

TECHNICAL MANUAL
 DIRECT SUPPORT AND
 GENERAL SUPPORT
 MAINTENANCE MANUAL INCLUDING
 REPAIR PARTS AND
 SPECIAL TOOLS LIST
 VOLUME I - TROUBLESHOOTING
 VOLUME II - MAINTENANCE

QUADRANT, FIRE CONTROL:
 ELEVATION

- M13A1 (1290-00-703-6262)
- M13A1C (1290-00-078-5568)
- M13A3 (1290-00-856-9451)
- M13B1 (1290-00-870-6276)

NOTE:
 THE STYLE OF THIS TM
 IS EXPERIMENTAL. IT IS BEING
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 ON A LIMITED BASIS

PART I TROUBLESHOOTING	CHAPTER 1	
	INTRODUCTION	1-1
	CHAPTER 2	
	TROUBLESHOOTING	2-1

	CHAPTER 1	
	INTRODUCTION	1-1
	CHAPTER 2	
	GENERAL MAINTENANCE INFORMATION	2-1
	CHAPTER 3	
	INSPECTION UPON RECEIPT	3-1
PART II MAINTENANCE	CHAPTER 4	
	MAINTENANCE PROCEDURES	4-1
	CHAPTER 5	
	FINAL INSPECTION	5-1
PART II MAINTENANCE	CHAPTER 6	
	PACKAGING	6-1
PART II MAINTENANCE	APPENDIX A	
	EXPENDABLE SUPPLIES AND MATERIALS LIST	A-1
PART II MAINTENANCE	APPENDIX B	
	MAINTENANCE TASK INDEX	B-1
PART II MAINTENANCE	APPENDIX C	
	FABRICATED TOOLS	C-1
PART II MAINTENANCE	APPENDIX D	
	REPAIR PARTS AND SPECIAL TOOLS LIST	D-1

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 DESTROY SUPERSEDED PAGES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

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 108 CONSISTING OF THE FOLLOWING:

Page No.	*Change No.	Page No.	*Change No.
Cover . . . . .	.0	4 - 5- 4-17 . . . . .	.0
Blank . . . . .	.0	4-18 Blank . . . . .	.0
A . . . . .	.0	4-19 - 4-33. . . . .	.0
BBlank. . . . .	.0	4-34 Blank . . . . .	.0
i-v . . . . .	.0	5- 1- 5-3 . . . . .	.0
vi Blank . . . . .	.0	5-4 Blank. . . . .	.0
		5-5 - 5-7. . . . .	.0
		5-8 Blank. . . . .	.0
		6-1 . . . . .	.0
		6-2 Blank. . . . .	.0
		A-1- A-2. . . . .	.0
		B-1- B-2. . . . .	.0
		C-1 . . . . .	.0
		C-2 Blank. . . . .	.0
		D-1 - D-5. . . . .	.0
		D-6 Blank. . . . .	.0
		D-7- D-11 . . . . .	.0
		D-12 Blank . . . . .	.0
		D-13 - D-15. . . . .	.0
		D-16 Blank . . . . .	.0
		D-17 - D-18. . . . .	.0
		Metric Conversion Chart . . . . .	.0
		Cover . . . . .	.0

**VOLUME I
TROUBLESHOOTING**

**VOLUME II
MAINTENANCE**

*Zero in this column indicates an original page.

Technical Manual
No. 9-1290-232-34&P

HEADQUARTERS,
DEPARTMENT OF THE ARMY
Washington, DC, 19 February 1982

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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:

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

A reply will be furnished to you.

*This manual supersedes TM 9-1290-232-34P, 25 June 1971, and so much as pertains to Direct Support and General Support portion of TM 9-1290-232-35, 6 February 1963.

Paragraph Page

HOW TO USE THIS MANUAL..... v

**VOLUME I
TROUBLESHOOTING**

CHAPTER 1	INTRODUCTION.....		1-1
	Scope.....	1-1	1-1
	Organization.....	1-2	1-1
	How to Troubleshoot.....	1-3	1-2
	Test Equipment.....	1-4	1-4
2.	TROUBLESHOOTING.....		2-1
	Scope.....	2-1	2-1
	Performance Test.....	2-2	2-1

**VOLUME II
MAINTENANCE**

CHAPTER 1.	INTRODUCTION.....		1-1
Section 1.	General.....		1-1
	Scope.....	1-1	1-1
	Organization.....	1-2	1-1
2.	Description and Data.....		1-2
	Physical Description.....	1-3	1-2
	Tabulated Data.....	1-4	1-4
	Differences Between Configurations.....	1-5	1-4
CHAPTER 2.	GENERAL MAINTENANCE INFORMATION.....		2-1
Section 1.	General.....		2-1
	Scope.....	2-1	2-1
2.	Reference Documents.....		2-1
	General Maintenance	2-2	2-1
	Cleaning.....	2-3	2-1
	Painting.....	2-4	2-1
	Sealing.....	2-5	2-1
	Lubrication.....	2-6	2-1
Section 3.	Safety Procedures.....		2-1
	General Procedure.....	2-7	2-1
4.	Special Tools and Test Equipment.....		2-2
	Tools and Test Equipment.....	2-8	2-2
CHAPTER 3.	INSPECTION UPON RECEIPT.....		3-1
	Scope.....	3-1	3-1
	Inspection Upon Receipt.....	3-2	3-1

		Paragraph	Page
CHAPTER 4.	MAINTENANCE PROCEDURES		4-1
Section 1.	Scope		4-1
	List of Elevation Fire Control Quadrant		
	Items Contained in This Chapter	4-2	4-1
2.	Level Vial Tube		4-2
	Level Vial Tube Maintenance Procedures		
	Index	4-3	4-2
	Level Vial Tube Removal	4-4	4-2
	Level Vial Tube Installation	4-5	4-5
3.	Scale Dial		4-8
	Scale Dial Maintenance Procedures Index	4-6	4-8
	Scale Dial Removal	4-7	4-8
	Scale Dial Installation	4-8	4-10
4.	Micrometer		4-12
	Micrometer Maintenance Procedures Index	4-9	4-12
	Micrometer Disassembly	4-10	4-12
	Micrometer Assembly	4-11	4-14
5.	Worm Shaft		4-16
	Worm Shaft Maintenance Procedures Index	4-12	4-16
	Worm Shaft Disassembly	4-13	4-16
	Worm Shaft Assembly	4-14	4-22
6.	Housing		4-28
	Housing Maintenance Procedures Index	4-15	4-28
	Housing Disassembly	4-16	4-28
	Housing Assembly	4-17	4-30
7.	Identification Plate		4-32
	Identification Plate Maintenance		
	Procedures Index	4-18	4-32
	Identification Plate Removal	4-19	4-32
	Identification Plate Installation	4-20	4-33
CHAPTER 5.	FINAL INSPECTION		5-1
	Scope	5-1	5-1
	Final Adjustment	5-2	5-2
	Final Inspection	5-3	5-6
6.	PACKAGING		6-1
	Scope	6-1	6-1
	Packaging	6-2	6-1
	Disposal of Radioactive Devices	6-3	6-1

		Paragraph	Page	Figure
APPENDIX A.	EXPENDABLE SUPPLIES AND MATERIALS LIST.....		A-1	
Section 1.	Introduction.....		A-1	
	Scope.....	A-1	A-1	
	Explanation of Columns.....	A-2	A-1	
2.	Expendable Supplies and Materials.....		A-2	
APPENDIX B.	MAINTENANCE TASK INDEX.....		B-1	
	Scope.....	B-1	B-1	
	Maintenance Task Index.....	B-2	B-2	
C.	FABRICATED TOOLS.....		C-1	
	Scope.....	C-1	C-1	
	Level Vial Wrench.....	C-2	C-1	
D.	DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST.....		D-1	
Section I.	Introduction.....		D-1	
II.	Repair Parts List.....		D-7	
Group 00	Fire Control Quadrant, M13A1 8642402, M13A1C 8286737, M13A3 7695046, M13B1 8270843 (overall view).....		D-9	D-1
00	Fire Control Quadrant, M13A1 8642402, M13A1C 8286737, M13A3 7695046, M13B1 8270843 (partial view).....		D - 13	D - 2
Section III.	Special Tools List (Not applicable).....		D-15	
IV.	National Stock Number and Part Number Index		D-17	

HOW TO USE THIS MANUAL

This manual has two volumes of maintenance information you will need to repair and service the M13A1, M13A1C, M13A3 and M13B1 Elevation Fire Control Quadrants.

- Volume I - Troubleshooting
- Volume II - Maintenance

The organization paragraph in each volume tells you what information you can find in each chapter and appendix.

There are four ways to find any maintenance information you need:

- Index on the front cover which tells what information is contained in each chapter
- Table of Contents located at the front of the manual which has a complete listing by paragraph number and page number
- Performance Test (Vol I, Chap 2)
- Maintenance Task Index (Vol II, App B) which lists major assemblies, subassemblies and paragraph numbers of all maintenance procedures

Before doing any maintenance, you should read and understand HOW TO TROUBLESHOOT on page 1-3. If you do not know the equipment well, you should read the section on description and data (Vol II, Chap 1).

Throughout the manual reference is made to a Job Performance Guide 113-091-9000R (JPG 41C) which helps you to develop skills in doing the maintenance tasks.

TECHNICAL MANUAL

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VOLUME I - TROUBLESHOOTING

QUADRANT, FIRE CONTROL:
ELEVATION

M13A1
M13A1C
M13A3
M13B1

CHAPTER 1

INTRODUCTION

1-1. SCOPE

This volume contains troubleshooting requirements for direct support and general support (DS/GS) of the M13A1, M13A1C, M13A3, and M13B1 Elevation Fire Control Quadrant. Because this unit is completely mechanical, the troubleshooting procedures are given in the form of a performance test. The performance test checks if the unit is operating correctly and helps you find the fault symptom. It also tells you what maintenance action is required to fix your fault.

1-2. ORGANIZATION

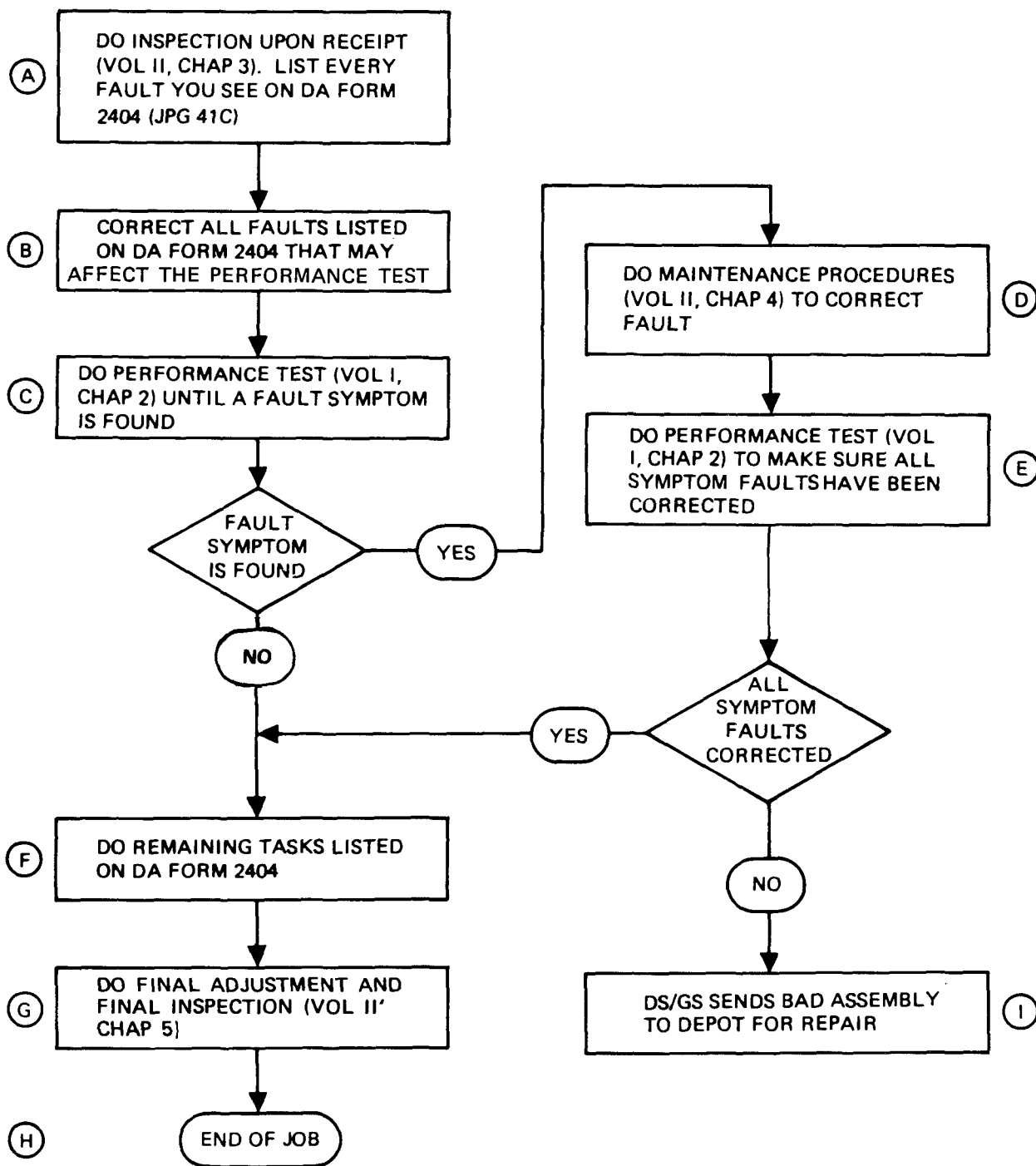
All troubleshooting requirements for checking out the elevation fire control quadrant and finding fault symptoms are given in Chapter 2. Information on how to troubleshoot is in paragraph 1-3.

1-3. HOW TO TROUBLESHOOT

The following steps tell you how to troubleshoot. A diagram of these steps is on page 1-3.

- A Do a visual check of the elevation fire control quadrant and list any faults on DA Form 2404 before making repairs. See Vol II, Chap 3 for what to check for.
- B If you see any faults that may affect the performance test, fix them now. This does not mean small things like painting scratches.
- C Do the performance test in Vol I, Chap 2 from the beginning until you find a fault symptom.
- D When a fault symptom is found, go to the chapter noted and follow the maintenance procedure given there.
- E After the fault symptom has been corrected, do the performance in Chapter 2 again. This is to make sure that all fault symptoms have been corrected.
- F If all fault symptoms are now corrected, do the remaining maintenance tasks on DA Form 2404.
- G Do the final inspection in Chapter 5. Some of the maintenance procedures also require that you do the final adjustment procedure.
- H The job is over and the good assembly is sent back to service.
- I If all fault symptoms were not corrected after step E, the bad assembly is sent back to the depot for repair.

1-3. HOW TO TROUBLESHOOT (CONT)



1-4. TEST EQUIPMENT

No special test equipment is needed to do the performance test on the elevation fire control quadrant.

CHAPTER 2

TROUBLESHOOTING

2-1. SCOPE

Troubleshooting of the M13A1, M13A1C, M13A3, or M13B1 Elevation Fire Control Quadrant is done by using the following performance test. If you find any symptom, look in the maintenance action column to find out what to do to correct it.

2-2. PERFORMANCE TEST

TOOLS: 6" C-clamps (two)

Fire control gunner's quadrant M1A1

Bench level

Surface plate

Angle plate

3/16" key

SUPPLIES: Angle plate support (item 7, Vol II, App A)

PERSONNEL: One

REFERENCES: JPG 41C for: Using bench level

Cross leveling surface plate

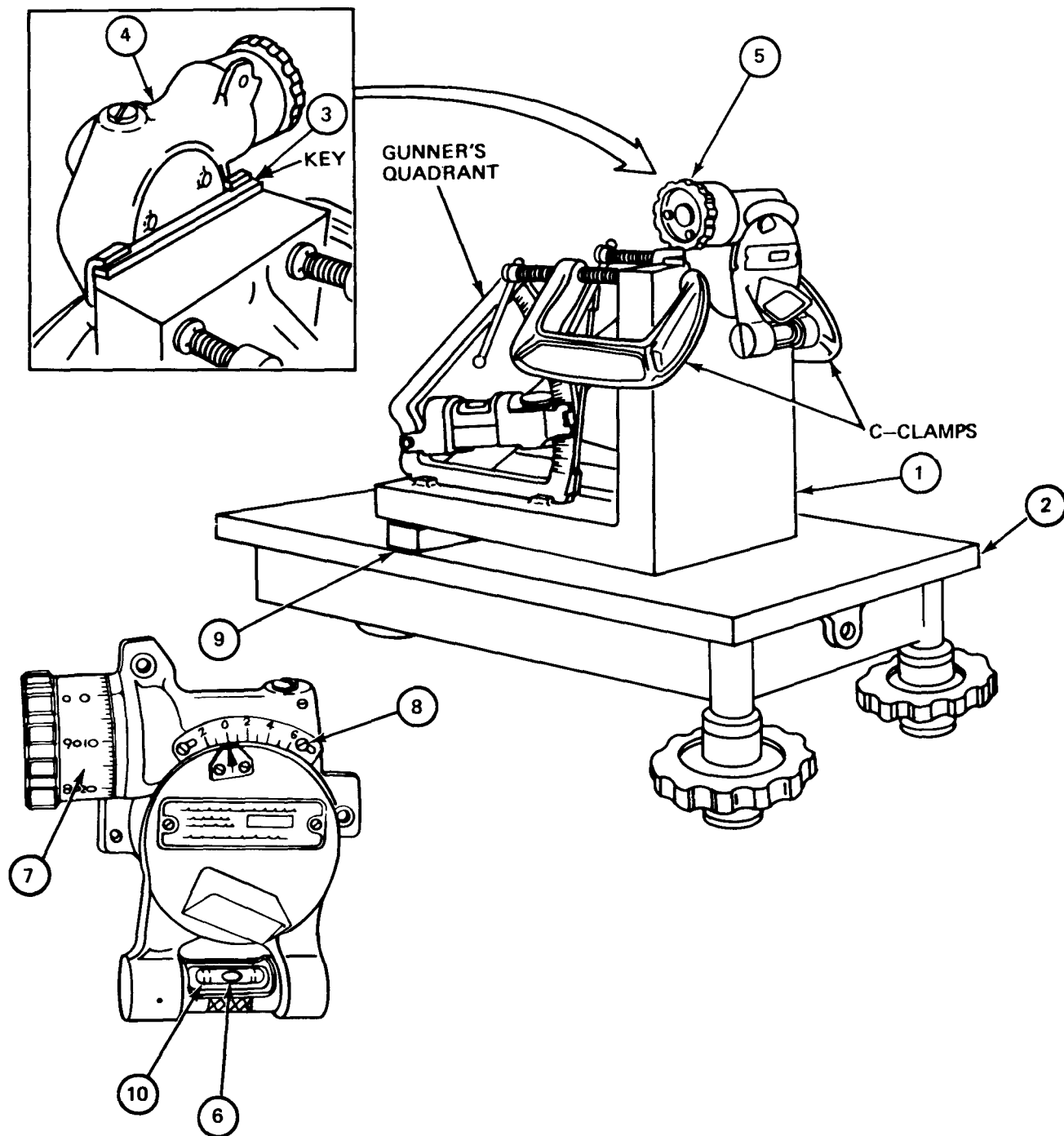
TM 9-1290-200-14&P for using M1A1 gunner's quadrant

EQUIPMENT CONDITION: Elevation fire control quadrant on work bench

2-2. PERFORMANCE TEST (CONT)

FRAME 1			
Step	Procedure	Maintenance Action	Reference
1.	Place angle plate (1) on surface plate (2).	. . .	. . .
2.	Using bench level, level surface plate (2) (JPG).	. . .	JPG 41C
3.	Place key in keyway at rear of mounting surface (3) of elevation fire control quadrant (4).	. . .	. . .
4.	Using two C-clamps, clamp elevation fire control quadrant (4) with key on upper surface of angle plate (1).	. . .	. . .
5.	Turn elevation knob (5) until level vial bubble (6) is centered.	If scales (7) and (8) do not indicate "O" adjust scales to zero	Vol II, para 5-2, frame 1, steps 5 thru 7 and frame 2, steps 1 thru 3
6.	Place gunner's quadrant on angle plate (1) and set to 178 roils (JPG).	. . .	JPG 41C
7.	Raise end of angle plate (1) opposite elevation fire control quadrant (4) clear of surface plate (2) and place support (9) under angle plate (1).	. . .	. . .
8.	Adjust support (9) so that gunner's quadrant bubble is centered.	. . .	TM 9-2350-215-10
9.	Check level vial bubble (6). It must be within 1/2 graduation of center of level vial (10).	Remove angle plate support (9) and do final adjustment. If elevation fire control quadrant cannot be adjusted, send to depot.	Vol II, para 5-2
GO TO FRAME 2			

2-2. PERFORMANCE TEST (CONT)

