TECHNICAL MANUAL

DIRECT SUPPORT AND
GENERAL SUPPORT
MAINTENANCE MANUAL

VOLUME I - TROUBLESHOOTING
VOLUME II - MAINTENANCE

PERISCOPE, TANK: M19-OLD AND NEW CONFIGURATION (6650-00-765-2971) (1240-01-005-6035) M24-OLD AND NEW CONFIGURATION (6650-00-344-4647) (1240-01-005-6036)

VOLUME I TROUBLESHOOTING

VOLUME II MAINTENANCE

HEADQUARTERS, DEPARTMENT OF THE ARMY 29 AUG 80

WARNING

Dangerous voltage is present. Make sure power is turned off before connecting high voltage power supply and/or touching any connector.

WARNING

Dry cleaning solvent can catch on fire. Keep it and all materials that can catch on fire away from flames. Use only in a room with a lot of fresh air.

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 DESTROY SUPERSEDED PAGES.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 . . . 29 Aug 80

TOTAL NUMBER OF PAGES IN THIS PUBLICATION IS 166 CONSISTING OF THE FOLLOWING:

Page No.	*Change No.
Cover	0
Warning	0
A	0
B Blank	0
i-vi	0
VOLUME I	
TROUBLESHOOTING	
Title	0
Reverse Blank	0
1-1 - 1-7	0
l-8 Blank	0
2-1 - 2-6	0
3-1	0
3-2 Blank	0
4-1 - 4-25	0
4-26 Blank	0
A-1 - A-2	0
B-1 - B-3	0
B-4 Blank	0
VOLUME II	
MAINTENANCE	
Title	0
Reverse Blank	0
1-1 - 1-5	0
l-6 Blank	0
2-1 - 2-2	0
3-1 - 3-5	0
3-6 Blank	0
3-7 - 3-11	0
3-12 Blank	0
3-13	0
4-0 - 4-3	0
4-4 Blank	0
4-5 - 4-11	0
4-12 Blank	0
4-13 - 4-15	0
4-16 Blank	0
4-17 - 4-25	0
4-26 Blank	0
4-27 - 4-35	0
4-36 Blank	0
4-37 - 4-70	0
5-1 - 5-2	0
6-1	0
6-2 Blank	0
A-1 - A-2	0
B-1 - B-3	0
B-4 Blank	0
Metric Conversion Chart	0
Cover	0

*Zero in this column indicates an original page.

Technical Manual
No. 9-1240-216-34

HEADQUARTERS,
DEPARTMENT OF THE ARMY,
Washington, D. C., 29 Aug 80

TECHNICAL MANUAL

DIRECT SUPPORT AND

GENERAL SUPPORT

MAINTENANCE MANUAL

PERISCOPE, TANK:

M19-OLD CONFIGURATION (6650-00-765-2971)
Ml9-NEW CONFIGURATION (1240-01-005-6035)
M24-OLD CONFIGURATION (6650-00-344-4647)
M24-NEW CONFIGURATION- (1240-01-005-6036)

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

A reply will be furnished to you.

*This manual supersedes TM 9-6650-216-34, March 1960.

TABLE OF CONTENTS

HOW TO USE THIS MANUAL

This manual has two volumes of maintenance information you will need to repair and service the M 19 and M24 Periscopes.

- 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
- Fault Symptom Index (Vol I, Chap 3) which lists the fault symptoms and shows where to look to fix them
- 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

DIRECT SUPPORT AND

GENERAL SUPPORT

MAINTENANCE MANUAL

VOLUME I - TROUBLESHOOTING

PERISCOPE, TANK:

Ml9 (OLD **AND** NEW CONFIGURATIONS)

M24 (OLD AND NEW CONFIGURATIONS)

CHAPTER 1

INTRODUCTION

1-1. SCOPE

This volume contains troubleshooting requirements and procedures for direct support and general support (DS/GS) maintenance of the M19 and M24 Periscopes. See Volume II for maintenance procedures.

1-2. ORGANIZATION

a. Chapter 2, Checkout Procedure, gives you flow charts to follow to check that the periscope is working right.

b. Chapter 3, Fault Symptom Index, lists the fault symptoms and where to look in this manual to fix each one.

c. Chapter 4, Fault Isolation Procedures, shows you step-by-step how to troubleshoot the fault symptoms found in Chapter 3.

d. Appendix A, Wiring Diagrams, may be used to help you find the cause of a fault. They can be used to trace signal flow or to find out what a voltage should be.

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 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 checkout procedure, fix them now. This does not mean small things like painting scratches.

(C) Do the checkout procedure 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. If you already know the fault symptom, look at the fault symptom index in Chapter 3 of this volume. This will also tell you what to do.

(E) After the bad part has been repaired or replaced, do the checkout procedure in Chapter 2 again. This is to make sure all fault symptoms have been corrected.

(F) If all the faults are now corrected, do the remaining maintenance tasks on DA Form 2404.

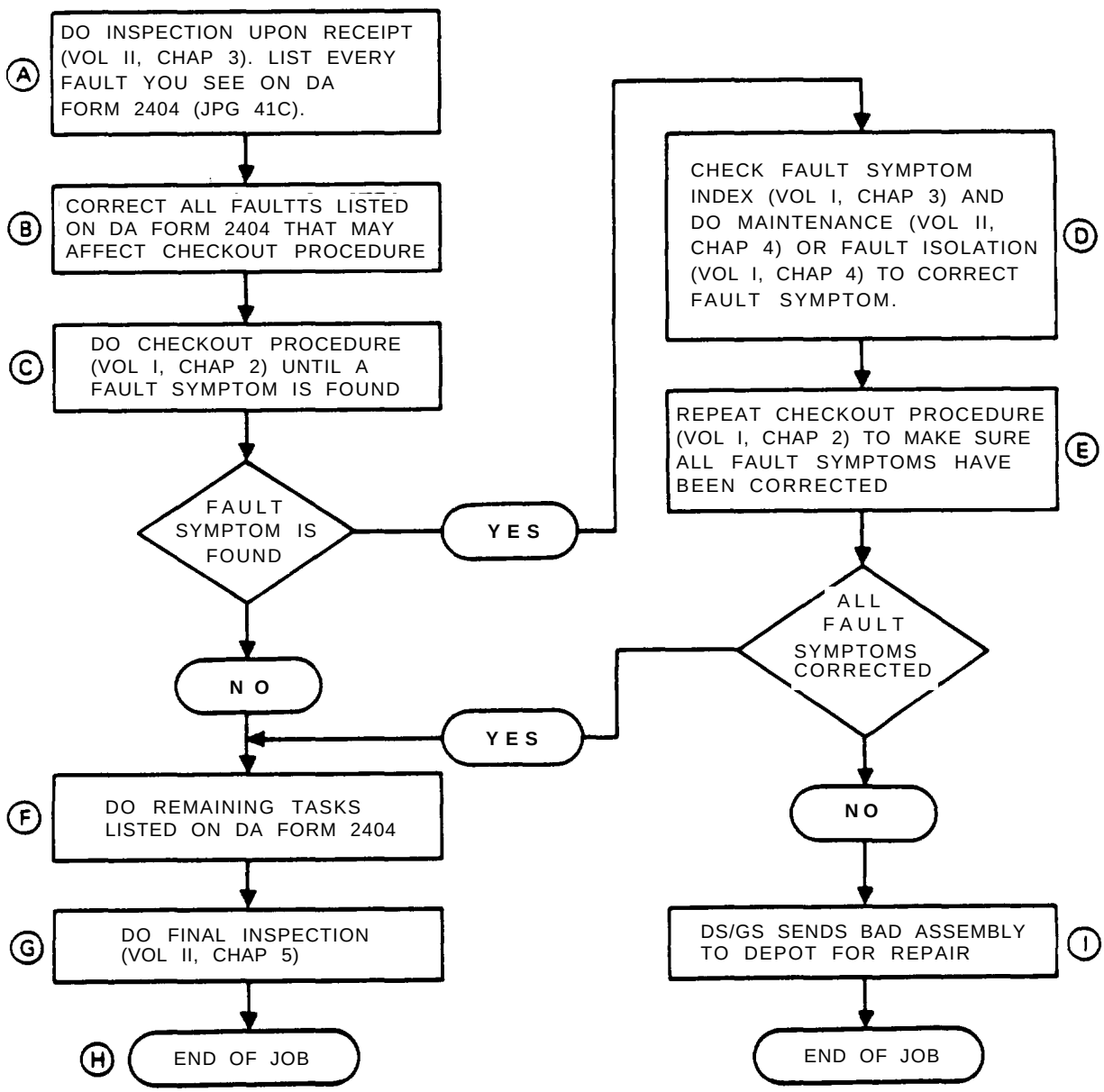
(G) Do the final inspection given in Vol II, Chap 5.

(H) The job is over and the good assembly is sent back to service.

(I) If all faults were not corrected after step E, the bad assembly is sent to the depot for repair.

The sample fault isolation procedure (para 1-5) shows you how to use the flow charts in this volume.

1-3. HOW TO TROUBLESHOOT (CONT)



1-4. TEST EQUIPMENT

Test Equipment	National Stock Number (NSN)	Test	Reference
1. 0-36 VDC Power Supply	6130-00-435-1116	Functional Check	JPG 41C
2. Cable	2590-00-065-1973	Functional Check	App B
3. Multimeter	6625-00-964-2629	Continuity and Resistance	JPG 41C
4. Power Supply, High Voltage	2590-00-025-3676	Functions! Check	App B1C

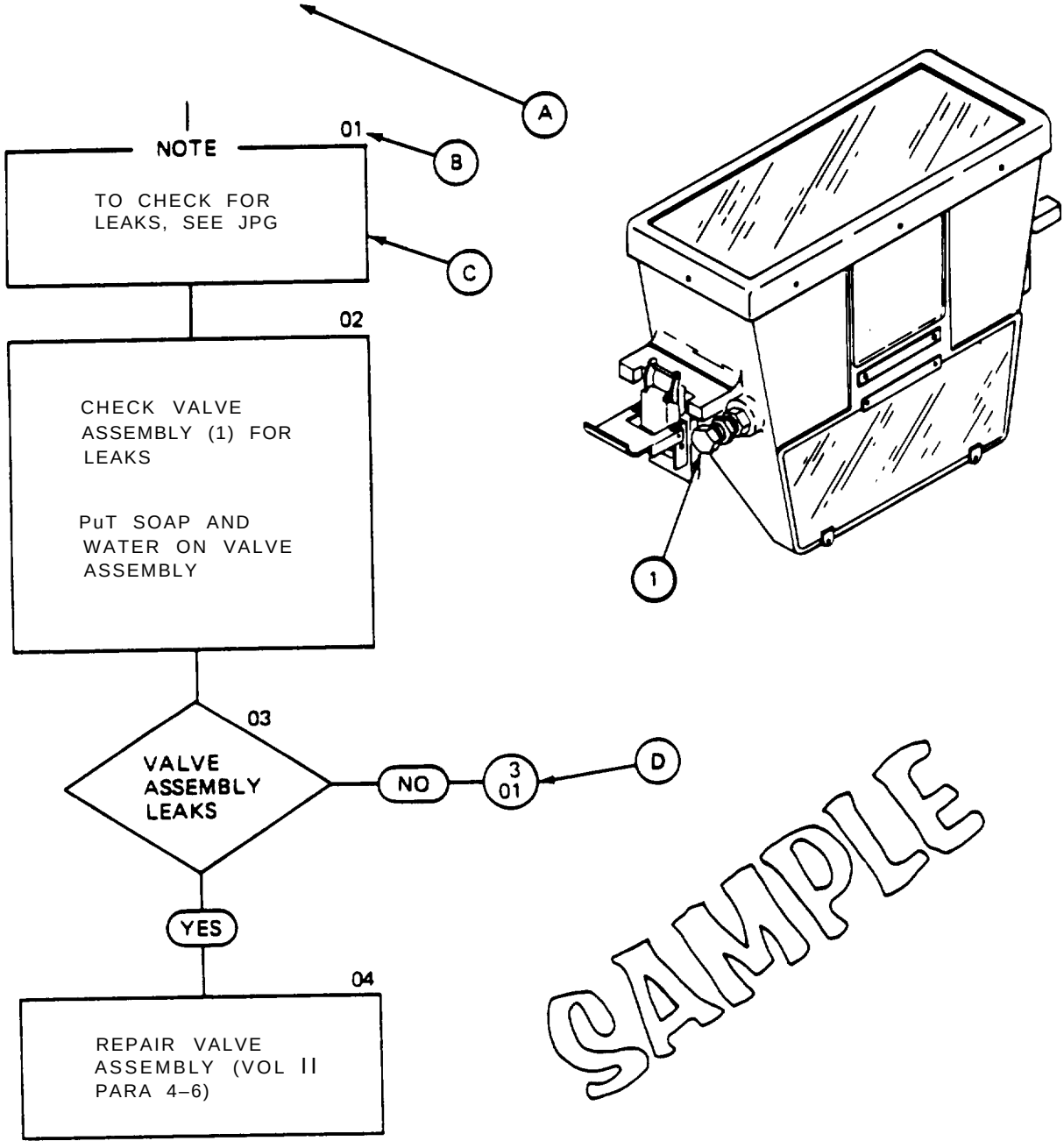
1-5. SAMPLE FAULT ISOLATION PROCEDURE

The sample fault isolation procedure tells you how to use the flow charts in Chapter 2 and 4.

Callouts	Description
(A)	This is the symptom shown in the Fault Symptom Index in Chapter 3.
(B)	Block number. Tells you the number of the block on the page. Block numbers start over at every page.
(C)	This is a note. It gives useful information that can help you in doing the procedure. A note will always come just before the step of the procedure that it is about.
	A warning will be labeled at top of block. Always follow the instruction in this kind of block carefully: If you don't you may be injured or injure someone else.
	A caution will also be labeled at top of block. The instructions in this kind of block tell you what to do so you will not damage equipment. Be sure you always follow caution instructions carefully.
(D)	The circle is used to send you to another sheet of procedure to keep on troubleshooting. The top number in the circle tells you what sheet to go to. The bottom number tells you what block on that sheet to start with. For example:  means that you should go to sheet 3, block 01, to continue the procedure.

1-5. SAMPLE FAULT ISOLATION PROCEDURE (CONT)

4-3. VIEW IS NOT CLEAR (SHEET 2 OF 3)

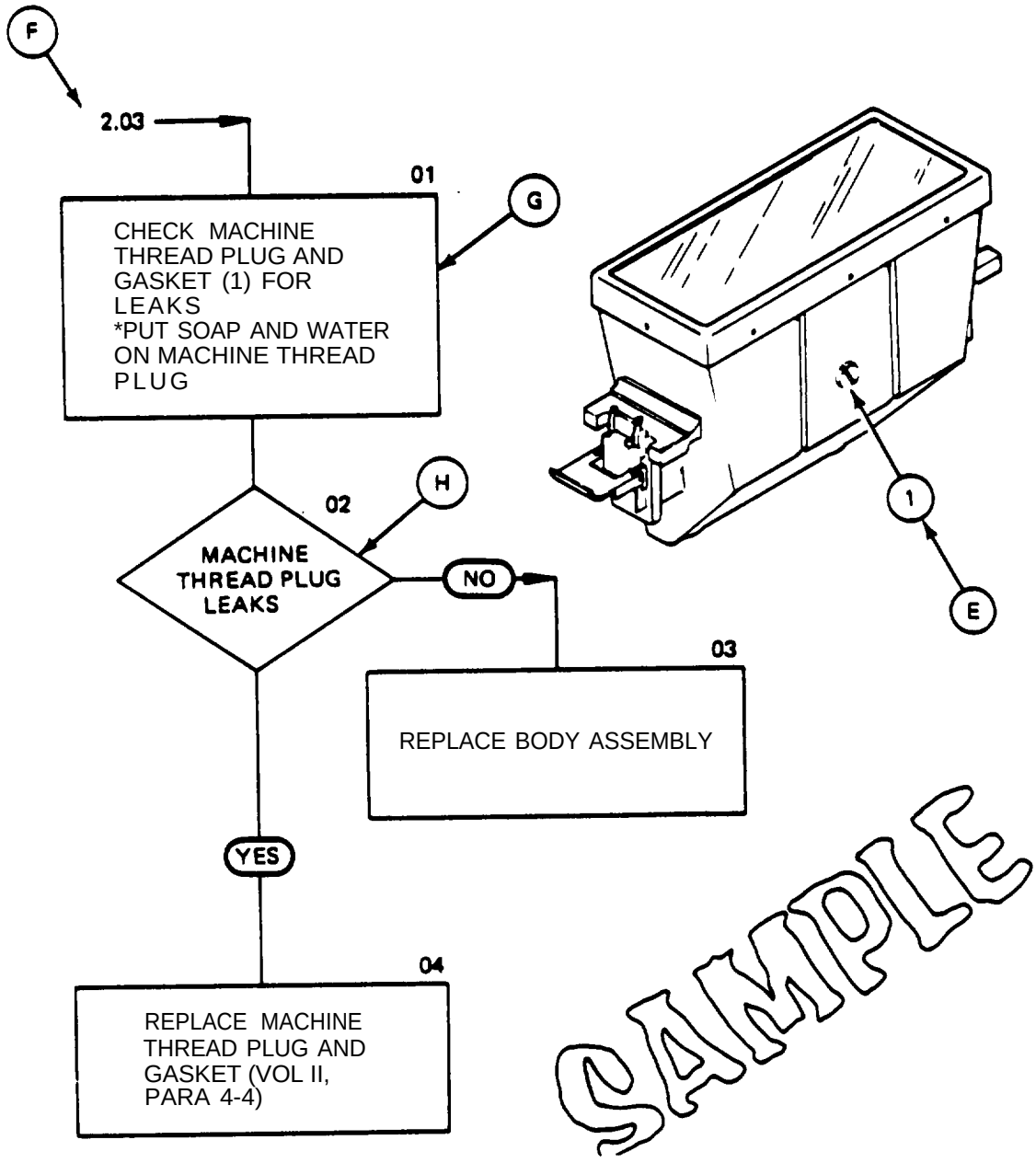


1-5. SAMPLE FAULT ISOLATION PROCEDURE (CONT)

Callouts	Description
(E)	Index numbers are found in the procedures and the illustration to help you find the connector, switch, knob, etc. The illustration will always be on the same or an opposite page, Remember, you will never have to turn the page to find the illustration.
(F)	This tells you where you came from, For example 2,03 means you came from sheet 2, block 03.
(G)	The top part of the box tells you what to do, The bottom parts tells you how to do it. After you become more skilled at troubleshooting and know more about the equipment, you may find that you only need to read the top part of the box.
(H)	This diamond shaped box is called a decision point, It asks you to answer a YES or NO question after doing the what-to-do statement. If the answer is YES, you should keep going down the YES branch, If the answer is NO, you should keep going down the NO branch.

1-5. SAMPLE FAULT ISOLATION PROCEDURE (CONT)

4-3. VIEW IS NOT CLEAR (SHEET 3 OF 3)



CHAPTER 2

CHECKOUT PROCEDURE

2-1. SCOPE

Checkout of the M19 and M24 Periscope is done by using the flow chart procedures in this chapter. You must do the checkout procedure from the beginning until a fault symptom is found. When it is, go to the fault symptom index in Chapter 3. After you have corrected the fault, start at the beginning again and do the checkout procedure until the periscope is working correctly.

2-2. CHECKOUT (SHEET 1 OF 6)

TEST EQUIPMENT: High voltage power supply, (tank)
0-36 VDC power supply
Multimeter test leads
High voltage cable

PERSONNEL: One

REFERENCES: JPG 41C for use of 0-36 VDC power supply
TM 10 for installing head assembly (TM 9-2350-215-10 for M60Al, TM 9-2350-257-10 for M60Al Rise, TM 9-2350-260-10 for M60, and TM 9-2350-222-10 for M728)

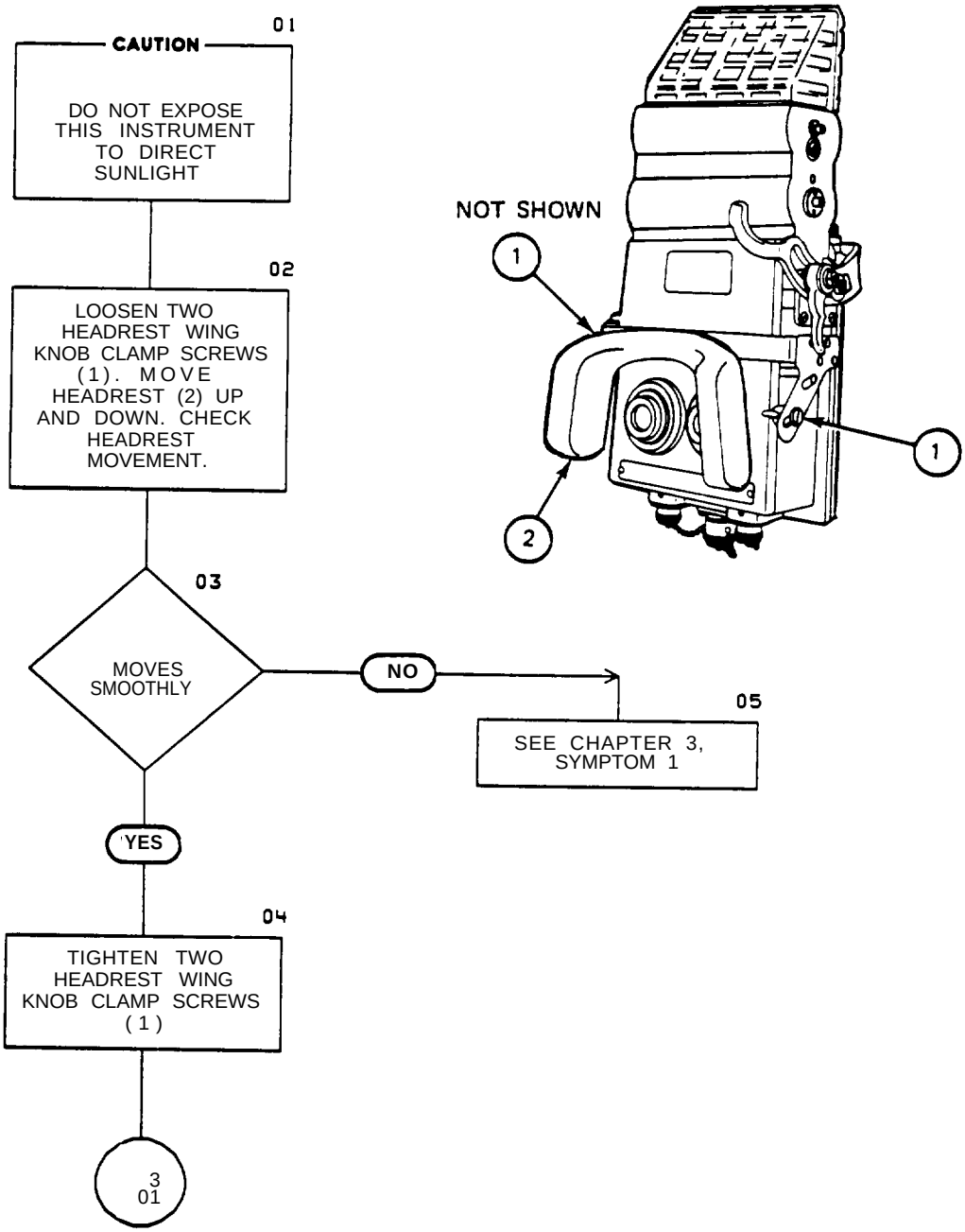
EQUIPMENT CONDITION: Body assembly on work bench with head assembly installed; power disconnected

PRELIMINARY PROCEDURES: Assemble power supplies (App B)

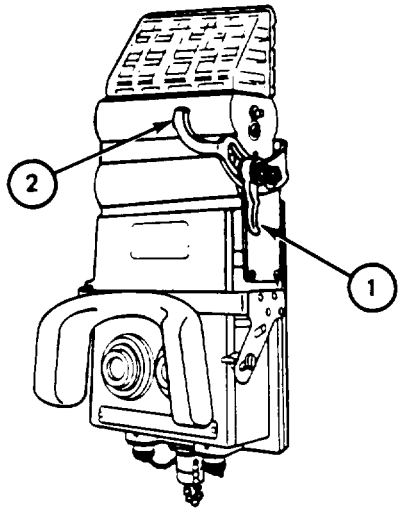
NOTE

All configurations are similar, so only the M24 (new configuration) is pictured in the checkout.

2-2. CHECKOUT (SHEET 2 OF 6)



2-2. CHECKOUT (SHEET 3 OF 6)



2.04 →

01

LOOSEN ELEVATION SETTING LEVER (1).

SWING PERISCOPE (ON MOUNT) OR MOVE ELEVATION LOCK ASSEMBLY SEGMENT (2) (ON WORK BENCH) UNTIL IT STOPS.

CHECK MOVEMENT.

02

MOVES SMOOTHLY

NO → 04

SEE CHAPTER 3, SYMPTOM 2

YES

03

TIGHTEN ELEVATION SETTING LEVER (1).

TRY TO MOVE PERISCOPE (ON MOUNT) OR ELEVATION LOCK ASSEMBLY SEGMENT (2) (ON WORK BENCH) TO CHECK FOR TIGHT LOCK.

