

TECHNICAL MANUAL

DIRECT SUPPORT
AND GENERAL SUPPORT
MAINTENANCE MANUAL

PART 2
MAINTENANCE

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

CHAPTERS 9 THRU 12	
MAINTENANCE INSTRUCTIONS	9-1
FOLDOUTS	
EQUIPMENT LOCATION DIAGRAMS	

This copy is a reprint which includes current pages from Changes 1 through 4.

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. 4

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

**DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL
PART 2
MAINTENANCE:
TURRET
FOR
COMBAT ENGINEER VEHICLE.
M728
(2350-00-795-1797)**

TM 9-2350-222-34-2-2, 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

11-25 and 11-26
11-167 and 11-168

Insert Pages

11-25 and 11-26
11-167 and 11-168

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

DISTRIBUTION: To be distributed in accordance with DA Form 12-37E, (Block 1043),
Direct and General Support Maintenance Requirements for TM 9-2350-222-34-2-2.

CHANGE

NO. 3

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

DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL
PART 2
MAINTENANCE
TURRET
FOR
COMBAT ENGINEER VEHICLE,
M728
(2350-00-795-1797)

TM 9-2350-222-34-2-2, 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	Insert Pages
A and B	None
i and ii	i and ii
11-1 thru 11-4	11-1 thru 11-4
11-25/(11-26 blank)	11-25 and 11-26
None	11-26.1 thru 11-26.3 /(11-26.4 blank)
11-39 and 11-40	11-39 and 11-40
11-47 thru 11-72	11-47 thru 11-72
11-79 and 11-80	11-79 and 11-80
11-95 and 11-96	11-95 and 11-96
11-125 thru 11-131/(11-132 blank)	11-125 thru 11-131/(11-132 blank)
11-133 thru 11-136	11-133 and 11-136
11-147 and 11-148	11-147/(11-148 blank)
11-149 thru 11-151/(11-152 blank)	None
11-191 and 11-192	11-191 and 11-192
11-199 and 11-200	11-199 and 11-200
Index 1 and Index 2	Index 1 and Index 2

File this change sheet in back 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:

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

DISTRIBUTION:

To be distributed in accordance with DA Form 12-37, Direct Support and General Support Maintenance requirements for Vehicle, Combat, Engineer, Full-Track, M728.

CHANGE
NO. 2

HEADQUARTERS
DEPARTMENT OF THE ARMY
WASHINGTON, D C 10 June 1986

DIRECT SUPPORT
AND GENERAL SUPPORT
MAINTENANCE MANUAL
PART 2
MAINTENANCE

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

TM 9-2350-222-34-2-2, 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

11-1 and 11-2
None

Insert Pages

11-1 and 11-2
11-160.1 thru 11-160.5/(11-160.6 blank)

File this change and all other change sheets in back of the publication for reference purposes.

By Order of the Secretary of the Army:

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

Official:

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

DISTRIBUTION:

To be distributed in accordance with DA Form 12-37, Direct and General Support Maintenance requirements for Vehicle, Combat Engineer, Full Tracked, M728.

Change }
 No. 1 }

Headquarters
 Department of the Army
 Washington, D. C., 25 November 1983

Direct Support and General Support Maintenance Manual
COMBAT ENGINEER VEHICLE, FULL-TRACKED, M728
NSN 2350-00-795-1797
(TURRET)

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

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

Remove Pages

11-1 and 11-2
 11-65 through 11-70
 11-95 and 11-96
 11-129 through 11-131/(11-132 blank)
 11-179 through 11-186

Insert Pages

11-1 and 11-2
 11-65 through 11-70
 11-95 and 11-96
 11-129 through 11-131/(11-132 blank)
 11-179 through 11-186

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

By Order of the Secretary of the Army:

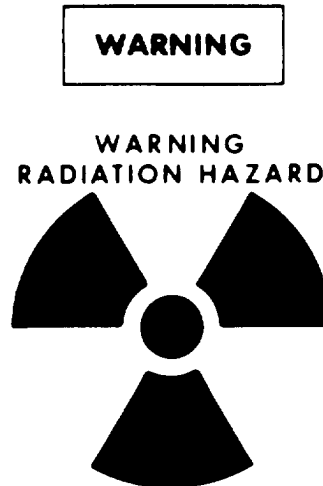
JOHN A. WICKHAM, JR.
General, United States Army
Chief of Staff

official:

ROBERT M. JOYCE
Major General, United States Army
The Adjutant General

Distribution:

To be distributed in accordance with DA Form 12-37, Direct and General Support Maintenance requirements for
Combat Engineer, Full Track, M728



Azimuth dial pointers in indicator may be tipped with radioactive material. This becomes dangerous when dial window is broken or removed. When this happens, make repairs as soon as possible.

If dial window is broken or removed, all maintenance must be done at depot level only, except replacement of lamps or replacement of whole indicator unit.

Protecting, handling, storing, and getting rid of radioactive material must be done in accordance with TB MED-232 and TB-750-237.

WARNING

When placing the turret (elev/trav) power switch in the ON position, ensure that the gunner's power control handles are not displaced. If handles are displaced, rapid movements of the turret traverse in azimuth may result in fatal injury.

WARNING

When turret is in the power mode the gun will elevate and depress without depressing the magnetic brake switch on the gunner's control handles.

WARNING

Assure crew are in safe positions and driver has lowered his seat and has head down before operating in power or manual traversing or elevating modes.

WARNING

Do not release magnetic brake switch or override in magnetic brake actuator while traversing until gunner's or commander's power control is returned to neutral position. This will reduce unnecessary wear and/or damage to magnetic brake.

WARNING

Be careful when working around pressurized parts. Hydraulic fluid under pressure can hurt you.

WARNING

Before charging main accumulator, hydraulic system pressure must be lowered to 0 psi. Hydraulic fluid under pressure can hurt you.

WARNING

Before draining hydraulic system, pressure must be lowered to 0 psi. Hydraulic fluid under pressure can hurt you.

WARNING

Before removing hydraulic tubes, hydraulic system pressure must be lowered to 0 psi. Hydraulic fluid under pressure can hurt you.

WARNING

Before traversing turret, make sure gun will not hit anything if turret is traversed. If necessary, move vehicle.

WARNING

Nitrogen under pressure can hurt you. Keep fingers and hands clear of valve while letting out nitrogen. Let nitrogen out slowly.

LIST OF EFFECTIVE PAGES

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES.

NOTE. The portions of the text affected by the changes are indicated in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Dates of issue for original and changed pages are:

Original . . . 0 . . . 10 October 1980

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 405 CONSISTING OF THE FOLLOWING

Page No.	*Change No.	Page No.	*Change No.
Cover	0	11-12 Blank	0
a - c	0	11-13 - 11-25	0
A - B	0	11-26 Blank	0
i - ii	0	11-27 - 11-63.	0
9-1	0	11-64 Blank	0
9-2 Blank	0	11-65 - 11-73.	0
9-3 - 9-5	0	11-74 Blank	0
9-6 Blank	0	11-75 - 11-85.	0
9-7 - 9-13	0	11-86 Blank	0
9-14 Blank	0	11-87 - 11-93.	0
9-15 - 9-17	0	11-94 Blank	0
9-18 Blank	0	11-95 - 11-101	0
9-19 - 9-23	0	11-102 Blank	0
9-24 Blank	0	11-103 - 11-117.	0
9-25 - 9-27	0	11-118 Blank	0
9-28 Blank	0	11-119 - 11-123.	0
9-29 - 9-33	0	11-124 Blank	0
9-34 Blank	0	11-125 - 11-127.	0
9-35 - 9-37	0	11-128 Blank	0
9-38 Blank	0	11-129 - 11-137.	0
10-1	0	11-138 Blank	0
10-2 Blank	0	11-139 - 11-141.	0
10-3 - 10-5	0	11-142 Blank	0
10-6 Blank	0	11-143 - 11-151.	0
10-7 - 10-13	0	11-152 Blank	0
10-14 Blank	0	11-153 - 11-159.	0
10-15 - 10-17	0	11-160 Blank	0
10-18 Blank	0	11-161 - 11-169.	0
10-19 - 10-21	0	11-170 Blank	0
10-22 Blank	0	11-171 - 11-173.	0
11-1 - 11-11.	0		

*Zero in this column indicates an original page.

LIST OF EFFECTIVE PAGES

INSERT LATEST CHANGED PAGES. DESTROY SUPERSEDED PAGES.

NOTE: The portions of the text affected by the changes are indicated in the outer margins of the page. Changes to illustrations are indicated by miniature pointing hands. Changes to wiring diagrams are indicated by shaded areas.

Page No.	*Change No.	Page No.	*Change No.
11-174 Blank	0	12-53 - 12-73	0
11-175 - 11-177	0	12-74 Blank	0
11-178 Blank	0	12-75 - 12-81	0
11-179 - 11-181	0	12-82 Blank	0
11-182 Blank	0	12-83 - 12-91	0
11-183 - 11-215	0	12-92 Blank	0
11-216 Blank	0	12-93 - 12-97	0
12-1 - 12-5	0	12-98 Blank	0
12-6 Blank	0	12-99 - 12-109	0
12-7 - 12-33	0	12-110 Blank	0
12-34 Blank	0	Index 1 - Index 3	0
12-35 - 12-43	0	Index 4 Blank	0
12-44 Blank	0	F0-1 - F0-5	0
12-45 - 12-51	0	Metric Conversion Chart	0
12-52 Blank	0	Cover	0

*Zero in this column indicates an original page.

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

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

Technical Manual

**Direct Support and General Support
Maintenance Manual**

**Part 2
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: AM SMC-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 9-2350-222-34-2-3, TM 9-2350-222-34-2-4, 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 Slipping Assembly, Turret and Miscellaneous Components for the M728 CEV. including all changes.

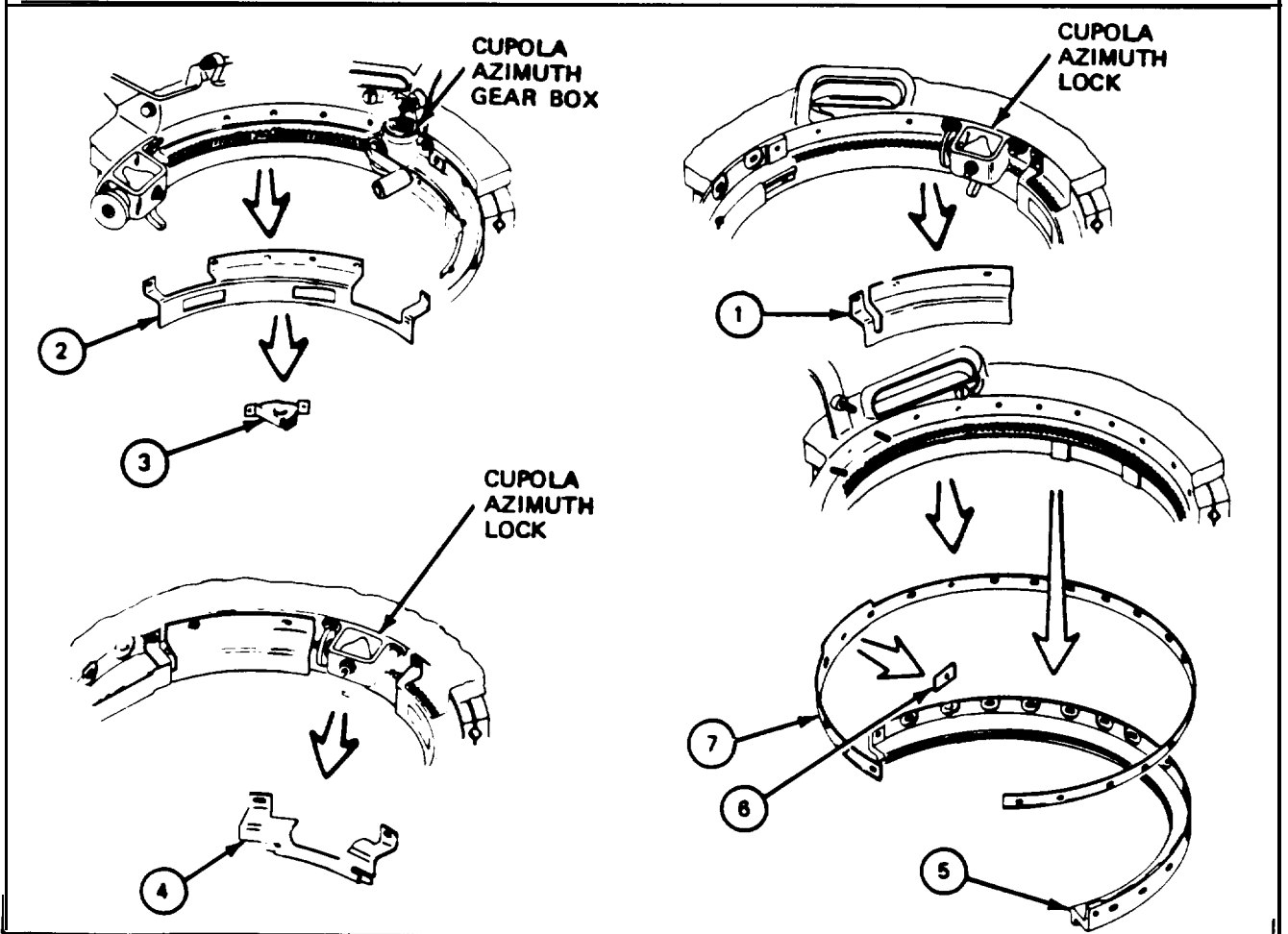
TABLE OF CONTENTS

		Paragraph	Page
CHAPTER 1.	.....	1-1	. . .
Thru	PART 1	Thru	
CHAPTER 8.	.....	8-27	. . .
CHAPTER 9.	CUPOLA GUARDS	9-1	9-1
CHAPTER 10.	HANGERS	10-1	10-1
CHAPTER 11.	CANNON M135 AND COMBINATION GUN MOUNT	11-1	11-1
Section 1.	Scope	11-1	11-1
Section 2.	Cannon M 135 and Combination Gun Mount M150	11-2	11-2
Section 3.	Replenisher	11-26	11-190
CHAPTER 12.	CUPOLA	12-1	12-1
Section 1.	Scope	12-1	12-1
Section 2.	Cupola	12-2	12-1
Section 3.	Cupola Bearing Components	12-5	12-14
Section 4.	Cupola Azimuth Gear Box	12-11	12-45
Section 5.	Elevating Screw Jack	12-17	12-72
CHAPTER 13.	.....	13-1	. . .
Thru	PART 3	Thru	
CHAPTER 14.	.....	14-20	. . .
CHAPTER 15.	.....	15-1	. . . .
Thru	PART 4	Thru	
CHAPTER 18	.....	18-102	. . .
CHAPTER 19.	.....	19-1	. . .
Thru	PART 5	Thru	
CHAPTER 29	.....	29-3	. . .
INDEX	.....	. . .	Index 1
FOLDOUTS	.....	. . .	. . .

CHAPTER 9 CUPOLA GUARDS

9-1. MAINTENANCE PROCEDURES INDEX

Equipment Item	Removal	Tasks Installation	Repair
1. Guard (10884246)	9-2	9-3	
2 Guard (10884251)	9-4	9-5	
3 Support Bracket	9-4	9-5	
4. Guard (10916000)	9-6	9-7	
5. Support	9-8	9-9	9-10
6. Plate	9-8	9-9	
7 Rubber Strip	9-8	9-9	



9-2. GUARD (10884246) REMOVAL PROCEDURE

TOOLS: 3/8" flat tip screwdriver
 1/4" flat tip screwdriver
 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

EQUIPMENT LOCATION INFORMATION

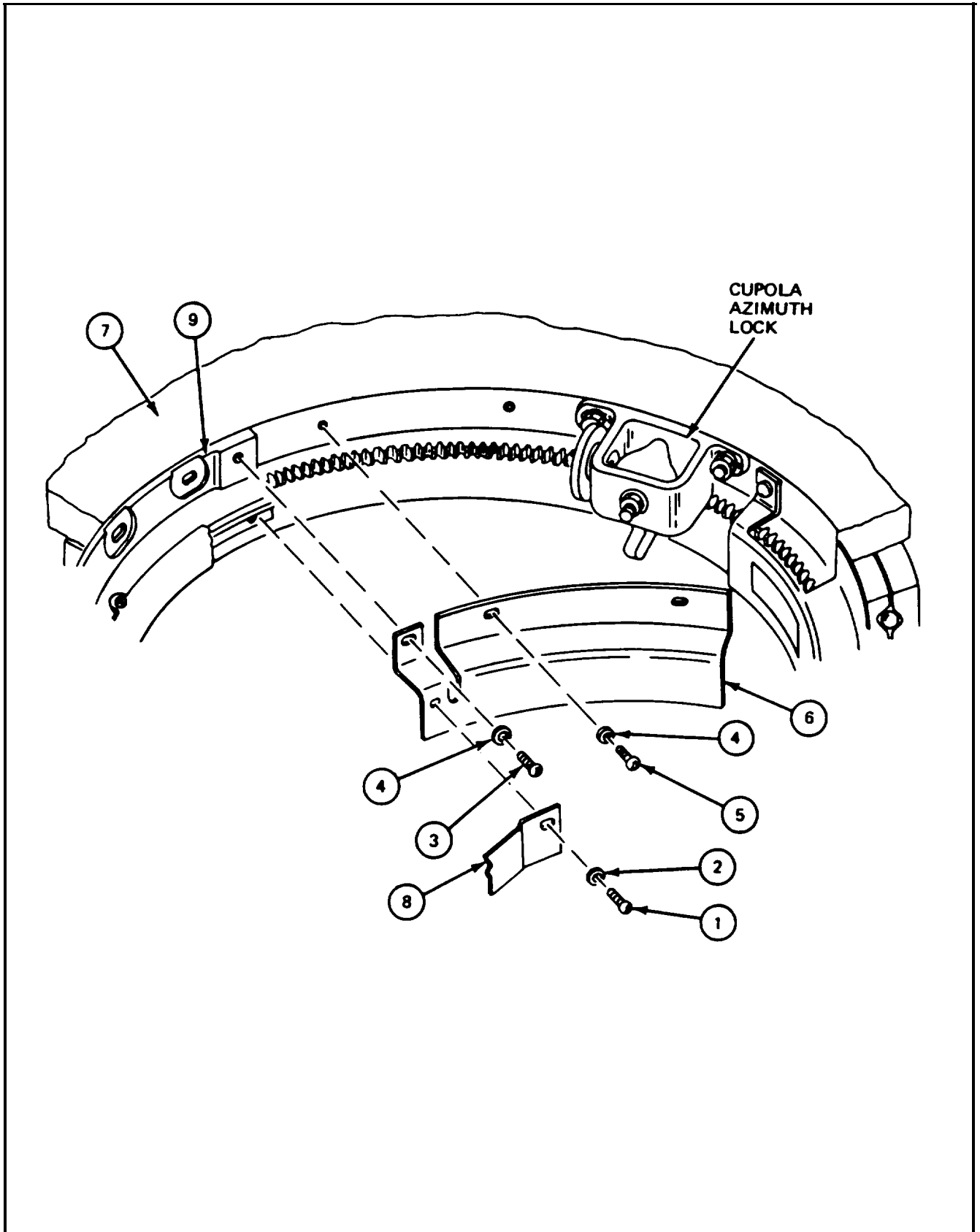
EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Cupola Azimuth Lock	FO-2	19

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

PRELIMINARY PROCEDURES:\ Remove guard (10916000) (para 9-6)

9-2. GUARD (10884246) REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Using 1/4" screwdriver, remove screw (1) and lockwasher (2).
2.	Using 3/8" screwdriver, remove screw (3), lockwasher (4), screw (5) and lockwasher (4) holding guard (6) to cupola (7).
	NOTE
	Lower left part of guard (6) is between backrest pad assembly (8) and support (9).
3.	Slide guard (6) to right, away from backrest pad assembly (8).
4.	Remove guard (6) from cupola (7).
	NOTE
	Follow-on Maintenance Action Required:
	Clean all parts (JPG).
	Inspect and repair all parts (JPG).
	Repair support (para 9-10).
	END OF TASK



9-3. GUARD (10884246) INSTALLATION PROCEDURE

TOOLS: 1/4" flat tip screwdriver
 3/8" flat tip screwdriver

PERSONNEL: One

EQUIPMENT LOCATION INFORMATION:

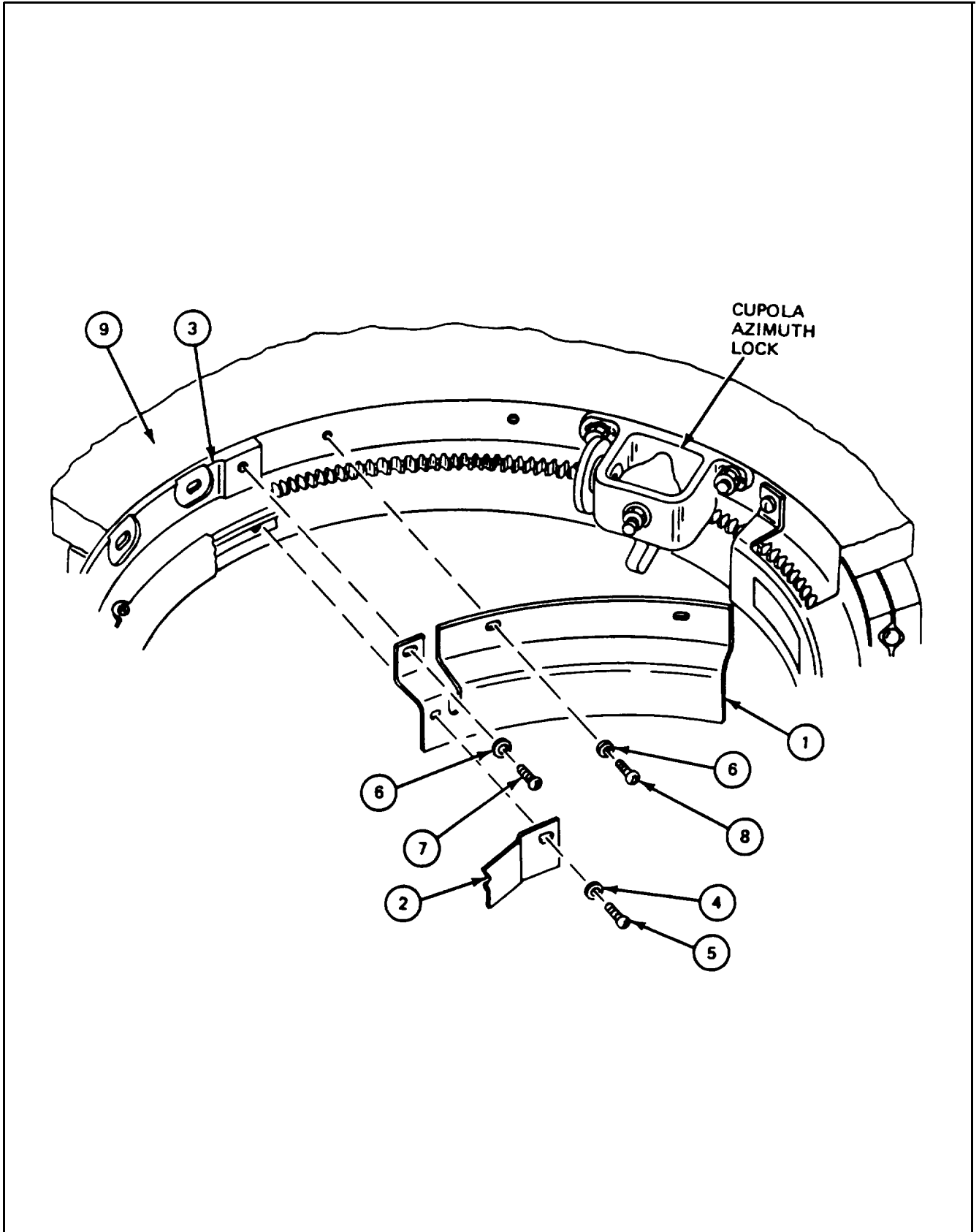
EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Cupola Azimuth Lock	FO-2	19

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

9-3. GUARD (10884246) INSTALLATION PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	<p>Slide left end of guard (1) between backrest pad assembly (2) and support (3). Line up four screw holes of guard (1).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Screw (5) is shortest screw.</p>
2.	<p>Using 1/4" screwdriver, put in lockwasher (4) and screw (5) that attach pad assembly (2) and left end of guard (1) to support (3).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Screw (7) is shorter than screw (8).</p>
3.	<p>Using 3/8" screwdriver, put in two lockwashers (6), screw (7) and screw (8) that attach guard (1) to cupola (9).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required: Install guard (10916000) (para 9-7).</p> <p>END OF TASK</p>



9-4. GUARD (10884251) AND SUPPORT BRACKET REMOVAL PROCEDURE

TOOLS: 1/4" flat tip screwdriver
 3/8" flat tip screwdriver
 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:
 Disconnect electrical connectors
 Clean parts
 Inspect and repair parts

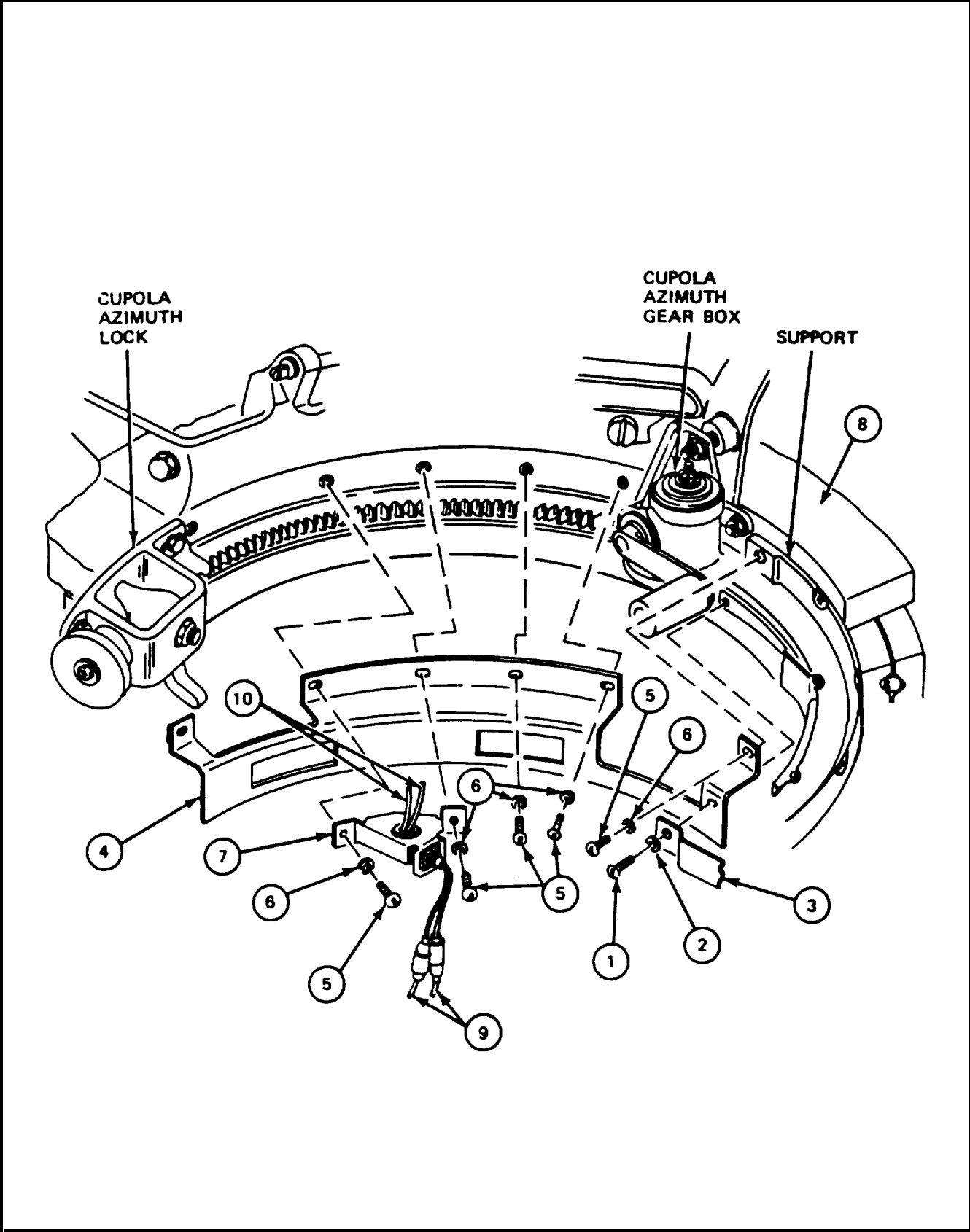
EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Cupola Azimuth Lock	FO-2	19

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

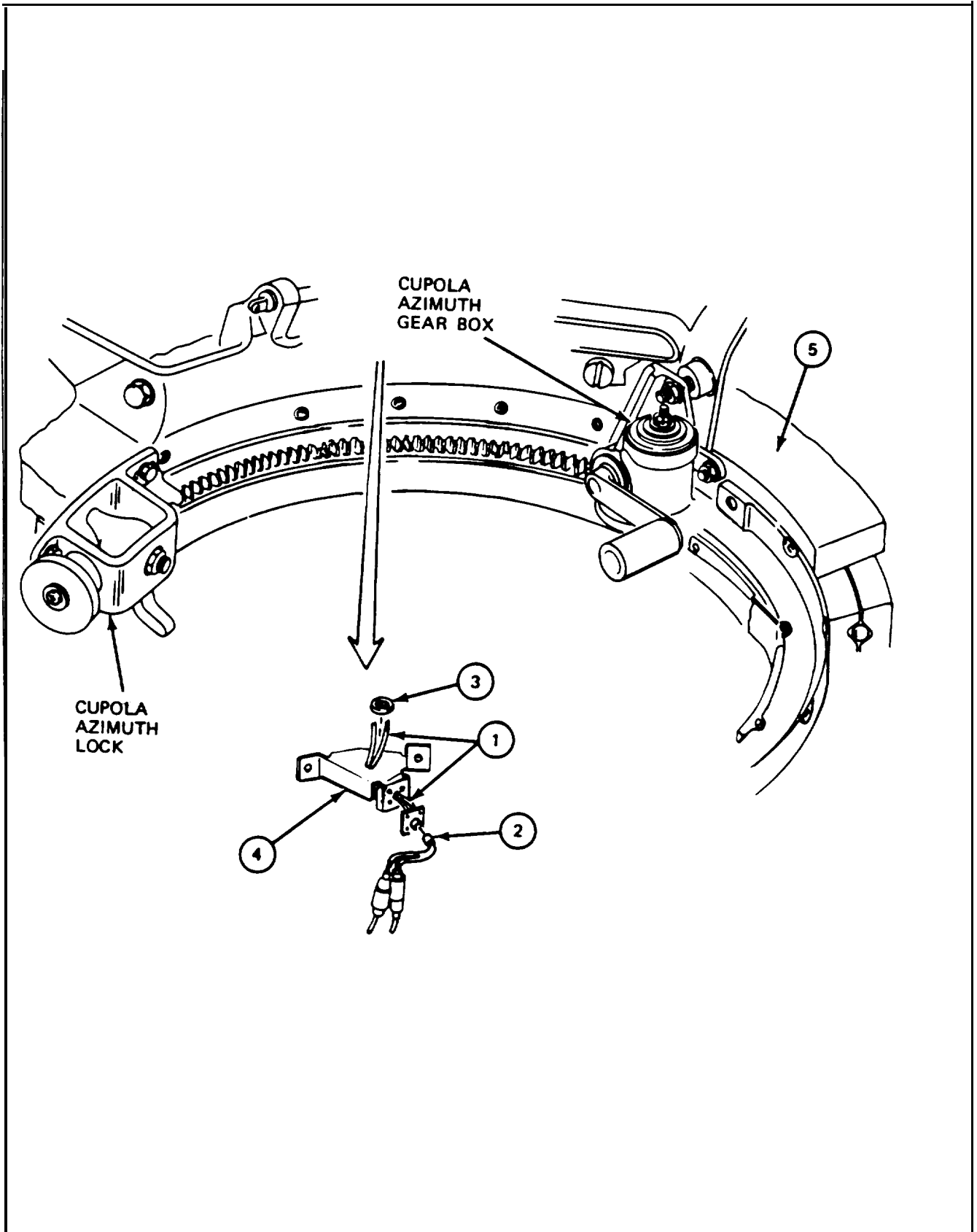
PRELIMINARY PROCEDURES: Remove guard (10916000) (para 9-6).

FRAME 1	
Step	Procedure
1.	Using 1/4" screwdriver, remove screw (1) and lockwasher (2) holding end of backrest pad assembly (3) against end of guard (4). <div style="text-align: center; border: 1px solid black; padding: 2px; width: fit-content; margin: 10px auto;">CAUTION</div> <p style="text-align: center;">After doing step 2, support bracket (7) will be free of guard (4) but still held up by wiring harness (9) and lead assembly (10). Be careful not to damage wires.</p>
2.	Using 3/8" screwdriver, remove five screws (5) and five lockwashers (6) holding support bracket (7) and guard (4) to cupola (8).
3.	Slide guard (4) to left from under backrest pad assembly (3).
4.	Remove guard (4) from cupola (8).
	GO TO FRAME 2



9-4. GUARD (10884251) AND SUPPORT BRACKET REMOVAL PROCEDURE (CONT)

FRAME 2	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do steps 1 thru 3 if support bracket (4) must be removed.</p> <ol style="list-style-type: none">1. Remove lead assembly (1) and electrical connector (2) (para 8-8).2. Using hands, remove grommet (3) from support bracket (4).3. Remove support bracket (4) from cupola (5). <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).</p> <p>END OF TASK</p>



9-5. GUARD (10884251) AND SUPPORT BRACKET INSTALLATION PROCEDURE

TOOLS: 1/4" flat tip screwdriver
 3/8" flat tip screwdriver

PERSONNEL: One

REFERENCES: JPG for procedure to connect electrical connectors

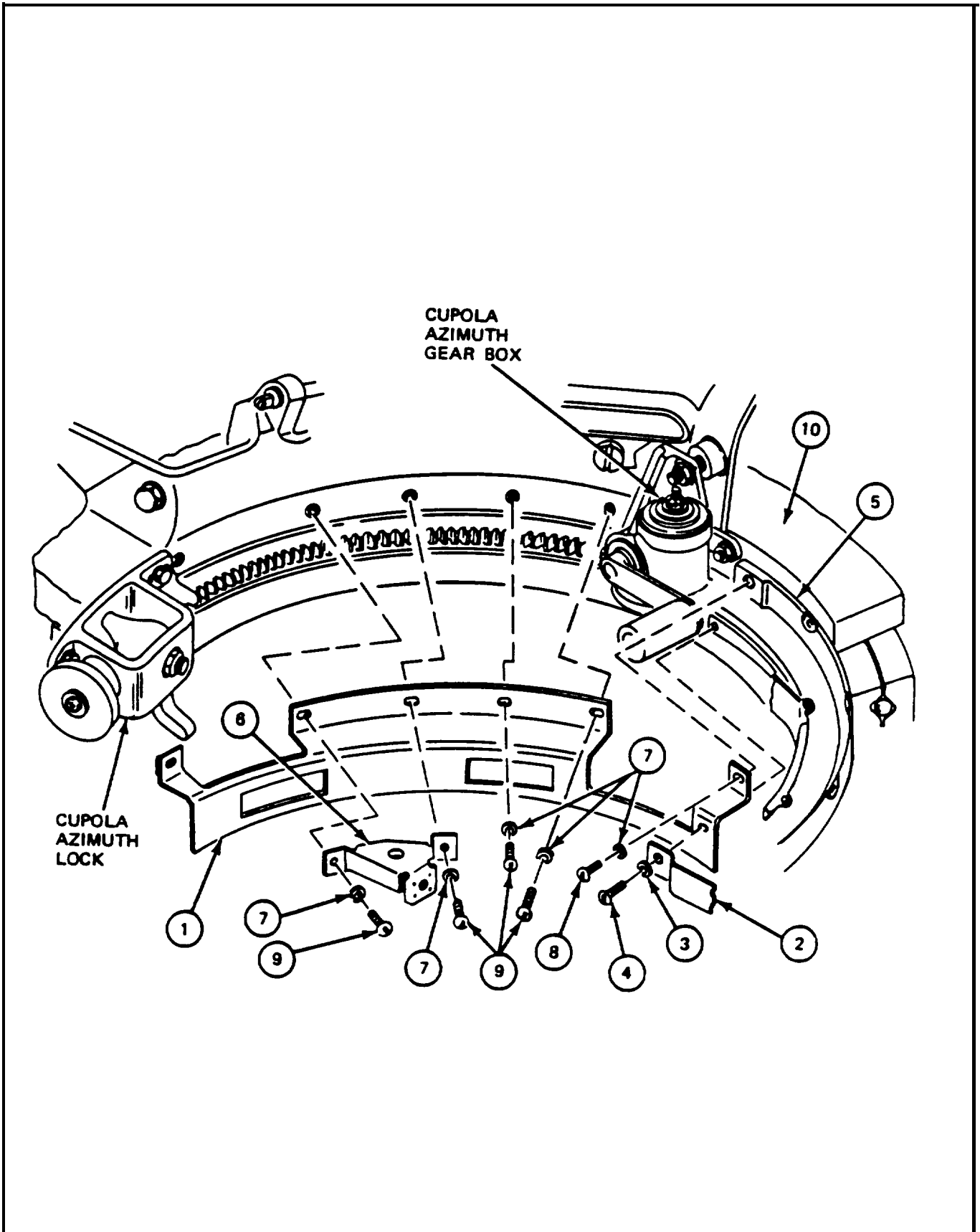
EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Cupola Azimuth Lock	FO-2	19

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

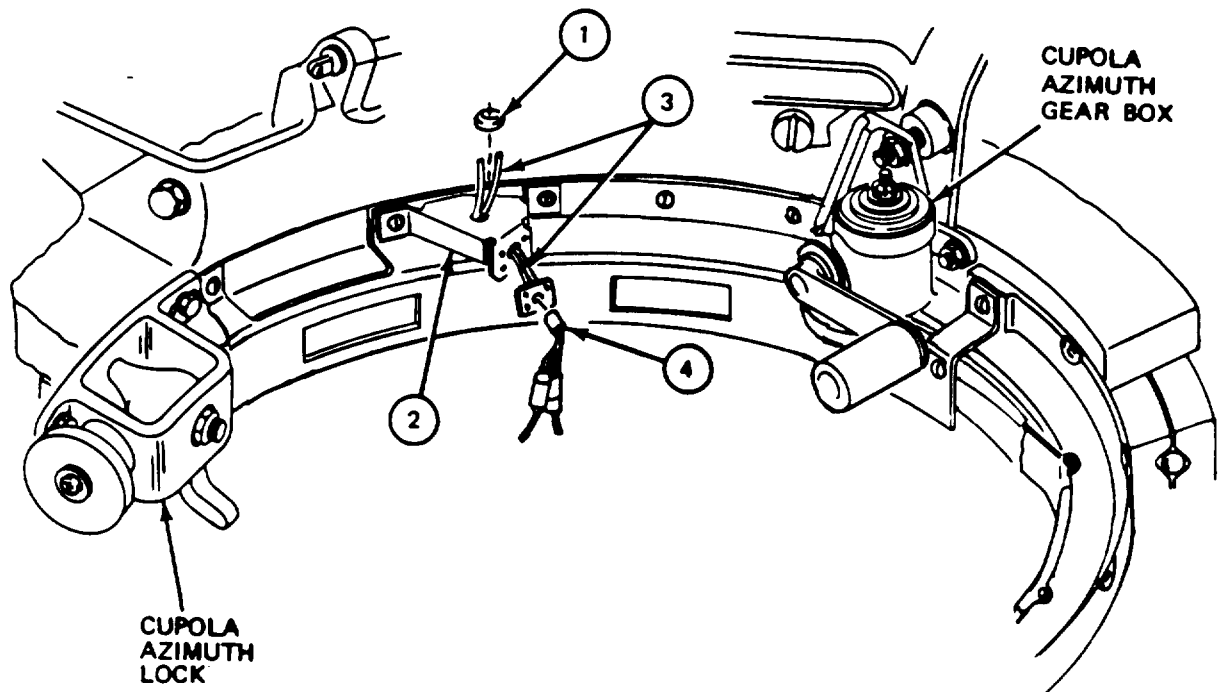
**9-5. GUARD (10884251) AND SUPPORT BRACKET INSTALLATION
PROCEDURE (CONT)**

FRAME 1	
Step	Procedure
1.	Slide right end of guard (1) between backrest pad assembly (2). NOTE screw (4) is shortest Screw.
2.	Using 1/4" screwdriver, put in lockwasher (3) and screw (4) that attach backrest pad assembly (2) and guard (1) to bottom of support (5).
3.	Put support bracket (6) on guard (1). Line up screw holes. NOTE Screw (8) is shorter than screws (9).
4.	Using 3/8" screwdriver, put in five lockwashers (7), screw (8), and four screws (9) that attach support bracket (6) and guard (1) to cupola (10). GO TO FRAME 2



**9-5. GUARD (10884251) AND SUPPORT BRACKET INSTALLATION
PROCEDURE (CONT)**

FRAME 2	
Step	Procedure
	<p>NOTE</p> <p>Do not do steps 1 and 2 if grommet (1) and lead assembly (3) were not removed.</p> <ol style="list-style-type: none"> 1. Using hands, put grommet (1) in support bracket (2). 2. Put in lead assembly (3) with electrical connector (4) attached (para 8-9). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Install guard (10916000) (para 9-7).</p> <p>END OF TASK</p>



9-6. GUARD (1091 6000) REMOVAL PROCEDURE

TOOLS: 3/8" flat tip screwdriver
 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

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Cupola Azimuth Lock	FO-2	19

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

FRAME 1

Step	Procedure
1.	Using screwdriver, remove two screws (1), two lockwashers (2) and cable clamp (3) holding guard (4) to cupola (5). <div style="text-align: center; border: 1px solid black; padding: 2px;">CAUTION</div> Be careful not to bend tabs (6) when removing guard (4).
2.	Slide guard (4) from under guard (7) and (8), and remove guard (4) from cupola (5).
3.	Remove cable clamp (3) from hand firing switch leads (9).
	NOTE
	Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG). Repair support (para 9-10).
	END OF TASK

9-7. GUARD (10916000) INSTALLATION PROCEDURE

TOOLS: 3/8" flat tip screwdriver

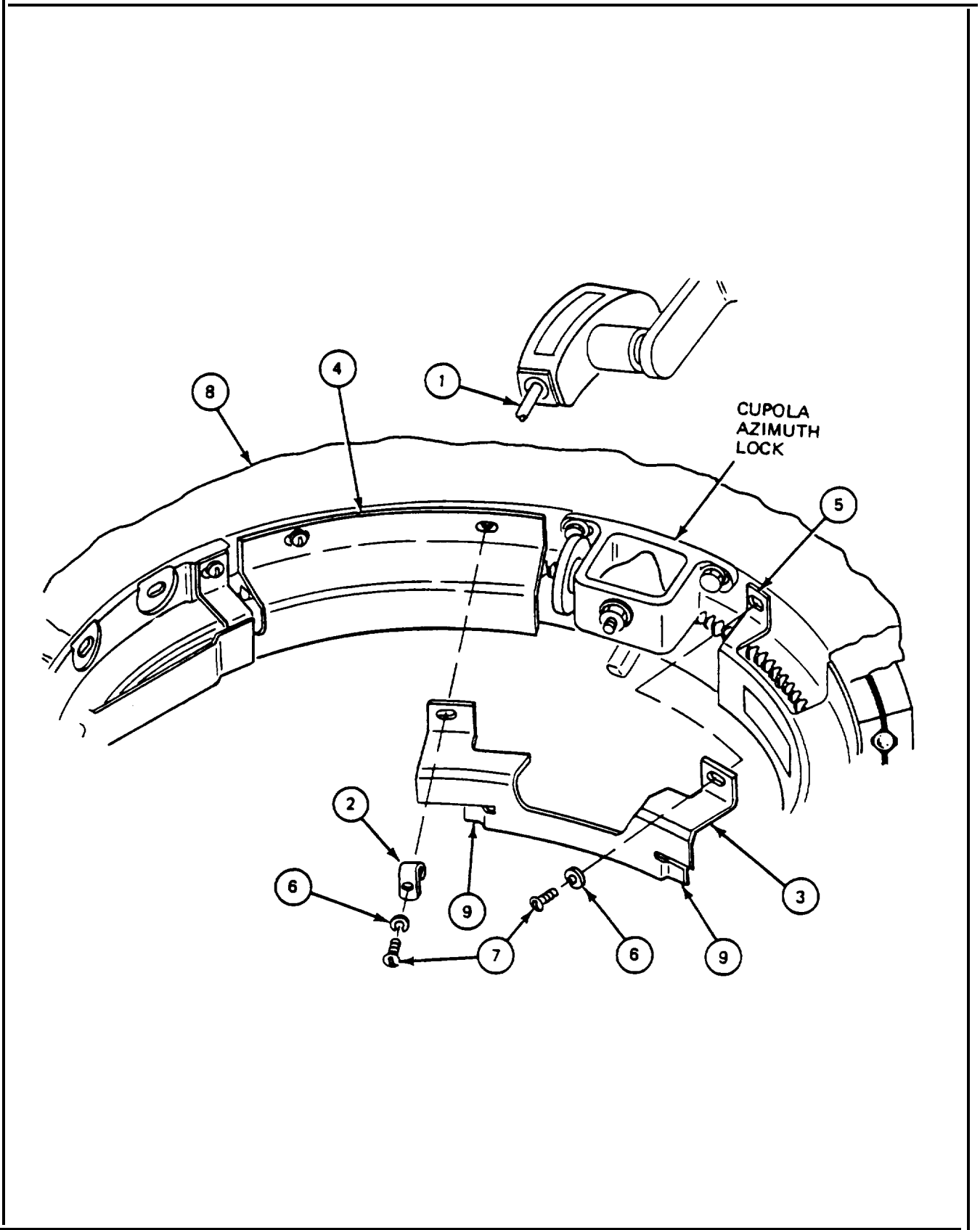
PERSONNEL: One

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Cupola Azimuth Lock	FO-2	19

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

FRAME 1	
Step	Procedure
1.	Place hand tiring switch leads (1) in cable clamp (2). NOTE Tabs (9) of guard (3) must be placed under guards (4) and (5).
2.	Slide guard (3) between guards (4) and (5).
3.	Using screwdriver, put in two lockwashers (6) and two screws (7) that attach guard (3) and cable clamp (2) to cupola (8). END OF TASK



9-8. SUPPORT, PLATE, AND RUBBER STRIP REMOVAL PROCEDURE

TOOLS: Putty knife
 1/4" flat tip screwdriver
 3/8" flat tip screwdriver
 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
 Remove adhesive
 TM 9-2350-222-20-2-3 for procedures to:
 Remove cupola azimuth gear box
 Remove cupola backrest pad

EQUIPMENT LOCATION INFORMATION:

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

NOTE

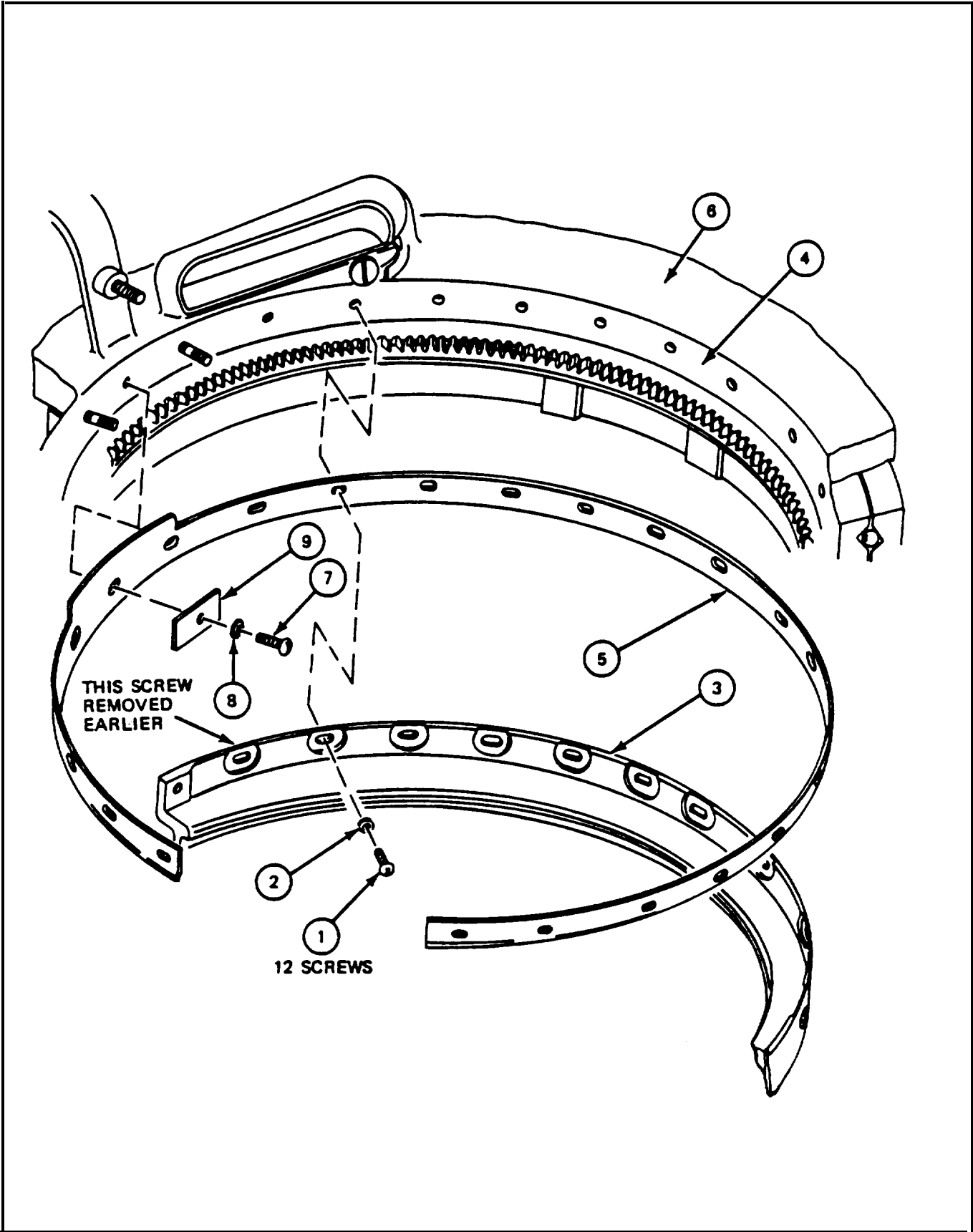
If support is not being replaced, do only equipment conditions and preliminary procedures marked with asterisk (*).

EQUIPMENT CONDITION: *Driver's master control panel MASTER BATTERY switch set to OFF
 Cupola backrest pad removed (TM-20-2-3)
 *Cupola azimuth gear box removed (TM-20-2-3)

PRELIMINARY PROCEDURES: * Remove guard (10884246) (para 9-2)
 *Remove guard (10884251) (para 9-4)
 *Remove guard (10916000) (para 9-6)
 *Remove wiring harness (left hand contact) (para 8-2 frame 1 steps 1 and frame 2 steps 1 thru 3)
 *Remove wiring harness (right hand contact) (para 8-4 frame 1 step 1 and frame 2 steps 1 thru 3)
 Remove terminal board (para 8-12)
 1 Remove wiring harness (10873607) (para 8-14 frame 1 steps 5 and 8, and frame 2 steps 3, 5 and 8)
 *Remove wiring harness (10911240) (para 8-16 steps 3, 5 and 8)

9-8. SUPPORT, PLATE, AND RUBBER STRIP REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Using 3/8" screwdriver, remove 12 screws (1) and 12 lockwashers (2) holding support (3) to metal surface (4) and rubber strip (5).
2.	Using screwdriver, pry support (3) from rubber strip (5). Remove support from cupola (6).
	NOTE
	Do steps 3 and 4 if metal plate (9) and rubber strip (5) must be removed. Do not remove rubber strip unless it is damaged. If rubber strip is removed, a new <i>one</i> must be installed.
3.	Using 1/4" screwdriver, remove screw (7), lockwasher (8) and metal plate (9).
4.	Using putty knife, carefully remove rubber strip (5) and old rubber adhesive from metal surface (4) (JPG).
	NOTE
	Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG). Repair support (para 9-10).
	END OF TASK



9-9. SUPPORT, PLATE, AND RUBBER STRIP INSTALLATION PROCEDURE

TOOLS: 3/8" flat tip screwdriver
 1/4" flat tip screwdriver
 1-1/2" oval paint brush

SUPPLIES: Adhesive (item 4, App. A)
 Rubber strip (10884248)

REFERENCES: TM 9-2350-222-20-2-3 for procedures to:
 Install cupola azimuth gear box
 Install cupola backrest pad

PERSONNEL: One

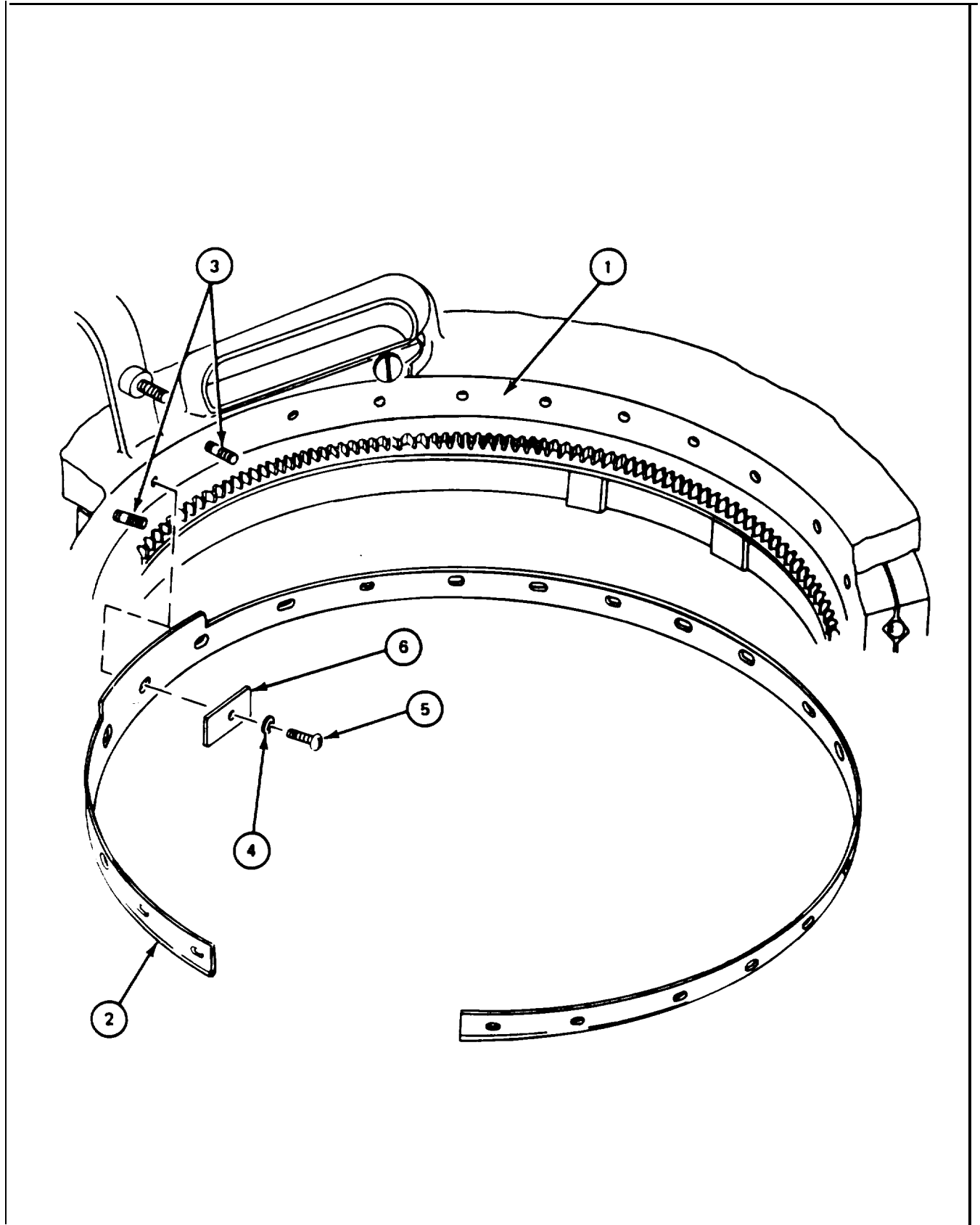
EQUIPMENT LOCATION INFORMATION:

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

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

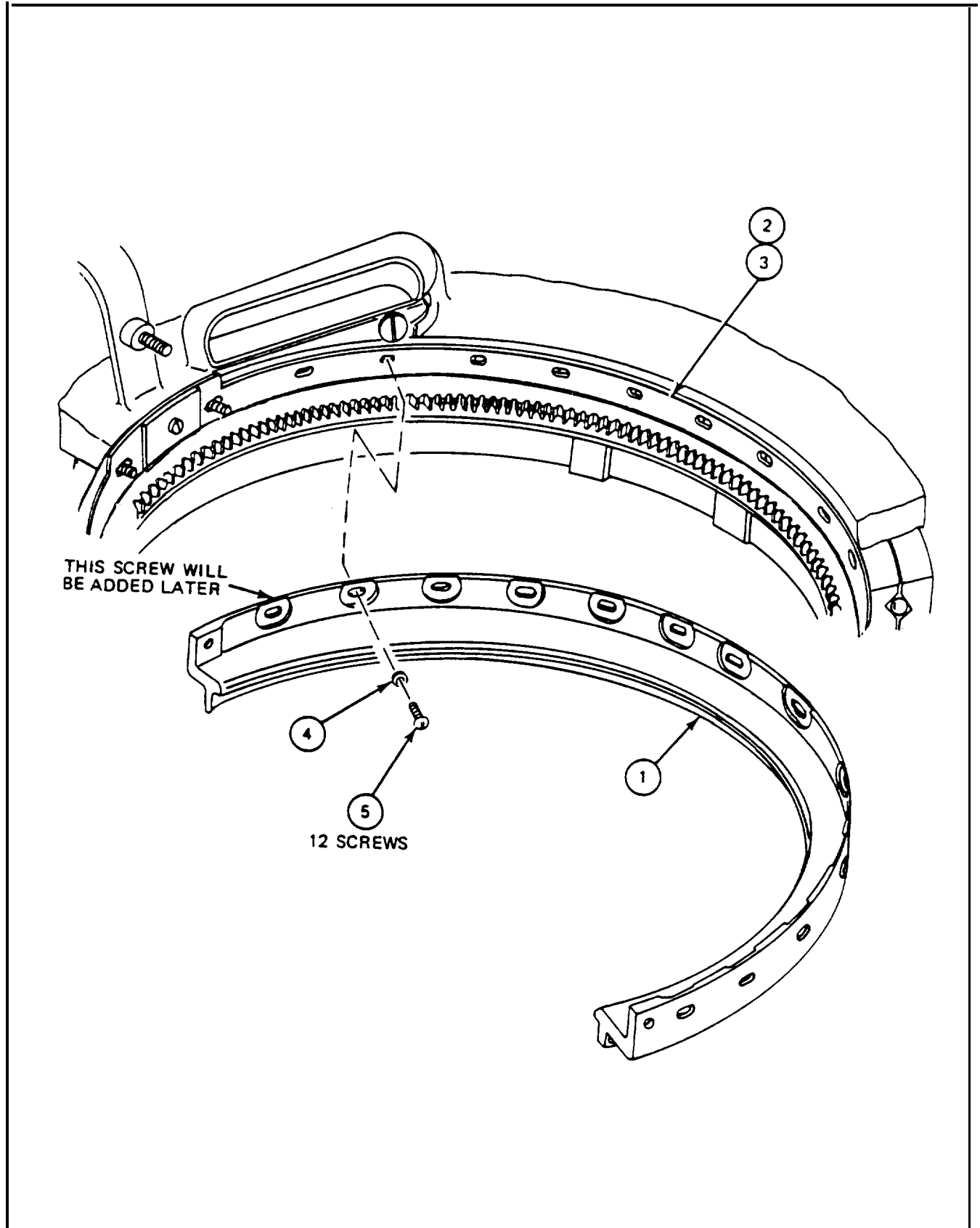
9-9. SUPPORT. PLATE, AND RUBBER STRIP INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p>If rubber strip (2) and plate (6) were not removed, go to Frame 2.</p> <p>Rubber strip (2) must be put on immediately after adhesive is placed on cupola (1). That way, adhesive is wet and rubber strip can be moved to line up with screw holes. Do not get adhesive in screw holes.</p> <p>1. Using paint brush, put a thin, even coat of adhesive on cupola (1), where rubber strip (2) will go.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Smooth side of rubber strip (2) face out.</p> <p>2. Align wide part of rubber strip (2) over two mounting studs (3).</p> <p>3. Carefully press rubber strip (2) in place on cupola (1).</p> <p>4. Using 1/4" screwdriver, put in lockwasher (4) and screw (5) to attach metal plate (6) to rubber strip (2) and cupola (1).</p> <p>GO TO FRAME 2</p>



**9-9 SUPPORT, PLATE, AND RUBBER STRIP INSTALLATION PROCEDURE
(CONT)**

FRAME 2	
Step	Procedure
	<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">CAUTION</div> <p>Do not damage or move robber strip (3) when doing step 1.</p>
<ol style="list-style-type: none"> 1. 2. 3. 	<p>Put support (1) in place on cupola (2) and rubber strip (3). Line up support (1) screw holes.</p> <p>Using hands, loosely put in 12 lockwashers (4) and 13 screws (5).</p> <p>Using 3/8" screwdriver, tighten 12 screws (5) holding support (1) to rubber strip (3) and cupola (2).</p>
	<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>If support was not replaced, do only procedures marked with an asterisk (*).</p> <p>*Install cupola azimuth gear box (TM-20-2-3). Install terminal board (para 8-13). *Install wiring harness (left hand contact) (para 8-3 frame 1). *Install wiring harness (right hand contact) (para 8-5 frame 1). *Install guard (10884251) (para 9-5). *Install guard (10884246) (para 9-3). *Install guard (10916000) (para 9-7). Install cupola backrest pad (TM-20-2-3). *Install wiring harness (10911240) (para 8-17). *Install wiring harness (10873607) (para 8-15).</p>
	<p>END OF TASK</p>



9-10. SUPPORT REPAIR PROCEDURE

TOOLS: 20 ounce ball peen hammer
1 /4" drive pin punch
Plastic face hammer
Helicoil repair kit

SUPPLIES: Helicoil inserts (MS 21208C6-10) as required
Self-locking nuts (592560) as required

PERSONNEL: One

REFERENCES: JPG for procedures to:
Use helicoil tools
Inspect and repair parts

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Support inspected (JPG)

GENERAL INSTRUCTIONS:

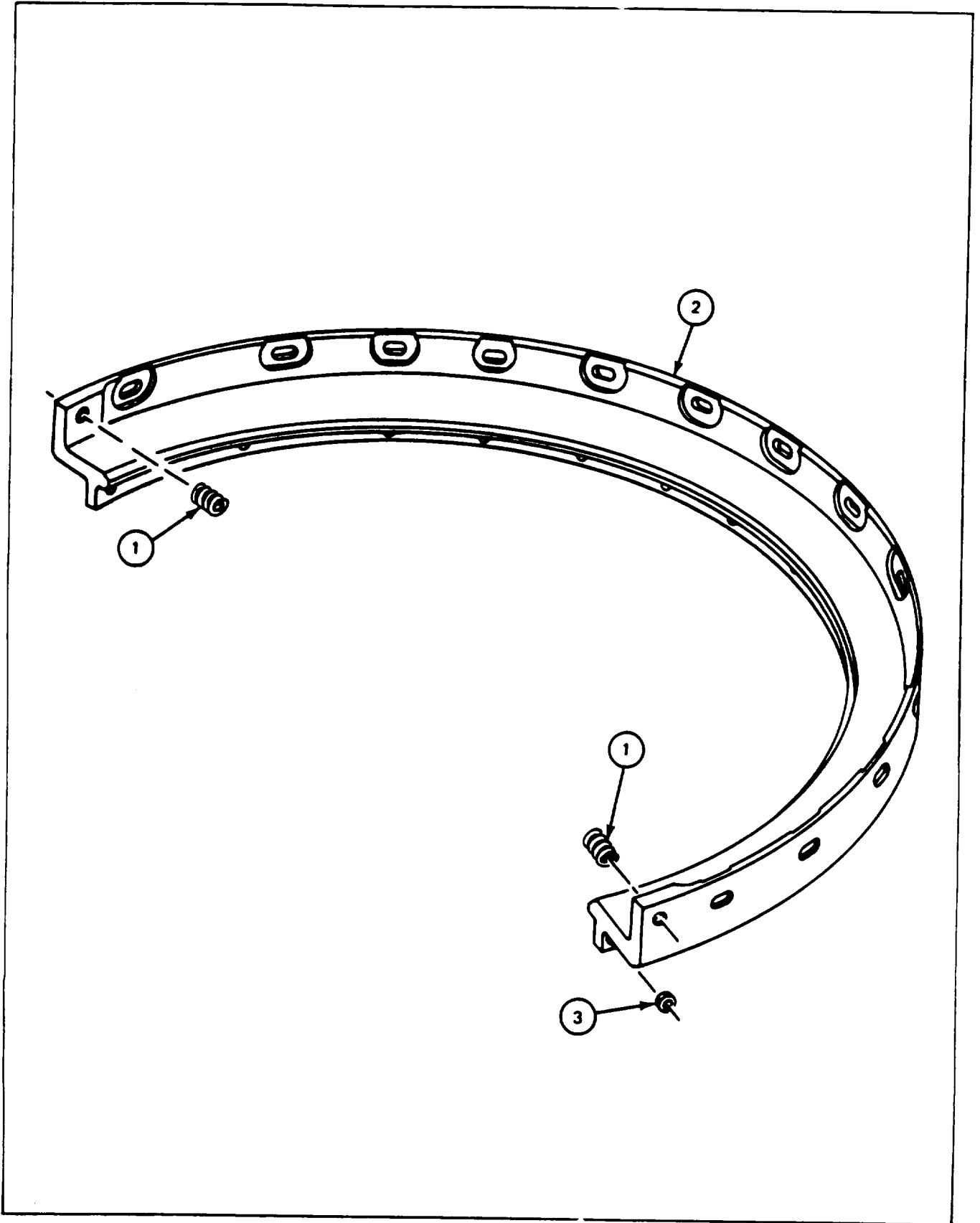
NOTE

This procedure is used to replace bad helicoil inserts and bad self-locking nuts in support.

To replace self-locking nuts support must be removed from vehicle (para 9-8). To replace helicoil inserts, support may be installed on vehicle.

9-10. SUPPORT REPAIR PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do steps 1 and 2 to replace bad helicoil inserts (1).</p> <p>1. Using helcoil tool, remove helicoil insert (1) from support (2) (JPG).</p> <p>2. Using helicoil tool, put new helicoil insert (1) into support (2) (JPG).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do steps 3 and 4 to replace bad self-locking nuts (3).</p> <p>3. Using punch and ball peen hammer, remove self-locking nuts (3) from support (2).</p> <p>4. Using plastic face hammer, put new self-locking nuts (3) in support (2).</p> <p>END OF TASK</p>



CHAPTER 10
HANGERS

10-1. MAINTENANCE PROCEDURES INDEX

Equipment Item	Removal	Tasks	Installation
1. Right Hanger	10-2		10-3
2. Center Hanger	10-4		10-5
3. Left Hanger	10-6		10-7

10-2. RIGHT HANGER REMOVAL PROCEDURE

TOOLS: 7/16" combination wrench
 9/16" combination wrench
 15/16" socket (3/4" drive)
 1-1/2" socket (3/4" drive)
 9/16" socket (1/2" drive)
 1/2" drive hinge handle
 3/4" drive sliding T

SUPPLIES: Wood block 2" X 4" X 6"

PERSONNEL: One

REFERENCES: TM 9-2350-222-10 for procedures to:
 Traverse turret
 Set turret traverse lock to LOCKED
 TM 9-2350-222-20-2-3 for procedure to:
 Remove gunner's footguard
 Remove equilibrator accumulator pressure gauge
 Remove gunner's filter hose

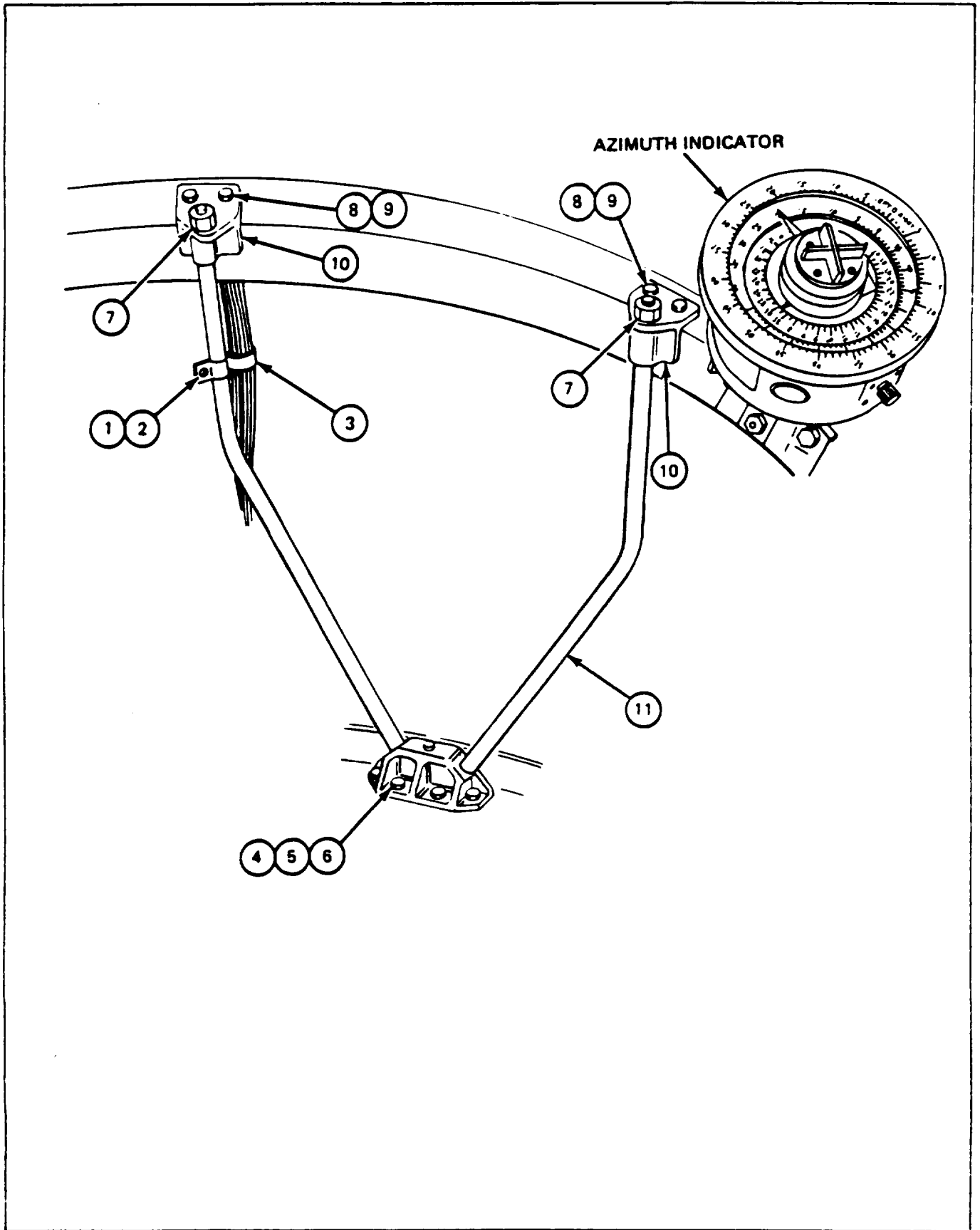
EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7
Azimuth Indicator	FO-1	6

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
 Equilibrator accumulator pressure gauge removed (TM-20-2-3)
 Gunner's filter hose removed (TM-20-2-3)
 Gunner's footguard removed (TM-20-2-3)

10-2. RIGHT HANGER REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Traverse turret until right hanger can be reached from driver's compartment (TM-10).
2.	Set turret traverse lock to LOCKED (TM-10).
3.	Using 7/16" combination wrench, remove screw (1) and lockwasher (2). Remove clamp (3).
4.	Using wood block, brace turret floor under hanger.
5.	Using 9/16" combination wrench and 9/16" socket wrench, remove five screws (4), five flat washers (5), and five self-locking nuts (6). Throw away self-locking nuts.
6.	Using 1-1/2" socket wrench, remove two nuts (7).
7.	Using 15/16" socket wrench, remove four screws (8) and four lockwashers (9). Remove two supports (10).
8.	Remove right hanger (11).
	END OF TASK



10-3. RIGHT HANGER INSTALLATION PROCEDURE

TOOLS: 7/16" combination wrench
 9/16" combination wrench
 15/16" socket (3/4" drive)
 1-1/2" socket (3/4" drive)
 9/16" socket (1/2" drive)
 1/2" drive hinge handle
 3/4" drive sliding T

SUPPLIES: Self-locking nuts (MS 21045-6) (five)

PERSONNEL: One

REFERENCES: TM 9-2350-222-20-2-3 for procedures to:
 Install gunner's footguard
 Install equilibrator accumulator pressure gauge
 Install gunner's filter hose

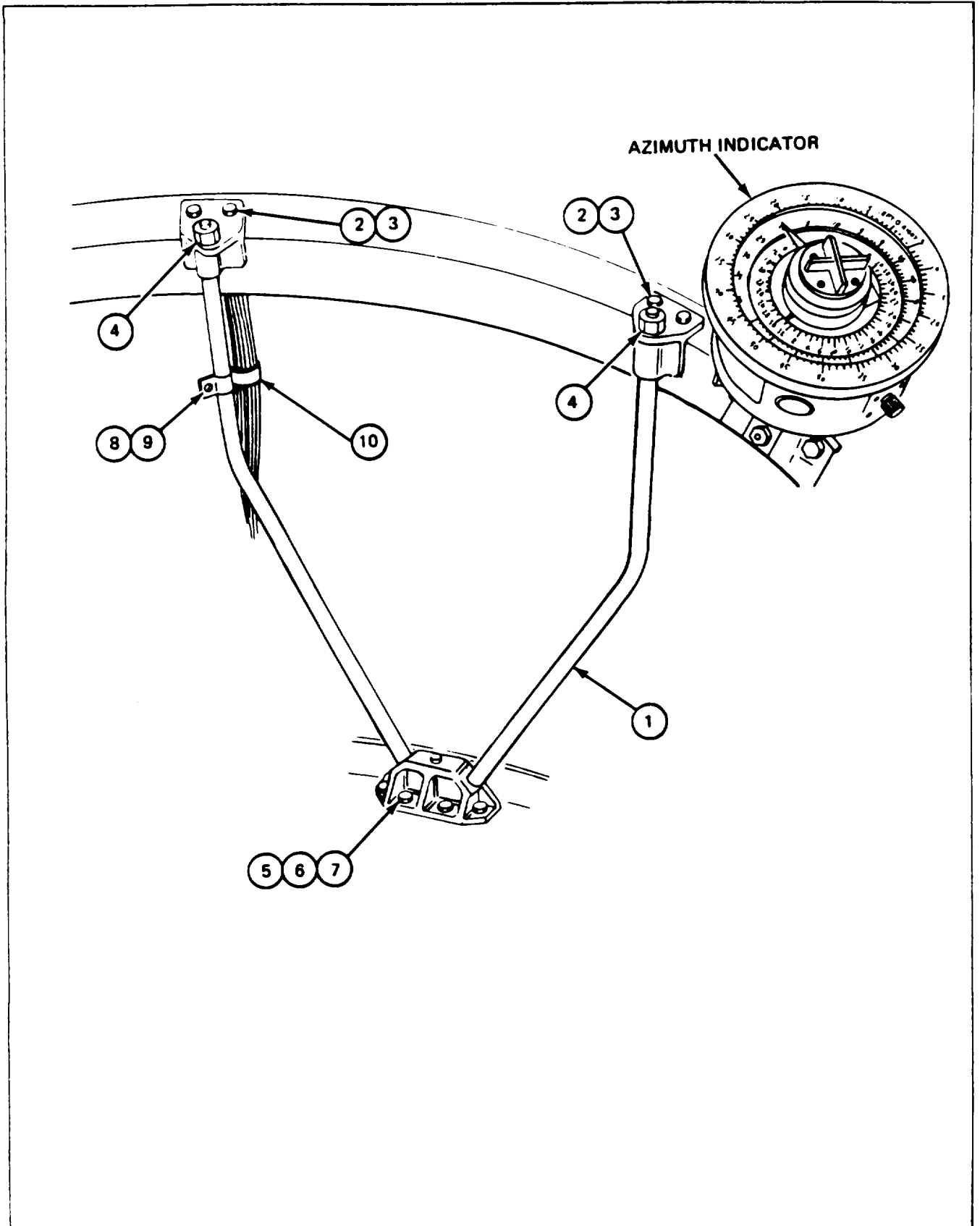
EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7
Azimuth Indicator	FO-1	6

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

10-3. RIGHT HANGER INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Put right hanger (1) in place for installation.
2.	Using 15/16" socket wrench, put in but do not tighten four screws (2) and four lockwashers (3).
3.	Using 1-1/2" socket wrench, put on but do not tighten two nuts (4).
4.	Using 9/16" combination wrench and 9/16" socket wrench, put in five screws (5), five flat washers (6), and five new self-locking nuts (7) and tighten.
5.	Using 1-1/2" socket wrench, tighten two nuts (4).
6.	Using 15/16" socket wrench, tighten four screws (2).
7.	Using 7/16" combination wrench, put in screw (8) and lockwasher (9) holding clamp (10) to right hanger (1).
8.	Remove wood block from under turret floor.
	<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Install gunner's footguard (TM-20-2-3).</p> <p>Install equilibrator accumulator pressure gauge (TM-20-2-3).</p> <p>Install gunner's filter hose (TM-20-2-3).</p>
	END OF TASK



10-4. CENTER HANGER REMOVAL PROCEDURE

TOOLS: 9/16" open end wrench
 15/16" socket (3/4" drive)
 Flat tip screwdriver
 9/16" socket (1/2" drive)
 1/2" drive hinge handle
 1-1/2" socket (3/4" drive)
 3/4" sliding T

SUPPLIES: Wood block 2" X 4" X 6"

PERSONNEL: One

REFERENCES: TM 9-2350-222-20-2-3 for procedures to:
 Traverse turret
 Set turret traverse lock to LOCKED

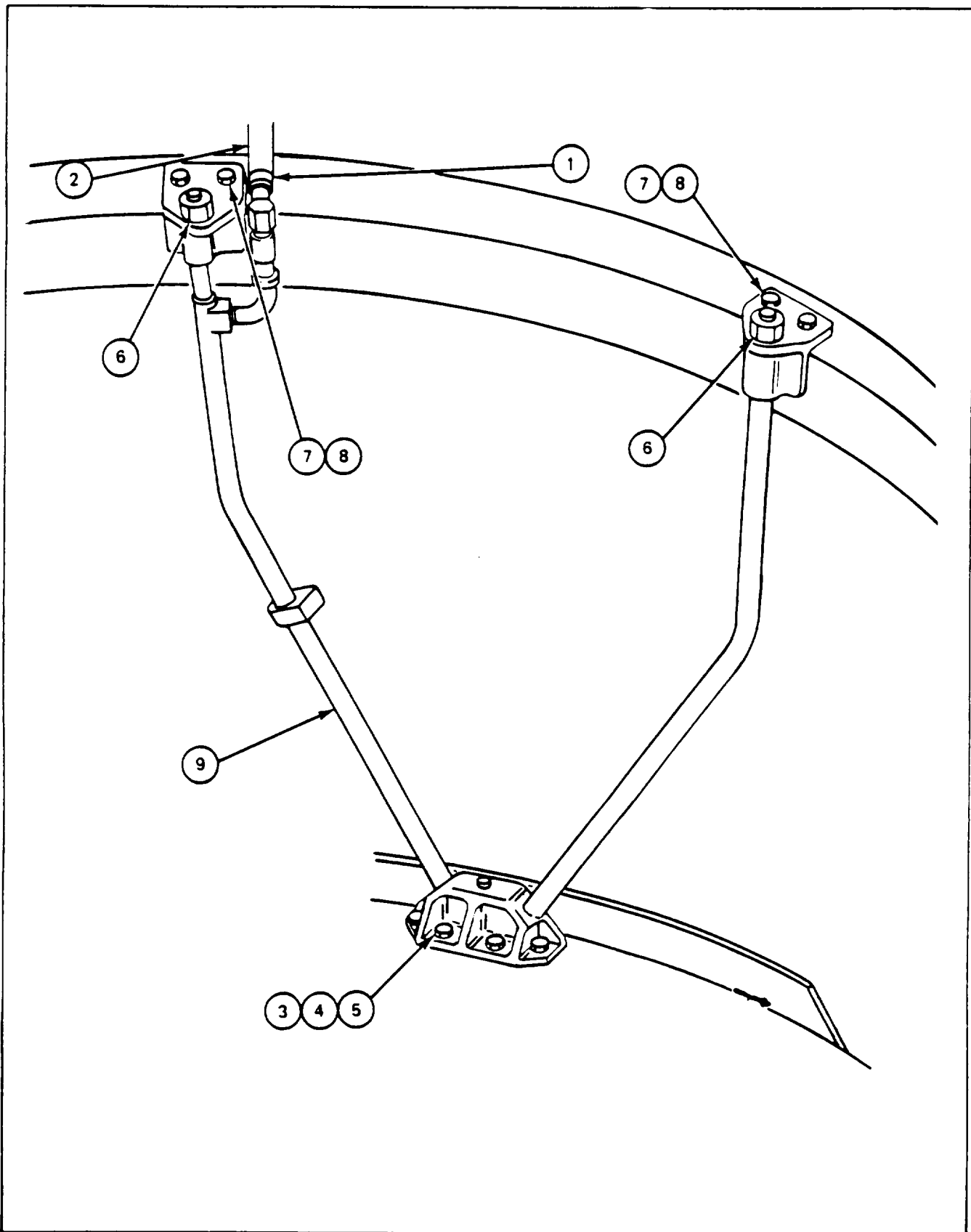
EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Center Hanger	FO-3	8

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

FRAME 1

Step	Procedure
1.	Traverse turret until center hanger can be reached from driver's compartment (TM-10).
2.	Set turret traverse lock to LOCKED (TM- 10).
3.	Using screwdriver, loosen clamp (1) and pull hose (2) free.
4.	Using wood block, brace turret floor under hanger.
5.	Using 9/16" open end wrench and 9/16" socket wrench, remove five screws (3), five flat washers (4), and five self-locking nuts (5). Throw away self-locking nuts.
6.	Using 1-1/2" socket wrench, remove two nuts (6).
7.	Using 15/16" socket wrench, remove four screws (7) and four lockwashers (8). Remove center hanger (9).
	END OF TASK



10-5. CENTER HANGER INSTALLATION PROCEDURE

- TOOLS: 9/16" open end wrench
 15/16" socket (3/4" drive)
 Flat tip screwdriver
 9/16" socket (1/2" drive)
 1/2" drive hinge handle
 1-1/2" socket (3/4" drive)
 3/4" sliding T

SUPPLIES: Self-locking nuts (MS 2 1045-6) (five)

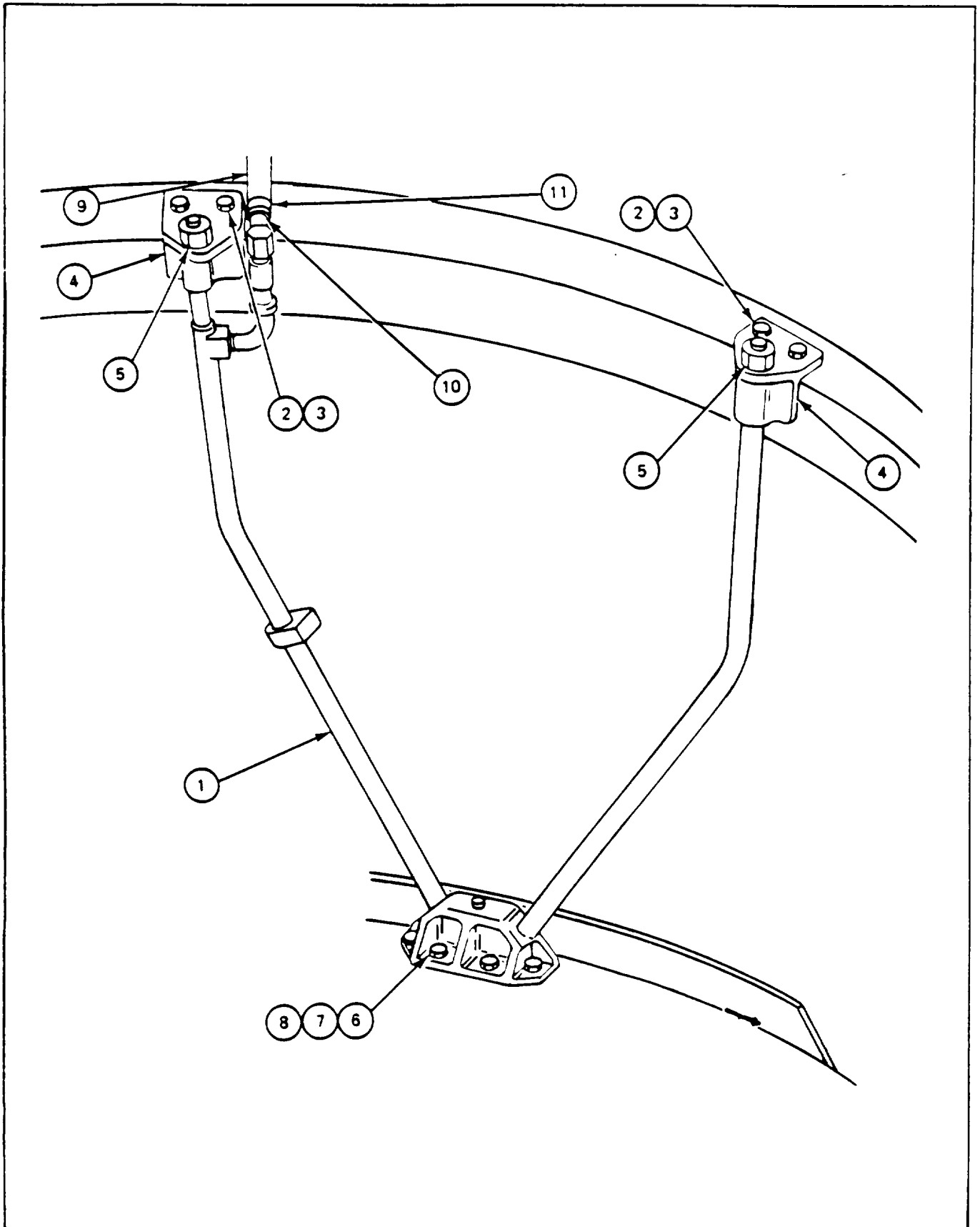
PERSONNEL: One

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Maser Control Panel	FO-3	11
Center Hanger	FO-3	8

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

FRAME 1	
Step	Procedure
1.	Position center hanger assembly (1) in place for installation.
2.	Using 15/16" socket wrench, put in but do not tighten four screws (2) and four flat washers (3) holding supports (4).
3.	Using 1-1/2" socket wrench, put on but do not tighten two nuts (5).
4.	Using 9/ 16" open end wrench and 9/16" socket wrench, put in five screws (6), five flat washers (7) and five new self-locking nuts (8).
5.	Using 1-1/2" socket wrench, tighten two nuts (5).
6.	Using 15/16" socket wrench, tighten four screws (2).
7.	Put hose (9) on hanger fitting (10).
8.	Using screwdriver, tighten clamp (11) to hold hose (9) to hanger fitting.
	END OF TASK



10-6. LEFT HANGER REMOVAL PROCEDURE

TOOLS: 9/16" open end wrench
 15/16" socket (3/4" drive)
 9/16" socket (1/2" drive)
 1/2" drive hinge handle
 1-1/2" socket (3/4" drive)
 3/4" drive sliding T

SUPPLIES: Wood block 2" X 4" X 6"

PERSONNEL: One

REFERENCES: TM 9-2350-222-20-2-3 for procedure to remove 7.62-MM ammunition box
 TM 9-2350-222-20-2-3 for procedures to:
 Traverse turret
 Set turret traverse lock to LOCKED

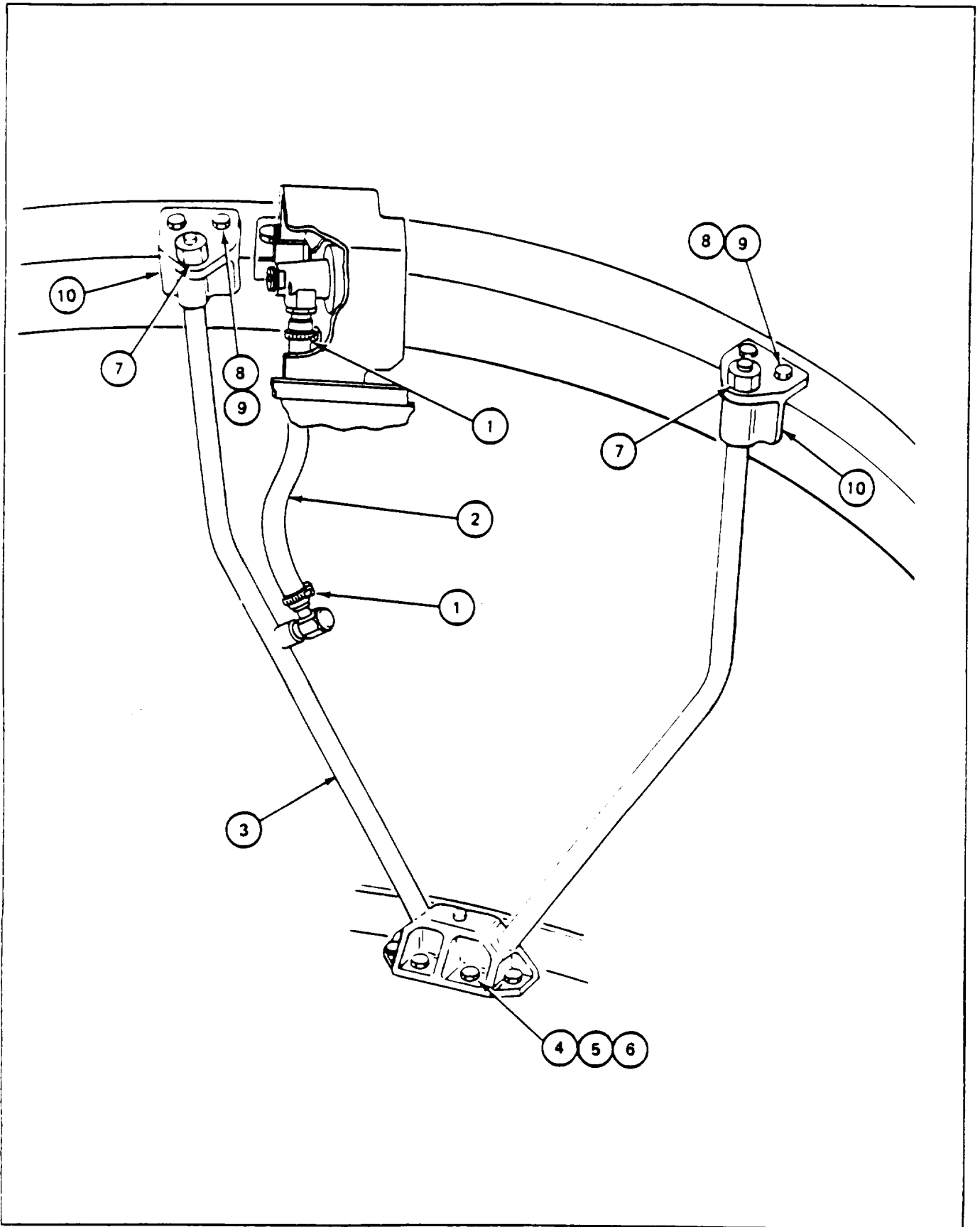
EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Left Hanger	FO-4	16

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
 7.62-MM ammunition box removed (TM-20-2-3)

10-6. LEFT HANGER REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Traverse turret until left hanger can be reached from driver's compartment (TM-10).
2.	Set turret traverse lock to LOCKED (TM-10).
3.	Using screwdriver, loosen clamp (1) and pull hose (2) free from hanger (3).
4.	Using wood block, brace turret floor under hanger.
5.	Using 9/16" open end wrench and 9/16" socket wrench, remove five screws (4), five flat washers (5), and five self-locking nuts (6). Throw away self-locking nuts.
6.	Using 1-1/2" socket wrench, remove two nuts (7).
7.	Using 15/16" socket wrench, remove four screws (8) and four lockwashers (9). Remove two supports (10).
8.	Remove hanger (3).
	END OF TASK



10-7. LEFT HANGER INSTALLATION PROCEDURE

TOOLS: 9/16" open end wrench
 15/16" socket (3/4" drive)
 Flat tip screwdriver
 9/16" socket (1/2" drive)
 1/2" drive hinge handle
 1-1/2" socket (3/4" drive)
 3/4" drive sliding T

SUPPLIES: Self-locking nuts (MS 2 1045-6) (five)

