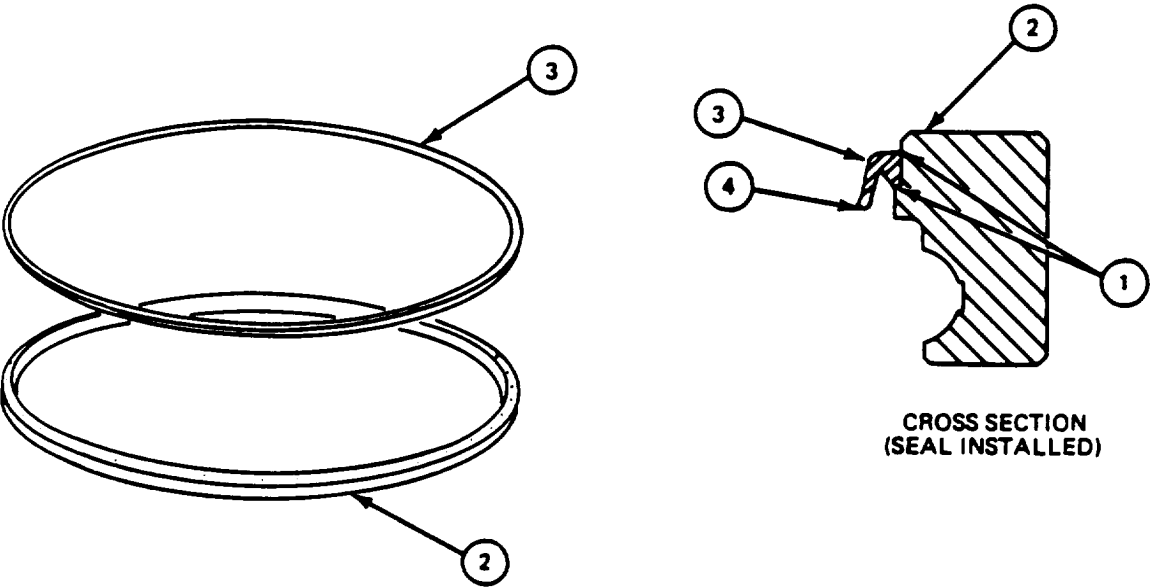
SUPPLIES: Ball race seal
Adhesive (item 4, App. A)
Grease (item 12, App. A)
Lockwire
Silicone compound (item 9, App. A)
Clean rags (item 21, App. A)

PERSONNEL: Three

REFERENCES: JPG for procedures to
Apply adhesive
Apply grease
Install lockwire
Apply silicone compound
Use spring scale
Use torque wrench
LO 9-2350-222-12 for procedure to lubricate turret race ring

PRELIMINARY PROCEDURES: Inspect turret race ring springs (para 17-2)

17-7. TURRET RACE RING ASSEMBLY PROCEDURE (CONT)

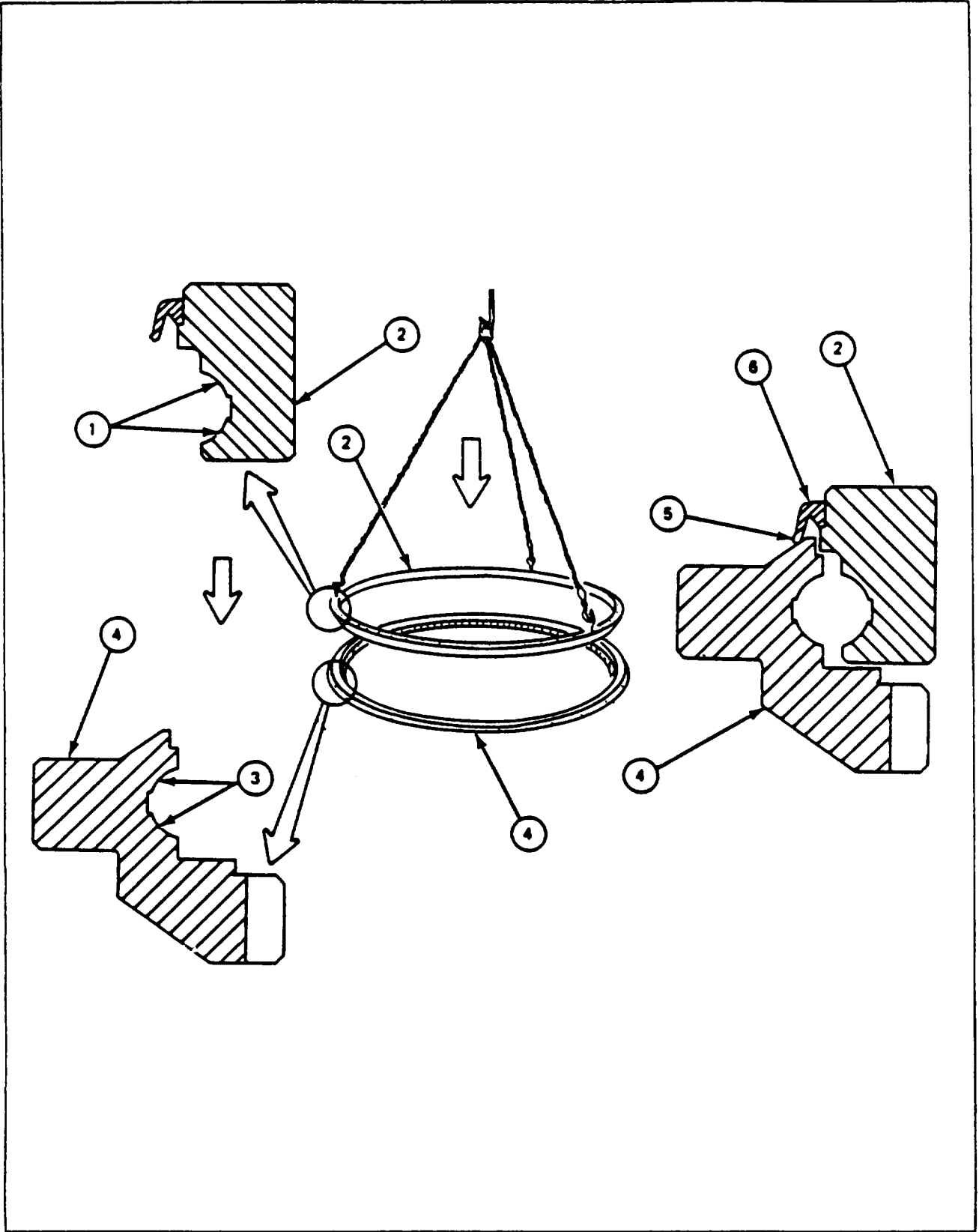
FRAME 1	Step Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">If seal on inner race was not removed, go to frame 2.</p> <p>Using brush, put adhesive on groove (1) around outside of inner race (2) (JPG).</p> <p>Using brush. put adhesive on inner surface of seal (3) that fits in groove (1) of inner race (2) (JPG).</p> <p style="text-align: center;">CAUTION</p> <p style="text-align: center;">When installing seal (3) on inner race (2), make sure that skirt (4) of seal hangs down.</p> <p>Put seal (3) on inner race (2). Make sure seal fits groove (1) evenly all the way around inner race.</p> <p>After adhesive has set, check seal (3). Using spring scale, seal must withstand a pull on skirt (4) of seal (3) (of five pounds) at any point without pulling away from inner race (2).</p> <p>GO TO FRAME 2</p>
	 <p style="text-align: center;">CROSS SECTION (SEAL INSTALLED)</p>

17-7. TURRET RACE RING ASSEMBLY PROCEDURE (CONT)

FRAME 2	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Three eyebolts (1) must be evenly spaced (every 12 holes) around inner race (2).</p> <ol style="list-style-type: none"> 1. Put three eyebolts (1) in three threaded holes in inner race (2). 2. Using hoist, lower hoist hook (3) and put sling (4) on hoist hook. 3. Position hoist hook (3) over center of inner race (2) and put three hooks of sling (4) through three eyebolts (1). 4. Raise inner race off work surface to about waist high. <p>GO TO FRAME 3</p>
	<p>The diagram illustrates the assembly procedure. It shows a circular inner race (2) with three eyebolts (1) attached to its outer edge. A hoist hook (3) is positioned above the center of the race, and a sling (4) is attached to the hoist hook and passes through the three eyebolts (1).</p>

17-7. TURRET RACE RING ASSEMBLY PROCEDURE (CONT)

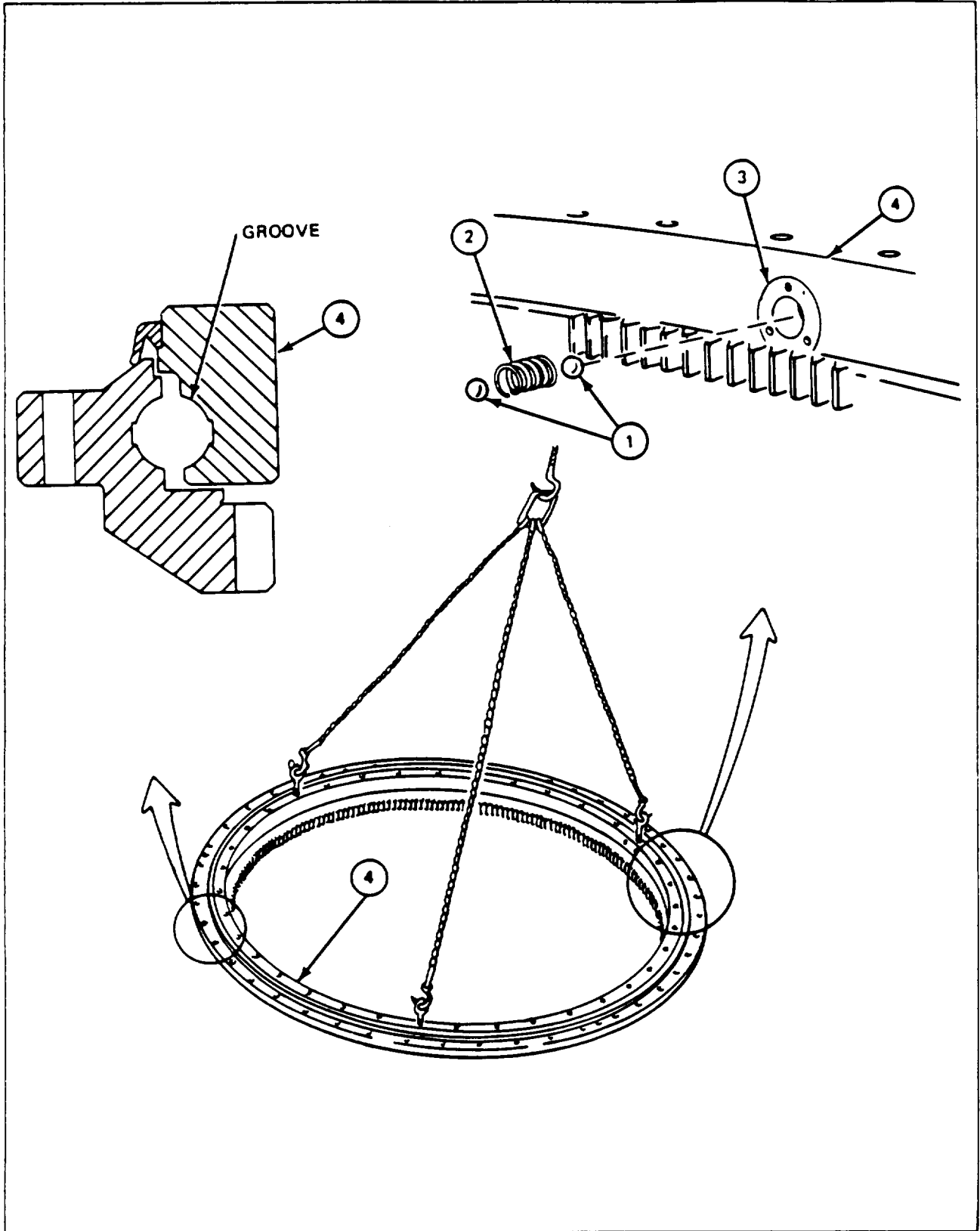
FRAME 3	
Step	Procedure
	NOTE
	Grease should be applied in a light even coat.
1.	Using brush, coat ball race (1) of inner race (2) with grease (JPG).
	NOTE
	Outer race may be in hull or on three wood blocks.
2.	Using brush, coat ball race (3) of outer race (4) with grease (JPG).
3.	Using hoist, position hoist with inner race (2) over outer race (4).
	CAUTION
	Do not allow skirt (5) of seal (6) to get caught between inner and outer race. Seal may be cut or damaged.
4.	Carefully lower inner race (2) into outer race (4). Do not lower inner race completely. Try to keep a small amount of clearance.
5.	Check skirt (5) of seal (6) all around to make sure skirt is on top of outer race (4).
	GO TO FRAME 4



17-7. TURRET RACE RING ASSEMBLY PROCEDURE (CONT)

FRAME 4

Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 	<p>Using hands, coat ball bearing (1) with grease (JPG).</p> <p>Using hands. coat spring (2) with grease (JPG).</p> <p>Put ball bearing (1) into access hole (3) in inner race (4).</p>
<p>NOTE</p> <p>Inner race may have to be lifted, with hoist slightly to make it easier to put ball bearing in groove between inner and outer race.</p>	
<ol style="list-style-type: none"> 4. 5. 6. 	<p>Using hands, put ball bearing (1) into groove and move to left of access hole (3).</p> <p>Put spring (2) into access hole (3) in inner race (4).</p> <p>Using hands, turn spring (2) so that coil of spring lies along groove and move to left of access hole (3).</p>
<p>CAUTION</p> <p>Count each ball bearing and spring as they are put in. Turret could jam if wrong number of ball bearings or springs are put in. Make sure there is only one spring between two ball bearings. It may be necessary to use screwdriver to push springs to one side when putting in last ball bearing.</p>	
<ol style="list-style-type: none"> 7. 	<p>Repeat steps 1 through 6 for either 179 more ball bearings (1) and springs (2) or 167 more oversized ball bearings (1) and springs (2) for turret race ring assemblies stamped with "OSB", by the part number.</p> <p>GO TO FRAME 5</p>

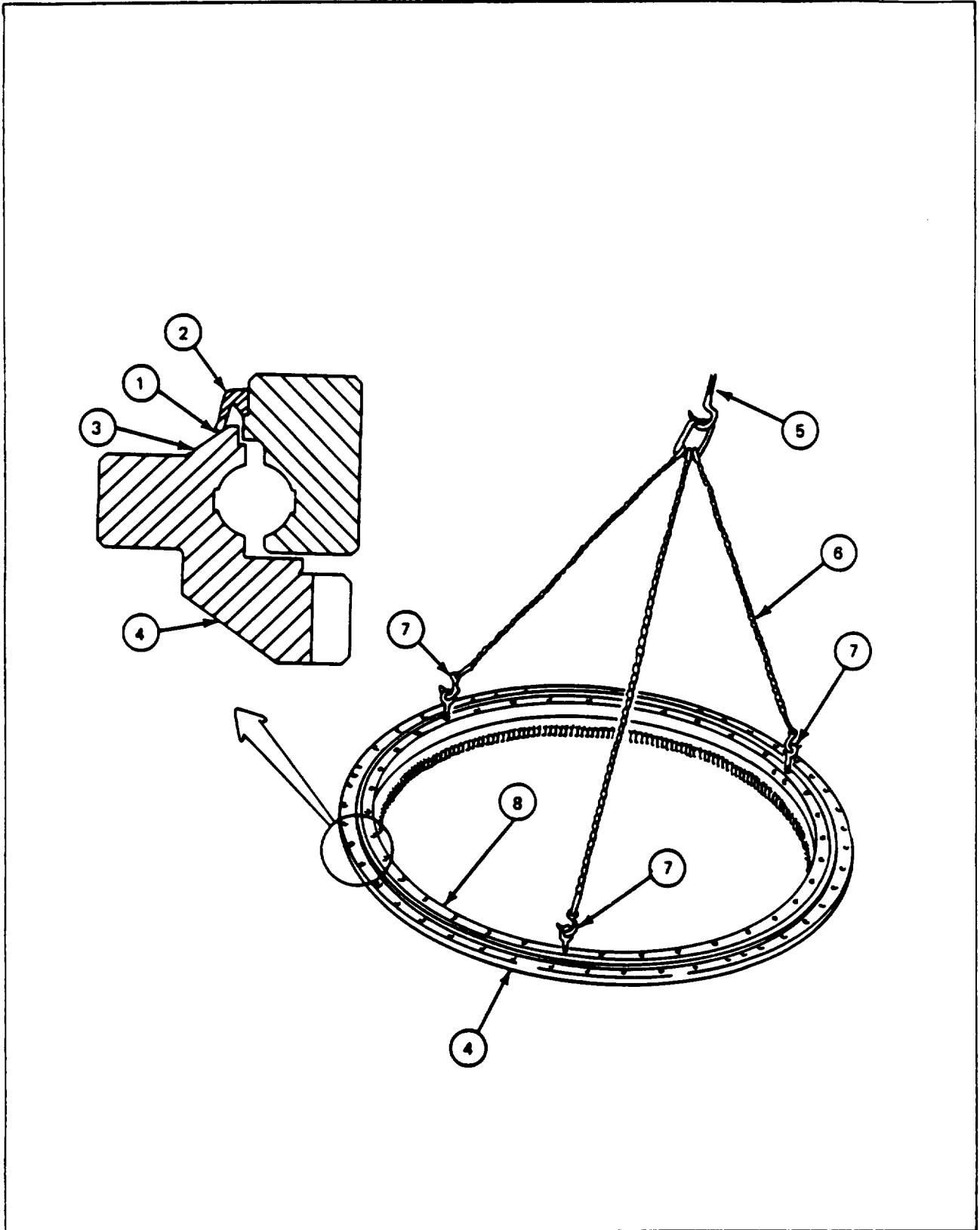


17-7. TURRET RACE RING ASSEMBLY PROCEDURE (CONT)

FRAME 5	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 4. 5. 6. 	<p>Using hands, coat small end of plug (1) with grease (JPG).</p> <p>Put plug (1) into access hole (2) of inner race (3). Push plug in until seated.</p> <p>Put three screws (4) in three holes of plug (1) without threads.</p> <p>Using socket wrench, tighten screws (4).</p> <p>Using torque wrench, torque three screws (4) to between 25 and 30 foot-pounds (JPG).</p> <p>Using slip joint and cutting pliers, install lockwire (5) through lockwire holes in three screws (4) (JPG).</p> <p>GO TO FRAME 6</p>

17-7. TURRET RACE RING ASSEMBLY PROCEDURE (CONT)

FRAME 6	
Step	Procedure
1.	Lift skirt (1) of seal (2) slightly. Using brush, put silicone compound on outer surface (3) of outer race (4) (under skirt of seal) (JPG). Put compound all around outer race.
2.	Lubricate turret race ring (LO).
3.	Using hoist, lower hoist hook (5) and remove three hooks of sling (6) from three eye bolts (7).
4.	Remove sling (6) from hoist hook (5).
5.	Move hoist out of way.
6.	Check that inner race (8) turns freely in both directions.
NOTE	
If race ring was assembled on hull, do step 7.	
7.	Remove three eyebolts (7) from inner race (8).
END OF TASK	



CHAPTER 18
TURRET TRAVERSING MECHANISM

Section 1. SCOPE

18-1. LIST OF EQUIPMENT ITEMS CONTAINED IN THIS CHAPTER

Section	Equipment Item	Paragraph
2	Turret Traversing Mechanism	18-2
3	No-bak	18-7
4	Clutch	18-23
5	Hydraulic Motor	18-37
6	Traversing Gear Box	18-49

Section 2. TURRET TRAVERSING MECHANISM

18-2. MAINTENANCE PROCEDURES INDEX

Equipment Item	Tasks			
	Removal	Installation	Disassembly	Assembly
Turret Traversing Mechanism	18-3	184	18-5	18-6

Para 18-2

18-2

18-3. TURRET TRAVERSING MECHANISM REMOVAL PROCEDURE

TOOLS: 7/8" combination wrench
 5/8" combination wrench
 11/16" combination wrench
 13/16" combination wrench
 3/4" socket (1/2" drive)
 1-1/8" socket (1/2" drive)
 8" extension (1/2" drive)
 1/2" drive ratchet
 1/2" drive hinged handle
 1" combination wrench
 Hoist
 Lifting sling (NSN 4910-00-708-3778)

SUPPLIES: Oil container (2 quart minimum)
 Rags (Item 21, App. A)
 Caps for hydraulic fittings
 Plugs for hydraulic lines

PERSONNEL: Two

REFERENCES: JPG for procedure to disconnect electrical connectors
 TM 9-2350-222-20-2-3 for procedures to:
 Remove commander's control
 Lower hydraulic pressure
 TM 9-2350-222-10 for procedures to:
 Traverse turret
 Traverse cupola
 Set turret traverse lock to LOCKED

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Turret Traversing Mechanism	FO-2	12
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7

EQUIPMENT CONDITION: Commander's control removed (TM-20-2-3)
 Hand traversing drive removed (TM-20-2-3)
 Driver's master control panel MASTER BATTERY switch set to OFF
 Turret traverse lock set to UNLOCKED

GENERAL INSTRUCTIONS:

CAUTION

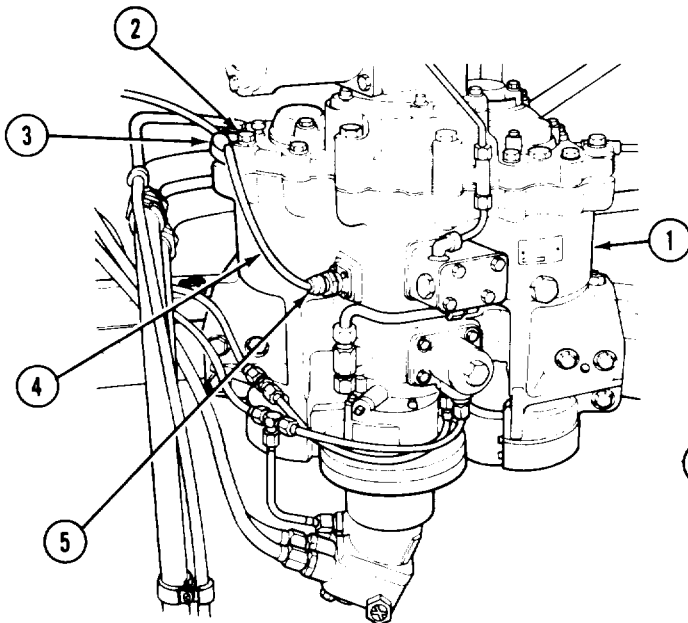
Keep dirt from getting in tubing or parts. Dirt can damage equipment.

NOTE

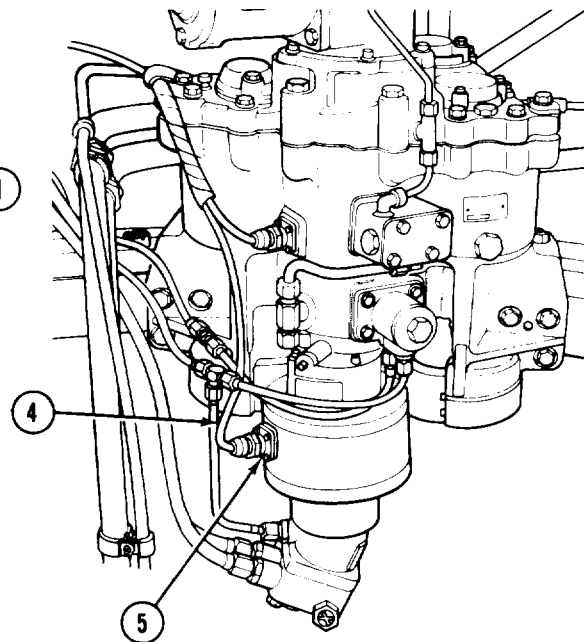
Use container and rags for oil spillage.

18-3. TURRET TRAVERSING MECHANISM REMOVAL PROCEDURE (CONT)

FRAME 1	
STEP	PROCEDURE
1.	Traverse turret until traversing mechanism (1) can be reached from driver's compartment (TM-10).
2.	Set turret traverse lock to LOCKED (TM-10).
<div style="border: 1px solid black; padding: 5px; display: inline-block;">WARNING</div> <p>Before removing hydraulic tubes or parts, hydraulic system pressure must be lowered to 0 psi. Hydraulic fluid under pressure can hurt you.</p>	
3.	Lower hydraulic system pressure to 0 psi (TM-20-2-3).
4.	Using 5/8 inch wrench, remove screw (2) that attaches clamp (3) securing wiring harness (4) to traversing mechanism (1). Remove clamp from screw.
5.	Using hands, put screw (2) in traversing mechanism (1). Do not tighten.
6.	Using 1 inch wrench, disconnect wiring harness (4) from magnetic brake connectors (5) (JPG). Place wiring harness away from traversing mechanism (1).
GO TO FRAME 2	



EARLY MODEL

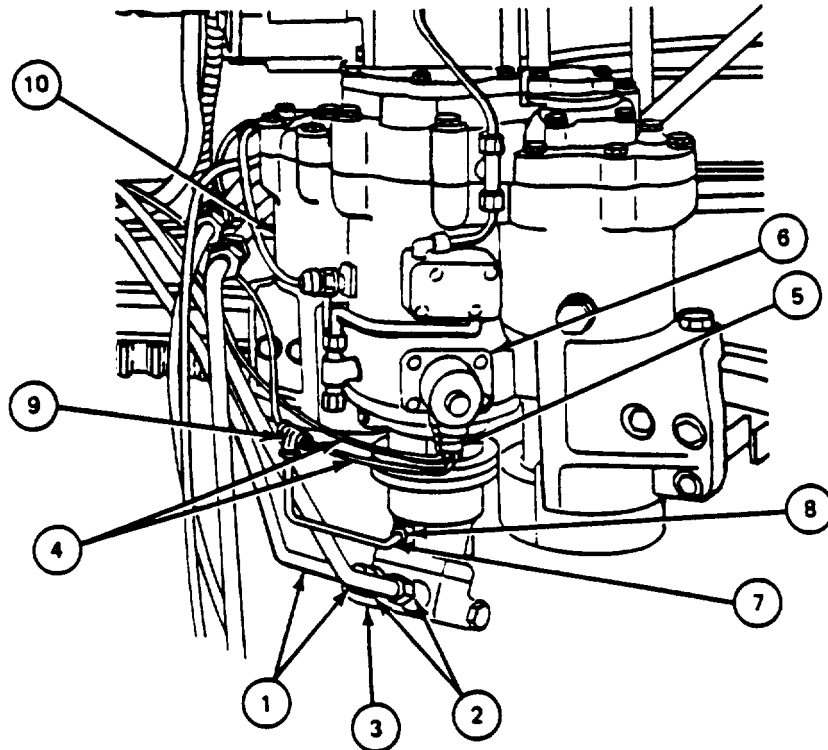


LATE MODEL

18-3. TURRET TRAVERSING MECHANISM REMOVAL PROCEDURE (CONT)

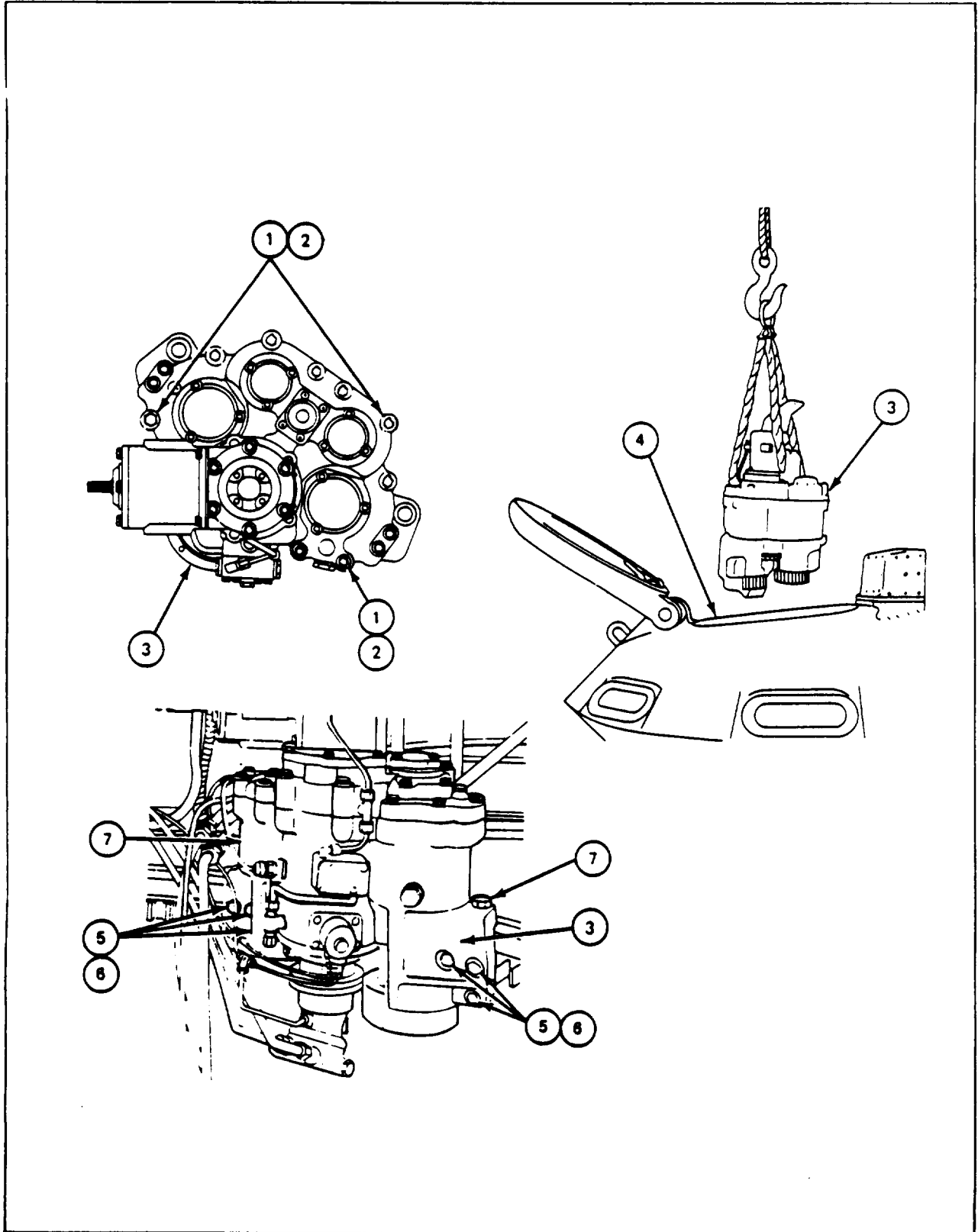
FRAME 2

Step	Procedure
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do not remove adapters or tees during tube removal.</p> <ol style="list-style-type: none"> 1. Using 7/8" and 1" wrenches, disconnect two tubes (1) from two adapters (2) on hydraulic motor (3). 2. Using 11/16" and 5/8" wrenches, disconnect two tubes (4) from two adapters (5) on pinlock (6). 3. Using 5/8" and 13/16" wrenches, disconnect tube (7) from adapter (8) on hydraulic motor (3). 4. Using 5/8" wrench, loosen tube (7) from tee (9) and swing tube away from traversing mechanism (10). <p>GO TO FRAME 3</p>	



18-3. TURRET TRAVERSING MECHANISM REMOVAL PROCEDURE (CONT)

FRAME 3	
Step	Procedure
1.	Using 5/8" wrench, remove three screws (1) and three lockwashers (2) from traversing mechanism (3).
2.	Using 5/8" wrench, attach lifting sling to traversing mechanism (3) with three screws (1).
3.	Traverse cupola until cupola machine gun cradle is in direction of loader's hatch (TM-10).
4.	Using hoist attached to sling through commander's hatch (4), take up slack in sling.
5.	Using 3/4" socket wrench, remove six screws (5) and six lockwashers (6) that attach traversing mechanism (3) to turret.
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <p>WARNING</p> </div> <p style="text-align: center;">Traversing mechanism is heavy enough to hurt you and damage equipment Traversing mechanism may swing toward rear of turret. Let hoist support traversing mechanism and use hands to guide it.</p>	
6.	Using 1-1/8" socket with extension and hinge handle, remove two bolts (7) that attach traversing mechanism (3) to turret.
7.	Soldier A: Operate hoist while soldier B guides traversing mechanism (3) through commander's hatch (4) and removes traversing mechanism from turret.
GO TO FRAME 4	



18-3. TURRET TRAVERSING MECHANISM REMOVAL PROCEDURE (CONT)

FRAME 4	
Step	Procedure
1.	Put traversing mechanism (1) on work surface and remove hoist.
2.	Using 5/8" wrench, remove three screws (2) and three lockwashers (3) that attach lifting sling. Remove sling.
3.	Using 5/8" wrench, install three screws (2) and three lockwashers (3) in traversing mechanism (1).
	END OF TASK

The diagram illustrates the removal of a hoist from a traversing mechanism. A hoist is suspended by a hook and a lifting sling. The mechanism is labeled (1). The sling is attached to the mechanism with screws (2) and lockwashers (3). The mechanism is shown being lowered from a work surface.

18-4. TURRET TRAVERSING MECHANISM INSTALLATION PROCEDURE

TOOLS: 1" combination wrench
 5/ 8" combination
 1-1/8" socket (3/4" drive)
 13/16" combination wrench
 Hoist
 Lifting sling (NSN 4910-00-708-3778)
 8" extension (3/4" drive)
 3/4" socket (1/2" drive)
 11/ 16" combination wrench
 External retaining ring pliers
 5/16" socket wrench (3/8" drive)
 3/8" drive ratchet
 7/8" combination wrench
 1/2" drive ratchet
 3/4" drive torque wrench (0-420 foot-pounds)

SUPPLIES: Oil container (2 quart minimum)
 Rags (Item 21, App. A)
 Viscous, coating (11663357)

PERSONNEL: Two

REFERENCES: JPG for procedures to:
 Use retaining ring pliers
 Connect electrical connectors
 TM 9-2350-222-20-2-3 for procedures to:
 Install hand traversing drive
 Install commander's control
 Adjust anti-backlash mechanism
 LO 9-2350-222-12 for procedure to add oil
 TM 9-2350-222-10 for procedure to traverse turret

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Turret Traversing Mechanism	FO-2	12
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
 Turret traverse lock set to LOCKED

PRELIMINARY PROCEDURES: Assemble turret traversing mechanism (para 18-6)

18-4. TURRET TRAVERSING MECHANISM INSTALLATION PROCEDURE (CONT)

GENERAL INSTRUCTIONS

CAUTION

Keep dirt from getting in tubing or parts. Dirt can damage equipment.

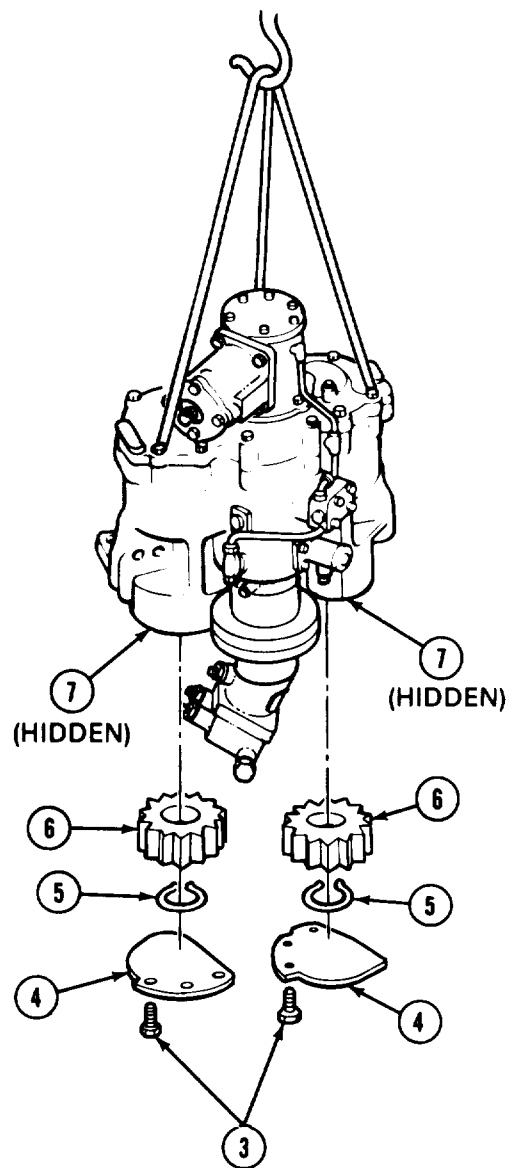
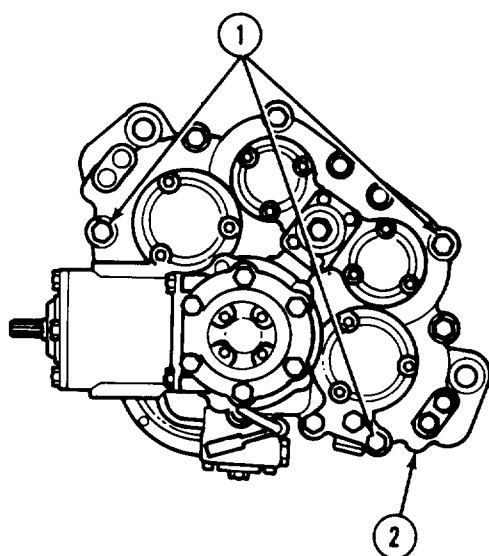
NOTE

Use container and rags for oil spillage. For traversing gear box to work properly, part numbers of clutch, no-bak, traversing gear box and hand traversing drive must match part numbers as follows:

Traversing Gear Box	Clutch	No-bak	Hand Traversing Drive
7739314	10951650	10951651	10911418

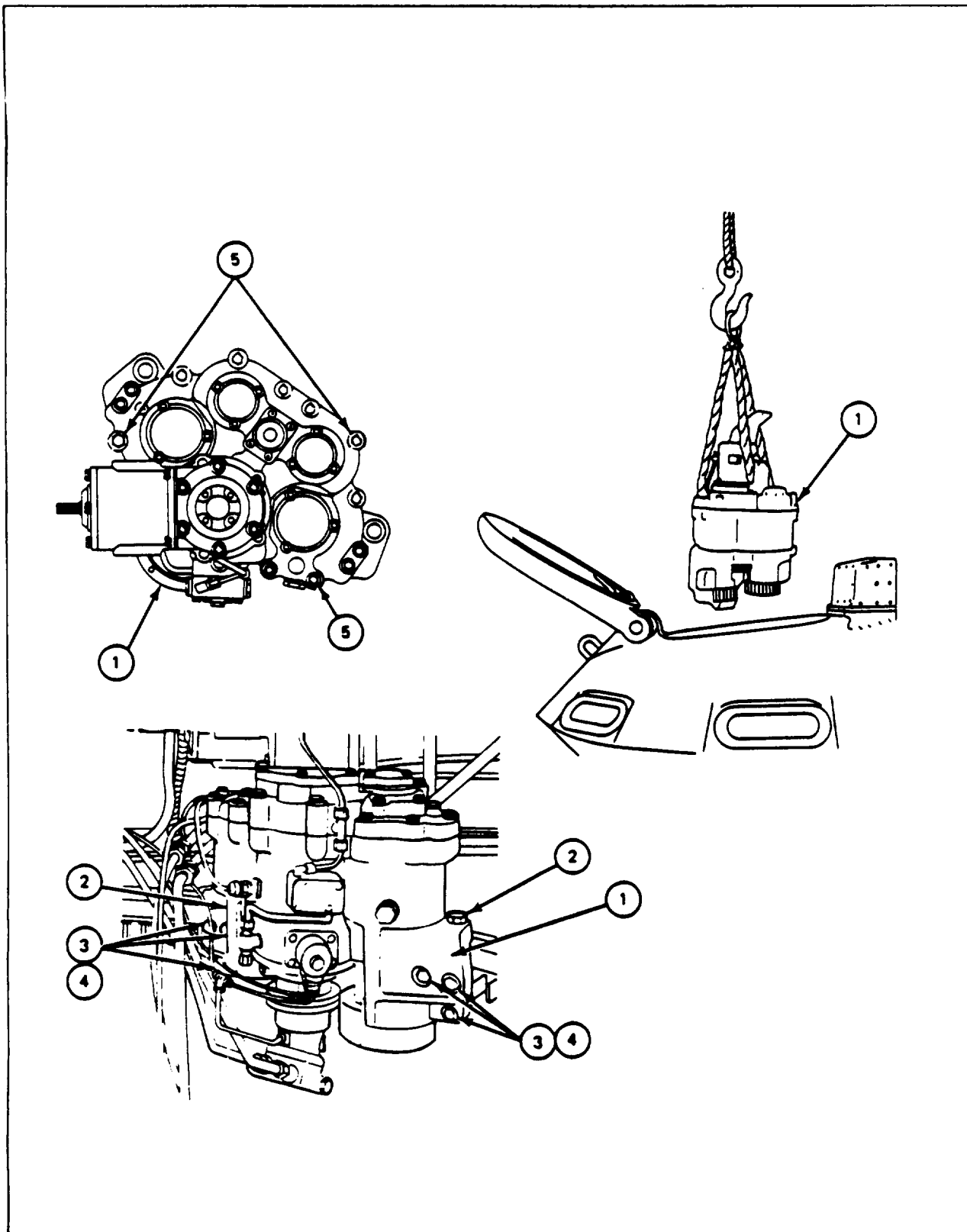
18-4. TURRET TRAVERSE MECHANISM INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Using 5/8" wrench, remove three screws (1) on traversing mechanism (2).
2.	Using 5/8" wrench, attach lifting sling to traversing mechanism (2) with three screws (1).
NOTE	
Traversing mechanism (2) is outside of vehicle. Two drive pinions (6) must be removed to aid installation of traversing mechanism.	
3.	Using 5/16" socket wrench, remove six screws (3) that attach two guard plates (4) to gear box (2). Remove two guard plates (4).
4.	Using pliers, remove two retaining rings (5) that attach two drive pinions (6) to two shafts (7) (JPG). Remove two drive pinions.
GO TO FRAME 2	

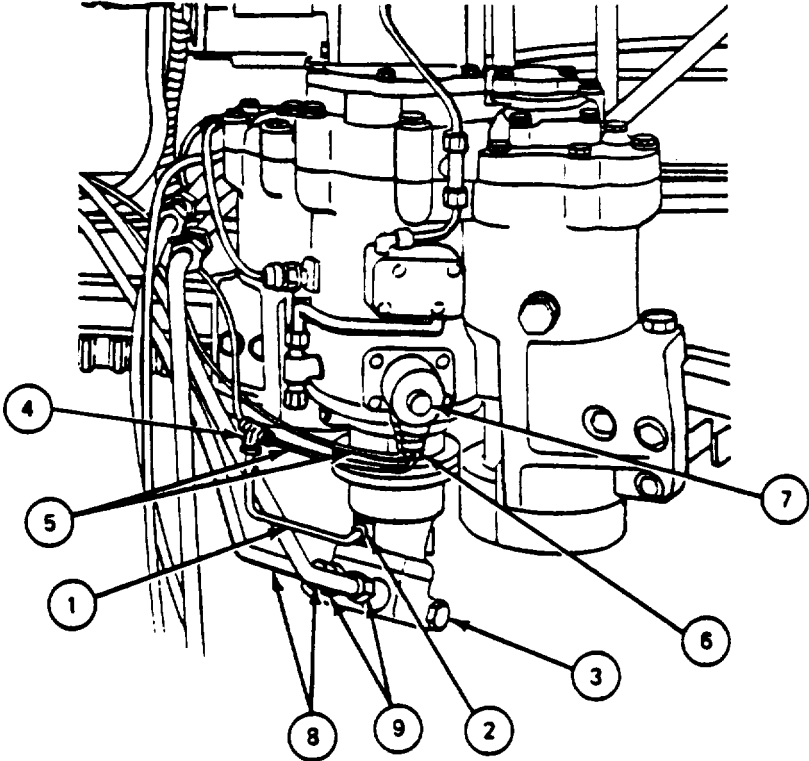


18-4. TURRET TRAVERSING MECHANISM INSTALLATION PROCEDURE (CONT)

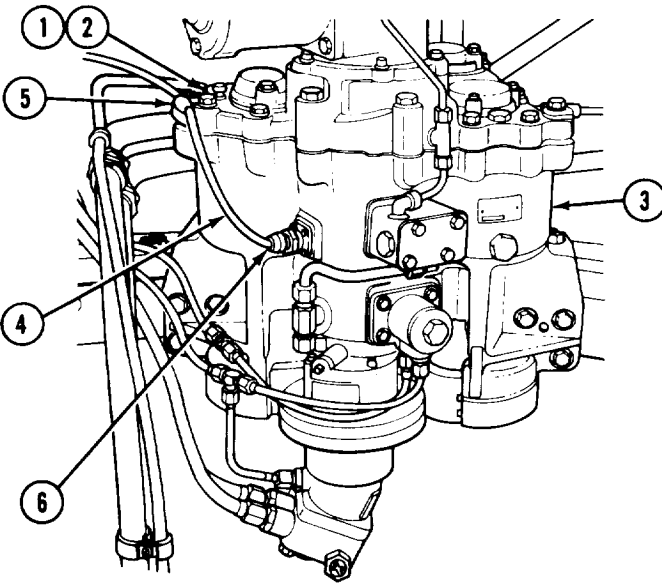
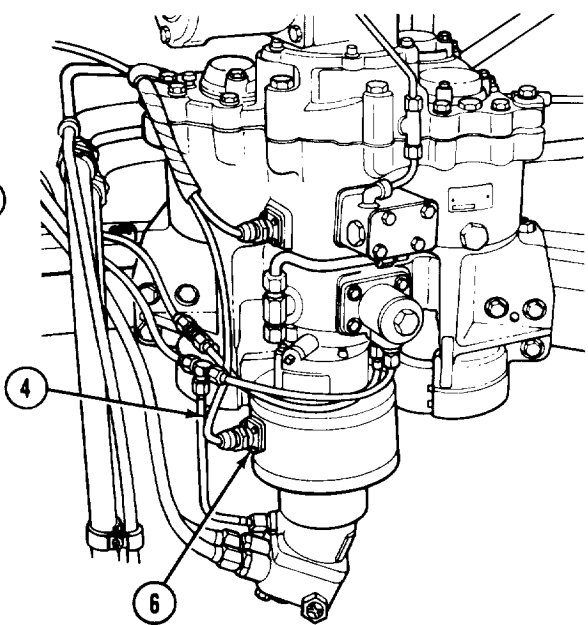
FRAME 2	
STEP	PROCEDURE
	<div style="border: 1px solid black; padding: 2px; display: inline-block;">WARNING</div> <p>Traversing mechanism (1) is heavy enough to hurt you and damage equipment.</p>
1.	Soldier A: Using hoist attached to sling, take up slack in sling and lift traversing mechanism (1).
2.	Soldier B: Guide traversing mechanism (1) through commander's hatch. Put traversing mechanism (1) on turret ring.
	<p>NOTE</p> <p>Bolts (2) must be free of grease and oil prior to applying coating.</p>
3.	Apply coating (item 8, App. A) to approximately 80% of threads of two bolts (2).
4.	Using 1-1/8 inch socket, extension, and torque wrench, attach traversing mechanism (1) to turret with two bolts (2) and torque bolts to between 300 and 350 foot-pounds.
5.	Using 3/4 inch socket wrench, attach traversing mechanism (1) to turret with six screws (3) and six lockwashers (4).
6.	Using 5/8 inch wrench, remove three screws (5) that attach lifting sling to traversing mechanism (1). Remove lifting sling and hoist.
7.	Using 5/8 inch wrench, put three screws (5) in traversing mechanism (1).
	GO TO FRAME 3



18-4. TURRET TRAVERSING MECHANISM INSTALLATION PROCEDURE (CONT)

FRAME 3	Step	Procedure
		<div style="text-align: center; border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;"> CAUTION </div> <p style="text-align: center;">Align and start all hydraulic tubes using hands to avoid cross threading.</p> <ol style="list-style-type: none"> 1. Using 5/8" and 13/16" wrenches, put tube (1) on adapters (2) of hydraulic motor (3). 2. Using 5/8" wrench, tighten tube (1) at tee (4). 3. Using 5/8" and 11/16" wrenches, put two tubes (5) on two adapters (6) of pinlock (7). 4. Using 7/8" wrench and 1" wrench, put two tubes (8) on two adapters (9) of (6) of pinlock (7). <p>GO TO FRAME 4</p>
		

18-4. TURRET TRAVERSING MECHANISM INSTALLATION PROCEDURE (CONT)

FRAME 4	
STEP	PROCEDURE
<ol style="list-style-type: none"> 1. 2. 3. 	<p>Using 5/8 inch wrench, remove screw (1) with washer (2) from traversing mechanism (3).</p> <p>Using 5/8 inch wrench, put wiring harness (4) with clamp (5) on traversing mechanism (3) using screw (1) and washer (2).</p> <p>Using 1 inch wrench, connect wiring harness (4) to magnetic brake connectors (6) (JPG).</p> <p style="text-align: center;">NOTE</p> <p>Drive pinions removed in frame 1 will be installed during anti-backlash mechanism adjustment.</p> <p>Follow-on Maintenance Action Required:</p> <p>Install hand traversing drive (TM-20-2-3). Install commander's control (TM-20-2-3). Perform traversing gearbox anti-backlash adjustment (TM-20-2-3). Fill powerpack to proper level (LO). Traverse turret three times to bleed air from system (TM-10). Traverse turret in power mode to make sure turret traversing mechanism is operating properly (TM-10).</p> <p>END OF TASK</p>
 <p>EARLY MODEL</p>	 <p>LATE MODEL</p>

18-5. TURRET TRAVERSING MECHANISM DISASSEMBLY PROCEDURE

PERSONNEL: One

REFERENCES: TM 9-2350-222-20-2-3 for procedures to:
 Remove no-bak
 Remove pinlock
 Disassemble pinlock

PRELIMINARY PROCEDURES: Remove turret traversing mechanism (para 18-3)

FRAME 1	
STEP	PROCEDURE
1.	Remove no-bak (TM-20-2-3).
2.	Disassemble no-bak (para 18-10).
3.	Remove clutch (para 18-26).
4.	Disassemble clutch (para 18-28).
5.	Remove hydraulic motor (para 18-40).
5.1	Remove brake adapter assembly (late model) (para 18-43.1).
5.2	Disassemble brake adapter assembly (late model) (para 18-43.3).
6.	Remove hydraulic motor adapter (para 18-45).
7.	Disassemble hydraulic motor (para 18-42).
8.	Disassemble hydraulic motor adapter (para 18-47).
9.	Remove pinlock (TM-20-2-3).
10.	Disassemble pin lock (TM-20-2-3).
11.	Disassemble traversing gearbox (para 18-52).
	END OF TASK

18-6. TURRET TRAVERSING MECHANISM ASSEMBLY PROCEDURE

PERSONNEL: One

REFERENCES: TM 9-2350-22-20-2-3 for procedures to:
 Assemble pinlock
 Install pinlock
 Install no-bak

FRAME 1	
STEP	PROCEDURE
1.	Assemble traversing gearbox (para 18-53).
2.	Assemble pinlock (TM-20-2-3).
3.	Install pinlock (TM-20-2-3).
4.	Assemble hydraulic motor adapter (para 18-48).
5.	Assemble hydraulic motor (para 18-43).
5.1	Assemble brake adapter assembly (late model) (para 18-43.5).
5.2	Install brake adapter assembly (late model) (para 18-43.2).
6.	Install hydraulic motor adapter (para 18-46).
7.	Install hydraulic motor (para 18-41).
8.	Assemble clutch (para 18-29).
9.	Install clutch (para 18-27).
10.	Assemble no-bak (para 18-11).
11.	Install no-bak (TM-20-2-3).
	END OF TASK

Section 3. NO-BAK

18-7. MAINTENANCE PROCEDURES INDEX

	Equipment Item	Inspection	Test	Tasks			
				Removal	Installation	Assembly	Repair
1.	No-bak	18-8	18-9	...	...	18-11	...
2.	Cover	...	...	18-12	18-13	18-15	...
3.	Bevel Gear	...	...	18-16	18-17	...	18-18
3.1	Bevel Gear Assembly	...	...	18-18.1	18-18.2	...	18-18.3
4.	Housing	...	...	18-16	18-17	...	...
5.	Shaft Coupling	...	...	18-21	18-22	18-22	...

18-8. NO-BAK INSPECTION PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Disassemble no-bak as required (para 18-10)

GENERAL INSTRUCTIONS:

NOTE

If part is bad, order repair part or next higher assembly as required.

a. Bevel Gear Assembly

FRAME 1	
STEP	PROCEDURE
1.	Check bevel gear assembly (1) for presence of plug (2). If plug (2) is missing, install plug (2) (para 18-18). GO TO FRAME 2

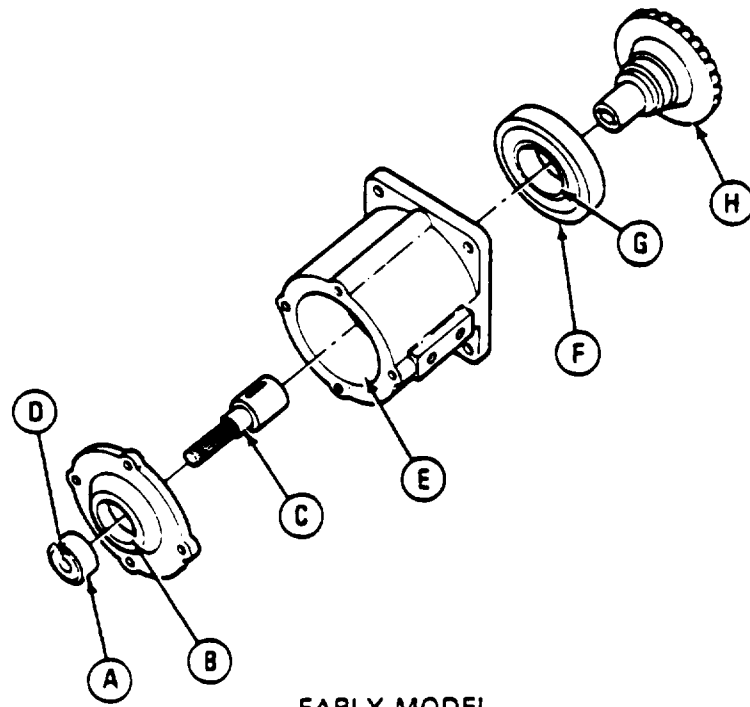
EARLY MODEL

LATE MODEL

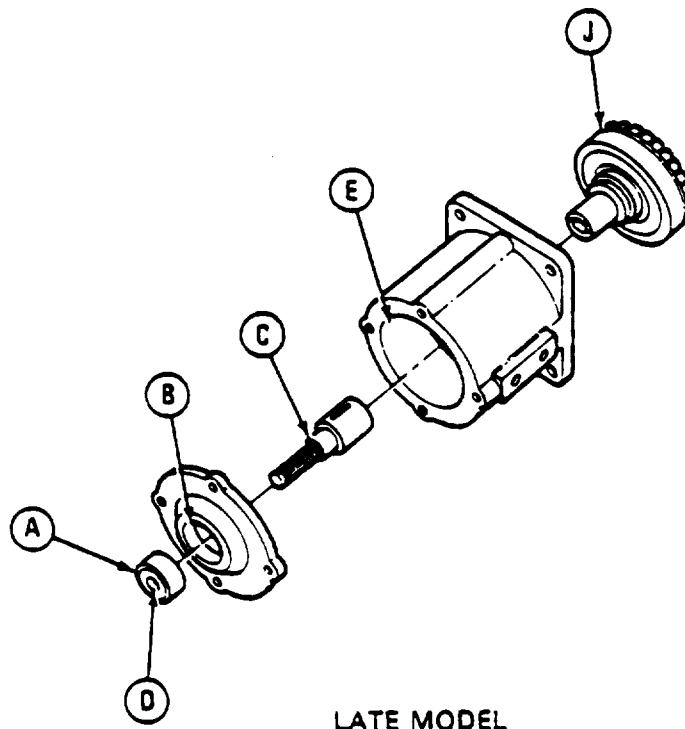
18.8. NO-BAK INSPECTION PROCEDURE (CONT)

b. Cover, Housing, and Bevel Gear Assembly

FRAME 2																															
STEP	PROCEDURE																														
	SUPPORT SHOP WORK																														
1.	Take one bearing, cover, housing, shaft, and bevel gear assembly to shop where inspection equipment is available.																														
2.	Make dimensional check.																														
	<table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Reference Letter</th> <th style="text-align: center;">Point of Measurement</th> <th style="text-align: center;">Measurement</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td>OD of bearing</td> <td style="text-align: center;">1.5745 to 1.5748</td> </tr> <tr> <td style="text-align: center;">B</td> <td>ID of housing cover bore</td> <td style="text-align: center;">1.5757 to 1.5753</td> </tr> <tr> <td style="text-align: center;">C</td> <td>OD of shaft shoulder</td> <td style="text-align: center;">0.6692 to 0.6695</td> </tr> <tr> <td style="text-align: center;">D</td> <td>ID of bearing</td> <td style="text-align: center;">0.6690 to 0.6693</td> </tr> <tr> <td style="text-align: center;">E</td> <td>ID of housing</td> <td style="text-align: center;">3.1496 to 3.1503</td> </tr> <tr> <td style="text-align: center;">F</td> <td>OD of bearing</td> <td style="text-align: center;">3.1491 to 3.1496</td> </tr> <tr> <td style="text-align: center;">G</td> <td>ID of bearing</td> <td style="text-align: center;">1.5743 to 1.5748</td> </tr> <tr> <td style="text-align: center;">H</td> <td>OD of bevel gear shoulder</td> <td style="text-align: center;">1.5749 to 1.5753</td> </tr> <tr> <td style="text-align: center;">J</td> <td>OD of bearing</td> <td style="text-align: center;">3.1491 to 3.1496</td> </tr> </tbody> </table>	Reference Letter	Point of Measurement	Measurement	A	OD of bearing	1.5745 to 1.5748	B	ID of housing cover bore	1.5757 to 1.5753	C	OD of shaft shoulder	0.6692 to 0.6695	D	ID of bearing	0.6690 to 0.6693	E	ID of housing	3.1496 to 3.1503	F	OD of bearing	3.1491 to 3.1496	G	ID of bearing	1.5743 to 1.5748	H	OD of bevel gear shoulder	1.5749 to 1.5753	J	OD of bearing	3.1491 to 3.1496
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J	OD of bearing	3.1491 to 3.1496																													
	NOTE																														
	Tag parts that are out of tolerance																														
3.	After support shop work, return all parts to turret shop.																														
	END OF TASK																														



EARLY MODEL



LATE MODEL

18-9. NO-BAK TORQUE TEST PROCEDURE

TOOLS: 1/2" drive torque wrench (0-50 inch-pounds)
 Torque socket (NSN 5120-00-627-8018)
 Vise with brass caps

PERSONNEL: One

REFERENCES: TM 9-2350-222-20-2-3 for procedure to remove no-bak

EQUIPMENT CONDITION: No-bak removed (TM-20-2-3)

PRELIMINARY PROCEDURE: Assemble no-bak (para 18-11)

FRAME 1	
Step	Procedure
1.	Clamp no-bak in bench vise
2.	Using torque wrench and special socket, apply torque to splined input shaft.
3.	The torque required to maintain motion of the splined shaft shall not vary more than 5 pound-inches (0.6 N.m) and the maximum torque shall not exceed 22 pound-inches (2.5 N.m). If these requirements are not met, replace springs in shaft coupling (para 18-21 and 18-22).
	NOTE If normal indication was obtained, no-bak is good.
	END OF TASK

18-10. NO-BAK DISASSEMBLY PROCEDURE

PERSONNEL: One

REFERENCES: TM 9-2350-222-20-2-3 for procedure to remove no-bak.

EQUIPMENT CONDITION: No-bak removed (TM-20-2-3)

FRAME 1	
STEP	PROCEDURE
1.	Remove cover (para 18-12).
2.	Remove shaft coupling (para 18-21).
3.	Remove bevel gear early model (para 18-16).
3.1	Remove bevel gear assembly late model (para 18-18.1).
4.	Disassemble cover (para 18-14).
5.	Disassemble housing (para 18-19).
	END OF TASK

18-11. NO-BAK ASSEMBLY PROCEDURE

PERSONNEL: One

FRAME 1	PROCEDURE
STEP	<ol style="list-style-type: none">1. Assemble housing (para 18-20).2. Assemble cover (para 18-15).3. Install bevel gear early model (para 18-17).3.1 Install bevel gear assembly late model (para 18-18.2).4. Install shaft coupling (para 18-22).5. Install cover (para 18-13). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required: Test no-bak (para 18-9).</p> <p>END OF TASK</p>

18-12. COVER REMOVAL PROCEDURE

TOOLS: 1/2" combination wrench
8 ounce ball peen hammer
1/2" drift pin

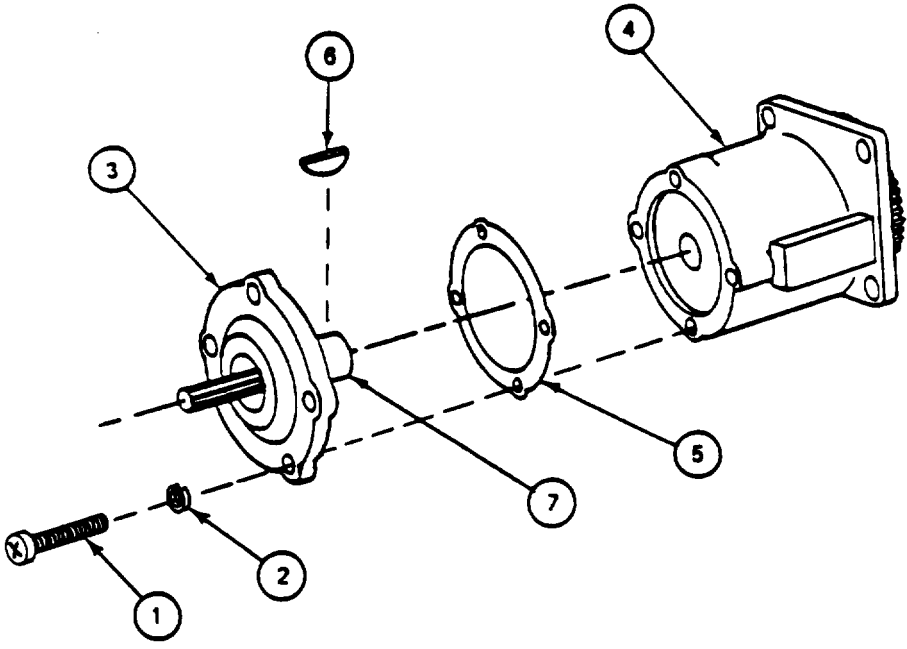
PERSONNEL: One

REFERENCES: TM 9-2350-222-20-2-3 for procedure to remove no-bak

EQUIPMENT CONDITION: No-bak removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Test no-bak (para 18-9)

FRAME 1		
Step	Procedure	
1.	Using wrench, remove four screws (1) and four lockwashers (2) that attach cover (3) to housing (4).	
2.	Using hammer and drift pin, lightly tap and remove cover (3) and shims (5).	
3.	Using hammer and drift pin, remove woodruff key (6) from shaft (7). END OF TASK	



The diagram is an exploded view of a mechanical cover assembly. It shows a central shaft (7) with a woodruff key (6) seated on it. A cover (3) is shown being removed from the shaft, with shims (5) between the cover and the housing (4). Four screws (1) and four lockwashers (2) are shown being removed from the cover. The housing (4) is shown to the right, with the cover (3) being moved away from it. The woodruff key (6) is shown being removed from the shaft (7).

18-13. COVER INSTALLATION PROCEDURE

TOOLS: Feeler gauge
1/2" socket (3/8" drive)
3/8" drive ratchet
3/8" drive torque wrench (0-150 inch-pounds)
20 ounce bell peen hammer

SUPPLIES: Shim (8734023) as required

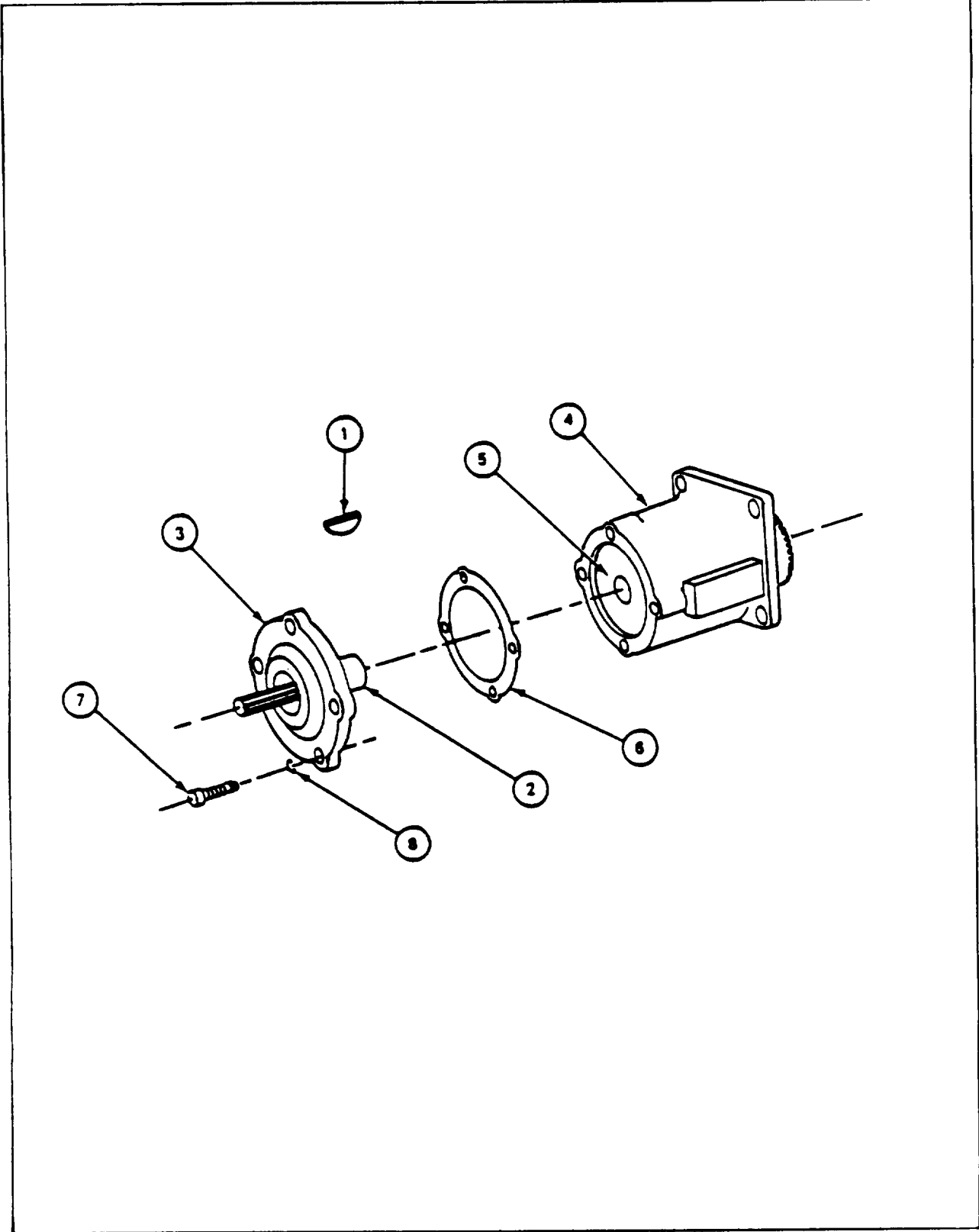
PERSONNEL: One

REFERENCES: JPG for procedure to use torque wrench.

PRELIMINARY PROCEDURES: Assemble cover (para 18-15).
Install shaft coupling (para 18-22).

18-13. COVER INSTALLATION PROCEDURE (CONT)

FRAME 1	
STEP	PROCEDURE
1.	Using hammer, put woodruff key (1) in shaft (2).
	NOTE
	Cover (3) must be shimmed to obtain between 0.005 inch end 0.010 inch end play between shaft (2) and shaft coupling (5).
2.	Put cover (3) on housing (4) with woodruff key (1) of shaft (2) in line with keyway in shaft coupling (5).
3.	Using feeler gauge, check end play between cover (3) and housing (4).
	NOTE
	If measurement obtained is between 0.005 inch and 0.010 inch, omit steps 4 and 5.
4.	Remove cover (3).
5.	Put shim (6) on housing (4) and repeat steps 2 and 3.
6.	Using socket wrench, attach cover (3) to housing (4) with four screws (7) and four lockwashers (8).
7.	Using torque wrench, torque screws (7) to between 96 and 120 inch-pounds (JPG).
	NOTE
	Follow-on Maintenance Action Required: Test no-bak (para 18-9).
	END OF TASK



18-14. COVER DISASSEMBLY PROCEDURE

TOOLS: 3/8" flat tip screwdriver
External retaining ring pliers
Plastic face hammer
Bearing puller
1/8" flat tip screwdriver
Vise with brass caps
Scraper
Stiff bristled brush
Fine stone

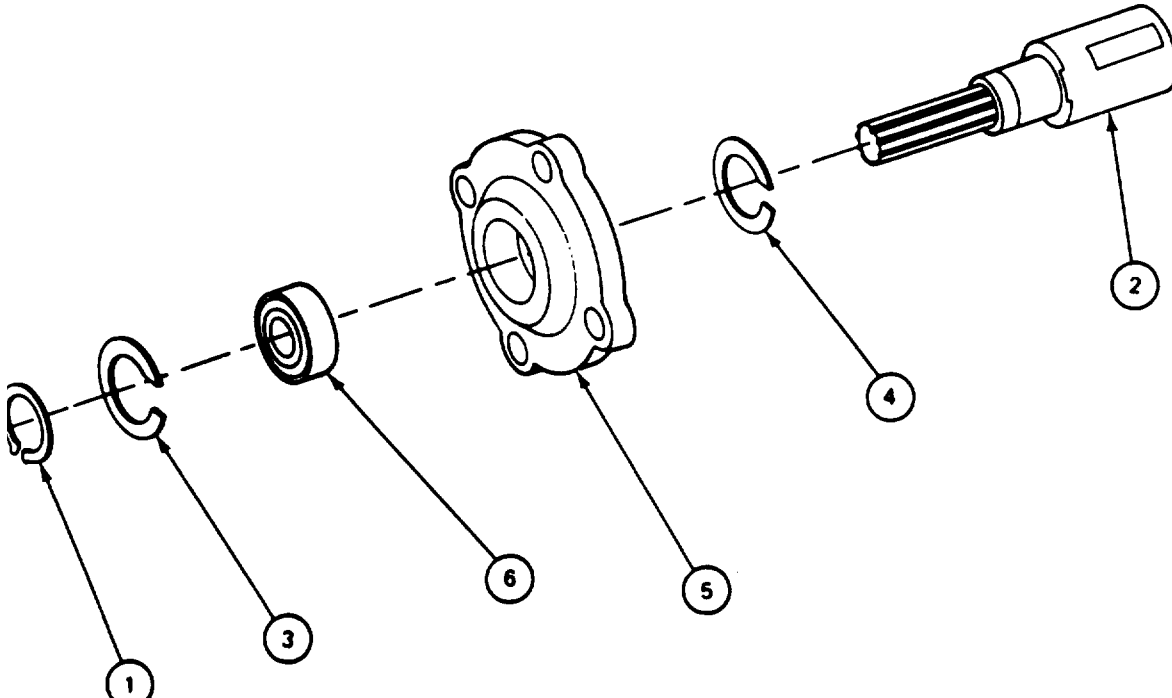
SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Use retaining ring pliers
Use bearing puller
Clean parts
Inspect and repair parts

PRELIMINARY PROCEDURES: Test no-bak (para 18-9)
Remove cover (para 18-12)

18-14. COVER DISASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">It may be necessary to put cover (5) in vise.</p> <ol style="list-style-type: none"> 1. Using pliers, remove retaining ring (1) from shaft (2) (JPG). 2. Using two screwdrivers, remove two retaining rings (3) and (4) from cover (5) 3. Using hammer, lightly tap shaft (2) and bearing (6) from cover (5). 4. Using bearing puller, remove bearing (6) from shaft (2) (JPG). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 18-8b).</p> <p>END OF TASK</p>
	

18-15. COVER ASSEMBLY PROCEDURE

TOOLS: External retaining ring pliers
1/8 flat tip screwdriver
1/4 drift pin
8 ounce ball peen hammer

PERSONNEL: One

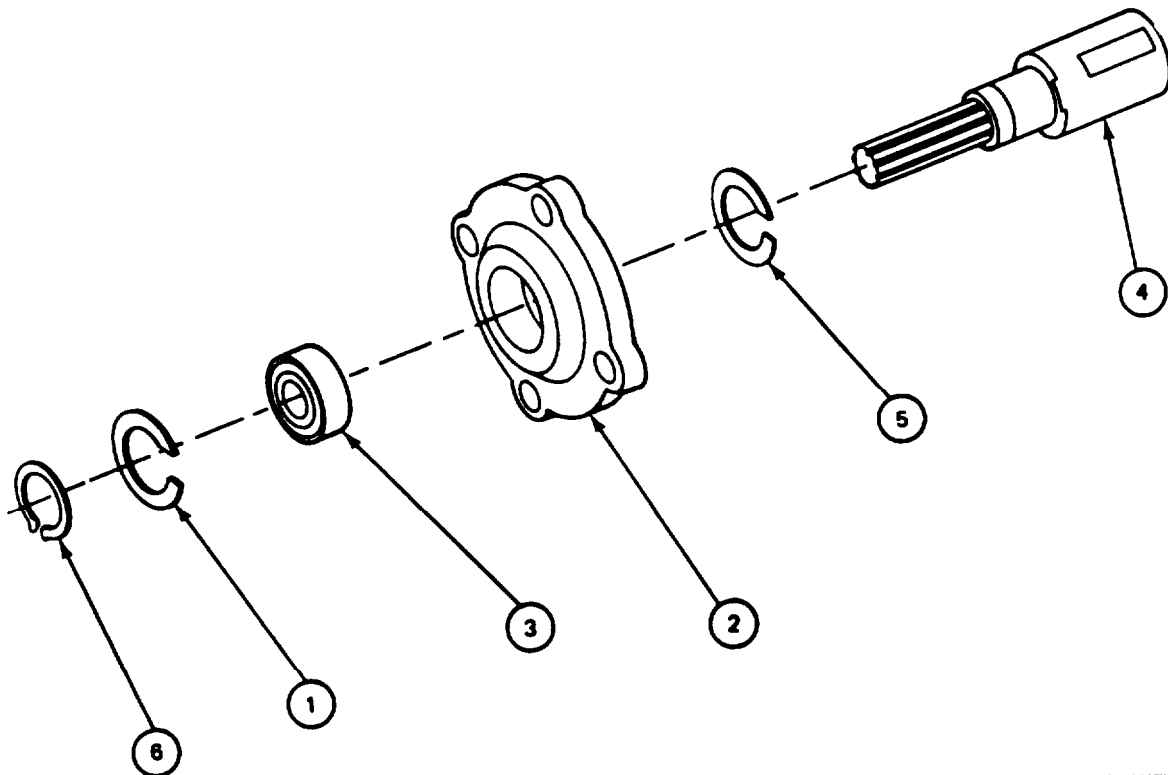
REFERENCES: JPG for procedure to use retaining ring pliers

PRELIMINARY PROCEDURES: Inspect cover (para 18-8b)

18-15. COVER ASSEMBLY PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	Using screwdriver, put retaining ring (1) in cover (2).
2.	Using hammer and drift pin, put bearing (3) with thrust side toward shaft seat, on shaft (4).
3.	Using hands, put bearing (3) and shaft (4) in cover (2).
4.	Using screwdriver, put retaining ring (5) in cover (2).
5.	Using pliers, put retaining ring (6) on shaft (4) (JPG).
<p>NOTE</p> <p>Follow-on Maintenance Action Required: Install cover (para 18-13).</p> <p>END OF TASK</p>	



Para 18-15 Cont

18-16. ELEVATION VALVE REMOVAL PROCEDURE

TOOLS: 5/8" open end wrench
 11/16" open end wrench
 7/32" socket head screw key (Allen wrench)
 1" open end wrench
 1-1/8" open end wrench
 O-ring extractor kit

SUPPLIES: Plugs for hydraulic **tubes** and manifold ports (twelve)
 Plugs for elevation mechanism and manifold ports (twelve)
 Small container
 Rags (item 21, App A)
 Masking tape (1" wide) (item 36, App A)
 Pen
 Wood block (4" x 4" x 10" long)

PERSONNEL One

REFERENCES: TM 9-2350-222 -20-2-3 for procedure to lower hydraulic pressure
 JPG for procedures to:
 Disconnect electrical connectors
 Remove preformed packings
 Tag hydraulic tubes
 TM 9-2350-222-10 for procedure to elevate and depress gun

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Elevating Mechanism	FO-4	8
Gunner's Control Box	FO-1	2
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
 Gunner's control box ELEV/TRAV POWER switch set to OFF
 Turret traverse lock set to LOCKED
 Position main gun to O elevation

GENERAL INSTRUCTIONS:

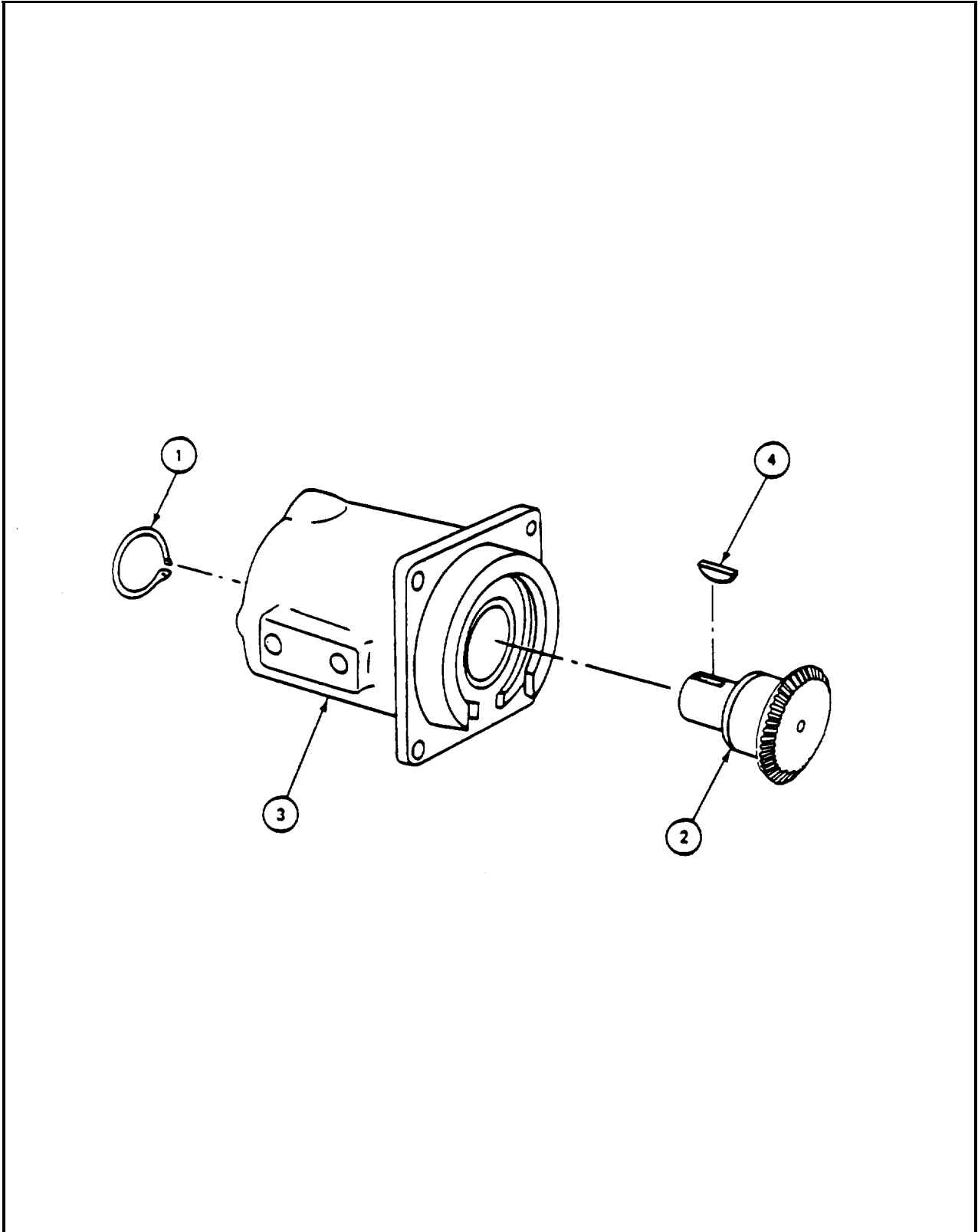


Keep dirt from getting in tubing or parts. **Dirt can damage equipment.**

NOTE

Use small container to catch hydraulic fluid which leaks when hydraulic lines are disconnected. Use rags to wipe up spilled hydraulic fluid.

Equipment condition applies only if task is being done on vehicle.