05

LOCK TIGHT

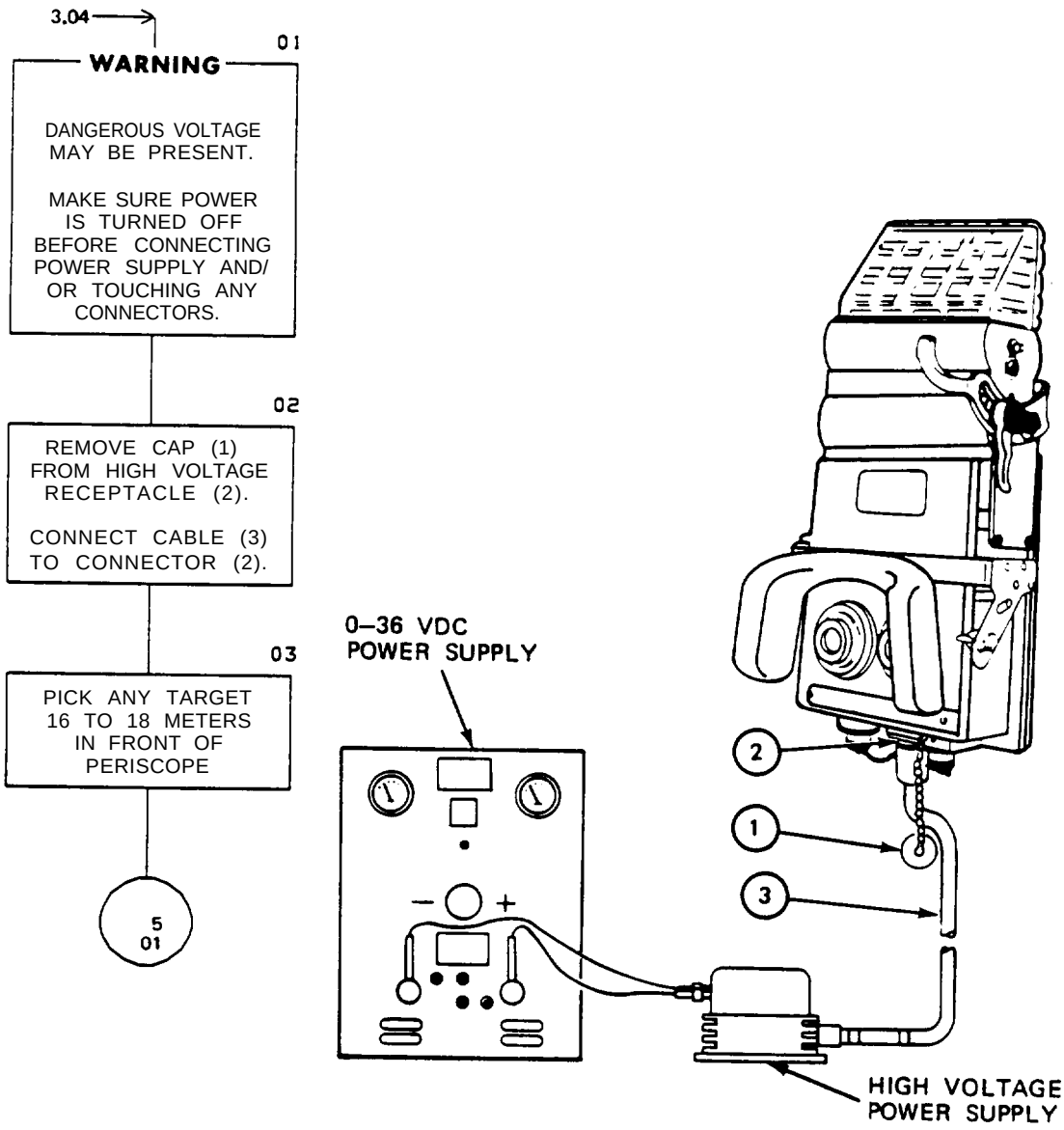
NO → 06

SEE CHAPTER 3, SYMPTOM 3

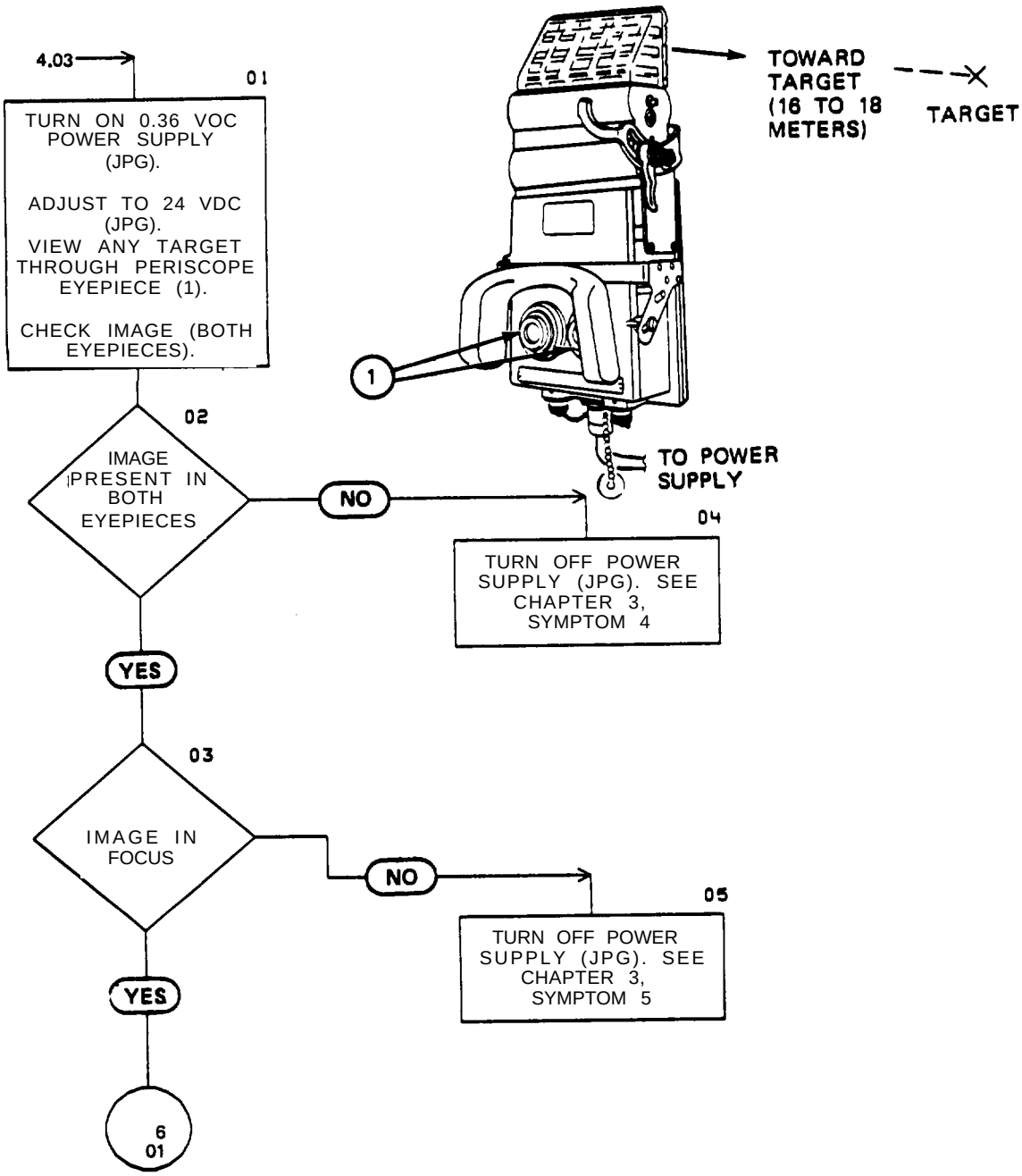
YES

4 01

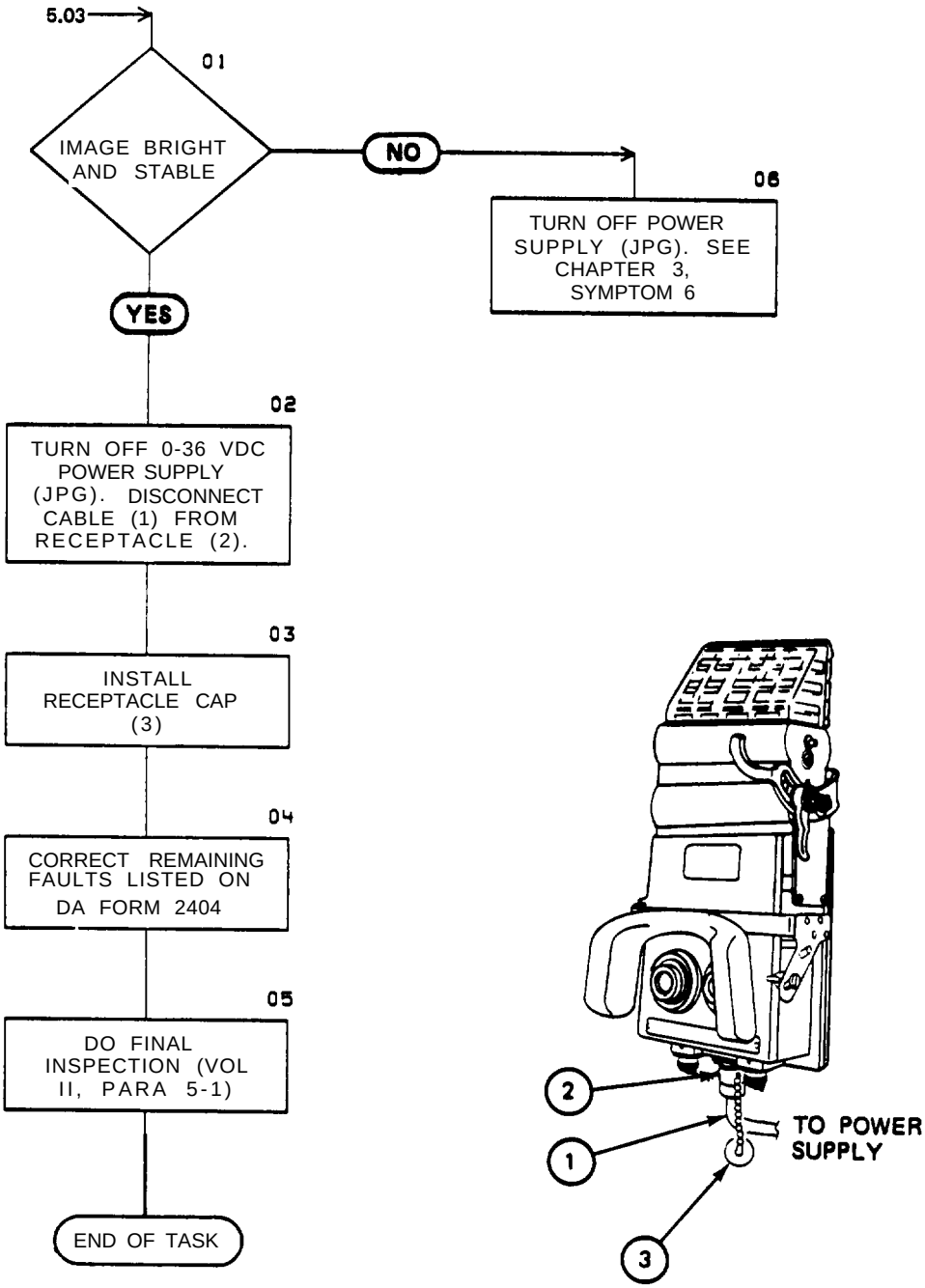
2-2. CHECKOUT (SHEET 4 OF 6)



2-2. CHECKOUT (SHEET 5 OF 6)



2-2. CHECKOUT (SHEET 6 OF 6)



CHAPTER 3

FAULT SYMPTOM INDEX

Symptom	Fault Isolation Procedure or Maintenance Procedure
1. Headrest does not move smoothly	Disassemble headrest assembly. Repair as required (Vol II, para 4-3)
2. Elevation lock does not move smoothly	Disassemble lock assembly, lubricate, repair or replace, as required (Vol II, para 4-8 and JPG)
3. Elevation lock does not lock tight	Disassemble lock assembly, lubricate and repair, as required (Vol II, para 4-8 and JPG)
4. No image (in one or both eyepieces) when power supply is on	Para 4-2 (old configurations) Para 4-5 (new configurations)
5. Poor focus (one one or both eyepieces)	Para 4-3 (old configurations) Para 4-5 (new configurations)
6. Image dim (not bright) or flickering (not stable)	Para 4-4 (old configurations) Para 4-5 (new configurations)

CHAPTER 4

FAULT ISOLATION PROCEDURES

4-1. SCOPE

This chapter gives step-by-step procedures to troubleshoot the fault symptoms found during checkout. After you replace the part, do the checkout procedure in Chapter 2 again. This is to make sure the new part has fixed the problem.

4-2. NO IMAGE (IN ONE OR BOTH EYEPIECES) WHEN POWER SUPPLY IS ON (SHEET 1 OF 5)

APPLICABLE CONFIGURATIONS: M19 and M24 old configurations

TEST EQUIPMENT High voltage power supply (tank)
Multimeter
0-36 VDC power supply
High voltage cable

PERSONNEL: One

REFERENCES: JPG 41C for: Using 0-36 VDC power supply
Using multimeter

EQUIPMENT CONDITION: Body assembly on work bench with head assembly installed; power

PRELIMINARY PROCEDURES: Assemble power supplies (App B)

NOTE

This procedure is for both the M19 and M24 periscopes. The M24 is pictured.

4-2. NO IMAGE (IN ONE OR BOTH EYEPIECES) WHEN POWER SUPPLY IS ON (SHEET 2 OF 5)

01

WARNING

HIGH VOLTAGE CAN KILL YOU.

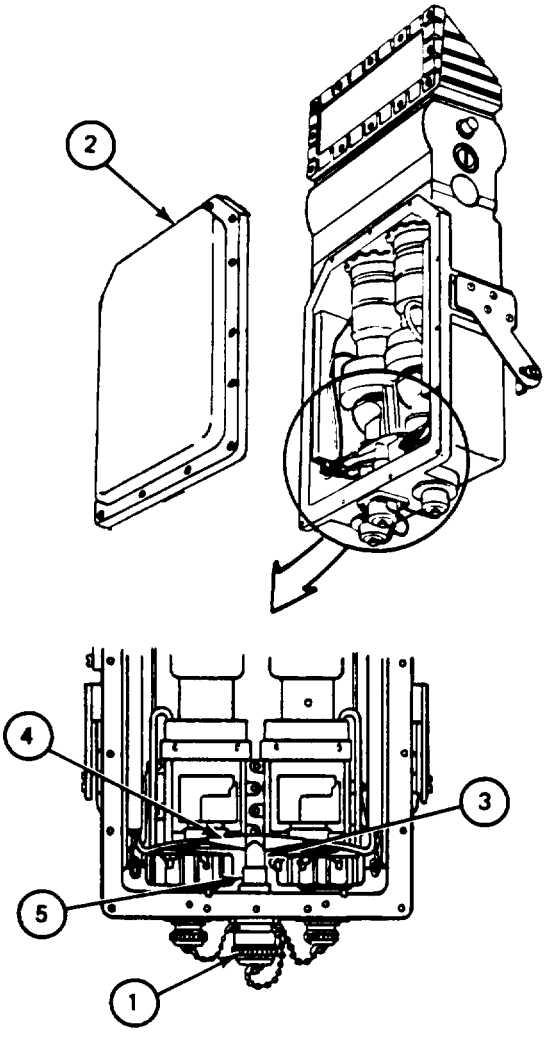
BE CAREFUL NOT TO TOUCH HIGH VOLTAGE CONNECTIONS WHEN OPERATING PERISCOPE. TURN OFF 0-36 VDC POWER SUPPLY (JPG). DISCONNECT CABLE FROM RECEPTACLE (1).

02

REMOVE BODY COVER (2) (VOL II. PARA 4-14)

03

REMOVE CENTER LEG TEE (3) OF HIGH VOLTAGE CABLE ASSEMBLY (4) FROM RECEPTACLE (5) (VOL II, PARA 4-20)



04

CHECK CONDITION OF HIGH VOLTAGE RECEPTACLE (5) INSULATION

05

INSULATION GOOD

NO

06

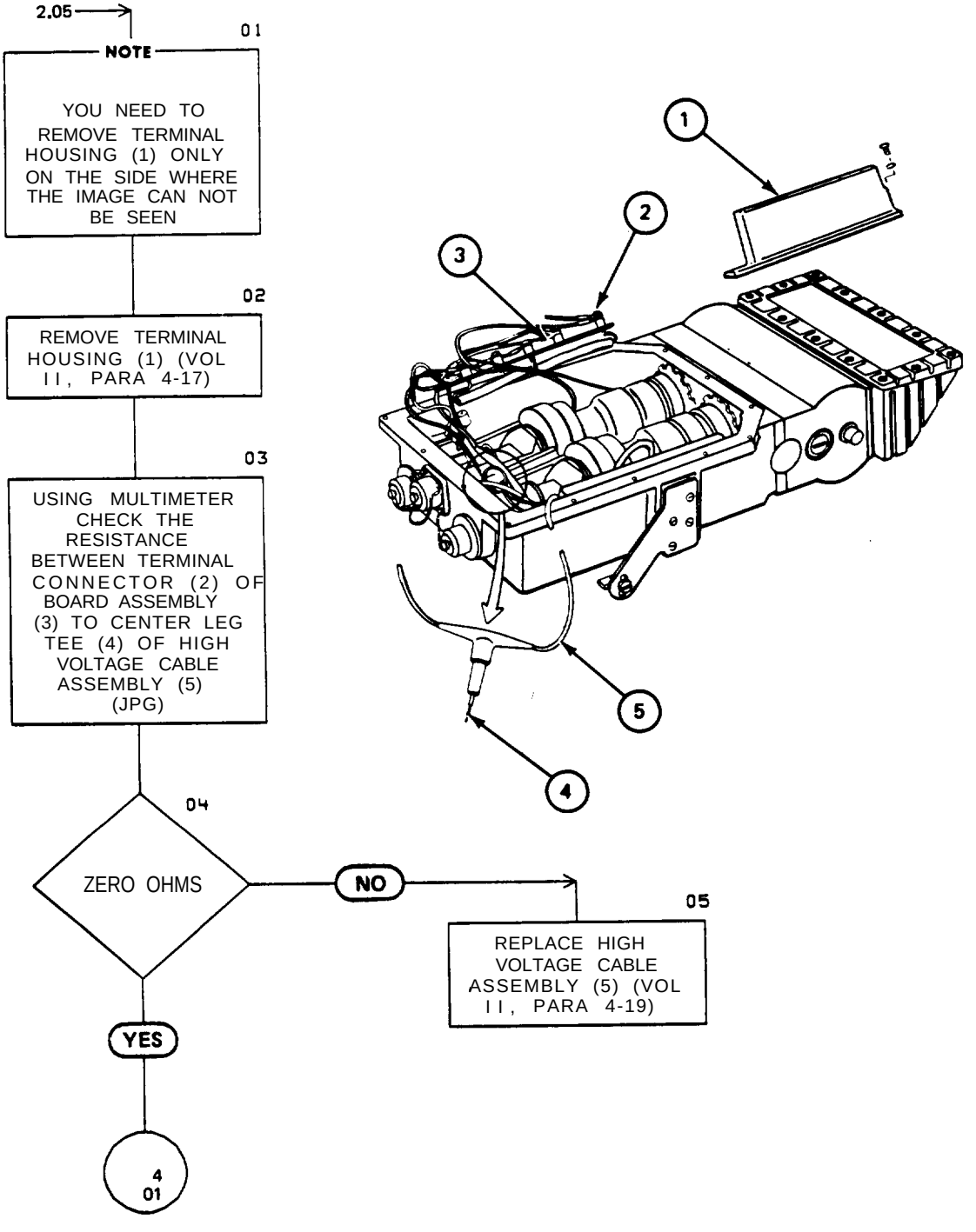
REPLACE RECEPTACLE (VOL II, PARA 4-22)

YES

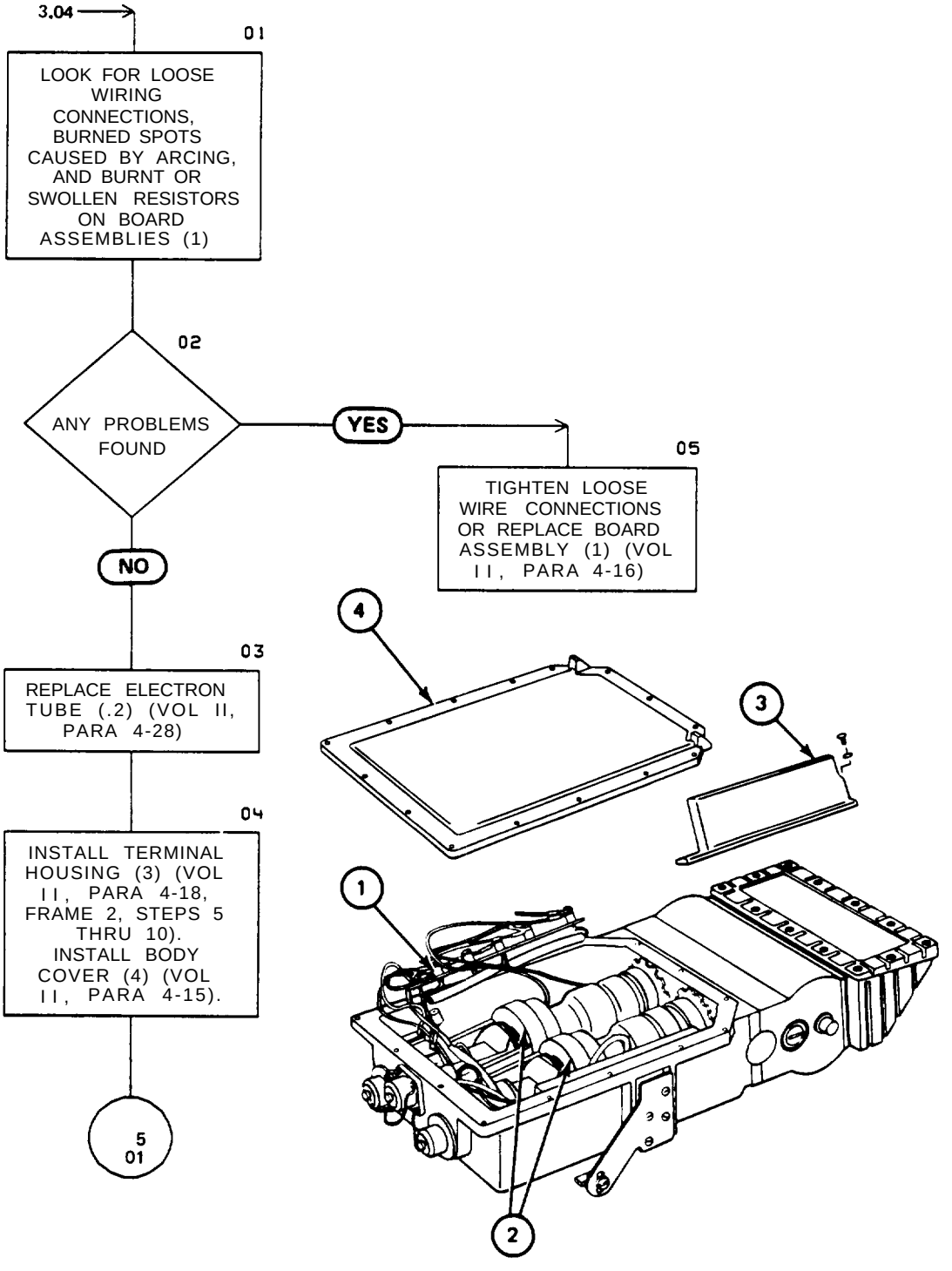
3
01

Para 4-2 (Sheet 2 of 5)

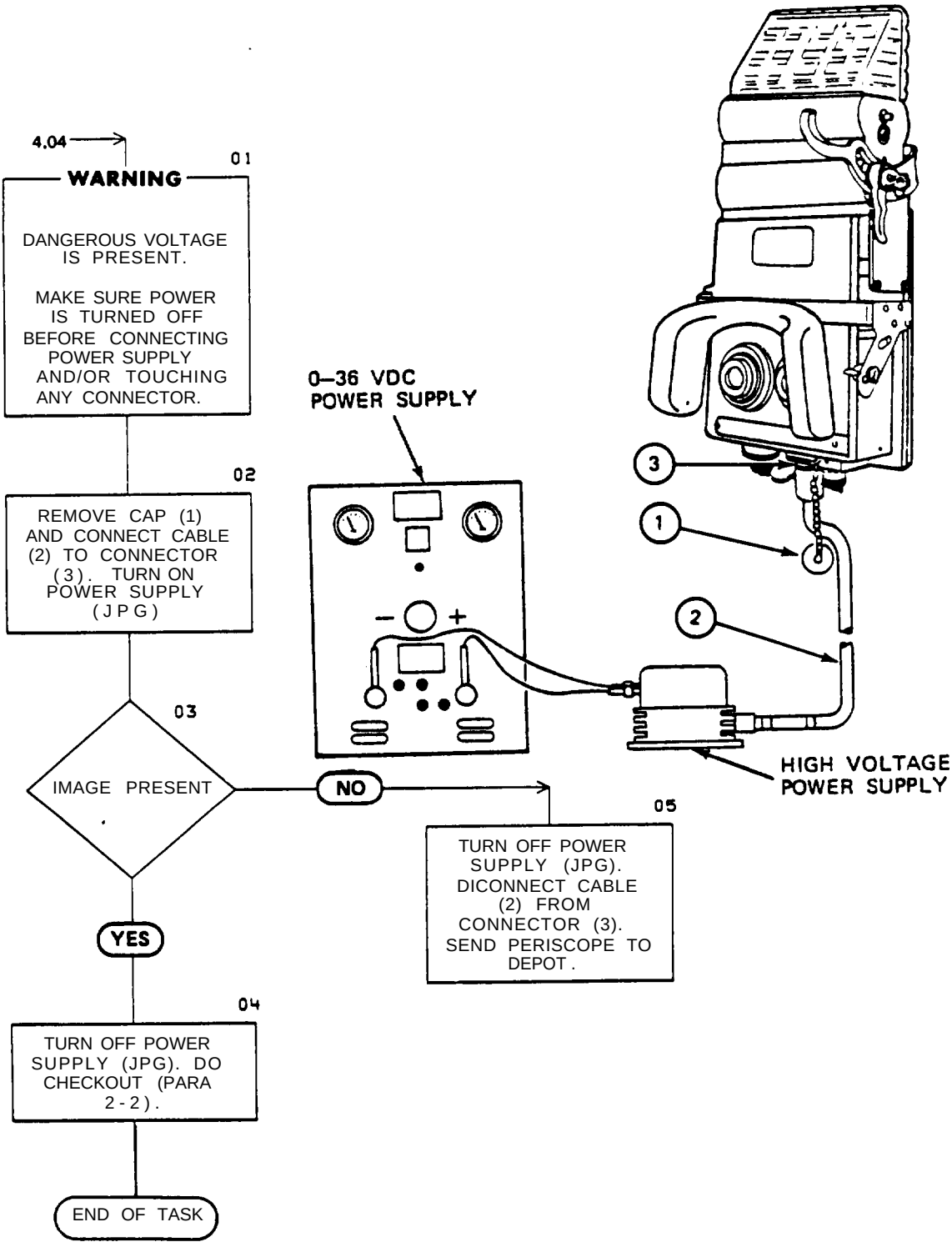
4-2. NO IMAGE (IN ONE OR BOTH EYEPIECES) WHEN POWER SUPPLY IS ON (SHEET 3 OF 5)



4-2. NO IMAGE (IN ONE OR BOTH EYEPIECES) WHEN POWER SUPPLY IS ON (SHEET 4 OF 5)



4-2. NO IMAGE (IN ONE OR BOTH EYEPIECES) WHEN POWER SUPPLY IS ON (SHEET 5 OF 5)



4-3. POOR FOCUS (ONE OR BOTH EYEPIECES) (SHEET 1 OF 6)

APPLICABLE CONFIGURATIONS: M19 and M24 old configurations

TEST EQUIPMENT: High voltage power supply (tank)
Multimeter
0-36 VDC power supply
High voltage cable

TOOLS: 3/16" flat tip screwdriver

PERSONNEL: One

REFERENCES: JPG 41C for: Using multimeter
Using 0-36 VDC power supply

EQUIPMENT CONDITION: Body assembly on work bench with head assembly installed; power disconnected

PRELIMINARY PROCEDURES: Assemble power supplies (App B)

NOTE

This procedure is for both the M19 and M24 periscopes,
The M24 is pictured.