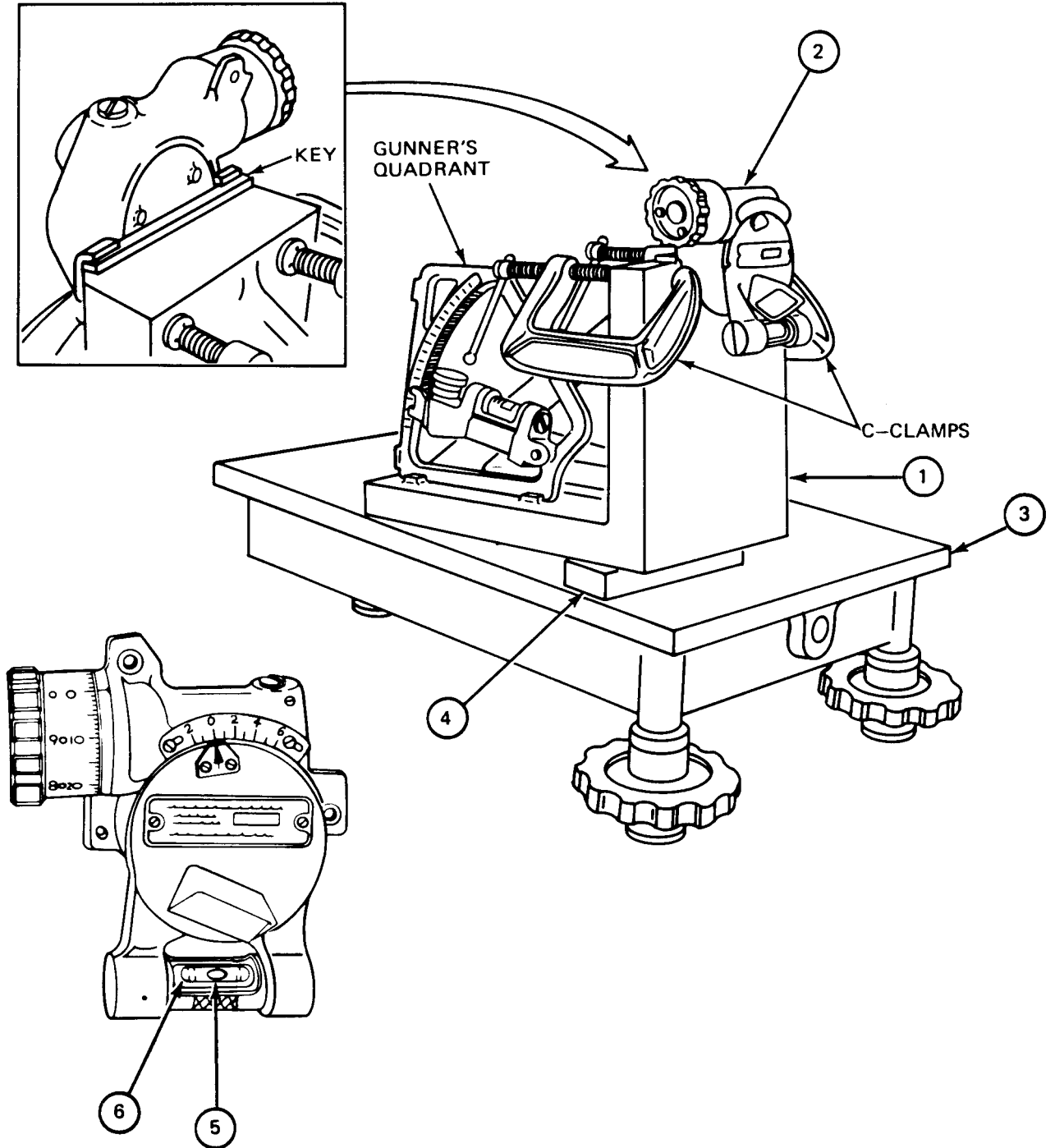


2-2. PERFORMANCE TEST (CONT)

FRAME 2

Step	Procedure	Maintenance Action	Reference
1.	Remove gunner's quadrant from angle plate (1).	. . .	. . .
2.	Raise end of angle plate (1) under elevation fire control quadrant (2) clear of surface plate (3) and place angle plate support (4) under angle plate (1).	. . .	. . .
3.	Set gunner's quadrant to 178 mils if necessary.	. . .	TM 9-2350-215-10
4.	Place gunner's quadrant on angle plate (1).	. . .	. . .
5.	Adjust angle plate support (4) until bubble on gunner's quadrant is centered.	. . .	. . .
6.	Check level vial bubble (5). It must be within 1/2 graduation of center of level vial (6).	Remove angle plate support (4) and do final adjustment. If elevation fire control quadrant cannot be adjusted, send to depot.	Vol II, para 5-2
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">FOLLOW-ON MAINTENANCE</p> <p>Correct the remaining faults listed on DA Form 2404.</p> <p>Do final adjustment (Vol II, para 5-2)</p> <p>Do final inspection (Vol II, para 5-3)</p> <p>END OF TASK</p>			

2-2. PERFORMANCE TEST (CONT)



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VOLUME II- MAINTENANCE

QUADRANT, FIRE CONTROL:
ELEVATION

M13A1
M13A1C
M13A3
M13B1

CHAPTER 1

INTRODUCTION

Section 1. GENERAL

1-1. SCOPE

This volume contains the maintenance requirements and procedures for direct support and general support (DS/GS) maintenance for the M13A1, M13A1C, M13A3 and M13B1 Elevation Fire Control Quadrants. See Volume I for troubleshooting information.

1-2. ORGANIZATION

a. Chapter 2, General Maintenance Information, lists the maintenance items and references general procedures that are necessary to do the maintenance in this manual.

b. Chapter 3, Inspection Upon Receipt, gives the kind of defects to look for when the elevation fire control quadrant is returned to DS/GS. A complete inspection should be made and faults listed on DA Form 2404 before any repairs are made.

c. Chapter 4, Maintenance Procedures, gives step-by-step procedures to repair faults found during inspection or troubleshooting.

d. Chapter 5, Final Inspection, gives procedures to be done after repair to make sure that the elevation fire control quadrant works and is ready for packaging or installation.

e. Chapter 6, Packaging, gives procedures for packaging the elevation fire control quadrant for storage or shipment.

f. Appendix A, Expendable Supplies and Materials List, lists the supplies and materials needed to repair the elevation fire control quadrant.

g. Appendix B, Maintenance Task Index, helps you find the necessary maintenance tasks for the elevation fire control quadrant.

h. Appendix C, Fabricated Tools, tells you how to make the special tools needed to repair the elevation fire control quadrant.

i. Appendix D, Repair Parts and Special Tools List, gives a listing of repair parts, special tools, and support equipment required for the performance of direct support, general support, and depot maintenance of the elevation quadrant.

Section II. DESCRIPTION AND DATA

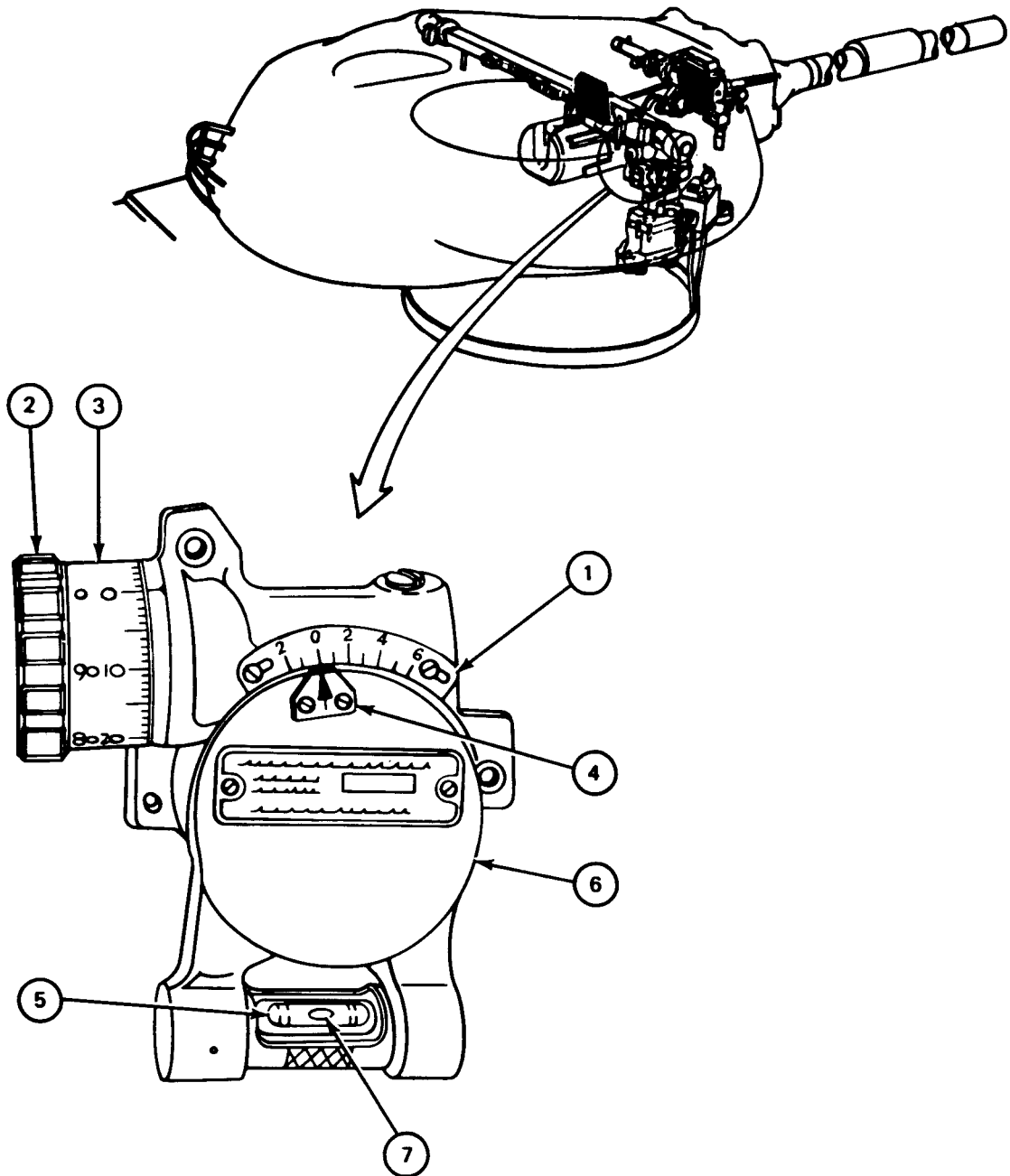
1-3. PHYSICAL DESCRIPTION

The Elevation Fire Control Quadrants M13A1, M13A1C, M13A3 and M13B1 are used with the indirect fire control system to show how much the weapon is elevated or depressed.

The quadrant is made up of an elevation knob and worm shaft, elevation micrometer, level vial tube, reflector (except the M13A3), and elevation scale. The quadrant is used for laying the weapon in elevation or depression during indirect fire.

The scale dial (1) is divided into 100-mil increments from minus 200 to plus 600 mils. An elevation knob (2) with a micrometer attached is used to set in elevation or depression angles. A micrometer scale (3), attached to the elevation knob is divided in 1 mil increments from 0 to 100 mils on two scales which are read in opposite directions. The inner scale (black numbers) is used when setting elevation angles. The outer scale (red numbers) is used when setting depression angles. The scale index (4) and level vial tube (5) are mounted on the housing (6). When the elevation knob (2) is turned, the housing (6) turns and moves the level vial bubble (7) off center. When the weapon has been elevated or depressed enough to put the level vial bubble (7) back in the center, the elevation scale (1) shows the elevation or depression angle of the weapon. Movement of the weapon is sent through linkage to the ballistic drive or the gun recoil guard where the quadrant is mounted. A reflector set at a 45 degree angle over the level vial tube (5) (except M13A3) allows easy viewing of the level vial tube (5) which is above eye level of tank personnel.

1-3. PHYSICAL DESCRIPTION (CONT)



1-4. TABULATED DATA (approximate)

General:

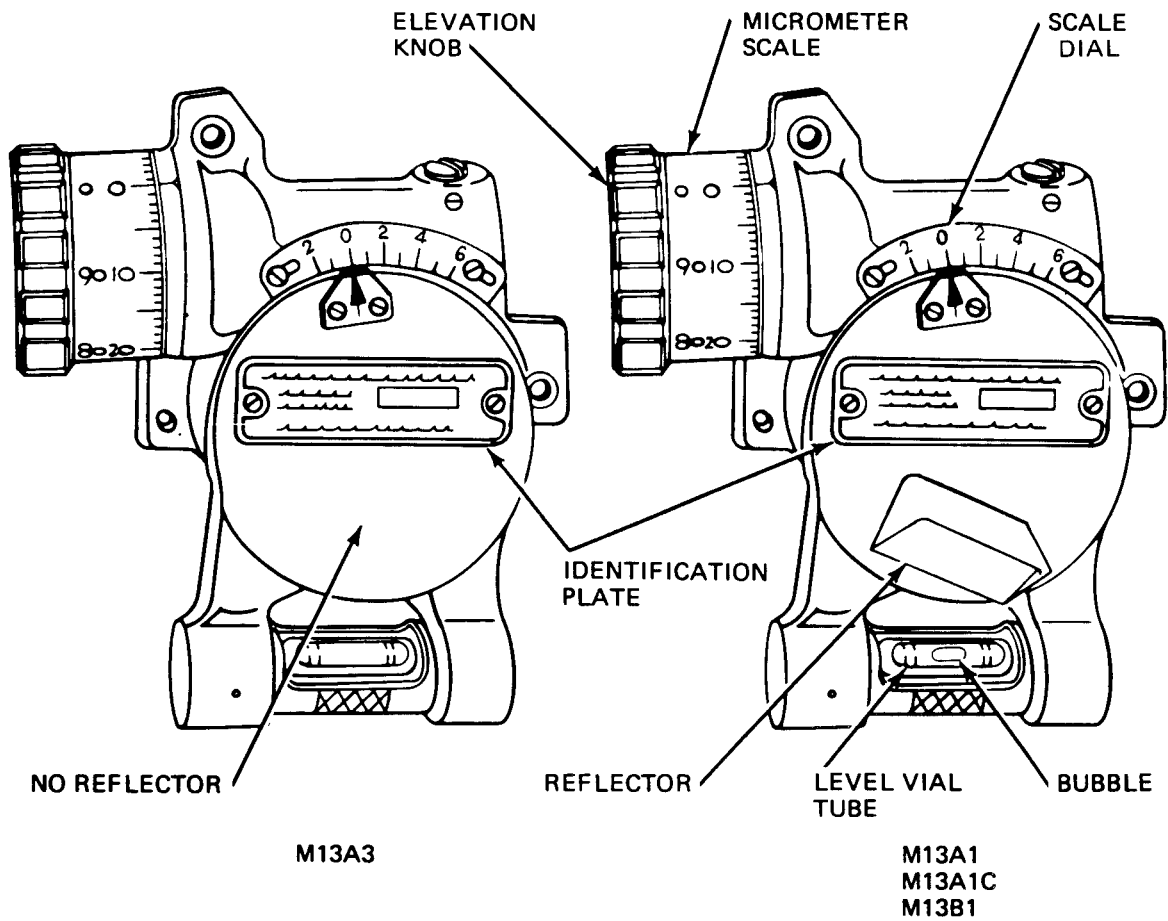
- Length 4-1 /2 inches
- Width 4-3/4 inches
- Height 2 inches
- Weight. 1-3/4 pounds

1-5. DIFFERENCES BETWEEN CONFIGURATIONS

When needed for doing a task, the differences between elevation fire control quadrant configurations will be given in the maintenance procedures. The differences that can be seen between configurations follow:

- a. M13A1 and M13A1C Elevation Fire Control Quadrant differences:
 - 1) The identification plates identify the unit as M13A1 or M13A1C Quadrant
 - 2) Has a reflector mounted on the quadrant housing
- b. M13A3 Elevation Fire Control Quadrant differences:
 - 1) The identification plate identifies it as M13A3
 - 2) Has no reflector
- c. M13B1 Elevation Fire Control Quadrant differences:
 - 1) The identification plate identifies it as M13B1
 - 2) Has a reflector mounted on the quadrant housing

1-5. DIFFERENCES BETWEEN CONFIGURATIONS (CONT)



CHAPTER 2

GENERAL MAINTENANCE INFORMATION

Section 1. GENERAL

2-1. SCOPE

This chapter tells you what special tools and test equipment are needed and where to find general information for the maintenance procedures in this volume.

Section 2. REFERENCE DOCUMENTS

2-2. GENERAL MAINTENANCE

General maintenance procedures for fire control materiel are in TM 9-254 and Job Performance Guide 113-091-9000R (JPG41C).

2-3. CLEANING

General cleaning procedures are in JPG 41C.

2-4. PAINTING

General painting procedures are in TM 43-0139.

2-5. SEALING

General instructions for how to use sealing compounds are in JPG 41C.

2-6. LUBRICATION

General instructions for how to use lubricants are in JPG 41C.

Section 3. SAFETY PROCEDURES

2-7. GENERAL PROCEDURE

General safety procedures are in AR 385-40 Safety Accident Reporting and Records.

Safety procedures for using power supplies and nitrogen tanks are in JPG 41C.

Section 4. SPECIAL TOOLS AND TEST EQUIPMENT

2-8. TOOLS AND TEST EQUIPMENT

Item	National Stock Number (NSN)	Part Number (FSCM)	Use
1. Level Vial Wrench	Fabricated tool (see App C)	. . .	Remove and install level vial ring

CHAPTER 3

INSPECTION UPON RECEIPT

3-1. SCOPE

This chapter gives procedures to check the elevation fire control quadrant for faults you can see when it is received in the DS/GS shop. It also tells you what part of this volume to go to for various repairs. A complete inspection should be made and all faults listed on DA Form 2404 before taking any maintenance actions. The performance test in Volume I, Chapter 2 should be done after doing the inspection upon receipt.

3-2. INSPECTION UPON RECEIPT

TOOLS: Fine file or scraper
3/16", 1/8", 1/4", flat tip screwdriver
.070" jewelers screwdriver
Level vial wrench (App C)
Artist's brush

SUPPLIES: Cloth (item 1, App A)
Primer (item 5, App A)
Paint (item 3, App A)

PERSONNEL: One

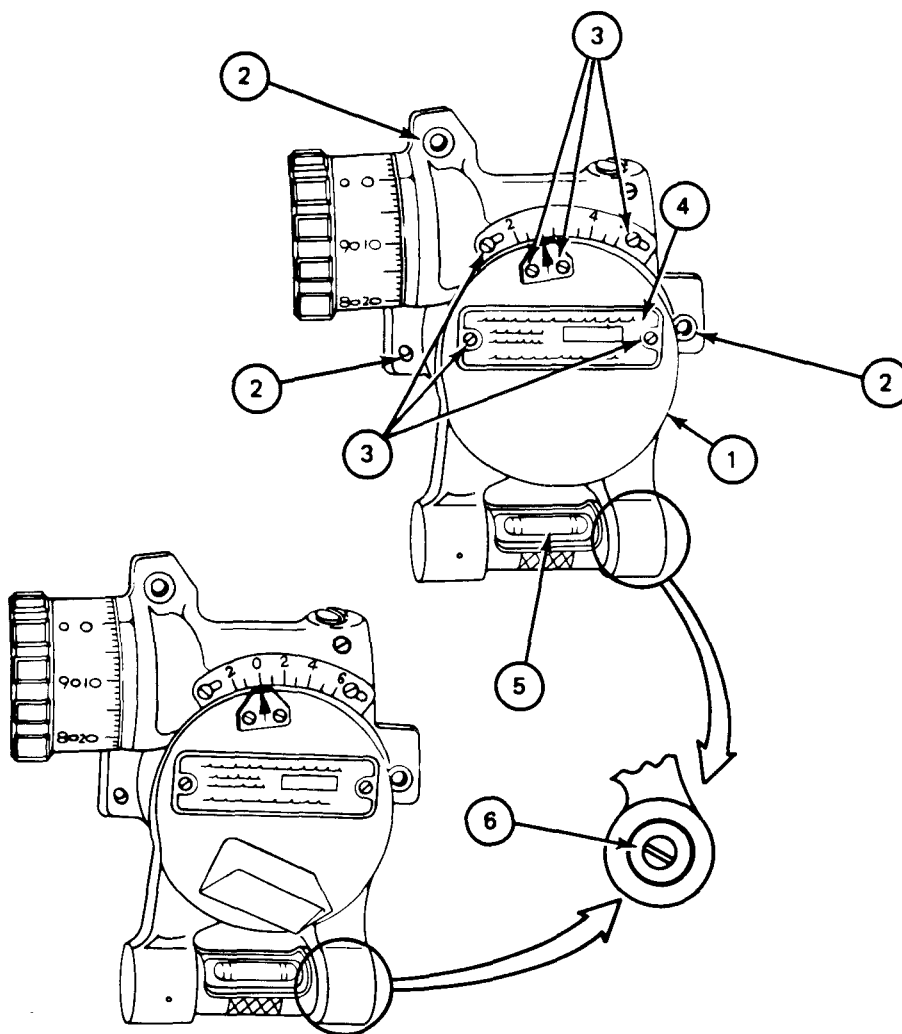
REFERENCES: TM 43-0139 for painting
JPG41C for: Cleaning
Removing nicks and burrs
Completing DA Form 2404

EQUIPMENT CONDITION: Elevation fire control quadrant in vehicle or on work bench

3-2. INSPECTION UPON RECEIPT (CONT)

FRAME 1			
Step	Procedure	Maintenance Action	Troubleshooting Reference
1.	Check elevation fire control quadrant (1) for cracks or dents.	Clean. If cracks or dents are found, tell your supervisor.	JPG 41C
2.	Check mounting surfaces (2) for nicks, burrs or dents.	Remove nicks and burrs. If dents are found, tell your supervisor.	JPG 41C
3.	Using 1/8" flat tip screwdriver, check that six screws (3) are tight.	Tighten or replace if missing.	. . .
4.	Check that identification plate (4) can be read easily.	Clean. For configurations M13A1 and M13A1C, put on new identification plate (3). For configuration M13A3, tell your supervisor.	JPG 41C Para 4-18
5.	Check that level vial tube (5) is not loose or cracked.	Tighten if loose. Replace if cracked (M13A1C and M13A1 only). Send M13A3 or M13B1 to depot for repair.	Para 4-3
6.	Using level vial wrench, check that eccentric ring (6) is tight. GO TO FRAME 2	Adjust and tighten if loose.	Para 5-2