PERSONNEL: One

REFERENCES: TM 9-2350-222-20-2-3 for procedure to install 7.62-MM ammunition box

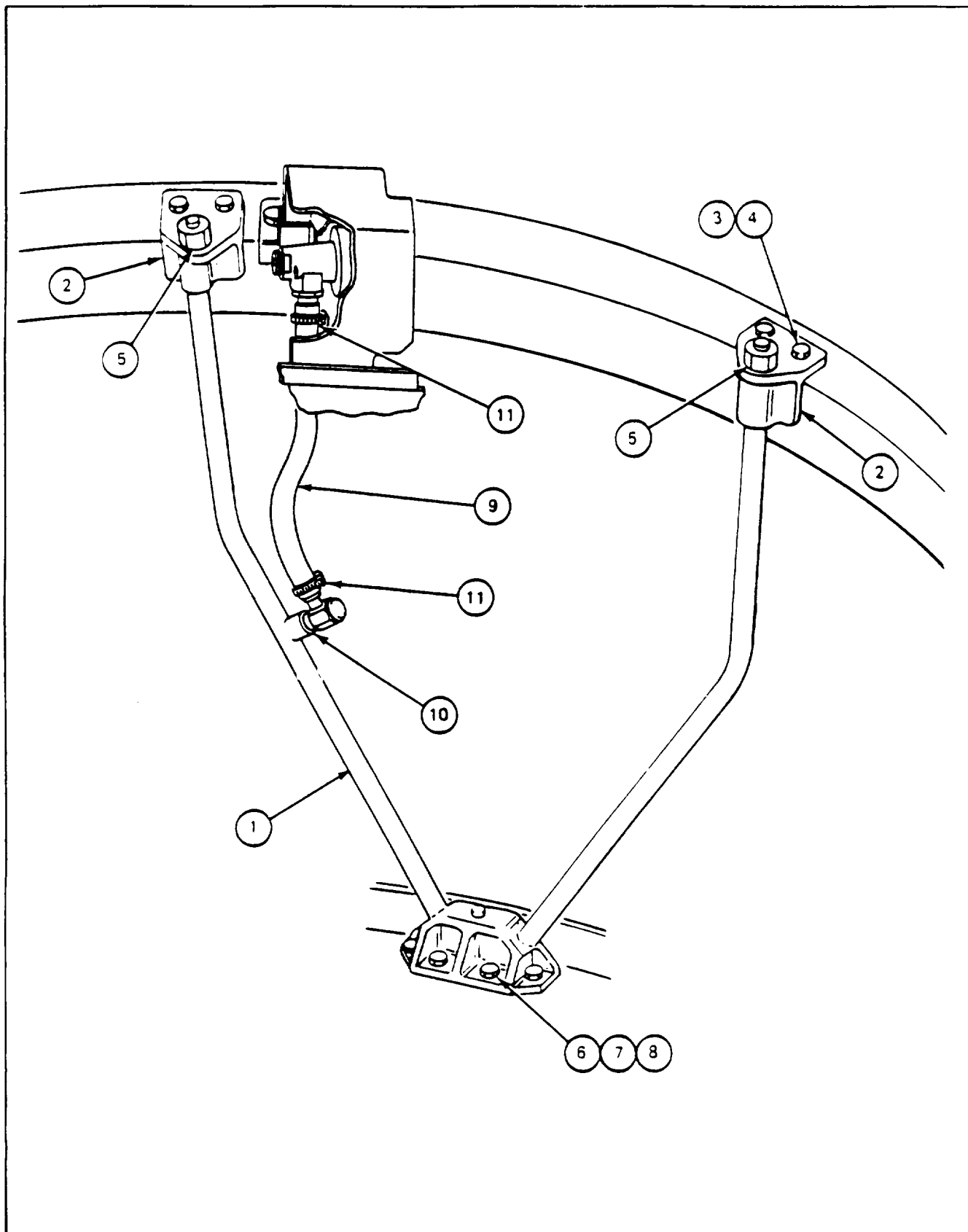
EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Left Hanger	FO-4	16

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

10-7. LEFT HANGER INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Position left hanger (1) in place for installation.
2.	Put two supports (2) on hanger (1).
3.	Using 15/16" socket wrench, put in but do not tighten four screws (3) and four flat washers (4).
4.	Using 1-1/2" socket wrench, put in but do not tighten two nuts (5).
5.	Using 9/16" combination wrench and 9/16" socket wrench put in and tighten five screws (6), five flat washers (7) and five new self-locking nuts (8).
6.	Using 15/16" socket wrench, tighten four screws (3).
7.	Using 1-1/2" socket wrench, tighten two nuts (5).
8.	Put hose (9) on hanger fitting (10).
9.	Using screwdriver, tighten clamp (11) to hold hose (10) to hanger (1).
10.	Remove wood block from under turret floor.
 NOTE 	
Follows Maintenance Action Required: Install 7.62-MM ammunition box (TM-20-2-3).	
END OF TASK	



CHAPTER 11
CANNON M135 AND COMBINATION GUN MOUNT M150/M150A1

Section 1. SCOPE

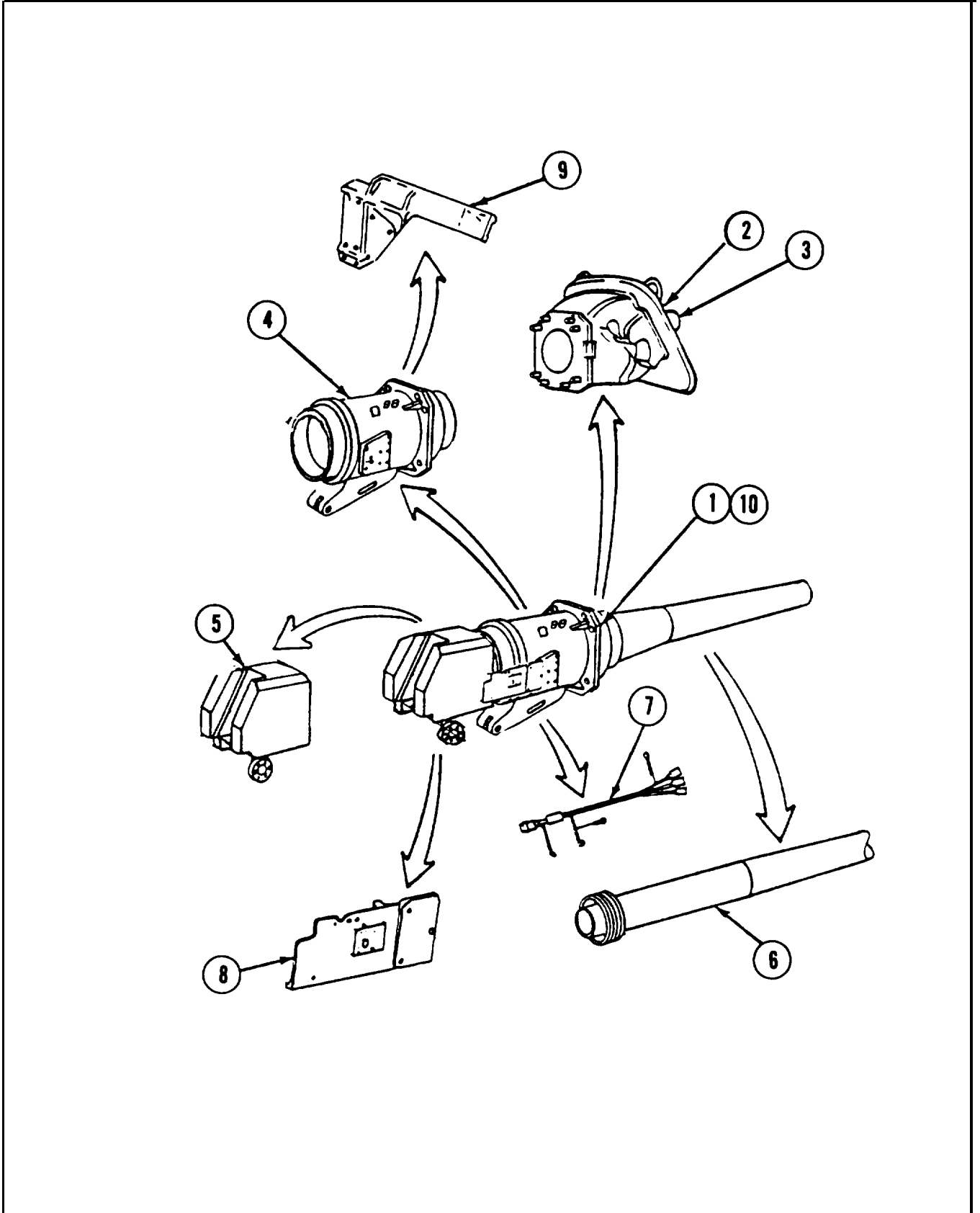
11-1. LIST OF EQUIPMENT ITEMS CONTAINED IN THIS CHAPTER

Section	Equipment Item	Paragraph
2	Cannon M135 and Combination Gun Mount M150/M150A1	11-2
3	Replenisher	11-26

Section 2. CANNON M135 AND COMBINATION GUN MOUNT M150/M150A1

11-2. MAINTENANCE PROCEDURES INDEX

Equipment Item	Inspection	Test	Removal	Tasks Installation	Disassembly	Assembly	Repair
1. Cannon M135 and Combination Gun Mount M150/M150A1			11-3	11-4	11-5	11-6	
2. Gun Shield			11-7	11-8			
3. Telescope M105F wedge Assembly				11-7.2			11-7.1
4. Recoil Mechanism	11-9	11-10	11-11	11-12	11-13	11-14	11-15
5. Breech Ring			11-16	11-17	11-18	11-19	
6. Cannon Tube			11-16	11-17			
7. Electrical Firing Lead			11-20	11-21			
8. Gunner's Guard Support Bracket			11-22	11-23			
9. Torque Bracket			11-24	11-25			
10. Cannon M135 and Gun Mount M150/M150A1 Two-year Maintenance	11-16.1						



11-3. CANNON MI 35 AND COMBINATION GUN MOUNT MI 50 REMOVAL PROCEDURE

TOOLS: Pry bar

- Movable hoist (4 ton capacity minimum)
- Sling (2 leg) (4 ton capacity minimum)
- 1-5/16" socket wrench (3/4" drive)
- 3/4" hinged handle
- 3/4" drive ratchet
- 2" extension (3/4" drive)

SUPPLIES:

- Rope (30 feet long) (1/4" diameter)
- Wooden block (one) (fabricated tool, item 17, App. B)
- Wooden block (one) (fabricated tool, item 10, App. B)
- Wooden blocks (12" x 12" x 36") (six)
- Wooden pole (round: 5" diameter x 20' long)

PERSONNEL: Four (including hoist operator)

REFERENCES: TM 9-2350-222-10 for procedures to:

- Traverse turret
- Elevate and depress cannon manually
- Remove 7.62-mm machine gun
- TM 9-1240-285-34 for procedure to remove M114 telescope mount
- TM 9-1220-220-34 for procedure to remove M10A5 ballistic drive
- TM 9-2350-222-20-2-3 for procedures to:
 - Remove machine gun mounting bracket
 - Remove M105F telescope
 - Remove M13A3 fire control elevation quadrant
 - Remove loader's guard
 - Remove gun shield cover
 - Remove nylon ballistic shield
 - Remove gun recoil replenisher hose
 - Remove loader's safety relay switch
 - Remove breech release mechanism
 - Remove breech operating mechanism
 - Remove blasting machine
 - Remove blasting machine mounting support
 - Remove gunner's guard
 - Remove detent plunger and firing conductor assembly
 - Remove elevating mechanism

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Gunner's Control Box	FO-1	2

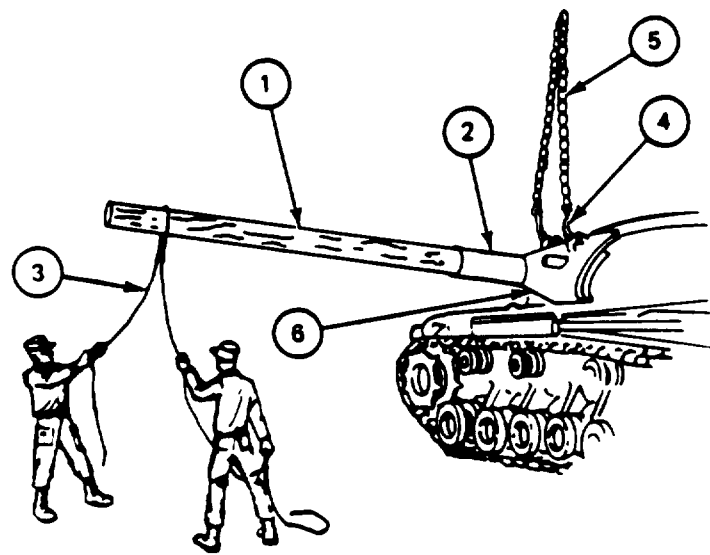
**11-3. CANNON M135 AND COMBINATION GUN MOUNT MI 50 REMOVAL
PROCEDURE (CONT)**

EQUIPMENT CONDITION: Turret traversed until cannon is to side of vehicle (TM-10)
Cannon set to 0 degrees elevation (TM- 10)
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
Machine gun removed (TM-10)
Machine gun mounting bracket removed (TM-20-2-3)
M105F telescope removed (TM-20-2-3)
M114 telescope mount removed (TM-285-34)
M13A3 fire control elevation quadrant removed (TM-20-2-3)
Gunner's guard removed (TM-20)
M10A5 ballistic drive removed (TM-220-34)
Loader's guard removed (TM-20-2-3)
Gun recoil replenisher hose removed (TM-20-2-3)
Loader's safety relay switch removed (TM-20-2-3)
Breech release mechanism removed (TM-20-2-3)
Detent plunger and firing conductor assembly removed (TM-20-2-3)
Blasting machine removed (TM-20-2-3)
Blasting machine mounting support removed (TM-20-2-3)
Gun shield cover removed (TM-20-2-3)
Nylon ballistic shield removed (TM-20-2-3)
Breech operating mechanism removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Remove electrical firing lead (para 11-20)
Remove gun firing harness (para 4-3)
Remove torque bracket (para 11-24)
Remove gunner's guard support bracket (para 11-22)

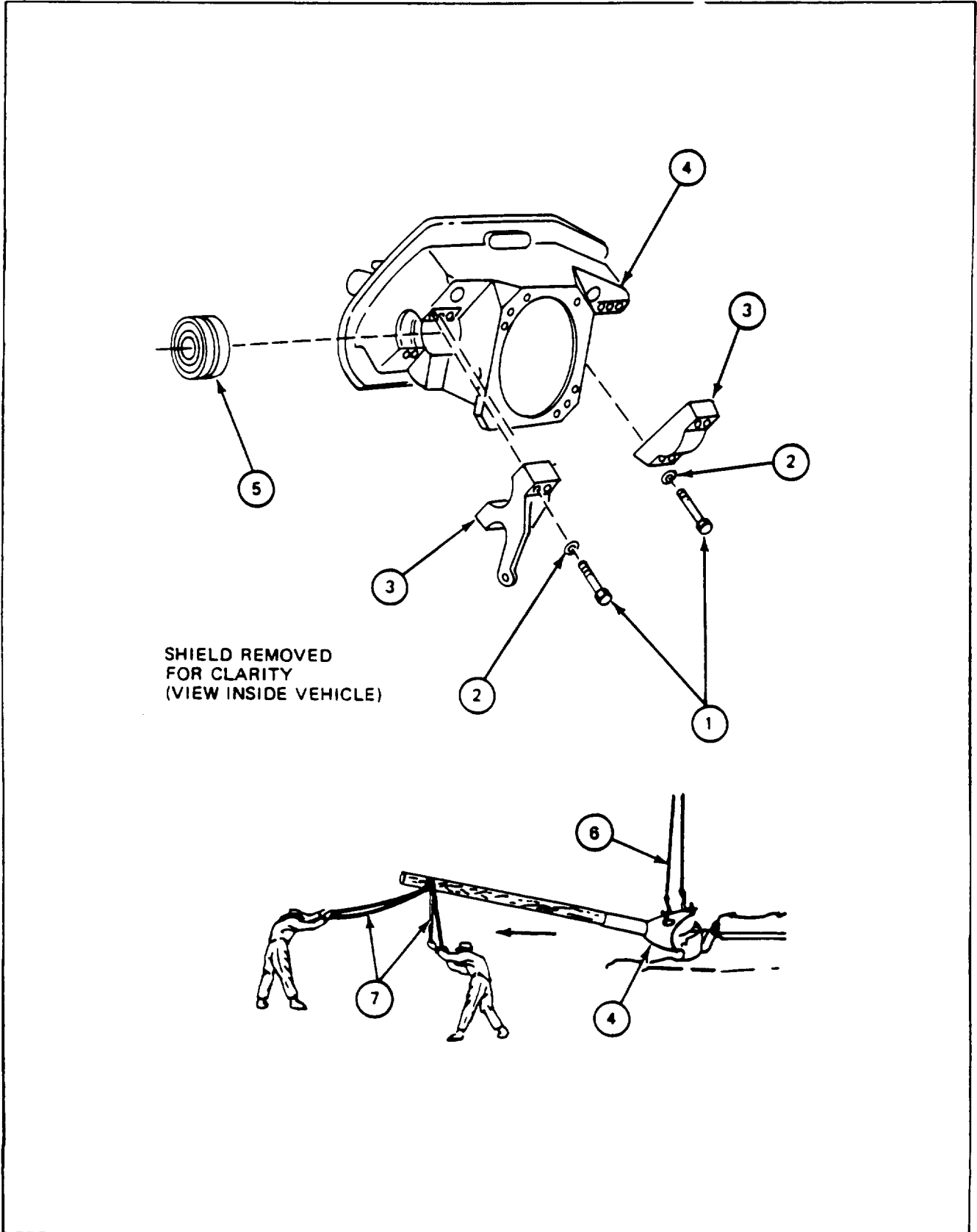
11-3. CANNON M135 AND COMBINATION GUN MOUNT MI 50 REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	<p>Carefully put 20 foot wooden pole (1) into cannon tube (2) as far as it will go.</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;">Cannon tube (2) and gun mount weigh about four tons. Soldiers must stay out of way of tube and gun mount when they are Lifted by hoist, to prevent injury.</p>
2.	<p>Using 1/4" rope (3) at middle, wrap two half hitches around wooden pole (1) three times.</p> <div style="text-align: center; margin: 10px auto;"> <p>NOTE</p> <p>Soldier A: Operate hoist. Soldiers B and C: Pull rope (1) to steady and guide cannon tube as gun mount is moved out of turret. Soldier D (inside turret): Check gun mount clearance on all sides to tell soldiers outside when gun mount is clear to move.</p> </div>
3.	<p>Put two hooks. (4) of sling (5) into two eyelets on gun mount (6).</p>
4.	<p>Using hoist, raise hoist until slack is removed from sling (5).</p> <p>GO TO FRAME 2</p>



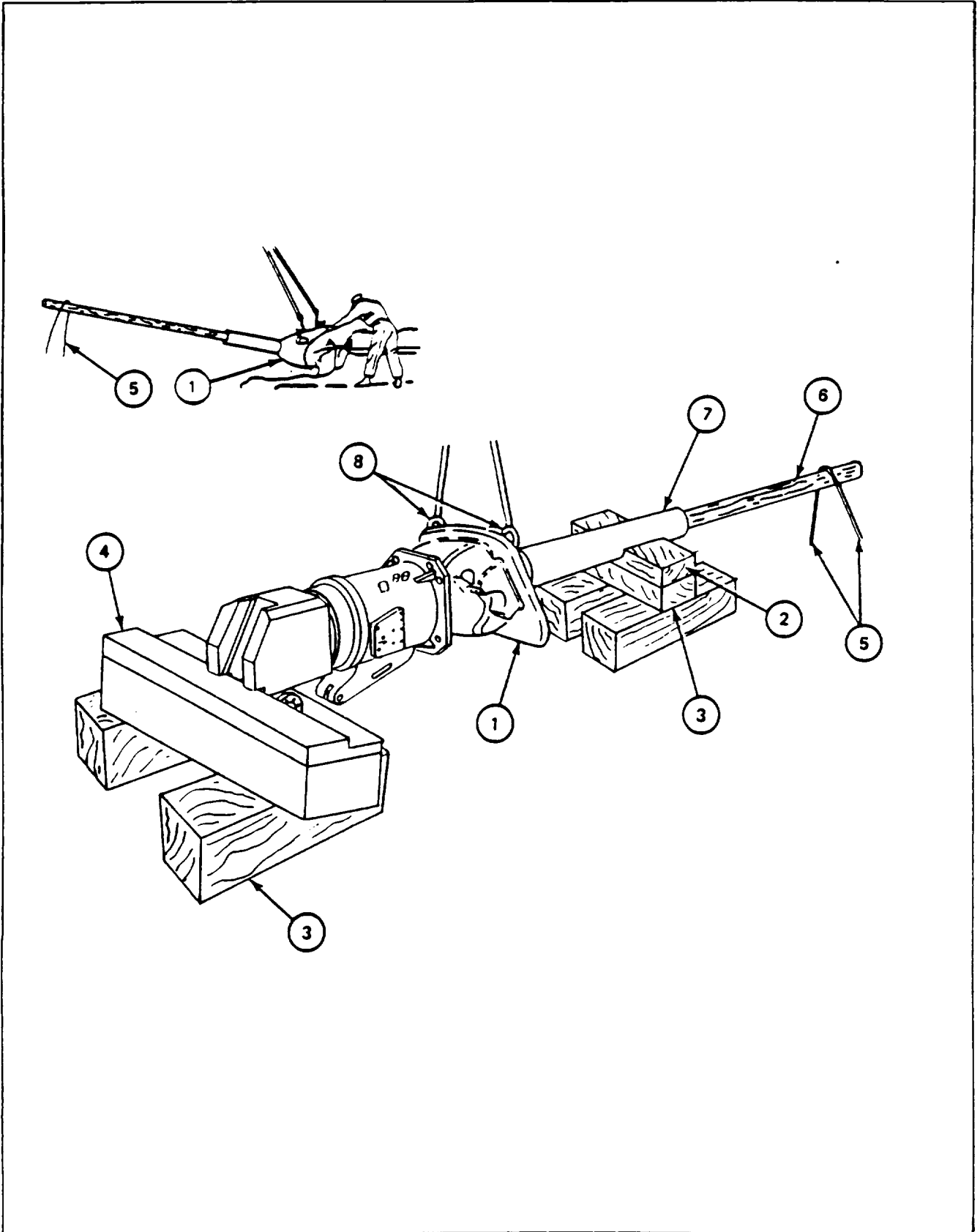
**11-3. CANNON MI 35 AND COMBINATION GUN MOUNT M150 REMOVAL
PROCEDURE (CONT)**

FRAME 2	
Step	Procedure
1.	Remove elevating mechanism (TM-20-2-3).
	<p>NOTE</p> <p>When two trunnion bearing caps (3) are taken off, left side cap and shield has a thrust washer coined in place.</p>
2.	Using socket wrench, remove eight screws (1) and eight lockwashers (2) holding two trunnion bearing caps (3) to gun mount (4).
3.	Using pry bar, if required, separate two trunnion bearing caps (3) from gun mount (4).
4.	Using hoist, raise gun mount (4) to clear trunnion bearings (5) in turret.
	<p>CAUTION</p> <p>Check clearance to gun mount (4) on all sides as gun mount (4) is moved out of turret opening.</p> <p>Trunnion bearings (5) in turret must not be damaged.</p>
5.	Use hoist (6) and guide ropes (7) to give clearance for gun mount (4) to move out of turret.
	GO TO FRAME 3



**11-3. CANNON M135 AND COMBINATION GUN MOUNT MI 50 REMOVAL
PROCEDURE (CONT)**

FRAME 3	
Step	Procedure
	NOTE
	Soldier A. Operate hoist. Soldiers B and C (one outside and one inside): Check clearance and guide gun mount (1).
1.	Using hoist, slowly and carefully move gun mount (1) out of turret opening.
2.	Using hoist, move gun mount (1) over wood blocks (2), (3) and (4) on level ground.
	NOTE
	Soldier A. Operate hoist. Soldirs B, C and D: Guide gun mount (1), position wood blocks and remove sling hook (4),
3.	Using hoist, slowly lower gun mount (1) onto wood blocks (2), (3) and (4).
4.	Remove guide rope (5) from end of wooden pole (6).
5.	Carefully remove wooden pole (6) from cannon tube (7).
	NOTE
	Do step 6 only if gun shield is not going to be removed (para 11-7).
6.	Remove two sling hooks (8) from gun mount (1) and move hoist to clear area, END OF TASK



**11-4. CANNON M135 AND COMBINATION GUN MOUNT MI 50
INSTALLATION PROCEDURE**

TOOLS: Movable hoist (4 ton capacity minimum)
 Sling (2 leg) (4 ton capacity minimum)
 1-5/16" socket wrench (3/4" drive)
 16" extension (3/4" drive)
 3/4" drive ratchet
 3/4" drive torque wrench (0 to 600 foot-pounds)
 Torque multiplier

SUPPLIES: Rope (30 feet long) (1/4" diameter)
 6 foot step ladder
 Wooden pole (round: 5" diameter x 20' long)

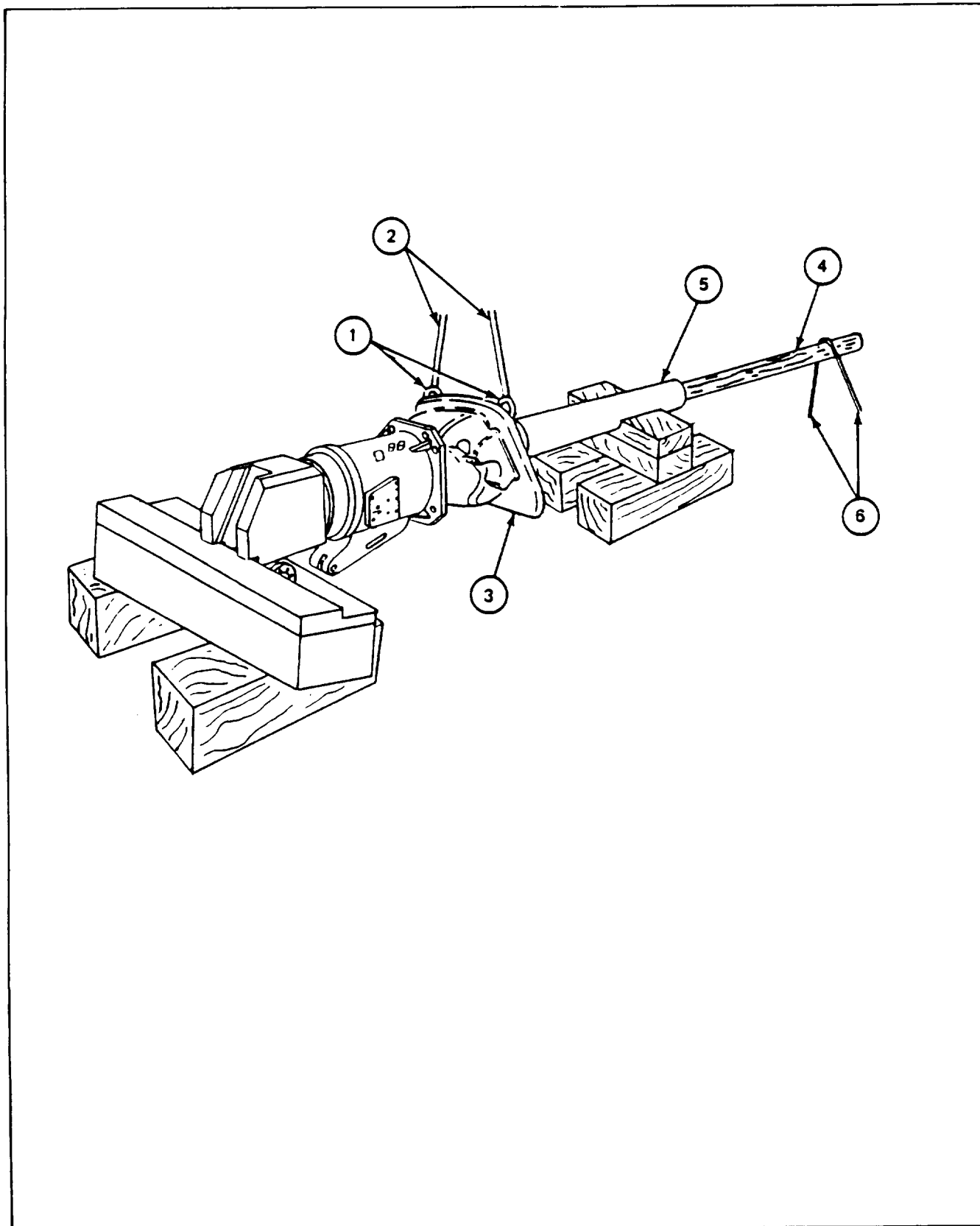
PERSONNEL: Four (including hoist operator)

REFERENCES: TM 9-2350-222-10 for procedures to:
 Install 7.62-mm machine gun
 TM 9-1240-285-34 for procedure to install M114 telescope mount
 TM 9-1220-220-34 for procedure to install M10A5 ballistic drive
 TM 9-2350-222-20-2-3 for procedures to:
 Install machine gun mounting bracket
 Install M105F telescope
 Install M13A3 fire control elevation quadrant
 Install gunner's guard
 Install loader's guard
 Install gun shield cover
 Install nylon ballistic shield
 Install gun recoil replenisher hose
 Install loader's safety relay switch
 Install breech release mechanism
 Install breech operating mechanism
 Install blasting machine
 Install blasting machine mounting support
 Install detent plunger and firing conductor assembly
 Install elevating mechanism
 JPG for procedures to:
 Use torque wrench
 Use torque multiplier

PRELIMINARY PROCEDURES: Install cannon tube and breech ring (para 11-17)
 Install recoil mechanism (para 11- 12)
 Install gun shield (para 11-8)

**11-4. CANNON M135 AND COMBINATION GUN MOUNT M150
INSTALLATION PROCEDURE (CONT)**

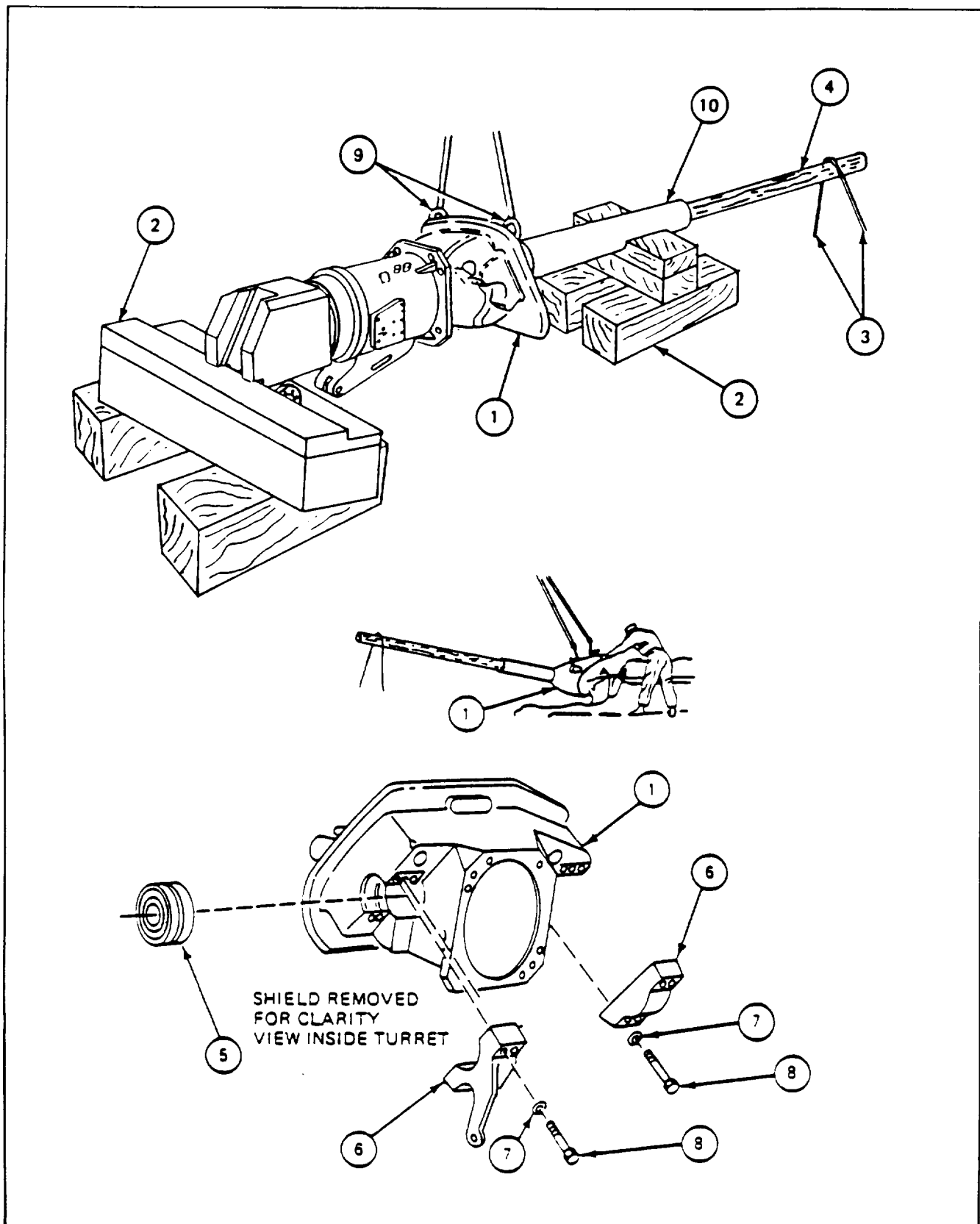
FRAME 1	
Step	Procedure
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p>Cannon tube and gun mount weigh about four tons. Stay out of way of tube and gun mount when they are lifted by hoist to prevent injury.</p> <p style="text-align: center;">NOTE</p> <p>Soldier A: Operate movable hoist. Soldier B and C: One on each side, hold guide rope, at muzzle end, to prevent swinging and help to guide gun mount (3) into turret. Soldier D (inside turret): Check and tell soldiers outside how clearances are inside for gun mount (3) as it is moved into turret.</p> <ol style="list-style-type: none"> 1. Put two hooks (1) of hoist sling (2) in two eyelets on gun mount (3). 2. Raise hoist sling (2) until slack is removed. 3. Put 20 foot wooden pole (4) into cannon tube (5) as far as it will go. 4. Using 1/4" diameter rope (6) (at middle), wrap two half hitches around wooden pole (4). <p>GO TO FRAME 2</p>



**11-4. CANNON M135 AND COMBINATION GUN MOUNT M150
INSTALLATION PROCEDURE (CONT)**

FRAME 2	
Step	Procedure
	<p>NOTE</p> <p>Soldier A: Operate movable hoist. Soldiers B and C: Guide gun mount (1). Soldier D (inside turret): Check and tell Soldier's outside how' clearances are for gun mount (1) as it is moved into turret.</p>
1.	<p>Using hoist, lift gun mount (1) off wooden blocks (2). Move gun mount (1) to position n front of turret opening.</p>
	<p>CAUTION</p> <p>Gun mount (1) must be lifted high enough to clear bearings (5) in turret, or bearings may be damaged.</p>
2.	Using guide rope (3), provide balance for gun mount (1) at end of wooden pole (4).
3.	Using hoist, slowly move gun mount (1) into turret opening.
	<p>CAUTION</p> <p>Use care when lowering shield onto trunnion bearings. Thrust washer will damage bearing if not properly seated.</p> <p>Two trunnion bearing caps (6) are not the same. Attach to gun mount (1) as shown.</p>
	<p>NOTE</p> <p>Left trunnion bearing cap (6) and shield has a thrust washer coined in place.</p>
4.	Using hoist, lower gun mount (1) on trunnion bearings (5).
5.	Using socket wrench, attach two trunnion bearing caps (6) to gun mount (1) with eight lockwashers (7) and eight screws (8).
6.	Using torque wrench, extension, and torque multiplier, tighten eight screws (8) to between 500 and 510 foot-pounds (JPG).
7.	Install elevating mechanism (TM-20-2-3).
8.	Remove two sling hooks (9) from gun mount (1).
9.	Remove guide rope (3) and wooden pole (4).
	GO TO FRAME 3

Para 11-4 Cont



**11-4, CANNON M135 AND COMBINATION GUN MOUNT M150
INSTALLATION PROCEDURE (CONT)**

FRAME 3	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p>Follow-on Maintenance Action Required:</p> <ul style="list-style-type: none"> Install torque bracket (para 11-25). Install gunner's guard support bracket (para 11-23). Install M105A ballistic drive (TM-220-34). Install gunner's guard (TM-20-2-3). Install loader's guard (TM-20-2-3). Install blasting machine mounting support (TM-20-2-3). Install blasting machine (TM-20-2-3). Install breech operating mechanism (TM-20-2-3). Install breech release mechanism (TM-20-2-3). Install loader's safety relay switch (TM-20-2-3). Install electrical firing lead (para 11-21). Install gun firing harness (para 4-3). Install detent plunger and firing conductor assembly (TM-20-2-3). Install gun recoil replenisher hose (TM-20-2-3). Install M13A3 fire control elevation quadrant (TM-20-2-3). Install M114 telescope mount (TM-285-34). Install M105F telescope (TM-20-2-3). Install machine gun mounting bracket (TM-20-2-3). Install machine gun (TM- 10). Install nylon ballistic shield (TM-20-2-3). Install gun shield cover (TM-20-2-3). <p>END OF TASK</p>

**11-5. CANNON M1 35 AND COMBINATION GUN MOUNT M150
DISASSEMBLY PROCEDURE**

PRELIMINARY PROCEDURES: Remove cannon M135 and combination gun mount M150 (para 11-3)

FRAME 1	
Step	Procedure
1.	Remove gun shield (para 11-7).
2.	Remove recoil mechanism (para 11-11).
3.	Remove breech ring and cannon tube (para 11-16).
	END OF TASK

11-6. CANNON M1 35 AND COMBINATION GUN MOUNT M150 ASSEMBLY PROCEDURE

FRAME 1	
Step	Procedure
1. 2. 3.	Install cannon tube and breech ring (para 11-17). Install recoil mechanism (para 11-12). Install gun shield (para 11-8). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required: Install cannon M135 and combination gun mount M150 (para 11-4).</p> <p>END OF TASK</p>

11-7. GUN SHIELD REMOVAL PROCEDURE

TOOLS: Movable hoist (4 ton capacity)
Sling (2 leg) (4 ton capacity)
3/8" socket head screw key (Allen wrench)
2" extension (3/4" drive)
1-5/8" socket (3/4" drive)
Socket wrench handle (3/4" drive)
Pry bar

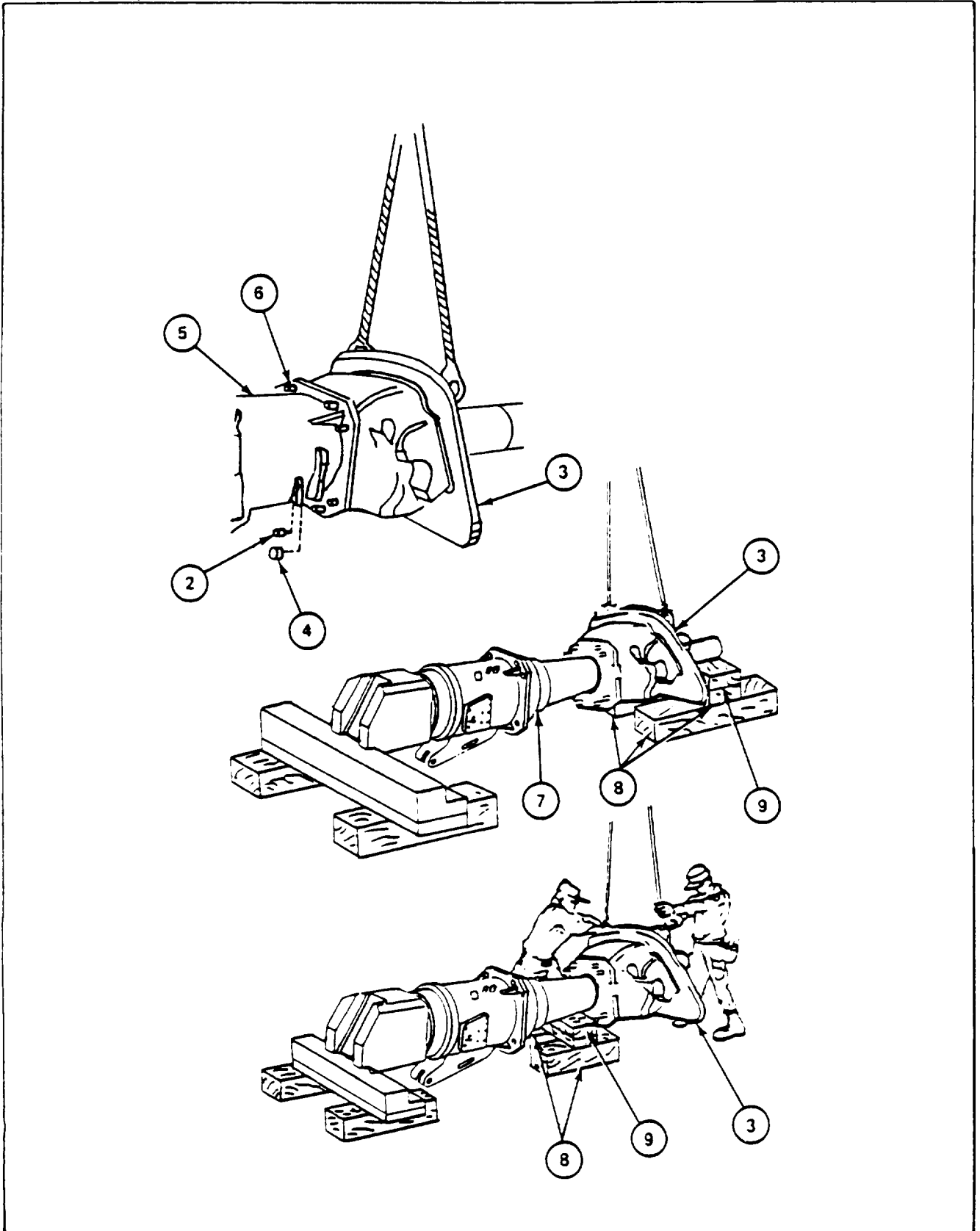
SUPPLIES: Rope (8 feet long) (3/4" diameter)
Wooden blocks (8" x 8" x 36") (two)

PERSONNEL: Three (including hoist operator)

PRELIMINARY PROCEDURES: Remove cannon M135 and combination gun mount M150 (para 11-3)

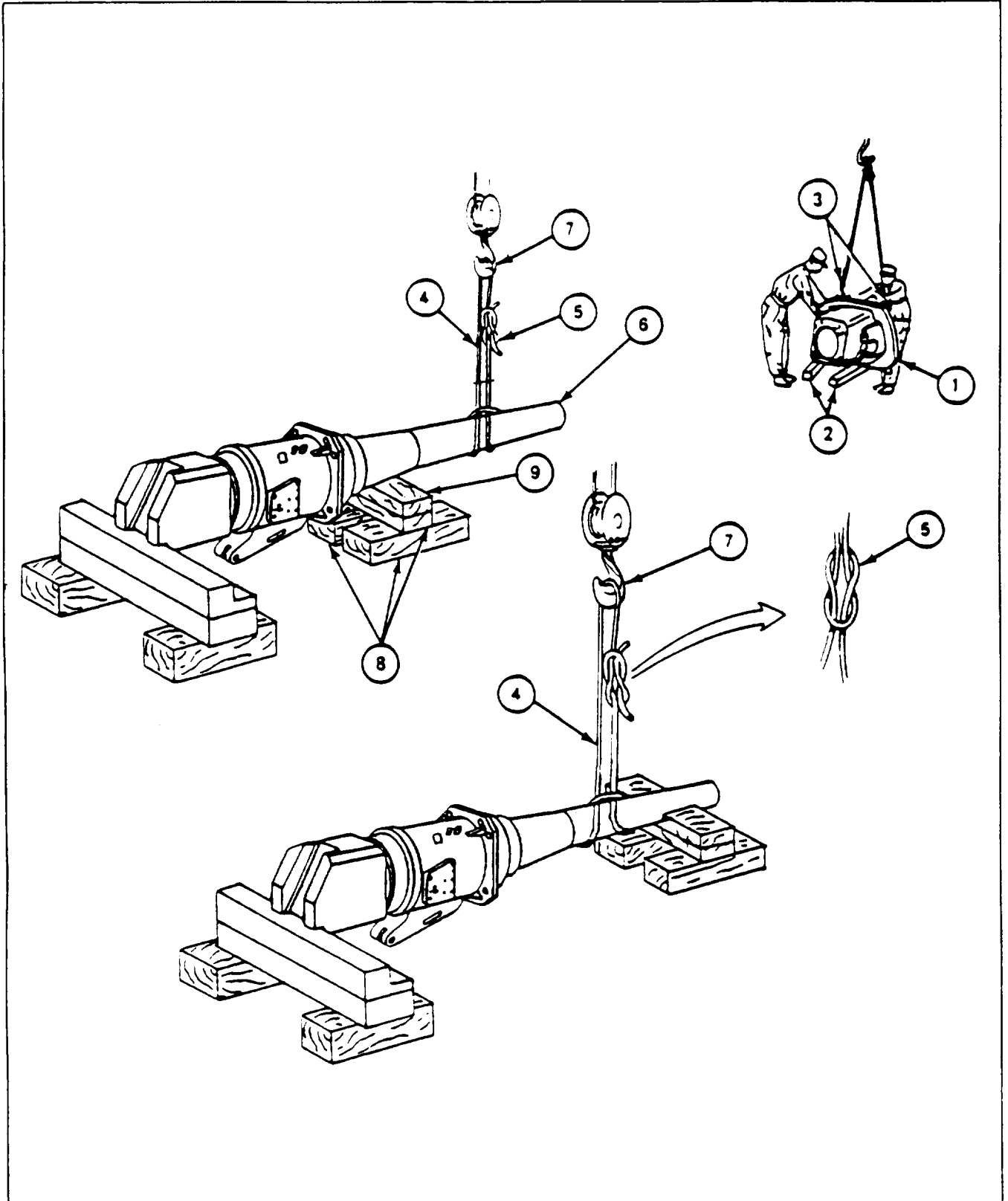
11-7. GUN SHIELD REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Using Allen wrench, remove two pipe plugs (1) from two expandable dowel pins (2) one on each side of gun shield (3).
2.	Using socket wrench. remove eight nuts (4) holding gun shield (3) to recoil mechanism (5).
3.	Throw away eight nuts (4).
CAUTION	
Use care in liftin to keep from damaing studs. Relieve weight on studs. Do not lift. Movable hoist and sling are still attached (para 11-3, frame 3).	
4.	Soldier A: Using movable hoist. lift weight of gun shield (3) off eight studs (6)
NOTE	
Use pry bar, if required. to loosen gun shield.	
5.	Soldiers B and C: One on each side, push gun shield (3) off eight studs (6).
6.	Soldier A: Using movable hoist. raise gun shield (3) a little to clear cannon tube (7) Soldier B and C: Guide gun shield and slide gun shield (3) along cannon tube to wooden blocks (8) and (9).
7.	Soldier A: Using movable hoist, lift gun shield (3) and cannon tube (7) off wooden blocks (8) and (9).
8.	Soldiers B and C: Move wooden blocks (8) and (9) on other side of gun shield (3)
9.	Soldier A: Using movable hoist, lower cannon tube (7) onto wooden blocks (8) and (9), Keep weight of gun shield (3) off cannon tube.
WARNING	
Do not get feet or any part of body under gun shield (3) while gun shield is lifted in air or injury may result if gun shield should fall.	
NOTE	
Soldier A: Operate hoist.	
Soldiers B and C. Guide gun shield (3).	
10.	Using hoist, shale gun sheid off cannon tube (7)
GO TO FRAME 2	



11-7. GUN SHIELD REMOVAL PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	<p>Soldier A: Using movable hoist, move gun shield (1) to level ground.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Wood blocking must support front and rear parts of shield.</p>
2.	Soldiers B and C: Put two wooden blocks (2) under gun shield (1) as shown.
3.	Soldier A: Using hoist, lower gun shield (1) on wooden blocks (2).
4.	Soldiers B and C: Remove two sling hooks (3) from eyelets on gun shield (1) and remove sling.
5.	Soldier B and C: Using rope (4), tie ends together with a square knot (5) forming a rope loop.
6.	Soldiers B and C: Wrap rope loop (4) around cannon tube (6) Put one end of rope loop through other end of rope loop and pull tight.
7.	Soldiers B and C: Put rope loop (4) over hoist hook (7), take up slack and tighten square knot (5).
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p style="text-align: center;">Do not get feet or any part of body under cannon tube while cannon tube (6) is being lifted in air or injury may result if cannon tube should fall.</p>	
8.	Soldier A: Using hoist, raise cannon tube (6) off wooden blocks (8) and (9).
9.	Soldiers B and C: Move wooden blocks (8) and (9) to muzzle end of cannon tube (6).
10.	Soldier A: Using hoist, lower cannon tube (6) on wooden blocks (8) and (9).
11.	Soldiers B and C: Remove hoist hook (7) from rope (4) and rope from cannon tube (6)
END OF TASK	



11-7.1. TELESCOPE M105F WEDGE ASSEMBLY REPAIR PROCEDURE

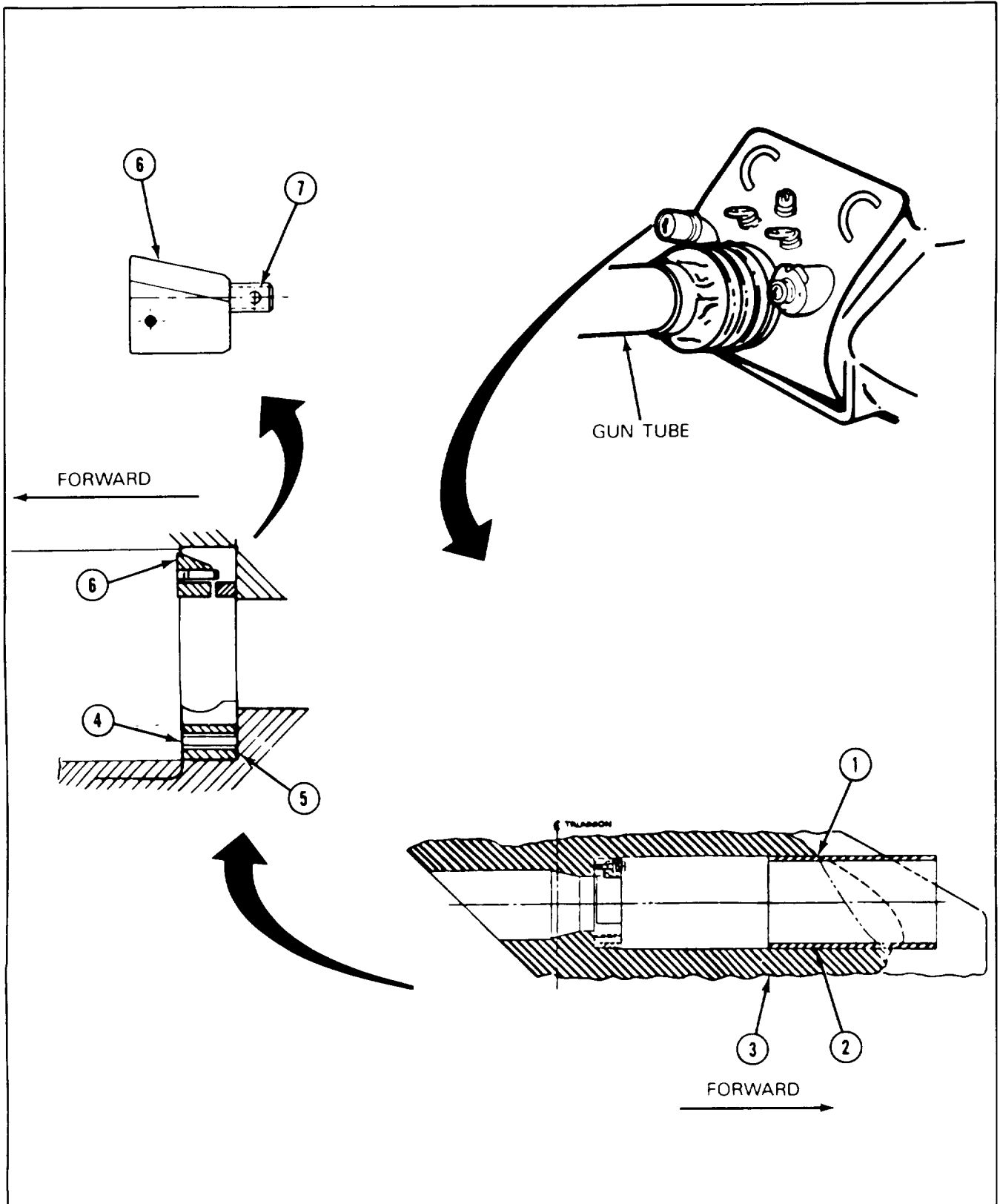
TOOLS: Abrasive disk
 Portable electrical grinder (NSN 5130-01-087-6820)
 7/64 in. diameter drill bit
 Screw extractor No. 2
 Thread restorer file (NSN 5110-00-373-1691)
 Slip joint pliers
 Soft cap hammer
 9/16 in. hex head socket, 3/8 in. drive
 3/8 in. drive ratchet
 Drill press

SUPPLIES: screw, 3/8 in. diameter x 16 NC (three) (with a minimum of 2-1/2 in. thread length)
 Dry cleaning solvent, P-D-680 (item 9.1 APP. A)

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove gun shield (mantlet) cover (TM-20-2-3)
 Remove M 105F telescope from gun shield (TM-20-2-3)

FRAME 1	
Step	Procedure
1.	Using electrical grinder and abrasive disk, grind welds (1) that hold telescope tube (2) to gun shield (3).
2.	Using hammer, tap lightly around telescope tube (2) and pull out telescope tube (2) with pliers
3.	Using socket and ratchet, screw in three 3/8 in diameter screw into three pre-tapped holes (4) in retainer ring (5),
4.	Apply even torque to three 3/8 in. diameter screws in retainer ring (5) Remove damaged wedge assembly 161 with retainer ring (5) from gun shield (3).
5.	Remove three 3/8 in. diameter screws from retainer ring (5)
6.	Place the retaining ring in drill press and drill out the broken wedge assembly bolt using a 7/64 bit and No 2 extractor tool
7.	Using thread restorer file clean wedge assembly threaded hole
	NOTE
	Follow-on Maintenance Action Required
	Clean all parts
	END OF TASK



11-7.2. TELESCOPE M105F WEDGE ASSEMBLY INSTALLATION PROCEDURE

TOOLS: Hammer
 1/2 in. diameter drift pin
 Brush

SUPPLIES: Primer coating, TT-P-664 (item 15., App. A)
 Wedge Assembly, 11659636 (NSN 1015-01-019-7133)

PERSONNEL: Two (including welder)

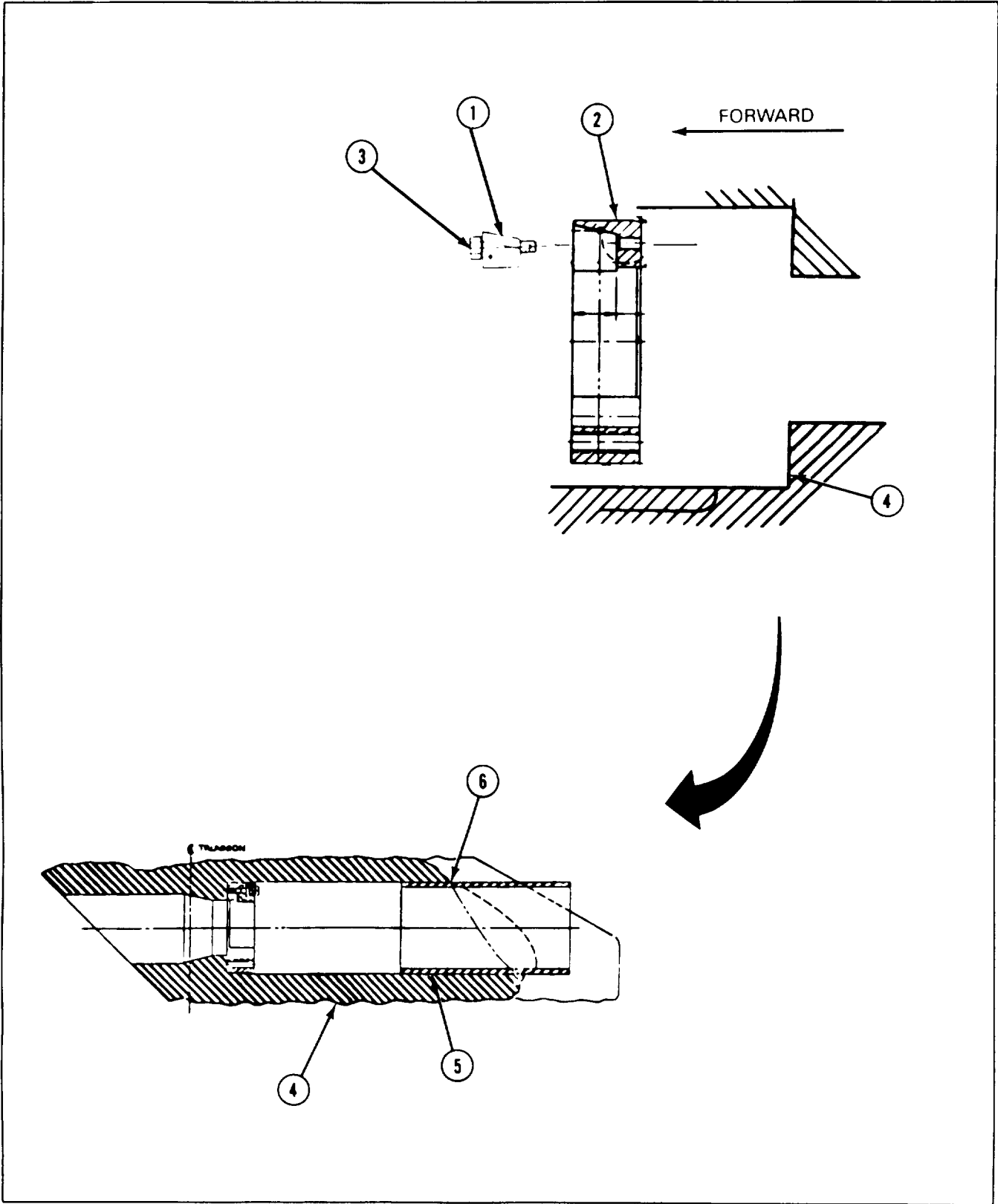
PRELIMINARY PROCEDURES: Remove gun shield (mantlet) cover (TM-20-2-3)
 Remove M105F telescope from gun shield (TM-20-2-3)

GENERAL INSTRUCTIONS:

NOTE

Notify your supervisor that a welder is needed to perform this task.

FRAME 1	
Step	procedure
1.	Insert new wedge assembly (1) to retainer ring (2), but do not tighten screw (3) on wedge assembly (1).
2.	Install retainer ring (2) and wedge assembly (1) into telescope mount hole (4).
3.	Using hammer and drift pin, tap retainer ring (2) lightly to secure even fit in telescope mount hole (4).
4.	Place telescope tube (5) in telescope mount hole (4). Using welding equipment, make three welds (6) on telescope tube (5).
5.	Using brush, apply a coat of primer to three welds (6).
<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Install M105F telescope to gun shield (TM -20-2-3) Install gun shield (mantlet) cover (TM -20-2-3).</p>	
END OF TASK	



11-8. GUN SHIELD INSTALLATION PROCEDURE

TOOLS: Movable hoist (4 ton capacity)
Sling (2 leg) (4 ton capacity)
3/8" socket head screw key (Allen wrench)
1-5/8" socket (3/4" drive)
Socket wrench handle (3/4" drive)
3/4" drive torque wrench (0 to 600 foot-pounds)
2" extension (3/4" drive)
1-5/8 socket (1" drive)

SUPPLIES: Nuts (MS 21044 -N18) (eight)
Crocus cloth (item 7, App. A)
Dry cleaning solvent (item 33, App. A)
Rags (item 21, App. A)
Grease (item 12, App. A)
Rope (8 feet long) (3/4" diameter)

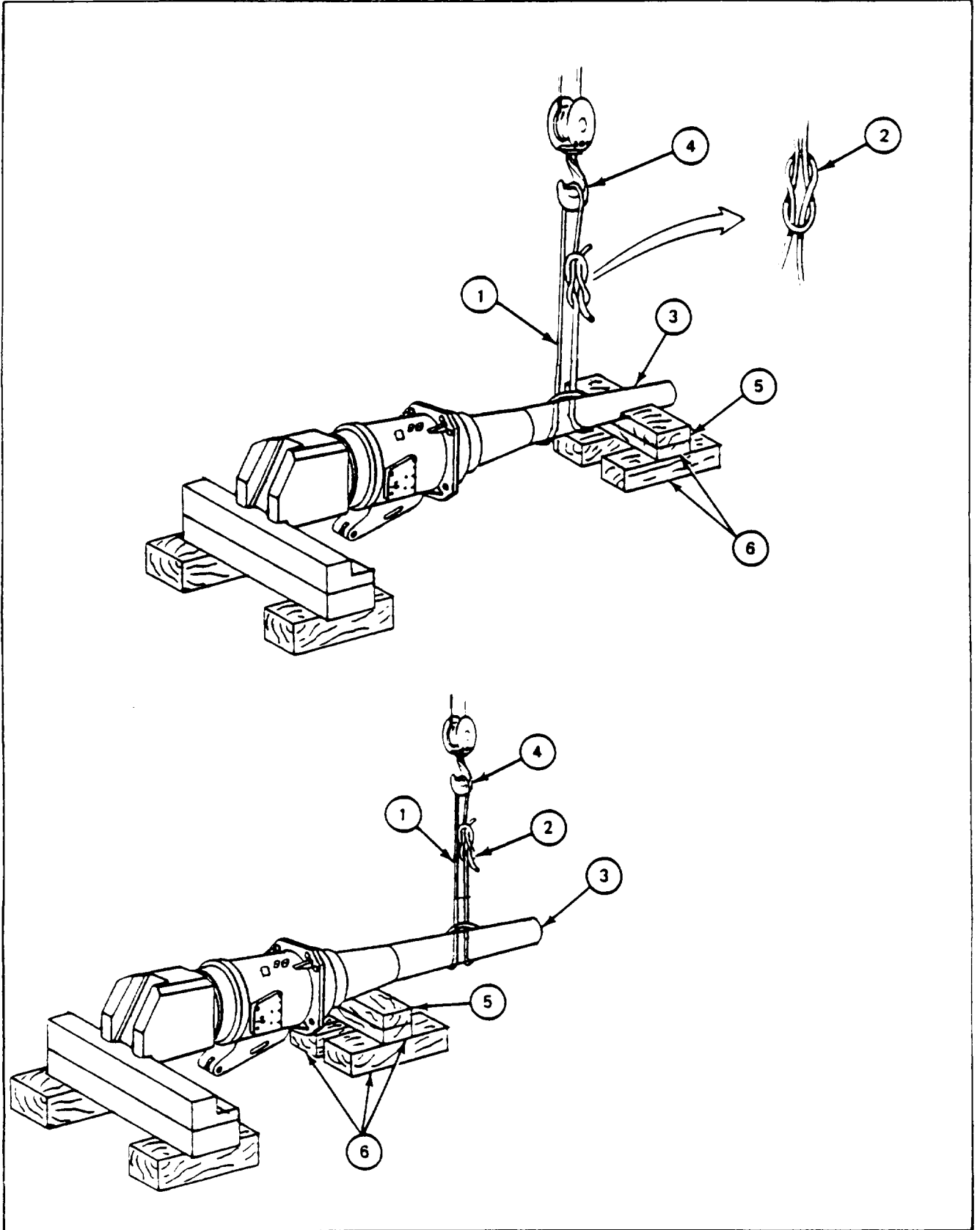
PERSONNEL: Three (including hoist operator)

REFERENCES: JPG for procedures to:
Use torque wrench
Remove dirt and rust

PRELIMINARY PROCEDURES: Install recoil mechanism (para 11-12)

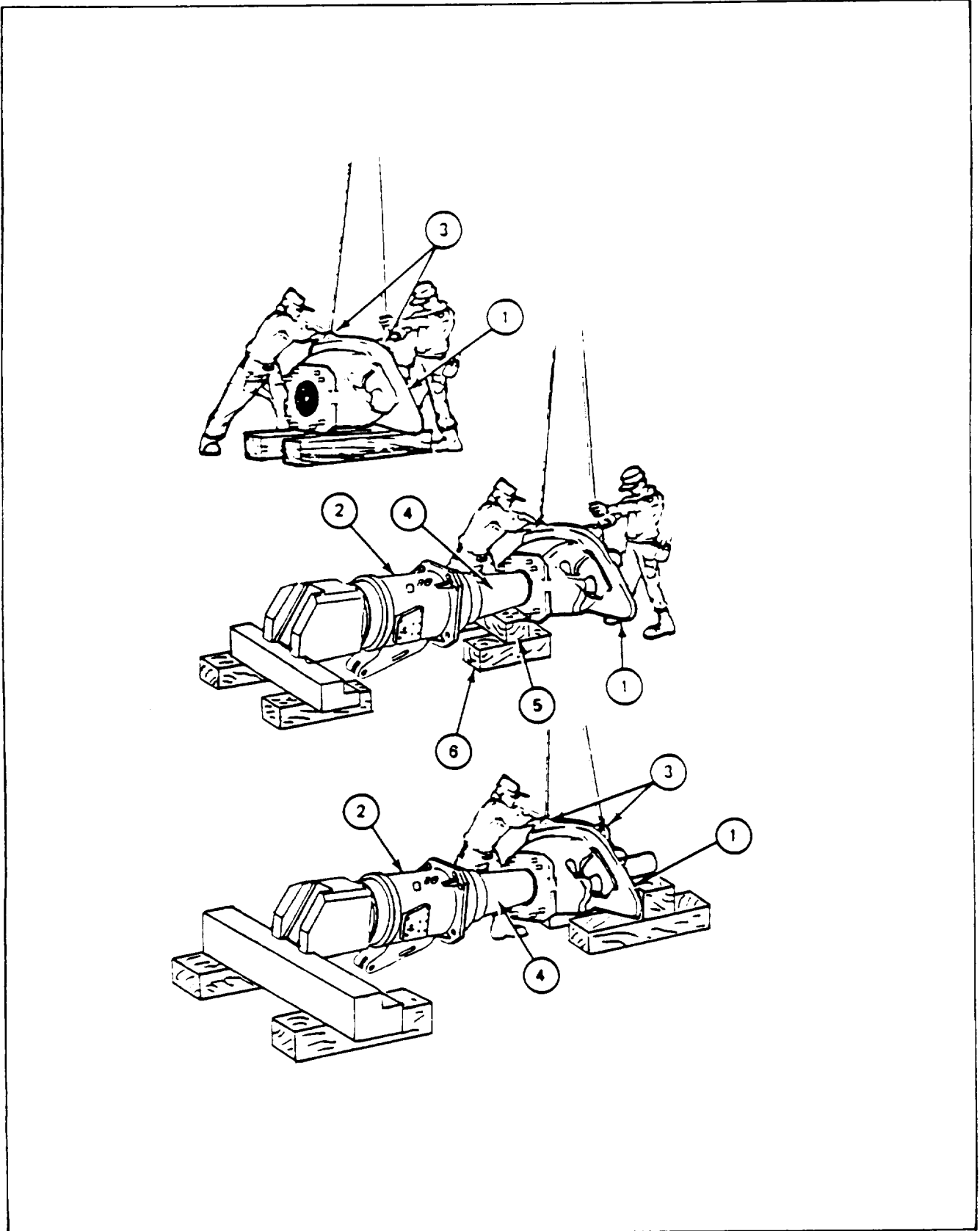
11-8. GUN SHIELD INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Using rope (1) tie ends together with a square knot (2) forming a loop of rope.
2.	Using loop wrap one end of loop of rope (1) around cannon tube (3) and push other end of loop through first end.
<p>NOTE</p> <p>Soldier A: Operate hoist</p>	
3.	Using hoist. put loop of rope (1) over hook (4) and take up slack to tighten square knot (2).
<div data-bbox="636 770 855 851" style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p>Do not get feet or any part of the body under cannon tube when cannon tube is being lifted in air. Injury may result if cannon tube should fall.</p>	
4.	Using hoist, raise cannon tube (3) off wooden blocks (5) and (6).
5.	Move wooden blocks (5) and (6) under cannon tube (3) on breech side of rope (1) near rope.
6.	Using hoist. lower cannon tube (3) on wooden blocks (5) and (6).
7.	Remove hoist hook (4) from rope (1).
8.	Remove rope (1) from cannon tube (3).
GO TO FRAME 2	



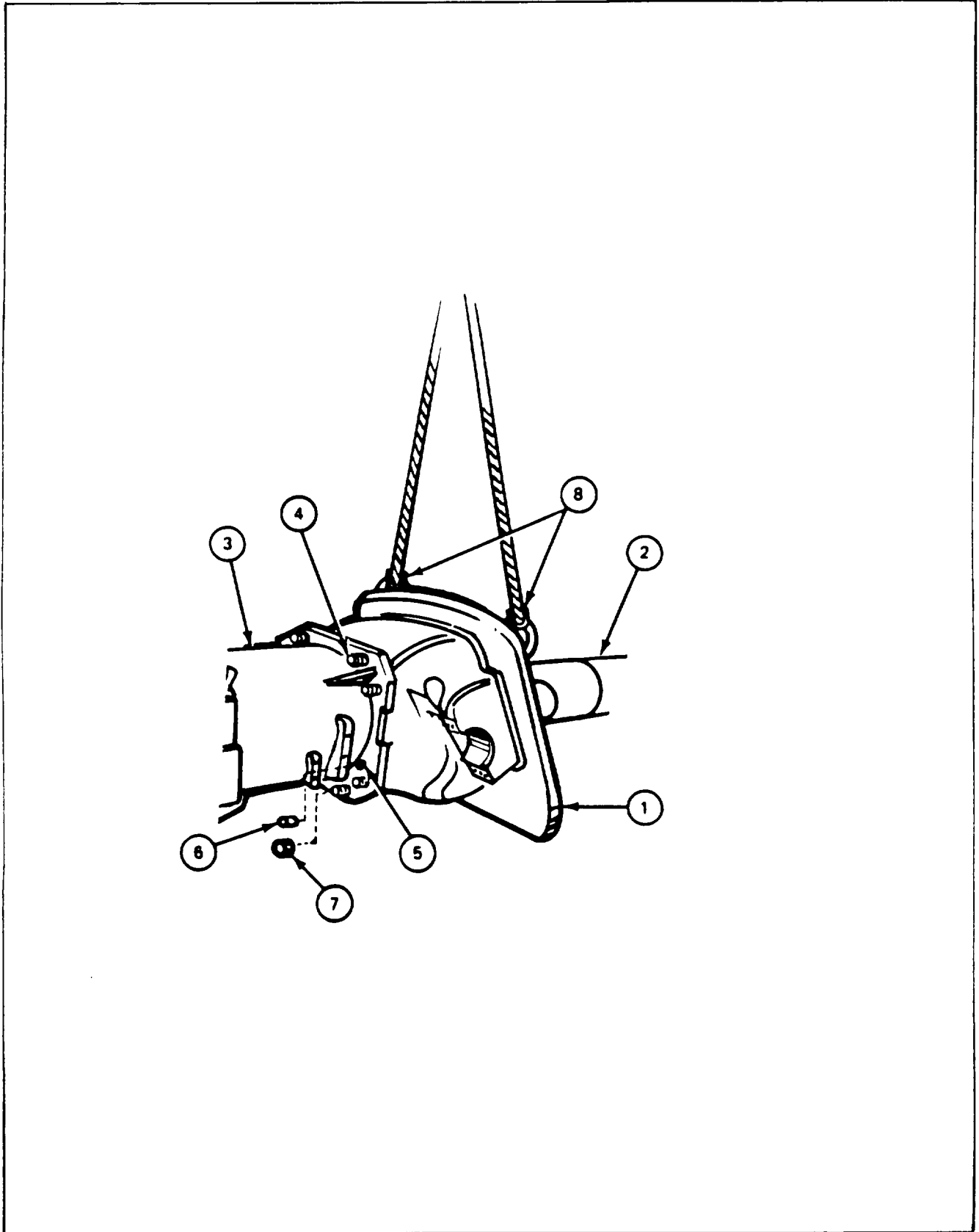
11-8. GUN SHIELD INSTALLATION PROCEDURE (CONT)

FRAME 2	
Step	Procedure
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p>Gun shield (1) weighs about 1-1/2 tons. Keep hands, feet and body from under gun shield when it is lifted by hoist to prevent injury if it should fall.</p> <p style="text-align: center;">NOTE</p> <p>Soldier A: Operate hoist. Soldiers B and C: Guide gun shield (1), check clearance between gun shield and cannon tube (4), and move wooden blocks (5) and (6).</p> <ol style="list-style-type: none"> 1. Using dry cleaning solvent, rags and crocus cloth, remove any dirt, rust, or rust preventive compound from machined surfaces before installing gun shield (1) (JG). 2. Using rag, spread a small amount of grease on inside of gun shield (1) and recoil mechanism (2) machined surfaces. 3. Put hoist sling hooks (3) into two eyelets on gun shield (1). 4. Using movable hoist, lift and move gun shield (1) along cannon tube (4) until gun shield is next to wooden blocks (5) and (6) (rear of shield). 5. Using hoist, carefully lift gun shield (1) until cannon tube (4) is off wooden blocks (5) and (6). 6. Move wooden blocks (5) and (6) to front side of gun shield (1). 7. Using hoist, lower gun shield (1) until cannon tube (4) rests on wooden blocks (5) and (6). 8. Using hoist, move weight of gun shield (1) off cannon tube (4) until there is clearance between them. <p>GO TO FRAME 3</p>



11-8. GUN SHIELD INSTALLATION PROCEDURE (CONT)

FRAME 3	
Step	Procedure
	NOTE
	Soldier A: Operate hoist. soldiers B and C: Guide gun shield.
1.	Using movable hoist, carefully move gun shield (1) over cannon tube (2) until it is against recoil mechanism (3).
2.	Soldiers B and C: Line up eight studs (4) and two dowel pins (5) with holes in recoil mechanism (3) and carefully push studs, dowel pins and gun shield (1) as far as they will go.
3.	Using Allen wrench, put two pipe plugs (6) into two dowel pins (5) in gun shield (1).
	NOTE
	Nuts (7) are self-locking type and must be replaced with new ones each time they are removed.
4.	Using socket wrench, attach recoil mechanism (3) to gun shield (1) with eight new nuts (7).
5.	Using torque wrench, torque eight nuts (7) to between 600 and 610 foot-pounds (JPG).
6.	Using Allen wrench, tighten two pipe plugs (6) into two dowel pins (5) in gun shield (1).
7.	Remove hoist sling hooks (8) from two eyelets on gun shield (1).
	NOTE
	Follow-on Maintenance Action Required: Install cannon M 135 and combination gun mount M150 (para 11-4).
	END OF TASK



11-9. RECOIL MECHANISM INSPECTION PROCEDURE

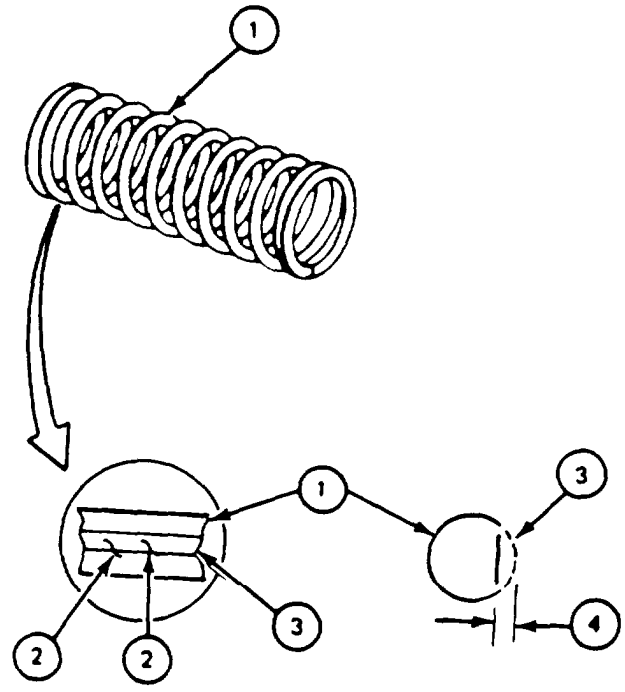
PERSONNEL: One

PRELIMINARY PROCEDURES: Disassemble recoil mechanism (para 11-13)

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;">NOTE</p> <p style="text-align: center;">Cracks (2) within worn area (3) of recoil spring (1) are normal.</p> <p>1. Replace recoil spring (1) if cracks (2) extend outside worn area (3).</p> <p>2. Replace recoil spring (1) if depth (4) of worn area (3) is greater than 0.020".</p> <p>GO TO FRAME 2</p>
	 <p>The diagram illustrates the inspection points for a recoil spring. It shows a perspective view of the spring (1) at the top. Below it, a cross-sectional view shows the spring (1) seated in a housing. Callout 2 points to two cracks on the spring. Callout 3 points to a worn area on the spring. Callout 4 points to the depth of the worn area, which is shown to be greater than 0.020 inches.</p>

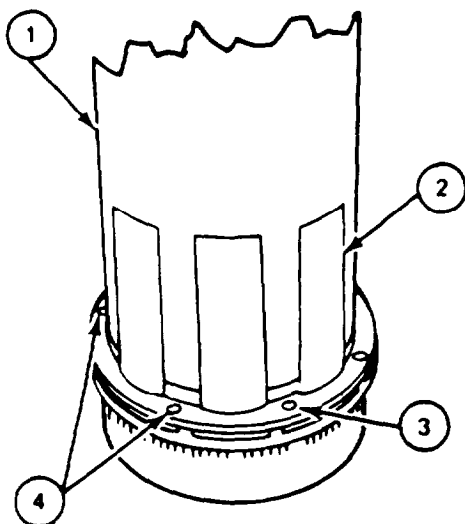
11-9. RECOIL MECHANISM INSPECTION PROCEDURE (CONT)

FRAME 2	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">If spring recoil ring (1) does not have two dowel pins (2), mandatory modification must be done to add them.</p> <p>1. Check spring recoil ring (1). If it does not have two dowel pins (2) and dowel pin holes (3) in addition to four existing screw holes (4), do para 11-15b.</p> <p>GO TO FRAME 3</p>

11- 9. RECOIL MECHANISM INSPECTION PROCEDURE (CONT)

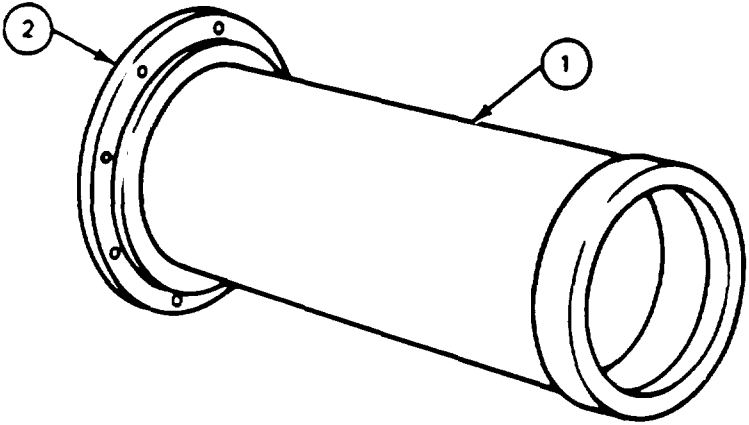
FRAME 3

Step	Procedure
	<p style="text-align: center;">NOTE</p> <p>If piston (1) part number is 8449037, piston is of new design and does not require modification by machining. If piston (1) part number is 11658913, piston has been modified. If piston (1) part number is 10915951, piston must be modified.</p>
1.	<p>Check part number of piston (1) located in (one of eight) splines (2). If piston part number is 10915951, do para 11-15b.</p>
	<p style="text-align: center;">NOTE</p> <p>If two dowel pin holes (3) do not exist, they must be added.</p>
2.	<p>Check head of piston (1). If it does not have two dowel pin holes (3) in addition to four existing screw holes (4), do para 11-15b.</p> <p>GO TO FRAME 4</p>



NOTE
 A DOWEL PIN HOLE IS
 HIDDEN FROM VIEW
 180° OPPOSITE DOWEL
 PIN (3) SHOWN.

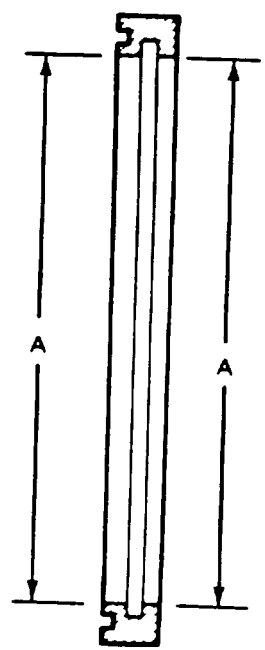
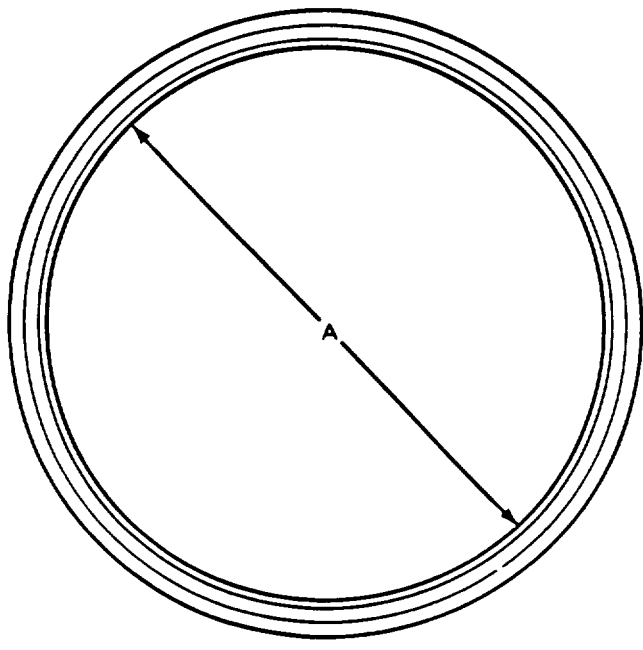
11-9. RECOIL MECHANISM INSPECTION PROCEDURE (CONT)

FRAME 4	
SStep	Procedure
	<p style="text-align: center;">NOTE</p> <p>If sleeve (1) part number is 8449036, sleeve is of new design and does not require modification by machining. If sleeve (1) part number is 11658912A, sleeve has been modified. If sleeve (1) part number is 8762794, sleeve must be modified. If sleeve (1) part number is 11658912, dimensions of rear bearing surfaces must be checked.</p> <ol style="list-style-type: none"> 1. Check part number of sleeve (1) located on upper face of flange (2). 2. If sleeve (1) part number is 8762794, do para 11-15c. 3. If sleeve (1) part number is 11658912, do para 11-15d. <p>GO TO FRAME 5</p> <div style="text-align: center; margin-top: 20px;">  </div>

11-9. RECOIL MECHANISM INSPECTION PROCEDURE (CONT)

FRAME 5

Step	Procedure						
	SUPPORT SHOP WORK						
1.	Take outer seal retainer to shop where inspection equipment is available.						
2.	Make dimensional check.						
	<table border="0" style="width: 100%; border-collapse: collapse;"> <tr> <td style="text-align: center; width: 33%;">Reference Letter</td> <td style="text-align: center; width: 33%;">Point of Measurement</td> <td style="text-align: center; width: 33%;">Measurement</td> </tr> <tr> <td style="text-align: center;">A</td> <td style="text-align: center;">ID</td> <td style="text-align: center;">11.505 to 11.511</td> </tr> </table>	Reference Letter	Point of Measurement	Measurement	A	ID	11.505 to 11.511
Reference Letter	Point of Measurement	Measurement					
A	ID	11.505 to 11.511					
	<p>NOTE</p> <p>Tag retainer if it is out of tolerance.</p>						
3.	After support shop work, return outer seal retainer to turret shop.						
	END OF TASK						



11-10. RECOIL MECHANISM TEST PROCEDURE

TEST EQUIPMENT: Hydraulic test kit (NSN 1015-01-151-6441) (9337932)
M3 oil pump
Recoil mechanism test fixture (NSN 4933-00-830-5637)
Watch with sweep second hand

TOOLS: 1/2 in. combination wrench
Machinist steel rule (12 in. long)
O-ring extractor kit

SUPPLIES: Hydraulic fluid (8 gallons) (item 10, App. A)
Rags (item 21, App. A)
Container (2 quart minimum)
Oil drip pan
Funnel

PERSONNEL: Two

PRELIMINARY PROCEDURES: Install recoil mechanism (para 11-12)

GENERAL INSTRUCTIONS:

CAUTION

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

NOTE

Use rags for fluid spillage.

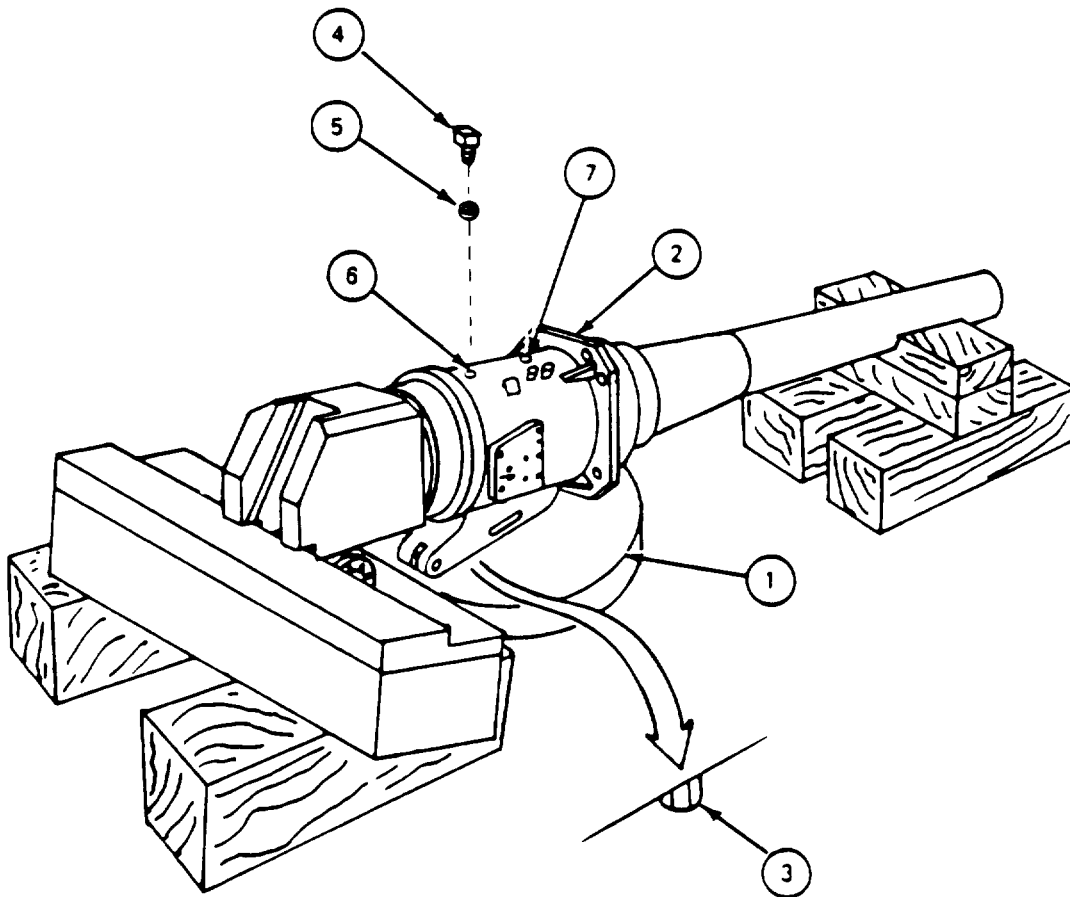
If normal indication is not obtained, remove and disassemble recoil mechanism (para 11-11 and 11-13). Refer to section index (para 11-2) for replacement of bad part.