4-3. POOR FOCUS (ONE OR BOTH EYEPIECES) (SHEET 2 OF 6)

01
WARNING

DANGEROUS VOLTAGE IS PRESENT.

MAKE SURE POWER IS TURNED OFF BEFORE CONNECTING POWER SUPPLY AND/OR TOUCHING ANY CONNECTOR.

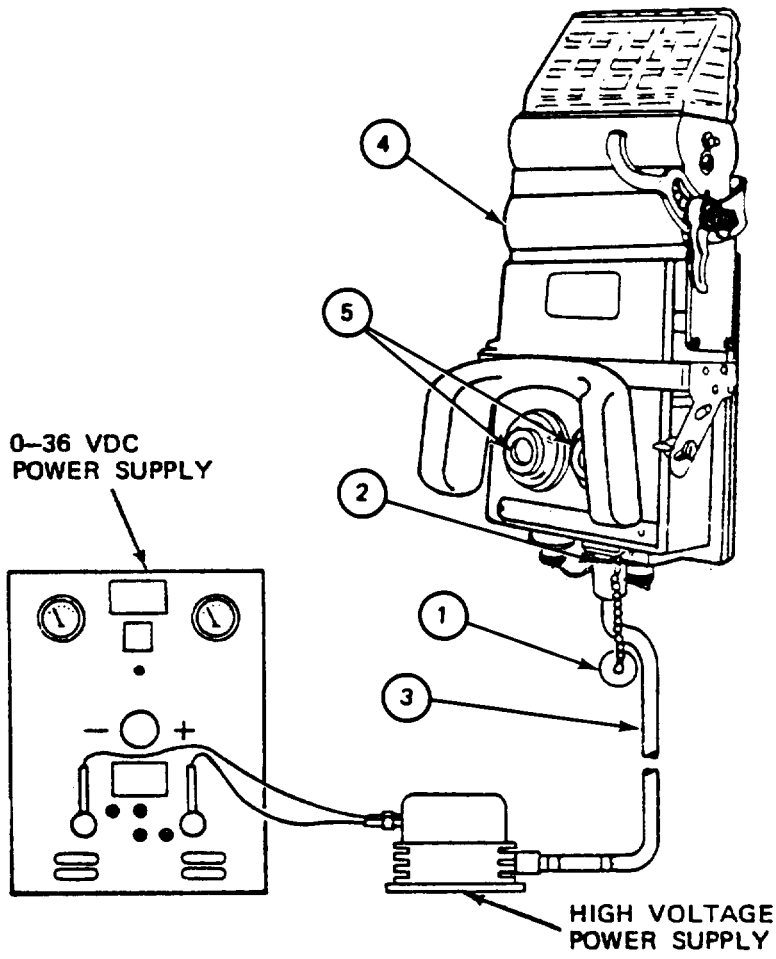
02
REMOVE CAP (1) FROM CONNECTOR (2)

CONNECT CABLE (3) TO CONNECTOR (2)

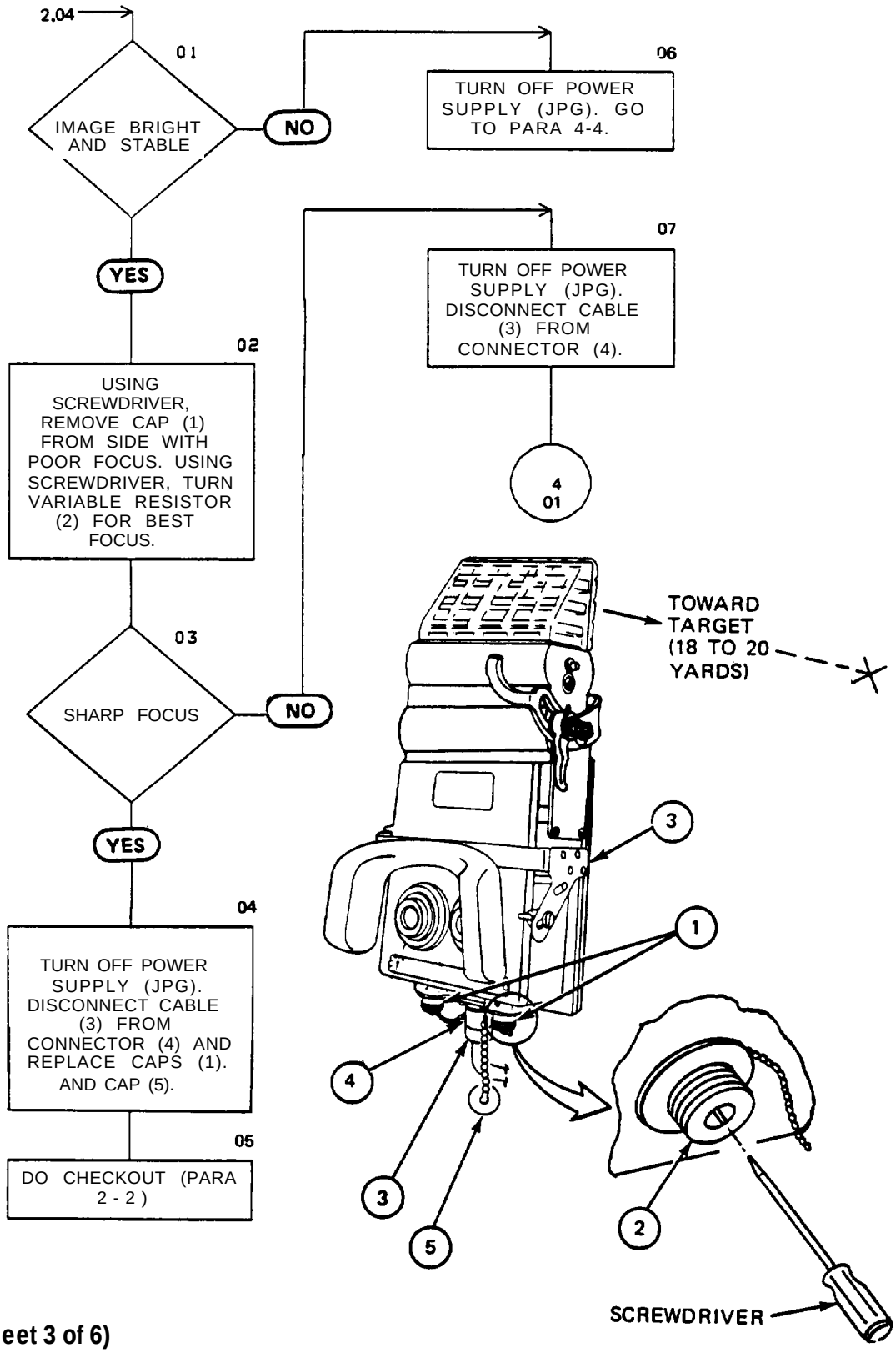
03
PICK ANY TARGET 16 TO 18 METERS IN FRONT OF PERISCOPE (4)

04
TURN ON 0-36 VDC POWER SUPPLY (JPG). LOOK AT TARGET IN EYEPIECES (5).

3
01

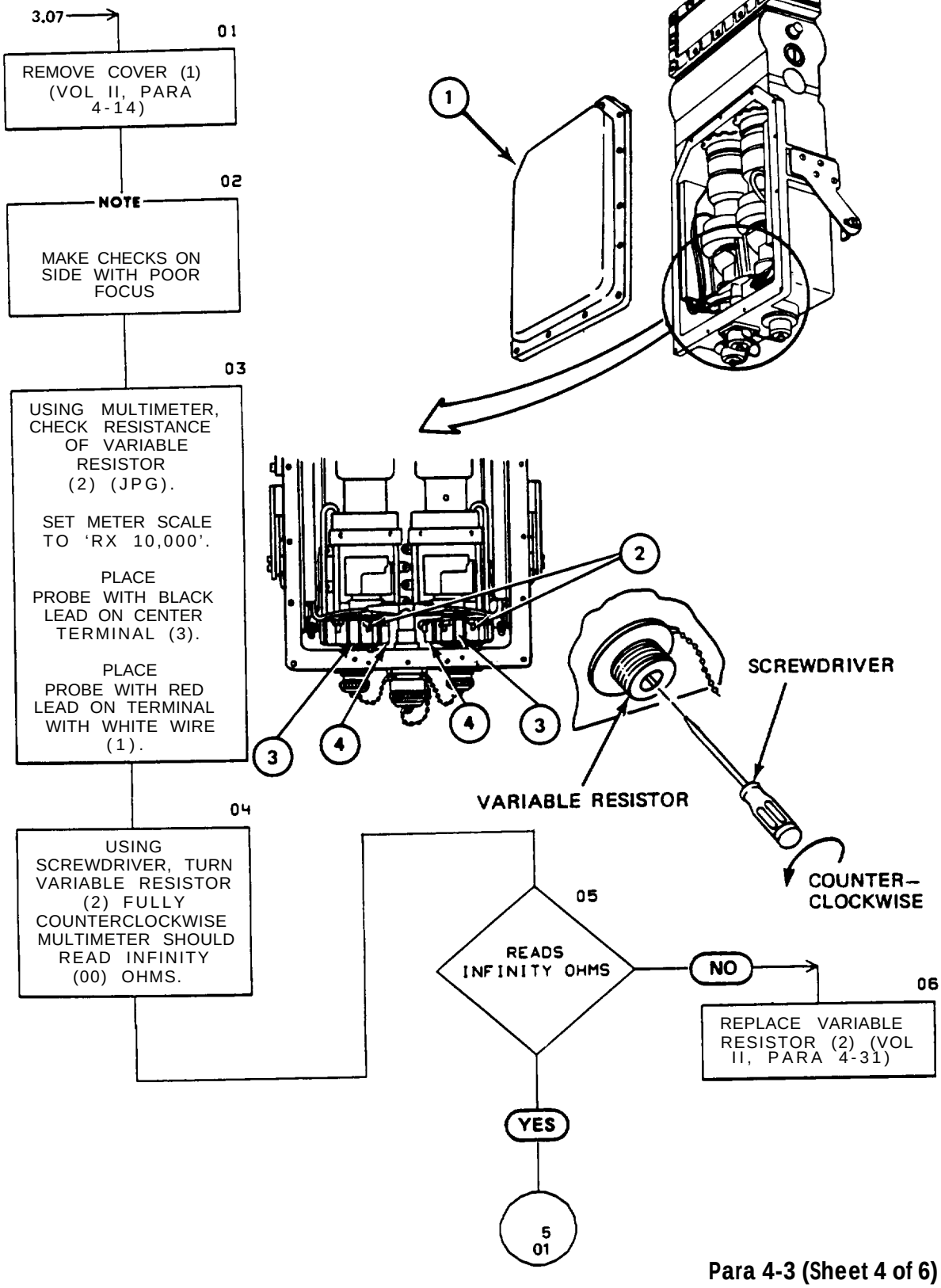


4-3. POOR FOCUS (ONE OR BOTH EYEPIECES) (SHEET 3 OF 6)

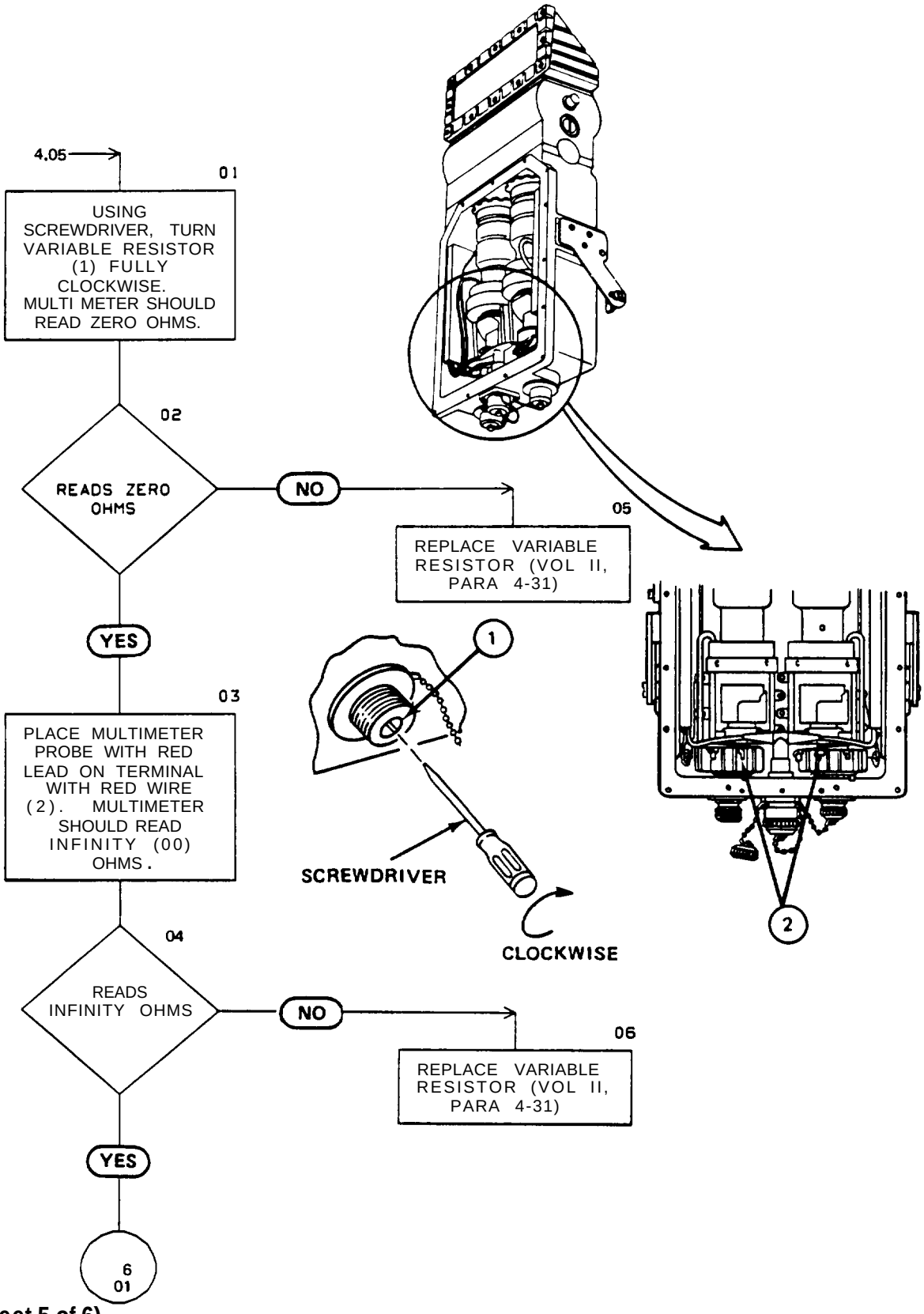


Para 4-3 (Sheet 3 of 6)

4-3. POOR FOCUS (ONE OR BOTH EYEPIECES) (SHEET 4 OF 6)

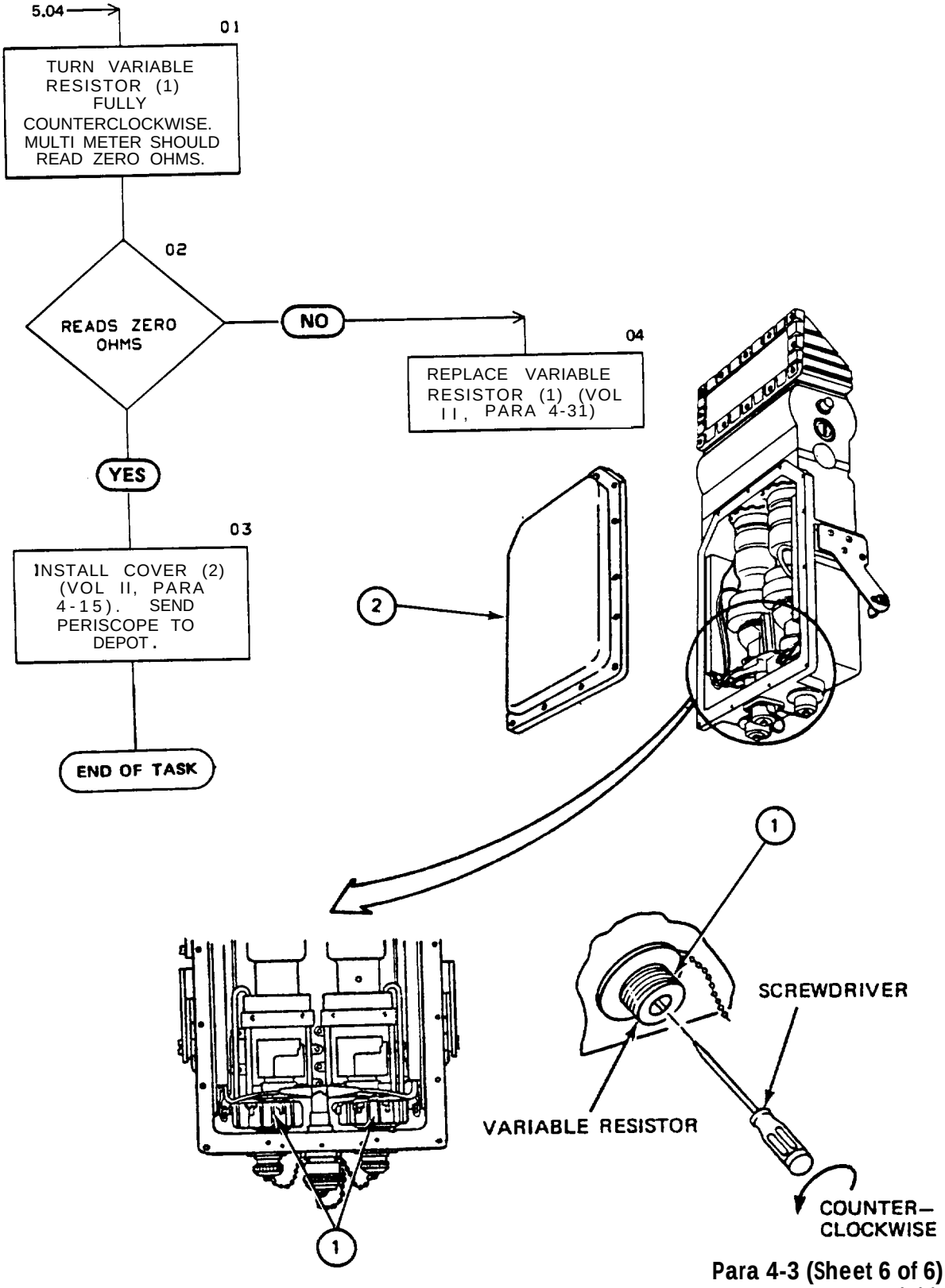


4-3. POOR FOCUS (ONE OR BOTH EYEPIECES) (SHEET 5 OF 6)



Para 4-3 (Sheet 5 of 6)

4-3. POOR FOCUS (ONE OR BOTH EYEPIECES) (SHEET 6 OF 6)



Para 4-3 (Sheet 6 of 6)

4-4. IMAGE DIM OR FLICKERING (SHEET 1 OF 4)

APPLICABLE CONFIGURATIONS: M19 and M24 old configurations

TEST EQUIPMENT High voltage power supply (tank)
Multimeter
0-36 VDC power supply
High voltage cable

PERSONNEL: One

REFERENCES: JPG 41C for: Using 0-36 VDC power supply
Using multimeter

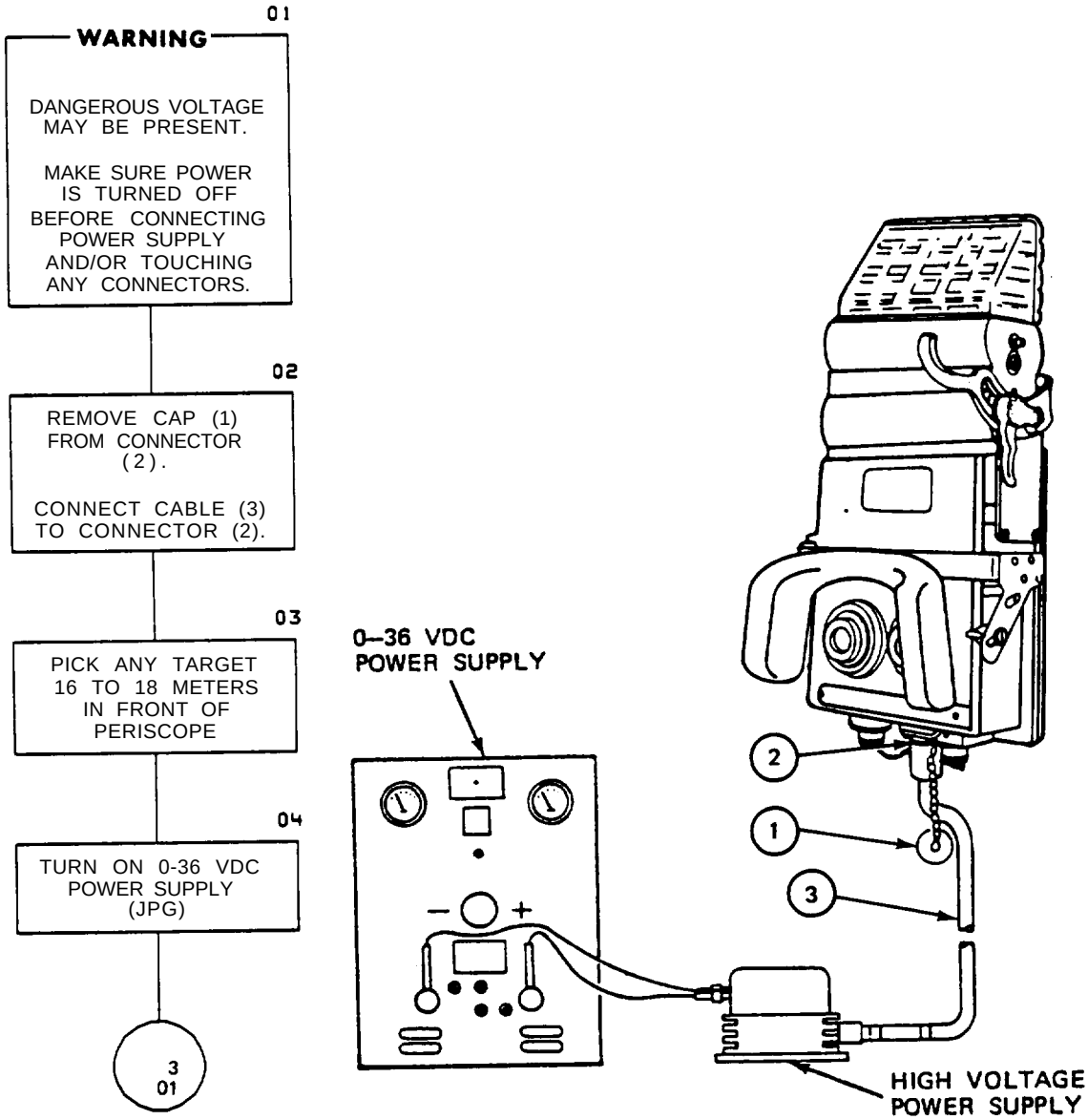
EQUIPMENT CONDITION: Body assembly on work bench with head assembly installed; power disconnected