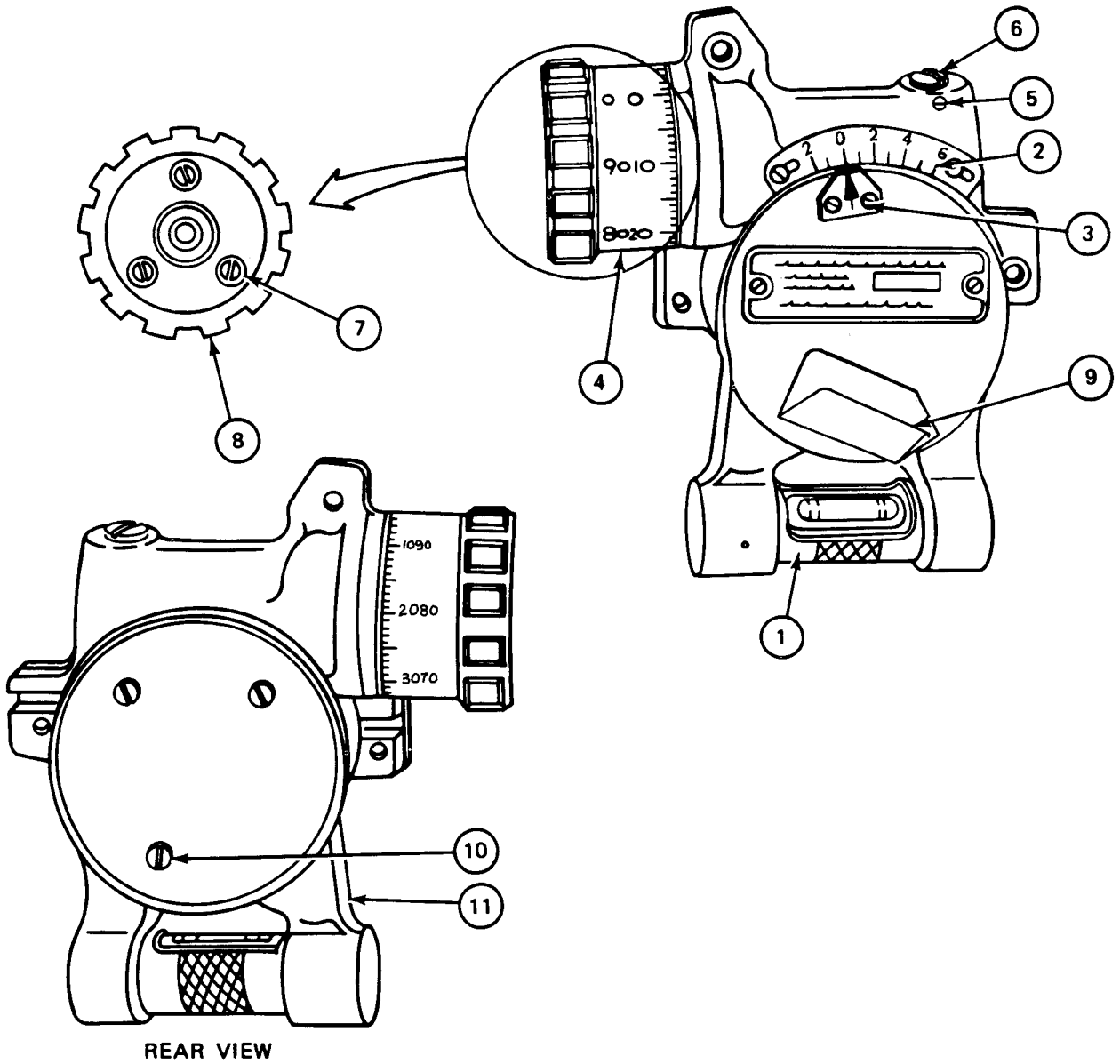
3-2. INSPECTION UPON RECEIPT (CONT)



3-2. INSPECTION UPON RECEIPT (CONT)

FRAME 2			
Step	Procedure	Maintenance Action	Troubleshooting Reference
1.	Check that level vial cover (1) turns easily and is held firmly in the open position and in the closed position.	Adjust level vial cover (1).	Para 4-5
2.	Check that all marks and numbers on dial scale (2), designation plate (3) and micrometer (4) are easy to read.	a. Paint b. Clean Replace if missing marks or number	TM 43-0139 JPG 41C Para 4-6 or 4-9
3.	Using jewelers' screwdriver, check that setscrew (5) is tight.	Tighten if loose or replace if missing.	. . .
4.	Check that plug (6) is tight and held in place by setscrew (5).	Replace if missing.	Para 4-12
5.	Using 3/16" flat tip screwdriver, check that three crews (7) holding knob (8) in place are tight.	Tighten. Replace if missing.	. . .
6.	Turn knob (8) fully clockwise, then fully counterclockwise. Knob (8) must turn smoothly with no binding.	a. Adjust worm shaft bearing. b. Replace elevating worm shaft.	Para 4-12 Para 4-12
7.	Check reflector (9) for fading and scratches (M13A1, M13A1C and M13B1 only).	a. Clean b. Replace	JPG 41C Para 4-15
8.	Using 1/4" flat tip screwdriver, check that three screws (10) are tight.	Tighten. Replace if missing.	. . .
9.	Check elevation fire control quadrant (11) for chipped or scratched paint.	Paint chipped or scratched area.	TM 43-0139
	<p style="text-align: center;">NOTE</p> <p>Correct faults listed on DA Form 2404 that may affect the performance test. Do performance test (Vol I, Chap 2).</p> <p style="text-align: center;">END OF TASK</p>		

3-2. INSPECTION UPON RECEIPT (CONT)



CHAPTER 4

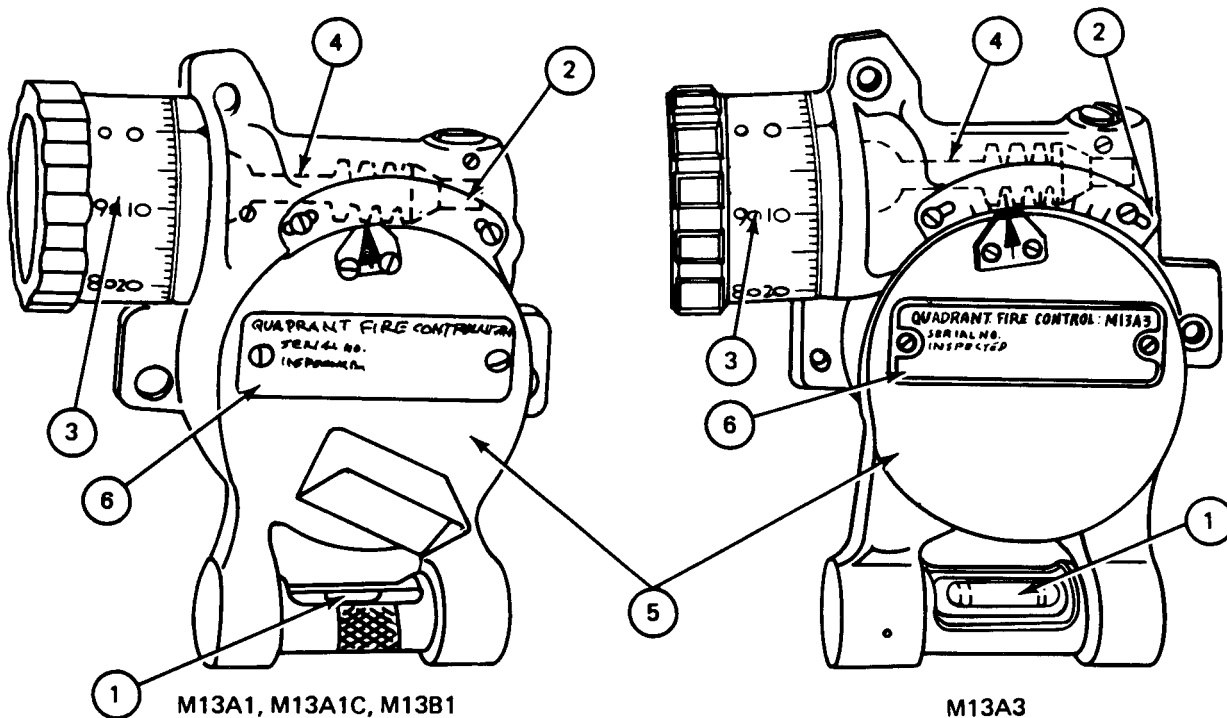
MAINTENANCE PROCEDURES

Section 1. SCOPE

4-1. Chapter 4 gives maintenance procedures for the elevation fire control quadrant.

4-2. LIST OF ELEVATION FIRE CONTROL QUADRANT ITEMS CONTAINED IN THIS CHAPTER

Item	Figure Index No.	Reference (para)
Level Vial Tube	1	4-3
Scale Dial	2	4-6
Micrometer	3	4-9
Worm Shaft (inside of housing)	4	4-12
Housing	5	4-15
Identification Plate	6	4-18



Section 2. LEVEL VIAL TUBE

4-3. LEVEL VIAL TUBE MAINTENANCE PROCEDURES INDEX

Task	Reference (para)
Removal	4-4
Installation	4-5

4-4. LEVEL VIAL TUBE REMOVAL

TOOLS: 1/16" drive pin punch
 4 oz ball peen hammer
 Level vial wrench (App C)

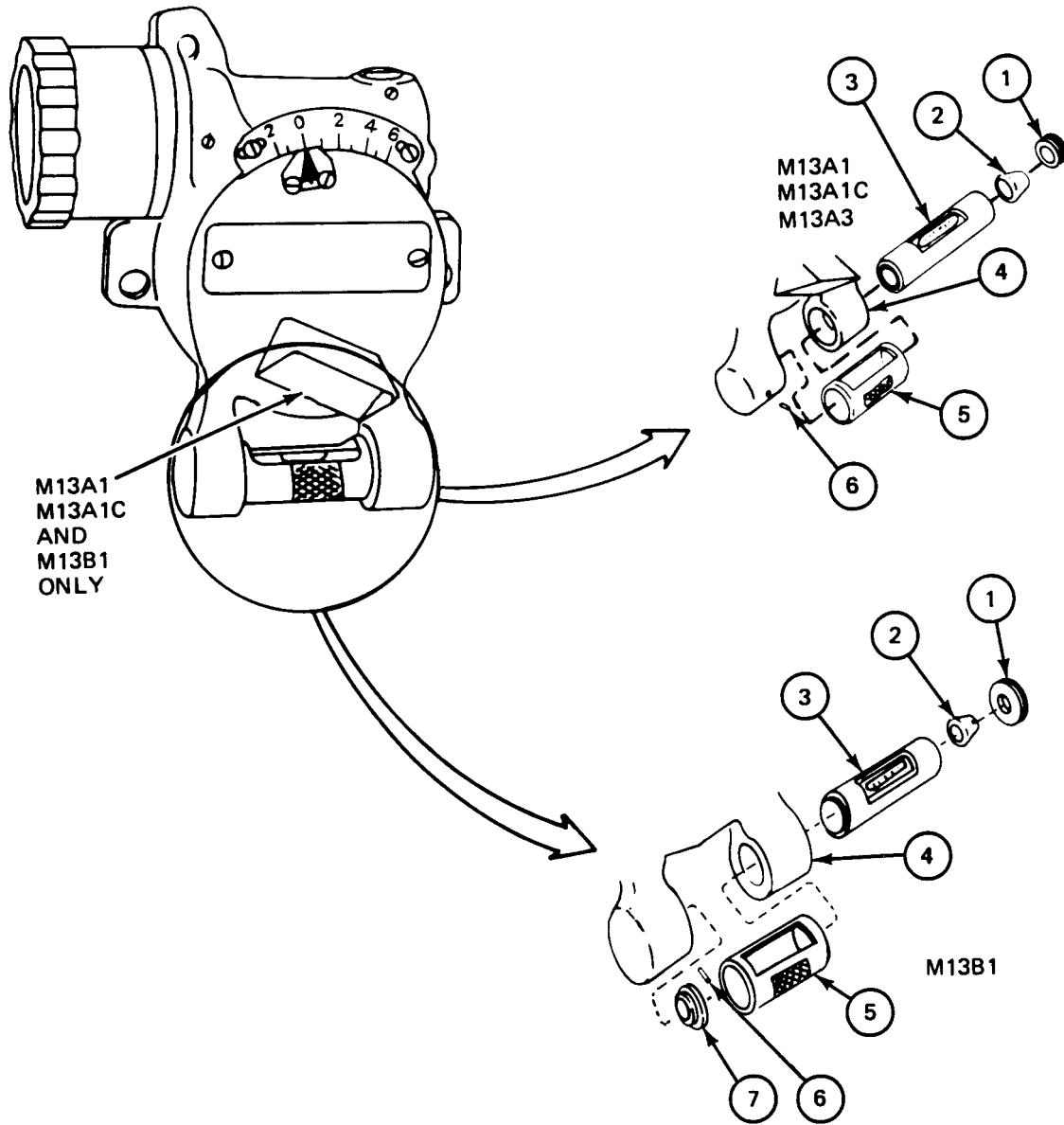
PERSONNEL: One

EQUIPMENT CONDITION: Elevation fire control quadrant on work bench

FRAME 1

Step	Procedure
1.	Using level vial wrench, remove ring (1) and eccentric (2).
2.	Using punch and hammer, carefully tap level vial tube (3) to free it from frame while guiding it through frame end (4).
NOTE	
Level vial tube cover (5) will fall free when level vial tube (3) is removed.	
3.	Carefully remove level vial tube (3) and level vial tube cover (5).
NOTE	
Do step 4 only if pin (6) or ring (7) is bent (M13B1 only).	
4.	Using punch and hammer, remove pin (6) and ring (7) (M13B1 only).
END OF TASK	

4-4. LEVEL VIAL TUBE REMOVAL (CONT)



4-5. LEVEL VIAL TUBE INSTALLATION

TOOLS: 1/16" pin drive punch
4 oz ball peen hammer
Level vial wrench (App C)

SUPPLIES: Grease (item 4, App A)

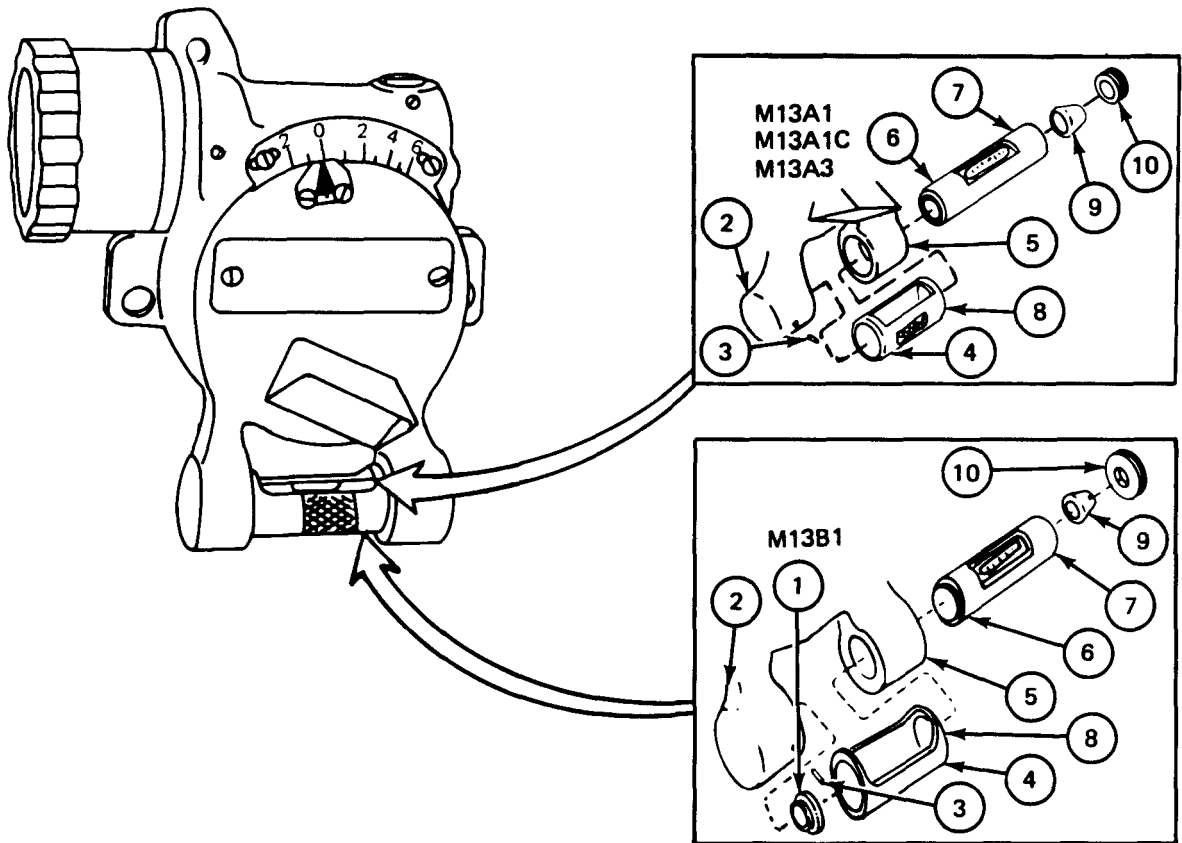
REFERENCES: JPG 41C for lubricating

EQUIPMENT CONDITION: Elevation fire control quadrant on work bench

4-5. LEVEL VIAL TUBE INSTALLATION (CONT)

FRAME 1	Procedure
Step	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do step 1 only if ring (1) (M13B1C only) or pin (3) was removed (para 4-4).</p> <p>1. Position ring (1) (M13B1 only) inside frame end (2) and using punch and hammer, install pin (3).</p> <p>2. Hold level vial cover (4) between frame ends (2) and (5).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">There are slots (6) in both sides of level vial tube (7).</p> <p>3. Place slotted end (6) of level vial tube (7) into frame end (2) with open side of level vial tube (7) facing upward.</p> <p>4. Carefully push level vial tube (7) all the way into level vial cover (4).</p> <p>5. Line up slot (6) in level vial tube (7) with pin (3) so that level vial tube (7) goes into frame end (5).</p> <p>6. Check that level vial cover (4) turns freely and snaps into detent in both open position and closed position.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do steps 7 and 8 only if level vial cover (4) turns too freely.</p> <p>7. Remove level vial tube (7) and level vial cover (4). Bend small sections (8) of level vial cover (4) for snug fit.</p> <p>8. Do steps 2 thru 6 again.</p> <p>9. Put small amount of grease on large end of eccentric (9) (JPG). Place eccentric (9) on end of level vial tube (7) through frame end (5).</p> <p>10. Using level vial wrench, install ring (10) carefully so that slotted end of eccentric (9) comes through center hole in ring (10).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">FOLLOW-ON MAINTENANCE</p> <p style="text-align: center;">Do performance test (Vol I, para 2-2).</p> <p>END OF TASK</p>

4-5. LEVEL VIAL TUBE INSTALLATION (CONT)



Section 3. SCALE DIAL

4-6. SCALE DIAL MAINTENANCE PROCEDURES INDEX

Task	Reference (para)
Removal Installation	4-7 4-8

4-7. SCALE DIAL REMOVAL

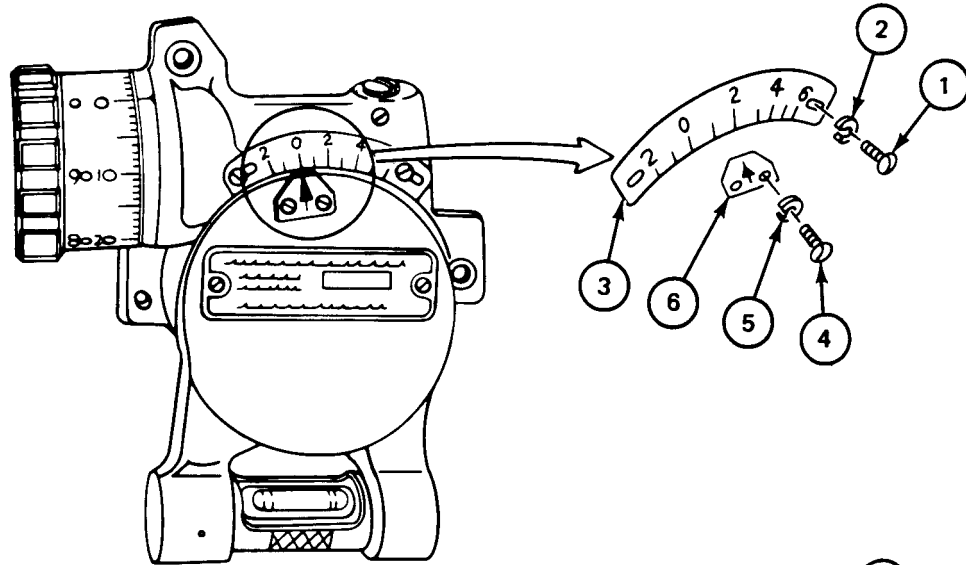
TOOLS: 1/8" flat tip screwdriver

PERSONNEL: One

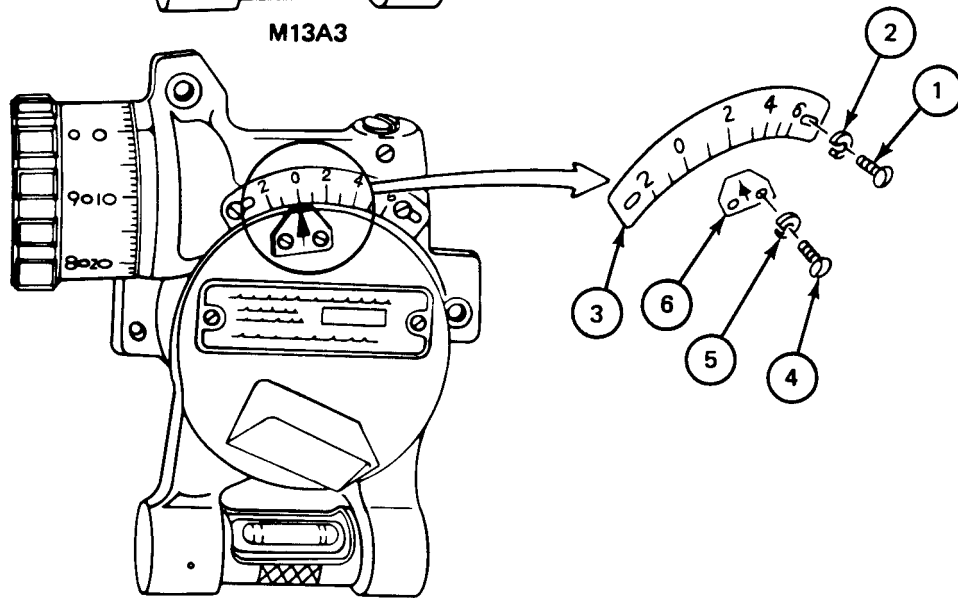
EQUIPMENT CONDITION: Elevation fire control quadrant in tank or on work bench