18-17. BEVEL GEAR OR HOUSING INSTALLATION PROCEDURE

TOOLS: External retaining ring pliers
 20 ounce ball peen hammer
 3/4" drift pin
 Vise with brass caps

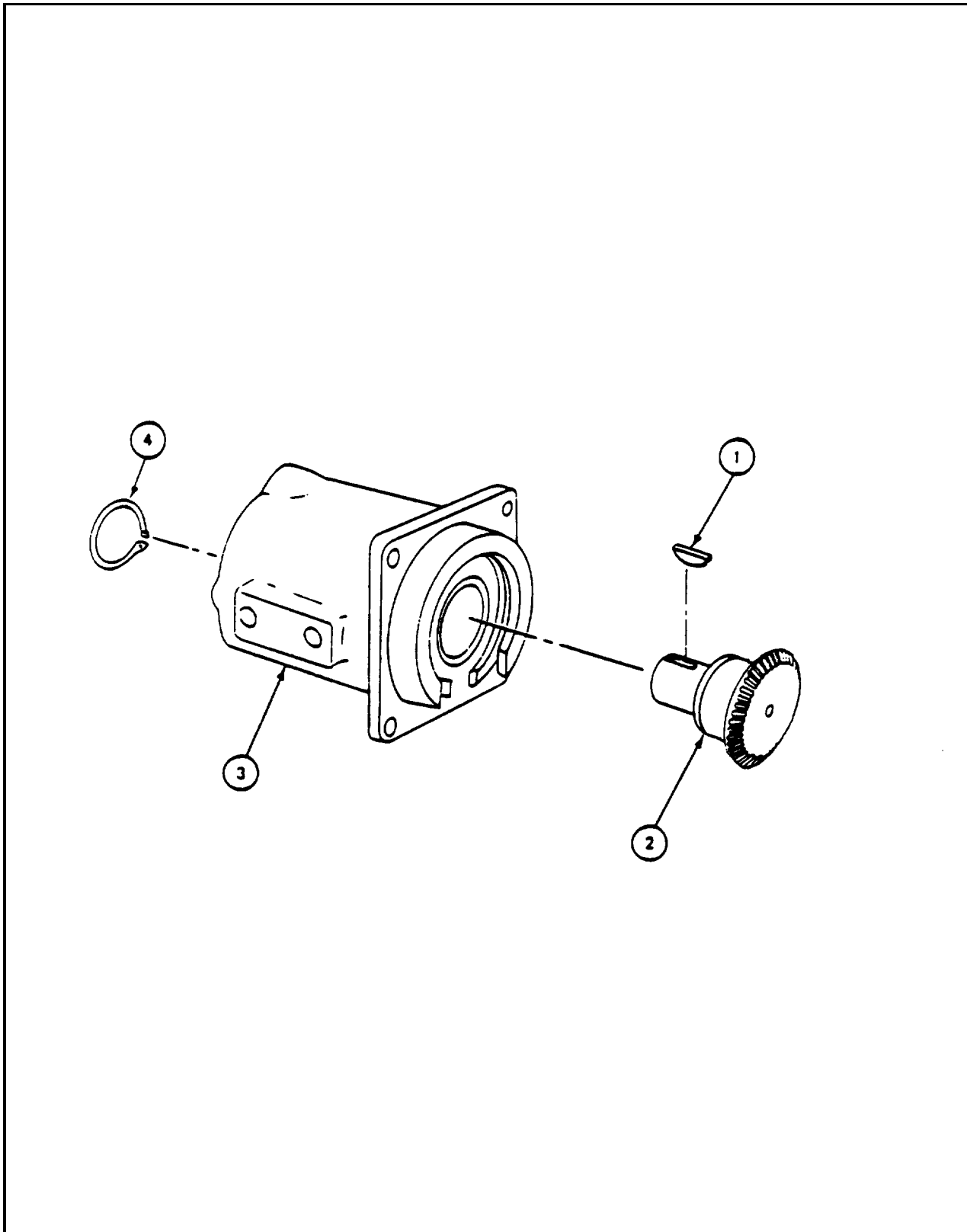
SUPPLIES: Oil (item 13, App. A)

PERSONNEL: One

REFERENCES: JPG for procedure to use retaining ring pliers

PRELIMINARY PROCEDURES: Assemble housing (para 18-20)

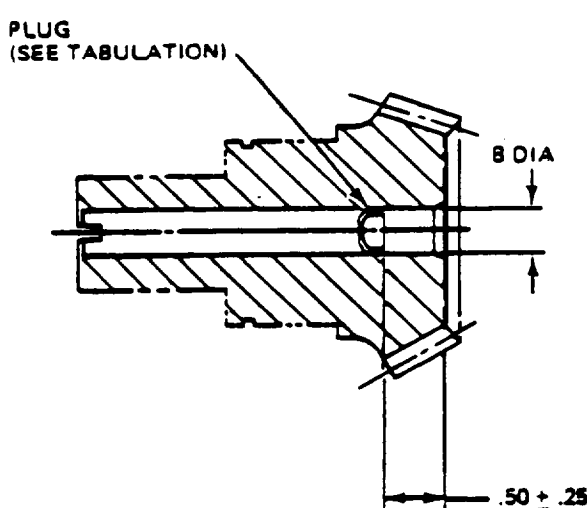
FRAME 1	
Step	Procedure
	<p>NOTE</p> <p>It may be necessary to put housing (3) in vise.</p>
1.	Lightly coat woodruff key (1) and shaft of bevel gear (2) with oil.
2.	Using hammer, put woodruff key (1) in shaft of bevel gear (2).
3.	Using hammer and drift pin, put bevel gear (2) in housing (3).
4.	Using pliers, put retaining ring (4) on bevel gear (2) (JPG).
	<p>NOTE</p> <p>Follow-on Maintenance Action Required: Install shaft coupling (para 18-22).</p>
	END OF TASK



18-18. BEVEL GEAR REPAIR PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Inspect bevel gear (para 18-8)

FRAME 1										
Step	Procedure									
SUPPORT SHOP WORK										
1.	Take bevel gear to shop where press, reaming, and inspection equipment are available. a. Make dimensional check. b. Install plug.									
2.	After support shop work, return bevel gear to turret shop, END OF TASK									
										
<table border="1"> <thead> <tr> <th>B DIA</th> <th>USE PLUG</th> <th>NSN</th> </tr> </thead> <tbody> <tr> <td>.380 OR LESS</td> <td>MS9176-04</td> <td>5340-00-081-6353</td> </tr> <tr> <td>OVER .380</td> <td>MS9176-06</td> <td>5340-00-947-0152</td> </tr> </tbody> </table>		B DIA	USE PLUG	NSN	.380 OR LESS	MS9176-04	5340-00-081-6353	OVER .380	MS9176-06	5340-00-947-0152
B DIA	USE PLUG	NSN								
.380 OR LESS	MS9176-04	5340-00-081-6353								
OVER .380	MS9176-06	5340-00-947-0152								

Para 18-18

18-18.1 BEVEL GEAR ASSEMBLY OR HOUSING REMOVAL PROCEDURE (LATE MODEL)

TOOLS: Internal retaining ring pliers
 External retaining ring pliers
 20 ounce ball peen hammer
 3/4" drift pin
 1/4" drift pin
 Vise with brass caps
 Scraper
 Stiff bristled brush
 Fine stone

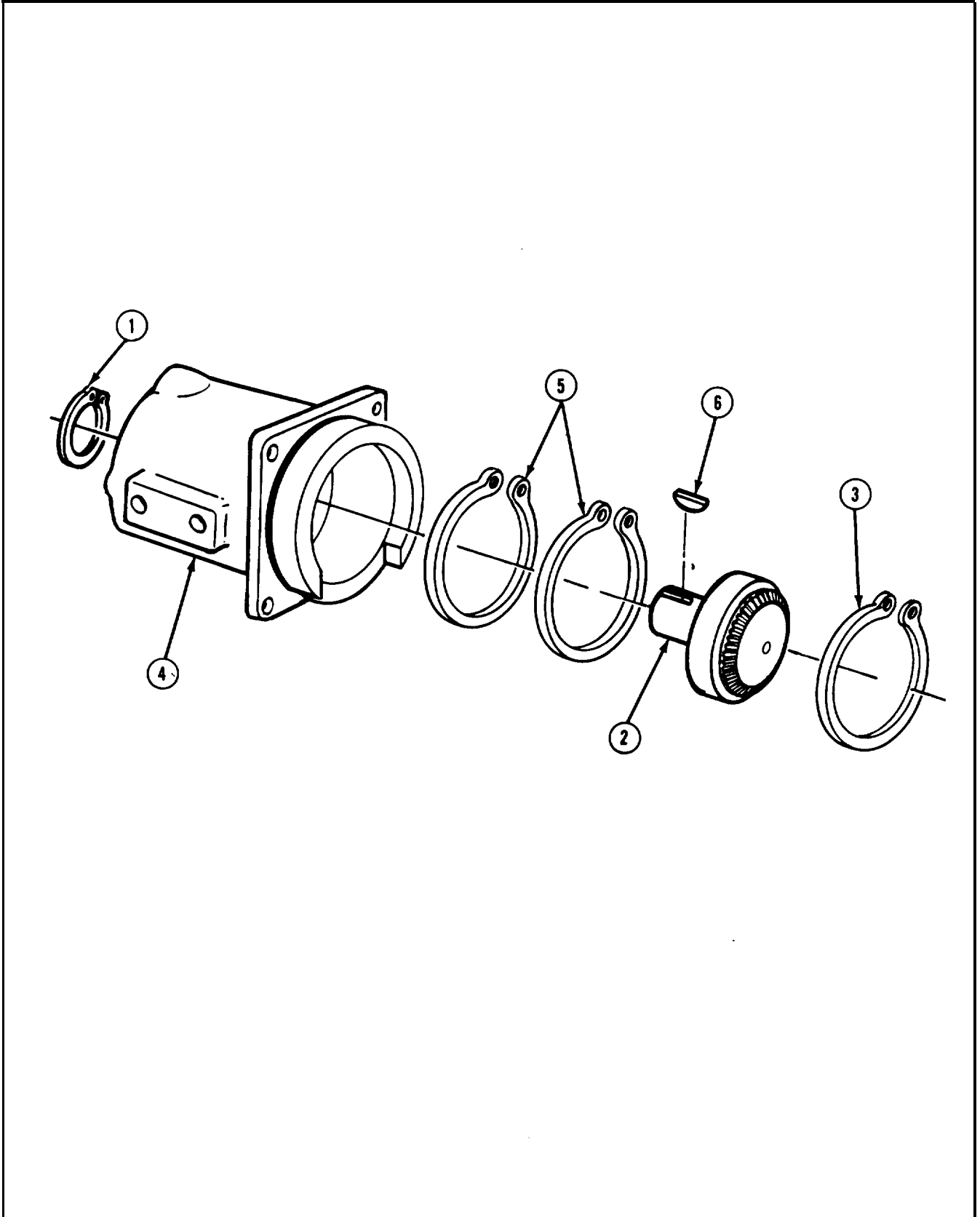
SUPPLIES: Dry cleaning solvent (item 33, App. A)
 Crocus cloth (item 7, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
 Clean part
 Inspect and repair parts
 Use retaining ring pliers

RELIMINARY PROCEDURES: Remove cover (para 18-12).
 Remove shaft coupling (para 18-21).

FRAME 1	
STEP	PROCEDURE
	NOTE It may be necessary to put housing (4) in vise.
1.	Using external retaining ring pliers, remove retaining ring (1) from bevel gear assembly (2) (JPG)
2.	Using internal retaining ring pliers, remove retaining ring (3) from housing (4) (JPG).
3.	Using drift pin, lightly tap bevel gear assembly (2) from housing (4).
4.	Using internal retaining ring pliers, remove two retaining rings (5) from housing (4) (JPG).
5.	Using hammer and 1/4 inch drift pin, remove woodruff key (6) from bevel gear assembly (2).
	NOTE Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG) . Do detail inspection of parts (pare 18-8) .
	END OF TASK



18-18.2. BEVEL GEAR ASSEMBLY OR HOUSING INSTALLATION PROCEDURE (LATE MODEL)

TOOLS: Internal retaining ring pliers
 External retaining ring pliers
 20 ounce ball peen hammer
 Vise with brass caps

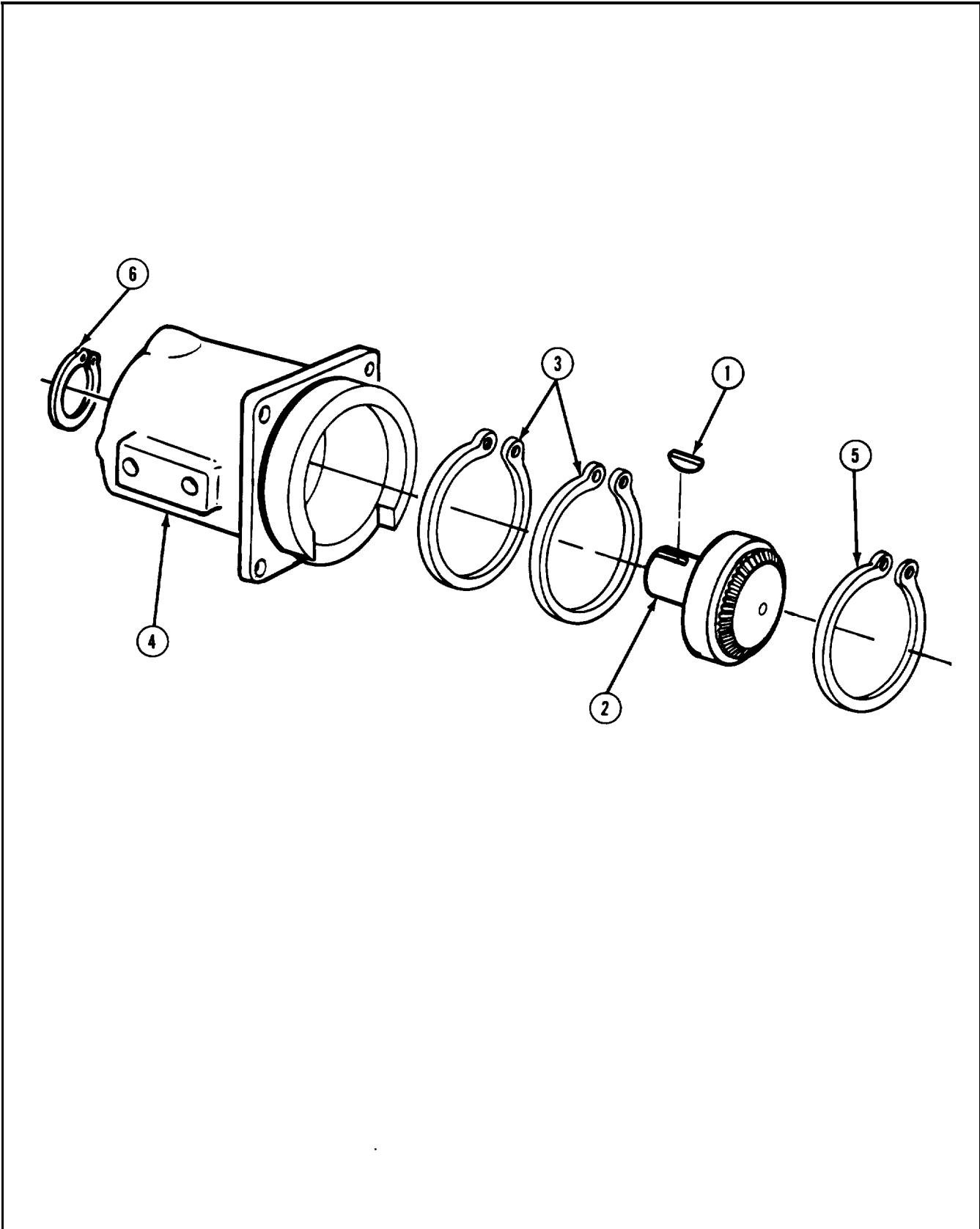
SUPPLIES: Oil (item 13, App, A)
 Woodruff key (MS 35756-16: (one required)

PERSONNEL: One

REFERENCES: JPG for procedure to use retaining ring pliers

PRELIMINARY PROCEDURES: Assemble housing (para 18-20)

FRAME 1	
STEP	PROCEDURE
	<p>NOTE</p> <p>It may be necessary to put housing (4) in visa.</p>
1.	Lightly coat woodruff key (1) and shaft of bevel gear assembly (2) with oil.
2.	Using hammer, put woodruff key (1) in shaft of bevel gear assembly (2).
3.	Using pliers, put two retaining rings (3) in housing (4) (JPG).
4.	Using hands, put bevel gear assembly (2) in housing (4).
5.	Using internal retaining ring pliers, put retaining ring (5) in housing (4) (JPG).
6.	Using external retaining ring pliers, put retaining ring (6) on bevel gear (2) (JPG).
	<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Install shaft coupling (pare 18-22).</p>
	END OF TASK

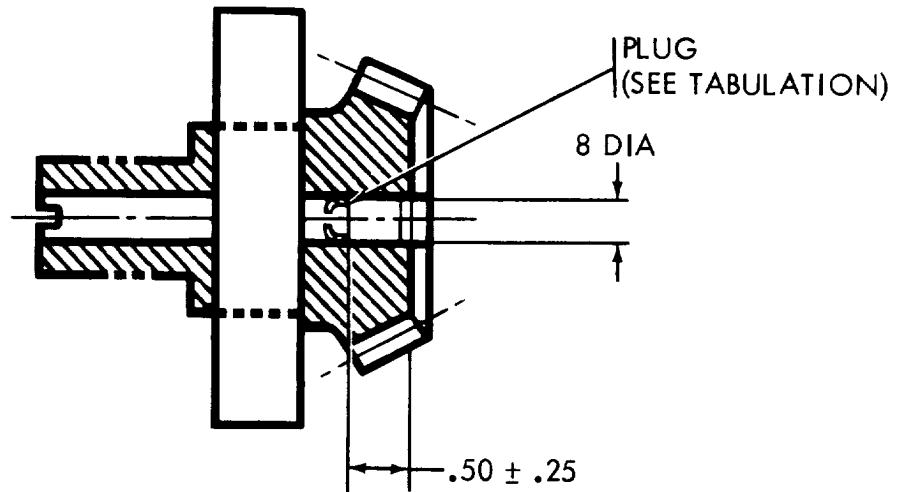


18-18.3 BEVEL GEAR ASSEMBLY REPAIR PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Inspect bevel gear (para 18-8)

FRAME 1	
STEP	PROCEDURE
SUPPORT SHOP WORK	
1.	Take bevel gear assembly to shop where press, reaming, and inspection equipment are available.
2.	After support shop work, return bevel gear assembly to turret shop.
END OF TASK	



8 DIA	USE PLUG	NSN
.380 OR LESS	MS9176-04	5340-00-061-6353
OVER .380	MS9176-05	5340-00-947-0152

18-19. HOUSING DISASSEMBLY PROCEDURE

TOOLS: Internal retaining ring pliers
3/4 drift pin
Scraper
Stiff bristled brush
Fine stone

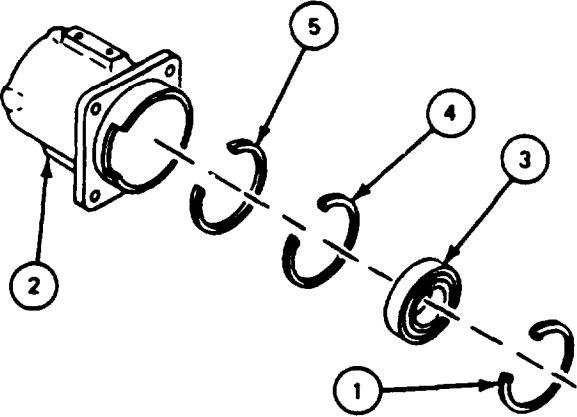
SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts
Use retaining ring pliers

PRELIMINARY PROCEDURES: Test no-bak (para 18-9)
Remove cover (para 18-12)
Remove shaft coupling (para 18-2 1)
Remove bevel gear (para 18-16)

18-19. HOUSING DISASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 	<p>Using pliers, remove retaining ring (1) from housing (2) (JPG).</p> <p>Using drift pin, lightly tap bearing (3) and remove from housing (2).</p> <p>Using pliers, remove two retaining rings (4) and (5) from housing (2) (JPG).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspecton of parts (para 18-8b).</p> <p>END OF TASK</p>
	

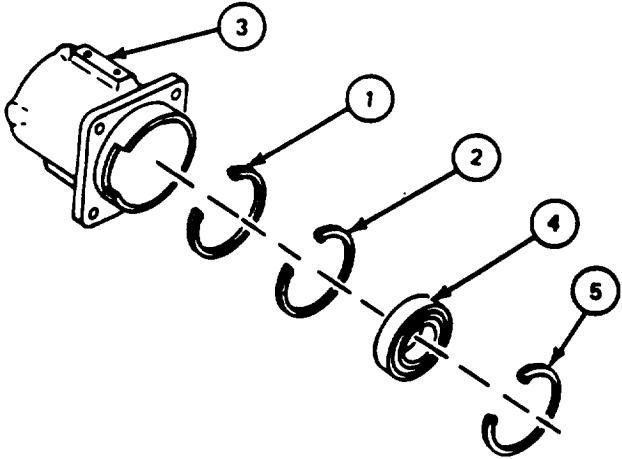
18-20. HOUSING ASSEMBLY PROCEDURE

TOOLS: Internal retaining ring pliers

PERSONNEL: One

REFERENCES: JPG for procedure to use retaining ring pliers

PRELIMINARY PROCEDURES: Inspect housing (para 18-8b)

FRAME 1	
Step	Procedure
1.	Using pliers, put two retaining rings (1) and (2) in housing (3) (JPG).
2.	Using hands, put bearing (4) in housing (3).
3.	Using pliers, put retaining ring (5) in housing (3) (JPG).
<p>NOTE</p> <p>Follow-on Maintenance Action Required: Install bevel gear (para 18-17).</p>	
<p>END OF TASK</p>	
	

18-21. SHAFT COUPLING REMOVAL AND DISASSEMBLY PROCEDURE

TOOLS Needle nose pliers
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

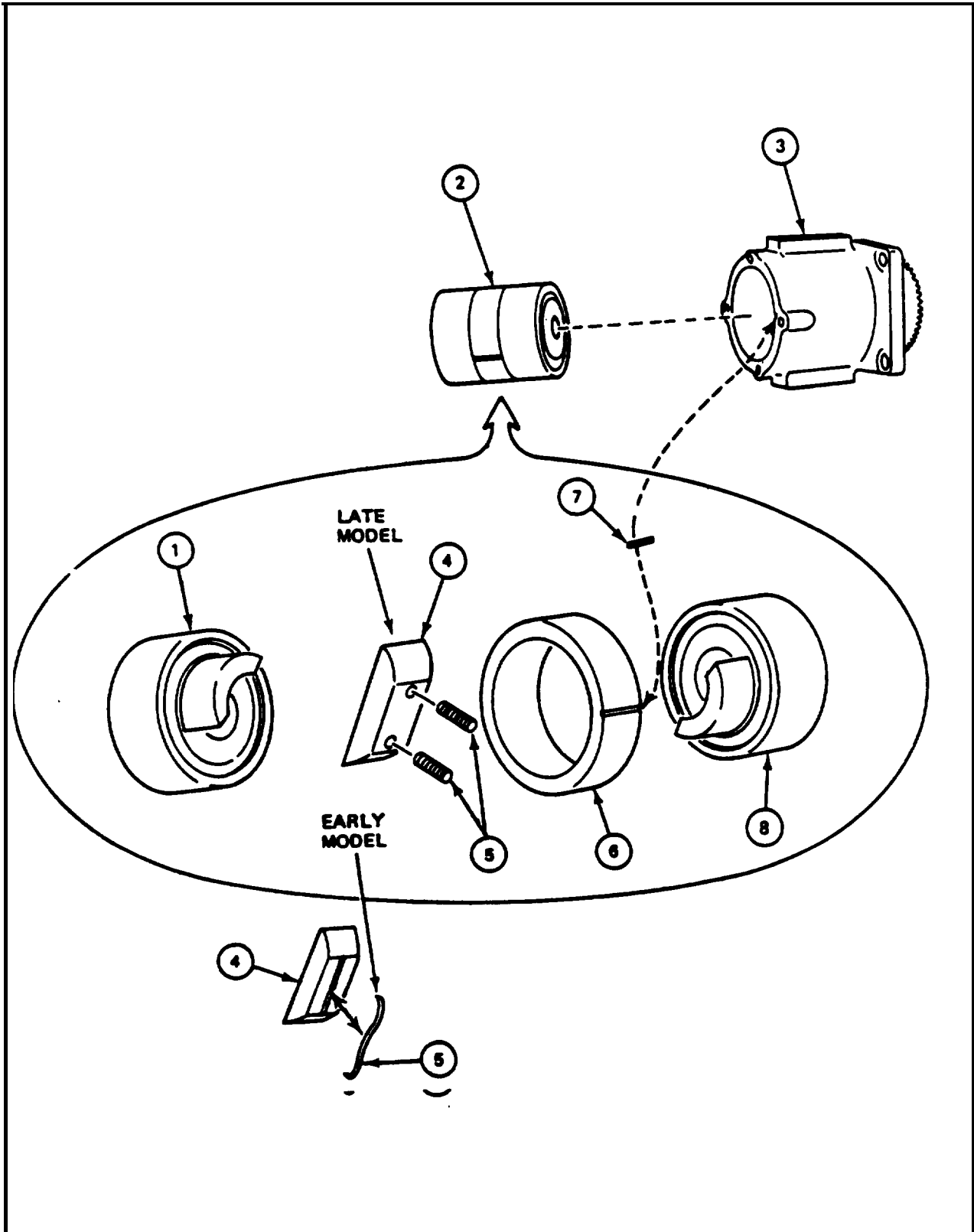
PERSONNEL: One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts

PRELIMINARY PROCEDURES: Remove cover (para 18-1 2)

18-21. SHAFT COUPLING REMOVAL AND DISASSEMBLY PROCEDURE (CONT)

FRAME 1	Step	Procedure
		NOTE
		Driven member (1), lockring (6) and driven member (8) must be removed by pulling straight out.
	1.	Using hands, pull out driven member (1) from shaft coupling (2) and housing (3).
		WARNING
		Be careful when removing locking bar (4) from lockring (6). Tension springs (5) may fly out and hurt you.
		NOTE
		Tension springs (5) consist of two coil springs in late models and four leaf-type springs in early models. Springs (5) must be compressed to remove locking bar (4).
	2.	Using hands, remove locking bar (4) with tension springs (5) from lockring (6).
	3.	Remove tension springs (5) from locking bar (4).
	4.	Using hands, pull lockring (6) out from housing (3).
	5.	Using pliers, remove pin (7) from housing (3).
		NOTE
		It may be necessary to tap housing on work table to loosen driven member from housing (3).
	6.	Using hands, remove driven member (8) from housing (3).
		NOTE
		Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG).
		END OF TASK



18-22. SHAFT COUPLING ASSEMBLY AND INSTALLATION PROCEDURE

TOOLS: 1/4" flat tip screwdriver

SUPPLIES: Grease (item 14, App. A)

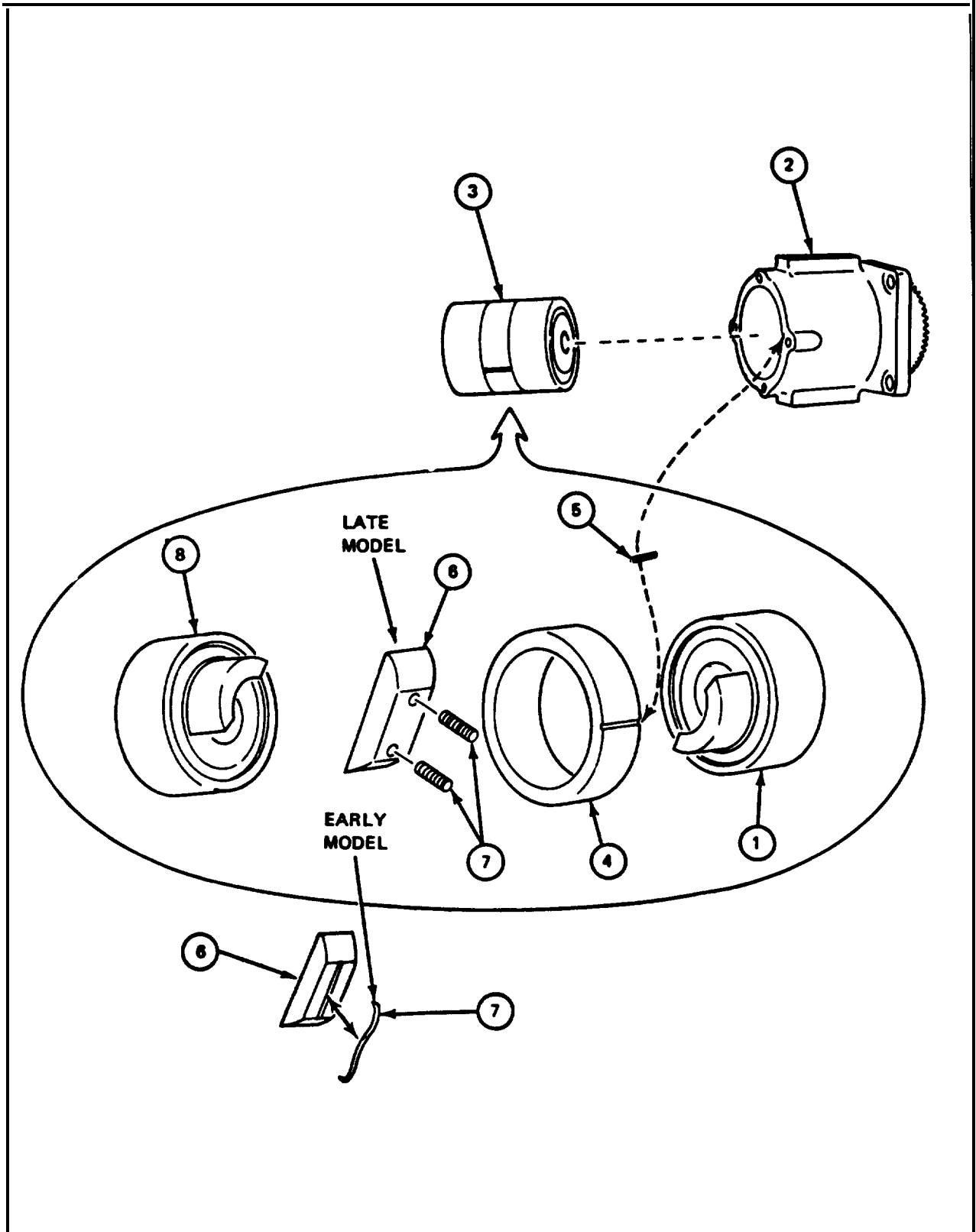
PERSONNEL: One

PRELIMINARY PROCEDURES: Assemble housing (para 18-20)
Install bevel gear (para 18-17)

18-22. SHAFT COUPLING ASSEMBLY AND INSTALLATION PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	Lightly coat driven member (1) and inside of housing (2) with grease.
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Driven member (1), lockring (4), and driven member (8) must be put in straight.</p> <p style="text-align: center;">Keyway in driven member (1) must be in line with woodruff key in shaft of housing (2).</p>
2.	Using hands, put driven member (1) of shaft coupling (3) in housing (2).
3.	Lightly coat lockring (4) and pin (5) with grease.
4.	Using hands, align groove in lockring (4) with groove in housing (2) and put pin (5) into lock housing (2) and lockring (4) together.
5.	Using hands, put lockring (4) and pin (5) into housing (2) until touching driven member (1).
6.	Lightly coat locking bar (6) with grease.
7.	Using hands, start locking bar (6) in lockring (4).
8.	Put tension springs (7) in locking bar (6).
9.	Using screwdriver and hands, press or position tension springs (7) in locking bar (6) while pushing locking bar (6) into lockring (4).
10.	Lightly coat driven member (8) with grease.
11.	Using hands, put driven member (8) in housing (2).
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required: Install cover (para 18-13).</p> <p>END OF TASK</p>



Section 4. CLUTCH

18-23. MAINTENANCE PROCEDURES INDEX

Equipment Item	Inspection	Test	Tasks					Repair
			Adjustment	Removal	Installation	Disassembly	Assembly	
1. Clutch	. . .	18-24	18-25	18-26	18-27	18-28	18-29	. . .
2. Clutch Housing	18-30	. . .	. . .		. . .	18-31	18-32	. . .
3. Clutch Body	18-23	. . .	. . .	. . .	. . .	18-34	18-35	18-36

18-24. CLUTCH TEST PROCEDURE

TOOLS Gear lock, 12290848
Socket, NSN 5120-00-627-8019
1/2 in. drive torque wrench (0 to 200 foot-pounds)
9/16 in. socket (3/8 in. drive)
3/8 in. drive ratchet

SUPPLIES: Screws (MS90728-60) (two)
Oil (item 18, App. A)
Lint-free cloths (item 21, App. A)
Container

PERSONNEL One

PRELIMINARY PROCEDURES: Remove clutch (para 18-26)
Assemble clutch (para 18-29)

GENERAL INSTRUCTIONS:

NOTE

If normal indication is not obtained, clutch is bad. Adjust clutch (para 18-25).

18-24. CLUTCH TEST PROCEDURE (CONT)

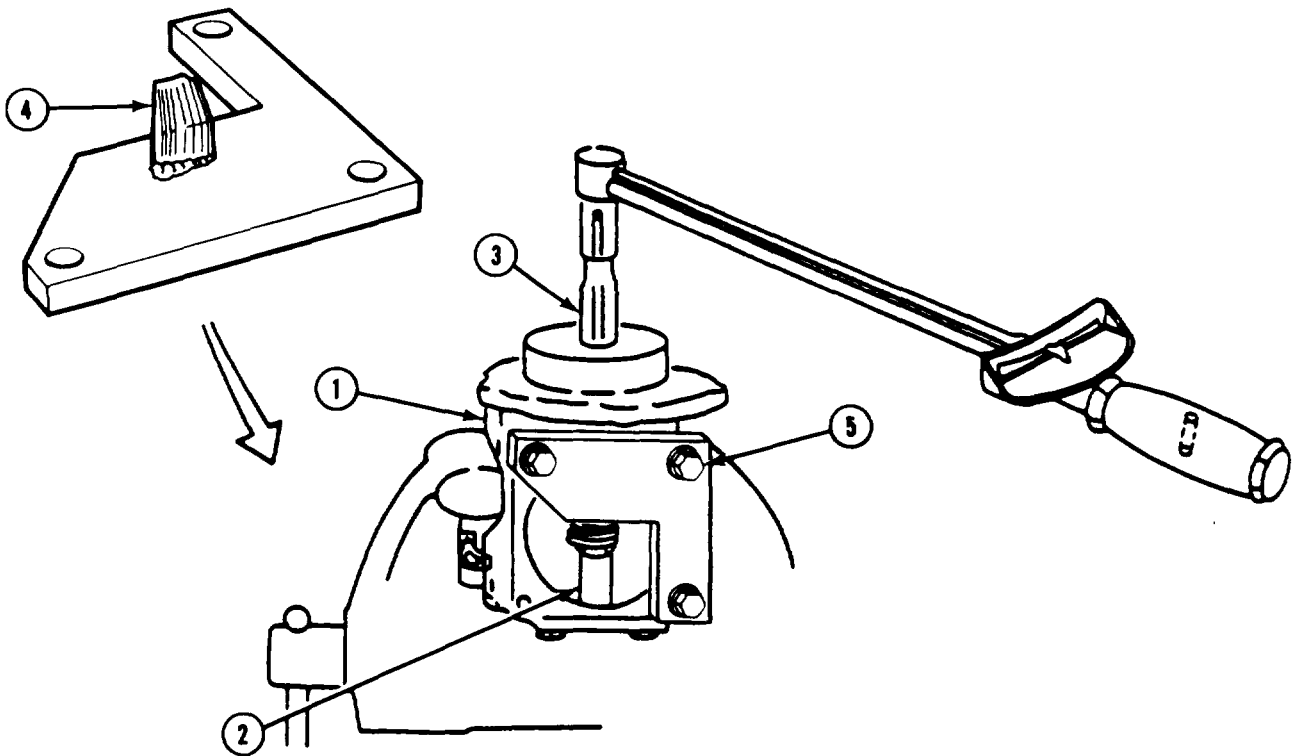
FRAME 1

Step	procedure
1.	Put clutch (1) in container with shaft (2) end down.
2.	put oil into clutch housing through no-bak opening until clutch (1) disks are thoroughly lubricated.
3.	Lock clutch (1) in a bench vise with splined shaft (3) end up.
4.	Put gear lock (4) through no-bak opening and mesh with clutch gear.
5.	Using socket wrench, put in three screws (5) to hold gear lock (4) to clutch housing.
6.	Using torque wrench and socket on clutch shaft (2), pull on torque wrench and note torque reading when shaft turns. Shaft should turn at a torque between 83 and 92 foot pounds. If shaft does not turn at specified torque, adjust clutch para 18-25).

NOTE

If normal indication was obtained, clutch is good.

END OF TASK



18-25. CLUTCH ADJUSTMENT PROCEDURE

TOOLS: Gear lock, 12290848
Torque socket, NSN 5120-00-627-8019
1/2 in. drive torque wrench (0 to 250 foot-pounds)
3/8 in. drive ratchet
1-1/8 in. open end wrench
Spanner wrench
Vise with brass jaws
5/16 in. socket (3/8 in. drive)
7/16 in. socket (3/8 in. drive)
5/8 in. socket (3/8 in. drive)
1-1/8 in. deepwell socket (1/2 in. drive)
3/8 in. drive torque wrench (0 to 600 inch-pounds)
1/2 in. drive hinged handle
9/16 in. socket (3/8 in. drive)
5/8 in. socket (1/2 in. drive)
9/16 in. socket (3/8 in. drive)

PERSONNEL: One

PRELIMINARY PROCEDURE: Test clutch (para 18-24)

GENERAL INSTRUCTIONS:

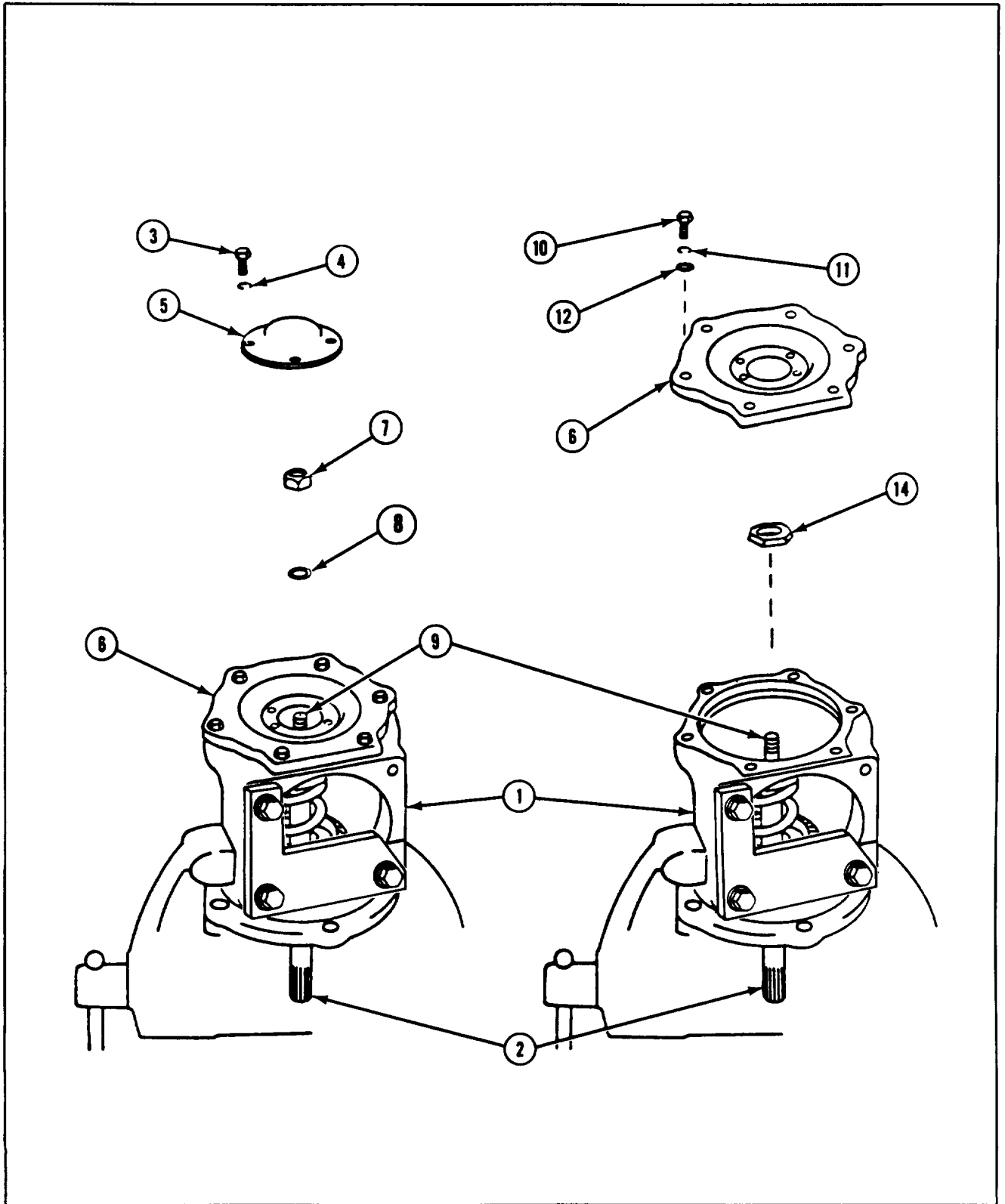
NOTE

This procedure is for clutch that does not meet test requirements (para 18-24).

Adjustments needed for rebuilt clutch are done during assembly (para 18-29).

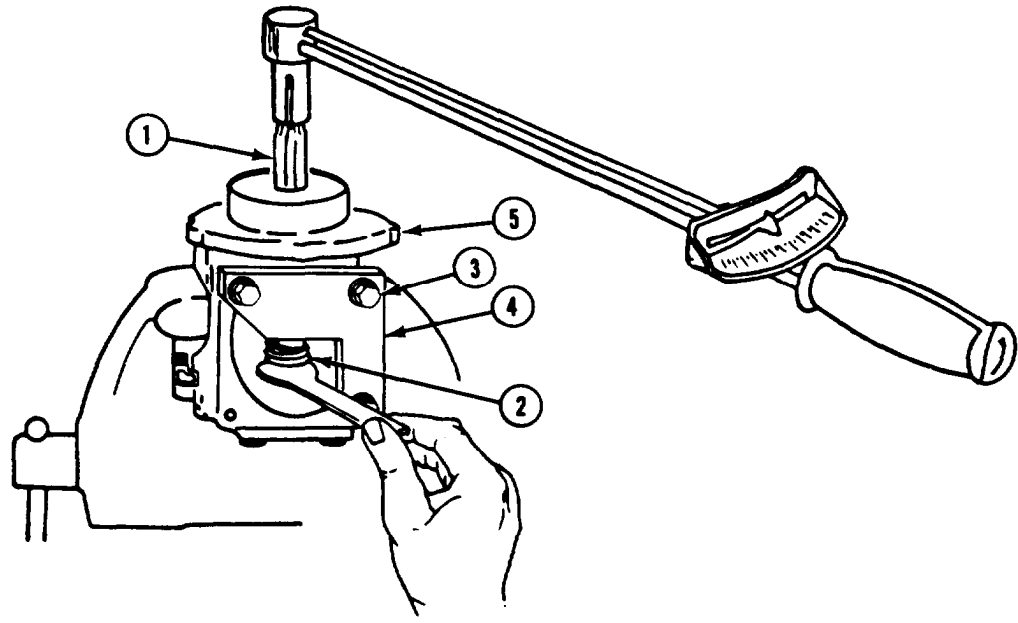
18-25. CLUTCH ADJUSTMENT PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Put clutch (1) in vise with splined shaft (2) end down.
2.	Using 5/16" socket wrench, remove four screws (3), four lockwashers (4) and cap (5) from housing cover (6).
3.	Using 5/8" socket wrench on nut (7), and torque socket with hinged handle on splined shaft (2) end, remove nut (7) and washer (8) from shaft (9).
4.	Using 7/16" socket wrench, remove six screws (10), six lockwashers (11), six flat washers (12), and cover (6) from clutch (1).
5.	Using 1-1/8" open end wrench on nut (14), and hinged handle with torque socket on spined shaft (2) end, loosen nut (14) on shaft (9).
6.	Remove clutch (1) from vise and then put clutch in vise with splined shaft (2) end up. GO TO FRAME 2



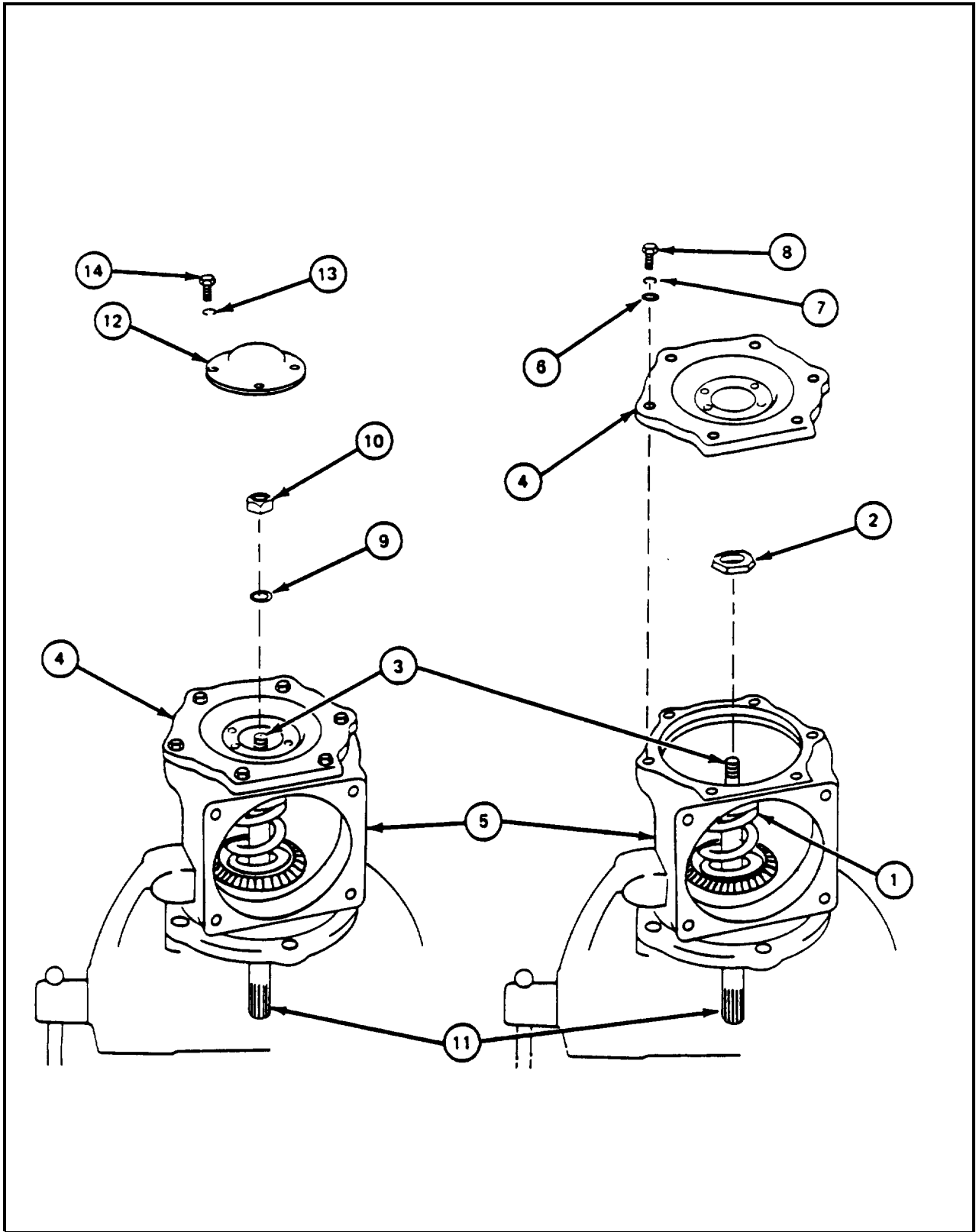
18-25. CLUTCH ADJUSTMENT PROCEDURE (CONT)

FRAME 2	
Step	procedure
1.	Using 1/2 in. torque wrench with torque socket on splined shaft (1), pull on torque wrench and note torque reading when clutch shaft turns.
	NOTE
	Tightening spring guide (2) will increase torque reading. Loosening spring guide (2) will decrease torque reading.
2.	Using hand or spanner wrench on spring (2), and 1/2 in. torque wrench with torque socket on splined shaft (1), hold and adjust spring guide (2) for a torque reading on low side of between 83 and 92 foot-pounds.
3.	Using 9/16 in. socket wrench, remove three screws (3) and gear lock (4) from clutch (5).
4.	Remove clutch (5) from vise and then put clutch in vise with splined shaft (1) end down.
	GO TO FRAME 3



18-25. CLUTCH ADJUSTMENT PROCEDURE (CONT)

FRAME 3	
Step	Procedure
1.	Using spanner wrench, hold upper spring guide (1) and using 1/2" torque wrench with 1-1/8" deepwell socket, torque nut (2) on shaft (3) to between 336 and 360 inch-pounds.
2.	Using 7/16" socket wrench, attach cover (4) to clutch housing (5) with six flat washers (6), six lockwashers (7) and six screws (8).
3.	Using 3/8" drive torque wrench and 7/16" socket, torque screws (8) to between 36 and 48 inch-pounds.
4.	Using hands, put washer (9) and nut (10) on shaft (3).
5.	Using hinged handle and torque socket, hold splined shaft (11), and using 3/8" torque wrench and 5/8" socket, torque nut (10) to between 192 and 216 inch-pounds.
6.	Using 5/16" socket wrench, attach cap (12) to cover (4) with four lockwashers (13) and four screws (14).
<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Test clutch (para 18-24).</p>	
<p>END OF TASK</p>	



18-26. CLUTCH REMOVAL PROCEDURE

TO: 7/16" socket (3/8" drive)
 318" drive ratchet
 5/8" open end wrench
 7/32" socket head screw key (Allen wrench)
 7/16" combination wrench

PERSONNEL: One

REFERENCES: TM 9-2350-222-20-2-3 for procedures to:
 Remove commander's control
 Remove hand traversing drive
 Remove no-bak

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Commander's Control Handle	FO-2	14
Traversing Mechanism	FO-2	12

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
 Commander's control removed (TM-20-2-3)
 Hand traversing drive removed (TM-20-2-3)
 No-bak removed (TM-20-2-3)

GENERAL INSTRUCTIONS:

CAUTION

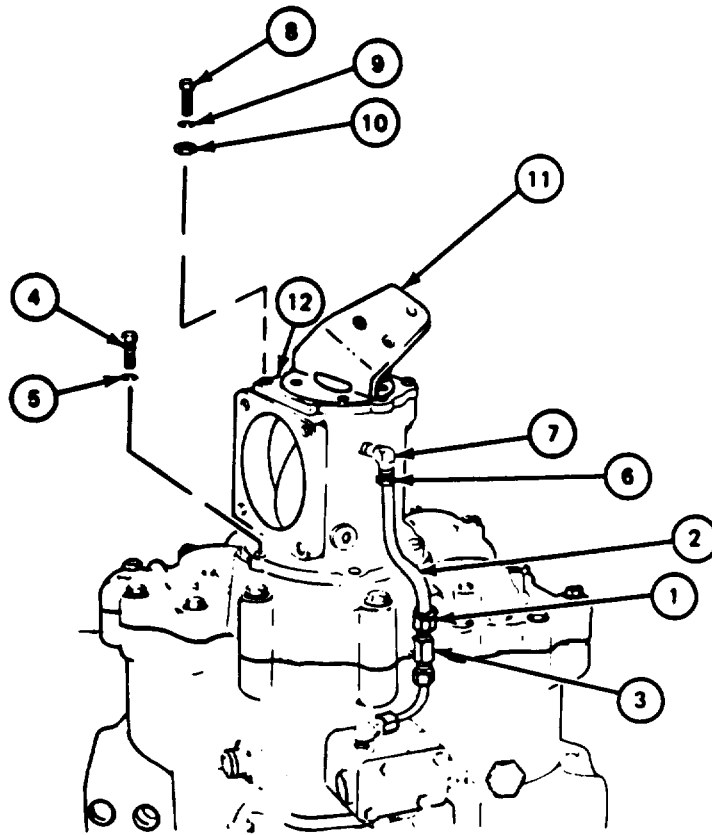
Put plugs in tube and cap on adapter to keep out dirt.
 Dirt can damage equipment.

NOTE

Equipment conditions apply only if task is being done on vehicle.

18-26. CLUTCH REMOVAL PROCEDURE (CONT)

FRAME 1	
STEP	PROCEDURE
1.	Using open end wrench, disconnect nut (1) that attaches oil tube (2) to tee fitting (9).
2.	Using Allen wrench, remove five screws (4) and five lockwashers (5) that attach clutch to traverse mechanism. Remove clutch.
3.	Using open end wrench, disconnect nut (6) that attaches oil tube (2) to elbow (7). Remove oil tube (2).
<p>NOTE</p> <p>Do steps 4, 5, and 6 only if clutch is being replaced or disassembled.</p>	
4.	Using combination wrench, remove elbow (7) from clutch housing.
5.	Using socket wrench, remove six screws (8), six lockwashers (9), and six flat washers (10) that attach bracket (11) to clutch cover (12). Remove bracket (11).
6.	Using socket wrench, put in six screws (8), six lockwashers (9), and six flat washers (10) that attach clutch cover (12) to clutch housing.
<p>END OF TASK</p>	



18-27. CLUTCH INSTALLATION PROCEDURE

TOOLS: 6 in. extension (3/8 in. drive)
 7/16 in. socket (3/8 in. drive)
 3/8 in. drive ratchet
 7/32 in. socket head screw key (Allen wrench)
 5/8 in. open end wrench
 7/16 in. combination wrench

SUPPLIES: Oil (item 18, App. A)

PERSONNEL: One

REFERENCES: TM 9-2350-222-10 for procedure to traverse turret
 TM 9-2350-222-20-2-3 for procedures to
 Install no-bak
 Install hand traversing drive
 Install commander's control

EQUIPMENT LOCATION INFORMATION

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Turret Traversing <i>Mechanism</i>	FO-2	12
Turret Traverse Lock	FO-3	7

EQUIPMENT CONDITION: Turret traverse lock set to LOCKED
 Driver's master control panel MASTER BATTERY switch set to OFF

PRELIMINARY PROCEDURES: Assemble clutch (para 18-27)
 Test clutch (para 18-24)

GENERAL INSTRUCTIONS:

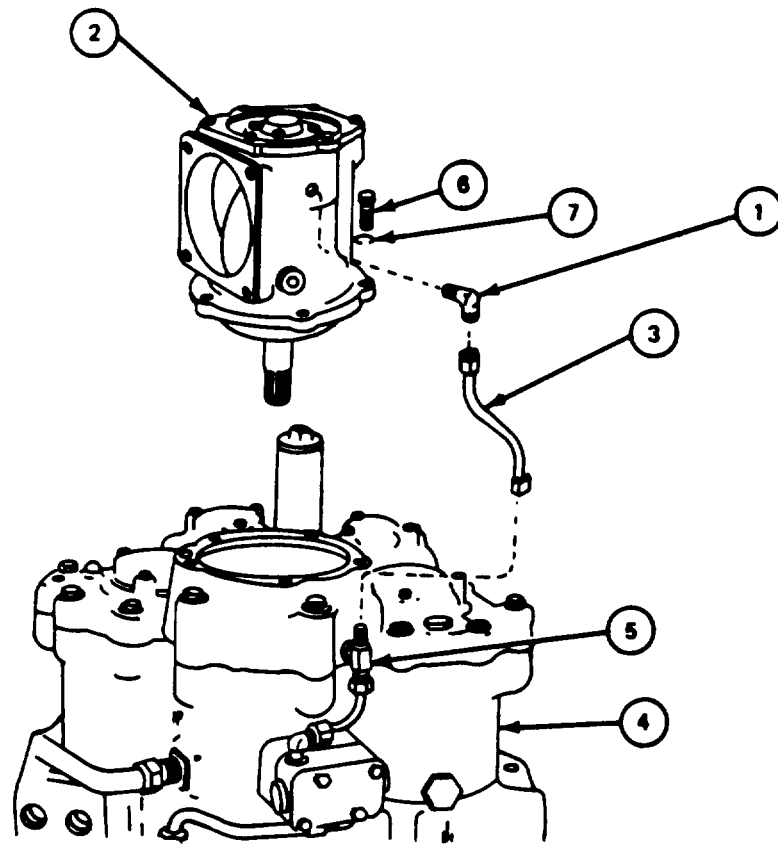
NOTE

Remove plug from tub. and cap from adaptor. For clutch to work properly, part numbers of clutch, no-bak, traversing gearbox and hand traversing drive must match part numbers as follow:

Traversing Gearbox	Clutch	No-bak	Hand Traversing Drive
7739314	10951650	10951651	10911418-4

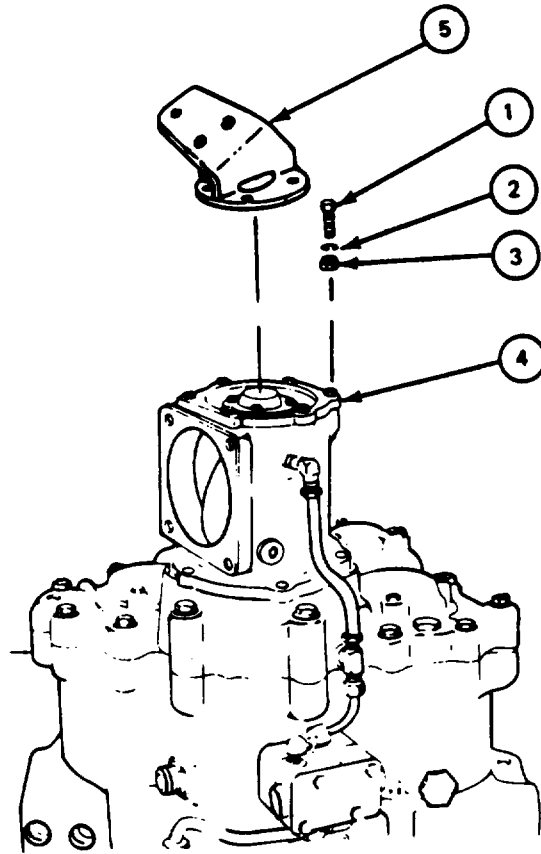
18-27. CLUTCH INSTALLATION PROCEDURE (CONT)

FRAME 1	
STEP	PROCEDURE
<p>NOTE</p> <p>Do step 1 if new clutch is to be installed.</p>	
1.	Using combination wrench, put elbow (1) on clutch (2) housing.
2.	Using hands, connect oil tube (3) to elbow (1). Do not tighten tube nut.
3.	Lightly coat clutch (2) shaft and inside of traversing mechanism (4) housing with oil.
4.	Using hands, put clutch (2) on traversing mechanism (4) while lining up oil tube (3) with tee fitting (5).
5.	Using hands, connect oil tube (3) to tee fitting (5). Do not tighten tube nut.
6.	Using Allen wrench, attach clutch (2) to traversing mechanism (4) with five screws (6) and five lockwashers (7).
7.	Using open end wrench, tighten two nuts on oil tube (3).
<p>GO TO FRAME 2</p>	



18-27. CLUTCH INSTALLATION PROCEDURE (CONT)

FRAME 2	
Step	Procedure
	NOTE Do steps 1 and 2 if commander's control handle mounting bracket is not installed.
1.	Using socket wrench, remove six screws (1), six lockwashers (2), and six flat washers (3) holding cover (4) to clutch housing.
	NOTE Do not re-use six flat washers (3).
2.	Using torque wrench, attach mounting bracket (5) and cover (4) to clutch housing with six screws (1) and six lockwashers (2). Torque screws (1) to between 4 and 6 foot-pounds (JPG).
	NOTE Do the following tasks if this procedure completes the maintenance of the traversing mechanism system. If other maintenance must be done, make sure following tasks are completed after other maintenance. Follow-on Maintenance Action Required: Install no-bak (TM-20-2-3). Install hand traversing drive (TM-20-2-3). Install commander's control (TM-20-2-3). Traverse turret in power mode to make sure clutch is working properly (TM- 10).
	END OF TASK



18-28. CLUTCH DISASSEMBLY PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove clutch (para 18-28)
Test clutch (para 18-26)

FRAME 1	
Step	Procedure
1.	Disassemble clutch housing (para 18-31).
2.	Disassemble clutch body (para 18-34).
	END OF TASK

18-29. CLUTCH ASSEMBLY PROCEDURE

PERSONNEL: One

FRAME 1	
Step	Procedure
1.	Assemble clutch body (para 18-35).
2.	Assemble clutch housing (para 18-32).
	NOTE
	Follow-on Maintenance Action Required:
	Test clutch (para 18-24).
	END OF TASK

18-30. CLUTCH HOUSING INSPECTION PROCEDURE

PERSONNEL: One

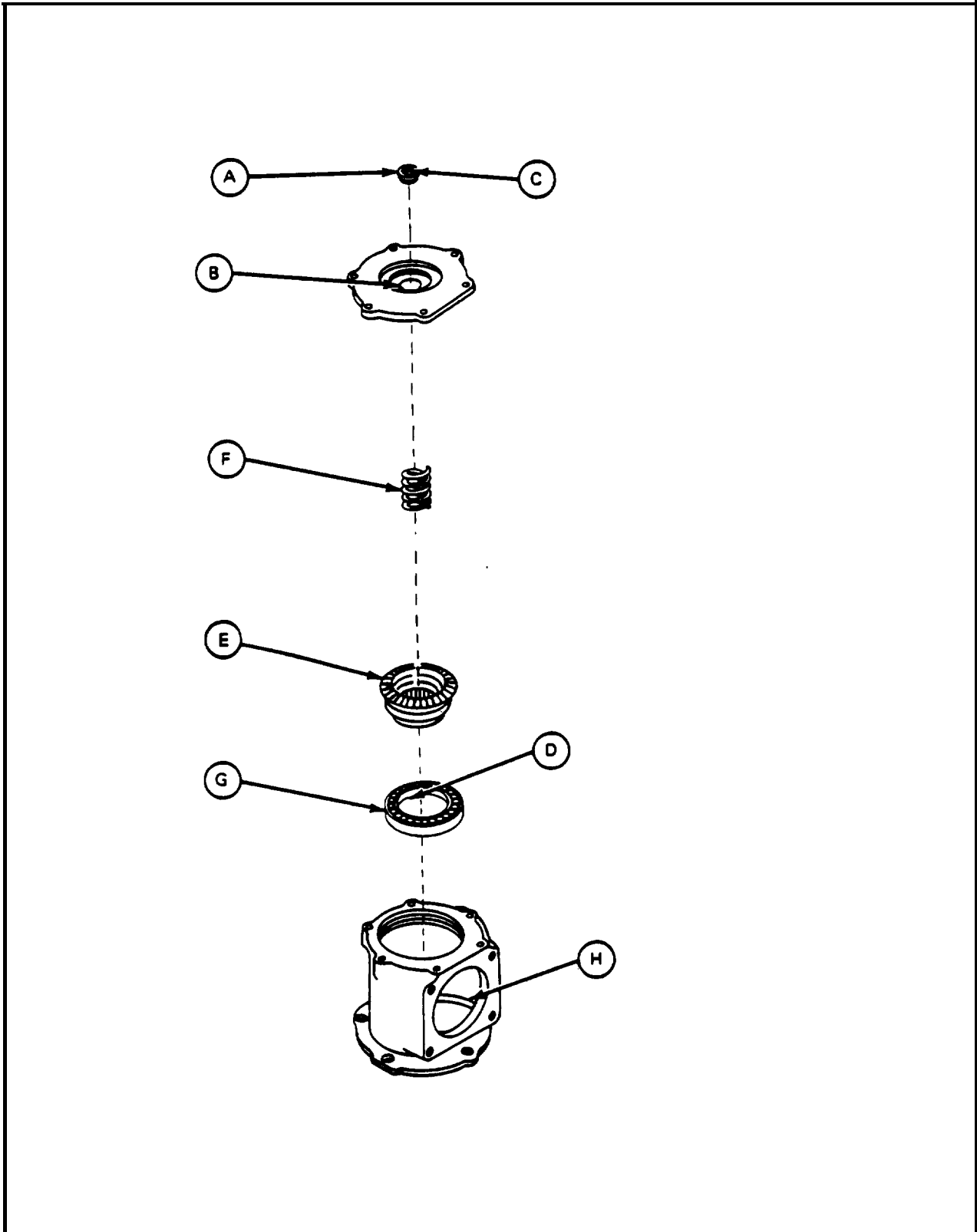
PRELIMINARY PROCEDURES: Disassemble clutch housing (para 18-31)

GENERAL INSTRUCTIONS:

NOTE

If part is bad, order repair pan or next higher assembly as required.

FRAME 1			
Step	Procedure		
	SUPPORT SHOP WORK		
1.	Take clutch housing parts to shop where inspection equipment and spring tester are available.		
2.	Make dimensional check.		
	Reference Letter	Point of Measurement	Measurement
	A	OD of bearing	1.1019 to 1.1024
	B	ID of housing cover	1.1023 to 1.1028
	C	ID of bearing	0.472 1 to 0.4724
	D	ID of bearing	2.2495 to 2.2500
	E	OD of gear shoulder	2.2485 to 2.2490
	F	Free length of spring	2.000 to 2.2485
	F	Load required to compress spring to 1.625	345 to 415 lb
	G	OD of bearing	2.9365 to 2.9370
	H	ID of clutch housing	2.9375 to 2.9380
	NOTE		
	Tag all parts that are out of tolerance.		
3.	After support shop work, return clutch housing parts to turret shop.		
	END OF TASK		



18-31. CLUTCH HOUSING DISASSEMBLY PROCEDURE

TOOLS: 5/16" socket (3/8" drive)
7/16" socket (3/8" drive)
5/8" socket (3/8" drive)
3/8" drive ratchet
1- 1/8" combination wrench
1/4" flat tip screwdriver
Hook type spanner wrench
1/2" drift pin
20 ounce ball peen hammer
1/2" drive hinged handle
Torque socket (NSN 5120-00-627-8019)
Scraper
Stiff bristled brush
Fine stone

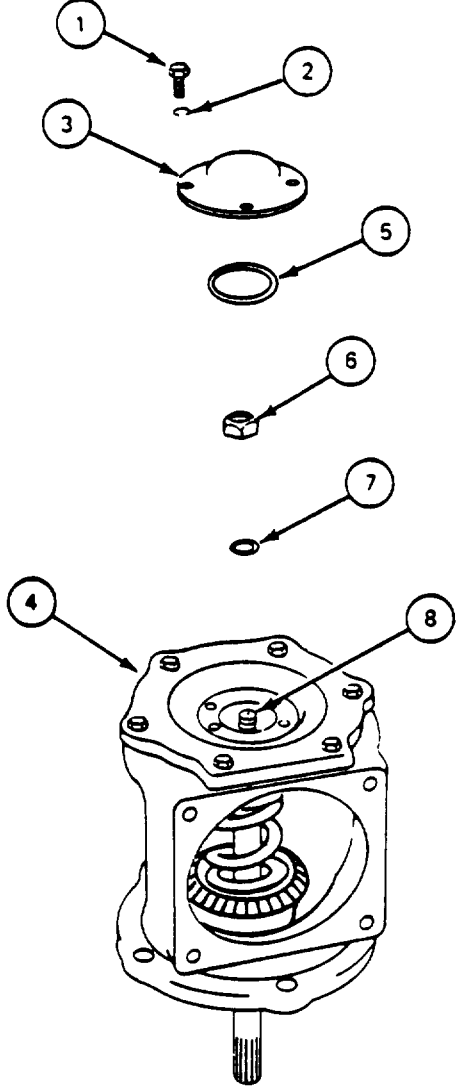
SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Remove preformed packing
Clean parts
Inspect and repair parts

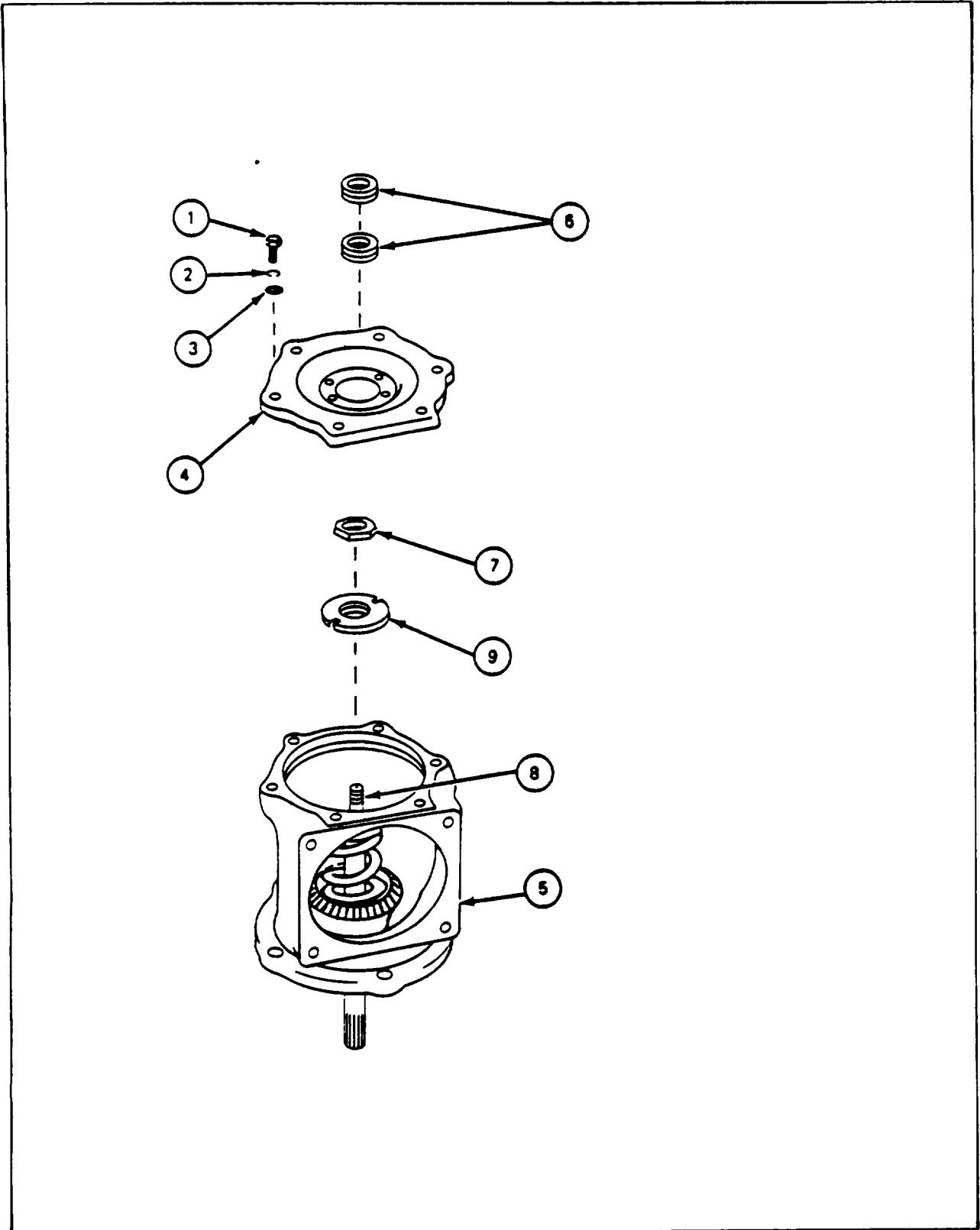
PRELIMINARY PROCEDURES: Remove clutch (para 18-26).
Test clutch (para 18-24)

18-31. CLUTCH HOUSING DISASSEMBLY PROCEDURE (CONT)

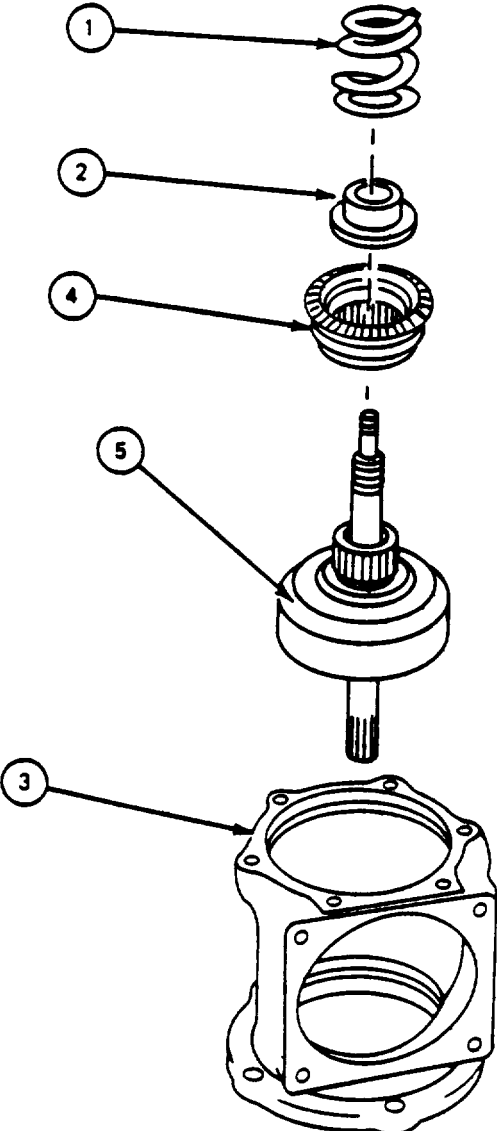
FRAME 1	
Step	Procedure
	<ol style="list-style-type: none"><li>1. Using 5/16" socket wrench, remove four screws (1) and four lockwashers (2) that attach cap (3) to housing cover (4). Remove cap.<li>2. Remove preformed packing (5) from cap (3) (JPG),<li>3. Using 5/8" socket wrench and torque socket with hinged handle on spline end, remove nut (6) and washer (7) from shaft (8). <p>GO TO FRAME 2</p> 

18-31. CLUTCH HOUSING DISASSEMBLY PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	<p>Using 7/16" socket wrench, remove six screws (1), six lockwashers (2), and six flat washers (3) that attach cover (4) to housing (5). Remove cover.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Dual bearing (6) consists of two bearings.</p>
2.	Using drift pin, lightly tap and remove dual bearing (6) from cover (4).
3.	Using 1-1/8" wrench and hinged handle with torque socket on splined end of shaft (8), remove nut (7) from shaft.
4.	Using spanner wrench, remove upper spring guide (9) from shaft (8).
	GO TO FRAME 3

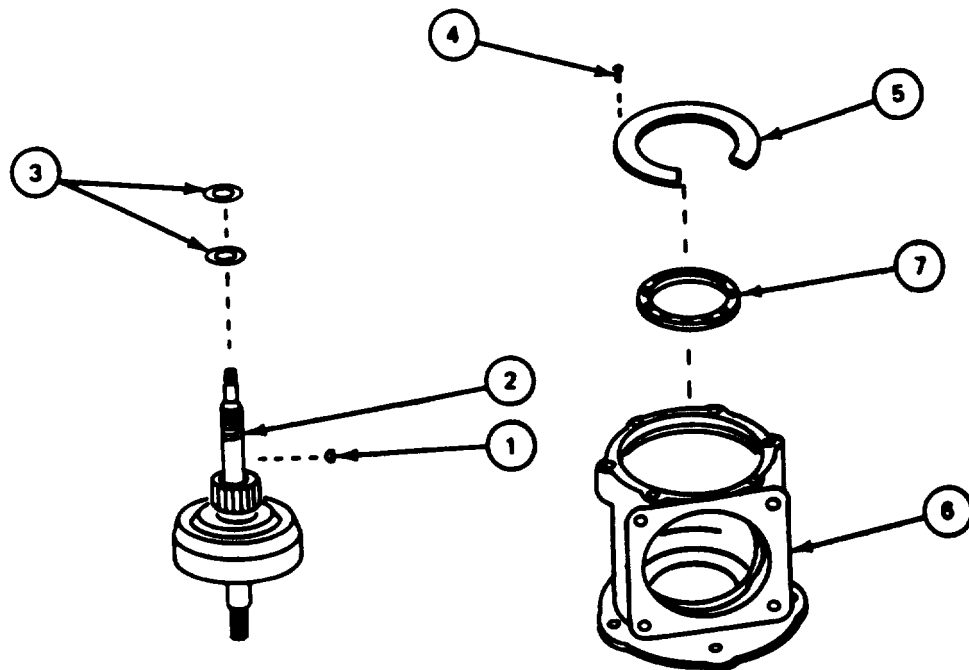


18-31. CLUTCH HOUSING DISASSEMBLY PROCEDURE (CONT)

FRAME 3	
Step	Procedure
	<ol style="list-style-type: none"><li>1. Using hands, remove spring (1) and lower spring guide (2) from housing (3).<li>2. Using hands, remove gear (4) and assembled clutch body and shaft (5) from housing (3). <p>GO TO FRAME 4</p> 

18-31. CLUTCH HOUSING DISASSEMBLY PROCEDURE (CONT)

FRAME 4	
Step	Procedure
1.	Using hammer and drift pin. remove woodruff key (1) from shaft (2).
2.	Using hands, remove two washers (3) from shaft (2).
3.	Using screwdriver. remove four screws with assembled washers (4) that attach plate (5) to housing (6). Remove plate.
4.	Using hammer and drift pin, lightly tap and remove bearing (7) from housing (6).
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Clean all parts. Inspect and repair all parts. Do detail inspection of parts (para 18-30).</p> <p>END OF TASK</p>



18-32. CLUTCH HOUSING ASSEMBLY PROCEDURE

TOOLS: 3 ounce brass hammer
Gear lock, 12290848
Torque socket, NSN 5120-00-627-8019
5/16 in. socket (3/8 in. drive)
7/16 in. socket (3/8 in. drive)
9/16 in. socket (3/8 in. drive)
5/8 in. socket (3/8 in. drive)
1-1/8 in. deepwell socket (1/2 in. drive)
3/8 in. drive ratchet
1/4 in. flat tip screwdriver
3/8 in. drive torque wrench (0 to 600 inch-pounds)
Plastic face hammer
1/2 in. drive torque wrench (0 to 250 foot-pounds)
Spanner wrench
Hinged handle (1/2 in. drive)
Vise with brass jaws
1-1/8 in. combination wrench

SUPPLIES: Oil (item 18, App. A)
Screws (MS90728-60) (two)
Preformed packing (MS28775-216)
Container
Rags (item 21, App. A)

PERSONNEL: One

PRELIMINARY PROCEDURES Inspect clutch housing (para 18-30)
Assemble clutch body (para 18-35)

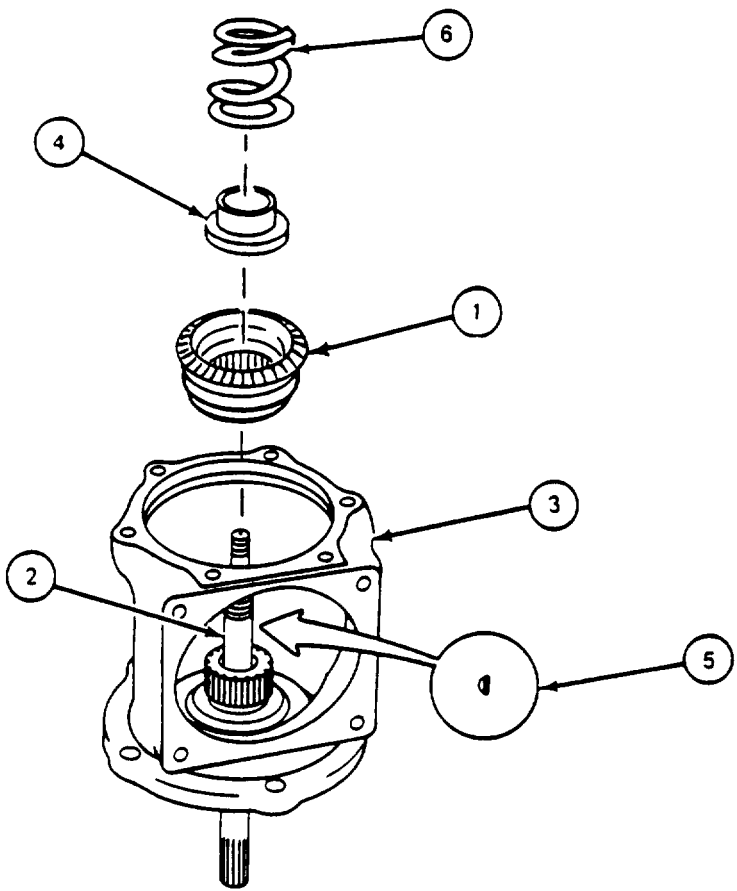
18-32. CLUTCH HOUSING ASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Word "THRUST" is marked on two bearings (1) and must be facing outward.</p> <p>1. Using plastic face hammer, put two bearings (1) in cover (2). GO TO FRAME 2</p>
<p>The diagram illustrates the assembly step. A circular clutch housing cover, labeled with a circled '2', is shown at the bottom. Above it, two bearings, each labeled with a circled '1', are shown being inserted into the housing. A dashed vertical line indicates the central axis of the bearings. Two arrows point from the circled '1' to the top and bottom bearings, indicating their orientation. The bearings have a textured outer surface and a smooth inner surface.</p>	