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

11-10. RECOIL MECHANISM TEST PROCEDURE (CONT)

FRAME 1

Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Make sure gun and mount are on wooden blocks at least 24" high. Recoil mechanism must be level.</p> <ol style="list-style-type: none"> 1. Put oil drip pan (1) under recoil mechanism (2). 2. Using 1/2" wrench, tighten drain plug (3) on bottom of recoil mechanism (2). 3. Using 1/2" wrench, remove plug (4) and washer (5) from hole (6) on top of recoil mechanism (2). 4. Remove protective plug or tape from hole (7) on top of recoil mechanism (2). <p>GO TO FRAME 2</p>



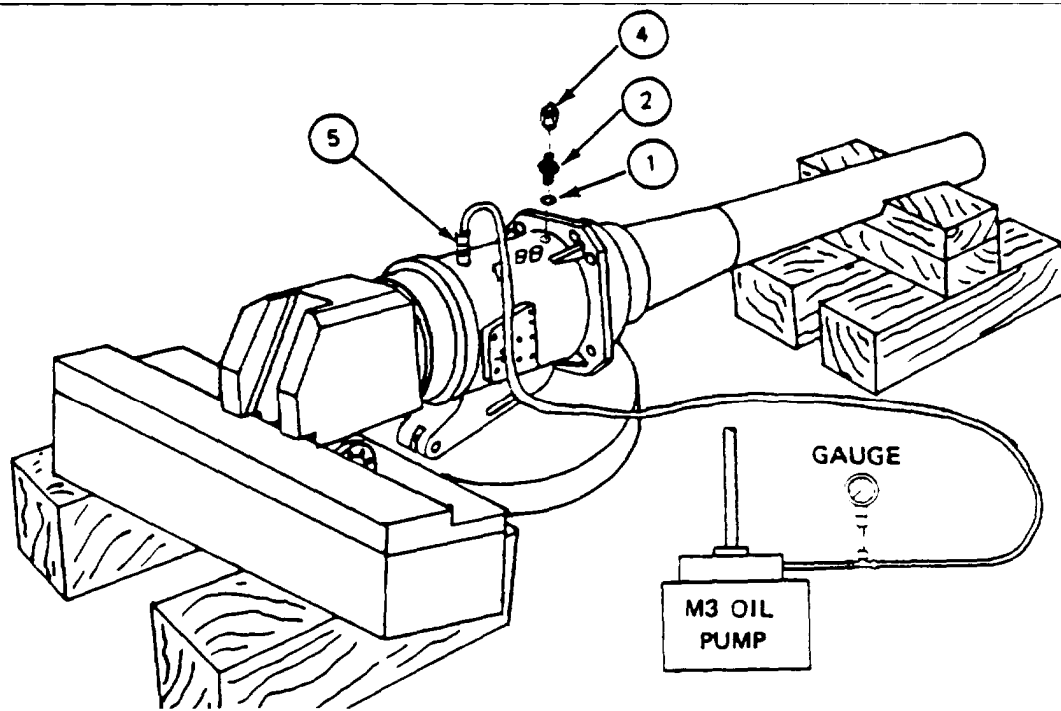
11-10. RECOIL MECHANISM TEST PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	Lightly coat preformed packing (1) with hydraulic fluid.
2.	Using O-ring extractor tool, put preformed packing (1) on reducer (2) (JPG).
3.	Put reducer (2) in hole on top of recoil mechanism (3).
NOTE	
Funnel (4) may need to be held slightly above hole so hydraulic fluid will flow freely. Recoil mechanism (3) holds about 4 gallons of hydraulic fluid.	
4.	Put funnel (4) in hole on top of recoil mechanism (3).
5.	Using container of clean hydraulic fluid, slowly pour hydraulic fluid through funnel (4) into recoil mechanism (3).
6.	Fill recoil mechanism (3) until hydraulic fluid free of air bubbles flows from reducer (2).
7.	Stop pouring hydraulic fluid and allow recoil mechanism (3) to set.
8.	Using watch, wait 5 minutes and then repeat step 5 and 6.
9.	Remove funnel (4).
GO TO FRAME 3	

11-10. RECOIL MECHANISM TEST PROCEDURE (CONT)

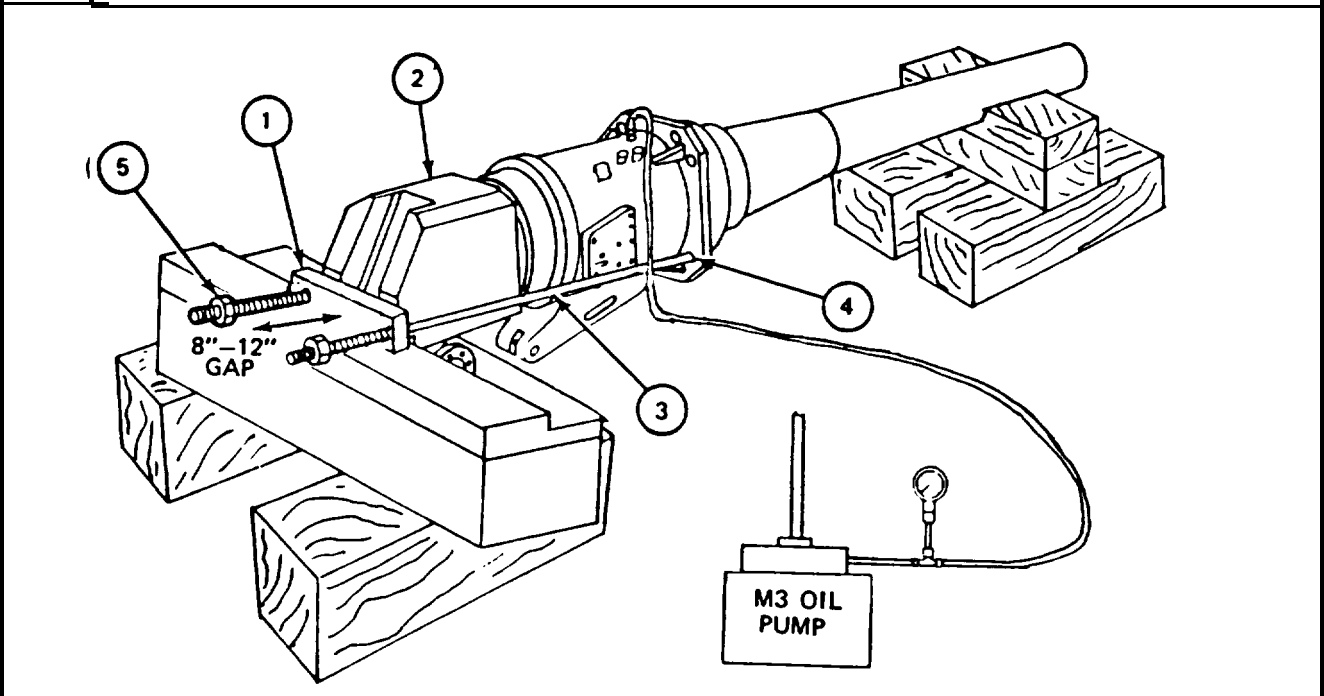
FRAME 3

Step	Procedure
1.	Lightly coat preformed packing (1) with hydraulic fluid.
2.	Using O-ring extractor tool, put preformed packing (1) on adapter (2) (JPG).
3.	Put adapter (2) in hole on top of recoil mechanism (3).
4.	Using hands, put pressure cap (4) on adapter (2).
5.	Assemble M3 oil pump with 5000 psi gauge as shown.
6.	Connect hose from M3 oil pump to reducer (5) on recoil mechanism (3).
<p>NOTE</p> <p>Soldier A: Operate M3 oil pump. Soldier B: Open pressure cap to remove air from recoil mechanism.</p>	
7.	Using M3 oil pump, raise pressure in recoil mechanism (3) to between 100 and 200 psi (JPG).
8.	Loosen and tighten pressure cap (4) until hydraulic fluid is free of air bubbles.
9.	Using M3 oil pump, reduce pressure to 0 psi (JPG).
<p>GO TO FRAME 4</p>	



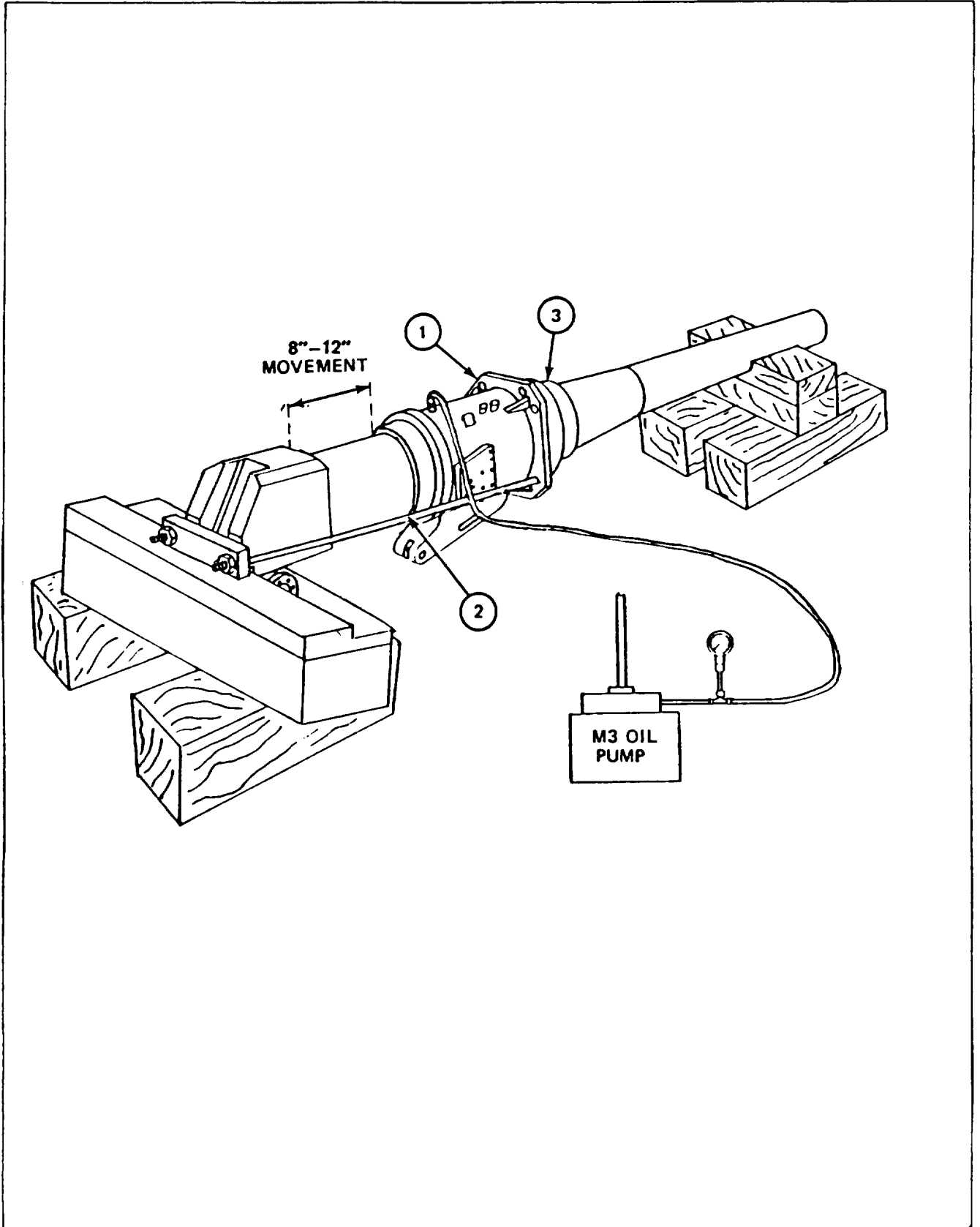
11-10. RECOIL MECHANISM TEST PROCEDURE (CONT)

FRAME 4	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Two Soldiers are needed to put test fixture in position. Soldier A holds block in place while soldier B puts in rods and nuts.</p> <ol style="list-style-type: none"> 1. Hold block (1) of test fixture against end of breech (2). 2. Push threaded end of two rods (3) of test fixture through holes (4) in flange from muzzle end of recoil mechanism. 3. Put two rods (3) through block (1). <p style="text-align: center;">NOTE .</p> <p style="text-align: center;">Block must be held against breech ring and rods pushed fully in place (rearward).</p> <ol style="list-style-type: none"> 4. Using steel rule, put two nuts (5) equally on rods (3) so distance from front face of block (1) to nuts is between 8" and 12". 5. Using rags, wipe all hydraulic fluid from outside of recoil mechanism for leak check. <p>GO TO FRAME 5</p>



11-10. RECOIL MECHANISM TEST PROCEDURE (CONT)

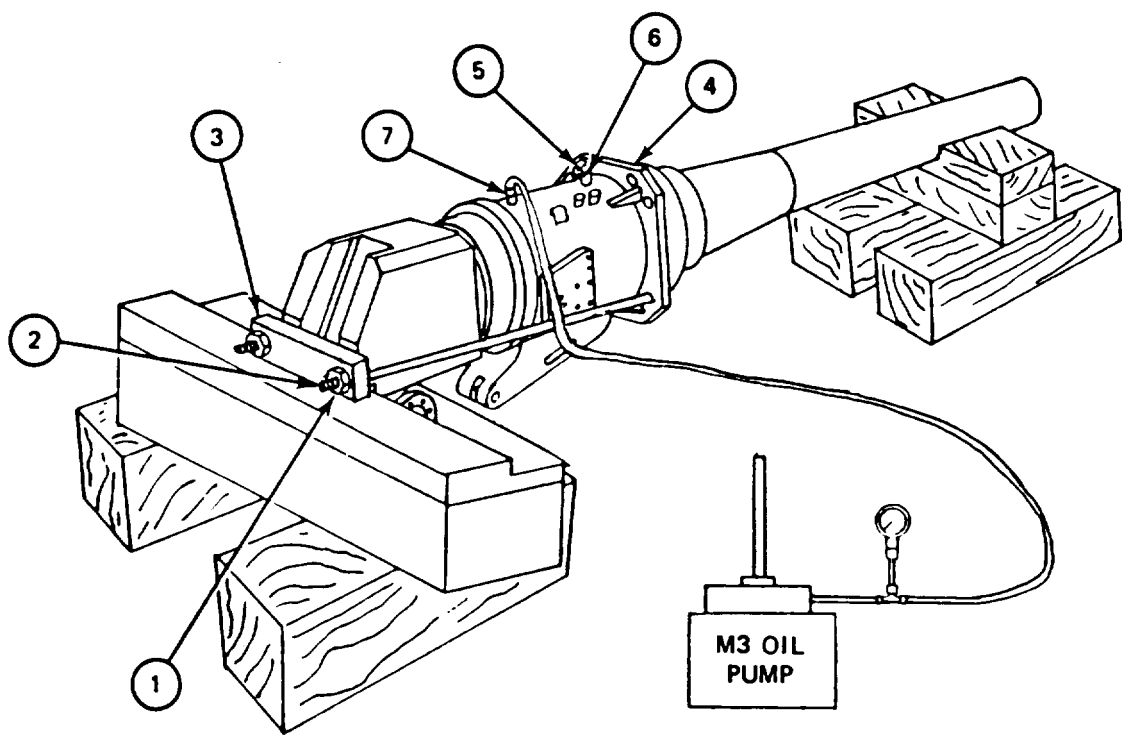
FRAME 5			
Step	Procedure	Normal Indication	Probable Fault
1.	Using M3 oil pump slowly pressurize recoil mechanism (1) (JPG).	. . .	. . .
2.	Check all test connections for leaks. Repair as required.	. . .	...
3.	Using M3 oil pump, continue to increase pressure in recoil mechanism (1) to between 300 and 400 psi (JPG).	A. 300 to 400 psi on pressure gauge. B. Recoil mechanism should start moving.	A. Leakage B. Obstruction blocking movements.
4.	Using M3 oil pump, continue to increase pressure in recoil mechanism (1) to between 2450 and 2550 psi (JPG).	A. Steady 2450 to 2550 psi on pressure gauge. B. Recoil mechanism should move 8" to 12" (Maximum allowed by block of test fixture)	A. Air in recoil mechanism (Repeat air removal, frame 3) Leakage B. Bad recoil mechanism
5.	Using watch, hold pressure for 5 minutes. Check for leaks at rear spring seat (2) and support sleeve (3).	A. Steady 2450 to 2550 psi on pressure gauge B. No leakage	A. Leakage B. Bad sleeve, internal seals, or seal retainer.
6.	Using M3 oil pump. reduce pressure to 0 psi (JPG).	A. 0 psi on pressure gauge B. Recoil mechanism should move to breech end (original position)	A. Hydraulic fluid blocked. B. Bad recoil mechanism or obstruction blocking movement,
GO TO FRAME 6			



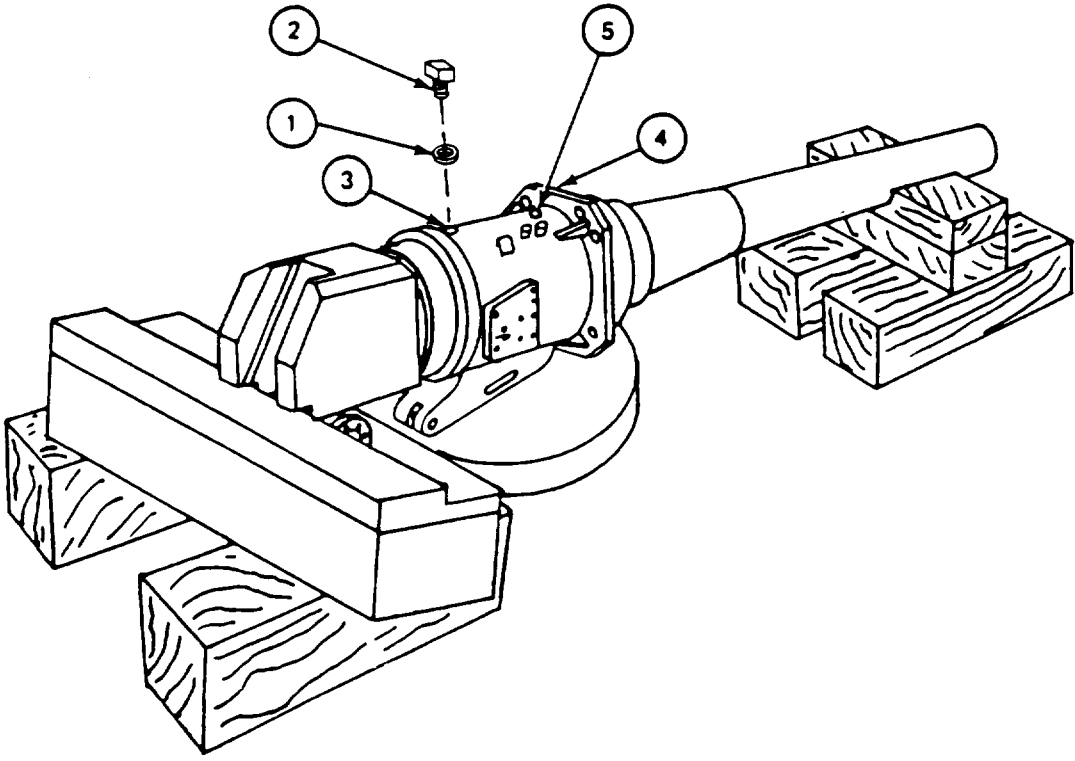
11-10. RECOIL MECHANISM TEST PROCEDURE (CONT)

FRAME 6

Step	Procedure
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">If normal indication was obtained in Frame 5, recoil mechanism is good. Two soldiers are needed to remove test fixture. Soldier A holds block while soldier B removes nuts and rods.</p> <ol style="list-style-type: none"> 1. Using hands, remove two nuts (1) from two rods (2) of test fixture. 2. Remove block (3) from two rods (2). 3. Carefully remove two rods (2) from recoil mechanism (4), 4. Remove pressure cap (5) and adapter (6) from top of recoil mechanism (4). 5. Remove hose of M3 oil pump from reducer (7). 6. Remove reducer (7) from top of recoil mechanism (4). 7. Disassemble M3 oil pump. <p>GO TO FRAME 7</p>	



11-10. RECOIL MECHANISM TEST PROCEDURE (CONT)

FRAME 7	
Step	Procedure
	<ol style="list-style-type: none"> 1. Using 1/2" wrench, put new washer (1) and plug (2) in hole (3) on top of recoil mechanism (4). 2. Put protective plug or tape in hole (5) on top of recoil mechanism (4). 3. Using rags, wipe up all hydraulic fluid spills from recoil mechanism (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 gun shield (para 11-8).</p> <p>END OF TASK</p> 

11-11. **RECOIL MECHANISM REMOVAL PROCEDURE**

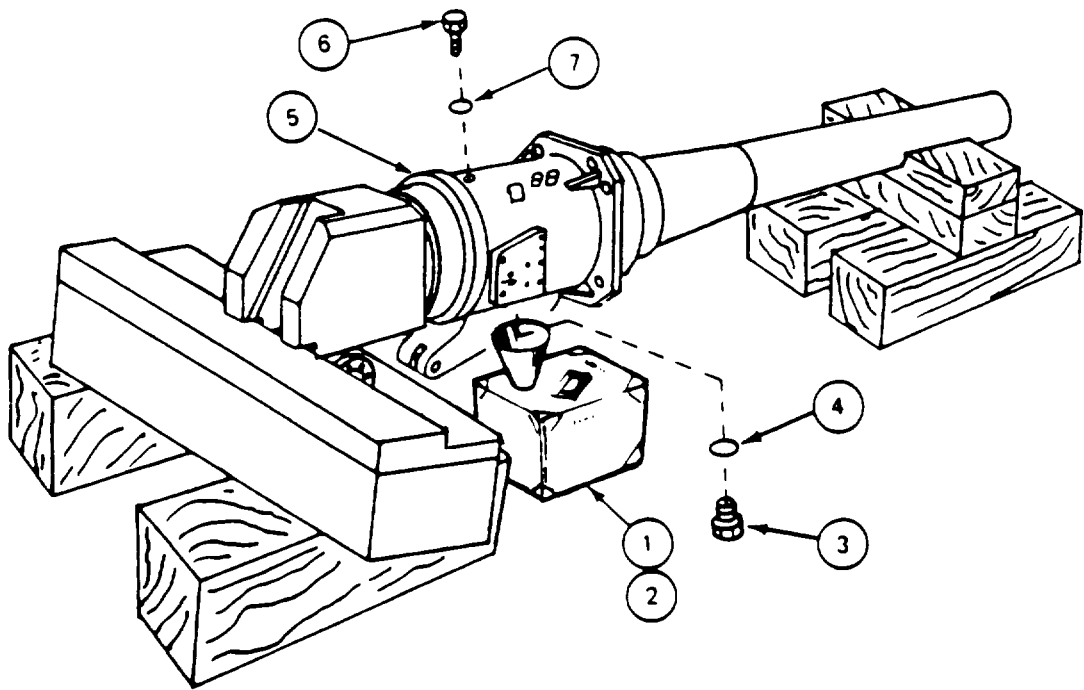
TOOLS: 1/2 in. open end wrench
Movable hoist (4 ton capacity)
5/16 in. socket head screw key (Allen wrench)
Spanner wrench (NSN 5120-00-986-3129)
Sling assembly (NSN 4933-00-903-1246) (10952111)
Shackle (SPEC-RR-271B. TYPE IV, CLASS 1, 7/8 DIA)

SUPPLIES: Funnel
Can (6 gallon capacity)
Wood blocks 12 in. x 12 in. x 36 in. (two)
Rags (item 21, App. A)

PERSONNEL: Three (including hoist operator)

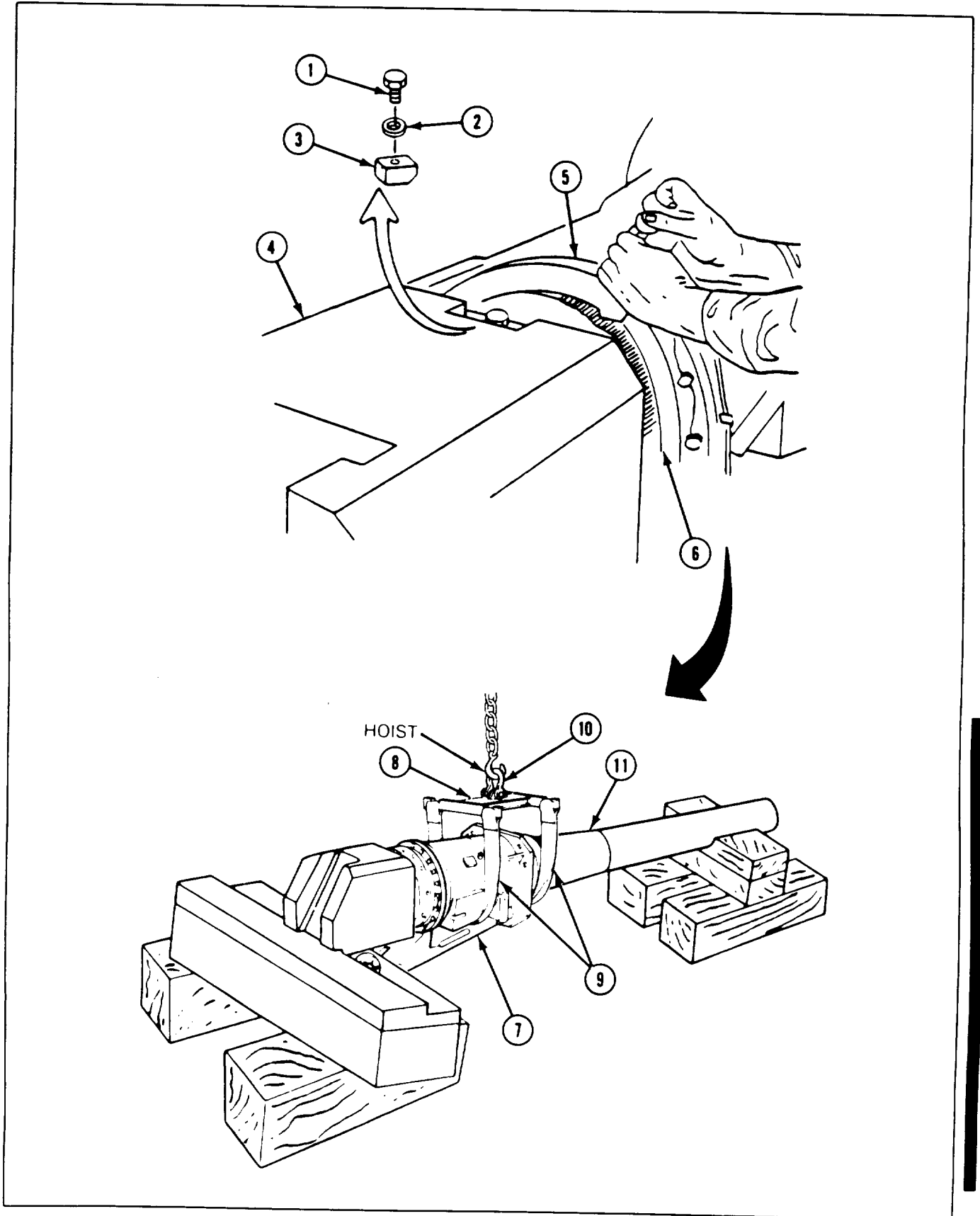
PRELIMINARY PROCEDURES: Remove gun shield (para 11-7)

11-11. RECOIL MECHANISM REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">If recoil mechanism will be disassembled, do steps 1 thru 6. If recoil mechanism will not be disassembled, GO TO FRAME 2.</p> <ol style="list-style-type: none"> 1. Put can (1) and funnel (2) under plug (3). 2. Using open end wrench, remove plug (3) and washer (4) from recoil mechanism (5). 3. Using open end wrench, remove plug (6) and washer (7) from recoil mechanism (5). 4. Let oil drain from recoil mechanism (5) until no oil runs out. 5. Using hand, put back washer (7) and plug (6). 6. Using hand, put back washer (4) and plug (3). 7. Using rags, wipe up oil spills and drippings. <p>GO TO FRAME 2</p>	
 <p>The diagram illustrates the removal of the recoil mechanism. It shows a long cylindrical barrel mounted on a wooden block. A recoil mechanism (5) is attached to the front of the barrel. A plug (3) and washer (4) are shown being removed from the front of the recoil mechanism. A can (1) and funnel (2) are positioned to catch any oil that drains from the mechanism. Another plug (6) and washer (7) are shown being removed from the top of the recoil mechanism. The diagram uses numbered circles (1-7) to identify the various components and tools involved in the procedure.</p>	

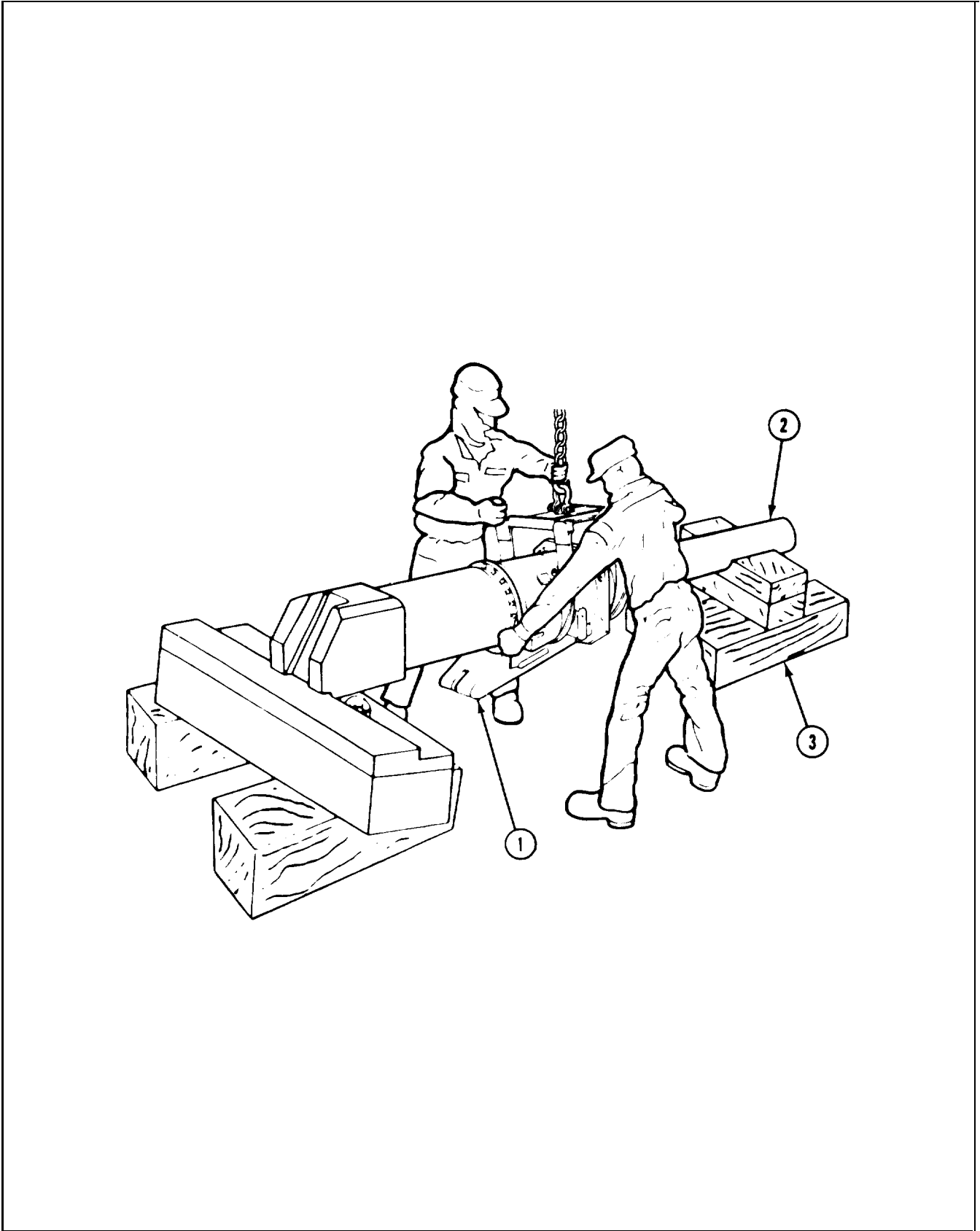
11-11. RECOIL MECHANISM REMOVAL PROCEDURE (CONT)

FRAME 2	
Step	procedure
1.	Using Allen wrench, remove screw (1), lockwasher (2), and breech lock (3) from breech ring (4).
2.	Using spanner wrench (5), unscrew collar (6) from breech ring (4).
NOTE	
Hoist hook must be parallel with recoil mechanism (7) with hook opening facing front.	
3.	Position hoist over recoil mechanism (7) with hook parallel to recoil mechanism and hook opening facing muzzle end,
4.	Using sling assembly (8) wrap web straps (9) around recoil mechanism (7) and connect ends of straps (9) to sling assembly (8)
5.	Connect shackle (10) to sling assembly (8) Put hoist hook through shackle (10)
6.	Soldier A: Using hoist, slowly lift weight of recoil mechanism (7) off cannon tube (11). Do not over lift
GO TO FRAME 3	



11-11. RECOIL MECHANISM REMOVAL PROCEDURE (CONT)

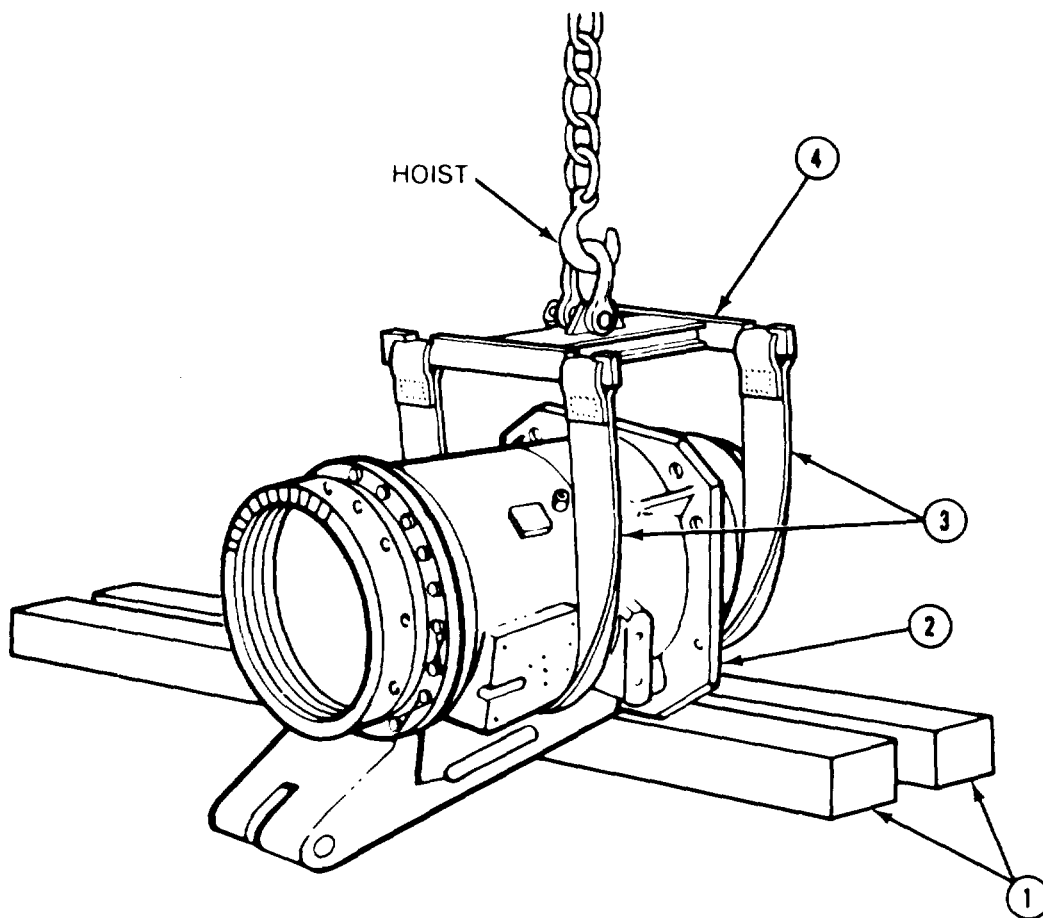
FRAME 3	
Step	Procedure
	<div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <p>WARNING</p> </div> <p>Recoil mechanism (1) weighs about 3/4 ton. Soldiers must stay from under recoil mechanism when it is lifted by hoist, to prevent injury if it should fall.</p> <div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <p>CAUTION</p> </div> <p>Machined surfaces of cannon tube (2) must not be scratched or damaged during removal of recoil mechanism.</p> <p style="text-align: center;">NOTE</p> <p>Soldier A: Operate hoist. Soldiers B and C: Guide recoil mechanism (1) and check clearance at all times.</p> <p>If recoil mechanism (1) does not move easily along cannon tube (2) check clearance and rock mechanism in a rotating motion around cannon tube.</p> <ol style="list-style-type: none"> 1. Using movable hoist, slide recoil mechanism (1) along cannon tube (2) until front end of recoil mechanism reaches blocks (3). 2. Using hoist, raise recoil mechanism (1) and lift cannon tube (2) off blocks (3). 3. Move blocks (3) under cannon tube (2) behind recoil mechanism (1). 4. Using hoist, lower recoil mechanism (1) until cannon tube (2) rests on blocks (3). 5. Using hoist, move weight of recoil mechanism (1) off cannon tube (2). 6. Using movable hoist, slide recoil mechanism (1) off muzzle of cannon tube (2). <p>GO TO FRAME 4</p>



11-1 1. RECOIL MECHANISM REMOVAL PROCEDURE (CONT)

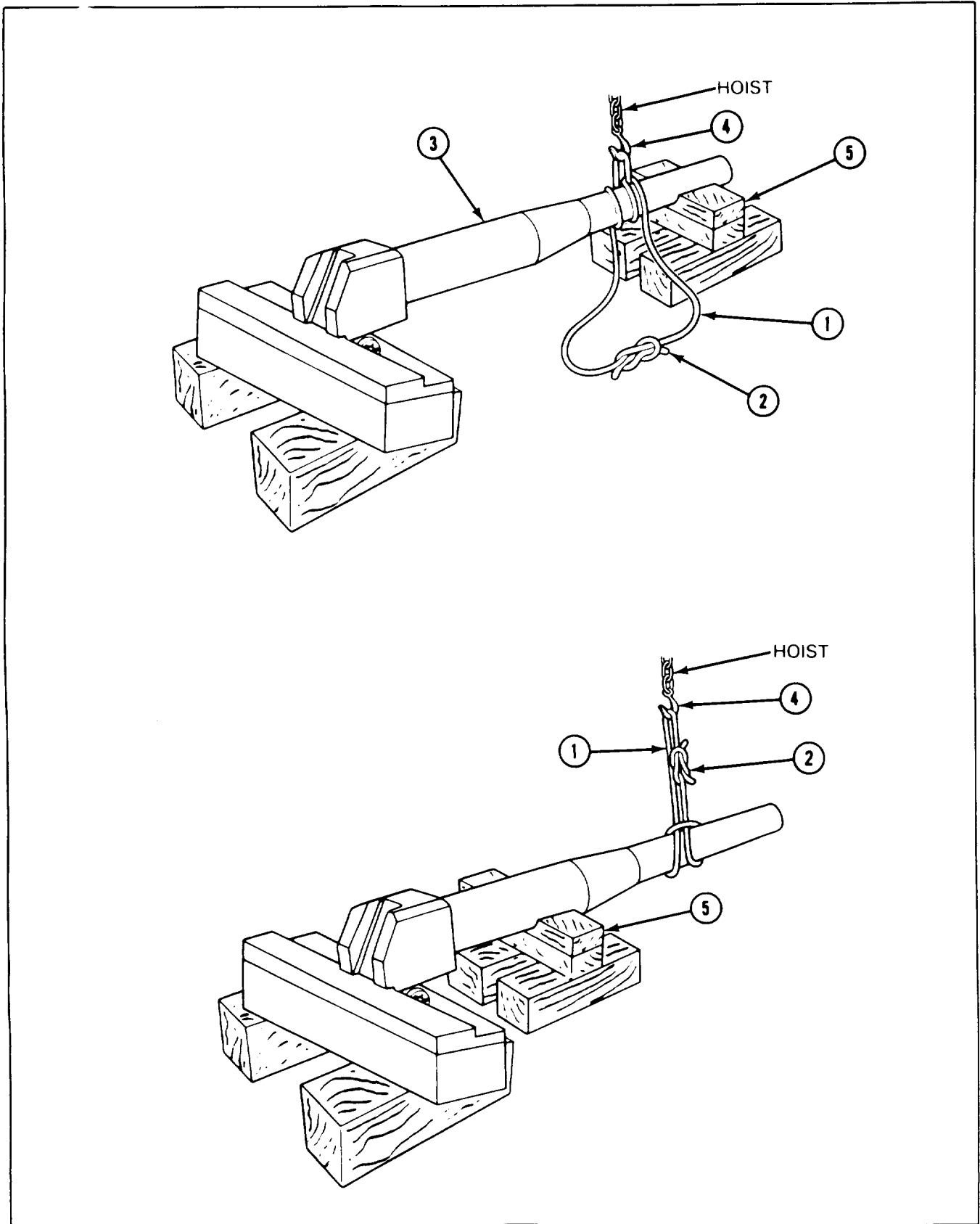
FRAME 4

Step	Procedure
1.	Soldiers Band C: Put wood blocks (1) on level ground.
2.	Soldier A: Using movable hoist, move recoil mechanism (2) over wood blocks(1).
3.	Soldier A: Using hoist, lower recoil mechanism (2) onto wood blocks (1).
4.	Soldiers B and C: Remove web straps (3) from sling assembly (4).
5.	Soldiers B and C: Slip web straps (3) off of recoil mechanism (2).
END OF TASK	



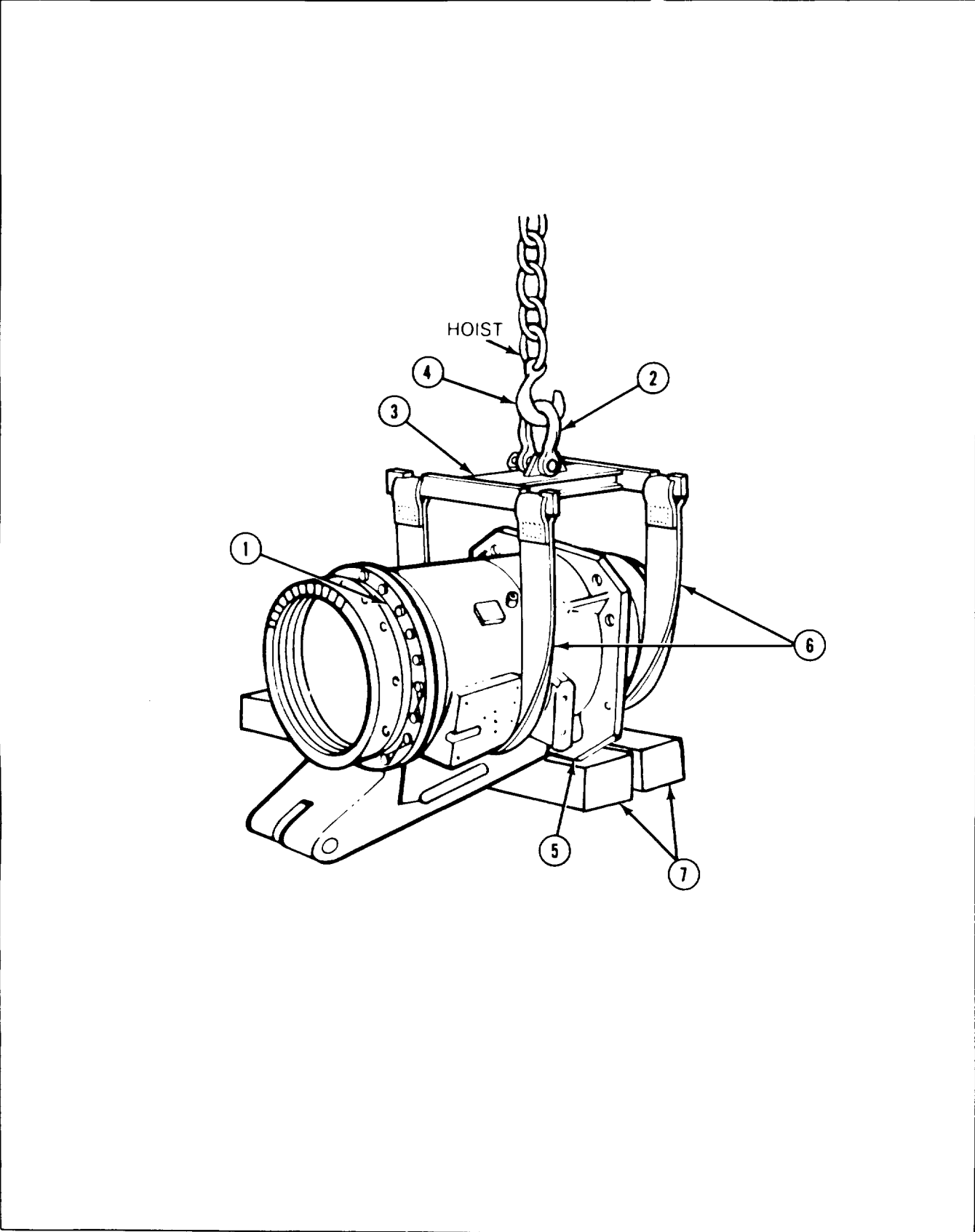
11-12. RECOIL MECHANISM INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Tie ends of rope (1) together with a square knot (2) forming loop.
2.	Wrap one end of looped rope around cannon tube (3) at bore evacuator location and push either end through first end forming a closed sling around cannon tube.
3.	Put loop of rope (1) in hook (4) of hoist.
4.	Soldier A: Using hoist, take up slack until square knot (2) is tight.
	<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">WARNING</div> <p style="text-align: center;">Keep feet and other parts of body from under cannon tube (3) when cannon tube is lifted or held off blocks (5). If cannon drops accidentally, cannon tube can cause serious injury.</p>
5.	Soldier A: Using hoist, lift cannon tube (3) off wood blocks (5).
6.	Move wood blocks (5) under cannon tube (3) back so that they are on breech side of rope (1).
7.	Soldier A: Using hoist, lower cannon tube (3) on wooden block (5).
8.	Remove rope (1) from hoist hook (4).
	GO TO FRAME 2



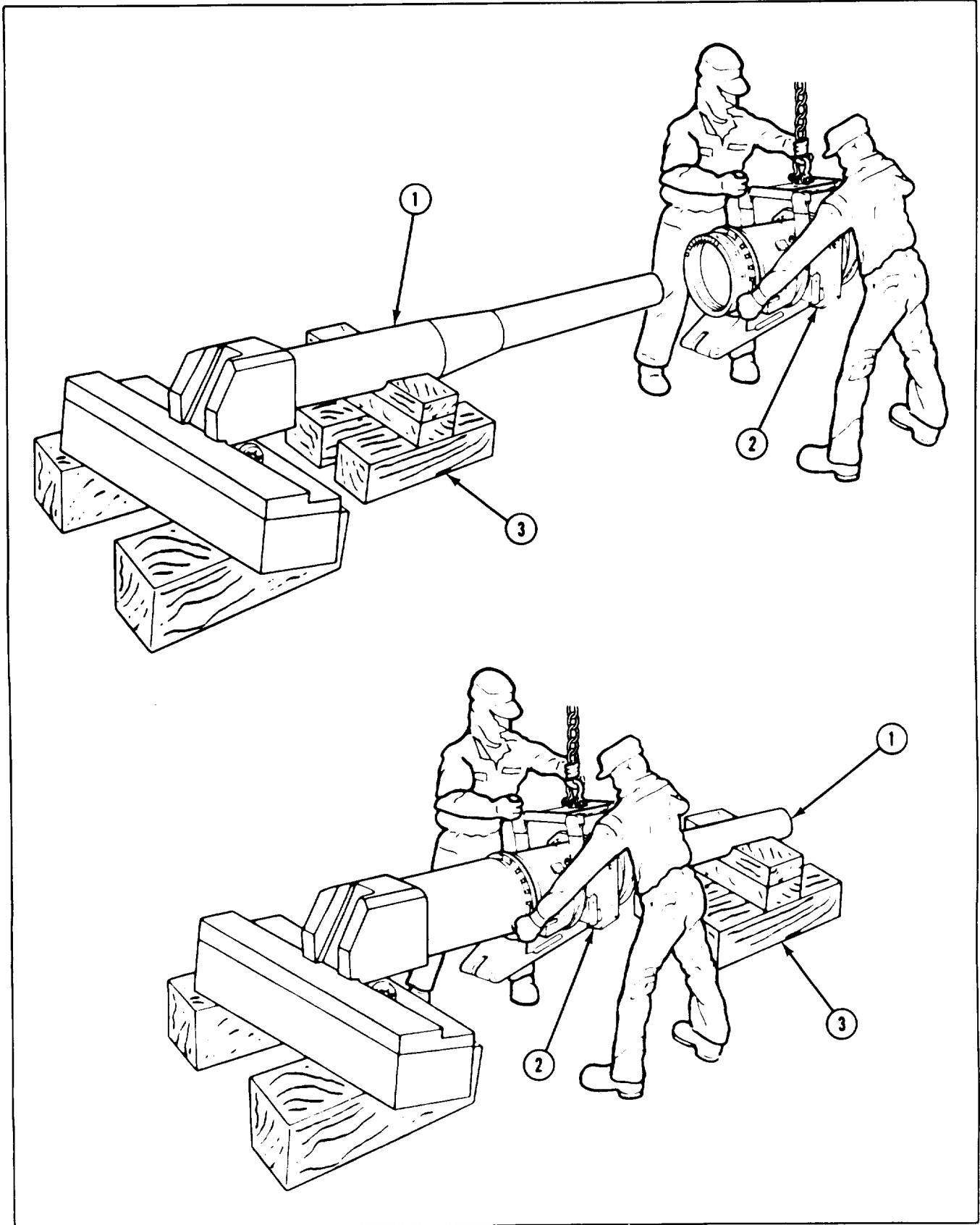
11-12. RECOIL MECHANISM INSTALLATION PROCEDURE (CONT)

FRAME 2	
Step	Procedure
	NOTE
	<p>If rust preventive has just been applied or if vehicle is going into storage, rust preventive compound must not be removed from cannon tube bore.</p> <p>Using cleaning fluid, rags, and crocus cloth, remove dirt, rust, and rust preventive compound from machined surfaces, before installing recoil mechanism (1).</p> <p>Using grease, lubricate unpainted surfaces of cannon tube and inner bearing surfaces of cannon tube support sleeve (LO).</p>
1.	Connect shackle (2) to sling assembly (3) Place hoist hook (4) in shackle (2).
	NOTE
	Hoist hook (4) must be parallel to recoil mechanism (1) with hook opening facing forward flange (5).
2.	Move and lower hoist hook (4) with sling assembly (3) over recoil mechanism (1).
3.	Disconnect web straps (6) from sling assembly (3) Wrap straps (6) around recoil mechanism (1) and connect ends of straps (6) to sling assembly (3)
	WARNING
	Recoil mechanism (1) weighs about 3/4 ton. Keep feet and other parts of body away from under it when lifting or holding it with hoist. if it is dropped accidentally, serious injury to personnel might result.
4.	Soldier A: Using hoist, raise recoil mechanism (1) off wood blocks (7)
	GO TO FRAME 3



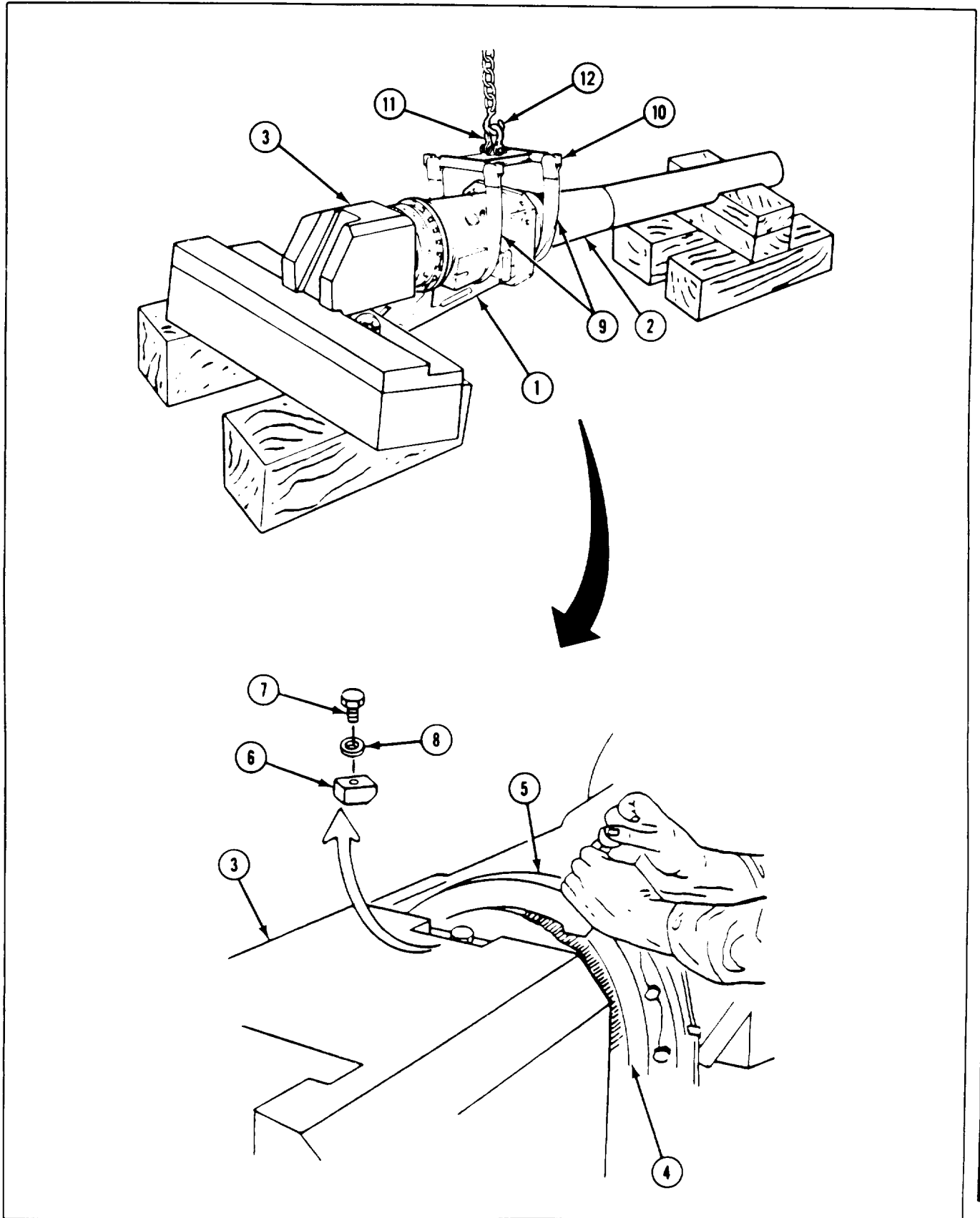
11-12. RECOIL MECHANISM INSTALLATION PROCEDURE (CONT)

FRAME 3	
Step	Procedure
	<p style="text-align: center;">CAUTION</p> <p>Machined surfaces of cannon tube (2) must not be scratched or damaged during installation of recoil mechanism (1). Make sure to keep clearance between cannon and recoil mechanism at all times.</p> <p style="text-align: center;">NOTE</p> <p>Soldier A: Operate hoist. Soldiers B and C: Guide recoil mechanism and check clearance between cannon and recoil mechanism.</p> <ol style="list-style-type: none"> 1. Using movable hoist, slide recoil mechanism (1) carefully over cannon tube (2) until it reaches wood blocks (3). 2. Using movable hoist, slowly and carefully lift recoil mechanism (1) and cannon tube (2) until it is off wood blocks (3). 3. Soldiers B and C: Move wood blocks (3) to other side of recoil mechanism (1) near cannon tube (2) muzzle. 4. Using movable hoist, lower recoil mechanism (1) until cannon tube (2) is on wood blocks (3). <p>GO TO FRAME 4</p>



11-12. RECOIL MECHANISM INSTALLATION PROCEDURE (CONT)

FRAME 2	
Step	Procedure
	CAUTION
	Use care when pushing recoil mechanism (1) against breech ring (3) to avoid damage to parts
	NOTE
	Soldier F.: Operate movable hoist.
	Soldier B and C: Guide recoil mechanism (1).
1.	Using movable hoist, raise or lower recoil mechanism (1) as it is moved along cannon tube (2) until it is against breech ring (3).
2.	Using hands, screw collar (4) on breech ring (3).
3.	Using spanner wrench (5), tighten collar (4) on breech ring (3).
4.	Using torque wrench and adapter, tighten collar (4) to between 500 and 510 foot-pounds.
	NOTE
	If lock (6) will not fit in collar (4), tighten collar (4) until it does, If this can't be done, loosen collar (4) just enough to have lock (6) fit.
5.	Using Allen wrench, attach lock (6) to breech ring (3) with screw (7) and lockwasher (8).
6.	Using hex head socket and torque wrench, tighten screw (7) to between 30 and 45 foot-pounds.
7.	Disconnect and unwrap web straps (9) from recoil mechanism (1).
8.	Remove sling assembly (10) and shackle (11) from hoist hook (12)
	NOTE
	Follow-on Maintenance Action Required:
	Test recoil mechanism (para 11-10). Install gun shield (para 11-8).
	END OF TASK

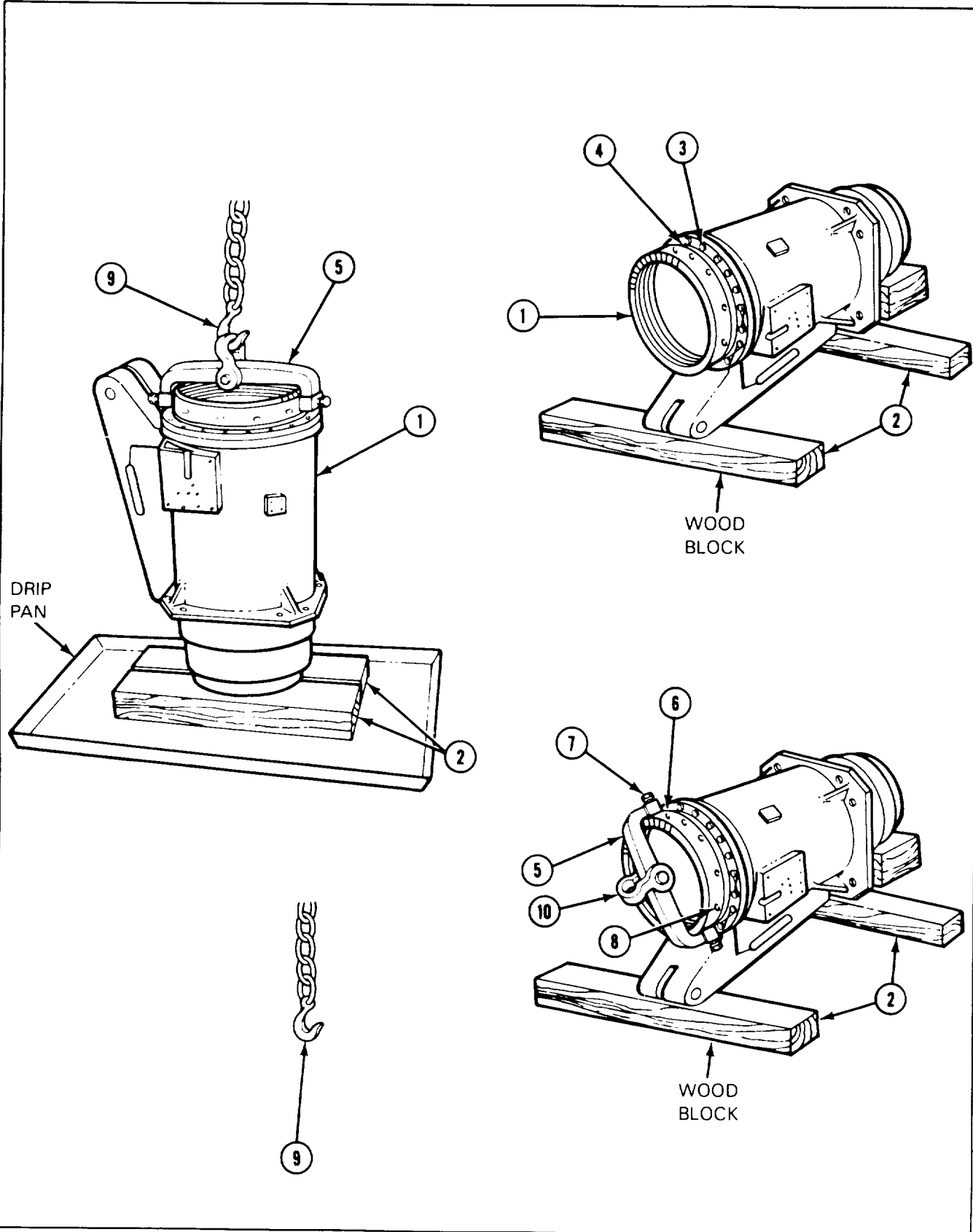


11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE

- TOOLS:**
- Wood block (fabricated tool, (item 19, App. B) (two)
 - 3/16 in. socket head screw key (Allen wrench)
 - 1/4 in. socket head screw key (Allen wrench)
 - 9/16 in. socket (1/2 in. drive)
 - 5/8 in. socket (1/2 in. drive)
 - 15/16 in. socket (1/2 in. drive)
 - 3/4 in. socket (1/2 in. drive)
 - 3 in. extension (1/2 in. drive)
 - 1/2 in. drive ratchet
 - 15/16 in. combination wrench
 - 1/2 in. drive hinged handle
 - 3/4 in. combination wrenches (two)
 - Sling (NSN 4910-00-708-3778)
 - 5/16 in. flat-tip screwdriver
 - O-ring extractor kit
 - Diagonal cutting pliers
 - External retaining ring pliers
 - Movable hoist (1 ton capacity)
 - Lifter assembly (NSN 1015-01-1 14-4002) (12290997)
 - Recoil piston adapter spanner wrench,
(fabricated tool, item 20, App. B)
 - Spring compressor fixture (NSN 4933-00-393-0240)
 - Thread protector (NSN 4933-00-039-0528)
 - Adjustable wrench
- SUPPLIES:**
- Oil drip pan 3 x 3 x 1/2 in. to 2 in. deep
 - Rope (10 feet long) (1 in. diameter)
 - Wood blocks 10 in. x 10 in. x 24 in. (two)
 - Wood blocks 2 in. x 4 in. x 12 in. (two)
 - Wood block 4 in. x 4 in. x 24 in.
 - Tape (item 35, App. A)
 - Eyebolt (NSN 5306-00-050-0348) (two)
 - Nut (5/8 in. - 11NC-2) (two)
 - Flat washer (1/8 in. thick, 3 /4 in. ID. 1-3/4 in. OD) (two)
 - Screw (3/8 in.-16 NC-2) (three)
 - Nut (3/8 in.-16NC-2) (three)
 - Flat washer (11/16 in. x 1/16 in) (three)
- PERSONNEL:** Three (including hoist operator)
- PRELIMINARY PROCEDURES:**
- Test recoil mechanism (para 11-10)
 - Remove recoil mechanism (para 11-11)

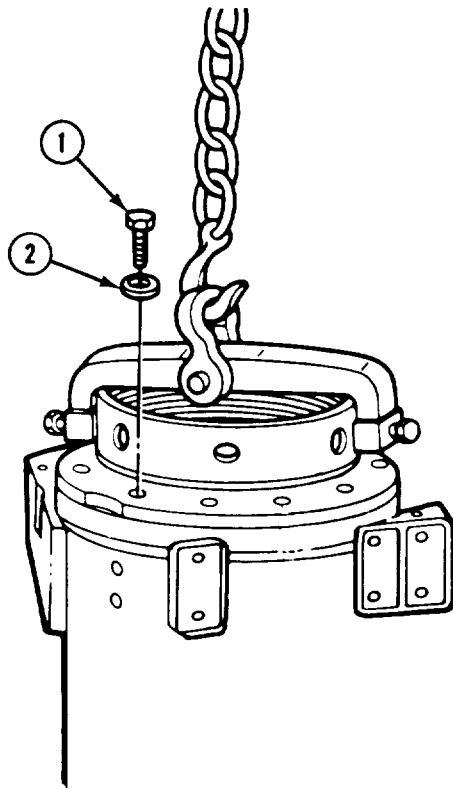
11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<p style="text-align: center;">CAUTION</p> <p>Make sure recoil mechanism (1) is level on wood blocks (2). This will prevent damage to recoil mechanism (1) and help when breaking screws (3) loose.</p> <p>1. Using diagonal cutting pliers, remove lockwires (4) from 12 screws (3).</p> <p style="text-align: center;">NOTE</p> <p>Early gun mounts require 3/4 inch or 9/16 inch socket. Late or modified gun mounts require 15/16 inch or 5/8 inch socket.</p> <p>2. Using socket and hinged handle, loosen 12 screws (3), but do not remove.</p> <p>3. Using hands, put lifter assembly (5) on collar (6). Screw in two adjusting screws (7) in holes (8) at both ends of collar (6).</p> <p>4. Using adjustable wrench, tighten two adjusting screws (7).</p> <p style="text-align: center;">WARNING</p> <p>Do not put hands, feet, or any part of body under recoil mechanism (1) when recoil mechanism is being lifted or held in raised position. Serious injury could result if recoil mechanism slips or falls.</p> <p style="text-align: center;">NOTE</p> <p>Front of recoil mechanism (1) will tip down when turning to vertical position. A piece of 4 inch x 4 inch x 24 inch wooden block should be laid long-way to prevent recoil mechanism from hitting the floor.</p> <p>5. Put hoist hook (9) on lifter assembly clevis (10).</p> <p>6. Soldier A: Using hoist, carefully lift recoil mechanism (1) off wood blocks (2) into vertical position. Soldiers B and C: Move wood blocks (2) into drip pan.</p> <p>7. Soldier A: Using hoist, lower recoil mechanism (1) onto blocks (2) in drip pan. Do not remove tilting hoist hook (9) from lifter assembly clevis (10).</p> <p>GO TO FRAME 2</p>



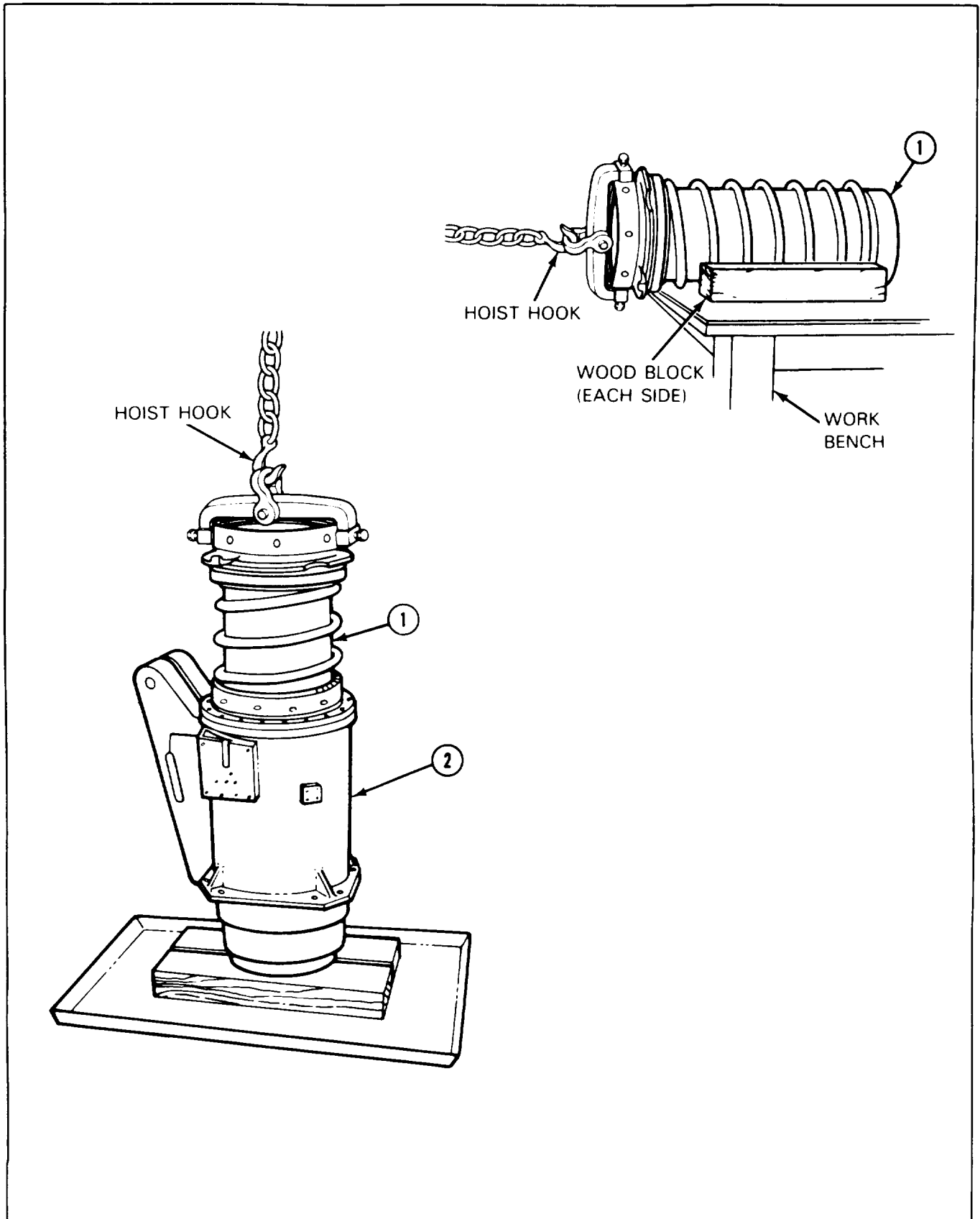
11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

FRAME 2	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p>Early gun mounts require 3/4 inch or 9/16 inch socket. Late or modified gun mounts require 15/16 inch or 5/8 inch socket.</p>
1.	<p>Using socket, remove 12 screws (1) (and 12 lockwashers (2) on late mount). Throw screws away if they have hex heads.</p> <p>GO TO FRAME 3</p>



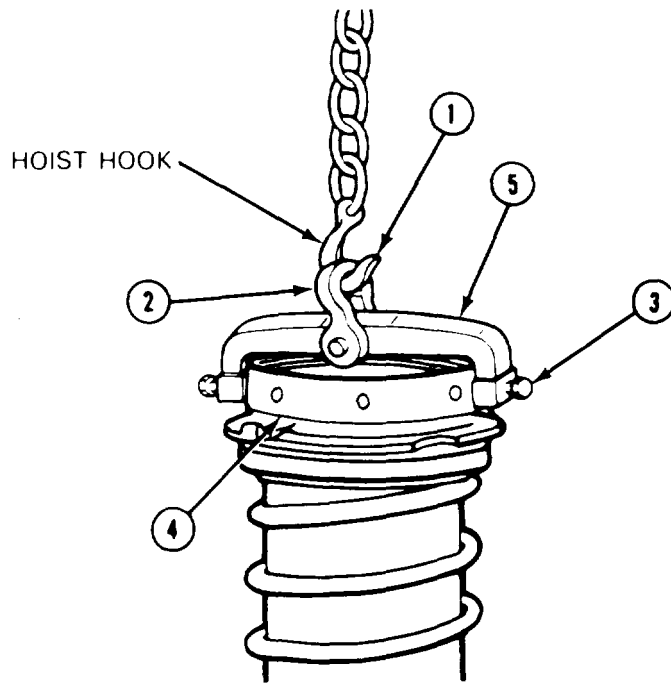
11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

FRAME 3	
Step	Procedure
	<div data-bbox="640 434 840 480" style="border: 1px solid black; text-align: center; padding: 2px;">WARNING</div> <p data-bbox="328 506 1148 591">Stay clear from under piston assembly (1) when it is lifted from recoil mechanism cradle (2) and when it is lowered by hoist to prevent being hurt if it should fall.</p> <p data-bbox="703 625 776 651" style="text-align: center;">NOTE</p> <p data-bbox="328 683 647 708">Soldier A: Operate hoist.</p> <p data-bbox="328 740 1115 766">Soldier B: Steady piston assembly (1) during steps 1, 2, and 3.</p> <ol data-bbox="84 802 1310 1034" style="list-style-type: none"> Using hoist, lift piston assembly (1) out of recoil mechanism cradle (2). Using hoist, lower piston assembly (1) to a clean working surface on work bench. Using hoist, carefully lay piston assembly (1) on its side. Soldier C: Using wood blocks, block each side of piston assembly to prevent it from rolling off work bench. <p data-bbox="160 1064 398 1089">GO TO FRAME 4</p>

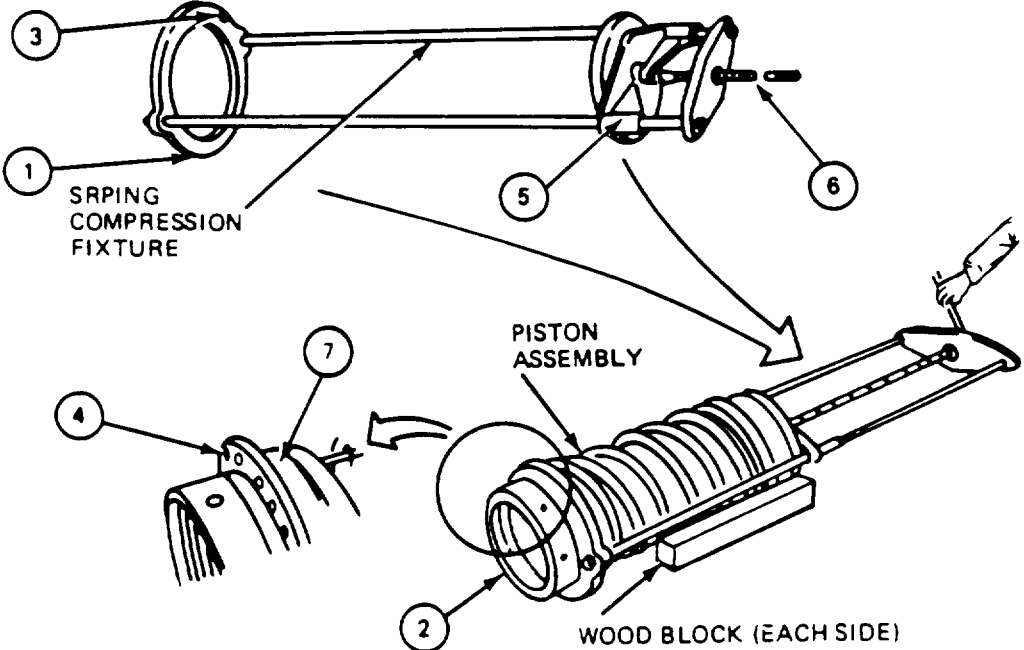


11.13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

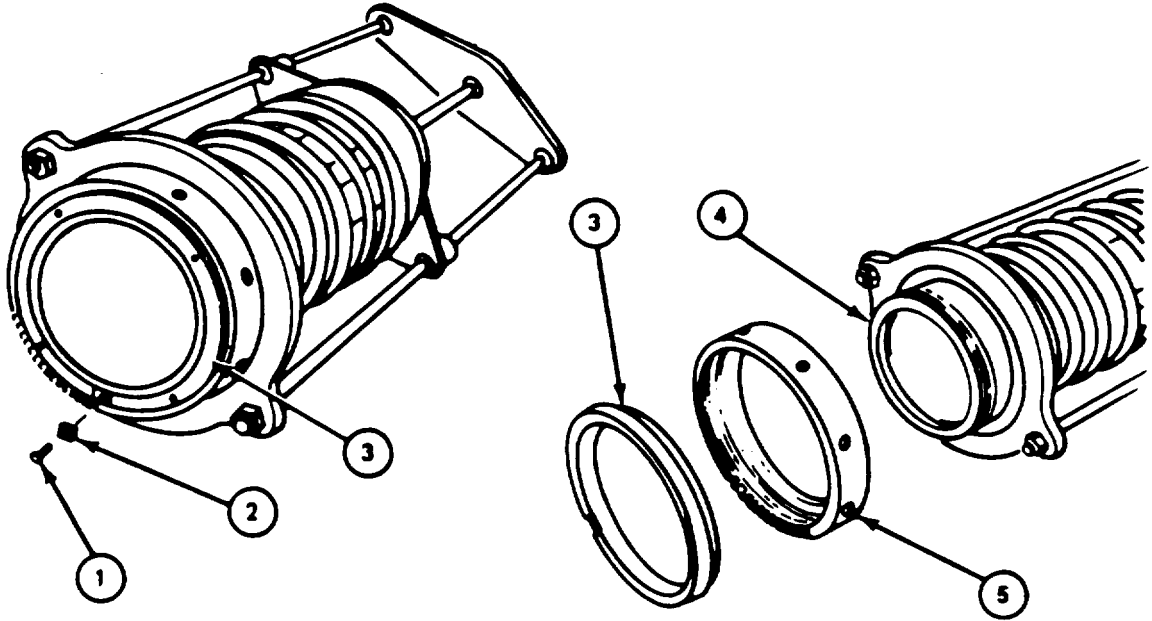
FRAME 4	
Step	Procedure
1.	Remove hoist hook (1) from lifter assembly clevis (2).
2.	Using adjustable wrench, unscrew two adjusting screws (3) at both ends of collar (4)
3.	Remove lifter assembly (5) from collar (4) GO TO FRAME 5



11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

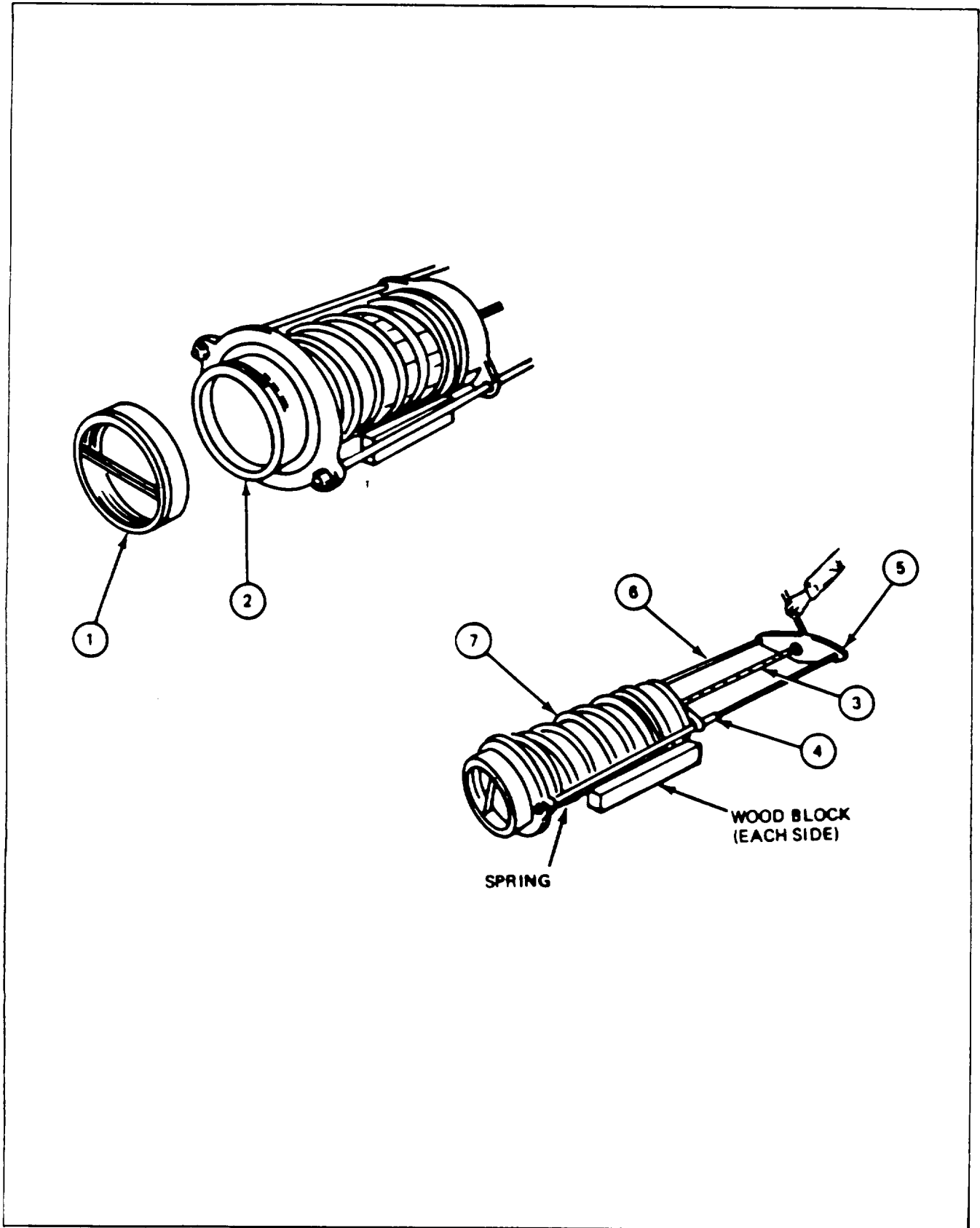
FRAME 5	
Step	Procedure
	<div data-bbox="727 480 950 560" style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">WARNING</div> <p data-bbox="483 604 1193 697">Use extreme care when working with spring compression fixture. Serious injury to hands and fingers could result.</p> <div data-bbox="755 772 919 825" style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">CAUTION</div> <p data-bbox="483 842 1193 934">Use care to avoid scratches, dents, and damage to machined surfaces of recoil piston assembly when installing spring compression fixture.</p> <ol data-bbox="215 951 1474 1125" style="list-style-type: none"> 1. Soldier B: Install spring compression fixture on piston assembly so that spring retainer plate (1) is put over adapter collar (2), two dowel pins (3) fit in holes in cover (4), and end of piston assembly is lined up with plate and bracket (5). 2. Soldier C: Using 5/8" socket wrench, turn jackscrew (6) until pressure of spring seat (7) no longer bears on adapter collar (2). <p data-bbox="282 1140 532 1171">GO TO FRAME 6</p>
	 <p>The diagram illustrates the assembly of a spring compression fixture for disassembling a recoil piston. It shows a piston assembly being held between two wood blocks. A cover (4) is placed over the piston assembly, with two dowel pins (3) inserted into holes in the cover. A spring retainer plate (1) is placed over an adapter collar (2) on the piston assembly. A jackscrew (6) is used to compress the spring seat (7) against the adapter collar. A hand is shown turning the jackscrew (6).</p>

11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

FRAME 6	
Step	Procedure
1.	<p>Using screwdriver, remove screw (1) and key (2) from recoil piston adapter (3).</p> <div data-bbox="760 512 927 562" style="text-align: center; border: 1px solid black; padding: 2px;">CAUTION</div> <p>Use care when removing recoil piston adapter (3) and breech ring adapter collar (5) so as not to damage threads on recoil piston (4).</p>
2.	Using recoil piston adapter spanner wrench, carefully remove recoil piston adapter (3) from recoil piston (4).
3.	Carefully slide off and remove breech ring adapter collar (5) from recoil piston (4). GO TO FRAME 7
	

11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

FRAME 7	
Step	Procedure
	<p>CAUTION</p> <p>Make sure thread protector tool (1) screws on recoil piston (2) straight so as not to damage threads. Do not overtighten. Thread protector must remain on recoil piston at all times until removed at assembly (para 11-14).</p>
1.	<p>Soldier B: Screw thread protector tool (1) on recoil piston (2) far enough so that no gap shows between thread protector tool and shoulder of recoil piston.</p>
	<p>WARNING</p> <p>Length of recoil piston is about 31 inches. Length of spring is about 47 inches when spring tension is released. Removal of piston assembly (7) from spring compression fixture (6), while spring is under compression, can result in severe injury to personnel. Make sure spring does not bend and becomes fully extended (no compression) in step 2.</p>
2.	<p>Soldier C: Using 5/8" socket wrench, turn end of jackscrew (3) so that plate and bracket (7) are moved to end bracket (5).</p>
	<p>CAUTION</p> <p>Use extreme care to avoid denting, scratching and scoring machined surfaces of recoil piston (2) when removing spring compression fixture (6).</p>
3.	<p>Soldiers B and C: Carefully remove spring compression fixture (6) from piston assembly (7).</p> <p>GO TO FRAME 8</p>



11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

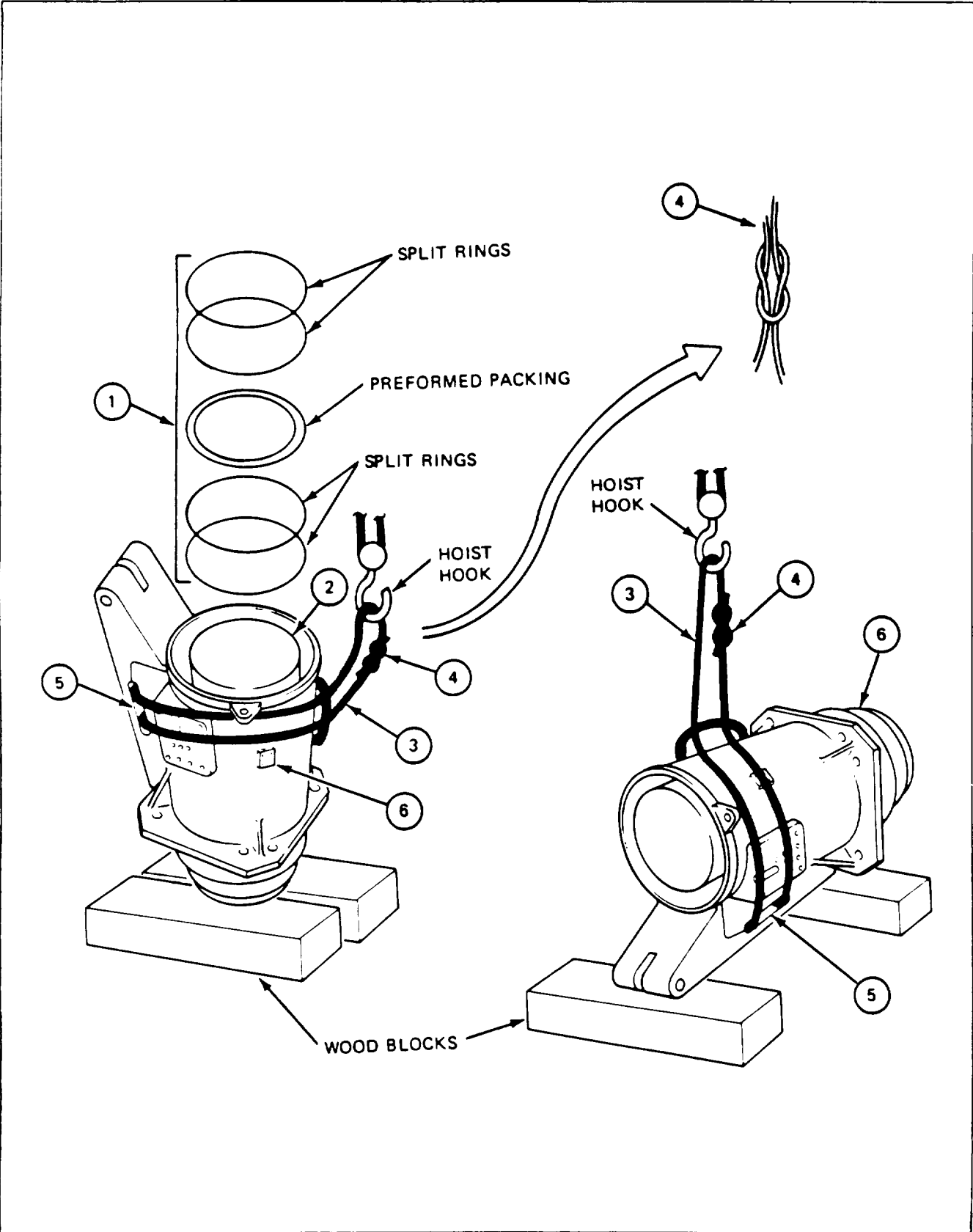
FRAME 8	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Retainer cover (3), seal retainer (5), and spring seat (8) were forced off piston assembly by spring when compression of spring was released in frame 7.</p> <p>1. Using screwdriver, remove six screws (1) and spacer (2) from retainer cover (3).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Two split rings are on each side of preformed packing of seal assembly (4).</p> <p>2. Using O-ring extractor tool, remove seal assembly (4) from inner circumference of seal retainer (5) (JPG). Throw seal assembly away.</p> <p>3. Using O-ring extractor tool, remove seal (6) from face of seal retainer (5) (JPG). Throw seal away.</p> <p>4. Using O-ring extractor tool, remove seal (7) from outer circumference of spring seat (8) (JPG). Throw seal away.</p> <p>GO TO FRAME 9</p>

11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

FRAME 9	
Step	Procedure
	<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">CAUTION</div> <p>Piston (1) scratches easily. Use extreme care when removing spring (2) from piston.</p>
1.	<p>Soldier A: Hold piston (1), Soldier B: Carefully slide spring (2) from piston (1).</p> <p style="text-align: center;">NOTE</p> <p>If spring recoil ring (4) has two dowel pin holes, as well as four screw holes in it, do not do steps 2 and 3 unless spring recoil ring is damaged and requires replacement.</p>
2.	Using 3/16 in. Allen wrench, remove four screws (3) from piston (1).
3.	Remove spring recoil ring (4) from piston (1).
4.	Using external retaining ring pliers, remove retaining ring (5) from piston (1).
5.	Remove recoil inertia valve (6) from piston (1).
	GO TO FRAME 10

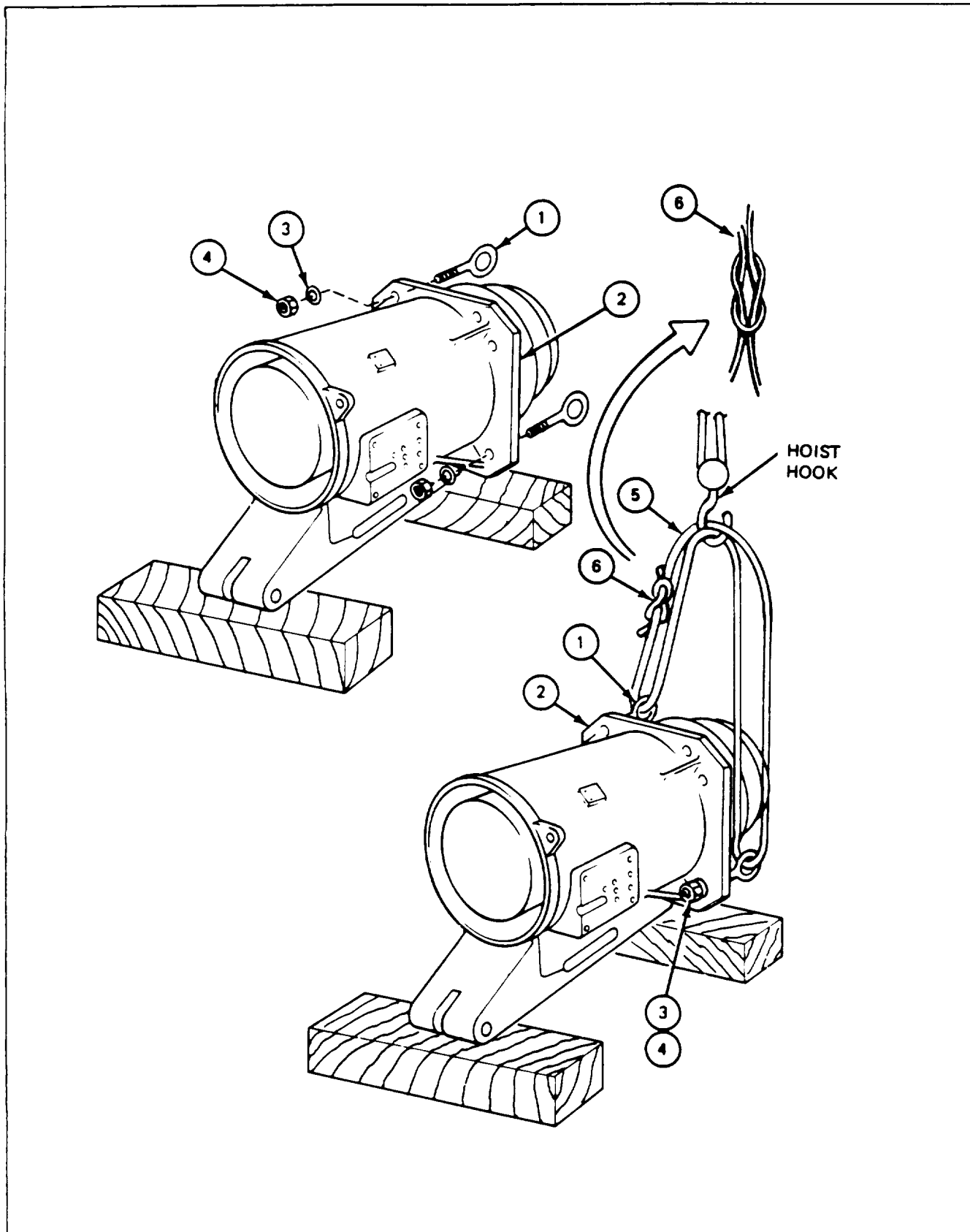
11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

FRAME 10	
Step	Procedure
	<p>NOTE</p> <p>Recoil mechanism (6) was left in vertical position on two wood blocks in frame 3.</p>
1.	Using O-ring extractor tool, remove seal assembly (1) by removing four split rings and preformed packing from support sleeve (2). Throw seal assembly away.
2.	Using rope (3). make a loop and tie ends with a square knot (4).
3.	Push one end of looped rope (3) through slot (5) of recoil mechanism (6) and bring around recoil mechanism through other end loop so as to form a sling around recoil mechanism.
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div>
	<p>Stay clear from underneath recoil mechanism (6) when it is lifted and lowered. If it falls accidentally, serious injury to personnel could result,</p>
4.	Soldier B: Put hoist hook through rope (3).
5.	Soldier A: Using hoist, take up slack and tighten knot (4).
6.	Soldier A: Using hoist, carefully lift recoil mechanism (6) off two wood blocks and move it to one side,
7.	Soldier B: Position two wood blocks to support recoil mechanism (6) when it is lowered to a horizontal position.
8.	Soldier A: Using hoist, lower recoil mechanism (6). Soldier B: Guide and tip recoil mechanism to a horizontal position on wood blocks.
9.	Soldier A: Lower hoist for slack,
10.	Soldier B: Remove hook from rope (3).
11.	Soldier A: Move hoist out of way.
12.	Soldier B: Remove rope (3) from recoil mechanism (6) and untie knot (4).
	GO TO FRAME 11



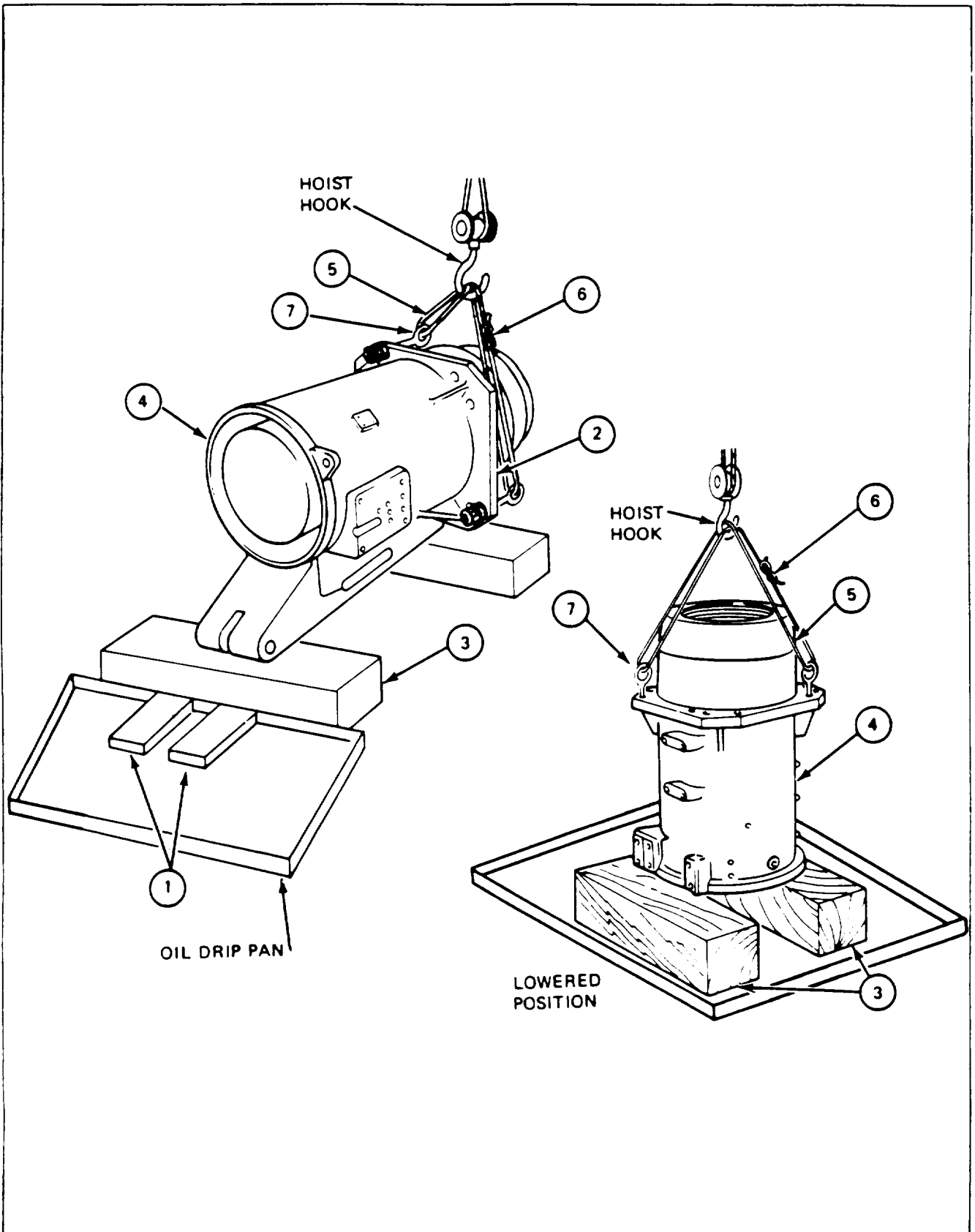
11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

FRAME 11	
Step	Procedure
	NOTE
	Two eyebolts (1) must be located in recoil mechanism flange (2) diagonally across from each other.
1.	Soldier B: Put two eyebolts (1) through holes in recoil mechanism flange (2).
2.	Soldier B: Using 15/16" combination wrench, install two flat washers (3) with two nuts (4) on two eyebolts (1).
	NOTE
	When fastening rope (5) to two eyebolts (1) in recoil mechanism flange (2), cross rope over itself so that crossed rope in hook will prevent recoil mechanism from slipping out of vertical position during lifting operation.
3.	Soldier B: Pass one end of rope (5) through two eyebolts (1).
4.	Soldier B: Cross rope (5) over itself before tying two ends with square knot (6).
5.	Soldier B: Put rope cross over hoist hook so that hook is lined up parallel with two eyebolts (1).
6.	Soldier A: Using hoist, take up slack in rope (5) to tighten square knot (6).
	GO TO FRAME 12

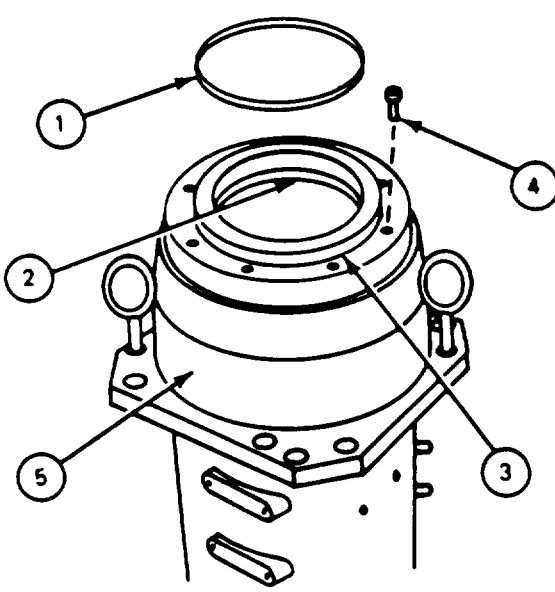


11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

FRAME 12		
Step	Procedure	
	<div data-bbox="642 470 863 549" style="border: 1px solid black; padding: 5px; text-align: center; margin: 0 auto;"> <p>WARNING</p> </div> <p style="text-align: center;">Recoil mechanism (2) weighs about 900 pounds. Use extreme care when hoisting and handling it. Stay clear from underneath recoil mechanism when it is lifted and lowered. If it falls, serious injury could result.</p> <ol style="list-style-type: none"> 1. Place oil drip pan containing two wood blocks (1) near end of recoil mechanism (2). 2. Position two wood blocks (1) so that they will prevent damage to end of recoil mechanism (2) when it is tilted by hoist and slides off wood block (3). 3. Soldier A: Using hoist, carefully lift recoil mechanism (2) so that it tilts into pan allowing any remaining oil to drain off. 4. Soldier A: After oil runs out, continue to lift recoil mechanism (2) slowly into an upright position. Soldier B: Steady recoil mechanism (2). 5. Remove two blocks (1) from oil drip pan. <div data-bbox="712 1104 794 1136" style="text-align: center; margin: 10px 0;"> <p>NOTE</p> </div> <p style="text-align: center;">Two wood blocks, used to support recoil mechanism (2) when it is lowered in upright position, must be positioned so that only outer cylinder cradle (4) rests on two wood blocks.</p> <ol style="list-style-type: none"> 6. Soldier A: Using hoist, lower recoil mechanism (2). Soldier B: positions two wood blocks (3) under outer cylinder cradle (4). 7. Remove hoist hook from rope (5), untie square knot (6), and remove rope from two eyebolts (7). <p>GO TO FRAME 13</p>	