FRAME 1	
Step	Procedure
1.	Using screwdriver, remove two screws (1), two lockwashers (2) and scale dial (3).
2.	Using screwdriver, remove two screws (4), two lockwashers (5) and designation plate (6). END OF TASK

4-7. SCALE DIAL REMOVAL (CONT)



M13A3



M13A1
M13A1C
AND
M13B1

4-8. SCALE DIAL INSTALLATION

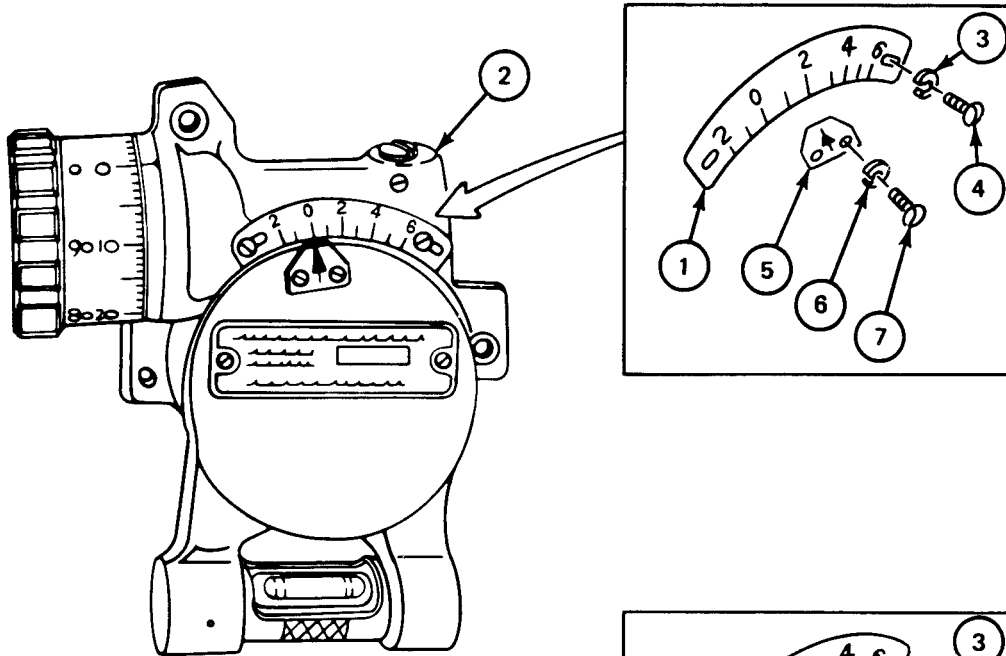
TOOLS: 1/8" flat tip screwdriver

PERSONNEL: One

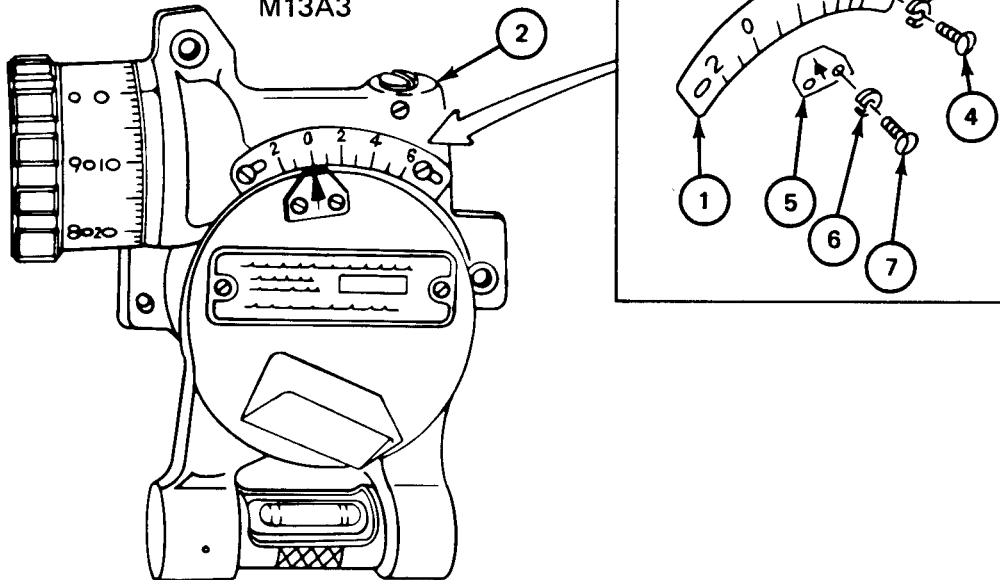
EQUIPMENT CONDITION: Elevation fire control quadrant in tank or on work bench

FRAME 1		
Step	Procedure	
1.	Place scale dial (1) on housing (2).	
2.	Using screwdriver, install two lockwashers (3) and two screws (4).	
3.	Place designation plate (5) on housing (2).	
4.	Using screwdriver, install two lockwashers (6) and two screws (7).	
NOTE		
FOLLOW-ON MAINTENANCE		
Do performance test (Vol I, para 2-2).		
END OF TASK		

4-8. SCALE DIAL INSTALLATION (CONT)



M13A3



M13A1
M13A1C
AND
M13B1

Section 4. MICROMETER

4-9. MICROMETER MAINTENANCE PROCEDURES INDEX

Task	Reference (para)
Disassembly Assembly	4-10 4-11

4-10. MICROMETER DISASSEMBLY

TOOLS: 3/16" flat tip screwdriver
 0 cross tip screwdriver (Phillips type)
 3/32" drive pin punch
 4 oz ball peen hammer
 Machinist's scribe
 "V" block

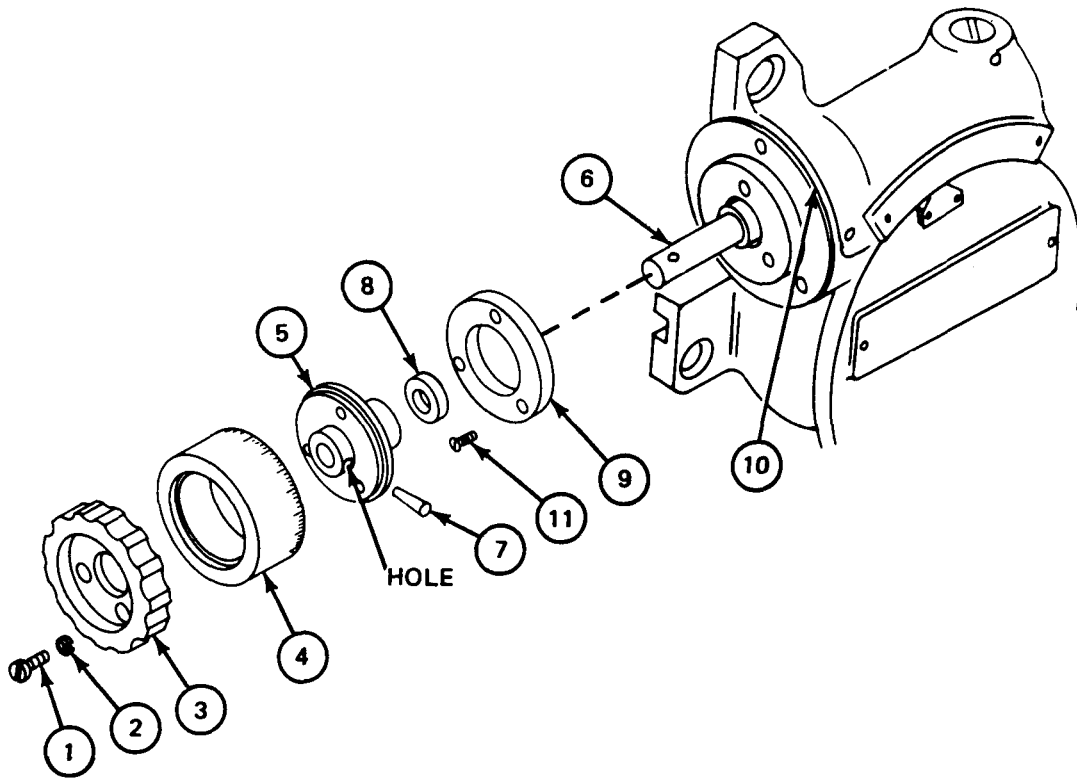
PERSONNEL: One

EQUIPMENT CONDITION: Elevation fire control quadrant on work bench

FRAME 1

Step	Procedure
1.	Using flat tip screwdriver, remove three screws (1) and three lockwashers (2) from knob (3).
2.	Pull knob (3) and micrometer scale (4) from adapter (5).
3.	Using scribe, make a mark on end of worm shaft (6) and on one side of adapter (5) where tapered pin (7) is removed.
4.	Place adapter (5) in "V" block, while removing tapered pin, to avoid bending worm shaft (6).
5.	Using punch and hammer, remove tapered pin (7).
6.	Remove adapter (5) and felt washer (8).
7.	Using scribe, make a mark on quadrant index (9) and on housing (10) so that the two marks are lined up with each other.
8.	Using Phillips screwdriver, remove three screws (11).
9.	Remove quadrant index (9).
	END OF TASK

4-10. MICROMETER DISASSEMBLY (CONT)



4-11. MICROMETER ASSEMBLY

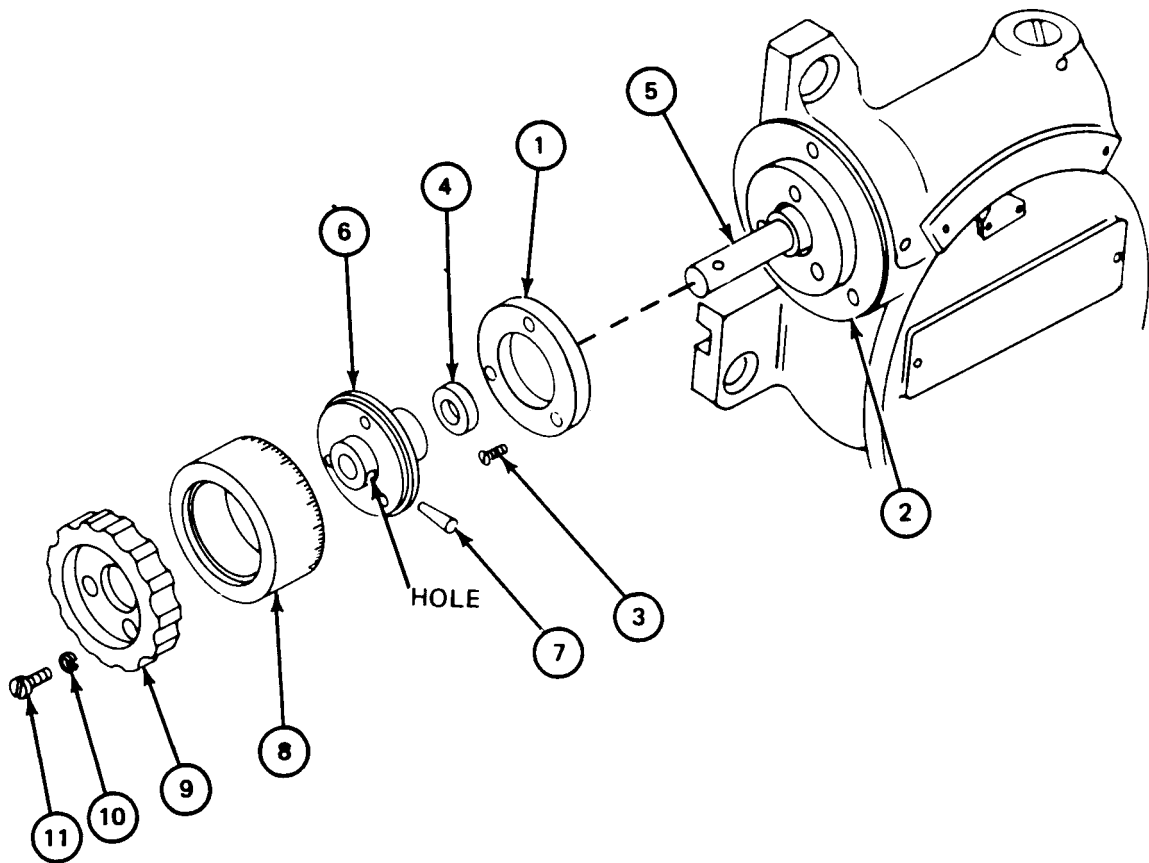
TOOLS: 3/16" flat tip screwdriver
 4 oz ball peen hammer
 3/32" drive pin punch
 #0 cross tip screwdriver (Phillips type)

PERSONNEL: One

EQUIPMENT CONDITION: Elevation fire control quadrant on work bench

FRAME 1	
Step	Procedure
1.	Place quadrant index (1) on housing (2) so the scribe marks made during disassembly are lined up.
2.	Using Phillips screwdriver, install three screws (3).
3.	Place felt washer (4) on end of worm shaft (5).
4.	Place adapter (6) on worm shaft (5) so that scribe marks made during disassembly are lined up.
5.	Using punch and hammer, install tapered pin (7).
6.	Slip micrometer scale (8) over adapter (6).
7.	Using 3/16" screwdriver, fasten knob (9) to adapter (6) with three lockwashers (10) and three screws (11).
<p>NOTE</p> <p>FOLLOW-ON MAINTENANCE</p> <p>Do performance test (Vol I, para 2-2).</p> <p>END OF TASK</p>	

4-11. MICROMETER ASSEMBLY (CONT)



Section 5. WORM SHAFT

4-12. WORM SHAFT MAINTENANCE PROCEDURES INDEX

Task	Reference (para)
Disassembly	4-13
Assembly	4-14

4-13. WORM SHAFT DISASSEMBLY

TOOLS: 1/8", 1/4" flat tip screwdrivers
 .070" jeweler's screwdriver
 0.055 to 0.060" pin diameter adjustable face spanner wrench
 0.050 socket head screw key (Allen wrench or equivalent)

PERSONNEL: One

EQUIPMENT CONDITION: Elevation fire control quadrant on work bench

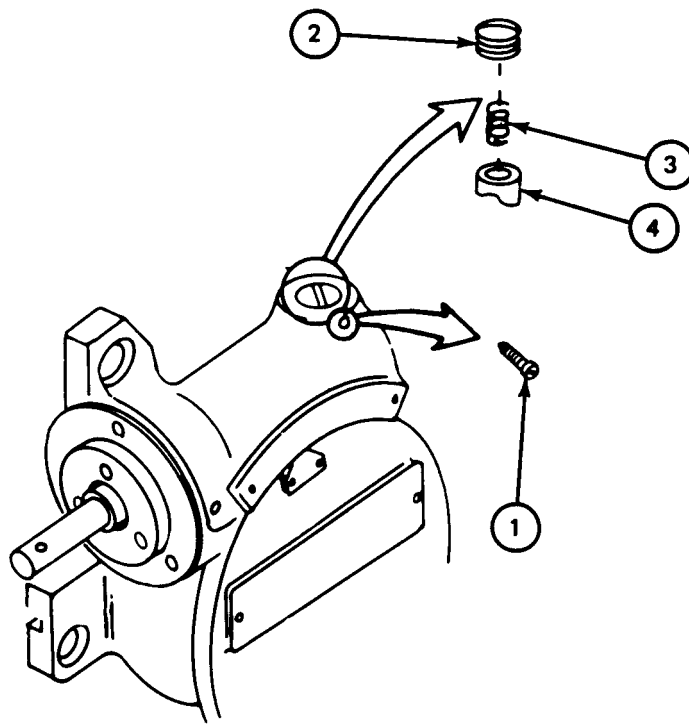
PRELIMINARY PROCEDURE: Remove micrometer assembly (para 4-10)

NOTE

Do frames 1 and 2 only for M13B1 configuration. Do frames 3 and 4 only for M13A1, M13A1C and M13A3 configurations.

4-13. WORM SHAFT DISASSEMBLY (CONT)

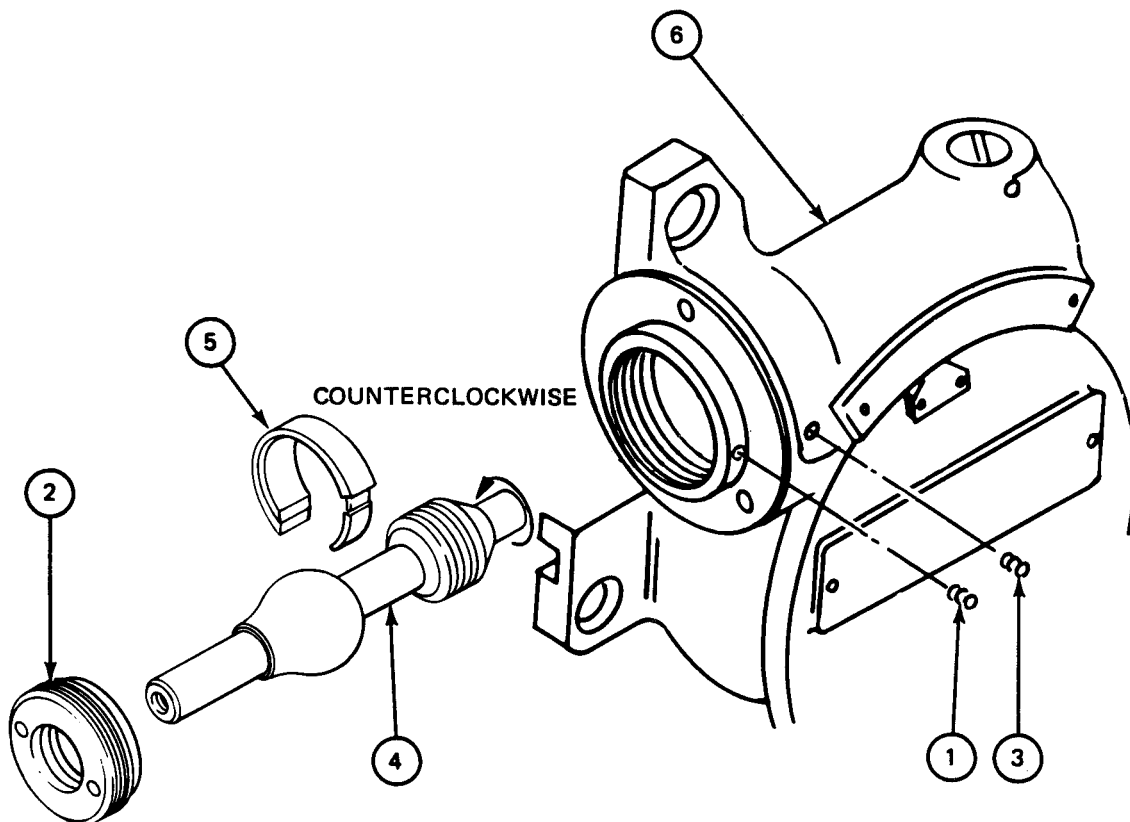
FRAME 1	
Step	Procedure
1.	Using jeweler's screwdriver, remove sealed setscrew (1) to unlock plug (2).
2.	Using 1/4" flat tip screwdriver, remove plug (2), spring (3) and bearing (4).
GO TO FRAME 2	



4-13. WORM SHAFT DISASSEMBLY (CONT)