18-32. CLUTCH HOUSING ASSEMBLY PROCEDURE (CONT)

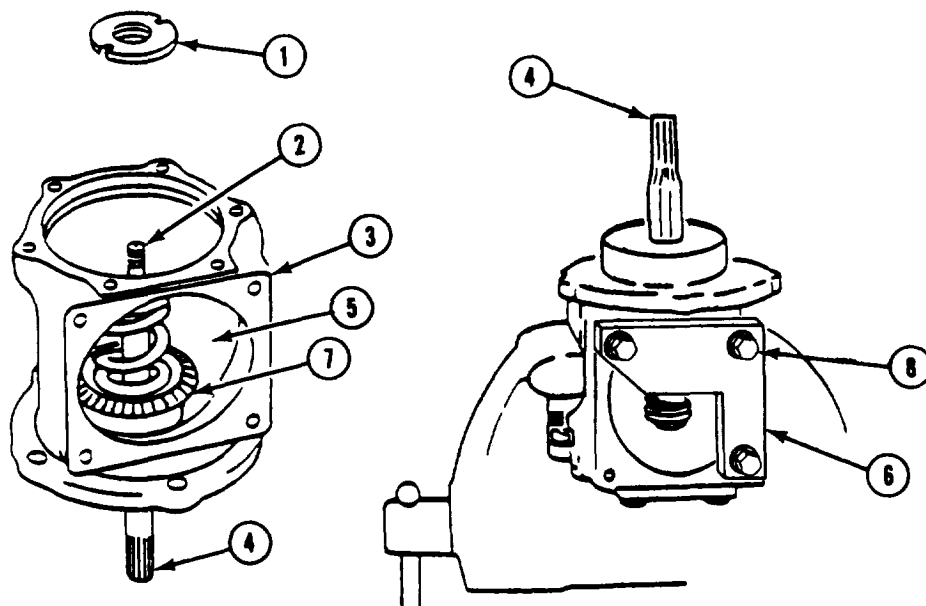
FRAME 2	
Step	Procedure
<ol style="list-style-type: none"> 1. Using plastic face hammer, lightly tap bearing (1) into housing (2). 2. Using screwdriver, attach bearing plate (3) to housing (2) with four screws and assembled washers (4). 3. Using hands, put steel washer (5) on shaft (6). 4. Using hands, put brass washer (7) on shaft (6). 5. Using brass hammer, lightly tap woodruff key (8) in shaft (6). 6. Using hands, put assembled clutch body (9) in housing (2). <p>GO TO FRAME 3</p>	<p>The diagram shows an exploded view of the clutch housing assembly. On the right, the housing (2) is shown with a bearing (1) being inserted into its bore. Above the housing, a bearing plate (3) is shown with four screws (4) and washers (5) being attached to its outer edge. On the left, a shaft (6) is shown with a steel washer (5) and a brass washer (7) being placed on its end. A woodruff key (8) is shown being inserted into a groove on the shaft. Below the shaft, the assembled clutch body (9) is shown being positioned to be inserted into the housing (2).</p>

18-32. CLUTCH HOUSING ASSEMBLY PROCEDURE (CONT)

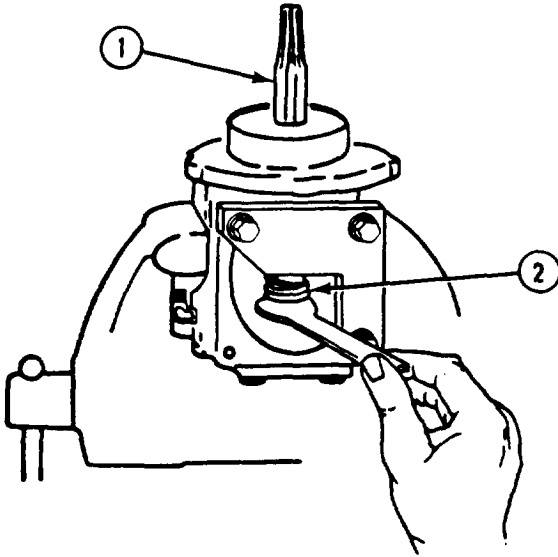
FRAME 3	
Step	Procedure
<ol style="list-style-type: none"> 1. Using hands, align splines in gear (1) with splines on shaft (2). 2. Using hands, put gear (1) on shaft (2) and seat bearing in housing (3). 3. Using hands, align spring guide (4) with woodruff key (5). 4. Put spring guide (4) on shaft (2). 5. Using hands, put spring (6) on spring guide (4) in housing (3). <p>GO TO FRAME 4</p>	
 <p>The diagram shows an exploded view of the clutch housing assembly. At the bottom is the main housing (3) with a shaft (2) protruding from the center. A gear (1) is shown above the shaft, with its splines aligned with the shaft's splines. A woodruff key (5) is positioned on the shaft, and a spring guide (4) is shown above it, aligned with the key. A spring (6) is shown at the top, positioned to be placed on the spring guide (4) inside the housing (3).</p>	

18-32. CLUTCH HOUSING ASSEMBLY PROCEDURE (CONT)

FRAME 4	
Step	Procedure
1.	Using hands, screw upper spring guide (1) on shaft (2).
2.	Put clutch housing (3) in a container with splined shaft (4) end down.
3.	Put oil into clutch housing (3) through no-bak opening (5) until clutch disks are thoroughly lubricated.
4.	Using hands, lock clutch housing (3) in bench vise with splined shaft (4) end up.
5.	Using hands, put gear lock (6) through no-bak opening (5) and mesh with clutch gear (7).
6.	Using 9/16 in. socket wrench, attach gear lock (6) to clutch housing (3) with three screws (8).
GO TO FRAME 5	

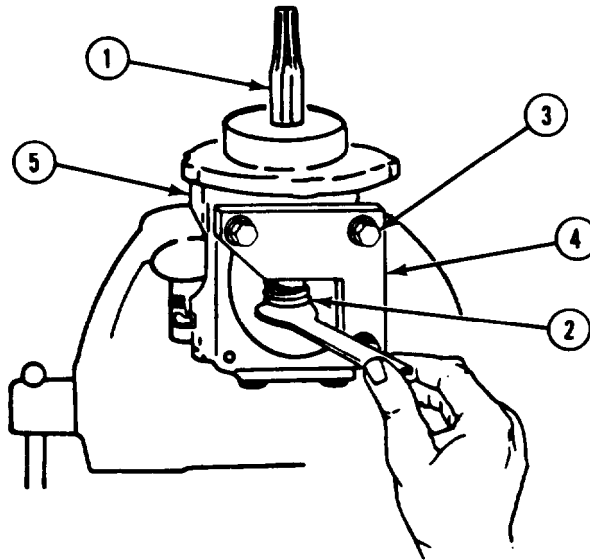


18-32. CLUTCH HOUSING ASSEMBLY PROCEDURE (CONT)

FRAME 5	
Step	Procedure
	NOTE
	Do this frame only if new disks are installed. Otherwise, go to frame 6.
1.	Using 1/2 in. torque wrench with torque socket on clutch shaft (1), pull on torque wrench and note torque reading when clutch shaft turns.
	NOTE
	Tightening spring guide (2) will increase torque reading, while loosening spring guide will decrease torque reading,
2.	Using hand or spanner wrench and 1/2 in. torque wrench with torque socket, hold and adjust spring guide (2) for a torque reading of about 125 foot-pounds.
3.	Using hinged handle and torque socket, turn clutch shaft (1) 30 turns to seat disks.
	GO TO FRAME 6
	

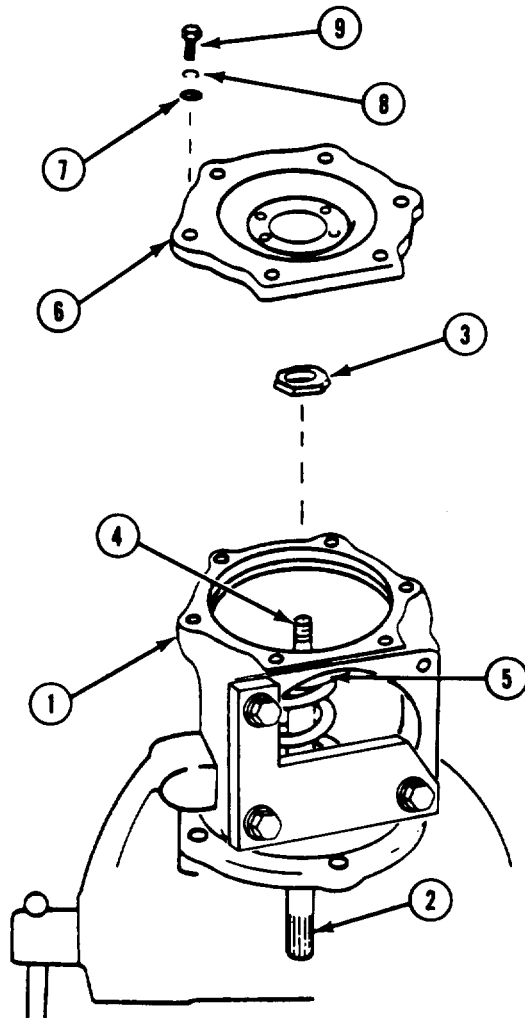
18-32. CLUTCH HOUSING ASSEMBLY PROCEDURE (CONT)

FRAME 6	
Step	Procedure
1.	Using 1/2 in. torque wrench with torque socket on splined shaft (1), pull on torque wrench and note torque reading when clutch shaft (1) turns.
	NOTE
	Tightening spring guide (2) will increase torque reading, while loosening spring guide will decrease torque reading.
2.	Using hand or spanner wrench and 1/2 in. torque wrench with torque socket, hold and adjust spring guide (2) for a torque reading on low side of 85 and 92 foot-pounds.
3.	Using 9/16 in. socket wrench, remove three screws (3) that attach gear lock (4) to clutch housing (5). Remove gear lock.
4.	Remove clutch housing (5) from vise.
	GO TO FRAME 7



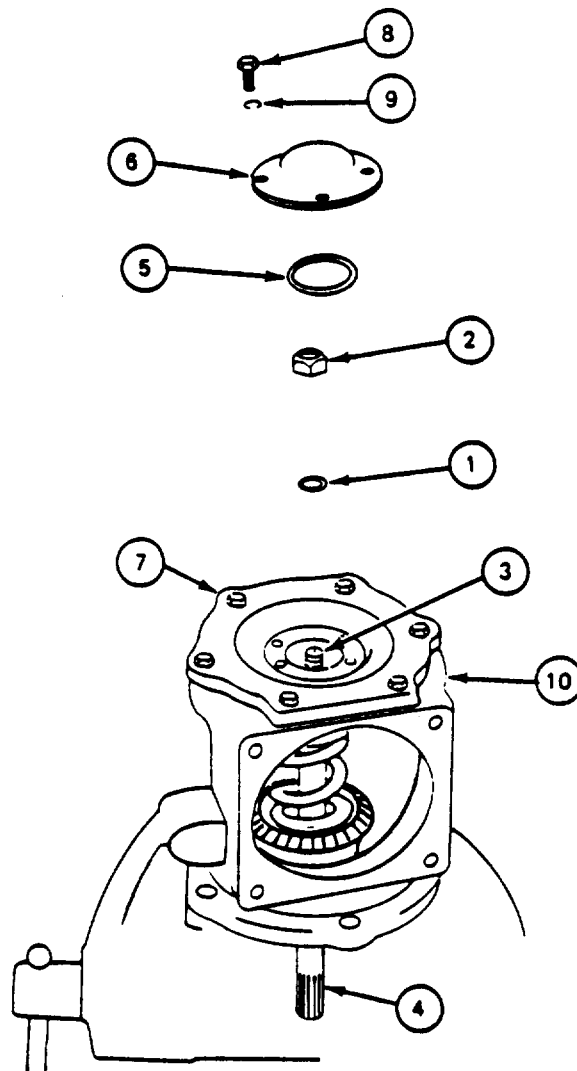
18-32. CLUTCH HOUSING ASSEMBLY PROCEDURE (CONT)

FRAME 7	
Step	Procedure
1.	Using hands, lock clutch housing (1) in vise with splined shaft (2) down.
2.	Using hands, put nut (3) on shaft (4).
3.	Using spanner wrench, hold upper spring guide (5) during step 4.
4.	Using 1/2" torque wrench with 1-1/8" deepwell socket, torque nut (3) to between 336 and 360 inch-pounds.
5.	Using 7/16" socket wrench, attach cover (6) to clutch housing (1) with six flat washers (7), six lockwashers (8) and six screws (9).
6.	Using 3/8" torque wrench with 7/16" socket, torque screws (9) to between 36 and 48 inch-pounds.
	GO TO FRAME 8



18-32. CLUTCH HOUSING ASSEMBLY PROCEDURE (CONT)

FRAME 8	
Step	Procedure
1.	Using hands, put washer (1) and nut (2) on shaft (3).
2.	Using hinged handle with torque socket, hold splined shaft (4) during step 3.
3.	Using 3/8" torque wrench with 5/8" socket, torque nut (2) to between 192 and 216 inch-pounds.
4.	Put preformed packing (5) in cap (6),
5.	Using 5/16" socket wrench, attach cap (6) to cover (7) with h four screws (8) and four lockwashers (9).
6.	Remove clutch housing assembly (10) from vise.
NOTE	
Follow-on Maintenance Action Required:	
Test clutch (para 18-24).	
END OF TASK	



18-33. CLUTCH BODY INSPECTION PROCEDURE

PERSONNEL: One

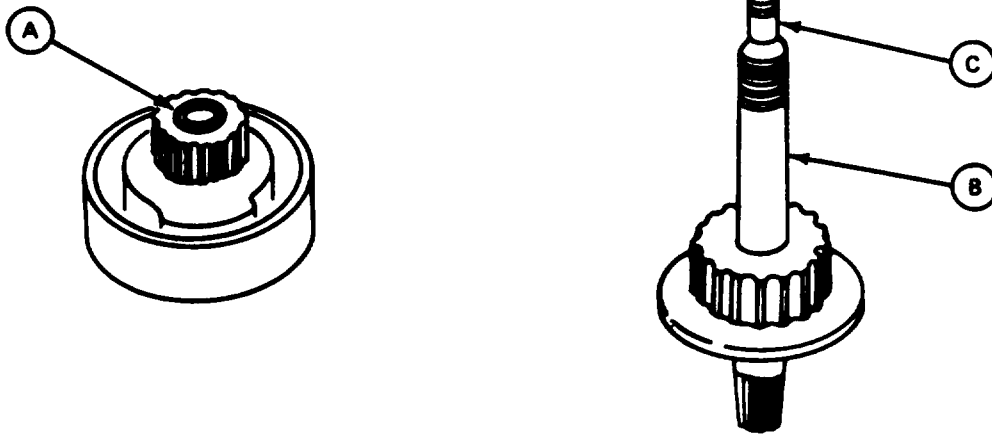
PRELIMINARY PROCEDURES: Disassemble clutch housing (para 18-33)
 Disassemble clutch body (para 18-36)

GENERAL INSTRUCTIONS:

NOTE

If part is bad, order repair part or next higher assembly as required.

FRAME 1			
Step	Procedure		
	SUPPORT SHOP WORK		
1.	Take clutch body parts to shop where inspection equipment is available.		
2.	Make dimensional check.		
	Reference Letter	Point of Measurement	Measurement
	A	ID of bushing	0.752 to 0.755
	B	OD of clutch shaft	0.750 to 0.751
	C	OD of clutch shaft shoulder	0.4711 to 0.4716
	NOTE		
	Tag all parts that are out of tolerance,		
3.	After support shop work, return clutch body parts to turret shop.		
	NOTE		
	If bushing measurement is out of tolerance, replace bushing (para 18-38).		
	END OF TASK		



18-34. CLUTCH BODY DISASSEMBLY PROCEDURE

TOOLS: Scraper
Stiff bristled brush
Fine stone

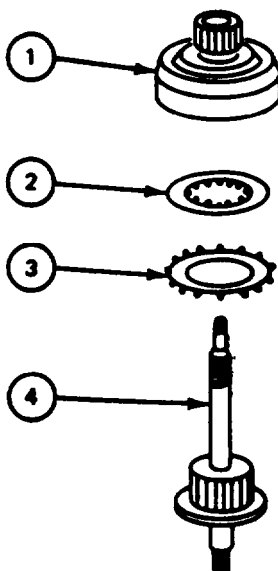
SUPPLIES: String or wire, 1 foot long
Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair pans

PRELIMINARY PROCEDURES: Remove clutch (para 18-26)
Test clutch (para 18-24)
Disassemble clutch housing (para 18-31)

18-34. CLUTCH BODY DISASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<p>NOTE</p> <p>Stack clutch disks in order in which removed. If re-used, disks must be reinstalled in same order.</p> <ol style="list-style-type: none"> 1. Using hands, remove clutch body (1), seven inner disks (2), and eight outer disks (3) from shaft (4). 2. Tie disks together with wire or string, so they won't get mixed up. <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 18-33).</p> <p>END OF TASK</p>
	 <p>The diagram illustrates the disassembly of a clutch body into four main components, labeled 1 through 4. Part 1 is the clutch body, shown as a cylindrical component with a splined end. Part 2 is an inner disk, a thin circular plate with a serrated inner edge. Part 3 is an outer disk, a circular plate with a serrated outer edge. Part 4 is the shaft, a long cylindrical rod with a splined end. Arrows point from the numbered circles to the respective parts.</p>

TM 9-2350-222-34-2-4

18-35 CLUTCH BODY ASSEMBLY PROCEDURE

TOOLS: 1/4" flat tip screwdriver

SUPPLIES: Oil (item 18, App. A)

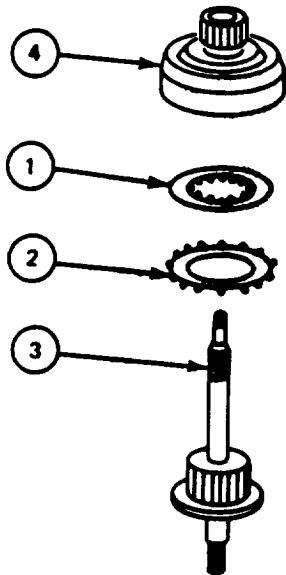
PERSONNEL: One

PRELIMINARY PROCEDURES: Inspect clutch body (para 18-35).

18-35. CLUTCH BODY ASSEMBLY PROCEDURE (CONT)

FRAME 1

Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">The inner disks (1) and outer disks (2) make up a matched disk set. If being reused, disks must be installed in the order which removed. There are seven inner disks and eight outer disks.</p> <ol style="list-style-type: none"> 1. Lightly coat inner and outer disks (1) and (2) with oil. 2. Put disks on shaft (3) starting with outer disks (2), then inner disk (1) and continue until all disks are on shaft. 3. Using screwdriver to align disks, put shaft (3) into clutch body (4). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required: Assemble clutch housing (para 18-32).</p> <p>END OF TASK</p>



18-36. CLUTCH BODY REPAIR PROCEDURE

SUPPLIES: Bushing (MS 35794-67)

PERSONNEL: One

PRELIMINARY PROCEDURES: Inspect parts (para 18-33)

GENERAL INSTRUCTIONS:

NOTE

Procedure is used to replace bad bushing in clutch body. If clutch body is bad, order repair part or next higher assembly as required.

18-36. CLUTCH BODY REPAIR PROCEDURE (CONT)

FRAME 1													
Step	Procedure												
	SUPPORT SHOP WORK												
1.	<p>Take clutch body and new bushing to shop where bearing press, precision measuring equipment, and reaming equipment are available.</p> <p>a. Remove bad bushing. b. Make dimensional check.</p> <table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 20%;">Reference Letter</th> <th style="text-align: left; width: 40%;">Point of Measurement</th> <th style="text-align: left; width: 40%;">Measurement</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>ID of bushing</td> <td>0.752 to 0.753</td> </tr> <tr> <td>B</td> <td>OD of bushing</td> <td>0.8745 to 0.8755</td> </tr> <tr> <td>C</td> <td>ID of body gear</td> <td>0.8745 to 0.8755</td> </tr> </tbody> </table> <p>c. Install new bushing. Press flush with body gear (C). d. Make bushing installation measurement. Center of bushing must be in line with center of major inside diameter (3.260 in.) within 0.0015 in. Ream bushing, if required.</p>	Reference Letter	Point of Measurement	Measurement	A	ID of bushing	0.752 to 0.753	B	OD of bushing	0.8745 to 0.8755	C	ID of body gear	0.8745 to 0.8755
Reference Letter	Point of Measurement	Measurement											
A	ID of bushing	0.752 to 0.753											
B	OD of bushing	0.8745 to 0.8755											
C	ID of body gear	0.8745 to 0.8755											
2.	<p>After support shop work, return clutch body to turret shop.</p> <p>END OF TASK</p>												

Section 5. HYDRAULIC MOTOR

18-37. MAINTENANCE PROCEDURES INDEX

Equipment Item	Inspection	Test	Tasks			
			Removal	Installation	Assembly	Repair
1. Hydraulic Motor	18-38	18-39	18-40	18-41	18-42	18-43
2. Hydraulic Motor Adapter	18-44	. . .	18-45	18-46	18-47	18-48

18-38. HYDRAULIC MOTOR INSPECTION PROCEDURE

PERSONNEL: One

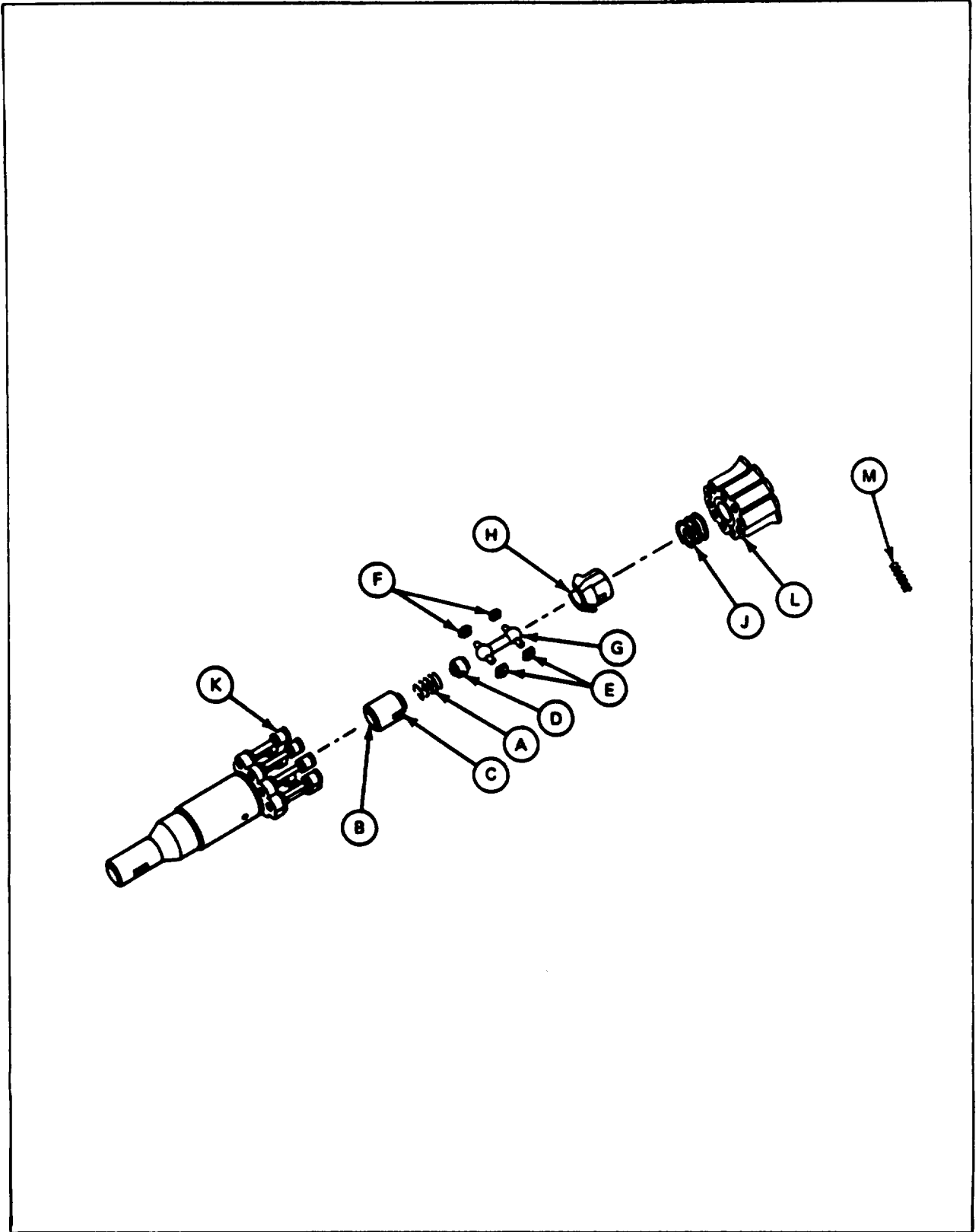
PRELIMINARY PROCEDURES: Disassemble hydraulic motor (para 18-42)

GENERAL INSTRUCTIONS:

NOTE

If part is bad, order repair part or next higher assembly as required.

FRAME 1																																								
Step	Procedure																																							
	SUPPORT SHOP WORK																																							
1.	Take hydraulic motor parts to shop where inspection equipment and spring tester are available.																																							
2.	Make dimensional check.																																							
	<table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: left;">Reference Letter</th> <th style="text-align: left;">Point of Measurement</th> <th style="text-align: left;">Measurement</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Spring-free length load at 0.280 in</td> <td>0.700 to 0.812 4.3 lbs</td> </tr> <tr> <td>B</td> <td>ID of retainer</td> <td>0.571 to 0.592</td> </tr> <tr> <td>C</td> <td>Width of slot in retainer</td> <td>0.4459 to 0.4464</td> </tr> <tr> <td>D</td> <td>OD of bearing</td> <td>0.548 to 0.569</td> </tr> <tr> <td>E</td> <td>Width of knuckle (four)</td> <td>0.4448 to 0.4450</td> </tr> <tr> <td>F</td> <td>ID of pin hole in knuckle (four)</td> <td>0.2199 to 0.2206</td> </tr> <tr> <td>G</td> <td>OD of pin</td> <td>0.2106 to 0.2197</td> </tr> <tr> <td>H</td> <td>Width of slot in retainer</td> <td>0.4457 to 0.4462</td> </tr> <tr> <td>J</td> <td>Spring-free length load at 0.630 in</td> <td>0.800 to 0.942 12.5 lbs</td> </tr> <tr> <td>K</td> <td>OD of piston (before fitting)</td> <td>0.408 to 0.409</td> </tr> <tr> <td>L</td> <td>ID of bore in motor block (before fitting)</td> <td>0.4062 to 0.4066</td> </tr> <tr> <td>M</td> <td>Spring-free length load at 1.046 in</td> <td>1.24 to 132 lbs</td> </tr> </tbody> </table>	Reference Letter	Point of Measurement	Measurement	A	Spring-free length load at 0.280 in	0.700 to 0.812 4.3 lbs	B	ID of retainer	0.571 to 0.592	C	Width of slot in retainer	0.4459 to 0.4464	D	OD of bearing	0.548 to 0.569	E	Width of knuckle (four)	0.4448 to 0.4450	F	ID of pin hole in knuckle (four)	0.2199 to 0.2206	G	OD of pin	0.2106 to 0.2197	H	Width of slot in retainer	0.4457 to 0.4462	J	Spring-free length load at 0.630 in	0.800 to 0.942 12.5 lbs	K	OD of piston (before fitting)	0.408 to 0.409	L	ID of bore in motor block (before fitting)	0.4062 to 0.4066	M	Spring-free length load at 1.046 in	1.24 to 132 lbs
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M	Spring-free length load at 1.046 in	1.24 to 132 lbs																																						
	NOTE																																							
	Tag all parts that are out of tolerance.																																							
3.	After support shop work, return hydraulic motor parts to turret shop.																																							
	END OF TASK																																							



18-39. HYDRAULIC MOTOR TEST PROCEDURE

TEST EQUIPMENT: Constant displacement pump
 10-micron filter
 Pressure regulator
 Tachometer
 Pressure gauge
 Two-way control valve
 Shutoff valve (three)
 Dynamometer
 125 psi check valve
 Flow meter (two)
 Temperature gauge
 Watch
 Hydraulic test kit (NSN 1015-01-151-6441) (9337932)

SUPPLIES: Hydraulic fluid (item 10, App. A)
 Lint-free cloths (item 21, App. A)
 Pencil
 Paper
 Plugs for ports

PERSONNEL: One

PRELIMINARY PROCEDURE: Hydraulic motor assembled (para 18-43).

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

Use lint-free cloths for oil spillage.

Put plugs in ports to keep out dirt.

NOTE

If normal indication is not obtained, hydraulic motor must be disassembled (para 18-42).

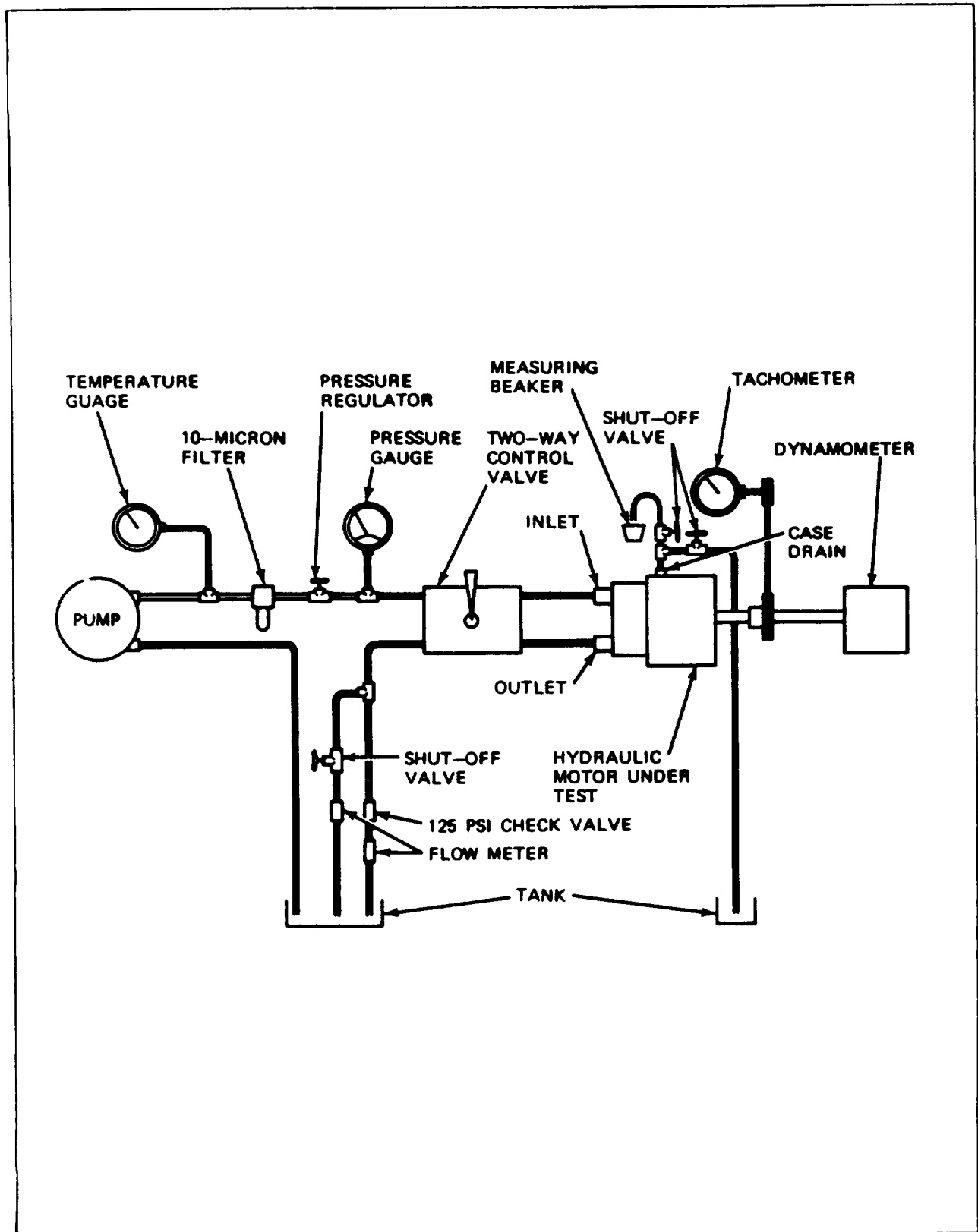
Test Conditions:

- (a) Maintain hydraulic fluid at a temperature of $100^{\circ} \pm 4^{\circ}\text{F}$, unless otherwise specified.
 Maximum height of drain line is 1 to 4 inches above maximum height of drain case.
 Maintain drain case full of hydraulic fluid.
 Maintain 125 psi at discharge port unless otherwise specified.
 Run-in tests on motor to be run in both directions.
 All shutoff valves closed.

18-39. HYDRAULIC MOTOR TEST PROCEDURE (CONT)

a. Run-In Test A

FRAME 1			
Step	Procedure	Normal Indication	Probable Fault
SUPPORT SHOP WORK			
1.	Connect hydraulic motor to test setup.	. . .	. . .
2.	Open shut-off valve from case drain to tank.	. . .	. . .
3.	Put two-way control valve in position to allow flow to hydraulic motor inlet.	. . .	. . .
4.	Apply load of 36 to 40 inch-pound at hydraulic motor shaft with dynamometer.	. . .	. . .
5.	Slightly open pressure regulator.	. . .	. . .
6.	Turn on hydraulic pump.	. . .	. . .
7.	Adjust pressure regulator to operate hydraulic motor at 550 to 650 rpm in tachometer.	550 to 650 rpm on tachometer	. . .
8.	Using hands and watch, after five minutes turn off hydraulic pump.	Hydraulic motor should operate without excessive noise.	Bad hydraulic motor
9.	Put two-way control valve in opposite position and allow flow to hydraulic motor outlet.	. . .	. . .
10.	Repeat steps 6 thru 8.	. . .	. . .
GO TO FRAME 2			

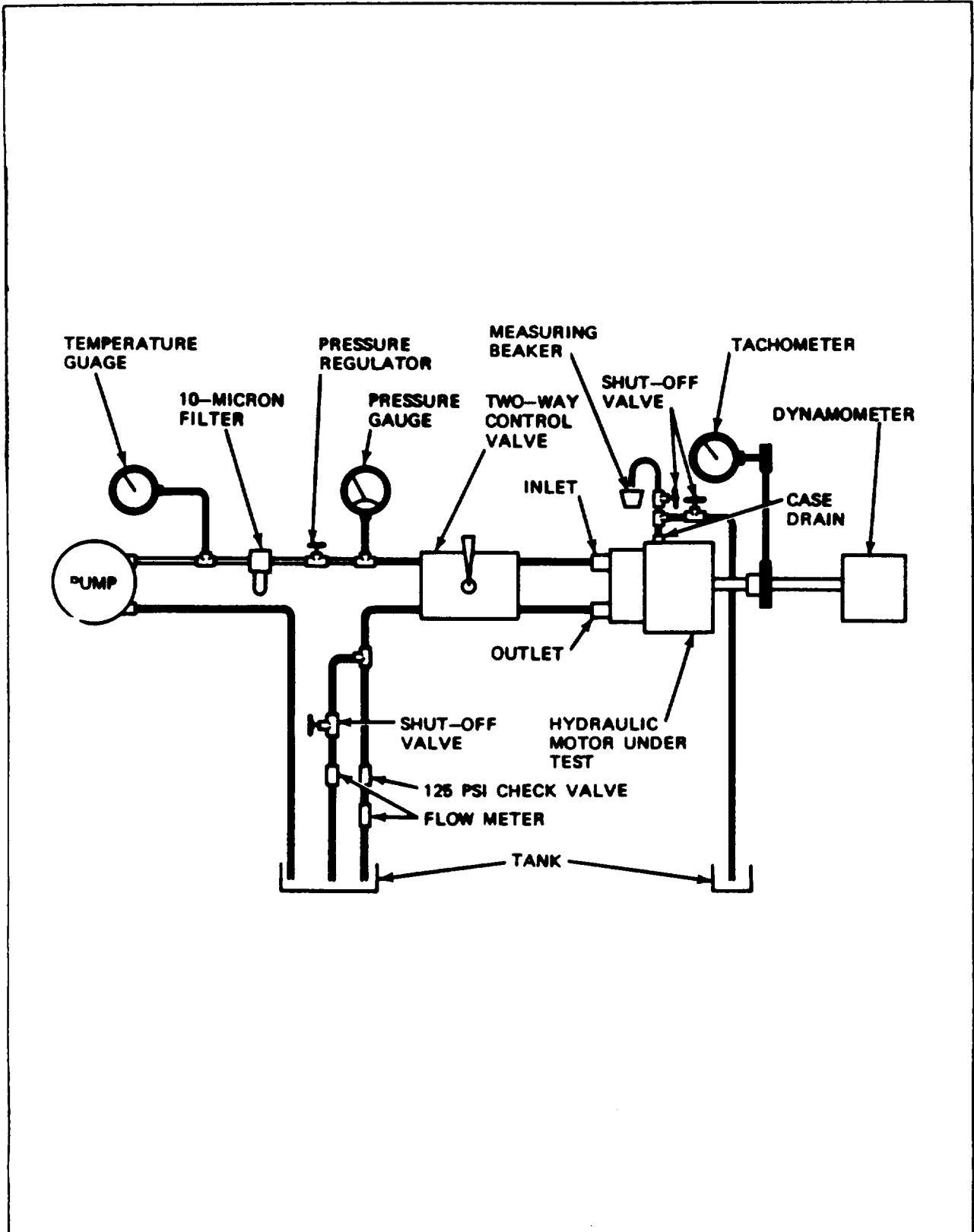


18-39. HYDRAULIC MOTOR TEST PROCEDURE (CONT)

Run-In Test B

FRAME 2

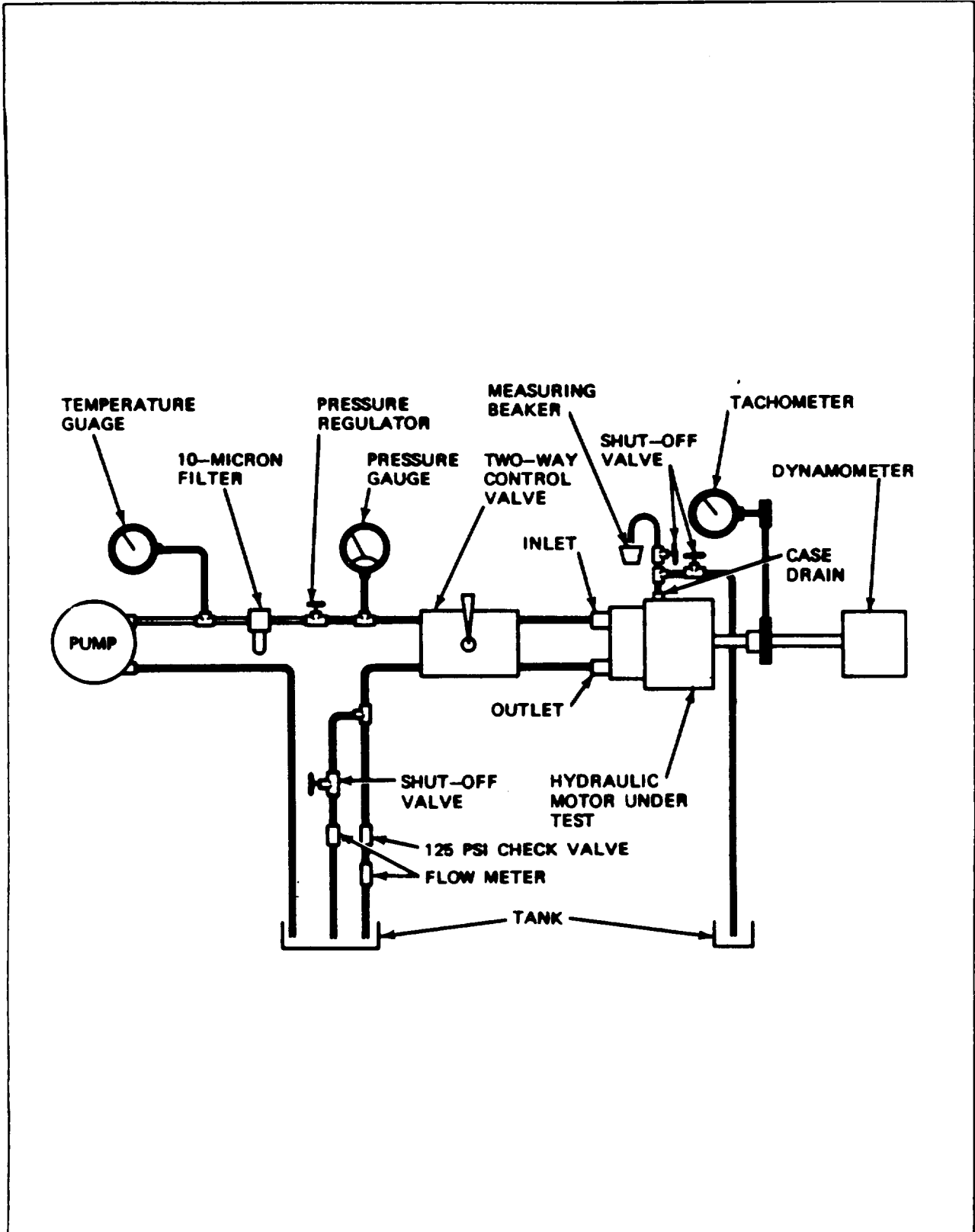
Step	Procedure	Normal Indication	Probable Fault
SUPPORT SHOP WORK			
1.	Apply load of 0.025 to 0.029 Pounds/second ² at hydraulic motor shaft with dynamometer.	...	...
2.	Turn on hydraulic pump,	...	...
3.	Adjust pressure regulator to operate hydraulic motor at 4750 to 4850 rpm on tachometer.	...	...
4.	Using hands and watch, put two-way control valve in off position for one second and then back to original position.	Hydraulic motor should operate without excessive noise.	Bad hydraulic motor
5.	Allow hydraulic motor speed to return to 4750 to 4850 rpm on tachometer.	4750 to 4850 rpm on tachometer	...
6.	Repeat steps 4 and 5 for 24 times to shock motor.	...	...
7.	Turn off hydraulic pump.	...	...
8.	Put two-way control valve in opposite position and allow flow to hydraulic motor inlet.	...	...
9.	Turn on hydraulic pump.	...	...
10.	Repeat steps 4 thru 6.	...	...
11.	Turn off hydraulic pump.	...	...
GO TO FRAME 3			



18-39. HYDRAULIC MOTOR TEST PROCEDURE (CONT)

c. Run-In Test C

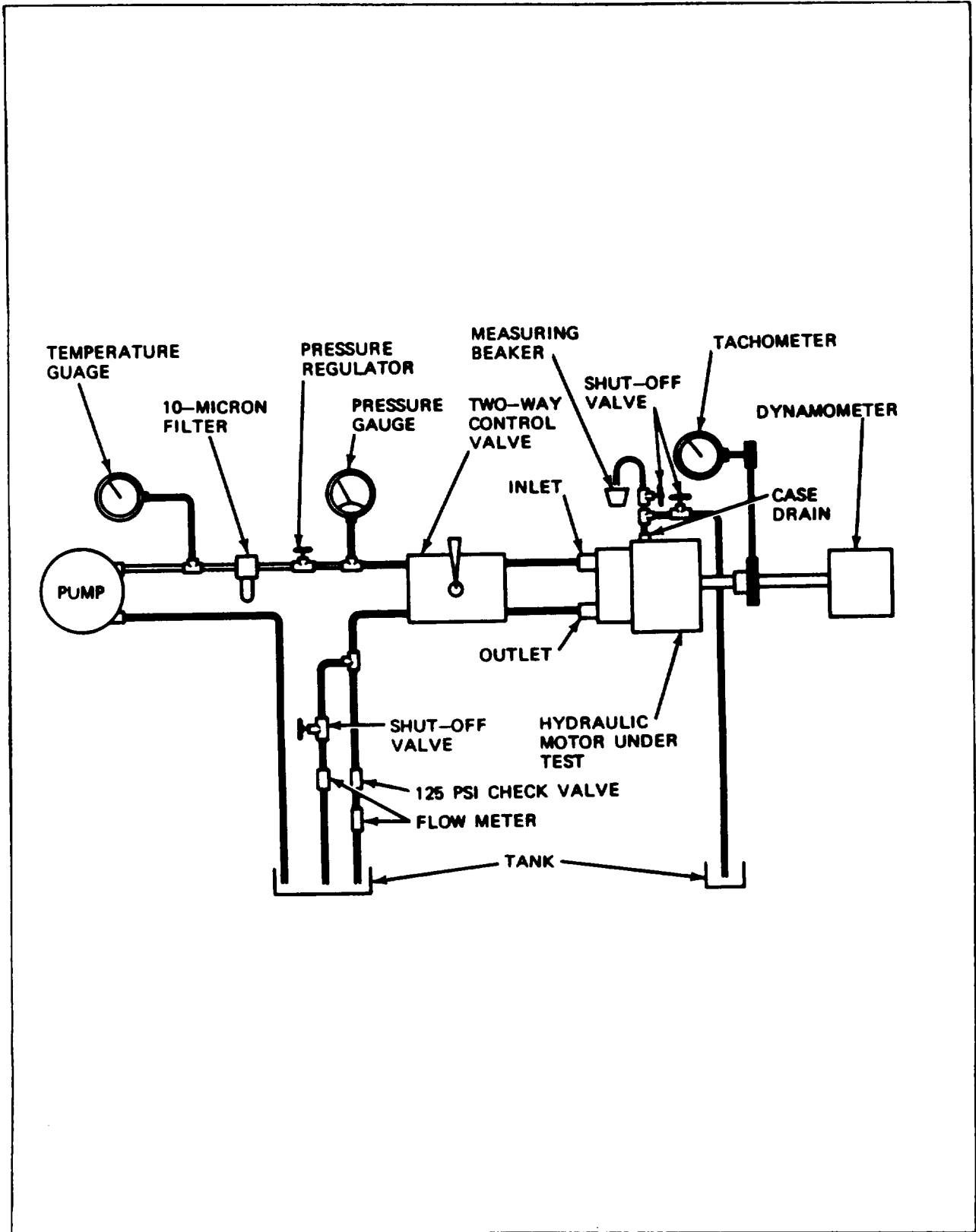
FRAME 3			
Step	Procedure	Normal Indication	Probable Fault
SUPPORT SHOP WORK			
1.	Apply load of 36 to 44 inch-pounds at hydraulic motor shaft with dynamometer.	. . .	. . .
2.	Turn on hydraulic pump.	. . .	. . .
3.	Using hands and watch, adjust pressure regulator to operate hydraulic motor at minimum temperature of 150°F for 1 minute.	Hydraulic motor should operate without excessive noise.	Bad hydraulic motor
4.	Turn off hydraulic pump.	. . .	. . .
5.	Put two-way control valve in opposite position and allow flow to hydraulic motor outlet.	. . .	. . .
6.	Repeat steps 2 thru 4. GO TO FRAME 4	. . .	. . .



18-39. HYDRAULIC MOTOR TEST PROCEDURE (CONT)

d. Relief Valve Setting Test

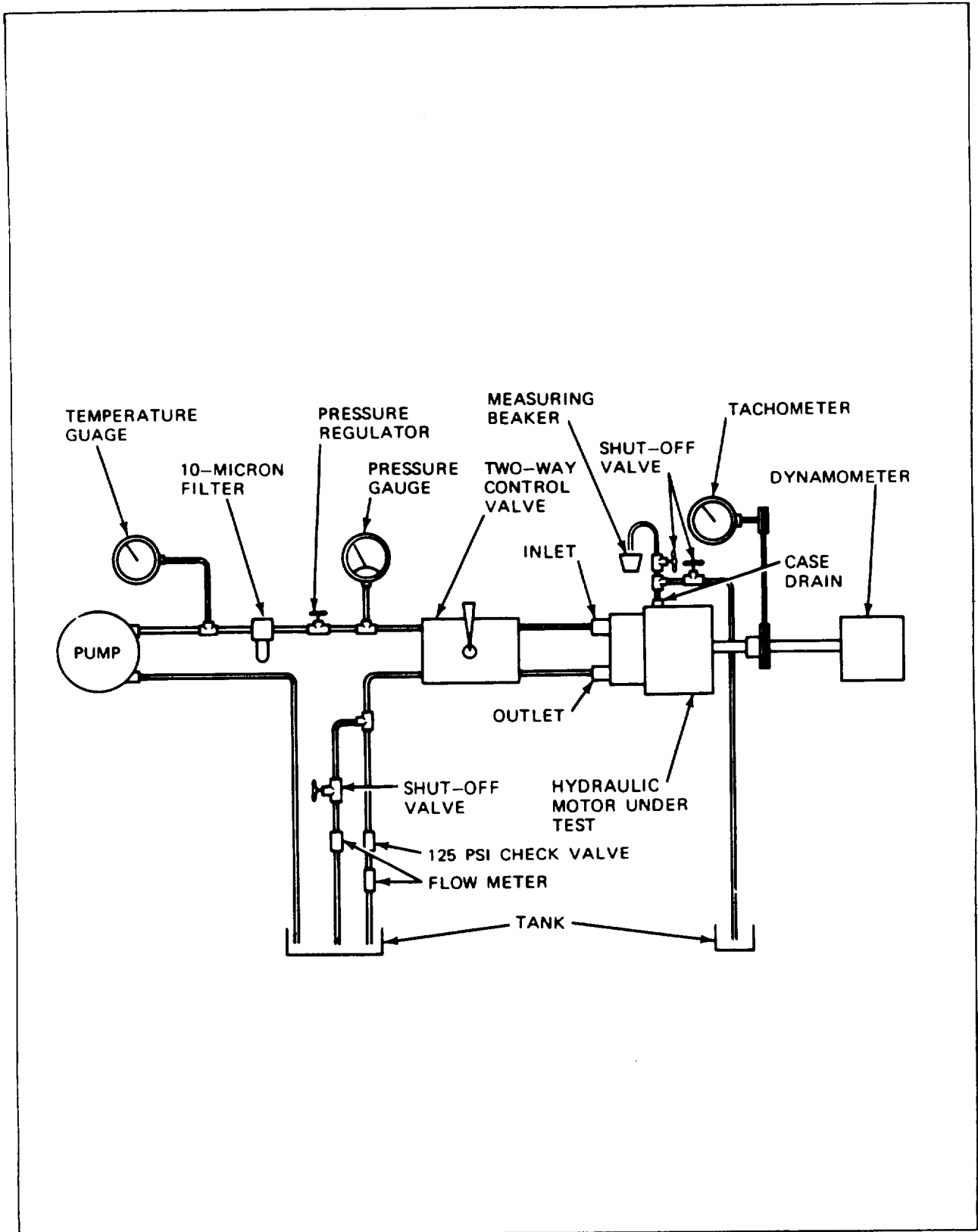
FRAME 4			
Step	Procedure	Normal Indication	Probable Fault
SUPPORT SHOP WORK			
1.	Apply load and lock hydraulic motor shaft with dynamometer.	. . .	. . .
2.	Put two-way control valve in opposite position and allow flow to hydraulic motor inlet.	. . .	. . .
3.	Turn on hydraulic pump.		
4.	Adjust pressure regulator to operate hydraulic motor at 1800 to 2100 psi on pressure gauge.	1800 to 2100 psi on pressure gauge	
5.	Open shut-off valve from case drain to measuring beaker.	. . .	. . .
6.	Close shut-off valve from case drain to tank.	. . .	. . .
7.	Open shut-off valve from two-way control valve to tank and get flow from 30 to 40 cubic inches per minute on flow meter.	External leakage at drain ports measuring beaker should not exceed 4.58 cubic inches per minute (75 cubic centimeters per minute).	Bad hydraulic motor
8.	Turn off hydraulic pump.	. . .	. . .
9.	Remove load from dynamometer.	. . .	. . .
10.	Close shut-off valve from case drain to measuring beaker.	. . .	. . .
11.	Open shut-off valve from case drain to tank.		
GO TO FRAME 5			



18-39. HYDRAULIC MOTOR TEST PROCEDURE (CONT)

e. Internal leakage Test A and B

FRAME 5			
Step	Procedure	Normal Indication	Probable Fault
SUPPORT SHOP WORK			
1.	Open shut-off valve from two-way control valve to tank. . . .	. . . .	. . . .
2.	Turn on hydraulic pump.	. . . .	. . . .
3.	Adjust dynamometer and pressure regulator to get 1000 to 1050 psi with a hydraulic motor speed of 594 to 606 rpm on tachometer.	1000 to 1050 psi on pressure gauge 594 to 606 rpm on tachometer	. . . .
4.	Using pencil, paper and watch, record flow measurement from flow meter for 1 minute.	. . . .	. . . .
5.	Turn off hydraulic pump.	. . . .	. . . .
6.	Remove load from dynamometer.	. . . .	. . . .
7.	Turn on hydraulic pump.	. . . .	. . . .
8.	Adjust pressure regulator to get 594 to 606 rpm on tachometer.	594 to 606 rpm on tachometer	. . . .
9.	Using pencil, paper and watch, record flow measurement from flow meter for 1 minute.	. . . .	. . . .
10.	Turn off hydraulic pump.	. . . .	. . . .
11.	Using pencil and paper, subtract flow measurement from step 9 from flow measurement from step 4.	Measurement should not exceed 15 cubic inches per minute.	Bad hydraulic motor
12.	Remove hydraulic motor from test setup.	. . . .	. . . .
NOTE			
If normal indication was obtained, hydraulic motor is good.			
END OF TASK			



Para 18-39 Cont

18-123/(18-124 blank)

18-40. HYDRAULIC MOTOR REMOVAL PROCEDURE

TOOLS: 1/4" drift pin
 8 ounce ball peen hammer
 5/8" combination wrench
 8" adjustable wrench
 1" combination wrench
 7/8" combination wrench
 6" extension (3/8" drive)
 5/16" open end wrench
 3/16" hex head screwdriver bit (3/8" drive)
 13/16" combination wrench
 5/16" socket (3/8" drive)
 3/8" drive ratchet
 O-ring extractor tool
 Scraper
 Stiff brisled brush
 Vise with brass caps
 3/32" socket head screw key (Allen wrench)
 Gear puller

SUPPLIES: 2 quart container
 Rags (item 21, App. A)
 Plugs and caps for tubes and adapters
 Dry cleaning solvent (item 33, App. A)

PERSONNEL: One

REFERENCES: TM 9-2350-222-20-2-3 for procedure to lower hydraulic pressure
 JPG for procedures to:
 Remove preformed packings
 Clean parts
 Use gear puller
 TM 9-2350-222-10 for procedure to traverse turret

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7
Turret Traversing Mechanism	FO-2	12

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
 Turret traverse lock set to LOCKED
 Hydraulic system pressure lowered to 0 psi (TM-20-2-3)

GENERAL INSTRUCTIONS:

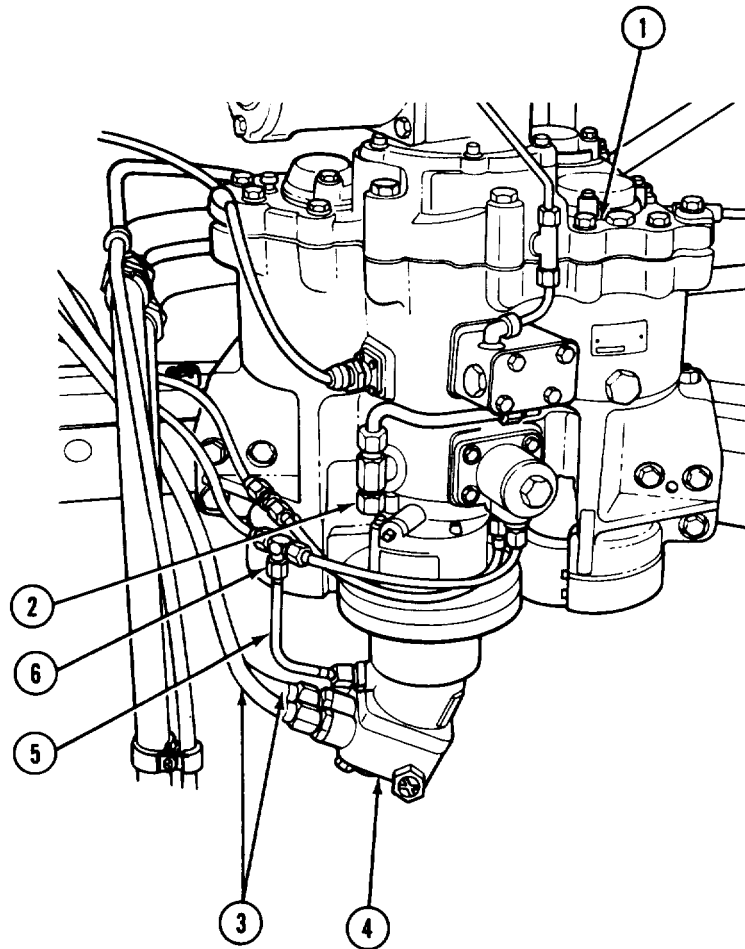
CAUTION

Keep dirt from getting in parts. Dirt can damage equipment. Use rags for oil spillage.

Put plugs in tubes and caps on adapters to keep out dirt.

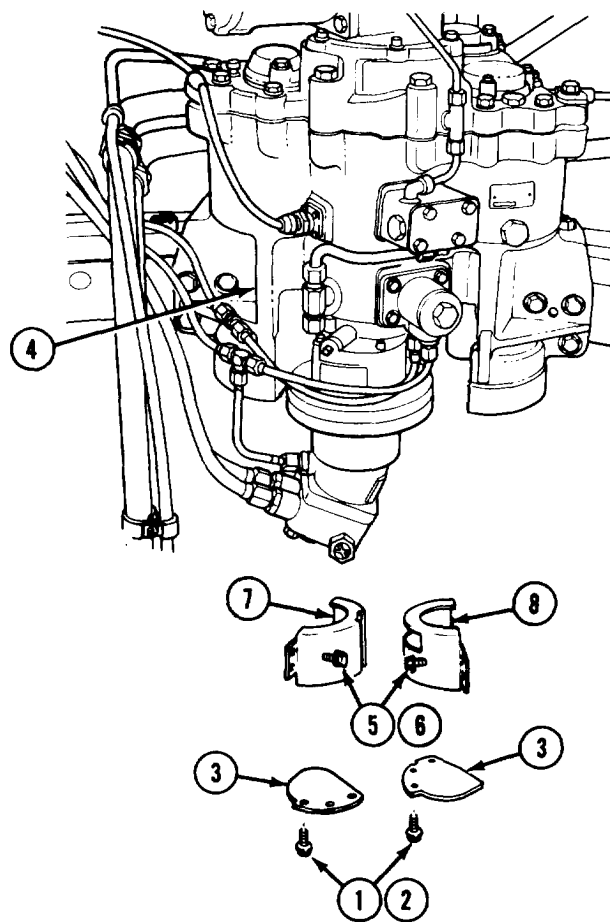
18-40. HYDRAULIC MOTOR REMOVAL PROCEDURE (CONT)

FRAME 1	
STEP	PROCEDURE
	<div style="text-align: center; border: 1px solid black; padding: 2px;">WARNING</div> <p style="text-align: center;">Before removing hydraulic tubes or parts, hydraulic system pressure must be lowered to 0 psi. Hydraulic fluid under pressure can hurt you.</p> <ol style="list-style-type: none"> 1. Traverse turret so traversing mechanism can be reached from driver's compartment (TM-ICI). 2. Using 7/8 inch wrench, loosen oil fill plug (1). Put container under drain plug (2). 3. Using adjustable wrench, remove drain plug (2). Let oil drain. 4. Using adjustable wrench, replace drain plug (2). 5. Using 7/8 inch and 1 inch wrenches, disconnect two tubes (3) from hydraulic motor (4). 6. Using 5/8 inch wrench, loosen tube (5) at tee (6). 7. Using 5/8 inch and 13/16 inch wrenches, disconnect tube (5) from hydraulic motor (4). pull tube (5) away from hydraulic motor (4). <p>GO TO FRAME 2</p>



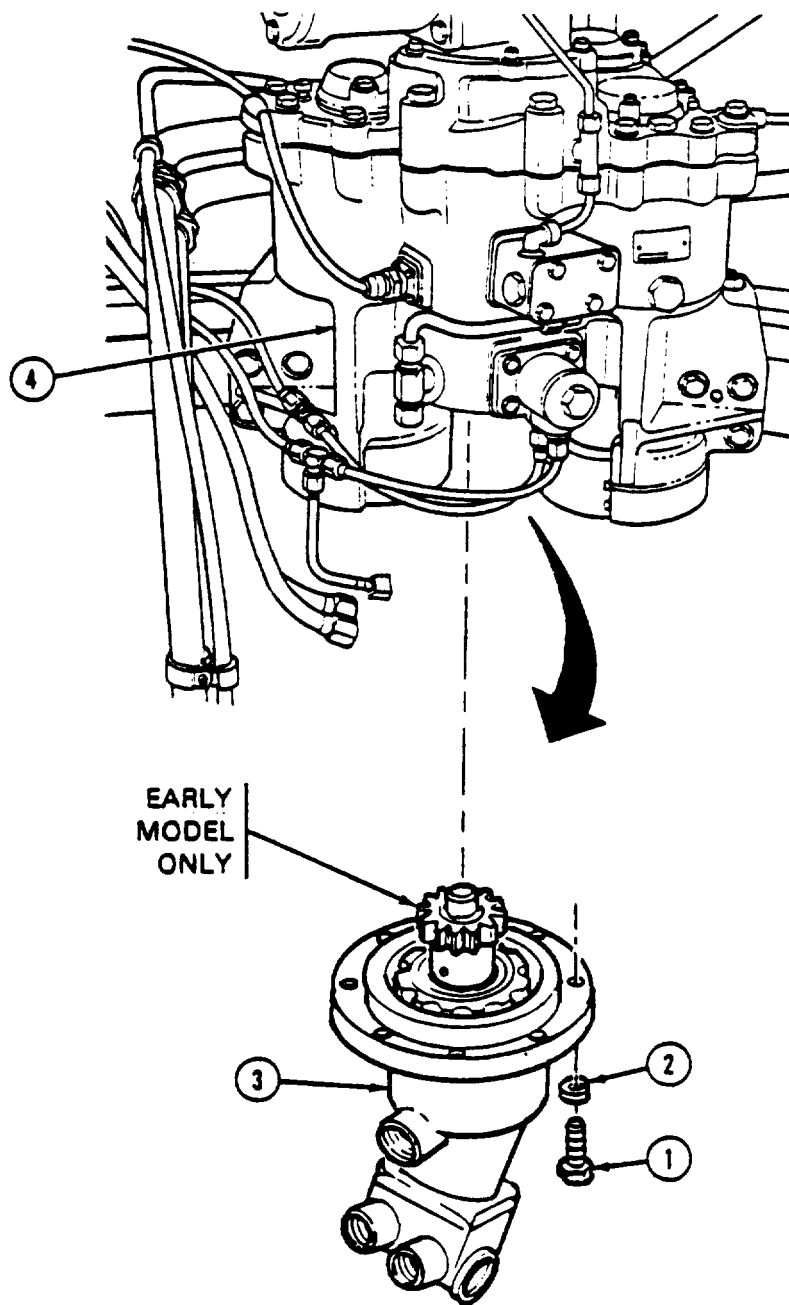
1840. HYDRAULIC MOTOR REMOVAL PROCEDURE (CONT)

FRAME 2	
STEP	PROCEDURE
1.	Using 5/16 inch socket wrench, remove three screws (1) and three assembled washers (2) that attach plate (3) to traversing mechanism (4). Remove plate (3).
2.	Using 5/16 inch open end wrench, remove two screws (5) and two assembled washers (6) that attach guard (7) to traversing mechanism (4). Remove guard,
3.	Repeat step 2 for guard (8).
GO TO FRAME 3	



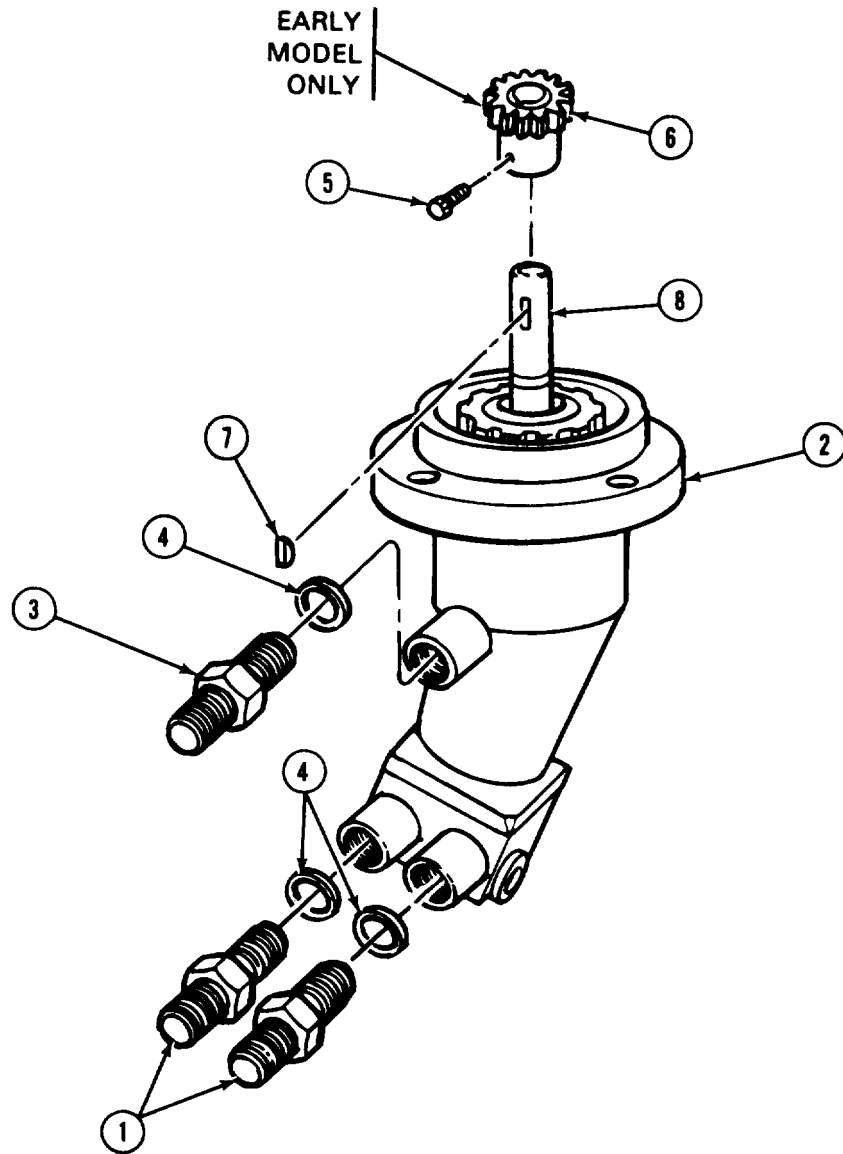
18-40. HYDRAULIC MOTOR REMOVAL PROCEDURE (CONT)

FRAME 3	
STEP	PROCEDURE
	<div style="text-align: center; border: 1px solid black; padding: 2px;">WARNING</div> <p style="text-align: center;">Oil will drip from traversing mechanism (4) when hydraulic motor (3) is removed. Hydraulic fluid could hurt you.</p> <ol style="list-style-type: none"> <li>1. Using 3/16 inch screwdriver bit with extension and ratchet, loosen four screws (1) and four lockwashers (2) that attach hydraulic motor (3) to traversing mechanism (4). <li>2. Using hands, remove four screws (1) and four lockwashers (2), while holding hydraulic motor (3). <li>3. Using hands, remove hydraulic motor (3). <p>GO TO FRAME 4</p>



18-40. HYDRAULIC MOTOR REMOVAL PROCEDURE (CONT)

FRAME 4	
STEP	PROCEDURE
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do steps 1 thru 6 if hydraulic motor (2) is not serviceable and is being replaced. It may be necessary to put hydraulic motor (2) in vise.</p> <ol style="list-style-type: none"> 1. Using 1 inch wrench remove two adapters (1) from hydraulic motor (2). 2. Using 13/16 inch wrench remove adapter (3) from hydraulic motor (2). 3. Using O-ring extractor tool, remove three preformed packings (4) from two adapters (1) and adapter (3) (JPG) Throw preformed packings (4) away. <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do steps 4 and 5 only if your hydraulic motor has this gear (6).</p> <ol style="list-style-type: none"> 4. Using Allen wrench, remove setscrew (5) from gear (6). 5. Using gear puller, remove gear (6) (JPG). 6. Using hammer and drift pin, remove woodruff key (7) from shaft (8). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required</p> <p style="text-align: center;">Clean all parts (JPG).</p> <p>END OF TASK</p>



18-41. HYDRAULIC MOTOR INSTALLATION PROCEDURE

- TOOLS:**
- 3/4" drift pin punch
 - 5/8" combination wrench
 - 7/8" combination wrench
 - 13/16" combination wrench
 - 1" combination wrench
 - 3 oz. soft brass hammer
 - 3/16" screwdriver bit (3/8" drive)
 - 5/16" socket (3/8" drive)
 - 3/8" drive torque wrench (0 to 150 inch-pounds)
 - 6" extension (3/8" drive)
 - 3/8" drive hinged handle
 - O-ring extractor tool
 - 3/8" drive ratchet
 - 3/32" socket head screw key (Allen wrench)

- SUPPLIES:**
- Mounting gasket (7739311)
 - Preformed packing (MS28778-8) (2 required)
 - Preformed packing (MS8778-6)
 - Hydraulic fluid (item 10, App. A)

PERSONNEL: One

- REFERENCES:**
- LO 9-2350-222-12 for procedures to:
 - Fill traversing mechanism
 - JPG for procedures to:
 - Use torque wrench
 - Install preformed packings
 - TM 9-2350-222-10 for procedure to traverse turret

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7
Turret Traversing Mechanism	FO-2	12

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Turret traverse lock set to LOCKED

PRELIMINARY PROCEDURES: Assemble hydraulic motor (para 18-43)
Test hydraulic motor (para 18-39)

GENERAL INSTRUCTIONS:

CAUTION

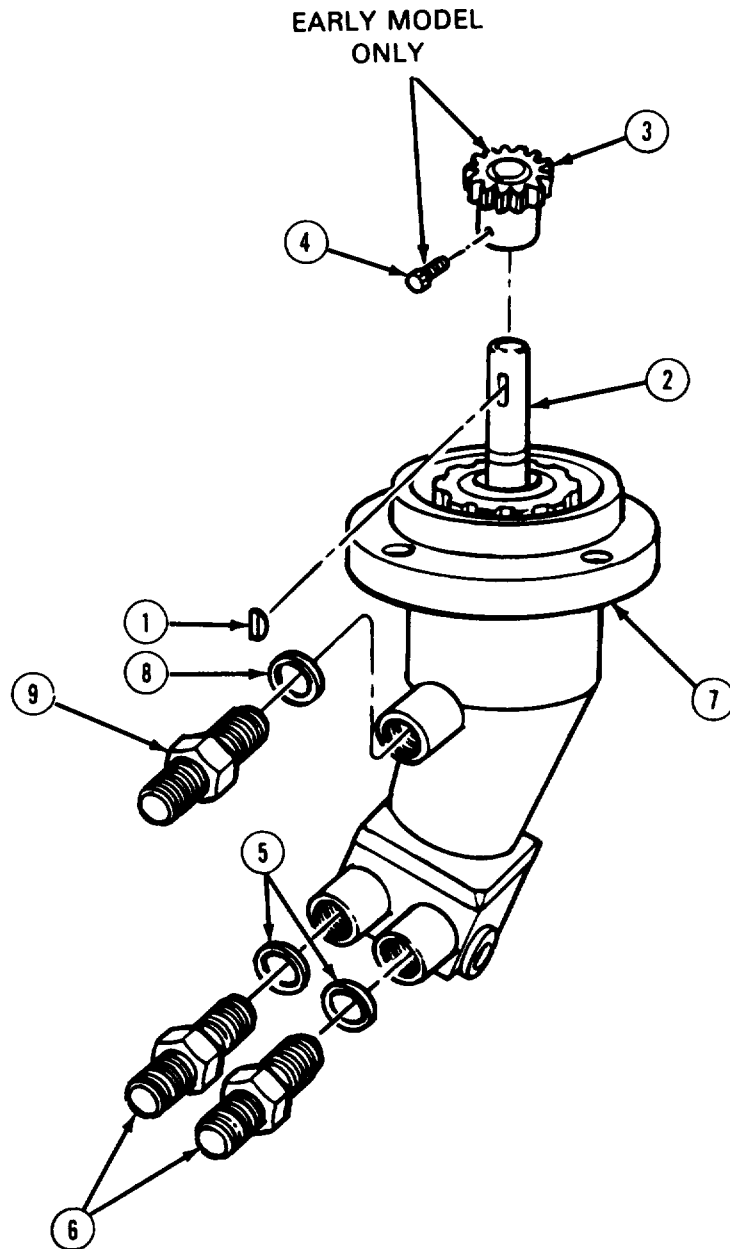
Keep dirt from getting in tubing or parts. Dirt can damage equipment.

NOTE

Remove plugs from tubes and caps of adapters.