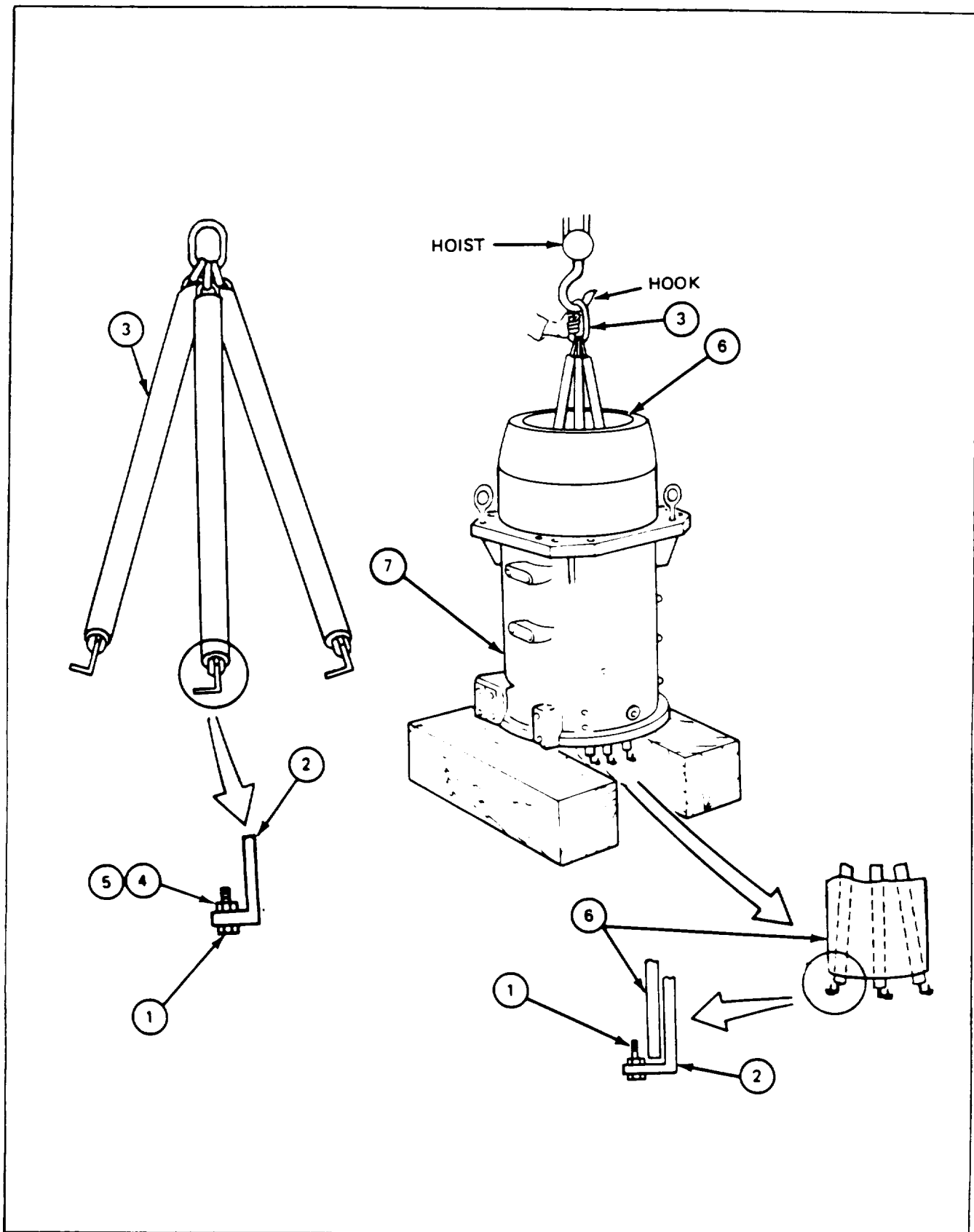


11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

FRAME 13	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do step 1 if seal quadrant ring (1) is damaged or gun tube is to be replaced.</p> <ol style="list-style-type: none"> 1. Using O-ring extractor tool, remove seal quadrant ring (1) from inside groove of sleeve (2) (JPG). 2. Using diagonal wire cutting pliers, cut and remove lacing wires (3) from eight screws (4). 3. Using 5/8" socket with hinged handle, remove eight screws (4) from recoil mechanism (5). <p>GO TO FRAME 14</p>
	

11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

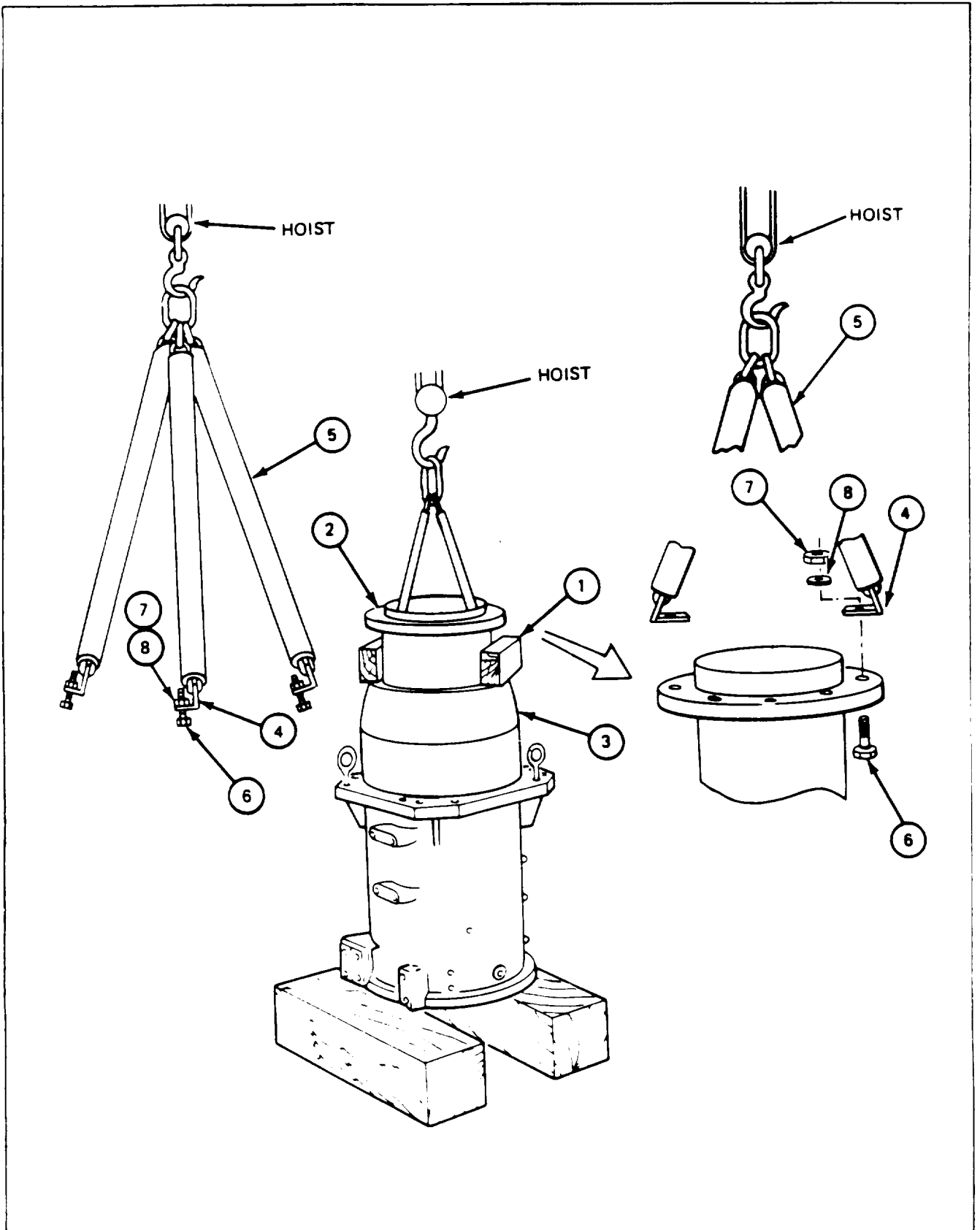
FRAME 14	
Step	Procedure
1.	Put three screws (1) through three hooks (2) of hoisting sling (3).
2.	Put three flat washers (4) and three nuts, (5) on three screws (1) and screw down finger tight.
3.	Using tape, wrap one layer around each of three screws (1) and three nuts (5) to protect support sleeve (6).
4.	Put sling (3) on hoist hook.
5.	Soldier A: Using hoist, lower sling (3) into recoil mechanism (7) until three hooks (2) reach just below bottom of recoil mechanism.
NOTE	
Three hooks (2) must be positioned around bottom of support sleeve (6) about 120 degrees span with bottom of support sleeve resting between three screws (1) and three hooks (2).	
6.	Soldier A. Using hoist, raise sling (3) just enough so Soldier B can position three hooks (2) around bottom of support sleeve (6) about 120 degrees apart.
7.	Soldier A: Using hoist, raise support sleeve (6) about five inches out of recoil cradle.
GO TO FRAME 15	



11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

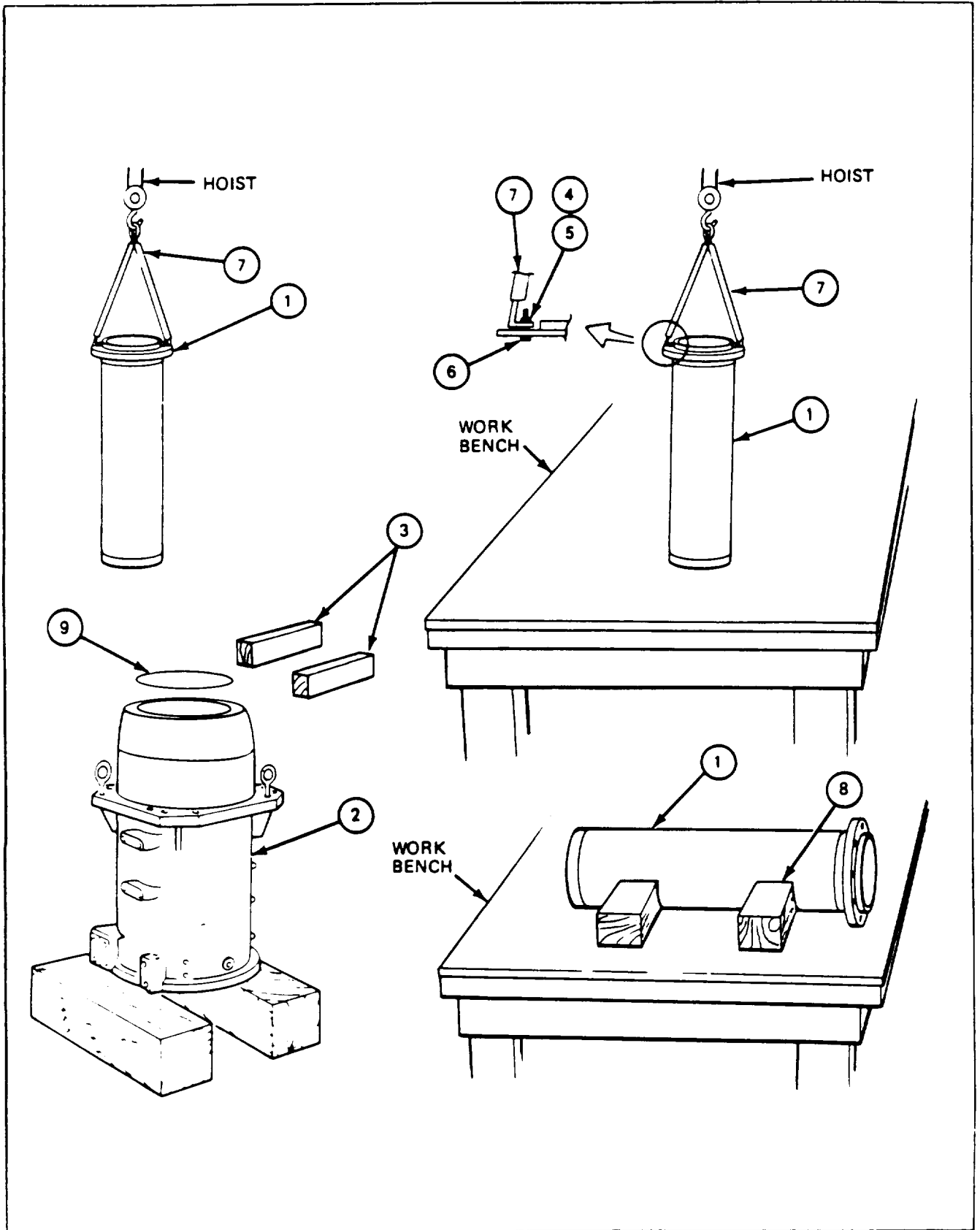
FRAME 15

Step	Procedure
1.	Soldier B: Put two wood blocks (2" x 4" x 12") (1) between flange of support sleeve (2) and top of recoil cradle (3).
2.	Soldier A: Using hoist, slowly and carefully lower support sleeve (2) so that flange rests on two wood blocks (1) and support sleeve is fully supported by two wood blocks.
3.	Soldier A: Continue to lower hoist until Soldier B can release three hooks (4) of sling (5) from lower end of support sleeve (2).
4.	Soldier A: Using hoist, carefully raise sling (5) out of support sleeve (2).
5.	Remove one sling leg (5) from hoist.
6.	Soldier B: Remove tape from two screws (6), and two nuts (7) on two hooks (4). Remove two screws (6), two nuts (7), and two flat washers (8).
NOTE	
Two hooks (4) must be attached to flange of support sleeve (2) in holes diagonally across (or as close to 180 degrees apart as possible) to give proper balance when lifting support sleeve out of recoil cradle (3).	
7.	Soldier B: Attach two hooks (4) to top of flange of support sleeve (2) with two screws (6), two washers (8), and two nuts (7). Make finger tight.
GO TO FRAME 16	



11-13. RECOIL MECHANISM DISASSEMBLY PROCEDURE (CONT)

FRAME 16	
Step	Procedure
	<div data-bbox="658 491 880 573" style="text-align: center; border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p>WARNING</p> </div> <p data-bbox="409 616 1127 741" style="text-align: center;">Stay clear from underneath support sleeve (1) when it is lifted out of recoil cradle (2) and lowered to work bench. If it fails accidentally, serious injury to personnel could result.</p> <div data-bbox="687 819 851 868" style="text-align: center; border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p>CAUTION</p> </div> <p data-bbox="409 890 1127 1004" style="text-align: center;">Support sleeve (1) must not be tilted and must be carefully guided as it is lifted out of recoil cradle (2) so as to prevent binding, scratching, and damaging support sleeve.</p> <ol data-bbox="144 1026 1404 1483" style="list-style-type: none"> 1. Soldier A: Using hoist, slowly lift support sleeve (1) out of recoil cradle (2). Soldier B: Carefully guide support sleeve (1). 2. Soldier B: Remove two wood blocks (3) from top of recoil cradle (2). 3. Soldier A: Using hoist, move support sleeve (1) toward work bench. 4. Soldier A: Using hoist, lower support sleeve (1) to work bench as soldier B guides it. 5. Soldier B: Remove two nuts (4) and two washers (5) from two screws (6) that attach hoist and sling (7) to support sleeve (1). 6. Soldiers B and C: Carefully lay support sleeve (1) in cutouts of two wood blocks (8) on work bench. 7. Using O-ring extractor tool, remove seal assembly (9) from top of recoil cradle (2) (JPG). Throw seal assembly away. <div data-bbox="732 1504 816 1532" style="text-align: center; margin: 10px auto;"> <p>NOTE</p> </div> <p data-bbox="480 1569 1081 1662" style="text-align: center;">Follow-on Maintenance Action Required: Inspect parts of recoil mechanism (para 11-9).</p> <p data-bbox="215 1677 430 1705">END OF TASK</p>



11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE

TOOLS: 3/16" hex head socket (3/8 drive)
 15/16" combination wrench
 1/4" socket head screw key (Allen wrench)
 3/16" socket head screw key (Allen wrench)
 5/8" socket (1/2" drive)
 3/4" socket (1/2" drive)
 15/16" socket (1/2" drive)
 3" extension (1/2" drive)
 1/2" drive ratchet
 5/16" flat tip screwdriver (with 3/8" drive end)
 3/8" drive torque wrench (0-50 foot-pounds)
 1/2" drive torque wrench (0 to 250 foot-pounds)
 5/16" flat tip screwdriver
 Long nose pliers
 Diagonal cutting pliers
 External retaining ring pliers
 Movable overhead hoist, 1 ton capacity
 Sling (NSN4910-00-708-3778)
 Lifter assembly (NSN 1015-01-114-4002) (12290997)
 Spring compression fixture (NSN 4933-00-393-02401)
 Recoil piston adapter spanner wrench (fabricated tool, item 20, App. B)
 Thread protector (NSN 4933-00-039-05281)
 3/4" combination wrench (two)
 Adjustable wrench

SUPPLIES: Repair kit (seals) (5911134)
 Rope (20 feet long) (3/4" diameter)
 Wood blocks, 10" X 10" X 24" (two)
 Wood blocks, 4" X 4" X 24" (two)
 Wood blocks, 6" X 6" X 18" (two)
 Wood blocks, 2" X 4" X 12" (two)
 Lockwire (MS 20995-F41)
 Lockwire (MS 20995-F47)
 Lockwire (QQ-W-461)
 Eyebolt (NSN 5306-00-050-03481) (two)
 Flat washer 3/4 x 1-3/4 x 1/8 (two)
 Screws (MS 21262-44) (four)
 Screw 3/8" 16NC-2 (three)
 Screw MS 18153-144 (ten)
 Flat washer 11/16 x 16 x 1 x 1/16" (three)
 Grease item 12. App. A1
 Nut 3/8" 16NC-2 (three)
 Nut 5/8" 11NC-2
 Tape (item 35, App. A)

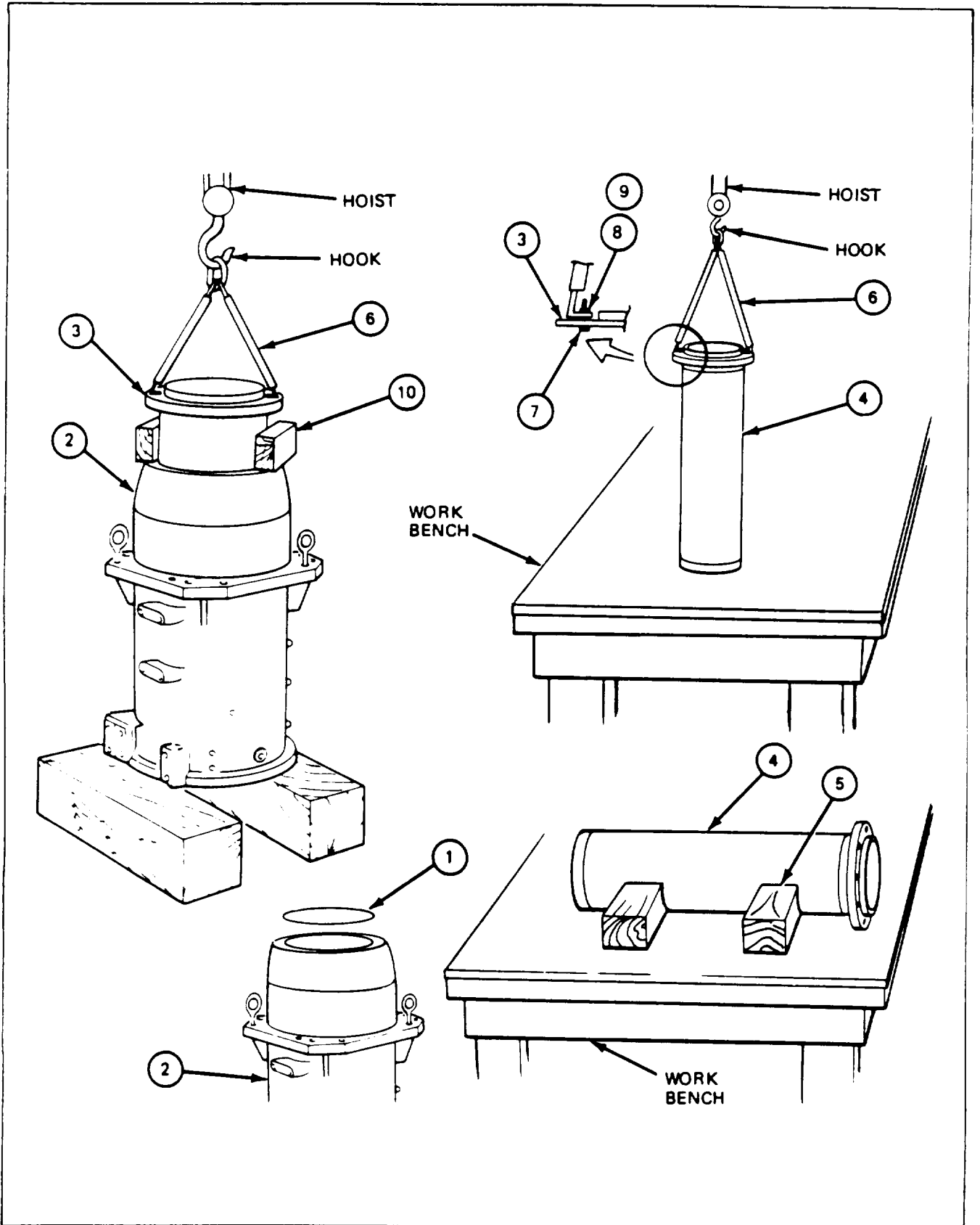
PERSONNEL: Three (including hoist operator)

PRELIMINARY PROCEDURES: Inspect recoil mechanism parts (para 11-9)

11 -14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

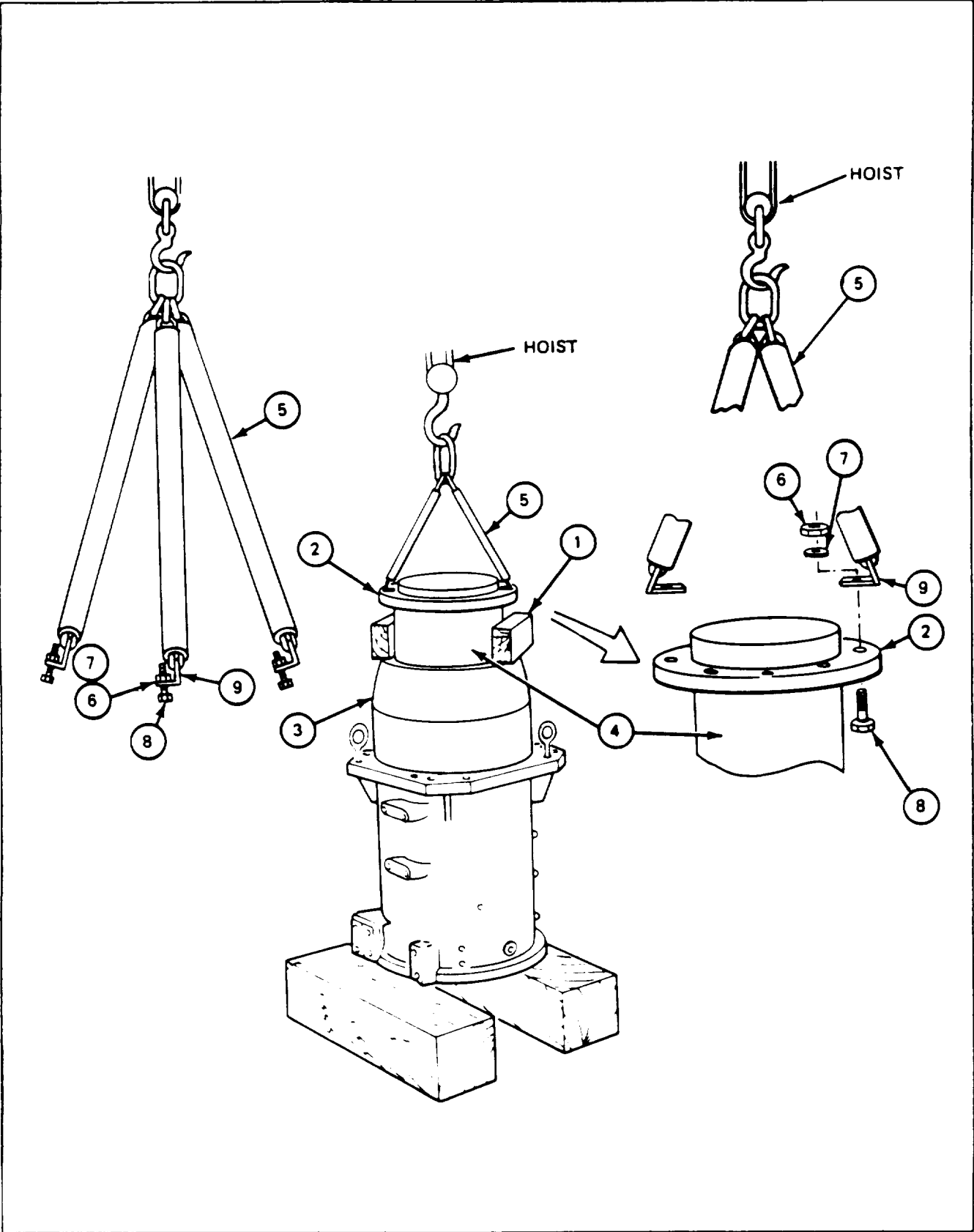
FRAME 1

Step	Procedure
1.	Put new seal assembly (1) in top of recoil cradle (2) that flange (3) of support sleeve (4) fits on.
2.	Put a light coating of grease on seal assembly (1).
3.	Soldiers B and C: Lift support sleeve (4) off two wood blocks (5) and stand it on work bench with flange (3) end up.
<p>NOTE</p> <p>Two legs of hoisting sling (6) must be attached to flange (3) in holes diagonally across (or as close as possible to 180 degrees apart) to give proper balance when support sleeve (4) is lifted.</p>	
4.	Soldier B: Hold support sleeve (4) while soldier B attaches two legs of sling (6) to flange (3) with two screws (7), two washers (8), and two nuts (9) and makes finger tight.
5.	Soldier C: Attach sling (6) to hoist hook.
<div data-bbox="646 1140 867 1213" style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p>Stay clear from underneath support sleeve (4) when it is lifted and lowered. If it falls accidentally, serious injury could result.</p>	
6.	Soldier B: Guide support sleeve (4) Soldier A: Using hoist, lift support sleeve (4) off work bench. and slowly lower it into recoil cradle (2) until flange (3) is about five inches above top of recoil cradle.
7.	Soldier C: Put two (2 x 4 x 12") wood blocks (10) between bottom of flange (3) and top of recoil cradle (2).
8.	Soldier A: Using hoist. carefully lower support sleeve (4) until flange (3) rests on two wood blocks (10).
<p>GO TO FRAME 2</p>	



11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

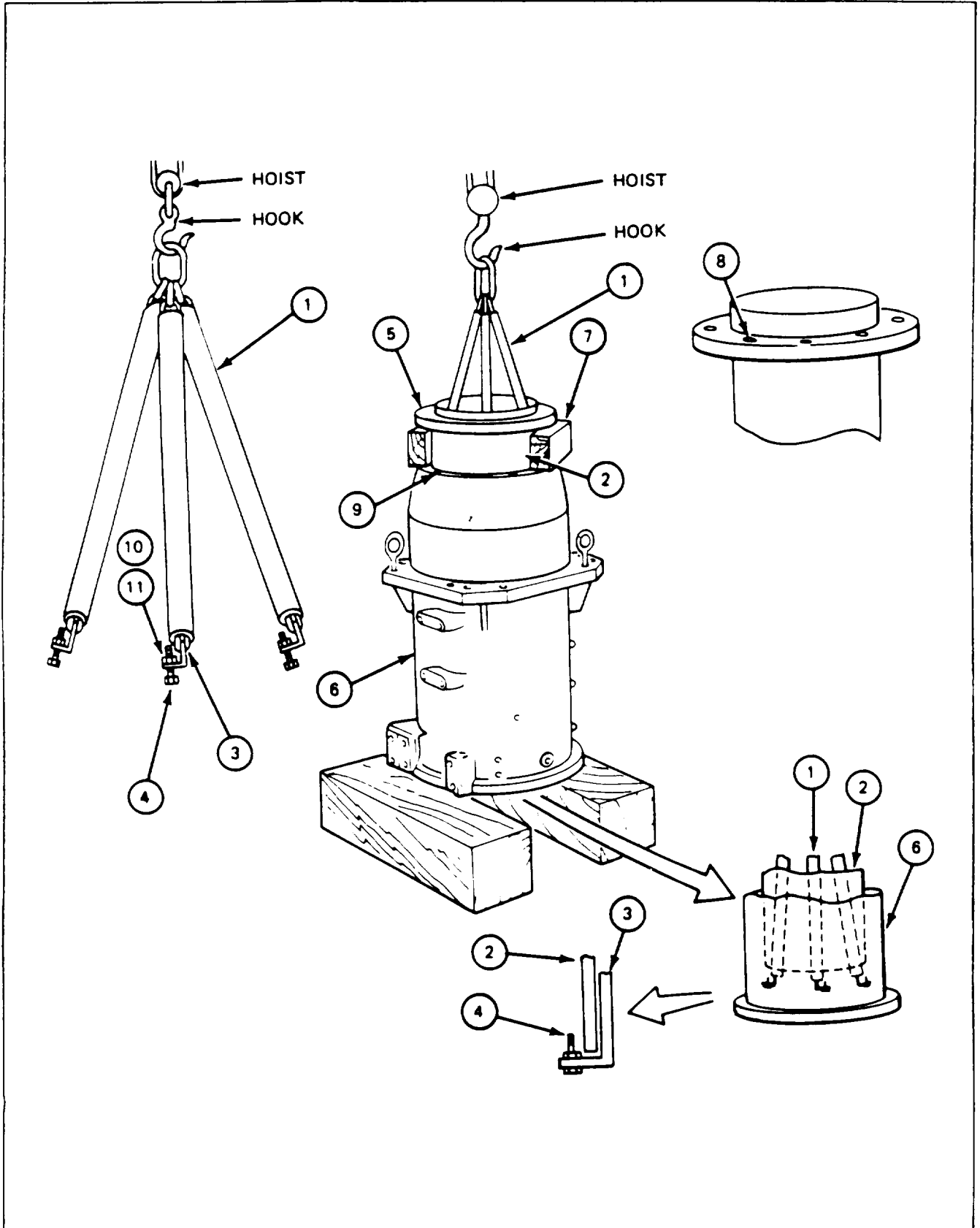
FRAME 2	
Step	Procedure
1.	Check two wood blocks (1) to make sure they are in place between flange (2) and top of recoil cradle (3).
2.	Soldier A: Using hoist, lower support sleeve (4) to allow slack in sling (5) so that support sleeve is fully supported by two wood blocks (1).
3.	Remove two nuts (6), two washers (7), and two screws (8) that attach two sling hooks (9) to flange (2) of support sleeve (4).
4.	Put one more sling (5) on hoist.
5.	Put three screws (8), three washers (7), and three nuts (6) in hooks (9) and make finger tight.
NOTE	
Tape is wrapped around nuts (6) and screws (8) to protect support sleeve (4) from being scratched when sling (5) is lowered inside of it.	
6.	Wrap layer of tape around each of three nuts (6) and screws (8) of three hooks (9). GO TO FRAME 3



11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

FRAME 3	
Step	Procedure
1.	<p>Soldier A: Using hoist, carefully lower hoist sling (1) into support sleeve (2) until three sling hooks (3) come out just below bottom of support sleeve where they can be reached by Soldier B.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Three hooks (3) must be positioned around bottom of sleeve (2) about 120 degrees apart with bottom of support sleeve resting between three hooks and three screws (4).</p>
2.	<p>Soldier B: Position three hooks (3), with three screws (4), around bottom of support sleeve (2) about 120 degrees apart.</p> <div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">WARNING</div> <p style="text-align: center;">Keep hands away from under flange (5). If support sleeve (2) should drop accidentally on recoil cradle (6), serious injury could result.</p>
3.	<p>Soldier A: Using hoist, carefully raise support sleeve (2) until it is off two wood blocks (7).</p>
4.	<p>Soldier B: Carefully remove two wood blocks (7).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">As support sleeve (2) is lowered into recoil cradle (6), screw holes (8) in support sleeve flange (5) must line up with screw holes (9) in recoil cradle.</p>
5.	<p>Soldier A: Using hoist, carefully lower support sleeve (2). Soldier B: Guide support sleeve (2) to line up holes (8) with holes (9) in recoil cradle (6).</p>
6.	<p>Soldier A: Carefully lower hoist and allow slack in sling (1).</p>
7.	<p>Soldier B: Remove three hooks (3) from bottom of support sleeve (2).</p>
8.	<p>Soldier A: Using hoist, lift sling (1) out of support sleeve (2).</p>
9.	<p>Remove sling (1) from hook.</p>
10.	<p>Remove three nuts (10), three washers (1) and three screws (4) from three hooks (3).</p> <p style="text-align: center;">GO TO FRAME 4</p>

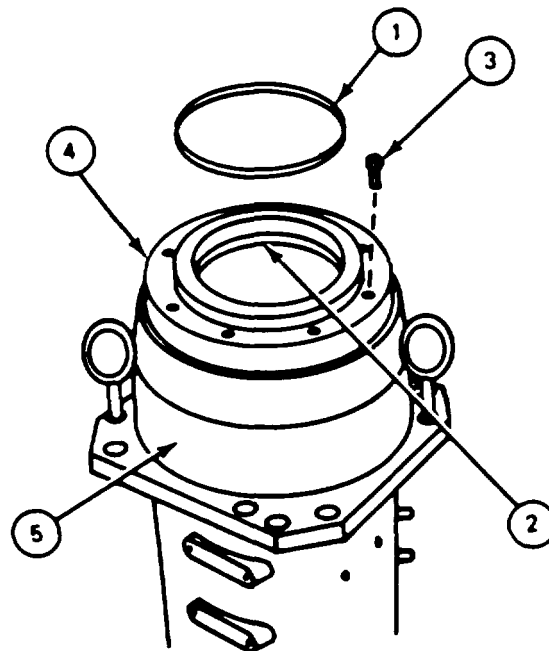
Para 11-14 Cont



11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

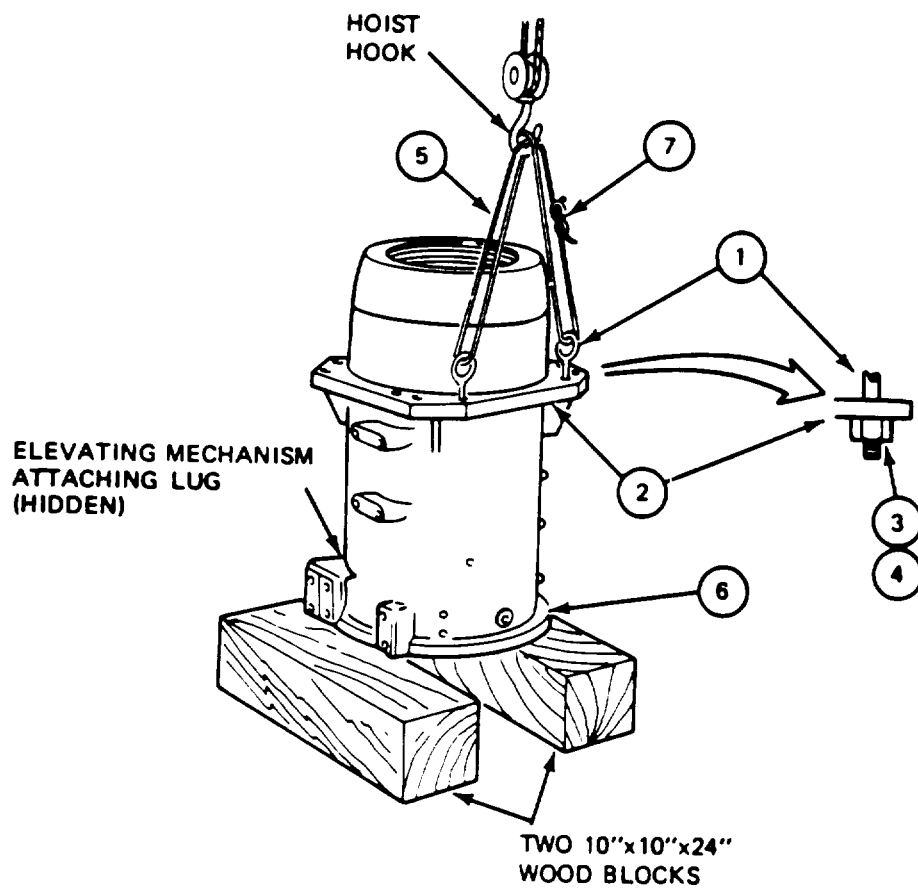
FRAME 4

Step	Procedure
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do step 1 if seal quadrant ring (1) was removed for damage or replacement of gun tube.</p> <ol style="list-style-type: none"> 1. Put new seal quadrant ring (1) into inside groove of sleeve (2). 2. Put a light coating of grease on seal quadrant ring (1). 3. Using 5/8" socket wrench, put eight screws (3) through sleeve flange (4) into recoil cradle (5). 4. Using torque wrench with 5/8" socket, torque eight screws (3) to between 50 and 70 foot-pounds (JPG). 5. Using diagonal pliers and long nose pliers, lockwire each pair of screws (3) together (JPG). <p>GO TO FRAME 5</p>	



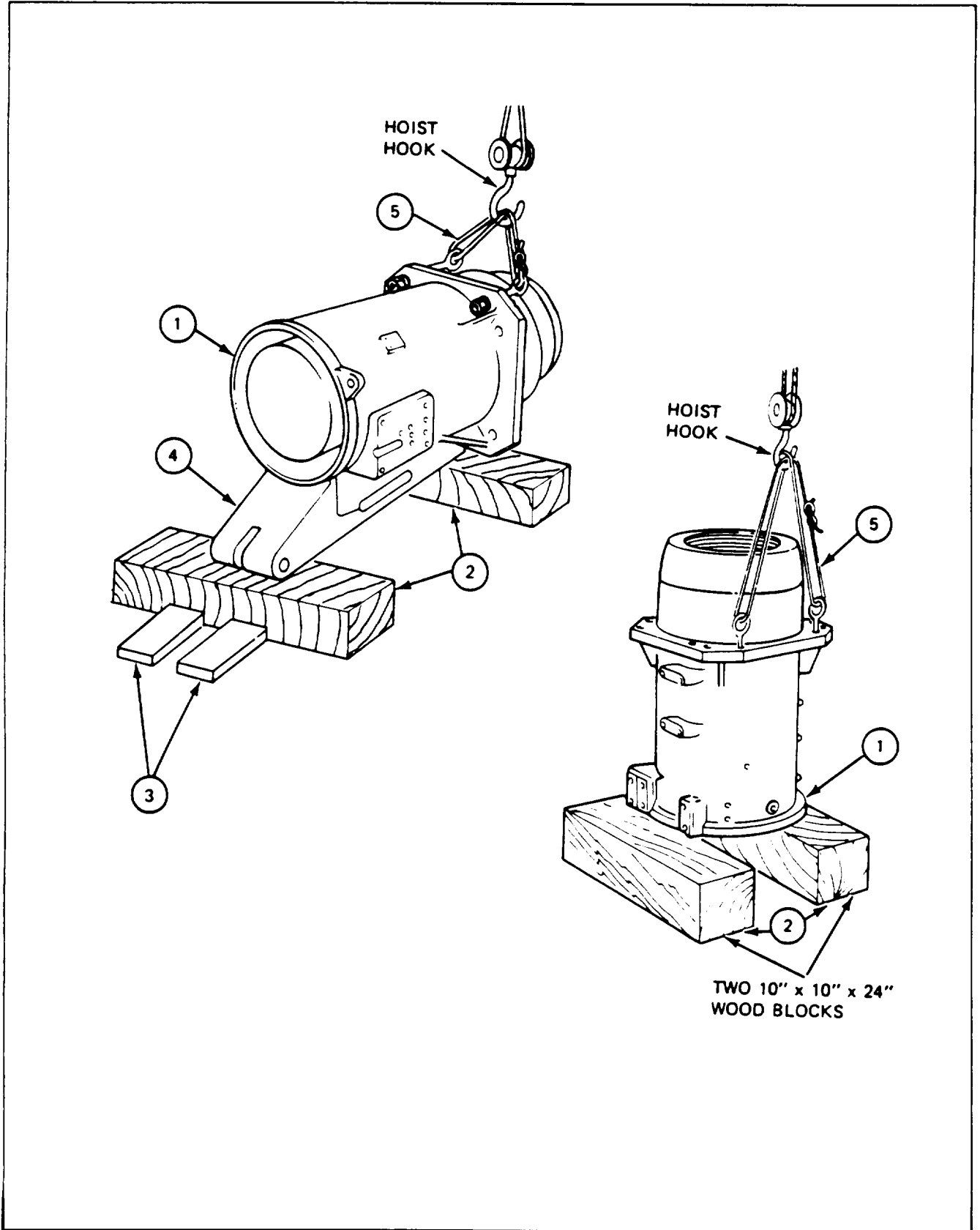
11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

FRAME 5	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p>Two eyebolts (1) must be located in adjacent comers of flange (2) that are opposite of elevating mechanism attaching lug (hidden). If eye bolts are in diagonal comers of flange or not installed, do Step 1. Otherwise, go to Step 2.</p>
1.	<p>Using 15/16" combination wrench attach two eyebolts (1) in adjacent comers of flange (2), opposite elevating mechanism attach lug (hidden), with two washers (3) and two nuts (4).</p>
	<p style="text-align: center;">NOTE</p> <p>When fastening rope (5) to two eyebolts (1), cross rope over itself so that crossed rope in hoist hook will prevent recoil mechanism (6) from slipping sideways during lifting operation.</p> <p>2. Pass one end of rope (5) through two eyebolts (1).</p> <p>3. Cross rope (5) over itself before tying two ends with square knot (7).</p> <p>4. Put rope cross into hoist hook so that hook is lined up parallel with two eyebolts (1).</p> <p>GO TO FRAME 6</p>



11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

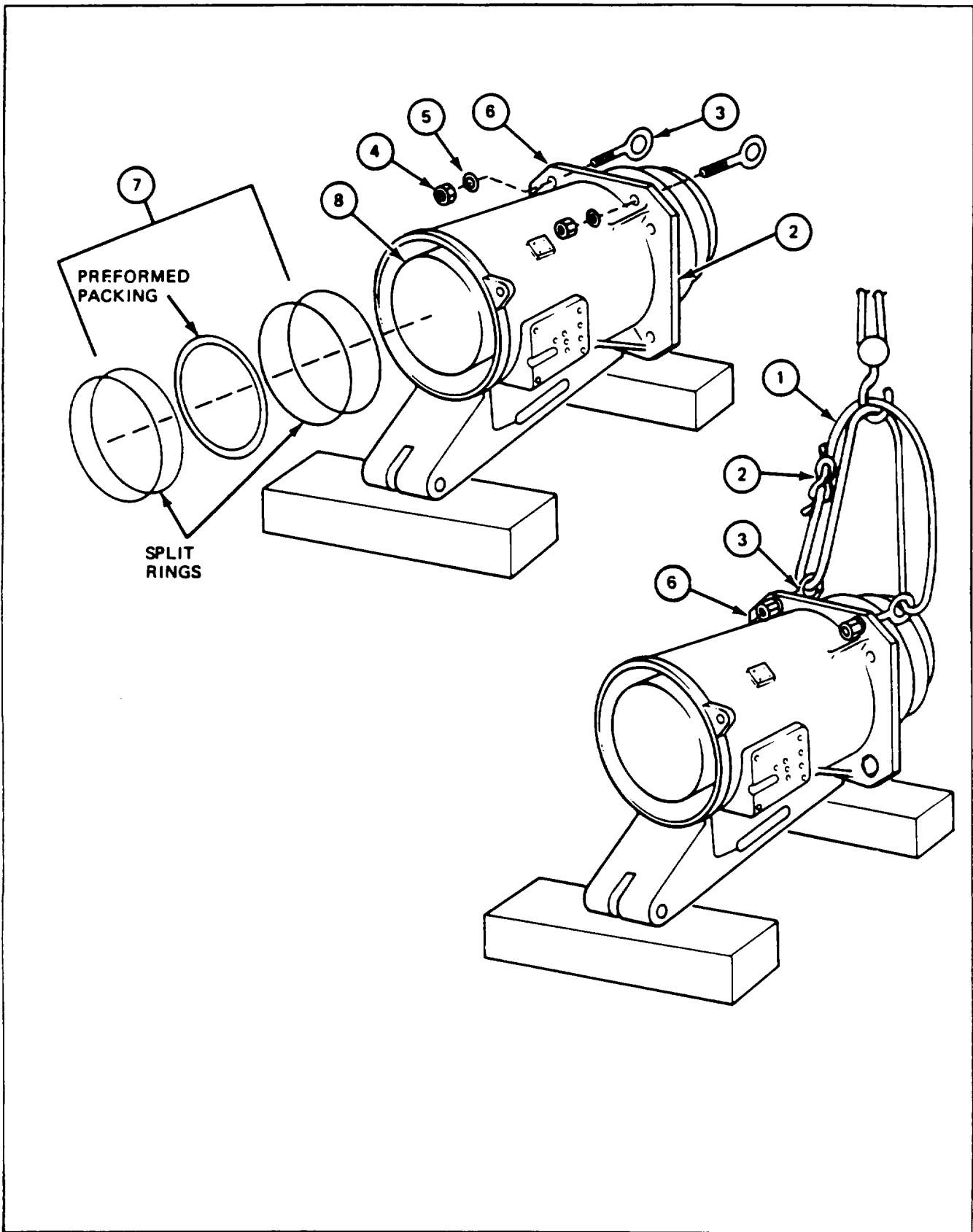
FRAME 6	
Step	Procedure
	<div data-bbox="673 433 900 519" style="border: 1px solid black; text-align: center; padding: 5px; margin: 10px auto; width: fit-content;"> <p>WARNING</p> </div> <p data-bbox="426 558 1144 745" style="text-align: center;">Recoil mechanism (1) weighs about 900 pounds. Use extreme care when raising and handling it. When raising recoil mechanism off blocks (2) in upright position, recoil mechanism will swing back. Stay clear and stay out from under recoil mechanism when it is lifted. If it falls accidentally, serious injury could result.</p> <ol data-bbox="157 763 1429 1366" style="list-style-type: none"> 1. Soldier A: Using hoist, lift recoil mechanism (1) off two wood blocks (2) and move it to one side. 2. Soldier C: Move two wood blocks (2) to new positions so as to support recoil mechanism (1) when it is lowered in horizontal position. 3. Soldier B: Put two (4 x 4 x 12") wood blocks (3) against one wood block (2) at right angles to protect recoil mechanism (1) as it is lowered to two wood blocks (2). 4. Soldier A: Using hoist, slowly lower recoil mechanism (1). Soldier B: Guide recoil mechanism (1) so that elevating mechanism attaching lug (4) touches two wood blocks (3). 5. Soldier C: Move two wood blocks (2) as necessary to be under recoil mechanism (1) when it is lowered to horizontal position. 6. Soldier A: Using hoist, continue to lower recoil mechanism (1) to horizontal position so that it rests on two wood blocks (2). 7. Soldier B: Remove two wood blocks (3). 8. Soldier A: Lower hoist to allow slack in rope (5). <p data-bbox="225 1381 477 1414">GO TO FRAME 7</p>



11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

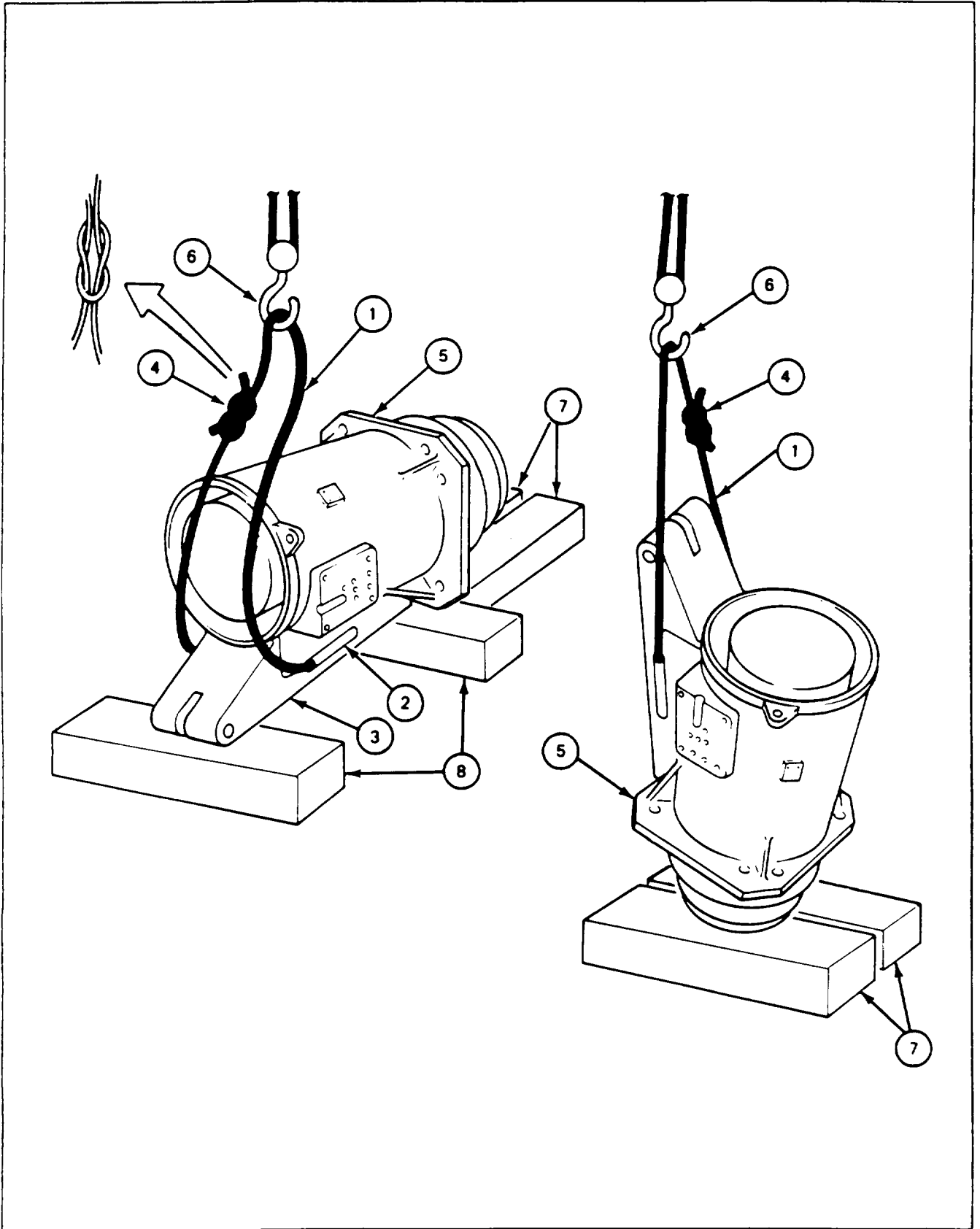
FRAME 7

Step	Procedure
1.	Remove rope (1) from hoist hook.
2.	Untie knot (2).
3.	Remove rope (1) from two eyebolts (3).
4.	Using 15/16" combination wrench, remove two nuts (4) and two flat washers (5) that attach two eyebolts (3) to recoil mechanism (6).
NOTE	
Two split rings are on each side of preformed packing of seal assembly (7). Splits of rings on same side must be 180 degrees apart. Splits of four rings must be 90 degrees apart. No two splits in line.	
5.	Put new seal assembly (7) into outside groove near end of support sleeve.
6.	Put a light coating of grease on seal assembly (7).
GO TO FRAME 8	



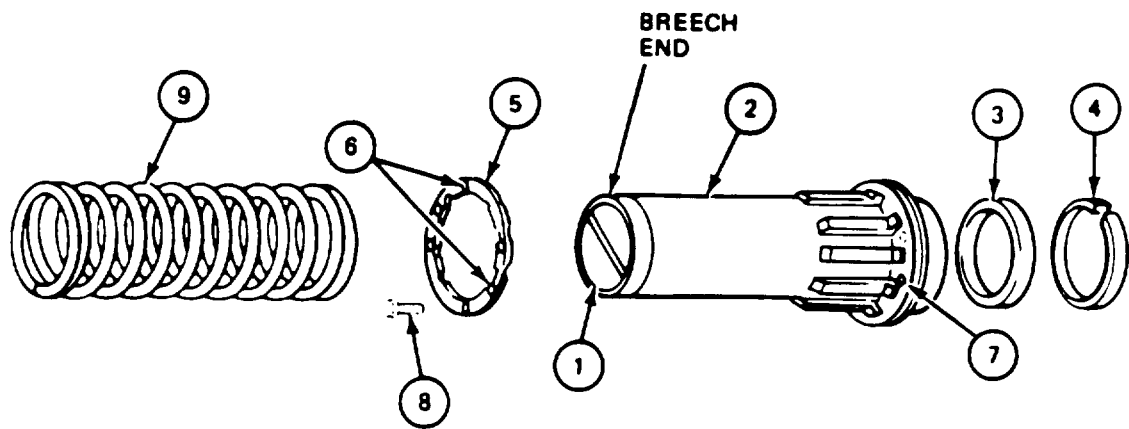
11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

FRAME 8	
Step	Procedure
1.	Put one end of rope (1) through slots (2) of attaching lug (3).
2.	Tie square knot (4) to make a rope sling (1).
3.	Put rope sling (1) over end of recoil mechanism (5).
4.	Put rope sling (1) over hoist hook (6).
5.	Put two 4 x 4 x 24" wood blocks (7) at right angle against wood block (8).
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p style="text-align: center;">Stay clear of recoil mechanism (5) during lifting and lowering operations. If it falls accidentally, serious injury could result.</p>	
6.	Soldier A: Using hoist, take up slack in rope sling (1) to tighten knob (4), then carefully lift recoil mechanism (5) off two wood blocks (8) to upright position.
7.	Soldier A: Using hoist, lower recoil mechanism (5). Soldier B: Guide recoil mechanism (5) to rest on two wood blocks (7) in upright position.
8.	Remove rope sling (1) from hoist hook (6).
9.	Untie knots (4).
10.	Remove rope (1) from recoil mechanism (5).
GO TO FRAME 9	



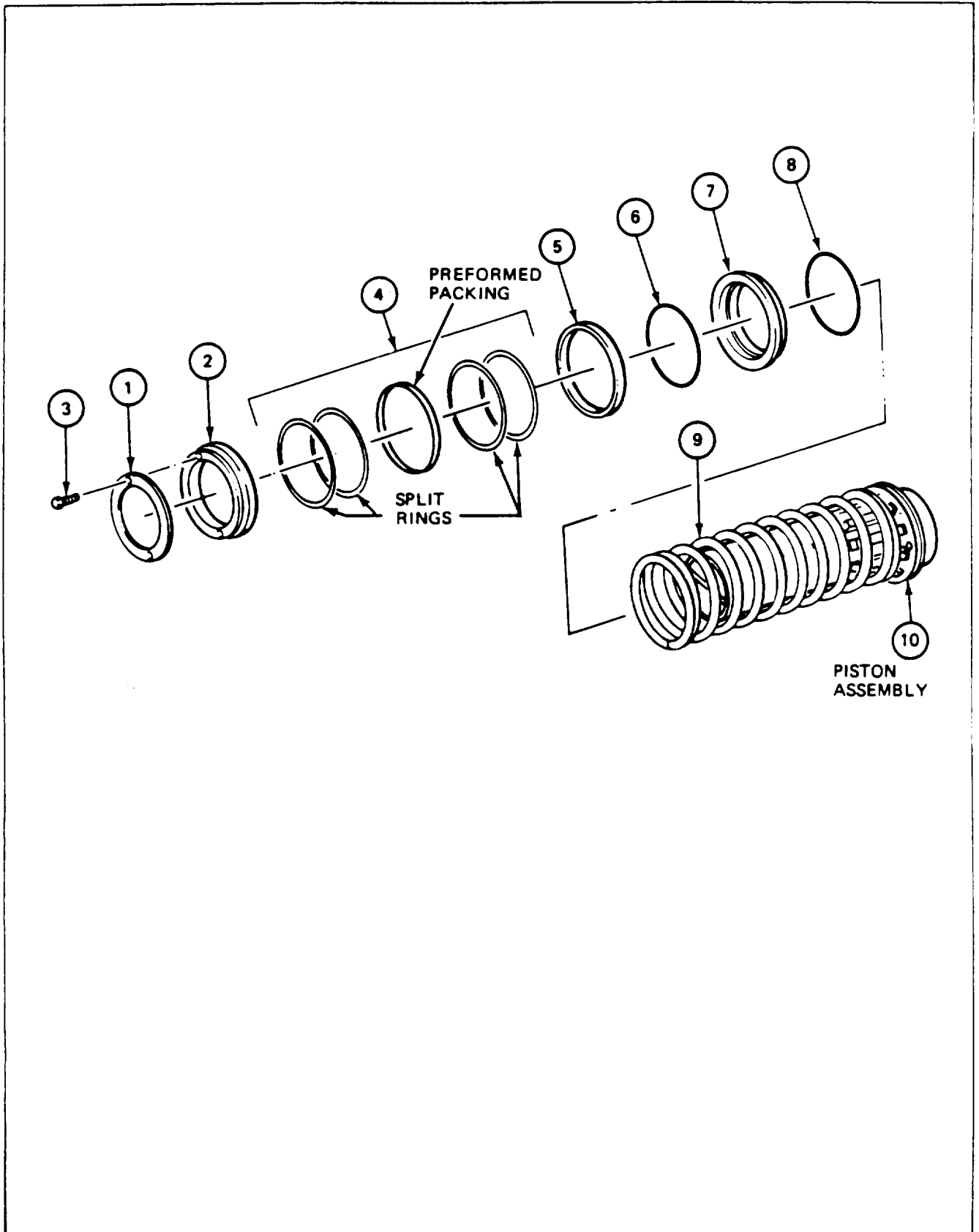
11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

FRAME 9	
Step	Procedure
	<div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p>Recoil piston (2) and recoil piston adapter are a matched machined set. Do not interchange recoil piston with parts from other sets. Serious injury may result.</p> <p style="text-align: center;">NOTE</p> <p>Have all parts on work bench before starting procedure. If screw thread protector (1) is not on recoil piston (2), do Step 1. Otherwise, go to Step 2.</p> <ol style="list-style-type: none"> 1. Put screw thread protector (1) on recoil piston (2). 2. Put recoil inertia valve (3) into recoil piston (2). 3. Using external retaining ring pliers, put retaining ring (4) into inside groove near end of recoil piston (2) (JPG). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Go to Step 5 if recoil ring is installed.</p> <ol style="list-style-type: none"> 4. Carefully put spring recoil ring (5) on recoil piston (2) so that two dowel pins (6) fit in two holes (7). 5. Using 3/16" Allen wrench, put four new screws (8) through spring recoil ring (5) and into recoil piston (2). 6. Using 3/16" hex head socket and torque wrench, torque four screws (8) to between 13 and 15 foot-pounds (JPG). <div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">CAUTION</div> <p>Recoil piston (2) scratches easily. Use extreme care when putting spring (9) on recoil piston.</p> <p style="text-align: center;">NOTE</p> <p>If spring (9) was determined to be serviceable, install spring so that end of spring showing most wear is located at breech end of gun mount. Generally, the end coils of spring are etched "BE" for breech end and "ME" for muzzle end.</p> <ol style="list-style-type: none"> 7. Soldiers B and C: Carefully put spring (9) on recoil piston (2). <p>GO TO FRAME 10</p>



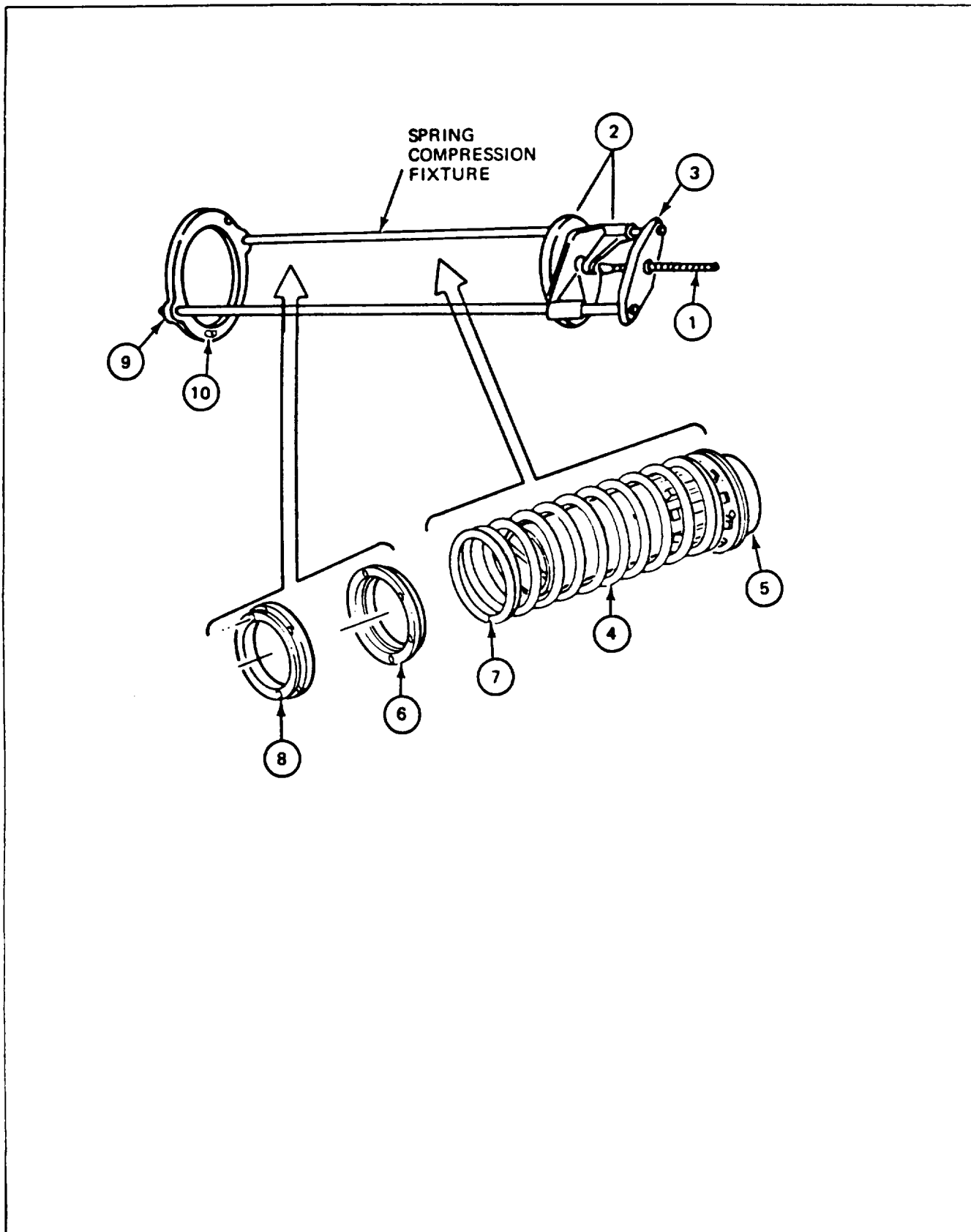
11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

FRAME 10	
Step	Procedure
1.	Using screwdriver, attach spacer (1) to retaining cover (2) with six screws (3).
2.	Using screwdriver and torque wrench, torque six screws (3) to 5 to 7 foot-pounds (JPG
3.	Put a light coating of grease on all surfaces of new seal assemblies,
<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">CAUTION</div> <p style="text-align: center;">Seal assembly is made up of two split rings on each side of preformed packing. Install the rings so that the splits of adjacent rings are 180 degrees apart, and the splits of the two rings on each side of the preformed packing are 90 degrees apart No two splits should be in line.</p>	
4.	Put new seal assembly (4) in inner groove of seal retainer (5).
5.	Put new seal assembly (6) in end groove of seal retainer (5).
6.	Put assembled seal retainer (5) with seal assembly (6) facing inside spring seat (7).
7.	Put new seal (8) in groove of spring seat (7).
8.	Line up spring seat (7) containing seal retainer (5) with spring (9) and piston (10)
GO TO FRAME 11	



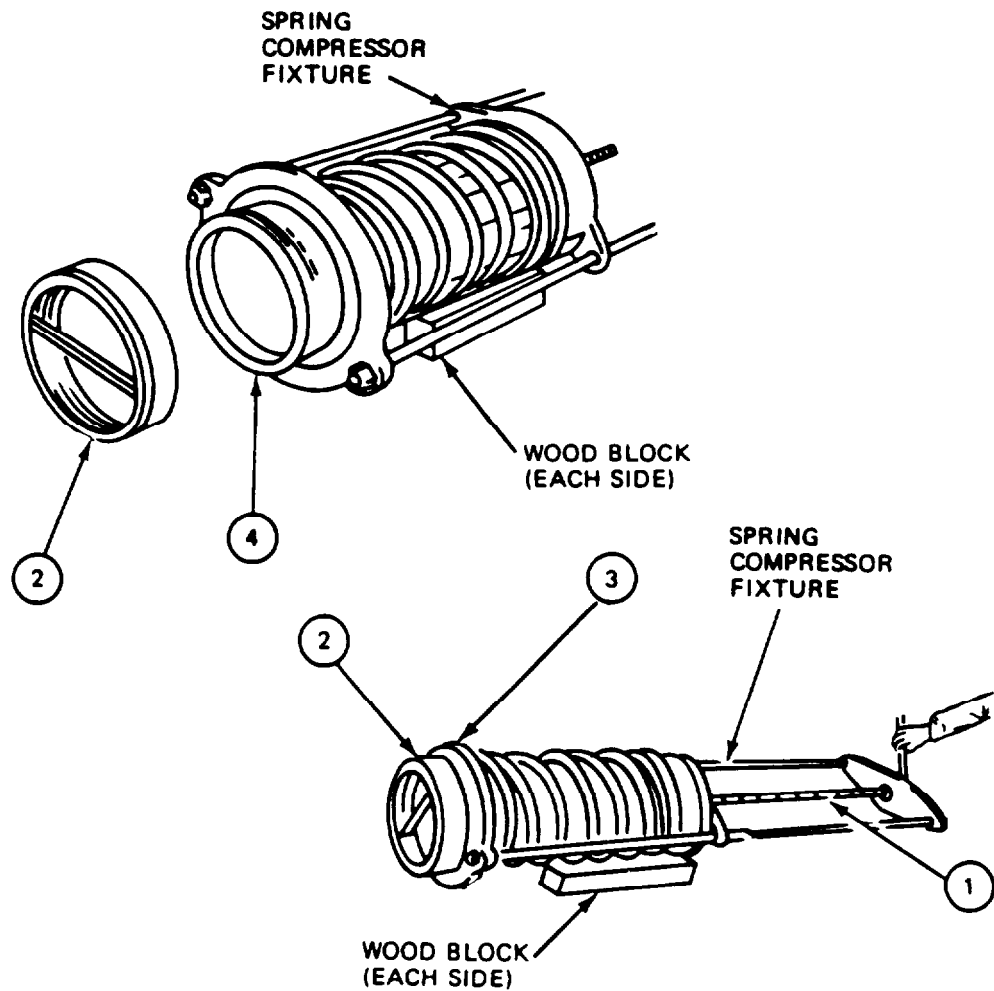
11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

FRAME 11	
Step	Procedure
1.	Using 5/8" socket wrench, turn end of jack screw (1) on spring compression fixture so that plate and bracket (2) are moved to end bracket (3).
	<div style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">CAUTION</div> <p style="text-align: center;">When placing spring compression fixture on piston assembly (4), use care to avoid scratches and damage to machined surfaces of piston assembly (4).</p>
2.	Soldiers B and C: Lift up spring compression fixture so that it is over and above piston assembly (4).
3.	Soldiers B and C: Lower spring compression fixture on piston assembly (4) so that piston assembly is inside spring compression fixture.
4.	Soldiers B and C: Carefully put end (5) of piston assembly (4) over plate (2) of spring compression fixture.
5.	Soldier B: Hold piston assembly (4) in place in spring impression fixture. Soldier C: Place spring seat (6) in spring (7).
6.	Soldier B. Position retainer cover (8) on retainer plate (9) of spring compression fixture so that two holes in retainer cover go over two dowel pins (10) in retainer plate,
7.	Soldier C: Using 5/8" socket wrench, slowly turn jack screw (1) until piston assembly and parts move near retainer cover (8).
8.	Soldier B: Line up notch in spring seat (6) with notch in retainer cover (8) and makes sure two holes in spring seat go over two dowel pins (10) of retainer plate (9).
	GO TO FRAME 12



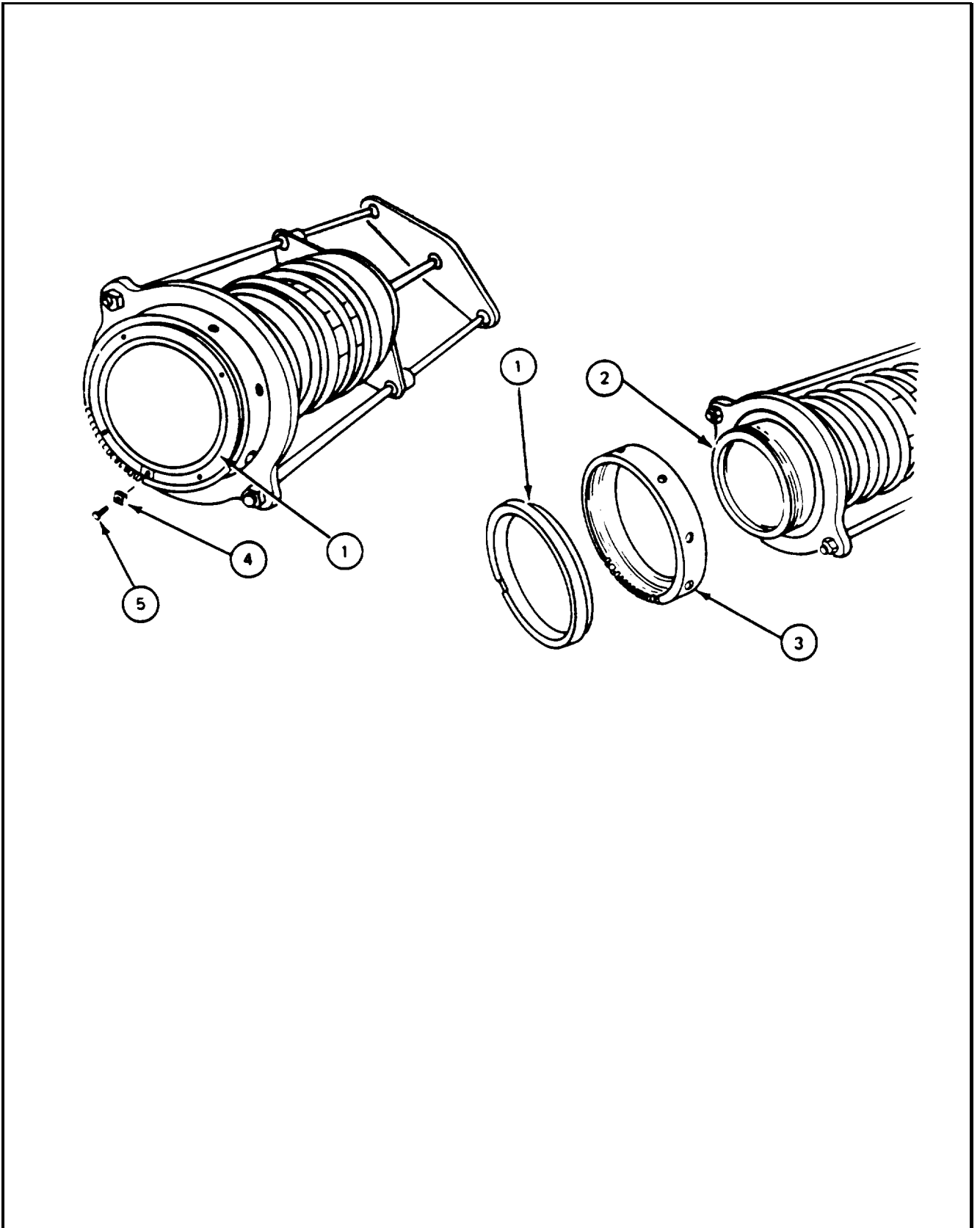
11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

FRAME 12	
Step	Procedure
1.	Soldier B: Place two 6 x 6 x 18" wood blocks under each side of spring compressor fixture to prevent movement.
2.	Soldier C: Using 5/8" socket wrench, continue to turn jackscrew (1) until a resistance is felt.
3.	Soldier B: Check that all parts are lined up properly to prevent damage.
4.	Soldier C: Using 5/8" socket wrench, turn jackscrew (1) until all of thread protector tool (2) sticks out of spring compressor fixture spring retainer plate (3).
5.	Remove thread protector tool (2) from recoil piston (4).
GO TO FRAME 13	



11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

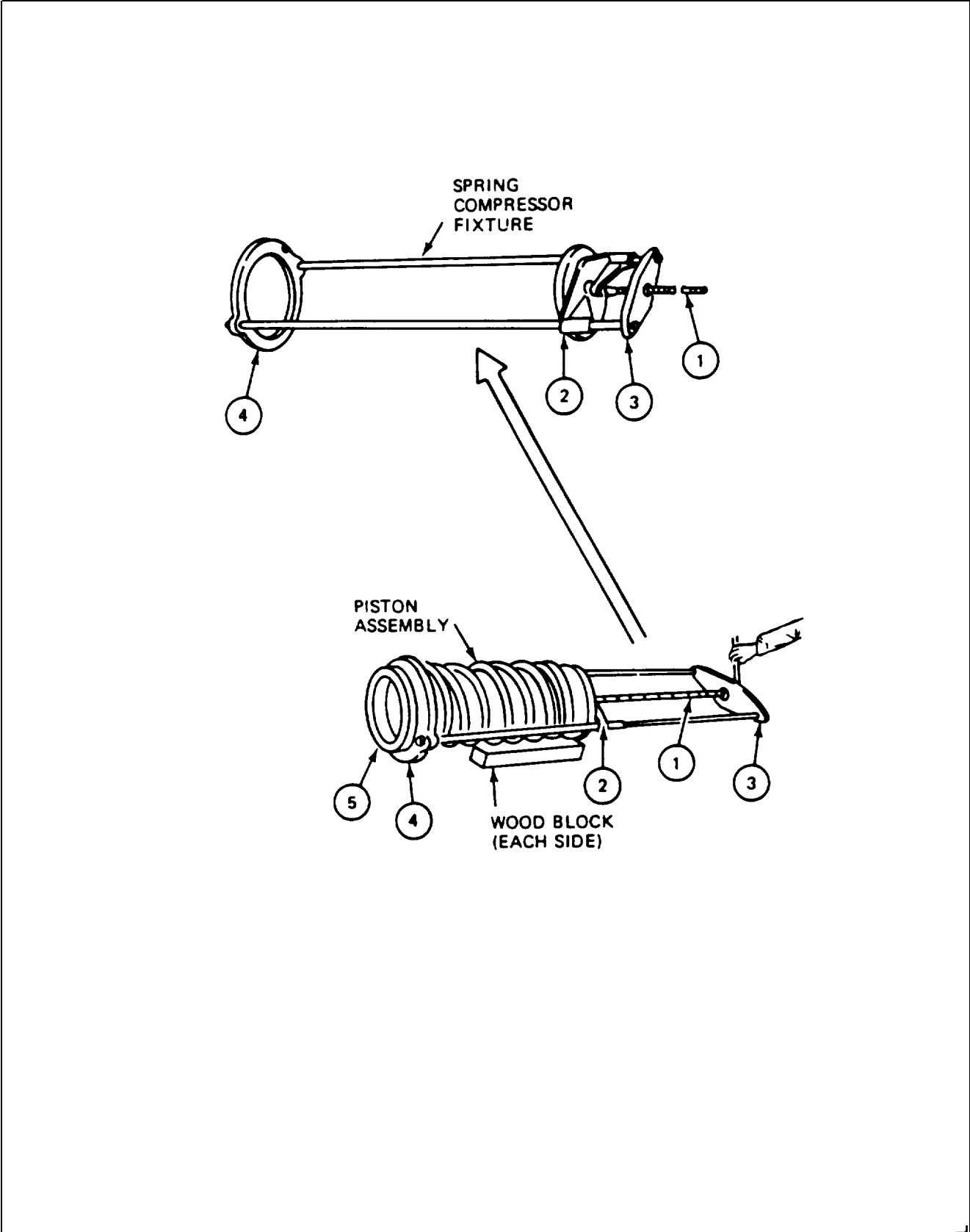
FRAME 13	
Step	Procedure
	<p style="text-align: center;">WARNING</p> <p>Recoil piston adapter (1) and recoil piston (2) are a matched machined set. Do not interchange recoil piston adapter or recoil piston with parts from other sets as serious injury may result.</p> <ol style="list-style-type: none"> 1. Check recoil piston adapter (1) part number on innerface. 2. Check recoil piston (2) part number in spline of piston, <p style="text-align: center;">CAUTION</p> <p>Be careful not to damage threads when putting adapter collar (3) on piston (2).</p> <ol style="list-style-type: none"> 3. Carefully put adapter collar (3) on recoil piston (2). 4. Using spanner wrench, screw piston adapter (1) on recoil piston (2). <p style="text-align: center;">NOTE</p> <p>Piston adapter surface must be flush to 0.01'' below piston surface before key (4) is installed.</p> <ol style="list-style-type: none"> 5. Using screwdriver, install key (4) on piston adapter (1) with screw (5). 6. Using screwdriver and torque wrench, torque screw (5) to 5 to 7 foot-pounds (JPG). <p>GO TO FRAME 14</p>



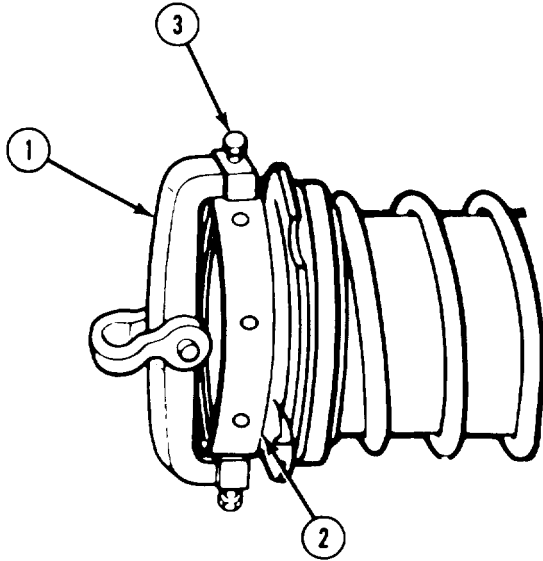
11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

FRAME 14

Step	Procedure
1.	Soldier B: Hold spring compressor fixture. Soldier C: Using 5/8" socket wrench, turn jackscrew (1) in the direction so that plate and bracket (2) of spring compression fixture is moved to end bracket (3). Soldier B: Hold spring compressor fixture.
2.	Soldier B: Remove two wood blocks from sides of spring compression fixture.
NOTE	
Soldiers B and C: Lift and remove spring compression fixture together from piston assembly.	
3.	Soldiers B and C: Put two wood blocks (2 x 2 x 24") under piston assembly.
4.	Carefully slide spring compressor fixture at bracket (3) so that plate and bracket (2) clears end of piston assembly.
NOTE	
It might be necessary to pry spring retainer plate (4) over piston adapter collar (5) to remove spring compressor fixture.	
5.	Slide spring retainer plate (4) over piston adapter collar (5).
6.	Remove spring compressor fixture from piston assembly.
GO TO FRAME 15	

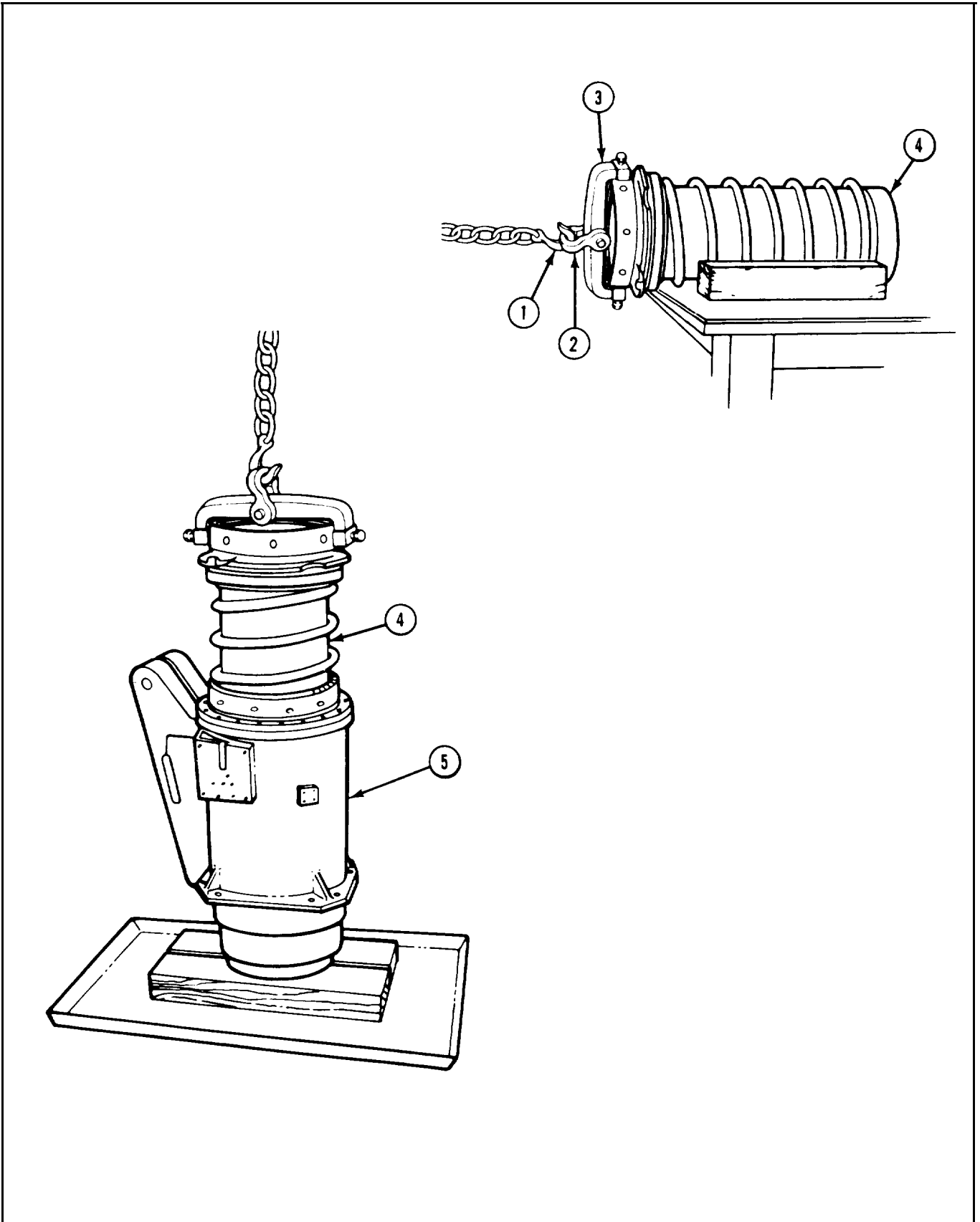


11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

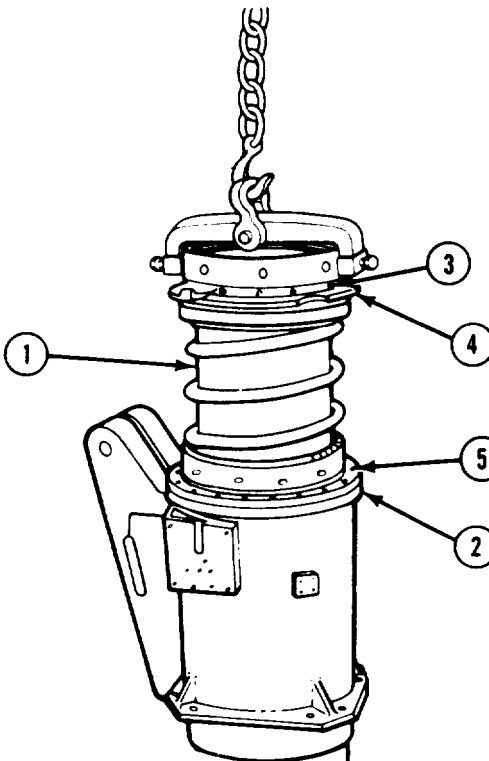
FRAME 15	
Step	Procedure
1. 2.	<p>Using hands, put lifter assembly (1) on piston assembly collar (2). Screw in two adjusting screws (3) in holes at both ends of collar (2).</p> <p>Using adjustable wrench, tighten two adjusting screws (3).</p> <p>GO TO FRAME 16</p>
 <p>The diagram shows a side view of a recoil mechanism assembly. It consists of a cylindrical piston assembly with a helical spring wrapped around it. A lifter assembly (1) is mounted on the piston assembly collar (2). Two adjusting screws (3) are shown being inserted into holes at the ends of the collar. The lifter assembly has a hook-like end and a circular end. The adjusting screws are positioned at the top and bottom of the collar.</p>	

11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

FRAME 16	
Step	Procedure
1.	<p>Soldier A: Using hoist, put hoist hook (1) through clevis (2) attached to lifter assembly (3).</p> <div style="text-align: center; border: 1px solid black; padding: 5px; margin: 10px auto; width: fit-content;"> <p>WARNING</p> </div> <p style="text-align: center;">Stay clear from underneath piston assembly (4) when it is lifted from working surface and moved into position above cradle (5). Serious injury could result if piston assembly (4) should fall.</p>
2.	Soldier B: Guide piston assembly (4).
3.	Soldier A: Using movable hoist, lift piston assembly (4) from working surface,
4.	Soldier A: Using movable hoist, place piston assembly (4) in position directly over cradle (5).
	GO TO FRAME 17

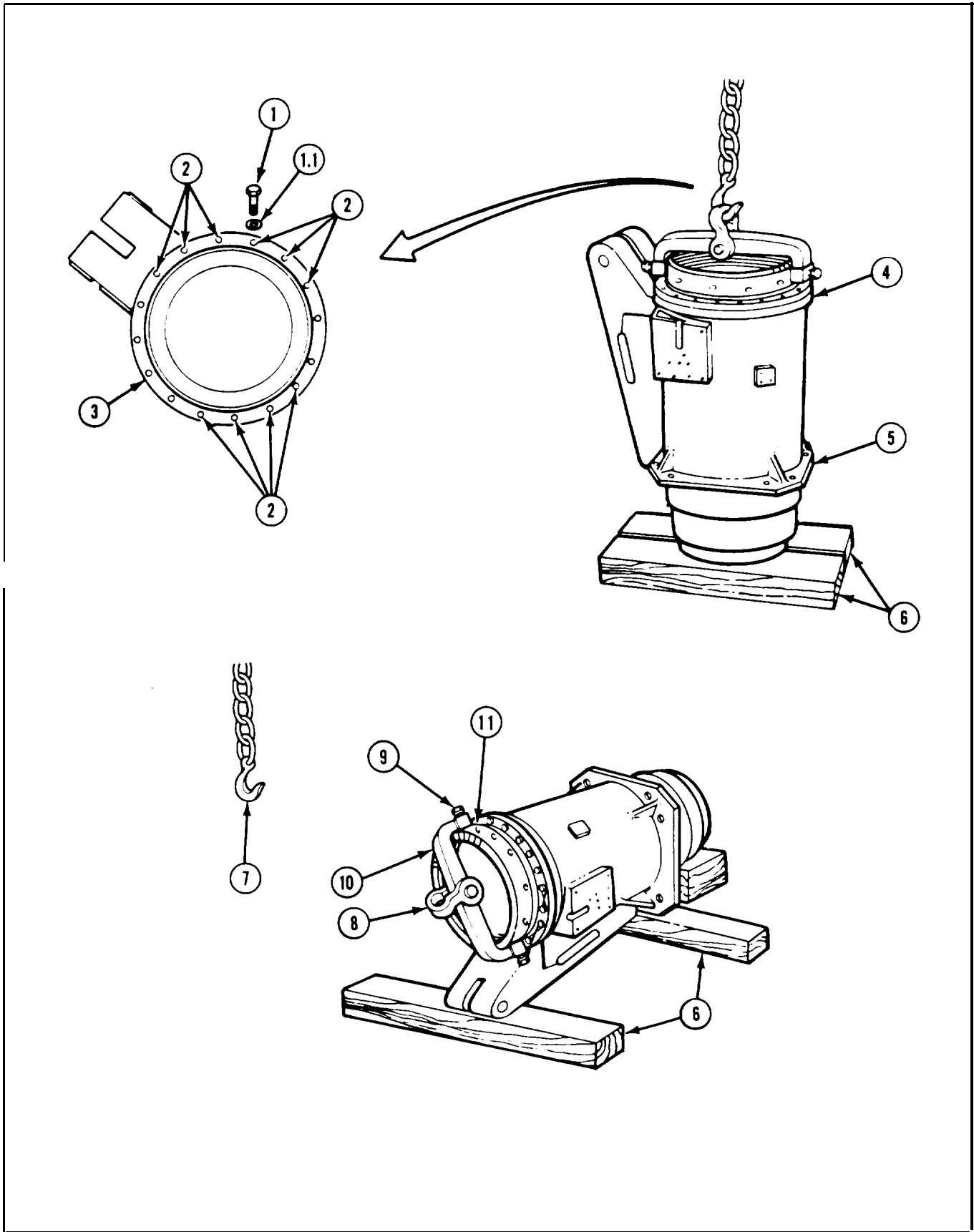


11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

FRAME 17	
Step	Procedure
1.	<p>Soldier A: Using movable hoist, lower piston assembly (1) into cradle (2). Soldier B: Steady piston assembly (1) and make sure screw holes (3) in spring seat and retainer cover (4) are in line with screw holes (5) in flange of cradle (2).</p> <p>GO TO FRAME 18</p>
 <p>The diagram shows a vertical assembly of mechanical parts. At the top, a chain is attached to a hook. Below the hook is a circular flange with several screw holes, labeled '3'. Underneath this flange is a cylindrical component with a textured surface, labeled '4'. Below that is another cylindrical component with a smooth surface, labeled '1'. This component is being lowered into a larger, cylindrical housing labeled '2'. The housing has a handle on the left side and a flange at the bottom with several screw holes, labeled '5'. Arrows point from the numbered circles to the corresponding parts in the diagram.</p>	

11-14. RECOIL MECHANISM ASSEMBLY PROCEDURE (CONT)

FRAME 18	
Step	Procedure
	NOTE
	Use the 12 shorter screws from screw repair kit to fasten retainer cover (3) to cradle (4). The longer screws are to be retained and will be used during follow-on maintenance.
	Early gun mounts required 9/16 inch socket. Late or modified gun mounts require 5/8 inch socket.
1.	Using socket, install 12 screws (1) and washers (1.1) in indicated holes (2) to hold cover (3) of piston assembly to cradle (4), do not tighten screws at this point.
	WARNING
	Stay clear from underneath recoil mechanism (5) when it is lifted and turned to horizontal position. If it should swing or fail accidentally, serious injury could result.
2.	Soldier A: Using hoist, carefully lift recoil mechanism (5) off two wood blocks (6) and move it out of way.
3.	Waler B: Move two wood blocks (6) to new position to suport recoil mechanism (5) when it is lowered and turned to horizontal position.
4.	Soldier C: Guide recoil mechanism (5) to turn to horizontal position on two wood blocks (6).
5.	Soldier A: Using hoist, slowly lower recoil mechanism (5) until it is supported fully in horizontal position on two wood blocks (6).
6.	Remove hoist hook (7) from clevis (8).
7.	Using adjustable wrench, loosen two adjusting screws (9) securing lifter assembly (10) to collar (11).
8.	Remove lifter assembly (10) from collar (11).
	NOTE
	Follow-on Maintenance Action Required:
	Install recoil mechanism (para 11-1 2).
	END OF TASK



11-15. RECOIL MECHANISM REPAIR PROCEDURE

TOOLS: Upper guide plate (fabricated tool, item 23, App. B)
Drill extension and split bushing
(fabricated tool, item 22, App. B)

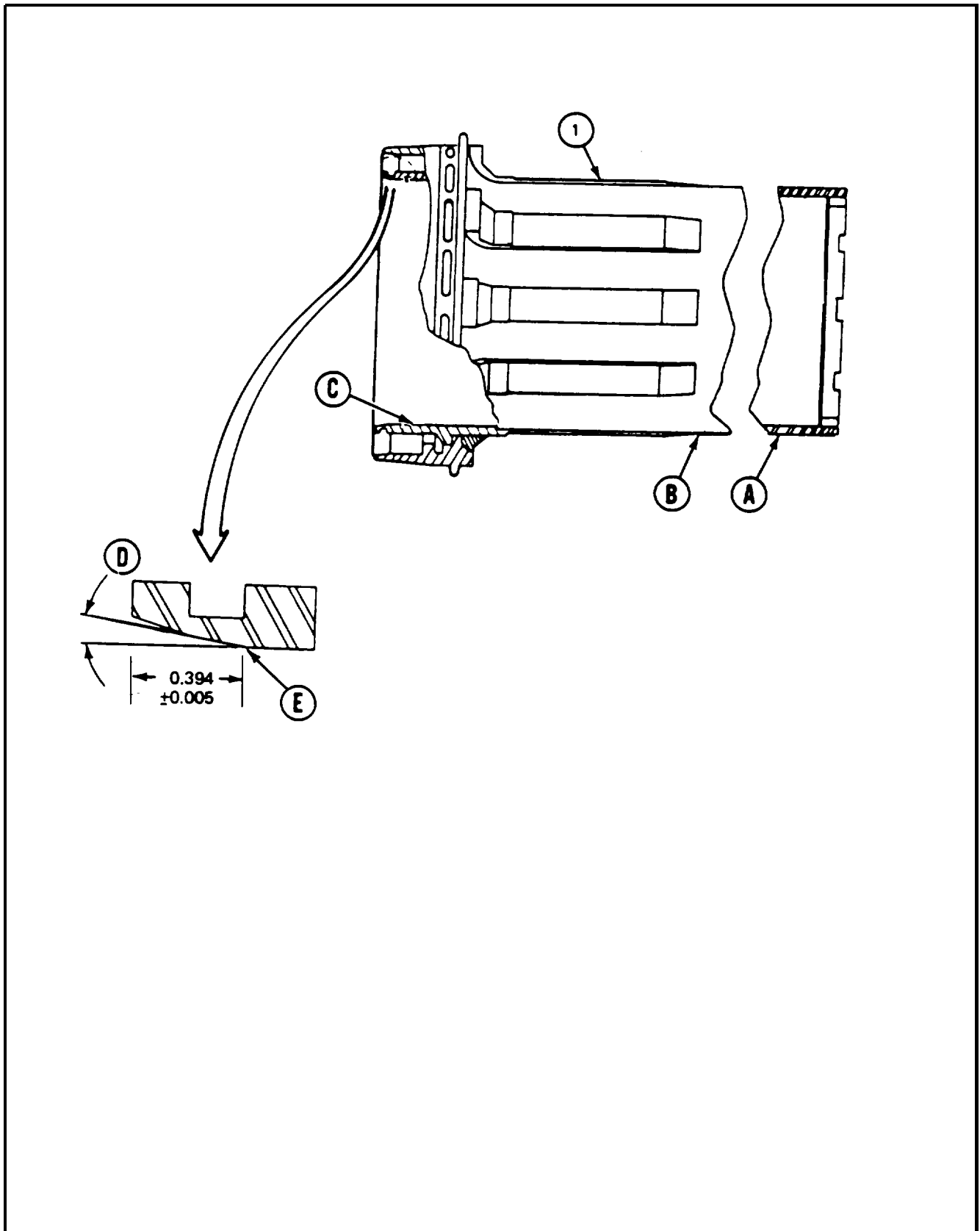
SUPPLIES: Dowel pins (8449259) (two)
Screws (MS21262-44) (four)

PERSONNEL: One

PRELIMINARY PROCEDURES: Inspect recoil mechanism parts (para 11-9)

GENERAL INSTRUCTION: If recoil mechanism parts are bad, order repair part or next higher assembly as required.