PRELIMINARY PROCEDURES: Assemble power supplies (APP B)

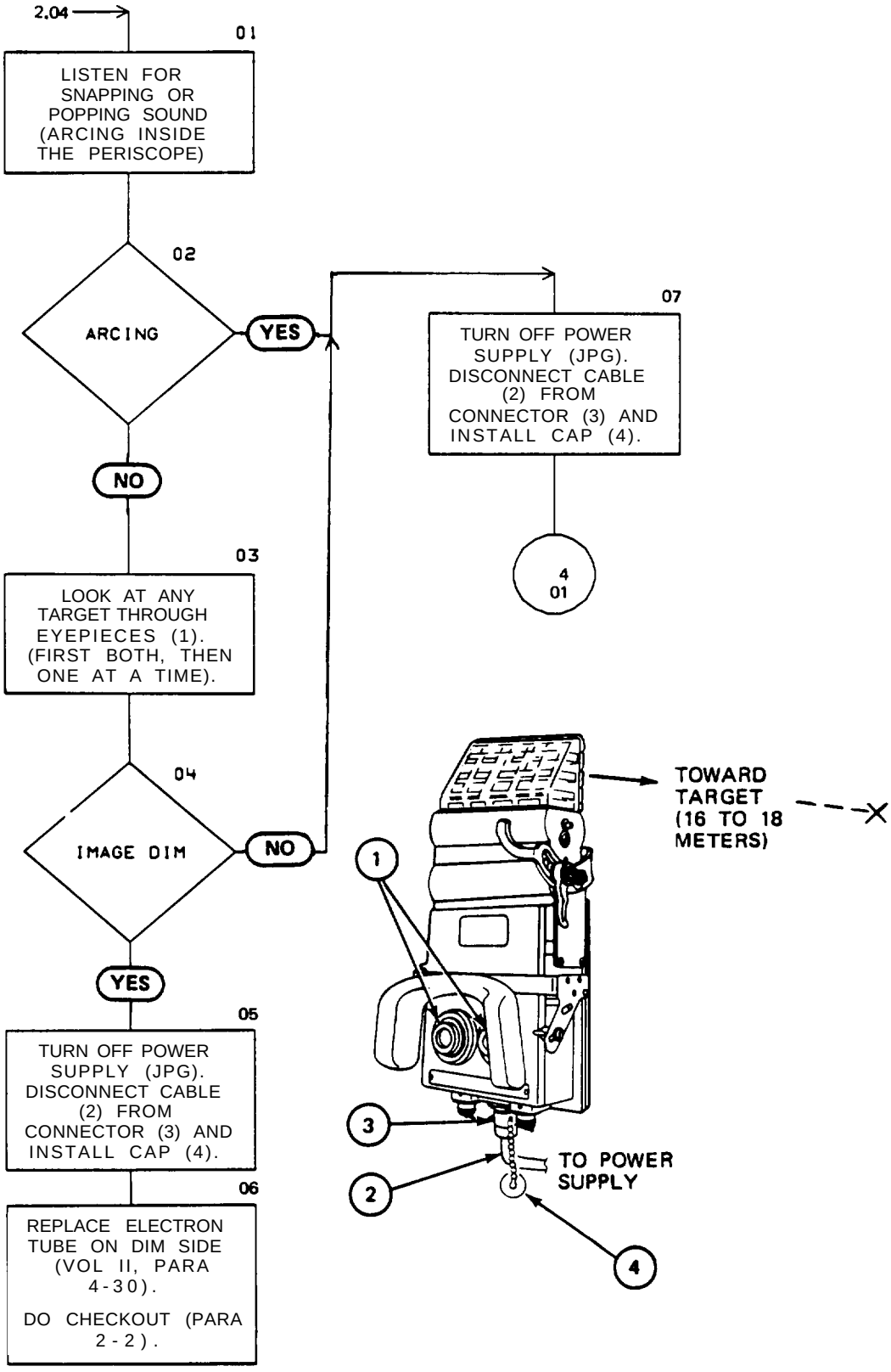
NOTE

This procedure is for both the M19 and M24 periscopes. The M24 is pictured.

4-4. IMAGE DIM OR FLICKERING (SHEET 2 OF 4)

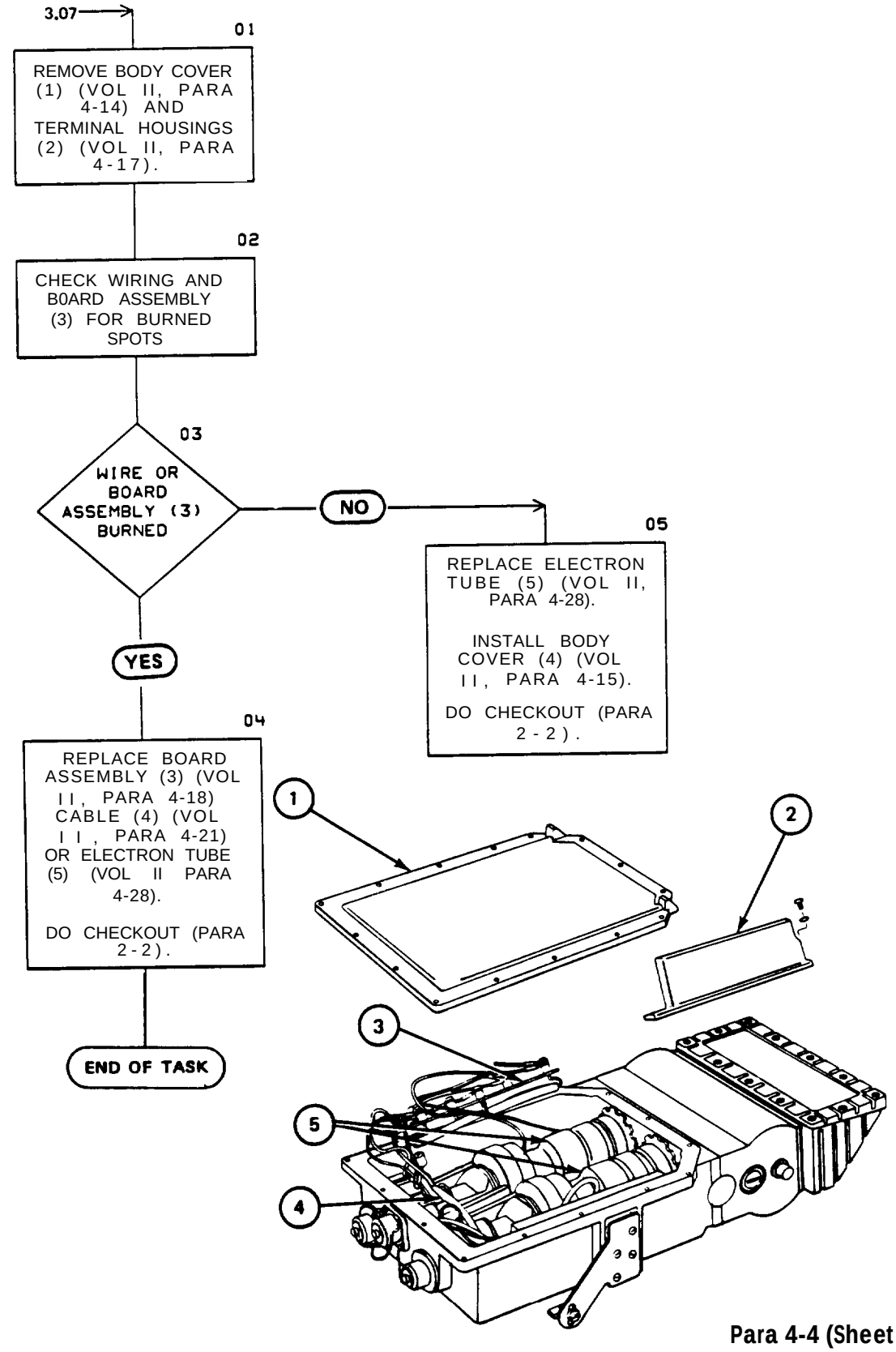


4-4. IMAGE DIM OR FLICKERING (SHEET 3 OF 4)



Para 4-4 (Sheet 3 of 4)

4-4. IMAGE DIM OR FLICKERING (SHEET 4 OF 4)



4-5. NO IMAGE OR DIM IMAGE OR POOR FOCUS IN EITHER EYEPIECE (SHEET 1 OF 10)

APPLICABLE CONFIGURATIONS: M19 and M24 new configurations

TEST EQUIPMENT: Multimeter

PERSONNEL: One

REFERENCES: JPG 4lC for use of multimeter
TM 10 for removing head assembly (TM 9-2350-215-10 for M60Al, TM 9-2350-257-10 for M60Al Rise, TM 9-2350-260-10 for M60, and TM 9-2350-222-10 for M728)

EQUIPMENT CONDITION: Body assembly on work bench; power disconnected

PRELIMINARY PROCEDURES: Remove head assembly (TM 10)

NOTE

This procedure is for the M19 and the M24 new configuration periscopes. The M24 new configuration is pictured.

4-5. NO IMAGE OR DIM IMAGE OR POOR FOCUS IN EITHER EYEPIECE (SHEET 2 OF 10)

01

ON BAD SIDE, REMOVE ELECTRON TUBE (1) (VOL II, PARA 4-29) . PUT CENTER LEG OF CABLE ASSEMBLY (2) IN RECEPTACLE (3).

02

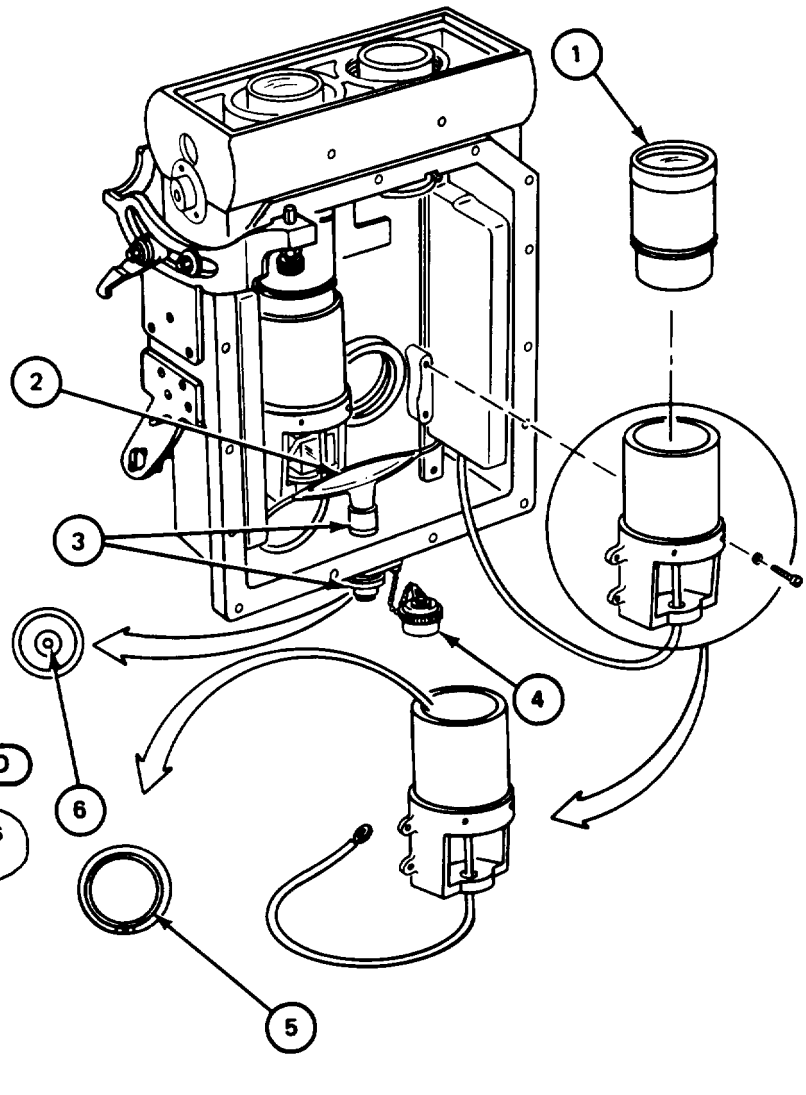
REMOVE RECEPTACLE CAP (4). USING MULTIMETER, CHECK RESISTANCE BETWEEN CONTACT RING (5) AND CENTER CONTACT (6) OF RECEPTACLE (3) (JPG).

03

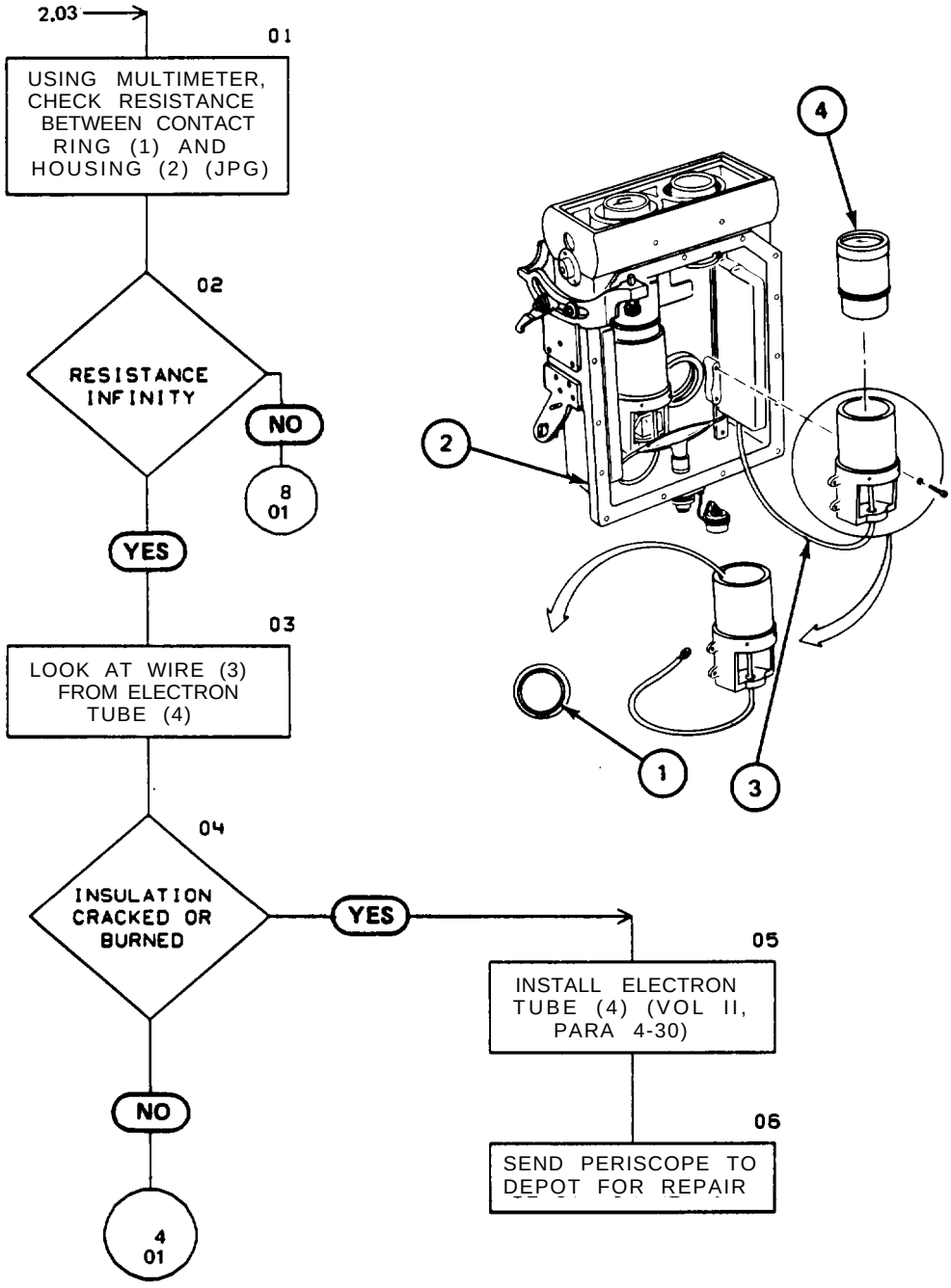
RESISTANCE 2 OHMS OR LESS

NO → 6 01

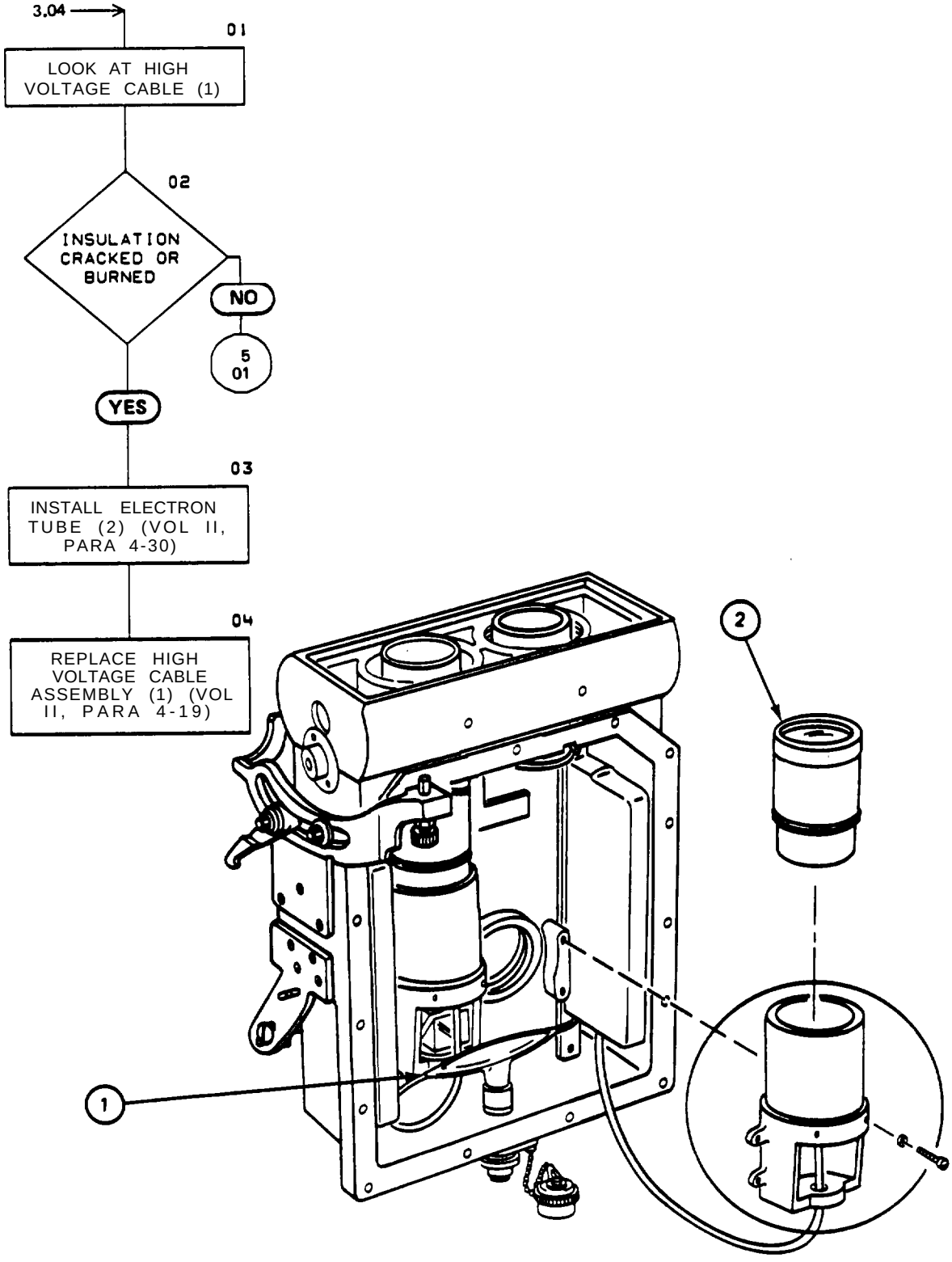
YES → 3 01



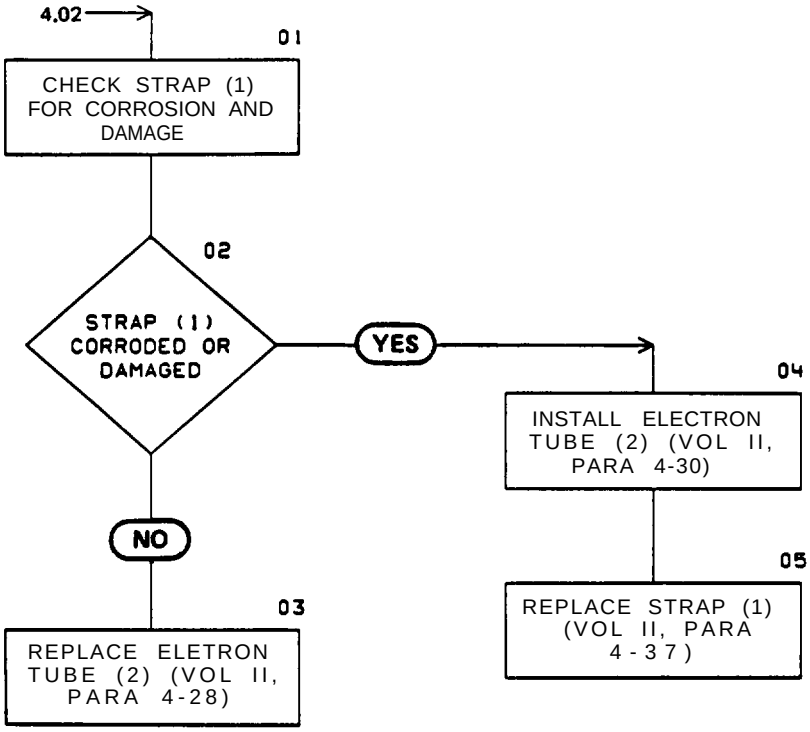
4-5. NO IMAGE OR DIM IMAGE OR POOR FOCUS IN EITHER EYEPIECE (SHEET 3 OF 10)

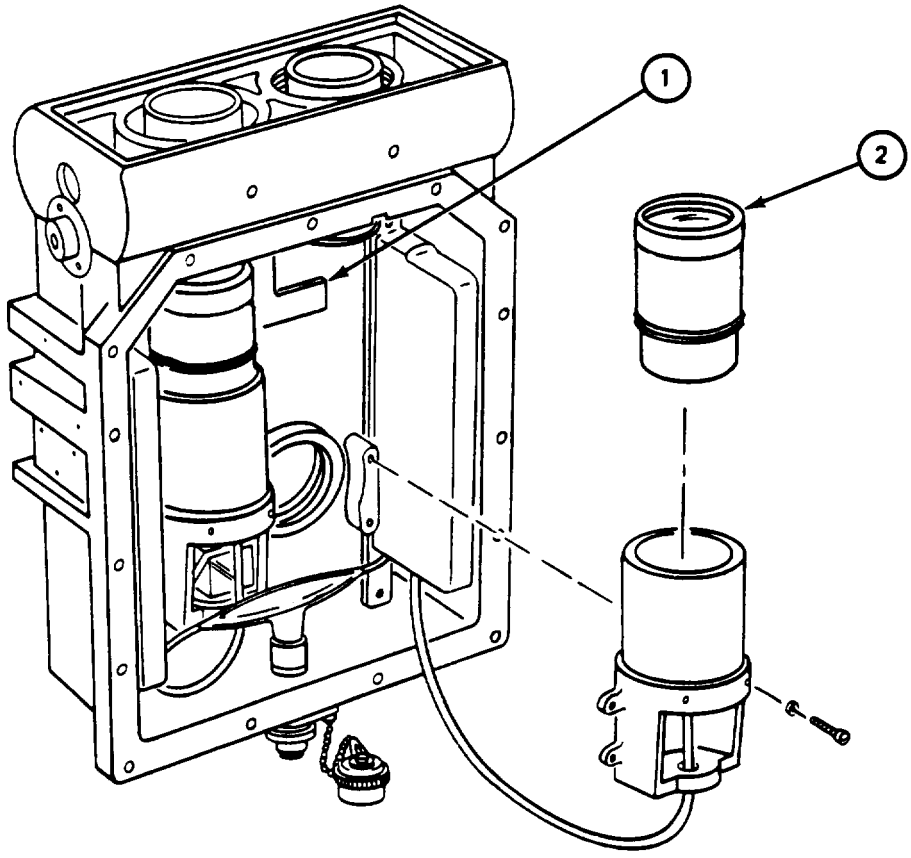


4-5. NO IMAGE OR DIM IMAGE OR POOR FOCUS IN EITHER EYEPIECE (SHEET 4 OF 10)



4-5. NO IMAGE OR DIM IMAGE OR POOR FOCUS IN EITHER EYEPIECE (SHEET 5 OF 10)





Para 4-5 (Sheet 5 of 10)

4-5. NO IMAGE OR DIM IMAGE OR POOR FOCUS IN EITHER EYEPIECE (SHEET 6 OF 10)