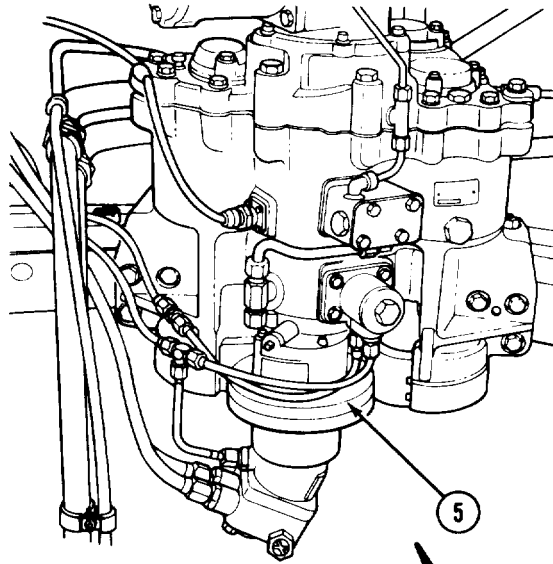
18-41. HYDRAULIC MOTOR INSTALLATION PROCEDURE (CONT)

FRAME 1	
STEP	PROCEDURE
	NOTE
	Do steps 1 through 8 if new hydraulic motor is to be installed. Skip steps 2, 3, and 4 if your hydraulic motor does not have gear (3).
1.	Using hammer, put woodruff key (1) in shaft (2). Woodruff key should be flat with edge of shaft.
2.	Align keyway in gear (3) with woodruff key (1).
3.	Using drift pin and hammer, put gear (3) on shaft (2).
4.	Using Allen wrench, put setscrew (4) in gear (3).
5.	Lightly coat two packings (5) with hydraulic fluid.
6.	Using O-ring extractor tool, put two preformed packings (5) on two adapters (6) (JPG).
7.	Using 1 inch wrench, put two adapters (6) in ports of hydraulic motor (7).
8.	Lightly coat preformed packing (8) with hydraulic fluid.
9.	Using O-ring extractor tool, put preformed packing (8) on adapter (9) (JPG).
10.	Using 13/ 16 inch wrench, put adapter (9) in port of hydraulic motor (7).
	GO TO FRAME 2

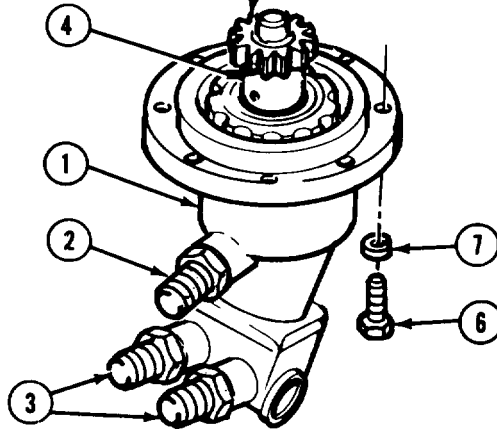


18-41. HYDRAULIC MOTOR INSTALLATION PROCEDURE (CONT)

FRAME 2	
STEP	PROCEDURE
1.	<p>Using hands, position hydraulic motor (1) so adapters (2) and (3) face hydraulic lines.</p> <p style="text-align: center;">NOTE</p> <p style="padding-left: 40px;">Align gear (4) with gear in hydraulic motor adapter (S) on early modal.</p> <p style="padding-left: 40px;">Align spline of hydraulic motor (1) with splines in adapter (5), on late model.</p>
2.	<p>Using hands, put hydraulic motor (1) on adapter (5). Hold hydraulic motor in place.</p> <p style="text-align: center;">NOTE</p> <p style="padding-left: 40px;">Turret may have to be traversed and hydraulic motor (1) turned slightly to align screw holes of hydraulic motor (1) with adapter (5).</p>
3.	<p>Using 3/16 inch hex head socket wrench and 6 inch extension, attach hydraulic motor (1) to hydraulic motor adapter (5) with four screws (6) and four lockwashers (7).</p>
4.	<p>Using torque wrench with 3/16 inch hex head socket and 6 inch extension, torque screws (6) to between 32 and 40 inch-pounds (JPG).</p> <p>GO TO FRAME 3</p>

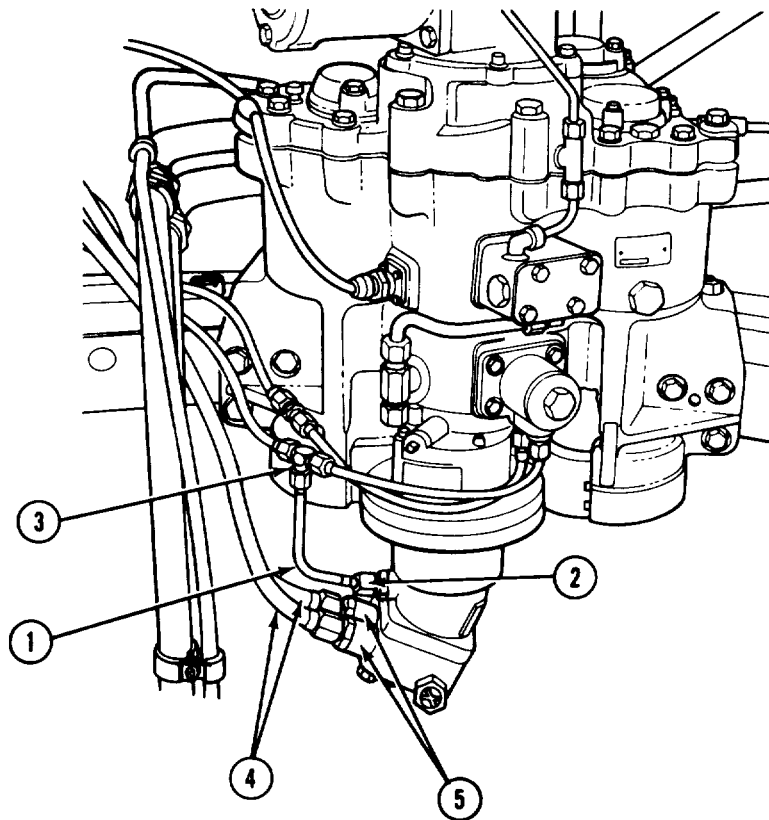


EARLY
MODEL
ONLY



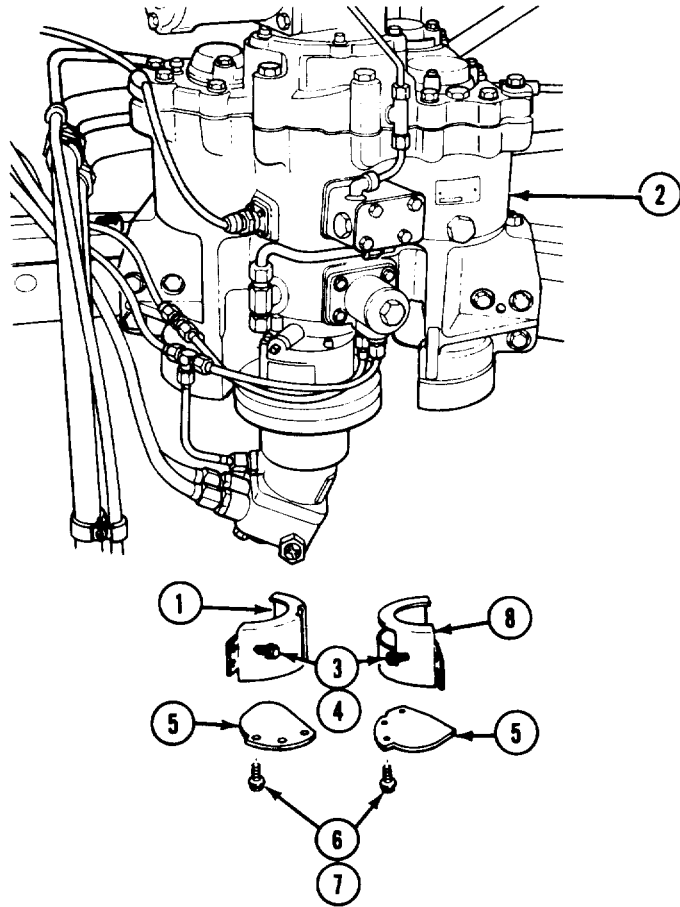
18-41. HYDRAULIC MOTOR INSTALLATION PROCEDURE (CONT)

FRAME 3	
STEP	PROCEDURE
1.	Using 5/8 inch and 13/16 inch wrenches, attach tube (1) on adapter (2).
2.	Using 5/8 inch wrench, tighten tube (1) at tee (3).
3.	Using 7/8 inch and 1 inch wrenches, attach two tubes (4) on two adapters (5).
	GO TO FRAME 4



18-41. HYDRAULIC MOTOR INSTALLATION PROCEDURE (CONT)

FRAME 4	
STEP	PROCEDURE
1.	Using 5/16 inch open end wrench, attach guard (1) to bottom of traversing mechanism (2) with two screws (3) and two assembled washers (4).
2.	Using 5/16 inch socket, attach plate (5) to traversing mechanism (2) with three screws (6) and three assembled washers (7).
3.	Repeat steps 1 and 2 for guard (8).
<p>NOTE</p> <p>Do the following tasks if this procedure completes the maintenance of the hydraulic system. If other maintenance must be done, make sure following tasks are completed after other maintenance.</p> <p>Follow-on Maintenance Action Required:</p> <p>Fill traversing mechanism with oil (LO). Fill powerpack to proper level (LO). Traverse turret three turns to bleed air from system (TM-10). Check for leaks and repair as required. Traverse turret in power mode to make sure hydraulic motor is working properly (TM-10).</p> <p>END OF TASK</p>	



18-42. HYDRAULIC MOTOR DISASSEMBLY PROCEDURE

TOOLS: Needle nose pliers
1/2" combination wrench
1" combination wrench
1/4" drift pin
1/2" drift pin
5/32" socket head screw key (Allen wrench)
20 oz. ball peen hammer
External retaining ring pliers
1/4" flat -tip screwdriver
Vise with brass caps
O-ring extractor kit
Diagonal cutting pliers
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Lint-free cloth (item 21, App. A)
Masking tape (item 36, App. A)
Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

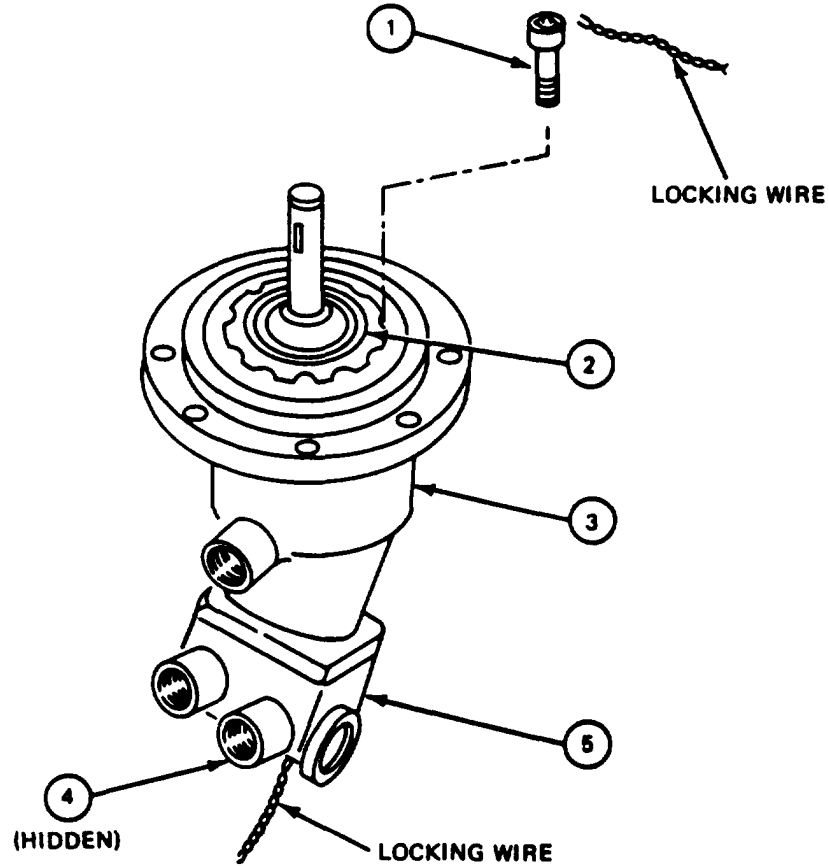
REFERENCES: JPG for procedures to:
Remove preformed packing
Use retaining ring pliers
Remove lockwire
Clean parts
Inspect and repair parts

PRELIMINARY PROCEDURES: Remove hydraulic motor (para 18-40)
Test hydraulic motor (para 18-39)

18-42. HYDRAULIC MOTOR DISASSEMBLY PROCEDURE (CONT)

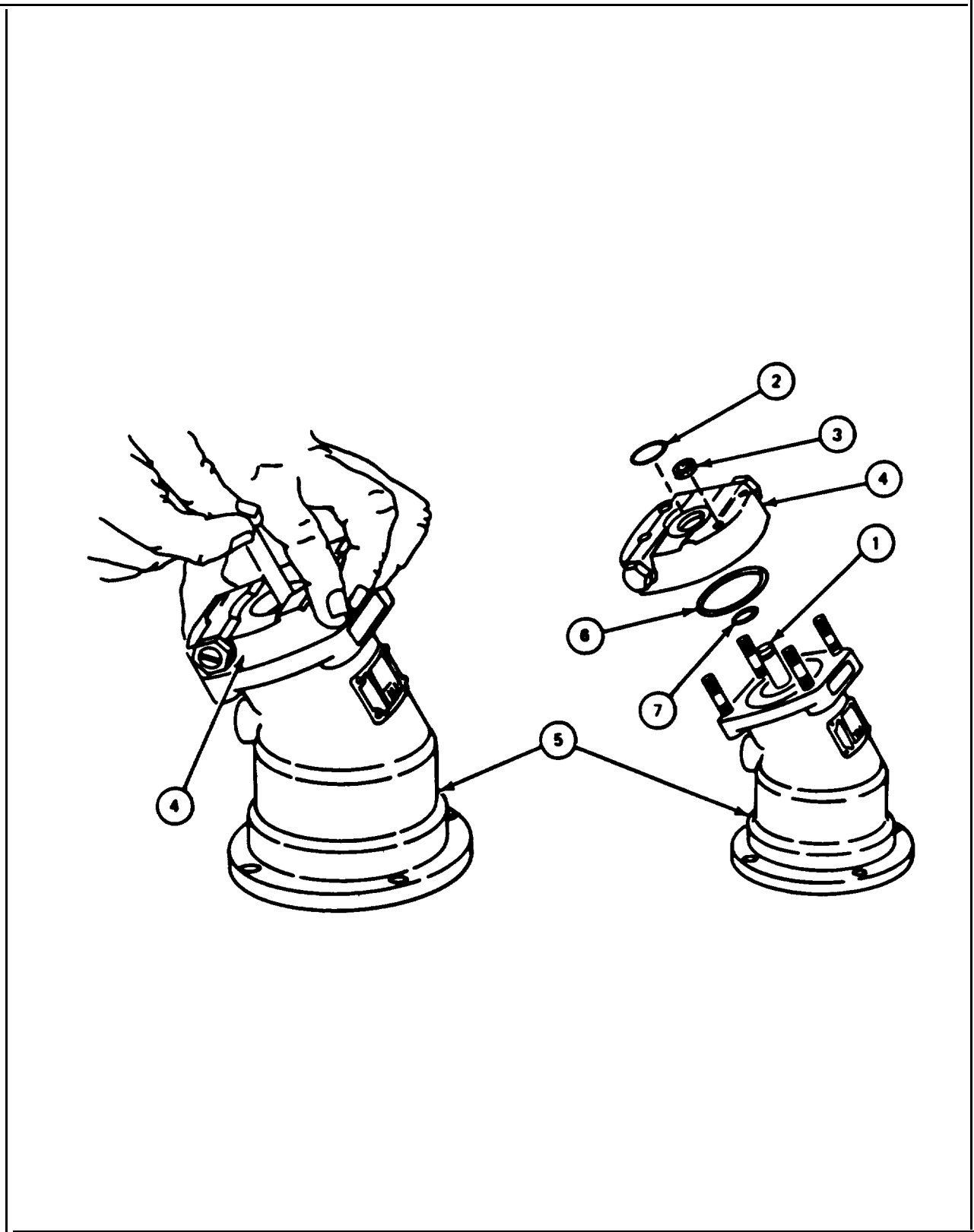
FRAME 1

Step	Procedure
1.	Using diagonal cutting pliers, cut lockwire from twelve screws (1) in bearing retainer (2) of housing (3) (JPG).
2.	Using needle nose pliers, remove lockwire from twelve screws (1) (JPG).
3.	Using needle nose pliers, remove lockwire from four nuts (4) on relief valve (5) of housing (3) (JPG).
4.	Using Allen wrench, remove twelve screws (1) that attach bearing retainer (2) to housing (3). GO TO FRAME 2



18-42. HYDRAULIC MOTOR DISASSEMBLY PROCEDURE (CONT)

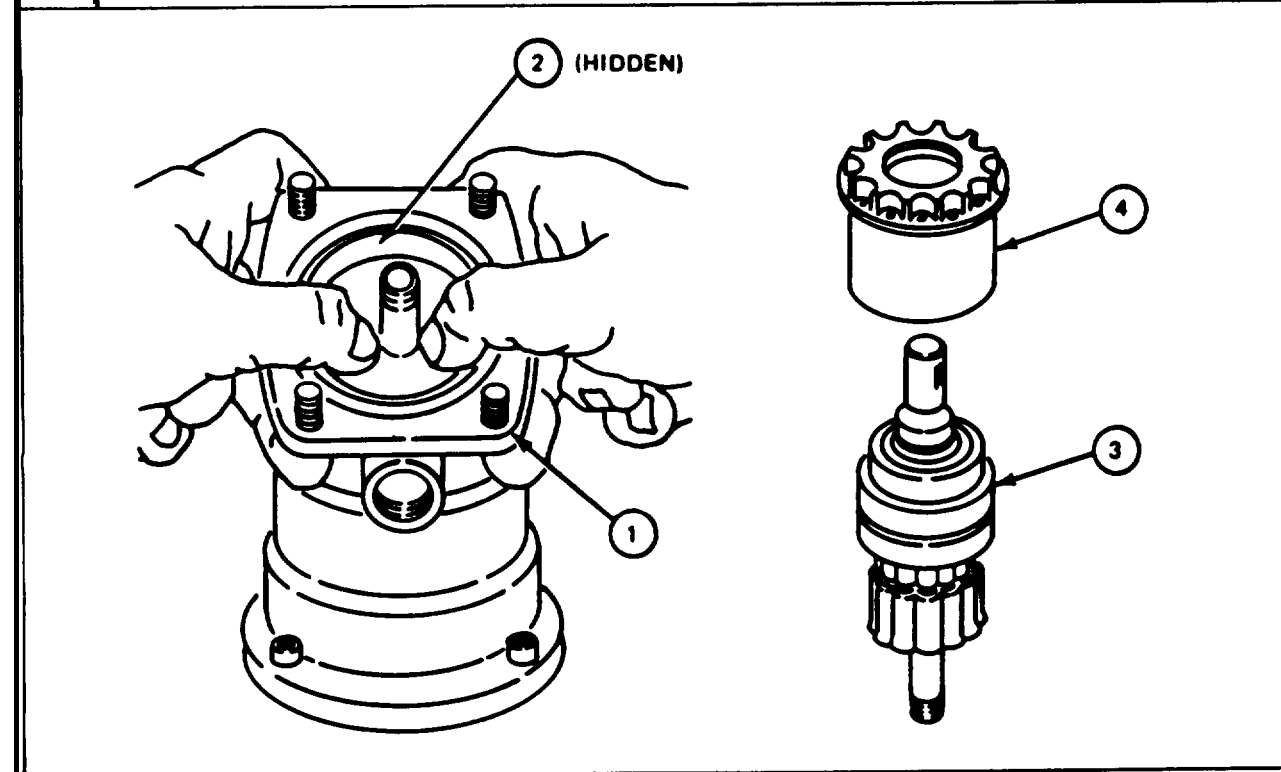
FRAME 2	
Step	Procedure
1.	Using flat tip screwdriver, slightly raise end of cylinder bearing pin (1) and hold to allow access to "C" washer (2).
2.	Using flat tip screwdriver remove "C" washer (2) from cylinder bearing pin (1). Release cylinder bearing pin.
3.	Using 1/2" wrench, remove four locknuts (3) that attach valve plate (4) to housing (5).
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">CAUTION</div> <p style="text-align: center;">To prevent damage to hydraulic motor pistons, cylinder bearing pin (1) must be held down during valve plate (4) removal.</p>	
4.	Using 1/4" drift pin, hold down on cylinder bearing pin (1) and remove valve plate (4). Release cylinder bearing pin.
5.	Using O-ring extractor tool, remove preformed packing (6) from housing (5) (JPG). Throw preformed packing away.
6.	Using O-ring extractor tool, remove preformed packing (7) from cylinder bearing pin (1) (JPG). Throw preformed packing away.
GO TO FRAME 3	



18-42. HYDRAULIC MOTOR DISASSEMBLY PROCEDURE (CONT)

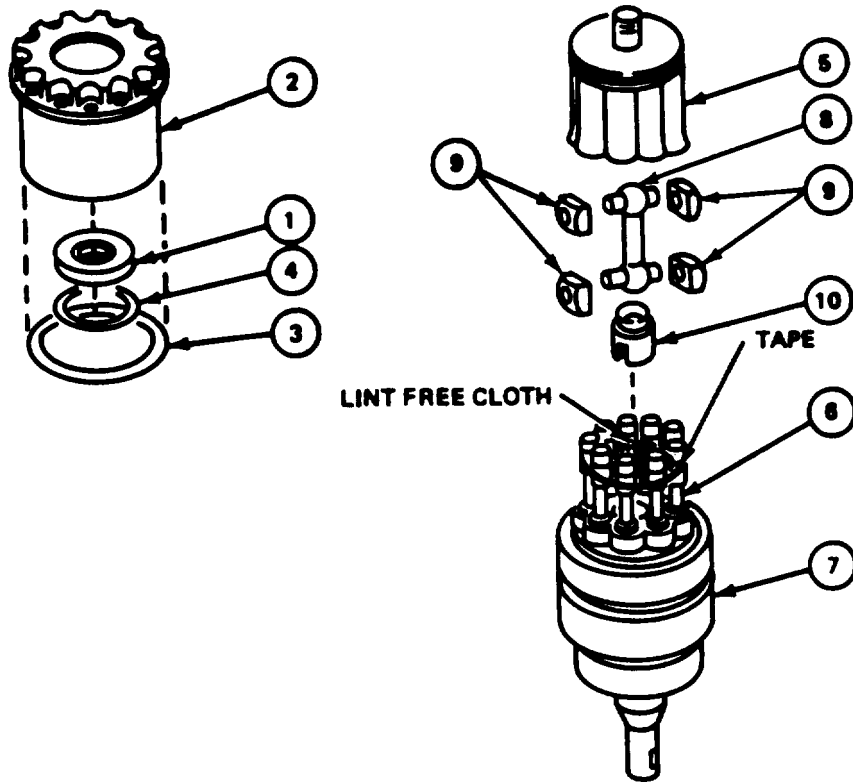
FRAME 3

Step	Procedure
	<p>CAUTION</p> <p>During housing (1) removal, guide rotating group (3) along angle of housing, being careful not to cock parts.</p>
1.	<p>Using hands, grasp housing (1) with fingers and press against cylinder block (2) with thumbs, while lifting housing (1) from rotating group (3) and bearing and shaft seal retainer (4).</p>
	<p>CAUTION</p> <p>During rotating group (3) removal, use care to prevent parts from separating. Do not let bearings become cocked in bearing and shaft retainer (4).</p>
2.	<p>Using hands, remove rotating group (3) from bearing and shaft seal retainer (4).</p> <p>GO TO FRAME 4</p>



18-42. HYDRAULIC MOTOR DISASSEMBLY PROCEDURE (CONT)

FRAME 4	
Step	Procedure
1.	Using 1/2" drift pin, lightly tap out shaft seal (1) from retainer (2).
2.	Using O-ring extractor tool, remove preformed packing (3) from groove on outside diameter of retainer (2) (JPG). Throw preformed packing away.
3.	Using hands, remove shaft seal ring (4).
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">CAUTION</div> <p>During removal of cylinder block (5), do not allow pistons (6) to hit one another and cause damage.</p>	
4.	Using hands, remove cylinder block (5) from pistons (6) and shaft (7).
5.	Using hands, remove universal link (8) from shaft (7).
6.	Using hands, remove four knuckles (9) from universal link (8),
7.	Using hands, remove flexible bearing (10) from inside shaft (7),
8.	Using hands, place lint-free cloth in center of pistons (6) and wrap pistons (6) with tape to prevent pistons from hitting each other.
GO TO FRAME 5	



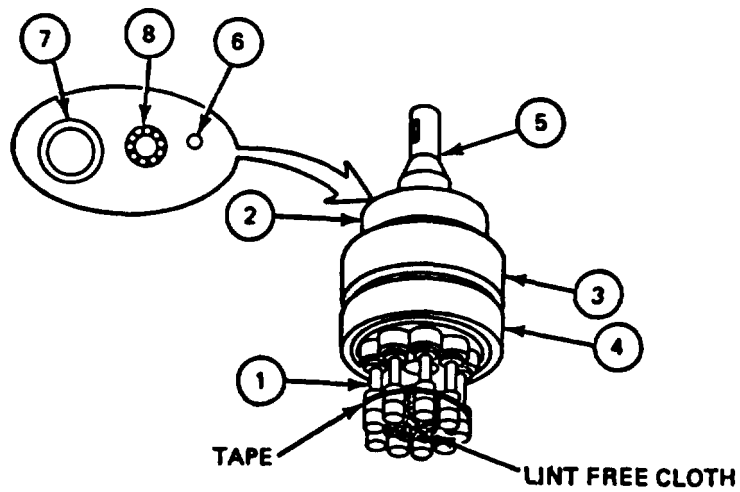
18-42. HYDRAULIC MOTOR DISASSEMBLY PROCEDURE (CONT)

FRAME 5	Procedure
	<div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <p>WARNING</p> </div> <p>Remaining parts are under spring tension and could hurt you. Place finger over top of cylinder block (2) to hold back parts.</p> <p style="text-align: center;">NOTE</p> <p>Retaining ring (1) tips can be seen only prior to being taken off.</p> <ol style="list-style-type: none"> 1. Using flat tip screwdriver, take out retaining ring (1) from inside cylinder block (2) by pushing tips toward each other. 2. Using hands, push in on cylinder pin (3) and remove cylinder pin, bearing retainer (4), spring retainer (5), and spring (6) from cylinder block (2). 3. Using retaining ring pliers, remove retaining ring (7) from fixed bearing (8) (JPG). 4. Using hands, remove fixed bearing (8) from bearing retainer (4). <p>GO TO FRAME 6</p>

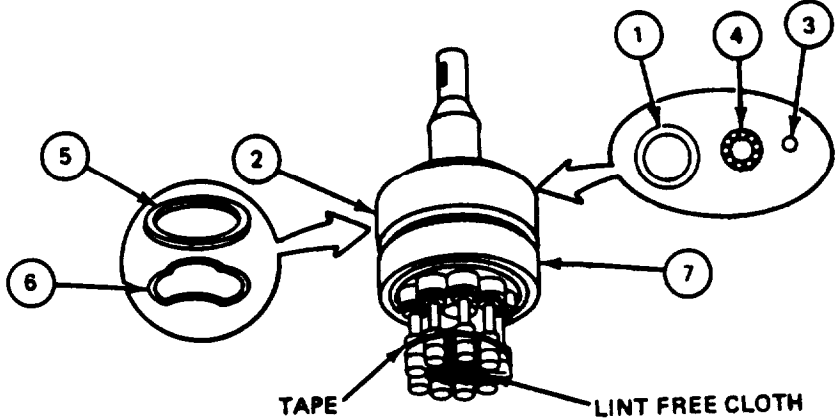
18-42. HYDRAULIC MOTOR DISASSEMBLY PROCEDURE (CONT)

FRAME 6

Step	Procedure
1.	<p style="text-align: center;">SUPPORT SHOP WORK</p> <p>Take shaft with pistons (1) to shop where bearing puller is available.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Bearings (2), (3), and (4) must be separated for removal from shaft (5). Balls (6) will fall out when bearings are separated.</p> <p>2. Using bearing puller, remove outer race (7) from bearing (2).</p> <p>3. Remove balls (6) and retainer (8). Mark bearings with tape as removed.</p> <p>GO TO FRAME 7</p>



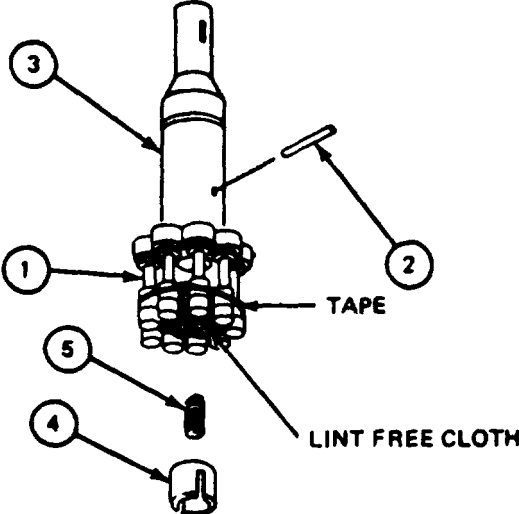
18-42. HYDRAULIC MOTOR DISASSEMBLY PROCEDURE (CONT)

FRAME 7	
Step	Procedure
	<p style="text-align: center;">SUPPORT SHOP WORK</p> <ol style="list-style-type: none"> 1. Using bearing puller, remove outer race (1) from bearing (2). 2. Remove balls (3) and retainer (4). 3. Remove bearing spacer (5) and wave washer (6). 4. Do steps 1 and 2 for bearing (7) removal. <p>GO TO FRAME 8</p>
	

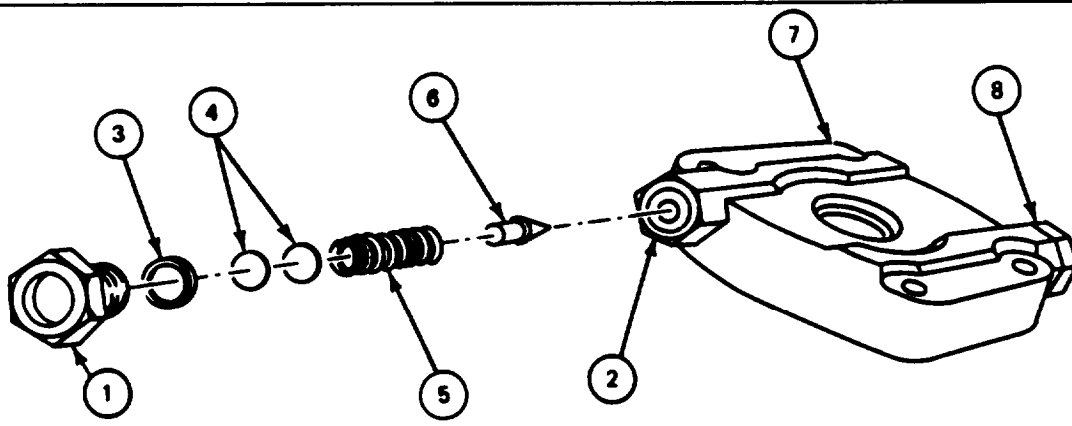
18-42. HYDRAULIC MOTOR DISASSEMBLY PROCEDURE (CONT)

FRAME 8	
Step	Procedure
	<p style="text-align: center;">SUPPORT SHOP WORK</p> <ol style="list-style-type: none"> 1. Using bearing puller, remove inner race (1) from shaft (2). 2. Remove spacer (3) from shaft (2). 3. Repeat steps 1 and 2 for inner race (4) and spacer (5). 4. Repeat step 1 for inner race (6). 5. After support shop work, return all parts to turret shop. <p style="text-align: center;">GO TO FRAME 9</p> <div style="text-align: center; margin-top: 20px;"> <p>The diagram shows a vertical shaft assembly. At the top is a small cylindrical component. Below it is a larger shaft with several components. Callout 1 points to the inner race of the first bearing. Callout 2 points to the shaft. Callout 3 points to a spacer between bearings. Callout 4 points to the inner race of the second bearing. Callout 5 points to a spacer between bearings. Callout 6 points to the inner race of the third bearing. At the bottom of the assembly, there are labels for 'TAPE' and 'LINT FREE CLOTH'.</p> </div>

18-42. HYDRAULIC MOTOR DISASSEMBLY PROCEDURE (CONT)

FRAME 9	
Step	Procedure
1.	<p>Using hands, remove tape and lint-free cloth from pistons (1).</p> <div style="text-align: center; border: 1px solid black; padding: 5px;"> <p>WARNING</p> </div> <p style="text-align: center;">Remaining pans are under spring tension and can hurt you.</p> <div style="text-align: center; border: 1px solid black; padding: 5px;"> <p>CAUTION</p> </div> <p style="text-align: center;">Use care to avoid damage to pistons (1) during removal.</p> <p>2. Using 1/4" drift pin and hammer, tap out pin (2) from shaft (3).</p> <p>3. Using hands, remove flexible bearing retainer (4) and spring (5).</p> <p>4. Using hands, place lint-free cloth in center of pistons (1) and wrap pistons (1) with tape to prevent pistons from hitting each other.</p> <p>GO TO FRAME 10</p>
 <p>The diagram shows a vertical shaft (3) with a pin (2) inserted into it. Below the shaft is a bearing retainer (4) and a spring (5). The pistons (1) are wrapped with tape and have lint-free cloth placed in the center. Labels include TAPE and LINT FREE CLOTH.</p>	

18-42. HYDRAULIC MOTOR DISASSEMBLY PROCEDURE (CONT)

FRAME 10	Step	Procedure
		<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do not mix parts from valve ports (2) and (8). Mark ports and tag parts during removal.</p> <p style="text-align: center;">It may be necessary to put plate (7) in vise to remove two plugs (1).</p> <ol style="list-style-type: none"> 1. Using 1" wrench, remove plug (1) from valve port (2). 2. Using O-ring extractor tool, remove preformed packing (3) from plug (1) (JPG). Throw preformed packing away. <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Number of spacers (4) will vary.</p> <ol style="list-style-type: none"> 3. Using hands, remove spacers (4), spring (5), and valve piston (6) from valve port (2) of plate (7). 4. Repeat steps 1 through 3 for valve port (8) of plate (7). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 18-38).</p> <p>END OF TASK</p>
		

18-43. HYDRAULIC MOTOR ASSEMBLY PROCEDURE

TOOLS: O-ring extractor kit
1/2" combination wrench
1" combination wrench
1/2" socket (3/8" drive)
13/16" socket (1/2" drive)
3/8" drive ratchet
5/32" hex head socket (3/8" drive)
3/8" drive torque wrench (0 to 600 inch-pounds)
1/4" drift pin
8 ounce ball peen hammer
External retaining ring pliers
1/4" flat tip screwdriver
Tweezers
Needle nose pliers
Vise with brass caps

SUPPLIES: Hydraulic fluid (item 10, App. A)
Dry cleaning solvent (item 33, App. A)
Masking tape (item 36, App. A)
Screw 1/4" x 20 NC (1" long)
Lint-free cloth (item 21, App. A)
Preformed packing (two)
Lockwire

PERSONNEL: One

REFERENCES: JPG for procedures to:
Use torque wrench
Install lockwire
Use retaining ring pliers
Install preformed packings

PRELIMINARY PROCEDURES: inspect hydraulic motor (para 18-38)

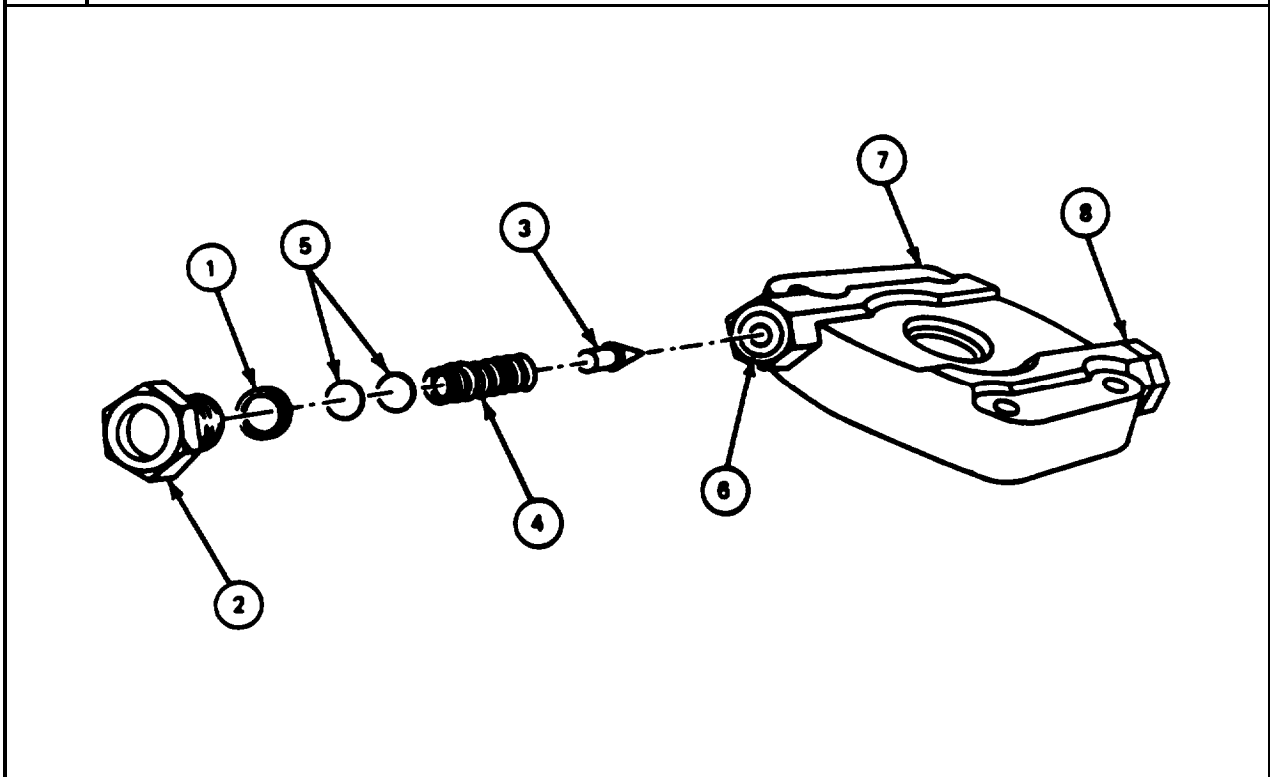
GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

18-43. HYDRAULIC MOTOR ASSEMBLY PROCEDURE (CONT)

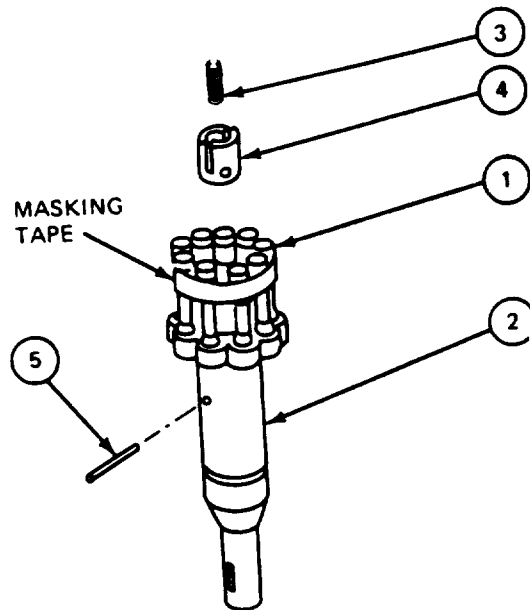
FRAME 1	
Step	Procedure
1.	Using hands, coat preformed packing (1) with hydraulic fluid.
2.	Using O-ring extractor tool, put preformed packing (1) on plug (2) (JPG).
<p>NOTE</p> <p>Number of spacers (5) may vary.</p>	
3.	Using hands, put valve piston (3), spring (4) and spacers (5) in port (6) of valve plate (7).
<p>NOTE</p> <p>It may be necessary to put valve plate (7) in vise.</p>	
4.	Using 1" wrench, put plug (2) in port (6) of valve plate (7).
5.	Repeat steps 1 through 4 for valve port (8).
GO TO FRAME 2	



18-43. HYDRAULIC MOTOR ASSEMBLY PROCEDURE (CONT)

FRAME 2

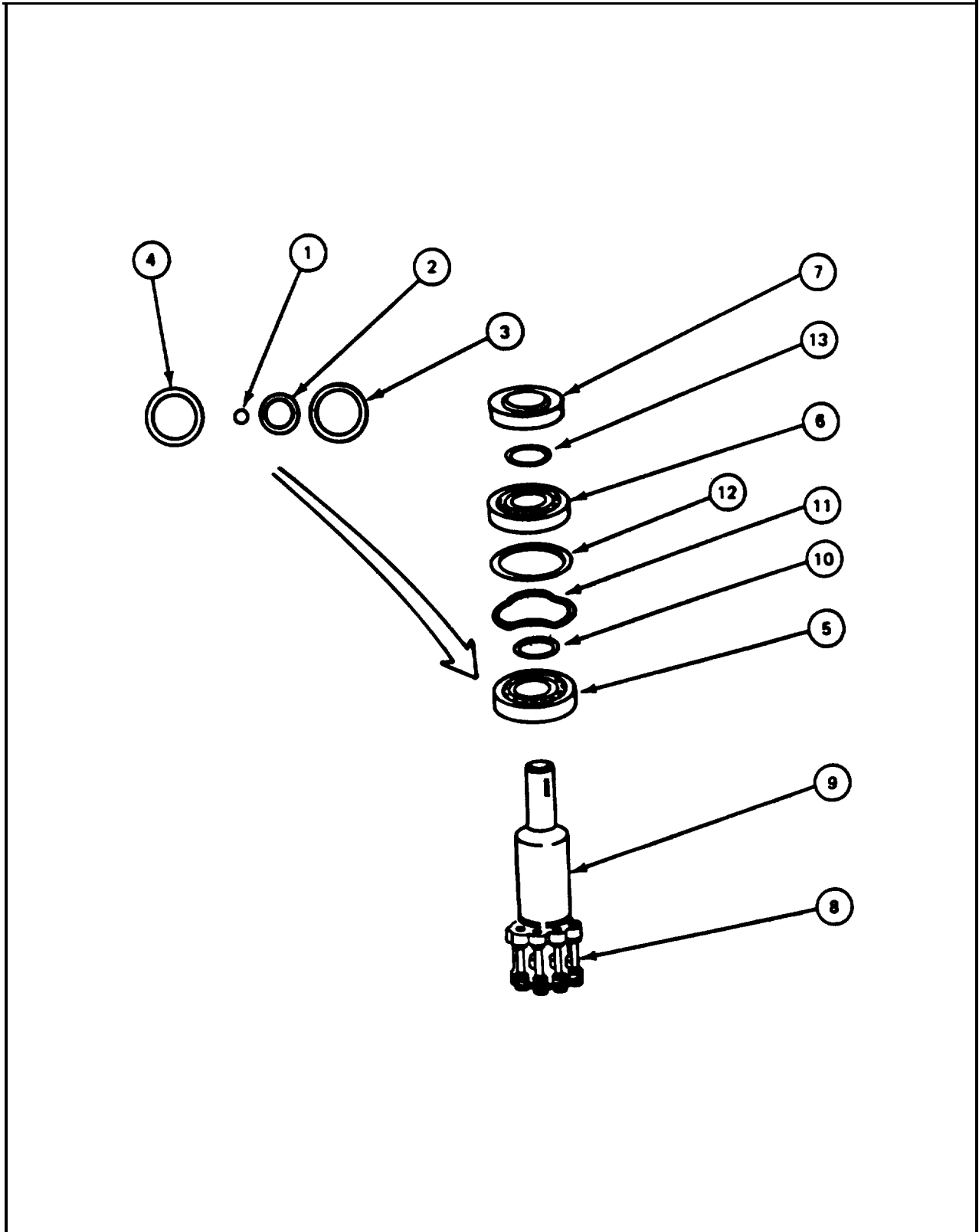
Step	Procedure
<p>NOTE</p> <p>Do step 1 only if pistons (1) and shaft (2) were replaced.</p> <ol style="list-style-type: none"> 1. Using hands, place lint-free cloth in center of pistons (1) on shaft (2) and wrap pistons with tape to prevent pistons from hitting each other. 2. Remove lint-free cloth from pistons (1). 3. Using hands, put spring (3) and retainer (4) in shaft (2). Align hole in retainer (4) with hole in shaft (2). 4. Using drift pin, compress spring (3) and put pin (5) in hole of shaft (2) to hold spring (3) and retainer (4) in place. 5. Using hammer, tap pin (5) in shaft (2) until pin is flush with shaft surface. 6. Put lint-free cloth in center of pistons (1). <p>GO TO FRAME 3</p>	



18-43. HYDRAULIC MOTOR ASSEMBLY PROCEDURE (CONT)

FRAME 3

Step	Procedure
SUPPORT SHOP WORK	
1.	Take parts to shop where bearing press is available.
2.	Place balls (1) in retainer (2) and assemble inner race (3) and outer race (4) for bearing (5).
3.	Repeat step 1 for bearings (6) and (7).
4.	Put 13/16" socket in between pistons (8) to bridge hole in shaft (9).
5.	Using bearing press, put bearing (5) with writing up on shaft (9). Pull bearing (5) to end of shaft (9).
6.	Put spacer (10), wave washer (11) and bearing spacer (12) on shaft (9).
7.	Using bearing press, put bearing (6) on shaft (9) until flush with spacer (10).
8.	Put spacer (13) on shaft (9).
9.	Using bearing press, put bearing (7) on shaft (9) until flush with spacer (13).
10.	After support shop work, return parts to turret shop.
GO TO FRAME 4	

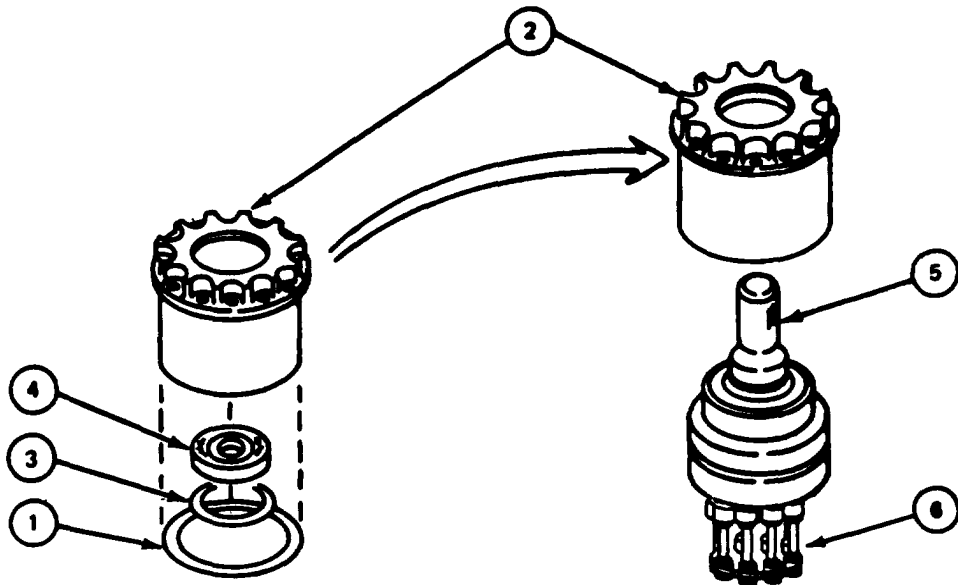


18-43. HYDRAULIC MOTOR ASSEMBLY PROCEDURE (CONT)

FRAME 4		
Step	Procedure	
1.	Using hands, put fixed bearing (1) in bearing retainer (2).	
2.	Using retaining ring pliers, put retaining ring (3) in fixed bearing (1) (JPG).	
<p>NOTE</p> <p>Position spring retainer with flat surface up.</p>		
3.	Using hands, put spring (4) and spring retainer (5) in cylinder block (6).	
4.	Using hands, put cylinder pin (7) through spring retainer (5) and spring (4), into cylinder block (6).	
5.	Using hands, put retaining ring (8) in groove of bearing retainer (2) with tips of retaining ring on flat side of bearing retainer facing up.	
6.	Using needle nose pliers, compress retaining ring (8) tight around bearing retainer (2).	
<p>NOTE</p> <p>Bearing retainer (2) must align with cylinder block (6).</p>		
7.	Using hands, align cut in bearing retainer with wide tips of cylinder block (6).	
8.	Using hands, put bearing retainer (2) in cylinder block (6) until retaining ring (8) snaps in place and is seated.	
GO TO FRAME 5		

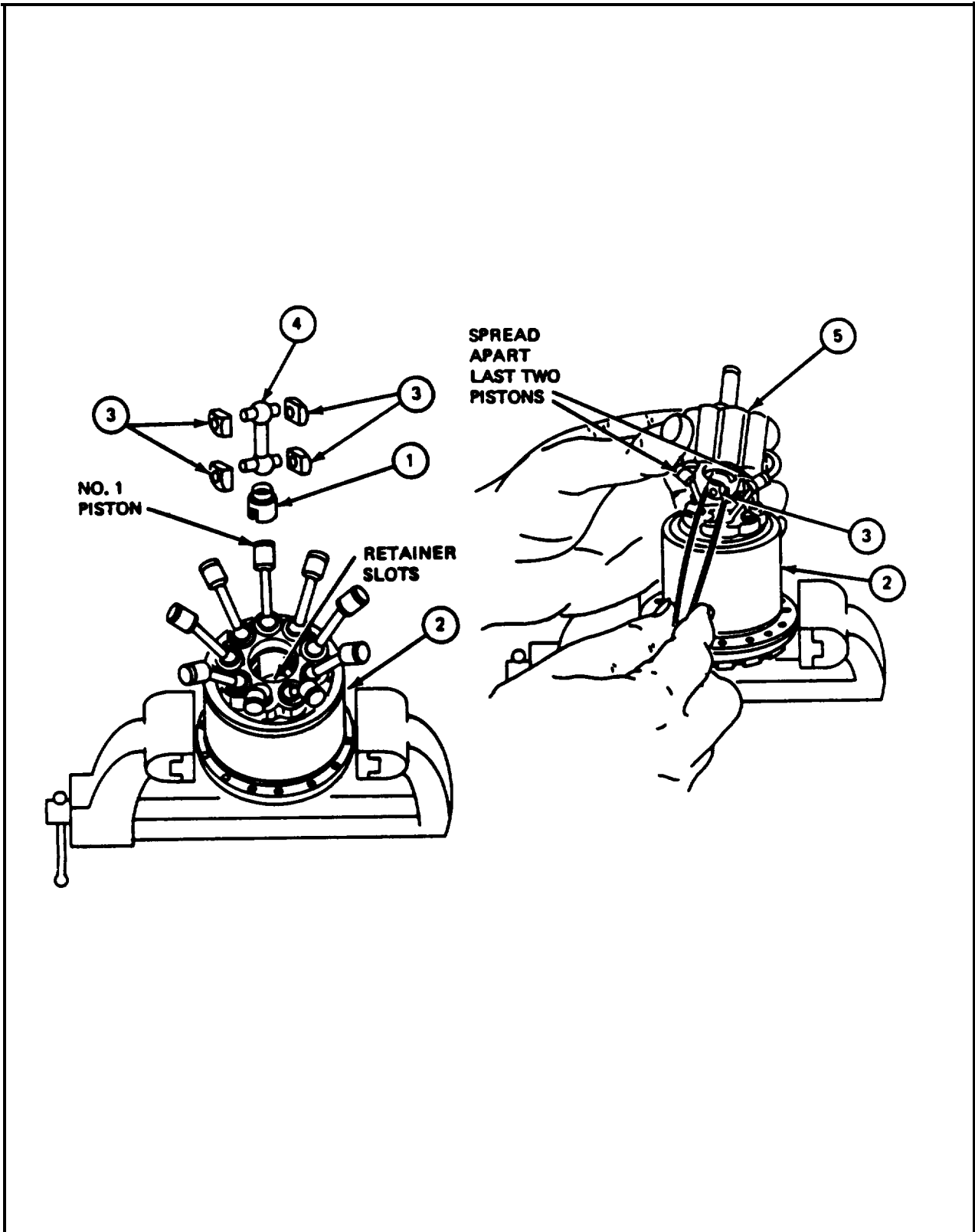
18-43. HYDRAULIC MOTOR ASSEMBLY PROCEDURE (CONT)

Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 4. 5. 6. 7. 8. 	<p>Lightly coat preformed packing (1) with hydraulic fluid.</p> <p>Using O-ring extractor tool, put preformed packing (1) in groove on outside of retainer (2) (JPG).</p> <p>Lightly coat shaft seal ring (3) with hydraulic fluid.</p> <p>Using hands, put shaft seal ring (3) in groove around shaft seal (4).</p> <p>Using hands, put shaft seal (4) inside retainer (2) with lettered side up.</p> <p>Using hands, put retainer (2) on shaft (5).</p> <p>Using hands. remove lint-free cloth and tape from pistons (6) and clean pistons in dry cleaning solvent.</p> <p>Using hands, put shaft end (5) in vise.</p> <p>GO TO FRAME 6</p>



18-43. HYDRAULIC MOTOR ASSEMBLY PROCEDURE (CONT).

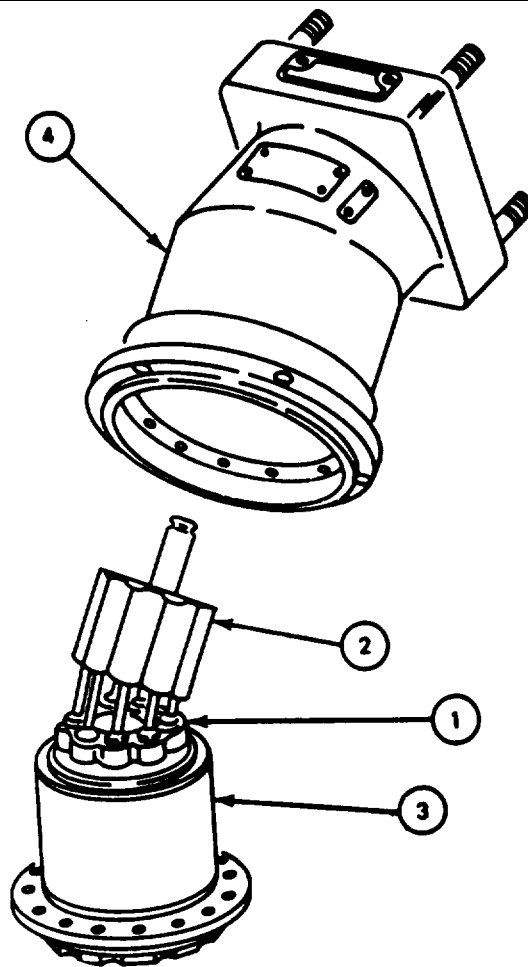
FRAME 6	
Step	Procedure
1.	Using hands, put flexible bearing (1) in retainer (2).
2.	Using hands, put four knuckles (3) on universal link (4).
3.	Using hands, put universal link (4) in retainer (2) by holding universal link at slight angle and engaging one knuckle (3) in retainer slot. Engage the other knuckle in opposite slot.
4.	Lightly coat walls of cylinder block (5) and pistons with hydraulic fluid.
<p>NOTE</p> <p>Number one piston on retainer (2) is one directly in line with both slots for universal link.</p> <p>Number one bore in cylinder block (5) is one directly in line with both slots for universal link.</p>	
5.	Using hands and tweezers, hold cylinder block (5) over retainer (2) and put piston number one into cylinder block bore number one.
6.	Put pistons in bores by working to right and left side of number one piston until only two pistons remain outside of cylinder block (5).
7.	Using hands and tweezers, spread last two pistons apart and while holding cylinder block (5) at an angle, engage two upper knuckles (3) of universal link (4) in slots of cylinder block (5).
8.	Put two remaining pistons in cylinder block (5) bores.
<p>GO TO FRAME 7</p>	



18-43. HYDRAULIC MOTOR ASSEMBLY PROCEDURE (CONT)

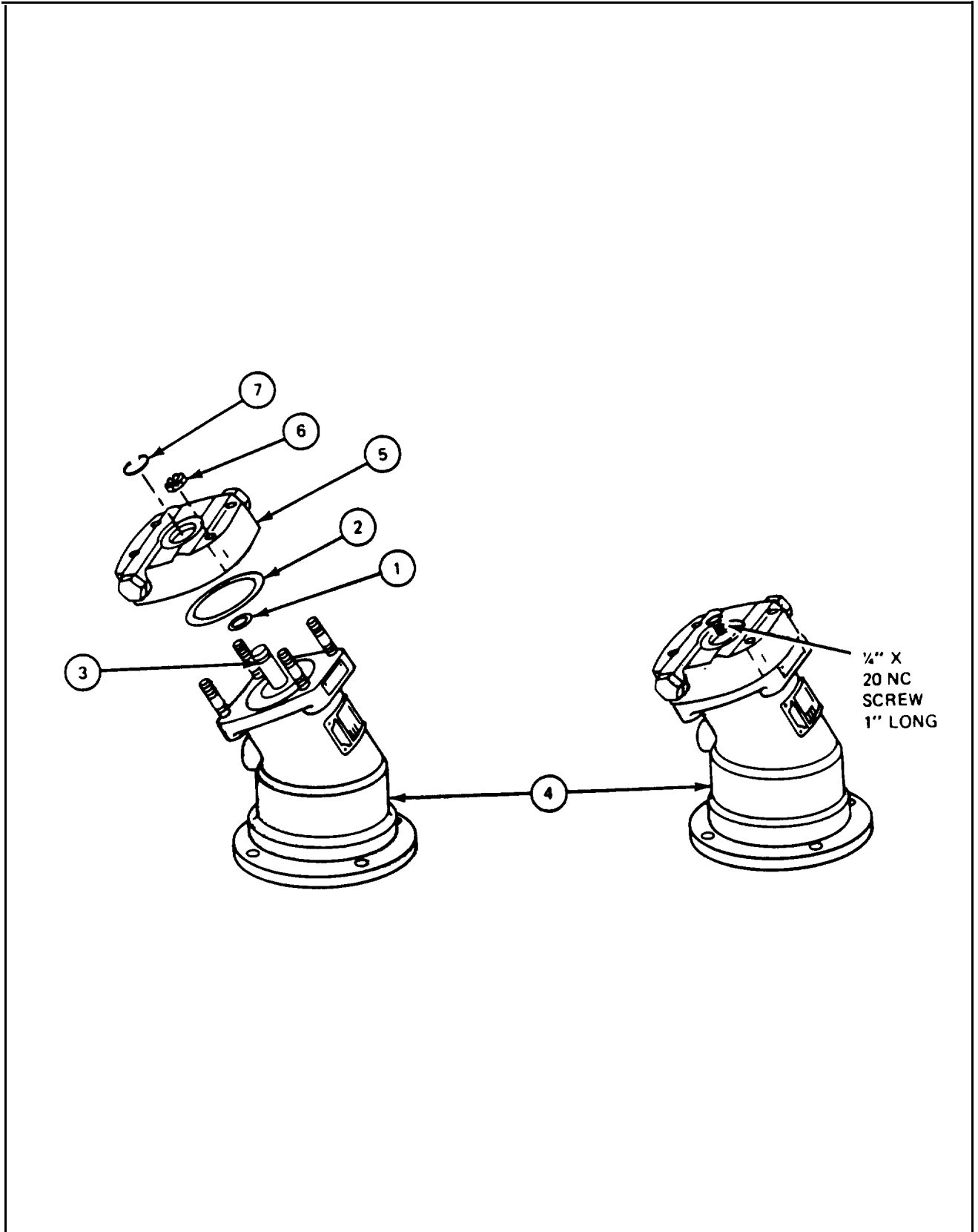
FRAME 7

Step	Procedure
1.	Using hands, check assembled group (1) for freedom of motion by pushing cylinder block (2) down and allowing it to return. Motion should be smooth and springy.
2.	Using hands, check assembled group (1) for freedom of motion by turning cylinder block (2) while holding retainer (3). Motion should be smooth without binding at any point.
3.	If assembled group (1) motion is bad, disassemble to determine bad part (para 18-42).
4.	Using hands, carefully lower housing (4) over cylinder block (2) while guiding cylinder block along angle of housing.
5.	When housing (4) reaches retainer (3), make sure it is squarely over retainer to avoid cocking parts inside housing. GO TO FRAME 8



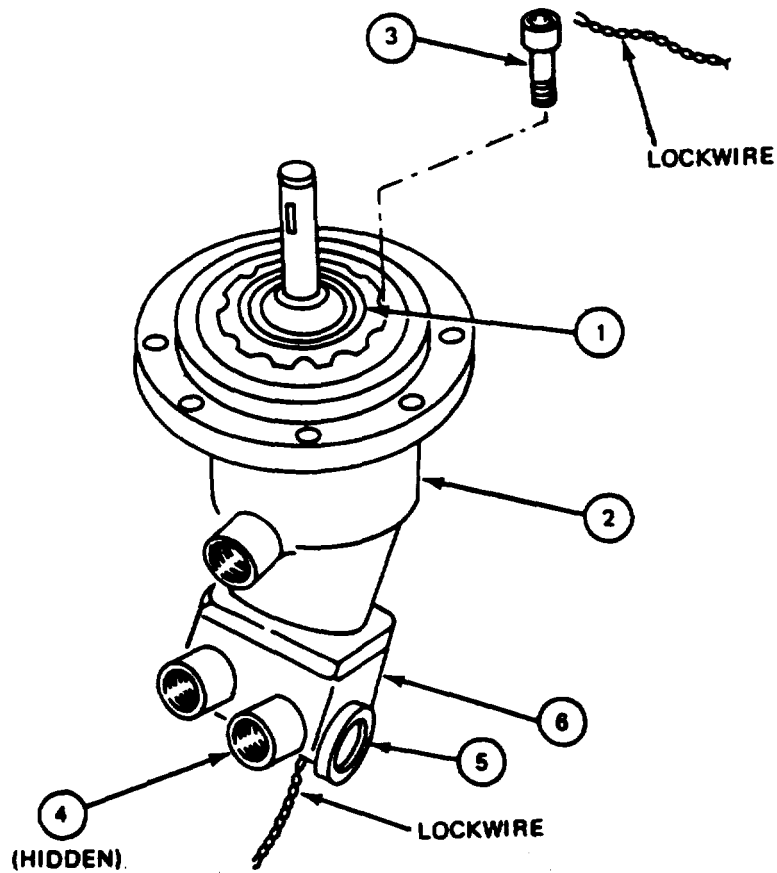
18-43. HYDRAULIC MOTOR ASSEMBLY PROCEDURE (CONT)

FRAME 8	
Step	Procedure
1.	Lightly coat two preformed packings (1) and (2) with hydraulic fluid.
2.	Using O-ring extractor tool, put preformed packing (1) in groove of cylinder bearing pin (3) (JPG).
3.	Using O-ring extractor tool, put preformed packing (2) in groove on face of housing (4) (JPG).
4.	Using hands, put valve plate (5) on studs of housing (4).
5.	Using 1/2" combination wrench, attach valve plate (5) to housing (4) with four nuts (6). Do not tighten nuts.
6.	Using hands, put 1/4" x 20 NC screw in cylinder bearing pin (3).
7.	Using screwdriver, pry under screw head slightly until recess in cylinder bearing pin (3) is showing.
8.	Using screwdriver, put "C" clamp (7) in recess of cylinder bearing pin (3).
9.	Using hands, remove 1/4" x 20 NC screw from cylinder bearing pin (3).
10.	Using torque wrench and 1/2" socket, torque four nuts (6) to between 216 and 240 inch-pounds (JPG).
<p>NOTE</p> <p>Do not let bearings slide out of housing.</p>	
11.	Using hands, remove housing (4) from vise.
GO TO FRAME 9	



18-43. HYDRAULIC MOTOR ASSEMBLY PROCEDURE (CONT)

FRAME 9	
Step	Procedure
1.	Using 5/32 in. hex head socket wrench, attach bearing retainer (1) to housing (2) with twelve screws (3).
2.	Using needle nose pliers, install lockwire on twelve screws (3).
3.	Using needle nose pliers, install lockwire on four nuts (4) and two valve ports (5) on relief valve (6).
<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Test hydraulic motor (para 18-41).</p>	
<p>END OF TASK</p>	



1843.1 BRAKE ADAPTER ASSEMBLY REMOVAL PROCEDURE

TOOLS: 3/16" screwdriver bit (3/8" drive)
 6" extension (3/8" drive)
 Ratchet (3/8" drive)

SUPPLIES: Rags (item 21, App. A)

PERSONNEL: One

REFERENCE: JPG for disconnecting electrical connectors

EQUIPMENT LOCATION INFORMATION:

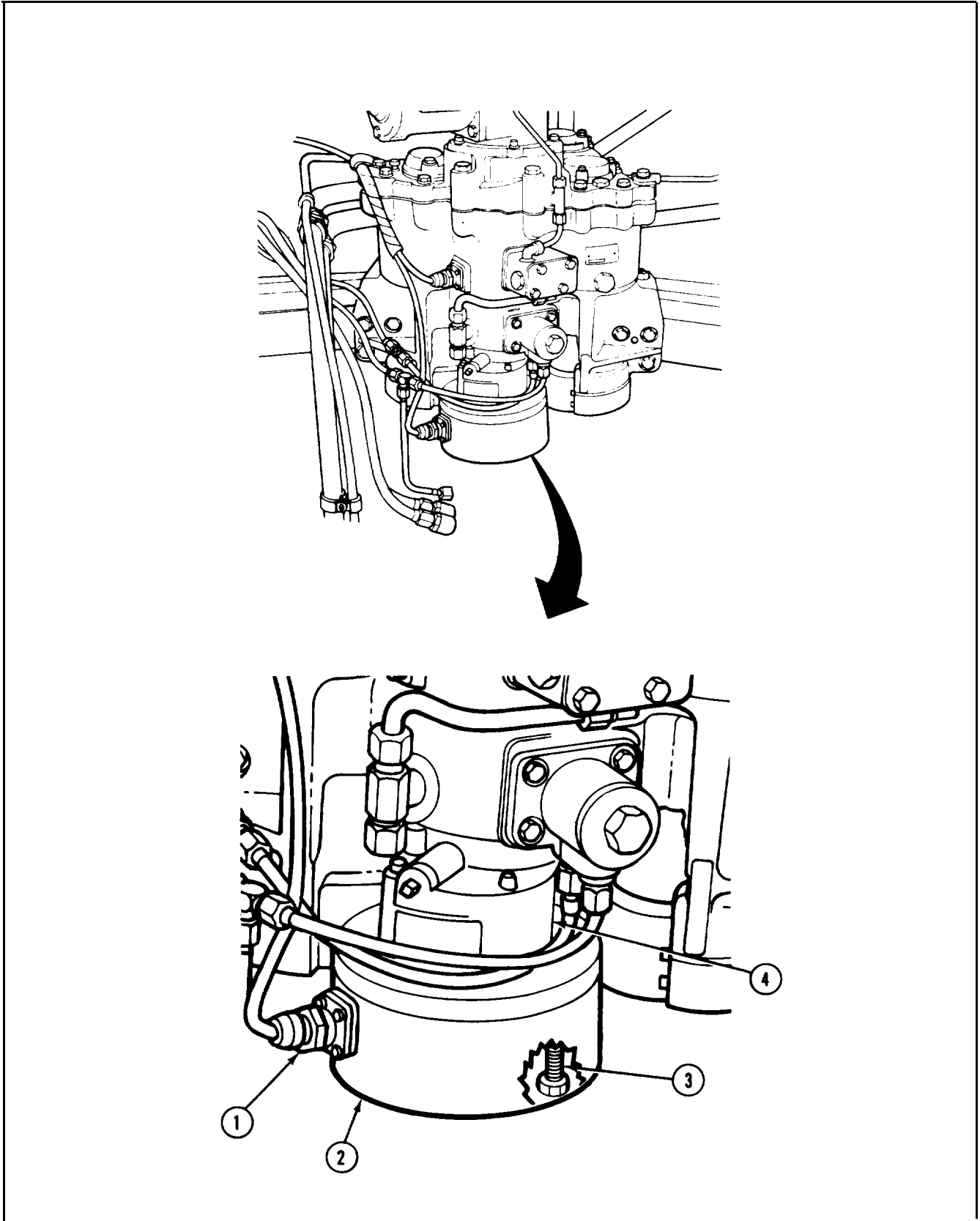
EQUIPMENT	FOLDOUT	CALLOUT
Turret Traverse Mechanism	FO-2	12

PRELIMINARY PROCEDURE: Remove hydraulic motor (para 18-40)

NOTE

Keep dirt from getting in parts. Dirt can damage equipment. Use rags for oil spillage.

FRAME 1	
STEP	PROCEDURE
1.	Disconnect wiring harness connector (1) from brake adapter assembly (2) receptacle.
2.	Using 3/16 inch screwdriver bit, extension, and ratchet, remove four screws (3) securing brake adapter assembly (2) to adapter (4). Throw screws (3) away.
3.	Remove brake adapter assembly (2) from adapter (4).
	END OF TASK



18-43.2 BRAKE ADAPTER ASSEMBLY INSTALLATION PROCEDURE

TOOLS: 3/16" screwdriver bit (3/8" drive)
 6" extension (3/8" drive)
 Ratchet (3/8" drive)

SUPPLIES: Self -locking screws, MS16997-662 (four required)

PERSONNEL: One

REFERENCE: JPG for disconnecting electrical connectors

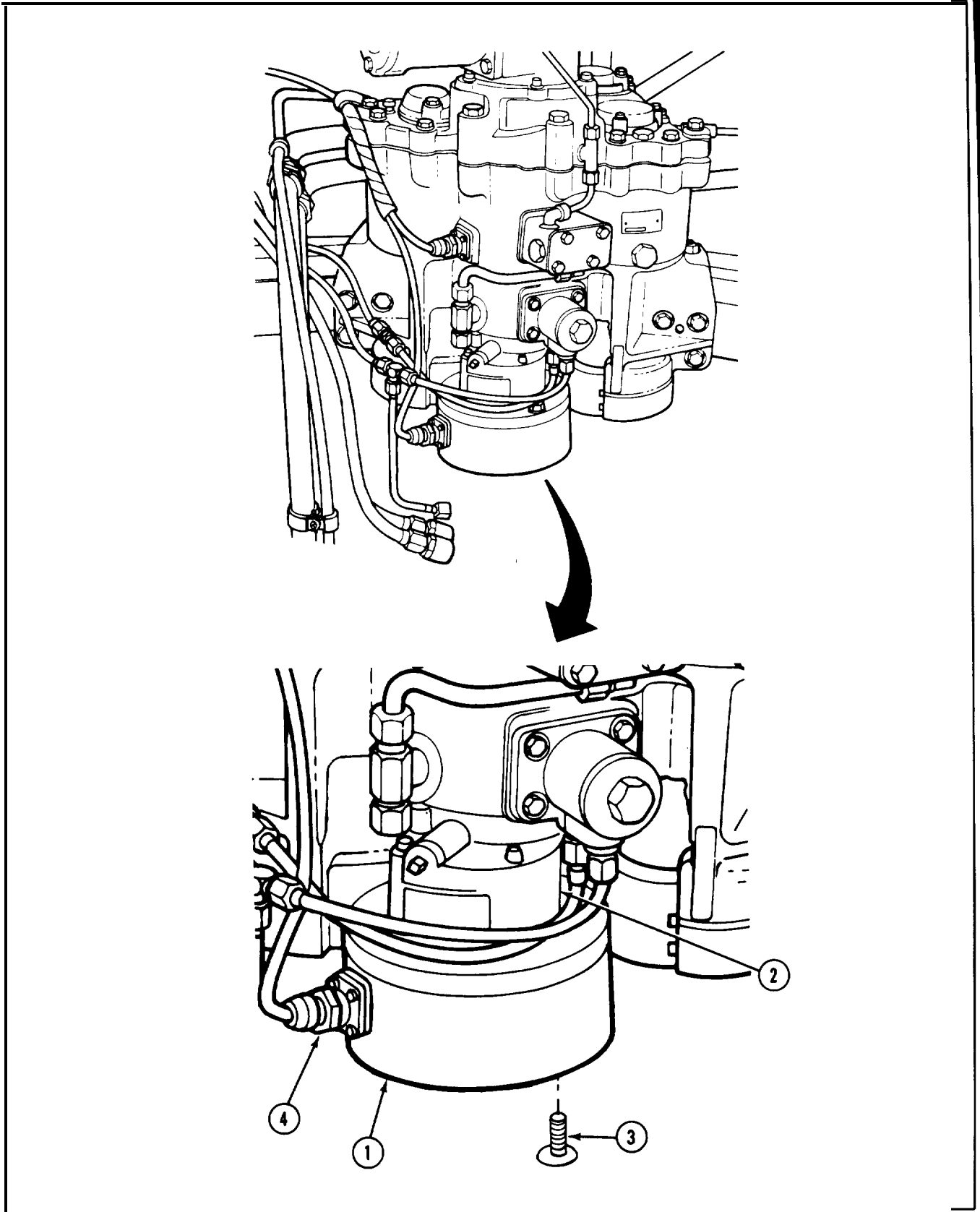
EQUIPMENT LOCATION INFORMATION:

EQUIPMENT
 Turret Traversing Mechanism

FOLDOUT
 FO-2

CALLOUT
 12

FRAME 1	
STEP	PROCEDURE
1.	Align gear on brake adapter assembly (1) with gear in adapter (2).
2.	Using hands, position brake adapter assembly (1) to adapter (2) so that mounting screw holes align.
3.	Using 3/16 inch screwdriver bit, extension, and ratchet, install and tighten four new screws (3) to secure brake adapter assembly (1) to adapter (2).
4.	Connect wiring harness connector (4) to receptacle on brake adapter assembly (1) (JPG).
<p>NOTE</p> <p>Follow-on Maintenance Action Required: Install hydraulic motor (Para 18-41)</p>	
END OF TASK	



18-43.3 BRAKE ADAPTER ASSEMBLY DISASSEMBLE PROCEDURES

TOOLS: 7/16" socket wrench (3/8" drive)
Ratchet (3/8" drive)
Gear puller
20 oz. ball peen hammer
3/16" punch
Scraper
O-ring extractor tool
Internal retaining ring pliers
Knife, pocket
Soldering iron
Flat - tip screwdriver (1/2" wide)
1/8" socket head screw key (Allen wrench)
Vise with brass clips
Plastic mallet

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Rags (item 21, App. A)

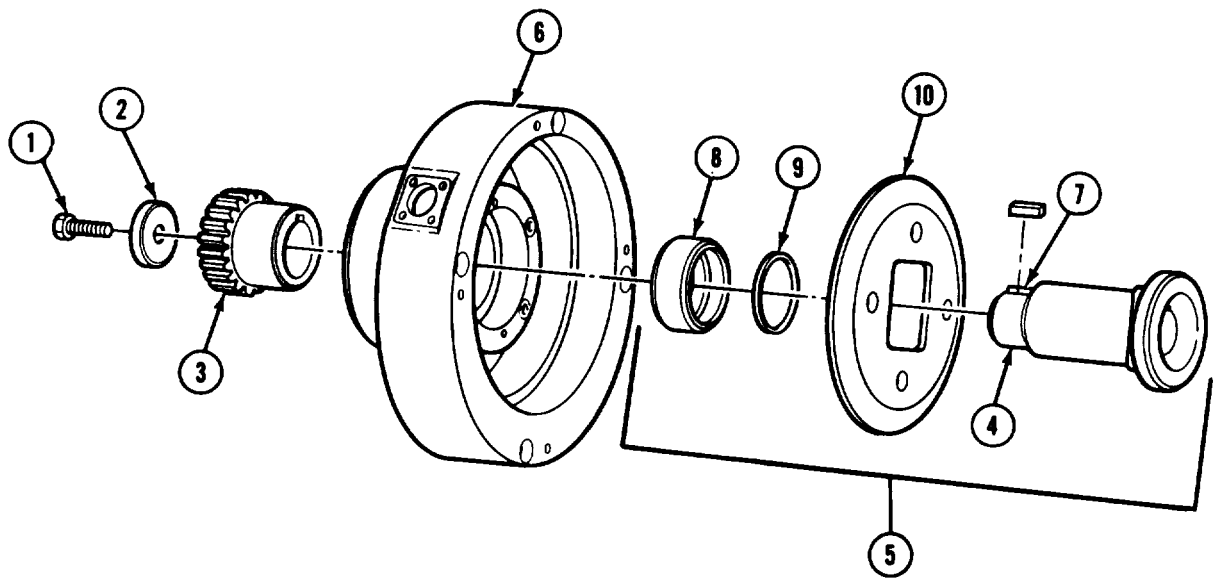
PERSONNEL: One

REFERENCES: JPG for procedures to:
Use bearing puller
Clean parts
Inspect and repair parts
Use solder iron

PRELIMINARY PROCEDURES: Remove brake adapter assembly (Para 18-43.1)

18-43.3 BRAKE ADAPTER ASSEMBLY DISASSEMBLE PROCEDURES (CONT)

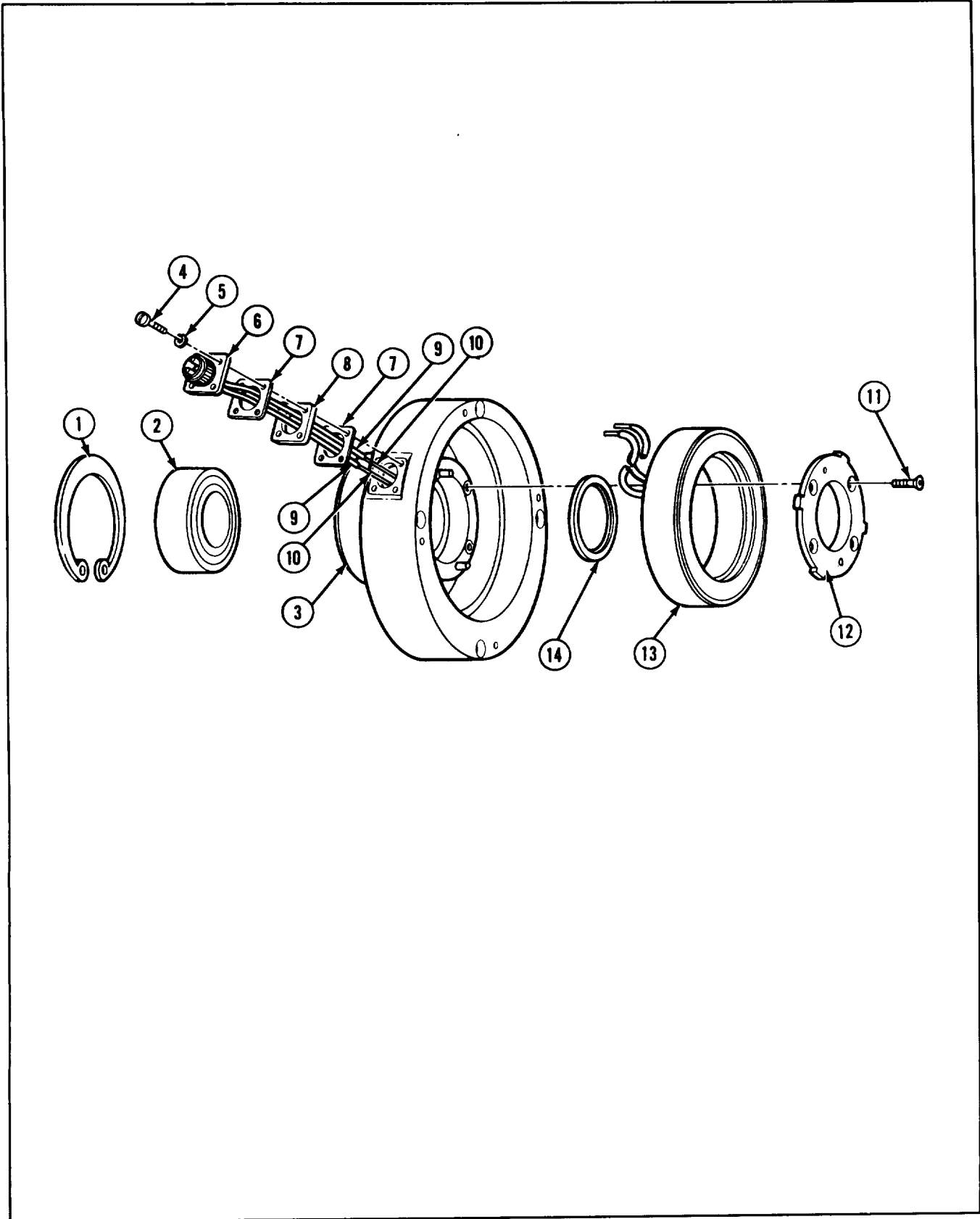
FRAME 1	
STEP	PROCEDURE
1.	Put gear (1) in vise.
2.	Using 7/16 inch socket and ratchet, remove screw (2) and washer (3) securing gear (1) to shaft (4).
3.	Remove gear (1) from (4). Use gear puller if necessary (JPG).
4.	Slide shaft assembly (5) out of housing (6). If necessary, use plastic mallet to aid to removing shaft assembly.
5.	Using 3/16 inch punch and ball peen hammer, remove key (7) from shaft (4).
6.	Slide spacer (8) off shaft (4). away.
7.	Using O-ring extractor, remove performed packing (9) from inside spacer (8). Throw performed packing away.
8.	Slide armature (10) off shaft (4).
	GO TO FRAME 2



8-43.3 BRAKE ADAPTER ASSEMBLY DISASSEMBLE PROCEDURES (CONT)

FRAME 2

STEP	PROCEDURE
1.	Using internal retaining ring pliers, remove retaining ring (1).
2.	Remove bearing (2) from housing (3).
3.	Using screwdriver, remove four screws (4) and lockwashers (5) securing electrical receptacle (6), two gaskets (7) and spacer (8) to housing (3). Throw lockwashers away.
4.	Separate electrical receptacle (6), gaskets (7), and spacer (8) from housing (3).
5.	Using knife, cut insulation (9) off electrical leads (10).
6.	Using soldering iron (JPG), unsolder electrical leads (10) from electrical receptacle (6).
7.	Remove electrical receptacle (6), spacer (8), and gaskets (7) from electrical leads (10). Throw gaskets (7) away.
NOTE	
If necessary, use scraper to remove gaskets.	
8.	Using 1/8 inch socket head screw key, remove four screws (11) securing plate (12) to housing (3). Throw screws (11) away.
9.	Remove plate (12) and brake assembly (13) from housing (3).
10.	Remove seal (14) from housing (3).
END OF TASK	



18-43.4 BRAKE ADAPTER ASSEMBLY INSPECTION PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Disassemble brake adapter assembly (para 18-43.3)

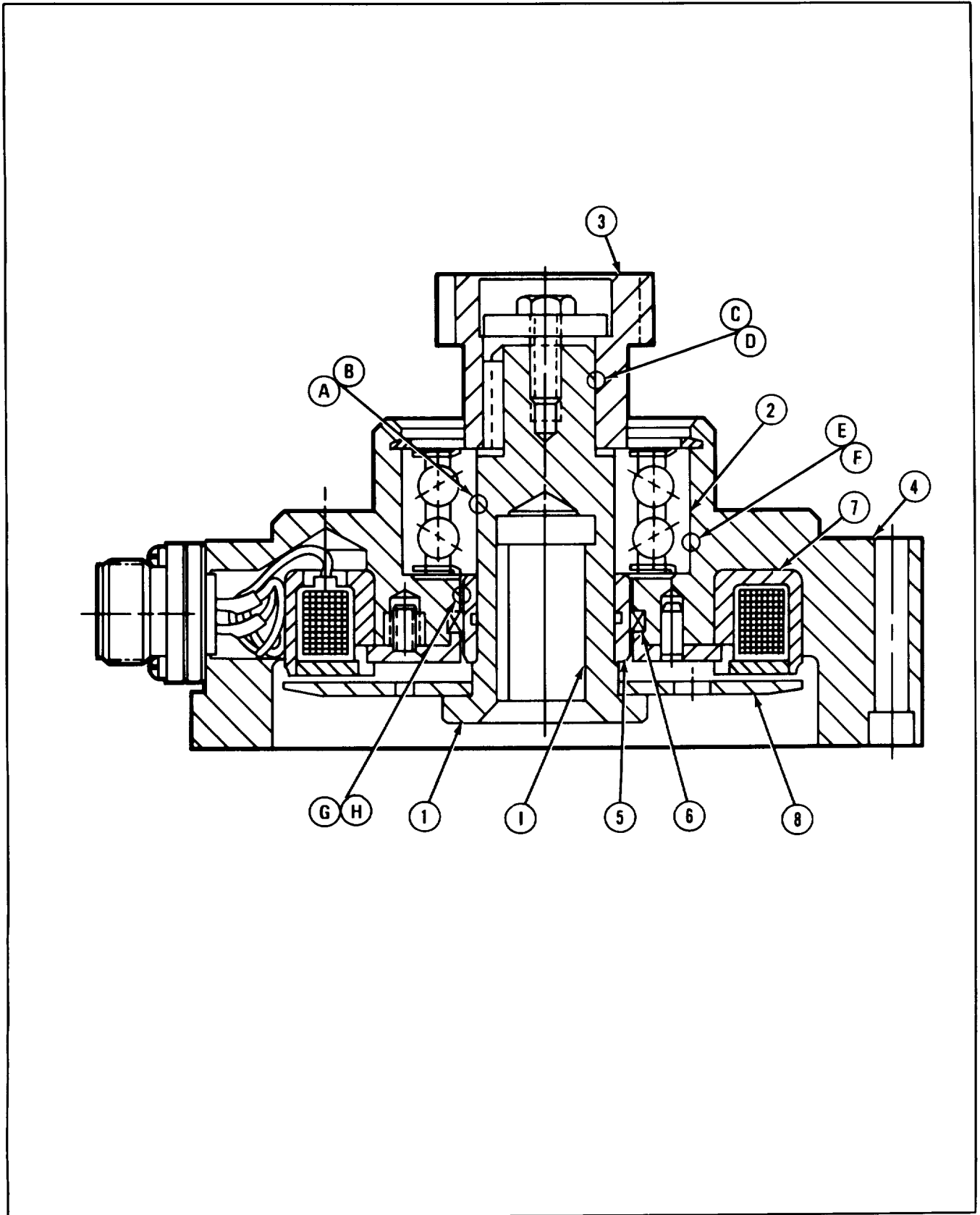
GENERAL INSTRUCTIONS:

NOTE

If part is bad. order repair part or next higher assembly as required.