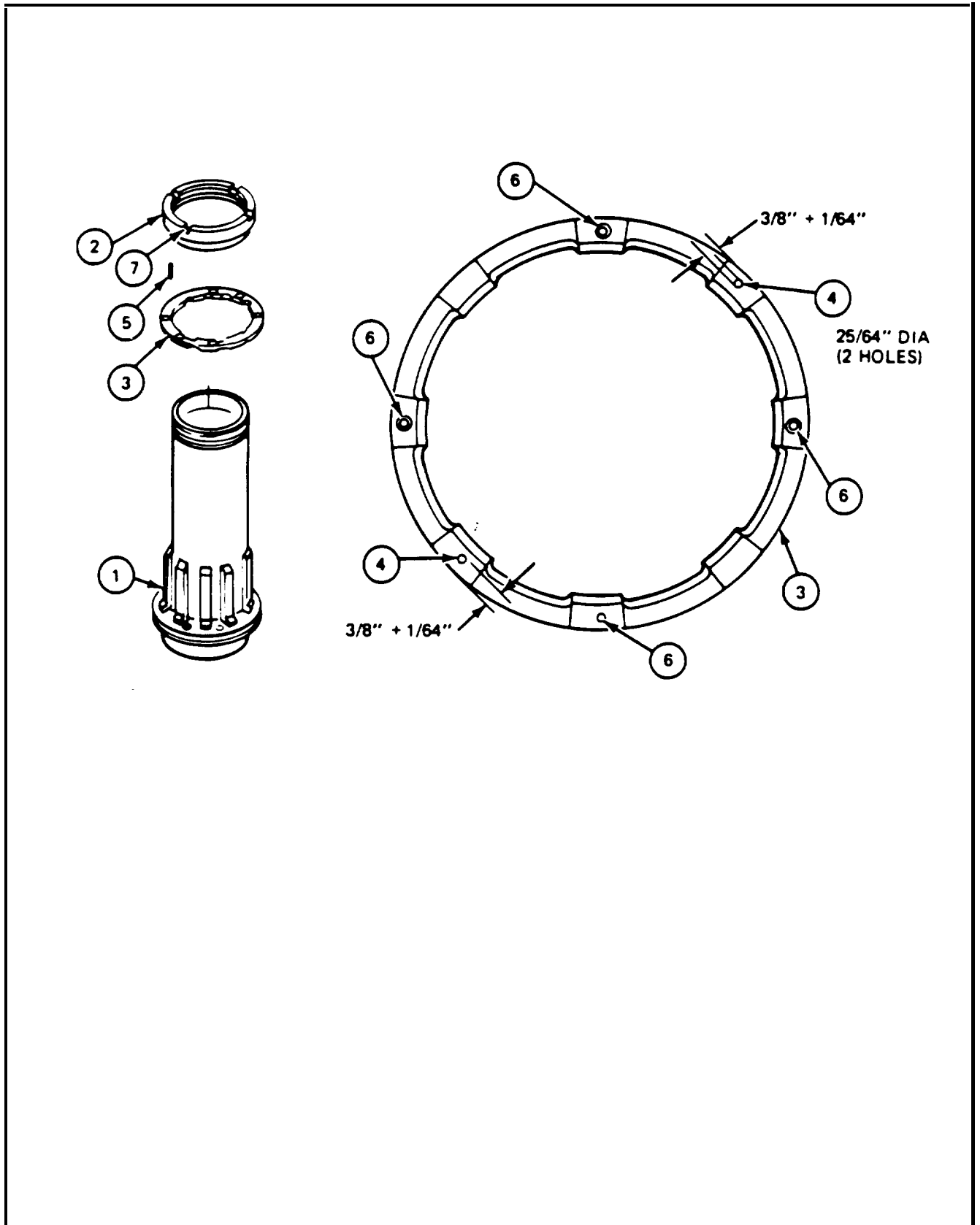
(All data on pages 11-134 and 11-135, including Frame 1, is deleted.)



11-15. RECOIL MECHANISM REPAIR PROCEDURE (CONT)

b. Modification to Add Dowel Pins to Piston Assembly

FRAME 2	
Step	Procedure
	SUPPORT SHOP WORK
1.	Take piston (1), matching piston adapter (2), and spring recoil ring (3) along with guide plate, drill extension, and split bushing (fabricated tools) to shop where machining equipment is available.
2.	Drill two holes (4) in spring recoil ring (3).
3.	Install spring recoil ring (3) on piston (1).
4.	Install four new screws (5) through four spring recoil ring holes (6) into piston (1).
5.	Tighten four screws (5) to between 13 and 15 foot-pounds.
6.	Screw piston adapter (2) onto piston (3) so that bottom of slots (7) are flush with top of piston (1).
	GO TO FRAME 3

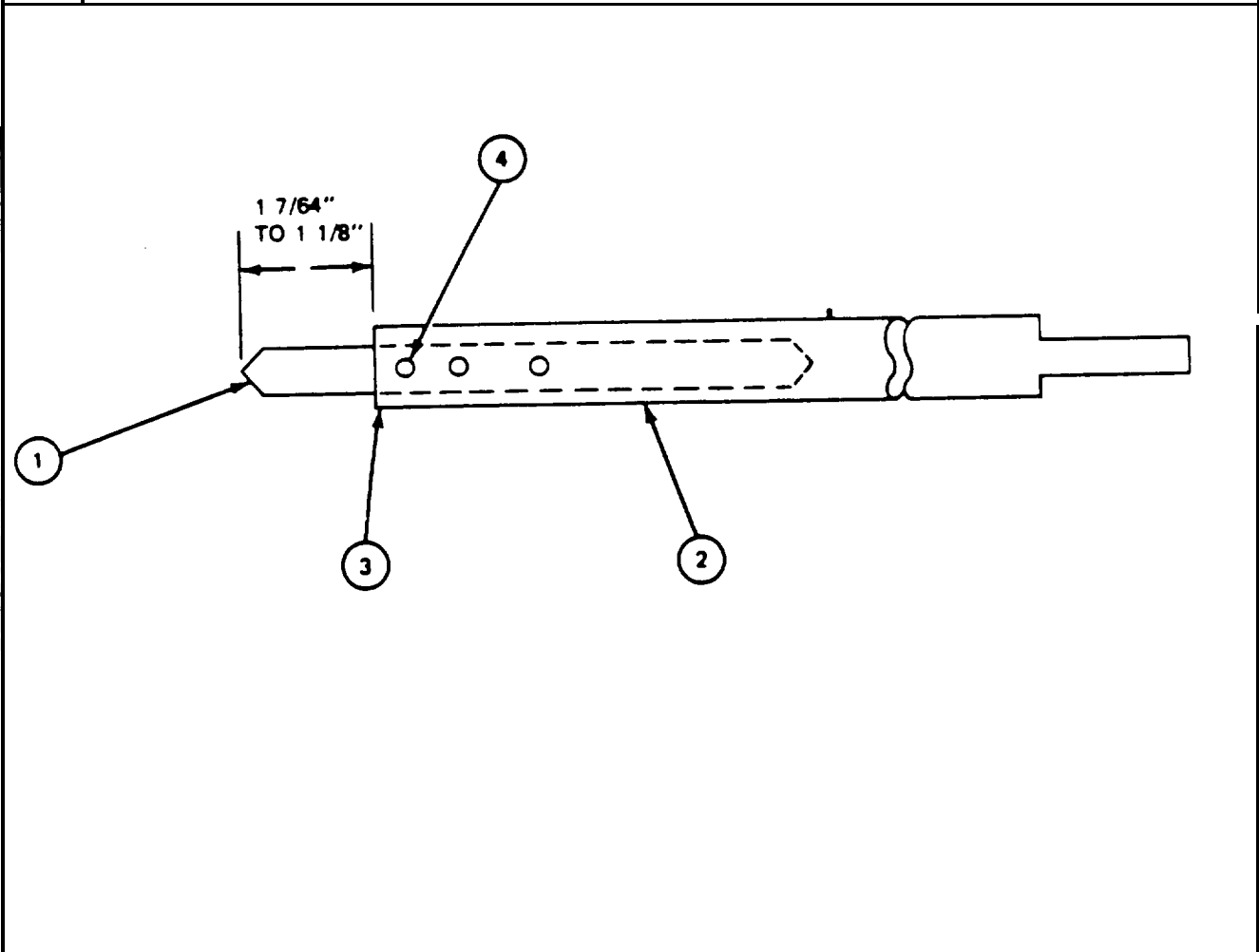


11-15. RECOIL MECHANISM REPAIR PROCEDURE (CONT)

b. Modification to Add Dowel Pins to Piston Assembly (Cont)

FRAME 3

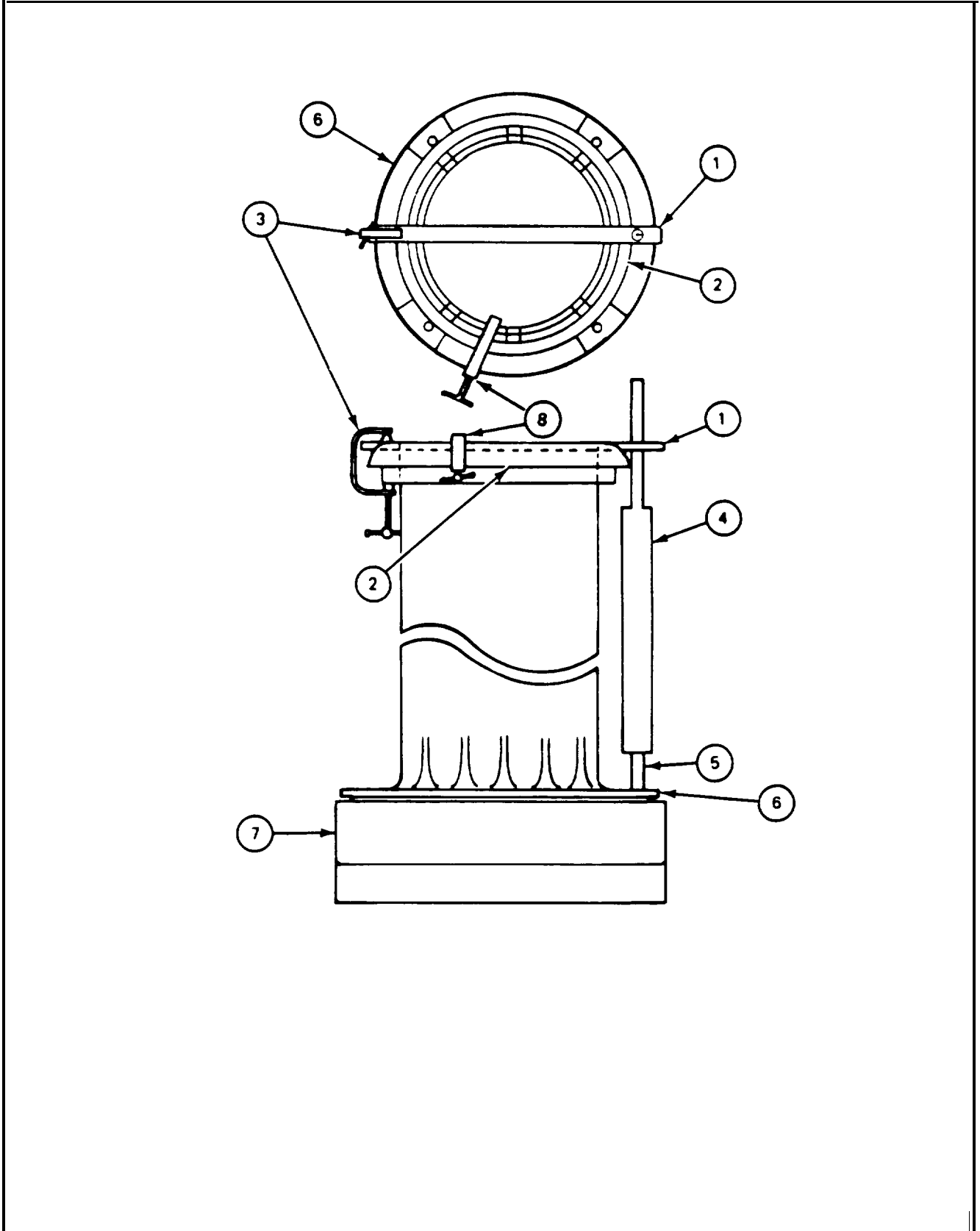
Step	Procedure
1.	<p style="text-align: center;">SUPPORT SHOP WORK</p> <p>Put 25/64" drill (1) into fabricated drill extension (2).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Drill must extend 1 - 7/64" to 1 - 1/8" from face (3) of drill extension (2).</p>
2	<p>Tighten three setscrews (4).</p> <p>GO TO FRAME 4</p>



11-15. RECOIL MECHANISM REPAIR PROCEDURE (CONT)

b. Modification to Add Dowel Pins to Piston Assembly (Cont)

FRAME 4	
Step	Procedure
	<p>SUPPORT SHOP WORK</p> <p>NOTE</p> <p>When doing step 1, make sure hole in upper guide plate (1) will just clear outside edge of piston adapter (2).</p>
1.	Put upper guide plate (1) into slots of piston adapter (2).
2.	Fasten upper guide plate (1) to piston adapter (2) with C-clamp (3).
3.	Put shank of drill extension (4) through hole in upper guide plate (1).
4.	Put drill bit (5) into right hand hole drilled in recoil spring ring (6) in frame 3.
	<p>NOTE</p> <p>A slight rotation of piston adapter (2) may be necessary to make drill extension (4) perpendicular (vertical) to base of piston (7). This may require a visual check from two different angles.</p>
5.	Line up drill extension (4) so that it is perpendicular (vertical) to base of piston (7)
6.	Fasten piston adapter (2) to piston (7) with C-clamp (8).
	<p>NOTE</p> <p>In next step, lubricate drill often. Remove drill from hole to remove metal chips.</p>
7.	Using electric drill and drill extension (4), drill hole in piston (7) to entire depth of extended drill bit (5).
8.	Remove C-clamp (8) and drill extension (4).
9.	Rotate adapter piston (2) with upper guide plate (1) so that upper guide plate hole is above left hand hole drilled in recoil spring ring (6) in frame 3.
10.	Repeat steps 3 through 7 to drill left hole in piston (7).
	GO TO FRAME 5



11-15. RECOIL MECHANISM REPAIR PROCEDURE (CONT)

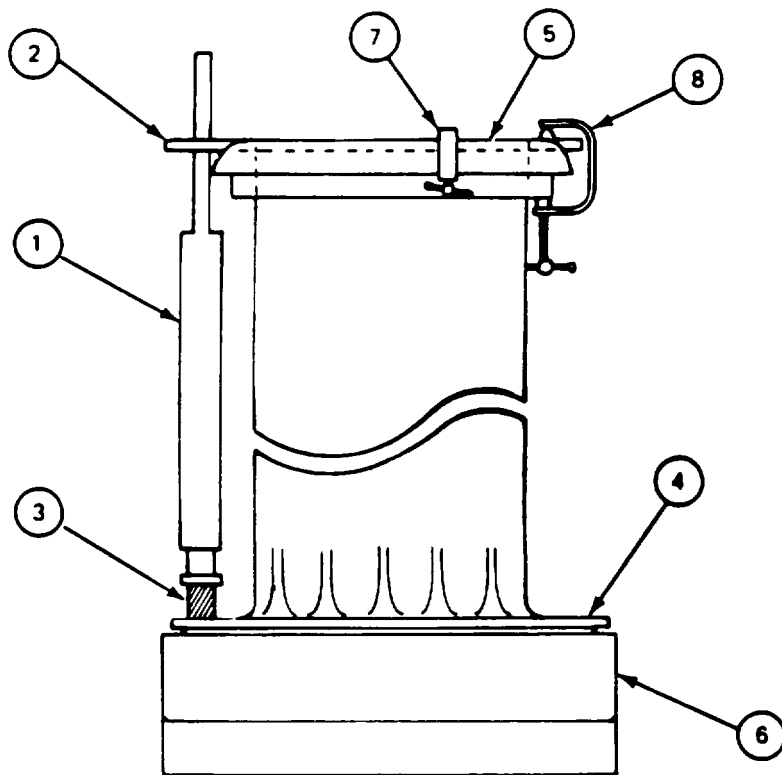
b. Modification to Add Dowel Pins to Piston Assembly (Cont)

FRAME 5	
Step	Procedure
SUPPORT SHOP WORK	
<ol style="list-style-type: none"> 1. Remove drill (1) from drill extension (2). 2. Put 13/32" reamer (3) with split bushing (4) into drill extension (2). <p>GO TO FRAME 6</p>	

11-15. RECOIL MECHANISM REPAIR PROCEDURE (CONT)

b. Modification to Add Dowel Pins to Piston Assembly (Cont)

FRAME 6	
Step	Procedure
	SUPPORT SHOP WORK
1.	Put shank of drill extension (1) through hole in upper guide plate (2)
2.	Put reamer bit (3 on left hand hole of recoil spring ring (4).
	NOTE
	A slight rotation of piston adapter (5) may be necessary to make drill extension (1) perpendicular to base of piston (6). This requires a visual check of drill extension (1) from two different angles.
3.	Rotate piston adapter (5) to align drill extension (1) so that it is perpendicular to base of piston (6).
4.	Fasten piston adapter (5) to piston (6) with C-clamp (7).
	NOTE
	In step 5. lubricate reamer bit (3) often Remove burrs and chips by lifting reamer from hole.
5.	Using electric drill, drill extension (1) and reamer (3), ream out holes in recoil spring ring (4) and piston (6).
6.	Remove C-clamp (7) and drill extension (1).
7.	Rotate piston adapter (5) with upper guide plate (2) so that upper guide plate hole is above right hand hole.
8.	Repeat steps 1 through 5 to ream out holes in recoil spring ring (4) and piston (6).
9.	Remove C-clamps (7) and (8), upper guide plate (2) and drill extension (1) from piston assembly (6).
	GO TO FRAME 7

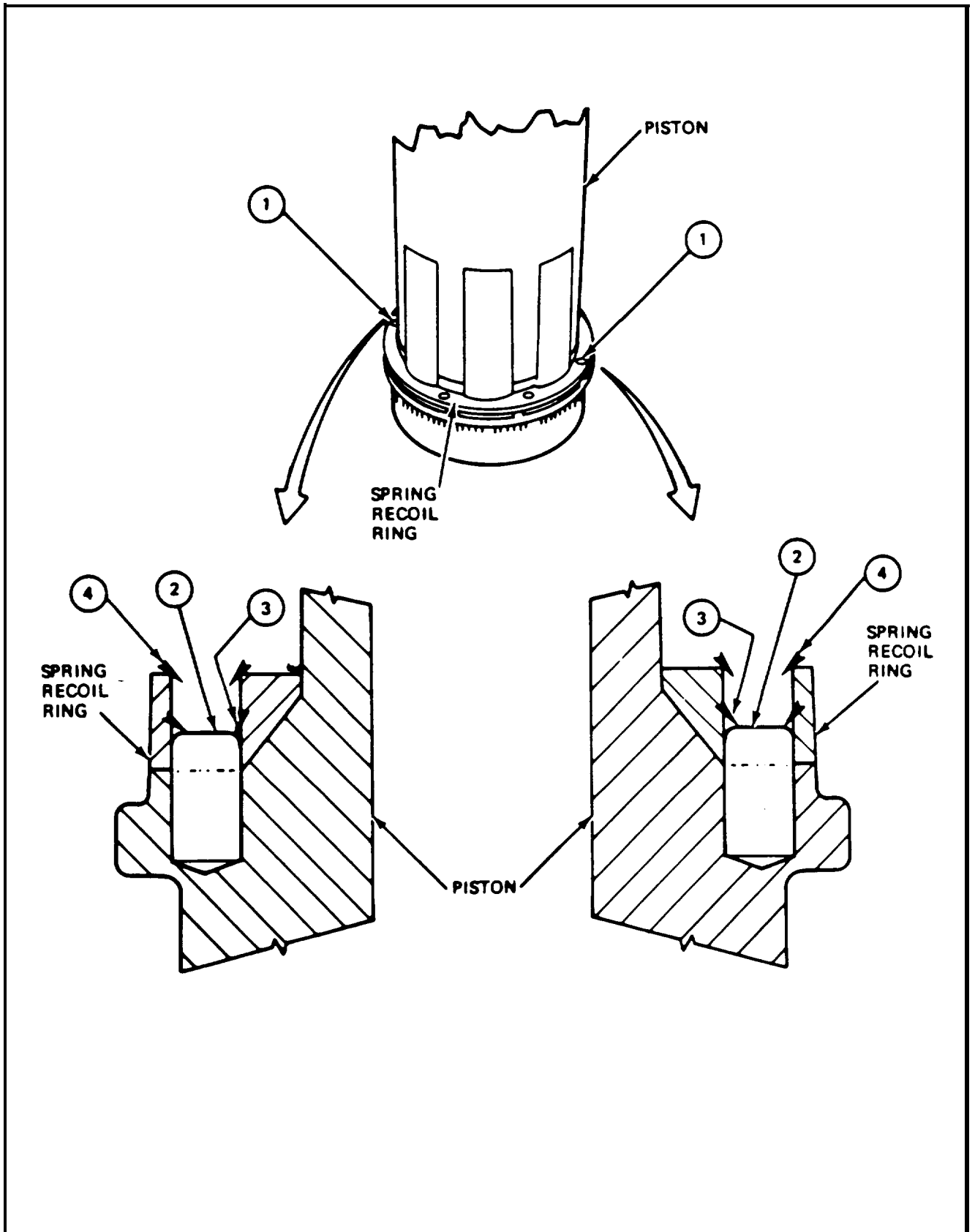


11-15. RECOIL MECHANISM REPAIR PROCEDURE (CONT)

b. Modification to Add Dowel Pins to Piston Assembly (Cont)

FRAME 7

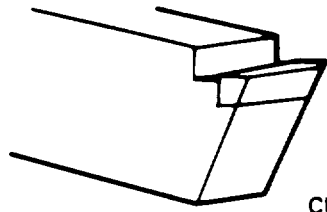
Step	Procedure
SUPPORT SHOP WORK	
1.	Clean two holes (1) thoroughly.
2.	Install and stake two dowel pins 8449259 (2) into two holes (1) at internal points (3).
3.	Stake edges of two holes (1) on surface of spring recoil ring at points (4).
4.	Return piston, with piston adapter to turret shop.
GO TO FRAME 8	



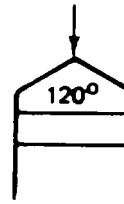
(All data on pages 11-148 thru 11-151 (11-152 blank), including Frames 8 and 9, deleted.)

TYPE: CARBIDE WA-4 OR VC-4

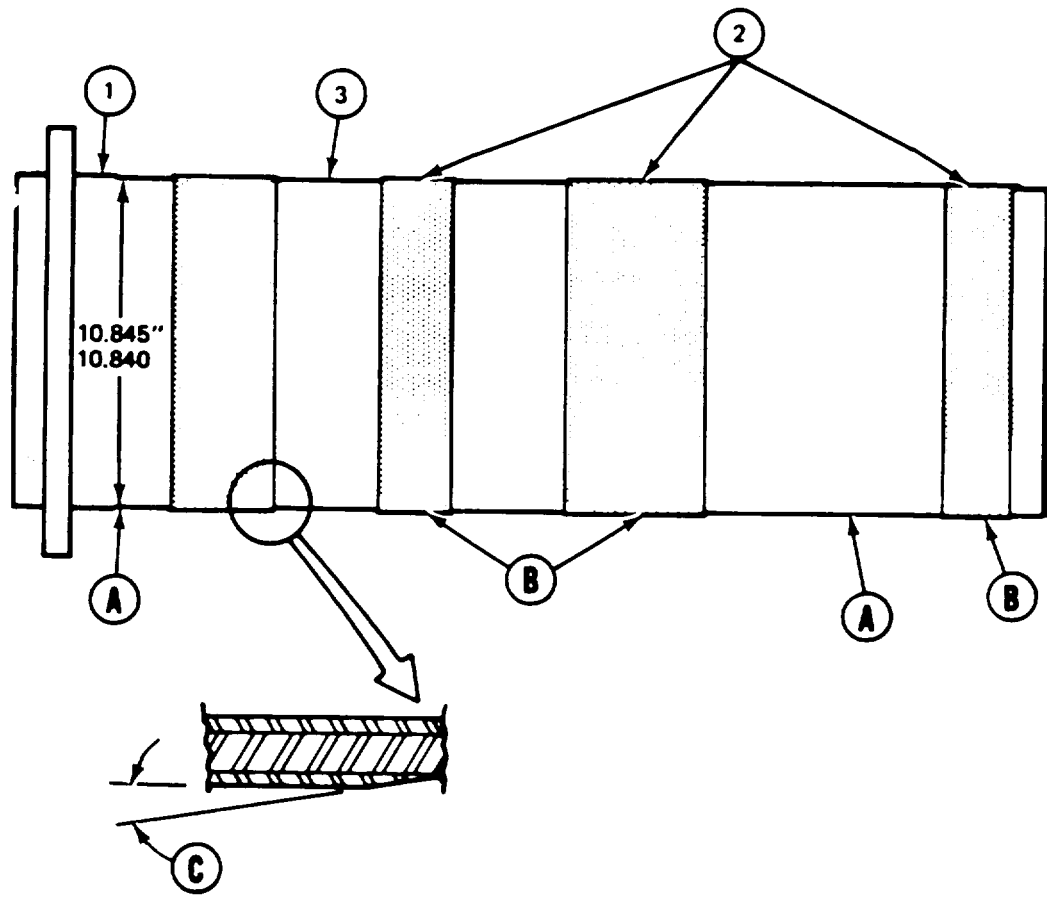
RADIUS: 1/16 - 1/32"



CUTTING TOOL



120°



11-15. RECOIL MECHANISM REPAIR PROCEDURE (CONT)

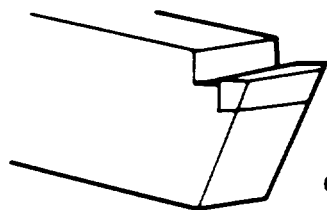
d. Sleeve 11658912 Dimensional Check and Modification

FRAME 9

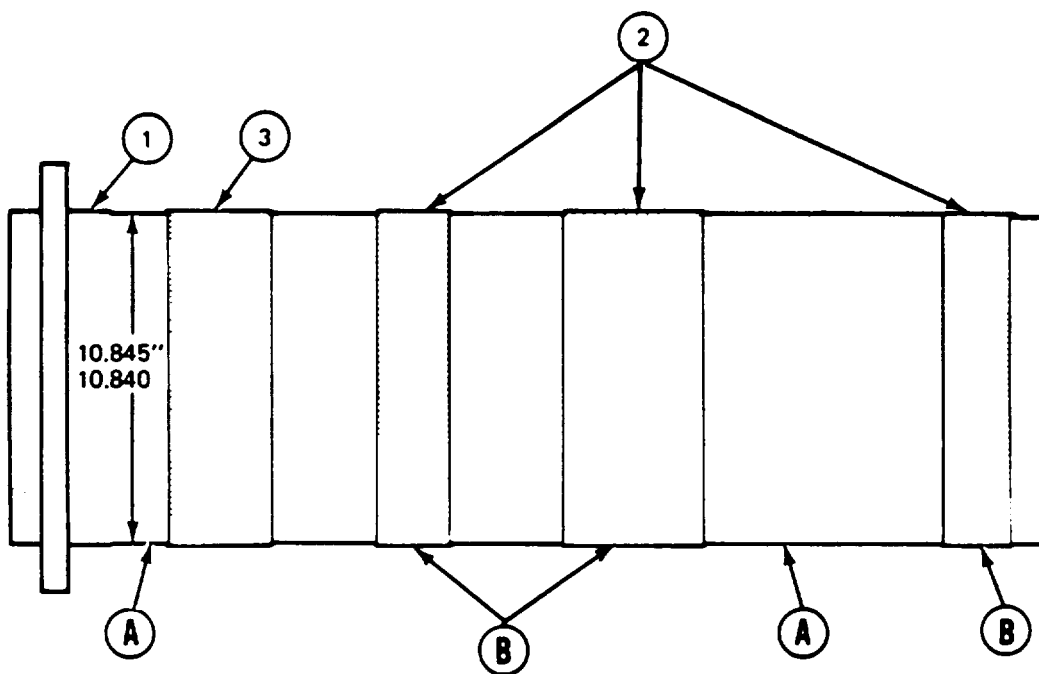
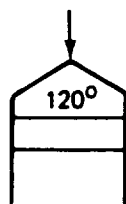
Step	Procedure									
	<p>SUPPORT SHOP WORK</p> <p>NOTE</p> <p>This procedure is for sleeve 11658912 only. Cutting tool, as shown, is recommended with a lathe speed of 147 rpm and feed 0.0036 inch. use 16 inch (or higher) lathe with steady rest.</p>									
1.	Take sleeve (1) and centering plate (fabricated tool) to shop where measurement and machining equipment are available.									
2.	Use centering plate with lathe and steady rest. <ul style="list-style-type: none"> a. Check roundness of sleeve (1). Tag if out of tolerance and go to step 3. b. Make dimensional check of three bearing surfaces (2). c. Turn and finish if necessary. Otherwise go to step 2e. d. Check finish against finish of outer bearing surface (3). 									
	<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>Sleeve OD roundness</td> <td>.005</td> </tr> <tr> <td>B</td> <td>OD of bearing surface</td> <td>10.855 to 10.865 63 microinch finish</td> </tr> </tbody> </table>	Reference Letter	Point of Measurement	Measurement	A	Sleeve OD roundness	.005	B	OD of bearing surface	10.855 to 10.865 63 microinch finish
Reference Letter	Point of Measurement	Measurement								
A	Sleeve OD roundness	.005								
B	OD of bearing surface	10.855 to 10.865 63 microinch finish								
	e. Metal stamp "A" after part number 11658912 on sleeve (1).									
3.	After support shop work, return sleeve (1) to turret shop.									
	END OF TASK									

TYPE: CARBIDE WA-4 OR VC-4

RADIUS: 1/16 - 1/32"



CUTTING TOOL



11-16. CANNON TUBE AND BREECH RING REMOVAL PROCEDURE

TOOLS: Movable hoist (4 ton capacity)
Girth wrench (NSN 4933-00-866-5850)
Breech lifting tool (NSN 4933-00-903-1246)
5/16" socket head screw key (Allen wrench)
Sling
Wooden block (fabricated tool, item 18, App. B)

SUPPLIES: Rags (item 21, App. A)
Wooden blocks (4" x 4" x 24") (two)
Rope (10 feet long) (1" diameter)

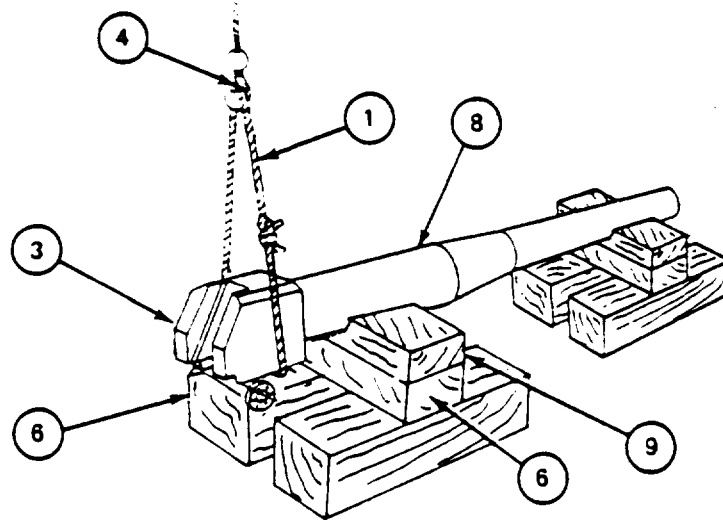
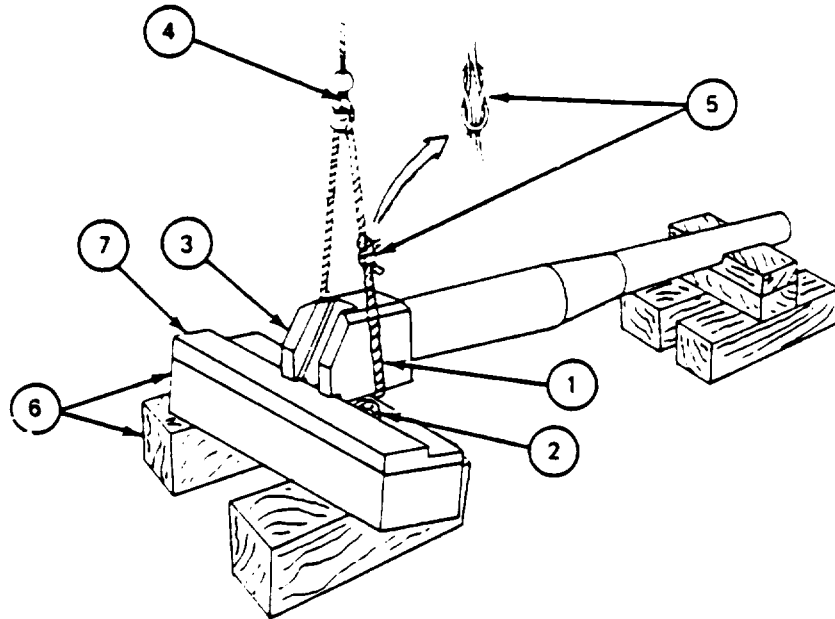
PERSONNEL: Four (including hoist operator)

REFERENCES: JPG for procedure to remove preformed packing

PRELIMINARY PROCEDURES: Remove recoil mechanism (para 11-11)

11-16. CANNON TUBE AND BREECH RING REMOVAL PROCEDURE (CONT)

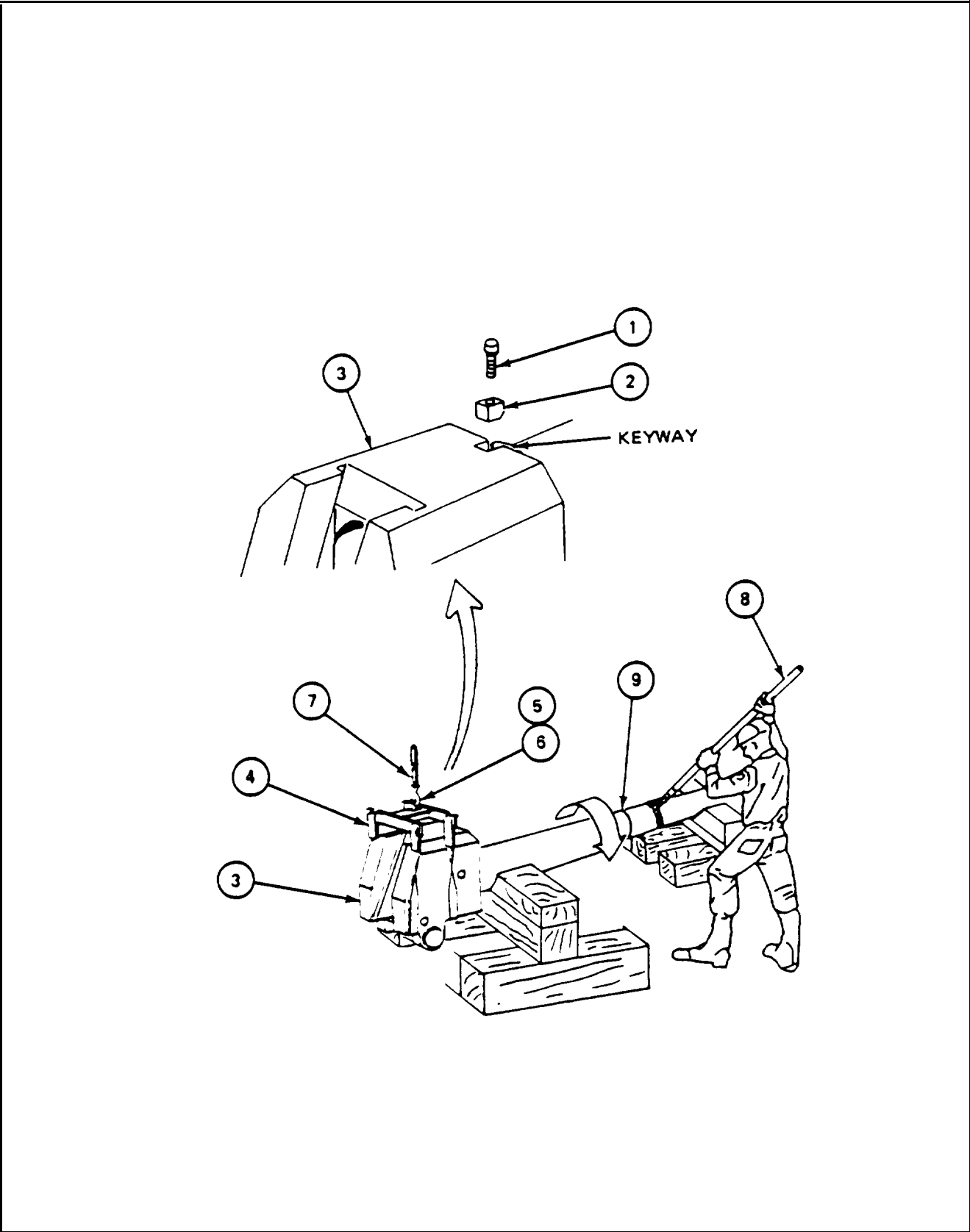
FRAME 1	
Step	Procedure
	NOTE
	Use rags for padding to protect rope from sharp edges.
1.	Put rope (1) through two bearing holes (2) in bottom of breech ring (3).
2.	Put one end of rope (1) over hoist hook (4) and tie ends of rope (1) together with a square knot (5).
3.	Soldier A: Using hoist (4), take up slack and tighten knot(s) then carefully lift breech ring (3) off wooden blocks (6) and (7).
4.	Move wooden blocks (6) under cannon tube (8) near breech ring (3).
5.	Put wooden block (9) between cannon tube (8) and wooden blocks (6).
6.	Soldier A: Using hoist, lower cannon tube (8) into cut out of wooden block (9).
7.	Remove hoist hook (4) and rope (1).
	GO TO FRAME 2



11-16. CANNON TUBE AND BREECH RING REMOVAL PROCEDURE (CONT)

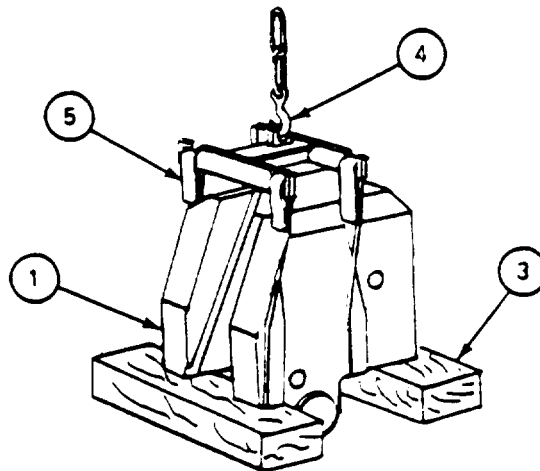
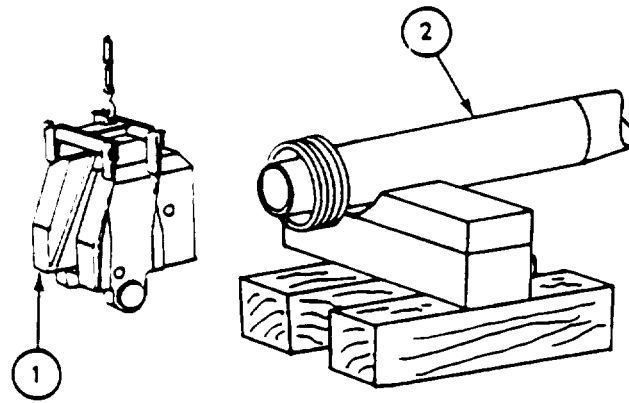
FRAME 2

Step	Procedure
1.	Using Allen wrench, remove screw (1) that attaches lock (2) to breech ring (3). Remove lock from keyway.
2.	Put breech lifting tool (4) on breech ring (3).
<p>NOTE</p> <p>If hole for lifting hook is too small, use clevis with large opening to allow hook clearance.</p>	
3.	Put hoist hook (5) in hole or clevis (6) in breech lifting tool (4).
4.	Using hoist, remove all slack in sling (7). Do not lift weight of breech ring (3).
<div data-bbox="662 905 889 982" style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p>Breech ring (3) weighs 740 pound. Soldiers must stay from under breech ring when it is lifted by hoist to prevent injury if breech ring should fall.</p>	
<p>NOTE</p> <p>Soldier A: Operate hoist. Soldiers B and C: Guide breech ring. Soldier D: Turn cannon tube with girth wrench.</p>	
5.	Put girth wrench (8) on cannon tube (9).
6.	Using girth wrench (8), turn cannon tube (9), as shown and loosen cannon tube.
7.	Soldier D: Remove girth wrench (8) from cannon tube (9).
<p>GO TO FRAME 3</p>	



11-16. CANNON TUBE AND BREECH RING REMOVAL PROCEDURE (CONT)

FRAME 3	
Step	Procedure
	<p style="text-align: center;">CAUTION</p> <p>Machined surfaces of cannon tube (2) must not be scratched or damaged during removal.</p> <p>Threads in breech ring (1) and cannon tube (2) must not be damaged during removal.</p> <p style="text-align: center;">NOTE</p> <p>Soldier A: Operate hoist. Soldiers B and C: Push and guide breech ring (1) during step 1.</p> <p>1. Using movable hoist, slide breech ring (1) off cannon tube (2).</p> <p style="text-align: center;">NOTE</p> <p>In order to work on breech ring (1), put breech ring on two wooden blocks. The lifting tool need not be removed. Breech ring may be laid flat on rear end, if necessary.</p> <p>2. Put breech ring (1) on two wooden blocks (3) on level ground or work bench and lower breech ring.</p> <p>3. Remove hoist hook (4) from breech lifting tool (5).</p> <p>4. Using O-ring extractor tool, remove preformed packing (6) and retaining ring (7) from cannon tube (2) (JPG). Throw preformed packing away.</p> <p>END OF TASK</p>



11-16.1. CANNON M135 AND GUN MOUNT M150/M150A1 TWO-YEAR MAINTENANCE

TEST EQUIPMENT: M3 Oil Pump
Hydraulic pressure gauge (0 to 5,000 psi)

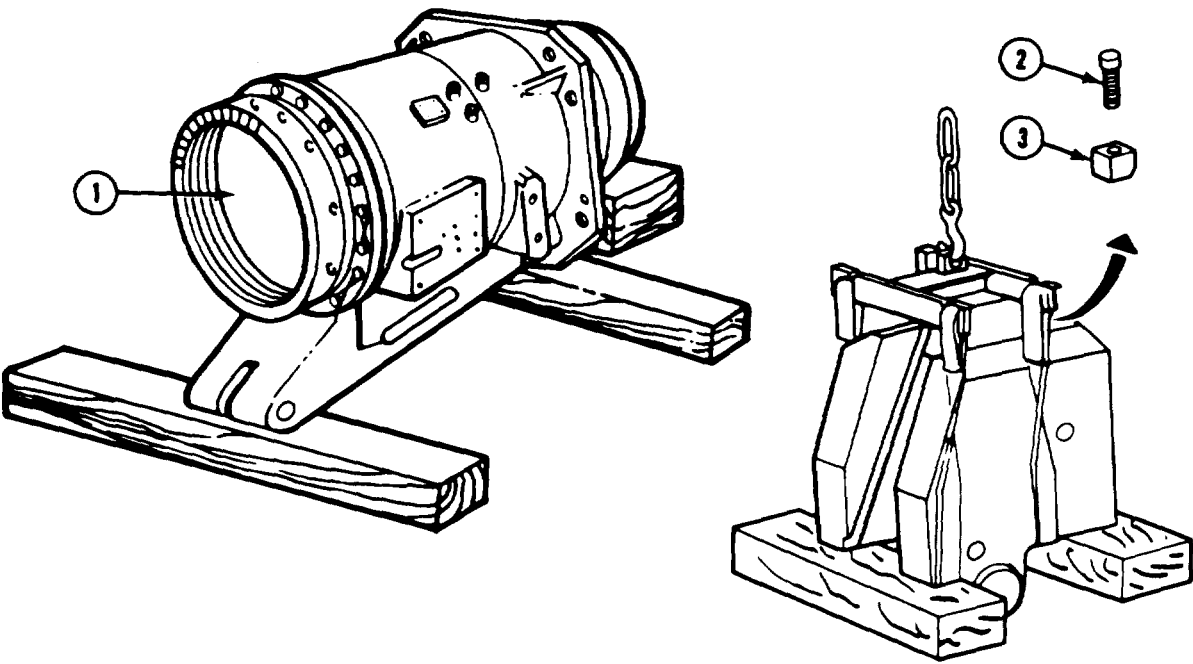
SUPPLIES: Solid lubricant (Item 14.1, App. A)
Grease (Item 12, App. A)
Crocus cloth (Item 7, App. A)
Dry cleaning solvent (Item 33, App. A)
Goggles (Item 11.2, App. A)
Gloves (Item 11.1, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to use M3 pump.

PRELIMINARY PROCEDURES: Remove breech ring and cannon tube (para. 11-16).

11-16.1. CANNON M135 AND GUN MOUNT M160/M160A1 TWO-YEAR MAINTENANCE (CONT)

FRAME 1	
Step	Procedure
	<div data-bbox="673 498 887 551" style="border: 1px solid black; padding: 5px; text-align: center; margin-bottom: 10px;">WARNING</div> <p data-bbox="287 573 1270 825">Dry cleaning solvent P-D-680 is toxic and flammable. To prevent personal injury, wear protective goggles and gloves and use only in a well-ventilated area. Avoid contact with skin, eyes, and clothes and don't breathe vapors. Do not use near open flame or excessive heat. The flash point for Type #1 Dry Cleaning Solvent is 100°F (38°C) and for Type #2 is 138°F (50°C). If you become dizzy while using cleaning solvent, get fresh air immediately and get medical aid. If contact with eyes is made, wash your eyes with water and get medical aid immediately.</p> <ol data-bbox="149 858 1391 918" style="list-style-type: none"> 1. Using crocus cloth and dry cleaning solvent, clean all recoil mechanism support sleeve mating surfaces (1) and breech attaching keyway bolt (2) and block (3). <p data-bbox="216 950 450 978">GO TO FRAME 2</p>
	

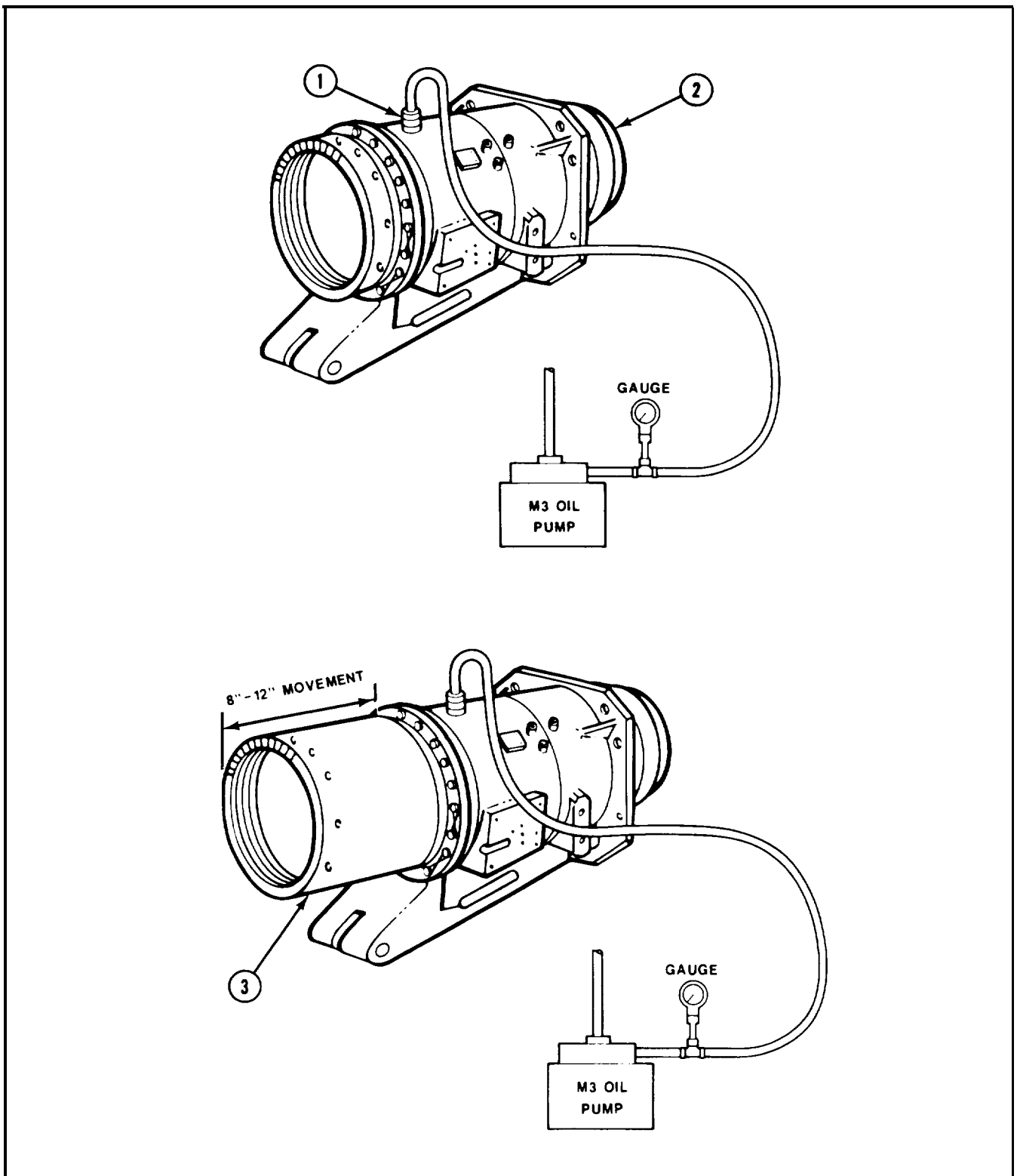
11-16.1. CANNON M135 AND GUN MOUNT M150/M150A1 TWO-YEAR MAINTENANCE (CONT)

FRAME 2	
Step	Procedure
2.	<p>Inspect gun tube machined area (1) for foreign grease and oil and for previously applied solid lubricant.</p> <p style="text-align: center;">NOTE Only solid lubricant is to be present on machined area (1). Do not remove solid lubricant.</p>
3.	If foreign grease or oil are present on machined area (1), remove, using crocus cloth and dry cleaning solvent.
4.	If solid lubricant is not applied entire length of machined area (1), apply solid lubricant only to those areas that require lubricant.
5.	Inspect breech ring (2) for rust, dirt, and foreign grease.
6.	If present, remove using crocus cloth and dry cleaning solvent.
7.	Assemble cannon tube (3) and breech ring (2), para. 11-17.
	GO TO FRAME 3

11-16.1. CANNON M135 and GUN MOUNT M150/M150A1 TWO-YEAR MAINTENANCE (CONT)

FRAME 3	
Step	Procedure
6.	Assemble M3 oil pump with 5000 psi gauge as shown.
7.	Connect hose from M3 oil pump to reducer (1) on recoil mechanism (2).
8.	Using M3 oil pump, slowly pressurize recoil mechanism (2) (JPG).
9.	Check all connections for leaks. Repair as required.
10.	Using M3 oil pump, increase recoil mechanism pressure to between 300 and 400 psi.
11.	Check all connections for leaks. Repair as required.
12.	Using M3 oil pump, increase recoil mechanism pressure until recoil mechanism piston (3) extends 8" to 12".
13.	Using crocus cloth and dry cleaning solvent, clean exposed area of recoil piston (3).
14.	Apply a light coat of grease to exposed area of recoil piston (3).
15.	Using M3 oil pump, reduce pressure to 0 psi (JPG).
16.	Install gun shield (para 11-8).
17.	Record services.
	<p>NOTE Follow-on Maintenance Action Required: Install cannon M135 and combination gun mount M150/M150A1 (para 11-4).</p>
	END OF TASK

11-16.1. CANNON M135 AND GUN MOUNT M160/M150A1 TWO-YEAR MAINTENANCE (CONT)



11-17. CANNON TUBE AND BREECH RING INSTALLATION PROCEDURE

TOOLS: Breech lifting tool (4933-00-903-1246)
Movable hoist (4 ton capacity)
Girth wrench (NSN 4933-00-866-5850)
5/16" socket head screw key (Allen wrench)
Sling
5/16" hex head socket (3/8" drive)
3/8" drive torque wrench (0 to 50 foot-pounds)

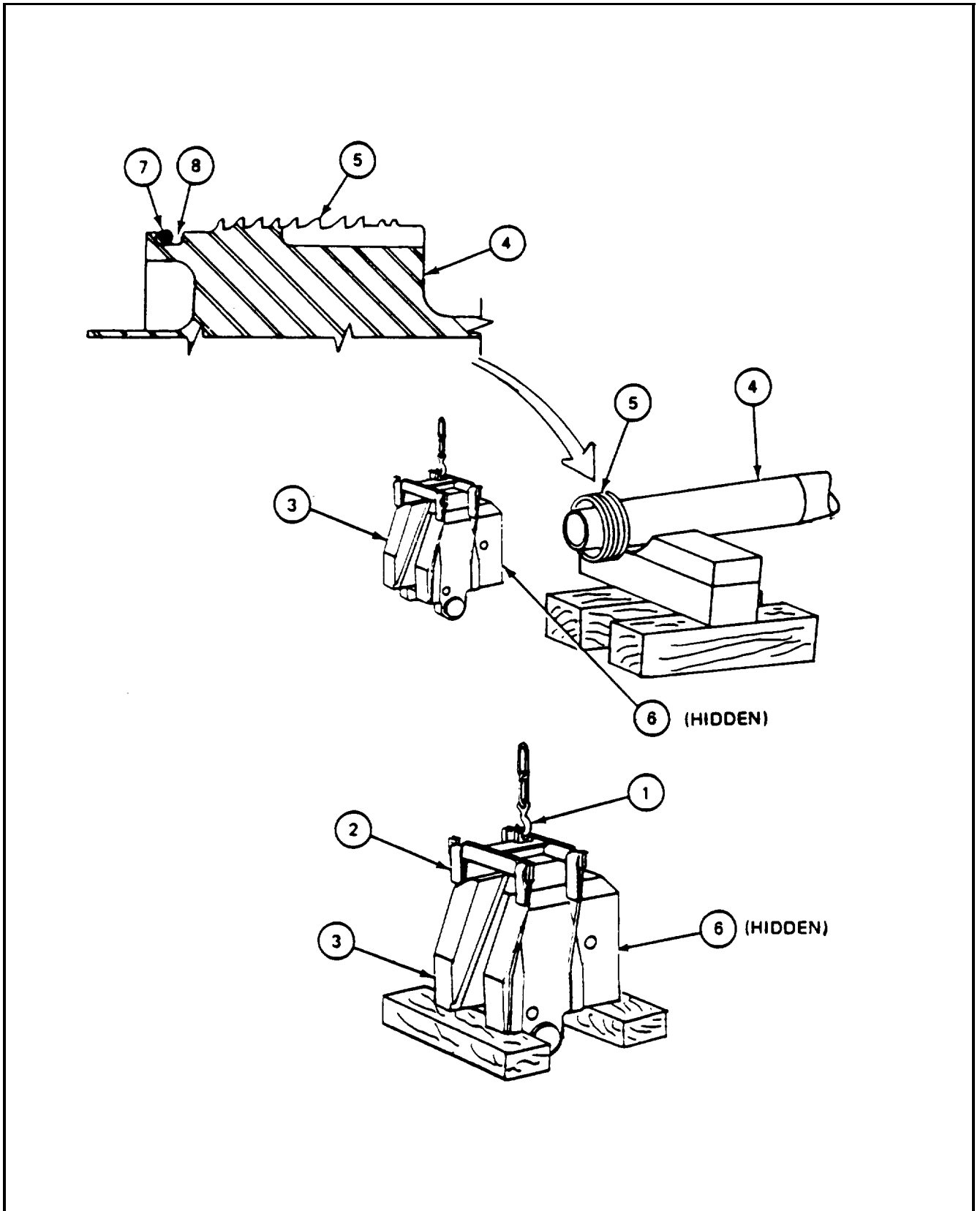
SUPPLIES: Grease (item 12, App. A)
Rags (item 21, App. A)
Rope (10 feet long) (1" diameter)
Preformed packing (MS 9021-453)
Retaining ring (MS 28774-453)

PERSONNEL: Four (including hoist operator)

REFERENCES: LO 9-2350-222-12 for lubricating procedure
JPG for procedures to:
Install preformed packing
Use torque wrench

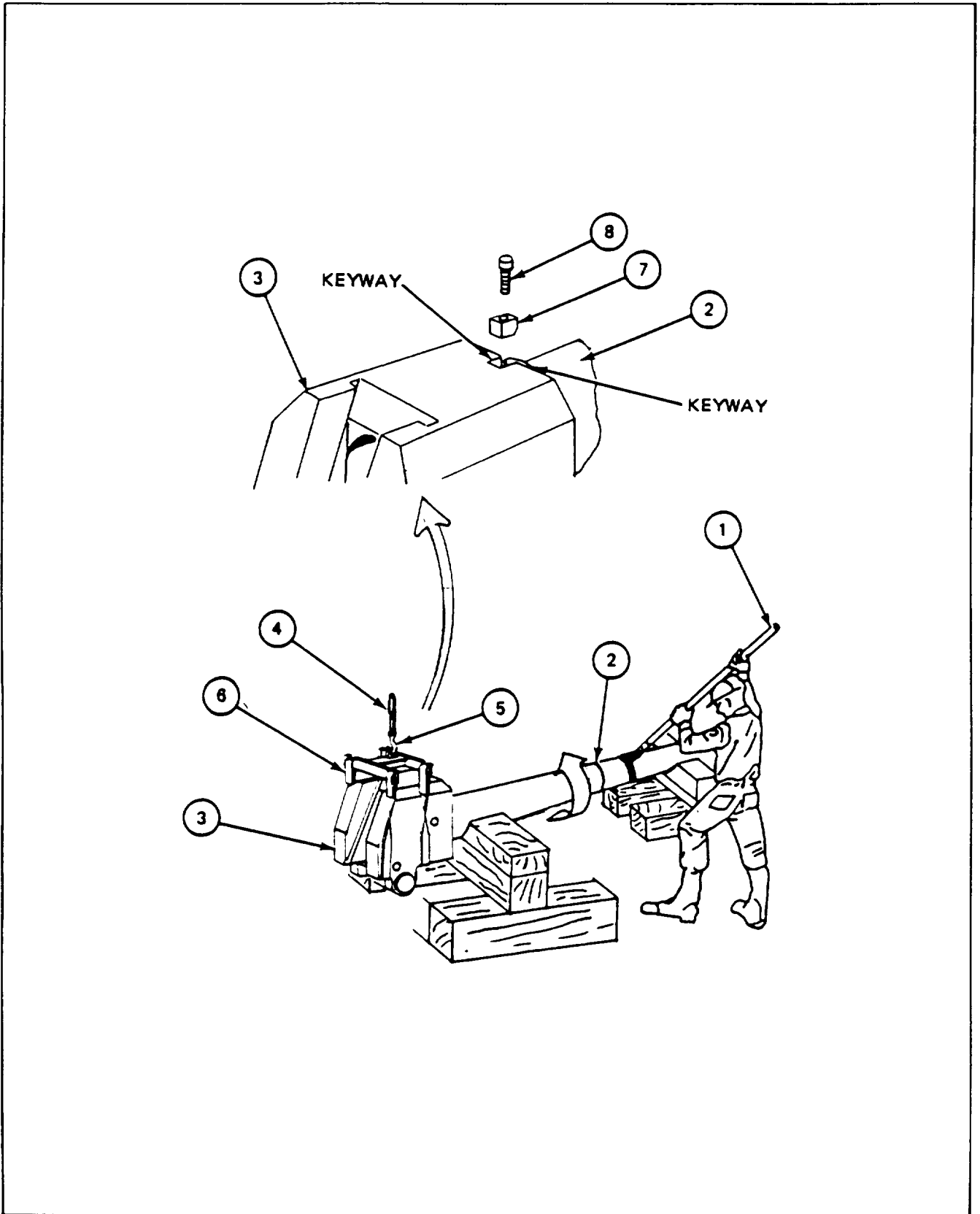
11-17. CANNON TUBE AND BREECH RING INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<div data-bbox="669 478 890 555" style="text-align: center; border: 1px solid black; padding: 5px;">WARNING</div> <p data-bbox="422 604 1134 693">Breech ring (3) weighs 740 pounds. Soldiers must stay from under breech ring when it is lifted by hoist to prevent injury if it should fall.</p> <div data-bbox="740 746 819 772" style="text-align: center;">NOTE</div> <p data-bbox="422 817 1134 874">If hole for lifting hook is too small, use clevis with large opening to allow hook clearance.</p> <ol data-bbox="155 895 1414 1087" style="list-style-type: none"> 1. Put hoist or sling hook (1) in hole or clevis on breech lifting tool (2) attached to breech ring (3). 2. Using rag, put thin coat of grease on cannon tube (4) threads (5) and breech ring (3) threads (6). 3. Lightly coat new preformed packing (7) with grease. <div data-bbox="740 1136 819 1161" style="text-align: center;">NOTE</div> <p data-bbox="422 1206 1134 1264">Preformed packing (7) must be to rear of groove in cannon tube (4).</p> <ol data-bbox="155 1285 1394 1342" style="list-style-type: none"> 4. Using O-ring extractor tool, put retaining ring (8) and preformed packing (7) in groove of cannon tube (4) (JPG). <div data-bbox="702 1417 863 1470" style="text-align: center; border: 1px solid black; padding: 5px;">CAUTION</div> <p data-bbox="422 1491 1134 1604">Machined surfaces of cannon tube (4) must not be scratched or damaged during installation. Threads (6) in breech ring (3) and threads (5) on cannon tube (4) must not be damaged during installation.</p> <ol data-bbox="155 1625 1414 1761" style="list-style-type: none"> 5. Soldier A using movable hoist, and Soldiers B and c, move breech ring (3) in line with threads (5) on cannon tube (4). 6. Soldier A using movable hoist, and Soldier B and C push and guide breech ring (3) and slide breech ring on cannon tube (4) as far as it will go. <p data-bbox="232 1783 480 1810">GO TO FRAME 2</p>



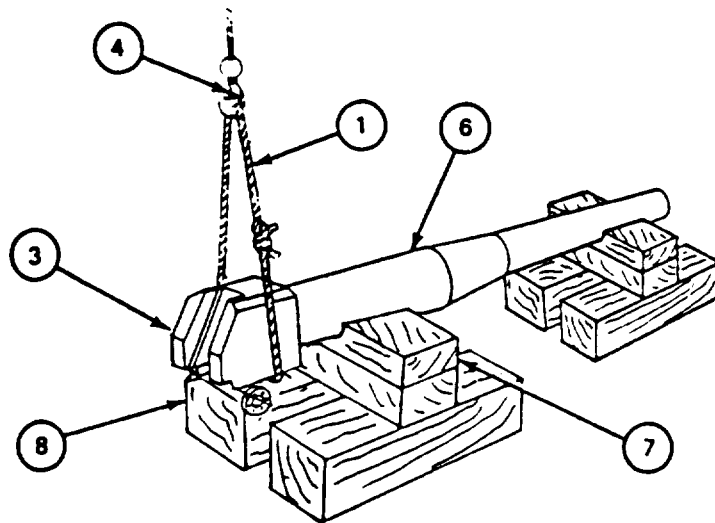
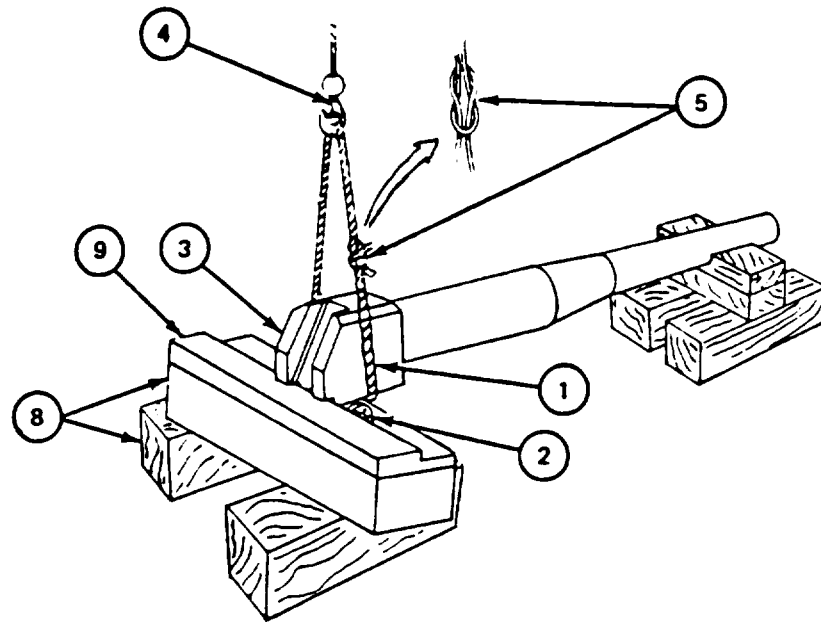
11-17. CANNON TUBE AND BREECH RING INSTALLATION PROCEDURE (CONT)

FRAME 2	
Step	Procedure
	NOTE
	Soldier A: Operate hoist. Soldiers B and C: Hold breech ring (3).
1.	Soldier D: Put girth wrench (1) on cannon tube (2).
2.	Soldier D: Using girth wrench (1), turn cannon tube (2), as shown, and tighten cannon tube.
3.	Soldier D: Using girth wrench (1), line up keyways in cannon tube (2) and breech ring (3).
4.	Using hoist, get slack in sling (4).
5.	Remove hoist or sling hook (5) from breech lifting tool (6) and move hoist out of the way.
6.	Remove breech lifting tool (6) from breech ring (3).
7.	Remove girth wrench (1).
8.	Put lock (7) in keyway of cannon tube (2) and breech ring (3).
9.	Using Allen wrench, attach lock (7) with screw (8).
10.	Using torque wrench, torque screw (8) to between 25 and 30 foot-pounds (JPG).
	GO TO FRAME 3



11-17. CANNON TUBE AND BREECH RING INSTALLATION PROCEDURE (CONT)

FRAME 3	
Step	Procedure
	NOTE
	Use rags for padding to protect rope making bend over sharp edges.
1.	Put rope (1) through two bearing holes (2) in bottom of breech ring (3).
2.	Run one end of rope (1) over hoist hook (4) and tie ends of rope (1) together with a square knot (5).
3.	Soldier A: Using hoist, take up slack and tighten knot, then carefully lift cannon tube (6) off wooden blocks (7) and (8).
4.	Move wooden block (7) out of the way. Move three wooden blocks (8) under flat area of breech ring (3),
5.	Put wooden block (9) between breech ring (3) and wooden blocks (8).
6.	Soldier A: Using hoist, lower breech ring (3) on wooden blocks (8) and (9).
7.	Remove sling hook (4) and rope (1).
	NOTE
	Follow-on Maintenance Action Required:
	Install recoil mechanism (para 11- 12).
	END OF TASK



11-18. BREECH RING DISASSEMBLY PROCEDURE

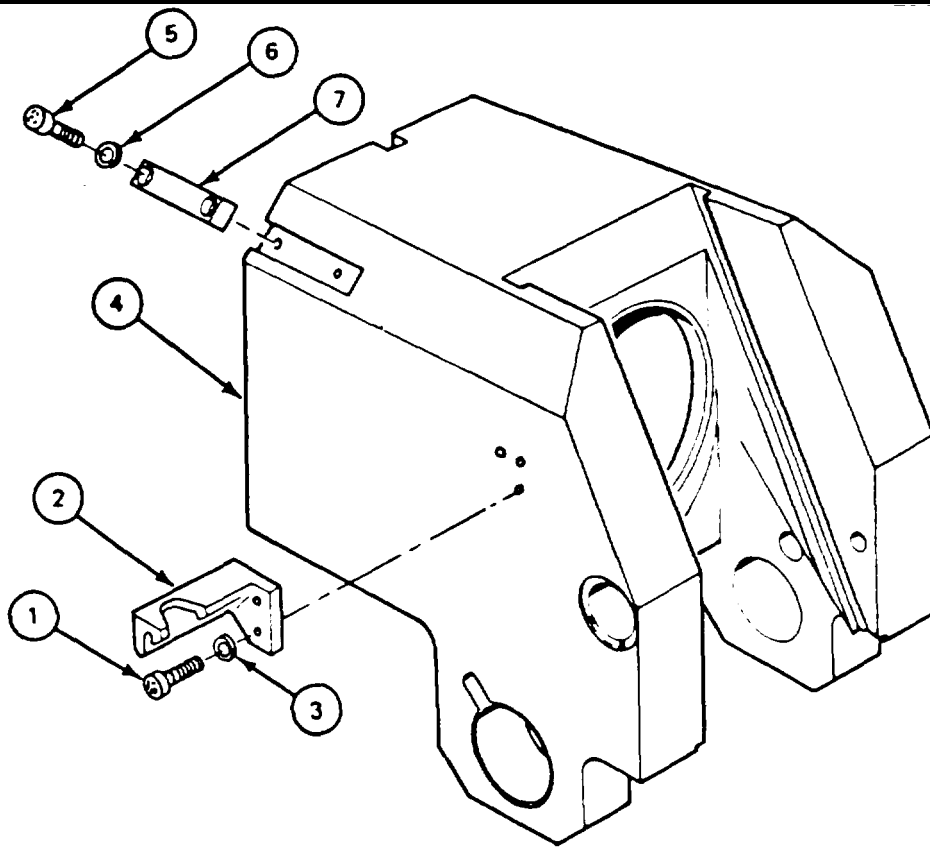
TOOLS: 5/16" socket head screw key (Allen wrench)
micrometer (0-2 inch)

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove breech ring from cannon tube (para 11-16)

FRAME 1

Step	Procedure
1.	Using Allen wrench, remove two screws (1) and two lockwashers (2) holding stop (3) to breech ring (4).
2.	Remove stop (3) from breech ring (4).
3.	Using Allen wrench, remove two screws (5), two lockwashers (6), and torque key (7) from breech ring (4).
4.	Measures torque key (7). If key measures less than 1.497 inches replace key.
END OF TASK	



11-19. BREECH RING ASSEMBLY PROCEDURE

TOOLS: 5/16" socket head screw key (Allen wrench)

PERSONNEL: One

FRAME 1	
Step	Procedure
<ol style="list-style-type: none"> 1. Using Allen wrench, attach stop (1) to breech ring (2) with two screws (3) and two lockwashers (4). 2. Using Allen wrench, attach torque key (5) to breech ring (2) with two screws (6) and two lockwashers (7). 	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Install breech ring on cannon tube (para 11- 17).</p> <p>END OF TASK</p>

11-20. ELECTRICAL FIRING LEAD REMOVAL PROCEDURE

TOOLS: 1/4" flat tip screwdriver
 7/16" socket wrench (3/8" drive)
 3/8" drive ratchet
 1- 1/8" open end wrench
 6" extension (3/8" drive)

PERSONNEL: One

REFERENCES: JPG for procedure to disconnect electrical connectors

EQUIPMENT LOCATION INFORMATION:

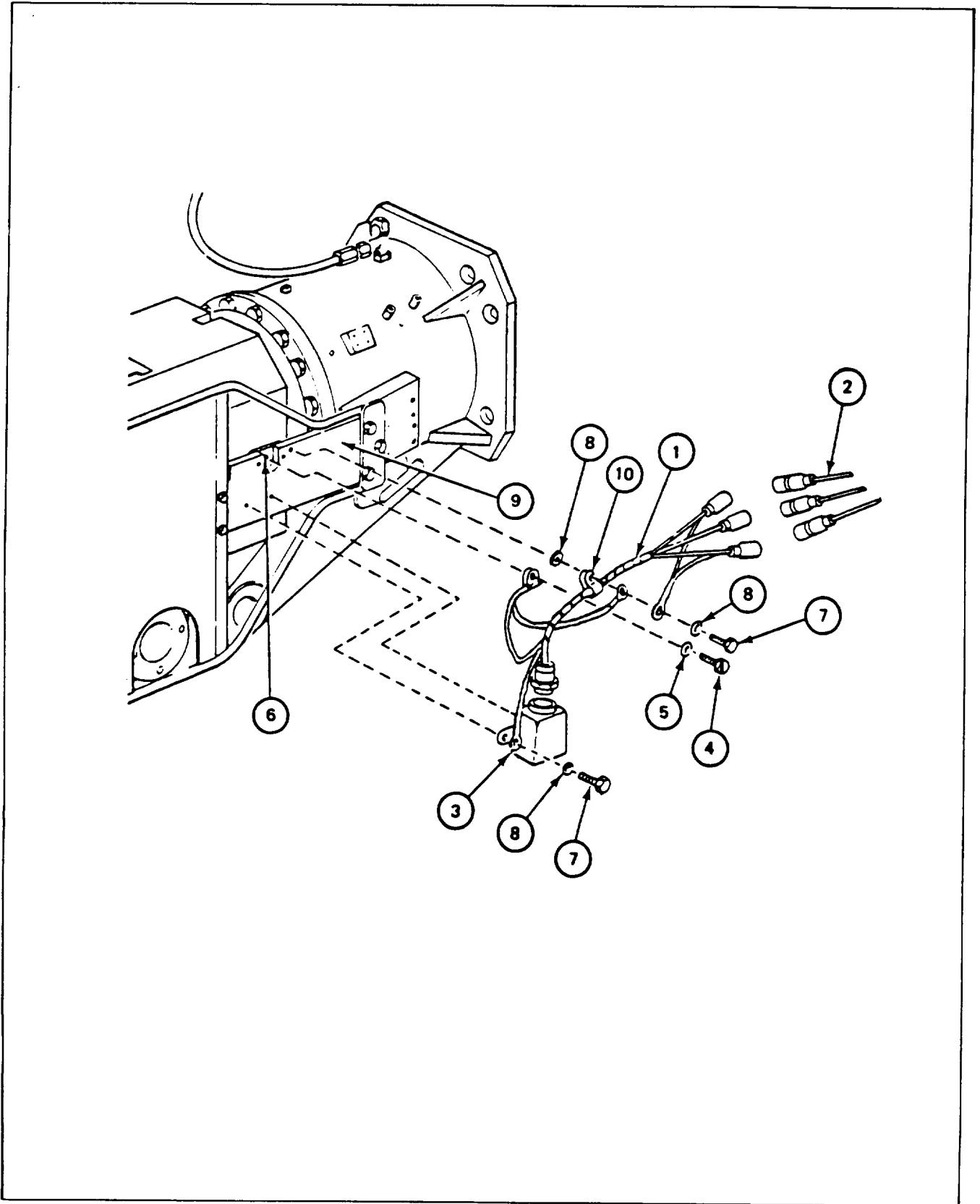
EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Gunner's Guard	FO- 1	17

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

11-20. ELECTRICAL FIRING LEAD REMOVAL PROCEDURE (CONT)

FRAME 1

Step	Procedure
1.	Disconnect three electrical connectors of firing lead (1) from harness assembly (2) (JPG).
2.	Using open end wrench, remove connector of firing lead (1) from relay (3) (JPG).
3.	Using screwdriver, remove lockwasher screw (4) and lockwasher (5) holding terminal of firing lead (1) to primer contact (6).
4.	Using socket wrench, remove screw (7) and lockwasher (8) holding terminal of firing lead (1) to relay (3) and support bracket (9).
5.	Using socket wrench, remove screw (7) and lockwasher (8) holding two terminals of firing lead (1), clamp (10) and second lockwasher (8) to support bracket (9).
6.	Remove clamp (10) from firing lead (1).
	END OF TASK



11-21. ELECTRICAL FIRING LEAD INSTALLATION PROCEDURE

TOOLS: 1/4" flat tip screwdriver
 7/16" socket (3/8" drive)
 3/8" drive ratchet
 1-1/8" open end wrench
 6" extension (3/8" drive)

PERSONNEL: One

REFERENCES: JPG for procedure to connect electrical connectors

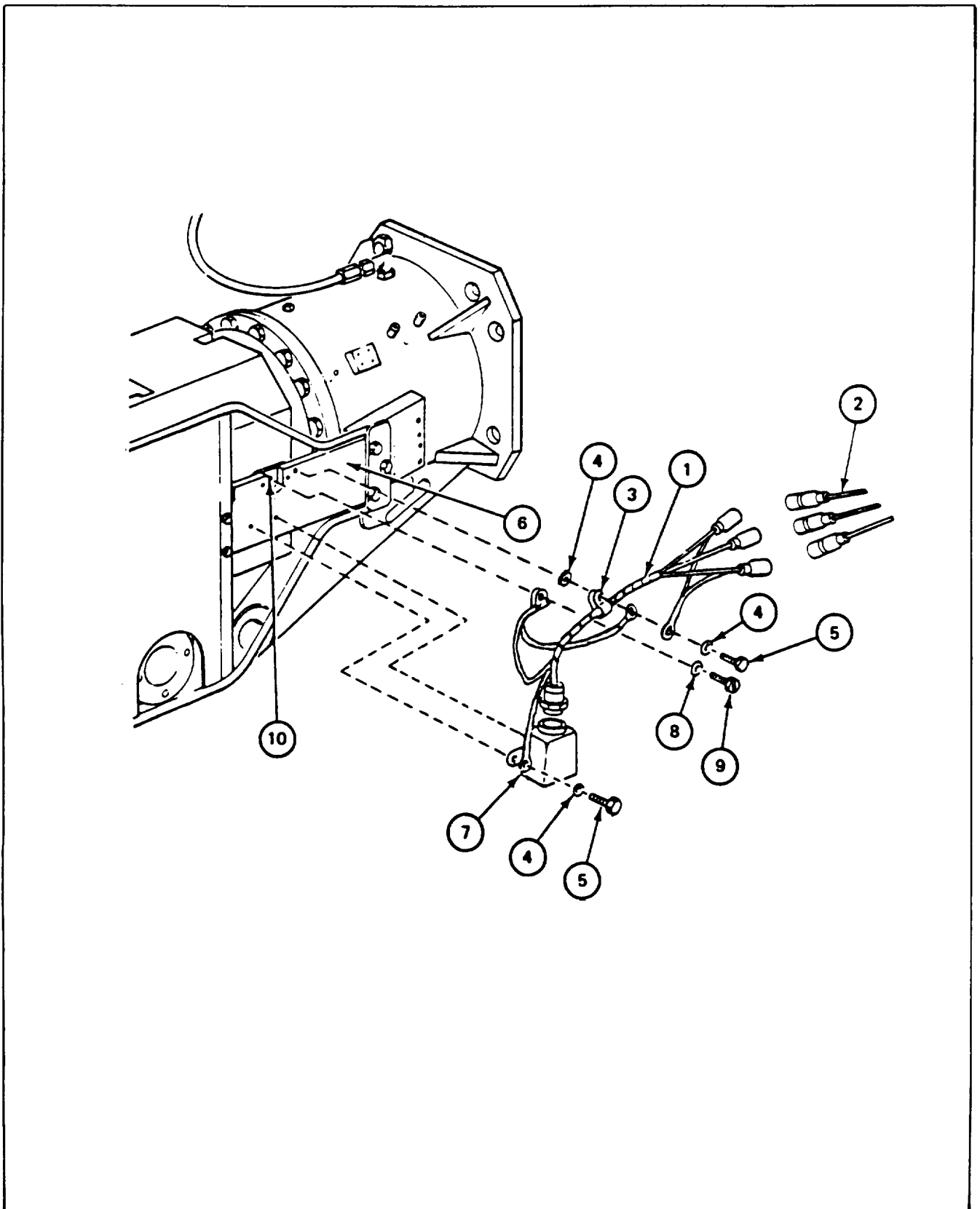
EQUIPMENT LOCATION INFORMATION:

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

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

11-21. ELECTRICAL FIRING LEAD INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<div style="border: 1px dashed black; padding: 2px; width: fit-content; margin: 0 auto;">CAUTION</div> <p>Firing lead connectors must be connected to harness assembly connectors which match circuit numbers on metal tabs attached to wires near connectors. Wrong connections will damage equipment.</p>
1.	Connect connector's (circuit 113C, 113D, and 113E) of firing lead (1) to matching connector's (circuit 113C, 113D and 113E) of harness assembly (2).
2.	Put clamp (3) on firing lead (1).
3.	Put lockwasher (4), two terminals of firing lead (1), clamp (3), and second lockwasher (4) on screw (5).
4.	Using socket wrench, put screw (5) in support bracket (6).
5.	Put lock washer (4) and terminal of firing lead (1) on screw (5),
6.	Using socket wrench, put screw (5) through relay (7) and attach to support bracket (6).
7.	Put lockwasher (8) and terminal of firing lead (1) on lockwasher screw (9).
8.	Using screwdriver, put screw (9) in primer contact (10).
9.	Using open end wrench, connect connector of firing lead (1) to relay (7) (JPG).
	END OF TASK



11-22. GUNNER'S GUARD SUPPORT BRACKET REMOVAL PROCEDURE

TOOLS: Diagonal cutting pliers
 Long nose pliers
 3/4 in. socket (1/2 in. drive)
 2 in. extension (1/2 in. drive)
 1/2 in. drive ratchet
 15/16 in. socket (1/2 in. drive)
 9/16 in. socket (1/2 in. drive)
 5/8 in. socket (1/2 in. drive)

PERSONNEL: Two

REFERENCES: TM 9-2350-222-20-2-3 for procedure to remove gunner's guard

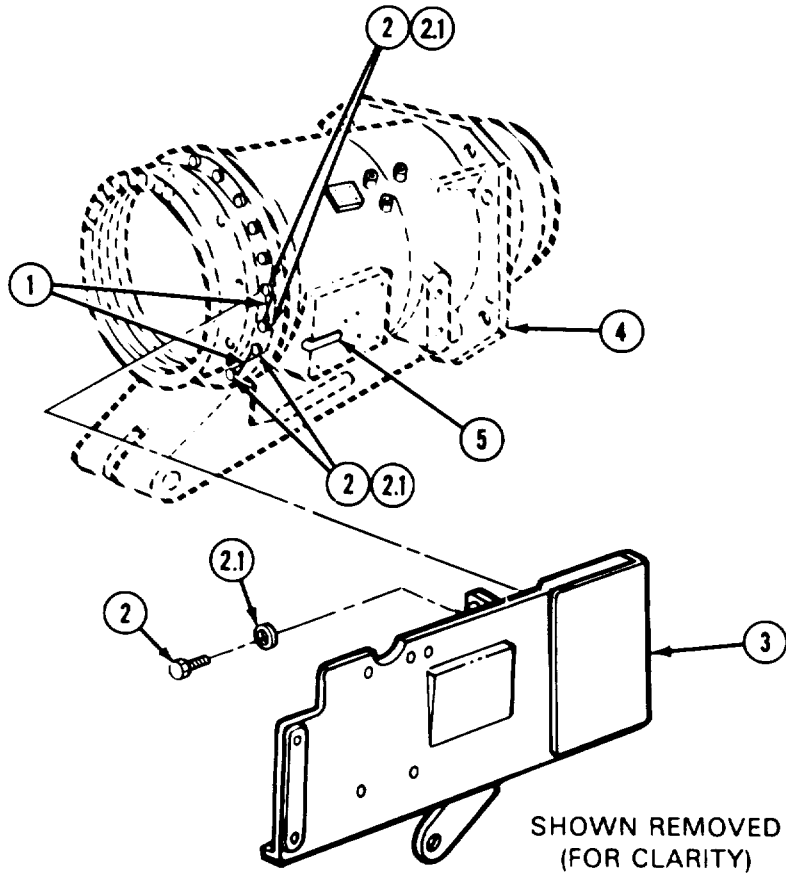
EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Gunner's Guard	FO-1	17
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
 Gunner's guard removed (TM-20-2-3)

11-22. GUNNER'S GUARD SUPPORT BRACKET REMOVAL PROCEDURE (CONT)

FRAME 1	
STEP	PROCEDURE
	<p data-bbox="685 437 880 480" style="text-align: center;">WARNING</p> <p data-bbox="383 502 1182 556" style="text-align: center;">Support bracket weighs about 80 pounds. Do not drop while removing. It will crush your toes.</p> <ol data-bbox="141 588 1060 674" style="list-style-type: none">1. Using diagonal cutting pliers, cut two lockwires (1) holding four screws (2).2. Using long nose pliers, remove two lockwires (1) from four screws (2). <p data-bbox="749 707 819 733" style="text-align: center;">NOTE</p> <p data-bbox="309 741 1312 832">Early gun mounts require 3/4 inch or 9/16 inch socket wrench. Late or modified gun mounts require 15/16 inch or 5/8 inch socket wrench.</p> <p data-bbox="309 853 1290 911">Soldier A : Hold support bracket (3) while Soldier B removes four screws (2).</p> <ol data-bbox="141 940 1387 1052" style="list-style-type: none">3. Using socket wrench, remove four screws (2) (and four lockwashers (2.1) on late mount) holding support bracket (3) to recoil mechanism (4). Throw four screws away if they have hex heads.4. Soldiers A and B: Pull support bracket (3) from guide key (5) of recoil mechanism (4). <p data-bbox="215 1080 413 1106">END OF TASK</p>



11-23. GUNNER'S GUARD SUPPORT BRACKET INSTALLATION PROCEDURE

TOOLS: Diagonal cutting pliers
 Long nose pliers
 3/4 in. socket (1/2 in. drive)
 2 in. extension (1/2 in. drive)
 1/2 in. drive ratchet
 1/2 in. drive torque wrench (0 to 250 foot-pounds)
 15/16 in. socket (1/2 in. drive)
 9/16 in. socket (1/2 in. drive)
 5/8 in. socket (1/2 in. drive)

SUPPLIES: Repair kit (screws and washers) (late model) (5911277)
 Repair kit (screws and washers) (early model) (5911276)
 Lockwire (MS20995-C32)

PERSONNEL: Two

REFERENCES: JPG for procedures to:
 Use torque wrench
 Install lockwire
 TM 9-2350-222-20-2-3 for procedure to install gunner's guard

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Gunner's Guard	FO-1	17

WARNING

Support bracket weighs about 80 pounds. Do not drop while installing.
Support bracket will crush your toes.

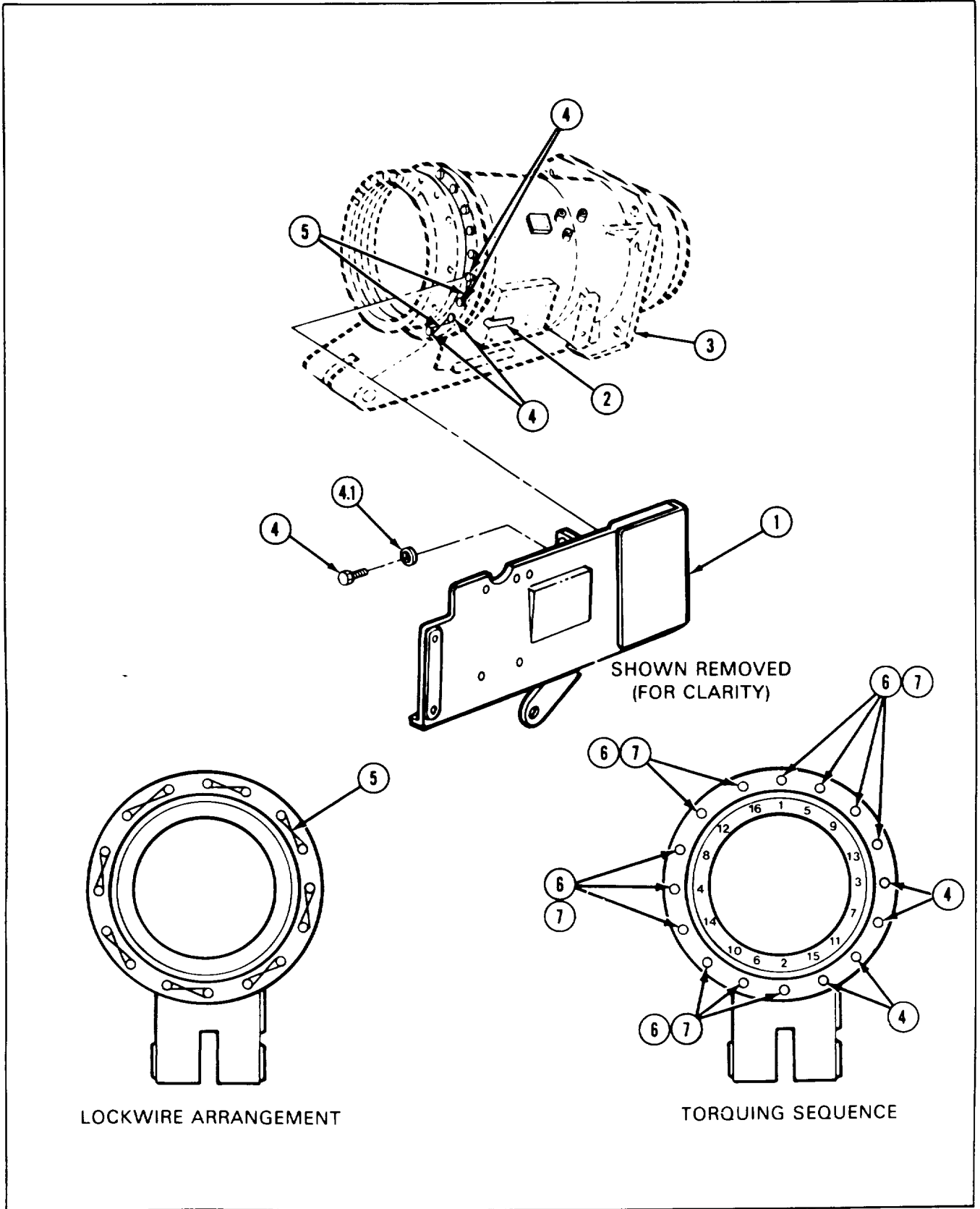
NOTE

Screws securing retention cover and gunner's support bracket are mandatory replacement parts.