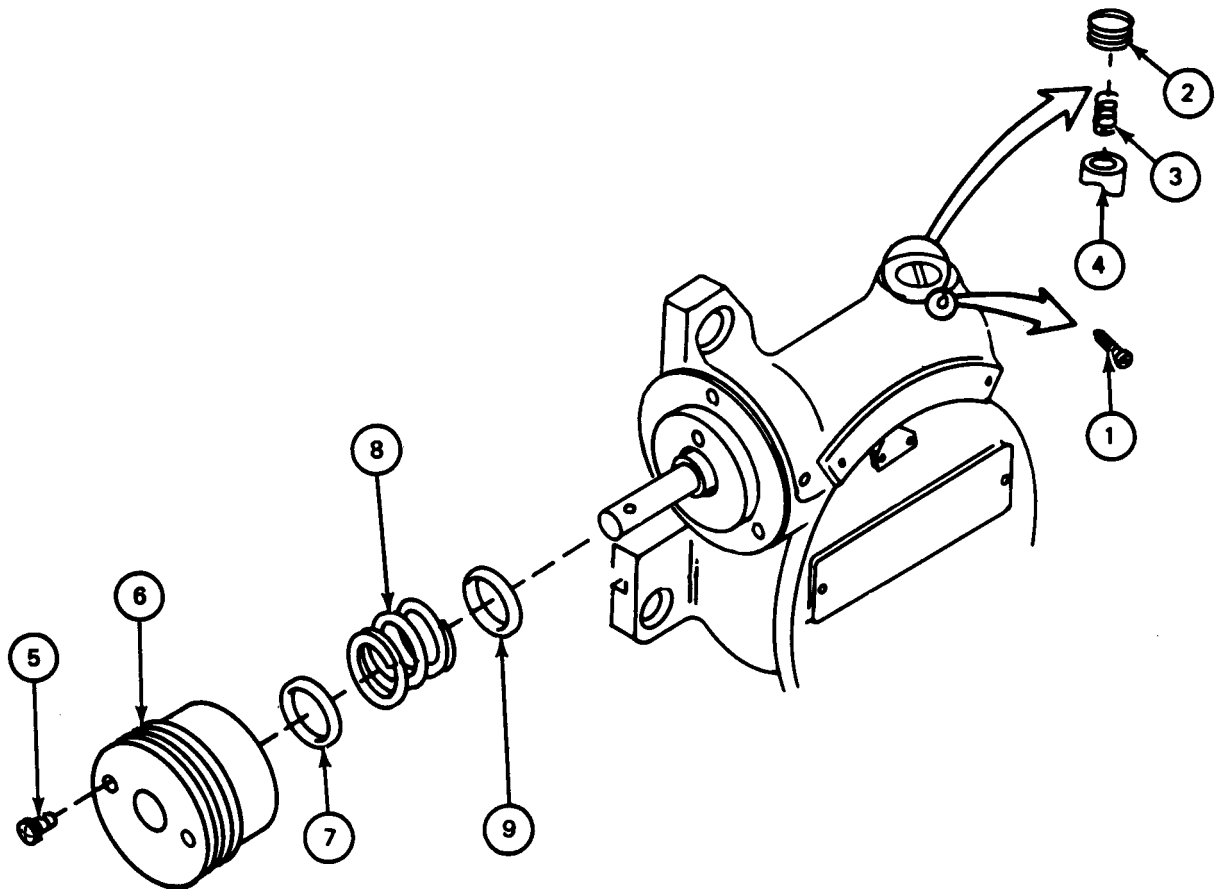
FRAME 2

Step	Procedure
1.	Using jeweler's screwdriver, remove sealed setscrew (1).
2.	Using spanner wrench, unscrew ball cap (2).
3.	Using 1/8" flat tip screwdriver, remove sealed setscrew (3).
4.	Turn worm shaft (4) counterclockwise until worm shaft (4) with ball seat (5) is free of housing (6).
5.	Slip ball seat (5) from worm shaft (4).
END OF TASK	



4-13. WORM SHAFT DISASSEMBLY (CONT)

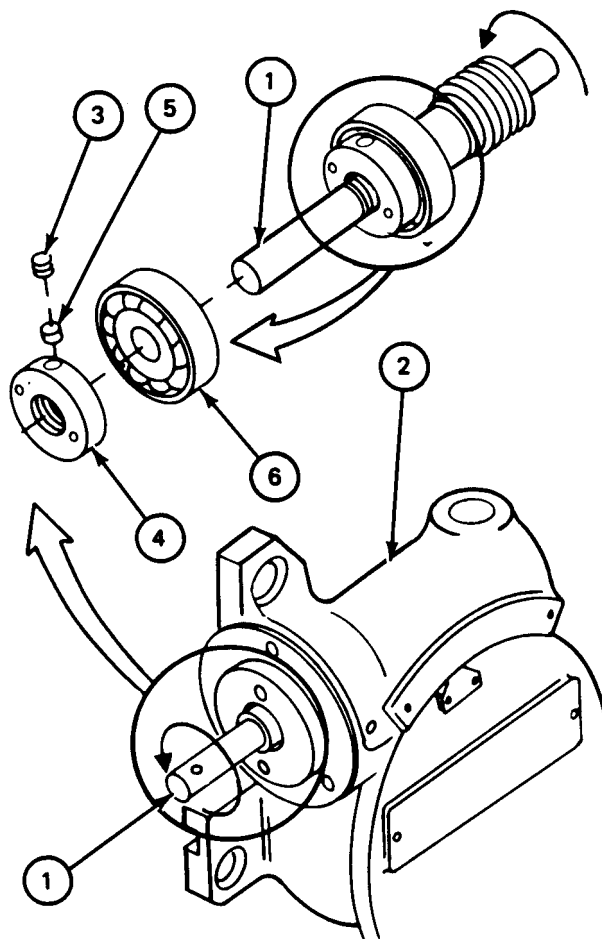
FRAME 3	
Step	Procedure
1.	Using jeweler's screwdriver, remove sealed setscrew (1) to unlock plug (2).
2.	Using 1/4" flat tip screwdriver, remove plug (2), spring (3) and bearing (4).
3.	Using 1/8" flat tip screwdriver, remove screw (5) to unlock retainer (6).
4.	Using spanner wrench, unscrew retainer (6).
5.	Remove washer (7), spring (8) and washer (9). GO TO FRAME 4



4-13. WORM SHAFT DISASSEMBLY (CONT)

FRAME 4

Step	Procedure
1.	Turn worm shaft (1) counterclockwise until free of housing (2).
2.	Using Allen wrench, loosen setscrew (3) in nut (4).
3.	Using spanner wrench, remove nut (4).
4.	Using Allen wrench, tighten setscrew (3), remove seat (5).
5.	Using Allen wrench, remove setscrew (3).
6.	Slide bearing (6) from worm shaft (1). END OF TASK



4-14. WORM SHAFT ASSEMBLY

TOOLS: 1/8", 1/4" flat tip screwdriver
 0.050" socket head screw key (Allen wrench or equivalent)
 .070" jeweler's screwdriver
 0.055 to 0.060" pin diameter adjustable face spanner wrench

SUPPLIES: Grease (item 4, App A)
 Sealing compound (item 6, App A)

REFERENCES: JPG 41C for: Lubricating
 Using sealing compound

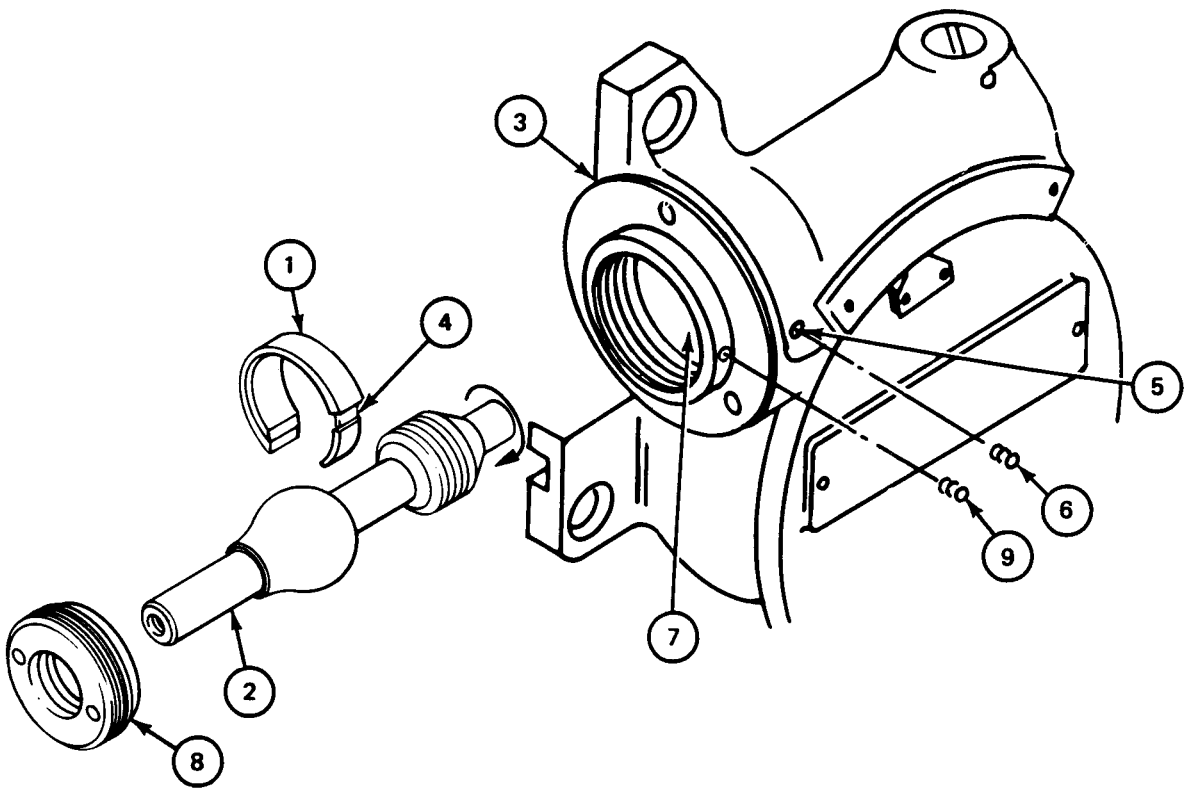
EQUIPMENT CONDITION: Elevation fire control quadrant on work bench

NOTE

Do frames 1 and 2 only for M13B1 configuration. Do frames 3 and 4 only for M13A1, M13A1C and M13A3 configurations.

FRAME 1	
Step	Procedure
1.	Put ball seat (1) on worm shaft (2).
2.	Put small amount of grease on worm shaft (2) (JPG).
3.	Screw worm shaft (2) clockwise into housing (3).
4.	Using jeweler's screwdriver, turn ball seat (1) until slot (4) is lined up with screw hole (5).
5.	Put sealing compound on threads of setscrew (6) (JPG).
<p>NOTE</p> <p>While installing setscrew (6), look into hole (7) of body (3) to make sure setscrew (6) goes into slot (4).</p>	
6.	Using 1/8" flat tip screwdriver, install setscrew (6).
7.	Using spanner wrench, install ball cap (8).
8.	Using jeweler's screwdriver, install setscrew (9).
GO TO FRAME 2	

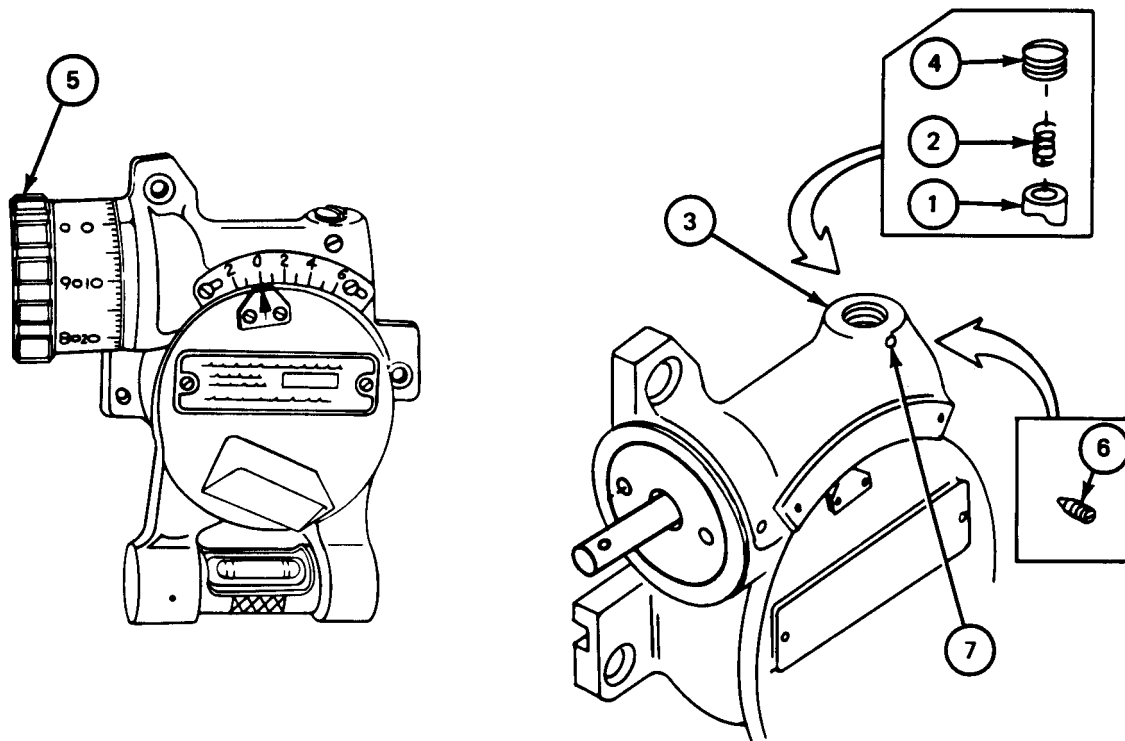
4-14. WORM SHAFT ASSEMBLY (CONT)



4-14. WORM SHAFT ASSEMBLY (CONT)

FRAME 2

Step	Procedure
<ol style="list-style-type: none"> 1. Put bearing (1) and spring (2) into housing (3). 2. Using 1/4" flat tip screwdriver, install plug (4). 3. Install micrometer assembly (para 4-11). 4. While turning micrometer knob (5) adjust (tighten or loosen) plug (4) until it is just tight enough to cause a slight but smooth resistance to turning the micrometer knob (5). 5. Put sealing compound on threads of setscrew (6) (JPG). 6. Using jeweler's screwdriver, install setscrew (6) in hole (7). 	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">FOLLOW-ON MAINTENANCE</p> <p style="text-align: center;">Do performance test (Vol I, para 2-2).</p> <p>END OF TASK</p>



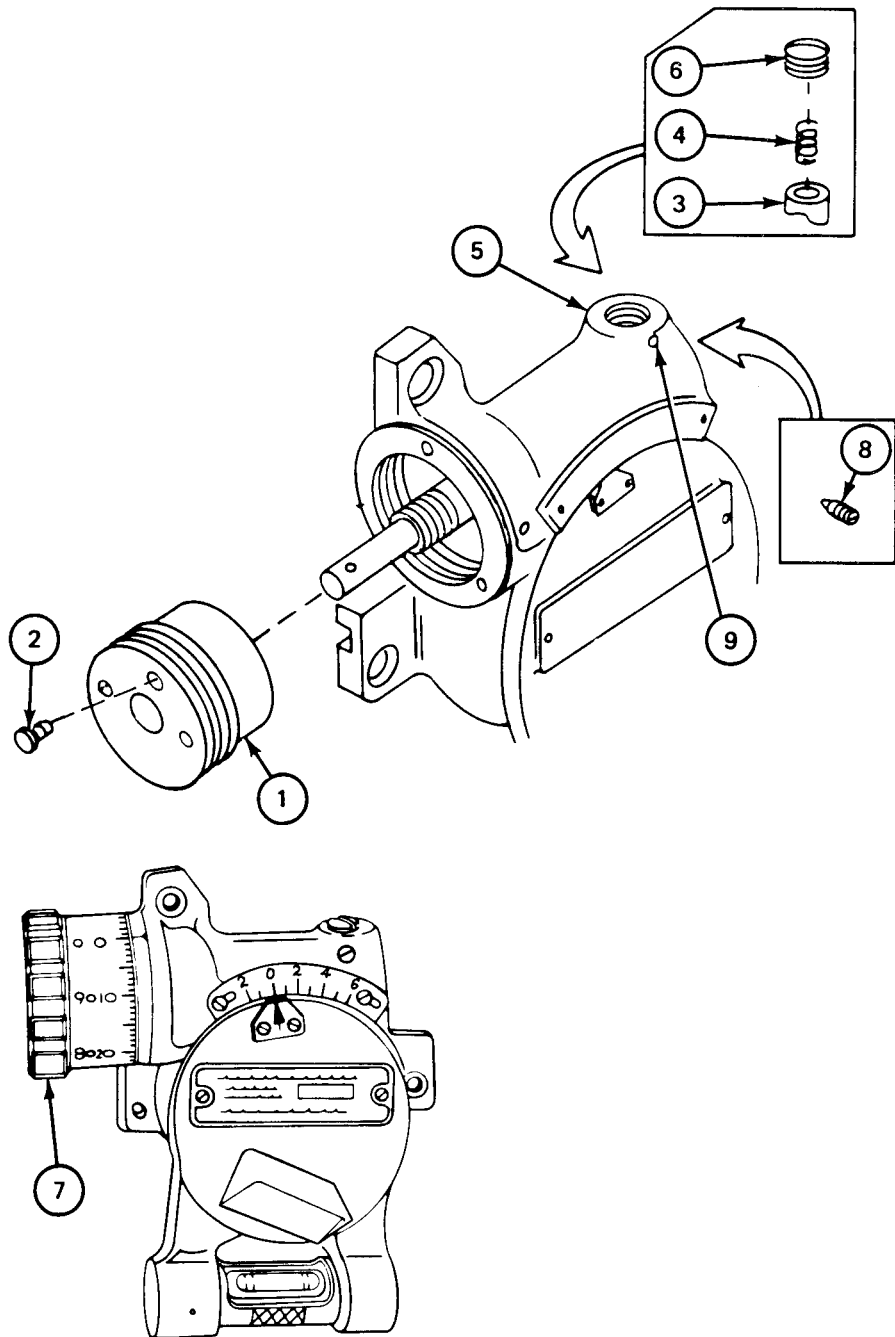
4-14. WORM SHAFT ASSEMBLY (CONT)

Step	Procedure
1. 2. 3. 4. 5. 6. 7.	<p>Put bearing (1) on worm shaft (2).</p> <p>Put a small amount of grease on worm shaft (2) (JPG).</p> <p>Using spanner wrench, screw nut (3) on worm shaft (2).</p> <p>Put seat (4) in nut (3).</p> <p>Using Allen wrench, screw setscrew (5) into nut (3).</p> <p>Screw worm shaft (2) clockwise into housing (6).</p> <p>Slide washer (7), spring (8) and washer (9) onto worm shaft (2).</p> <p>GO TO FRAME 4</p>

4-14. WORM SHAFT ASSEMBLY (CONT)

FRAME 4	Procedure
Step	<ol style="list-style-type: none"> 1. Using spanner wrench, install retainer (1). 2. Using 1/8" flat tip screwdriver, put in screw (2). 3. Put bearing (3) and spring (4) into housing (5). 4. Using 1/4" flat tip screwdriver, install plug (6). 5. Install micrometer assembly (para 4-11). 6. While turning micrometer knob (7) adjust (tighten or loosen) plug (6) until it is just tight enough-to cause a slight but smooth resistance against turning the micrometer knob (7). 7. Put drop of sealing compound on threads of setscrew (8) (JPG). 8. Using jeweler's screwdriver, install setscrew (8) in hole (9). <p style="text-align: center;">NOTE</p> <p style="text-align: center;">FOLLOW-ON MAINTENANCE</p> <p style="text-align: center;">Do performance test (Vol I, para 2-2).</p> <p>END OF TASK</p>

4-14. WORM SHAFT ASSEMBLY (CONT)



Section 6. HOUSING

4-15. HOUSING MAINTENANCE PROCEDURES INDEX

Task	Reference (para)
Disassembly	4-16
Assembly	4-17

4-16. HOUSING DISASSEMBLY

TOOLS: 3/16", 1/4" flat tip screwdriver
 Parallel action jaw pliers

PERSONNEL: One

EQUIPMENT CONDITION: Elevation fire control quadrant on work bench

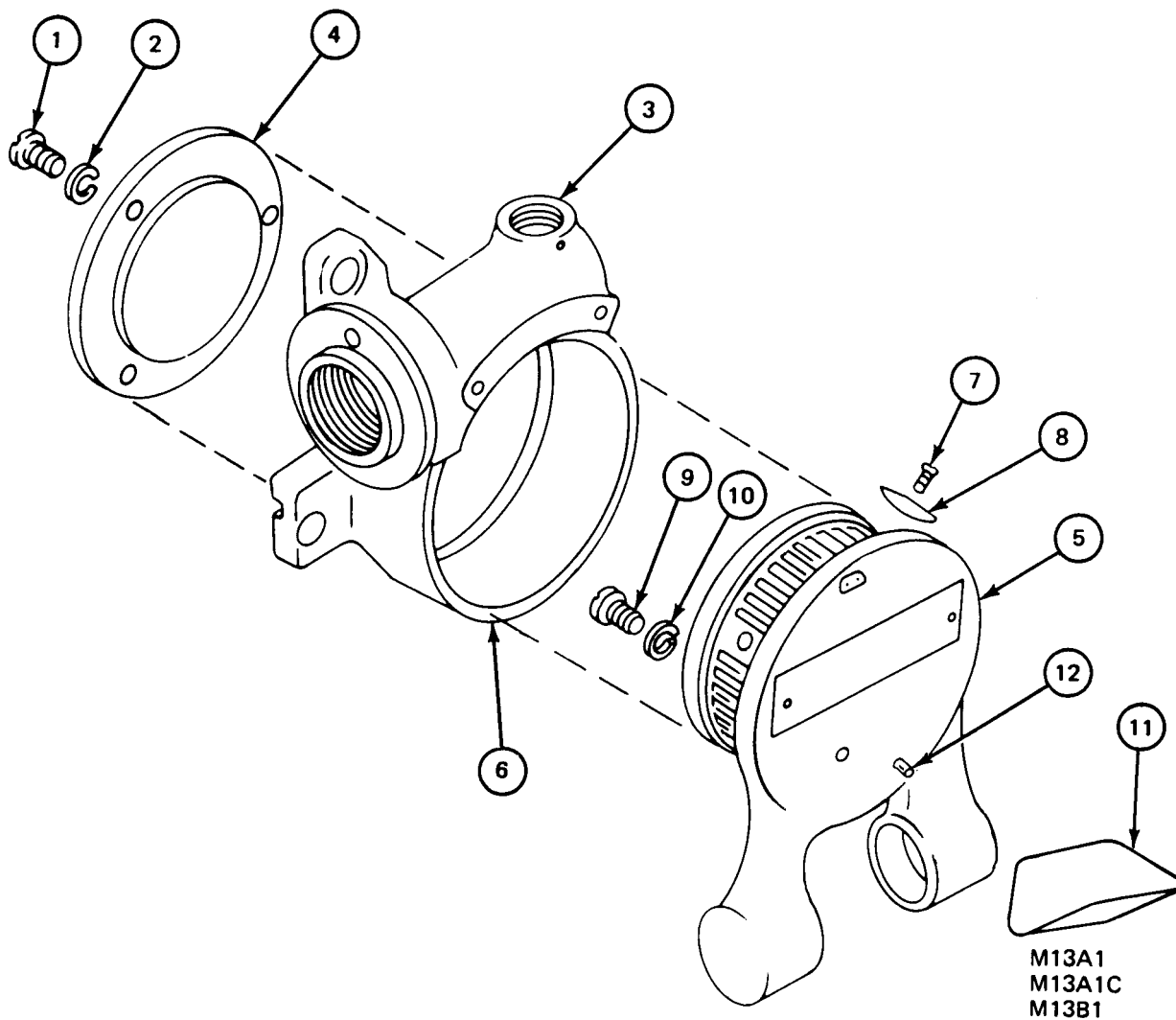
PRELIMINARY PROCEDURES: Remove worm shaft assembly (para 4-13)

NOTE

The worm gear housing (5) and elevating worm housing (6) are matched assemblies and should remain a set throughout disassembly and assembly.