FRAME 1

STEP	PROCEDURE																														
1.	Take brake adapter assembly parts to shop where inspection equipment is available.																														
2.	<p>Make dimensional check.</p> <table border="1"> <thead> <tr> <th>Reference Letter</th> <th>Point of Measurement</th> <th>Measurement</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>OD of Shaft</td> <td>1.1803 to 1.1806</td> </tr> <tr> <td>B</td> <td>ID of Bearing</td> <td>1.1807 to 1.1811</td> </tr> <tr> <td>c</td> <td>ID of Gear</td> <td>.8755 to .8760</td> </tr> <tr> <td>D</td> <td>OD of Shaft</td> <td>.874 to .875</td> </tr> <tr> <td>E</td> <td>ID of Housing</td> <td>2.4410 to 2.4416</td> </tr> <tr> <td>F</td> <td>OD of Bearing</td> <td>2.4404 to 2.4409</td> </tr> <tr> <td>G</td> <td>ID of Housing</td> <td>1.678 to 1.680</td> </tr> <tr> <td>H</td> <td>OD of Spacer</td> <td>1.433 to 1.435</td> </tr> <tr> <td>I</td> <td>ID of Shaft</td> <td>.629 to .630</td> </tr> </tbody> </table>	Reference Letter	Point of Measurement	Measurement	A	OD of Shaft	1.1803 to 1.1806	B	ID of Bearing	1.1807 to 1.1811	c	ID of Gear	.8755 to .8760	D	OD of Shaft	.874 to .875	E	ID of Housing	2.4410 to 2.4416	F	OD of Bearing	2.4404 to 2.4409	G	ID of Housing	1.678 to 1.680	H	OD of Spacer	1.433 to 1.435	I	ID of Shaft	.629 to .630
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G	ID of Housing	1.678 to 1.680																													
H	OD of Spacer	1.433 to 1.435																													
I	ID of Shaft	.629 to .630																													
3.	Refer to para 18-95 for magnetic brake coil and armature/disc inspection procedures.																														
<p>NOTE</p> <p>Tag all parts that are out of tolerance.</p>																															
4.	After support shop work, return brake adapter assembly parts to turret shop.																														
<p>NOTE</p> <p>Inspect all parts for damage, replace as required.</p>																															
<p>END OF TASK</p>																															



18-43.5 BRAKE ADAPTER ASSEMBLY ASSEMBLY PROCEDURES

TOOLS: 7/16" socket (3/8" drive)
Ratchet (3/8" drive)
Internal retaining ring pliers
Flat - tip screwdriver, 1/8" wide
Soldering iron
1/8" socket head screw key (Allen wrench)
Heat gun
Torque wrench 3/8" drive (0-150" lb.) (0-16.8 N.m)
Vise with brass caps

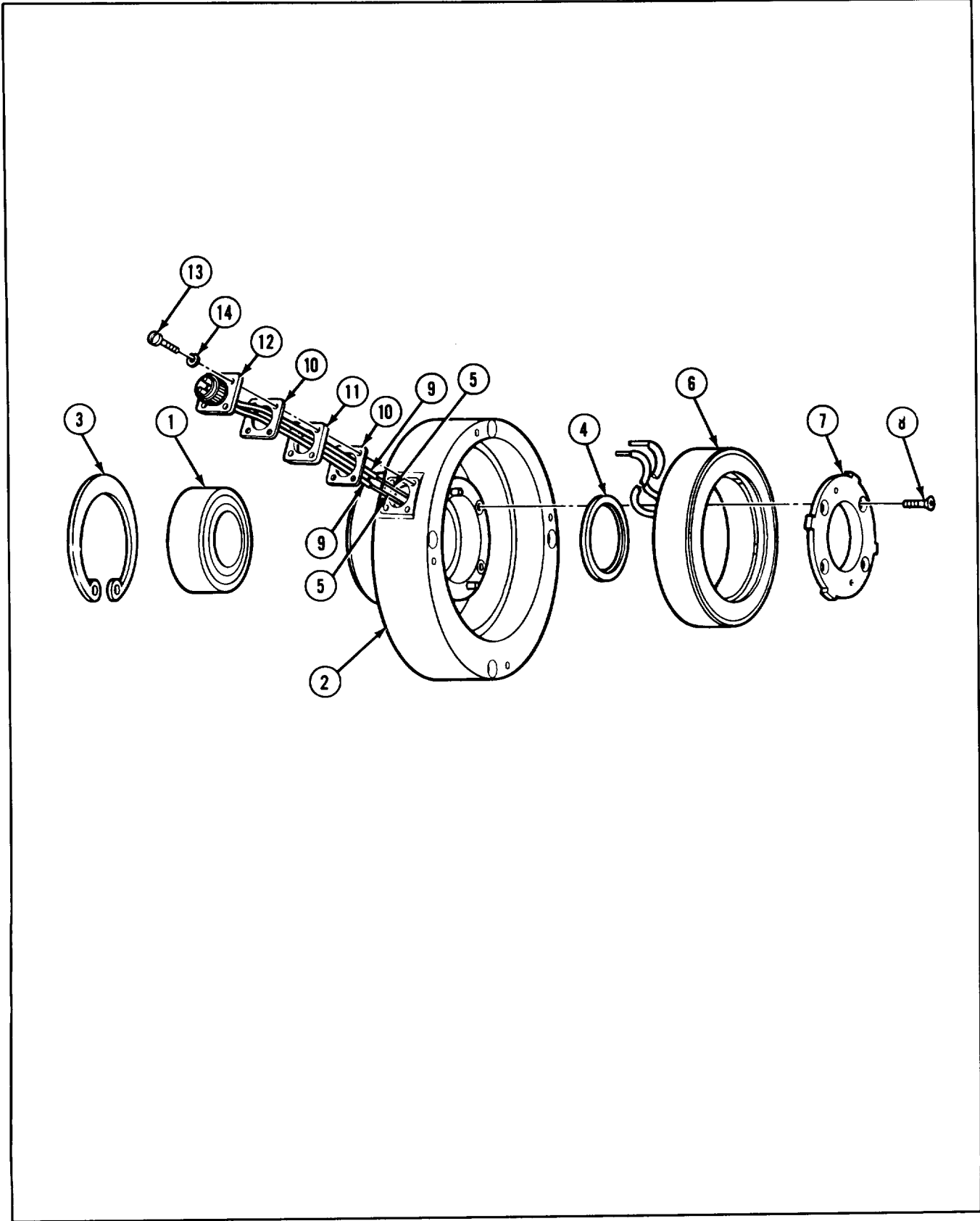
SUPPLIES: Preformed packing MS28775-025
Gasket MS52000-4 (two required)
Self-locking screws MS24667-20L (four required)
Lockwasher MS35338-40 (four required)
Tubing, heat shrinkable (item 39, App. A)
Grease (item 12, App. A)
Grease (item 14, App. A)
Solder (item 31, App. A)
Sealing compound (item 29, App. A)

PERSONNEL: One

REFERENCES JPG for procedures to:
Grease bearing
Heat shrink tubing
Solder electrical receptacle

8-43.5. BRAKE ADAPTER ASSEMBLY ASSEMBLY PROCEDURES (CONT)

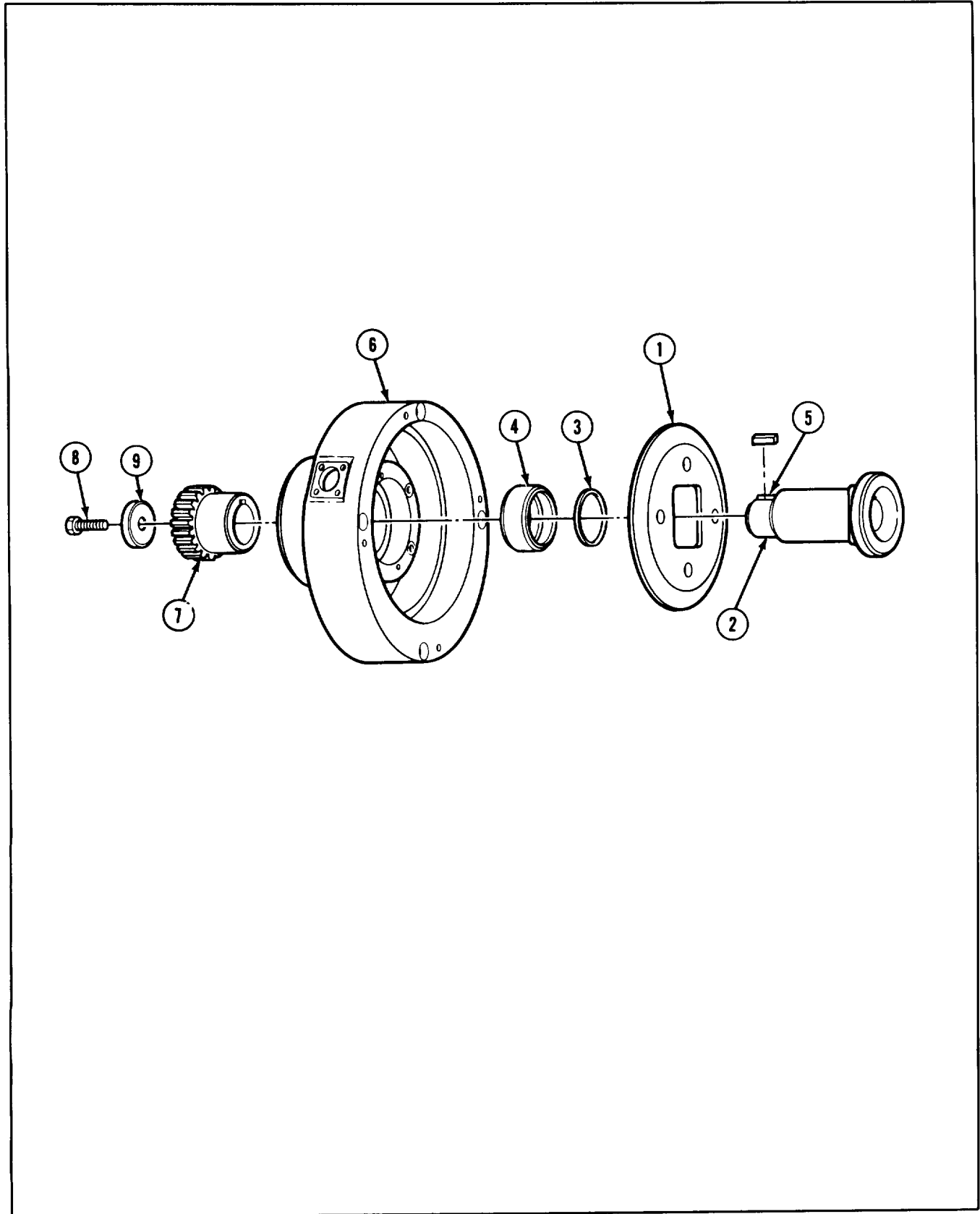
FRAME 1	
STEP	PROCEDURE
1.	Apply grease (item 12, App. A) to bearing (1) (JPG) and install bearing (1) into housing (2).
2.	Using internal retaining ring pliers, install. retaining ring (3) to secure bearing (1) in housing (2).
3.	Install seal (4) into housing (2).
4.	Insert leads (5) for coil of brake assembly (6) through opening in housing (2) and install brake assembly (6) into housing (2).
5.	Position plate (7) on brake assembly (6) in housing [2].
6.	Install four screws (8) with 1/8 in. Allen wrench.
7.	Cut two pieces of insulation tubing (9) (item 41, App. A), 3/8 inch long and install over leads (5).
8.	Install one gasket (10), spacer (11), and another gasket (10) over leads (5).
9.	Slide insulating tubing (9) over leads (5) solder lead (5) to receptacle (12) and heat shrink (JPG).
10.	Using heat gun heat shrink insulating tubing (9)
11.	Using screwdriver, secure receptacle (12), gaskets (10), and spacer (11) to housing (2) with four screws (13) and four new lockwashers (14).
	GO TO FRAME 2



18-43.5 BRAKE ADAPTER ASSEMBLY ASSEMBLY PROCEDURES (CONT)

FRAME 2

STEP	PROCEDURE
1.	Install plate (1) onto shaft (2).
2.	Lubricate new preformed packing (3) with grease (item 14, App. A) and install into spacer (4).
3.	Install spacer (4) with preformed packing (3) onto shaft (2).
4.	Install key (5) onto shaft (2).
5.	Carefully install shaft (2) (with assembled parts) into housing (6). Be careful not to damage preformed packing (3).
6.	Install gear (7) onto keyed shaft (2).
7.	Apply sealing compound (item 29, App. A) to threads of screw (8).
8.	Using 7/16 inch socket and ratchet, install screw (8) and washer (9) to secure gear (7) on shaft (2).
9.	Using 7/16 inch socket and torque wrench, tighten screw (8) 9-11 foot -pounds (12 to 16 N. m).
<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Test magnetic brake (para 18-96).</p> <p>END OF TASK</p>	



18-44. HYDRAULIC MOTOR ADAPTER INSPECTION PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Disassemble hydraulic motor adapter (para 18-47)

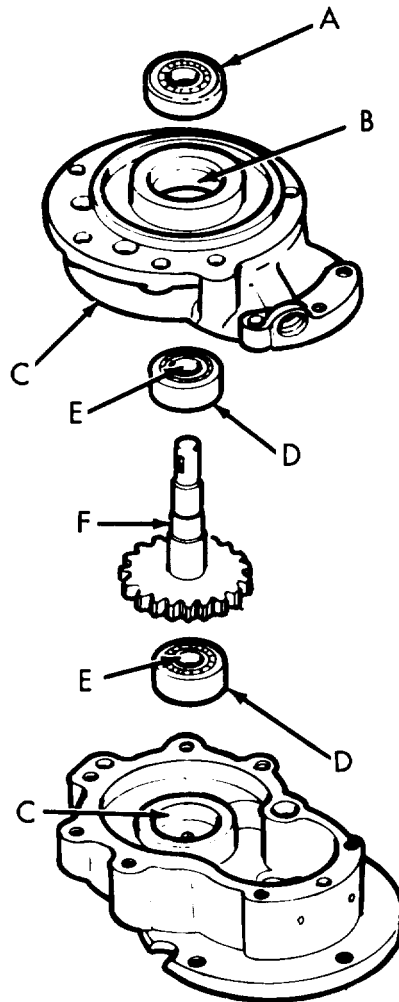
GENERAL INSTRUCTIONS:

NOTE

If part is bad, order repair part or next higher assembly as required.

18-44. HYDRAULIC MOTOR ADAPTER INSPECTION PROCEDURE (CONT)

FRAME 1																						
Step	Procedure																					
	SUPPORT SHOP WORK																					
1.	Take hydraulic motor adapter parts to shop where inspection equipment is available.																					
2.	Make dimensional check.																					
	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center;">Reference Letter</th> <th style="text-align: center;">Point of Measurement</th> <th style="text-align: center;">Measurement</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td>OD of seal</td> <td>1.986 to 1.990</td> </tr> <tr> <td style="text-align: center;">B</td> <td>ID of housing</td> <td>1.983 to 1.985</td> </tr> <tr> <td style="text-align: center;">C</td> <td>ID of adapter</td> <td>1.8504 to 1.8509</td> </tr> <tr> <td style="text-align: center;">D</td> <td>OD of bearing</td> <td>1.8504 to 1.8499</td> </tr> <tr> <td style="text-align: center;">E</td> <td>ID of bearing</td> <td>0.7874 to 0.7870</td> </tr> <tr> <td style="text-align: center;">F</td> <td>OD of gear shaft</td> <td>0.7877 to 0.7880</td> </tr> </tbody> </table>	Reference Letter	Point of Measurement	Measurement	A	OD of seal	1.986 to 1.990	B	ID of housing	1.983 to 1.985	C	ID of adapter	1.8504 to 1.8509	D	OD of bearing	1.8504 to 1.8499	E	ID of bearing	0.7874 to 0.7870	F	OD of gear shaft	0.7877 to 0.7880
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E	ID of bearing	0.7874 to 0.7870																				
F	OD of gear shaft	0.7877 to 0.7880																				
	NOTE																					
	Tag all parts that are out of tolerance.																					
3.	After support shop work, return hydraulic motor adapter parts to turret shop.																					
	END OF TASK																					



18-45. HYDRAULIC MOTOR ADAPTER REMOVAL PROCEDURE

- TOOLS:** 3-16" socket head screw socket wrench attachment
 6" extension (3/8" drive)
 3/8" drive ratchet
 1/4" drift pin punch
 20 oz. ball peen hammer

SUPPLIES: Rags (item 21, App. A)

PERSONNEL: One

EQUIPMENT LOCATION INFORMATION:

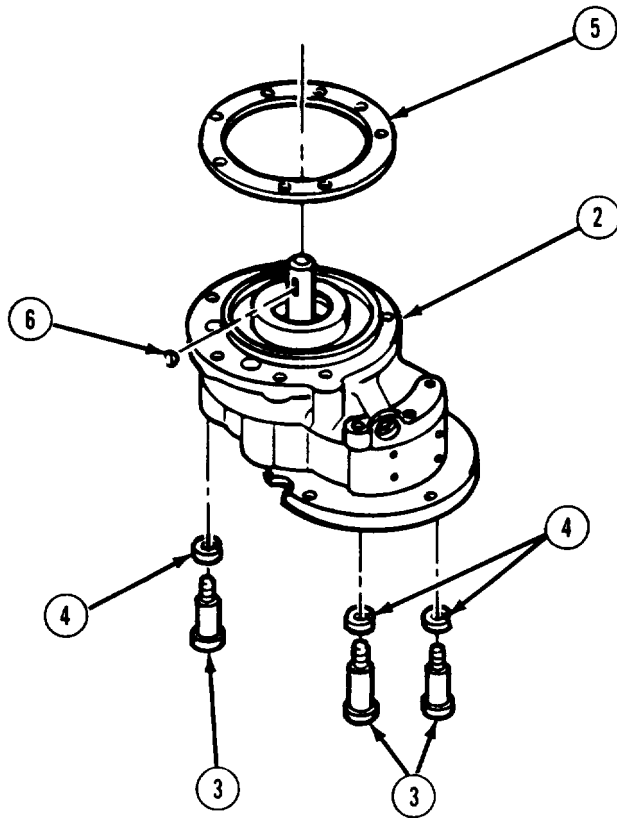
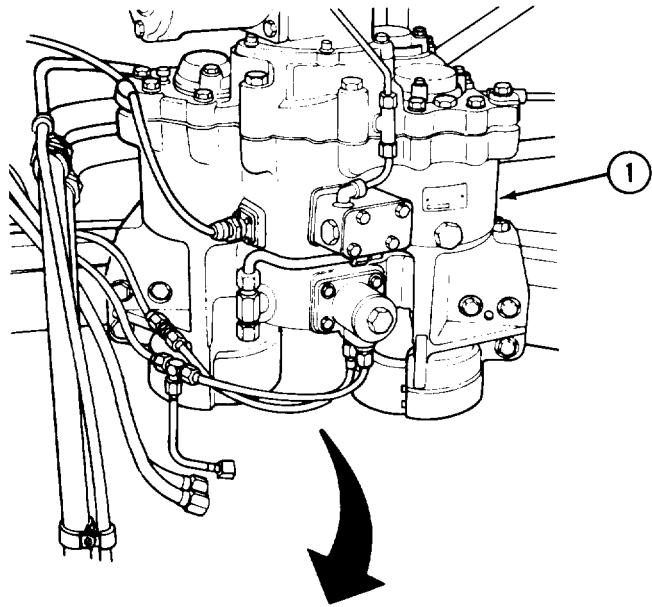
EQUIPMENT	FOLDOUT	CALLOUT
Turret Traversing Mechanism	FO-2	12

- PRELIMINARY PROCEDURES:** Remove hydraulic motor (para 18-40)
 Remove brake adapter assembly (para 16-43.1) (late model only)

NOTE

Keep dirt from getting in parts. Dirt can damage equipment. Use rags for oil spillage.

FRAME 1	
STEP	PROCEDURE
	NOTE
	Oil will drip from traversing mechanism (1) when hydraulic motor adapter (2) is removed.
1.	Using 3/16 inch socket head screw socket wrench attachment with extension and ratchet, remove eight screws (3) and lockwashers (4) from inside hydraulic motor adapter (2).
2.	Using hands, remove hydraulic motor adapter (2) from traversing mechanism (1).
3.	Using hands remove gasket (5) from hydraulic motor adapter (2).
	NOTE
	Do step 4 if hydraulic motor adapter (2) is to be replaced.
4.	Using hammer and punch, remove woodruff key (6) from hydraulic motor adapter (2) shaft.
	END OF TASK



18-46. HYDRAULIC MOTOR ADAPTER INSTALLATION PROCEDURE

TOOLS: 3/16" socket head screw socket wrench attachment
 6" extension (3/8" drive)
 3/8" drive ratchet
 3/8" drive torque wrench (0 to 150 inch-pounds)
 3 oz. brass hammer

SUPPLIES: Mounting gasket (7739311)
 Lockwasher MS51848-10 (eight required)

PERSONNEL: One

REFERENCES: JPG for procedure to use torque wrench

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Turret Traversing Mechanism	FO-2	12

PRELIMINARY PROCEDURES: Assemble hydraulic motor adapter (para 18-48)

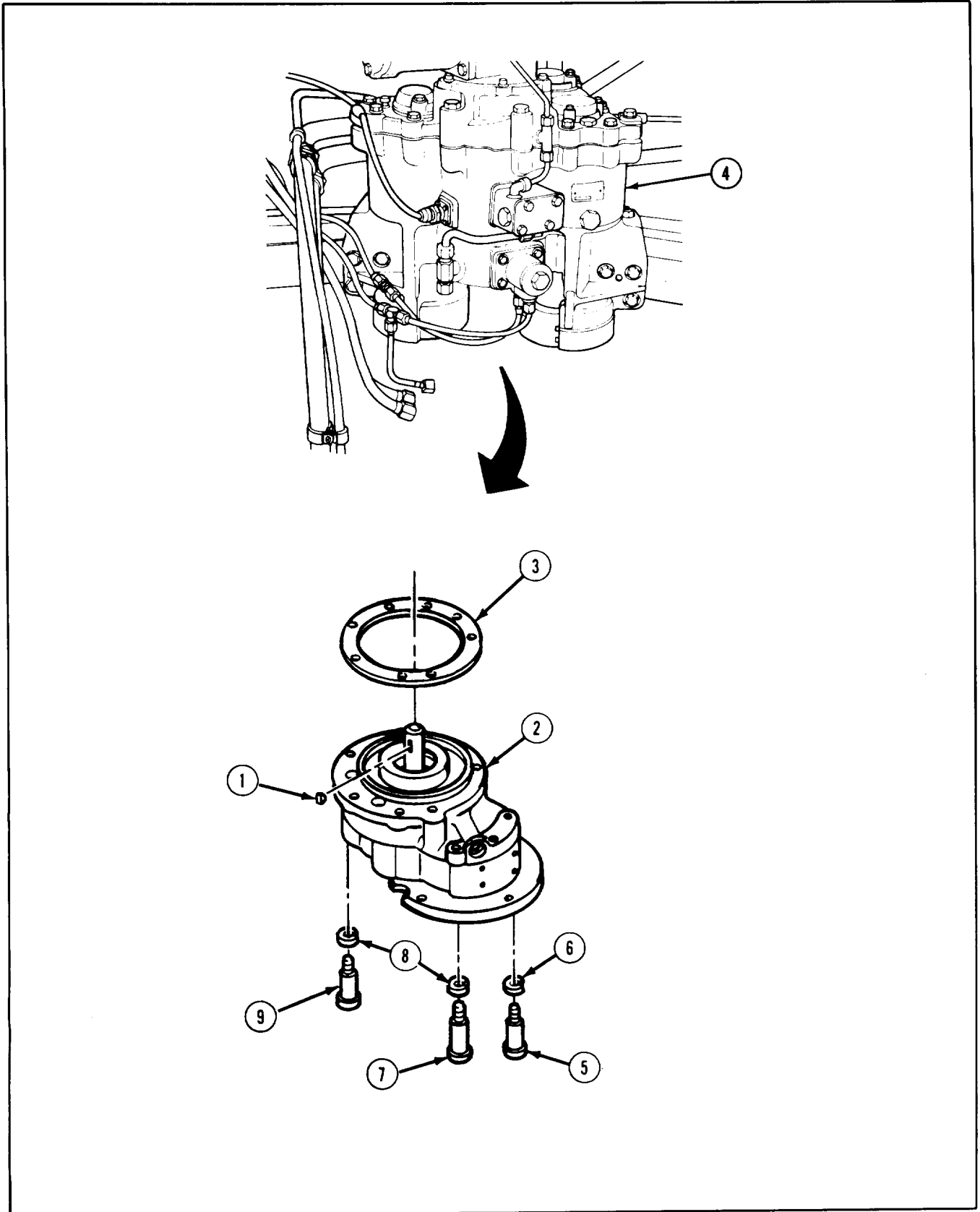
GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

18-46. HYDRAULIC MOTOR ADAPTER INSTALLATION PROCEDURE (CONT)

FRAME 1	
STEP	PROCEDURE
	<p>NOTE</p> <p>Do step 1 if new hydraulic motor adapter (2) is to be installed.</p>
1.	Using hammer, put woodruff key (1) in shaft of hydraulic motor adapter (2). Woodruff key should be flat with edge of shaft.
2.	Using hands, put gasket (3) on hydraulic motor adapter (2) and align.
3.	Using hands, position hydraulic motor adapter (2) so screw holes are in line with holes in traversing mechanism (4).
4.	Using hands, rotate shaft to align woodruff key (1) with groove in traversing mechanism (4).
5.	Using hands, position hydraulic motor adapter (2) to traversing mechanism (4). Hold hydraulic motor adapter in place.
	<p>NOTE</p> <p>Screws (5) and (7) have to be put in from inside of hydraulic motor adapter (2).</p>
6.	Using ratchet with 3/16 inch socket head screw socket wrench attachment and 6 inch extension, attach hydraulic motor adapter (2) to traversing mechanism (4) with one long screw (5) and one new lockwasher (6).
7.	Using ratchet with 3/16 inch socket wrench screw socket head attachment and 6 inch extension, attach hydraulic motor adapter (2) to traversing mechanism (4) with seven short screw (7 and 9) and new lockwasher (8).
8.	Using torque wrench, with 3/16 inch socket head screw socket wrench attachment and 6 inch extension torque screws (7 and 9) 36 to 40 inch-pounds (4.0-4.5 N•m).
	END OF TASK



18-47. HYDRAULIC MOTOR ADAPTER DISASSEMBLY PROCEDURE

TOOLS: 3/16" hex head socket (3/8" drive)
3/8" drive ratchet
Fine stone
20 oz ball peen hammer
3/8" punch
Scraper
Stiff bristled brush
Soft face hammer

SUPPLIES: Dry-cleaning solvent (item 33, App A)
Crocus cloth (item 7, App A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Use bearing puller
Clean parts
Inspect and repair parts

PRELIMINARY PROCEDURES: Remove hydraulic motor adapter (para 18-45)

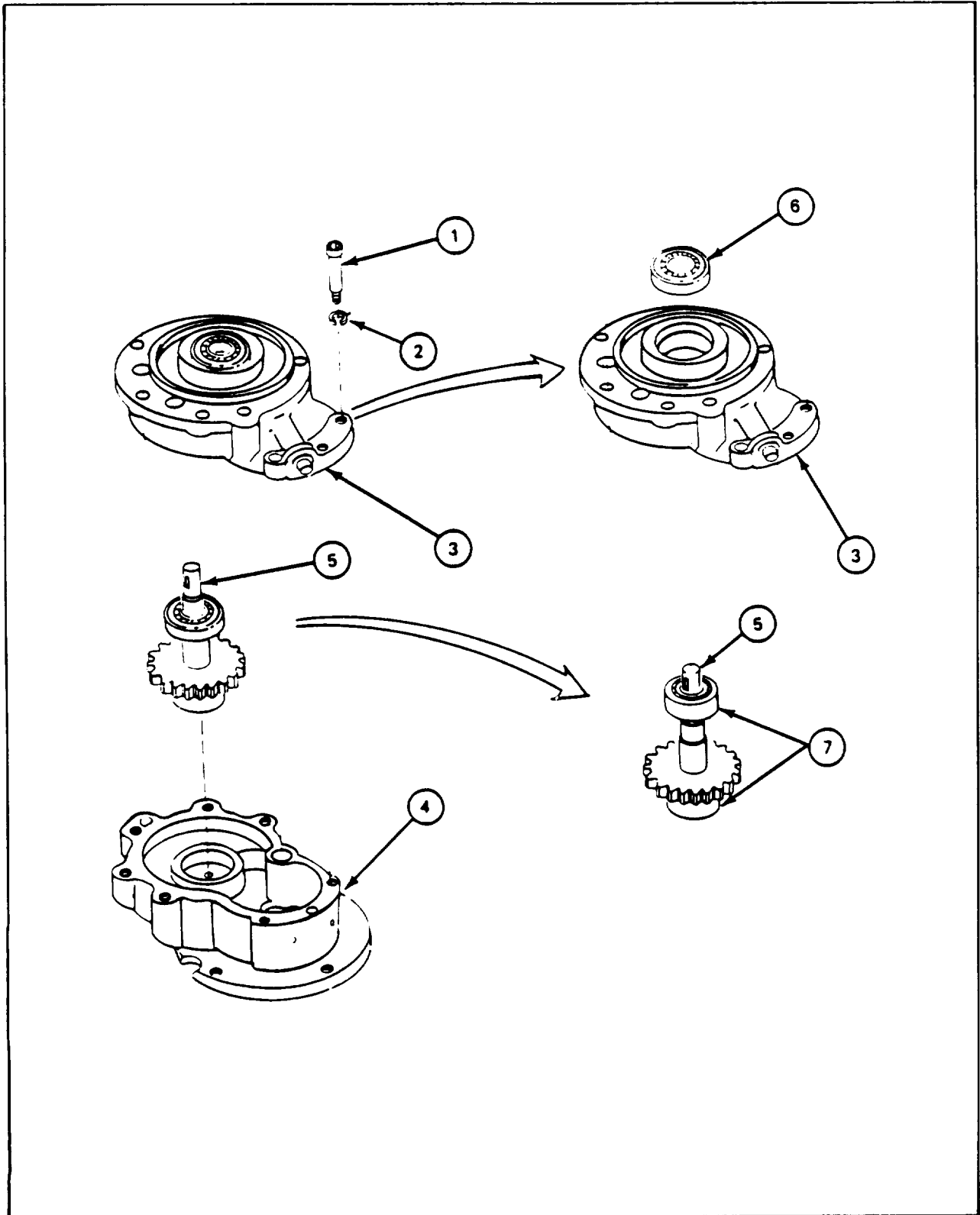
GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in parts. Dirt can damage equipment

18-47. HYDRAULIC MOTOR ADAPTER DISASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	<p>Using socket wrench, remove seven screws (1) and seven lockwashers (2) that attach upper housing (3) to lower housing (4).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">It may be necessary to use soft face hammer to perform step (2).</p>
2.	Using hands, remove upper housing (3) from lower housing (4).
3.	Using hands, remove gear shaft (5) with bearings from lower housing (4).
	<p>NOTE</p> <p>Do step 4 if seal (6) is to be removed.</p>
4.	Using ball peen hammer and punch from inside upper housing (3), lightly tap seal (6) and remove from upper housing.
	SUPPORT SHOP WORK
5.	Take shaft (5) with two bearings (7) to shop where press is available. Press shaft (5) from two bearings (7).
6.	After support shop work, return gear shaft (5) with bearings (7) to turret shop.
	<p>NOTE</p> <p>Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 18-44).</p>
	END OF TASK



18-48. HYDRAULIC MOTOR ADAPTER ASSEMBLY PROCEDURE

TOOLS: 3/16" hex head socket (3/8" drive)
3/8" drive torque wrench (0 to 150 inch-pounds)
20 oz. ball peen hammer
Ratchet (3/8" drive)

SUPPLIES: Seal (7059852)
Grease (item 12, App A)

PERSONNEL: One

REFERENCES: JPG for procedure to grease bearings

PRELIMINARY PROCEDURES: Inspect hydraulic motor adapter (para 18-44)

GENERAL INSTRUCTIONS:

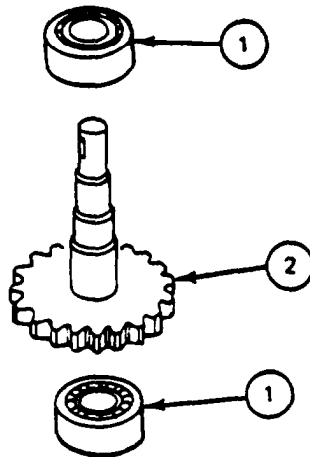
NOTE

Keep dirt from getting in parts. Dirt can damage equipment.

18-48. HYDRAULIC MOTOR ADAPTER ASSEMBLY PROCEDURE (CONT)

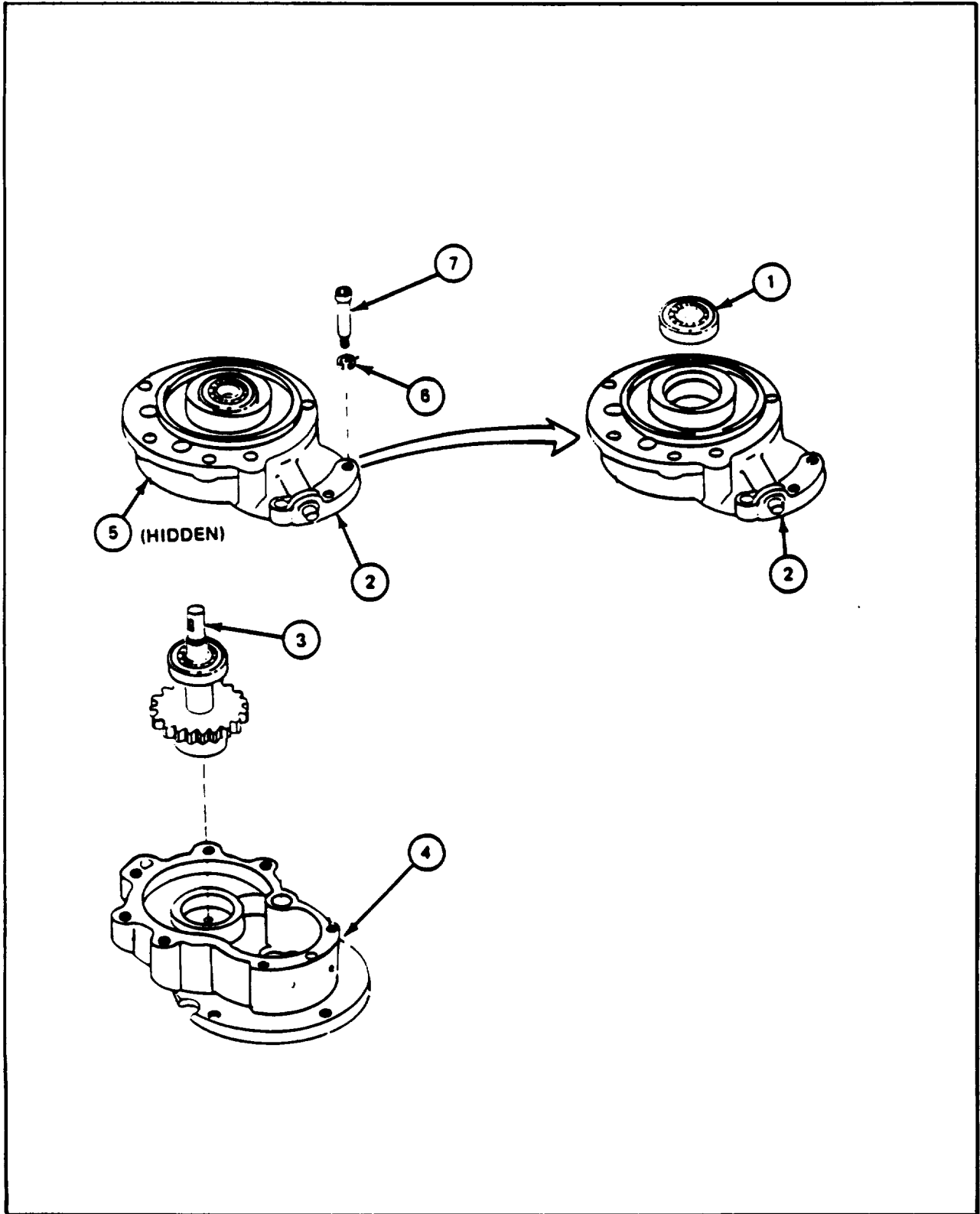
FRAME 1

Step	Procedure
1.	Grease two bearings (1) (JPG).
	SUPPORT SHOP WORK
2.	Take two bearings (1) and shaft (2) to shop where press is available. Press two bearings (1) on shaft (2).
3.	After support shop work, return shaft (2) with bearings (1) to turret shop. GO TO FRAME 2



18-48. HYDRAULIC MOTOR ADAPTER ASSEMBLY PROCEDURE (CONT)

FRAME 2	
Step	Procedure
	NOTE
	Do step 1 if seal (1) was removed.
1.	Using hammer, lightly tap seal (1) into upper housing (2).
2.	Lightly coat gear shaft (3) and bearings with grease.
3.	Using hands, put shaft (3) with bearings in lower housing (4).
4.	Using hands, line up two dowel pins (5) on upper housing (2) with two holes in lower housing (4).
5.	Put upper housing (2) down over gear shaft (3) with bearings and on to lower housing (4).
6.	Using ratchet with hex head socket, attach upper housing (2) to lower housing (4) with seven lockwashers (6) and seven screws (7).
7.	Using torque wrench with hex head socket, torque seven screws (7) to between 32 and 40 inch-pounds.
	END OF TASK

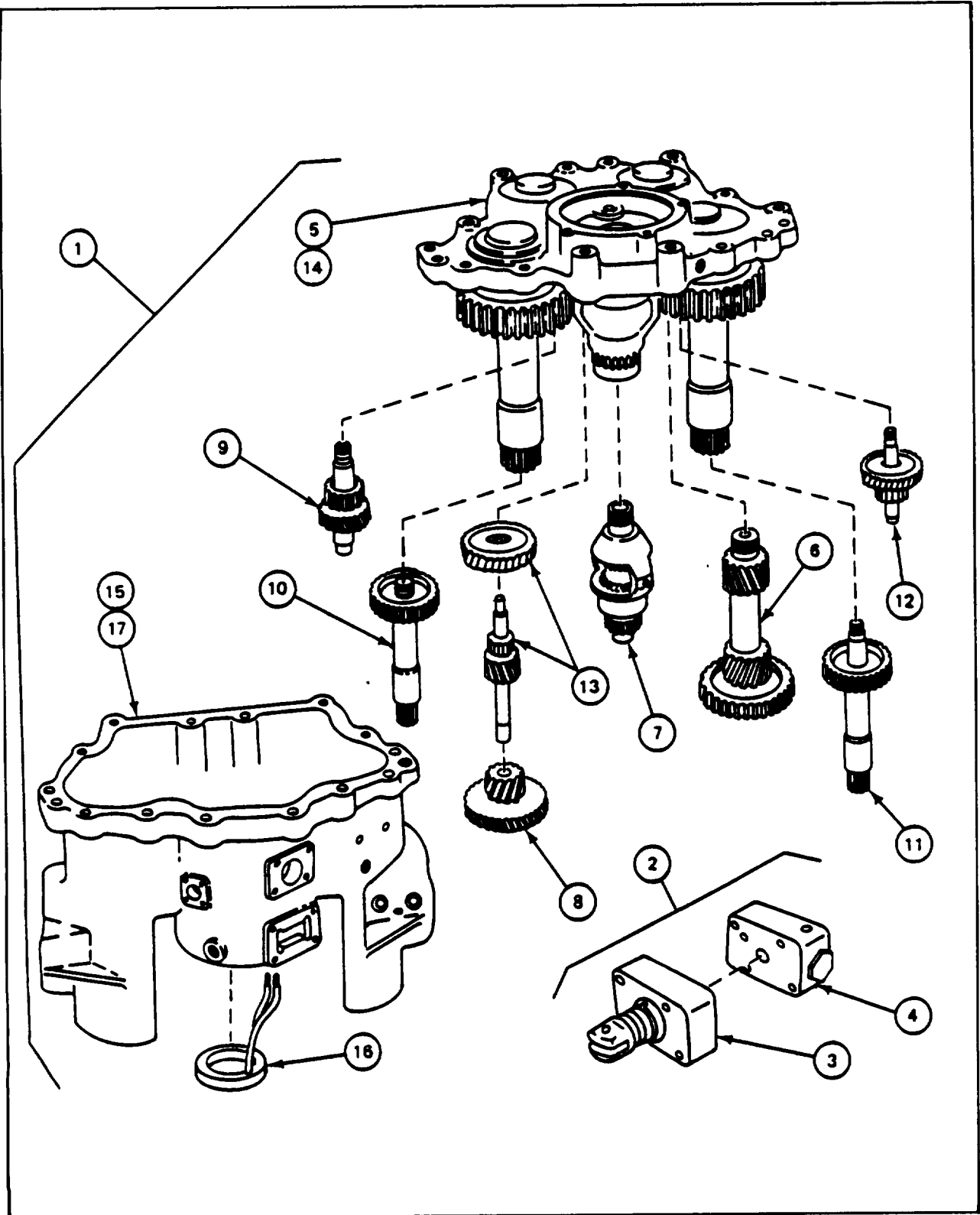


Section 6. TRAVERSING GEAR BOX

18-49. MAINTENANCE PROCEDURES INDEX

Equipment Item	Inspection	Test	Removal	Tasks Installation	Disassembly	Assembly	Repair
1. Traversing Gear Box	...	...	18-50	18-51	18-52	18-53	. . .
2. Gear Box Pump	18-54	18-55	18-56	18-57	18-58	18-59	. . .
3. Pump Body	...	...	18-60	18-61	18-62	18-63	. . .
4. Pump Plate	...	...	18-60	18-61	18-64	18-65	. . .
5. Upper Housing and Gear Train	18-66	. . .	18-67	18-68	18-69	18-70	. . .
6. Intermediate Gear	. . .	. . .	18-71	18-72	. . .	. . .	. . .
7. Differential	18-73	. . .	18-74	18-75	18-76	18-77	. . .
8. Lower Backlash Gear	...	...	18-78	18-79	. . .	. . .	. . .
9. Left Gear Shaft	...	...	18-80	18-81	. . .	. . .	. . .
10. Left Pinion Shaft	. . .	. . .	18-82	18-83	. . .	. . .	. . .
11. Right Pinion Shaft	. . .	. . .	18-84	18-85	. . .	. . .	. . .
12. Right Gear Shaft	. . .	. . .	18-86	18-87	. . .	. . .	. . .
13. Backlash Gear Shaft	...	...	18-88	18-89	. . .	. . .	. . .
14. Upper Housing	18-66	. . .	18-88	18-89	18-90	18-91	18-92
15. Lower Housing Group	...	...	18-67	18-68	18-93	18-94	. . .
16. Magnetic Brake	18-95	18-96	18-97	18-98	. . .	. . .	. . .
17. Lower Housing	18-99	. . .	18-97	18-98	18-100	18-101	18-102

**Para 18-49
18-190**



18-50. TRAVERSING GEAR BOX REMOVAL PROCEDURE

PERSONNEL: One

REFERENCES: TM 9-2350-222-2-3 for procedure to remove no-bak

PRELIMINARY PROCEDURES: Remove turret traversing mechanism (para 18-3)

FRAME 1	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Turret traversing mechanism is outside of vehicle. Parts must be removed from old gear box and put on new gear box (para 18-49).</p> <ol style="list-style-type: none">1. Remove hydraulic motor (para 18-40).2. Remove hydraulic motor adapter (para 18-45).3. Remove no-bak (TM-20-2-3).4. Remove clutch (para 18-26). <p>END OF TASK</p>

18-51. TRAVERSING GEAR BOX INSTALLATION PROCEDURE

PERSONNEL: One

REFERENCES: LO 9-2350-222-12 for procedure to add oil
 TM 9-2350-222-20-2-3 for procedure to install no-bak

PRELIMINARY PROCEDURES: Install upper housing and gear train (para 18-68).

GENERAL INSTRUCTIONS:

NOTE

For traversing gear box to work properly, part numbers of clutch, no-bak, traversing gear box and hand traversing drive must match part numbers as follows:

Traversing Gear Box	Clutch	No-bak	Hand Traversing Drive
7739314	10951650	10951651	10911418-4

FRAME 1	
Step	Procedure
1.	Install clutch (para 18-27).
2.	Install no-bak (TM-20-2-3).
3.	Install hydraulic motor adapter (para 18-46).
4.	Install hydraulic motor (para 18-41).
NOTE	
Follow-on Maintenance Required:	
Fill traversing gear box with oil (LO). Check for leaks and repair as required.	
END OF TASK	

18-52. TRAVERSING GEAR BOX DISASSEMBLY PROCEDURE

PERSONNEL: One

REFERENCES: TM 9-2350-222-20-2-3 for procedure to remove anti-backlash mechanism

PRELIMINARY PROCEDURES: Remove traversing gear box (para 18-50).

FRAME 1	
Step	Procedure
1.	Remove anti-backlash mechanism (TM-20-2-3).
2.	Remove gear box pump (para 18-56).
3.	Remove upper housing and gear train (para 18-67).
4.	Disassemble lower housing group (para 18-93).
5.	Disassemble upper housing and gear train (para 18-69).
	END OF TASK

18-53. TRAVERSING GEAR BOX ASSEMBLY PROCEDURE**PERSONNEL:** One**REFERENCES:** TM 9-2350 -222-20-2-3 for procedure to install anti-backlash mechanism

FRAME 1	
Step	Procedure
1.	Assemble upper housing and gear train (para 18-70).
2.	Assemble lower housing group (para 18-94).
3.	Install upper housing and gear train (para 18-68).
4.	Install gear box pump (para 18-57).
5.	Install anti-backlash mechanism (TM-20-2-3).
	END OF TASK

18-54. GEAR BOX PUMP INSPECTION PROCEDURE

PERSONNEL: One

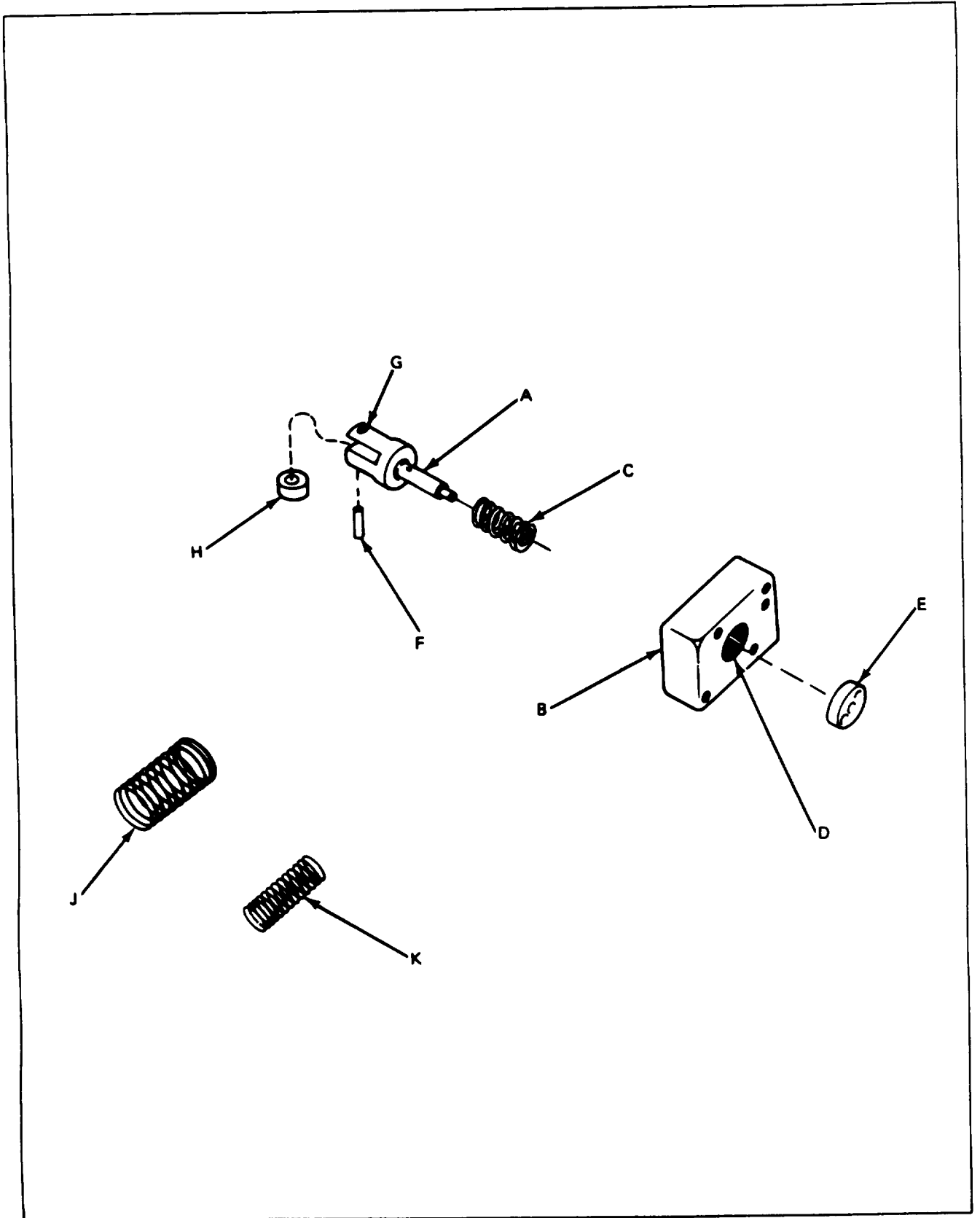
PRELIMINARY PROCEDURES : Disassemble gear box pump (para 18-58).

GENERAL INSTRUCTIONS:

NOTE

If part is bad, order repair part or next higher assembly as required.

FRAME 1																																											
Step	Procedure																																										
	SUPPORT SHOP WORK																																										
1.	Take gear box pump to shop where inspection equipment and spring tester are available.																																										
2.	Make dimensional check.																																										
	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Reference Letter</th> <th style="text-align: left;">Point of Measurement</th> <th style="text-align: left;">Measurement</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>OD of pump stem</td> <td>0.3737 to 0.3740</td> </tr> <tr> <td>B</td> <td>ID of pump body</td> <td>0.3745 to 0.3750</td> </tr> <tr> <td>C</td> <td>Free length of plunger spring</td> <td>1.380 in</td> </tr> <tr> <td>C</td> <td>Load required to compress spring to 17/32 in</td> <td>7.7 to 9.3 oz</td> </tr> <tr> <td>D</td> <td>ID of body plunger bore</td> <td>0.9843 to 0.9848</td> </tr> <tr> <td>E</td> <td>OD of plunger</td> <td>0.9833 to 0.9838</td> </tr> <tr> <td>F</td> <td>OD of cam follower pin</td> <td>0.246 to 0.250</td> </tr> <tr> <td>G</td> <td>ID of pin holes in pump head</td> <td>0.251 to 0.252</td> </tr> <tr> <td>H</td> <td>ID of pump cam follower</td> <td>0.251 to 0.252</td> </tr> <tr> <td>J</td> <td>Free length of inlet valve spring</td> <td>1.06 in</td> </tr> <tr> <td>J</td> <td>Load required to compress spring to 27/32 in</td> <td>0.9 to 1.1 oz</td> </tr> <tr> <td>K</td> <td>Free length of outlet valve spring</td> <td>0.94 in</td> </tr> <tr> <td>K</td> <td>Load required to compress spring to 11/16 in</td> <td>0.70 to 0.86 oz</td> </tr> </tbody> </table>	Reference Letter	Point of Measurement	Measurement	A	OD of pump stem	0.3737 to 0.3740	B	ID of pump body	0.3745 to 0.3750	C	Free length of plunger spring	1.380 in	C	Load required to compress spring to 17/32 in	7.7 to 9.3 oz	D	ID of body plunger bore	0.9843 to 0.9848	E	OD of plunger	0.9833 to 0.9838	F	OD of cam follower pin	0.246 to 0.250	G	ID of pin holes in pump head	0.251 to 0.252	H	ID of pump cam follower	0.251 to 0.252	J	Free length of inlet valve spring	1.06 in	J	Load required to compress spring to 27/32 in	0.9 to 1.1 oz	K	Free length of outlet valve spring	0.94 in	K	Load required to compress spring to 11/16 in	0.70 to 0.86 oz
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	NOTE Tag all parts that are out of tolerance.																																										
3.	After support shop work, return gear box pump to turret shop.																																										
	END OF TASK																																										



18-55. GEAR BOX PUMP TEST PROCEDURE

TEST EQUIPMENT: Hydraulic test kit (NSN 1015-01-151-6441) (9337932)
M3 oil pump (NSN 4933-00-449-7166) (7550134)

SUPPLIES: Rags (item 21, App. A)
Oil (item 18, App. A)
Container, 1 quart (two)

PERSONNEL: One

PRELIMINARY PROCEDURES: Assemble gear box (para 18-59)
Remove gear box pump (para 18-57)

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in ports. Dirt can damage equipment. Put plugs in ports to keep out dirt.

NOTE

Use rags to clean up oil spills.

Suitable fittings, preformed packings, tools, and hose should be used to connect test equipment to parts being tested.

If normal indication is not obtained, gear box pump must be disassembled (para 18-58).

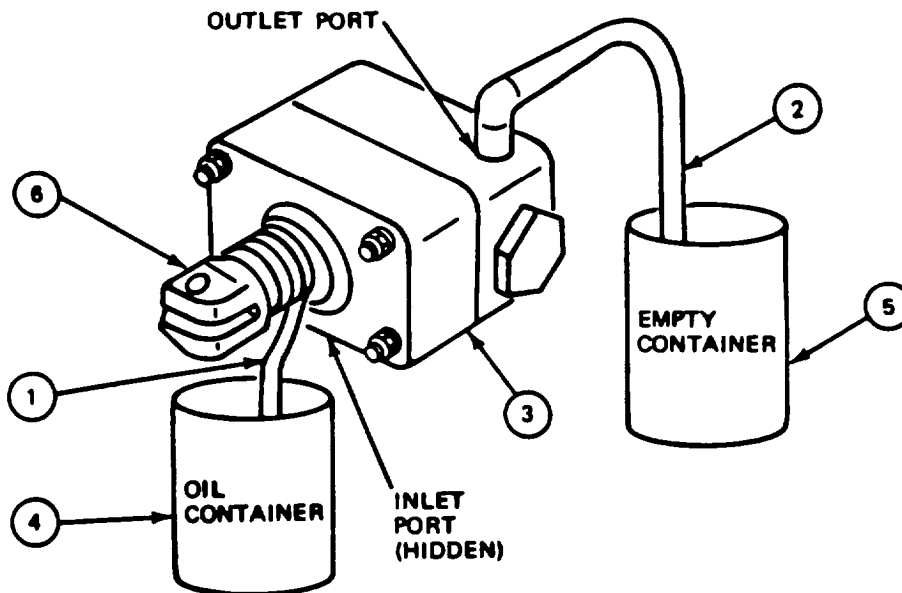
Refer to section index (para 18-49) for replacement of bad parts.

18-55. GEAR BOX PUMP TEST PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1. 2. 3. 4. 5. 6. 7. 8.	<p>Cap outlet port (1) in pump (2).</p> <p>Assemble M3 oil pump.</p> <p>Connect M3 oil pump and pressure gauge to inlet port (3) of pump (2).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">There should be no visible leaks except for small amount at plunger shaft (4).</p> <p>Using M3 oil pump, pressurize pump (2) to 25 psi (JPG). Check for leaks.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">If leakage was found, pump (2) is bad.</p> <p>Using M3 oil pump, reduce pressure in pump (2) to 0 psi (JPG)</p> <p>Uncap outlet port (1) in pump (2). Let excess oil drain.</p> <p>Disconnect M3 oil pump and pressure gauge from inlet port (3) of pump (2).</p> <p>Disassemble M3 oil pump.</p> <p>GO TO FRAME 2</p>
<p>The diagram illustrates the test setup. On the left is a rectangular box labeled 'M3 OIL PUMP'. A line connects it to a circular pressure gauge. From the gauge, another line leads to the inlet port (3) of a vertical gear box pump. The gear box pump has an outlet port (1) at the bottom and a plunger shaft (4) at the top. A line also points to the plunger shaft (4).</p>	

18-55. GEAR BOX PUMP TEST PROCEDURE (CONT)

FRAME 2	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 4. 5. 6. 	<p>Connect one hose (1) to inlet port and second hose (2) to outlet port of pump (3).</p> <p>Fill one container (4) with about one quart of oil.</p> <p>Put hose (1) from inlet port into container of oil (4) about two inches and hold inlet port of pump (3) between four and six inches above oil level in container.</p> <p>Put hose (2) from outlet port in empty container (5).</p> <p>Using hand, push in and release stem (6) until oil spurts out of hose (2) into empty container (5).</p> <p>Push in and release stem (6) until empty container is about 1/2 full to flush out hydraulic fluid used with M3 oil pump (frame 1).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">If oil does not spurt out, gear box pump is bad.</p> <p>END OF TASK</p>



18-56. GEAR BOX PUMP REMOVAL PROCEDURE

TOOLS: 7/16" open end wrench
 9/16" open end wrench
 5/8" open end wrench
 1/2" open end wrench
 7/8" open end wrench
 3/4" open end wrench

SUPPLIES: Drain pan (2 quart)
 Rags (item 21, App. A)
 Shipping nuts (MS 27151-11) (four)

PERSONNEL: One

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7
Turret Traversing Mechanism	FO-2	12

EQUIPMENT CONDITION: Driver's master control panel **MASTER BATTERY** switch set to OFF
 Turret traverse lock set to **LOCKED**

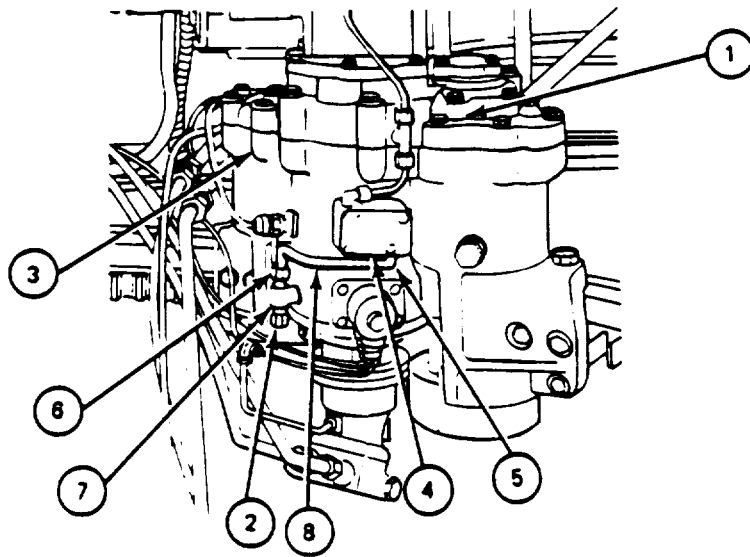
GENERAL INSTRUCTIONS:

NOTE

Put plug on tube or cap on adapter to keep out dirt.
 Use container and rags for oil spillage.

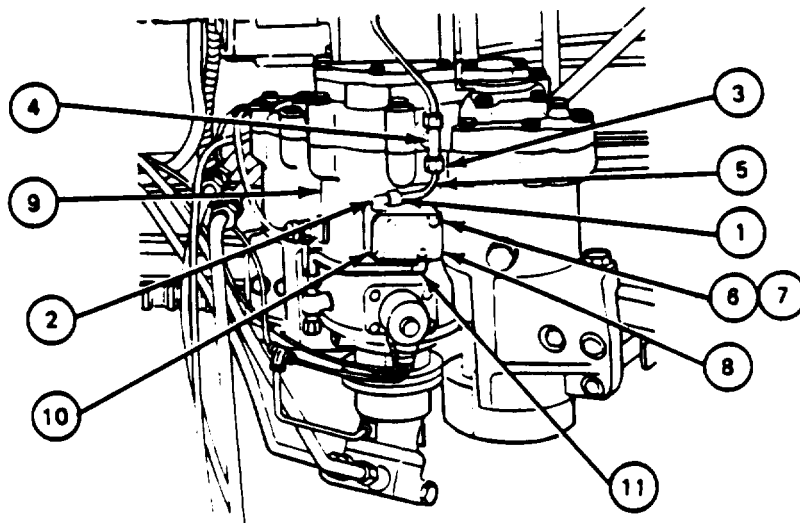
18-56. GEAR BOX PUMP REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<p>NOTE</p> <p>Drain pan should be placed under drain plug (2) of traversing gear box (3).</p>
<ol style="list-style-type: none"> 1. 2. 3. 	<ol style="list-style-type: none"> Using 7/8" wrench, loosen filler plug (1). Using 3/4" wrench, remove drain plug (2) from traversing gear box (3). Drain lubricating oil into drain pan.
	<p>NOTE</p> <p>Keep dirt from getting in tubing or parts. Dirt can damage pump.</p>
<ol style="list-style-type: none"> 4. 5. 6. 7. 	<ol style="list-style-type: none"> Using 3/4" wrench, put drain plug (2) back on traversing gear box (3). Using 3/4" wrench on nut (4), disconnect nut but do not loosen elbow (5). Using 3/4" wrench on nut (6), disconnect nut but do not loosen tee (7). Remove tube (8). <p>GO TO FRAME 2</p>



18-56. GEAR BOX PUMP REMOVAL PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	Using 5/8" wrench on nut (1). disconnect nut but do not loosen elbow (2).
2.	Using 5/8" wrench on nut (3), disconnect nut but do not loosen tee (4).
3.	Remove tube (5).
4.	Using 7/16" wrench, remove four screws (6) and four lockwashers (7) that attach gear box pump (8) to traversing gear box (9).
<p>NOTE</p> <p>Pump (8) may separate when removed.</p>	
5.	Remove gear box pump (8) and gasket (10). Throw gasket away.
<p>NOTE</p> <p>Do steps 6, 7 and 8 if gear box pump is bad.</p>	
6.	Using 7/16" and 1/2" wrench, hold gear box pump (8) together with four screws (6), four lockwashers (7), and four shipping nuts.
7.	Using 7/16" wrench, remove elbow (2) from gear box pump (8).
8.	Using 9/16" wrench, remove elbow (11) from gear box pump (8).
END OF TASK	



18-57. GEAR BOX PUMP INSTALLATION PROCEDURE

TOOLS: 7/16" combination wrench
1/2" combination wrench
9/16" combination wrench
3/4" Combination wrench
5/8" combination wrench
3/8" drive torque wrench (0 to 150 inch-pounds)
7/16" socket (3/8" drive)

SUPPLIES: Oil (item 18, App. A)

PERSONNEL: One

REFERENCES: LO 9-2350-222-12 for procedure to add oil
JPG for procedure to use torque wrench
TM 9-2350-222-10 for procedure to traverse turret

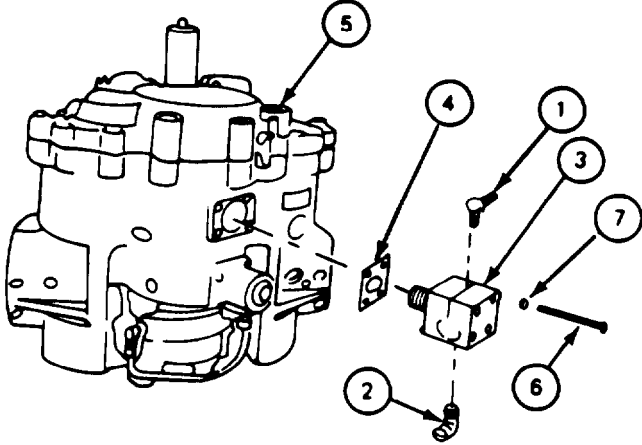
EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7
Turret Traversing Mechanism	FO-2	12

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Turret traverse lock set to LOCKED

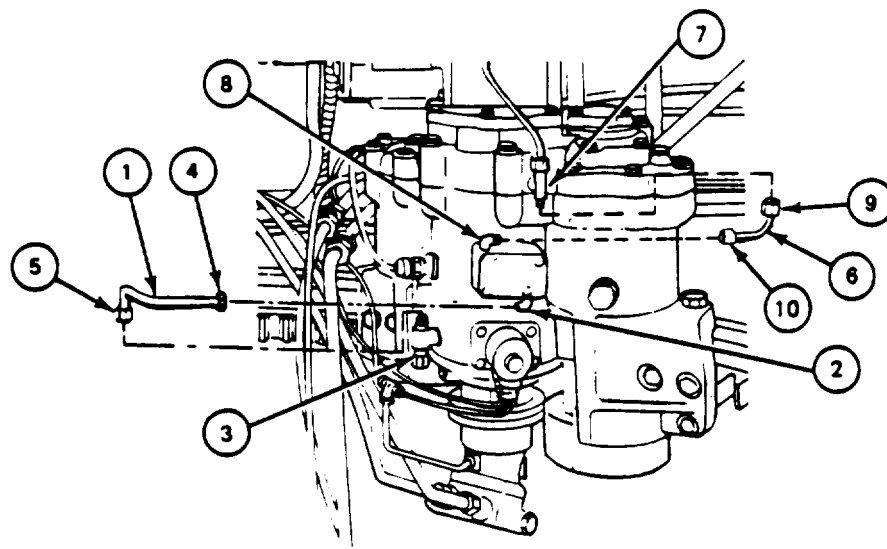
PRELIMINARY PROCEDURES: Assemble gear box pump (para 18-59)

18-57. GEAR BOX PUMP INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do steps 1 and 2 if new gear box pump is to be installed.</p> <ol style="list-style-type: none"> 1. Using 7/16" and 9/16" wrenches, put elbows (1) and (2) on new pump (3) in positions shown. 2. Using 7/16" and 1/2" wrenches, remove four shipping nuts from new pump (3). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Put side of pump with IN stamped on it to right.</p> <ol style="list-style-type: none"> 3. Using torque wrench and 7/16" socket, attach pump (3) and gasket (4) to gear box assembly housing (5) with four screws (6) and four lockwashers (7). Torque four screws (6) to between 60 and 70 inch-pounds (JPG). <p>GO TO FRAME 2</p>
	

18-57. GEAR BOX PUMP INSTALLATION PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	Remove plugs from tube (1) and caps from elbow (2) and tee (3).
2.	Using hands, attach tube (1) to elbow (2) and tee (3) and tighten nuts (4) and 5) finger tight.
3.	Using 3/4" wrench, tighten nut (4) on elbow (2).
4.	Using 3/4" wrench, tighten nut (5) on tee (3).
5.	Remove plugs from tube (6) and caps from tee (7) and elbow (8).
6.	Using hands, attach tube (6) to tee (7) and elbow (8) and tighten nuts (9) and (10) finger tight.
7.	Using 5/8" wrench, tighten nut (9) on tee (7).
8.	Using 5/8" wrench, tighten nut (10) on elbow (8).
<p>NOTE</p> <p>Do the following tasks if this procedure completes the maintenance of-the traversing mechanism system If other maintenance must be done, make sure following tasks are completed after other maintenance.</p> <p>Follow-on Maintenance Action Required:</p> <p>Fill traversing mechanism with oil (LO). Check for leaks and repair as required, Traverse turret in power mode to check operation of gear box pump (TM- 10).</p>	
END OF TASK	



18-58. GEAR BOX PUMP DISASSEMBLY PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove gear box pump (para 18-56)
Test gear box pump (para 18-55)

FRAME 1	
Step	Procedure
1.	Remove pump body (para 18-60).
2.	Disassemble pump body (para 18-62).
3.	Disassemble pump plate (para 18-64).
	END OF TASK

18-59. GEAR BOX PUMP ASSEMBLY PROCEDURE

PERSONNEL: One

FRAME 1	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 	<p>Assemble pump body (para 18-63).</p> <p>Assemble pump plate (para 18-65).</p> <p>Install pump body (para 18-61).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Test gear box pump (para 18-55).</p> <p>END OF TASK</p>

18-60. PUMP BODY OR PUMP PLATE REMOVAL PROCEDURE

TOOLS: 7/16" combination wrench
1/2" combination wrench
Plastic face hammer

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove gear box pump (para 18-56).
Test gear box pump (para 18-55)

18-60. PUMP BODY OR PUMP PLATE REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 	<p>Using 7/16" and 1/2" wrench, remove four screws (1), four lockwashers (2) and four shipping nuts (3) that hold pump body (4) to pump plate (5).</p> <p>Using hammer, carefully tap pump body (4) from pump plate (5).</p> <p>Using hands, remove pump body (4) from pump plate (5). Remove gasket (6).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Disassemble pump body (para 18-62). Disassemble pump plate (para 18-64).</p> <p>END OF TASK</p>

18-61. PUMP BODY OR PUMP PLATE INSTALLATION PROCEDURE

TOOLS: 7/16" combination wrench
1 / 2" combination wrench

SUPPLIES: Lockwashers (MS 35387-44) (four)
Gasket (873403 1)
Gasket (8734032)
Nuts (MS27151-11) (four)
Screws (MS 90725- 17) (four)

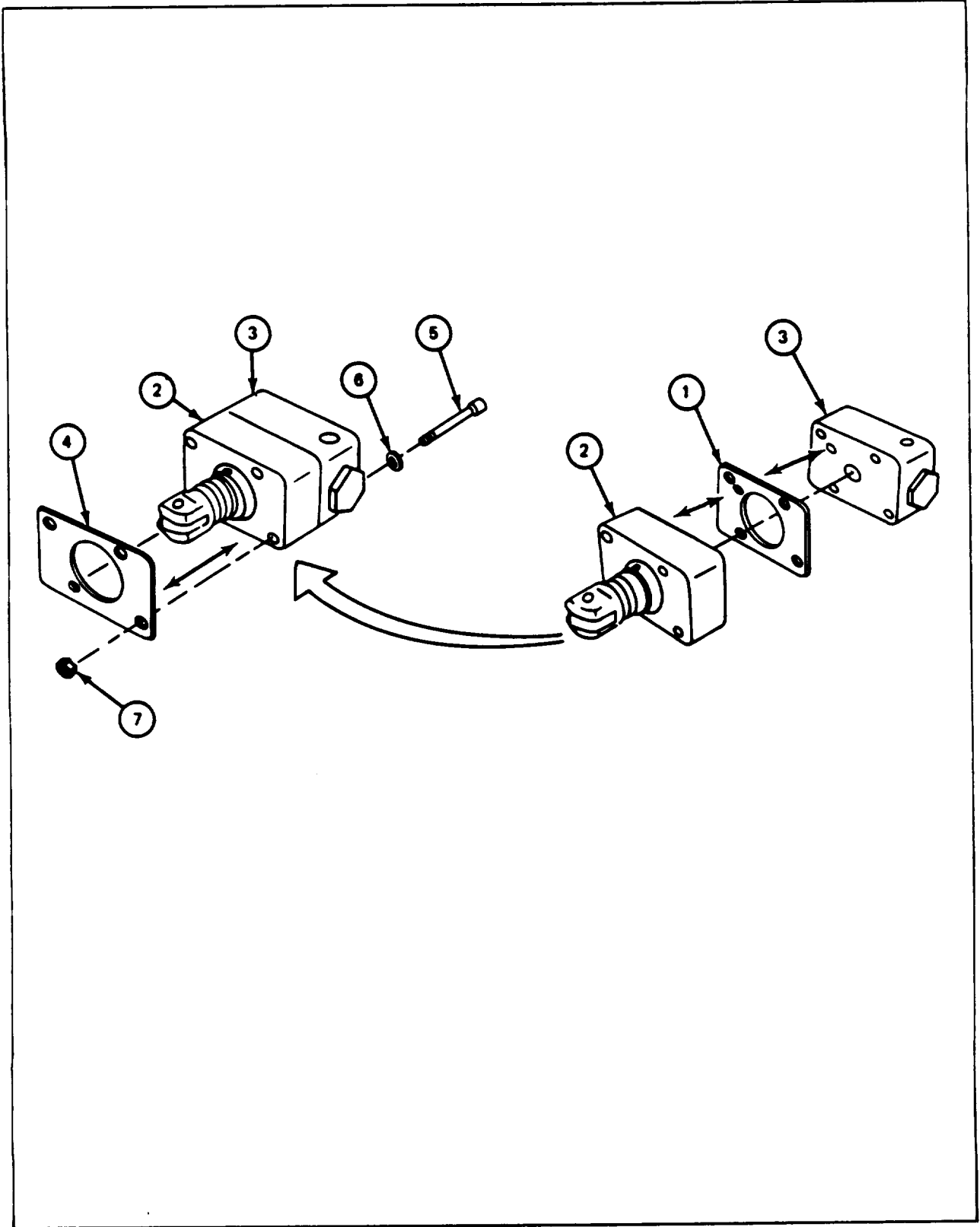
PERSONNEL: One

PRELIMINARY PROCEDURES: Assemble pump body (para 18-63).
Assemble pump plate (para 18-65).

CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

FRAME 1	
Step	Procedure
1.	Using hands, line up holes in gasket (1), pump body (2), and pump plate (3).
2.	Using hands, line up holes in gasket (4) with pump body (2).
3.	Using hands, attach gasket (4) to body (2), gasket (1), and pump plate (3) with four screws (5), four lockwashers (6), and four nuts (7).
4.	Using 7/16 and 1/2" wrench, tighten four nuts (7) to four screws (5).
NOTE	
Follow-on Maintenance Action Required:	
Test gear box pump (para 18-55).	
END OF TASK	



18-62. PUMP BODY DISASSEMBLY PROCEDURE

TOOLS: External retaining ring pliers
Long round nose pliers
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

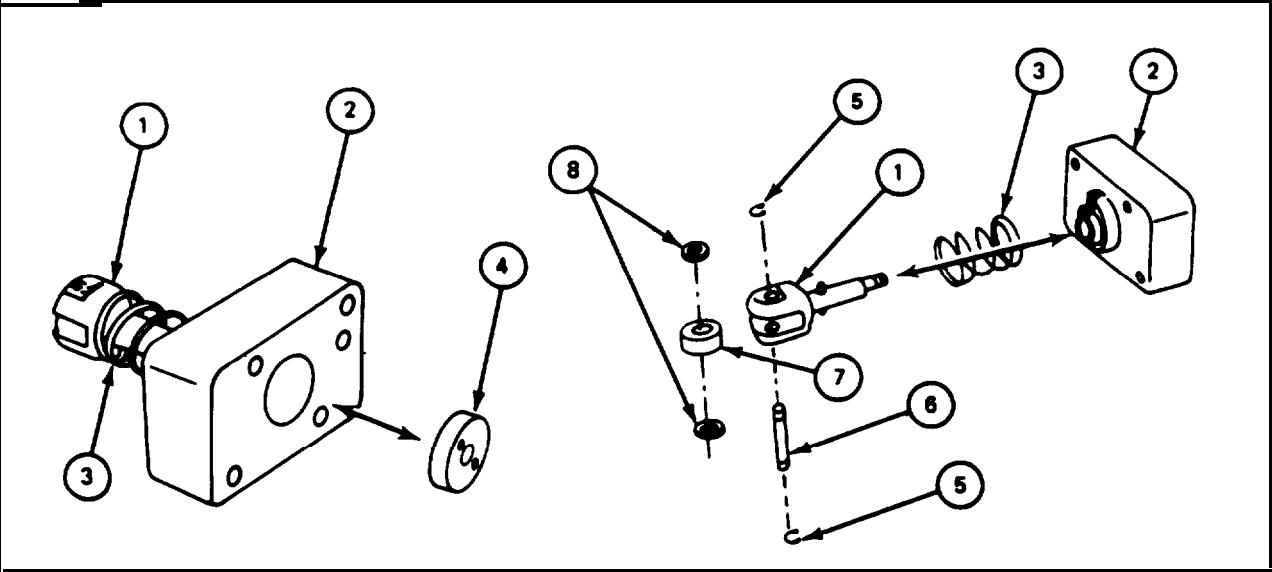
REFERENCES: JPG for procedures to:
Use retaining ring pliers
Clean parts
Inspect and repair parts

PRELIMINARY PROCEDURES: Remove gear box pump (para 18-55)
Test gear box pump (para 18-54)
Remove pump body (para 18-60)

18-62. PUMP BODY DISASSEMBLY PROCEDURE (CONT)

FRAME 1

Step	Procedure
	<p>CAUTION</p> <p>Be careful when removing stem (1) from pump body (2). It is under spring tension.</p> <ol style="list-style-type: none"> 1. Using hands, push stem (1) in pump body (2) and hold in against spring (3) while performing step 2. 2. Using long nose pliers, remove plunger (4) slowly from stem (1). 3. Using hands, remove stem (1) and spring (3) from pump body (2). 4. Using pliers, remove two retaining rings (5) from pin (6) (JPG). 5. Using hands, remove pin (6) from stem (1). 6. using hands, remove cam follower (7) and two washers (8). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 18-54).</p> <p>END OF TASK</p>



18-63. PUMP BODY ASSEMBLY PROCEDURE

TOOLS: External retaining ring pliers
8 ounce ball peen hammer
Center punch
Long round nose pliers

PERSONNEL: One

REFERENCES: JPG for procedures to
Use retaining ring pliers
Stake

PRELIMINARY PROCEDURES: Inspect pump body (pare 18-54)

GENERAL INSTRUCTIONS:

CAUTION

Keep dirt from getting in parts. Dirt can damage equipment

18-63. PUMP BODY ASSEMBLY PROCEDURE (CONT)

FRAME 1	Procedure
Step	<ol style="list-style-type: none"> 1. Using hands, put cam follower (1) with two washers (2), one on each side of cam follower, in stem (3). 2. Using hands, put pin (4) in stem (3), holding cam follower (1) and two washers (2) in place. 3. Using retaining ring pliers, put two retaining rings (5) on pin (4) (JPG). 4. Using hands, put spring (6) on stem (3) and put both m pump body (7). <div style="text-align: center; border: 1px dashed black; padding: 5px; width: fit-content; margin: 10px auto;"> CAUTION </div> <p style="text-align: center;">Be careful when installing stem (3) in pump body (7), it is under spring tension.</p> <ol style="list-style-type: none"> 5. Using hands, push on stem (3) and spring (6) and put plunger (8) on stem. 6. Using long nose pliers, attach stem (3) to pump body (7) with plunger (8), 7. Using center punch and hammer, lightly stake stem (3) to plunger (8) (JPG). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required: Install pump body (para 18-61).</p> <p>END OF TASK</p>

18-64. PUMP PLATE DISASSEMBLY PROCEDURE

TOOLS: 1" combination wrench
External retaining ring pliers
20 ounce ball peen hammer
Vise with brass caps
Wooden dowel 3/8" diameter 4" length
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

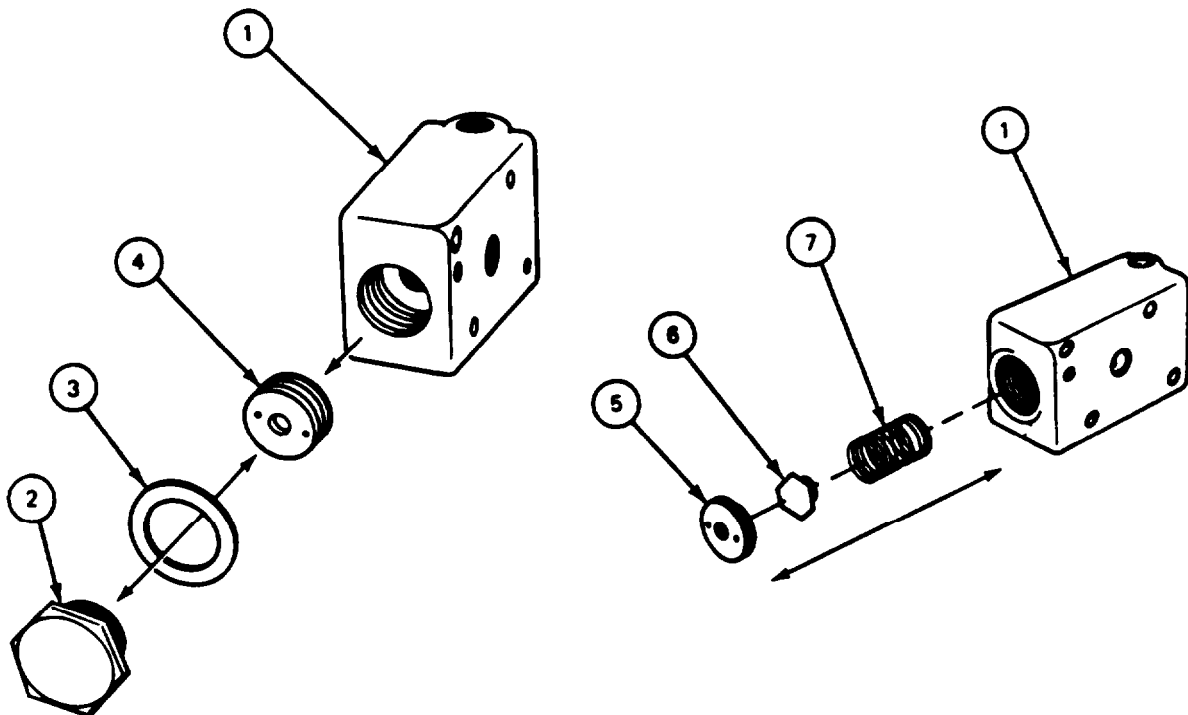
REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts
Use retaining ring pliers

PRELIMINARY PROCEDURES: Remove gear box pump (para 18-56)
Test gear box pum (para 18-55)
Remove pump body (para 18-60)

18-64. PUMP PLATE DISASSEMBLY PROCEDURE (CONT)

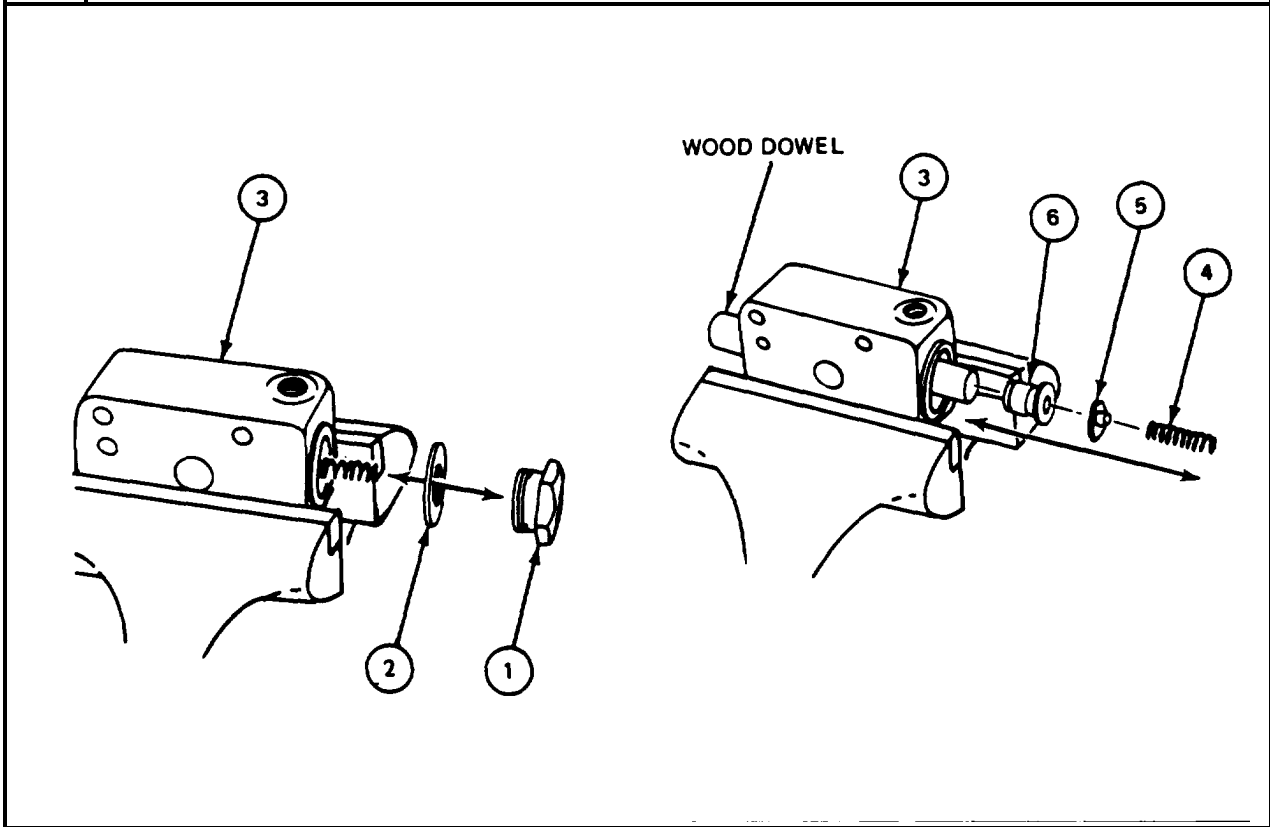
FRAME 1

Step	Procedure
1.	Put pump plate (1) in vise.
2.	Using 1" wrench, remove" plug (2) from pump plate (1). Remove gasket (3) from plug (1).
3.	Using retaining ring pliers, remove lock plug (4) from pump plate (1) (JPG).
4.	Using retaining ring pliers, slowly remove inlet valve seat (5) from pump plate (I) (JPG).
5.	Remove pump plate (1) from vise.
6.	Using hands, remove inlet valve (6) and spring (7) from pump plate (1).
7.	Place pump plate (1) in vise.
GO TO FRAME 2	



18-64. PUMP PLATE DISASSEMBLY PROCEDURE (CONT)

FRAME 2	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 4. 	<p>Using wrench, remove plug (1) and gasket (2) from pump plate (3). Remove gasket (2) from plug (1).</p> <p>Using hands, remove spring (4) and outlet valve (5).</p> <p>Remove pump plate (3) from vise.</p> <p>Using hammer and wood dowel, put dowel in end opposite plug (1) and drive out valve seat (6).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 18-54).</p> <p>END OF TASK</p>



18-65. PUMP PLATE ASSEMBLY PROCEDURE

TOOLS: 1" combination wrench
External retaining ring pliers
20 ounce ball peen hammer
Vise with brass caps
Wooden dowel 3/8" diameter 4" length

PERSONNEL: One

REFERENCES: JPG for procedure to use retaining ring pliers

PRELIMINARY PROCEDURES: Inspect pump plate (para 18-54)

GENERAL INSTRUCTIONS:

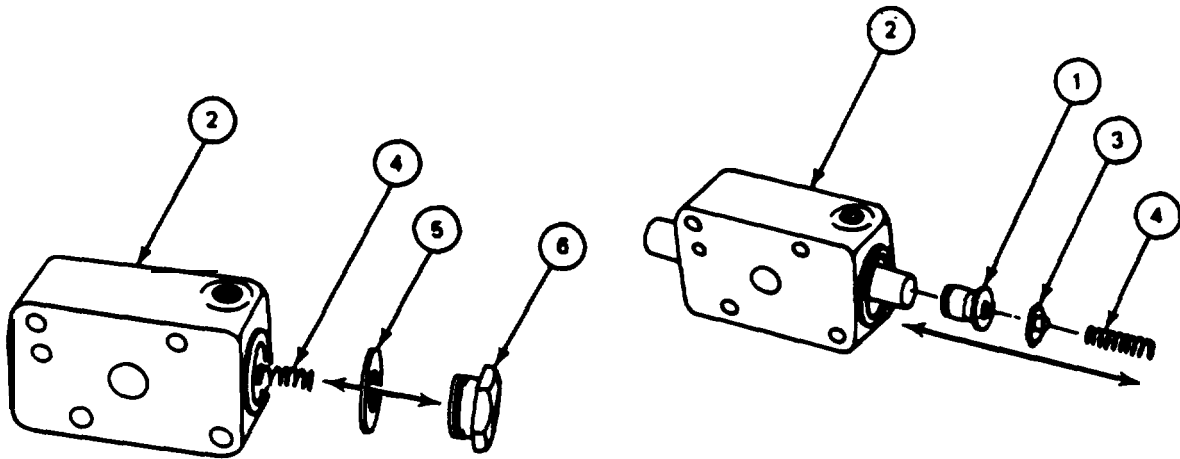
CAUTION

Keep dirt from getting in parts. Dirt can damage equipment.