- **If the screws have hex heads, replace them with 12-point head screws from kit according to steps 1, 3, 4, 5, 6, 7, and 8.**
- **If the recoil mechanism had been disassembled, use the long screws left over from kit and do steps 1, 3, 7, and 8.**
- **If the screws have the 12-point head, do steps 1, 2, 7, and 8.**

11-23. GUNNER'S GUARD SUPPORT BRACKET INSTALLATION PROCEDURE (CONT)

FRAME 1	
STEP	PROCEDURE
1.	<p>Soldiers A and B: Line up key slot in support bracket (1) with key (2) on recoil mechanism (3).</p> <p style="text-align: center;">NOTE</p> <p>Soldier A: Hold bracket while Soldier B puts in screws.</p> <p>Early gun mounts require 3/4 inch or 9/16 inch wrench. Late or modified gun mounts require 15/16 inch or 5/8 inch wrench.</p>
2.	Using socket wrench, attach support bracket (1) to recoil mechanism (3) with four screws (4) and lockwashers (4.1).
3.	Using socket wrench, attach support bracket (1) to recoil mechanism (3) with four long screws (4) and lockwashers (4.1).
4.	Using needle nose pliers and diagonal cutting pliers, cut and remove lockwire (5) from screws (6).
5.	Using socket, remove 12 hex head screws (6).
6.	Using socket, install 12 short twelve-point head screws (6) and washers (7) from screw repair kit.
7.	Using 9/16 inch or 5/8 inch socket and torque wrench, tighten screws (4) and/or (6) to 90-110 Ib-ft (JPG) for the M150 gun mount or to 120-140 lb-ft for the M150A1 gun mount. (See torquing sequence on page 11-185).
8.	Using needle nose pliers and diagonal cutting pliers, lockwire screws (4 and 6) in pairs (JPG). (See lockwiring arrangement on page-1 1-185.)
	END OF TASK



11-24. TORQUE BRACKET REMOVAL PROCEDURE

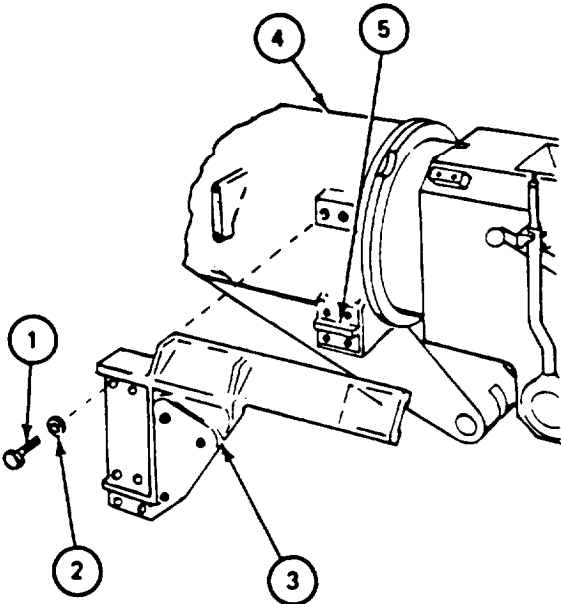
TOOLS: 3/4 in. socket wrench (1/2 in. drive)
1/2 in. drive ratchet

PERSONNEL: Two

REFERENCES: TM 9-2350-222-20-2-3 for procedure to remove loader's guard

EQUIPMENT CONDITION: Loader's guard removed (TM-20-2-3)

11-24. TORQUE BRACKET REMOVAL PROCEDURE (CONT)

FRAME 1	Procedure
	<p data-bbox="773 480 992 559" style="text-align: center;">WARNING</p> <p data-bbox="526 608 1235 672">Torque bracket weighs about 80 pounds. Do not drop while removing. Torque bracket will crush your toes.</p> <p data-bbox="841 715 922 746" style="text-align: center;">NOTE</p> <p data-bbox="526 789 1230 853">Soldier A: Hold torque bracket (3) while Soldier B removes six screws (1).</p> <ol data-bbox="256 868 1487 985" style="list-style-type: none">1. Using 3/4" socket wrench, remove six screws (1) and six lockwashers (2) holding torque bracket (3) to recoil mechanism (4).2. Soldiers A and B: Pull torque bracket (3) off guide key (5) in recoil mechanism (4). <p data-bbox="321 1002 540 1034">END OF TASK</p>
	 <p>The diagram illustrates the removal of a torque bracket from a recoil mechanism. It shows a perspective view of the recoil mechanism (4) with a torque bracket (3) attached. A guide key (5) is visible on the recoil mechanism. A screw (1) and lockwasher (2) are shown being removed from the torque bracket. The torque bracket (3) is shown being pulled off the guide key (5).</p>

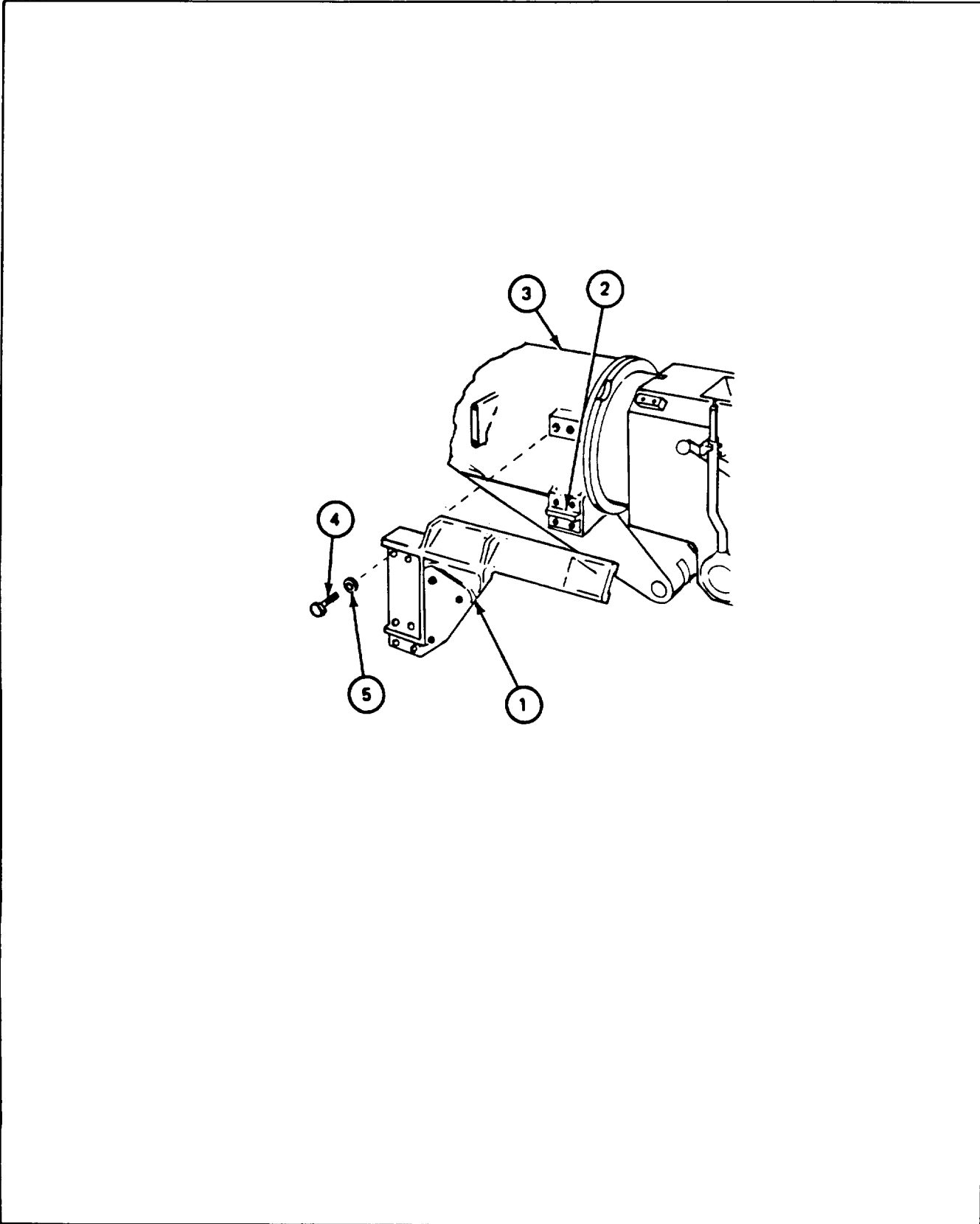
11-25. **TORQUE BRACKET INSTALLATION PROCEDURE**

TOOLS: 3/4" socket wrench (1/2 drive)
 1/2" drive ratchet
 Torque wrench (0 to 250 foot-pounds) (1/2" drive)

PERSONNEL: Two

REFERENCES: JPG for procedure to use torque wrench

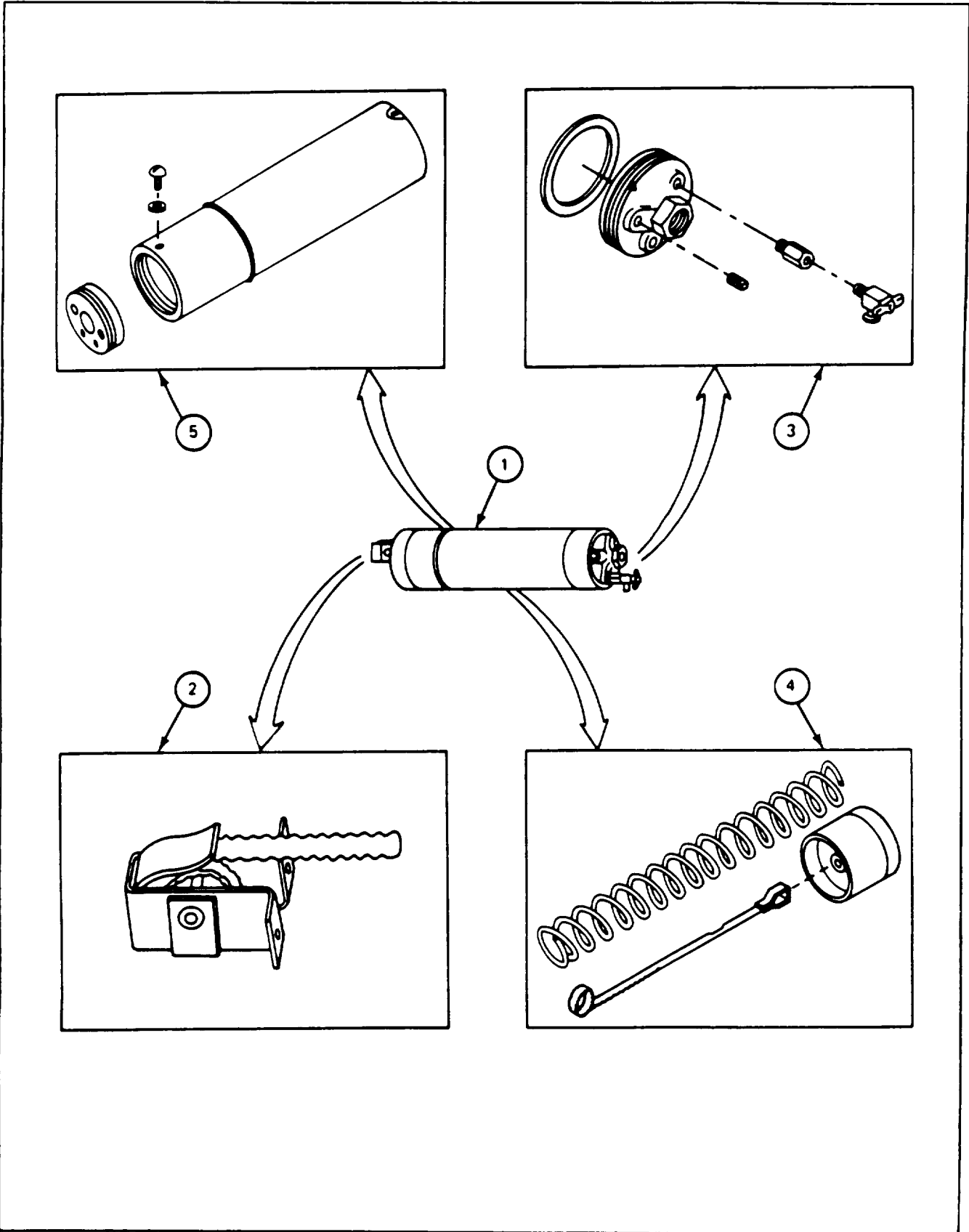
FRAME 1	
Step	Procedure
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p>Torque bracket weighs about 80 pounds. Do not drop while installing, Torque bracket will crush your toes.</p>
1.	Using Soldiers A and B, line up key slot in torque bracket (1) with key (2) on recoil mechanism (3). Push torque bracket (1) on key (2).
	<p>NOTE</p> <p>Soldier A: Hold bracket while Soldier B puts in screws.</p>
2.	Using 3/4" wrench, attach torque bracket (1) to recoil mechanism (3) with six screws (4) and six lockwashers (5).
3.	Using torque wrench, torque six screws (4) to between 70 and 90 foot-pounds (JPG).
	<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Install loader's guard (TM-20-2-3).</p>
	END OF TASK



Section 3. REPLENISHER

11-26. MAINTENANCE PROCEDURES INDEX

Equipment Item	Test	Tasks			
		Removal	Installation	Disassembly	Assembly
1. Replenisher	11-27			11-28	11-29
2. Indicator		11-30	11-31		
3. Head		11-32	11-33		
4. Piston and Tape		11-32	11-33		
5. Cylinder		11-32	11-33		



11-27. REPLENISHER 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: 1/2 in. combination wrench
9/16 in. combination wrench

SUPPLIES: Pan
Rags (item 21, App. A)
Hydraulic fluid (item 10, App. A)

PERSONNEL: One

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

EQUIPMENT CONDITION: Replenisher removed (TM -20-2-3)

GENERAL INSTRUCTIONS:

CAUTION

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

NOTE

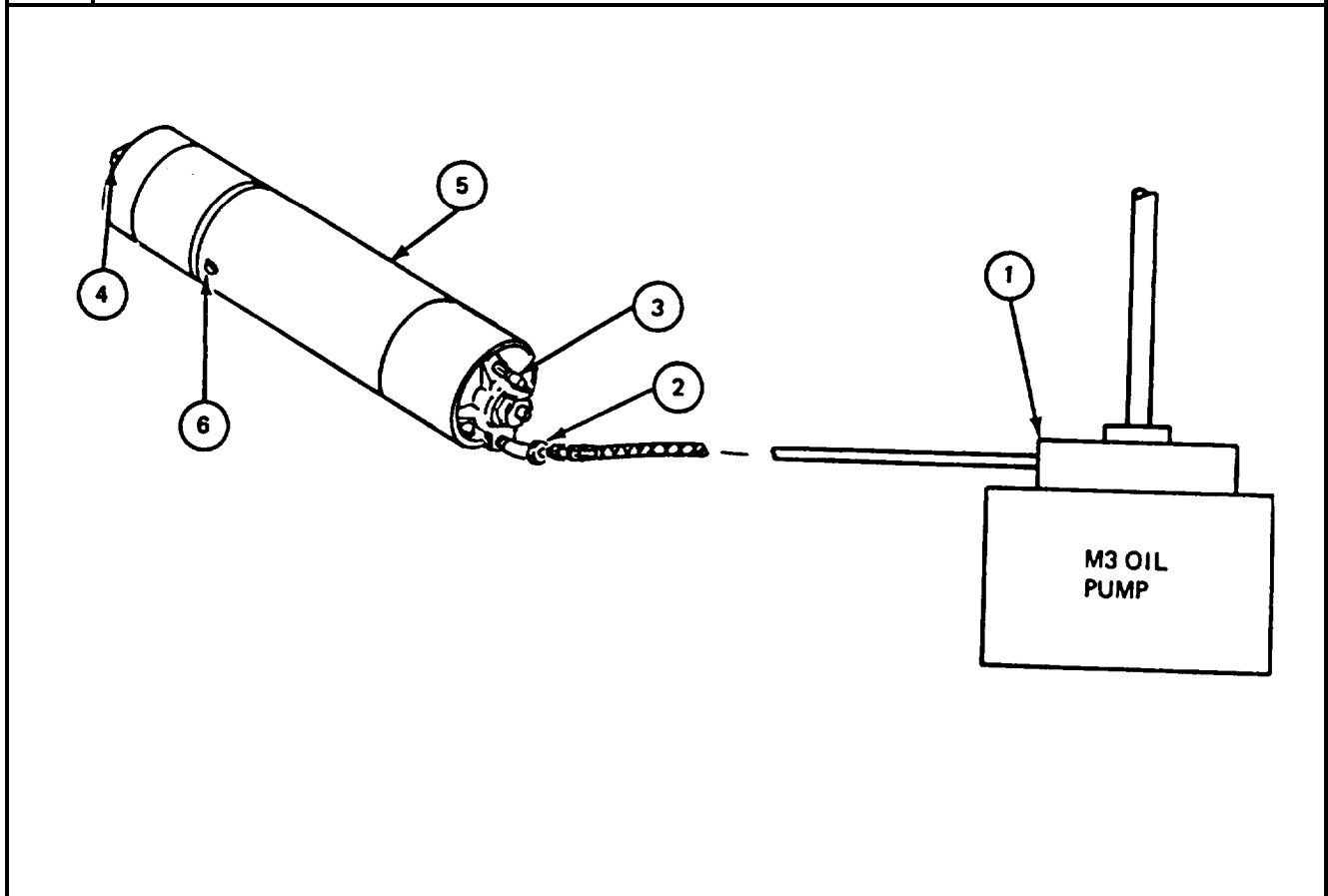
If normal indication is not obtained, replenisher is bad. Refer to section index (para 11-26) for replacement of parts.

Use pan and rags for oil drainage and spills.

Use suitable hydraulic fittings, preformed packings and tools to connect test equipment to parts tested.

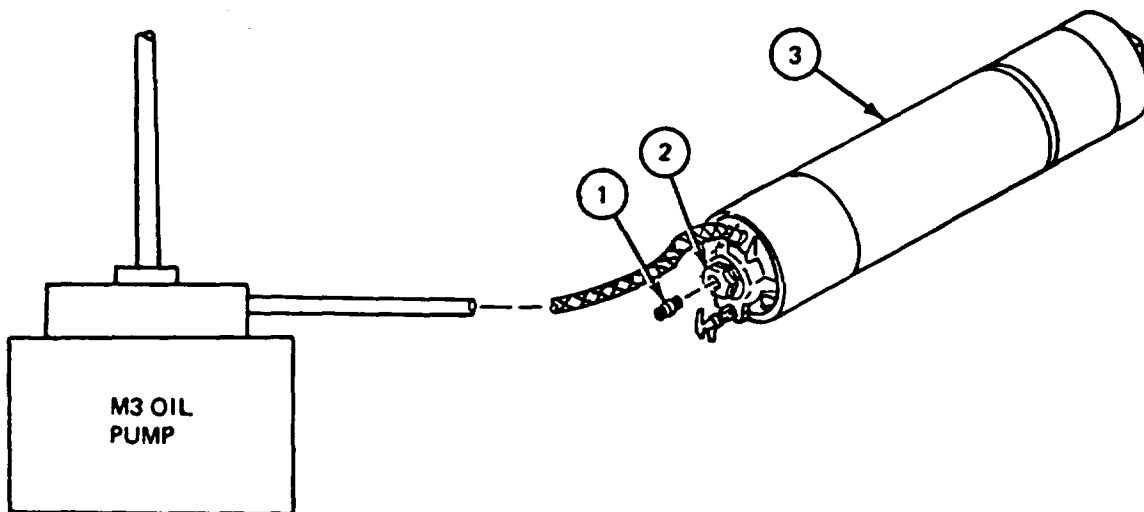
11-27. REPLENISHER TEST PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Assemble M3 oil pump (1).
2.	Using 9/16" wrench, connect hose from M3 oil pump (1) to elbow (2).
3.	Using hand, close drain cock (3).
NOTE	
If indicator (4) tape does not wind up smoothly in indicator, tape may have to be rewound.	
4.	Using M3 oil pump (1), fill replenisher (5) until steady stream of oil comes out overflow hole (6) (JPG). Check indicator (4) tape for smooth operation during filling.
5.	Using M3 oil pump (1), reduce pressure until oil stops coming out of overflow hole (6) (JPG).
GO TO FRAME 2	



11-27. REPLENISHER TEST PROCEDURE (CONT)

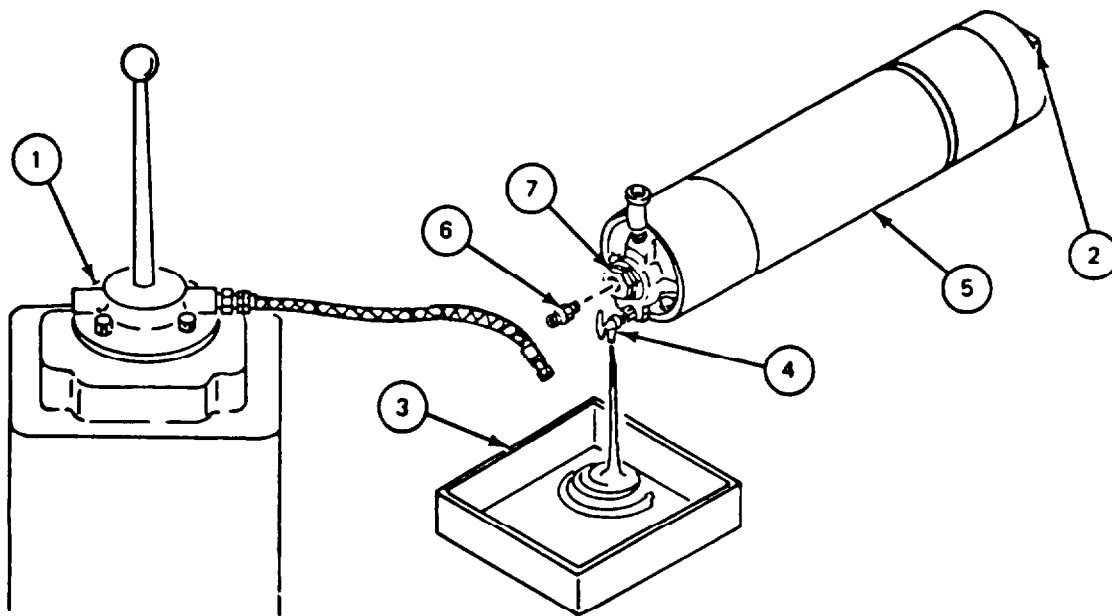
FRAME 2	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 	<p>Using 1/2" wrench, remove plug (1) from valve (2).</p> <p>Using watch. start timing for 5-minute test.</p> <p>Check valve (2) for leaks.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">If valve (2) leaked more than one drop during 5-minute test, valve is bad.</p>
<ol style="list-style-type: none"> 4. 	<p>Check replenisher (3) for leaks.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">If replenisher (3) leaked in step 4, replenisher is bad.</p> <p>GO TO FRAME 3</p>



11-27. REPLENISHER TEST PROCEDURE (CONT)

FRAME 3

Step	Procedure
1.	Using M3 oil pump (1), reduce pressure until indicator (2) tape stops unwinding (JPG).
2.	Disconnect M3 oil pump (1) hose.
3.	Using pan (3) to catch oil, open drain cock (4) to drain any remaining oil in replenisher (5), Close drain cock (4).
4.	Using 1/2" wrench, install plug (6) in valve (7).
<p>NOTE</p> <p>If normal indication was obtained in frames 1, 2, and 3, replenisher is good.</p> <p>END OF TASK</p>	



11-28. REPLENISHER DISASSEMBLY PROCEDURE

PERSONNEL: One

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

EQUIPMENT CONDITION: Replenisher removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Test replenisher (para 11-27)

FRAME 1	
Step	Procedure
1.	Remove indicator (para 11-30).
2.	Remove head. piston, and tape (para 11-32).
	END OF TASK

11-29. REPLENISHER ASSEMBLY PROCEDURE

PERSONNEL: One

FRAME 1	
Step	Procedure
1.	Install head, piston and tape (para 11-33).
2.	Install indicator (para 1 -31).
	<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Test replenisher (para 11-27).</p>
	END OF TASK

11-30. **INDICATOR REMOVAL PROCEDURE**

TOOLS: Stiff bristled brush
Scraper
Fine stone
1 /4" flat tip screwdriver
5/16" open end wrench

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

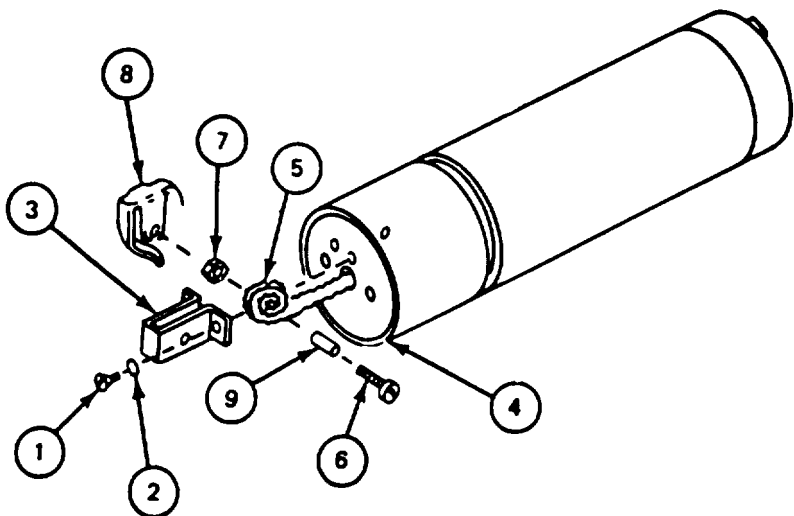
PERSONNEL One

REFERENCES: JPG for procedures to:
Clean parts
Inspect and repair parts
TM 9-2350-222-20-2-3 for procedure to remove replenisher

EQUIPMENT CONDITION: Replenisher removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Test replenisher (para 11-27)

11-30. INDICATOR REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	<p style="text-align: center;">WARNING</p> <p style="text-align: center;">Edges of tape are sharp. Be careful when handling tape.</p> <ol style="list-style-type: none"> 1. Using screwdriver, remove two screws (1) and two lockwashers (2) that attach bracket (3) to cap (4). 2. Using hands, pull on bracket (3) until tape (5) is uncoiled. 3. Using screwdriver and wrench, remove screw (6) and nut (7). 4. Using hands, separate bracket (3) and guide (8). 5. Using hands, slide pin (9) from tape (5). <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.</p> <p>END OF TASK</p>
	 <p>The diagram shows an exploded view of the indicator assembly. A cylindrical cap (4) is shown with a bracket (3) attached to its front. Two screws (1) and two lockwashers (2) are shown being removed from the bracket. A tape (5) is uncoiled from the bracket. A screw (6) and nut (7) are shown being removed from the tape. A guide (8) is shown being separated from the bracket. A pin (9) is shown being slid from the tape.</p>

11-31. INDICATOR INSTALLATION PROCEDURE

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

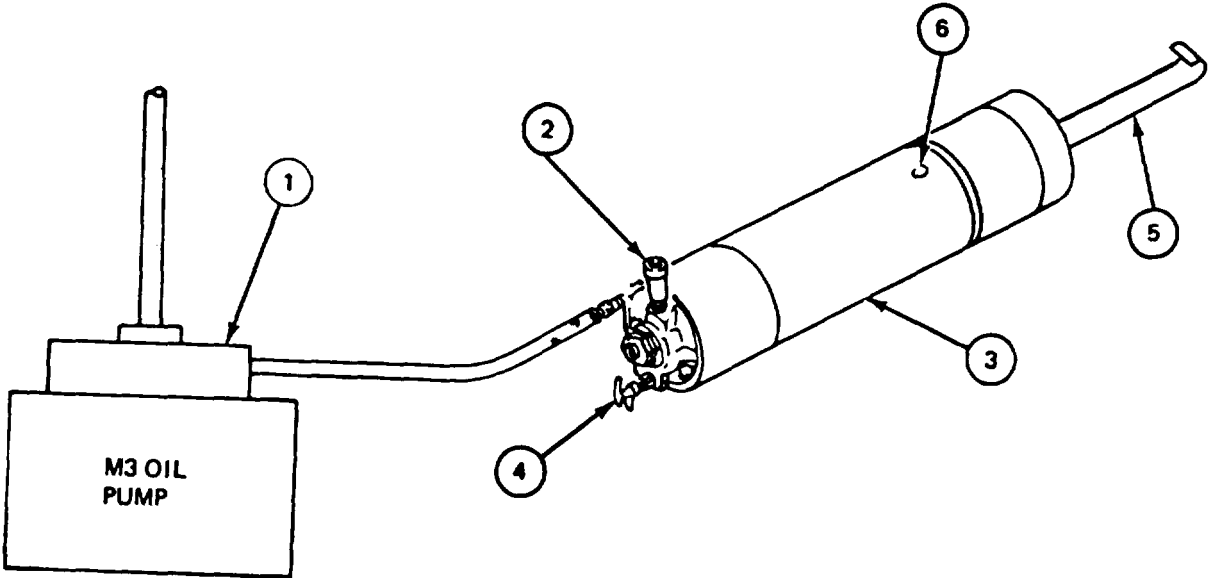
TOOLS: 1/4 in. flat tip screwdriver
5/16 in. open end wrench
9/16 in. combination wrench
Needle nose pliers

SUPPLIES: Thin wire (4 in. long)
Cotter pin

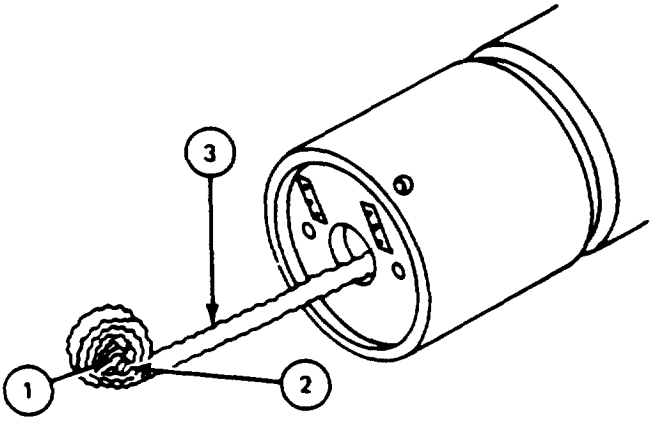
PERSONNEL: One

PRELIMINARY PROCEDURES: Install piston and tape (para 11-33)

11-31. INDICATOR INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Assemble M3 oil pump (1).
2.	Connect M3 oil pump (1) hose to elbow (2) on replenisher (3).
3.	Using hand, close drain cock (4).
4.	Using M3 oil pump (1), fill replenisher (3) until tape (5) with notch cut on both sides comes out of replenisher and oil comes out of overflow hole (6) (JPG).
5.	Using M3 oil pump (1), maintain pressure on replenisher (3) while doing frames 2 and 3 (JPG).
	GO TO FRAME 2
	

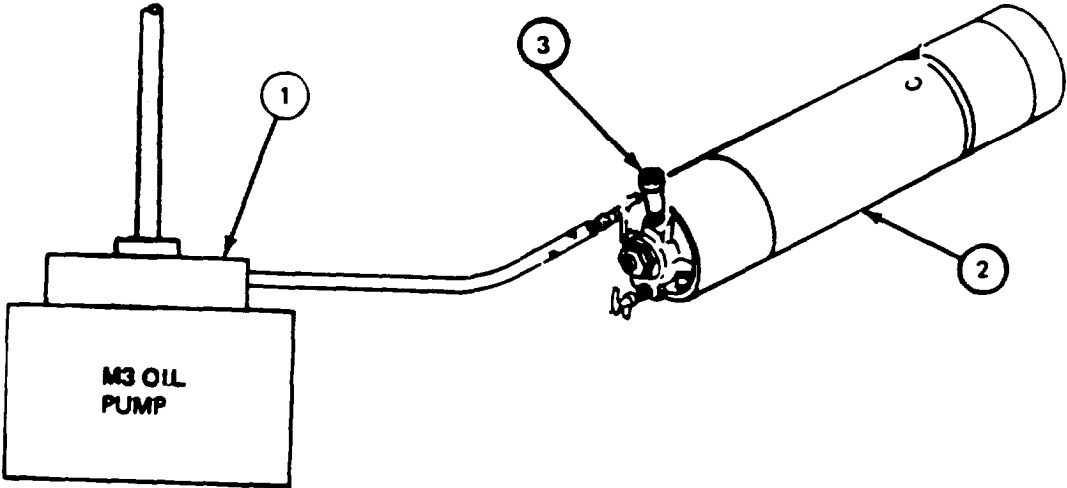
11-31. INDICATOR INSTALLATION PROCEDURE (CONT)

FRAME 2	
Step	Procedure
	<div style="text-align: center; border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto 20px auto;">WARNING</div> <p style="text-align: center;">Edges of tape are sharp. Be careful when handling tape.</p> <ol style="list-style-type: none"> 1. Put tape end (1) through slot in pin (2). 2. Using cotter pin, put one side through hole in pin (2) and wind tape (1) until approximately 1-1/4 inches of tape is showing. 3. Put thin wire through center of pin (2) and around tape (3). Twist wire until tight around tape (3). 4. Remove cotter pin. <p>GO TO FRAME 3</p>
	

11-31. INDICATOR INSTALLATION PROCEDURE (CONT)

FRAME 3		
Step	Procedure	
<ol style="list-style-type: none"> 1. Using hands, put guide (1) in bracket (2). 2. Put coiled tape (3) and pin (4) in guide (1) and bracket (2). 3. Align hole in pin (4) with holes in guide (1) and bracket (2). 4. Using screwdriver and 5/16" wrench, install screw (5) and nut (6). 5. Using pliers, remove wire (used to hold tape (3) in snug ball). 6. Using screwdriver, attach bracket (2) to cap (7) with two lockwashers (8) and two screws (9). <p>GO TO FRAME 4</p>		

11-31. INDICATOR INSTALLATION PROCEDURE (CONT)

IFRAME 4	
Step	Procedure
1.	Using M3 oil pump (1), reduce oil pressure on replenisher (2) (JPG).
2.	Disconnect M3 oil pump (1) hose from elbow (3) on replenisher (2).
3.	Disassemble M3 oil pump (1).
<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Test replenisher (para 11-27).</p>	
<p>END OF TASK</p>	
 <p>The diagram illustrates the connection between an M3 Oil Pump and a replenisher. On the left, a rectangular box labeled 'M3 OIL PUMP' has a vertical pipe extending upwards. A hose connects the pump to a cylindrical replenisher on the right. The hose has an elbow (3) where it meets the replenisher. A circular arrow (2) indicates the direction of flow or pressure reduction at the replenisher. A circled number 1 points to the pump, and a circled number 2 points to the replenisher.</p>	

11-32. HEAD, PISTON, AND TAPE OR CYLINDER REMOVAL PROCEDURE

TOOLS: 20 ounce ball peen hammer
 Center punch
 Adjustable face spanner wrench (3/8" diameter pins)
 Push rod (fabricated tool, item 11, App. B)
 Vise (with brass caps)
 1/4" flat tip screwdriver
 1/2" combination wrench
 8" adjustable wrench
 9/16" combination wrench
 5/8" combination wrench
 15" adjustable wrench
 O-ring extractor kit
 Scraper
 Stiff bristled brush
 Fine stone

SUPPLIES: Rags (item 21, App. A)
 Container
 Dry cleaning solvent (item 33, App. A)
 Crocus cloth (item 7, App. A)

PERSONNEL: One

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

PRELIMINARY PROCEDURES Test replenisher (para 11-27)
 Remove indicator (para 11-30)

GENERAL INSTRUCTIONS:

CAUTION

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

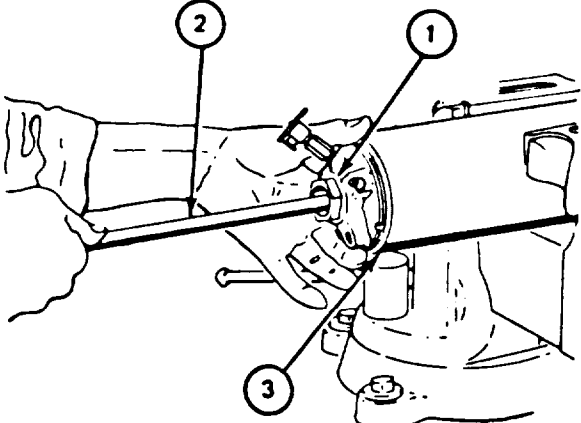
NOTE

Use container and rags for oil spills.

11-32. HEAD, PISTON, AND TAPE OR CYLINDER REMOVAL PROCEDURE
(CONT)

FRAME 1	
Step	Procedure
1.	Using vise, clamp replenisher (1) in vise jaws with setscrew (2) up. <div style="text-align: center; margin: 10px 0;"> <div style="border: 1px solid black; padding: 2px; display: inline-block;">CAUTION</div> <p>Make sure setscrew (2) is tight.</p> <p>NOTE</p> <p>Washer (4) is not removed from valve (5) unless being replaced.</p> </div>
2.	Using 1/2" combination wrench, remove plug (3) and washer (4) from valve (5).
3.	Using screwdriver, lift bent tangs of key washer (6) from valve (5).
	<div style="text-align: center; margin: 10px 0;">NOTE</div> <p>Spacer (7) is not removed from head (8) unless being replaced.</p>
4.	Using 15" adjustable wrench, remove valve (5), key washer (6), and spacer (7) from head (8). Throw key washer away.
5.	Using screwdriver, remove setscrew (2) and lockwasher (9) from replenisher cylinder (1).
	GO TO FRAME 2

**11-32. HEAD, PISTON, AND TAPE OR CYLINDER REMOVAL PROCEDURE
(CONT)**

FRAME 2	
Step	Procedure
	<div data-bbox="751 540 972 619" style="border: 1px solid black; text-align: center; padding: 5px;">WARNING</div> <p data-bbox="505 666 1214 789">Spring and piston inside cylinder (3) are kept under tension by head (1). Removal of head must be done carefully to prevent injury by release of spring and piston.</p> <ol data-bbox="237 810 1463 1023" style="list-style-type: none">1. Using 15" adjustable wrench, loosen but do not remove head (1).2. Put push rod (2) through hole in head (1).3. Pushing on rod (2) to keep pressure on piston and spring in cylinder (3). Use hand to remove head (1) from cylinder (3).4. Keeping pressure on rod (2), slide head (3) back onto rod. <p data-bbox="305 1044 548 1066">GO TO FRAME 3</p>
	 <p>The diagram shows a cross-section of a mechanical assembly. A hand is shown using a wrench to turn a nut on a rod. The rod passes through a hole in a head (1) and into a cylinder (3). A push rod (2) is inserted into the head. The cylinder (3) contains a piston and a spring. The head (1) is being pushed back onto the rod (2) to maintain pressure on the piston and spring.</p>

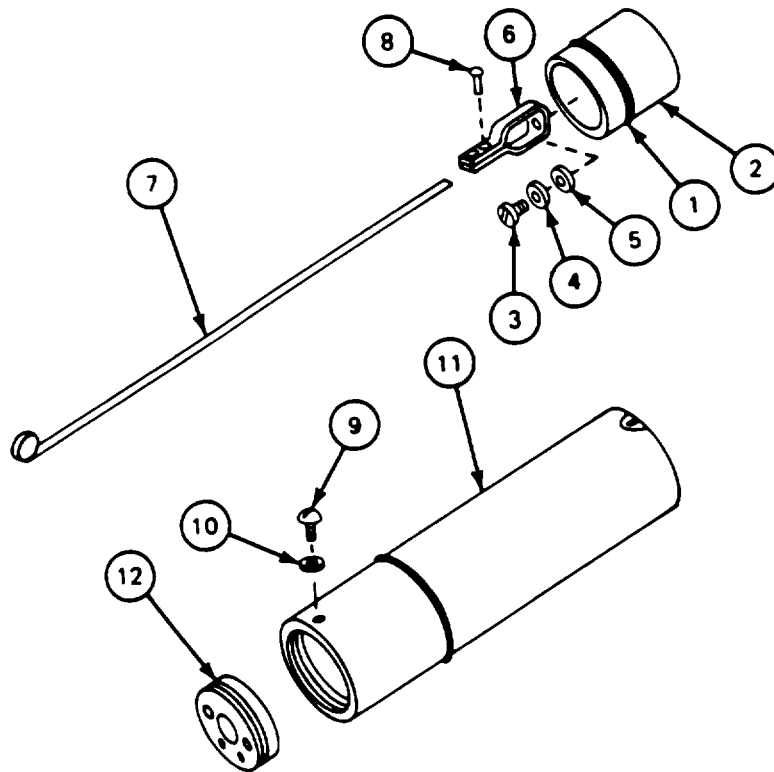
11-32. HEAD, PISTON, AND TAPE OR CYLINDER REMOVAL PROCEDURE
(CONT)

FRAME 3	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 4. 	<p>Slowly remove push rod (1) from cylinder (2).</p> <p>Using hands, remove piston (3) and tape (4) from cylinder (2).</p> <p>Remove head (4) from push rod (1).</p> <p>Remove spring (6) from cylinder (2).</p> <p>GO TO FRAME 4</p>

**11-32. HEAD, PISTON, AND TAPE OR CYLINDER REMOVAL PROCEDURE
(CONT)**

FRAME 4

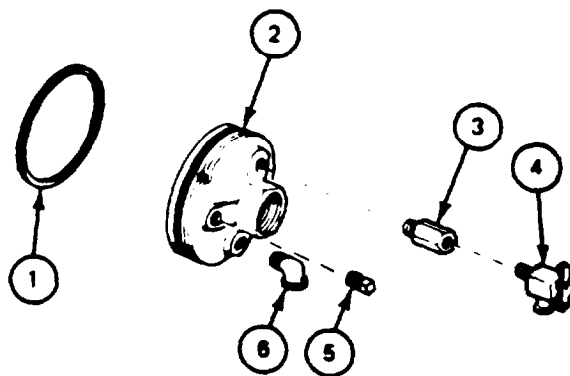
Step	Procedure
1.	Using O-ring extractor tool, remove seal assembly (1) from piston (2) (JPG). Throw away seal.
2.	Using screwdriver, remove screw (3), lockwasher (4), sleeve bearing (5), clamp (6), and tape (7) from piston (2).
3.	Using hammer and punch, remove two rivets (8) and tape (7) from clamp (6) (JPG).
4.	Using screwdriver, remove setscrew (9) and lockwasher (10) from cylinder (11)
5.	Using spanner wrench, remove cap (12) from cylinder (11). GO TO FRAME 5



11-32. HEAD, PISTON, AND TAPE OR CYLINDER REMOVAL PROCEDURE
(CONT)

FRAME 5

Step	Procedure
1.	<p>Using O-ring extractor tool, remove preformed packing (1) from head (2) (JPG) Throw away preformed packing.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">It may be necessary to put nut part of head (2) in vise.</p>
2.	Using 5/8" wrench on coupling (3) and 9/16" wrench on drain cock (4), remove drain cock from coupling.
3.	Using 5/8" wrench, remove coupling (3) from head (2).
4.	Using 8" adjustable wrench, remove two plugs (5) from head (2).
5.	Using 8" adjustable wrench. remove elbow (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 (JPG). Inspect and repair all parts (JPG).</p> <p>END OF TASK</p>	



11-33. HEAD, PISTON, AND TAPE OR CYLINDER INSTALLATION PROCEDURE

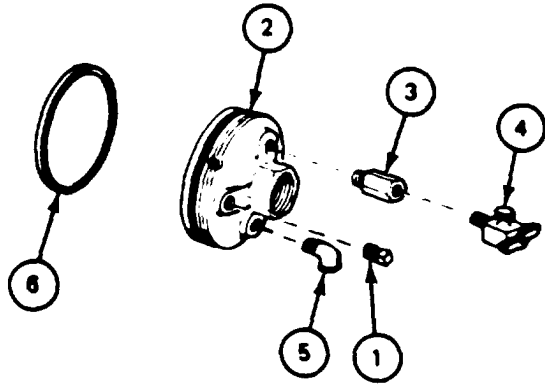
TOOLS: Vise (with brass caps)
Adjustable face spanner wrench (3/8" pins)
Push rod (fabricated tool, **item 11**, App. B)
1/4" flat tip screwdriver
1/2" combination wrench
9/16" combination wrench
5/8" combination wrench
15" adjustable wrench
8" adjustable wrench
20 ounce ball peen hammer
3/16" drive pin punch
O-ring extractor kit

SUPPLIES: Preformed packing (MS 28775-338)
Key washer (5238398)
Shim stock, 1/2" by 5", 0.005" thick (four)
Seal (8449047)
Rivets (MS16535-68) (two)
Grease (item 12, App. A)
Hydraulic fluid (item 10, App. A)

PERSONNEL: One

REFERENCES: JPG for procedures to:
Install preformed packings
Install rivets

11-33. HEAD, PISTON, AND TAPE OR CYLINDER INSTALLATION PROCEDURE
(CONT)

FRAME 1	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">It may be necessary to put nut part of head (2) in vise.</p> <ol style="list-style-type: none"> 1. Using 8" adjustable wrench, put two plugs (1) in head (2). 2. Using 5/8" combination wrench, install coupling (3) in head (2). 3. Using 9/16" combination wrench, put drain cock (4) in coupling (3). 4. Using 8" adjustable wrench, put elbow (5) in head (2). 5. Put light coat of hydraulic fluid on preformed packing (6). 6. Using O-ring extractor tool, put preformed packing (6) on head (2) (JPG). <p>GO TO FRAME 2</p>
	 <p>The diagram shows an exploded view of a hydraulic head assembly. Callout 1 points to two small cylindrical plugs. Callout 2 points to the main head component. Callout 3 points to a coupling. Callout 4 points to a drain cock. Callout 5 points to an elbow. Callout 6 points to a preformed packing ring.</p>

11-33. HEAD, , PISTON, AND TAPE OR CYLINDER INSTALLATION PROCEDURE (CONT)

FRAME 3

Step	Procedure
1.	Put cylinder (1) in vise with setscrew (2) hole
2.	Using spanner wrench, tighten cap (3) up to end of cylinder
3.	Using spanner wrench, tighten (or loosen) cap (3) nearest of flange (4) in cap is in line with setscrew (2) hole.
4.	Using screwdriver, put setscrew (2) and lockwasher (5) in cylinder
5.	Using hammer, attach clamp (6) to tape (7) with two rivets (8) (JPG).
6.	Using screwdriver, attach clamp (6) to piston (9) with screw (10), lockwasher (11), and sleeve bearing (12).
7.	Put a coat of hydraulic fluid on seal (13).

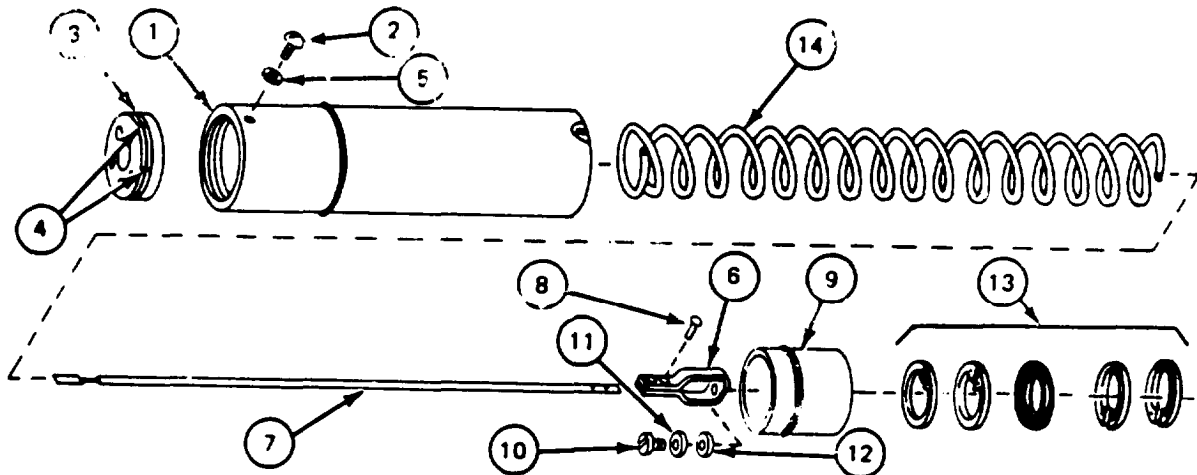
NOTE

Breaks in seal assembly (13) should be 180 degrees apart

Using extra set of tool, put seal assembly (13) on piston (9) (JPC)

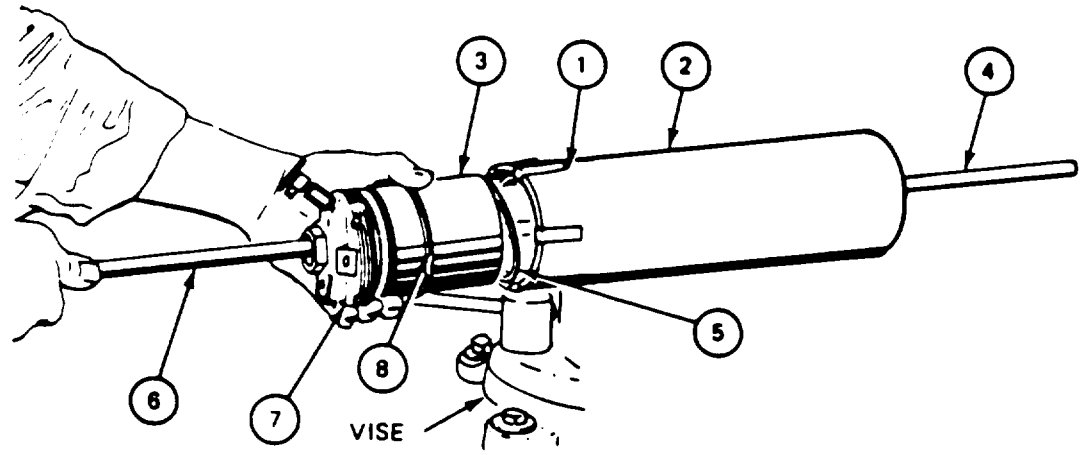
9. Put piston (9) and seal assembly (13) in cylinder (1).

FRAME 3



11 -33. HEAD, PISTON, AND TAPE OR CYLINDER INSTALLATION PROCEDURE
(CONT)

FRAME 3	
Step	Procedure
<div data-bbox="665 535 828 588" style="border: 1px solid black; padding: 2px; width: fit-content; margin: 0 auto;">CAUTION</div> <p data-bbox="389 598 1104 693">Shims (1) must be used during installation of piston (3) to prevent damage to piston seal (8). Coat shims with grease to hold in place.</p> <ol data-bbox="113 703 1364 1050" style="list-style-type: none"> 1. Bend four shims (1) around cylinder (2) opening to cover threads inside. 2. Put piston (3) and tape (4) in cylinder (2) and guide tape through center of spring (5) and center of cap installed in end of cylinder. Put piston over spring. 3. Put push rod (6) through hole in head (7). Position head against piston (3). 4. Pushing rod (6) in against piston (3) and spring (5), slowly guide piston (3) into cylinder (2) until piston seal (8) is inside cylinder (2). 5. Holding piston in with push rod (6), remove four shims (1). 6. Using hands, screw head (7) in cylinder (2). Remove push rod (6). <p data-bbox="178 1060 430 1092">GO TO FRAME 4</p>	



**11-33. HEAD, PISTON, AND TAPE OR CYLINDER INSTALLATION PROCEDURE
(CONT)**

FRAME 4	
Step	Procedure
1.	Using 15" adjustable wrench, tighten head nut (1) until head is approximately flush with end of cylinder (2) and drain cock (3) is at bottom.
2.	Using 15" adjustable wrench, tighten (or loosen) head (1) until nearest of four slots in head is in line with setscrew (4) hole.
3.	Using screwdriver, put setscrew (4) and lockwasher (5) in cylinder (2).
4.	Using 15" adjustable wrench, put valve (6), new key washer (7), and spacer (8) in head nut (1).
5.	Using hammer and punch, bend one tang of key washer (7) down in groove in head (1) nut and six tangs down on valve nut (6).
6.	Using 1/2" wrench on plug (9) and 15" adjustable wrench on valve nut (6), put plug (9) and flat washer (10) in valve nut.
<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Install indicator (para 1 1-31). Test replenisher (para 11-27).</p> <p>END OF TASK</p>	

CHAPTER 12
CUPOLA

Section 1. SCOPE

12-1. LIST OF EQUIPMENT ITEMS CONTAINED IN THIS CHAPTER

Section	Equipment Item	Paragraph
2	Cupola	12-2
3	Cupola Bearing Components	12-5
4	Cupola Azimuth Gear Box	12-11
5	Elevating Screw Jack	12-17

Section 2. CUPOLA

12-2. MAINTENANCE PROCEDURES INDEX

Equipment Item	Removal	Tasks	Installation
Cupola	12-3		12-4

12-3. CUPOLA REMOVAL PROCEDURE

TOOLS: Hoist (2 ton minimum capacity)
Sling (NSN 4933-00-480-5662)
3/4" drive breaker bar
Cupola adapters A and B (fabricated tool, item 4, App. B)

SUPPLIES: 6" X 6" X 36" wood blocks (two)

PERSONNEL: Three

REFERENCES: TM 9-2350-222-10 for procedures to:
Close and lock cupola hatch
Remove cal .50 machine gun
Remove M36 periscope
TM 9-2350-222-20-2-3 for procedures to:
Remove flexible chute
Remove ammunition box
Remove cupola azimuth gear box

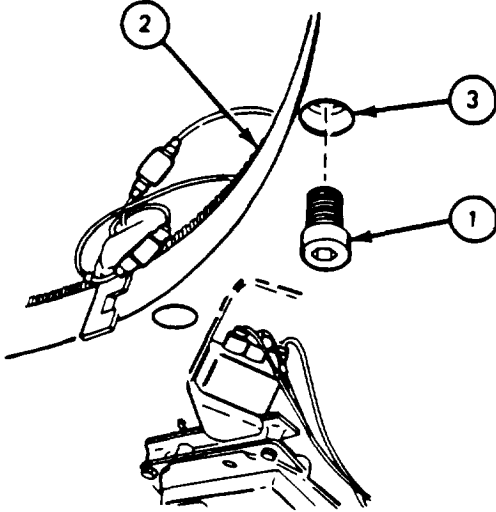
EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-4	10

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
Cal .50 machine gun removed (TM-10)
M36 periscope removed (TM-10)
Flexible chute removed (TM -20-2-3)
Ammunition box removed (TM-20-2-3)
Cupola azimuth gear box removed (TM-20-2-3)

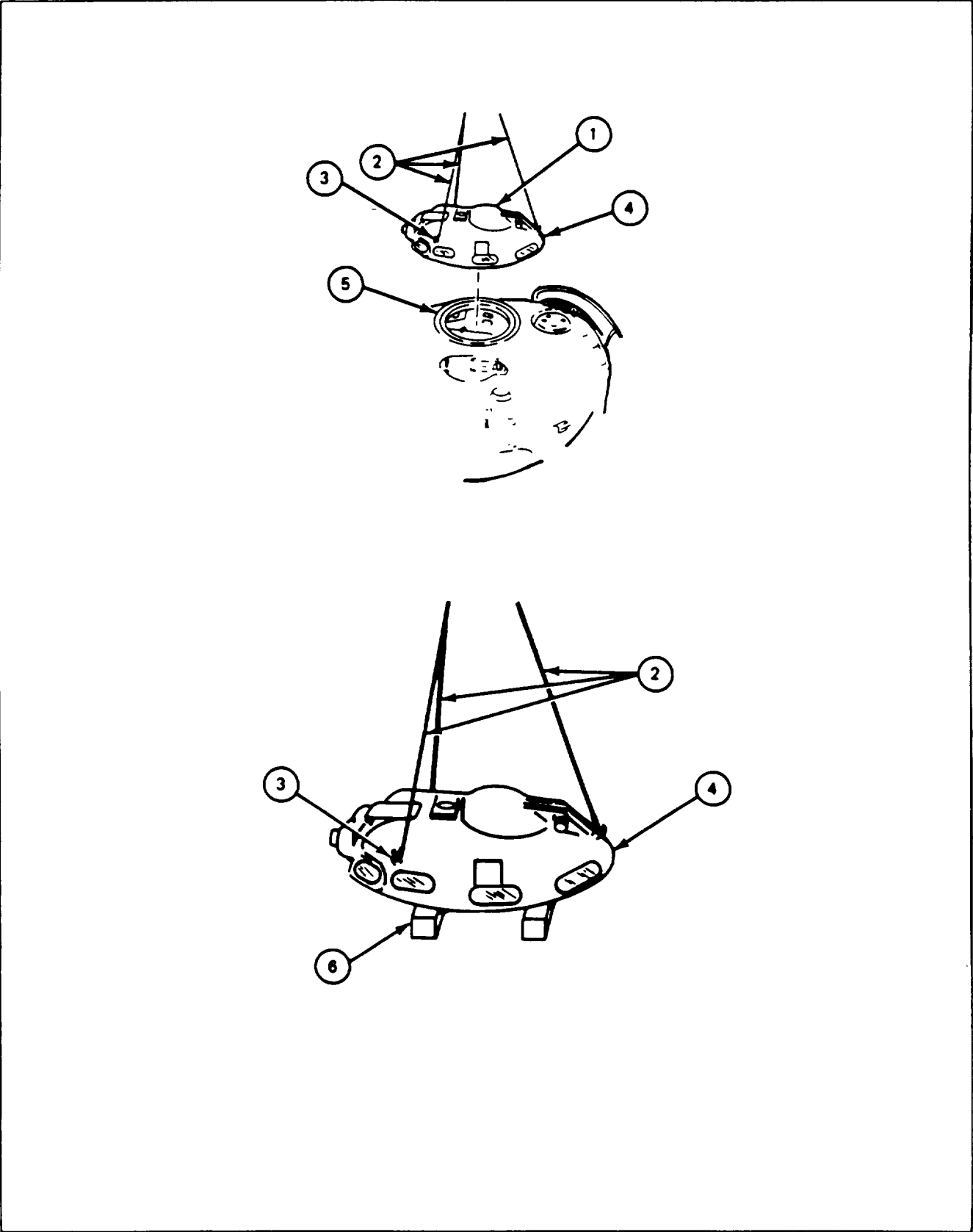
PRELIMINARY PROCEDURES: Remove cupola guards (para 9-2, 9-4 and 9-6)
Remove wiring harness (10873607) (para 8-14, frame 1, steps 5 and 8, and frame 2, steps 1, 4, 5, 6, 7 and 8)
Remove wiring harness (10911240) (para 8-16, step 3)
Remove cupola support, plate, and rubber strip (para 9-8)

12-3. CUPOLA REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p>Adapter A is used to remove two cupola spur gear attaching screws from turret roof over rangefinder. Adapter B is used to remove other ten cupola spur gear attaching screws.</p> <ol style="list-style-type: none"> 1. Using adapter A and breaker bar, remove two screws (1) over rangefinder, that attach cupola spur gear (2) to turret roof (3). 2. Using adapter B and breaker bar, remove other ten screws (1) that attach cupola spur gear (2) to turret roof (3). <p>GO TO FRAME 2</p>
	

12-3. CUPOLA REMOVAL PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	Soldier A: Close and lock cupola hatch (1) (TM-10).
2.	Soldier B: Attach sling (2) to three lifting eyes (3) on roof of cupola (4).
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;"> <p>WARNING</p> </div> <p style="text-align: center;">Cupola weighs one ton, Soldiers must stay clear of cupola when it is being lifted or moved by hoist to keep from getting hurt.</p>	
3.	Soldiers A and B: Guide cupola (4) as it is being lifted from turret roof (5).
4.	Soldier C: Using hoist, lift cupola (4) from turret roof (5).
5.	Soldier C: Using hoist. lower cupola (4) near ground.
6.	Soldiers A and B: Put wood blocks (6) under cupola (4).
7.	Soldier C: Using hoist, lower cupola (4) onto wood blocks (6).
8.	Soldiers A and B: Remove sling (2) from three lifting eyes (3) on roof of cupola (4).
	END OF TASK



12-4. CUPOLA INSTALLATION PROCEDURE

TOOLS: Hoist (2 ton minimum capacity)
 Sling (NSN 4933-00-480-5662)
 3/4" drive breaker bar
 Cupola adapters A and B (fabricated tool, item 4, App. B)
 3/4" drive torque wrench (0 to 420 foot-pounds)

PERSONNEL: Three

REFERENCES: JPG for procedure to use torque wrench
 TM 9-2350-222-20-2-3 for procedures to:
 Install cupola azimuth gear box
 Install ammunition box
 TM 9-2350-222-10 for procedures to:
 Install M36 periscope
 Install cal .50 machine gun
 Check electrical and mechanical operation of cupola

EQUIPMENT LOCATION INFORMATION:

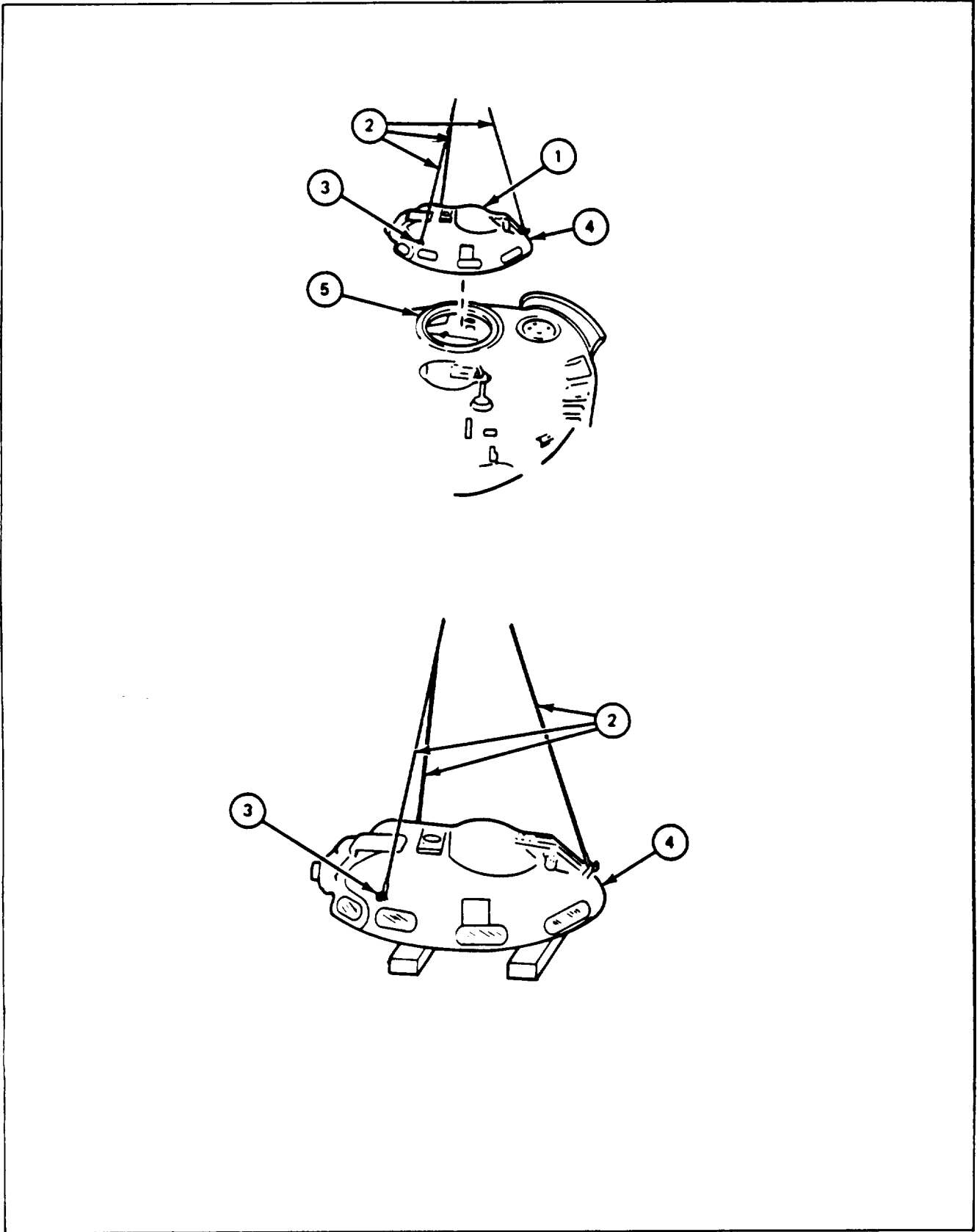
EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11

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

PRELIMINARY PROCEDURES: Install cupola bearing components (para 12-10)

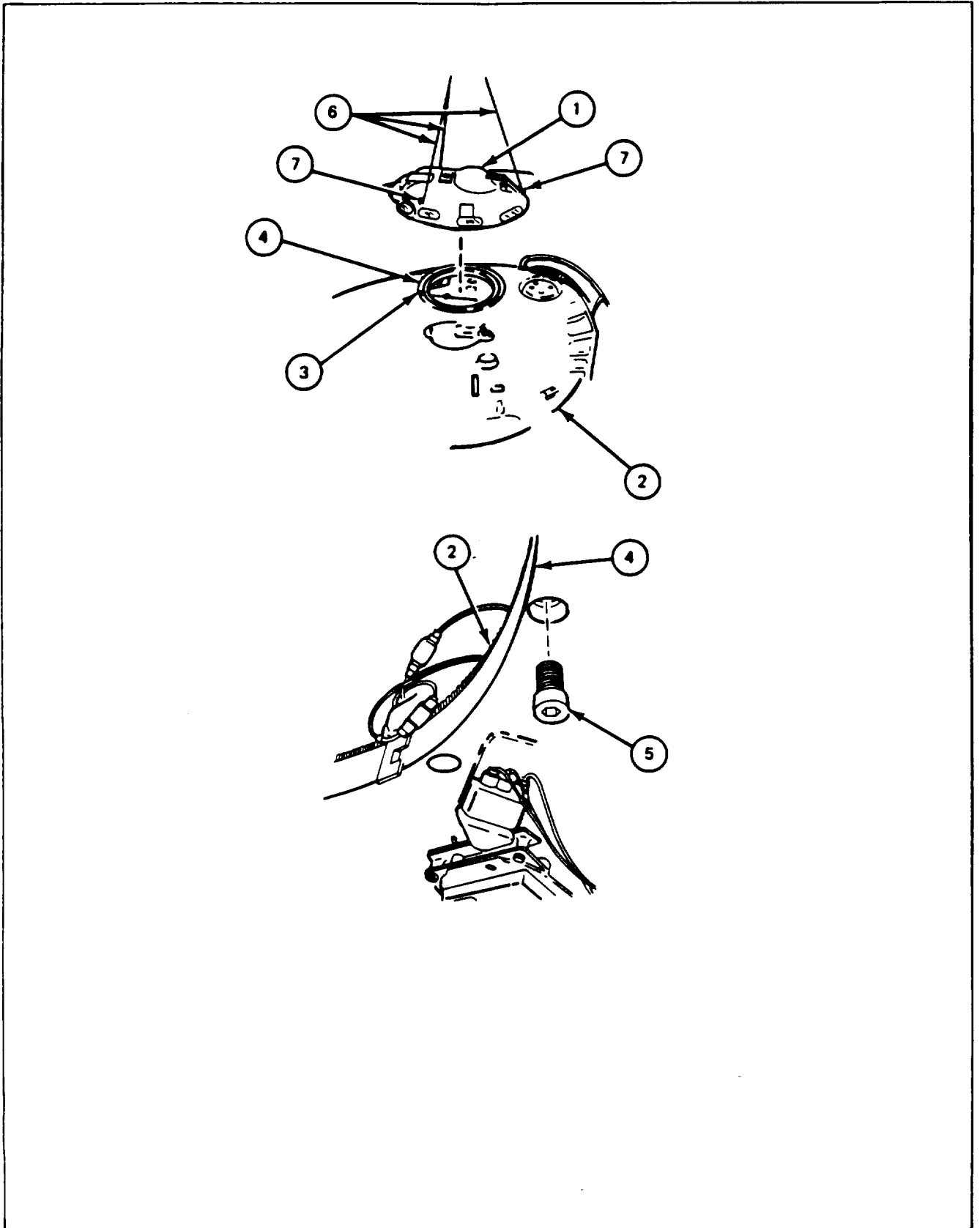
12-4. CUPOLA INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Soldier A: Check that cupola hatch (1) is locked.
2.	Soldier B: Attach sling (2) to three lifting eyes (3) on roof of cupola (4)
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p style="text-align: center;">Cupola weighs one ton. Soldiers must stay clear of cupola when-it is being lifted or moved by hoist, to keep from getting hurt.</p>	
3.	Soldiers A and B: Guide cupola (4) as it is being lifted onto turret roof (5).
4.	Soldier C: Using hoist, lift cupola (4) over turret roof (5), and lower to about 6" above cupola opening in turret roof.
GO TO FRAME 2	



12-4. CUPOLA INSTALLATION PROCEDURE (CONT)

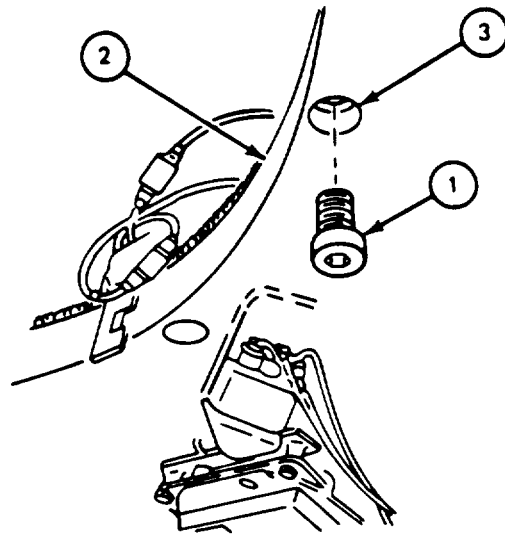
FRAME 2	
Step	Procedure
1.	Soldier A: Get inside turret.
2.	Soldier B: Guide cupola (1) into position from outside cupola.
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p style="text-align: center;">Do not get fingers between cupola and turret roof. They could get hurt.</p>	
3.	Soldier A: Using hands, turn spur gear (2) until locating pin hole is lined up with locating pin (3) on turret roof (4).
4.	Soldier C: Using hoist, slowly lower cupola (1) to within 1/4" of turret roof (4).
5.	Soldier A: Start 12 screws (5) that attach spur gear (2) to turret roof (4).
6.	Soldier C: Using hoist, lower cupola (1) to turret roof (4).
7.	Soldier B: Remove sling (6) from three lifting eyes (7) on roof of cupola (1).
GO TO FRAME 3	



12-4. CUPOLA INSTALLATION PROCEDURE (CONT)

FRAME 3

Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Adapter A is used to tighten two cupola spur gear attaching screws in turret roof over rangefinder.</p> <p style="text-align: center;">Adapter B is used to tighten other 10 cupola spur gear attaching screws.</p> <ol style="list-style-type: none"> 1. Using adapter A and breaker bar, tighten two screws (1) over rangefinder, that attach cupola spur gear (2) to turret roof (3). 2. Using adapter B and breaker bar, tighten other 10 screws (1) that attach cupola spur gear (2) to turret roof (3). 3. Using torque wrench and adapters A and B, torque screws (1) between 270 and 280 foot-pounds (JPG). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Install cupola azimuth gear box (TM-20-2-3). Install wiring harness (10911240) (para 8-17, step 2). Install wiring harness (10873607) (para 8-15, frame 1, steps 1,2, 3, 4, 5 and 10, and frame 2, steps 3 and 6). Install cupola guards (para 9-3, 9-5, 9-7). Install cupola support, plate, and rubber strip (para 9-9). Install ammunition box (TM-20-2-3). Install M36 periscope (TM-10). Install cal .50 machine gun (TM-10). Check electrical and mechanical operation of cupola (TM-10).</p> <p>END OF TASK</p>



Section 3. CUPOLA BEARING COMPONENTS

12-5. MAINTENANCE PROCEDURES INDEX

Equipment Item	Inspection	Test	Tasks Adjustment	Removal	Installation
Cupola Bearing Components	12-6	12-7	12-8	12-9	12-10

12-6. CUPOLA BEARING COMPONENTS INSPECTION PROCEDURE

PERSONNEL: Two

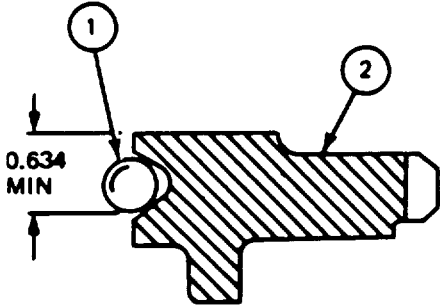
PRELIMINARY PROCEDURES: Remove cupola bearing components (para 12-9)

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>Take bearing balls (1) and spur gear (2) to shop where precision inspection equipment is available.</p> <ol style="list-style-type: none"> a. Check bearing balls for ball with diameter of 0,406 inch, b. Using 0.406 inch bearing ball (1) seated in bearing race, measure from top surface of spur gear (2) to bottom of ball. Measurement must be between 0.636 ±.002 inches. Repeat at several places around spur gear. c. Tag parts that are out of tolerance. <p>After support shop work, return parts to turret shop.</p> <p>END OF TASK</p>



12-7. CUPOLA BEARING COMPONENTS TEST PROCEDURE

TOOLS: Spring scale (0 to 10 pounds capacity)
 Dial indicator with magnetic base holder and connecting rods

SUPPLIES: Screw 9406897 (spur gear to turret roof attach screw)
 String (about 3 feet)

PERSONNEL: Two

REFERENCES: JPG for procedure to use spring scale

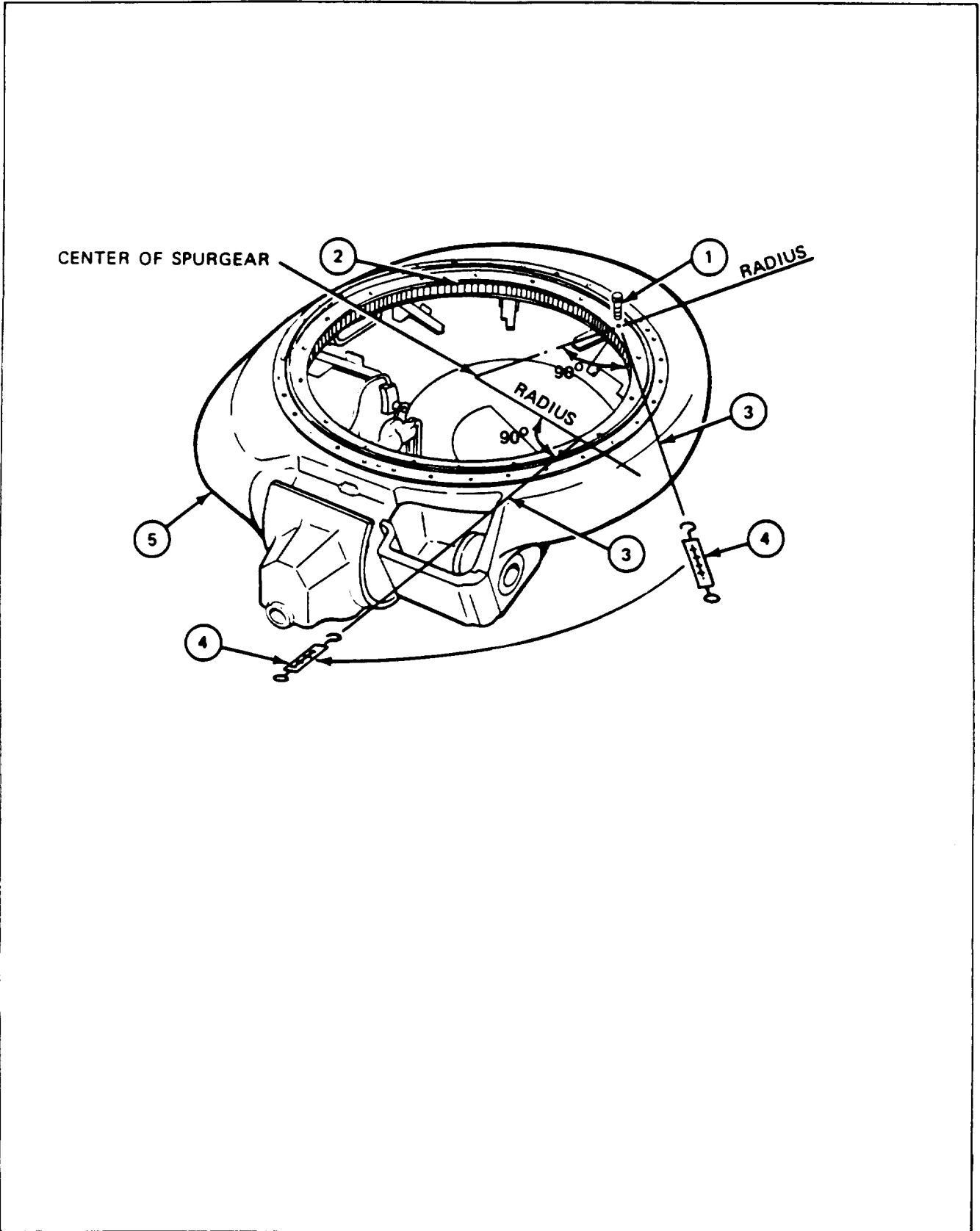
PRELIMINARY PROCEDURES: Remove cupola (para 12-3)
 Set cupola upside down on wood blocks (para 12-9, frames 1 and 2)

GENERAL INSTRUCTIONS:

NOTE

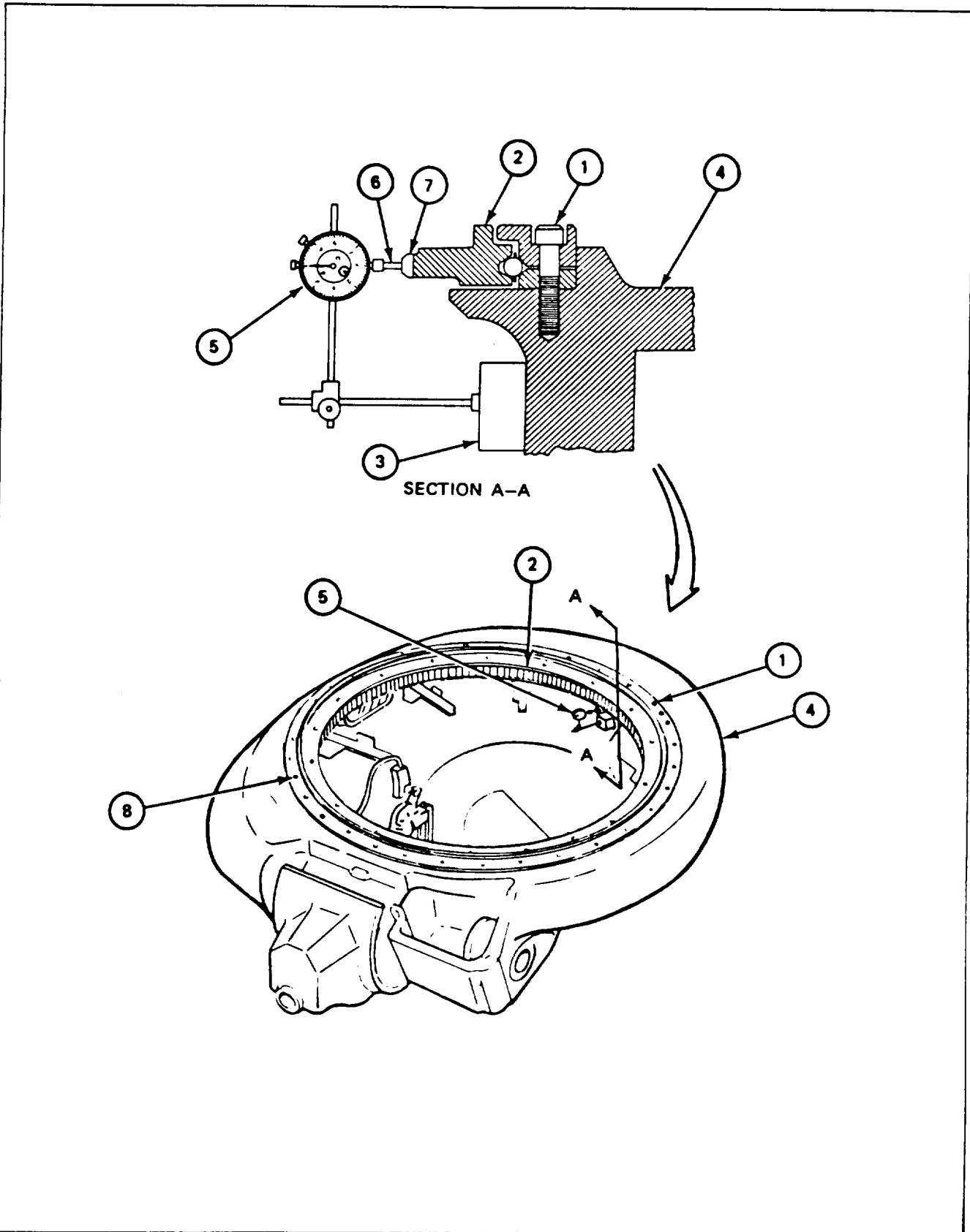
A support shop work team with precision measuring tools is required for this procedure.

FRAME 1	
Step	Procedure
1.	Soldier A: Put attach screw (1) in spur gear (2).
2.	Soldier A: Tie one end of string (3) to screw (1).
3.	Soldier A: Tie other end of string (3) to spring scale (4),
	NOTE
	Soldier A: Watch spring scale (4) indications while Soldier B pulls on spring scale. After start of movement of spur gear (2), spring cable should show less than 3-3/4 pounds. Pull at any place during one complete turn of spur gear (2). Mark any places where high spring scale indications are found. There should be no noises other than normal bearing noise and spur gear should move smoothly.
4.	Soldier B: With spring scale (4) kept at an angle of 90 degrees of radius of spur gear (2). pull evenly, and walk around cupola (5) until spur gear has completed full turn (JPG).
5.	Soldiers A and B: Remove screw (1), string (3) and spring scale (4).
	NOTE
	If bad indications are found, tag cupola for repair, and continue test.
	GO TO FRAME 2



12-7. CUPOLA BEARING COMPONENTS TEST PROCEDURE (CONT)

FRAME 2	
Step	Procedure
	<p>SUPPORT SHOP WORK</p> <p>NOTE</p> <p>This part of test requires support shop work team with precision measuring tools.</p>
1.	Soldier A: Using hands on screw (1), pull spur gear (2) to outside and hold during steps 2 through 4.
2.	Soldier B: Attach magnetic base holder (3) to cupola (4) even with screw (1).
3.	Soldier B: Using rods, universal rod connector and dial indicator (5), put indicator contact point (6) in contact with spur gear tooth (7).
4.	Soldier B: Set dial indicator (5) to 0.
5.	Soldier A: Release spur gear (2).
6.	Soldier A: Go to other side of cupola (4).
7.	Soldier A: Using hands on opposite screw (1), pull spur gear (2) to outside and hold.
8.	Soldier B: Read indication of dial indicator (5). Indication should be no greater than 0.003". If indication is greater than 0.003", mark race ring at screw (1) for adjustment
9.	Repeat steps 1 through 8 at every 5th screw (1) around cupola (4).
	<p>NOTE</p> <p>if bad indications are found, tag cupola for adjustment (para 12-8).</p>
	END OF TASK



12-8. CUPOLA BEARING COMPONENTS ADJUSTMENT PROCEDURE

TOOLS: 5/16" hex head socket (3/8" drive)
3/8" drive ratchet
3/8" drive torque wrench (0 to 600 pounds)

SUPPLIES: Used self locking screws (from lower race ring removal for jackscrews)

PERSONNEL: Two

REFERENCES: JPG for procedure to use torque wrench

PRELIMINARY PROCEDURES: Remove cupola (para 12-3)
Set cupola upside down on "blocks (para 12-9, frames 1 and 2)
Test cupola bearing components (para 12-7)

GENERAL INSTRUCTIONS:

NOTE

During testing (para 12-7), areas were marked showing tightness or looseness of the spur gear.

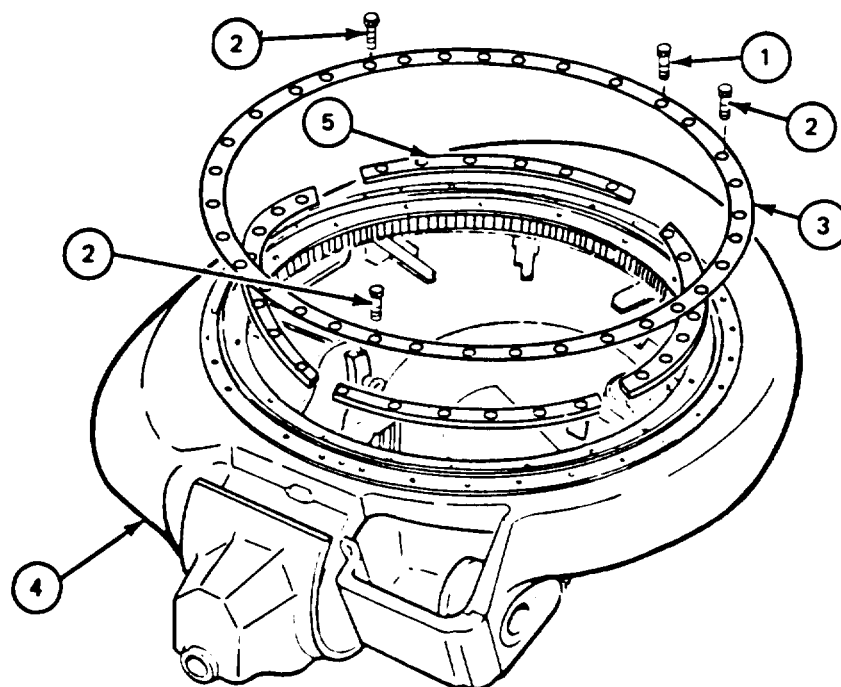
Shims are made in thicknesses of 0.002", 0.005", and 0.010". Combinations of these shims are used as required.

If spur gear is too tight (para 12-7, frame 1) shims must be added or changed to next thickness combination.

If spur gear is too loose (para 12-7, frame 2), shims must be changed to next thinnest combination or removed. If no shims are left to be removed and spur gear is still too loose, try removing shim about 15 screw holes away. If this does not tighten spur gear, remove ring races and spur gear (para 12-9) and check them for wear. Replace all worn parts.