2.03 →

01
REMOVE TERMINAL BOARD ASSEMBLY (1) ON THE SAME SIDE AS THE PROBLEM (VOL II, PARA 4-17)

02
USING MULTIMETER. CHECK RESISTANCE OF CONTACT RING wIRE (2) BETWEEN TERMINAL (3) AND CONTACT RING (4) (JPG)

03
RESISTANCE 2 OHMS OR LESS

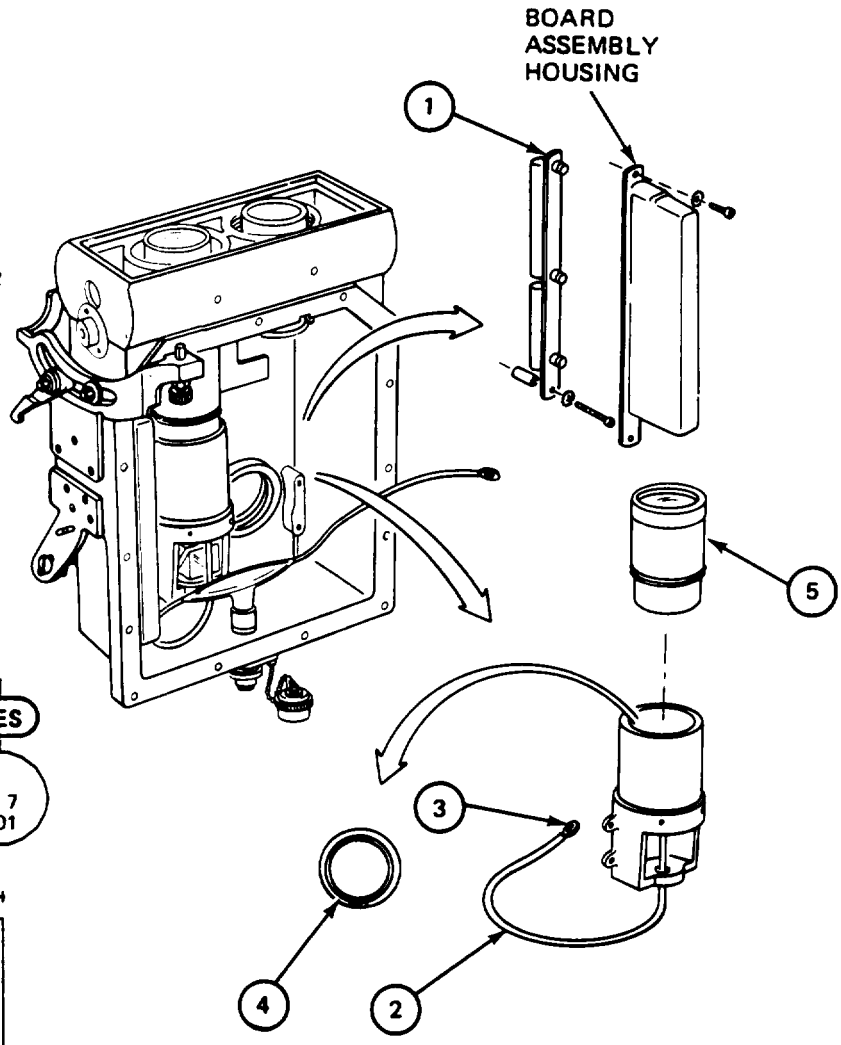
YES → 7 01

NO

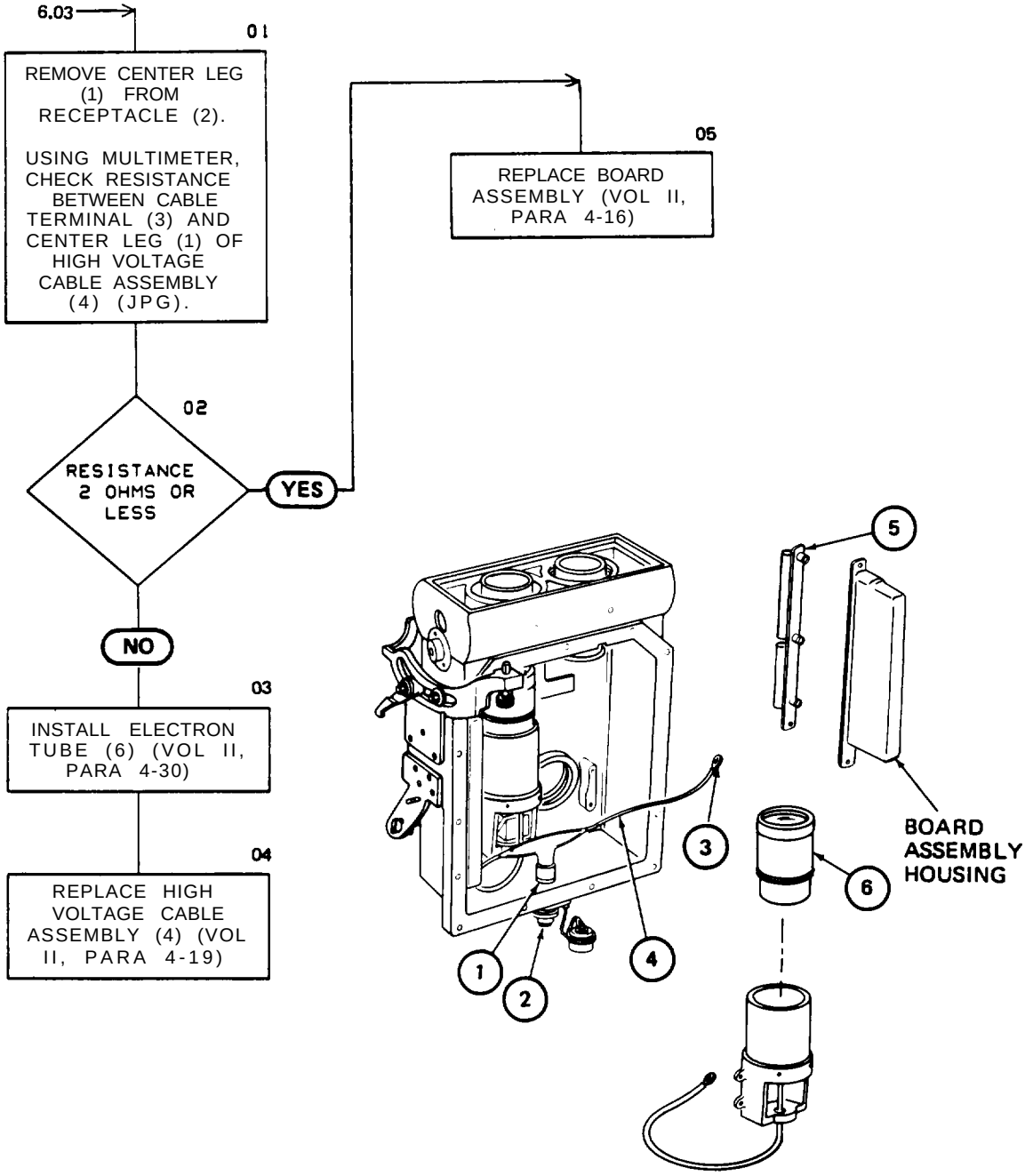
04
INSTALL BOARD ASSEMBLY (1) (VOL II, PARA 4-18).

INSTALL ELECTRON TUBE (5) (VOL II, PARA 4-30).

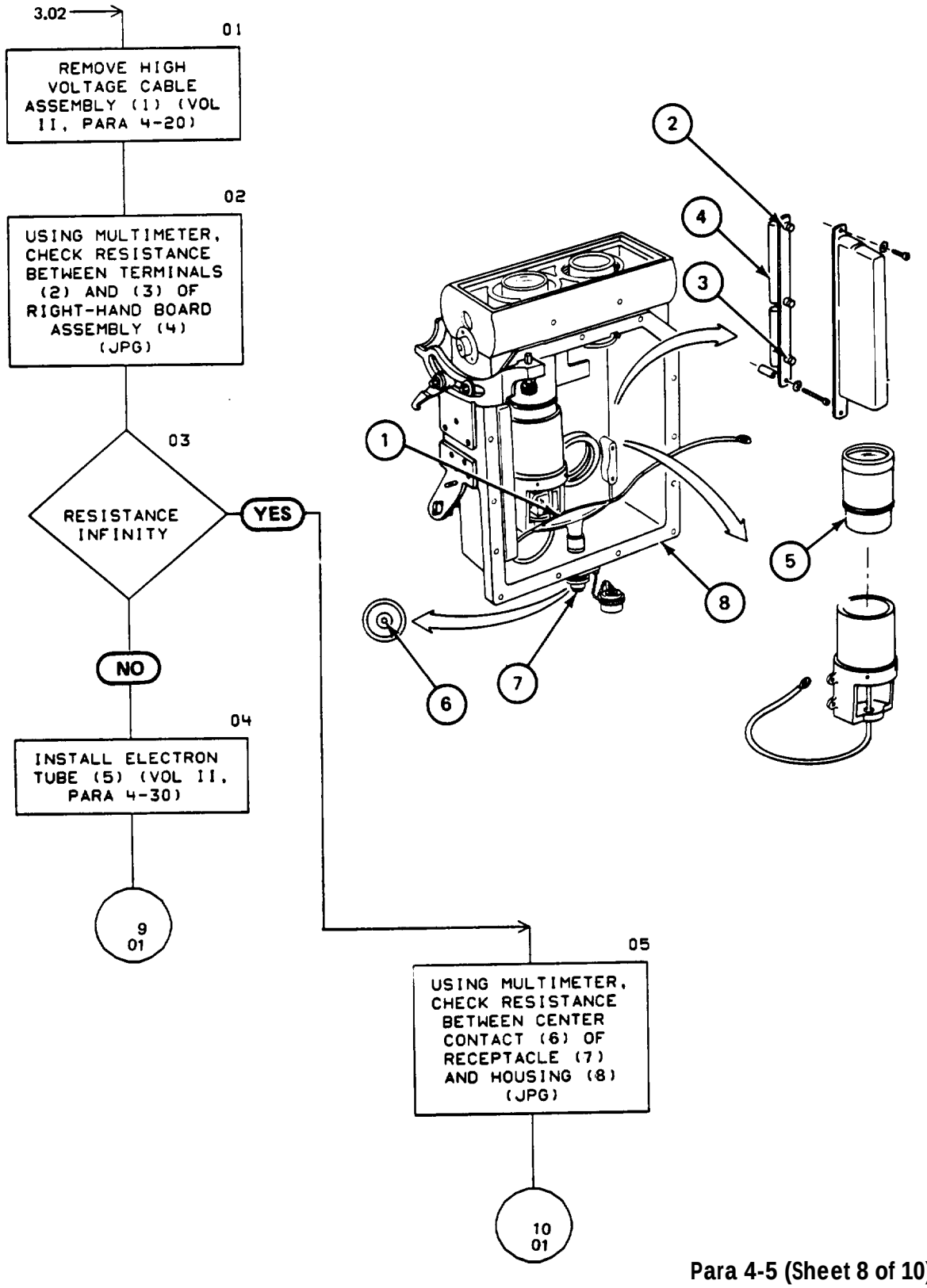
05
SEND PERISCOPE TO DEPOT FOR REPAIR



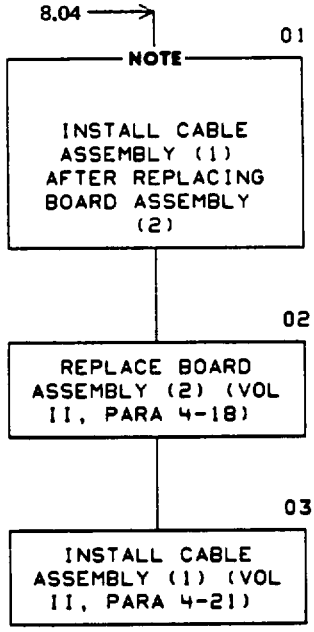
4-5. NO IMAGE OR DIM IMAGE OR POOR FOCUS IN EITHER EYEPIECE (SHEET 7 OF 10)

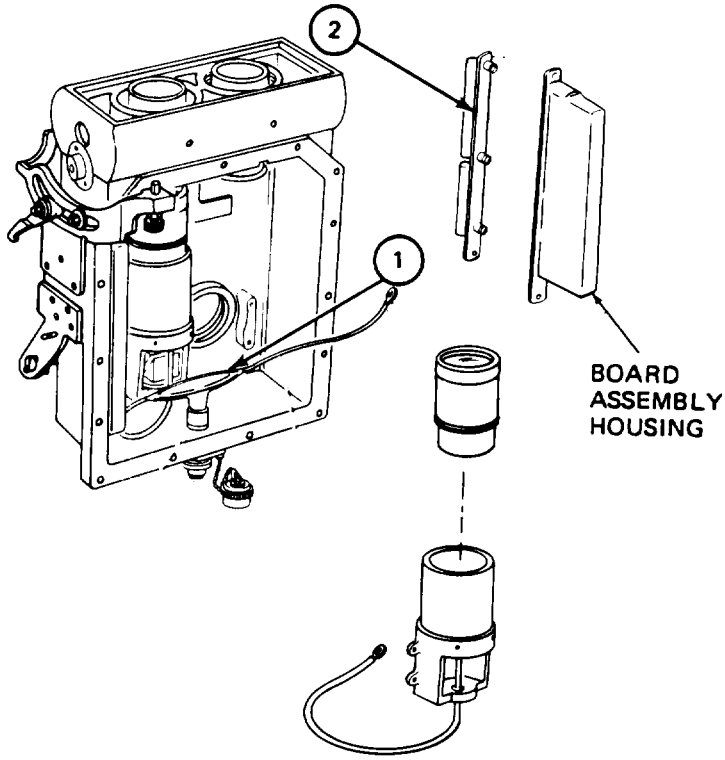


4-5. NO IMAGE OR DIM IMAGE OR POOR FOCUS IN EITHER EYEPIECE (SHEET 8 OF 10)

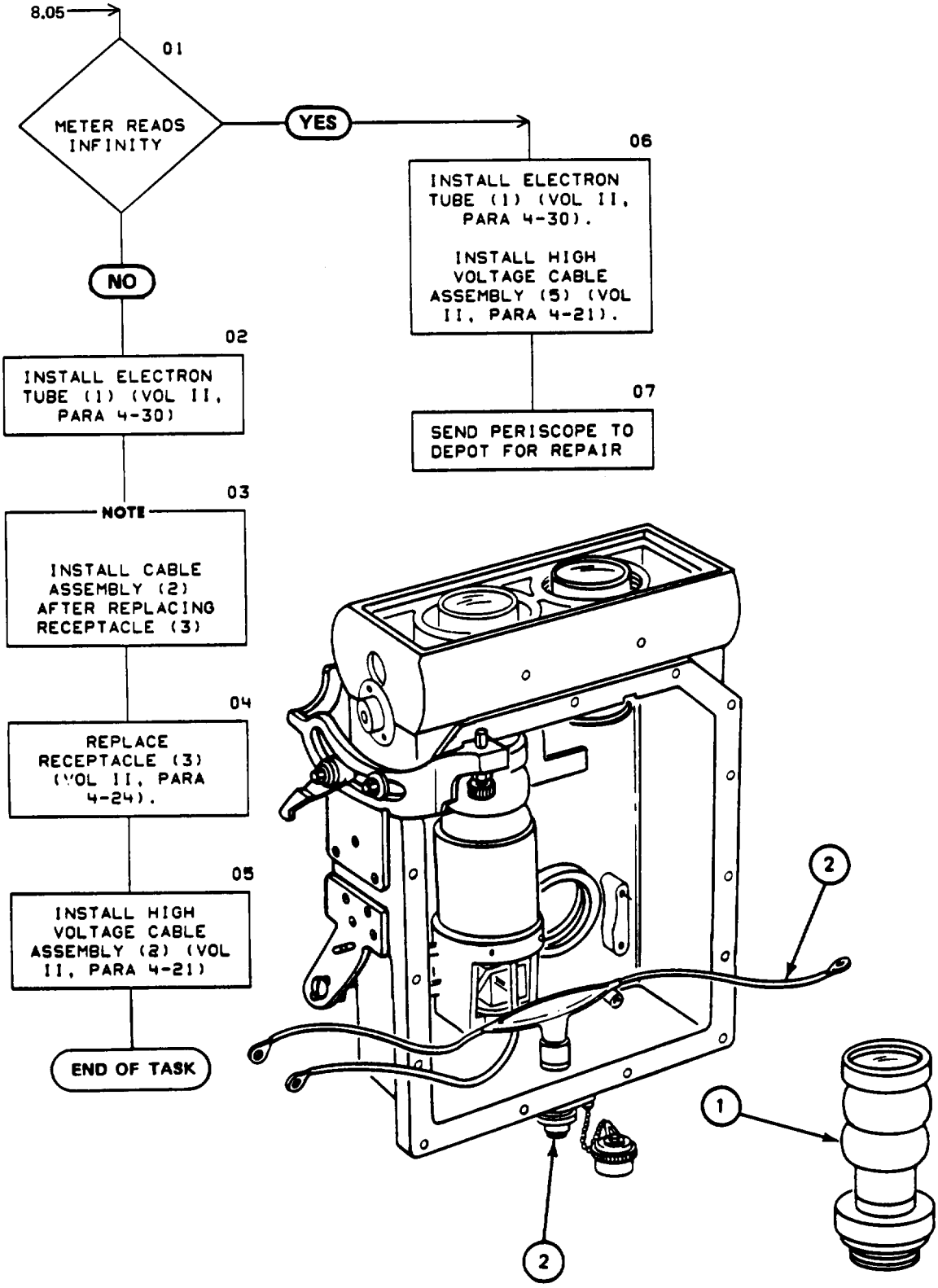


4-5. NO IMAGE OR DIM IMAGE OR POOR FOCUS IN EITHER EYEPIECE (SHEET 9 OF 10)





4-5. NO IMAGE OR DIM IMAGE OR POOR FOCUS IN EITHER EYEPIECE (SHEET 10 OF 10)

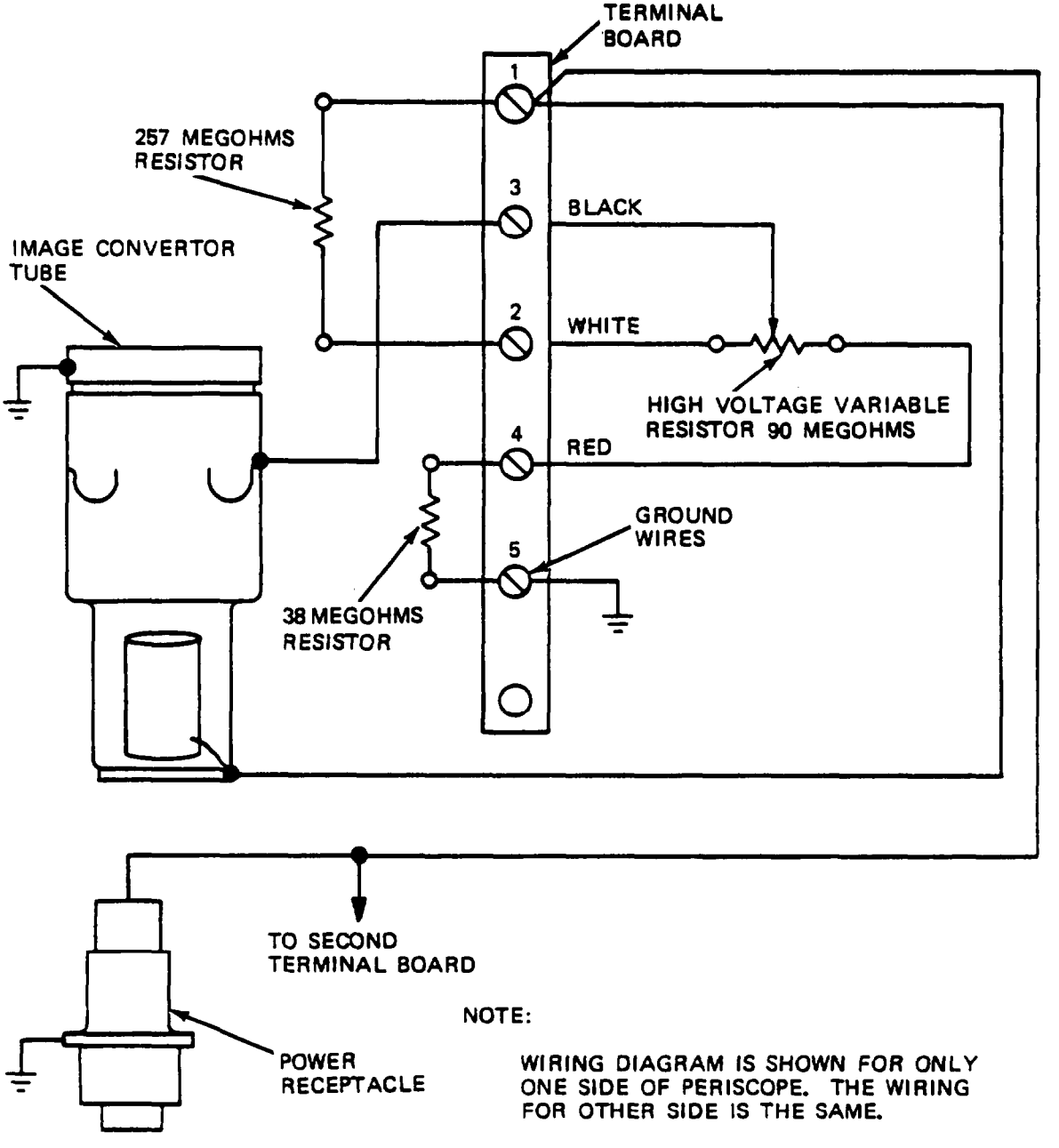


Para 4-5 (Sheet 10 of 10)

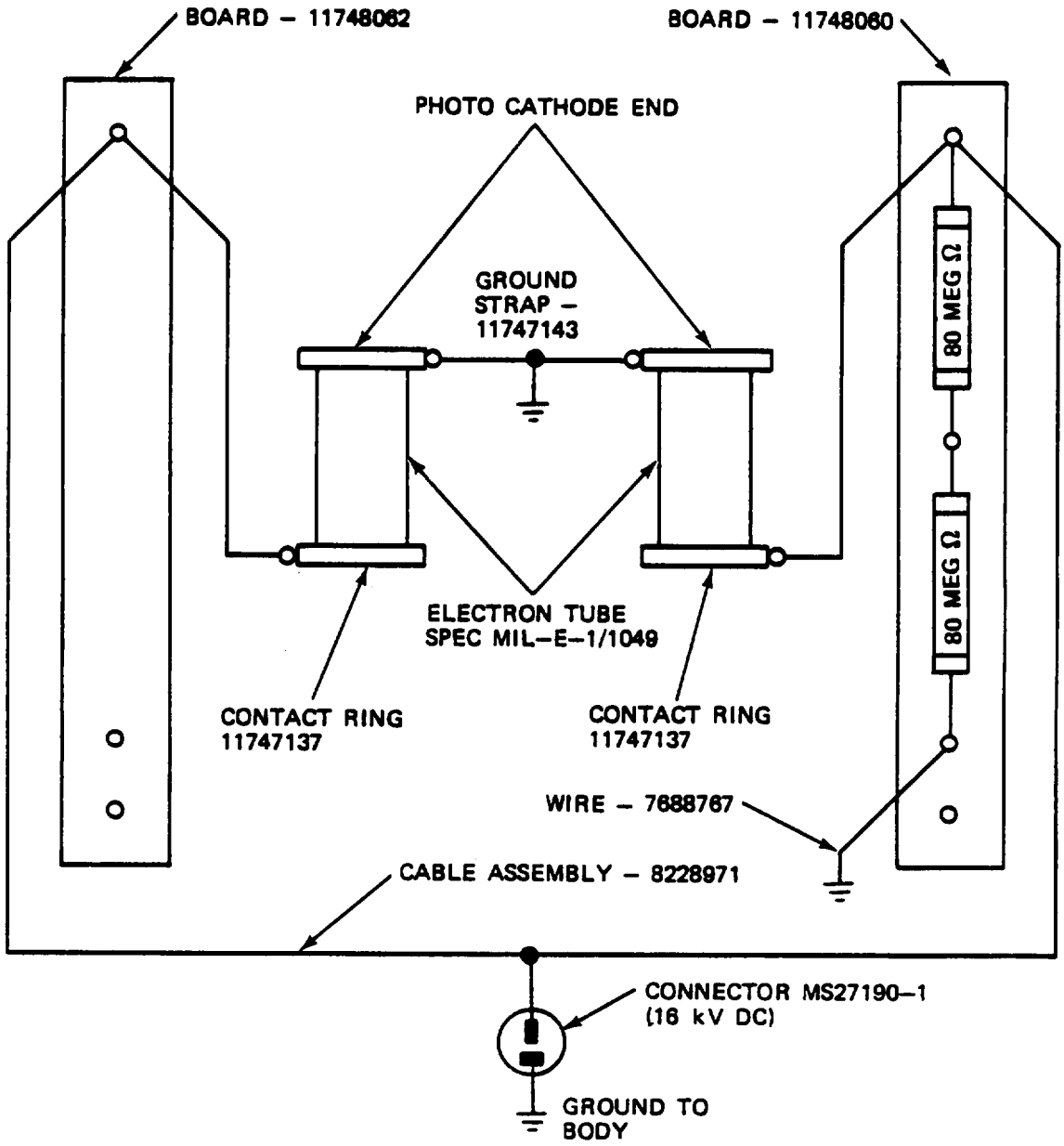
APPENDIX A

WIRING DIAGRAMS

A-1. M19 AND M24 PERISCOPE (OLD CONFIGURATION) WIRING DIAGRAM



A-2. M19 AND M24 PERISCOPE (NEW CONFIGURATION) WIRING DIAGRAM



APPENDIX B

ASSEMBLY OF POWER SUPPLIES

B-1. SCOPE

This appendix tells how to connect the 0-36 VDC power supply and the high voltage power supply to the M 19 or M24 series periscopes.