18-65. PUMP PLATE ASSEMBLY PROCEDURE (CONT)

FRAME 1

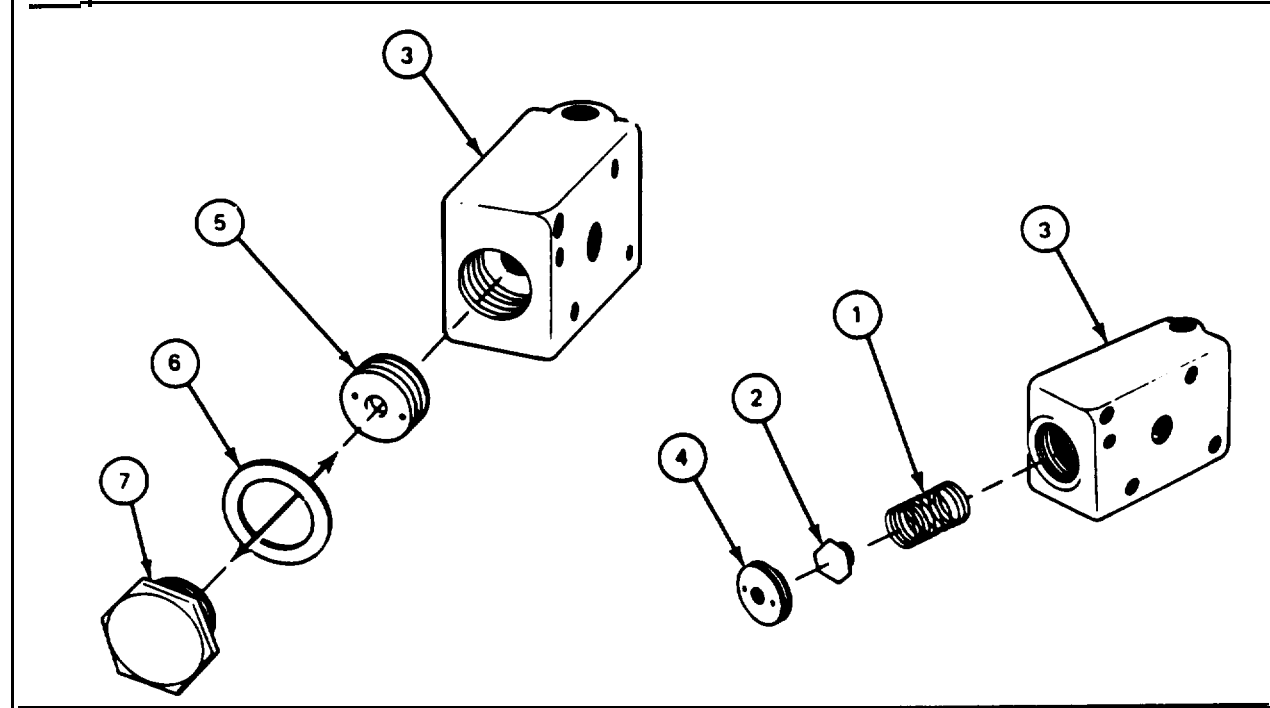
Step	Procedure
1.	Using hammer and wood dowel, drive outlet valve seat (1) into end of pump plate (2).
2.	Using hands, put outlet valve (3) with small diameter facing out in pump plate (2).
3.	Using hands, put spring (4) on small diameter of outlet valve (3) in pump plate (2).
4.	Using hands, put gasket (5) on plug (6). Attach plug (6) to pump plate (2) finger tight.
5.	Place pump plate (2) in vise.
6.	Using wrench, tighten plug (6) with gasket (5) to pump plate (2).
7.	Remove pump plate (2) from vise.
GO TO FRAME 2	



18-65. PUMP PLATE ASSEMBLY PROCEDURE (CONT)

FRAME 2

Step	Procedure
1.	Using hands, put spring (1) and inlet valve (2), with small diameter facing spring, in pump plate (3).
2.	Using retaining ring pliers, put inlet valve seat (4) in pump plate (3) (JPG). Screw in valve seat as far as it will go.
3.	Using retaining ring pliers, put lock plug (5) in pump plate (3) (JPG). Screw in lock plug as far as it will go.
4.	Using hands, put gasket (6) on plug (7). Attach plug to pump plate finger tight.
5.	Place pump plate (3) in vise.
6.	Using wrench, tighten plug (7) with gasket (6) to pump plate (3).
7.	Remove pump plate (3) from vise.
NOTE	
Follow-on Maintenance Action Required:	
Install pump plate (para 18-61).	
END OF TASK	



18-66. UPPER HOUSING AND GEAR TRAIN INSPECTION PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Disassemble upper housing and gear train as required (para 18-69)

GENERAL INSTRUCTIONS:

NOTE

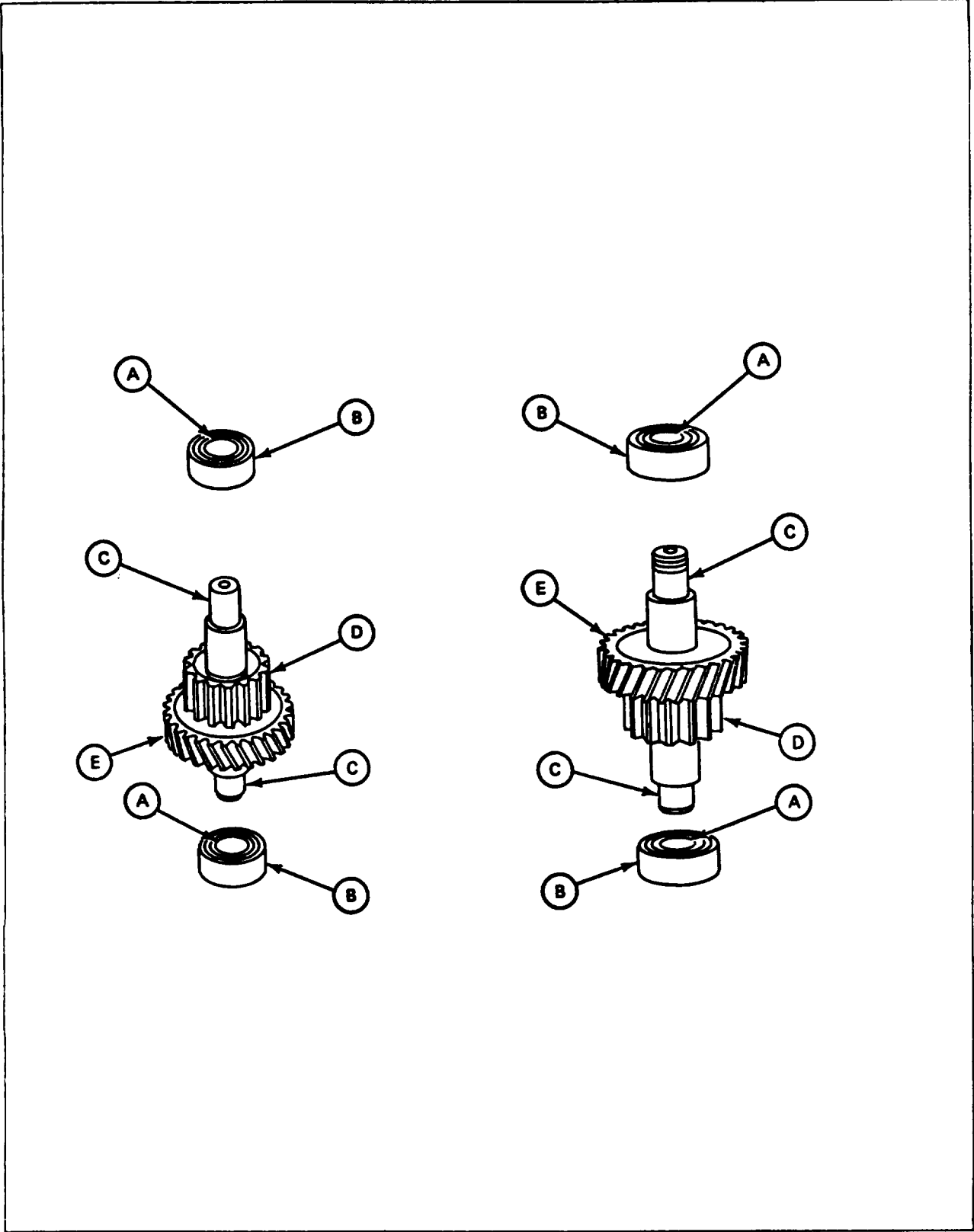
If part is bad, order repair part or next higher assembly as required.

Frames 2 thru 7 should be taken to support shop at same time for inspection.

18-66. UPPER HOUSING AND GEAR TRAIN INSPECTION PROCEDURE (CONT)

a. Left Gear Shaft and Right Gear Shaft

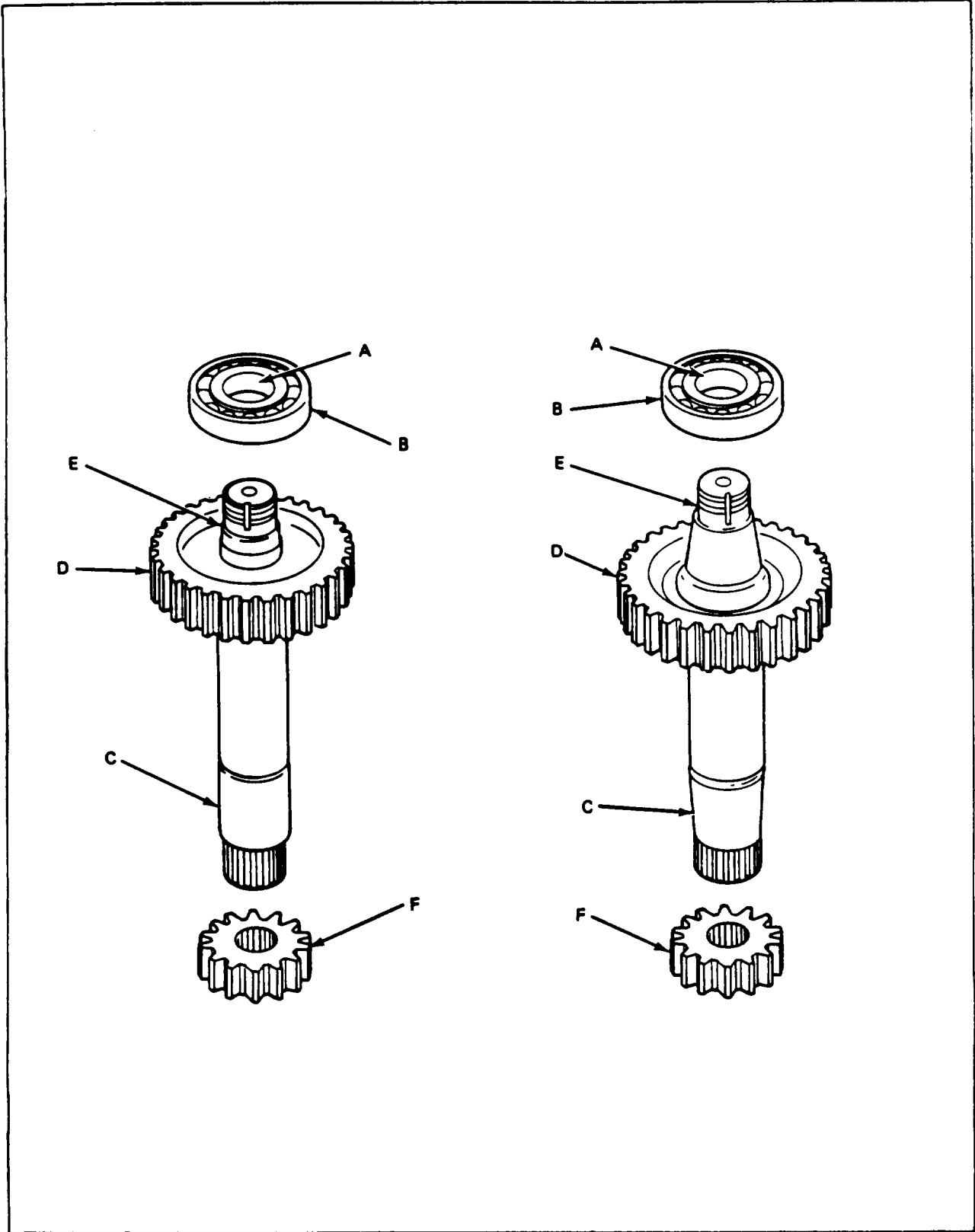
FRAME 1																			
Step	Procedure																		
	SUPPORT SHOP WORK																		
1.	Take left and right gear and four bearings to shop where inspection equipment is available.																		
2.	Make dimensional check.																		
	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Reference Letter</th> <th style="text-align: left;">Point of Measurement</th> <th style="text-align: left;">Measurement</th> </tr> </thead> <tbody> <tr> <td style="vertical-align: top;">A</td> <td>ID of ball bearing</td> <td>0.9839 to 0.9843</td> </tr> <tr> <td></td> <td>OD of ball bearing</td> <td>2.0467 to 2.0472</td> </tr> <tr> <td style="vertical-align: top;">C</td> <td>OD of shaft shoulder</td> <td>0.9828 to 0.9834</td> </tr> <tr> <td style="vertical-align: top;">D</td> <td>Diameter of gear over 0.2880 inch pins</td> <td>2.8786 to 2.8823</td> </tr> <tr> <td style="vertical-align: top;">E</td> <td>Diameter of gear over 0.2160 inch pins</td> <td>4.0789 to 4.0828</td> </tr> </tbody> </table>	Reference Letter	Point of Measurement	Measurement	A	ID of ball bearing	0.9839 to 0.9843		OD of ball bearing	2.0467 to 2.0472	C	OD of shaft shoulder	0.9828 to 0.9834	D	Diameter of gear over 0.2880 inch pins	2.8786 to 2.8823	E	Diameter of gear over 0.2160 inch pins	4.0789 to 4.0828
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E	Diameter of gear over 0.2160 inch pins	4.0789 to 4.0828																	
	NOTE																		
	Tag all parts that are out of tolerance.																		
3.	After support shop work, return left and right gear and four bearings to turret shop.																		
	GO TO FRAME 2																		



18-66. UPPER HOUSING AND GEAR TRAIN INSPECTION PROCEDURE (CONT)

b. left Pinion Shaft and Right Pinion Shaft

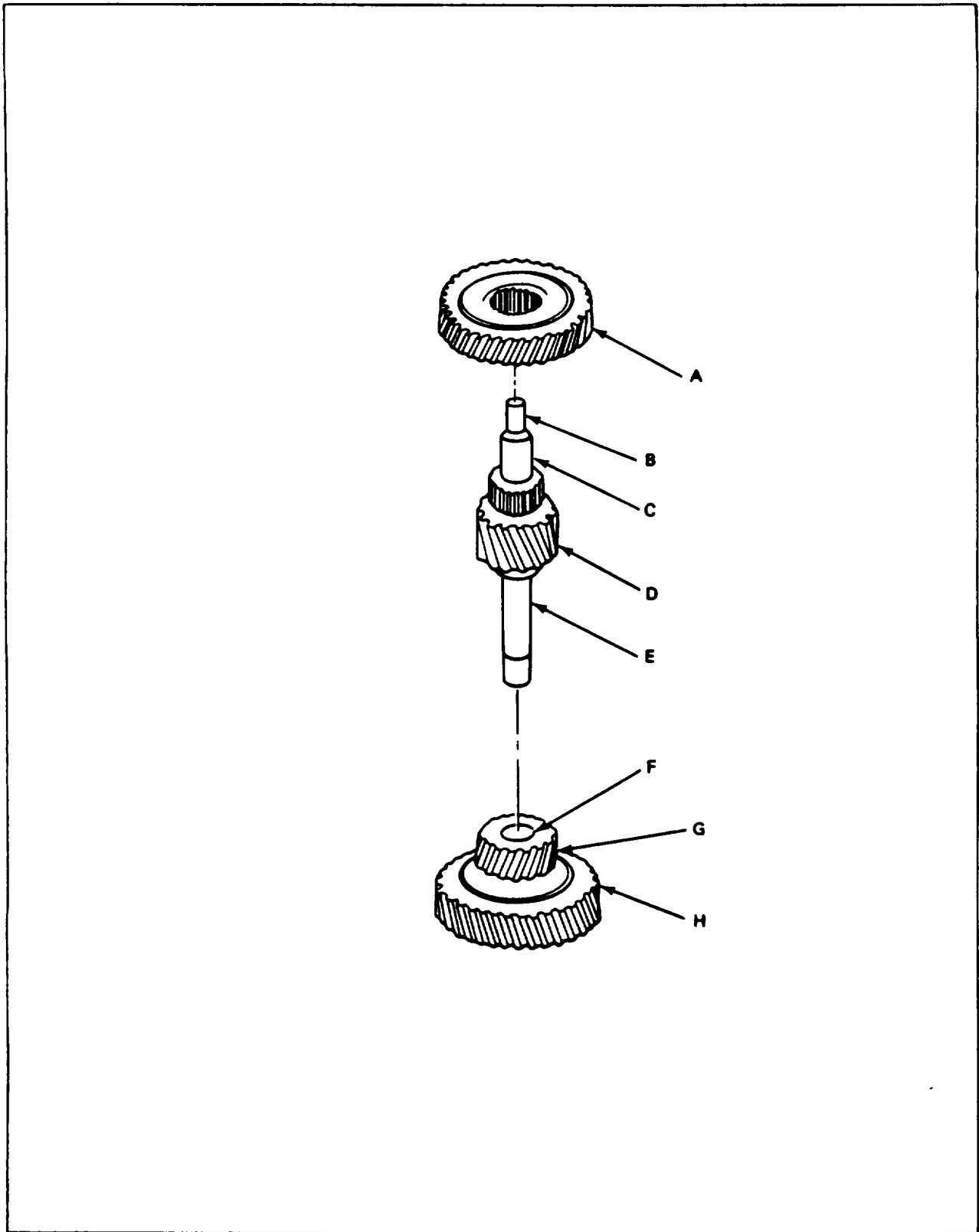
FRAME 2																						
Step	Procedure																					
	SUPPORT SHOP WORK																					
1.	Take left and right pinion and two bearings to shop where inspection equipment is available.																					
2.	Make dimensional check.																					
	<table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Reference Letter</th> <th style="text-align: left;">Point of Measurement</th> <th style="text-align: left;">Measurement</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>ID of ball bearing</td> <td>1.3775 to 1.3780</td> </tr> <tr> <td>B</td> <td>OD of ball bearing</td> <td>2.8341 to 2.8346</td> </tr> <tr> <td>c</td> <td>OD of shaft</td> <td>2.1230 to 2.1235</td> </tr> <tr> <td>D</td> <td>Diameter of gear over 0.2880 inch pins</td> <td>5.7343 to 5.7367</td> </tr> <tr> <td>E</td> <td>OD of shaft assembly</td> <td>1.3765 to 1.3770</td> </tr> <tr> <td>F</td> <td>Diameter of gear over 0.4800 inch pins</td> <td>4.7630 to 4.7714</td> </tr> </tbody> </table>	Reference Letter	Point of Measurement	Measurement	A	ID of ball bearing	1.3775 to 1.3780	B	OD of ball bearing	2.8341 to 2.8346	c	OD of shaft	2.1230 to 2.1235	D	Diameter of gear over 0.2880 inch pins	5.7343 to 5.7367	E	OD of shaft assembly	1.3765 to 1.3770	F	Diameter of gear over 0.4800 inch pins	4.7630 to 4.7714
Reference Letter	Point of Measurement	Measurement																				
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B	OD of ball bearing	2.8341 to 2.8346																				
c	OD of shaft	2.1230 to 2.1235																				
D	Diameter of gear over 0.2880 inch pins	5.7343 to 5.7367																				
E	OD of shaft assembly	1.3765 to 1.3770																				
F	Diameter of gear over 0.4800 inch pins	4.7630 to 4.7714																				
	NOTE Tag all parts that are out of tolerance.																					
3.	After support shop work, return left and right pinion and two bearings to turret shop. GO TO FRAME 3																					



18-66. UPPER HOUSING AND GEAR TRAIN INSPECTION PROCEDURE (CONT)

c. Backlash Gear Shaft and Lower Backlash Gear

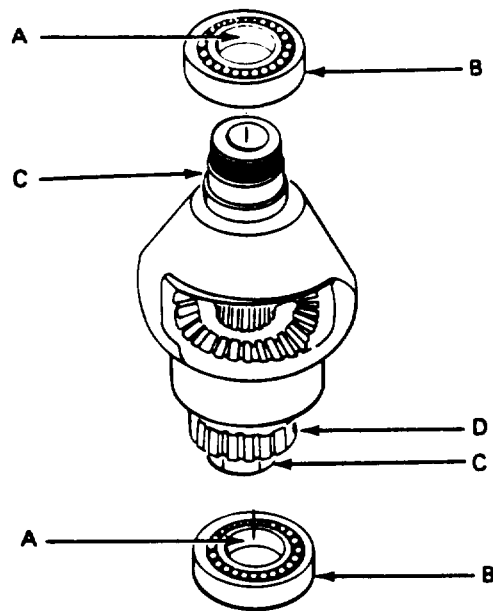
FRAME 3																												
Step	Procedure																											
	SUPPORT SHOP WORK																											
1.	Take backlash gear shaft, upper gear, and lower gear to shop where inspection equipment is available.																											
2.	Make dimensional check.																											
	<table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Reference Letter</th> <th style="text-align: left;">Point of Measurement</th> <th style="text-align: left;">Measurement</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Diameter of gear over 0.1728 inch pins</td> <td>4.0640 to 4.0680</td> </tr> <tr> <td>B</td> <td>OD of backlash shaft bearing surface</td> <td>0.4987 to 0.4992</td> </tr> <tr> <td>c</td> <td>OD of backlash shaft</td> <td>0.7489 to 0.7494</td> </tr> <tr> <td>D</td> <td>Diameter of backlash gear over 0.2160 pins</td> <td>2.0707 to 2.0771</td> </tr> <tr> <td>E</td> <td>OD of backlash shaft</td> <td>0.7489 to 0.7494</td> </tr> <tr> <td>F</td> <td>ID of lower backlash gear</td> <td>0.7517 to 0.7532</td> </tr> <tr> <td>G</td> <td>Diameter of gear over 0.2160 inch pins</td> <td>2.0707 to 2.0741</td> </tr> <tr> <td>H</td> <td>Diameter of gear over 0.1728 inch pins</td> <td>4.0639 to 4.0680</td> </tr> </tbody> </table>	Reference Letter	Point of Measurement	Measurement	A	Diameter of gear over 0.1728 inch pins	4.0640 to 4.0680	B	OD of backlash shaft bearing surface	0.4987 to 0.4992	c	OD of backlash shaft	0.7489 to 0.7494	D	Diameter of backlash gear over 0.2160 pins	2.0707 to 2.0771	E	OD of backlash shaft	0.7489 to 0.7494	F	ID of lower backlash gear	0.7517 to 0.7532	G	Diameter of gear over 0.2160 inch pins	2.0707 to 2.0741	H	Diameter of gear over 0.1728 inch pins	4.0639 to 4.0680
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	NOTE																											
	Tag all parts that are out of tolerance,																											
3.	After shop work, return backlash gear shaft, upper gear, and lower gear to turret shop. GO TO FRAME 4																											



18-66. UPPER HOUSING AND GEAR TRAIN INSPECTION PROCEDURE (CONT)

d. Differential

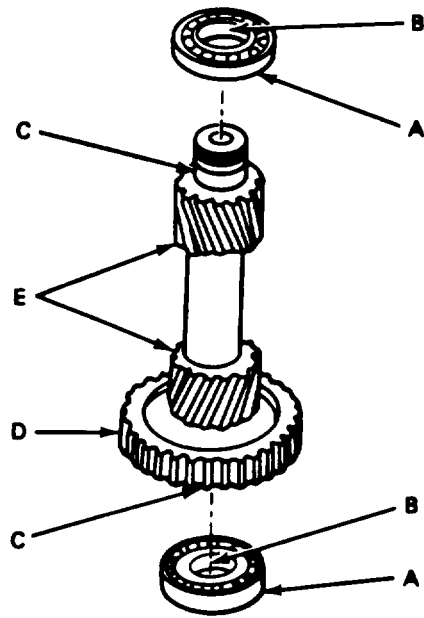
FRAME 4																
Step	Procedure															
	SUPPORT SHOP WORK															
1.	Take differential and two bearings to shop where inspection equipment is available.															
2.	Make dimensional check.															
	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Reference Letter</th> <th style="text-align: left;">Point of Measurement</th> <th style="text-align: left;">Measurement</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>ID of ball bearing</td> <td>1.1807 to 1.1811</td> </tr> <tr> <td>B</td> <td>OD of ball bearing</td> <td>2.1649 to 2.1654</td> </tr> <tr> <td>C</td> <td>OD of differential bearing surface</td> <td>1.1797 to 1.1802</td> </tr> <tr> <td>D</td> <td>Diameter of differential over 0.1728 inch pins</td> <td>2.0340 to 2.0384</td> </tr> </tbody> </table>	Reference Letter	Point of Measurement	Measurement	A	ID of ball bearing	1.1807 to 1.1811	B	OD of ball bearing	2.1649 to 2.1654	C	OD of differential bearing surface	1.1797 to 1.1802	D	Diameter of differential over 0.1728 inch pins	2.0340 to 2.0384
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D	Diameter of differential over 0.1728 inch pins	2.0340 to 2.0384														
	NOTE Tag all parts that are out of tolerance.															
3.	After shop work, return differential and two bearings to turret shop.															
	GO TO FRAME 5															



18-66. UPPER HOUSING AND GEAR TRAIN INSPECTION PROCEDURE (CONT)

e. Intermediate Gear

FRAME 5																			
Step	Procedure																		
	SUPPORT SHOP WORK																		
1.	Take intermediate gear and two bearings to shop where inspection equipment is available.																		
2.	Make dimensional check.																		
	<table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Reference Letter</th> <th style="text-align: left;">Point of Measurement</th> <th style="text-align: left;">Measurement</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>OD of ball bearing</td> <td>1.9995 to 2.0000</td> </tr> <tr> <td>B</td> <td>ID of ball bearing</td> <td>0.9996 to 1.0000</td> </tr> <tr> <td>C</td> <td>OD of intermediate shaft shoulder</td> <td>0.9985 to 0.9990</td> </tr> <tr> <td>D</td> <td>Diameter of gear over 0.1728 inch pins</td> <td>3.5277 to 3.5356</td> </tr> <tr> <td>E</td> <td>Diameter of gear over 0.1728 inch pins</td> <td>1.7480 to 1.7514</td> </tr> </tbody> </table>	Reference Letter	Point of Measurement	Measurement	A	OD of ball bearing	1.9995 to 2.0000	B	ID of ball bearing	0.9996 to 1.0000	C	OD of intermediate shaft shoulder	0.9985 to 0.9990	D	Diameter of gear over 0.1728 inch pins	3.5277 to 3.5356	E	Diameter of gear over 0.1728 inch pins	1.7480 to 1.7514
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	NOTE																		
	Tag all parts that are out of tolerance.																		
3.	After shop work, return intermediate gear and two bearings to turret shop.																		
	GO TO FRAME 6																		

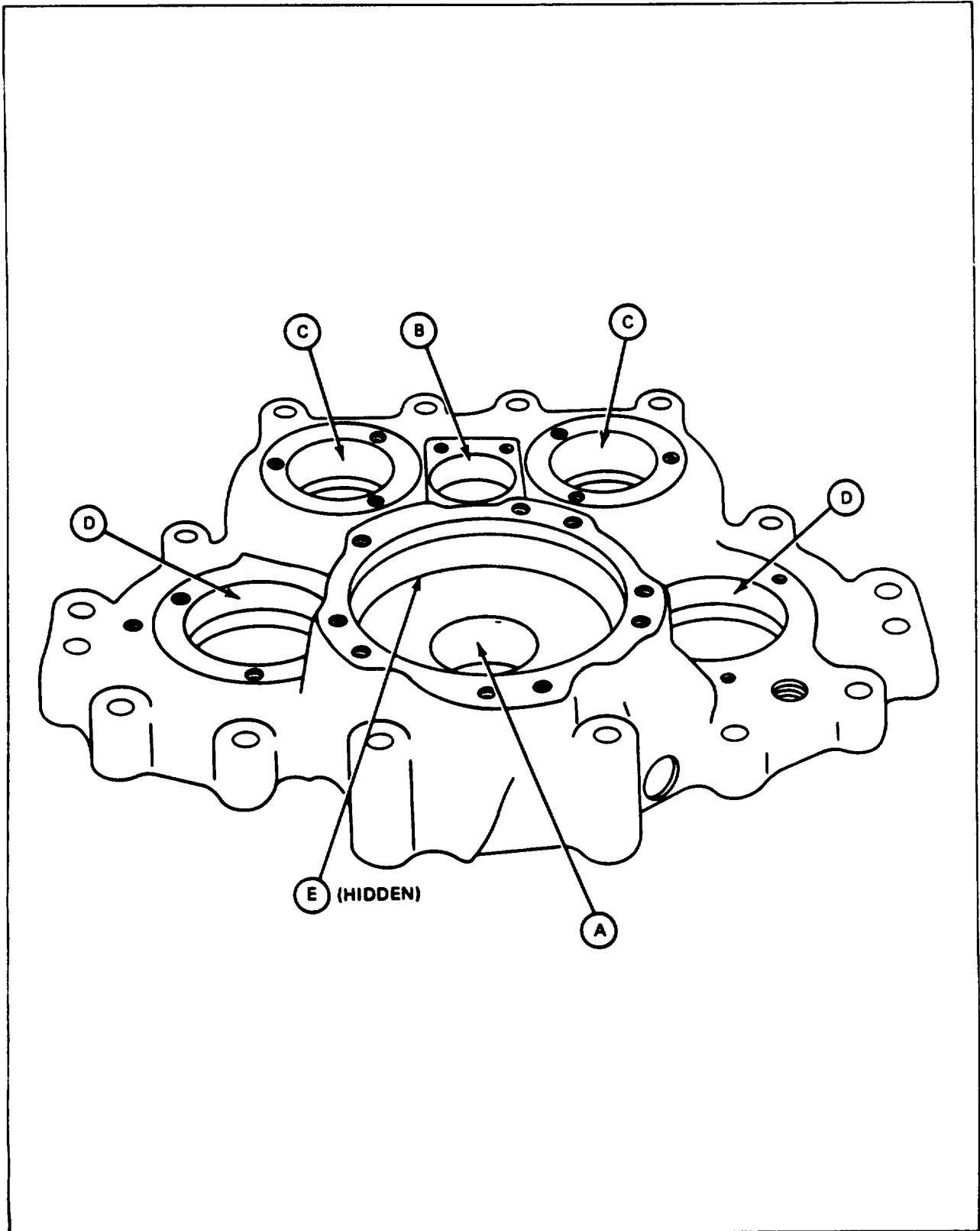


18-66. UPPER HOUSING AND GEAR TRAIN INSPECTION PROCEDURE (CONT)

Upper Housing

FRAME 6

Step	Procedure																		
	SUPPORT SHOP WORK																		
1.	Take upper housing to shop where inspection equipment is available.																		
2.	Make dimensional check.																		
	<table border="0" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left; width: 15%;">Reference Letter</th> <th style="text-align: left; width: 55%;">Point of Measurement</th> <th style="text-align: left; width: 30%;">Measurement</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Housing bore for bearing</td> <td>2.1659 to 2.1664</td> </tr> <tr> <td>B</td> <td>ID of bushing (installed in housing)</td> <td>0.7499 to 0.7509</td> </tr> <tr> <td>c</td> <td>Housing bore for bearing (two places)</td> <td>2.0477 to 2.0482</td> </tr> <tr> <td>D</td> <td>Housing bore for bearing (two places)</td> <td>2.8351 to 2.8356</td> </tr> <tr> <td>E</td> <td>Housing bore for bearing</td> <td>2.005 to 2.0010</td> </tr> </tbody> </table>	Reference Letter	Point of Measurement	Measurement	A	Housing bore for bearing	2.1659 to 2.1664	B	ID of bushing (installed in housing)	0.7499 to 0.7509	c	Housing bore for bearing (two places)	2.0477 to 2.0482	D	Housing bore for bearing (two places)	2.8351 to 2.8356	E	Housing bore for bearing	2.005 to 2.0010
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E	Housing bore for bearing	2.005 to 2.0010																	
	NOTE																		
	Tag all parts that are out of tolerance.																		
3.	After support shop work, return upper housing to turret shop.																		
	NOTE																		
	If bushing measurement is out of tolerance, replace bushing (para 18-92).																		
	END OF TASK																		



18-67. UPPER HOUSING AND GEAR TRAIN OR LOWER HOUSING GROUP REMOVAL PROCEDURE

TOOLS: 3/8" drive hinged handle
5/16" socket (3/8" drive)
External retaining ring pliers
5/8" socket (1/2" drive)
Pry bar (two)
Putty knife
1/2" drive ratchet
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: Two

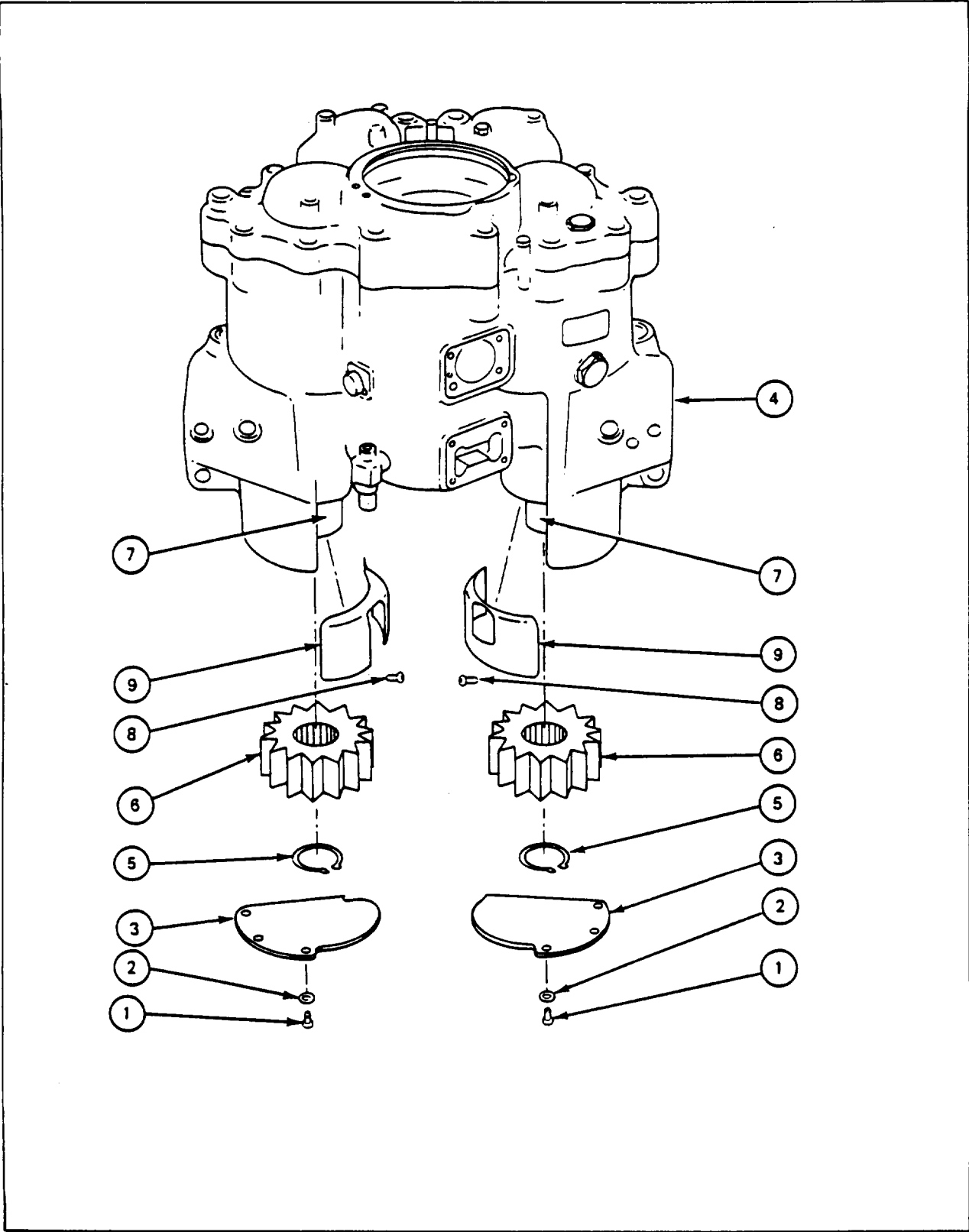
REFERENCES: TM 9-2350-222-20-2-3 for procedures to:
Remove pin lock
Remove anti-backlash mechanism
JPG for procedures to:
Use retaining ring pliers
Clean parts
Inspect and repair parts

EQUIPMENT CONDITION: Pin lock removed (TM-20-2-3)
Anti-backlash mechanism removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Remove traversing gear box (para 18-50)
Remove gear box pump (para 18-56)

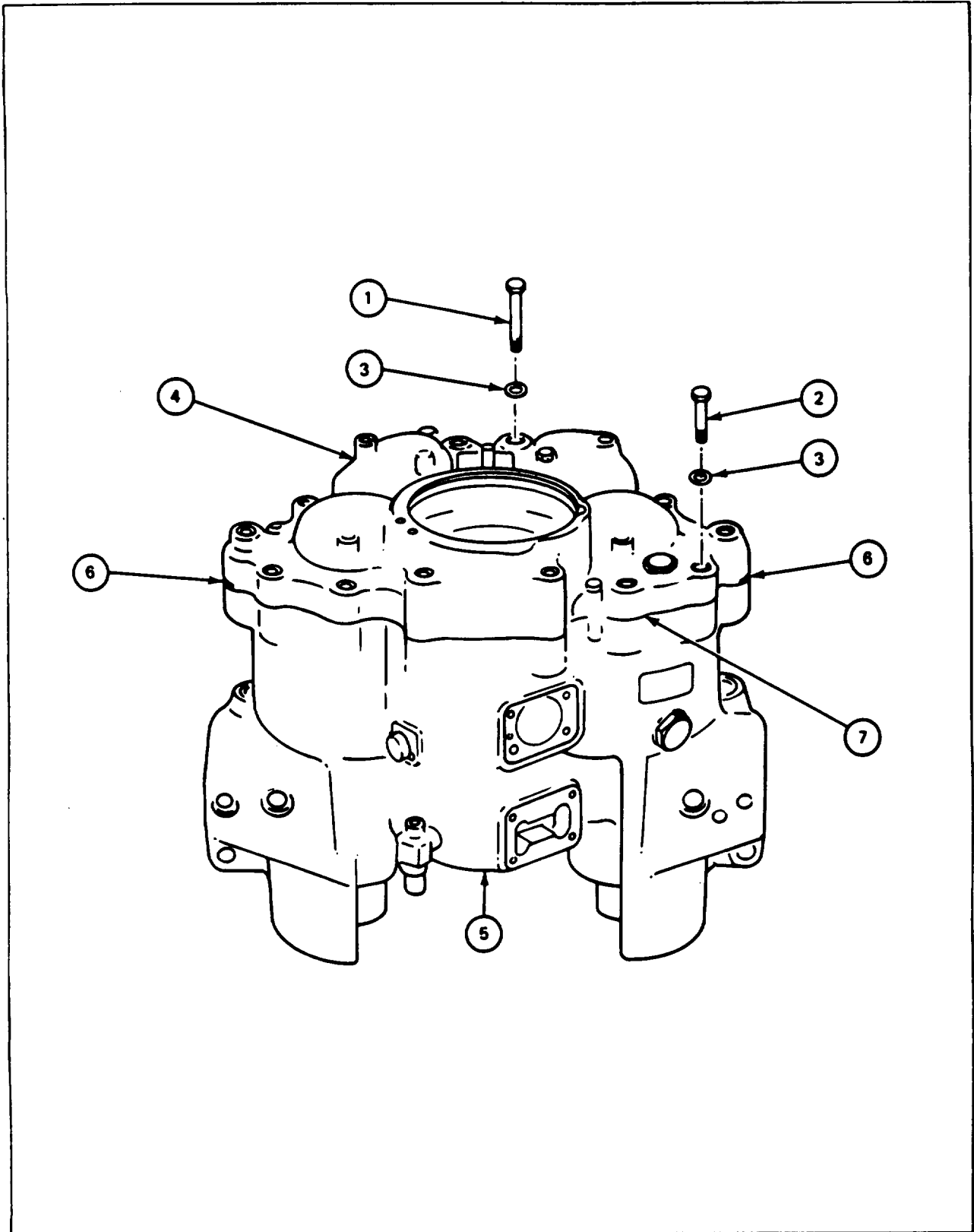
18-67. UPPER HOUSING AND GEAR TRAIN OR LOWER HOUSING GROUP
REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Soldier A: Using 5/ 16" socket and hinged handle, remove six screws (1) and six lockwashers (2) that attach two guard plates (3) to gear box (4). Remove two guard plates.
2.	Using pliers, remove two retaining rings (5) that attach two drive pinions (6) to two shafts (7). Remove two drive pinions (JPG).
3.	Using 5/16 6" socket and hinged handler remove four screws (8) with attached lockwashers that attach two guards (9) to gear box (4). Remove two guards.
	GO TO FRAME 2



**18-67. UPPER HOUSING AND GEAR TRAIN OR LOWER HOUSING GROUP
REMOVAL PROCEDURE (CONT)**

FRAME 2	
Step	Procedure
1.	Soldier B: Using 5/8" socket, remove six long screws (1), eight short screws (2), and fourteen lockwashers (3) that attach upper housing (4) to lower housing (5),
2.	Soldiers A and B: Using pry bars in slots (6), separate upper housing (4) from lower housing (5).
3.	Soldiers A and B: Using hands, remove upper housing (4) from lower housing (5).
	NOTE
	Gasket (7) may remain on lower housing (5).
4.	Using putty knife, remove gasket (7) from upper housing (4).
	NOTE
	Follow-on Maintenance Action Required:
	Clean all parts (JPG).
	Inspect and repair all parts (JPG).
	END OF TASK



18-68. UPPER HOUSING AND GEAR TRAIN OR LOWER HOUSING GROUP INSTALLATION PROCEDURE

TOOLS: External retaining ring pliers
Adapter (NSN 5 120-00-588-1986) (two)
5/16" combination wrench
5/8" socket (3/8" drive)
3/8" drive torque wrench (0 to 50 foot-pounds)
3/8" drive ratchet

SUPPLIES: Gasket (1091 1968)
Wood block (4" x 4" x 18")
Wood block (2" x 4" x 6") (two)

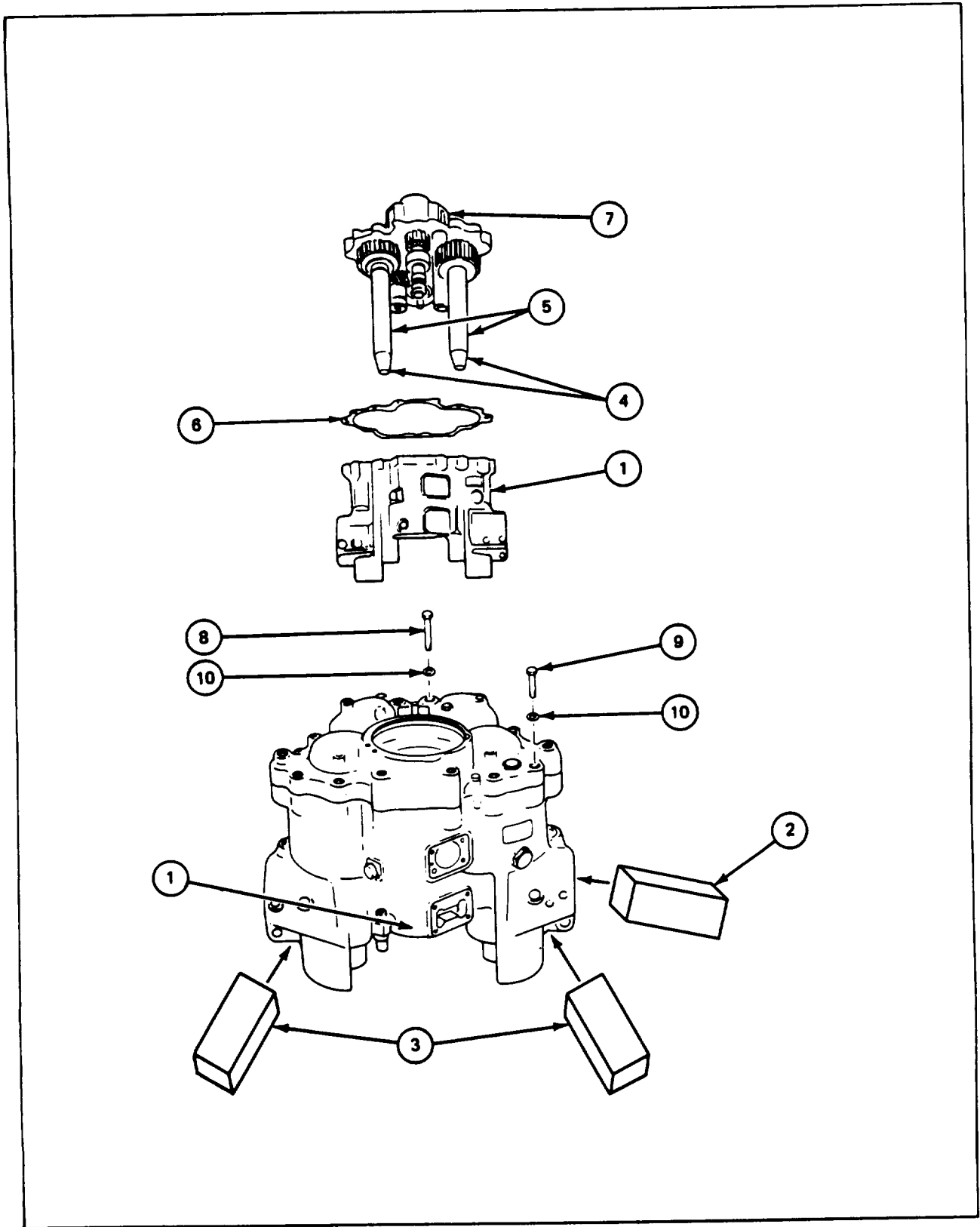
PERSONNEL: Two

REFERENCES: JPG for procedures to:
Use torque wrench
Use retaining ring pliers
TM 9-2350-222 -20-2-3 for procedures to:
Install pinlock
Install anti-backlash mechanism

PRELIMINARY PROCEDURES: Assemble lower housing group (para 18-94)
Assemble upper housing and gear train (para 18-70)

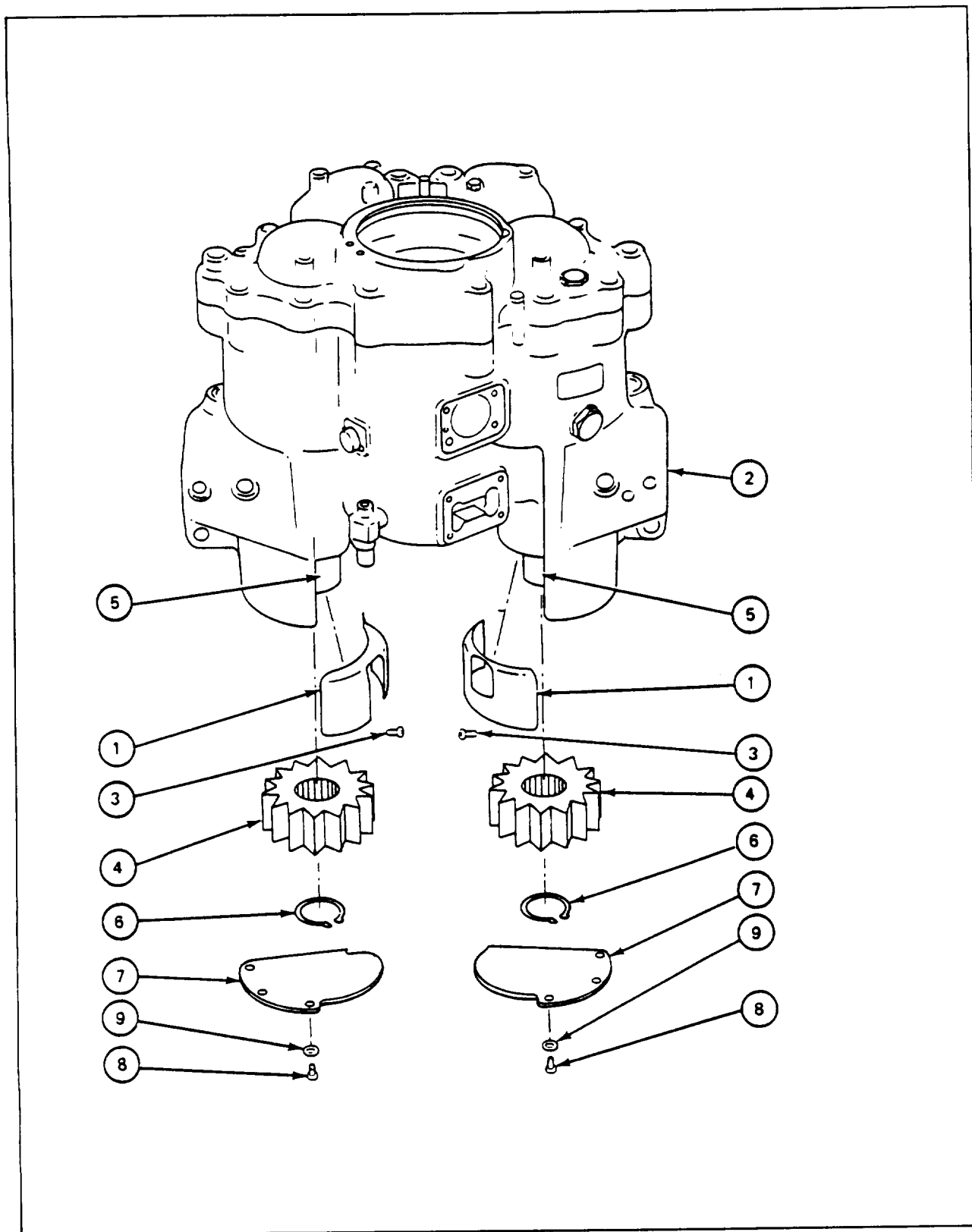
**18-68. UPPER HOUSING AND GEAR TRAIN OR LOWER HOUSING GROUP
INSTALLATION PROCEDURE (CONT)**

FRAME 1	
Step	Procedure
1.	Soldier A: Lift and hold lower housing (1) for steps 2 and 3.
2.	Soldier B: Place wood block (2) (4" x 4" x 18") under lower housing (1).
3.	Soldier B: Place two wood blocks (3) (2" x 4" x 6") under lower housing (1).
4.	Soldier A: Put two adapters (4) on ends of two pinion shafts (5).
5.	Soldier B: Put gasket (6) on lower housing (1).
6.	Soldiers A and B: Put upper housing (7) in lower housing (1).
7.	Soldier A: Using socket wrench, attach upper housing (7) to lower housing (1) with six long screws (8), eight short screws (9), and fourteen lockwashers (10).
8.	Soldier B: Using torque wrench, torque screws (8) and (9) to between 27 and 32 foot-pounds (JPG).
9.	Using hands, remove two adapters (4) from ends of pinion shaft (2).
	GO TO FRAME 2



18-68. UPPER HOUSING AND GEAR TRAIN OR LOWER HOUSING GROUP
INSTALLATION PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	Using combination wrench, attach two guards (1) to gear box (2) with four screws (3) with attached lockwashers.
2.	Using pliers, attach two drive pinions (4) to two shafts (5) with two retaining rings (6) (JPG).
3.	Using combination wrench, attach two guard plates (7) to gear box (2) with six screws (8) and six lockwashers (9).
<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Install gearbox pump (para 18-57). Install pinlock (TM-20-2-3). , Install anti-backlash mechanism (TM-20-2-3). Install traversing gear box (para 18-51).</p> <p>END OF TASK</p>	



18-69. UPPER HOUSING AND GEAR TRAIN DISASSEMBLY PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove upper housing and gear train (para 18-68)

FRAME 1	
Step	Procedure
1.	Remove intermediate gear (para 18-71).
2.	Remove differential (para 18-74).
3.	Disassemble differential (para 18-76).
4.	Remove lowr backlash gear (para 18-78).
5.	Remove left gear shaft (para 18-80).
6.	Remove left pinion shaft (para 18-82).
7.	Remove right pinion shaft (para 18-84).
8.	Remove right gear shaft (para 18-86).
9.	Remove backlash gar shaft (para 18-88).
10.	Disassemble upper housing (para 18-90).
	END OF TASK

18-70. UPPER HOUSING AND GAR TRAIN ASSEMBLY PROCEDURE

PERSONNEL: One

FRAME 1	
Step	Procedure
1.	Assemble upper housing (para 18-91).
2.	Install backlash gear shaft (para 18-89).
3.	Install right gear shaft (para 18-87).
4.	Install right pinion shaft (para 18-85).
5.	Install left pinion shaft (para 18-83).
6.	Install left gear shaft (para 18-81).
7.	Install lower backlash gar (para 18-79).
8.	Assemble differential (para 18-77).
9.	Install differential (para 18-75).
10.	Install intermediate gear (para 18-72).
NOTE	
Follow-on Maintenance Action Required:	
Install upper housing and gar train (para 18-68).	
END OF TASK	

18-71. INTERMEDIATE GEAR REMOVAL PROCEDURE

TOOLS: 8 ounce ball peen hammer
1/4" drift pin
External retaining ring pliers
Scraper
Stiff bristled brush
Fine stone
Traverse gear tool kit (12270518)

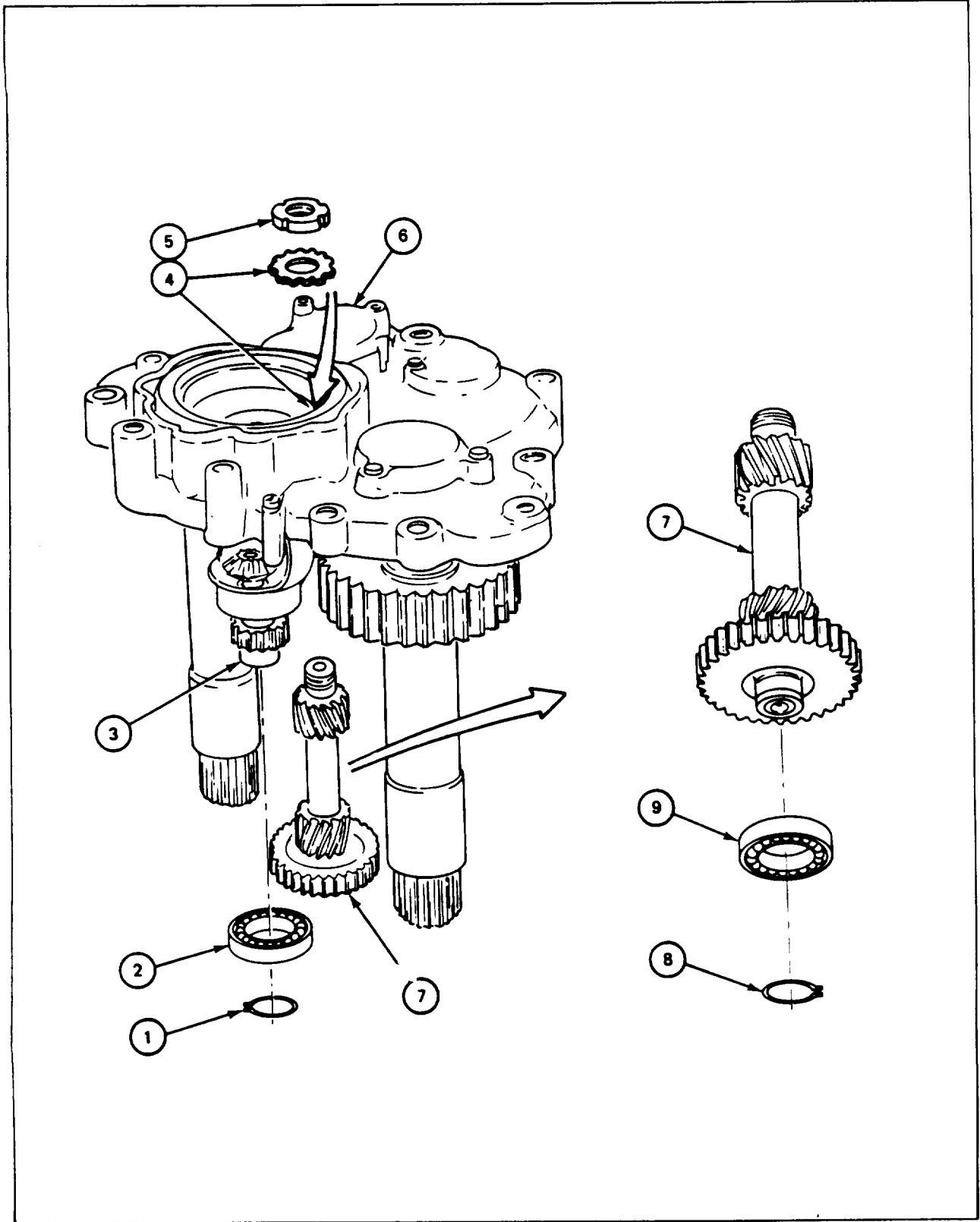
SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove upper housing and gear train (para 18-67)

18-71. INTERMEDIATE GEAR REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Using pliers, remove retaining ring (1) that attaches bearing (2) to differential gear (3). Remove bearing.
2.	Using hammer and drift pin, straighten washer (4) tangs from slots in nut (5).
NOTE	
Pull on intermediate gear (7) as nut (5) is loosened, to provide clearance for nut.	
3.	Using traverse gear tool kit in upper housing (6), loosen nut (5) to remove intermediate gear (7). Remove gear but do not remove nut (5) and washer (4) from upper housing (6). 6).
4.	Using pliers, remove retaining ring (8) that attaches bearing (9) to intermediate gear (7). Remove bearing.
NOTE	
Follow-on Maintenance Action Required:	
Clean all parts.	
Inspect and repair all parts.	
Do detail inspection of parts (para 18-66e).	
END OF TASK	



18-72. INTERMEDIATE GEAR INSTALLATION PROCEDURE

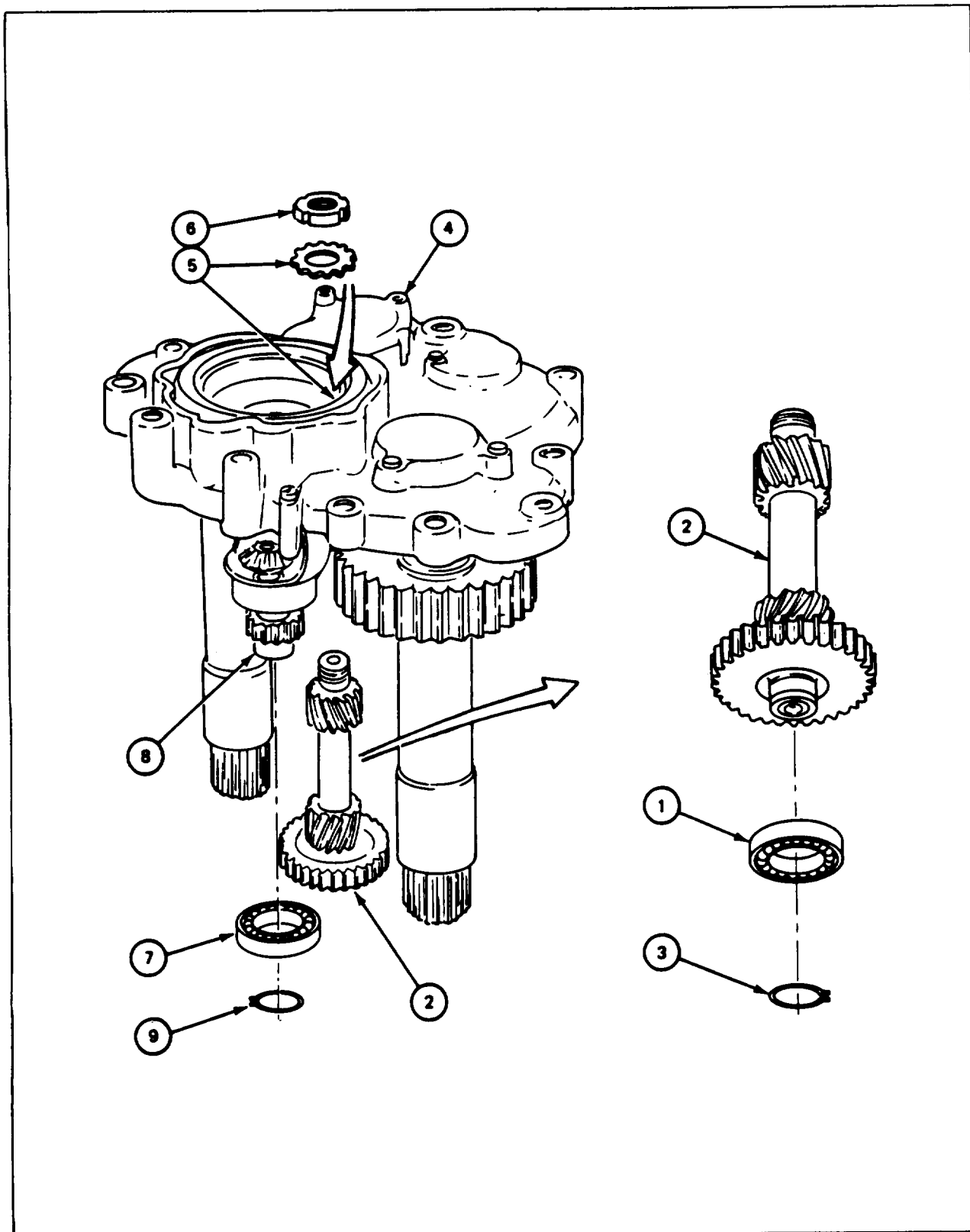
TOOLS: Traverse gear tool kit (12270518)
6 in. extension (1/2 in. drive)
External retaining ring pliers
1/4 in. flat-tip screwdriver
1/2 in. drive trouque wrench (0 to 175 foot-pounds)

PERSONNEL: One

PRELIMINARY PROCEDURES: Install differential (para 18-75)
Inspect intermediate gear (para 18-66e)

18-72. INTERMEDIATE GEAR INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Using hands, put bearing (1) on intermediate gear (2).
2.	Using pliers, attach bearing (1) to intermediate gear (2) with retaining ring (3).
3.	Using hands, put intermediate gear (2) in upper housing (4). Mesh gears.
4.	Align tang of lockwasher (5) to intermediate gear (2) and using hands, start nut (6) on intermediate gear (2) (parts in upper housing).
5.	Using traverse gear tool kit, attach intermediate gear (2) to upper housing (4) with nut (6) and washer (5). Using torque wrench, tighten nut (6) to 25 and 50 foot-pounds (33.9 and 67.8 Newton meters).
6.	Using screwdriver, bend lockwasher (5) tangs to slot in nut (6).
7.	Using hands, put bearing (7) on differential gear (8).
3.	Using pliers, attach bearing (7) to differential gear (8) with retaining ring (9),
<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Install upper housing and gear train (para 18-68).</p>	
END OF TASK	



18-73. DIFFERENTIAL INSPECTION PROCEDURE

PERSONNEL: One

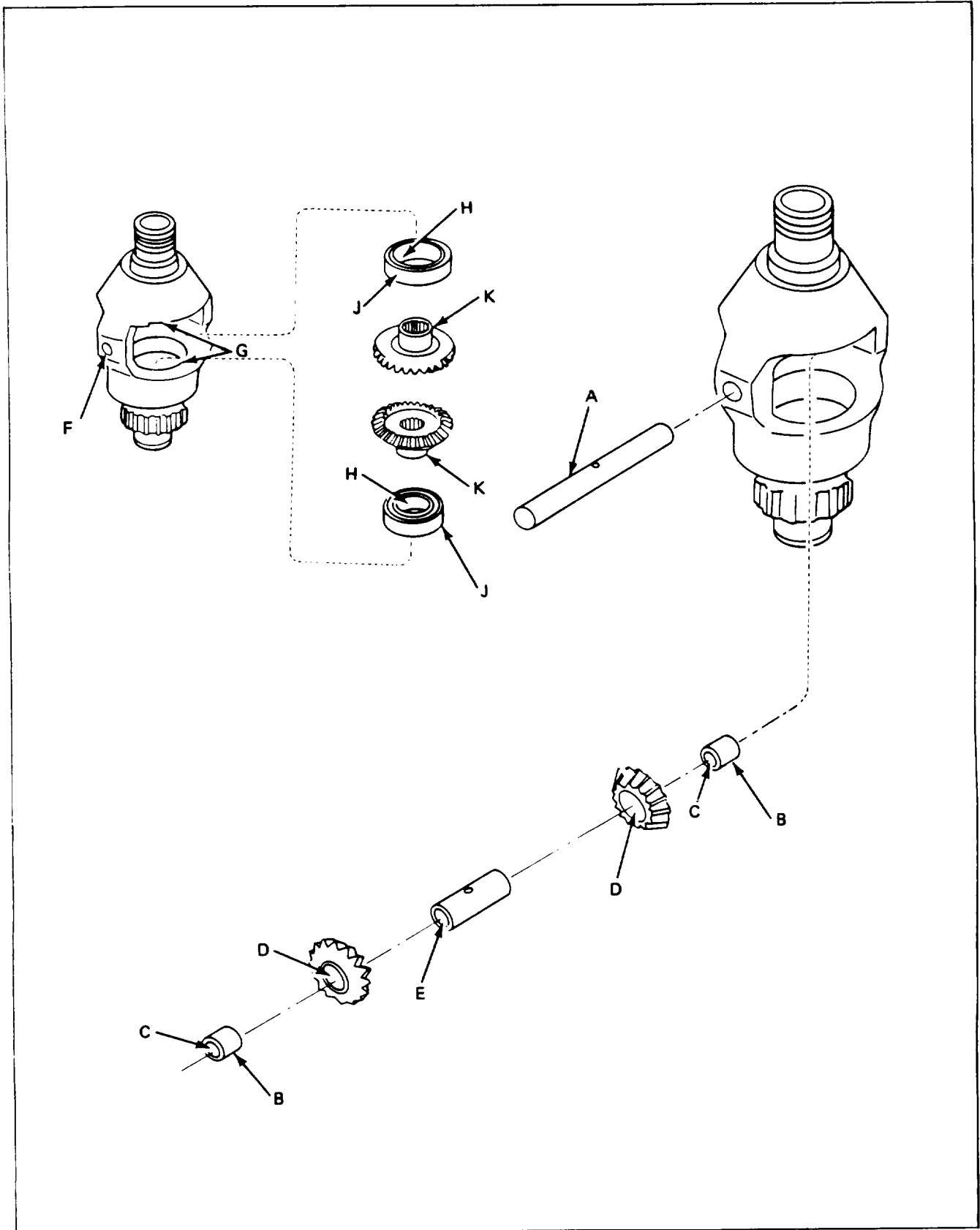
PRELIMINARY PROCEDURES: Disassemble differential as required (para 18-76)

GENERAL INSTRUCTIONS:

NOTE

If part is bad, order repair part or next higher assembly as required.