12-8. CUPOLA BEARING COMPONENTS ADJUSTMENT (CONT)

FRAME 1	
Step	Procedure
1.	<p>Soldier A: Using hex head socket, remove thirty lower race ring screws (1).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Tighten three jack screws evenly so lower race ring does not bind in cupola. Use three screws (1) for three jack screws (2).</p>
2.	Soldier A: Using hex head socket, put three jackscrews (2) in three threaded holes of lower race ring (3). Tighten jackscrews enough so fingers can get under inner lip of lower race ring.
3.	Soldiers A and B: Lift lower race ring (3) from cupola (4).
4.	Soldier A: Remove or add shims (5) as required (see notes in general instructions).
5.	Install lower race ring (para 12-10, frame 4, and frame 5 steps 1 through 3 only).
6.	Do cupola bearing components test (para 12-7).
	END OF TASK



12-9. CUPOLA BEARING COMPONENTS REMOVAL PROCEDURE

TOOLS: Hoist (2 ton capacity minimum)
 Sling (NSN 4933-00-480-5662)
 5/16" hex head socket (3/8" drive)
 3/8" drive ratchet
 Metal scribe
 Scraper
 Stiff bristled brush
 Fine stone

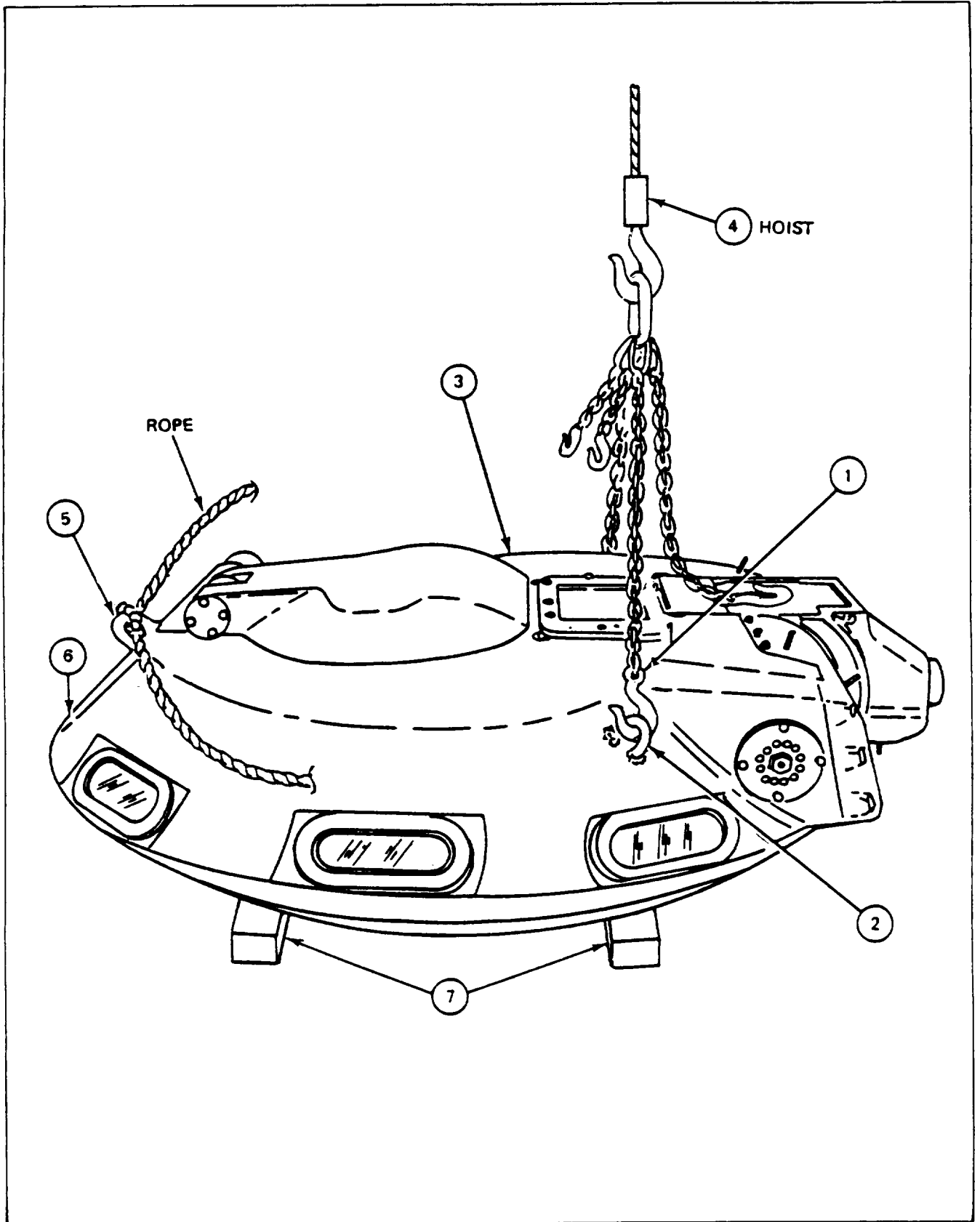
SUPPLIES: Masking tape, 1" wide (item 36, App. A)
 Wood block (6" X 6" X 36")
 Rags (item 21, App. A)
 Pencil
 Dry cleaning solvent (item 33, App. A)
 Crocus cloth (item 7, App. A)
 Rope (1/2" X 24" long)

PERSONNEL: Three

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

PRELIMINARY PROCEDURES: Remove cupola (para 12-3)
 Test cupola bearing components (para 12-7)

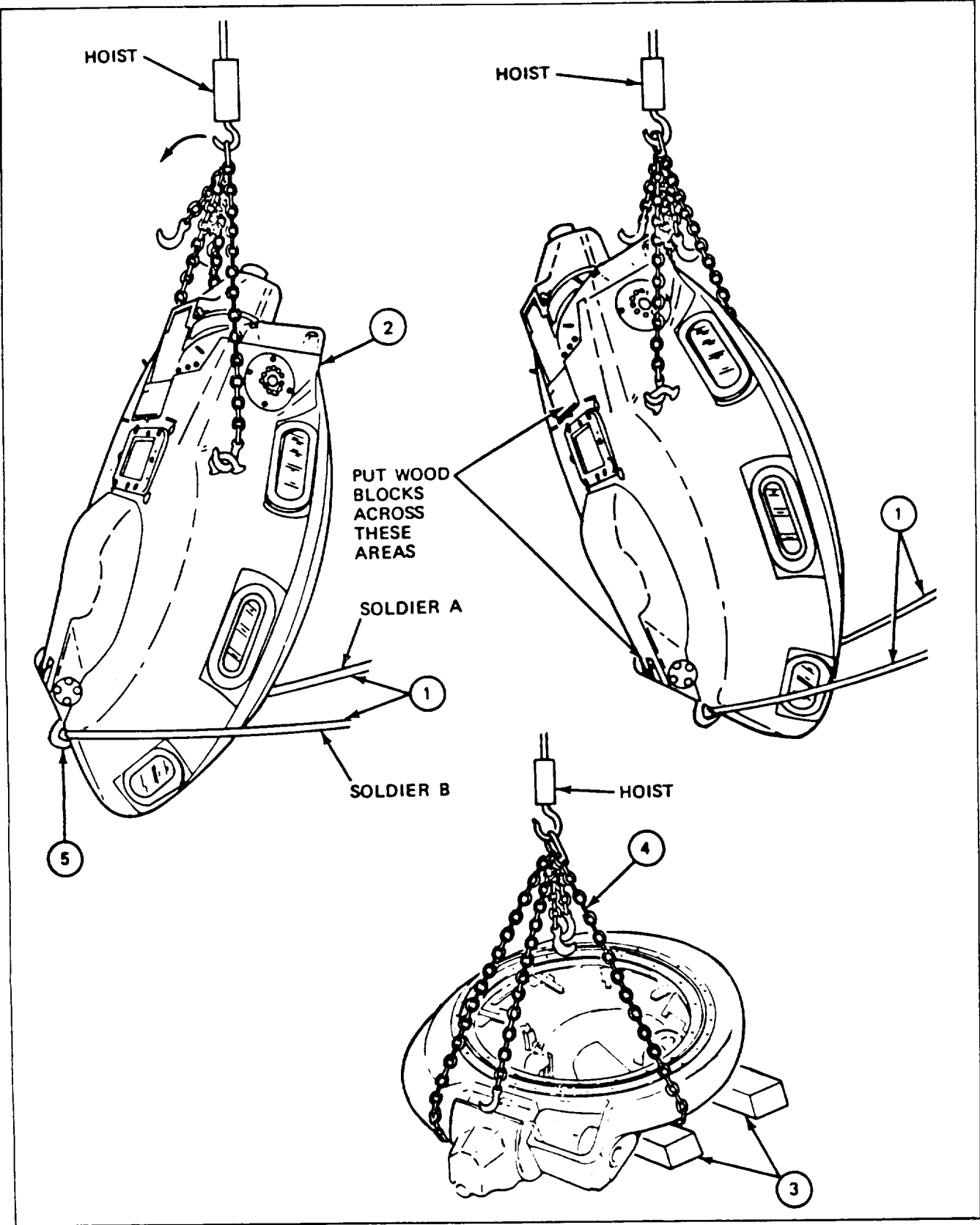
FRAME 1	
Step	Procedure
1.	Soldier A: Attach two legs of sling (1) to two front lifting eyes (2) on roof of cupola (3) and hoist (4).
2.	Soldier B: Tie rope (at center of rope) to lifting eye (5).
	<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p style="text-align: center;">Cupola (3) weighs one ton. Soldiers must stay clear of cupola when it is being lifted or moved by hoist to keep from getting hurt.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Soldier C should operate hoist. Soldiers A and B should guide cupola and help when needed.</p>
3.	Soldier C: Using hoist, lift cupola (3) until back edge (6) of cupola (3) is touching floor.
4.	Soldiers A and B: Remove two wood blocks (7) from under cupola (3)
	GO TO FRAME 2



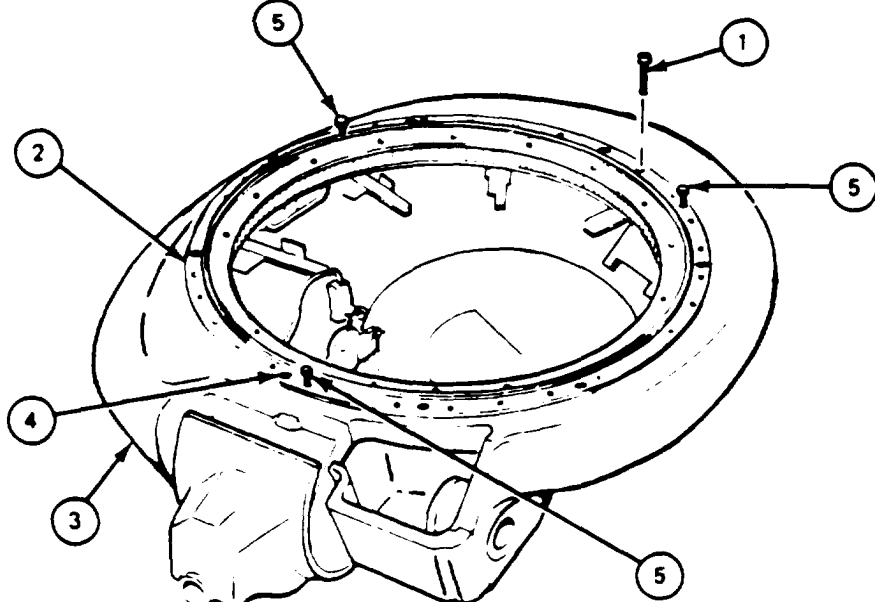
12-9. CUPOLA BEARING COMPONENTS REMOVAL PROCEDURE (CONT)

FRAME 2

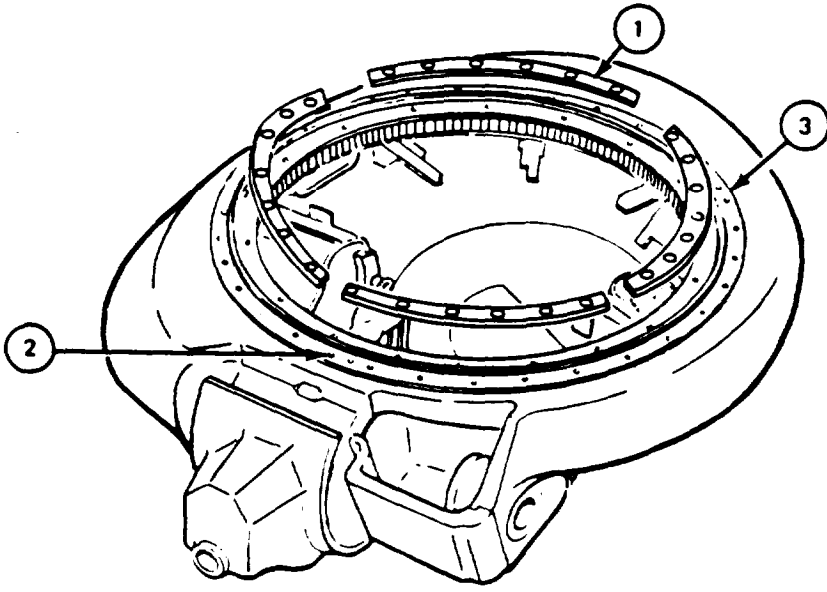
Step	Procedure
1.	Soldiers A and B: Pull on rope (1) while Soldier C lowers hoist.
2.	Soldier C: Start lowering cupola (2) in direction of arrow toward ground with top of cupola (2) down.
3.	Soldiers A and B: Position two wood blocks (3) under cupola (2) in areas shown.
4.	Soldier C: Using hoist, lower cupola (2) on wood blocks (3).
5.	Soldiers A and B: Remove sling (4) from cupola (2).
6.	Soldier A: Remove rope (1) from lifting eye (5).
	GO TO FRAME 3



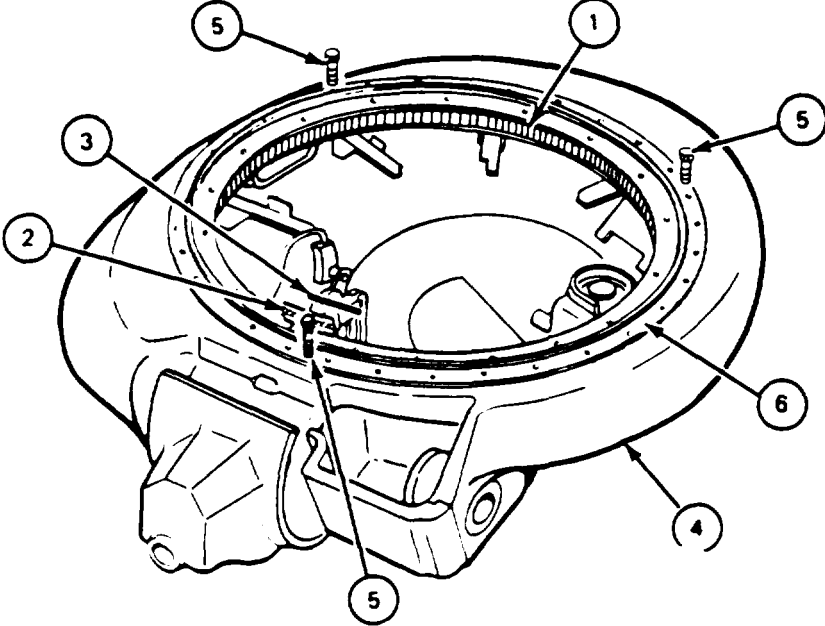
12-9. CUPOLA BEARING COMPONENTS REMOVAL PROCEDURE (CONT)

FRAME 3	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Save six screws (1) removed in step 1 for use as jacking screws for removal of lower and upper race rings.</p> <ol style="list-style-type: none"> 1. Soldier A: Using hex head socket, remove 30 self-locking screws (1) that attach lower race ring (2) to cupola (3). Throw self-locking screws away. 2. Soldier B: Using metal scribe, mark forward centerline screw hole (4) of lower race ring (2) to cupola (3). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Tighten three jackscrews evenly so lower race ring does not bind in cupola (3).</p> <ol style="list-style-type: none"> 3. Soldier A: Using hex head socket, put three jackscrews (5) in three threaded holes of lower race ring (2). Tighten jackscrews enough so fingers can get under inner lip of lower race ring. 4. Soldiers A and B: Lift lower race ring (2) from cupola (3). 5. Soldier C: Using hex head socket, remove three jacking screws (5) from lower race ring (2). <p>GO TO FRAME 4</p>
	

12-9. CUPOLA BEARING COMPONENTS REMOVAL PROCEDURE (CONT)

FRAME 4	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Screw holes are counted clockwise, starting with cupola front centerline screw hole.</p> <ol style="list-style-type: none"> 1. Using pencil and paper, write screw hole location and number of shims in shim set (1) to help during assembly. 2. Carefully remove and tape together shim sets (1). 3. Using pencil, mark location of each shim set (1) on tape. 4. Using metal scribe, mark front centerline screw hole (2) of upper race ring (3). <p>GO TO FRAME 5</p>
	

12-9. CUPOLA BEARING COMPONENTS REMOVAL PROCEDURE (CONT)

FRAME 5	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Soldiers A and B: Slightly raise spur gear (1) until step 1 is completed.</p> <ol style="list-style-type: none"> 1. Soldier C: Remove bearing retainer (2) and bearings (3). 2. Soldiers A and B: Remove spur gear (1) from cupola (4). 3. Soldier A: Using hex head socket, put three jackscrews (5) in three threaded holes of upper race ring (6). Tighten jackscrews enough so fingers can get under race ring. 4. Soldiers B and C: Lift upper race ring (6) from cupola (4). 5. Soldier A: Using hex head socket, remove three jackscrews (5) from upper race ring. <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required: Clean all parts (JPC). Inspect and repair all parts (JFG). Do detail inspection of parts (para 12-6).</p> <p>END OF TASK</p>
	

12-10. CUPOLA BEARING COMPONENTS INSTALLATION PROCEDURE

TOOLS: Hoist (2 ton capacity minimum)
Sling (NSN 4933-00-480-5662)
5/16" hex head socket (3/8" drive)
3/8" drive ratchet
Metal scribe
3/8" drive torque wrench (0 to 600 inch-pounds)

SUPPLIES: Used self-locking screws (from cupola bearing components removal) (six)
Self-locking screw, 8728157 (thirty)
Shims, 10873683, 10883926, or 10883925 (as required)
Grease (item 12, App. A)
Rags (item 21, App. A)
Wood block, 6" X 6" X 36" (two)

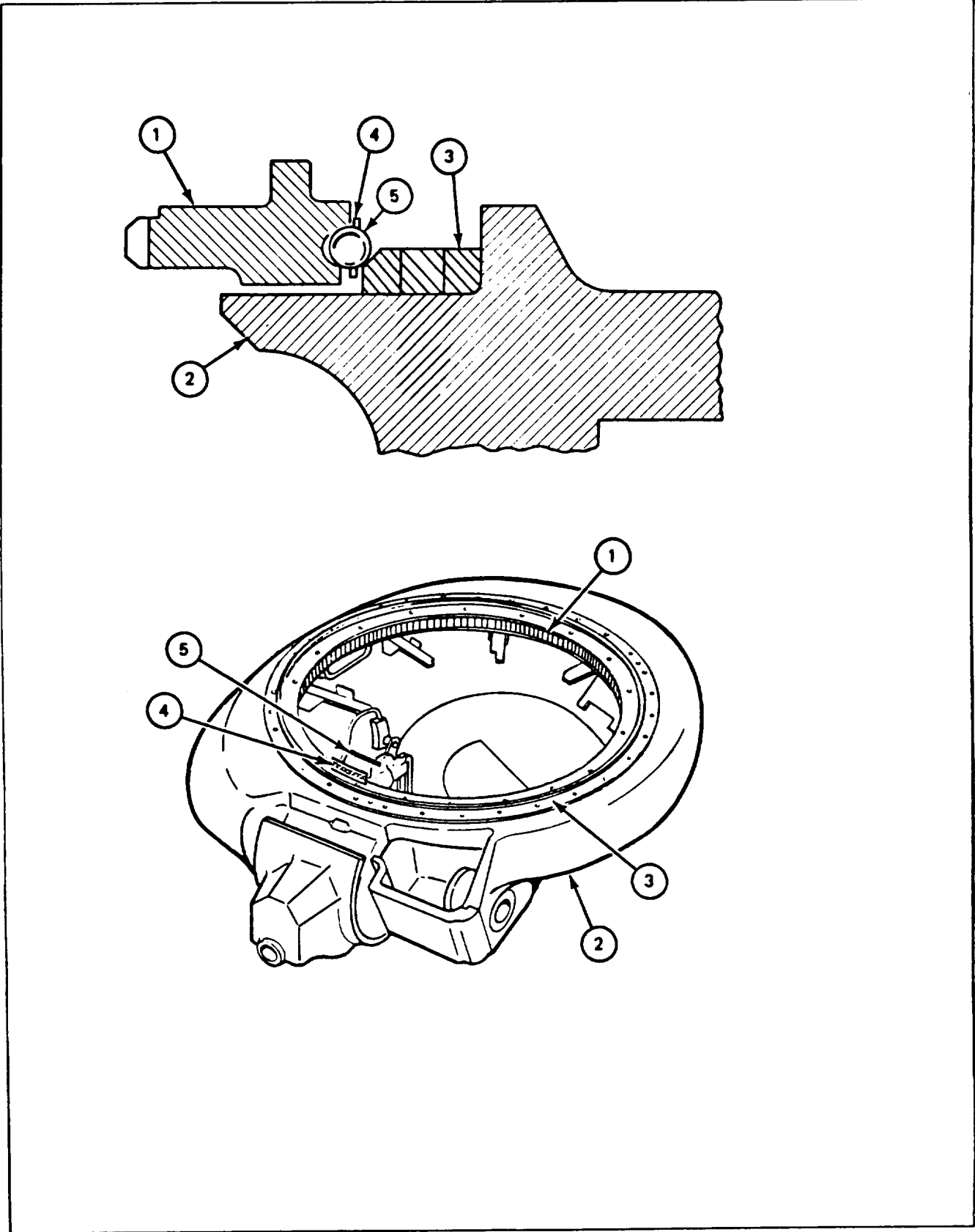
PERSONNEL: Three

REFERENCES: JPG for procedure to use torque wrench
LO 9-2350-222-12 for procedure to lubricate spur gear teeth

PRELIMINARY PROCEDURES: Inspect cupola bearing components (para 12-6)

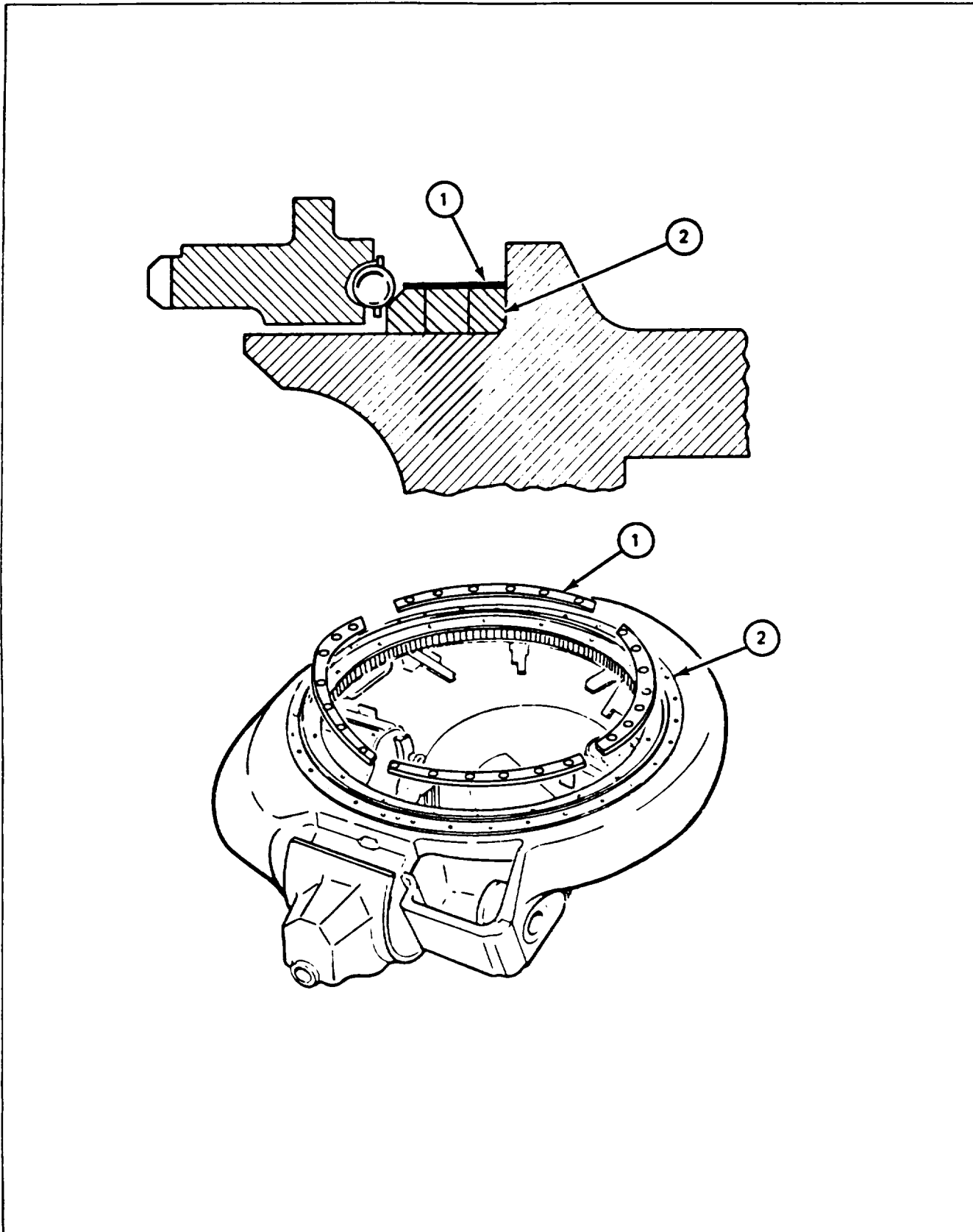
12-10. CUPOLA BEARING COMPONENTS INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	<p>Soldier A: Check that upper race ring (1) is lying with large bevel up.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Jackscrews (2) are used to help hold upper race ring (1) when putting it on cupola (3).</p>
2.	<p>Soldier A: Using hex head socket. put three jackscrews (2) in three threaded holes of upper race ring (1).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Be sure that marked forward centerline screw hole of upper race ring is lined up with forward centerline screw hole of cupola.</p>
3.	<p>Soldiers B and C: Put upper race ring (1) on cupola (3).</p>
4.	<p>Soldier A: Using another jackscrew (2), start jackscrew in any attach screw hole to insure alignment between race ring (1) and cupola (3).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Screw jackscrews out evenly so upper race ring does not bind in cupola.</p>
5.	<p>Soldier A: Using hex head socket, screw three jackscrews (2) out of upper race ring.</p>
6.	<p>Soldier A: Remove fourth jackscrew (2).</p> <p>GO TO FRAME 2</p>



12-10. CUPOLA BEARING COMPONENTS INSTALLATION PROCEDURE (CONT)

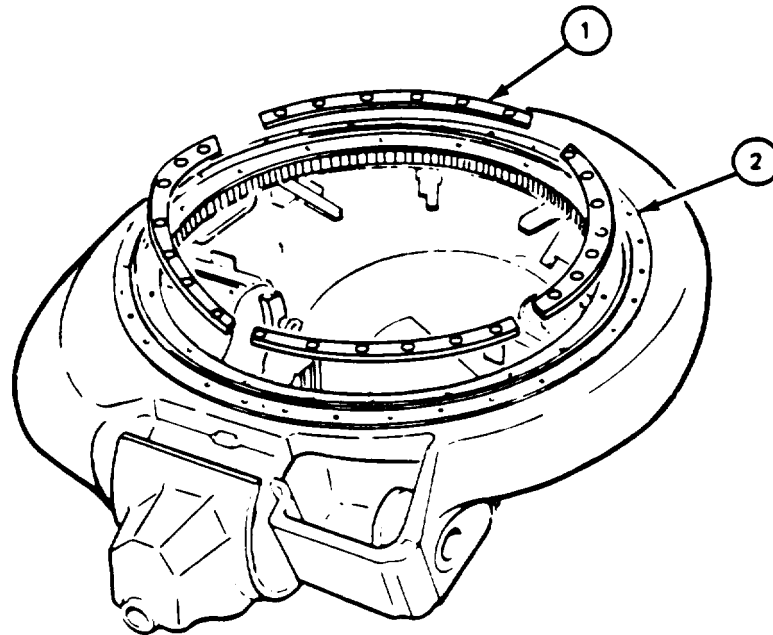
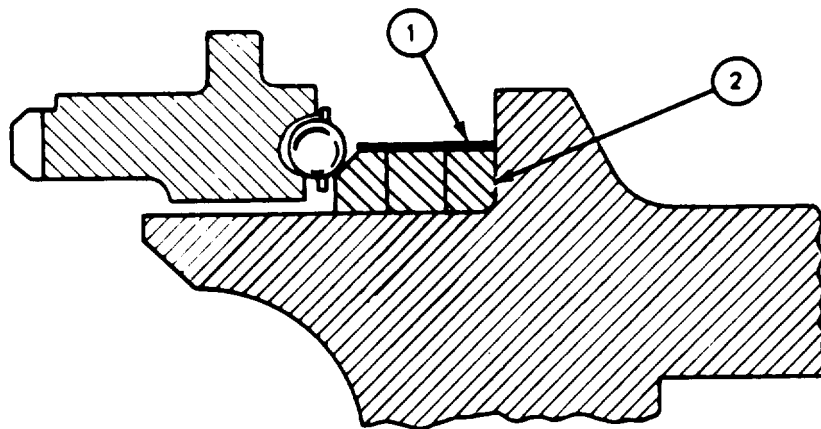
FRAME 2	
Step	Procedure
	<p>NOTE</p> <p>Spur gear is put in cupola with flat side down.</p>
1.	<p>Soldiers B and C: Put spur gear (1) on cupola (2) inside upper race ring (3).</p>
	<p>NOTE</p> <p>While bearing balls are being put in retainer, spur gear (1) must be held up slightly to let retainer (4) and bearing balls (5) go between spur gear and upper race ring.</p>
2.	<p>Soldiers B and C: Slightly lift spur gear (1).</p>
3.	<p>Soldier A: Starting at one end of retainer (4), put one bearing ball (5) in retainer (4) and slide retainer between spur gear (1) and upper race ring (3). Keep doing this until all 234 bearing balls (5) are put in retainer and retainer is put into place.</p>
4.	<p>Soldiers B and C: Lower spur gear (1).</p>
5.	<p>Soldier A: Check that all bearing balls (5) and retainer (4) are seated between spur gear (1) and upper race ring (3).</p>
	<p>GO TO FRAME 3</p>



12-10. CUPOLA BEARING COMPONENTS INSTALLATION PROCEDURE (CONT)

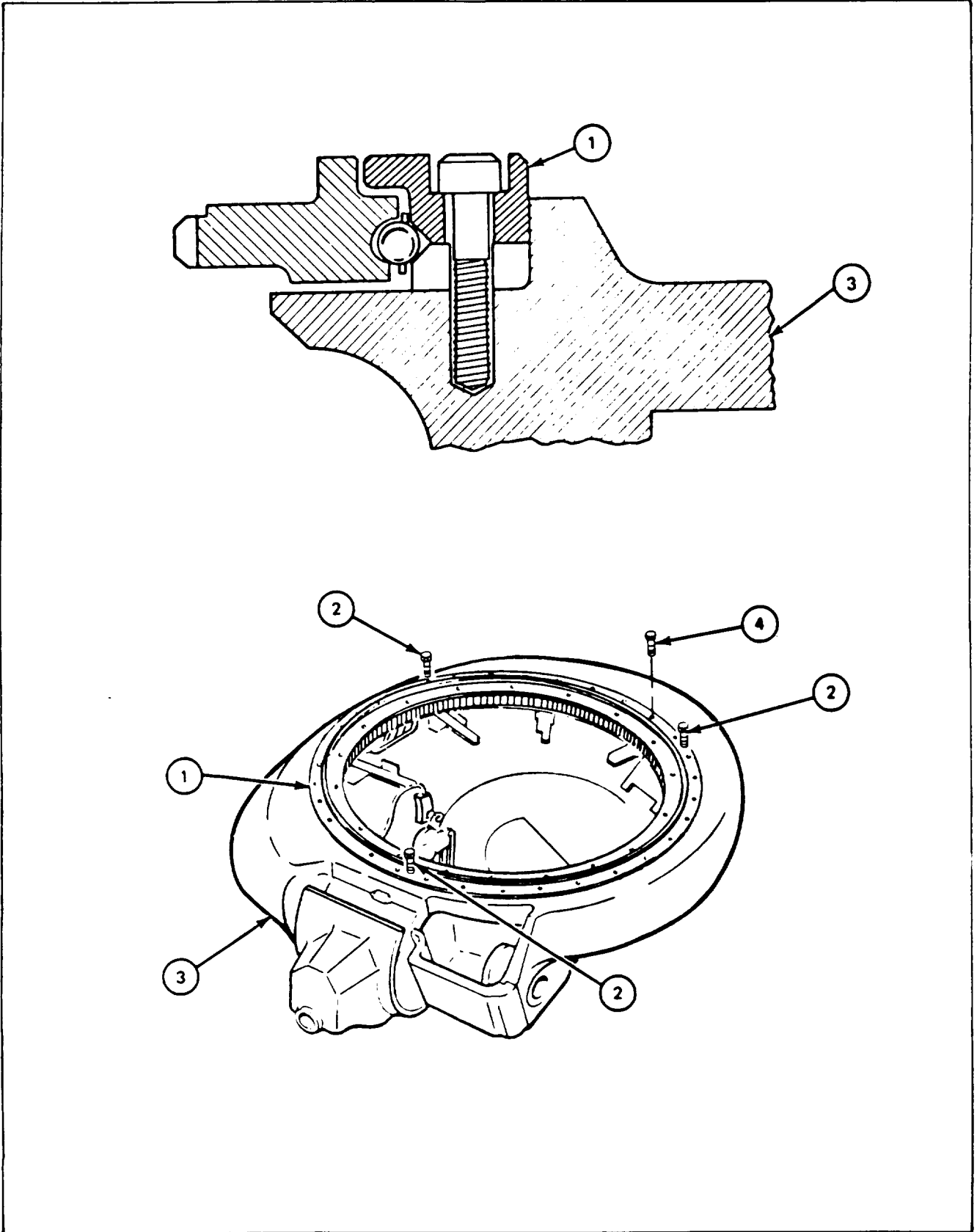
FRAME 3

Step	Procedure
1.	Using notes made during removal, put shim sets (1) in place where they were removed.
2.	Carefully remove tape from shim sets (1) and line up with screw holes on upper race ring (2). GO TO FRAME 4



12-10. CUPOLA BEARING COMPONENTS INSTALLATION PROCEDURE (CONT)

FRAME 4	
Step	Procedure
1.	<p>Soldier A: Check that lower race ring (1) is lying with beating bevel down and inner lip up.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Jackscrews (2) are used to help hold lower race ring (1) when installing it on cupola (3).</p>
2.	<p>Soldier A: Using hex head socket, put three jackscrews (2) in three threaded holes of lower race ring (1).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Be sure that marked forward centerline screw hole of lower race <i>ring</i> is lined up with forward centerline screw hole of cupola.</p> <p style="text-align: center;">Do not move shim sets when putting lower race ring in cupola.</p>
3.	Soldiers C and D: Put lower race ring (1) on cupola (3).
4.	Soldier A: Using another jackscrew (4), start screw in any attach screw hole.
5.	Soldier B: Using hex head socket, screw three jackscrews (2) out of lower race ring. Remove jackscrews.
	GO TO FRAME 5



12-10. CUPOLA BEARING COMPONENTS INSTALLATION PROCEDURE (CONT)

FRAME 5

Step

Procedure

NOTE

Attaching screws are to be spaced evenly.

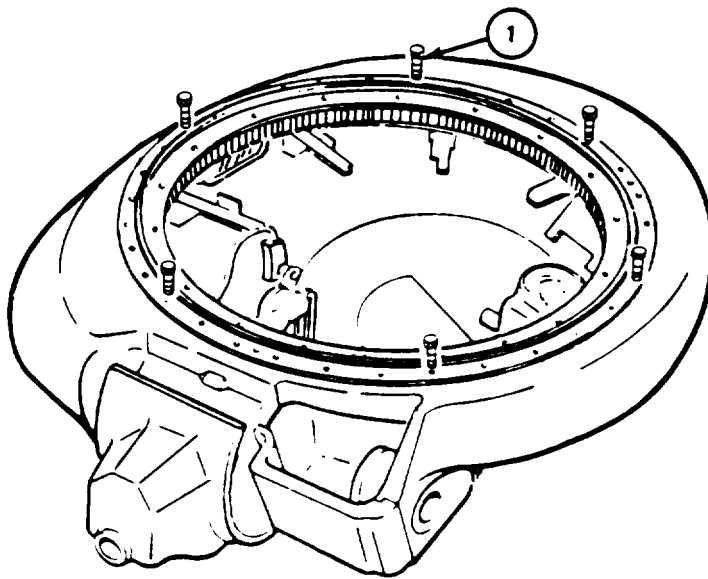
1. Put five more jackscrews (1) in attach screw holes, spacing them in every fifth screw hole, starting with jackscrew already put in.
2. Using hex head socket, tighten six jackscrews (1).
3. Using torque wrench, torque six jackscrews (1) between 33 and 35 foot-pounds (JPG).
4. Do cupola bearing components test (para 12-7).

NOTE

If cupola bearing components test is good, go to frame 6. If cupola bearing components test is bad, do step 5.

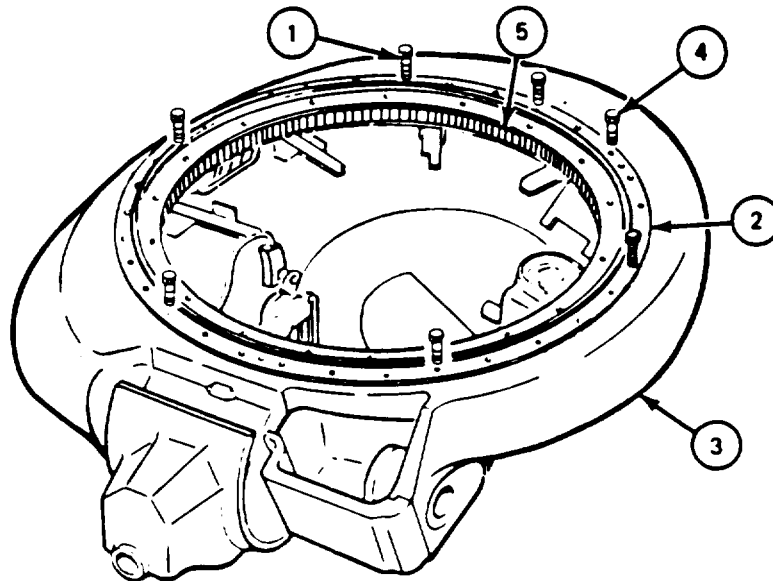
5. Do cupola bearing components adjustment (para 12-8).
6. Repeat steps 4 and 5 as necessary.

GO TO FRAME 6



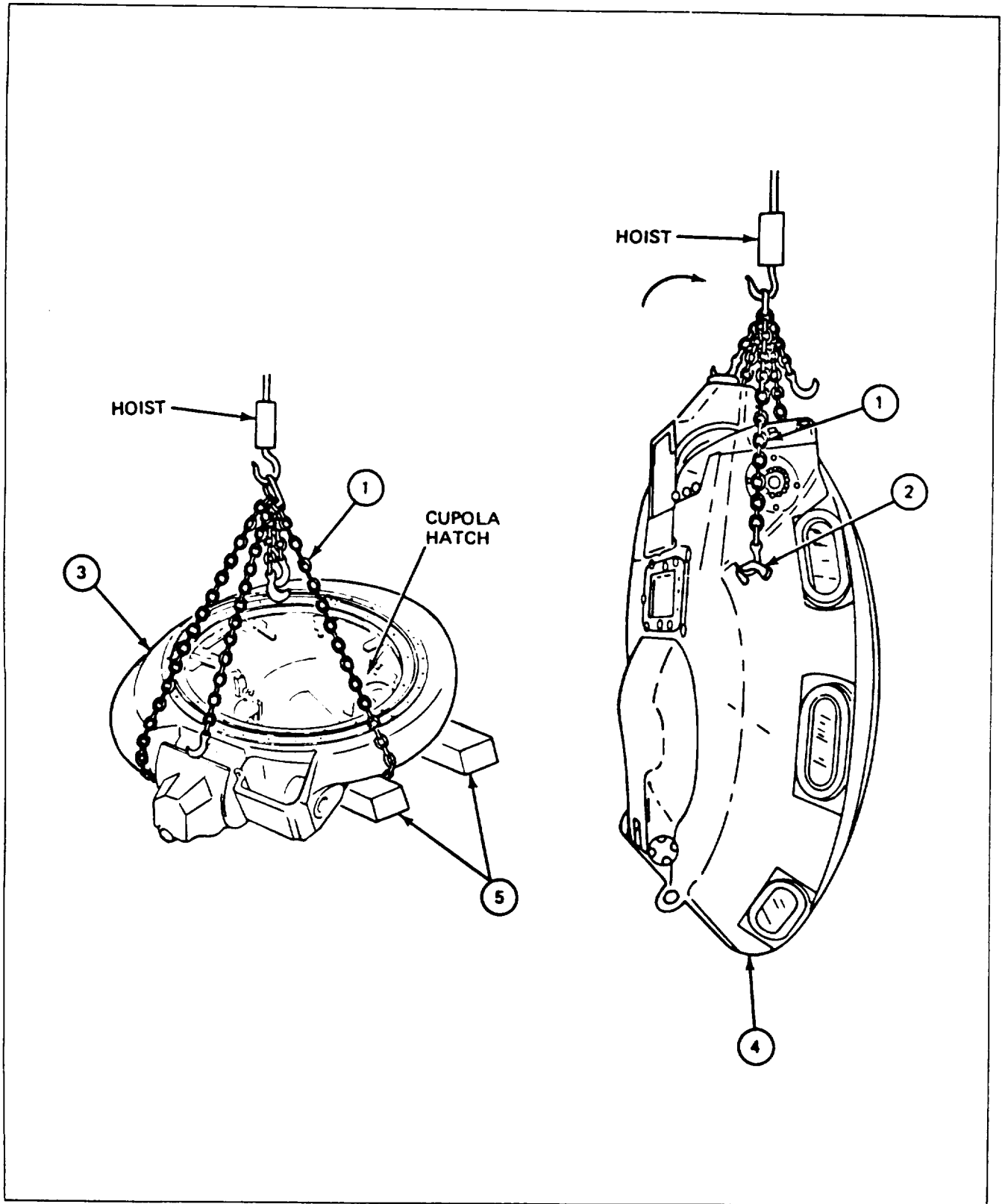
12-10. CUPOLA BEARING COMPONENTS INSTALLATION PROCEDURE (CONT)**FRAME 6**

Step	Procedure
1.	Using hex head socket, remove six jackscrews (1) that attach lower race ring (2) to cupola (3).
2.	Using hex head socket, attach lower race ring (2) to cupola (3) with 30 new self-locking screws (4).
3.	Using torque wrench, torque self locking screws (4) between 33 and 35 foot-pounds (JPG).
4.	Grease teeth of spur gear (5) (LO), GO TO FRAME 7



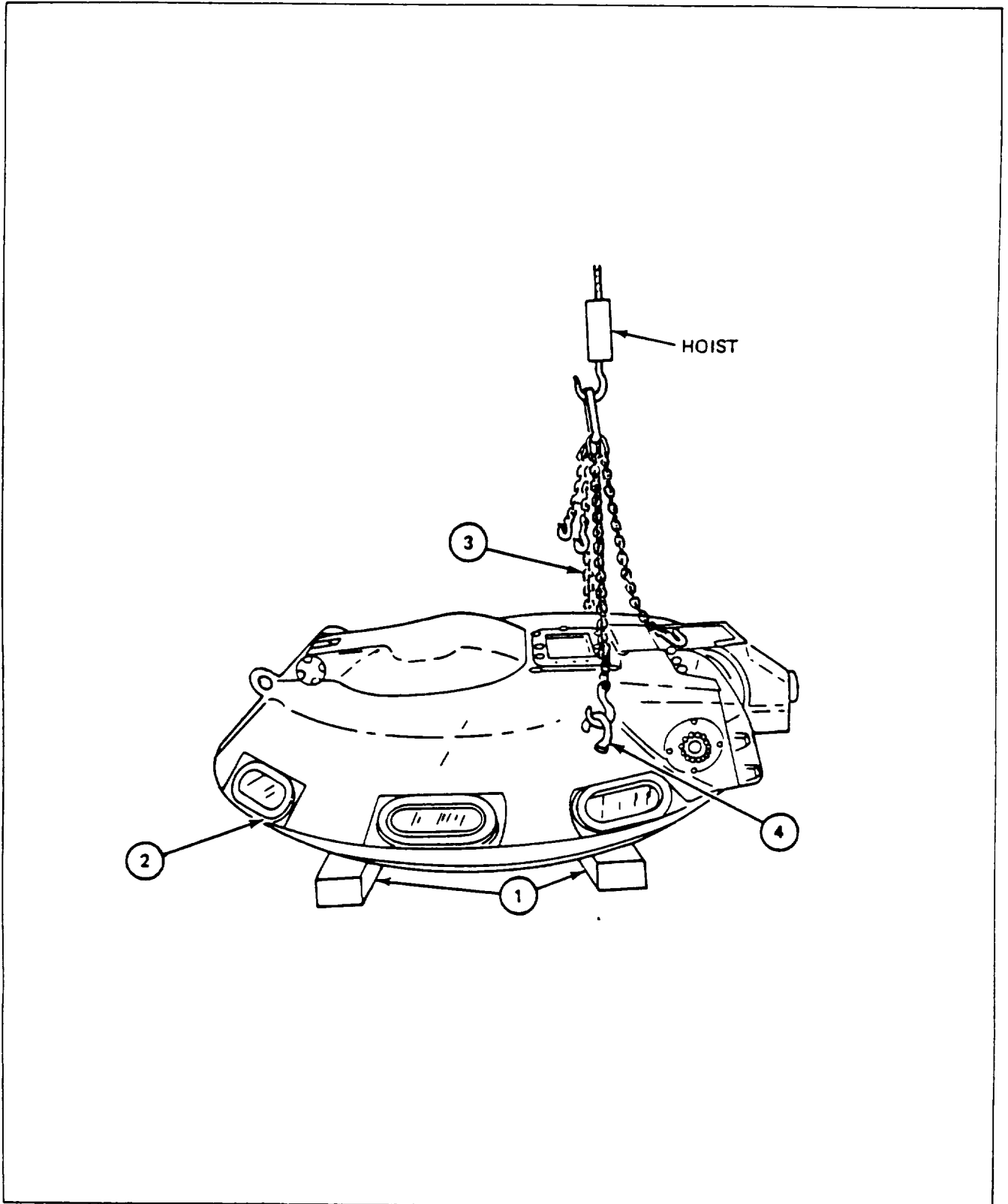
12-10. CUPOLA BEARING COMPONENTS INSTALLATION PROCEDURE (CONT)

FRAME 7	
Step	Procedure
1.	Soldier A: Attach two legs of sling (1) on two front lifting eyes (2) on roof of cupola (3) and hoist.
2.	Soldier B: Check that cupola hatch is locked.
<div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">WARNING</div> <p style="text-align: center;">Cupola (3) weighs one ton. Soldiers must stay clear of cupola when it is being lifted or moved by hoist, to keep from getting hurt.</p>	
3.	Soldier C: Using hoist, lift cupola (3) until edge (4) is touching floor.
4.	Soldiers A and B: Remove two wood blocks (5) from under cupola (3).
GO TO FRAME 8	



12-10. CUPOLA BEARING COMPONENTS INSTALLATION PROCEDURE (CONT)

FRAME 8	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 	<p>Soldiers A and B: Position wood blocks (1) under cupola (2).</p> <p>Soldier C: Using hoist, lower cupola (2) on wood blocks (1).</p> <p>Soldiers A and B: Remove sling (3) from two front lifting eyes (4).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required: Install cupola (para 12-4).</p> <p>END OF TASK</p>



Section 4. CUPOLA AZIMUTH GEAR BOX

12-11. MAINTENANCE PROCEDURES INDEX

Equipment Item	Adjustment	Test	Tasks Disassembly	Assembly	Repair
Cupola Azimuth Gear Box	12-12	12-13	12-14	12-15	12-16

12-12. CUPOLA AZIMUTH GEAR BOX ADJUSTMENT PROCEDURE

TOOLS: Vise
 5/64" socket head screw key (Allen wrench)
 1/8" flat tip screwdriver (two)

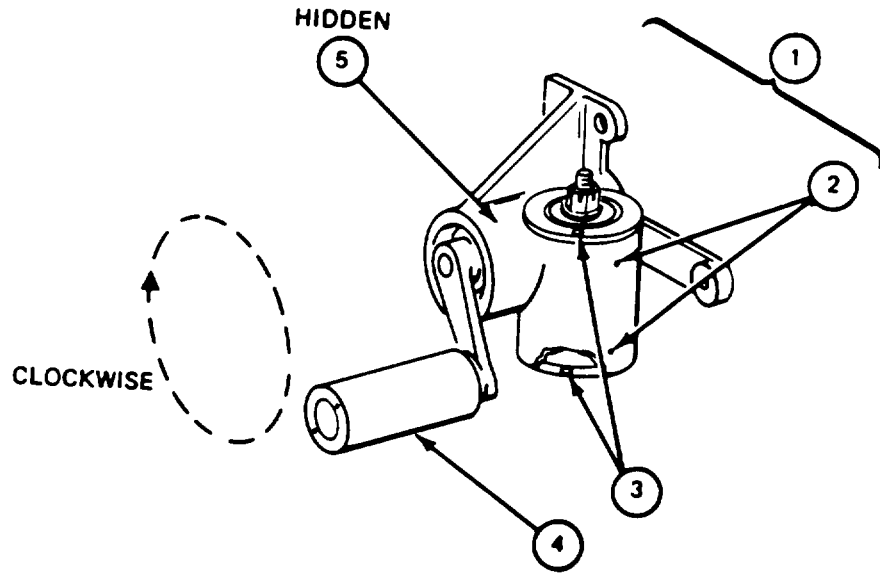
PERSONNEL: Two

REFERENCES: TM 9-2350-222-20-2-3 for procedure to remove cupola azimuth gear box

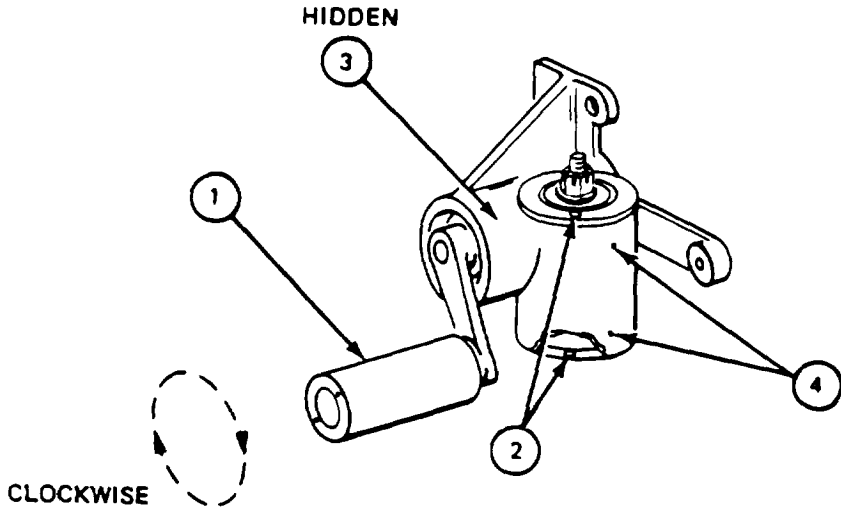
EQUIPMENT CONDITION: Cupola azimuth gear box removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Assemble cupola azimuth gear box (para 12-15)

FRAME 1	
Step	Procedure
1.	Put cupola azimuth gear box (1) in vise.
2.	Using Allen wrench, loosen two setscrews (2).
	NOTE
	If slots in upper and lower bearing retainer rings (3) are more than five degrees out of line with each other, do step 3, otherwise do step 4.
3.	Using screwdriver, line up slots in upper and lower bearing retainer rings (3).
	NOTE
	Soldier A and soldier B must start and finish step 4 at the same time.
4.	Soldier A: Turn crank (4) slowly clockwise until it binds. Soldier B: Using screwdrivers, turn slots in upper and lower bearing retainer rings (3) towards worm gear (5).
	GO TO FRAME 2

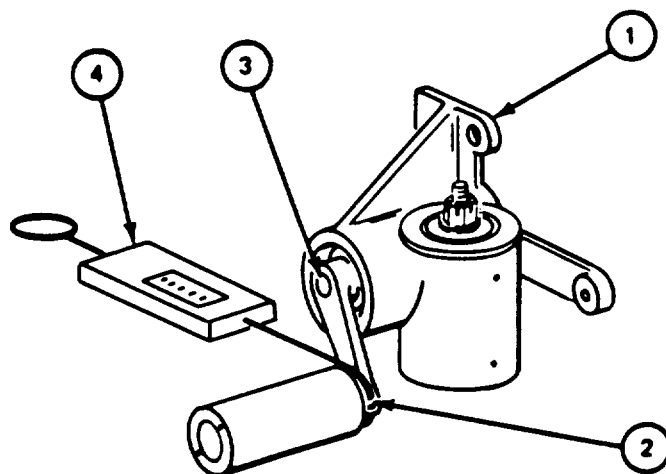


12-12. CUPOLA AZIMUTH GEAR BOX ADJUSTMENT PROCEDURE (CONT)

FRAME 2	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Soldier A and soldier B must start and finish step 1 at the same time.</p> <p>1. Soldier A: Turn crank (1) clockwise. Soldier B: Using screwdrivers, turn slots in upper and lower bearing retainer rings (2) away from worm gear (3) until crank (1) turns free.</p> <p>2. Using Allen wrench, tighten two setscrews (4).</p> <p>GO TO FRAME 3</p>
	 <p style="text-align: center;">HIDDEN</p> <p style="text-align: center;">CLOCKWISE</p>

12-12. CUPOLA AZIMUTH GEAR BOX ADJUSTMENT PROCEDURE (CONT)**FRAME 3**

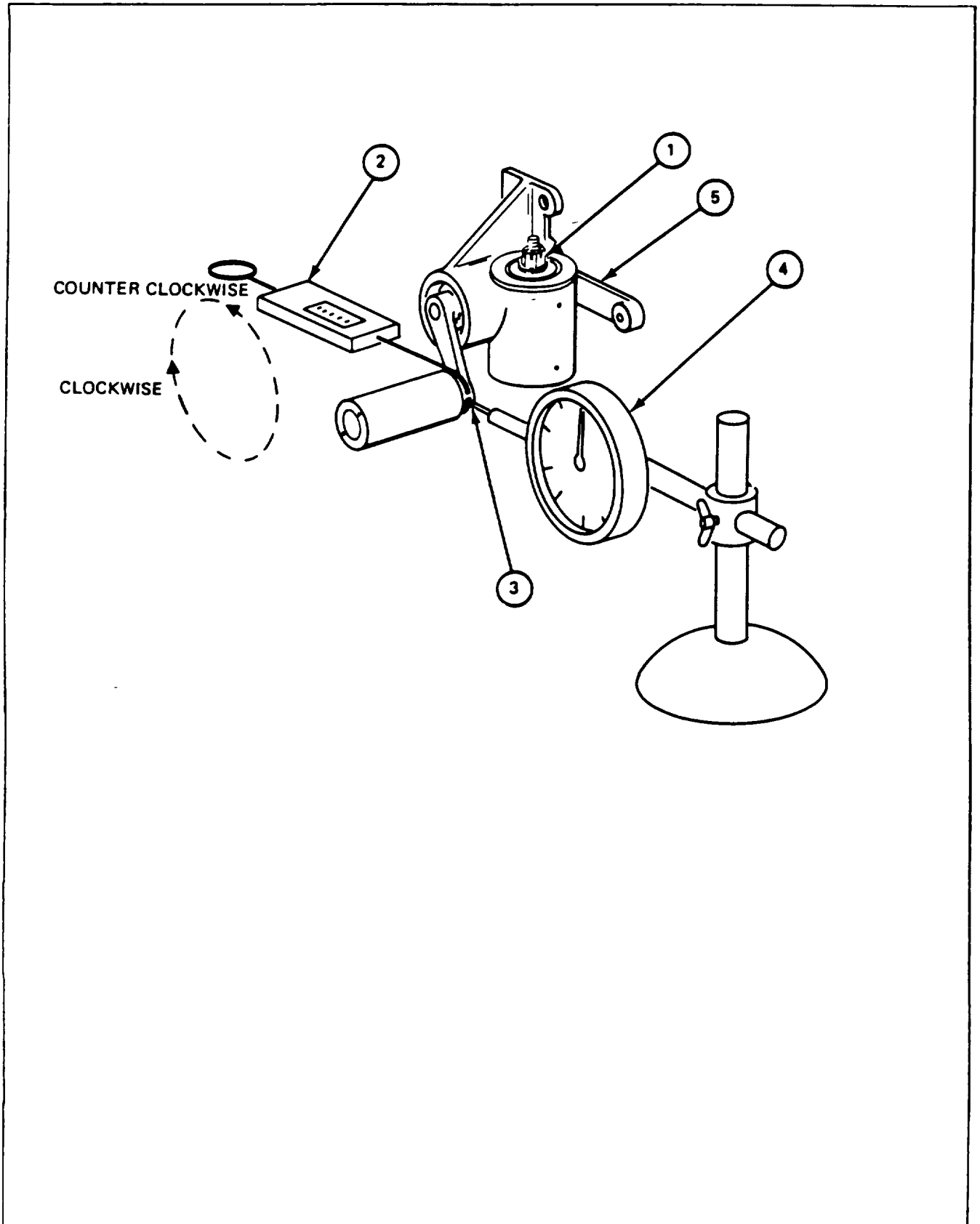
Step	Procedure
SUPPORT SHOP WORK	
1.	Take cupola azimuth gear box to support shop where dial indicator and spring scale are available.
2.	Put cupola azimuth gear box (1) in vise.
3.	Mark crank (2) three inches from center of crankshaft (3).
4.	Attach spring scale (4) to mark done in step 3 on crank (2). GO TO FRAME 4



12-12. CUPOLA AZIMUTH GEAR BOX ADJUSTMENT PROCEDURE (CONT)

FRAME 4

Step	Procedure
SUPPORT SHOP WORK	
NOTE	
Soldier A must do step 1 for all of Frame 4.	
1.	Soldier A: Using wrench, keep output gear nut (1) from turning.
Soldier B: Pull spring scale (2) clockwise 90 degrees to crank arm (3) until it reads 6 to 6.5 pounds.	
2.	Soldier A: Put zero reading dial indicator (4) against mark on crank (3) and set to zero.
NOTE	
In step 3, if zero reading dial indicator (4) reads more than 0.045 inches, repeat adjustment procedure.	
Otherwise, do step 4.	
3.	Soldier B: Pull spring scale (2) counterclockwise 90 degrees to crank arm (3) until it
“cads 6 to 6.5 pounds.	
Soldier A: Read zero reading dial indicator (4).	
4.	Return cupola azimuth gear box (5) to turret shop.
END OF TASK	



12-13. CUPOLA AZIMUTH GEAR BOX TEST PROCEDURE

PERSONNEL: One

REFERENCES: TM 9-2350-222-20-2-3 for procedure to remove cupola azimuth gear box

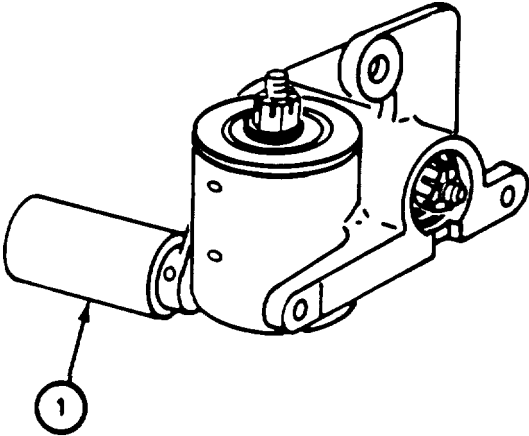
EQUIPMENT CONDITION: Cupola azimuth gear box removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Adjust cupola azimuth gear box (para 12-12)

GENERAL INSTRUCTIONS:

NOTE

If normal indication is not obtained, disassemble cupola azimuth gear box (para 12-14). Refer to section index (para 12-11) for replacement of parts.

FRAME 1	
Step	Procedure
1.	<p>Check for smooth movement and no binding when turning crank (1) in both directions.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">If normal indication was obtained in step 1, cupola azimuth gear box is good.</p> <p>END OF TASK</p>
	

12-14. CUPOLA AZIMUTH GEAR BOX DISASSEMBLY PROCEDURE

TOOLS: External retaining ring pliers
9/16" combination wrench
1/8" drive pin punch
3/16" drive pin punch
1/2" drift pin
20 ounce ball peen hammer
5/64" socket head screw key (Allen wrench)
Vise with jaw caps
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:
Remove retaining rings
Remove cotter pins
Clean parts
Inspect and repair parts

PRELIMINARY PROCEDURES: Test cupola azimuth gear box (para 12-13)

12-14. CUPOLA AZIMUTH GEAR BOX DISASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
<ol style="list-style-type: none"> 1. Using needle nose pliers, remove cotter pin (1) from nut (2) (JPG). 2. Using combination wrench, remove nut (2) and spacer (3) from shaft (4). 3. Using Allen wrench, remove two setscrews (5) from housing (6). 4. Using hammer and drift pin, tap shaft (4) through bearing (7), retainer (8) and out of housing (6). 5. Using hammer and drift pin, tap bearing retainer ring (8) with bearing (7) attached, from housing (6). <p>GO TO FRAME 2</p>	

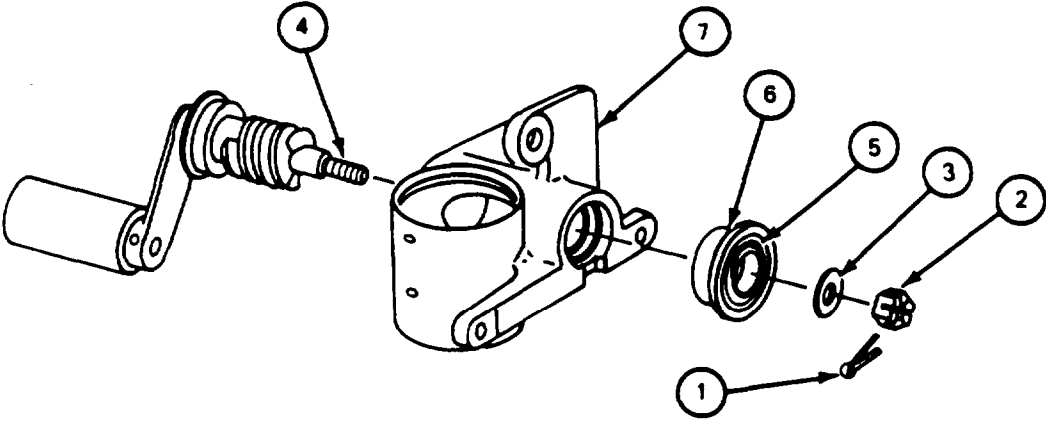
12-14. CUPOLA AZIMUTH GEAR BOX DISASSEMBLY PROCEDURE (CONT)

FRAME 2	
Step	Procedure
<ol style="list-style-type: none"> 1. Using retaining ring pliers, remove retaining ring (1) from shaft (2) (JPG). 2. Using hammer and drift pin, tap shaft (2) from gear (3). 3. Using hammer and drift pin, tap key (4) from shaft (2). 4. Using hammer and drift pin, tap shaft (2) from bearing retainer ring (5) with bearing (6) attached. 5. Using hammer and 3/16" drive pin punch, tap spring pin (7) through worm gear (8) and shaft (2). 6. Using hammer and drift pin. remove worm gear (8) from shaft (2). <p>GO TO FRAME 3</p>	
<p>The diagram illustrates the disassembly process. On the left, a perspective view shows the gear box housing and the worm gear assembly. On the right, an exploded view shows the shaft (2) with the retaining ring (1) at the bottom, the worm gear (8) in the middle, and the bearing retainer ring (5) with the bearing (6) at the top. A key (4) is shown on the shaft, and a spring pin (7) is shown passing through the worm gear (8) and shaft (2). A separate view shows the worm gear (8) being removed from the shaft (2).</p>	

12-14. CUPOLA AZIMUTH GEAR BOX DISASSEMBLY PROCEDURE (CONT)

FRAME 3

Step	Procedure
1.	Using needle nose pliers, remove cotter pin (1) from nut (2) (JPG).
2.	Using combination wrench, remove nut (2) and spacer (3) from shaft (4).
3.	Using hammer and drift pin, tap shaft (4) through bearing (5), sleeve bushing (6) and out of housing (7).
4.	Using hammer and drift pin, tap sleeve bushing (6) with bearing (5) attached, from housing (7). GO TO FRAME 4



12-14. CUPOLA AZIMUTH GEAR BOX DISASSEMBLY PROCEDURE (CONT)

FRAME 4	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 4. 	<p>Using hammer and 3/16" drive pin punch, tap spring pin (1) through worm gear (2) and shaft (3). Remove spring pin (1).</p> <p>Using hammer and drift pin, tap shaft (3) through worm gear (2), bearing (4) and sleeve bushing (5).</p> <p>Using hammer and 1/8" drive pin punch, drive spring pin (6) through crank (7) and shaft (3). Remove spring pin (6).</p> <p>Remove crank (7) from shaft (3).</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 (JPC). Inspect and repair all parts (JPC). Repair cupola azimuth gear box (para 12-16).</p> <p>END OF TASK</p>

12-15. CUPOLA AZIMUTH GEAR BOX ASSEMBLY PROCEDURE

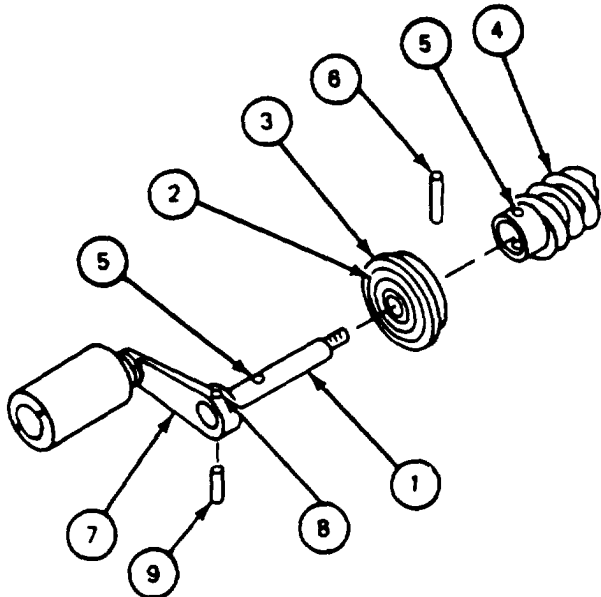
TOOLS: 1/8" flat tip screwdriver
Plastic face hammer
1/2" drift pin
External retaining ring pliers
9/16" combination wrench
3/16" drive pin punch
1/8" drive pin punch
20 ounce ballpeen hammer
5/64" socket head screw key (Allen wrench)
Needle nose pliers

SUPPLIES: Grease (item 12, App. A)
Cotter pin A380-2-4
Spring pin MS16562-38, MS16562-50, NAS561P6-18

PERSONNEL: One

REFERENCES: JPG for procedures to:
Pack bearings with grease
Install cotter pins
Use retaining ring pliers

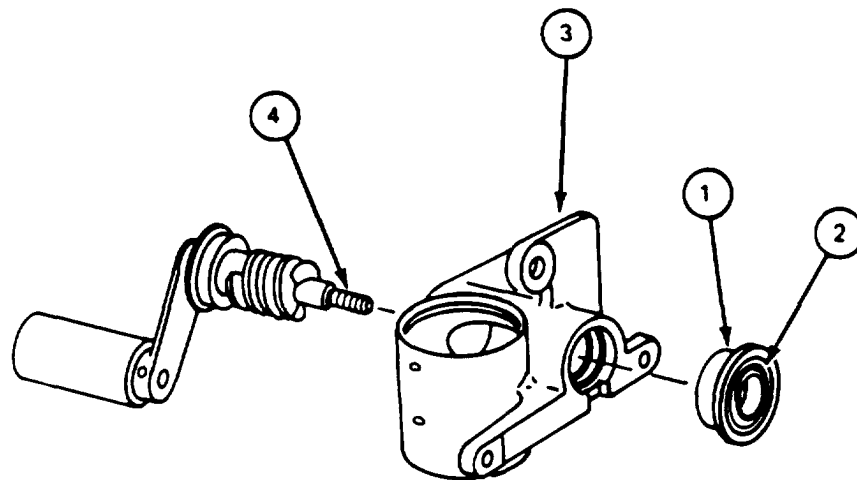
12-15. CUPOLA AZIMUTH GEAR BOX ASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 4. 5. 	<p>1. Push shaft (1) through bearing (2) and sleeve bushing (3).</p> <p>2. Put worm gear (4) on shaft (1) and line up pin holes (5) with 3/16" drive pin punch.</p> <p>3. Using hammer, drive new spring pin (6) through aligned holes (5) until spring pin (6) is centered.</p> <p>4. Put crank (7) on shaft (1) and line up pin holes (8) with 1/8" drive pin punch.</p> <p>5. Using hammer, drive new spring pin (9) through aligned holes (8) until spring pin (9) is centered.</p> <p>GO TO FRAME 2</p>
	

12-15. CUPOLA AZIMUTH GEAR BOX ASSEMBLY PROCEDURE (CONT)

FRAME 2

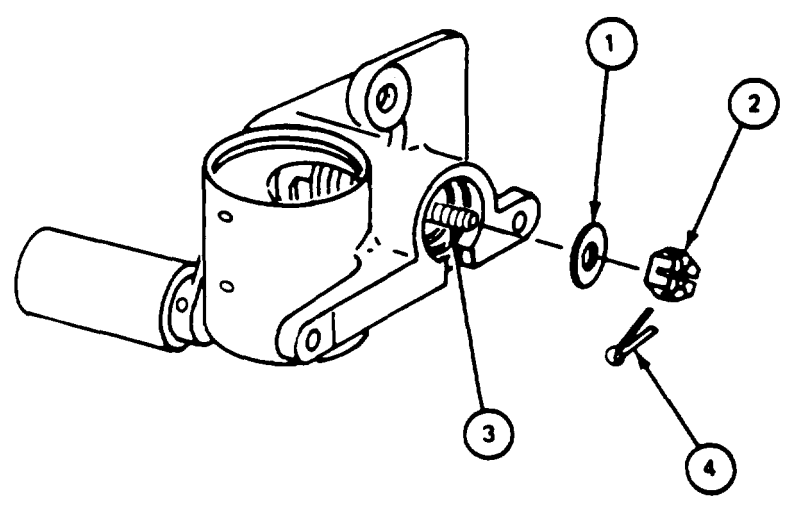
Step	Procedure
1.	Using plastic face hammer, tap sleeve bushing (1) with bearing (2) until it seats in housing (3).
2.	Push shaft (4) through housing (3), sleeve bushing (1) and bearing (2).
3.	Using plastic face hammer, tap handle end of shaft (4) until it seats in housing (3). GO TO FRAME 3



12-15. CUPOLA AZIMUTH GEAR BOX ASSEMBLY PROCEDURE (CONT)

FRAME 3

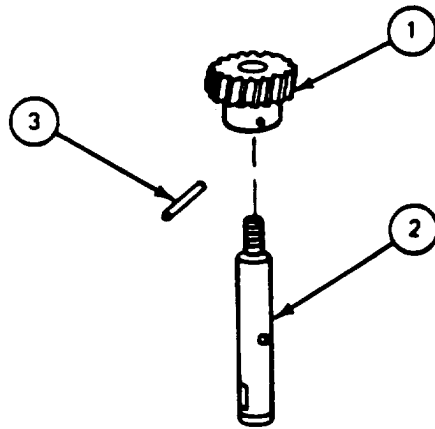
Step	Procedure
1.	Put spacer (1) and nut (2) on shaft (3).
2.	Using combination wrench, tighten nut (2).
3.	Using combination wrench, loosen nut (2) 1/4 turn and line up on nut with hole in shaft (3).
4.	Put new cotter pin (4) through slot in nut and hole in shaft (3) (JPG).
GO TO FRAME 4	



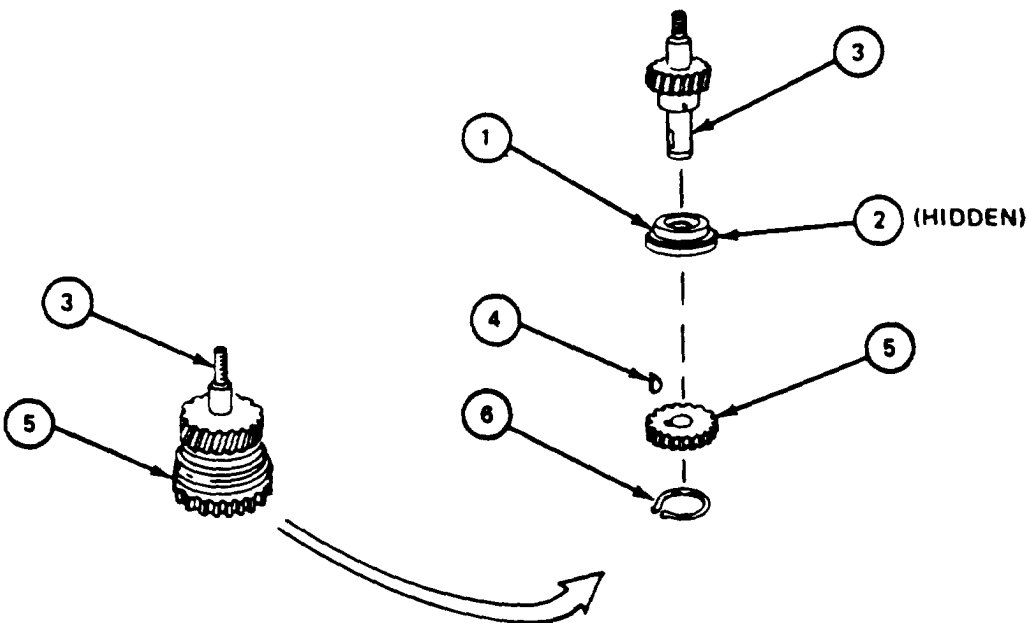
12-15. CUPOLA AZIMUTH GEAR BOX ASSEMBLY **PROCEDURE** (CONT)

FRAME 4

Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 	<p>Put worm gear (1) on shaft (2).</p> <p>Using 3/16" drive pin punch, line up pin holes in worm gear (1) and shaft (2).</p> <p>Using hammer and drift pin, tap new spring pin (3) through worm gear (1) and shaft (2) until spring pin is centered.</p> <p>GO TO FRAME 5</p>



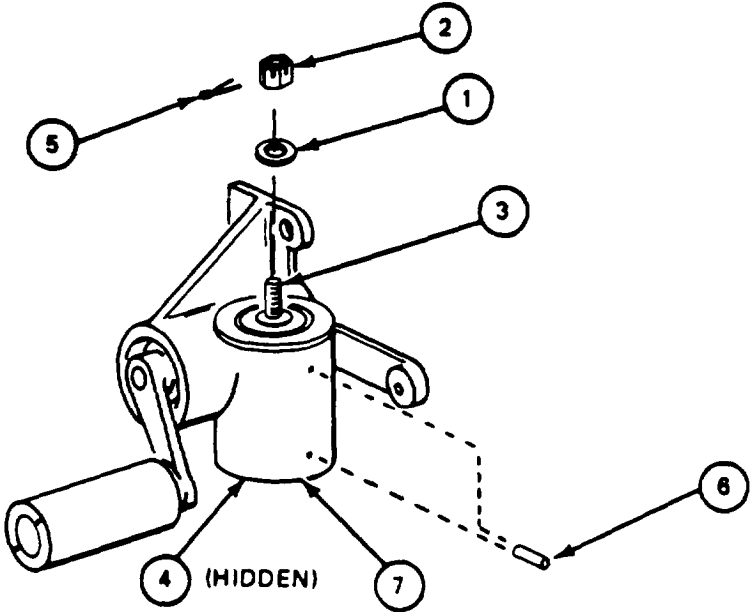
12-15. CUPOLA AZIMUTH GEAR BOX ASSEMBLY PROCEDURE (CONT)

FRAME 5	
Step	Procedure
<ol style="list-style-type: none"> 1. Put retainer ring (1) and bearing (2) on shaft (3). 2. Put key (4) in keyway on shaft (3). 3. Using plastic face hammer, seat key (4) by tapping. 4. Put gear (5) on shaft (3) and key (4). 5. Using retaining ring pliers, put retaining ring (6) in ring groove near end of shaft (3). <p>GO TO FRAME 6</p>	

12-15. CUPOLA AZIMUTH GEAR BOX ASSEMBLY PROCEDURE (CONT)

FRAME 6	
Step	Procedure
<ol style="list-style-type: none"> 1. Push shaft (1) into housing (2) until it seats in housing. 2. Fill housing (2) cavity half full of grease. 3. Push bearing retainer ring (3) and bearing (4) on shaft (1) until bearing retainer ring (3) seats in housing (2). 4. Using screwdriver, position retainer ring (3) and retainer ring (5) slots (6) in line in vertical position. <p>GO TO FRAME 7</p>	

12-15. CUPOLA AZIMUTH GEAR BOX ASSEMBLY PROCEDURE (CONT)

FRAME 7	
Step	Procedure
1.	<p>Put spacer (1) and nut (2) on shaft (3).</p> <div style="text-align: center; border: 1px solid black; padding: 2px; width: fit-content; margin: 10px auto;"> CAUTION </div> <p style="text-align: center;">Overtightening of nut (2) will cause damage to retaining ring (4).</p> <p>2. Using wrench, tighten nut (2) until snug.</p> <p>3. Using wrench, loosen nut (2) slightly and line up slot in nut with hole in shaft (3).</p> <p>4. Using needle nose pliers, put new cotter pin (5) through slot in nut (2) and shaft (3) (JPG).</p> <p>5. Using Allen wrench, put two setscrews (6) in housing (7).</p> <div style="text-align: center; margin-top: 20px;"> <p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Adjust cupola azimuth gear box (para 12-12). Test cupola azimuth gear box (para 12-13).</p> </div> <p>END OF TASK</p>
 <p>The diagram shows a cross-section of the cupola azimuth gear box. Callout 1 points to a spacer on the shaft. Callout 2 points to a nut on the shaft. Callout 3 points to the shaft itself. Callout 4 points to a retaining ring on the shaft, with the text '(HIDDEN)' below it. Callout 5 points to a cotter pin inserted through the nut and shaft. Callout 6 points to a set screw in the housing. Callout 7 points to the housing of the gear box.</p>	

12-16. CUPOLA AZIMUTH GEAR BOX REPAIR PROCEDURE

PERSONNEL: One

PRELIMINARY PROCEDURES: Disassemble cupola azimuth gear box (para 12-14)

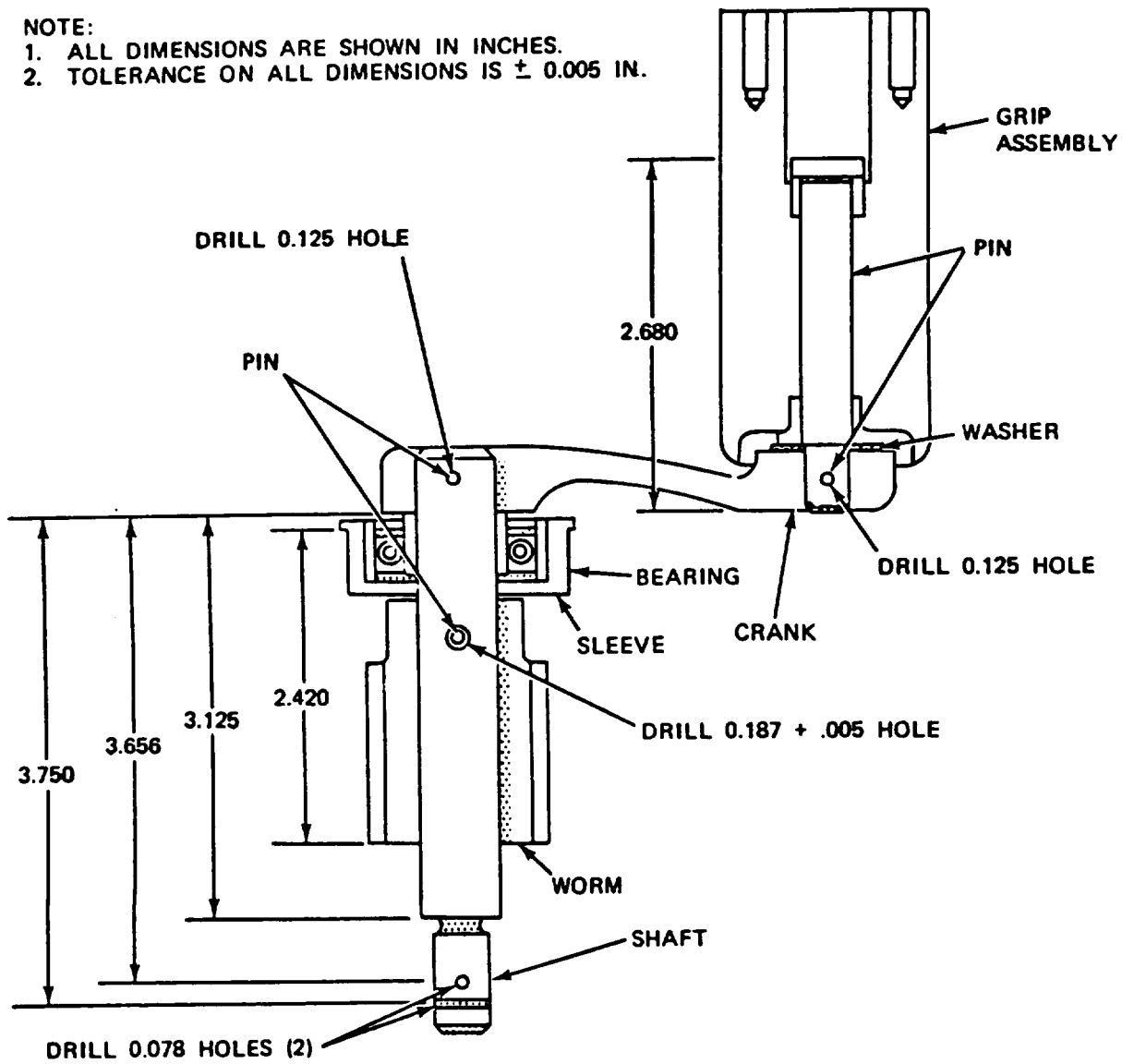
FRAME 1	
Step	Procedure
	<p>SUPPORT SHOP WORK</p> <p>NOTE</p> <p>This frame is used to replace bad bearings.</p>
<ol style="list-style-type: none"> 1. a. b. 2. 	<p>Take cupola azimuth gear box bearings to shop where press is available.</p> <p>Remove bad bearings.</p> <p>Install new bearings.</p> <p>After support shop work, return cupla azimugh gear box to turret shop.</p>
	<p>GO TO FRAME 2</p>

12-16. CUPOLA AZIMUTH GEAR BOX REPAIR PROCEDURE (CONT)

FRAME 2	
Step	Procedure
	<p style="text-align: center;">SUPPORT SHOP WORK</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">This frame is used to replace worm gear or shaft, and crank or shaft.</p> <ol style="list-style-type: none"> 1. Take cupola azimuth gear box parts to shop where drill press is available. <ol style="list-style-type: none"> a. Position parts and drill holes for new parts as required. b. Restore all threads after drilling. 2. After support shop work, return cupola azimuth gear box parts to turret shop. <p>GO TO FRAME 3</p>

NOTE:

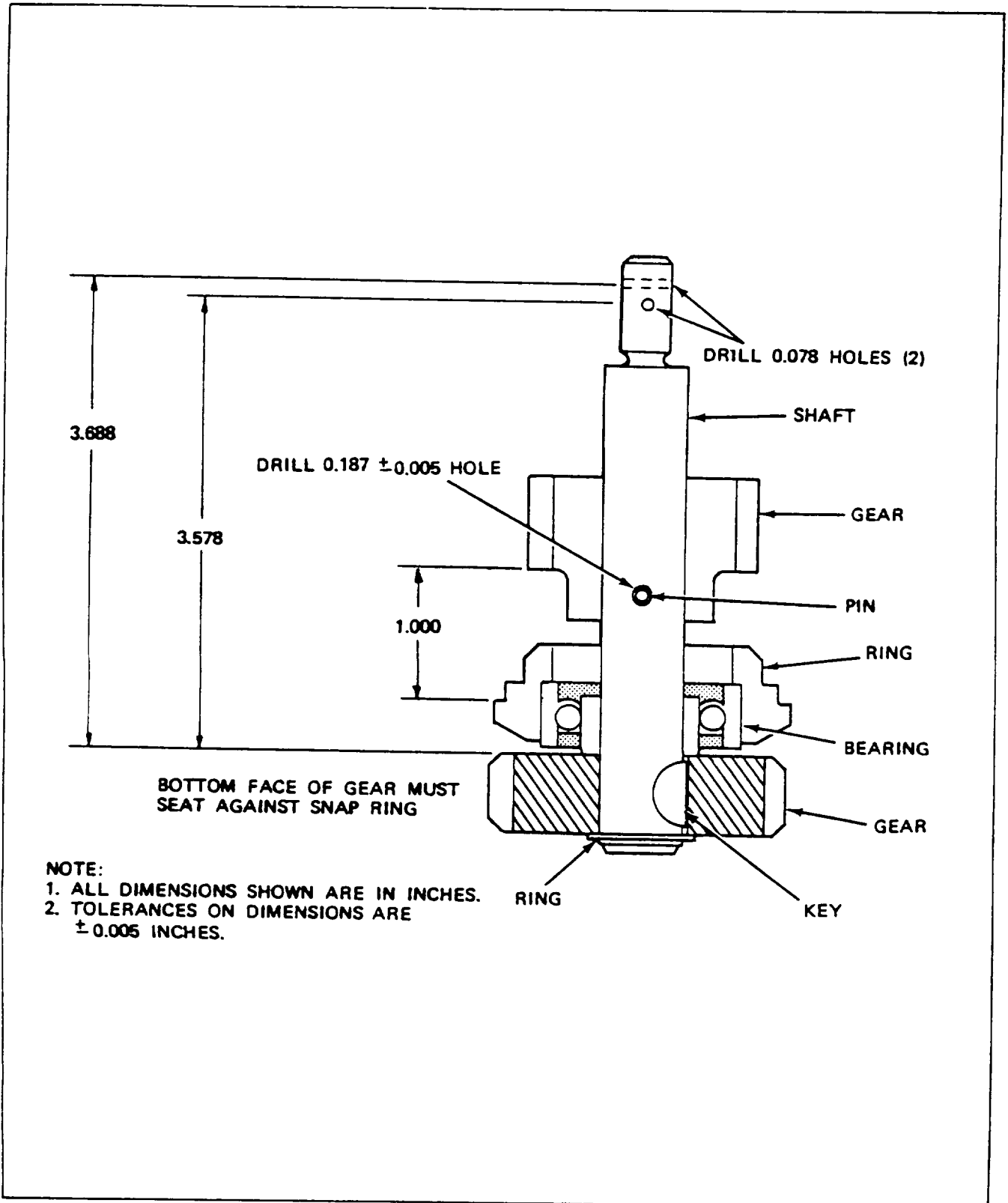
1. ALL DIMENSIONS ARE SHOWN IN INCHES.
2. TOLERANCE ON ALL DIMENSIONS IS ± 0.005 IN.



12-16. CUPOLA AZIMUTH GEAR BOX REPAIR PROCEDURE (CONT)

FRAME 3

Step	Procedure
	<p style="text-align: center;">SUPPORT SHOP WORK</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">This frame is used to replace shaft with two gears.</p> <ol style="list-style-type: none"> 1. Take cupola azimuth gear box parts to shop where drill press is available. <ol style="list-style-type: none"> a. Position parts and drill holes for new parts as required. b. Restore all threads after drilling. 2. After support shop work, return cupola azimuth gear box parts to turret shop. <p>END OF TASK</p>



Section 5. ELEVATING SCREW JACK

12-17. MAINTENANCE PROCEDURES INDEX

Equipment Item	Adjust- ment	Test	Removal	Tasks Instal- lation	Disas- sembly	Assembly	Repair
Elevating Screw Jack	12-18	12-19	12-20	12-21	12-22	12-23	12-24

12-18. ELEVATING SCREW JACK ADJUSTMENT PROCEDURE

TEST EQUIPMENT Elevating screw jack holding fixture (fabricated tool, item 9, App. B)
60-pound load

TOOLS: Dial indicator (0.001-inch marks)
Machinist's 6-inch steel rule
3/4" combination wrenches (two)
External retaining ring pliers

SUPPLIES: Rope for 60-pound load
Bolts, MS 90728-118 UNC-2A (five)
Washers, MS 27183-17 (five)
Nuts, MS 21044-N8-20 UNJF-3B (five)
Bushing, NSN 3120-00-738-1345
Pencil
Masking tape (item 36, App. A)

PERSONNEL: One

REFERENCES: JPG for procedure to use retaining pliers

PRELIMINARY PROCEDURES: Remove elevating screw jack (para 12-20)

GENERAL INSTRUCTIONS:

NOTE

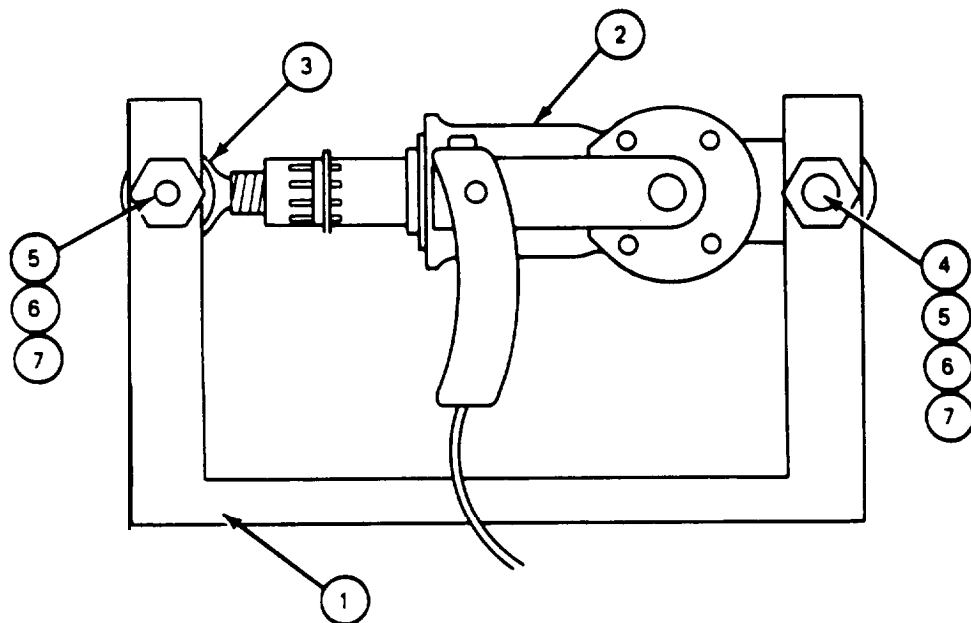
Screw jack is adjusted in support shop by support shop and turret shop personnel.

12-18. ELEVATING SCREW JACK ADJUSTMENT PROCEDURE (CONT)

a. **Backlash**

FRAME 1

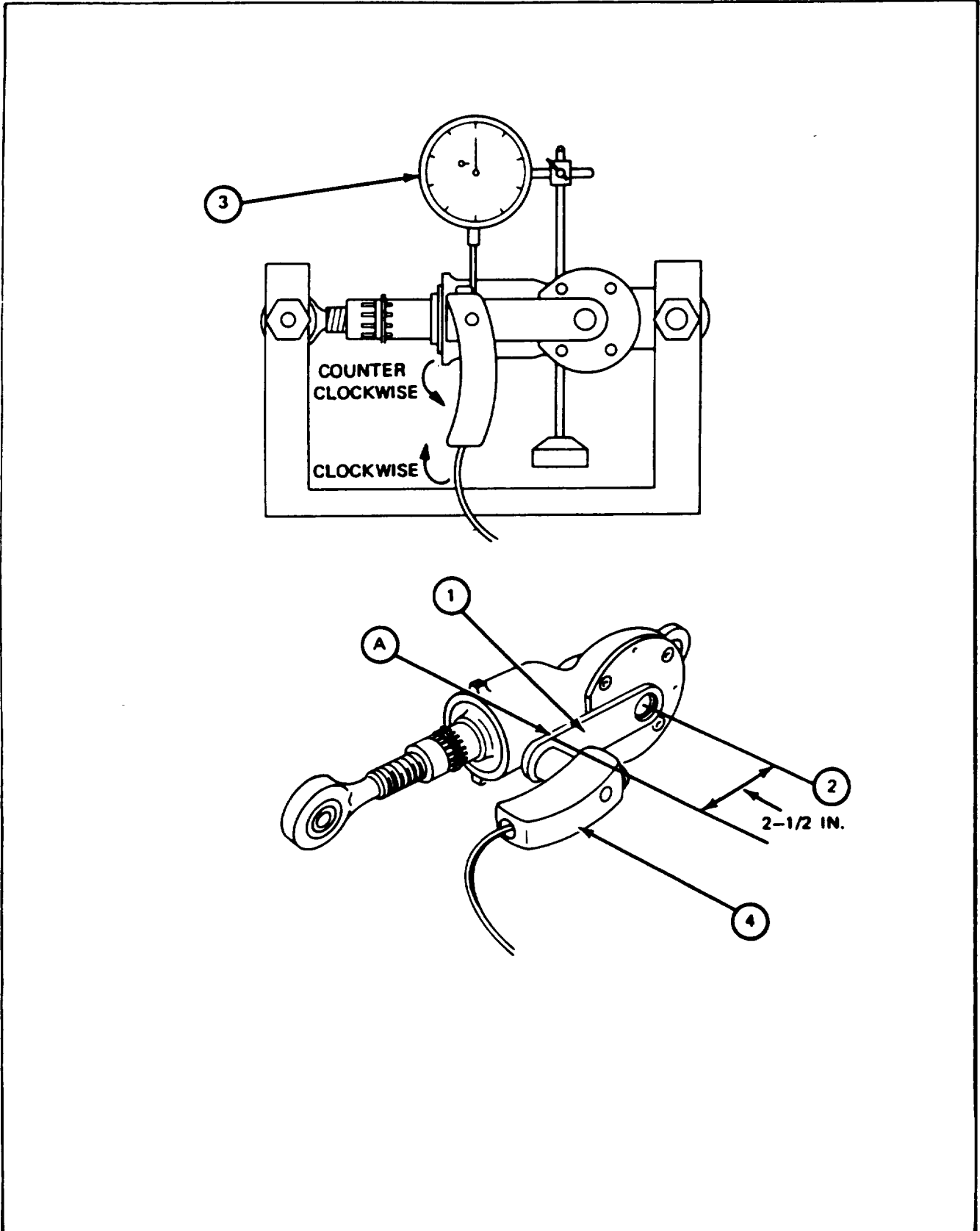
Step	Procedure
SUPPORT SHOP WORK	
1.	Take holding fixture (1) and screw jack housing (2) to support shop equipped with dial indicator for measuring backlash.
2.	Clamp holding fixture (1) to work bench.
NOTE	
Screw jack housing (2) and worm gear (3) must be secured in holding fixture (1) to prevent any movement at either end of screw jack.	
3.	Using combination wrenches, put in bushing (4), bolt (5), washer (6) and nut (7) that attach screw jack housing (2) to holding fixture (1).
4.	Using combination wrenches, put in bolt (5). washer (6), and nut (7) that attach worm gear (3) to holding fixture (1).
GO TO FRAME 2	



12-18. ELEVATING SCREW JACK ADJUSTMENT PROCEDURE (CONT)

a. Backlash (Cont)

FRAME 2	
Step	Procedure
1.	Using masking tape, pencil, and rule, make reference mark (A) on crank arm (1) 2-1/2 inches from centerline of crank gearshaft (2).
2.	Move dial indicator (3) to zero. Place dial indicator (3) on crank arm (1) at reference mark (A).
3.	While watching dial indicator (3), turn screw jack handle (4) clockwise. Write down dial indicator reading.
4.	Reset dial indicator (3) to zero. While watching dial indicator (3), turn screw jack handle (4) counterclockwise. Write down dial indicator reading,
NOTE	
Backlash indication must be between 0.002 and 0.009 inch.	
5.	Add readings taken in steps 3 and 4. Write down number.
6.	Remove dial indicator (3) from crank arm (1).
GO TO FRAME 3	



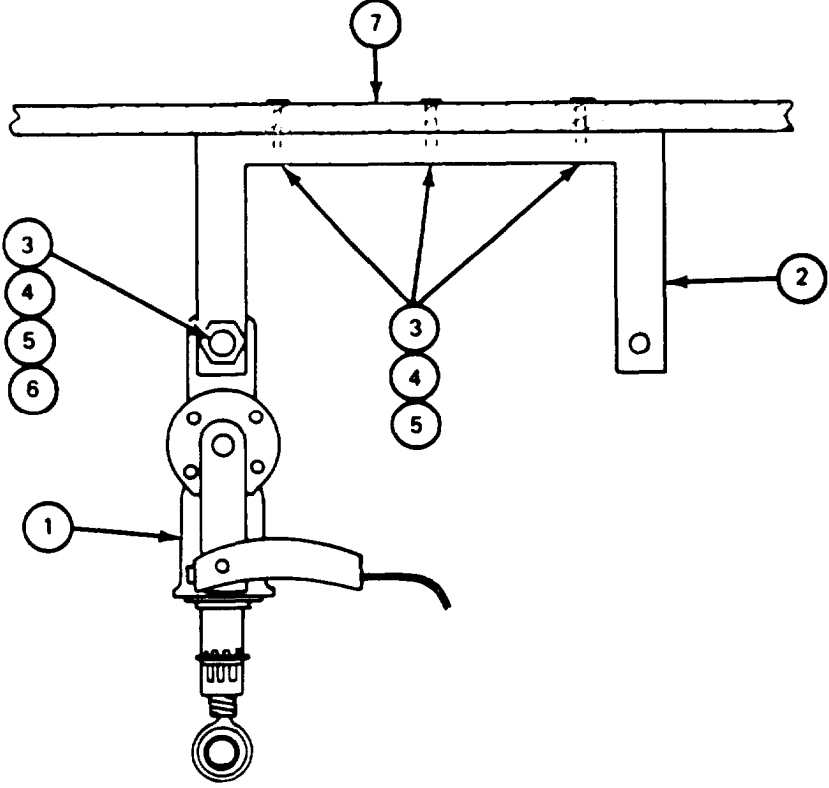
12-18. ELEVATING SCREW JACK ADJUSTMENT PROCEDURE (CONT)

a. **Backlash (Cont)**

FRAME 3	
Step	Procedure
1.	Using combination wrenches, remove bolt (1), washer (2), and nut (3) that attach worm gear (4) to holding fixture (5).
2.	Using combination wrenches, remove bolt (1), washer (2), nut (3), and bushing (6) that attach screw jack housing (7) to holding fixture (5). Remove screw jack (7).
<p>NOTE</p> <p>If indication for backlash (step 5, frame 2) is between 0.002 and 0.009 inch, go to frame 5. If indication for backlash is not between 0.002 and 0.009 inch, go to step 3.</p>	
3.	Remove shim from screw jack housing (para 12-22, frame 1, steps 1 thru 3).
4.	<p>Add to or take away from shim pack as follows:</p> <p>If indication for backlash is less than 0.002 inch, peel off layers of laminated shim and add to shim pack to get proper backlash.</p> <p>If indication for backlash is more than 0.009 inch, peel off layers of laminated shim pack as necessary to get proper backlash.</p>
5.	Put shim on screw jack housing (para 12-23, frame 3, steps 4 thru 7).
6.	Adjust screw jack for proper backlash (frame 1, steps 2 thru 4; and frame 2, steps 1 thru 4).
<p>GO TO FRAME 4</p>	

12-18. ELEVATING SCREW JACK ADJUSTMENT PROCEDURE (CONT

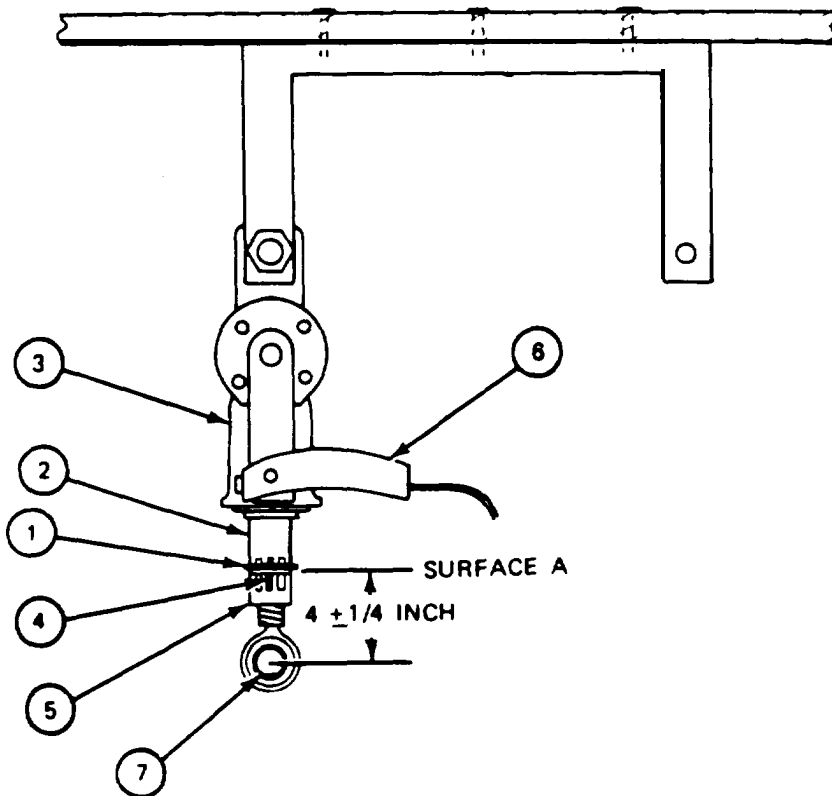
b. Gear Setting

FRAME 4	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Screw jack housing (1) must be secured in holding fixture (2) to prevent any movement at housing end, and must be installed at least 5 feet above floor to allow for 60-pound load.</p> <ol style="list-style-type: none"> 1. Using combination wrenches, put a bolt (3), washer (4), and nut (5) at three places that attach holding fixture (2) to upright support (7). 2. Using combination wrenches, put a bushing (6), bolt (3), washer (4), and nut (5) that attach screw jack housing (1) to holding fixture (2). <p>GO TO FRAME 5</p>
	 <p>The diagram illustrates the assembly of a screw jack. A horizontal beam (7) is supported by a vertical upright (7). A holding fixture (2) is attached to the upright (7) at three points, each secured with a bolt (3), washer (4), and nut (5). A screw jack housing (1) is attached to the holding fixture (2) at three points, each secured with a bushing (6), bolt (3), washer (4), and nut (5). The screw jack housing (1) is shown in a partially extended position, with a handle and a hook at the bottom.</p>

12-18. ELEVATING SCREW JACK ADJUSTMENT PROCEDURE (CONT)

b. Gear Setting (Cont)

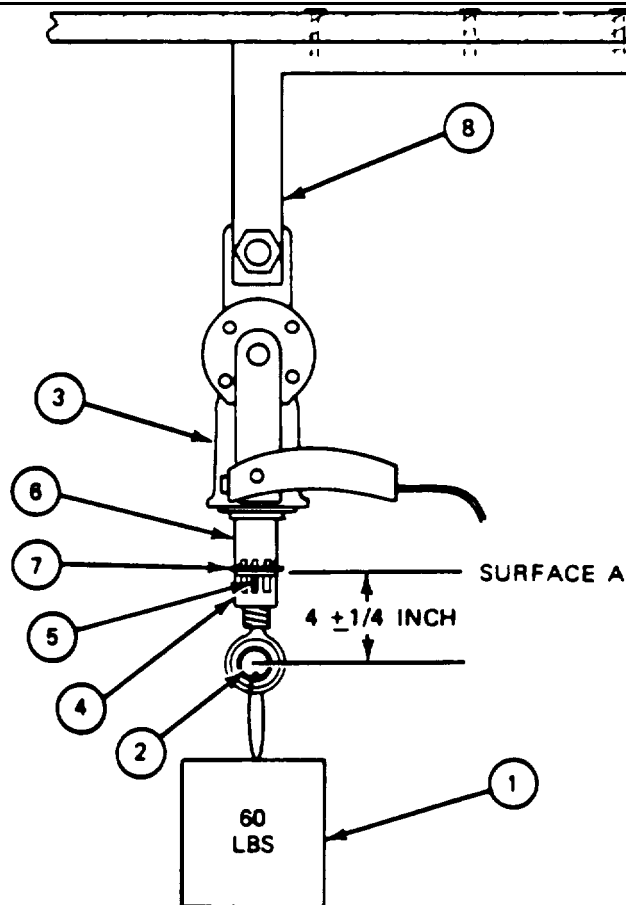
FRAME 5	
Step	Procedure
1.	Using retaining ring pliers, remove retaining ring (1) from bevel gearshaft (2) of screw jack (3).
2.	Remove machine key (4) from matching grooves of bevel gearshaft (2) and sleeve nut (5).
3.	Loosen sleeve nut (5).
4.	Turn crank handle (6) until centerline of worm gear (7) eye is between 3-3/4 and 4-1/4 inches from surface A.
GO TO FRAME 6	



12-18. ELEVATING SCREW JACK ADJUSTMENT PROCEDURE (CONT)

b. Gear Setting (Cont)

FRAME 6	
Step	Procedure
<ol style="list-style-type: none"> 1. Using rope, hang 60-pound load (1) from worm gear (2) eye of screw jack (3). 2. Screw sleeve nut (4) finger-tight against surface A. 3. Put machine key (5) in matching grooves of sleeve nut (4) and bevel gearshaft (6). 4. Using retaining ring pliers, put retaining ring (7) in groove around bevel gearshaft (6). Do not remove 60-pound load (1) or screw jack (3) from holding fixture (8). 	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Follow-on Maintenance Action Required:</p> <p style="text-align: center;">Test elevating screw jack (para 12-19).</p>
END OF TASK	



12-19. ELEVATING SCREW JACK TEST PROCEDURE

TEST EQUIPMENT: Elevating screw jack holding fixture (fabricated tool, item 9, App. B)
60-pound load

TOOLS: 8" adjustable wrenches (two)
Spring scale (9 to 25-pound range)
Machinist's 6-inch steel rule

SUPPLIES: Rope for 60-pound load
Rope for spring scale
Pencil
Paper

PERSONNEL: One

PRELIMINARY PROCEDURES: Remove elevating screw jack (para 12-20)
Adjust elevating screw jack (para 12-18)

GENERAL INSTRUCTIONS:

NOTE

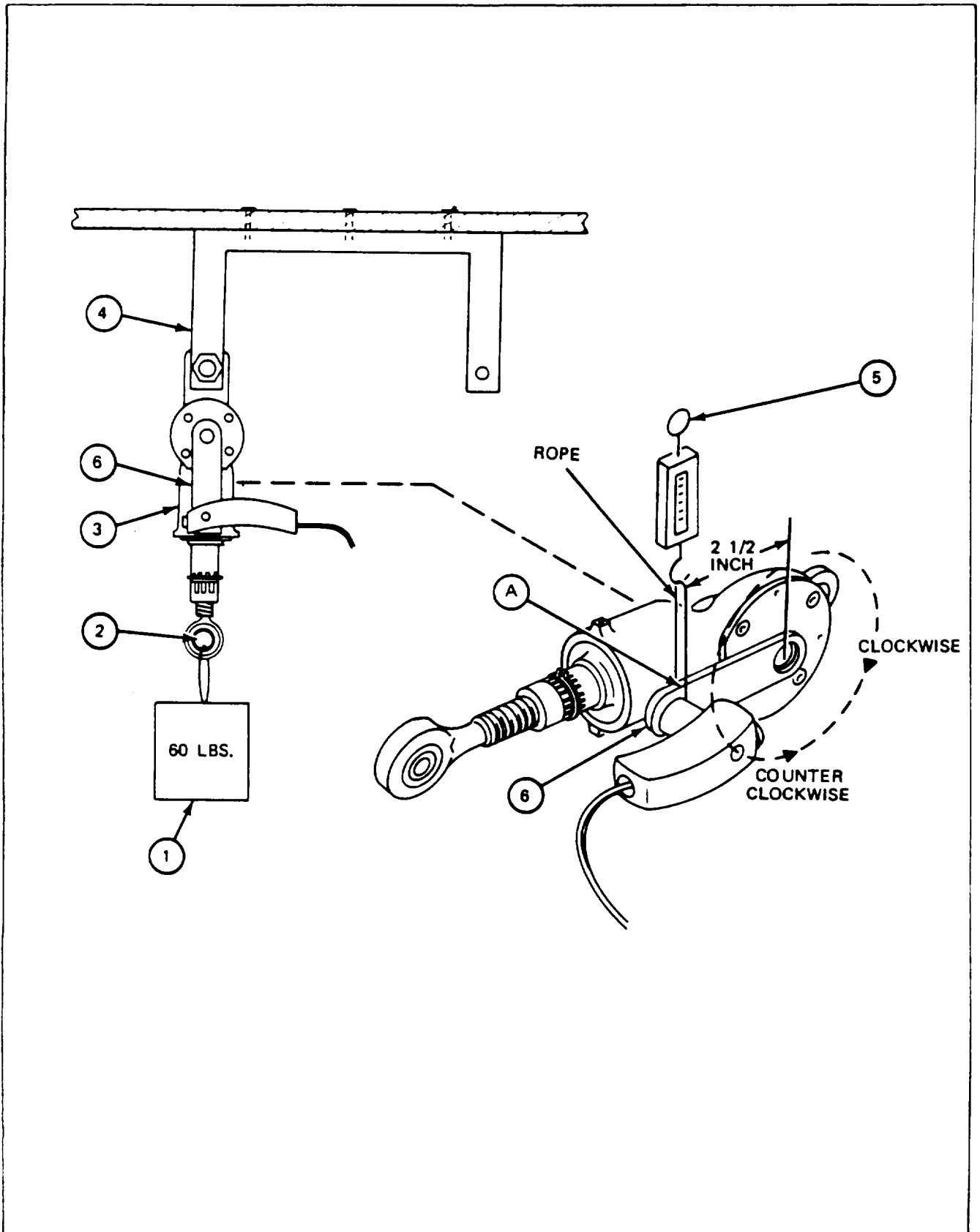
Screw jack is tested in support shop by support shop and turret shop personnel.