B-2. ASSEMBLY

TEST EQUIPMENT: High voltage power supply (16,000 VDC) (taken from tank)
0-36 VDC power supply
Multimeter test leads
High voltage cable

W A R N I N G

The high voltage power supply puts out 16,000 VDC as soon as input power is applied. There is no on/off switch.

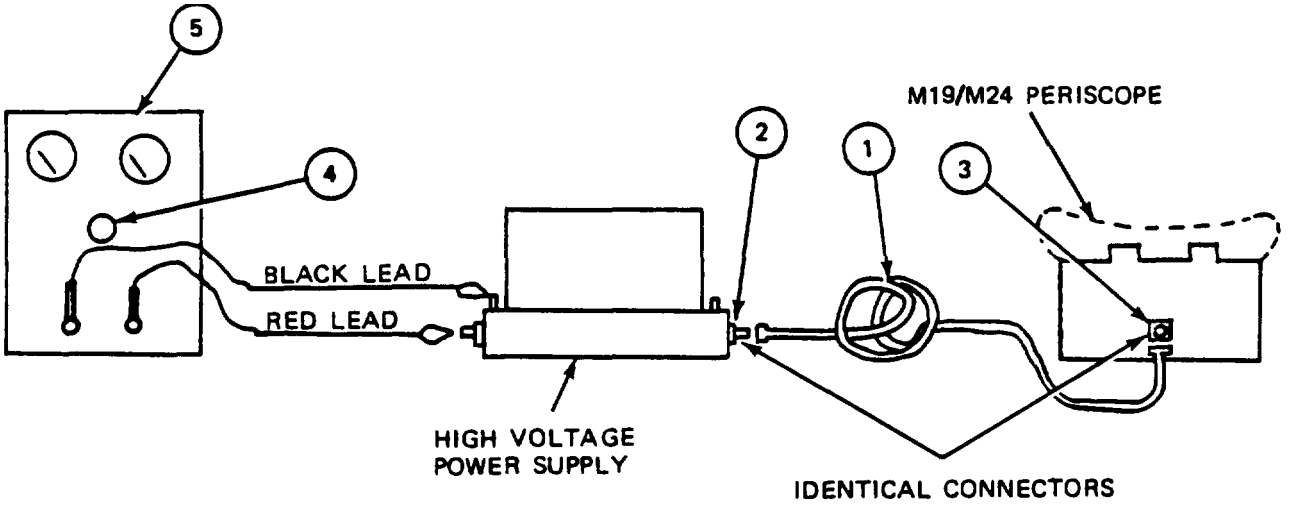
NOTE

- Do not connect 24V input power to the high voltage power supply until after its output is connected to the periscope.
- The high voltage cable is used to connect the high voltage power supply output to the periscope. Both cable end connectors are identical, so either end of the cable may go to either connector.
- The high voltage power supply connectors are not labeled, but are different sizes. The high voltage connector will fit only the connector providing the high voltage output.

B-2. ASSEMBLY (CONT)

FRAME 1

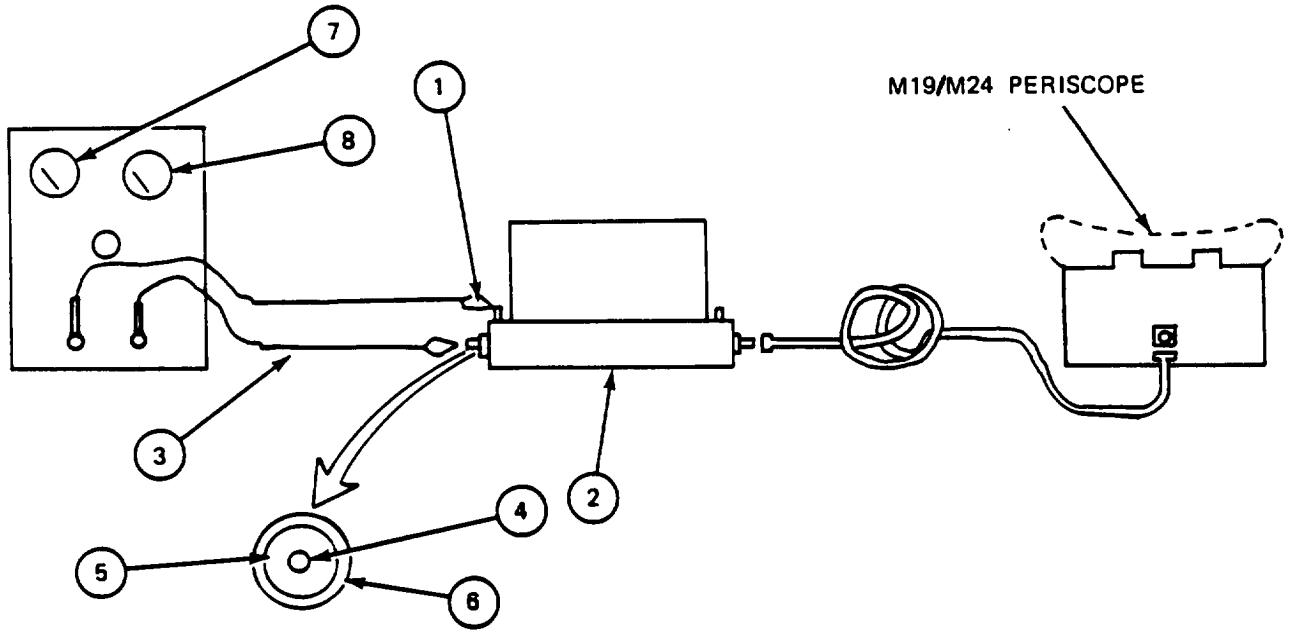
Step	Procedure
1.	Connect one end of high voltage cable (1) to high voltage power supply output connector (2).
2.	Connect other end of high voltage cable (1) to periscope high voltage input connector (3).
	NOTE Make sure that 0-36 VDC power supply is turned off, and that output VOLTAGE ADJ (4) control is turned fully counterclockwise (to the left).
3.	Connect prod ends of multimeter test leads to 0-36 VDC power supply (5): black prod to (-) terminal; red prod to ( ) terminal. GO TO FRAME 2



B-2. ASSEMBLY (CONT)

FRAME 2

Step	Procedure
1.	Connect (-) black lead alligator clip (1) to any bare place on high voltage power supply (2).
2.	Connect (+) red lead alligator clip (3) to center pin (4) of high voltage power supply input connector (5) without touching body (6).
3.	Turn on 0-36 VDC power supply.
	CAUTION In the next step, if the current starts to go over 1 ampere, immediately set the voltage to zero. Turn off 0-36 VDC power supply and tell your supervisor.
4.	While watching both the voltmeter (7) and current meter (8), slowly raise voltage to 24V.
	END OF TASK



TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL

VOLUME II - MAINTENANCE

PERISCOPE, TANK:
Ml9 (OLD AND NEW CONFIGURATIONS)
M24 (OLD AND NEW CONFIGURATIONS)

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 M19 and M24 Periscopes. See Volume I for troubleshooting procedures.

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 unit 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 periscopes work and are ready for packaging or installation.

e. Chapter 6, Packaging, gives procedures for packaging the periscopes for storage or shipment.

f. Appendix A, Expendable Supplies and Materials, lists the supplies and materials needed to repair the periscopes.

g. Appendix B, Maintenance Task Index, helps you find the necessary maintenance tasks for the periscopes.

Section 2. DESCRIPTION AND DATA

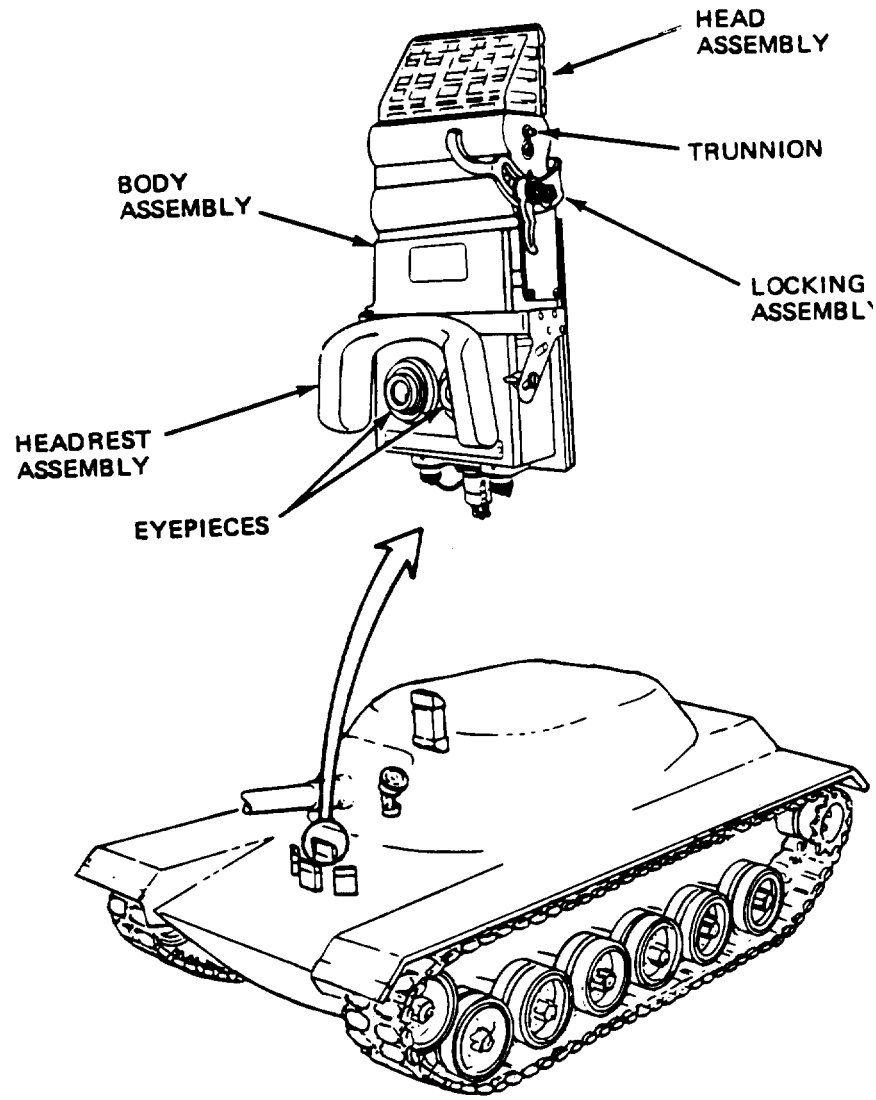
1-3. PHYSICAL DESCRIPTION

The M19 and M24 Periscopes are used to see at night. The vehicle has infrared head lamps that light the area in front with invisible infrared rays. The rays bounce off objects in the area and return to the periscope. The periscope changes the infrared rays to visible light, so that the dark area covered by the infrared head lamps can be seen. The periscope is focused at about 18 meters in front of the vehicle. The periscopes are made up of two main parts:

a. The HEAD ASSEMBLY holds the prism that directs the infrared rays down into the body assembly. The head assembly projects up through the vehicle armor,

b. The BODY ASSEMBLY converts infrared rays to visible light. The body assembly has two image converter tubes that change the infrared rays to visible light that can be seen by looking in the two EYEPIECES on the rear of the body assembly. On the M19 and M24 old configurations, the body assembly has a left and right focus control. The TRUNNION supports the body assembly in the vehicle. The LOCKING ASSEMBLY lets you move the periscope to get a better view. The HEADREST ASSEMBLY can be moved to change the distance from your eyes to the eyepieces.

1-3. PHYSICAL DESCRIPTION (CONT)



1-4. TABULATED DATA

	M19 (old and new configurations)	M24 (old and new configurations)
General:		
Length	6 in.	6 in.
Height	15-1/4 in.	18-1/2 in.
Width	8-1/4 in.	8-1/4 in.
Weight	15 lb. 10 OZ.	16 lb.
Magnification	1 power	1 power
Operating Voltage	16,000 VDC	16,000 VDC
Field of View	26.8 degrees	26.8 degrees

1-5. DIFFERENCES BETWEEN CONFIGURATIONS

When the tasks are different between configurations, the configuration will be called out in the procedure. The differences that you can see are:

a. M24 Old and New Configurations

(1) An extender (1) has been added to increase the height of the M24 periscope.

(2) A longer plate (2) is necessary with the extender (1).

b. M19 and M24 New Configurations

The left and right focus controls (3 and 4) on the M19 and M24 old configurations are not used on the new configurations.

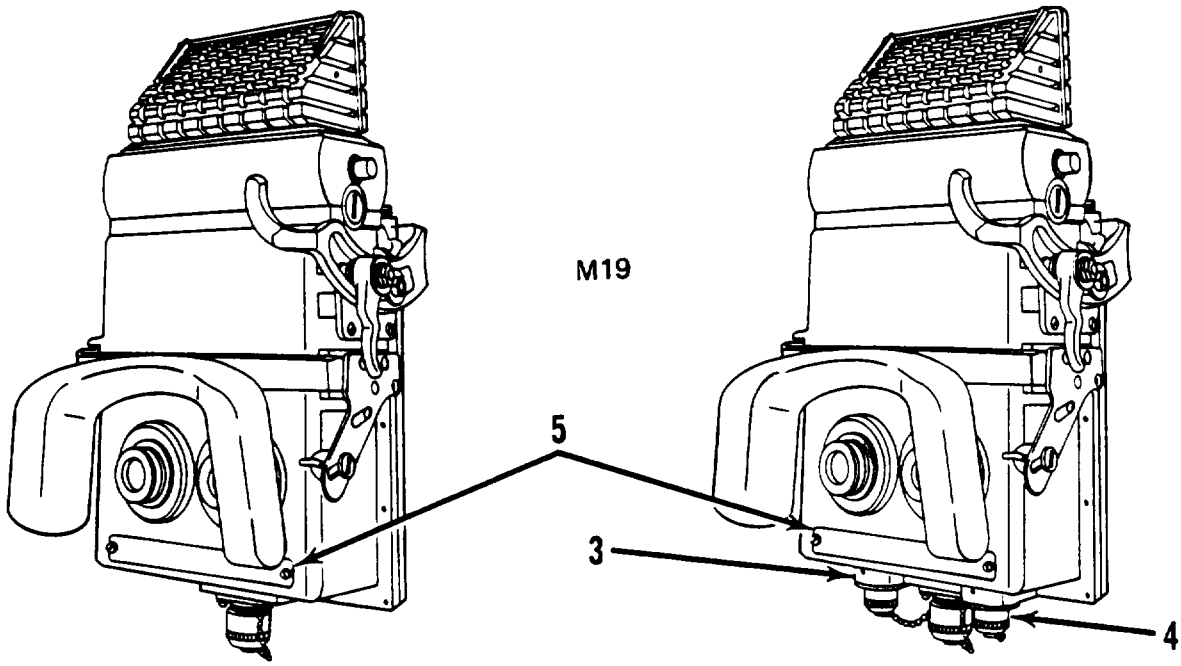
c. M19 and M24 Old and New Configurations

Each configuration has an identifying nameplate (5) on the rear at the bottom.

The Ml 9 periscope has P/N 7652971 (old configuration) and P/N 11747126 (new configuration).

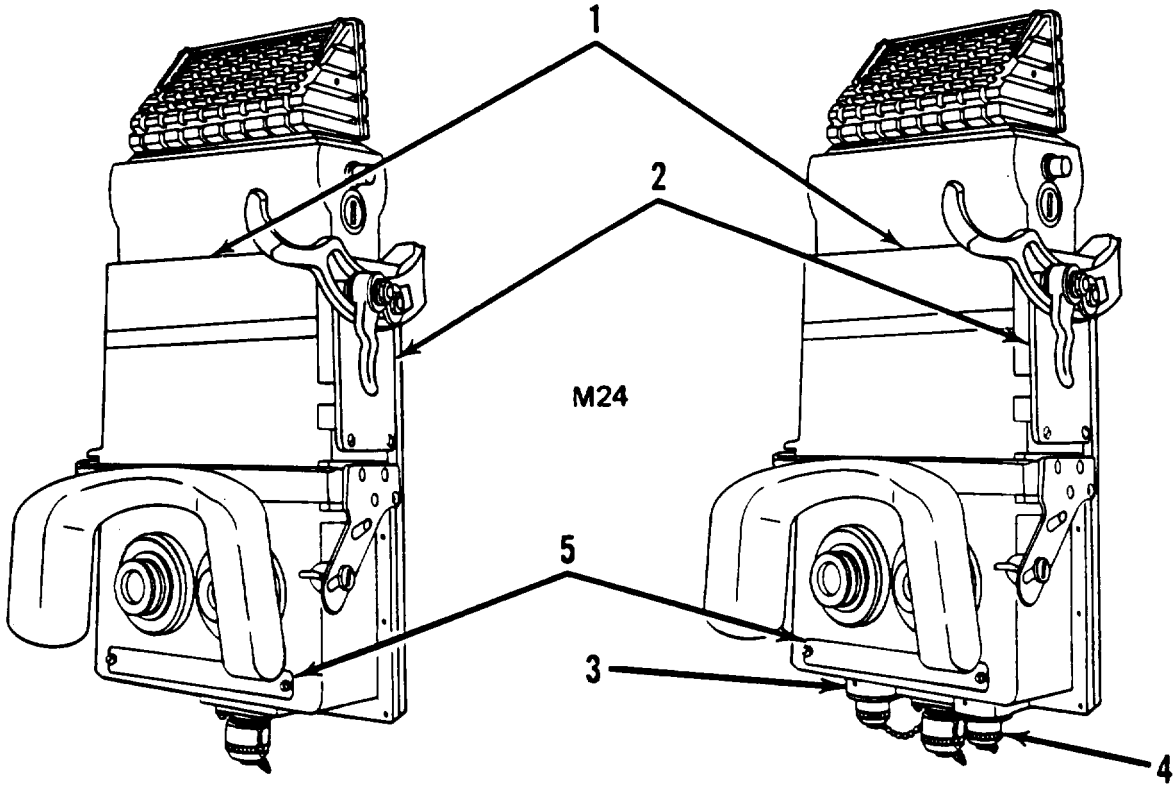
The M24 periscope has P/N 8293676 (old configuration) and P/N 11747127 (new configuration).

1-5. DIFFERENCES BETWEEN CONFIGURATIONS (CONT)



NEW CONFIGURATION

OLD CONFIGURATION



NEW CONFIGURATION

OLD CONFIGURATION

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 file control material are in TM 9-254 and Job Performance Guide 113-091-9000R (JPG 41C).

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 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. Wrench, Periscope Clip	5120-00-763-1861	7631861	Removal and installation of retaining clips
2. Gun, Sealing Compound, Hydraulic	4931-00-508-5428	. . .	Force sealing compound

CHAPTER 3

INSPECTION UPON RECEIPT

3-1. SCOPE

This chapter gives procedures to check the M19 and M24 periscopes for faults you can see when they are 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.

3-2. BODY ASSEMBLY INSPECTION UPON RECEIPT

TOOLS: 7/16" open end wrench
3/16" flat tip screwdriver
1/4" flat tip screwdriver
1/16" pin open face spanner wrench
1/16" socket head screw key (Allen wrench or equivalent)
#2 Phillips

SUPPLIES: Cloth (item 1, App A)
Grease (item 2, App A)
Paint (items 4, 5, App A)
Primer (item 6, App A)
Solvent (item 9, App A)

PERSONNEL: One

REFERENCES: JPG 4lC for: Cleaning and lubricating
Completing DA Form 2404

TM 43-0139 for painting
TM 9-254 for general maintenance
TM 10 for removing head assembly (TM 9-2350-215-10 for M60A1, TM 9-2350-257-10 for M60A1 Rise, TM 9-2350-260-10 for M60, and TM 9-2350-222-10 for M728)

EQUIPMENT CONDTION: Body assembly on work bench; power disconnected

PRELIMINARY PROCEDURES: Remove head assembly (TM 10)

CAUTION

Handle lenses with care. Do not put fingerprints on them. Do not place on rough surfaces. Clean after inspection.

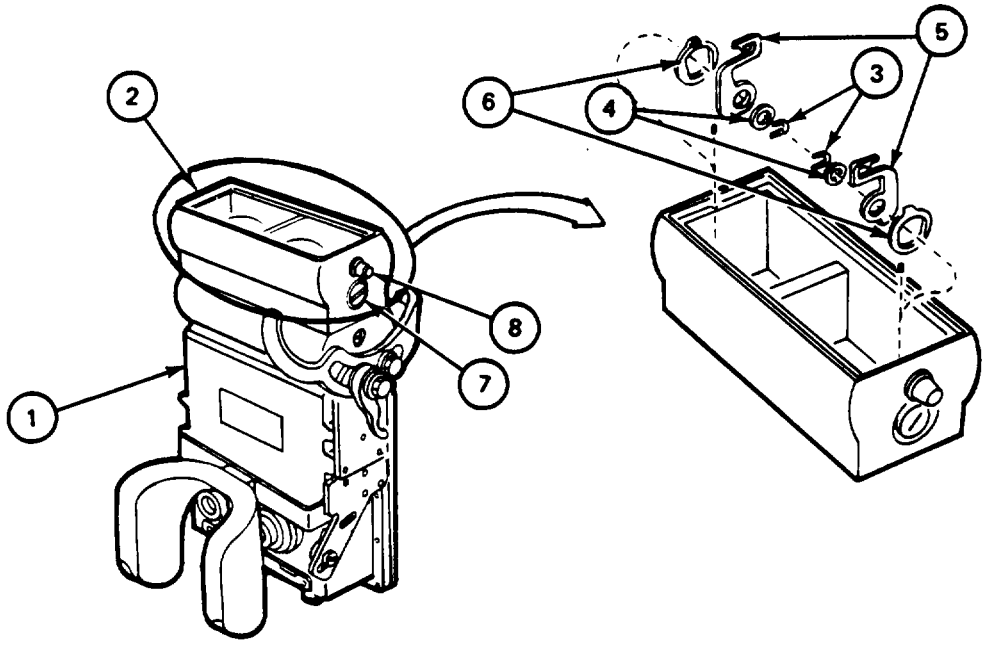
NOTE

One body assembly configuration will be pictured for use with inspection procedure.

3-2. BODY ASSEMBLY INSPECTION UPON RECEIPT (CONT)

FRAME 1

Step	Procedure	enance Action	Reference
1.	Look into body assembly (1) and check two objective lenses for cracks or scratches. Check for dirt or moisture inside.	Tell your supervisor.	. . .
2.	Check gasket (2) for damage.	Replace gasket if damaged.	Para 4-22
3.	Look into body assembly (1). Check two spring clips (3), two spring washers (4), two latches (5), and two keyed washers (6) for damage.	Replace if damaged or missing.	Para 4-22
4.	Check two eccentrics (7) and two trunnions (8) for damaged surfaces. GO TO FRAME 2	Replace if damaged or missing.	Para 4-22



Para 3-2 Cont

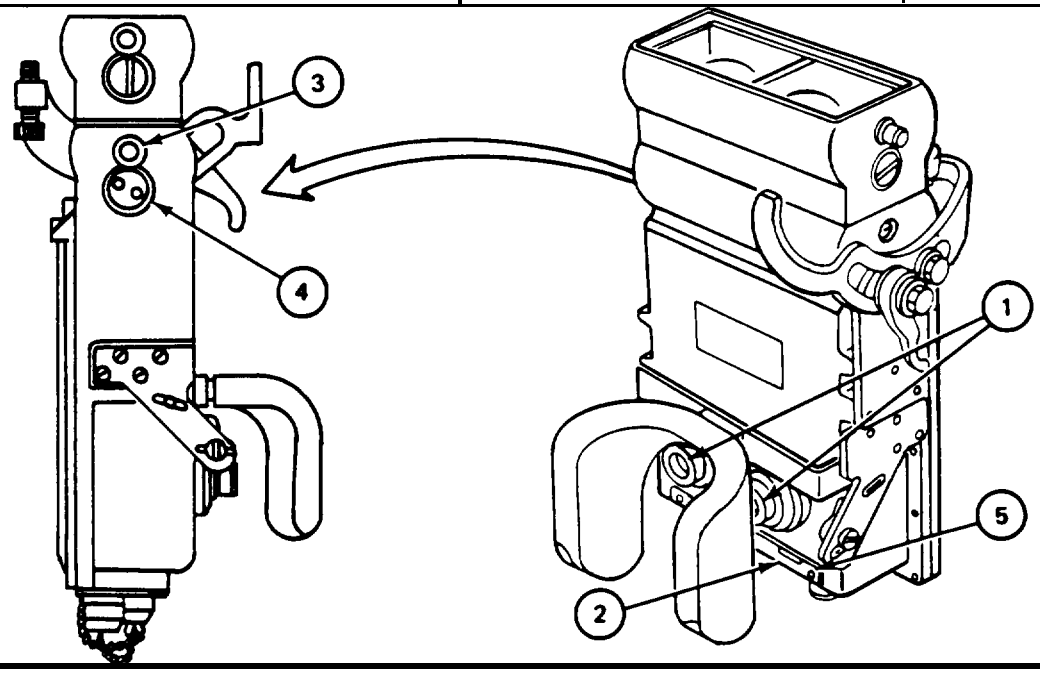
3-2. BODY ASSEMBLY INSPECTION UPON RECEIPT (CONT)

NOTE

For M24 old and new configurations, do steps 3 and 4 only.