FRAME 1																																		
Step	Procedure																																	
	SUPPORT SHOP WORK																																	
1.	Take differential parts to shop where inspection equipment is available.																																	
2.	Make dimensional check.																																	
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	NOTE																																	
	Tag all parts that are out of tolerance.																																	
3.	After support shop work, return differential parts to turret shop.																																	
	END OF TASK																																	



18-74. DIFFERENTIAL REMOVAL PROCEDURE

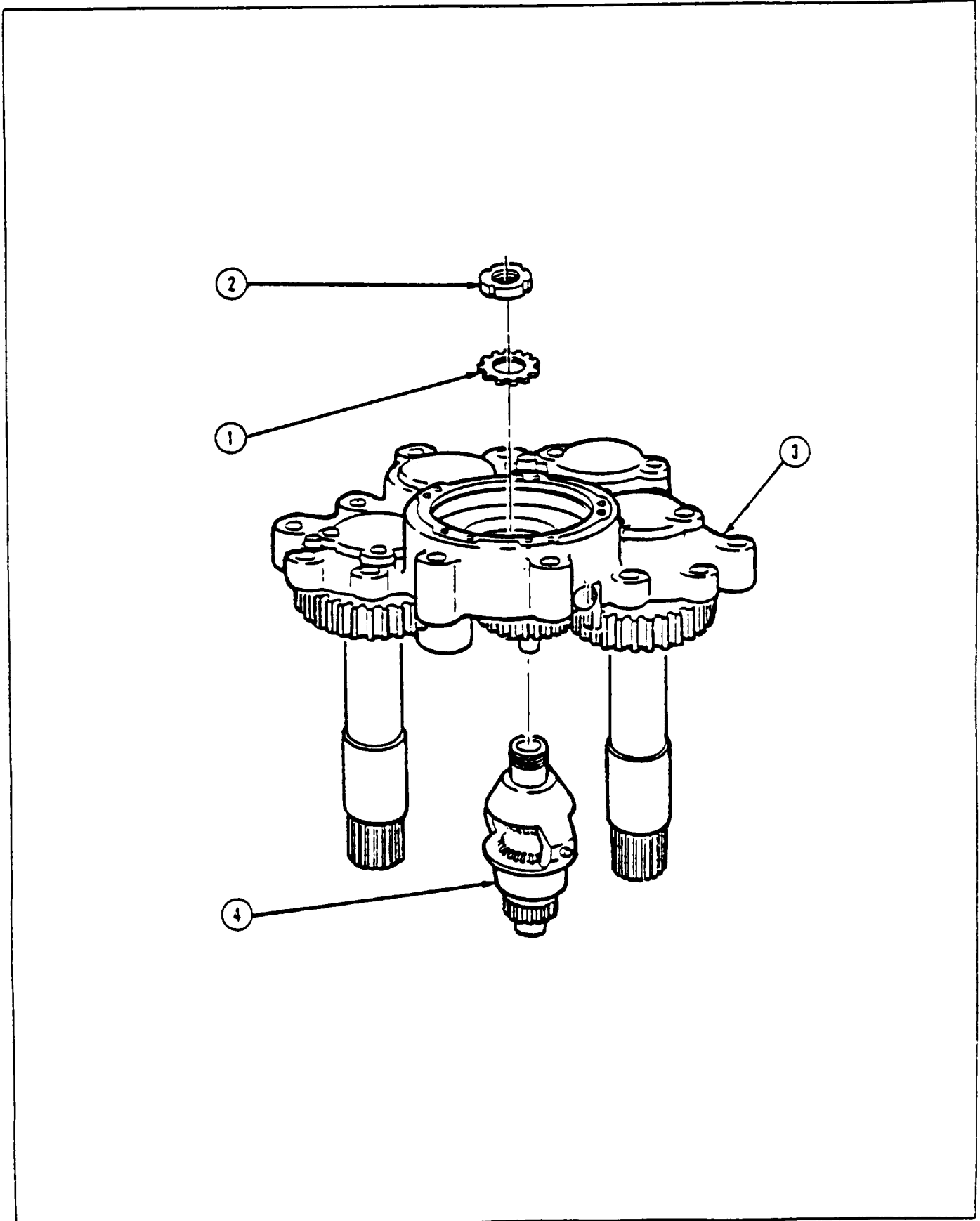
- TOOLS:** 8 ounce ball peen hammer
 1/4" drift pin
 Scraper
 Stiff bristled brush
 Fine stone
 Traverse gear tool kit (12270518)

- SUPPLIES** Dry cleaning solvent (item 33, App. A)
 Crocus cloth (item 7, App. A)

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove upper housing and gear train (para 18-67)
 Remove intermediate gear (para 18-71)

FRAME 1	
Step	Procedure
1.	Using hammer and drift pin, straighten washer (1) tangs from slots in nut (2) in upper housing (3).
2.	Using traverse gear tool kit, remove nut (2) and washer (1) that attach differential (4) to upper housing (3). Remove differential.
	NOTE
	Follow-on Maintenance Action Required: Clean all parts. Inspect and repair all parts. Do-detail inspection of parts (para 18-66d).
	END OF TASK



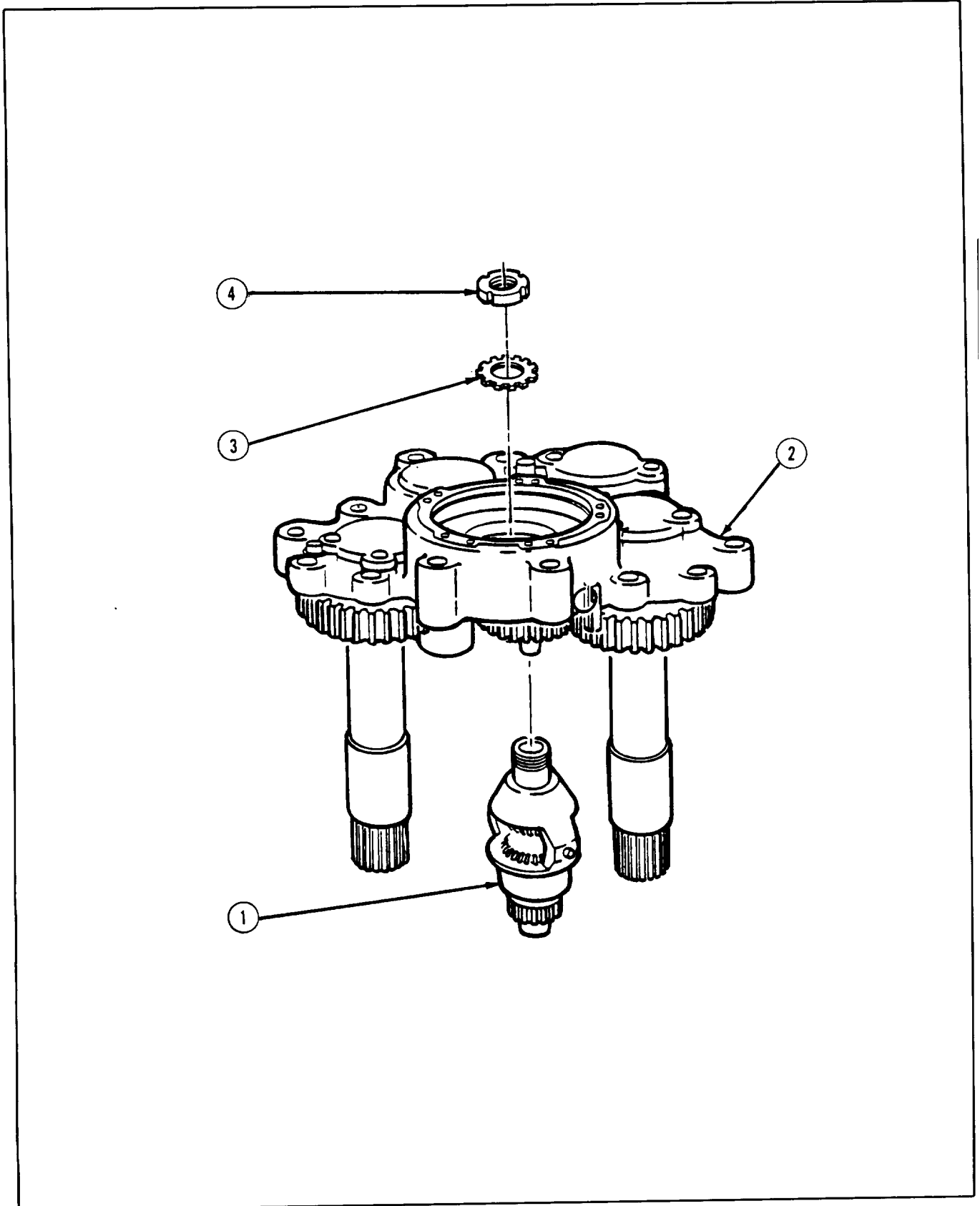
18-75. DIFFERENTIAL INSTALLATION PROCEDURE

TOOLS: 1/2 in. drive torque wrench (0 to 175 foot-pounds)
6 in. extension (1/2 in. drive)
1/4 in. flat-tip screwdriver
Traverse gear tool kit (12270518)

PERSONNEL: One

PRELIMINARY PROCEDURES: Install lower backlash gear (para 18-79)
Assemble differential (para 18-77)

FRAME 1	
Step	Procedure
1.	Using hands, put differential (1) through bearing in upper housing (2). Mesh gears.
2.	Using hands, position washer (3) and nut (4) on differential (1) and tighten,
3.	Using torque wrench and traverse gear tool kit, torque nut (4) to between 28 to 50 foot pounds (38 to 67.8 Newton meters).
4.	Using screwdriver, bend washer (3) tangs to slot in nut (4).
	NOTE
	Follow-on Maintenance Action Required: Install intermediate gear (para 16-72).
	END OF TASK



18-76. DIFFERENTIAL DISASSEMBLY PROCEDURE

TOOLS: 1/4" flat -tip screwdriver
Needle nose pliers
8 oz. ball peen hammer
1/4" drift pin
3/4" drift pin
Bearing puller
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Remove cotter pins
Clean parts
Inspect and repair parts
Use bearing puller

PRELIMINARY PROCEDURES: Remove upper housing and gear train (para 16-67)
Remove intermediate gear (para 18-71)
Remove differential (para 18-74)

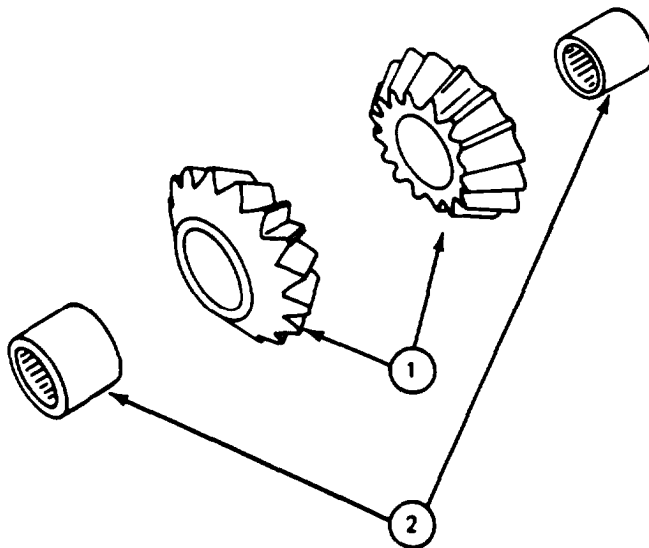
18-76. DIFFERENTIAL DISASSEMBLY PROCEDURE (CONT)

FRAME 1		
Step	Procedure	
<ol style="list-style-type: none"> 1. 2. 3. 4. 5. 	<p>Using pliers, straighten and remove cotter pin (1) from differential gear sleeve (2) and pin (3) of differential (4) (JPG).</p> <p>Using hammer and 1/4" drift pin, remove pin (3) from differential (4).</p> <p>Using hands, remove loose sleeve (2).</p> <p>Using screwdriver, remove two shim washers (5) from differential (4).</p> <p>Using hands, remove two gears (6) from differential (4).</p> <p>GO TO FRAME 2</p>	

18-76. DIFFERENTIAL DISASSEMBLY PROCEDURE (CONT)

FRAME 2

Step	Procedure
1. 2. 3.	<p style="text-align: center;">SUPPORT SHOP WORK</p> <p>Take two gears (1) to support shop where press is available. Remove two needle bearings (2) from two gears (1). After support shop work, return parts of differential to turret shop.</p> <p>GO TO FRAME 3</p>



18-76. DIFFERENTIAL DISASSEMBLY PROCEDURE (CONT)

FRAME 3	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 	<p>Using hammer and 3/4" drift pin, work through each end of differential earner (1) and tap two pinion gears (2) out of differential earner (1).</p> <p>Using hands, remove two pinion gears (2) and shim washers (3) from differential earner (1).</p> <p>Using bearing puller, remove two ball bearings (4) from two pinion gears (2) (JPG).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 18-73)</p> <p>END OF TASK</p>
<p>The diagram illustrates the disassembly process. On the left, a differential earner (1) is shown with two pinion gears (2) and shim washers (3) being removed. On the right, two pinion gears (2) are shown with their respective ball bearings (4) being removed.</p>	

18-77. DIFFERENTIAL ASSEMBLY PROCEDURE

TOOLS: 3 ounce brass hammer
8 ounce ball peen hammer
Needle nose pliers
Feeler gauge
1/4" drift pin

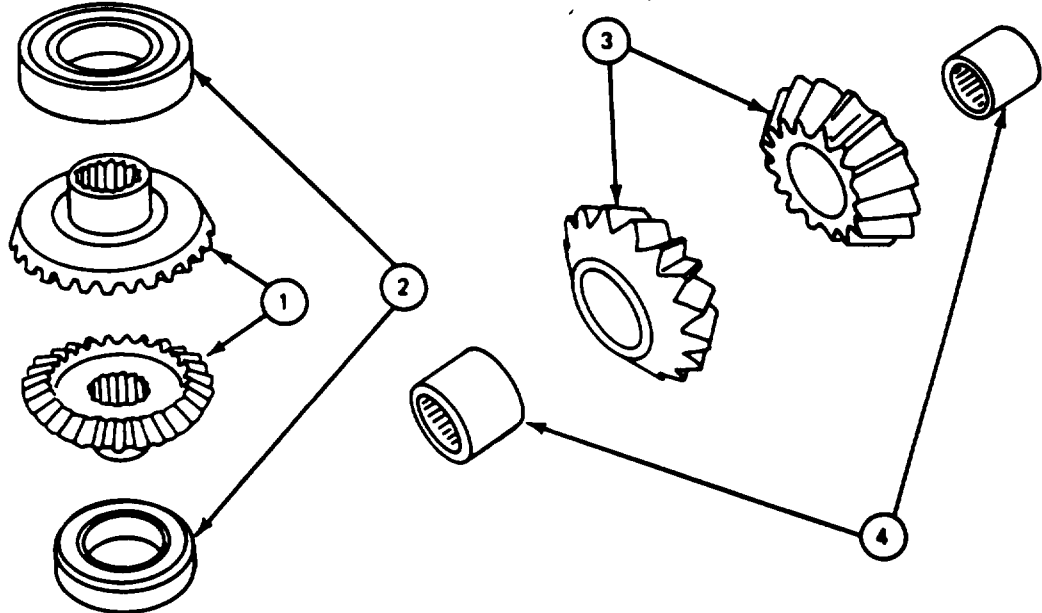
SUPPLIES: Cotter pin (MS 24665-283)
Washer, 0.125 thk (7996769)
Washer, 0.127 thk (8734860)
Washer, 0.129 thk (8734858)
Shim, 0.131 thk (8734859)
Shim, 0.133 thk (8734857)
Shim, 0.135 thk (7996768)
Shim, 0.002 thk (8734856)
Shim, 0.003 thk (7996771)
Shim, 0.005 thk (8734861)
Shim, 0.140 thk (8734862)
Shim, 0.152 thk (8731863)
Shim, 0.130 thk (8733976)
Pencil
Paper

PERSONNEL: One

REFERENCES: JPG for procedure to install cotter pins

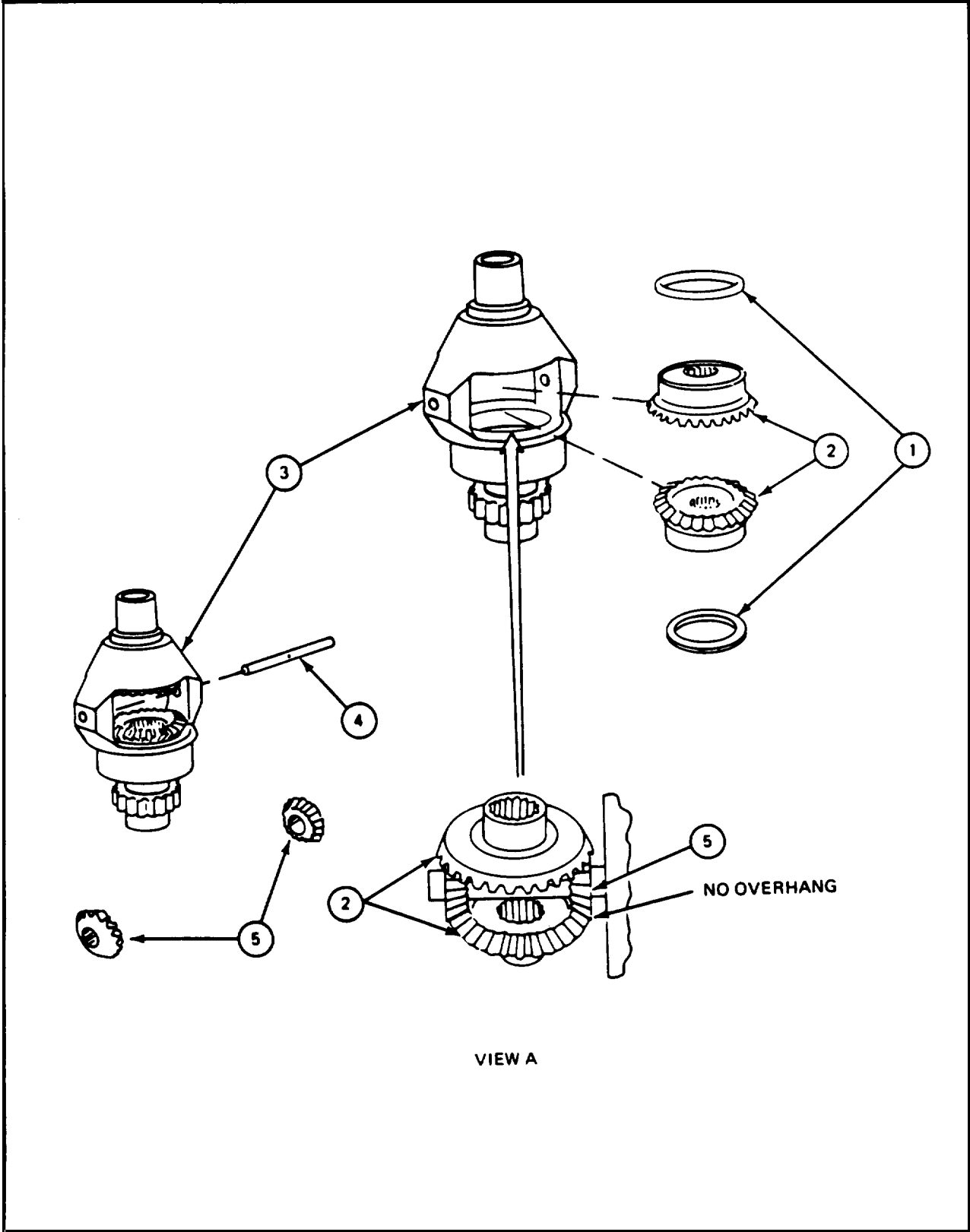
PRELIMINARY PROCEDURES: Inspect differential (para 18-73)

18-77. DIFFERENTIAL ASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
SUPPORT SHOP WORK	
<ol style="list-style-type: none"> 1. a. b. 2. 	<p>Take two pinion gears (1), two bearings (2), two gears (3) and two needle bearings (4) to shop where press is available.</p> <ol style="list-style-type: none"> a. Install two bearings (2) on two pinion gears (1). b. Install two needle bearings (4) on two gears (3). <p>After support shop work, return parts of differential to turret shop.</p> <p>GO TO FRAME 2</p>
	

18-77. DIFFERENTIAL ASSEMBLY PROCEDURE (CONT)

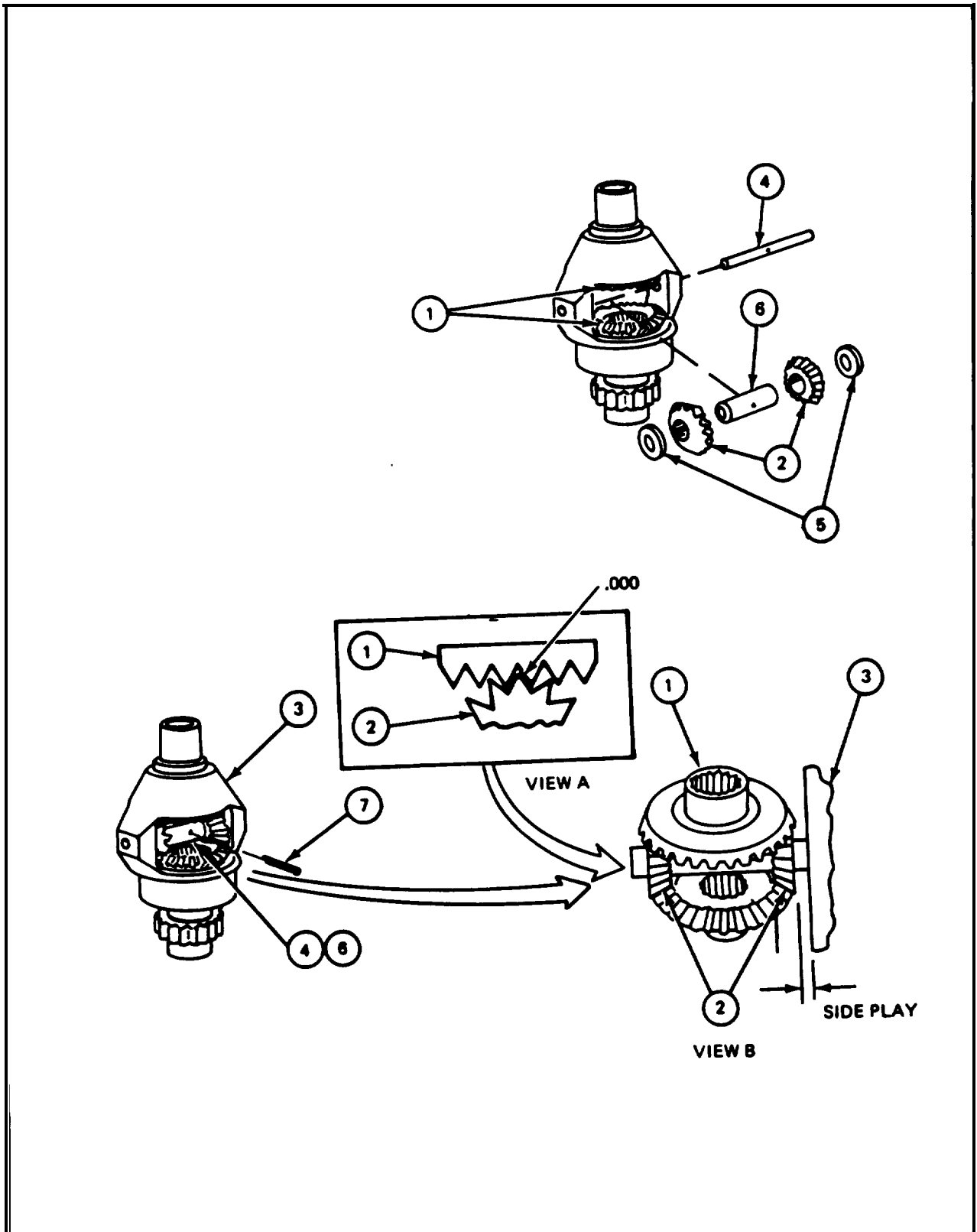
FRAME 2	
Step	Procedure
1.	Using hands, put two shim washers (1) and two pinion gears (2) in differential carrier (3). NOTE When installing pin (4) in differential carrier (3), make sure hole in pin is facing toward you.
2.	Using brass hammer, tap pin (4) part way in differential carrier (3) until it is flush with inner wall on one side.
3.	Using hands, put two gears (5) in differential earner (3) while aligning them with pin (4). Hold two gears (5) in place.
4.	Using brass hammer, tap pin (4) through two gears (5) until pin (4) is flush with both outer surfaces of differential carrier (3). NOTE Make sure two pinion gears (2) are fully seated.
5.	Push both gears (5) together to mesh with two pinion gears (2). Pinion gears (2) and gears (5) should mesh with no overhand (View A).
6.	If overhang of pinion gears (2) and gears (5) is evident, add or remove size of shim washers (1). GO TO FRAME 3



18-77. DIFFERENTIAL ASSEMBLY PROCEDURE (CONT)

FRAME 3

Step	Procedure
1.	Check backlash between two pinion gears (1) and two gears (2). Backlash must be 0.000" (View A).
2.	Using feeler gauge, check side play between two gears (2) and differential housing (3) (View B). Using pencil and paper, write down side play measurement for right side and left side.
3.	Using ball peen hammer and punch, remove pin (4) from differential housing (3).
4.	Place right and left side shims (5) (size measured in step 2) between two gears (2) and differential housing (3).
NOTE	
Make sure hole in pin (4) is facing you.	
5.	Using brass hammer, tap pin (4) through right shim (5) and flush with right gear (2).
6.	Using hands, put sleeve (6) in differential carrier (3) and align with pin (4) and two gears (2).
7.	Using brass hammer, tap pin (4) through sleeve (6), left gear (2) and left shim (5), until pin is flush with both outer surfaces of differential carrier (3).
8.	Using pliers, put new cotter pin (7) through sleeve (6) and pin (4) (JPG)
NOTE	
Follow-on Maintenance Action Required:	
Install differential (para 18-74).	
END OF TASK	



18-78. LOWER BACKLASH GEAR REMOVAL PROCEDURE

TOOLS: External retaining ring pliers
 Scraper
 Stiff bristled brush
 Fine stone

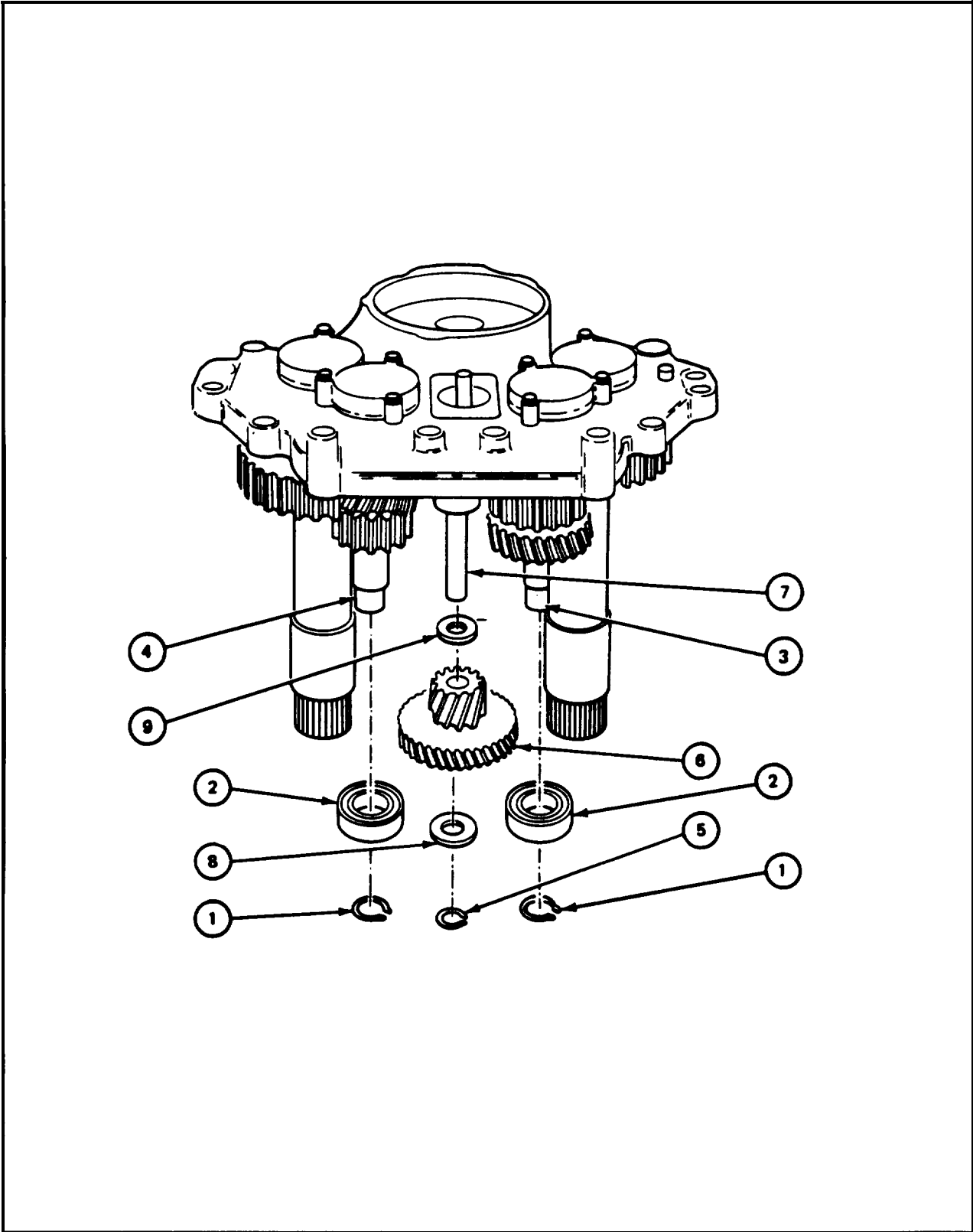
SUPPLIES: Dry cleaning solvent (item 33, App. A)
 Crocus cloth (item 7, App. A)

PERSONNEL. One

REFERENCES: JPG for procedures to:
 Clean parts
 Inspect and repair parts
 Use retaining ring pliers

PRELIMINARY PROCEDURES: Remove upper housing and gear train (para 18-67)
 Remove intermediate gear (para 18-71)
 Remove differential (para 18-74)

FRAME 1	
Step	Procedure
1.	Using pliers, remove two retaining rings (1) that attach two bearings (2) to the left gear shaft (3) and right gear shaft (4) (JPG).
2.	Using hands, remove two bearings (2).
3.	Using pliers, remove retaining ring (5) that attaches lower backlash gear (6) to backlash shaft (7) (JPG).
4.	Using hands, remove flat washer (8), lower backlash gear (6), and flat washer (9).
	NOTE
	Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of pans (para 18-66e).
	END OF TASK



Para 18-78 Cont
18-279/(18-280 blank)

18-79. LOWER BACKLASH GEAR INSTALLATION PROCEDURE

TOOLS: External retaining ring pliers

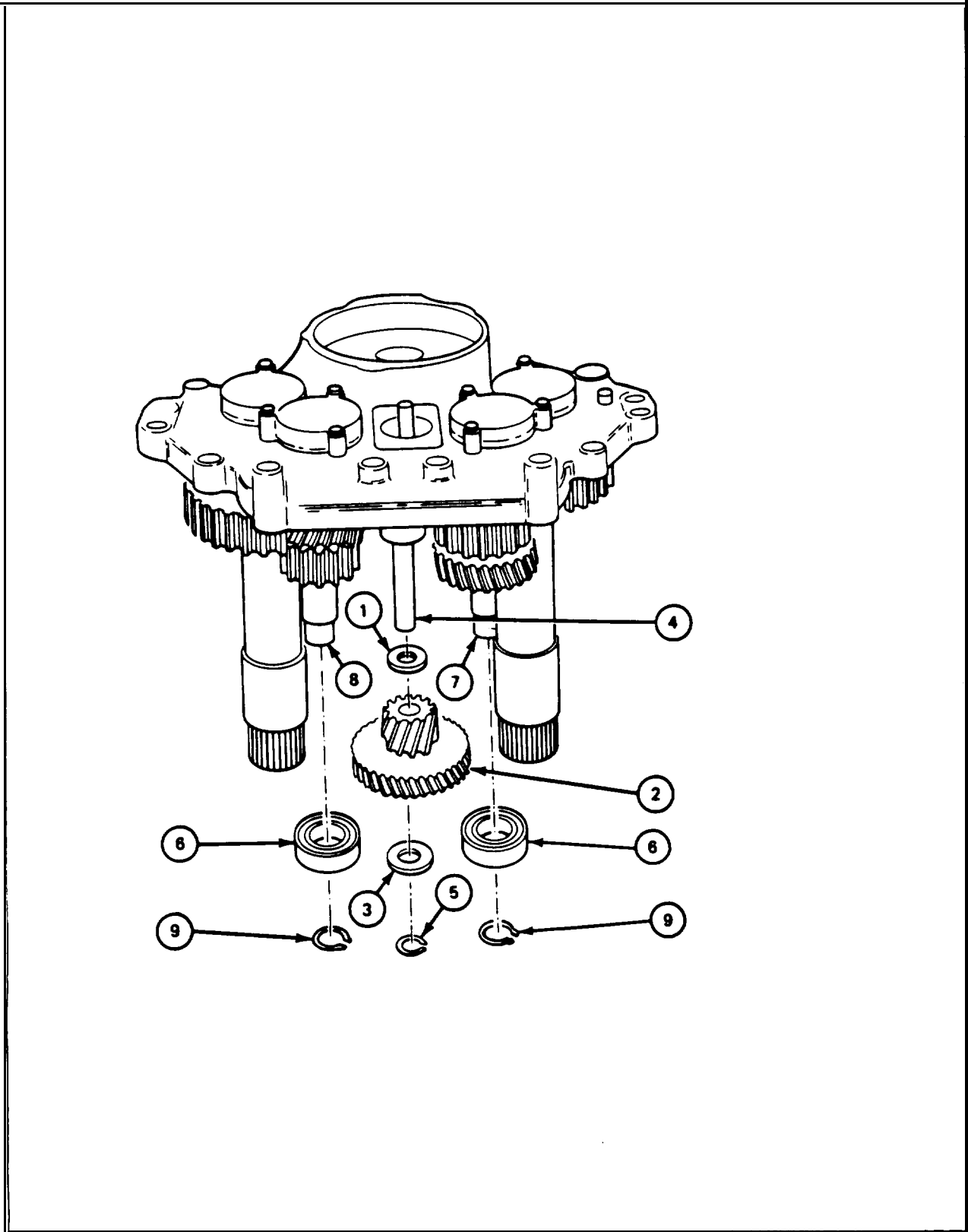
PERSONNEL One

REFERENCES: JPG for procedure to use retaining ring pliers

PRELIMINARY PROCEDURES: Install left gear shaft (para 18-81)
Inspect lower backlash gear (para 18-66c)

18-79. LOWER BACKLASH GEAR INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	NOTE
	Washer (1) has curved surface and must be put in with flat side down.
1.	Using hands, put flat washer (1), lower backlash gear (2) and flat washer (3) on backlash shaft (4). Mesh gears.
2.	Using pliers, attach lower backlash gear (2) to backlash shaft (4) with retaining ring (5) (JPG).
3.	Using hands, put two bearings (6) on left gear shaft (7) and right gear shaft (8) (JPG).
4.	Using pliers, attach two bearings (6) to left gear shaft (7) and right gear shaft (8) with two retaining rings (9) (JPG).
	NOTE
	Follow-on Maintenance Action Required:
	Install differential (para 18-75).
	END OF TASK



18-80. LEFT GEAR SHAFT REMOVAL PROCEDURE

TOOLS: 7/16" socket (3/8 drive)
3/8" drive ratchet
8 ounce ball peen hammer
1/4" drift pin
Plastic face hammer
Scraper
Stiff bristled brush
Fine stone
Traverse gear tool kit (12270518) ■

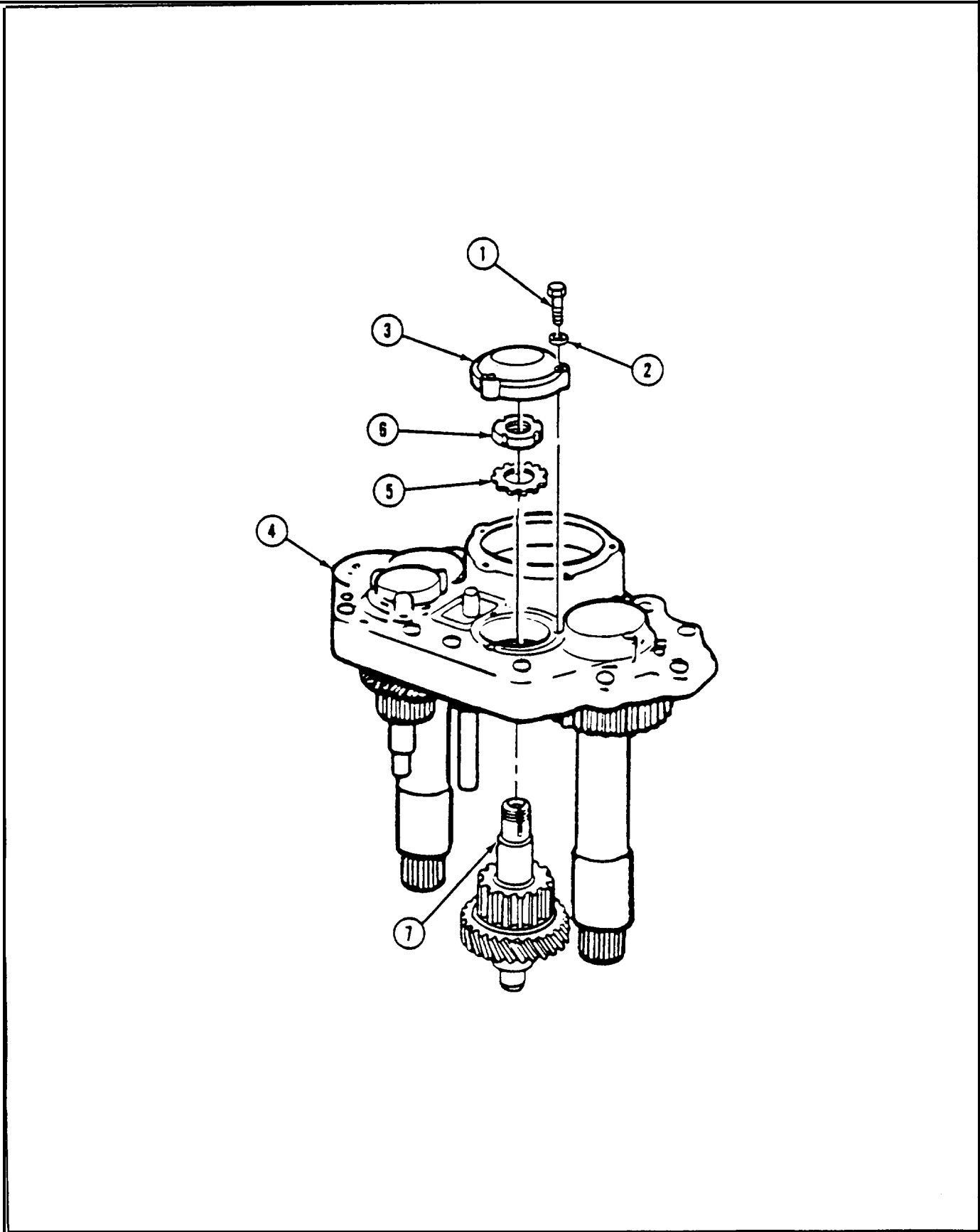
SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove upper housing and gear train (para 18-67)
Remove intermediate gear (para 18-71)
Remove differential (para 18-74)
Remove lower backlash gear (para 18-78)

18-80. LEFT GEAR SHAFT REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	<p>Using 7/16" socket wrench, remove three screws (1) and three lockwashers (2) that attach left gear cover (3) to upper housing (4).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Plastic face hammer may be needed to tap gear cover loose.</p>
2.	Using hands, remove gear cover (3).
3.	<p>Using ball peen hammer and drift pin, straighten washer (5) tangs from slots in nut (6) in upper housing (4).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">It may be necessary to hold gear shaft (7) with hands when removing nut (6).</p>
4.	Using traverse gear tool kit, remove nut (6) and washer (5) that attach left gear shaft (7) to upper housing (4).
5.	Using hands, remove left gear shaft (7).
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Clean all parts. Inspect and repair all parts. Do detail inspection of parts (para 18-66a).</p> <p>END OF TASK</p>



18-81. LEFT GEAR SHAFT INSTALLATION PROCEDURE

TOOLS: 8 ounce ball peen hammer
7/16 in. socket (3/8 in. drive)
1/2 in. drive torque wrench (0-175 foot-pounds)
■ 3/8 in. drive torque wrench (0-150 inch pounds)(NSN 5120-00-230-6380)
■ 3/8 in. drive ratchet
Traverse gear tool kit (12270518)
1/4 drift pin
1/4 drift pin

PERSONNEL: One

PRELIMINARY PROCEDURES: Install left pinion shaft (para 18-83)
Inspect left gear shaft (para 18-66a)

18-82. LEFT PINION SHAFT REMOVAL PROCEDURE

TOOLS: 7/16" socket (3/8" drive)
3/8" drive ratchet
8 ounce ball peen hammer
1/4" drift pin
Plastic face hammer
Scraper
Stiff-bristled brush
Fine stone
Traverse gear tool kit (12270518)

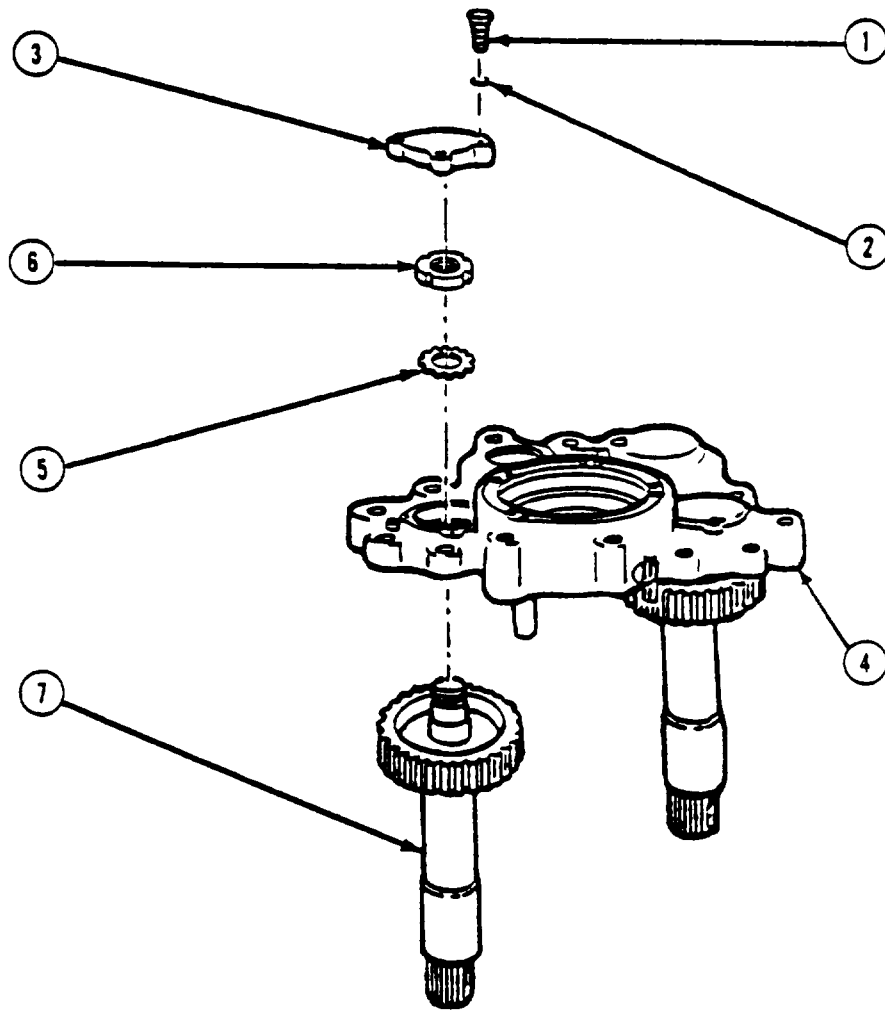
SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove upper housing and gear shaft (para 18-67)
Remove intermediate gear (para 18-71)
Remove differential (para 18-74)
Remove lower backlash gear (para 18-78)
Remove left gear shaft (para 18-80)

18-82. LEFT PINION SHAFT REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	<p>Using 7/16" socket wrench, remove three screws (1) and three lockwashers (2) that attach left pinion cover (3) to upper housing (4).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Plastic face hammer may be needed to tap cover (3) loose.</p>
2.	Using hands, remove gear cover (3).
3.	<p>Using ball peen hammer and drift pin, straighten washer (5) tangs from slots in nut (6) in upper housing (4).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">It may be necessary to hold pinion shaft (7) with hands when removing nut (6).</p>
4.	Using traverse gear tool kit, remove nut (6) and washer (5) that attach left pinion shaft (7) to upper housing (4).
5.	Using hands, remove left pinion shaft (7).
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Clean all parts. Inspect and repair all parts. Do detail inspection of parts (para 18-66a).</p> <p>END OF TASK</p>



18-03. LEFT PINION SHAFT INSTALLATION PROCEDURE

TOOLS: 8 ounce ball peen hammer
7/16 in. socket (3/8 in. drive)
1/2 in. drive torque wrench (0 to 175 foot-pounds)
3/8 in. drive torque wrench (0 to 150 inch-pounds) (NSN 5120-00-230-6380)
Traverse gear tool kit (12270518)
1/4 in. drift pin

PERSONNEL: One

PRELIMINARY PROCEDURE: Inspect left pinion shaft (para 18-66b)

18-83. LEFT PINION SHAFT INSTALLATION PROCEDURE (CO NT)

FRAME 1	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 4. 5. 	<p>Using hands, put left pinion shaft (1) in upper housing (2) and mesh gears.</p> <p>Using traverse gear tool kit, attach left pinion shaft (1) to upper housing [2] with nut (3) and washer (4). Using 1/2 inch drive torque wrench, tighten nut (3) to between 25 and 50 foot-pounds (33.9 and 67.8 Newton meters).</p> <p>Using hammer and drift pin, bend washer (4) tangs to slot in nut (3).</p> <p>Using socket wrench, attach left pinion cover (5) to upper housing (2) with three screws (6) and three lockwashers (7).</p> <p>Using 3/8 inch drive torque wrench, torque screws (6) to between 36 and 60 inch-pounds (4.1 to 6.8 Newton meters)</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Install left gear shaft (para 18-81).</p> <p>END OF TASK</p>

18-84. RIGHT PINION SHAFT REMOVAL PROCEDURE

TOOLS: 3/8" drive ratchet
7/16" socket (3/8" drive)
8 ounce ball peen hammer
1/4" drift pin
Plastic face hammer
Scraper
Stiff bristled brush
Fine stone
Traverse gear tool kit (12270518)

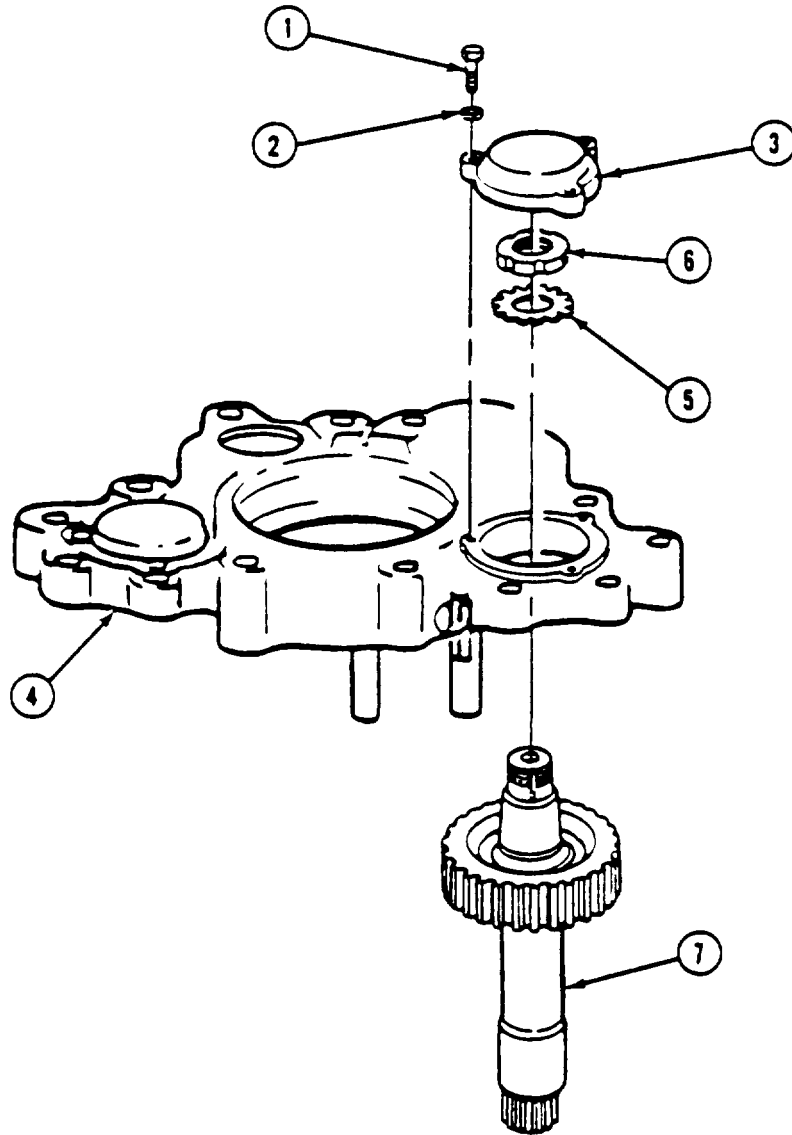
SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

PRELIMINARY PROCEDURES: Upper housing and gear train removed (para 18-67)

18-84. RIGHT PINION SHAFT REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	<p>Using 7/ 16" socket wrench, remove three screws (1) and three lockwashers (2) that attach right pinion cover (3) to upper housing (4).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Plastic face hammer may be needed to tap cover (3) loose.</p>
2.	Using hands, remove gear cover (3).
3.	<p>Using ball" peen hammer and drift pin, straighten washer (5) tangs from slots in nut (6) in upper housing (4).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">It may be necessary to hold shaft (7) with hand when removing nut (6).</p>
4.	Using traverse gear tool kit, remove nut (6) and washer (5) that attach right pinion shaft (7) to upper housing (4).
5.	Using hands, remove right pinion shaft (7).
	<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Clean all parts. Inspect and repair all parts. Do detail inspection of parts (para 18-66b).</p>
	END OF TASK



18-85. RIGHT PINION SHAFT INSTALLATION PROCEDURE

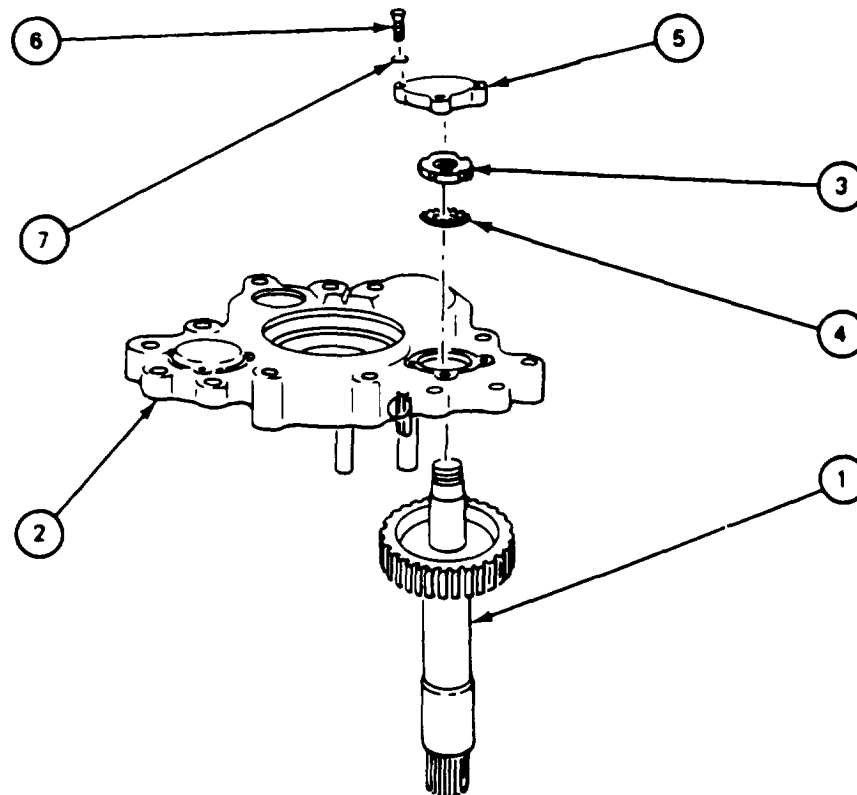
TOOLS: 8 ounce ball peen hammer
7/16 in. socket (3/8 in. drive)
1/2 in. drive torque wrench (0 to 175 foot-pounds)
3/8 in. drive torque wrench (0 to 150 inch-pounds) (NSN 5120-00-230-6380)
3/8 in. drive ratchet
Traverse gear tool kit (12270518)
1/4 in. drift pin

PERSONNEL: One

PRELIMINARY PROCEDURES: Install right gear shaft (para 18-87)
Inspect right pinion shaft (para 18-66b)

18-85. RIGHT PINION SHAFT INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1	Using hands, put right pinion shaft (1) in upper housing (2) and mesh gears.
2.	Using traverse gear tool kit, attach right pinion shaft (1) to upper housing (2) with nut (3) and washer (4). Using 1/2 in drive torque wrench, tighten nut (4) to between 25 and 50 foot-pounds (33.9 and 67.8 Newton meters).
3.	Using hammer and drift pin, bend washer (4) tangs to slot in nut (3).
4.	Using socket wrench, attach right pinion cover (5) to upper housing (2) with three screws (6) and three lockwashers (7).
5.	Using 3/8 inch drive torque wrench, torque screws (6) to between 36 and 60 inch-pounds (4.1 to 6.8 Newton meters)
<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Install upper housing and gear train (para 18-68).</p>	
END OF TASK	



18-86. RIGHT GEAR SHAFT REMOVAL PROCEDURE

TOOLS: 3/8" drive ratchet
7/16" socket (3/8" drive)
8 ounce ball peen hammer
1/4" drift pin
Scraper
Stiff bristled brush
Fine stone
Traverse gear tool kit (12270518)

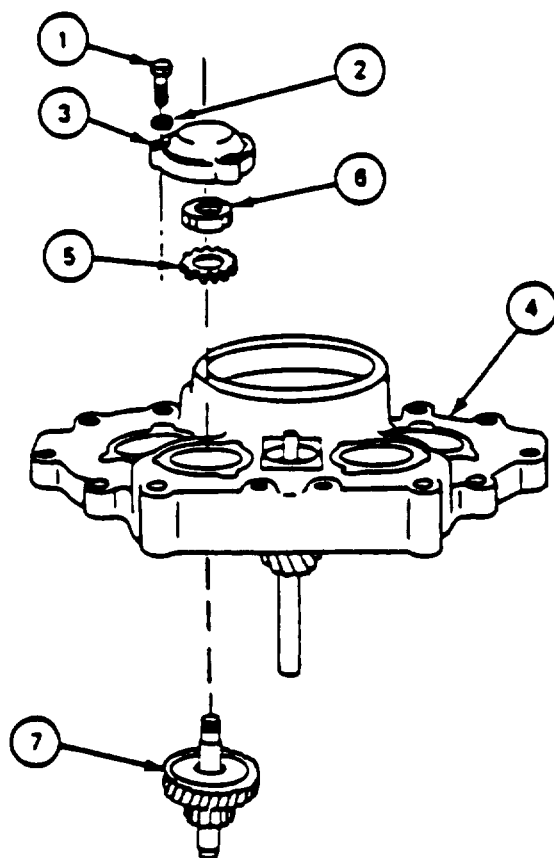
SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove upper housing and gear train (para 18-67)
Remove right pinion shaft (para 18-84)

18-86. RIGHT GEAR SHAFT REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	<p>Using 7/16" socket wrench, remove three screws (1) and three lockwashers (2) that attach right gear cover (3) to upper housing (4).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Plastic face hammer may be needed to tap cover (3) loose.</p>
2.	Using hands, remove gear cover (3).
3.	<p>Using ball peen hammer and drift pin, straighten washer (5) tangs from slots in nut (6) in upper housing (4).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">It may be necessary to hold shaft (7) with hand when removing nut (6).</p>
4.	Using traverse gear tool kit, remove nut (6) and washer (5) that attach right gear shaft (7) to upper housing (4).
5.	Using hands, remove right gear shaft (7).
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Clean all parts. Inspect and repair all pans. Do detail inspection of parts (para 18-66a).</p> <p>END OF TASK</p>



18-87. RIGHT GEAR SHAFT INSTALLATION PROCEDURE

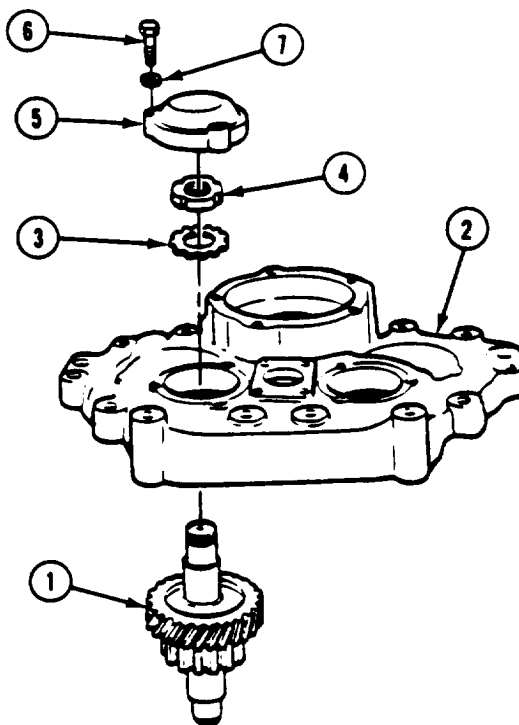
TOOLS: 7/16 in. socket (3/8 in. drive)
8 ounce ball peen hammer
1/4 drift pin
3/8 in. drive torque wrench (0 to 150 inch-pounds) (NSN 5120-00-230-6380)
1/2 in. drive torque wrench (0 to 175 foot-pounds)
3/8 in. drive ratchet
Traverse gear tool kit (12270518)

PERSONNEL: One

PRELIMINARY PROCEDURES: Install backlash gear shaft (para 18-89)
Inspect right gear shaft (para 18-66a)

18-87. RIGHT GEAR SHAFT INSTALLATION PROCEDURE (CONT)

FRAME 1	
STEP	PROCEDURE
<ol style="list-style-type: none"> 1. Using hands, put right gear shaft (1) in upper housing (2) and mesh gears. 2. Using hands, position washer (3) and nut (4) on right gear shaft (1) and tighten. 3. Using traverse gear tool kit, attach right gear shaft (1) to upper housing (2) with washer (3) and nut (4). Using 1/2 in drive torque wrench, tighten nut (4) to between 25 and 50 foot-pounds (33.9 and 67.8 Newton meters). 4. Using hammer and drift pin, bend washer (3) tangs to slot in nut (4). 5. Using socket wrench, attach right gear cover (5) to upper housing (2) with three screws (6) and three lockwashers (7). 6. Using 3/8 inch drive troque wrench, troque screws (6) to between 36 to 60 inch-pounds (4.1 to 6.8 Newton meters). 	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required: Install right pinion shaft (para 18-85).</p> <p>END OF TASK</p>



18-88. BACKLASH GEAR SHAFT OR UPPER HOUSING REMOVAL PROCEDURE

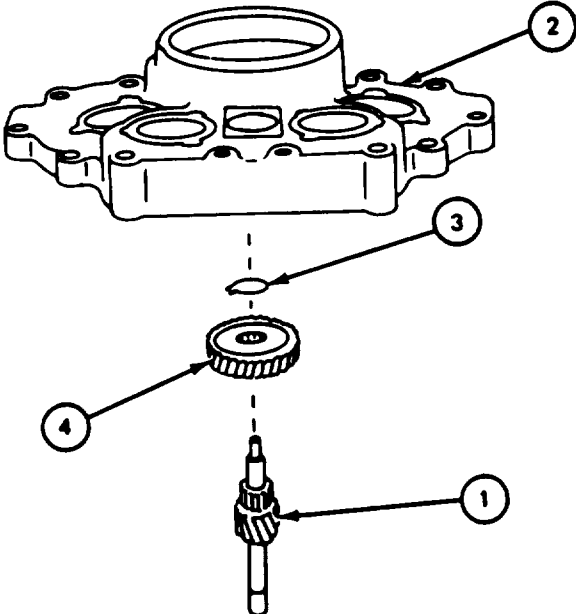
TOOLS: External retaining ring pliers
Plastic face hammer
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove upper housing and gear train (para 18-67)
Remove intermediate gear (para 18-71)
Remove differential (para 18-74)
Remove lower backlash gear (para 18-78)
Remove left gear shaft (para 18-80)
Remove left pinion gear (para 18-82)
Remove right pinion gear (para 18-87)
Remove right gear shaft (para 18-86)

18-88. BACKLASH GEAR SHAFT OR UPPER HOUSING REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 	<p>Using hands, remove backlash gear shaft (1) from upper housing (2).</p> <p>Using pliers, remove retaining ring (3) that attaches backlash gear (4) to backlash gear shaft (1) (JPG).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">If gear (4) cannot be removed from shaft (1) in step 3, send parts to support shop where bearing press is available.</p>
<ol style="list-style-type: none"> 3. 	<p>Using hammer, remove gear (4) from shaft (1).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 18-66c or 18-66f).</p> <p>END OF TASK</p>
	

**18-89. BACKLASH GEAR SHAFT OR UPPER HOUSING INSTALLATION
PROCEDURE**

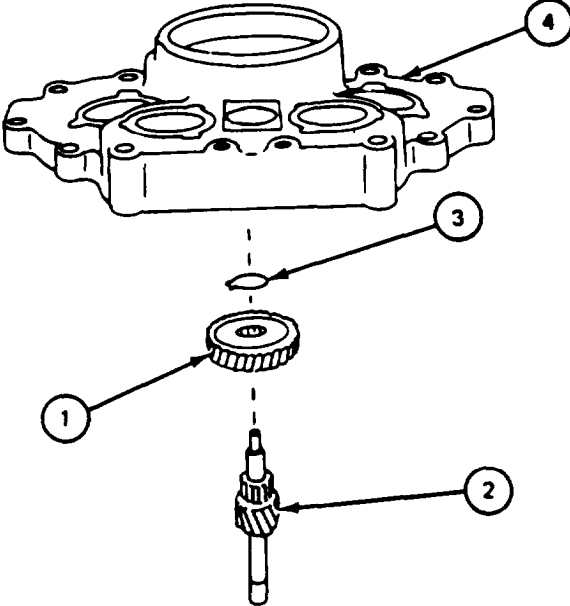
TOOLS: External retaining ring pliers
Plastic face hammer

PERSONNEL: One

REFERENCES: JPG for procedure to use retaining ring pliers

PRELIMINARY PROCEDURES: Inspect upper housing (para 18-66f)
Inspect backlash gear shaft (para 18-66c)
Assemble upper housing (para 18-91)

**18-89. BACKLASH GEAR SHAFT OR UPPER HOUSING INSTALLATION
PROCEDURE (CONT)**

FRAME 1	Step Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">If backlash gear (1) cannot be put on backlash gear shaft (2) in step 1. send parts to support shop where bearing press is available.</p> <ol style="list-style-type: none"> 1. Using plastic face hammer, lightly tap backlash gear (1) on backlash gear shaft (2) with large bevel edge (angle) down. 2. Using pliers, put retaining ring (3) on shaft (2) (JPG). 3. Using hands, put backlash gear shaft (2) in upper housing (4). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Install right gear shaft (para 18-87). Install left pinion shaft (para 18-83).</p> <p>END OF TASK</p>
	

18-90. UPPER HOUSING DISASSEMBLY PROCEDURE

TOOLS: 9/16" combination wrench
7/16" combination wrench
1/2" combination wrench
5/8" combination wrench
3/4" combination wrench
7/8" combination wrench
9/64" socket head screw key (Allen wrench)
Flat tip screwdriver
Internal retaining ring pliers
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

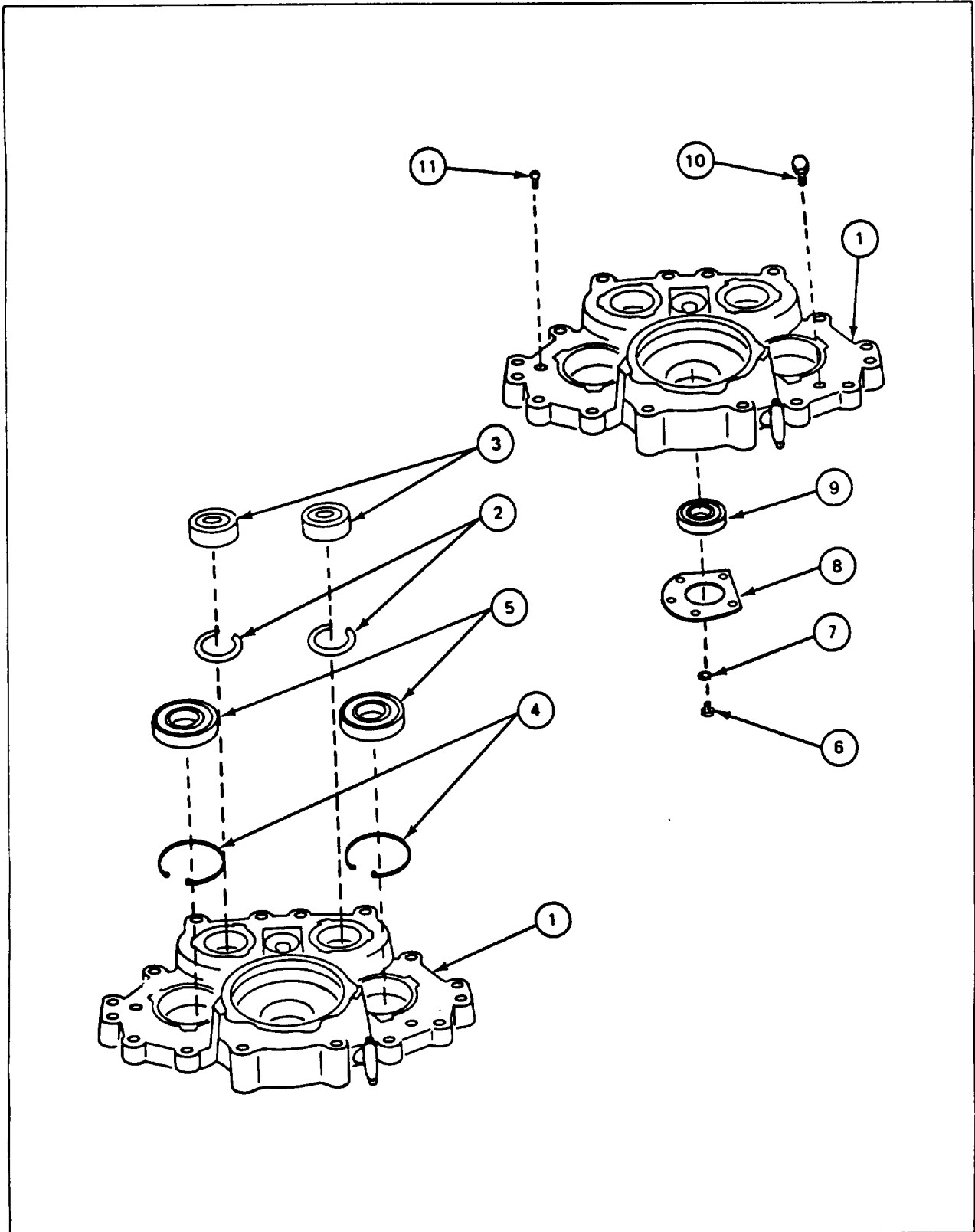
PERSONNEL: One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts
Use retaining ring pliers

PRELIMINARY PROCEDURES: Remove upper housing and gear train (para 18-67)
Remove intermediate gear (para 18-71)
Remove differential (para 18-74)
Remove lower backlash gear (para 18-78)
Remove left gear shaft (para 18-80)
Remove left pinion shaft (para 18-82)
Remove right pinion shaft (para 18-84)
Remove right gear shaft (para 18-86)
Remove backlash gear shaft (para 18-88)

18-90. UPPER HOUSING DISASSEMBLY PROCEDURE (CONT)

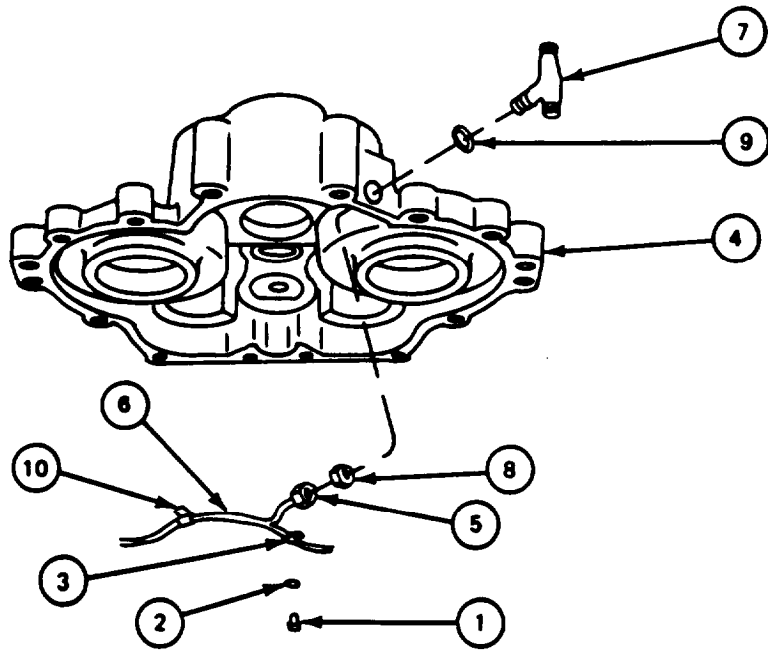
FRAME 1	
Step	Procedure
1.	Using hands, place upper housing (1) upside down to remove parts.
	<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">CAUTION</div> <p style="text-align: center;">When removing retaining rings (2) and (3), bearings (4) and (5) may fall out.</p>
2.	Using retaining ring pliers, remove two retaining rings (2) and push out two bearings (4) from upper housing (1) (JPG).
3.	Using retaining ring pliers, remove two retaining rings (3) and push out two bearings (5) from upper housing (1) (JPG).
4.	Using 7/16" wrench, remove five screws (6) and five lockwashers (7) that attach differential bearing retaining plate (8) to upper housing (1).
5.	Using hands, remove retaining plate (8) and differential bearing (9).
6.	Using 7/8" wrench, remove fill plug (10) from upper housing (1).
7.	Using 7/16" wrench, remove vent plug (11) from upper housing (1).
	GO TO FRAME 2



18-90. UPPER HOUSING DISASSEMBLY PROCEDURE (CONT)

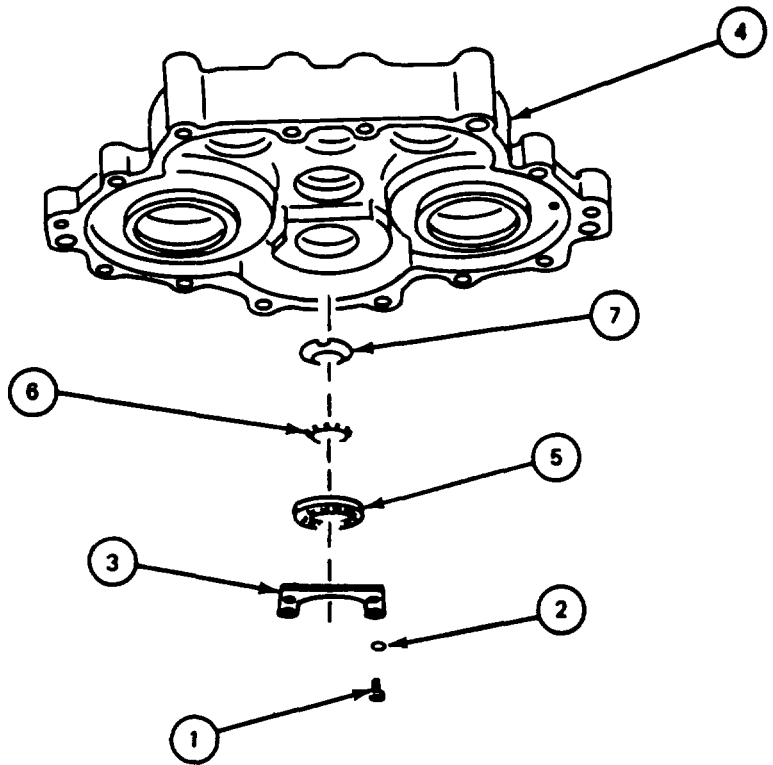
FRAME 2

Step	Procedure
1.	Using Allen wrench, remove screw (1) and lockwasher (2) that hold clamp (3) to upper housing (4). NOTE Some upper housings (4) need 9/16" wrench for 1/2" wrench in steps 2 and 3.
2.	Using 1/2" and 5/8" wrenches, loosen nut (5) of oil tube (6) at tee (7). Remove tube (6).
3.	Using 1/2" and 3/4" wrenches, remove nut (8) from tee (7).
4.	Using hands, remove tee (7) and washer (9) from upper housing (4).
	NOTE Do step 5 only if tube (6) is to be replaced.
5.	Using screwdriver, pry open and remove clamps (3) and (10) from tube (6). GO TO FRAME 3



18-90. UPPER HOUSING DISASSEMBLY PROCEDURE (CONT)

FRAME 3	
Step	Procedure
1.	Using 7/16" wrench, remove four screws (1)) and four lockwashers (2) that attach intermediate bearing retaining plate (3) to upper housing (4).
2.	Using hands, remove retaining plate (3), intermediate bearing (5), washer (6), and nut (7) from upper housing (4).
<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 18-66 f).</p>	
<p>END OF TASK</p>	



18-91. UPPER HOUSING ASSEMBLY PROCEDURE

TOOLS: 7/16 combination wrench
1 / 2" combination wrench
9/16" combination wrench
5 / 8" combination wrench
3/4" combination wrench
7/8" combination wrench
3/8" drive ratchet
7/16" socket (3/8" drive)
9/64" socket head screw key (Allen wrench)
3/8" drive torque wrench (0 to 150 inch-pounds)
Internal retaining ring pliers

SUPPLIES: Washer (7109405)

PERSONNEL: One

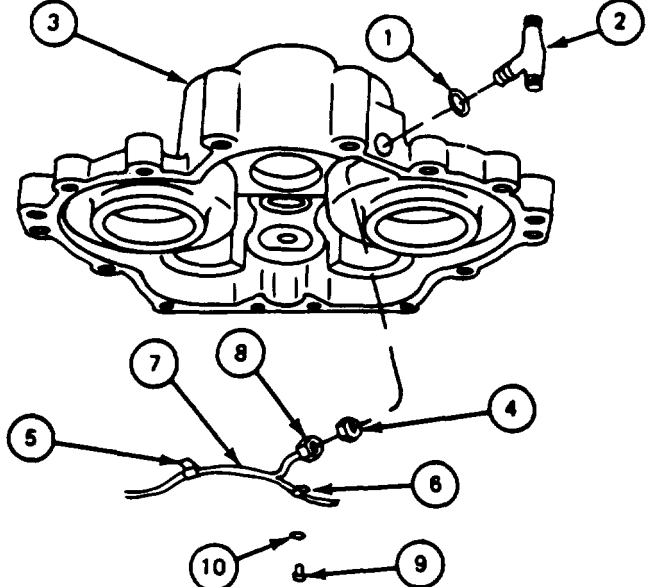
REFERENCES: JPG for procedures to:
Use retaining ring pliers
Use torque wrench

PRELIMINARY PROCEDURES: Inspect upper housing (para 18-66 f).

18-91. UPPER HOUSING ASSEMBLY PROCEDURE (CONT)

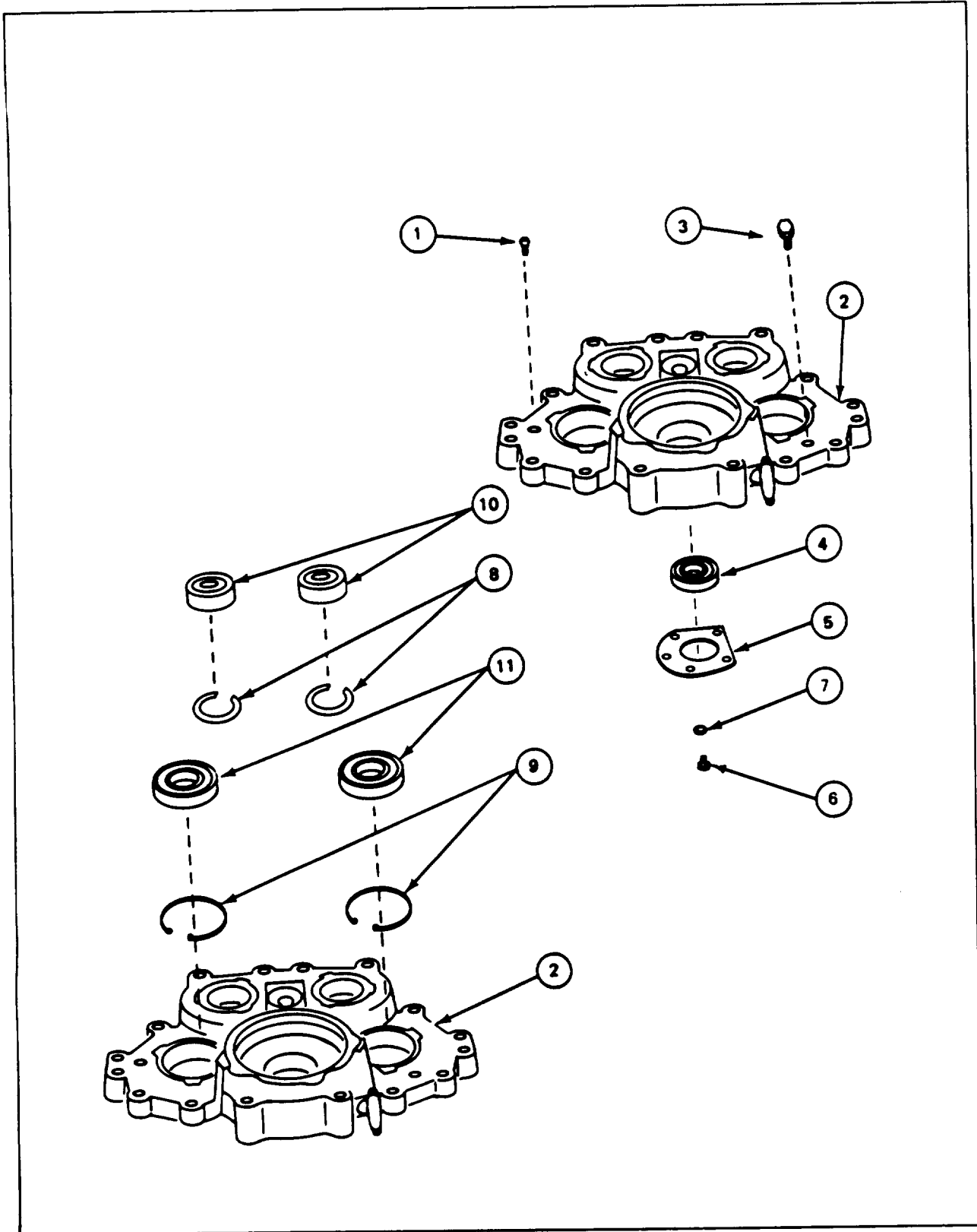
FRAME 1	
Step	Procedure
1.	Using hands, put nut (1), new washer (2), and intermediate bearing (3) with flat side toward housing, in upper housing (4).
2.	Using 7/16" socket wrench, attach intermediate bearing retaining plate (5) to upper housing (4) with four screws (6) and four lockwashers (7).
3.	Using torque wrench, torque four screws (6) to between 36 and 60 inch-pounds (JPG). GO TO FRAME 2

18-91. UPPER HOUSING ASSEMBLY PROCEDURE (CONT)

FRAME 2	
Step	Procedure
<ol style="list-style-type: none"> 1. Using hands, put washer (1) on tee (2) with bevel side of washer toward tee. 2. Using hands, put tee (2) in upper housing (3) and attach nut (4) from inside upper housing, 	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Some upper housings (3) need 9/16" wrench for 1/2" wrench.</p>
<ol style="list-style-type: none"> 3. Using 1/2" and 3/4" wrenches, tighten nut (4) while holding tee (2) ports vertical to upper housing (3). 4. Using hands, attach clamps (5) and (6) to tube (7), if tube is to be replaced. 	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Some upper housings (3) need 9/16" wrench for 1/2" wrench.</p>
<ol style="list-style-type: none"> 5. Using 1/2" and 5/8" wrenches, attach nut (8) of oil tube (7) to tee (2). 6. Using Allen wrench, attach clamp (6) to upper housing (3) with screw (9) and lockwasher (10). <p>GO TO FRAME 3</p>	
	

18-91. UPPER HOUSING ASSEMBLY PROCEDURE (CONT)

FRAME 3	
Step	Procedure
1.	Using 7/16" wrench, attach vent plug (1) to upper housing (2).
2.	Using 7/8" wrench, attach fill plug (3) to upper housing (2).
3.	Using hands, put differential bearing (4) in upper housing (2). Put retaining plate (5) under clamp of oil tube in upper housing,
4.	Using 7/16" socket wrench, attach retaining plate (5) and clamp of oil tube to upper housing (2) with five screws (6) and five lockwashers (7).
5.	Using torque wrench, torque five screws (6) to between 36 and 60 inch-pounds (JPG).
NOTE	
Bearings (10) and (11) can be installed in housing (2) from either side.	
6.	Using pliers, put two retaining rings (8) in upper housing (2) (JPG).
7.	Using pliers. put two retaining rings (9) in upper housing (2) (JPG).
8.	Using hands, put two bearings (10) in upper housing (2).
9.	Using hands, put two bearings (11) in upper housing (2).
NOTE	
Follow-on Maintenance Action Required: Install backlash gear shaft (para 18-89).	
END OF TASK	



Para 18-91 Cont
18-323/(18-324 blank)

18-92. UPPER HOUSING REPAIR PROCEDURE

SUPPLIES Bushing (12252650)

PERSONNEL: One

PRELIMINARY PROCEDURES: Inspect upper housing (para 18-66)

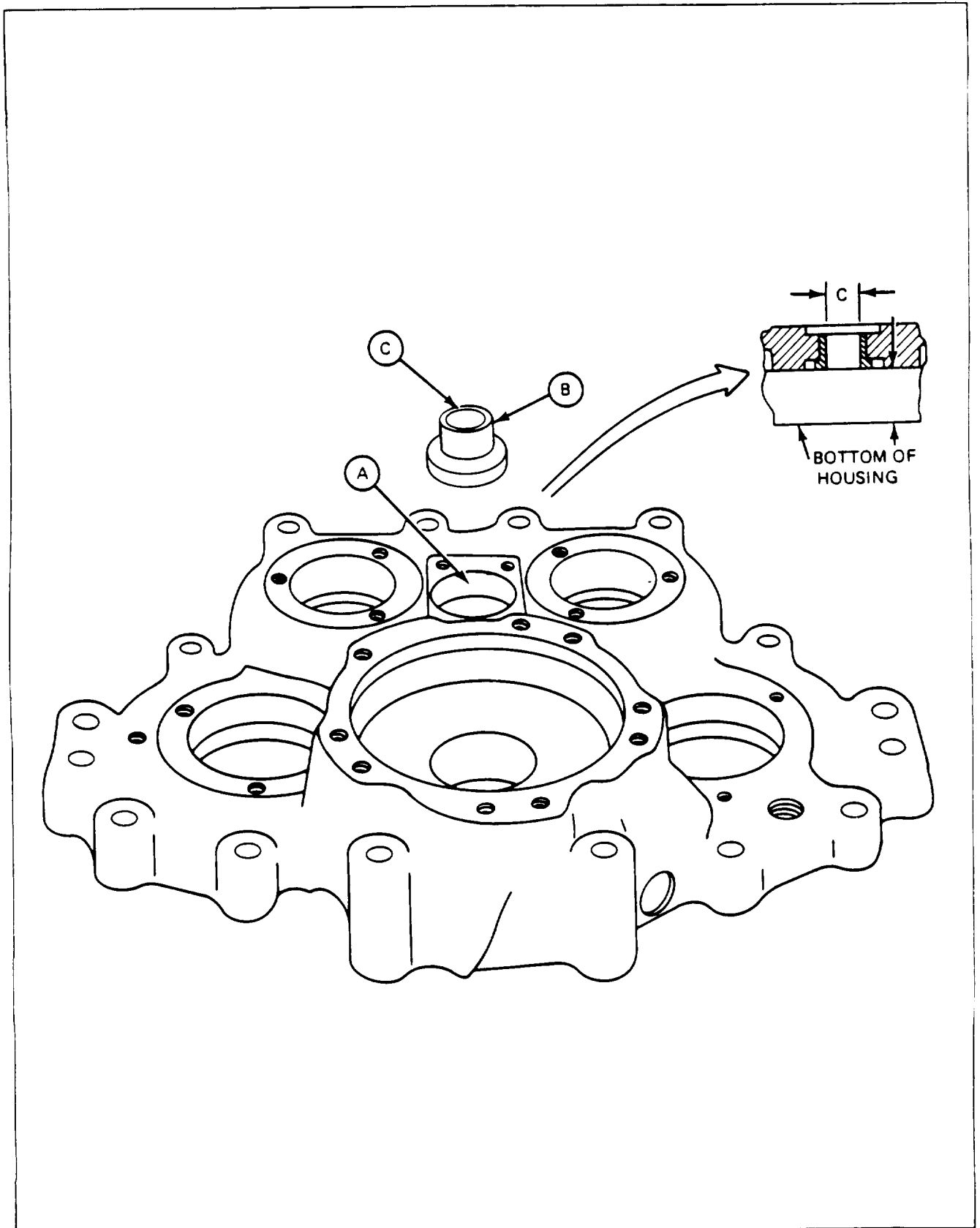
GENERAL INSTRUCTIONS:

NOTE

Procedure is used to replace bad bushing in upper housing.
If upper housing is bad, order repair part or next higher
assembly as required.

18-92. UPPER HOUSING REPAIR PROCEDURE (CONT)

FRAME 1			
Step	Procedure		
1.	SUPPORT SHOP WORK		
	Take upper housing and new bushing to shop where press and inspection equipment are available.		
	a. Remove bad bushing.		
	b. Make dimensional check.		
	Reference Letter	Point of Measurement	Measurement
	A	Housing bore for bushing	1.0000 to 1.0010
	B	OD of new bushing	1.004 to 1.005
	c. Install new bushing.		
	Reference Letter	Point of Measurement	Measurement
	C	ID of bushing	0.751 to 0.755
2.	After support shop work, return upper housing to turret shop, END OF TASK		



18-93. LOWER HOUSING GROUP DISASSEMBLY PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove upper housing and gear trains (para 18-67)

FRAME 1		
Step	Procedure	
1.	Remove magnetic brake (para 18-97).	
2.	Disassemble lower housing (para 18-100).	
END OF TASK		

18-94. LOWER HOUSING GROUP ASSEMBLY PROCEDURE

PERSONNEL: One

FRAME 1

step	Procedure
1.	Assemble lower housing (para 18-101).
2.	Install magnetic brake (para 18-98).
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Install upper housing and gear train (para 18-68).</p> <p>END OF TASK</p>

18-95. MAGNETIC BRAKE INSPECTION PROCEDURE

TOOLS: Multimeter

PERSONNEL: One

REFERENCES: JPG for procedures to:
Use multimeter

PRELIMINARY PROCEDURES: Remove magnetic brake (para 18-97)

GENERAL INSTRUCTIONS

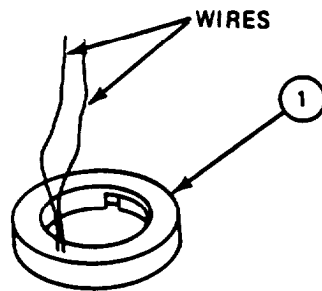
NOTE

If part is bad, order repair pan or next higher assembly as required.

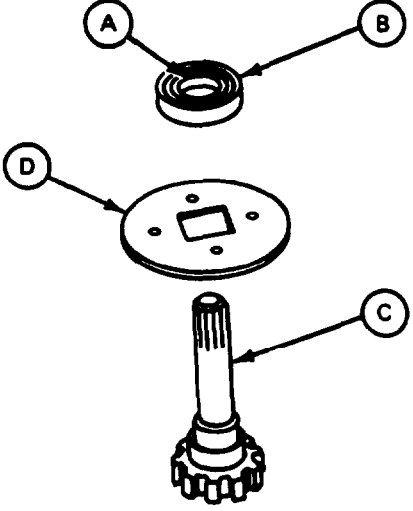
18-95. MAGNETIC BRAKE INSPECTION PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	Using multimeter, check coil (1) wires for continuity of about 40 ohms (JPG). Replace bad part. GO TO FRAME 2



18-95. MAGNETIC BRAKE INSPECTION PROCEDURE (CONT)

FRAME 2																	
Step	Procedure																
	SUPPORT SHOP WORK																
<ol style="list-style-type: none"> 1. Take magnetic brake bearing, disk, and pinlock shaft to shop where inspection equipment is available. 2. Make dimensional check. 																	
	<table border="0"> <thead> <tr> <th style="text-align: center;">Reference Letter</th> <th style="text-align: center;">Point of Measurement</th> <th style="text-align: center;">Measurement</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td>ID of bearing</td> <td style="text-align: center;">1.1807 to 1.1811</td> </tr> <tr> <td style="text-align: center;">B</td> <td>OD of bearing</td> <td style="text-align: center;">2.1649 to 2.1654</td> </tr> <tr> <td style="text-align: center;">C</td> <td>OD of pinlock shaft</td> <td style="text-align: center;">1.1797 to 1.1802</td> </tr> <tr> <td style="text-align: center;">D</td> <td>Disk must be flat</td> <td></td> </tr> </tbody> </table>	Reference Letter	Point of Measurement	Measurement	A	ID of bearing	1.1807 to 1.1811	B	OD of bearing	2.1649 to 2.1654	C	OD of pinlock shaft	1.1797 to 1.1802	D	Disk must be flat		
Reference Letter	Point of Measurement	Measurement															
A	ID of bearing	1.1807 to 1.1811															
B	OD of bearing	2.1649 to 2.1654															
C	OD of pinlock shaft	1.1797 to 1.1802															
D	Disk must be flat																
	NOTE																
	Tag all parts that are out of tolerance.																
<ol style="list-style-type: none"> 3. After support shop work, return magnetic brake bearing, disk, and pinlock shaft to turret shop. 																	
	END OF TASK																
 <p>The diagram shows three components of a magnetic brake assembly. At the top is a bearing with two measurement points: 'A' pointing to the inner diameter (ID) and 'B' pointing to the outer diameter (OD). Below the bearing is a flat circular disk with a central square hole and four small holes around its perimeter; a measurement point 'D' points to the disk's surface. At the bottom is a pinlock shaft with a splined upper section and a gear-like base; a measurement point 'C' points to the outer diameter (OD) of the splined section.</p>																	

18-96. MAGNETIC BRAKE TEST PROCEDURE

TEST EQUIPMENT: 24-28 vdc power source
Power source leads (two)
Magnetic brake torque wrench adapter

TOOLS: 3/4" socket (3/8" drive)
3/8" drive torque wrench (0-250 inch-pounds)

PERSONNEL: One

PRELIMINARY PROCEDURES: Install magnetic brake (para 18-98)
Assemble brake adapter assembly (para 18-43.5)
(Late model only)

GENERAL INSTRUCTIONS:

NOTE

This test procedure is used to test the magnetic brake in the traversing gearbox or the brake adapter assembly.