FRAME 1	
Step	Procedure
1.	Using 1/4" screwdriver, remove three screws (1) and three lockwashers (2).
2.	Hold quadrant (3) in your hand with cover (4) facing work bench. Gently tap quadrant (3) on work bench until cover (4) separates from quadrant (3).
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Worm gear housing (5) and elevating worm housing (6) are close fits and must be separated evenly and carefully to prevent binding.</p>	
3.	Carefully and evenly take worm gear housing (5) out of elevating worm housing (6).
4.	Using 3/16" screwdriver, remove two screws (7) and two stops (8).
5.	Using 1/4" screwdriver, remove screw (9), lockwasher (10) and reflector (11). (M13A1, M13A1C and M13B1 only.)
<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do step 6 only if pin (12) is damaged.</p>	
6.	Using parallel action jaw pliers, remove pin (12). END OF TASK

4-16. HOUSING DISASSEMBLY (CONT)



4-17. HOUSING ASSEMBLY

TOOLS: 3/16", 1/4" flat tip screwdriver
 4 oz ball peen hammer

SUPPLIES: Grease (item 4, App A)

PERSONNEL: One

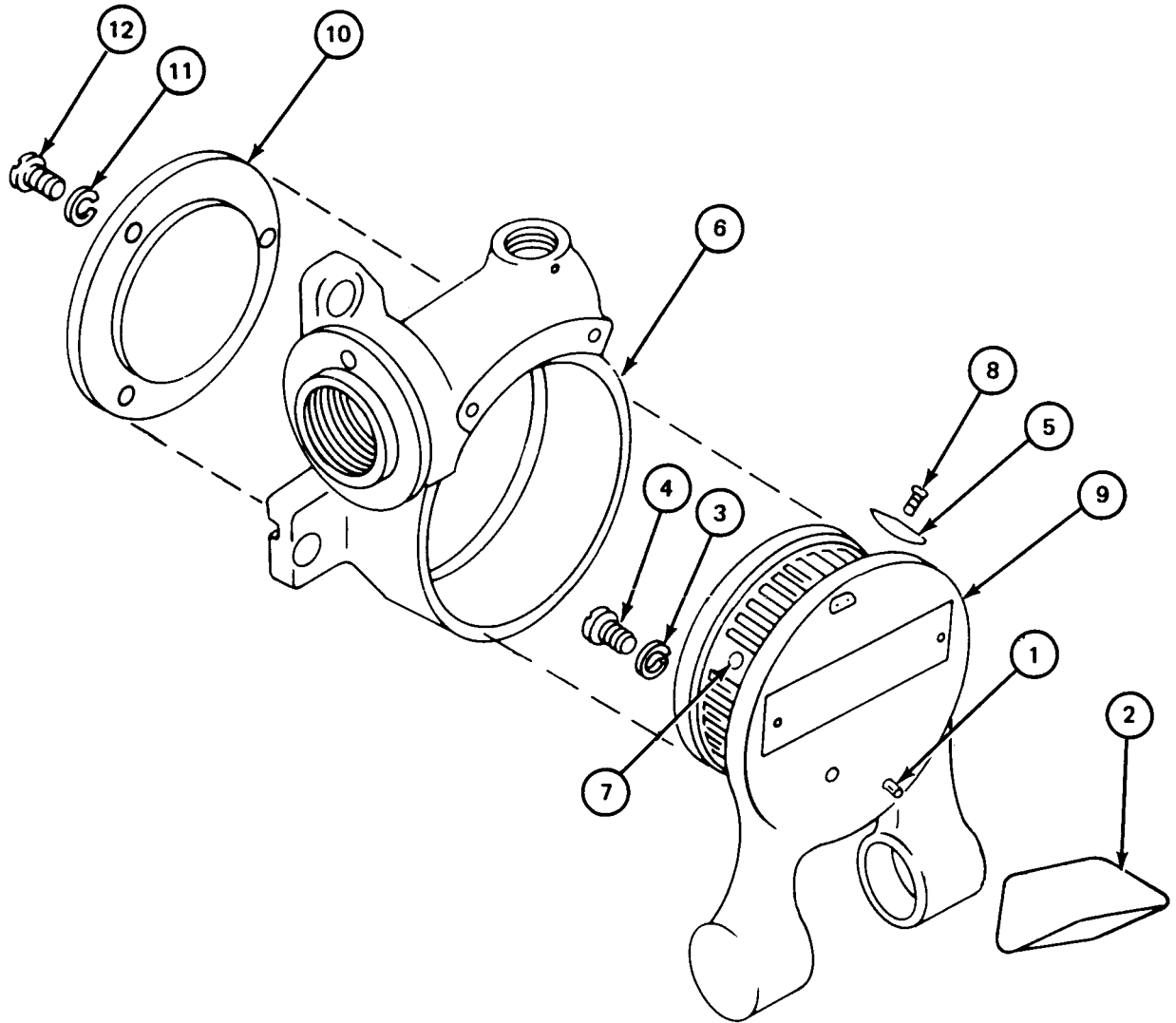
REFERENCES: JPG 41C for: Lubricating
 Staking screws

EQUIPMENT CONDITION: Elevation fire control quadrant on work bench

FRAME 1

Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do step 1 only if pin (1) has been removed.</p> <p>1. Using punch and hammer, install pin (1).</p> <p>2. Place reflector (2) on pin (1) (M13A1, M13A1C and M13B1 only). Using 1/4" screwdriver, install lockwasher (3) and screw (4) to hold reflector (2) in place.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Stops (5) must be installed to clear the elevating worm shaft housing (6).</p> <p>3. Place two stops (5) in two seats (7). Using 3/16" screwdriver, install two screws (8). Stake screws (8) (JPG).</p> <p>4. Put grease on inside surface of elevating worm shaft housing (6) (JPG).</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">When putting worm gear housing (9) and elevating worm shaft housing (6) together, be careful not to tilt or turn worm gear housing (9). Shorter area between stops (5) on worm gear housing (9) must be in line with worm shaft open area.</p> <p>5. Place worm gear housing (9) into elevating worm shaft housing (6).</p> <p>6. Place cover (10) on elevating worm shaft housing (6) so that holes are lined up with holes in worm gear housing (9).</p> <p>7. Using 1/4" screwdriver, install three lockwashers (11) and three screws (12) to hold rover (10) in place.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">FOLLOW-ON MAINTENANCE</p> <p style="text-align: center;">Install worm shaft (para 4-14). Do performance test (Vol I, Chap 2).</p> <p>END OF TASK</p>

4-17. HOUSING ASSEMBLY (CONT)



Section 7. IDENTIFICATION PLATE

4-18. IDENTIFICATION PLATE MAINTENANCE PROCEDURES INDEX

Task	Reference (para)
Removal Installation	4-19 4-20

4-19. IDENTIFICATION PLATE REMOVAL

APPLICABLE CONFIGURATIONS: M13A3 and M13B1

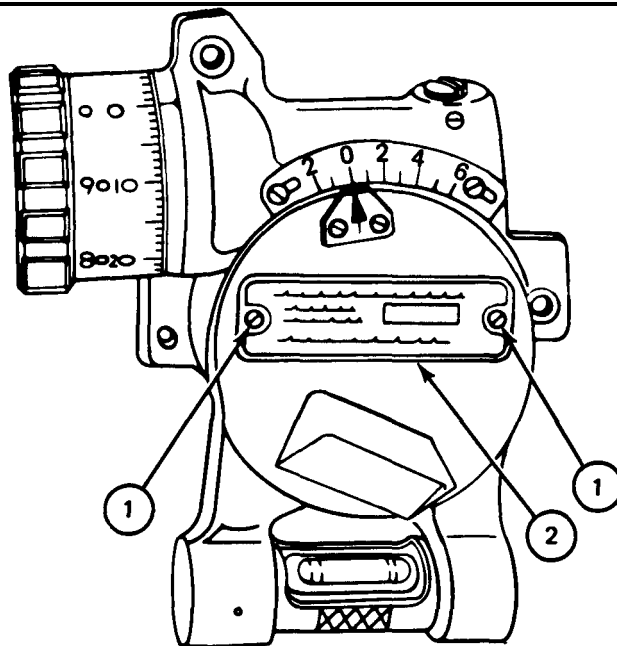
TOOLS: 1/8" flat tip screwdriver

PERSONNEL: One

EQUIPMENT CONDITION: Elevation fire control quadrant in vehicle or on work bench

FRAME 1

Step	Procedure
1.	Using screwdriver, remove two screws (1) and identification plate (2). END OF TASK



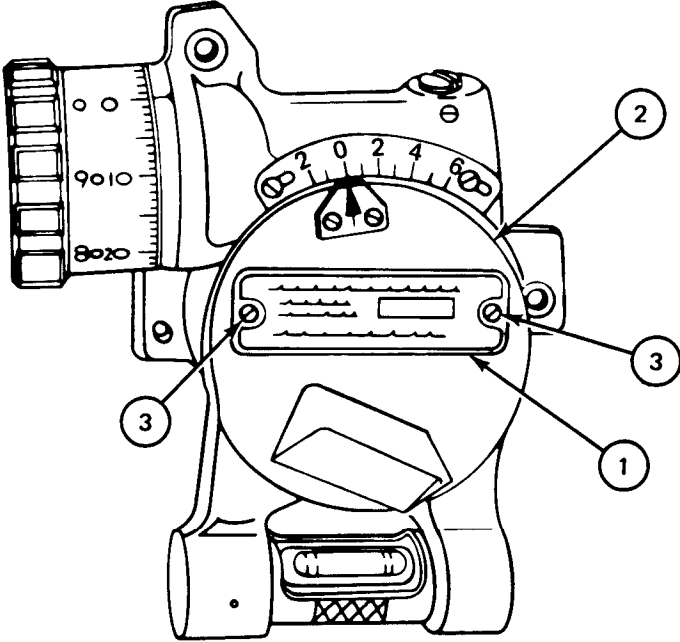
4-20. IDENTIFICATION PLATE INSTALLATION

APPLICABLE CONFIGURATIONS: M13A3 and M13B1

TOOLS: 1/8" flat tip screwdriver

PERSONNEL: One

EQUIPMENT CONDITION: Elevation fire control quadrant in vehicle or on work bench

FRAME 1	
Step	Procedure
<ol style="list-style-type: none"> 1. 2. 	<p>Place identification plate (1) against housing (2) so mounting holes are lined up.</p> <p>Using screwdriver, install two screws (3) to hold identification plate (1) in place.</p> <p style="text-align: center;">NOTE</p> <p style="text-align: center;">FOLLOW-ON MAINTENANCE</p> <p style="text-align: center;">Do final inspection (para 5-3).</p> <p style="text-align: center;">END OF TASK</p>
	

CHAPTER 5
FINAL INSPECTION

5-1. SCOPE

This chapter gives final inspection and maintenance procedures to be done after the repairing of the elevation fire control quadrant.

Task	Reference (para)
Final Adjustment	5-2
Final Inspection	5-3

5-2. FINAL ADJUSTMENT

TOOLS: Level vial wrench (App C)
 3/16" flat tip screwdriver

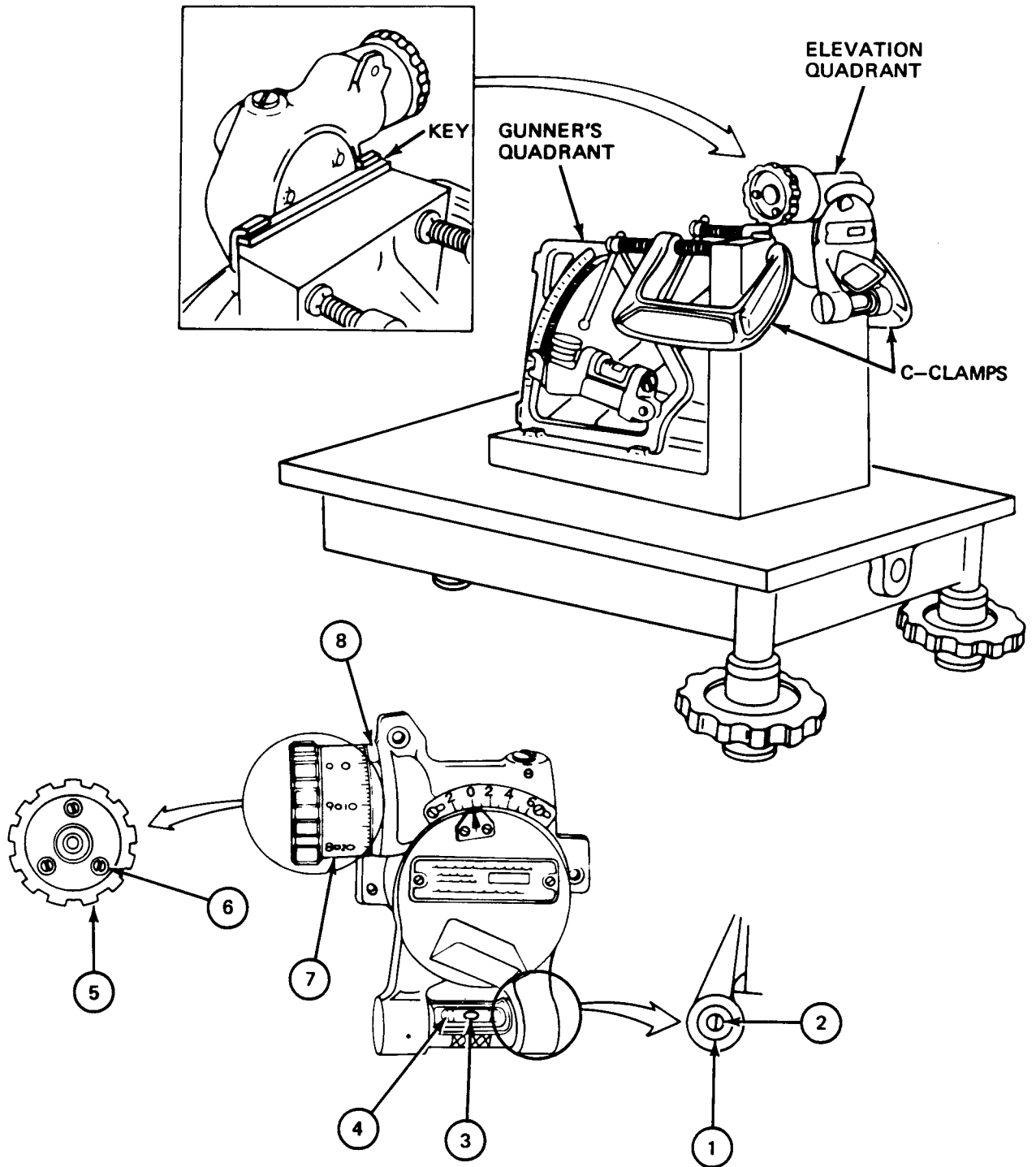
PERSONNEL: One

EQUIPMENT CONDITION: Elevation fire control quadrant on work bench

PRELIMINARY PROCEDURES: Do performance test (Vol I, para 2-2)

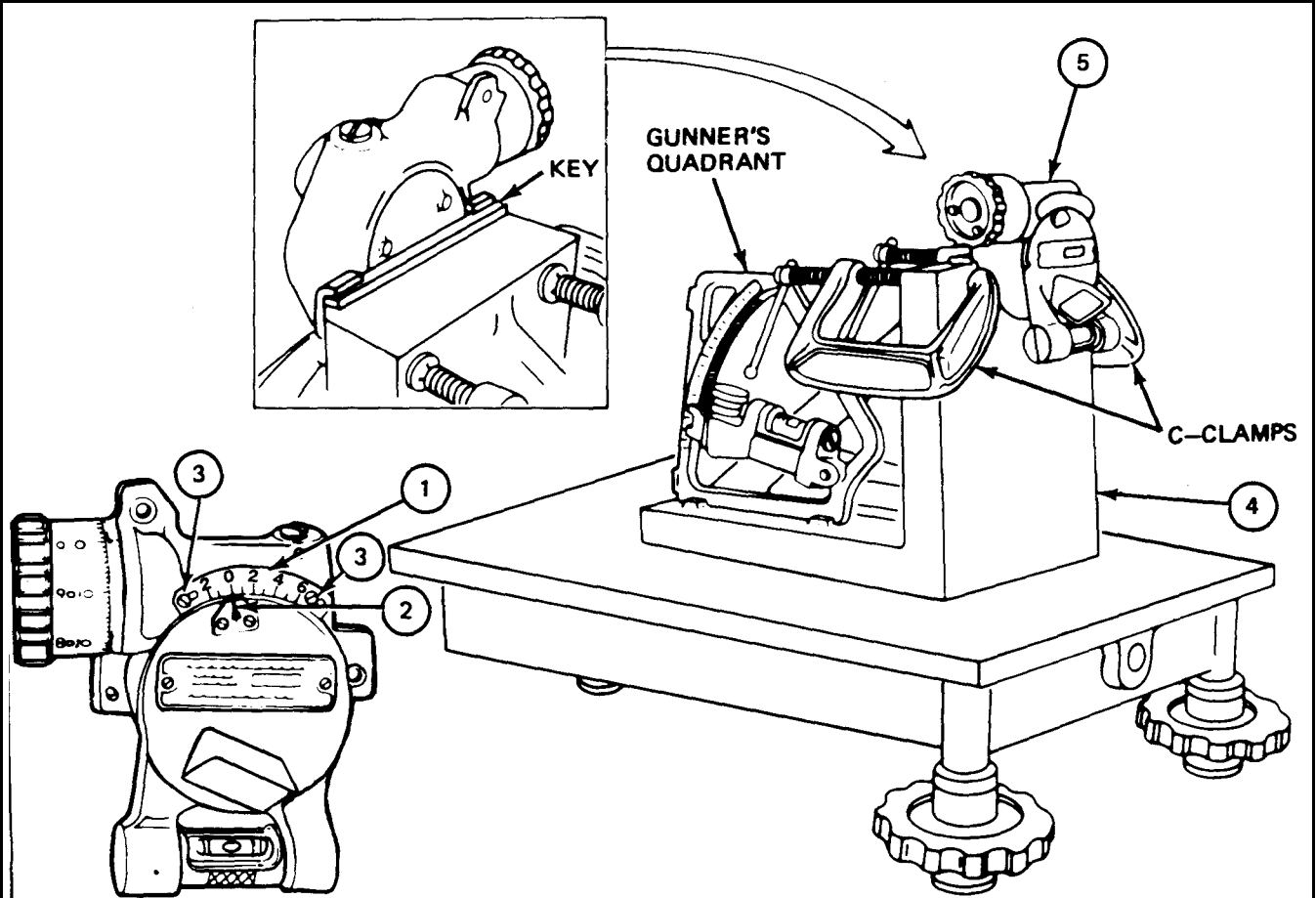
FRAME 1	
Step	Procedure
1.	Using level vial wrench, loosen ring (1) far enough for eccentric (2) to be turned. <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Level , vial bubble (3) must be able to travel the full length of the level vial tube (4) when using eccentric (2). This means that you might have to turn the micrometer knob (5).</p>
2.	Level elevation fire control quadrant by finding the center of movement of level vial bubble (3).
3.	Using screwdriver, turn eccentric (2) until level vial bubble (3) is centered. <p style="text-align: center;">NOTE</p> <p style="text-align: center;">Make sure eccentric (2) does not move when tightening ring (1).</p>
4.	Using level vial wrench, tighten ring (1).
5.	Using screwdriver, loosen three screws (6) holding micrometer knob (5).
6.	Slip micrometer scale (7) so that 0 (zero) is lined up with index mark (8).
7.	Using screwdriver, tighten three screws (6).
	GO TO FRAME 2

5-2. FINAL ADJUSTMENT (CONT)



5-2. FINAL ADJUSTMENT (CONT)

FRAME 2	
Step	Procedure
	<p style="text-align: center;">NOTE</p> <p style="text-align: center;">Do steps 1 thru 3 only if 0 (zero) reading on scale dial (1) is not lined up with index mark on designation plate (2).</p> <ol style="list-style-type: none"> 1. Using screwdriver, loosen two screws (3) and move scale dial (1). 2. Line up 0 (zero) reading on scale dial (1) with index mark on designation plate (2). 3. Using screwdriver, tighten two screws (3). 4. Remove gunner's quadrant from angle plate (4). 5. While holding elevation fire control quadrant (5), remove two C-clamps to free it from angle plate (4) and remove key from back of elevation fire control quadrant (5). <p>END OF TASK</p>



5-3. FINAL INSPECTION

SUPPLIES: Cloth, lint free (item 1, App A)

PERSONNEL: One

REFERENCES: JPG 41C for cleaning

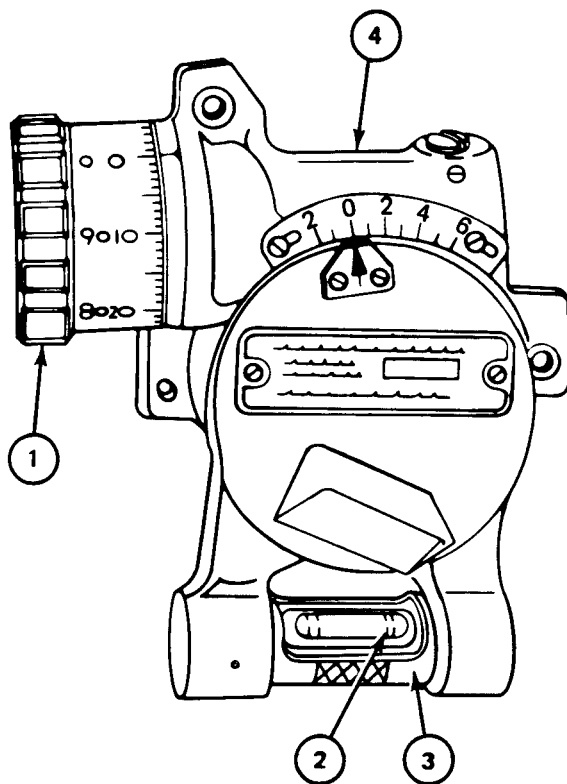
EQUIPMENT CONDITION: Elevation fire control quadrant on work bench

NOTE

If you find a fault, tell your supervisor. If you do not find a fault, send the good elevation fire control quadrant back to service.