FRAME 2

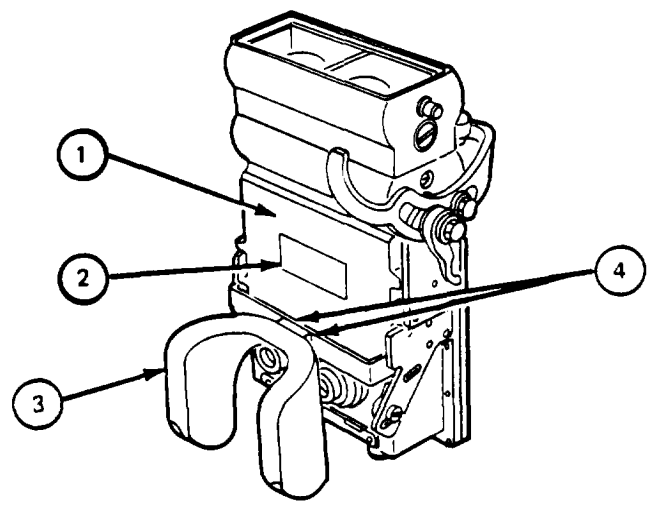
Step	Procedure	Maintenance Action	Reference
1.	Check two eyepieces (1) for cracks or scratches. Look in eyepieces and check for dirt or moisture inside.	Tell your supervisor.	. . .
2.	Check that identification plate (2) can be read.	If missing or cannot be read, tell your supervisor.	. . .
3.	Using 1/4" screwdriver, check that two studs (3) are tight.	Tighten. If damaged or missing, send body assembly to depot for repair.	. . .
4.	Using 1/16" pin open face spanner wrench, check that plug (4) is tight.	Tighten. If damaged or missing, send body assembly to depot for repair.	. . .
5.	Using 3/16" screwdriver, check that two identification plate screws (5) are tight.	Tighten. Replace if damaged or missing.	. . .
	GO TO FRAME 3		



3-2. BODY ASSEMBLY INSPECTION UPON RECEIPT (CONT)

FRAME 3

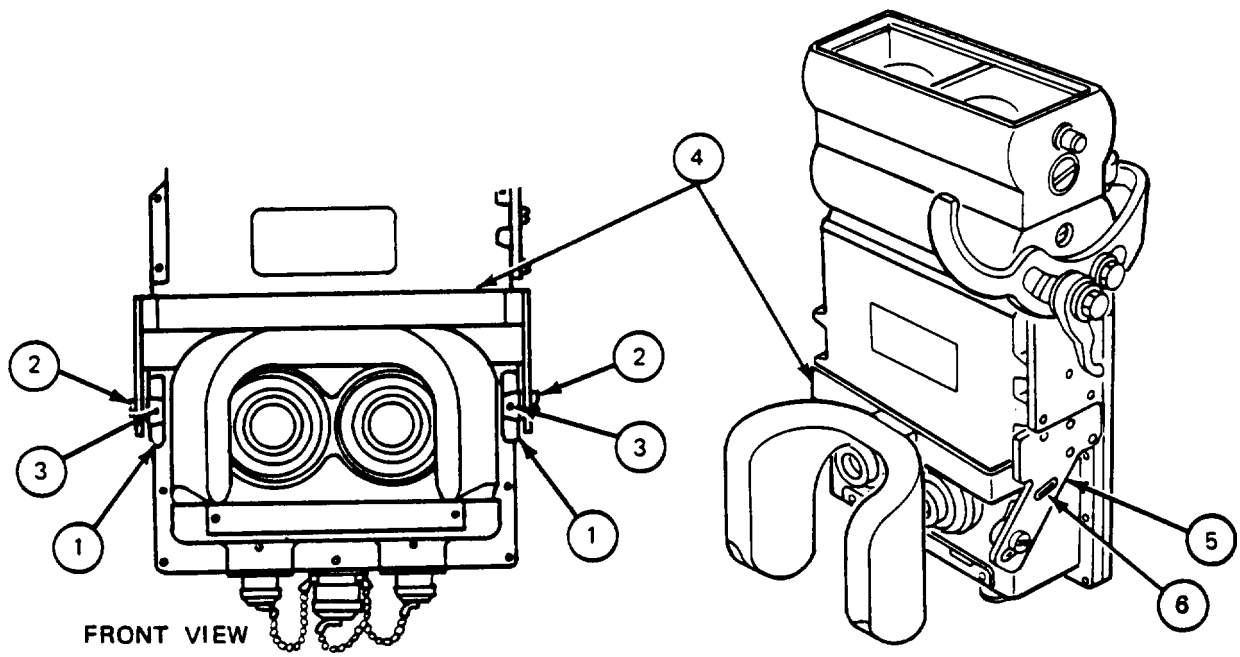
Step	Procedure	Maintenance Action	Reference
1.	Check body assembly (1) for dents or cracks.	Tell your supervisor.	. . .
2.	Check that CAUTION decal (2) can be read.	Replace if missing or cannot be read.	Para 4-34
3.	Check body assembly (1) for bare metal spots, scratches, and chipped or loose paint.	Paint scratched or chipped areas.	TM 43-0139
4.	Check rubber headrest (3) for cracks and other damage.	Replace if damaged or missing.	Para 4-3
5.	Check tightness of two screws (4) by trying to move headrest (headrest should not move).	Tighten. Replace if missing or damaged.	Para 4-4
	GO TO FRAME 4		



3-2. BODY ASSEMBLY INSPECTION UPON RECEIPT (CONT)

FRAME 4

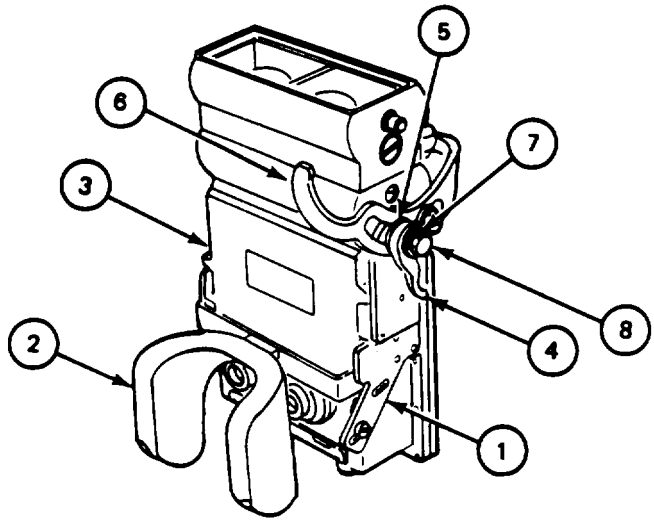
Step	Procedure	Maintenance Action	Reference
1.	Check that two wing knobs (1) are held to two locking screws (2) with two pins (3).	Replace if damaged or missing.	Para 4-3
2.	Turn two wing knobs (1) counterclockwise to loosen two locking screws (2). Check that headrest frame (4) moves freely on mounting bracket (5).	Repair or replace if damaged.	Para 4-3
3.	Check sliding surfaces and two ball bearings (6) for cleanliness and lubrication.	Clean and lubricate.	JPG 41C
4.	Turn wing knobs (1) clockwise to tighten locking screws (2) and check for stripped threads. GO TO FRAME 5	Replace if damaged or missing.	Para 4-3



3-2. BODY ASSEMBLY INSPECTION UPON RECEIPT (CONT)

FRAME 5

Step	Procedure	Maintenance Action	Reference
1.	Using 1/4" screwdriver, that eight screws (1) (four on each side) holding headrest assembly (2) to body assembly (3) are tight.	Tighten. Replace if missing or damaged.	Para 4-3
2.	Turn locking lever (4) counterclockwise and check for binding.	Repair or replace if damaged.	Para 4-8
3.	Check for one washer (5) between locking lever (4) segment (6) and two washers (7) between locking lever (4) and lock nut (8).	Replace if damaged or missing.	Para 4-8
	GO TO FRAME 6		

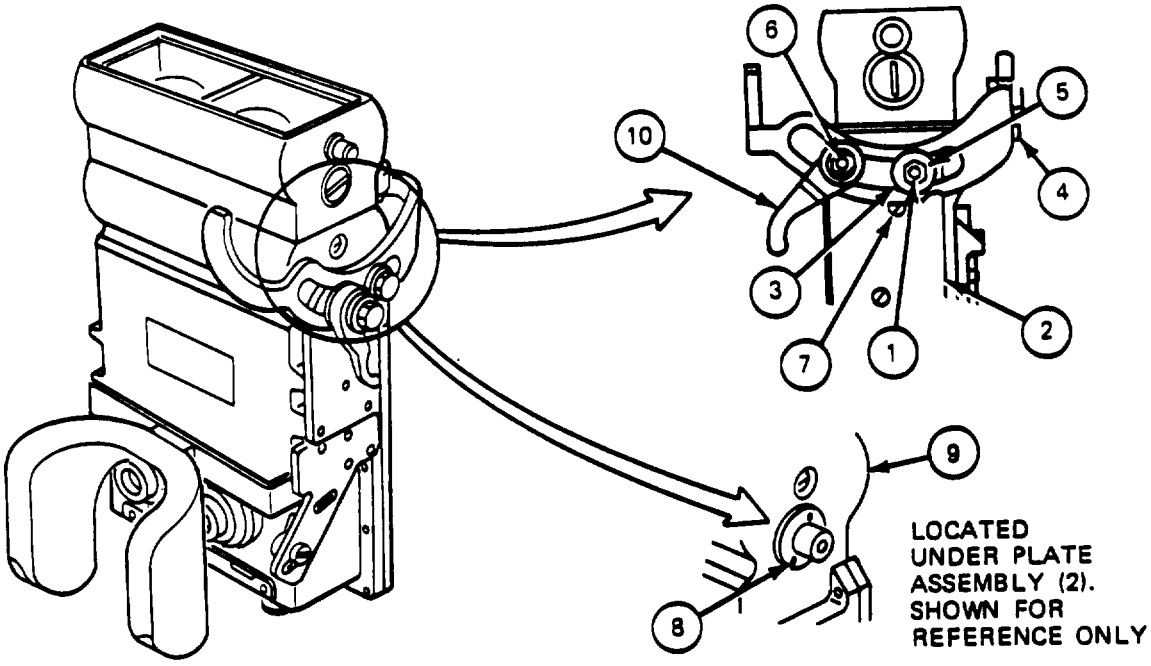


3-2. BODY ASSEMBLY INSPECTION UPON RECEIPT (CONT)

FRAME 6

Step	Procedure	Maintenance Action	Reference
1.	Check short stud (1) on plate assembly (2) for one washer (3) between segment (4) and lock nut (5).	Replace if damaged or missing.	Para 4-8
2.	Using open-end wrench, check that lock nut (6) is tight.	Tighten. Replace if missing or damaged.	Para 4-8
3.	Move segment (4) through its full travel and check for binding.	Clean and lubricate. Repair or replace if it binds.	Para 4-8
	NOTE Do steps 4 and 5 for M24 configurations only.		
4.	Line up notch in segment (4) with screw (7) holding plate assembly (2) to support (8) on body assembly (9), Tighten locking lever (10).		Para 4-8
5.	Using 3/16" screwdriver, check that screw (7) in plate assembly (2) under segment (4) is tight. GO TO FRAME 7	Tighten. Replace if missing.	Para 4-8

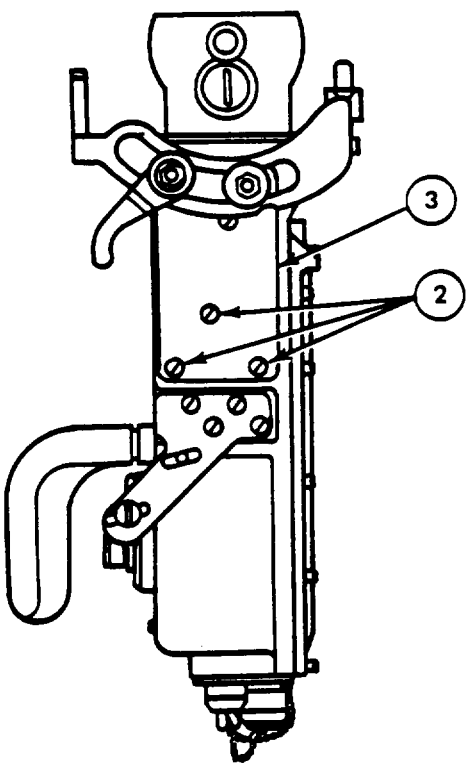
3-2. BODY ASSEMBLY INSPECTION UPON RECEIPT (CONT)



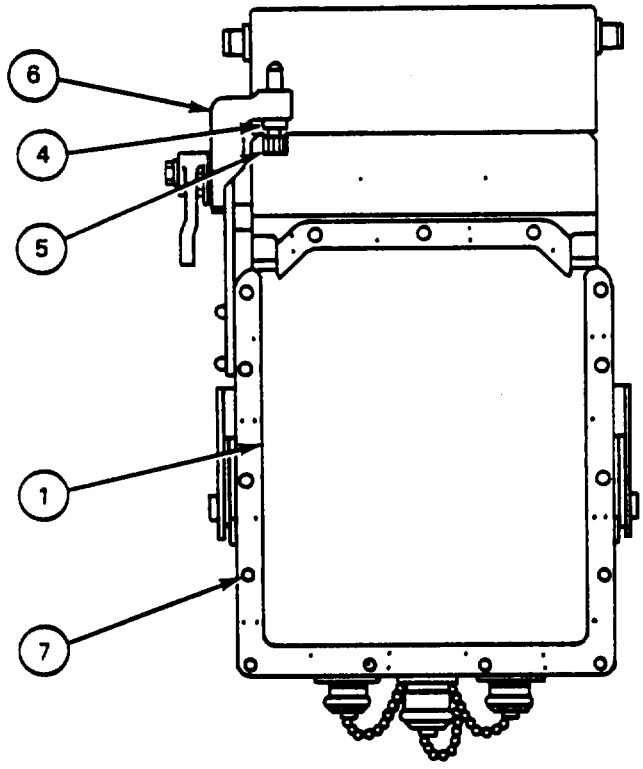
3-2. BODY ASSEMBLY INSPECTION UPON RECEIPT (CONT)

FRAME 7

Step	Procedure	Maintenance Action	Reference
1.	Check cover assembly (1) for dents and cracks.	Tell your supervisor.	. . .
2.	Using 1/4" screwdriver, check that three screws (2) in plate assembly (3) are tight.	Tighten. Replace if missing.	. . .
3.	Screw lock nut (4) to head of knurled knob screw (5). Check threads of screw and nut.	Replace if damaged or missing.	Para 4-8
4.	Screw knob screw (5) into segment (6) to check segment for damaged threads.	Replace if damaged or missing.	Para 4-8
5.	Using 1/4" screwdriver, check that 15 cover assembly screws (7) are tight.	Tighten. Replace if missing or damaged.	. . .
	GO TO FRAME 8		



SIDE VIEW

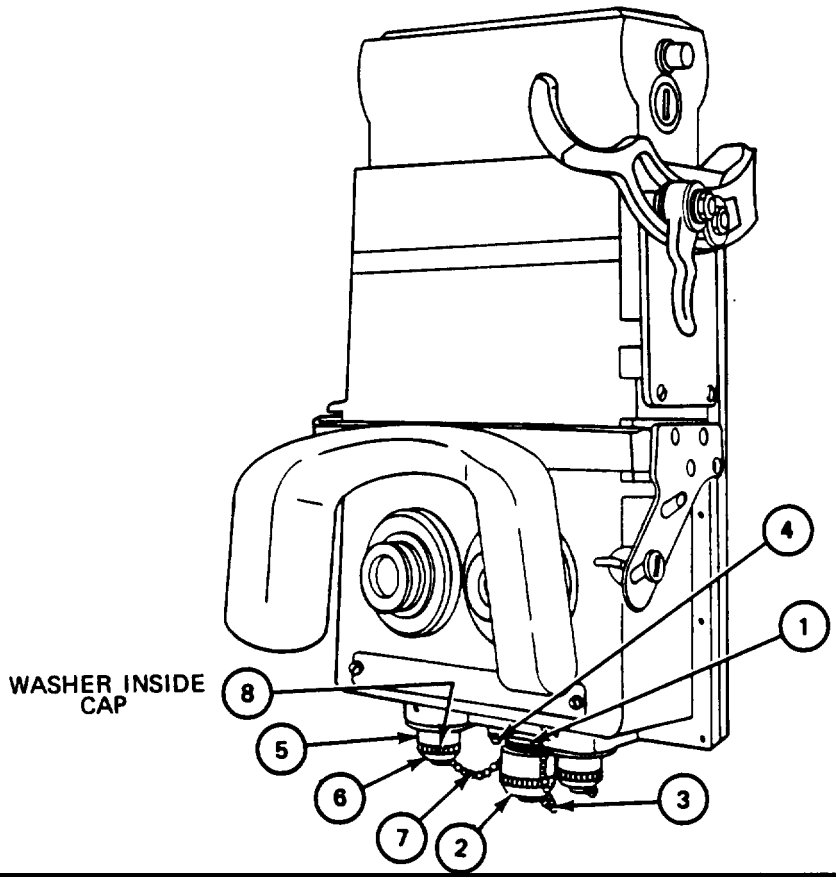


Para 3-2 Cont

3-2. BODY ASSEMBLY INSPECTION UPON RECEIPT (CONT)

FRAME 8

Step	Procedure	Maintenance Action	Reference
1.	Check high voltage receptacle (1) for cap (2) and chain (3).	Replace if damaged or missing.	Para 4-19
2.	Using 3/16" screwdriver, check that four high voltage receptacle screws (4) are tight.	Tighten. Replace if missing or damaged.	Para 4-19
3.	Check two variable resistor's (focus adjustment) bushings (5) for caps (6) and chains (7).	Replace if damaged or missing.	Para 4-33
4.	Check two rubber washers (8) between cap (6) and bushing (5).	Replace if damaged or missing.	Para 4-33
	GO TO FRAME 9		

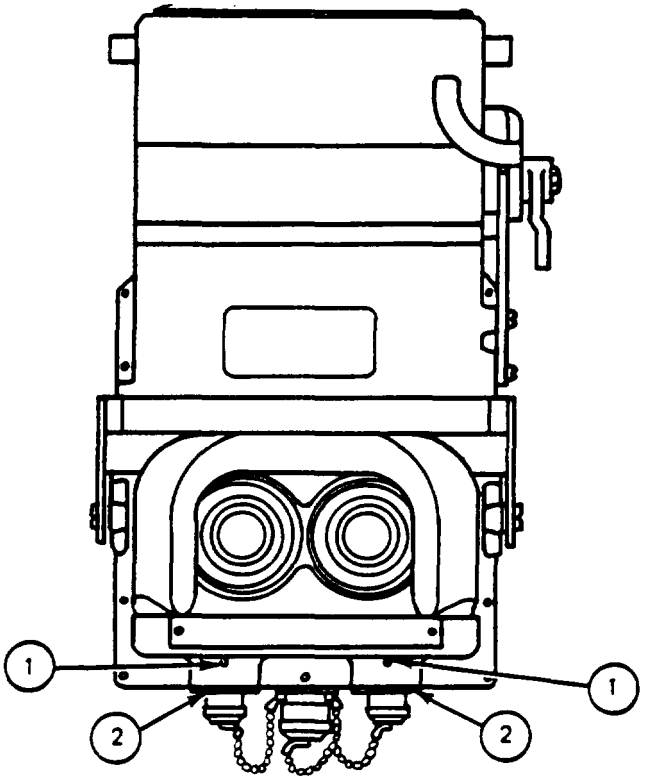


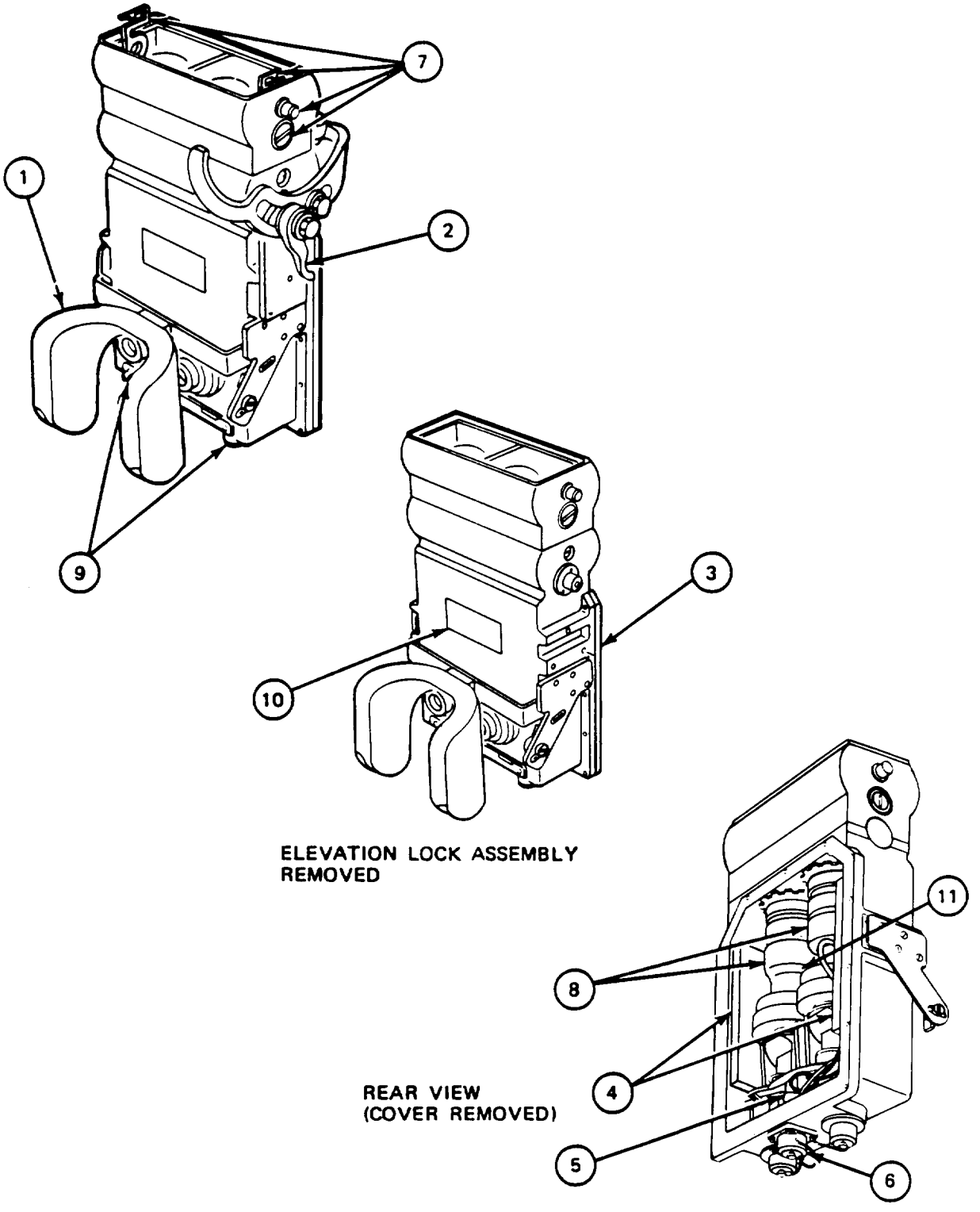
Para 3-2 Cont

3-2. BODY ASSEMBLY INSPECTION UPON RECEIPT (CONT)

FRAME 9

Step	Procedure	Maintenance Action	Reference
1.	Using 1/16" Allen wrench, check that two variable resistor retaining setscrews (1) are tight.	Tighten. Replace if missing or damaged.	. . .
2.	Using 1/16" Allen wrench, check that two variable resistor bushing retaining setscrews (2) are tight.	Tighten. Replace if missing or damaged.	. . .
	NOTE FOLLOW-ON MAINTENANCE Do checkout procedure (Vol I, para 2-2). END OF TASK		





ELEVATION LOCK ASSEMBLY
REMOVED

REAR VIEW
(COVER REMOVED)

CHAPTER 4

MAINTENANCE PROCEDURES

Section 1. GENERAL

4-1. SCOPE

This chapter gives maintenance procedures for the Ml 9 (old and new configuration) and M24 (old and new configuration) Tank Periscope.