If normal indication is not obtained during test, readjust screw jack for proper backlash or gear setting as required (para 12-18).

12-19. ELEVATING SCREW JACK TEST PROCEDURE (CONT)

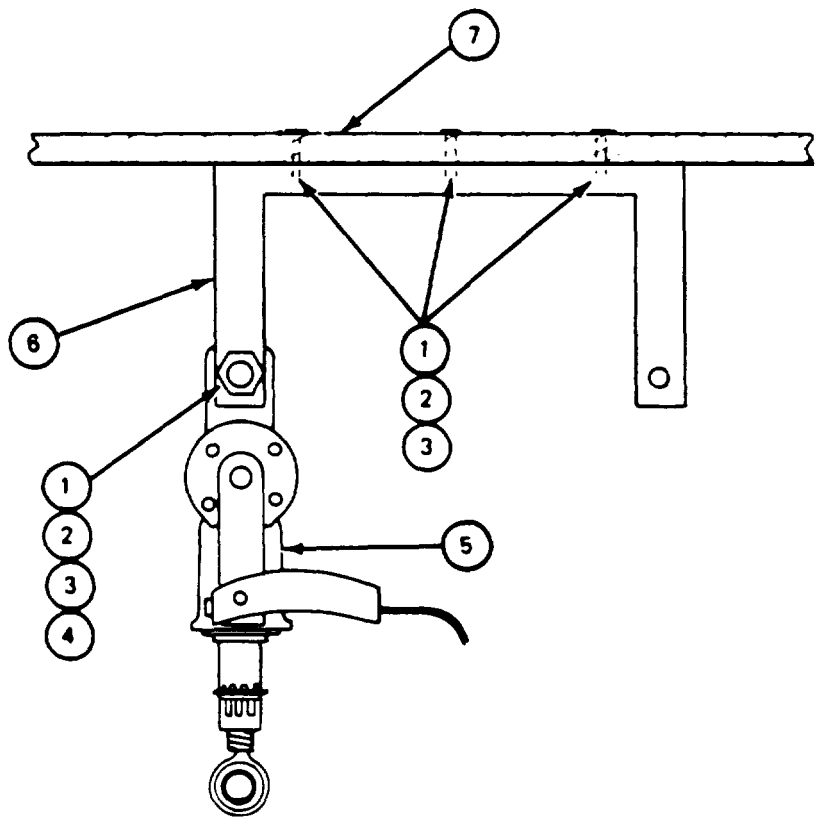
FRAME 1

Step	Procedure	Normal Indication	Probable Fault
SUPPORT SHOP WORK			
NOTE			
With 60-pound load (1) connected to worm gear (2) eye, and screw jack (3) installed in holding fixture (4) (para 12-18. frames 4, 5, and 6), do following test:			
1.	Connect rope and spring scale (5) to crank arm (6) at 2-1/2 inch mark (A).		
WARNING			
Do not allow worm gear (2) to move more than 3-3/4 inches (gear's full working stroke is about 3-11/32 inches). The 60-pound load (1) can drop and hurt you.			
Spring scale (5) must be pulled at right angle to crank arm (6).			
2.	While watching spring scale (5), pull on scale so that crank arm (6) turns clockwise until worm gear (2) moves smoothly through one full working stroke. Write down indication.	a. No more than 6 pounds on spring scale (5).	a. Bad adjustment
3.	While watching spring scale (5), pull on scale so that crank arm (6) turns counterclockwise until worm gear (2) moves smoothly in other direction through one full working stroke, Write down indication.	b. No binding.	b. Bad adjustment
4.	Remove rope and scale (5), and masking tape from crank arm (6).	a. No more than 6 pounds on spring scale (5).	a. Bad adjustment
5.	Remove 60-pound load (1) from worm gear (2) eye.		
GO TO FRAME 2			



12-19. ELEVATING SCREW JACK TEST PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	Using combination wrenches, remove bolt (1), nut (2), washer (3), and bushing (4) that attach screw jack (5) housing to holding fixture (6).
2.	Using combination wrenches, remove bolt (1), washer (2), and nut (3) at three places that attach holding fixture (6) to upright support (7).
3.	Return screw jack (5), holding fixture (6) and attaching hardware (1), (2), (3), and (4) to turret shop.
4.	Stow holding fixture (6), and attaching hardware (1), (2), (3), and (4).
<p>NOTE</p> <p>If normal indication was obtained in frames 1 and 2, elevating screw jack is good.</p> <p>END OF TASK</p>	



12-20. ELEVATING SCREW JACK REMOVAL PROCEDURE

TOOLS: 3/8" flat tip screwdriver
 3/4" socket (1/2" drive)
 1/2" drive ratchet
 3/4" combination wrench
 7/16" combination wrench
 Hammer, soft brass head

PERSONNEL: One

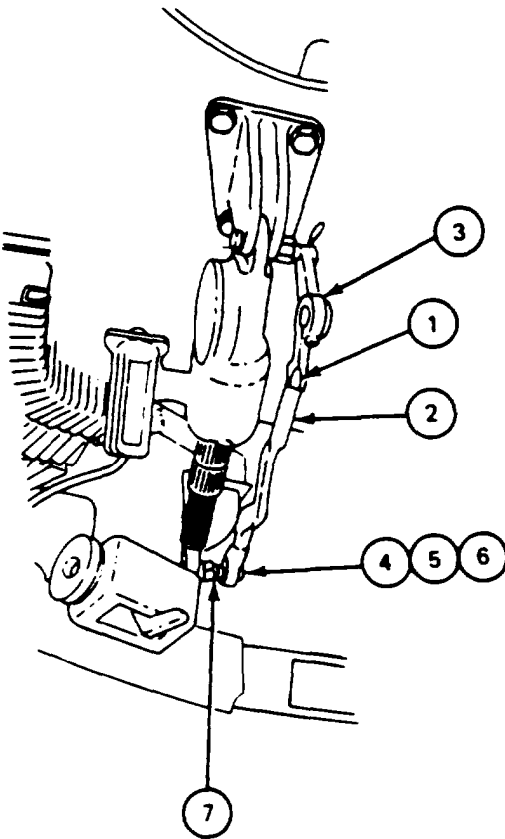
REFERENCES: JPG for procedure to disconnect electrical connectors
 TM 9-2350-222-10 for procedures to:
 Remove caliber .50 machine gun
 Remove M36 periscope

EQUIPMENT LOCATION INFORMATION:

EQUIPMENT	FOLDOUT	CALLOUT
Driver's Master Control Panel	FO-3	11
Turret Traverse Lock	FO-3	7
Elevating Screw Jack	FO-2	24

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
 Caliber .50 machine gun removed (TM-10)
 M36 periscope removed (TM-10)
 Turret traverse lock set to LOCKED

12-20. ELEVATING SCREW JACK REMOVAL PROCEDURE (CONT)

FRAME 1	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 	<p>Squeeze clamp (1) until periscope link assembly (2) can be removed from periscope rod (3).</p> <p>Using 7/16" combination wrench, remove one nut (4) and one small flat washer (5) from screw jack mounting screw (6).</p> <p>Remove periscope link assembly (2) and spacer (7).</p> <p>GO TO FRAME 2</p>
	

12-20. ELEVATING SCREW JACK REMOVAL PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	Using 3/4" combination wrench and socket wrench, remove nut (1), washer (2) and spring (3). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Spring tension will cause cupola cradle to rotate upwards in step 2.</p>
2.	Using hammer, remove screw jack mounting screw (4) and washer (5).
3.	Disconnect two electrical connectors (6) (JPG).
4.	Using screwdriver, remove screw (7), lockwasher (8), and clamp (9) that attach connectors (6) to side of cupola.
5.	Using 3/4" combination wrench and socket wrench, remove nut (10) from bolt (11).
6.	Hold elevating screw jack (12) with one hand. Remove bolt (11).
7.	Remove elevating screw jack (12).
	END OF TASK

12-21. ELEVATING SCREW JACK INSTALLATION PROCEDURE

TOOLS: 3/8" flat tip screwdriver
3/4" socket (1/2" drive)
1/2" drive ratchet
3/4" combination wrench
7/16" combination wrench
3 ounce brass hammer

SUPPLIES: Self-locking nut (MS21044-N8) (two)
Self-locking nut (MS21083-N4)

PERSONNEL: One

REFERENCES: JPG for procedure to connect electrical connectors
TM 9-2350-222-10 for procedures to:
Elevate and depress caliber .50 machine gun
Install M36 periscope
Remove and install caliber .50 machine gun

EQUIPMENT CONDITION: Driver's master control panel MASTER BATTERY switch set to OFF
M36 periscope removed (TM-10)
Turret traverse lock set to LOCKED
Caliber .50 machine gun removed (TM-10)

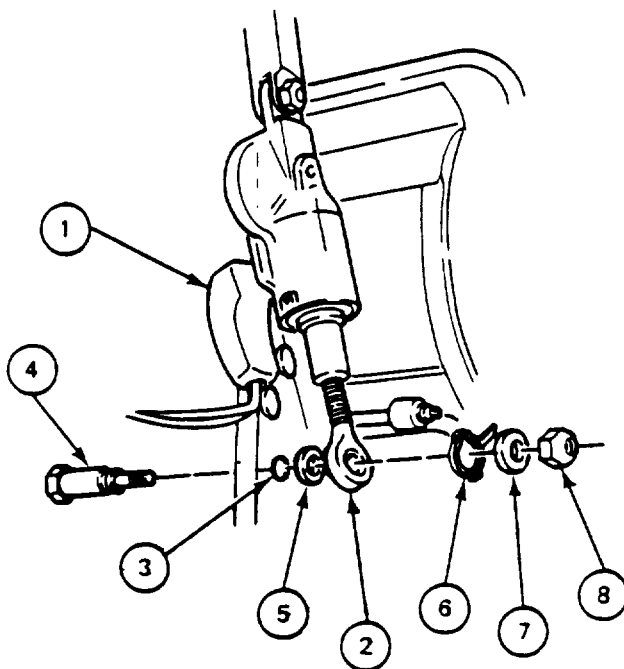
12-21. ELEVATING SCREW JACK INSTALLATION PROCEDURE (CONT)

FRAME 1	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Make sure front part of elevating screw jack (1), with smooth side toward mounting hole, is in cradle assembly before doing step 1.</p> <ol style="list-style-type: none"> 1. Place elevating screw jack (1) between mounting bracket (2). Put in screw (3) 2. Using combination wrench and socket wrench, put new self-locking nut (4) on screw (3) 3. Connect two electrical connectors (5) (JPG). 4. Put clamp (6) on two electrical connector (5) leads. 5. Using screwdriver, attach clamp (6) to cupola with lockwasher (7) and screw (8). <p>GO TO FRAME 2</p>

12-21. ELEVATING SCREW JACK INSTALLATION PROCEDURE (CONT)

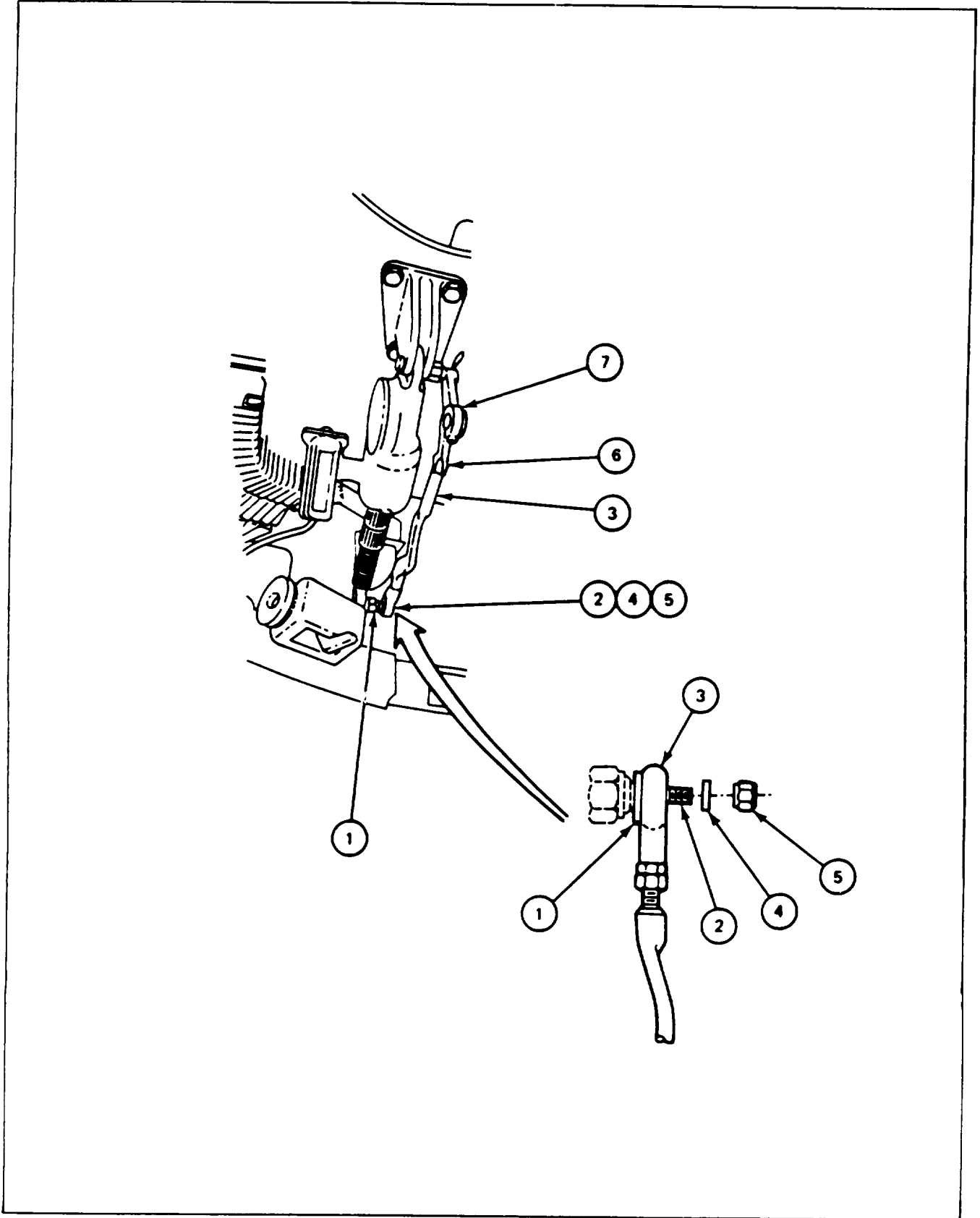
FRAME 2

Step	Procedure
1.	Rotate elevating screw jack handle (1) and line up bearing eye (2) hole with hole in cradle (3).
2.	Put screw jack mounting screw (4) in cradle (3) far enough to put on washer (5).
3.	Using hammer, tap screw jack mounting screw (4) through cradle assembly (3), washer (5), and bearing eye (2).
NOTE	
Tang on spring (6) goes in slot in bearing eye (2).	
4.	Put spring (6) and washer (7) on screw jack mounting screw (4).
5.	Using 3/4" combination wrench and socket wrench, put new self-locking nut (8) on screw jack mounting screw (4).
GO TO FRAME 3	



12-21. ELEVATING SCREW JACK INSTALLATION PROCEDURE (CONT)

FRAME 3	
Step	Procedure
1.	Put spacer (1) on screw jack mounting screw (2), flat side first.
2.	Place periscope link assembly (3) over screw jack mounting screw (2).
3.	Using 7/16" wrench, put washer (4) beveled side first, and new self-locking nut (5) on screw jack mounting screw (2).
4.	Squeeze clamp (6) together and put it over pins on periscope connecting link (7).
<p>NOTE</p> <p>Follow-on Maintenance Action Required:</p> <p>Install M36 periscope (TM-10). Install caliber .50 machine gun (TM-10). Elevate and depress machine gun to check elevating screw jack for proper operation (TM-10).</p>	
<p>END OF TASK</p>	



12-22. ELEVATING SCREW JACK DISASSEMBLY PROCEDURE

TOOLS: 20 ounce ball peen hammer
Plastic face hammer
3/32" drive pin punch
3/32" socket head screw key (Allen wrench)
5/32" socket head screw key (Allen wrench)
External retaining ring pliers
1/2" drift pin
Bearing puller
12" adjustable wrench
Scraper
Stiff bristled brush
Fine stone

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

PERSONNEL: One

REFERENCES: TM 9-2350-222-20-2-3 for procedure to remove elevating screw jack handle
JPG for procedures to:
Remove retaining rings
Use bearing puller
Clean parts
Inspect and repair parts

EQUIPMENT CONDITION: Elevating screw jack handle removed (TM-20-2-3)

PRELIMINARY PROCEDURES: Remove elevating screw jack (para 12-20)
Adjust elevating screw jack (para 12- 18)
Test elevating screw jack (para 12- 19)

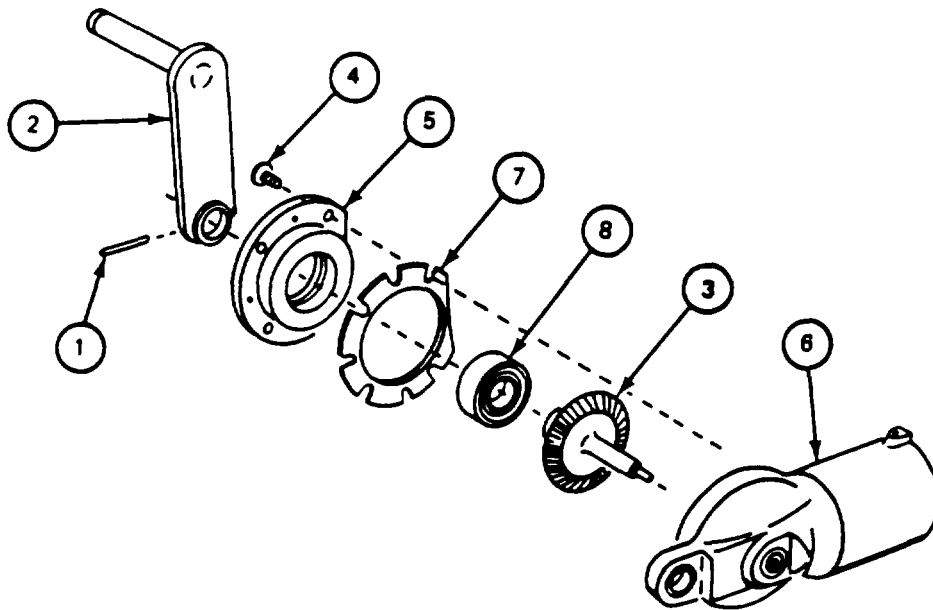
GENERAL INSTRUCTIONS:

CAUTION

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

12-22. ELEVATING SCREW JACK DISASSEMBLY PROCEDURE (CONT)

FRAME 1	
Step	Procedure
1.	Using ball peen hammer and 3/32" drive pin punch, remove spring pin (1) that attaches hand crank (2) to crank gearshaft (3). Remove hand crank (2).
2.	Using 5/32" Allen wrench, remove four screws (4) that attach cover (5) to screw jack housing (6).
3.	Using 5/32" Allen wrench, put three screws (4) in threaded holes in cover (5), tighten evenly and remove cover (5), shims (7), bearing (8), and crank gearshaft (3) from screw jack housing (6).
4.	Remove laminated shim (7).
5.	Using ball peen hammer and drift pin, tap gearshaft (3) and bearing (8) from cover (5).
6.	Using bearing puller, pull bearing (8) from crank gearshaft (3) (JPG).
7.	Using 5/32" Allen wrench, remove three screws (4) from cover (5).
GO TO FRAME 2	



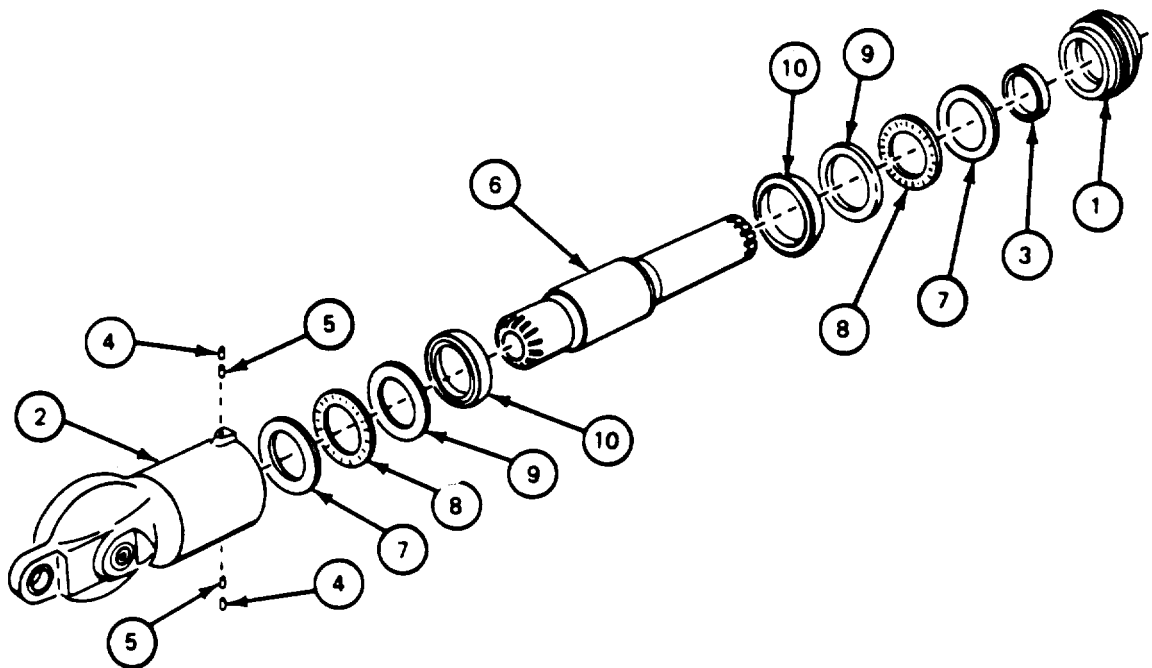
12-22. ELEVATING SCREW JACK DISASSEMBLY PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	Turn worm gear (1) until it is fully removed from sleeve nut (2) and bevel gearshaft (3).
2.	Using retaining ring pliers, remove retaining ring, (4) that secures machine key (5) in grooves of bevel gearshaft (3) and sleeve nut (2). Remove machine key and sleeve nut (JPG).
3.	Using 3/32" Allen wrench, loosen setscrews (6) at top and bottom of screw jack housing (7).
GO TO FRAME 3	

The diagram shows an exploded view of the screw jack assembly. Part 1 is a worm gear with a circular gear face. Part 2 is a sleeve nut with a matching gear face. Part 3 is a bevel gearshaft with a beveled end. Part 4 is a retaining ring. Part 5 is a machine key. Part 6 consists of two setscrews. Part 7 is the screw jack housing, which is a cylindrical component with a threaded section. Dashed lines indicate the assembly relationship between the parts.

12-22. ELEVATING SCREW JACK DISASSEMBLY PROCEDURE (CONT)

FRAME 3	
Step	Procedure
1.	Using adjustable wrench, remove packing nut (1) from screw jack housing (2). NOTE Remove grease seal (3) <i>only</i> if it is being replaced.
2.	Remove grease seal (3) from packing nut (1).
3.	Using 3/32" Allen wrench, tighten two setscrews (4) into screw jack housing (2) and push out two nylon plugs (5).
4.	Remove two setscrews (4) from screw jack housing (2),
5.	Remove bevel gearshaft (6) from screw jack housing (2).
6.	Slide two thrust washers (7), two outer bearings (8), and two thrust washers (9) off ends of bevel gearshaft (6).
7.	Using plastic face hammer, tap two inner bearings (10) off ends of bevel gearshaft (6) NOTE Follow-on Maintenance Action Required: Clean all parts (JPG). Inspect and repair all parts (JPG). Repair elevating screw jack (para 12-24).
	END OF TASK



12-23. ELEVATING SCREW JACK ASSEMBLY PROCEDURE

TOOLS: Bearing press
20 ounce ball peen hammer
Plastic face hammer
15" adjustable wrench
3/8" drive torque wrench (0 to 150 inch-pounds)
1-1/2" crowfoot adapter (3/8" drive)
3/32" socket head screw key (Allen wrench)
5/32" socket head screw key (Allen wrench)
Retaining ring pliers
1/2" drift pin
6" machinist's steel rule
3/32" hex head socket (3/8" drive)

SUPPLIES: Grease (item 12, App. A)

PERSONNEL: One

REFERENCES: TM 9-2350-222-20-2-3 for procedure to install elevating screw jack handle
JPG for procedures to:
Lubricate parts
Use torque wrench
Install retaining rings
Use bearing press

GENERAL INSTRUCTIONS:

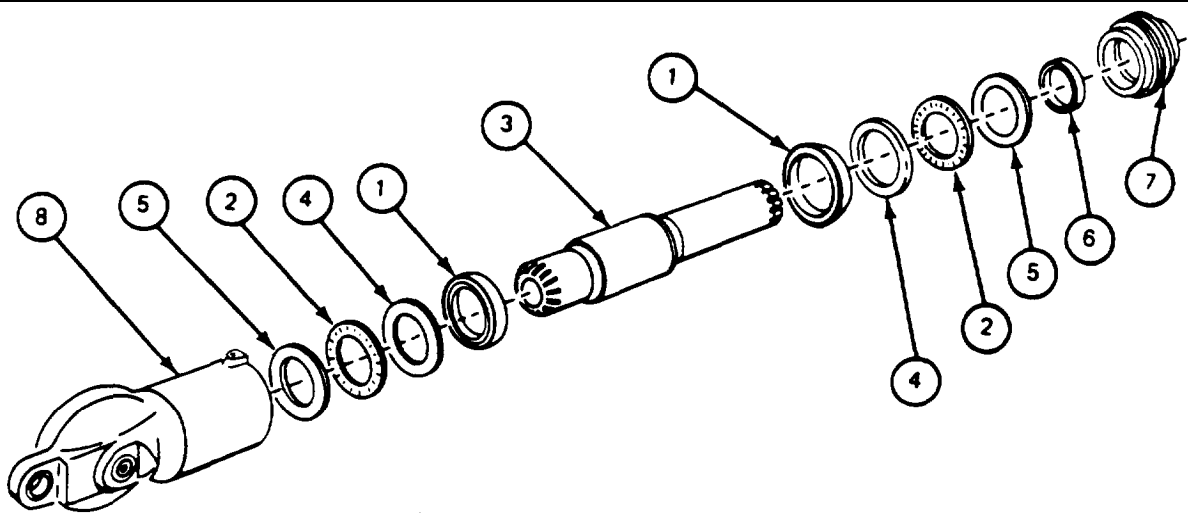
CAUTION

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

12-23. ELEVATING SCREW JACK ASSEMBLY PROCEDURE (CONT)

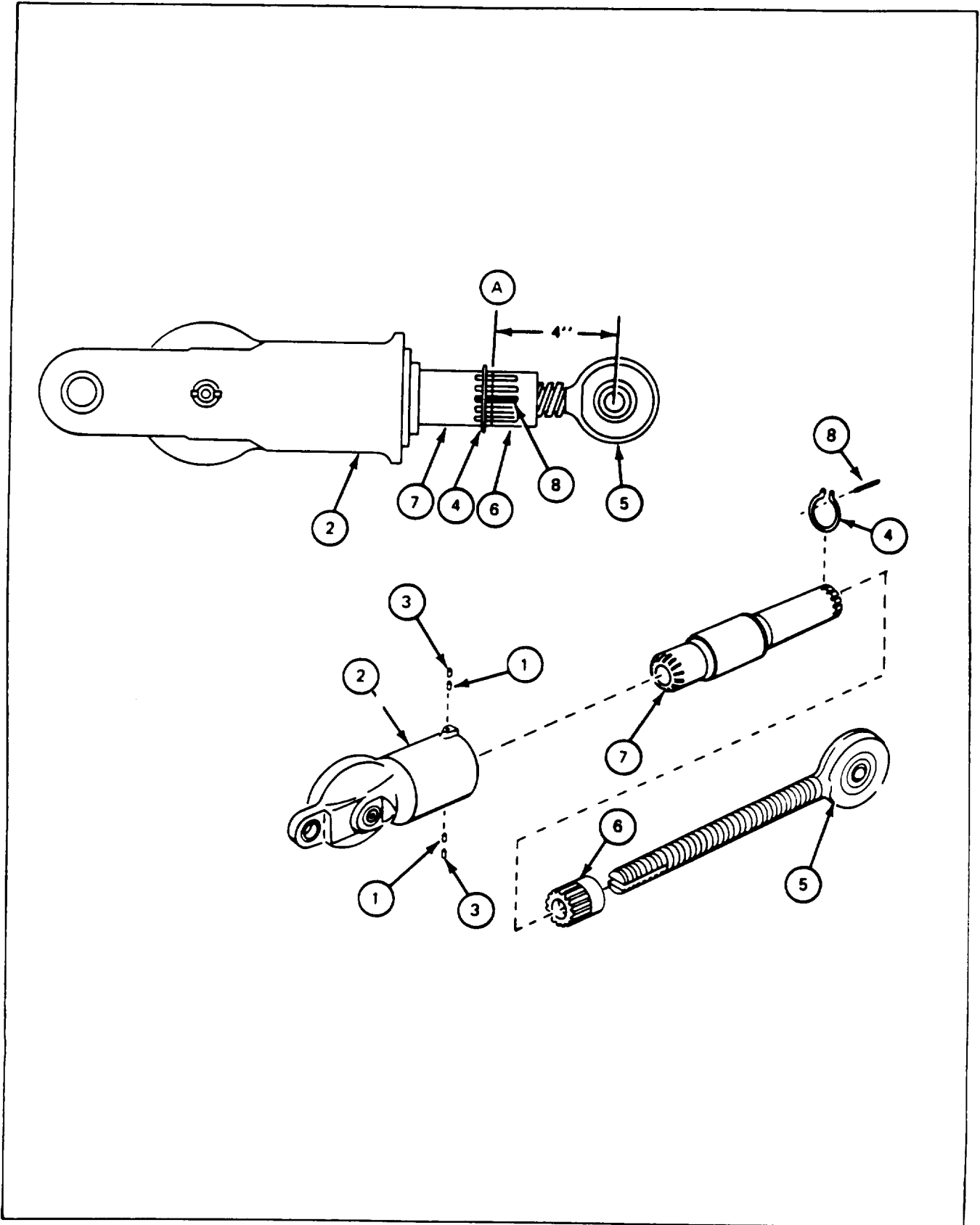
FRAME 1

Step	Procedure
1.	Grease two inner bearings (1) and two outer bearings (2) (JPG).
2.	Place two inner bearings (1) over end of bevel gearshaft (3). Using plastic face hammer, tap bearing against each shoulder on gearshaft.
	<p>NOTE</p> <p>Thrust washer (4) is thicker than thrust washer (5).</p>
3.	Slide two thrust washers (4), two outer bearings (2), and two thrust washers (5) over ends of bevel gearshaft (3).
4.	Install grease seal (6) in packing nut (7).
5.	Slide packing nut (7) over long end of bevel gearshaft (3), being careful not to damage grease seal (6).
6.	Put bevel gearshaft (3) in screw jack housing (8).
	<p>NOTE</p> <p>To make sure of a solid seating through bearings (1) and (2), it is necessary to tighten and loosen packing nut (7).</p>
7.	Using adjustable wrench, tighten packing nut (7); loosen packing nut. Using torque wrench and crowsfoot adapter, torque packing nut to between 15 and 25 inch-pounds (JPG).
	GO TO FRAME 2

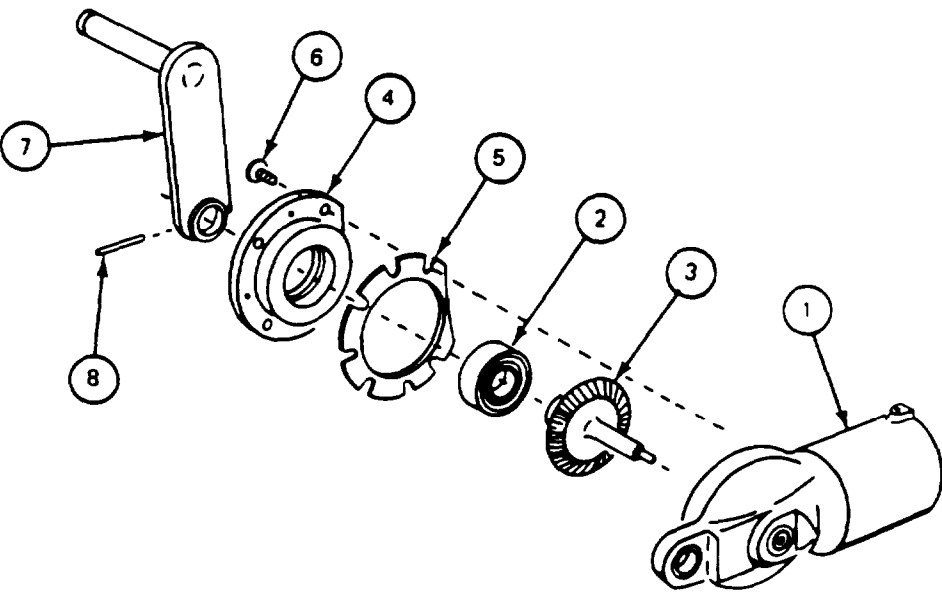


12-23. ELEVATING SCREW JACK ASSEMBLY PROCEDURE (CONT)

FRAME 2	
Step	Procedure
1.	Put two nylon plugs (1) in screw jack housing (2).
2.	Using 3/32" Allen wrench, put two setscrews (3) in screw jack housing (2). Using torque wrench and hex head socket, torque two setscrews to between 10 and 14 inch-pounds (JPG).
3.	Slide retaining ring (4) over worm gear (5) and screw sleeve nut (6) on worm gear (5).
4.	Screw worm gear (5) into bevel gearshaft (7).
	NOTE
	Worm gear (5) should be turned so that centerline of worm gear eye is about 4 inches from surface A. It will be necessary to check this setting again during adjustment procedure (para 12-18).
5.	Turn sleeve nut (6) until groove on sleeve nut matches groove on bevel gearshaft (7) and is finger-tight.
6.	Put machine key (8) in matching grooves on sleeve nut (6) and bevel gearshaft (7). Line up notch in machine key (8) with notch in spline of bevel gearshaft (7).
7.	Using retaining ring pliers, seat retaining ring (4) in groove on bevel gearshaft (7) and groove of machine key (8) (JPG).
	GO TO FRAME 3



12-23. ELEVATING SCREW JACK ASSEMBLY PROCEDURE (CONT)

FRAME 3	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 3. 4. 5. 6. 7. 	<p>Pack screw jack gear housing (1) half full with grease (JPG).</p> <p>Using bearing press, put bearing (2) on gearshaft (3) (JPG).</p> <p>Using plastic face hammer, put bearing (2) and gearshaft (3) in cover (4).</p> <p>Place laminated shims (5) on cover (4). Put cover on screw jack gear housing (1).</p> <p>Using 5/32" Allen wrench, put in four screws (6) that attach shims (5) and cover (4) to screw jack gear housing (1).</p> <p>Line up holes and put hand crank (7) on gearshaft (3).</p> <p>Using ball peen hammer and drift pin, tap spring pin (8) in matching holes of hand crank (7) and gearshaft (3).</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 elevating screw jack handle (TM-20-2-3). Adjust elevating screw jack (para 12-18).</p> <p>END OF TASK</p>
	

12-24. ELEVATING SCREW JACK REPAIR PROCEDURE

SUPPLIES: Self-aligning bearing
Sleeve bearing, NSN 3120-00-516-0503
Grease (item 12, App. A)

PERSONNEL: One

PRELIMINARY PROCEDURES: Disassemble elevating screw jack (para 12-22)

GENERAL INSTRUCTIONS:

NOTE

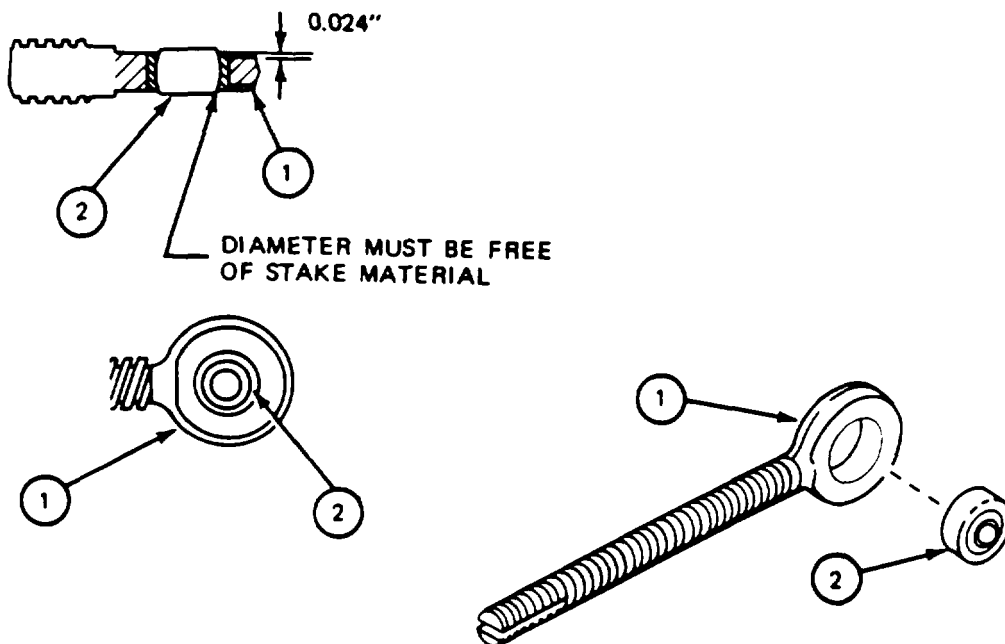
This procedure is used to replace self-aligning bearing in the worm gear and sleeve bearings in screw jack housing.

12-24. ELEVATING SCREW JACK REPAIR PROCEDURE (CONT)

- a. Self-aligning Bearing

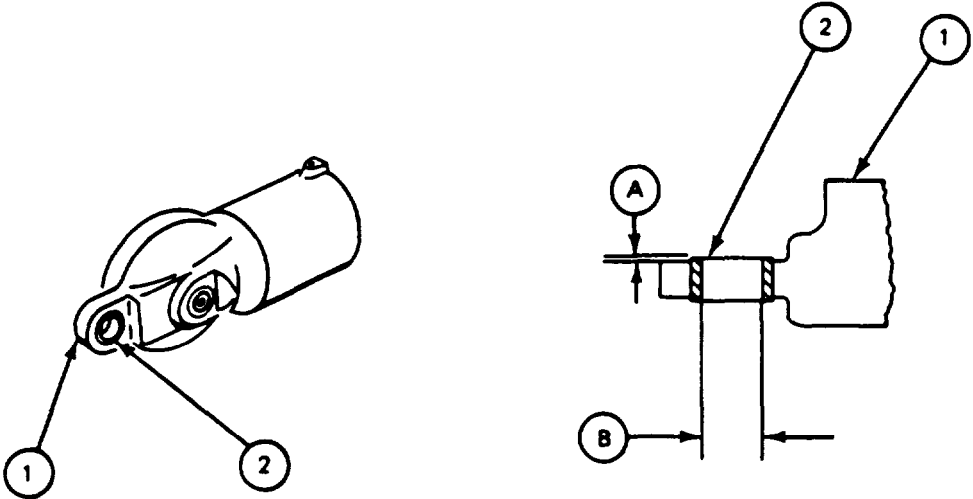
FRAME 1

Step	Procedure
SUPPORT SHOP WORK	
1.	Take worm gear (1) with self-aligning bearing (2) to support shop equipped with bearing press and measuring tools.
2.	Remove self-aligning bearing (2) from worm gear (1) eye. Throw bearing away.
3.	Grease new self-aligning bearing (2) (JPG).
NOTE	
Make sure self-aligning bearing (2) does not stick out more than 0.024 inch on either side of worm gear (1) eye.	
4.	Put self-aligning bearing (2) in worm gear (1) eye.
5.	Stake worm gear (1) eye 0.06 by 0.06 inch in four places on both sides (JPG).
6.	After support shop work, return parts to turret shop.
GO TO FRAME 2	



12-24. ELEVATING SCREW JACK PROCEDURE (CONT)

b. Sleeve Bearing

FRAME 2							
Step	Procedure						
SUPPORT SHOP WORK							
<ol style="list-style-type: none"> 1. Take screw jack housing (1) with sleeve bearing (2) to support shop equipped with bearing press, measuring and machining tools. 2. Remove sleeve bearing (2) from screw jack housing (1). Throw bearing away. 3. Put new sleeve bearing (2) in screw jack housing (1). 4. Machine bearing (2) if necessary to get following dimensions: 	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: center; padding: 5px;">Reference Letter</th> <th style="text-align: center; padding: 5px;">Measurement</th> </tr> </thead> <tbody> <tr> <td style="text-align: center; padding: 5px;">A</td> <td style="padding: 5px;">0.02" to 0.04" both sides</td> </tr> <tr> <td style="text-align: center; padding: 5px;">B</td> <td style="padding: 5px;">0.751" to 0.752"</td> </tr> </tbody> </table>	Reference Letter	Measurement	A	0.02" to 0.04" both sides	B	0.751" to 0.752"
Reference Letter	Measurement						
A	0.02" to 0.04" both sides						
B	0.751" to 0.752"						
<ol style="list-style-type: none"> 5. After support shop work, return parts to turret shop. <p style="margin-top: 0;">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
AZIMUTH GEAR BOX, CUPOLA	3	12-11
BOOM	5	29-1
BOOM LINEAR ACTUATING CYLINDER	5	28-1
BLOWER, TURRET VENTILATING	1	7-1
BREECH RING	2	11-2
CAM ASSEMBLY, TURRET LOCK	5	20-9. 20-10
CANNON M135 AND COMBINATION GUN MOUNT M 150	2	11-1
CHECK VALE	3	13-34
CLAMP, GUNNER'S CONTROL	3	13-104, 13-105
CLUTCH	4	18-23
COMBINATION GUN MOUNT M150, CANNON M135 AND	2	11-1
COMMANDER'S CONTROL HANDLE	3	14-1
CONTROL BOX, GUNNER 5	1	6-1
CONTROL, GUNNER'S	3	13-77
CONTROL HANDLE, COMMANDER 3	3	14-1
CRANK ASSEMBLY, CUPOLA AZIMUTH GEAR BOX	2	12-14, 12-15
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
CYLINDER, BOOM LINEAR ACTUATING	5	28-1
DIRECTIONAL CONTROL VALVE	5	25-1
DRAIN TUBE	3	13-31
ELECTRICAL FIRING LEAD	2	11-0
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	13-99. 13-100
EQUILIBRATOR ACCUMULATOR	5	21-1
EQUILIBRATOR CHARGING MANIFOLD	5	22-1
EYE ASSEMBLY, ELEVATION MECH (1 1591025)	4	15-6. 15-7 23-1
FERRULE, WIRE ROPE AND	5	23-1
FILTER, OIL	3	13-40
FIRING LEAD, ELECTRICAL	2	11-6
GEAR BOX, CUPOLA AZIMUTH	2	12-11
GEAR BOX, TRAVERSING	2	18-49
GUARD, GUNNER'S	2	11-6

INDEX	PART	PARA
GUARDS, CUPOLA	2	9-I
GUIDE ASSEMBLY, ELEVATING MECH	4	15-6, 15-7
GU _n MOUNT, M150 COMBINATION,	2	11-1
GUN SHIELD	2	11-2
GUNNER'S CONTROL	3	13-77
GUNNER'S CONTROL BOX	1	6-1
GUNNER'S GUARD	2	11-2
HAND TRAVERSING DRIVE	5	19-1
HANGERS	2	10-1
HOUSING ASSEMBLY, HYDRAULIC MOTOR	4 Part of	18-46, 18-47
HYDRAULIC MOTOR	4	18-37
HYDRAULIC PUMP AND MOTOR MOUNT	3	13-52
HYDRAULIC RISER	3	13-11
LEVER ASSEMBLY, TURRET LOCK	5 Part of	20-7, 20-8
LOCK, TURRET TRAVERSE	5	20-1
MAIN ACCUMULATOR	4	16-1
MANIFOLD, EQUILIBRATOR CHARGING	5	22-1
MANUAL ELEVATION ACCUMULATOR	3	13-7
MANUAL ELEVATION PUMP	3	13-58
MOTOR, HYDRAULIC	4	18-37
MOTOR MOUNT, HYDRAULIC PUMP AND	3	13-52
MOUNT, 165-MM COMBINATION GUN	2	11-I
No-BAK	4	18-7
OIL FILTER	3	13-40
OIL RESERVOIR	3	13-47
PISTON AND SHAFT ASSEMBLY, HYDRAULIC MOTOR	4 Part of	18-46, 18-47
PLATFORM, TURRET	1	2-2
POWER AND SEARCHLIGHT RELAY BOX (10905722 OR 11654980), TURRET	1	5-1
POWER PACK	3 Part of	13-1, 13-2
PUMP, MANUAL ELEVATION	3	13-58
PUMP, HYDRAULIC, AND MOTOR MOUNT	3	13-52
RACE ASSEMBLY, INNER BEARING	4 Part of	17-6, 17-7
RACE RING, TURRET	4	17-1
RECOIL MECHANISM	2	11-2
RELAY BOX (10905722 OR 16654980), TURRET POWER AND SEARCHLIGHT	1	5-1
RELIEF VALVE	3	13-25
REPLENISHER	2	11-26
RESERVOIR, OIL	3	13-47
RISER, HYDRAULIC	3	13-11

INDEX	PART	PARA
SCREW JACK, ELEVATING	2.....	12-17
SHAFT ASSEMBLY, CUPOLA AZIMUTH GEARBOX	2 Part of	12-14, 12-15
SHUTTLE VALVE	3.....	13-18
SLEEVE ASSEMBLY, ELEVATING MECH	4.....	15-6, 15-7
SLIPRING, TURRET ELECTRICAL	1.....	3-1
SUPPORT, GUNNER'S CONTROL	2 Part of	13-104, 13-105
TERMINAL BOARD ASSEMBLY, CUPOLA	1.....	8-12
TRAVERSE LOCK, TURRET	5.....	20-1
TRAVERSE SHAFT	3 Part of	13-99, 13-100
TRAVERSING DRIVE, HAND	5.....	19-1
TRAVERSING GEAR BOX	4	18-49
TRAVERSING MECHANISM, TURRET	4 Part of	18-1, 18-2
TRUNNION, A-FRAME LEFT	5.....	27-1
TRUNNION, A-FRAME RIGHT	5	26-1
TURRET	1.....	2-1
TURRET ELECTRICAL SLIPRING	1	3-1
TURRET PLATFORM	1	2-2
TURRET POWER AND SEARCHLIGHT RELAY BOX (10905722 OR 11654980)	1	5-1
TURRET RACE RING	4	17-1
TURRET STRUCTURE	1	2-6
TURRET TRAVERSE LOCK	5	20-1
TURRET TRAVERSING MECHANISM	4 Part of	18-1, 18-2
TURRET VENTILATING BLOWER	1.....	7-1
VALVE, DIRECTIONAL CONTROL	5	25-1
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

DISTRIBUTION:

To be distributed in accordance with DA Form 12-37, Direct and General Support Maintenance requirements for Combat Engineer, Full-Track, M728 Vehicle.



SOMETHING WRONG WITH THIS MANUAL?

THEN... JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)
 Your mailing address.
 DATE Date you fill out this form.

PUBLICATION NUMBER: **TM 9-XXXX-XXX-XX** DATE: **Date of TM** TITLE: **Title of TM**

BE EXACT... PIN-POINT WHERE IT IS				IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
PAGE NO.	PARA GRAPH	FIGURE NO.	TABLE NO.	
3		2		Item 10. Change illustration. Reason: Tube end shown assembled on wrong side of lever cam.
109		51		Item 3. The NSN and P/N are not listed on the AMDF nor the MCRL. Request correct NSN and P/N be furnished.
2-8			2-1	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.
12	1-6a			Since there are both 20- and 30- round magazines for this rifle, data on both should be listed.

SAMPLE

TEAR ALONG DOTTED LINE

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER SIGN HERE:



SOMETHING WRONG WITH THIS MANUAL?

THEN . . . JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER

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

DATE

10 OCT 1980

TITLE

COMBAT ENGINEER VEHICLE, M728, TURRET, PART 2, MA

BE EXACT . . . PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.
----------	------------	------------	-----------

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

TEAR ALONG DOTTED LINE

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

FILL IN YOUR
UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

Commander
US Army Armament Materiel Readiness Command
ATTN: DRSAR-MAS
Rock Island, IL 61299

TEAR ALONG DOTTED LINE

FOLD BACK



SOMETHING WRONG WITH THIS MANUAL?

THEN... JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER

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

DATE

10 OCT 1980

TITLE

COMBAT ENGINEER VEHICLE, M728, TURRET, PART 2, MA

BE EXACT... PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.
----------	------------	------------	-----------

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

TEAR ALONG DOTTED LINE

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

FILL IN YOUR
UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

Commander
US Army Armament Materiel Readiness Command
ATTN: DRSAR-MAS
Rock Island, IL 61299

TEAR ALONG DOTTED LINE

FOLD BACK



SOMETHING WRONG WITH THIS MANUAL?

THEN... JOT DOWN THE DOPE ABOUT IT ON THIS FORM, TEAR IT OUT, FOLD IT AND DROP IT IN THE MAIL!

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER

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

DATE

10 OCT 1980

TITLE

COMBAT ENGINEER VEHICLE, M728,
TURRET, PART 2, MA

BE EXACT... PIN-POINT WHERE IT IS

PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.
----------	------------	------------	-----------

IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:

TEAR ALONG DOTTED LINE

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

FILL IN YOUR
UNIT'S ADDRESS

FOLD BACK

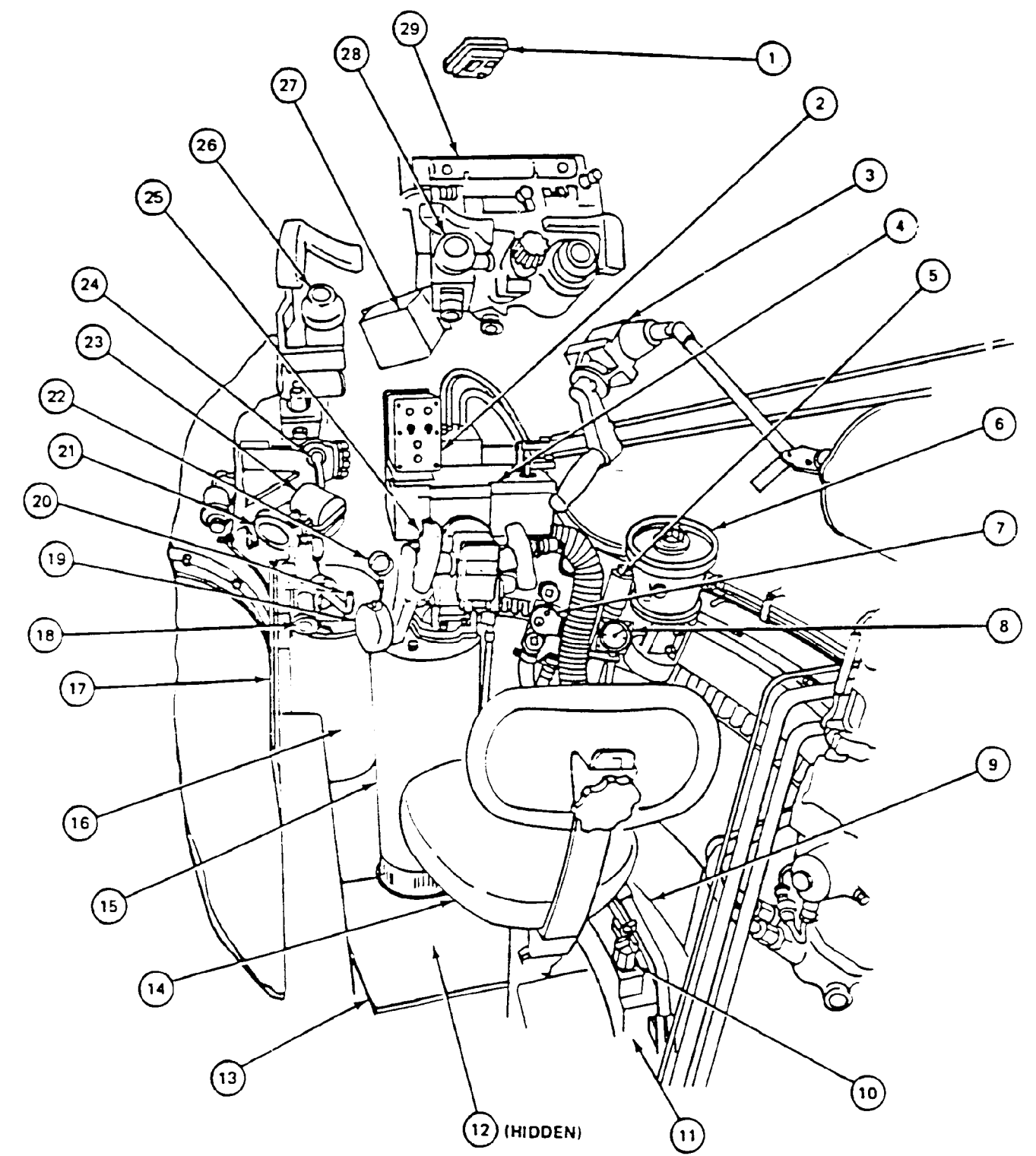
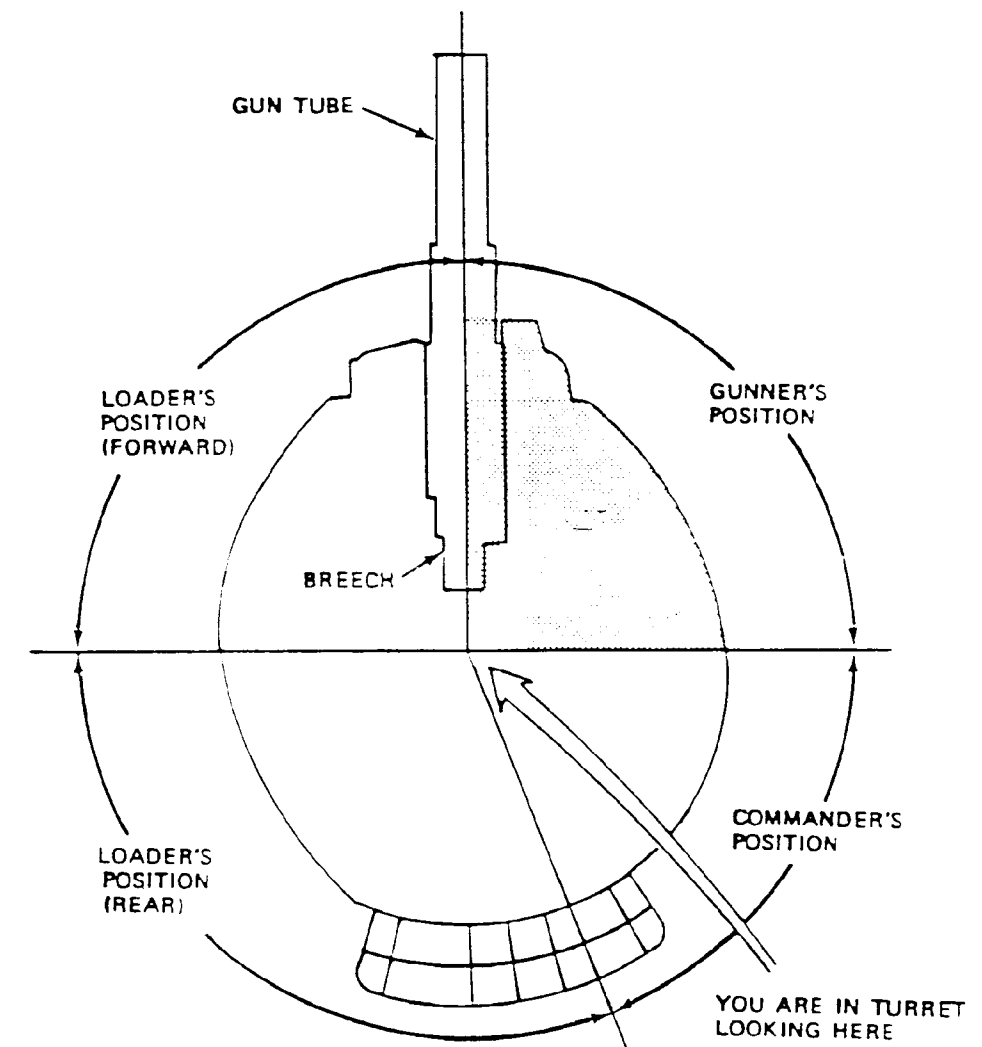
DEPARTMENT OF THE ARMY

Commander
US Army Armament Materiel Readiness Command
ATTN: DRSAR-MAS
Rock Island, IL 61299

FOLD BACK

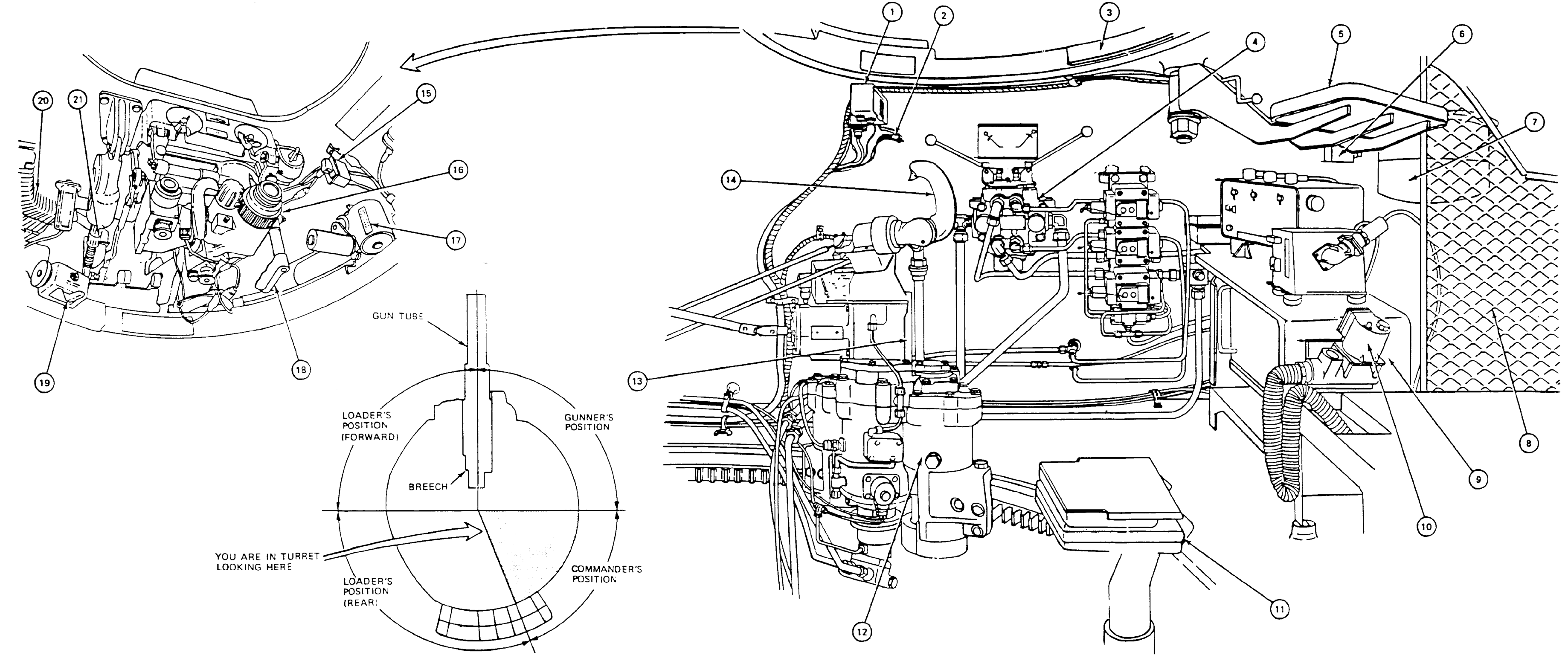
TEAR ALONG DOTTED LINE

- 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

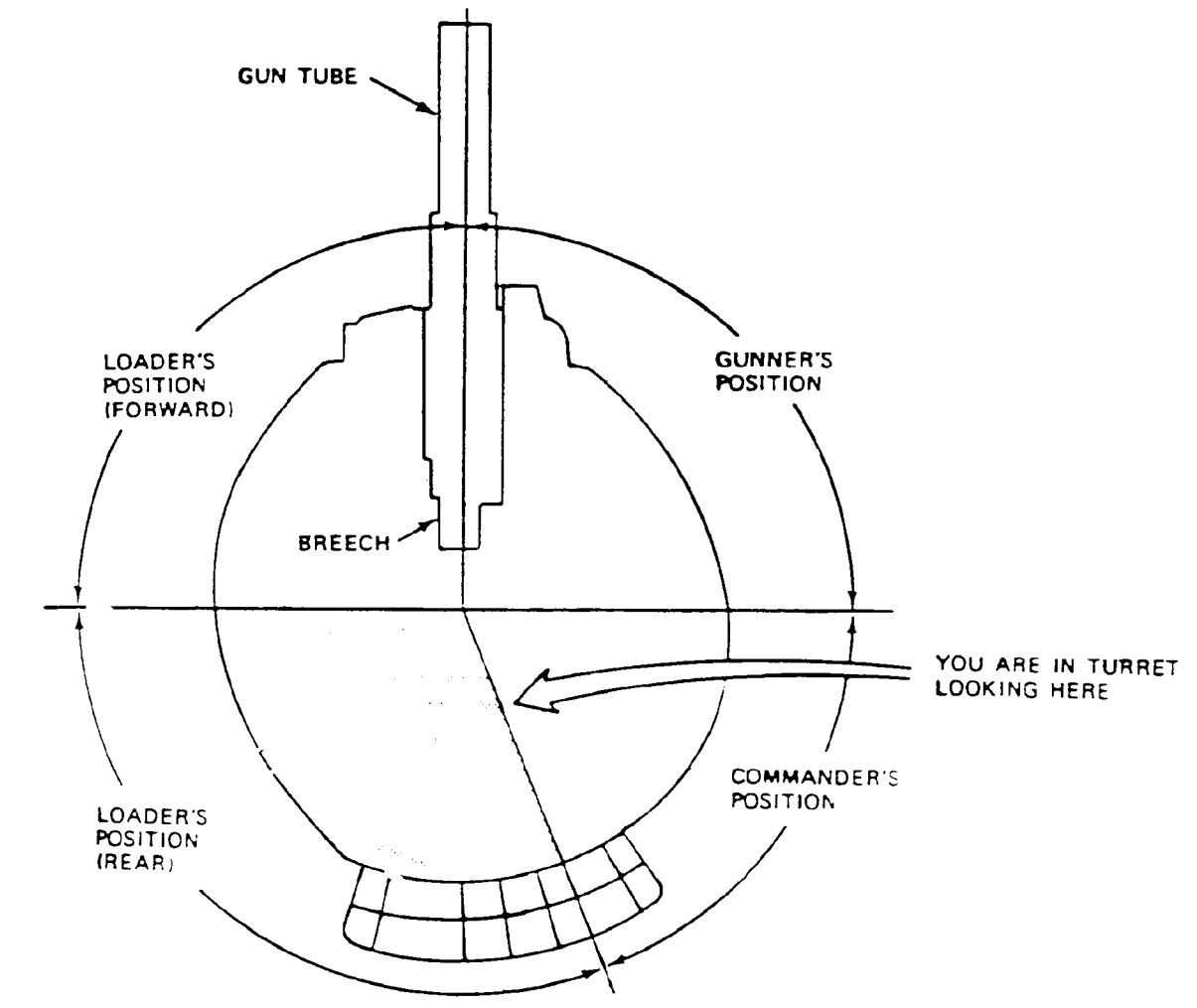


FO-1. EQUIPMENT LOCATION INFORMATION - GUNNER'S POSITION

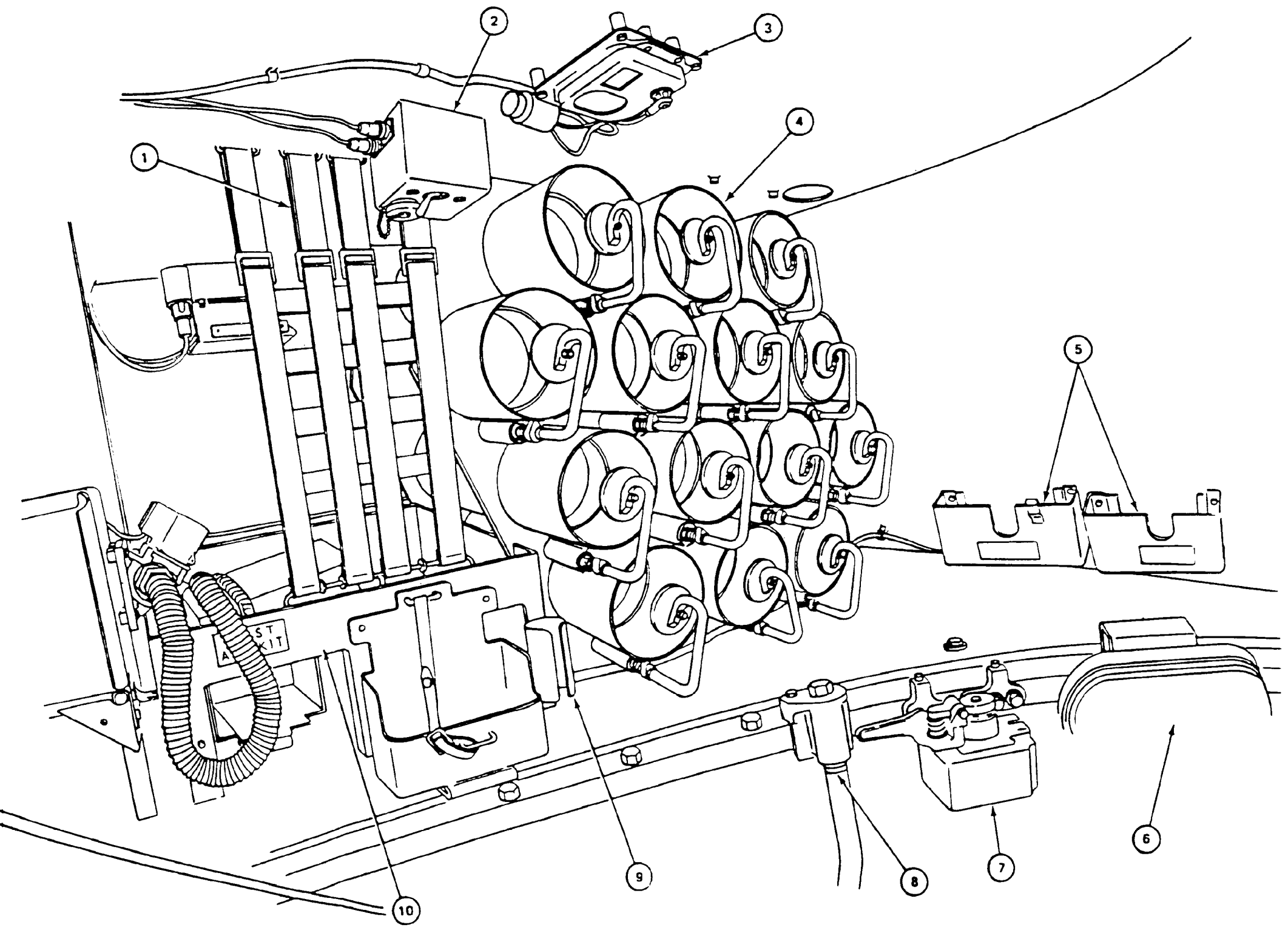
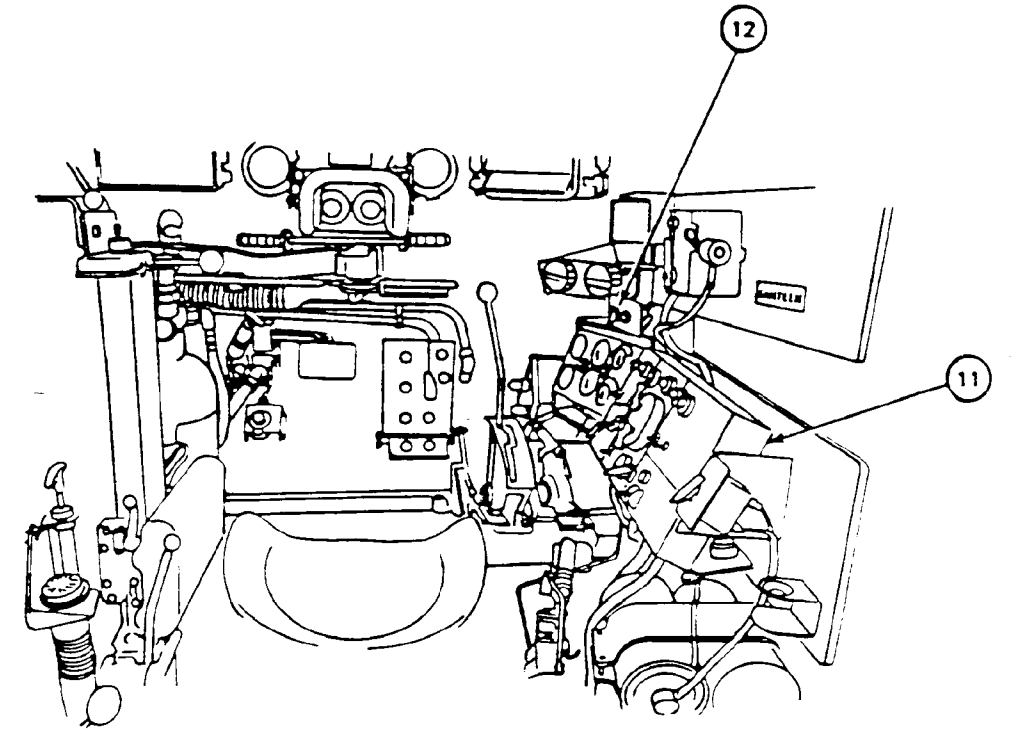
- LEGEND:**
1. INTERPHONE AND CONTROL BOX
 2. CUPOLA ELECTRICAL POWER CONTROL PANEL
 3. BACKREST PAD
 4. WINCH BOOM CONTROL VALVES
 5. COMMANDER'S SWING SEAT
 6. INTERCONNECTING BOX
 7. TURRET VENTILATING BLOWER
 8. ODDMENT TRAY RIGHT SCREEN
 9. TURRET RADIO SUPPORTS
 10. COMMANDER'S ELECTRIC AIR FILTER 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



FO-2. EQUIPMENT LOCATION INFORMATION - COMMANDER'S POSITION

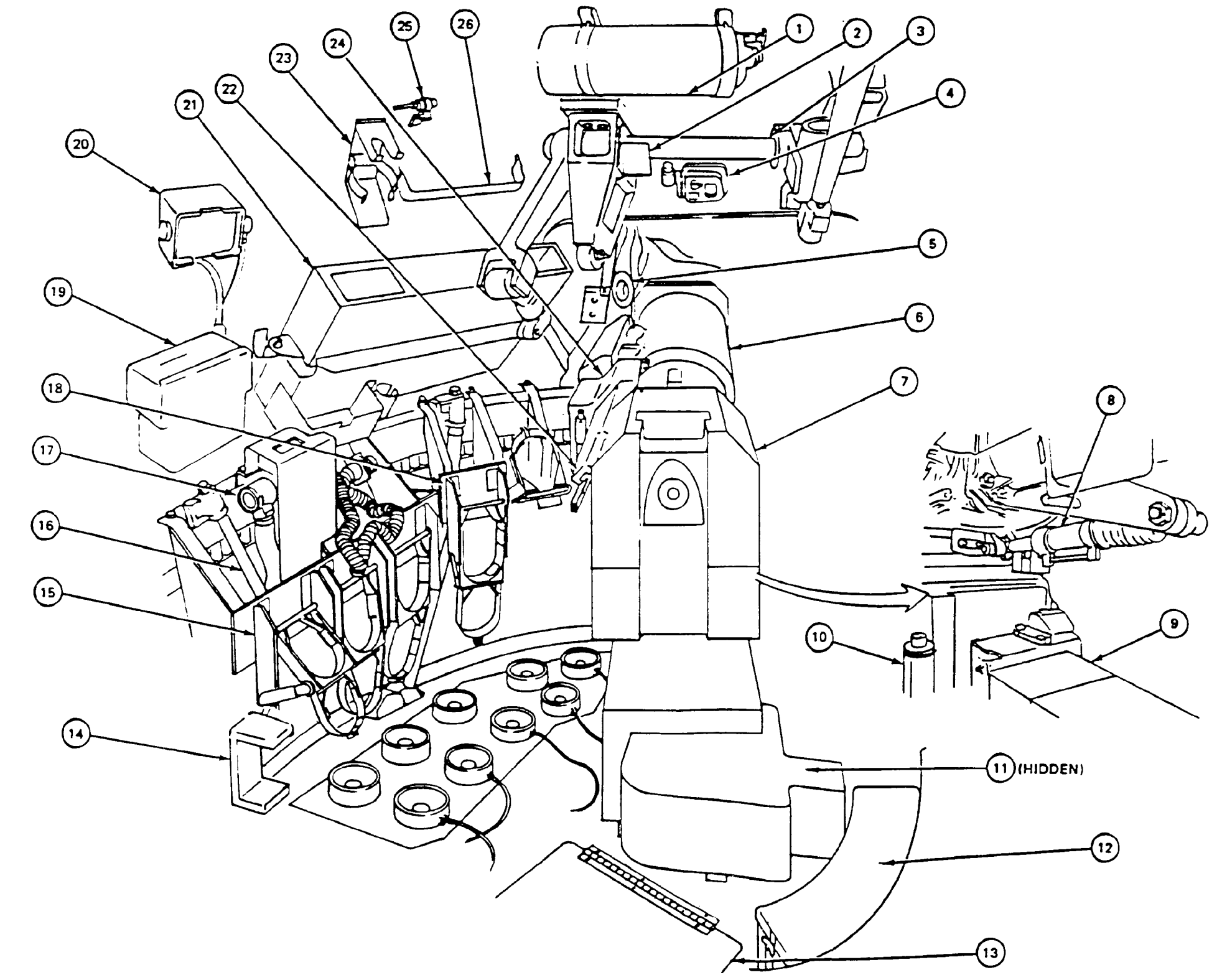
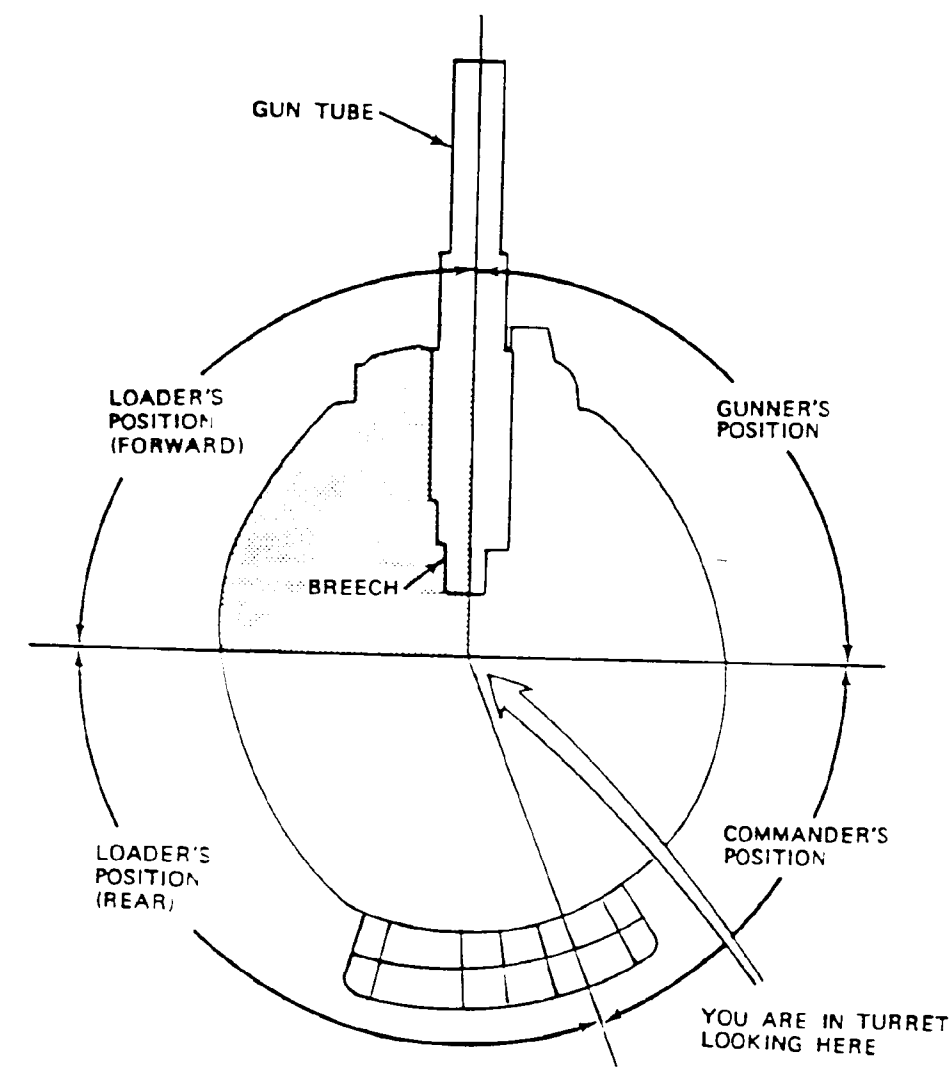


- LEGEND:**
- 1. RADIO GUARD SCREEN
 - 2. TURRET VENTILATING CONTROL BOX
 - 3. COMMANDER'S DOME LIGHT
 - 4. FOURTEEN ROUND AMMUNITION STOWAGE RACK
 - 5. HAND GRENADE STOWAGE BRACKETS
 - 6. LOADER'S SEAT
 - 7. TURRET TRAVERSE LOCK
 - 8. CENTER HANGER
 - 9. FLASHLIGHT TUBE
 - 10. ODDMENT TRAY
 - 11. DRIVER'S MASTER CONTROL PANEL
 - 12. HYDRAULIC PUMP PANEL



FO-3. EQUIPMENT LOCATION INFORMATION - LOADER'S POSITION REAR

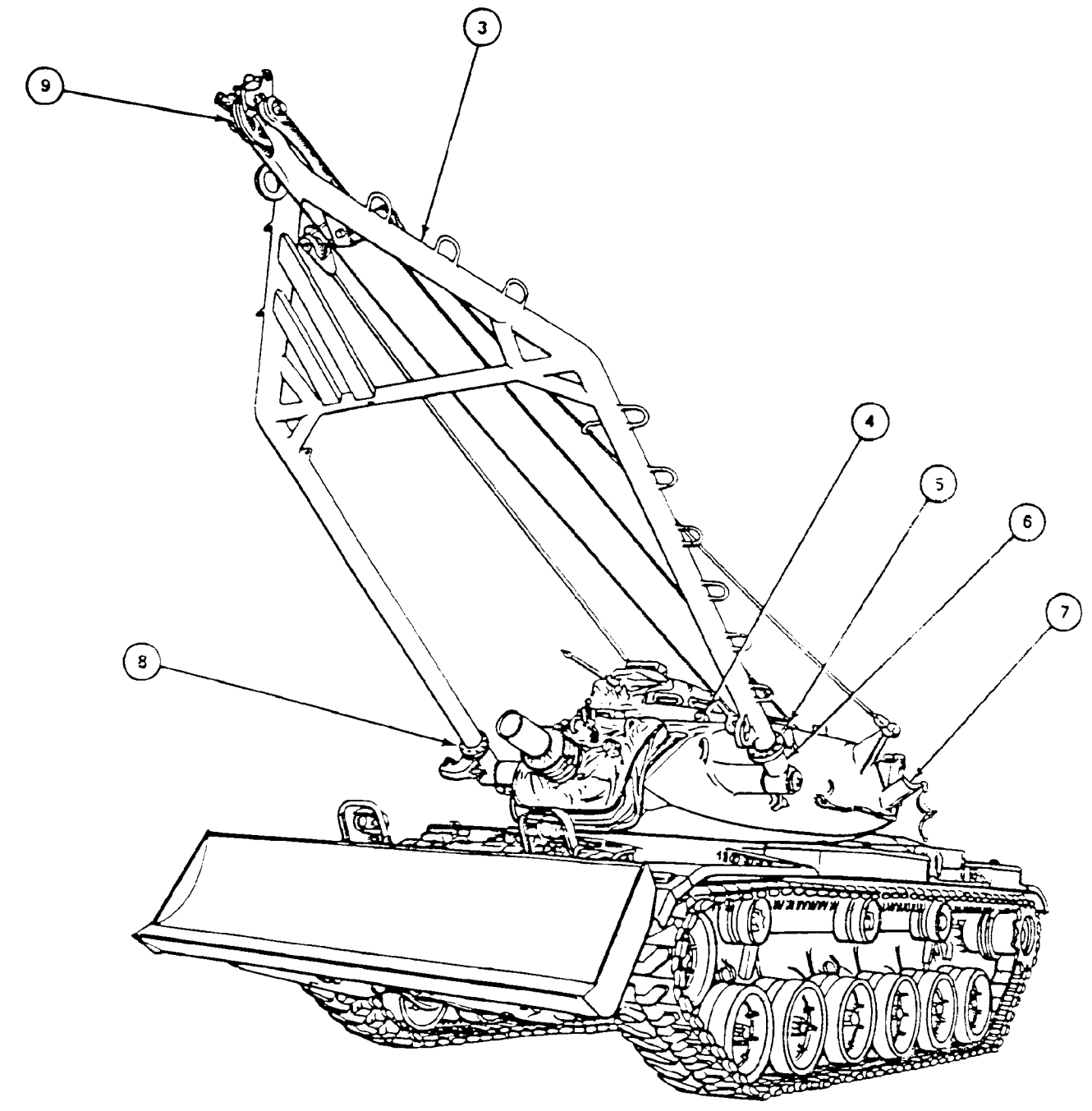
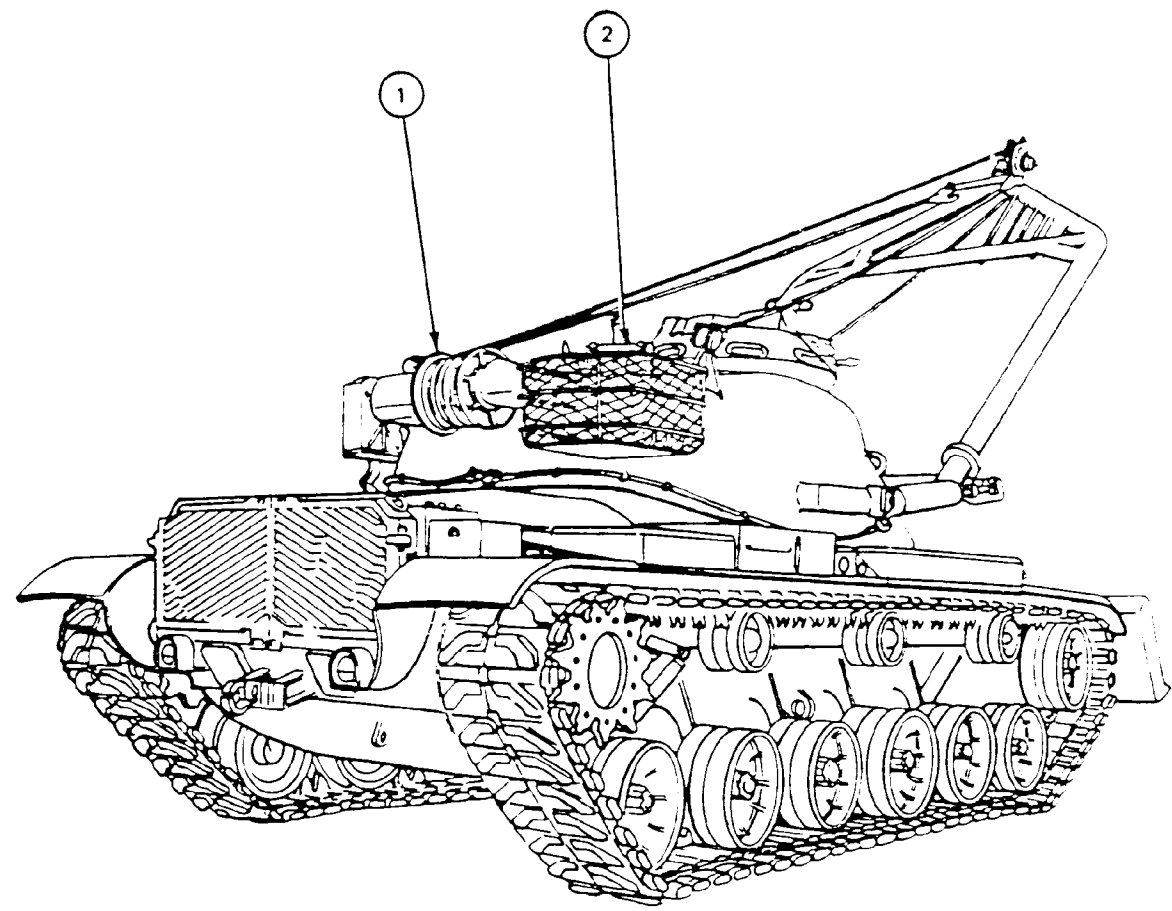
- LEGEND:
1. REPLENISHER
 2. GUN ELEVATION INTERFERENCE SWITCH
 3. BALLISTIC DRIVE
 4. LOADER'S DOMELIGHT
 5. MACHINE GUN MOUNT
 6. 165-MM GUN
 7. BREECH
 8. ELEVATING MECHANISM
 9. PERISCOPE STOWAGE BOX
 10. EQUILIBRATOR ACCUMULATOR
 11. ELECTRICAL SLIPRING
 12. CALIBER .50 AMMUNITION BOXES
 13. BATTERY ACCESS DOOR
 14. FIRE EXTINGUISHER MOUNTING BRACKET
 15. 165-MM SIX ROUND AMMUNITION RACK
 16. LEFT HANGER
 17. LOADER'S ELECTRIC AIR FILTER HEATER
 18. 165-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 FO-4

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



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

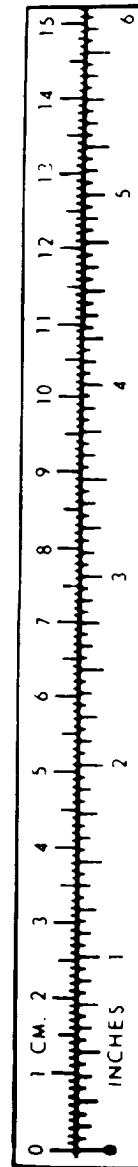
TEMPERATURE

$5/9 (F - 32) = C$
 212° Fahrenheit is equivalent to 100° Celsius
 90° Fahrenheit is equivalent to 32° Celsius
 32° Fahrenheit is equivalent to 0° Celsius
 $9/5 C + 32 = F$

APPROXIMATE CONVERSION FACTORS

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Inches	Centimeters	2.540
Feet	Meters	0.305
Yards	Meters	0.914
Miles	Kilometers	1.609
Square Inches	Square Centimeters	6.451
Square Feet	Square Meters	0.093
Square Yards	Square Meters	0.836
Square Miles	Square Kilometers	2.590
Acres	Square Hectometers	0.405
Cubic Feet	Cubic Meters	0.028
Cubic Yards	Cubic Meters	0.765
Fluid Ounces	Milliliters	29.573
Pints	Liters	0.473
Quarts	Liters	0.946
Gallons	Liters	3.785
Ounces	Grams	28.349
Pounds	Kilograms	0.454
Short Tons	Metric Tons	0.907
Pound-Feet	Newton-Meters	1.356
Pounds per Square Inch	Kilopascals	6.895
Miles per Gallon	Kilometers per Liter	0.425
Miles per Hour	Kilometers per Hour	1.609

<u>TO CHANGE</u>	<u>TO</u>	<u>MULTIPLY BY</u>
Centimeters	Inches	0.394
Meters	Feet	3.280
Meters	Yards	1.094
Kilometers	Miles	0.621
Square Centimeters	Square Inches	0.155
Square Meters	Square Feet	10.764
Square Meters	Square Yards	1.196
Square Kilometers	Square Miles	0.386
Square Hectometers	Acres	2.471
Cubic Meters	Cubic Feet	35.315
Cubic Meters	Cubic Yards	1.308
Milliliters	Fluid Ounces	0.034
Liters	Pints	2.113
Liters	Quarts	1.057
Liters	Gallons	0.264
Grams	Ounces	0.035
Kilograms	Pounds	2.205
Metric Tons	Short Tons	1.102
Newton-Meters	Pound-Feet	0.738
Kilopascals	Pounds per Square Inch	0.145
Kilometers per Liter	Miles per Gallon	2.354
Kilometers per Hour	Miles per Hour	0.621



TA089991