FRAME 1	
step	Procedure
1.	Turn micrometer knob (1) clockwise then counterclockwise. Knob (1) should move freely without binding.
2.	Make sure that level vial tube glass (2) is not cracked or broken.
3.	Make sure that level vial tube cover (3) snaps into detent in both open and closed positions.
4.	Using cloth, clean elevation fire control quadrant (4) (JPG).
	END OF TASK

5-3. FINAL INSPECTION (CONT)



CHAPTER 6

PACKAGING

6-1. SCOPE

This chapter tells you how to package the elevation fire control quadrant for storage or shipment.

6-2. PACKAGING

Package and pack the M13A1, M13A1C, M13A3 and M13B1 Elevation Fire Control Quadrants in accordance with AR700-15.

APPENDIX A
EXPENDABLE SUPPLIES AND MATERIALS LIST

Section 1. INTRODUCTION

A-1. SCOPE

This appendix lists expendable supplies and materials you will need to repair the M13A1, M13A1C, M13A3 or M13B1 Elevation Fire Control Quadrant. These items are authorized to you by CTA 50-970, Expendable Items (Except Medical, Class V, Repair Parts and Heraldic ITEMS).

A-2. EXPLANATION OF COLUMNS

a. Column 1 - Item Number. This number is assigned to the entry in the listing and is used in the manual to identify the material, for example, sealing compound (item 6, App A).

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

F - Direct Support Maintenance

H - General Support Maintenance

c. Column 3 - National Stock Number. This is the National stock number assigned to the item. Use it to request or requisition the item.

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

e. Column 5 - Unit of Measure (U/M). This column shows how the item is measured. For example, you may see these abbreviations: ea (each), in (inches), or pr (pair). Order the smallest amount you need.

Section 2. EXPENDABLE SUPPLIES AND MATERIALS

(1) Item No.	(2) Level	(3) National Stock No.	(4) Description	(5) U / M
1	F	8305-00-267-3015	Cloth, Lint Free CCCC440 1 yd	Y D
2	F	8010-00-598-5936	Enamel, Semi-Gloss, O. D. 1 pt can	PT
3	F	8010-00-297-2092	Enamel, White 1 qt can	QT
4	F	9150-00-119-9291	Grease: Aircraft and Instrument: MIL-G-4343 3 oz tube	O Z
5	F	8010-00-936-8372	Primer, Enamel TTP664 1 pt can	PT
6	F	8030-00-275-8110	Sealing Compound, Adhesive Curing: MIL-S-11031 1 pt can	PT

APPENDIX B
MAINTENANCE TASK INDEX

B-1. SCOPE

This appendix helps you find maintenance tasks for the elevation fire control quadrant by giving you references to the procedures.

B-2. MAINTENANCE TASK INDEX

QUADRANT, FIRE CONTROL, ELEVATION: M13A1 (1290-00-703-6262) M13A1C (1290-00-078-5568) M13A3 (1290-00-856-9451) M1381 (1290-00-870-6276)	Maintenance Tasks							Notes
	Inspection Upon Receipt (Vol II)	Final Inspection (Vol II)	Performance Test (Vol II)	Adjust Align, Calibrate (Vol II)	Removal/Installation (Vol II)	Disassembly/Assembly (Vol II)	Tools and Test Equipment (Vol II)	
Nomenclature								
M13 SERIES QUADRANT	Para 3-2	Para 5-3	Chap 2	Para 5-2			Para 2-8	
HOUSING						Para 4-16/ 4-17		
IDENTIFICATION PLATE (M13A1 AND M13A1C ONLY)						Para 4-19/ 4-20		
LEVEL VIAL TUBE					Para 4-4/ 4-5			
MICROMETER						Para 4-10/ 4-11		
SCALE DIAL					Para 4-7/ 4-8			
WORM SHAFT						Para 4-13/ 4-14		

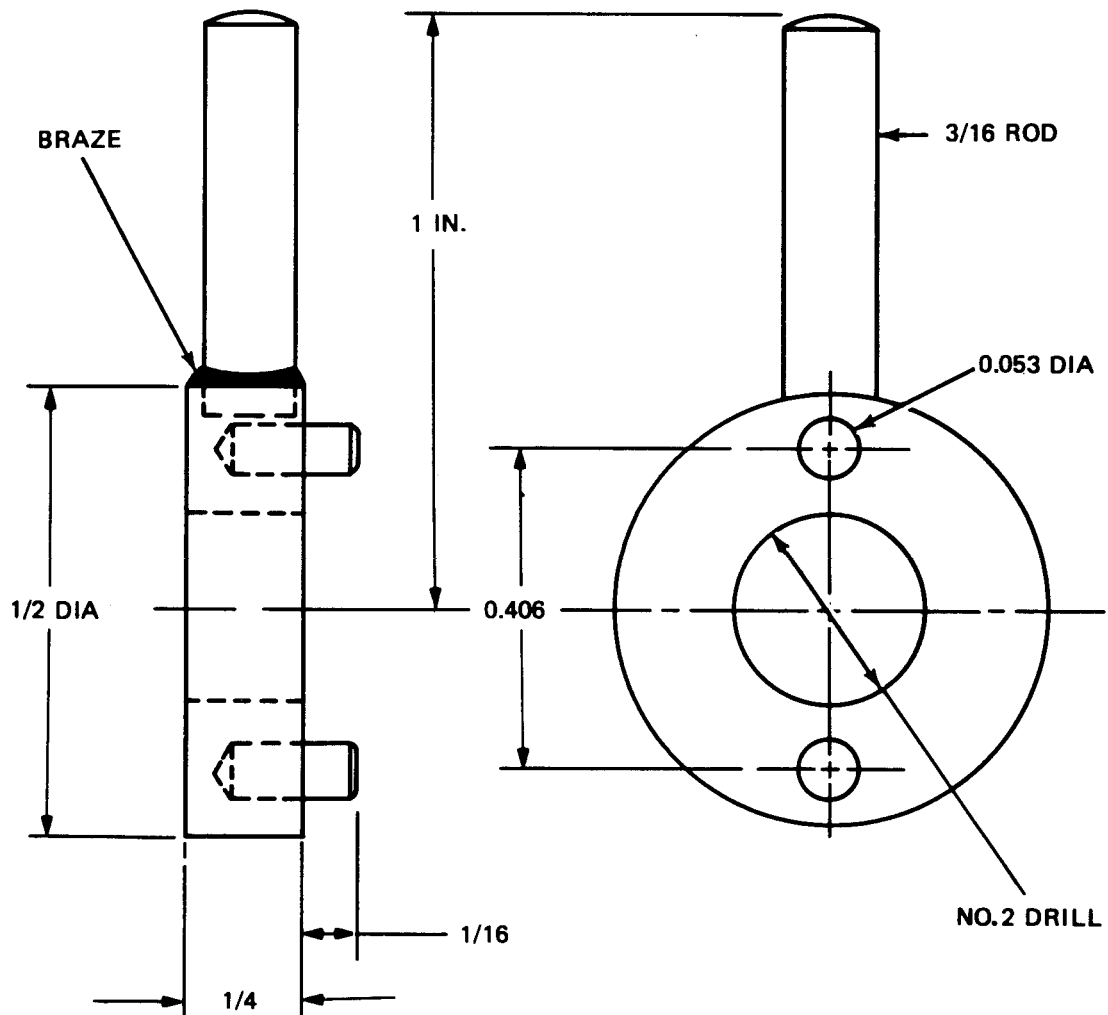
APPENDIX C
FABRICATED TOOLS

C-1. SCOPE

This appendix shows the tool, with dimensions and use, necessary to fix the elevation fire control quadrant. Dimensions are given so that you can have the tool made.

C-2. LEVEL VIAL WRENCH

Used to remove and install level vial ring.



NOTE:
MATERIAL: STEEL
ALL DIMENSIONS SHOWN ARE IN INCHES

APPENDIX D
DIRECT SUPPORT AND
GENERAL SUPPORT MAINTENANCE
REPAIR PARTS AND SPECIAL TOOLS LIST

(Current as of 24 July 1981)

Section I. INTRODUCTION

D-1. SCOPE

This appendix lists spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE), and other special support equipment required for performance of direct support, and general support of the Quadrant, Fire Control, M13A1, M13A1C, M13A3, M13B1. It authorizes the requisitioning and issue of spares and repair parts as indicated by the source and maintenance codes.

D-2. GENERAL

This Repair Parts and Special Tools List is divided into the following sections:

a. Section II. Repair Parts List. A list of spares and repair parts authorized for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in numeric sequence, with the parts in each group listed in figure and item number sequence.

b. Section III. Special Tools List. (Not Applicable)

c. Section IV. National Stock Number and Part Number Index. A list in National item identification number (NIIN) sequence, of all National stock numbers (NSN) appearing in the listings, followed by a list in alphameric sequence of all part numbers appearing in the listings. National stock numbers and part numbers are cross-referenced to each illustration figure and item number appearance.

D-3. EXPLANATION OF COLUMNS

a. Illustration. This column is divided as follows:

(1) Figure Number. Indicates the figure number of the illustration on which the item is shown.

(2) Item Number. The number used to identify item called out in the illustration.

b. Source, Maintenance, and Recoverability (SMR) Codes.

(1) Source Code. Source codes indicate the manner of acquiring

support items for maintenance, repair, or overhaul of end items. Source codes are entered in the first and second positions of the Uniform SMR Code format as follows:

Code	Definition
PA	-Item procured and stocked for anticipated or known usage.
PB	-Item procured and stocked for insurance purpose because essentiality dictates that a minimum quantity be available in the supply system.
PC	-Item procured and stocked and which otherwise would be coded PA except that it is deteriorative in nature.
PD	-Support item, excluding support equipment, procured for initial issue or outfitting and stocked only for subsequent or additional initial issues or outfittings. Not subject to automatic replenishment.
PE	-Support equipment procured and stocked for initial issue or outfitting to specified maintenance repair activities.
PF	-Support equipment which will not be stocked but which will be centrally procured on demand.
PG	-Item procured and stocked to provide for sustained support for the life of the equipment. It is applied to an item peculiar to the equipment which, because of probable discontinuance or shutdown of production facilities, would prove uneconomical to reproduce at a later time.
KD	-An item of a depot overhaul/repair kit and not purchased separately. Depot kit defined as a kit that provides items required at the time of overhaul or repair.
KF	-An item of a maintenance kit and not purchased separately. Maintenance kit defined as a kit that provides an item that can be replaced at organizational or intermediate levels of maintenance.
KB	-Item included in both a depot overhaul/repair kit and a maintenance kit.
MO	-Item to be manufactured or fabricated at organizational level.
MF	-Item to be manufactured or fabricated at the direct support maintenance level.
MH	-Item to be manufactured or fabricated at the general support maintenance level.
MD	-Item to be manufactured or fabricated at the depot maintenance level.
AO	-Item to be assembled at organizational level.
AF	-Item to be assembled at direct support maintenance level.
AH	-Item to be assembled at general support maintenance level.
AD	-Item to be assembled at depot maintenance level.
XA	-Item is not procured or stocked because the requirements for the item will result in the

	replacement of the next higher assembly.	F	-Support item is removed, replaced, used at the direct support level.
XB	-Item is not procured or stocked. If not available through salvage, requisition.	H	-Support item is removed, replaced, used at the general support level.
XC	-Installation drawing, diagram, instruction sheet, field service drawing, that is identified by manufacturer's part number.	D	-Support items that are removed, replaced, used at depot, mobile depot, or specialized repair activity only.
XD	-A support item that is not stocked. When required, item will be procured through normal supply channels.		

NOTE: Cannibalization or salvage may be used as a source of supply for any items coded above except those coded XA and aircraft support items as restricted by AR 700-42.

(b) The maintenance code entered in the fourth position indicates whether the item is to be repaired and identifies the lowest maintenance level with the capability to perform complete repair (i.e., all authorized maintenance functions). This position will contain one of the following maintenance codes.

(2) Maintenance Code.
Maintenance codes are assigned to indicate the levels of maintenance authorized to USE and REPAIR support items. The maintenance codes are entered in the third and fourth positions of the Uniform SMR Code format as follows:

(a) The maintenance code entered in the third position will indicate the lowest maintenance level authorized to remove, replace, and use the support item. The maintenance code entered in the third position will indicate one of the following levels of maintenance:

Code	Application/Explanation	Code	Application/Explanation
C	-Crew or operator maintenance performed within organizational maintenance.	D	-The lowest maintenance level capable of complete repair of the support item is the depot level.
O	-Support item is removed, replaced, used at the organizational level.	L	-Repair restricted to Specialized Repair Activity. (Not Applicable).

Z -Nonreparable. No repair is authorized. specialized repair activity level.

B -No repair is authorized. The item may be reconditioned by adjusting, lubricating, etc., at the user level. No parts or special tools are procured for the maintenance of this item.

A -Item requires special handling or condemnation procedures because of specific reasons (i.e., precious metal content, high dollar value, critical material or hazardous material). Refer to appropriate manuals/directives for specific instructions.

(3) Recoverability Code.

Recoverability codes are assigned to support items to indicate the disposition action on unserviceable items. The recoverability code is entered in the fifth position of the Uniform SMR Code format as follows:

Recover-
ability
Codes

Definition

Z -Nonreparable item. When unserviceable, condemn and dispose at the level indicated in position 3.

O -Reparable item. When uneconomically reparable, condemn and dispose at organizational level.

F -Reparable item. When uneconomically reparable, condemn and dispose at the direct support level.

H -Reparable item. When uneconomically reparable, condemn and dispose at the general support level.

D -Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal not authorized below depot level.

L -Reparable item. Repair, condemnation, and disposal not authorized below depot/

c. National Stock Number.

Indicates the National stock number assigned to the item and which will be used for requisitioning.

d. Federal Supply Code for Manufacturer (FSCM). The FSCM is a 5-digit numeric code listed in SB 708-42 which is used to identify the manufacturer, distributor, or Government agency, etc.

e. Part Number. Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

NOTE: When a stock numbered item is requisitioned, the item received may have a different part number than the part being replaced.

f. Description. Indicates the Federal item name and, if required, a minimum description to identify the item.

g. Unit of Measure (U/M). Indicates the standard of the basic quantity of the listed item as used in performing the actual maintenance function. This measure is expressed by a two-character alphabetical

abbreviation (e.g., ea, in, pr, etc).
 When the unit of measure differs from
 the unit of issue, the lowest unit of
 issue that will satisfy the required
 units of measure will be requisitioned.

h. Quantity Incorporated in Unit.
 Indicates the quantity of the item used
 in the breakout shown on the
 illustration figure, which is prepared
 for a functional group, subfunctional
 group, or an assembly. A "V" appearing
 in this column in lieu of a quantity
 indicates that no specific quantity
 is applicable, (e.g., shims, spacers,
 etc).

D-4. SPECIAL INFORMATION

Usable on codes are shown in the
 description column. Uncoded items are
 applicable to all models. Identifica-
 tion of the usable codes used in this
 publication are:

Code	Used On
262	Quadrant, Fire Control M13A1
W45	Quadrant, Fire Control M13A1C
757	Quadrant, Fire Control M13A3
763	Quadrant, Fire Control M13B1

D-5. HOW TO LOCATE REPAIR PARTS

a. When National Stock Number
 or Part Number is Unknown:

(1) First. Using the table
 of contents, determine the functional
 group within which the item belongs.
 This is necessary since illustrations
 are prepared for functional groups,
 and listings are divided into the same
 groups.

(2) Second. Find the
 illustration covering the functional
 group to which the item belongs.

(3) Third. Identify the item
 on the illustration and note the
 illustration figure and item number
 of the item.

(4) Fourth. Using the Repair
 Parts Listing, find the figure and item
 number noted on the illustration.

b. When National Stock Number
 or Part Number is Known:

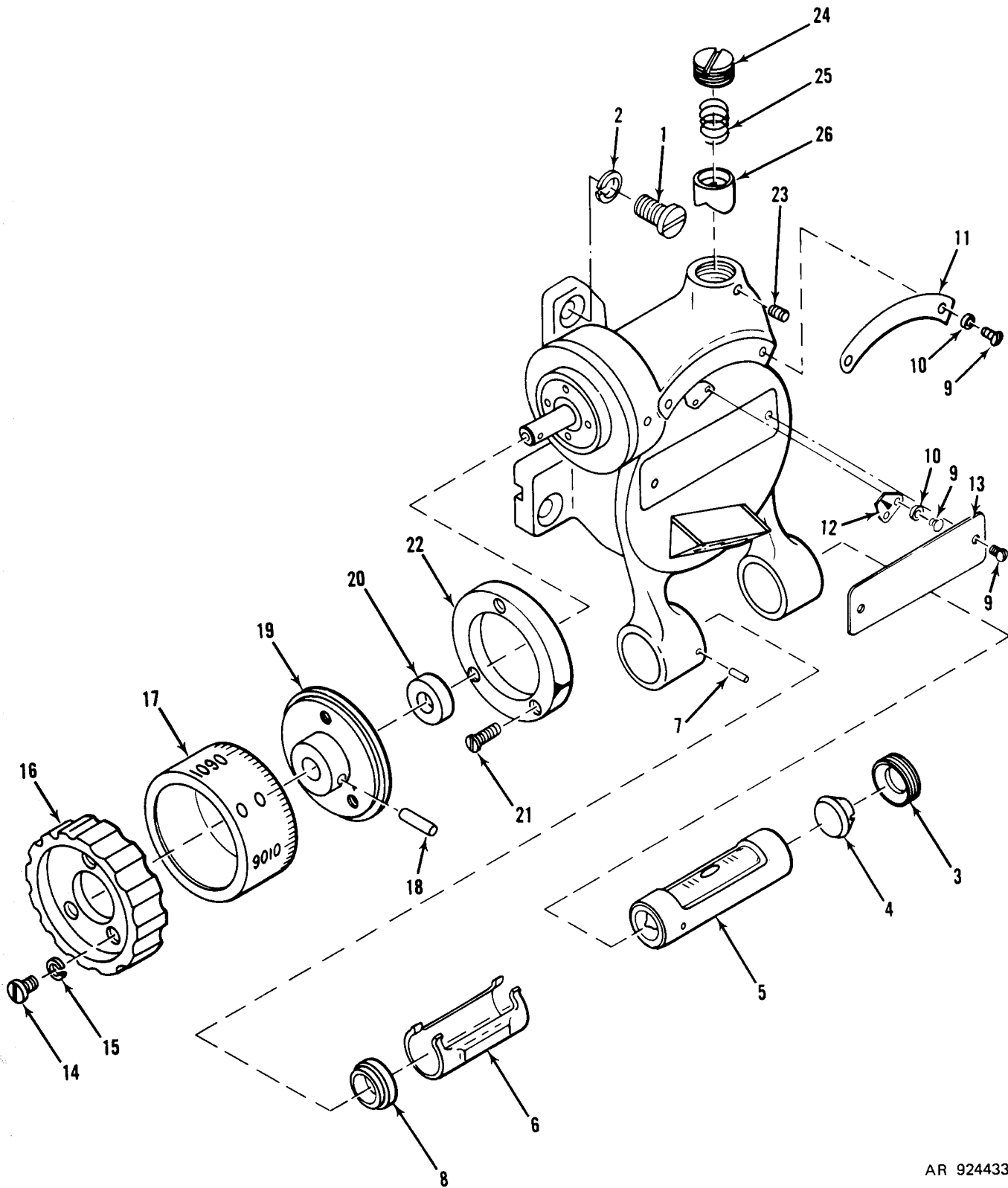
(1) First. Using the Index
 of National Stock Numbers and Part
 Numbers, find the pertinent National
 stock number or part number. This index
 is in NIIN sequence followed by a list
 of part numbers in alphameric sequence,
 cross-referenced to the illustration
 figure number and item number.

(2) Second. After finding
 the figure and item number, locate the
 figure and item number in the repair
 parts list.