If normal indication is not obtained, magnetic brake is bad. Replace bad magnetic brake or brake assembly.

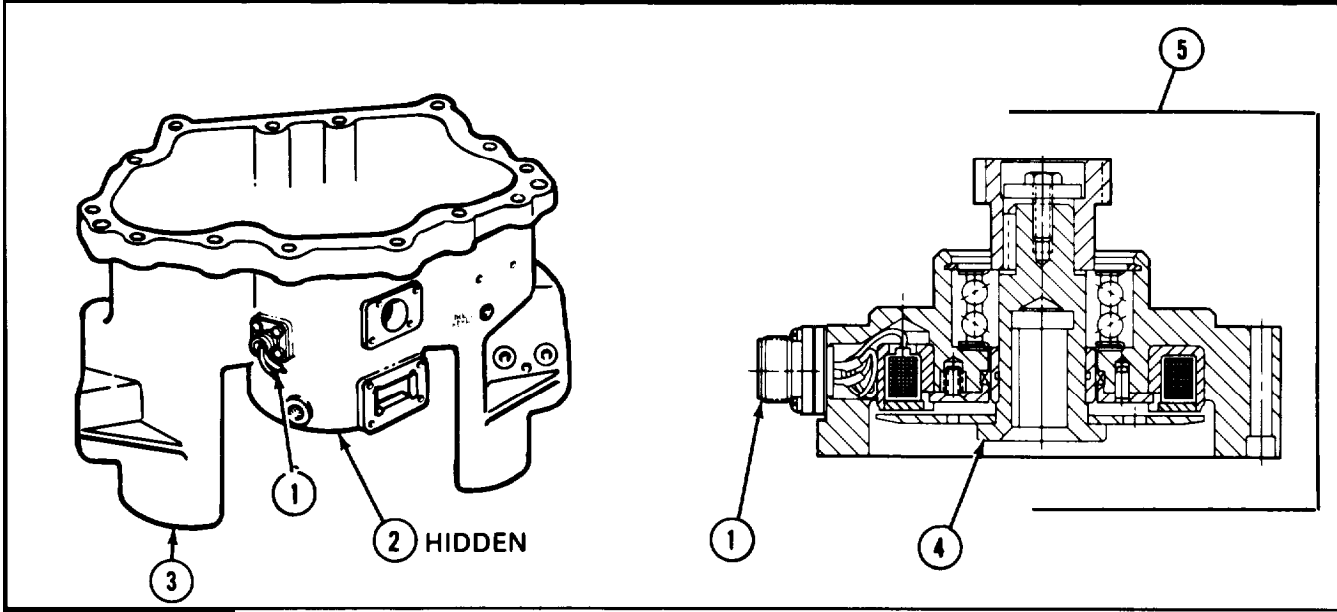
Suitable fittings and tools should be used to connect test equipment to parts being tested.

To test magnetic brake, do steps 1, 2, 3, 4, 5, and 6.

To test brake adapter assembly, do steps 1, 2, 3.1, 4, 5, and 6.

18-96. MAGNETIC BRAKE TEST PROCEDURE (CONT)

FRAME 1		
STEP	PROCEDURE	NORMAL INDICATION PROBABLE FAULT
1.	Connect positive lead of power source to brake connector (1) pin A. Connect negative lead to connector pin B.	... ..
2.	Turn power source on.	... ..
3.	Using torque wrench and adapter, apply between Shaft does not move 160 and 170 inch-pounds to pin lock shaft (2) in lower housing (3).	Magnetic brake
3.1	Using torque wrench and adapter, apply between Shaft does not move 160 and 170 inch-pounds to shaft (4) of brake adapter assembly (5).	Defective brake assembly
4.	Remove torque wrench and adapter.	... ..
5.	Turn power source off	... ..
6.	Disconnect power source leads.	... ..
<p>NOTE</p> <p>If normal indication was obtained in steps 3 or 3.1, brake is good.</p>		
<p>END OF TASK</p>		



18-97. MAGNETIC BRAKE OR LOWER HOUSING REMOVAL PROCEDURE

TOOLS: Internal retaining ring pliers
External retaining ring pliers
Soldering iron
3/4" drift pin
1/4" flat tip screwdriver
9/64" socket head screw key (Allen wrench)
20 ounce ball peen hammer
3/4" combination wrench
7/8" combination wrench
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Lint-free cloth (item 21, App. A)
Pencil
Masking tape (item 36, App. A)
Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

PERSONNEL One

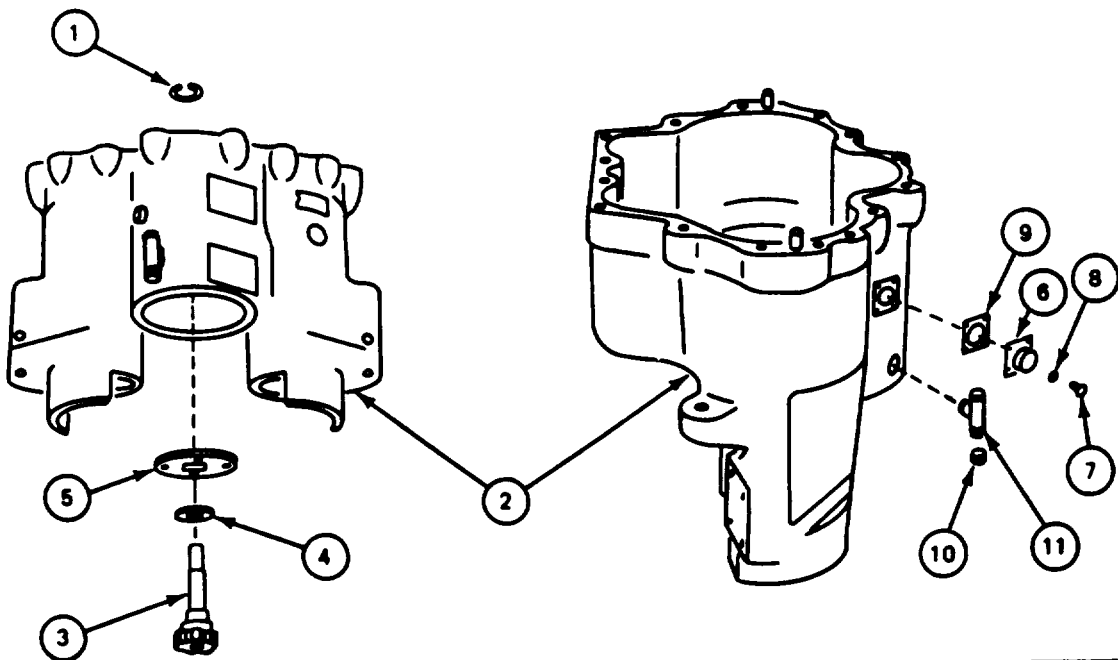
REFERENCES: JPG for procedures to:
Use soldering iron
Use retaining ring pliers
Clean parts
Inspect and repair parts
Tag wires

PRELIMINARY PROCEDURES: Remove upper housing and gear train (para 18-67)
Test magnetic brake (para 18-96)

**18-97. MAGNETIC BRAKE OR LOWER HOUSING REMOVAL PROCEDURE
(CONT)**

FRAME 1

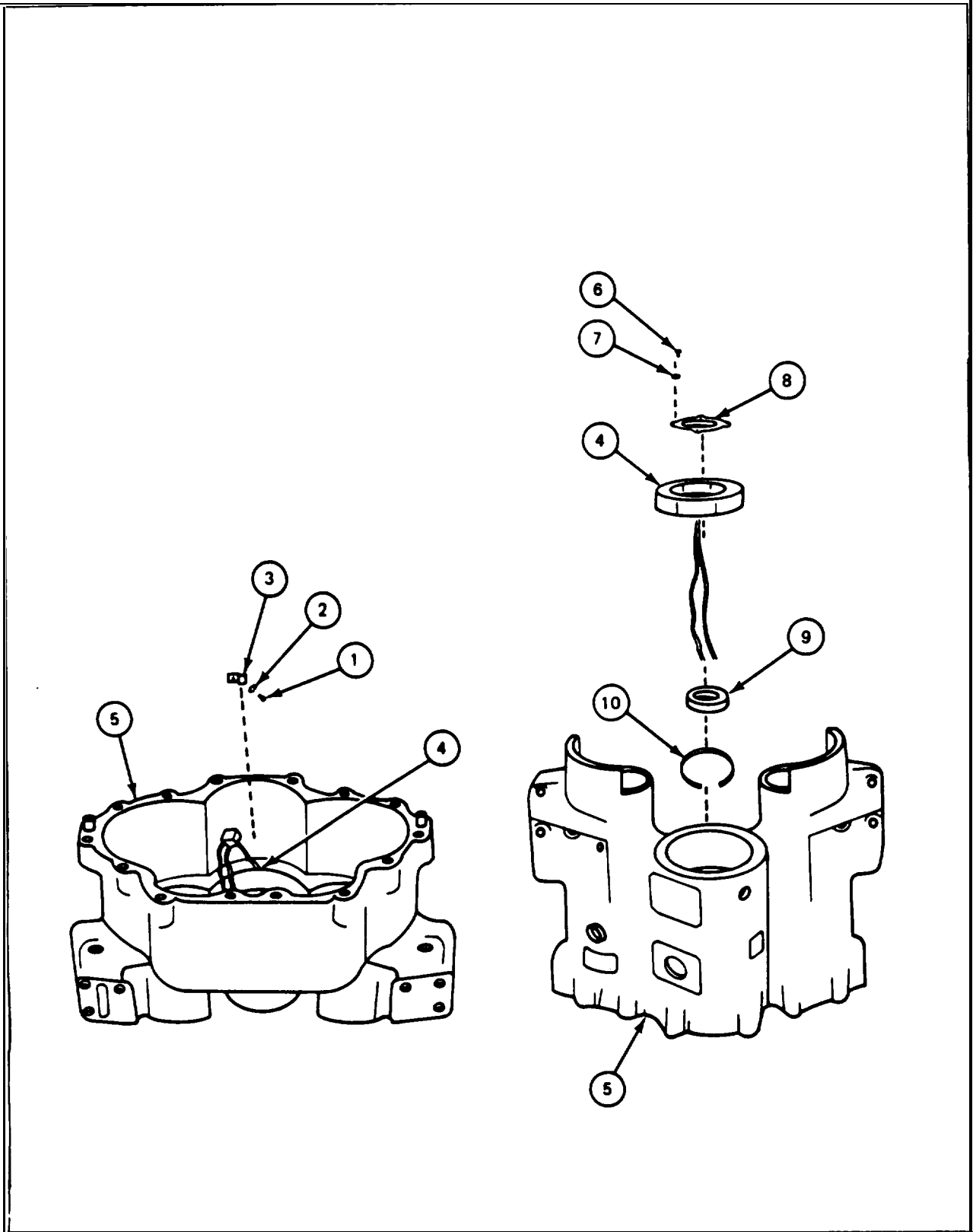
Step	Procedure
1.	Using external retaining ring pliers, remove retaining ring (1) (inside housing (2) that attaches pinlock shaft (3) to lower housing (2). Remove shaft (3), washer (4) and armature (5) (JPG).
2.	Using cloth and thinner, wipe area inside lower housing (2) around electrical connector (6).
3.	Using masking tape and pencil, tag each wire connected to terminals (JPG).
4.	Using screwdriver, remove four screws (7) and four lockwashers (8) that attach connector (6) to lower housing (2). Pull connector away from lower housing.
5.	Using soldering iron, unsolder two tagged wires from electrical connector (6) (JPG).
6.	Using hands, remove connector (6) and gasket (9).
7.	Remove gasket (9) from connector (6).
8.	Using 3/4" wrench, remove plug (10) from tee (11).
9.	Using 7/8" wrench, remove tee (11) from lower housing (2).
GO TO FRAME 2	



**18-97. MAGNETIC BRAKE OR LOWER HOUSING REMOVAL PROCEDURE
(CONT)**

FRAME 2

Step	Procedure
1.	Using Allen wrench, remove screw (1), lockwasher (2), and clamp (3) that attach magnetic brake (4) electrical leads to lower housing (5).
2.	Using screwdriver, remove four screws (6) and four lockwashers (7) that attach magnetic brake retaining plate (8) to lower housing (5). Remove plate (8).
3.	Using hands, remove magnetic brake (4).
4.	Using drift pin and hammer, tightly tap bearing (9) from lower housing (5).
5.	Using internal retaining pliers, remove retaining ring (10) from lower housing (5) (JPG).
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required</p> <p style="text-align: center;">Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of parts (para 18-99 or 18-95).</p> <p>END OF TASK</p>	



18-98. MAGNETIC BRAKE OR LOWER HOUSING INSTALLATION PROCEDURE

TOOLS: 7/8" combination wrench
20 ounce ball peen hammer
3/4" drift pin
Soldering iron
External retaining ring pliers
Internal retaining ring pliers
3/8" drive torque wrench (0 to 150 inch-pounds)
1/4" flat tip screwdriver (3/8" drive handle)
9/64" socket head screw key (Allen wrench)
3/16" flat tip screwdriver
Feeler gauge
3/4" combination wrench

SUPPLIES: Solder (item 31, App. A)
Gasket (MS 52000-4)

PERSONNEL: One

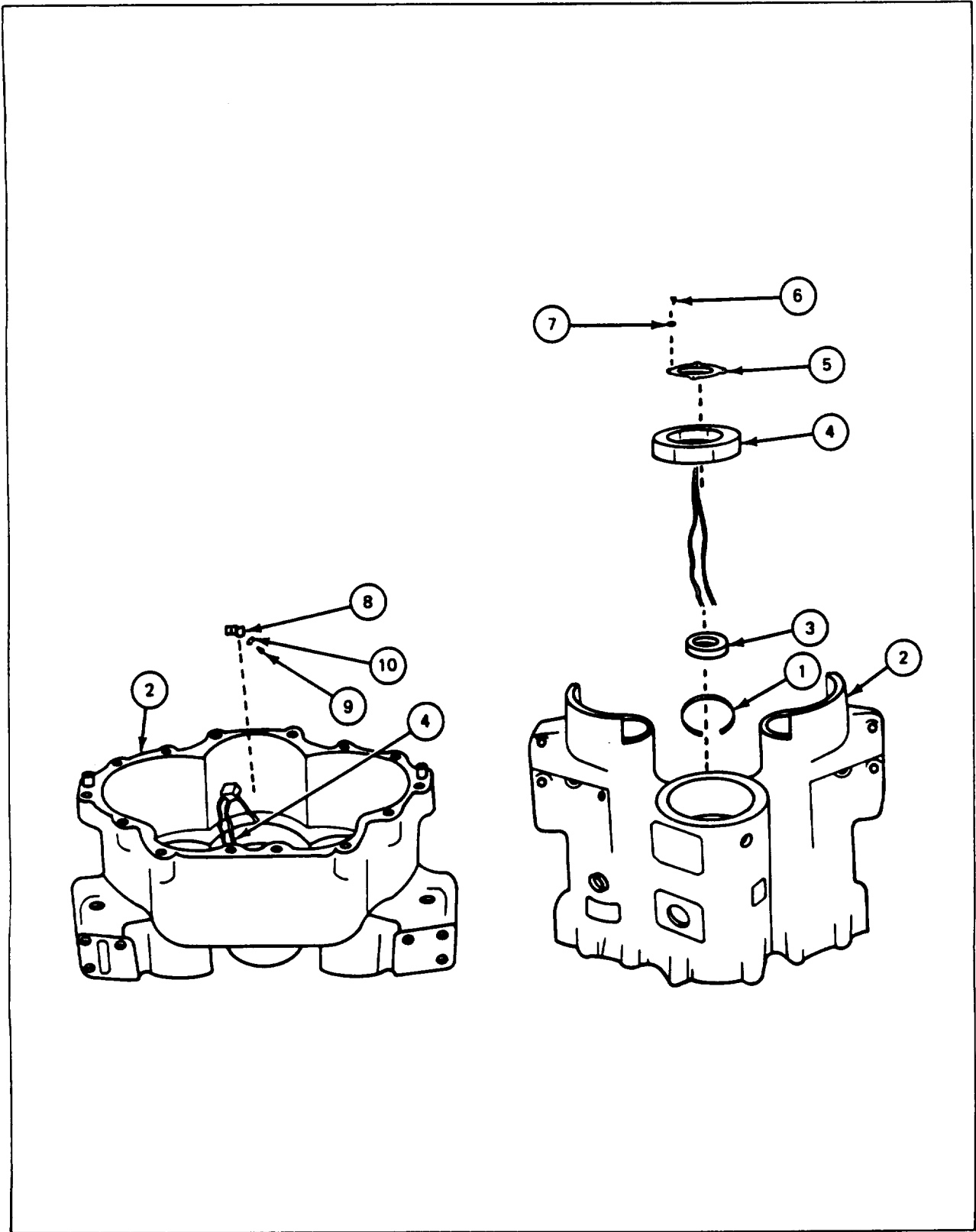
REFERENCES: JPG for procedures to:
Use soldering iron
Use retaining ring pliers

PRELIMINARY PROCEDURES: Assemble lower housing (para 18-101)
Inspect magnetic brake (para 18-95)

**18-98. MAGNETIC BRAKE OR LOWER HOUSING INSTALLATION PROCEDURES
(CONT)**

FRAME 1

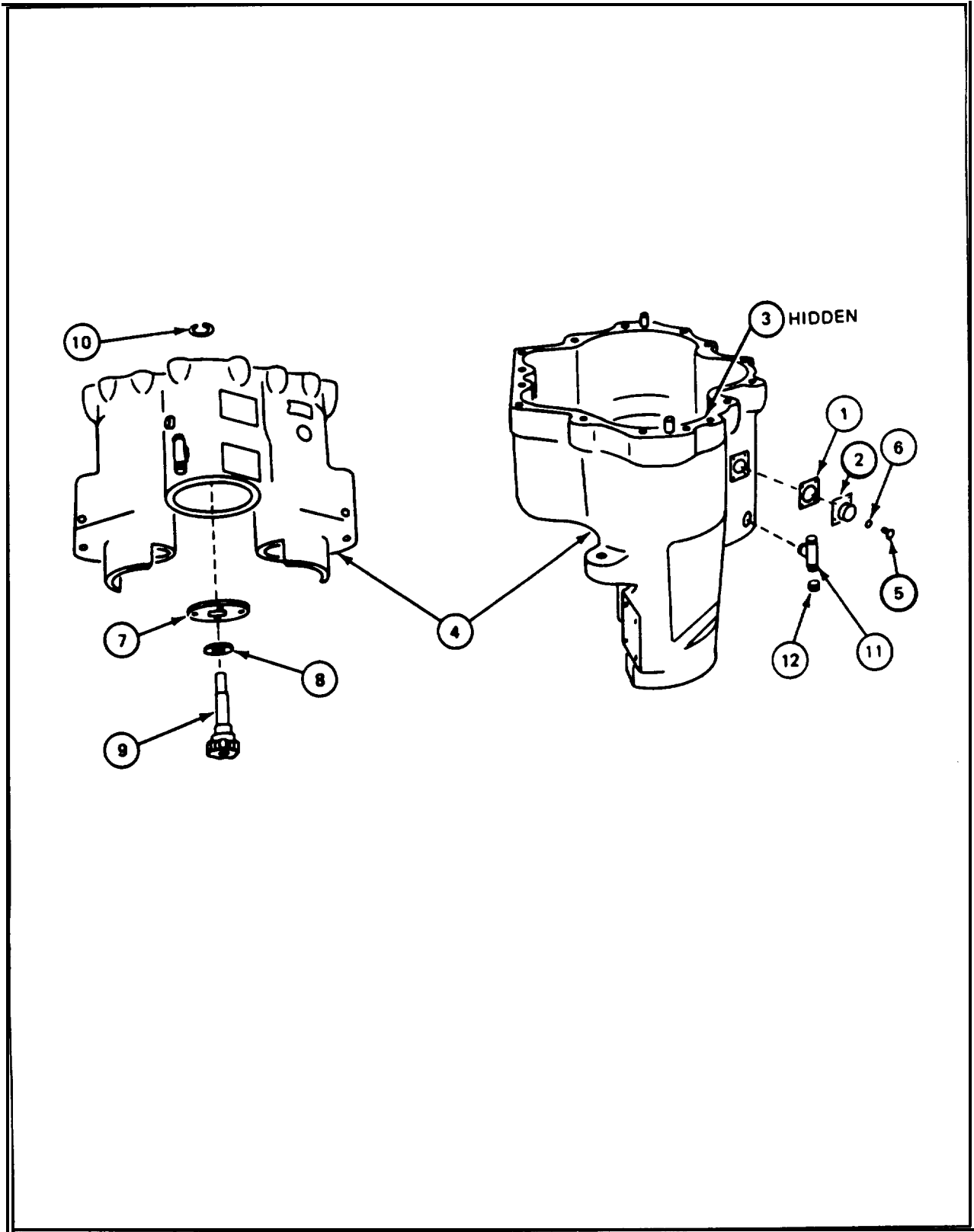
Step	Procedure
1.	Using internal retaining ring pliers, put retaining ring (1) in lower housing (2) (JPG).
2.	Using hammer and drift pin, lightly tap bearing (3) and magnetic brake (4) in lower housing (2).
3.	Using torque wrench and 1/4" screwdriver handle, attach magnetic brake retaining plate (5) to lower housing (2) with four screws (6) and four lockwashers (7). Torque screws to between 22 and 24 inch-pounds.
4.	Using Allen wrench, attach magnetic brake (4) electrical leads to lower housing (2) with clamp (8), screw (9), and lockwasher (10). GO TO FRAME 2



**18-98. MAGNETIC BRAKE OR LOWER HOUSING INSTALLATION PROCEDURE
(CONT)**

FRAME 2

Step	Procedure
1.	Using hands. put gasket (1) on connector (2).
2.	Using soldering iron, solder two tagged wires of magnetic brake (3) to proper terminals on connector (2) (JPG).
3.	Using hands, remove masking tape tags from two electrical wires of magnetic brake (3).
4.	Using hands, put insulation over soldered terminals of connector (2).
5.	Using flat tip screwdriver, attach connector (2) and gasket (1) to lower housing (4) with four screws (5) and four lockwashers (6).
<p>NOTE</p> <p>Washers are required (5 maximum) to obtain air gap between magnetic brake (3) and armature (7),</p>	
6.	Using hands, put armature (7), washers (8), and pin lock shaft (9) in lower housing (4).
7.	Using feeler gauge, check air gap to obtain between 0.020" and 0.040" between magnetic brake (3) and armature (7).
8.	Repeat steps 6 and 7 until proper air gap is obtained.
9.	Using external retaining ring pliers, from inside lower housing (4) attach pinlock shaft (9) to lower housing (4) with retaining ring (10) (JPG).
10.	Using 7/8" wrench, put tee (11) in lower housing (4).
11.	Using 7/4" wrench, put plug (12) on tee (11).
<p>NOTE</p> <p>Follow-on Maintenance Action Required: Test magnetic brake (para 18-96).</p> <p>END OF TASK</p>	



18-99. LOWER HOUSING INSPECTION PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES Disassemble lower housing group (para 18-100)

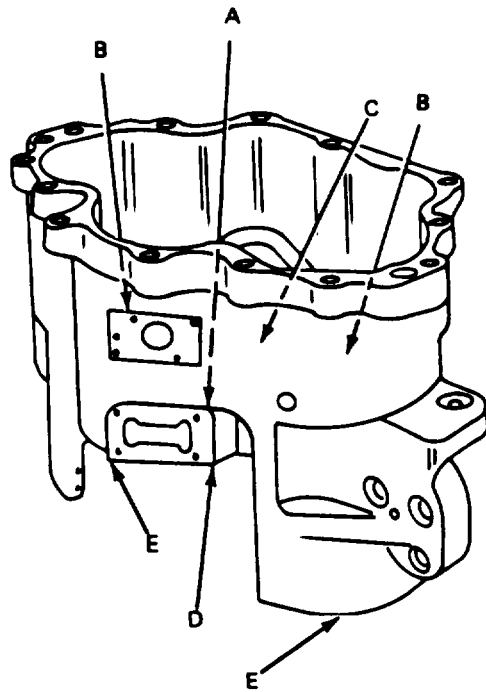
GENERAL INSTRUCTIONS:

NOTE

If part is bad, order repair part or next higher assembly as required.

FRAME 1

Step	Procedure																		
	<p style="text-align: center;">SUPPORT SHOP WORK</p> <p>1. Take lower housing to shop where inspection equipment is available.</p> <p>2. Make dimensional check.</p> <table style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th style="text-align: center;">Reference Letter</th> <th style="text-align: center;">Point of Measurement</th> <th style="text-align: center;">Measurement</th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td>Housing bore for bearing</td> <td style="text-align: center;">2.1659 to 2.1664</td> </tr> <tr> <td style="text-align: center;">B</td> <td>Housing bore for bearing (2 places)</td> <td style="text-align: center;">2.0477 to 2.0482</td> </tr> <tr> <td style="text-align: center;">c</td> <td>Housing bore for bearing</td> <td style="text-align: center;">2.0005 to 2.0010</td> </tr> <tr> <td style="text-align: center;">D</td> <td>ID of bushing (installed in housing)</td> <td style="text-align: center;">0.7499 to 0.7509</td> </tr> <tr> <td style="text-align: center;">E</td> <td>ID of shaft bushing (installed in housing, two placed)</td> <td style="text-align: center;">2.1250 to 2.1275</td> </tr> </tbody> </table> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Tag all parts that are out of tolerance.</p> <p>3. After support shop work, return lower housing to turret shop.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">If bushing measurements are out of tolerance, replace bushings (para 18-102).</p> <p>END OF TASK</p>	Reference Letter	Point of Measurement	Measurement	A	Housing bore for bearing	2.1659 to 2.1664	B	Housing bore for bearing (2 places)	2.0477 to 2.0482	c	Housing bore for bearing	2.0005 to 2.0010	D	ID of bushing (installed in housing)	0.7499 to 0.7509	E	ID of shaft bushing (installed in housing, two placed)	2.1250 to 2.1275
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18-100. LOWER HOUSING DISASSEMBLY PROCEDURE

TOOLS: 7/16" combination wrench
1-1/8" combination wrench
3/6" socket head screw key (Allen wrench)
20 ounce ball peen hammer
1/4" drift pin
Slip joint pliers
Diagonal cutting pliers
Putty knife
Scraper
Stiff bristled brush
Fine stone

SUPPLIES: Dry cleaning solvent (item 33, App. A)
Crocus cloth (item 7, App. A)

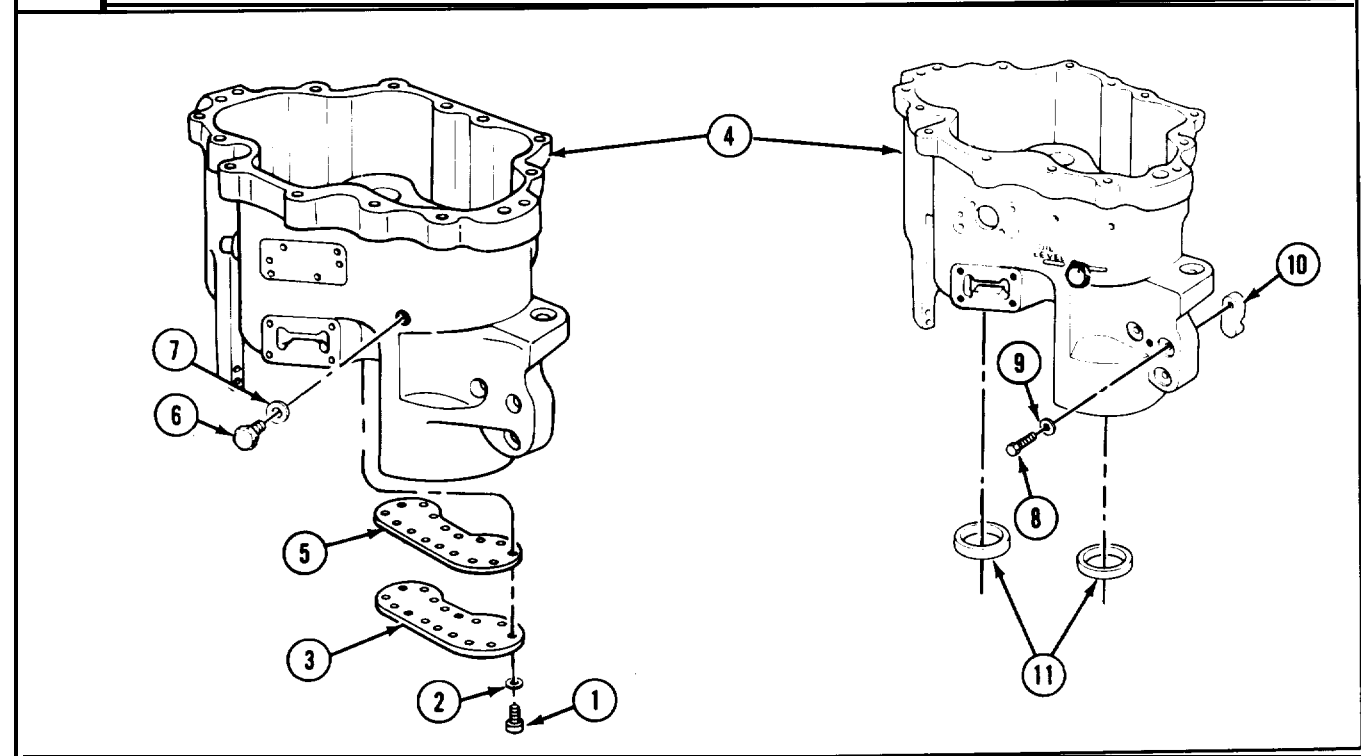
PERSONNEL One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts

PRELIMINARY PROCEDURES: Remove upper housing and gear train (para 18-67)
Remove magnetic brake (para 18-97)

18-100. LOWER HOUSING DISASSEMBLY PROCEDURE (CONT)

FRAME 1	
STEP	PROCEDURE
1.	Using 7/16 inch wrench, remove 16 screws (1) and washers (2) that attach cover (3) to lower housing (4). Remove cover (3).
2.	Using putty knife, remove gasket (5) from lower housing (4).
3.	Using 1-1/8 inch wrench, remove magnetic plug (6) and gasket (7) from lower housing (4).
4.	Using Allen wrench, remove screw (8) and lockwasher (9) that attach shear key (10) to lower housing (4). Remove shear key (10).
5.	Using hammer, drift pin, slip joint, and diagonal cutting pliers, remove two oil seals (11) from lower housing (4).
<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Clean all parts (JPG). Inspect and repair all parts (JPG). Do detail inspection of lower housing (para 18-99).</p>	
<p>END OF TASK</p>	



18-101. LOWER HOUSING ASSEMBLY PROCEDURE

TOOLS: 7/16" combination wrench
1-1/8" combination wrench
3/16" socket head screw key (Allen wrench)
20 oz. ball peen hammer
1/4" thick plate x 2-3/4" diameter (for seal)

SUPPLIES: Oil seal (10887434) (two required)
Gasket (10923855)
Gasket (8744504)

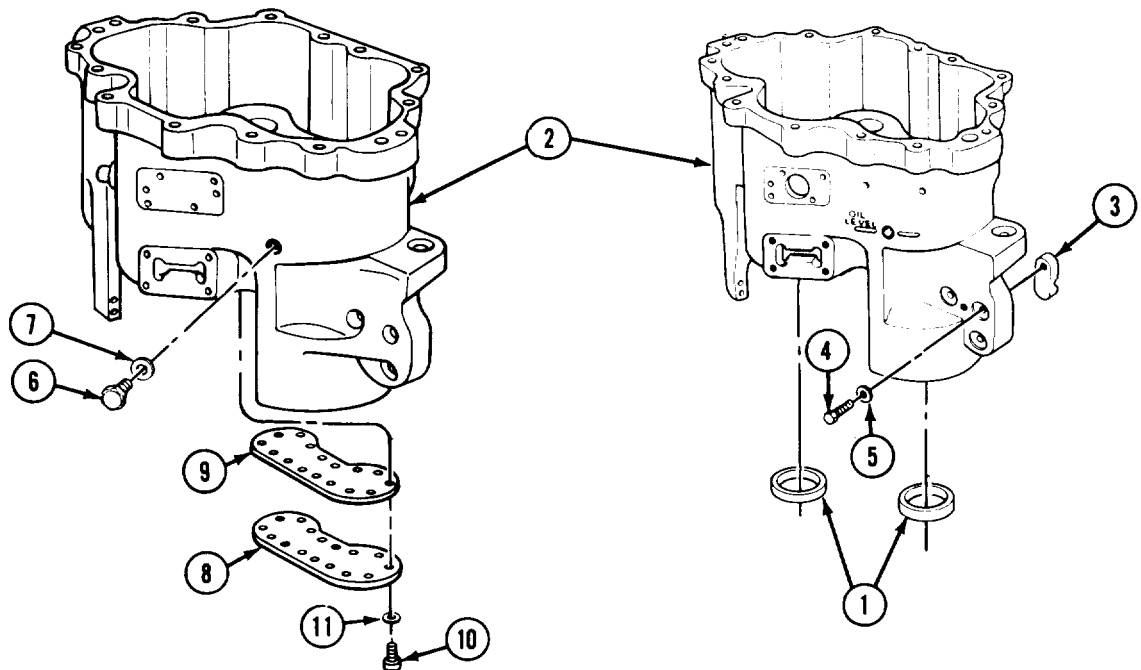
PERSONNEL: One

PRELIMINARY PROCEDURES: Inspect lower housing (para 18-99)

18-101. LOWER HOUSING ASSEMBLY PROCEDURE (CONT)

FRAME 1

STEP	PROCEDURE
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Oil seal (1) must be put in lower housing (2) with lip spring toward center of housing.</p> <ol style="list-style-type: none"> 1. Using hammer and plate, put two new oil seals (1) in lower housing (2). 2. Using Allen wrench, attach shear key (3) to lower housing (2) with screw (4) and lockwasher (5). 3. Using 1-1/8 inch wrench, put magnetic plug (6) and gasket (7) in lower housing (2). 4. Using 7/16 inch wrench, attach cover (8) and gasket (9) to lower housing (2) with 16 screws (10) and washers (11). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Install magnetic brake (para 18-98).</p> <p>END OF TASK</p>



18-102. LOWER HOUSING REPAIR PROCEDURE

SUPPLIES: Two bushings (7973653)
Bushing (12252649)

PERSONNEL: One

PRELIMINARY PROCEDURES: Inspect lower housing (para 18-99)

GENERAL INSTRUCTIONS:

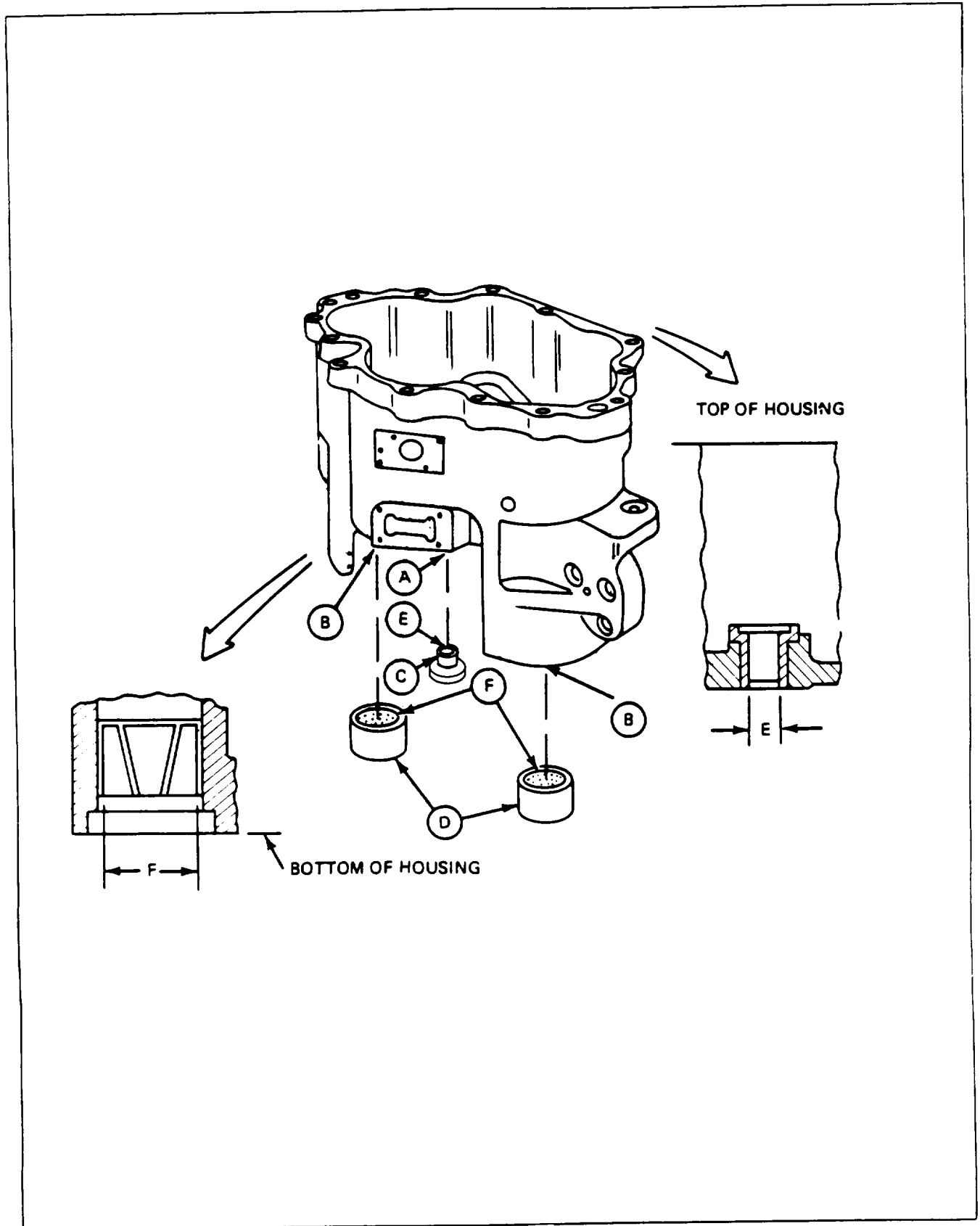
NOTE

Procedure is used to replace bad bushings in lower housing. If lower housing is bad, order repair part or next higher assembly as required.

18-102. LOWER HOUSING REPAIR PROCEDURE (CONT)

FRAME 1

Step	Procedure																								
	SUPPORT SHOP WORK																								
1.	<p>Take lower housing and new bushings, as required, to shop where press and inspection equipment are available.</p> <p>a. Remove bad bushing. b. Make dimensional check.</p> <table border="0" style="width: 100%; margin-top: 20px;"> <thead> <tr> <th style="text-align: left;">Reference Letter</th> <th style="text-align: left;">Point of Measurement</th> <th style="text-align: left;">Measurement</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>Housing bore for bushing</td> <td>1.0000 to 1.0010</td> </tr> <tr> <td>B</td> <td>Housing bore for bushing (two places)</td> <td>2.3120 to 2.3130</td> </tr> <tr> <td>C</td> <td>OD of new bushing</td> <td>1.004 to 1.005</td> </tr> <tr> <td>D</td> <td>OD of new bushing (two bushings)</td> <td>2.3175 to 2.3205</td> </tr> </tbody> </table> <p>c. Install new bushing. d. Finish bushing and make dimensional check.</p> <table border="0" style="width: 100%; margin-top: 20px;"> <thead> <tr> <th style="text-align: left;">Reference Letter</th> <th style="text-align: left;">Point of Measurement</th> <th style="text-align: left;">Measurement</th> </tr> </thead> <tbody> <tr> <td>E</td> <td>ID of bushing</td> <td>0.751 to 0.755</td> </tr> <tr> <td>F</td> <td>ID of shaft bushing (finished at assembly two places)</td> <td>2.1250 to 2.1260</td> </tr> </tbody> </table>	Reference Letter	Point of Measurement	Measurement	A	Housing bore for bushing	1.0000 to 1.0010	B	Housing bore for bushing (two places)	2.3120 to 2.3130	C	OD of new bushing	1.004 to 1.005	D	OD of new bushing (two bushings)	2.3175 to 2.3205	Reference Letter	Point of Measurement	Measurement	E	ID of bushing	0.751 to 0.755	F	ID of shaft bushing (finished at assembly two places)	2.1250 to 2.1260
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F	ID of shaft bushing (finished at assembly two places)	2.1250 to 2.1260																							
2.	<p>After support shop work, return lower housing to turret shop.</p> <p>END OF TASK</p>																								



INDEX	PART	PARA
A-FRAME LEFT TRUNNION	5	27-1
A-FRAME RIGHT TRUNNION	5	26-1
ACCUMULATOR, EQUILIBRATOR	5	21-1
ACCUMULATOR, MAIN	4	16-1
ACCUMULATOR, MANUAL ELEVATION	3	13-7
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BOOM LINEAR ACTUATING CYLINDER	5	28-1
BLOWER, TURRET VENTILATING	1	7-1
BREECH RING	2	11-2
CAM ASSEMBLY, TURRET LOCK	5 Part of	20-9, 20-10
CANNON M 135 AND COMBINATION GUN MOUNT M 150	2	11-1
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CUPOLA	2	12-1
CUPOLA AZIMUTH GEAR BOX	2	12-11
CUPOLA BEARINGS	2	12-5
CUPOLA ELECTRICAL SYSTEM	1	8-1
CUPOLA GUARDS	2	9-1
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DRAIN TUBE	3	13-31
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ELECTRICAL FIRING LEAD	2	11-6
ELECTRICAL SLIPRING TURRET	1	3-1
ELECTRICAL SYSTEM, CUPOLA	1	8-1
ELEVATING MECHANISM	4	15-1
ELEVATING SCREW JACK	2	12-17
ELEVATION SHAFT	3 Part of	13-99, 13-100
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EYE ASSEMBLY, ELEVATION MECH (11 591025)	4 Part of	15-6, 15-7
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GUNNER'S CONTROL	3	13-77
GUNNER'S CONTROL BOX	1	6-1
GUNNER'S GUARD	2	11-2
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VENTILATING BLOWER, TURRET	1	7-1
WINCH	5	24-1
WIRE ROPE AND FERRULE	5	23-1
WIRING HARNESS	1	4-1
YOKE ASSEMBLY, HANDLE	3 Part of	13-67, 13-68

By Order of the Secretary of the Army:

E. C. MEYER
General, *United States Army*
Chief of Staff

Official:

J. C. PENNINGTON
Major General, *United States Army*
The Adjutant General

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PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.
3		2	
109		51	
2-8			2-1
12	1-6a		

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.

SAMPLE

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FIGURE NO.

TABLE NO.

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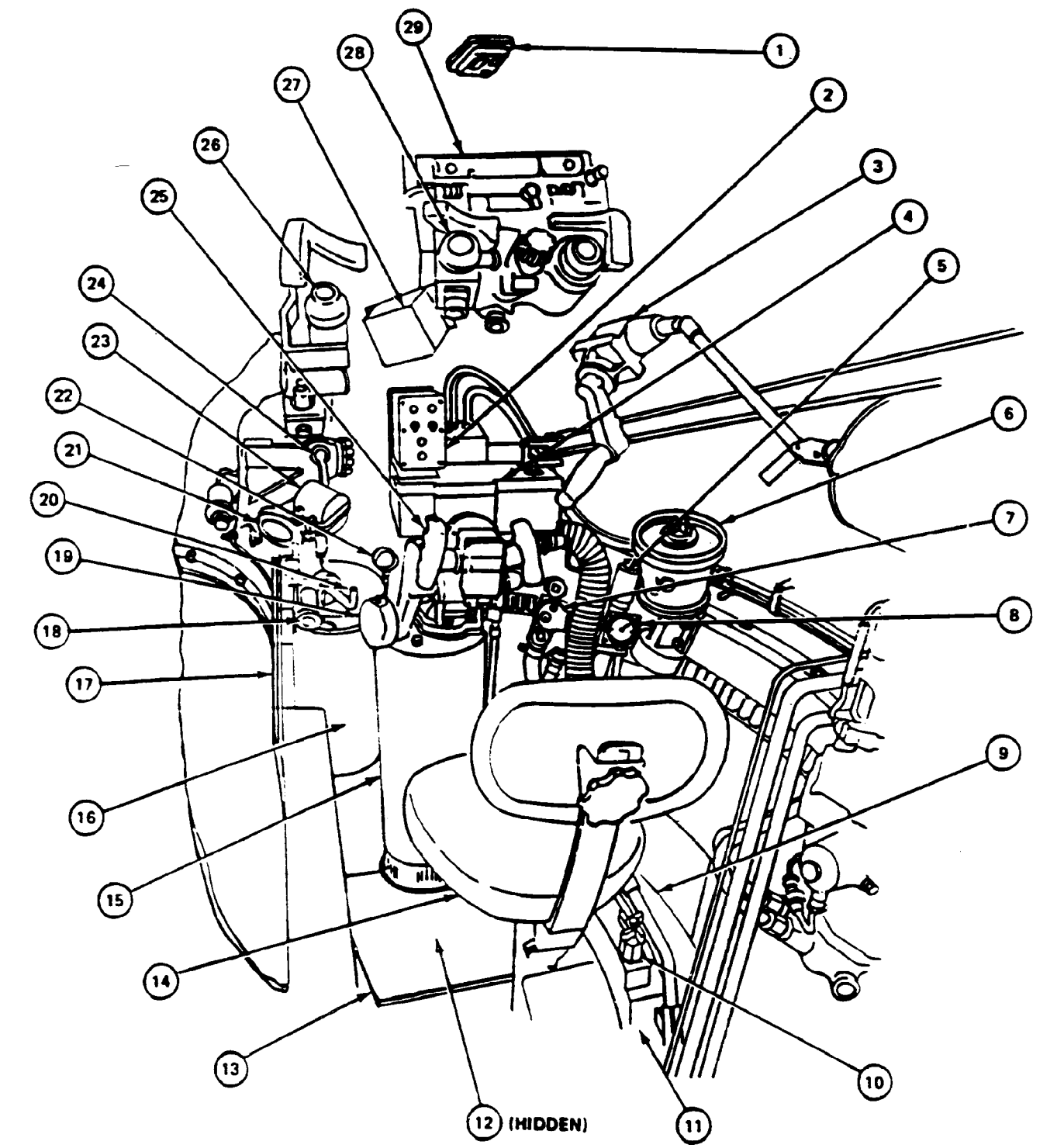
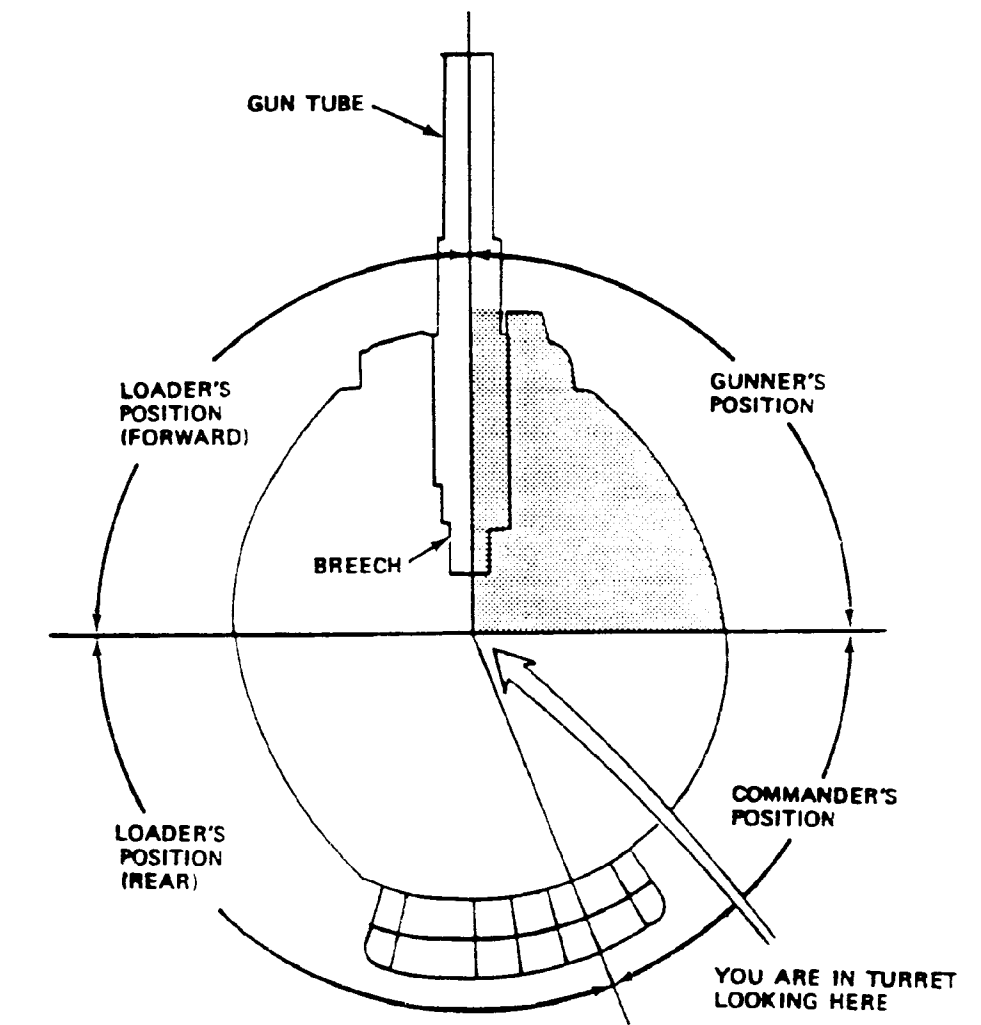
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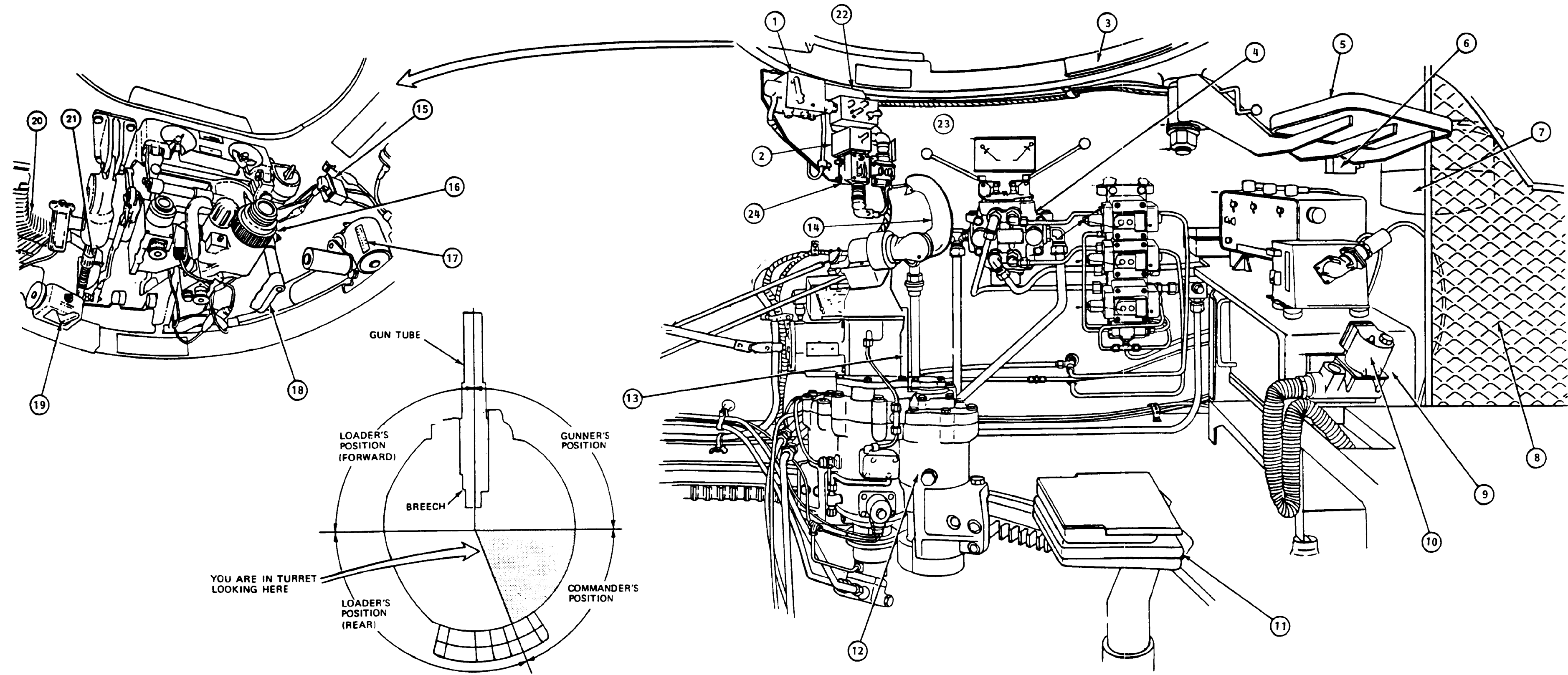
- LEGEND:**
1. GUNNER'S DOMELIGHT
 2. GUNNER'S CONTROL BOX
 3. HAND TRAVERSING DRIVE
 4. GUNNER'S CONTROL
 5. RIGHT HANGER
 6. AZIMUTH INDICATOR
 7. GUNNER'S ELECTRIC AIR FILTER HEATER
 8. EQUILIBRATOR PRESSURE GAUGE
 9. GUNNER'S FOOTGUARD
 10. EQUILIBRATOR CHARGING MANIFOLD
 11. 7.62-MM AMMUNITION BOXES
 12. TURRET POWER AND SEARCHLIGHT RELAY BOX
 13. GUNNER'S FOOTREST PLATE
 14. GUNNER'S SEAT
 15. POWER PACK
 16. MAIN ACCUMULATOR
 17. GUNNER'S GUARD
 18. ELEVATION QUADRANT
 19. MANUAL ELEVATING HANDLE
 20. BLASTING MACHINE
 21. TELESCOPE LIGHT SOURCE CONTROL
 22. PRESSURE GAUGE
 23. FILTER BOX
 24. M114 TELESCOPE MOUNT
 25. GUNNER'S CONTROL HANDLES
 26. ARTICULATED TELESCOPE M105F
 27. TURRET GUN FIRING RELAY BOX
 28. GUNNER'S PERISCOPE M32
 29. GUNNER'S PERISCOPE MOUNT M118



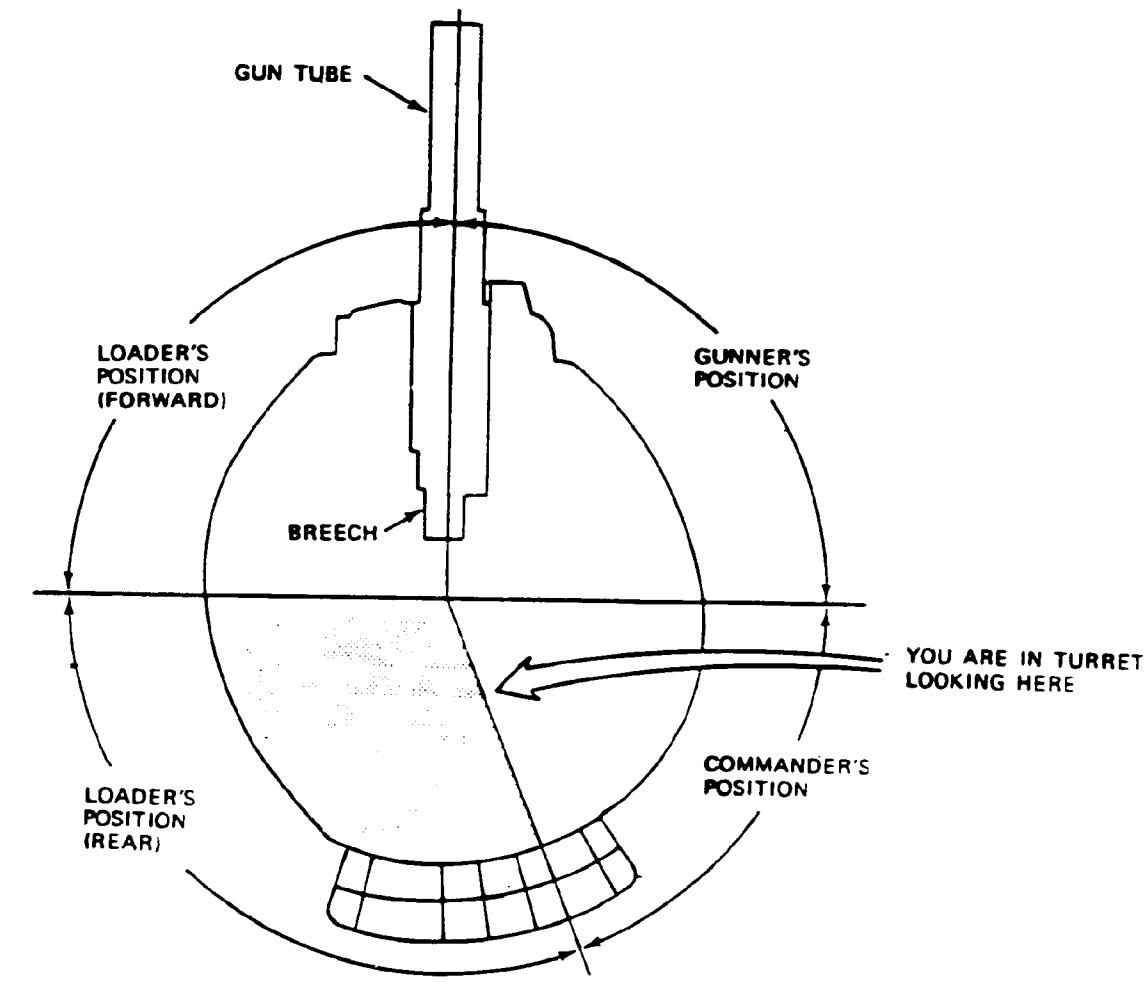
FO-1. EQUIPMENT LOCATION INFORMATION - GUNNER'S POSITION

LEGEND:

1. INTERPHONE AND CONTROL BOX
2. CUPOLA ELECTRICAL POWER CONTROL PANEL
3. BACKREST PAD
4. WINCH BOOM CONTROL VALVES
5. COMMANDER'S SWING SEAT
6. INTERCONNECTING BOX
7. TURRET VENTILATING BLOWER
8. ODDMENT TRAY RIGHT SCREEN
9. TURRET RADIO SUPPORTS
10. COMMANDER'S ELECTRIC AIR FILTER HEATER
11. COMMANDER'S SEAT
12. TURRET TRAVERSING MECHANISM
13. ANTI BACKLASH MECHANISM
14. COMMANDER'S CONTROL HANDLE
15. CUPOLA GUN SAFETY SWITCH AND GUARD
16. COMMANDER'S PERISCOPE
17. CUPOLA AZIMUTH GEAR BOX
18. SHIELD OPERATING HANDLE
19. CUPOLA AZIMUTH LOCK
20. FLEXIBLE CHUTE ASSEMBLY
21. ELEVATION SCREW JACK
22. SEARCH LIGHT CONTROL BOX
23. SMOKE GRENADE PUSHBUTTON UNIT
24. SMOKE GRENADE POWER BOX

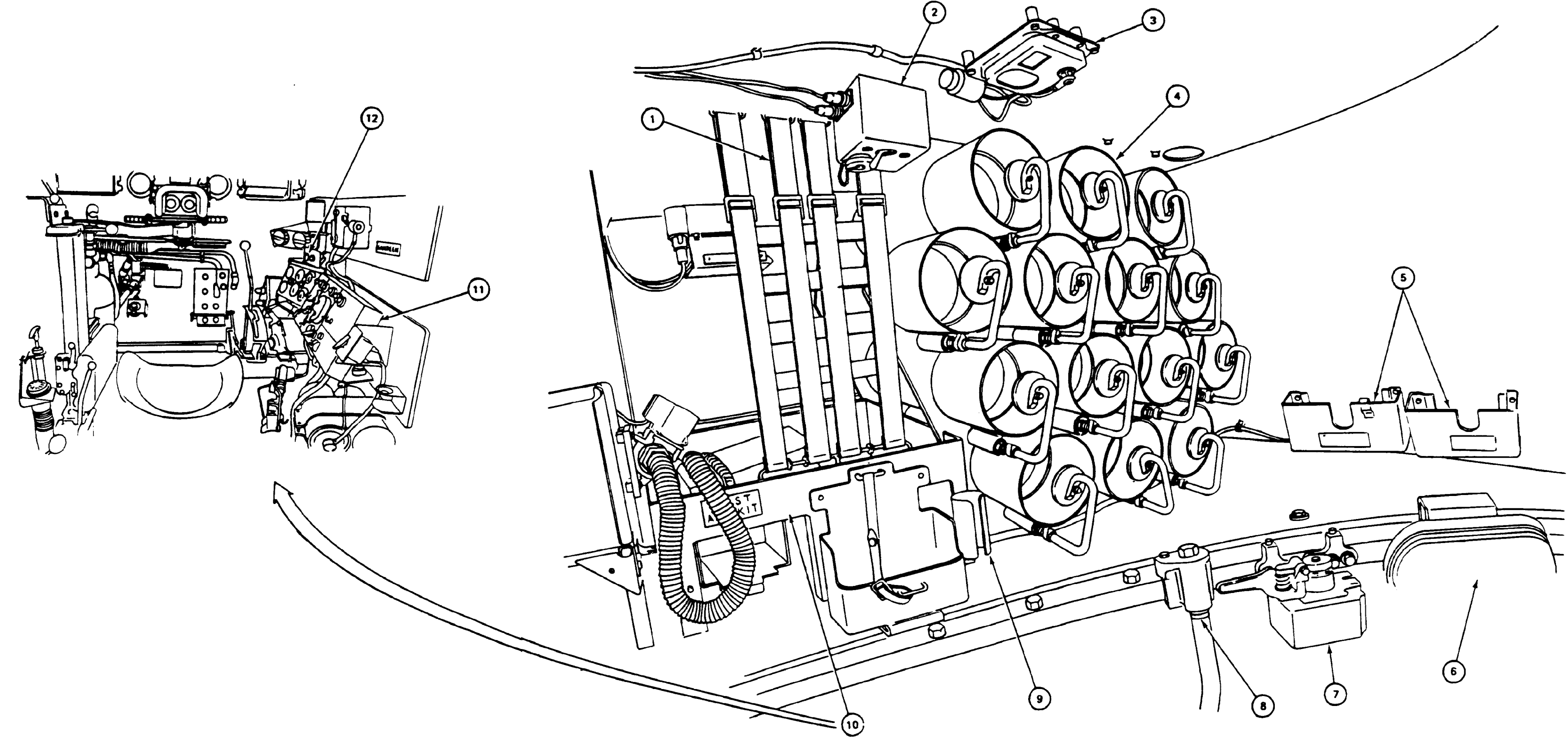


FO-2. EQUIPMENT LOCATION INFORMATION - COMMANDER'S POSITION



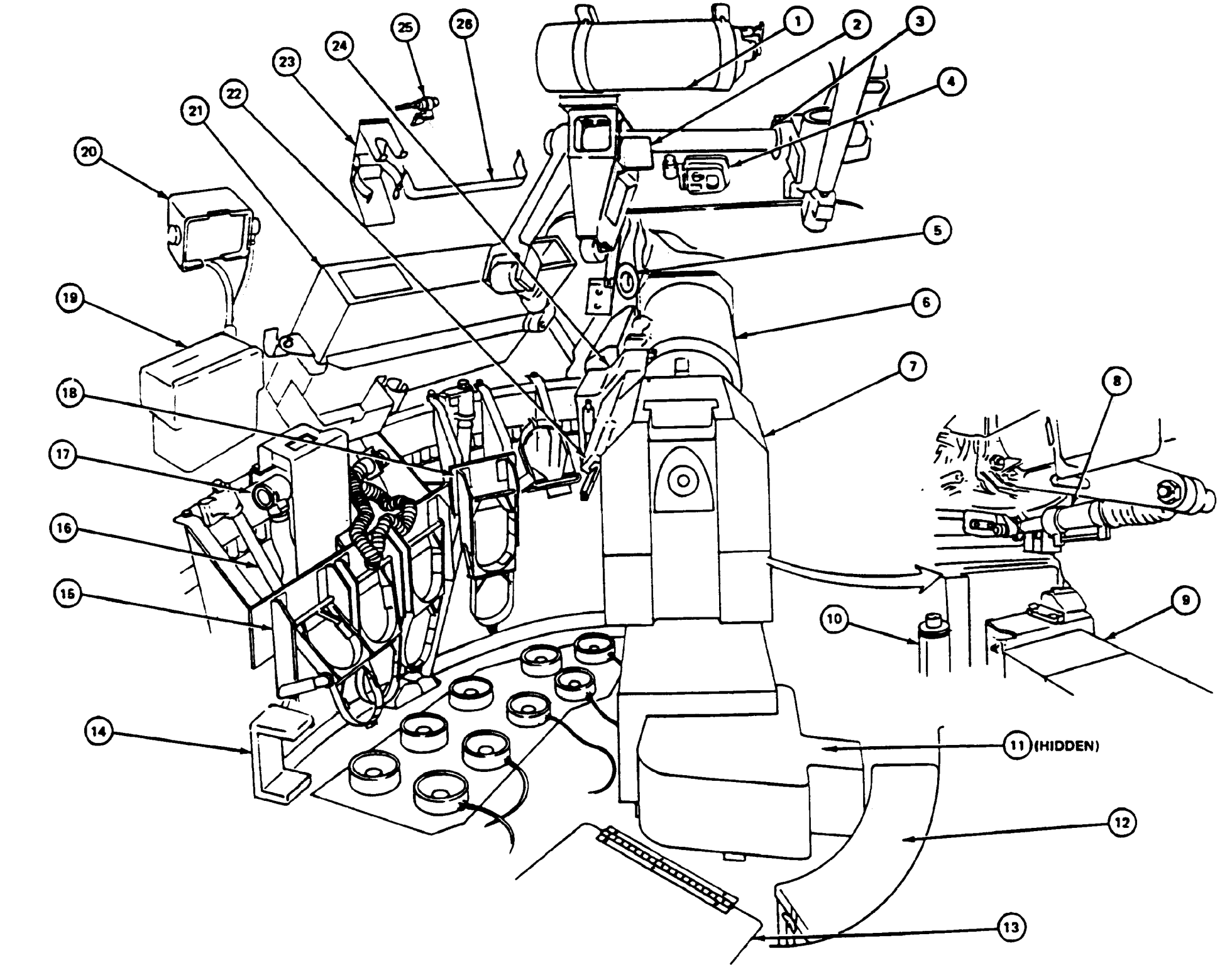
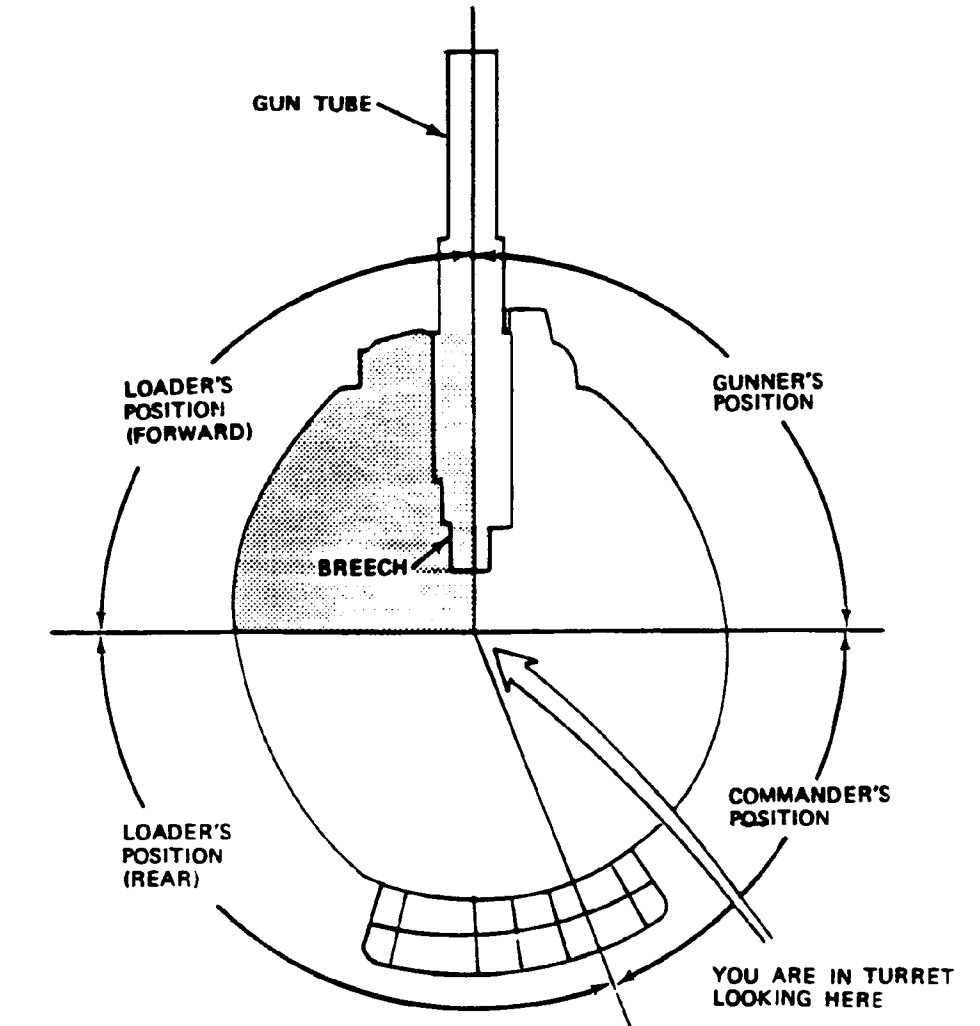
LEGEND:

- 1. RADIO GUARD SCREEN
- 2. TURRET VENTILATING CONTROL BOX
- 3. COMMANDER'S DOME LIGHT
- 4. FOURTEEN ROUND AMMUNITION STOWAGE RACK
- 5. HAND GRENADE STOWAGE BRACKETS
- 6. LOADER'S SEAT
- 7. TURRET TRAVERSE LOCK
- 8. CENTER HANGER
- 9. FLASHLIGHT TUBE
- 10. ODDMENT TRAY
- 11. DRIVER'S MASTER CONTROL PANEL
- 12. HYDRAULIC PUMP PANEL



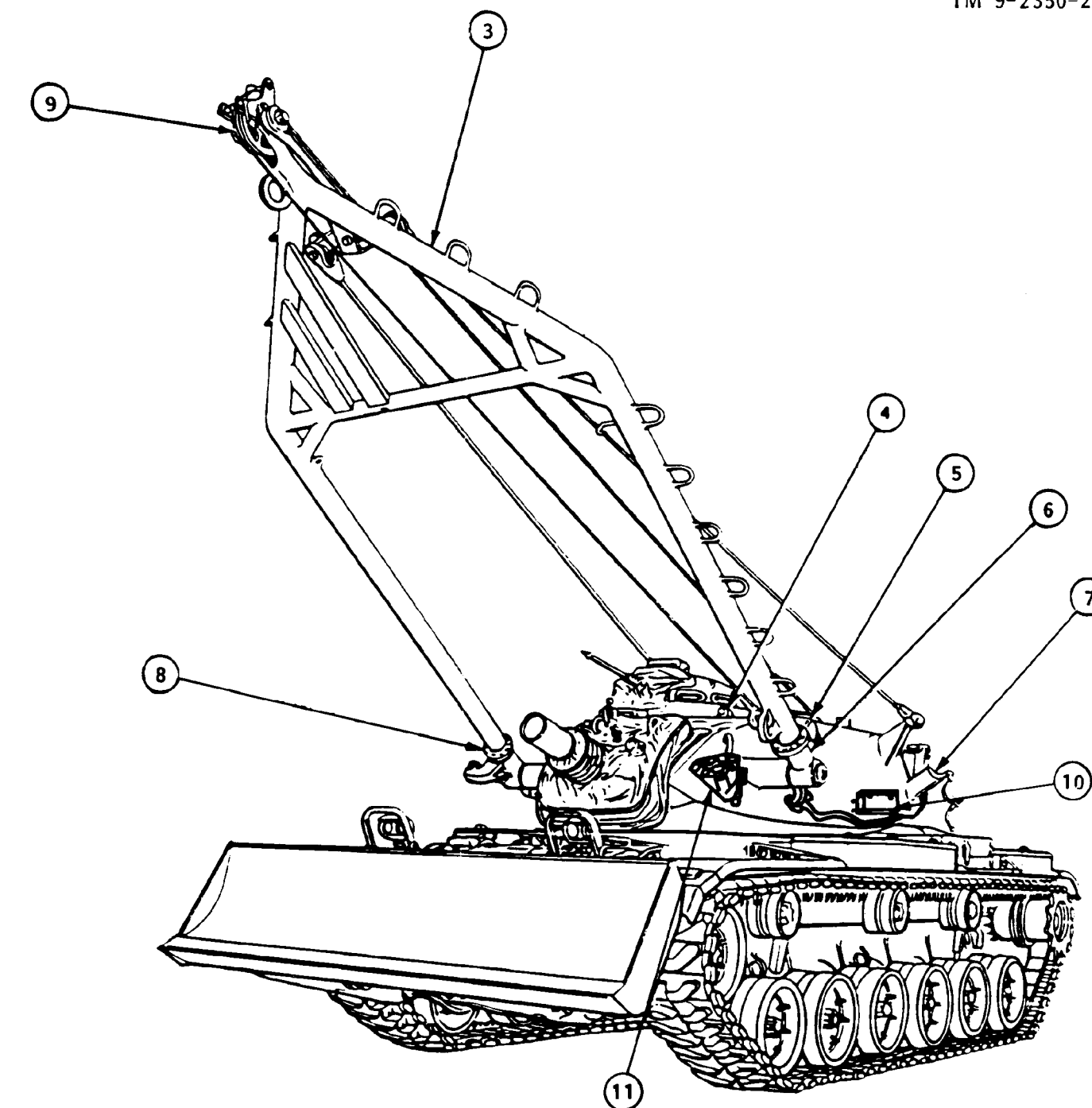
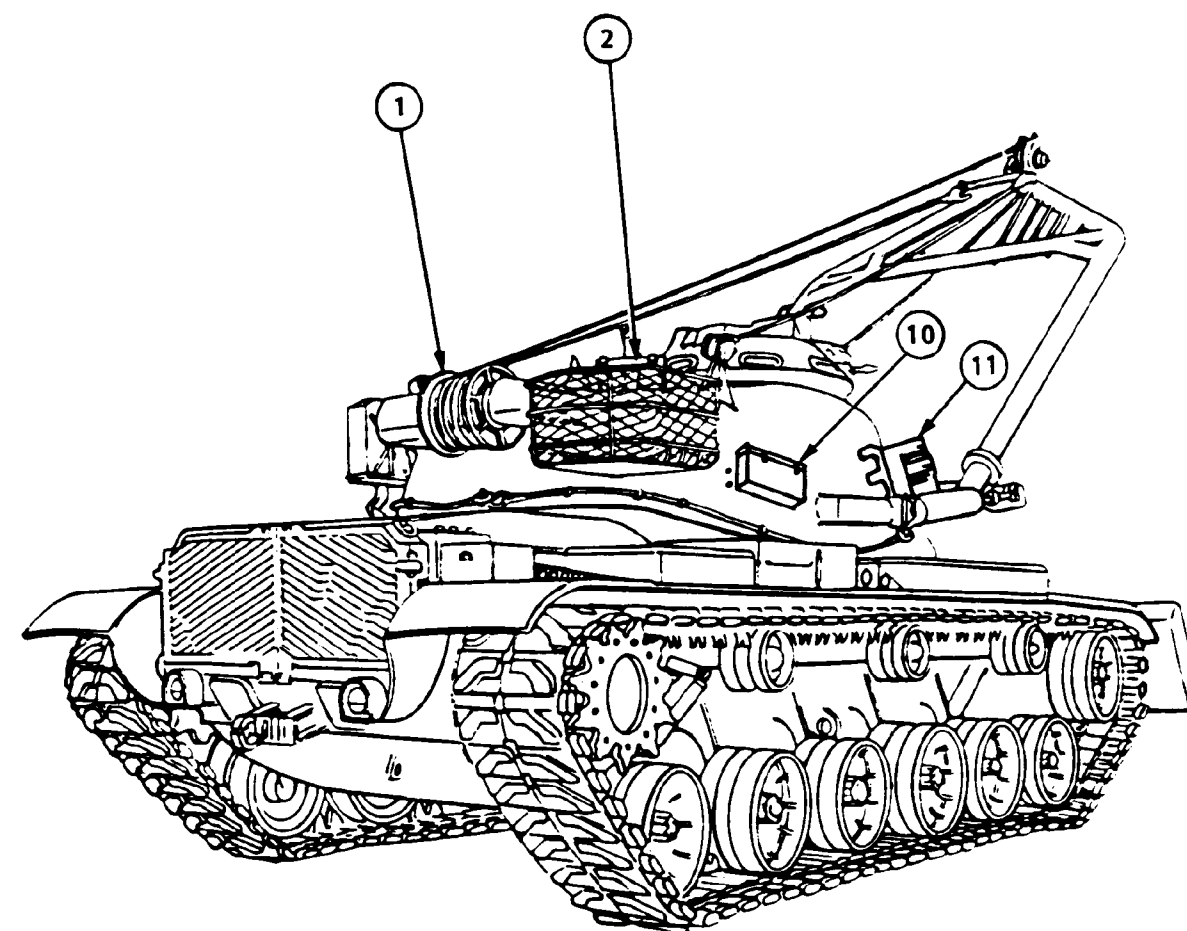
FO-3. EQUIPMENT LOCATION INFORMATION - LOADER'S POSITION REAR

- LEGEND:**
1. REPLENISHER
 2. GUN ELEVATION INTERFERENCE SWITCH
 3. BALLISTIC DRIVE
 4. LOADER'S DOME LIGHT
 5. MACHINE GUN MOUNT
 6. 105-MM GUN
 7. BREECH
 8. ELEVATING MECHANISM
 9. PERISCOPE STORAGE BOX
 10. EQUILIBRATOR ACCUMULATOR
 11. ELECTRICAL SLIPRING
 12. CALIBER .50 AMMUNITION BOXES
 13. BATTERY ACCESS DOOR
 14. FIRE EXTINGUISHER MOUNTING BRACKET
 15. 105-MM SIX ROUND AMMUNITION RACK
 16. LEFT HANGER
 17. LOADER'S ELECTRIC AIR FILTER HEATER
 18. 105-MM THREE ROUND AMMUNITION RACK
 19. LOADER'S PERISCOPE BOX
 20. LOADER'S INTERPHONE CONTROL BOX
 21. 7.62 READY ROUND AMMO BOX AND COVER
 22. LOADER'S GUARD
 23. OILCAN MOUNTING BRACKET
 24. LOADER'S SAFETY SWITCH
 25. RADIATION DETECTOR
 26. CANTEEN MOUNTING BRACKET



FO-4. EQUIPMENT LOCATION INFORMATION - LOADER'S POSITION FORWARD

- LEGEND:**
- 1. WINCH
 - 2. SEARCHLIGHT STOWAGE BOX
 - 3. A-FRAME
 - 4. SEARCHLIGHT CONNECTOR
 - 5. LOADER'S ESCAPE HATCH
 - 6. A-FRAME LEFT TRUNNION
 - 7. BOOM TRAVEL LOCK
 - 8. A-FRAME RIGHT TRUNNION
 - 9. A-FRAME PULLEY
 - 10. SMOKE GRENADE STOWAGE BOX
 - 11. SMOKE GRENADE DISCHARGER



FO-5. EQUIPMENT LOCATION INFORMATION - OUTSIDE TANK

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

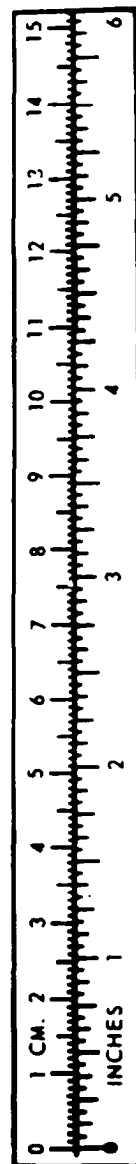
TEMPERATURE

$5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}$
 212^o Fahrenheit is equivalent to 100^o Celsius
 90^o Fahrenheit is equivalent to 32.2^o Celsius
 32^o Fahrenheit is equivalent to 0^o Celsius
 $9/5 \text{ C}^{\circ} + 32 = \text{F}^{\circ}$

APPROXIMATE CONVERSION FACTORS

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



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