D-6. ABBREVIATIONS
 (Not Applicable)

Section II

REPAIR PARTS LIST



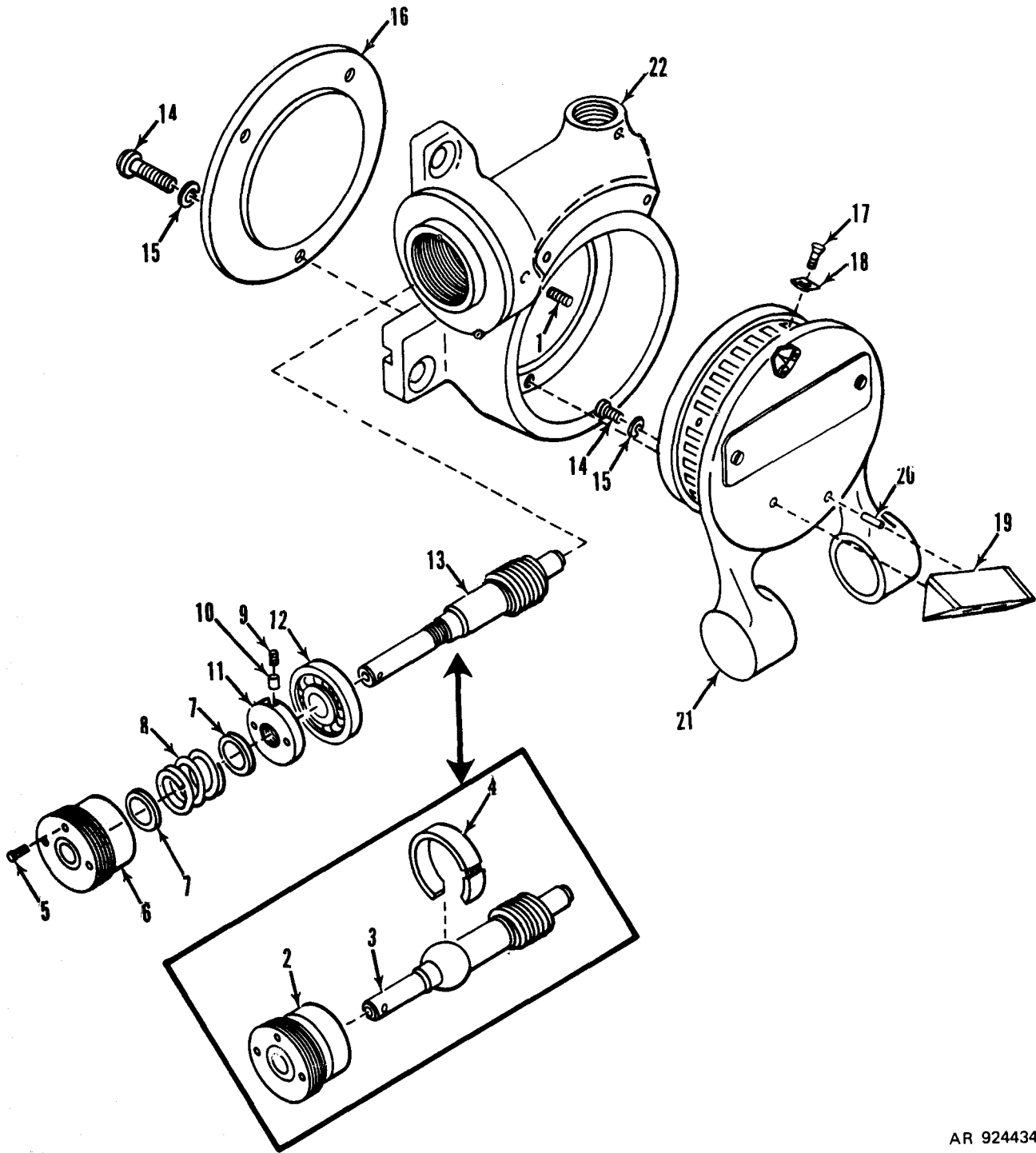
AR 924433

Figure D-1. Fire control quadrant, M13A1 8642402, M13A1C 8286737, M13A3 7695046,
M13B1 8270843 (overall view)

(1) ILLUSTRATION (a) FIG NO	(b) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	TM9-1290-232-34&P (6) DESCRIPTION	(7) USABLE ON CODE U/M	(8) QTY INC IN UNIT
						GROUP 00 FIRE CONTROL QUADRANT,M13A1		
						8642402,M13A1C 8286737,M13A3		
						7695046, M13B1 8270843		
						(OVERALL VIEW)		
D-1	1	PAOZZ	5305-00-912-4838	96906	MS35276-263	SCREW, MACHINE	W45,757,262, EA	3
D-1	1	PAOZZ	5305-00-059-3659	96906	MS51958-63	SCREW, MACHINE	763 EA	3
D-1	2	PAOZZ	5310-00-933-8120	96906	MS35338-138	WASHER, LOCK	757,262 EA	3
D-1	2	PAOZZ	5310-00-869-9576	96906	MS35338-157	WASHER, LOCK	W45,763 EA	3
D-1	3	PAFZZ	5365-00-692-1492	19200	8202181	RING	EA	1
D-1	4	PAFZZ	1290-00-896-2251	19200	8202177	ECCENTRIC	EA	1
D-1	5	PAFZZ	1290-00-692-1493	19200	8202183	LEVEL, FIRE CONTROL	757,262,763 EA	1
D-1	5	PAFZZ	1290-00-078-5589	19200	8286735	LEVEL, FIRE CONTROL	W45 EA	1
D-1	6	PAFZZ	1290-00-896-2239	19200	8215835	COVER, LEVEL VIAL	EA	1
D-1	7	PAFZZ	5315-00-817-0889	96906	MS16555-601	PIN, STRAIGHT	763 EA	1
D-1	7	PAFZZ	5315-00-054-4103	21450	544103	PIN, STRAIGHT	W45,757,262 EA	1
D-1	8	PAFZZ	1290-00-455-1494	19200	8202178	RING	763 EA	1
D-1	9	PAFZZ	5305-00-057-0498	96906	MS51958-2	SCREW, MACHINE	EA	6
D-1	10	PAFZZ	5310-00-543-4652	96906	MS35333-69	WASHER, LOCK	W45,757,262 EA	4
D-1	10	PAFZZ	5310-00-869-4199	96906	MS35338-156	WASHER, LOCK	763 EA	4
D-1	11	PAFZZ	5355-00-765-2223	19200	7652223	DIAL, SCALE	262,763 EA	1
D-1	11	PAFZZ	1290-00-472-4448	19200	8565444	SCALE, DIAL	757 EA	1
D-1	11	PAFZZ	5355-00-163-7376	19200	8619447	DIAL, SCALE	W45 EA	1
D-1	12	PAFZZ	5355-00-765-2225	19200	7652225	POINTER, DIAL	262,763 EA	1
D-1	12	PAFZZ	9905-00-497-8277	19200	8619448	PLATE, DESIGNATION	W45,757 EA	1
D-1	13	PAHZZ	9905-00-137-7906	19200	8286736	PLATE	W45 EA	1
D-1	13	PAHZZ	9905-00-497-8275	19200	8565981-1	PLATE	757 EA	1
D-1	13	PAHZZ	9905-00-497-8276	19200	8565981-2	PLATE	763 EA	1
D-1	13	PAHZZ	9905-00-137-7907	19200	8642404	PLATE	262 EA	1
D-1	14	PAFZZ	5305-00-057-0511	96906	MS51958-14	SCREW, MACHINE	W45,757,262 EA	3
D-1	14	PAFZZ		21450	225416	SCREW	763 EA	3
D-1	15	PAFZZ	5310-00-933-8118	96906	MS35338-135	WASHER, LOCK	W45,757,262 EA	3
D-1	15	PAFZZ		21450	582805	WASHER	763 EA	3
D-1	16	PAFZZ	5355-00-667-9502	19207	7652227	KNOB	EA	1
D-1	17	PAFZZ	1290-00-472-4447	19200	8619595	SCALE, DIOPTER (MICROMETER)	EA	1
D-1	18	PAFZZ		96906	MS24692-2P	PIN, TAPERED, PLAIN	262 EA	1
D-1	18	PAFZZ	5315-00-187-3254	96906	MS24692-78	PIN, TAPERED, PLAIN	757 EA	1
D-1	18	PAFZZ		96906	MS24692-76P	PIN, TAPERED, PLAIN	W45,763 EA	1
D-1	19	PAFZZ	1290-00-765-2224	19200	7652224	ADAPTER	763 EA	1
D-1	19	PAFZZ	1290-00-191-1390	19200	8642406	ADAPTER	W45,757,262 EA	1
D-1	20	PAFZZ	5310-00-291-3021	19200	7652233	WASHER, FLAT	763 EA	1

(1) ILLUSTRATION (a) FIG NO	(b) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	TM9-1290-232-34&P (6) DESCRIPTION	(7) USABLE ON CODE U/M	(8) QTY INC IN UNIT
						GROUP 00 FIRE CONTROL QUADRANT,M13A1		
						8642402, M13A1C 8286737, M13A3		
						7695046, M13B1 8270843		
						(OVERALL VIEW) (CONTINUED)		
D-1	20	PAFZZ	5310-00-807-4364	19200	8642405	WASHER, FLAT	W45,757,262 EA	1
D-1	21	PAFZZ	5305-00-701-5230	96906	MS51960-8	SCREW, MACHINE	W45,757,262 EA	3
D-1	21	PAFZZ	5305-00-728-1498	96906	MS51960-9	SCREW, MACHINE	763 EA	3
D-1	22	PAFZZ	1290-00-432-2188	19200	8619431	INDEX, QUADRANT	EA	1
D-1	23	PAFZZ	5305-00-068-6708	96906	MS51038-16	SETSCREW	EA	1
D-1	24	PAFZZ	5365-00-202-6609	19200	7652230	PLUG, MACHINE	EA	1
D-1	25	PAFZZ	5340-00-286-4365	19200	7647928	SPRING, HELICAL	763 EA	1
D-1	25	PAFZZ	5360-00-766-4789	19200	8293173	SPRING, HELICAL	W45,757,262 EA	1
D-1	26	PAFZZ	3120-00-503-1369	96906	MS35689-3	BEARING, V	763 EA	1
D-1	26	PAFZZ	3120-00-726-4295	19200	8293174	BEARING V	W45,757,262 EA	1

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AR 924434

Figure D-2. Fire control quadrant, M13A1 8642402, M13A1C 8286737, M13A3 7695046, M13B1 8270843 (partial view)

(1) ILLUSTRATION (a) FIG NO	(b) ITEM NO	(2) SMR CODE	(3) NATIONAL STOCK NUMBER	(4) FSCM	(5) PART NUMBER	TM9-1290-232-34&P (6) DESCRIPTION	(7) USABLE ON CODE U/M	(8) QTY INC IN UNIT
						GROUP 00 FIRE CONTROL QUADRANT,M13A1		
						8642402, M13A1C 8286737, M13A3		
						7695046, M13B1C 8270843		
						(PARTIAL VIEW)		
D-2	1	PAFZZ	5305-00-503-4659	19200	5034659	SETSCREW	763 EA	1
D-2	2	PAFZZ	6650-00-505-5462	19200	7653185	CAP, BALL	763 EA	1
D-2	3	PAFZZ	1290-00-765-2221	19200	7652221	WORM SHAFT	763 EA	1
D-2	4	PAFZZ	1240-00-505-5461	19200	7653184	SEAT, BALL SOCKET	763 EA	1
D-2	5	PAFZZ	5305-00-774-9701	96906	MS51960-3	SCREW, MACHINE	W45,757,262 EA	1
D-2	6	PAFZZ	1290-00-474-7013	19200	8642408	RETAINER, QUADRANT	W45,757,262 EA	1
D-2	7	PAFZZ	5310-00-800-1669	19200	8642410	WASHER,FLAT	W45,757,262 EA	2
D-2	8	PAFZZ	5360-00-846-6610	19200	7659439	SPRING, HELICAL	W45,757,262 EA	1
D-2	9	PAFZZ	5305-00-527-5737	96906	MS51031-16	SETSCREW	W45,757,262 EA	1
D-2	10	PAFZZ	1290-00-970-1210	19200	7695038	SEAT	W45,757,262 EA	1
D-2	11	PAFZZ	5310-00-970-1209	19200	7694161	NUT, PLAIN, ROUND	W45,757,262 EA	1
D-2	12	PAFZZ		19200	8293172	BEARING, BALL	W45,757,262 EA	1
D-2	13	PAFZZ	1290-00-715-9285	19200	8642409	WORM SHAFT	W45,757,262 EA	1
D-2	14	PAFZZ	5305-00-701-5058	96906	MS51958-42	SCREW, MACHINE	W45,757,262 EA	4
D-2	14	PAFZZ	5305-00-701-5058	96906	MS51958-42	SCREW, MACHINE	757 EA	3
D-2	15	PAFZZ	5310-00-933-8119	96906	MS35338-137	WASHER,LOCK	W45,262 EA	4
D-2	15	PAFZZ	5310-00-933-8119	96906	MS35338-137	WASHER,LOCK	757 EA	3
D-2	15	PAFZZ	5310-00-869-4199	96906	MS35338-156	WASHER,LOCK	763 EA	4
D-2	16	PAFZZ	1290-00-765-2229	19200	7652229	COVER, ACCESS	EA	1
D-2	17	PAFZZ	5305-00-774-9662	96906	MS51960-16	SCREW, MACHINE	W45,757,262 EA	2
D-2	17	PAFZZ		21450	420569	SCREW	763 EA	2
D-2	18	PAFZZ	1290-00-765-2232	19200	7652232	STOP	EA	2
D-2	19	PAFZZ	1290-00-765-2231	19200	7652231	REFLECTOR	W45,262 EA	1
D-2	19	PAFZZ	1290-00-085-7126	19200	8620183	HOUSING	763 EA	1
D-2	20	PAFZZ	5315-00-241-2923	88044	AN122691	PIN, STRAIGHT	W45,757,262 EA	1
D-2	21	XBFZZ		19200	7695050	HOUSING	757 EA	1
D-2	21	XBFZZ		19200	8590702	HOUSING	W45,262 EA	1
D-2	21	XBFZZ		19200	8289196	HOUSING	763 EA	1
D-2	22	XBFZZ		19200	7082219	HOUSING	763 EA	1
D-2	22	XBFZZ		19200	7695049	HOUSING	757 EA	1
D-2	22	XBFZZ		19200	8642403	HOUSING	W45,262 EA	1

D-13(D-14 BLANK)

Section III

SPECIAL TOOLS LIST

(NOT APPLICABLE)

Section IV

NATIONAL STOCK NUMBER AND PART NUMBER INDEX

NATIONAL STOCK NUMBER AND PART NUMBER INDEX

STOCK NUMBER	FIGURE NO.	ITEM NO.	STOCK NUMBER	FIGURE NO.	ITEM NO.
5315-00-054-4103	D-1	7	5305-00-701-5058	D-2	14
5305-00-057-0498	D-1	9	5305-00-701-5058	D-2	14
5305-00-057-0511	D-1	14	5305-00-701-5230	D-1	21
5305-00-059-3659	D-1	1	1290-00-715-9285	D-2	13
5305-00-068-6708	D-1	23	3120-00-726-4295	D-1	26
1290-00-078-5589	D-1	5	5305-00-728-1498	D-1	21
1290-00-085-7126	D-2	19	1290-00-765-2221	D-2	3
9905-00-137-7906	D-1	13	5355-00-765-2223	D-1	11
9905-00-137-7907	D-1	13	1290-00-765-2224	D-1	19
5355-00-163-7376	D-1	11	5355-00-765-2225	D-1	12
5315-00-187-3254	D-1	18	1290-00-765-2229	D-2	16
1290-00-191-1390	D-1	19	1290-00-765-2231	D-2	19
5365-00-202-6609	D-1	24	1290-00-765-2232	D-2	18
5315-00-241-2923	D-2	20	5360-00-766-4789	D-1	25
5340-00-286-4365	D-1	25	5305-00-774-9662	D-2	17
5310-00-291-3021	D-1	20	5305-00-774-9701	D-2	5
1290-00-432-2188	D-1	22	5310-00-800-1669	D-2	7
1290-00-455-1494	D-1	8	5310-00-807-4364	D-1	20
1290-00-472-4447	D-1	17	5315-00-817-0889	D-1	7
1290-00-472-4448	D-1	11	5360-00-846-6610	D-2	8
1290-00-474-7013	D-2	6	5310-00-869-4199	D-1	10
9905-00-497-8275	D-1	13	5310-00-869-4199	D-2	15
9905-00-497-8276	D-1	13	5310-00-869-9576	D-1	2
9905-00-497-8277	D-1	12	1290-00-896-2239	D-1	6
3120-00-503-1369	D-1	26	1290-00-896-2251	D-1	4
5305-00-503-4659	D-2	1	5305-00-912-4838	D-1	1
1240-00-505-5461	D-2	4	5310-00-933-8118	D-1	15
6650-00-505-5462	D-2	2	5310-00-933-8119	D-2	15
5305-00-527-5737	D-2	9	5310-00-933-8119	D-2	15
5310-00-543-4652	D-1	10	5310-00-933-8120	D-1	2
5355-00-667-9502	D-1	16	5310-00-970-1209	D-2	11
5365-00-692-1492	D-1	3	1290-00-970-1210	D-2	10
1290-00-692-1493	D-1	5			

FSCM	PART NUMBER	FIGURE NO.	ITEM NO.	FSCM	PART NUMBER	FIGURE NO.	ITEM NO.
88044	AN122691	D-2	20	19200	7652230	D-1	24
96906	MS16555-601	D-1	7	19200	7652231	D-2	19
96906	MS24692-2P	D-1	18	19200	7652232	D-2	18
96906	MS24692-76P	D-1	18	19200	7652233	D-1	20
96906	MS24692-78	D-1	18	19200	7653184	D-2	4
96906	MS35276-263	D-1	1	19200	7653185	D-2	2
96906	MS35333-69	D-1	10	19200	7659439	D-2	8
96906	MS35338-135	D-1	15	19200	7694161	D-2	11
96906	MS35338-137	D-2	15	19200	7695038	D-2	10
96906	MS35338-137	D-2	15	19200	7695049	D-2	22
96906	MS35338-138	D-1	2	19200	7695050	D-2	21
96906	MS35338-156	D-1	10	19200	8202177	D-1	4
96906	MS35338-156	D-2	15	19200	8202178	D-1	8
96906	MS35338-157	D-1	2	19200	8202181	D-1	3
96906	MS35689-3	D-1	26	19200	8202183	D-1	5
96906	MS51031-16	D-2	9	19200	8215835	D-1	6
96906	MS51038-16	D-1	23	19200	8286735	D-1	5
96906	MS51958-14	D-1	14	19200	8286736	D-1	13
96906	MS51958-2	D-1	9	19200	8289196	D-2	21
96906	MS51958-42	D-2	14	19200	8293172	D-2	12
96906	MS51958-42	D-2	14	19200	8293173	D-1	25
96906	MS51958-63	D-1	1	19200	8293174	D-1	26
96906	MS51960-16	D-2	17	19200	8565444	D-1	11
96906	MS51960-3	D-2	5	19200	8565981-1	D-1	13
96906	MS51960-8	D-1	21	19200	8565981-2	D-1	13
96906	MS51960-9	D-1	21	19200	8590702	D-2	21
21450	225416	D-1	14	19200	8619431	D-1	22
21450	420569	D-2	17	19200	8619447	D-1	11
19200	5034659	D-2	1	19200	8619448	D-1	12
21450	544103	D-1	7	19200	8619595	D-1	17
21450	582805	D-1	15	19200	8620183	D-2	19
19200	7082219	D-2	22	19200	8642403	D-2	22
19200	7647928	D-1	25	19200	8642404	D-1	13
19200	7652221	D-2	3	19200	8642405	D-1	20
19200	7652223	D-1	11	19200	8642406	D-1	19
19200	7652224	D-1	19	19200	8642408	D-2	6
19200	7652225	D-1	12	19200	8642409	D-2	13
19207	7652227	D-1	16	19200	8642410	D-2	7
19200	7652229	D-2	16				

By Order of the Secretary of the Army:

E. C. MEYER
General, United States Army
Chief of Staff

Official:

ROBERT M. JOYCE
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The Adjutant General

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BE EXACT... PIN-POINT WHERE IT IS

PAGE NO	PARA-GRAPH	FIGURE NO	TABLE NO
400		183	
512		191	

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

Change illustration. Reason: Tube end shown assembled on wrong side of lever cam.

Figure 191, item 3 has the wrong NSN. Supply rejects orders for this item. The NSN shown here is not listed in the AMDF or the MCRL.

Please give us the correct NSN and P/N.

SAMPLE

PRINTED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER
John Smith, S. SGT. 793/XXXX

SIGN HERE:
John Smith

TEAR ALONG PERFORATED LINE

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TM 9-1290-232-34&P

PUBLICATION DATE

19 Feb 82

PUBLICATION TITLE Quadrant, Fire Control
Elevation: M13A1, M13A1C, M13A3, M13B1

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PAGE NO.

PARA-GRAPH

FIGURE NO.

TABLE NO.

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M13B1

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PAGE NO.	PARA-GRAPH	FIGURE NO.	TABLE NO.
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DA FORM 2028-2
1 JUL 79

PREVIOUS EDITIONS ARE OBSOLETE.

P.S.—IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR RECOMMENDATION MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

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

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THE METRIC SYSTEM AND EQUIVALENTS

LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meters = 0.3937 Inches
 1 Meter = 100 Centimeters = 1000 Millimeters = 39.37 Inches
 1 Kilometer = 1000 Meters = 0.621 Miles

WEIGHTS

1 Gram = 0.001 Kilograms = 1000 Milligrams = 0.035 Ounces
 1 Kilogram = 1000 Grams = 2.2 Lb
 1 Metric Ton = 1000 Kilograms = 1 Megagram = 1.1 Short Tons

LIQUID MEASURE

1 Milliliter = 0.001 Liters = 0.0338 Fluid Ounces
 1 Liter = 1000 Milliliters = 33.82 Fluid Ounces

SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inches
 1 Sq Meter = 10,000 Sq Centimeters = 10.76 Sq Feet
 1 Sq Kilometer = 1,000,000 Sq Meters = 0.386 Sq Miles

CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.06 Cu Inches
 1 Cu Meter = 1,000,000 Cu Centimeters = 35.31 Cu Feet

TEMPERATURE

$5/9 (^{\circ}\text{F} - 32) = ^{\circ}\text{C}$
 212^o Fahrenheit is equivalent to 100^o Celsius
 90^o Fahrenheit is equivalent to 32.2^o Celsius
 32^o Fahrenheit is equivalent to 0^o Celsius
 $9/5 \text{ C}^{\circ} + 32 = \text{F}^{\circ}$

APPROXIMATE CONVERSION FACTORS

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

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