4-2. LIST OF PERISCOPE ITEMS CONTAINED IN THIS CHAPTER

Item	Figure Index No.	Reference (para)
Headrest Assembly	I	4-3
Elevation Lock Assembly	2	4-8
Body Cover	3	4-13
Board Assembly and Ground Wire Assembly	4	4-16
High Voltage Cable Assembly	5	4-19
Receptacle	6	4-22
Trunnion, Latch, Eccentric, and Related Parts	7	4-25
Image Converter Electron Tube	8	4-28
Resistor Assembly	9	4-31
Decal	10	4-34
Strap	11	4-37

Section 2. HEADREST ASSEMBLY

4-3. HEADREST ASSEMBLY MAINTENANCE PROCEDURES INDEX

Task	Reference (para)
Removal	4-4
Disassembly	4-5
Assembly	4-6
Installation	4-7

4-4. HEADREST ASSEMBLY REMOVAL

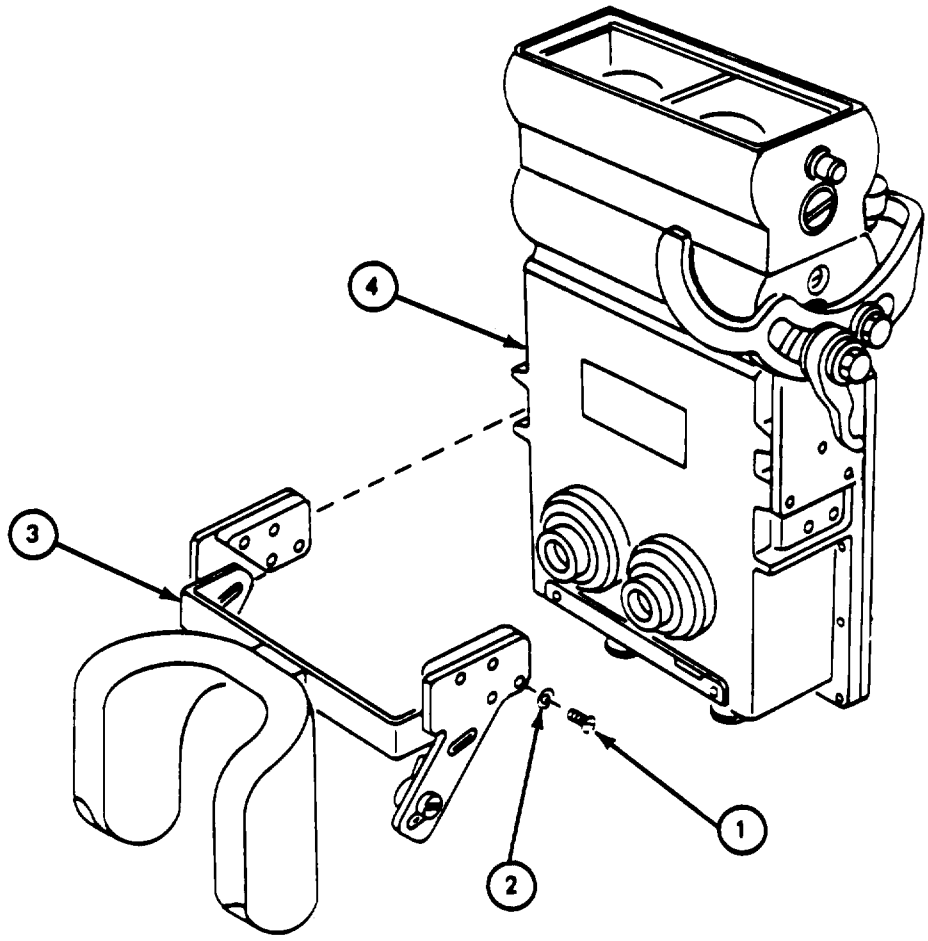
TOOLS: 1/4" flat tip screwdriver

PERSONNEL: One

EQUIPMENT CONDITION: Body assembly on work bench; power disconnected

FRAME 1

Step	Procedure
1.	Using screwdriver, remove eight screws (1) and eight lockwashers (2) which hold headrest assembly (3) to body assembly (4).
2.	Remove headrest assembly (3) from body assembly (4).
	END OF TASK



4-5. HEADREST ASSEMBLY DISASSEMBLY

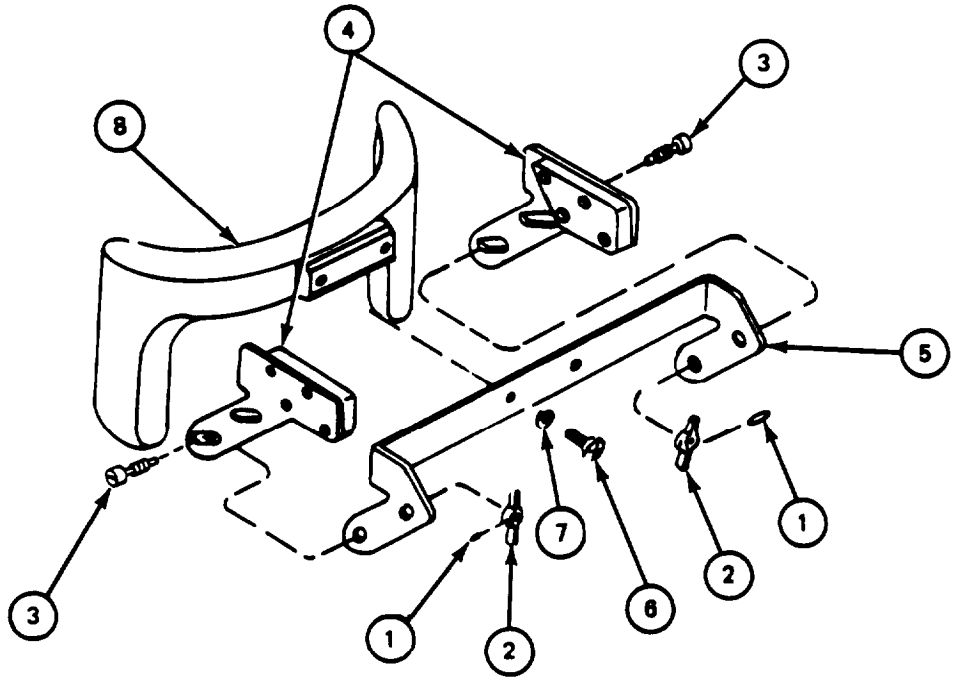
TOOLS: 3/8" flat tip screwdriver
#2 cross tip screwdriver (Phillips type)
4 oz. ball peen hammer
1/16" drive pin punch

PERSONNEL: One

EQUIPMENT CONDITION: Headrest assembly on work bench

FRAME 1

Step	Procedure
1.	Using hammer and drive pin punch, drive out two spring pins (1) which lock wing knobs (2) to two special screws (3).
2.	Using flat tip screwdriver, remove two special screws (3) while holding wing knobs (2).
3.	Using hammer and drive pin punch, drive two special screws (3) from wing knobs (2).
4.	Remove bracket assemblies (4) from headrest frame (5).
5.	Using Phillips screwdriver, remove two screws (6) and two lockwashers (7) from headrest (8).
6.	Remove headrest (8) from headrest frame (5).
	END OF TASK



4-6. HEADREST ASSEMBLY ASSEMBLY

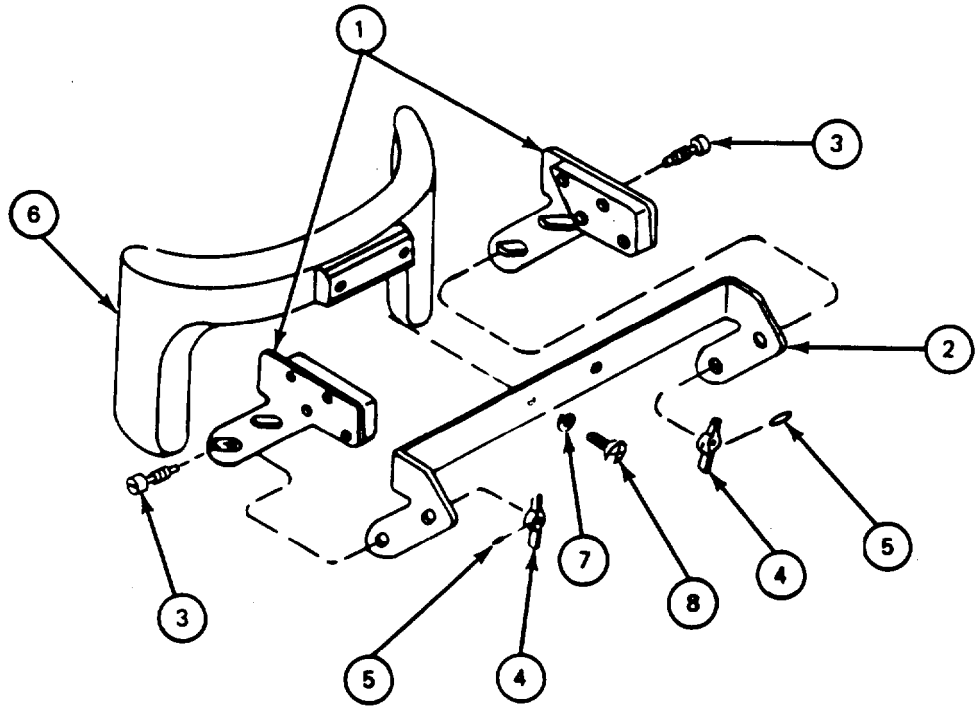
TOOLS: 3/8" flat tip screwdriver
#2 cross tip screwdriver (Phillips type)
4 oz. ball peen hammer

PERSONNEL: One

EQUIPMENT CONDITION: Headrest assembly on work bench

FRAME 1

Step	Procedure
1.	Place two bracket assemblies (1) in position on headrest frame (2).
2.	Using flat tip screwdriver, put two special screws (3) onto headrest frame (2).
3.	Put two wing knobs (4) on special screw (3). Line up in holes.
4.	Using hammer, drive spring pins (5) into hole of wing knobs (4).
5.	Hold headrest (6) in position on headrest frame (2).
6.	Using Phillips screwdriver, install headrest (6) on headrest frame (2) with two lockwashers (7) and two screws (8).
	END OF TASK



4-7. HEADREST ASSEMBLY INSTALLATION

TOOLS: 1/4" flat tip screwdriver

PERSONNEL: One

EQUIPMENT CONDITION: Body assembly on work bench; power disconnected

FRAME 1

Step	Procedure
1.	Hold headrest assembly (1) in position on body assembly (2).
2.	Using screwdriver, install headrest assembly (1) with eight lockwashers (3) and eight screws (4) on the body assembly (2).

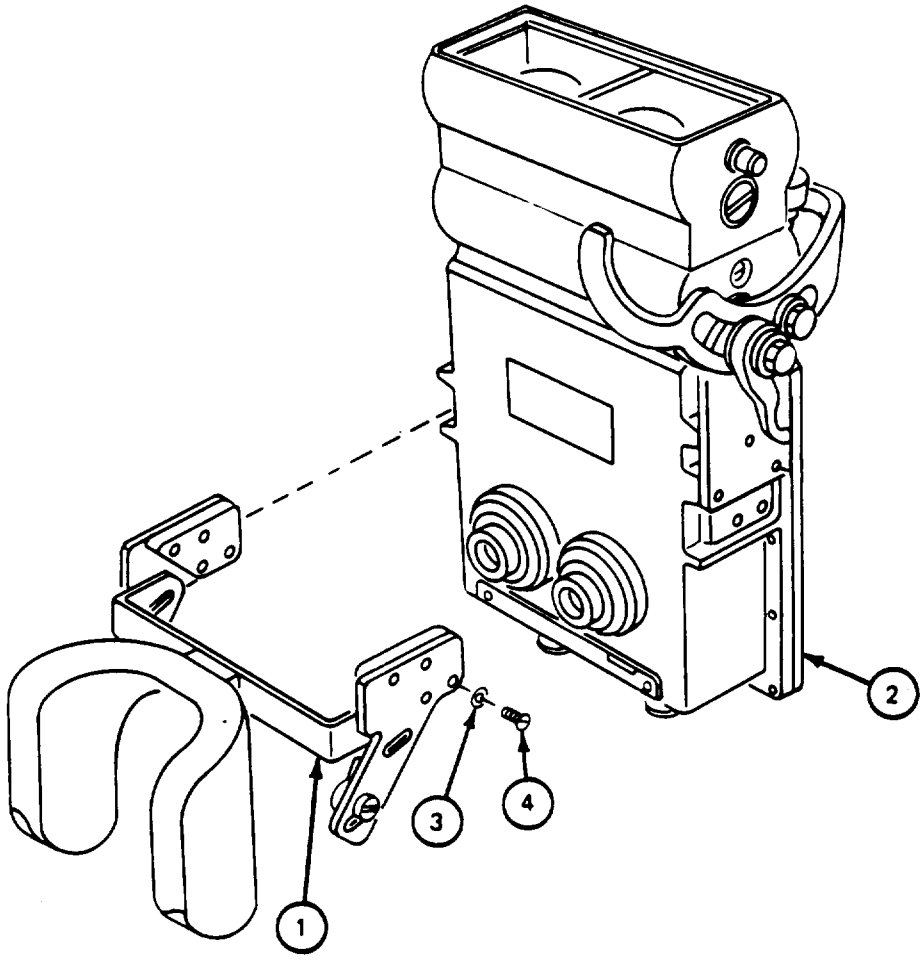
NOTE

FOLLOW-ON MAINTENANCE

Do checkout procedure (Vol I, para 2-2).

END OF TASK

4-7. HEADREST ASSEMBLY INSTALLATION (CONT)



Section 3. ELEVATION LOCK ASSEMBLY

4-8. ELEVATION LOCK ASSEMBLY MAINTENANCE PROCEDURES INDEX

Task	Reference (para)
Removal	4-9
Disassembly	4-10
Assembly	4-11
Installation	4-12

4-9. ELEVATION LOCK ASSEMBLY REMOVAL

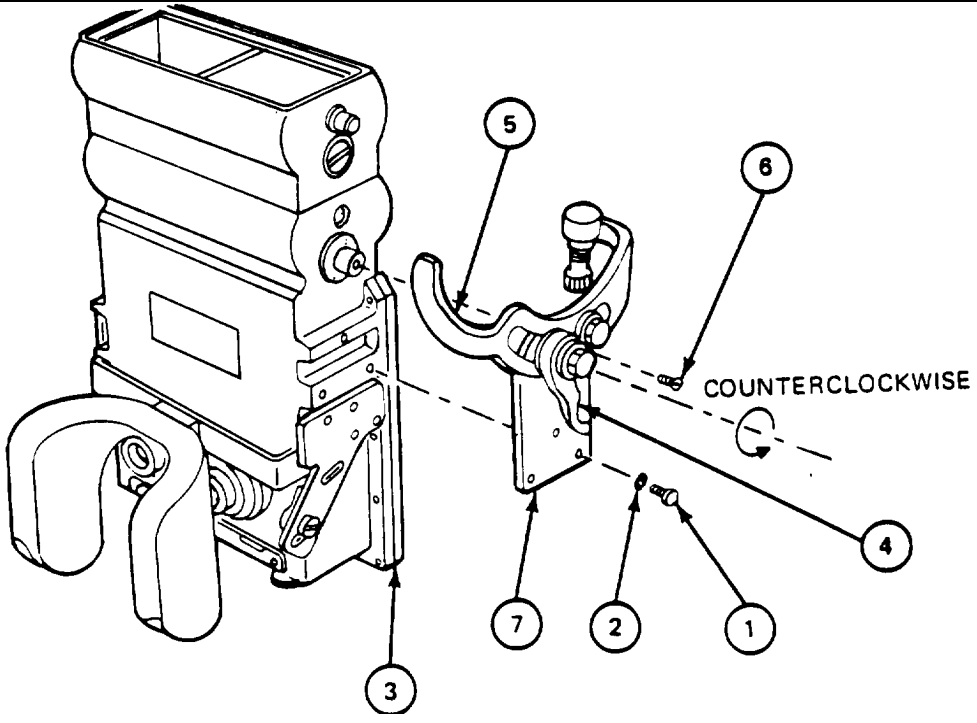
TOOLS: 1/4" flat tip screwdriver
#2 Phillips

PERSONNEL: One

EQUIPMENT CONDITION: Body assembly on work bench; power disconnected

FRAME 1

Step	Procedure
1.	Using screwdriver, remove three screws (1) and three washers (2) from body assembly (3).
2.	Turn lever (4) counterclockwise to loosen segment (5).
	NOTE Do steps 3 and 4 for M24 configurations only.
3.	Move segment (5) to line up notch on segment (5) with screw (6).
4.	Using screwdriver, remove screw (6) from body assembly (3) while lifting on lock assembly (7). Screw (6) will remain in lock assembly (7).
5.	Remove lock assembly (7) from body assembly (3).
	END OF TASK



4-10. ELEVATION LOCK ASSEMBLY DISASSEMBLY

TOOLS: 7/16" open end wrench
3/8" drive pin punch
4 oz. ball peen hammer
Hand thread chaser -18 exterior

PERSONNEL: One

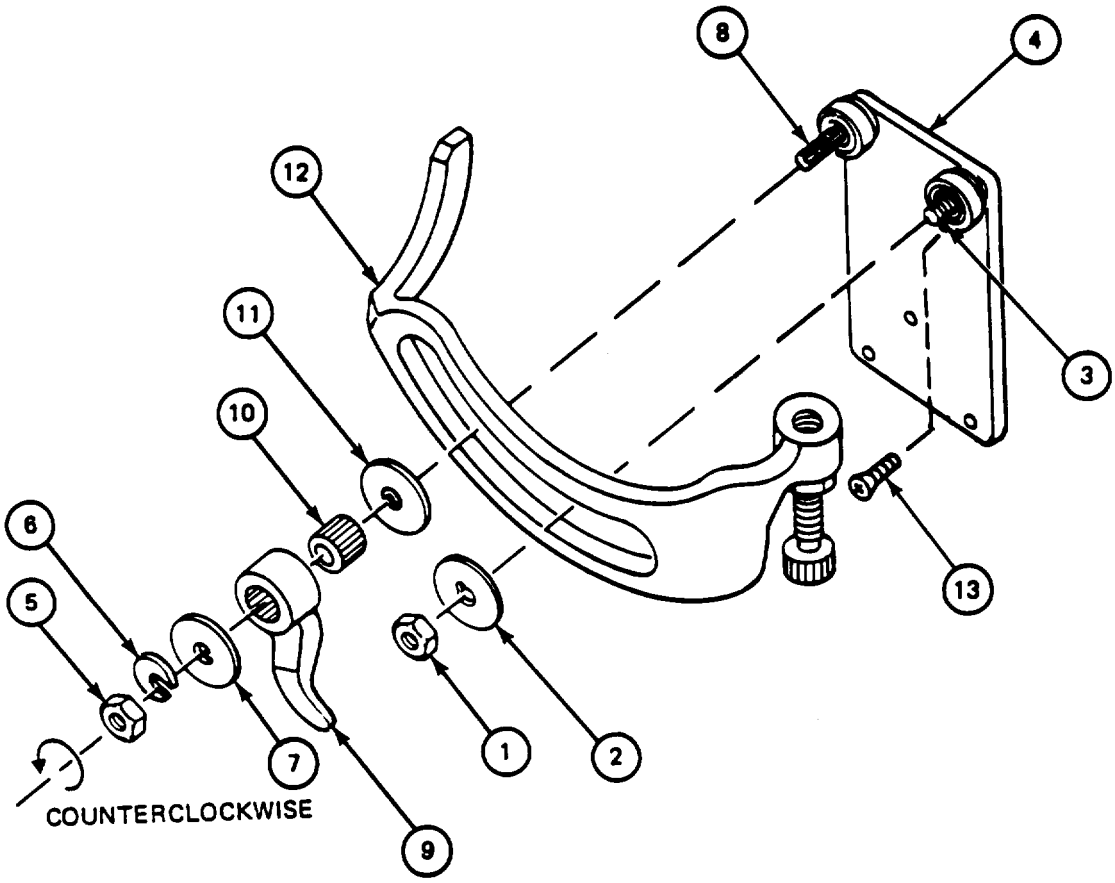
REFERENCES: JPG 41C for using thread chaser

EQUIPMENT CONDITION: Lock assembly on work bench

FRAME 1

Step	Procedure
1.	Using open end wrench, remove nut (1) and special washer (2) from stud (3) of plate assembly (4).
2.	Using open end wrench, remove nut (5), washer (6) and key washer (7) from stud (8) of plate assembly (4).
3.	Turn lever (9) counterclockwise to unscrew round nut (10).
4.	Using hammer and drive pin punch, drive round nut (10) out of lever (9).
5.	Remove key washer (11) from stud (8) of plate assembly (4).
6.	Lift segment (12) off plate assembly (4).
	NOTE Do Step 7 for M24 configurations only.
7.	Remove screw (13) from plate assembly (4). GO TO FRAME 2

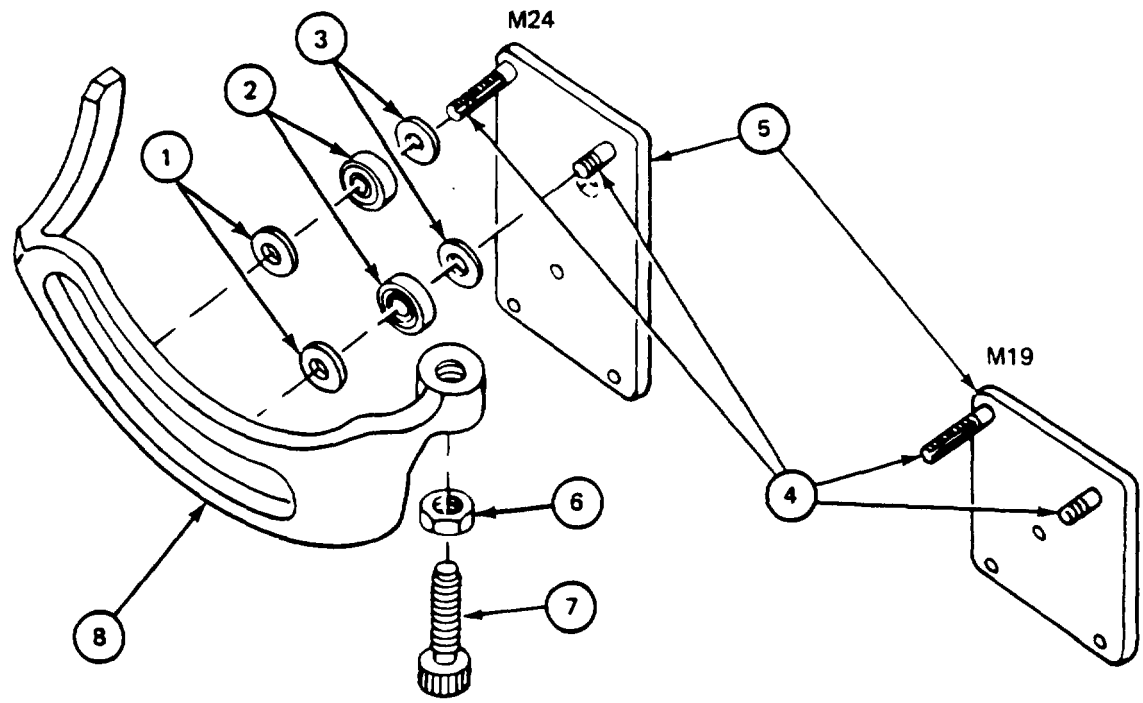
4-10. ELEVATION LOCK ASSEMBLY DISASSEMBLY (CONT)



4-10. ELEVATION LOCK ASSEMBLY DISASSEMBLY (CONT)

FRAME 2

Step	Procedure
1.	Remove two washers (1), two bearings (2) and two washers (3) from two studs (4) on plate assembly (5).
2.	Loosen locking nut (6) on knob (7).
	NOTE If threads or knob (7) are damaged, continue with step 3. If not, go to step 5.
3.	Hold locking nut (6) and screw knob (7) as far as possible in segment (8).
4.	Using thread chaser, rework thread on knob (7) (JPG).
5.	Unscrew knob (7) from segment (8).
6.	Unscrew nut (6) from knob (7).
	END OF TASK



4-11. ELEVATION LOCK ASSEMBLY ASSEMBLY

TOOLS: 7/16" open end wrench
4 oz. ball peen hammer
Soft face hammer
Center punch

PERSONNEL: One

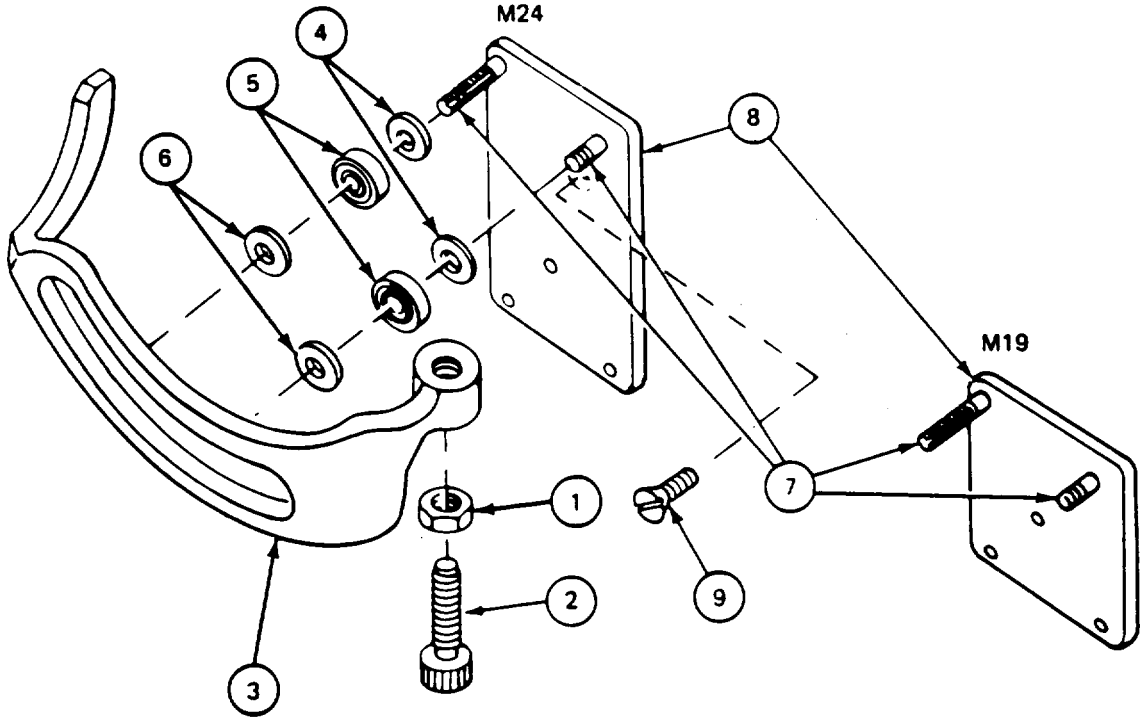
REFERENCES: JPG 4lC for staking threads

EQUIPMENT CONDITION: Lock assembly on work bench

FRAME 1

Step	Procedure
1.	Screw nut (1) onto knob (2).
2.	Screw knob (2) into segment (3).
3.	Using hammer and center punch, stake threads of knob (2) between first and second thread at tip (JPG).
4.	Place two washers (4), two ball bearings (5), and two washers (6) on studs (7) of plate assembly (8).
	NOTE Do step 5 for M24 configurations only.
5.	Place screw (9) in plate assembly (8). GO TO FRAME 2

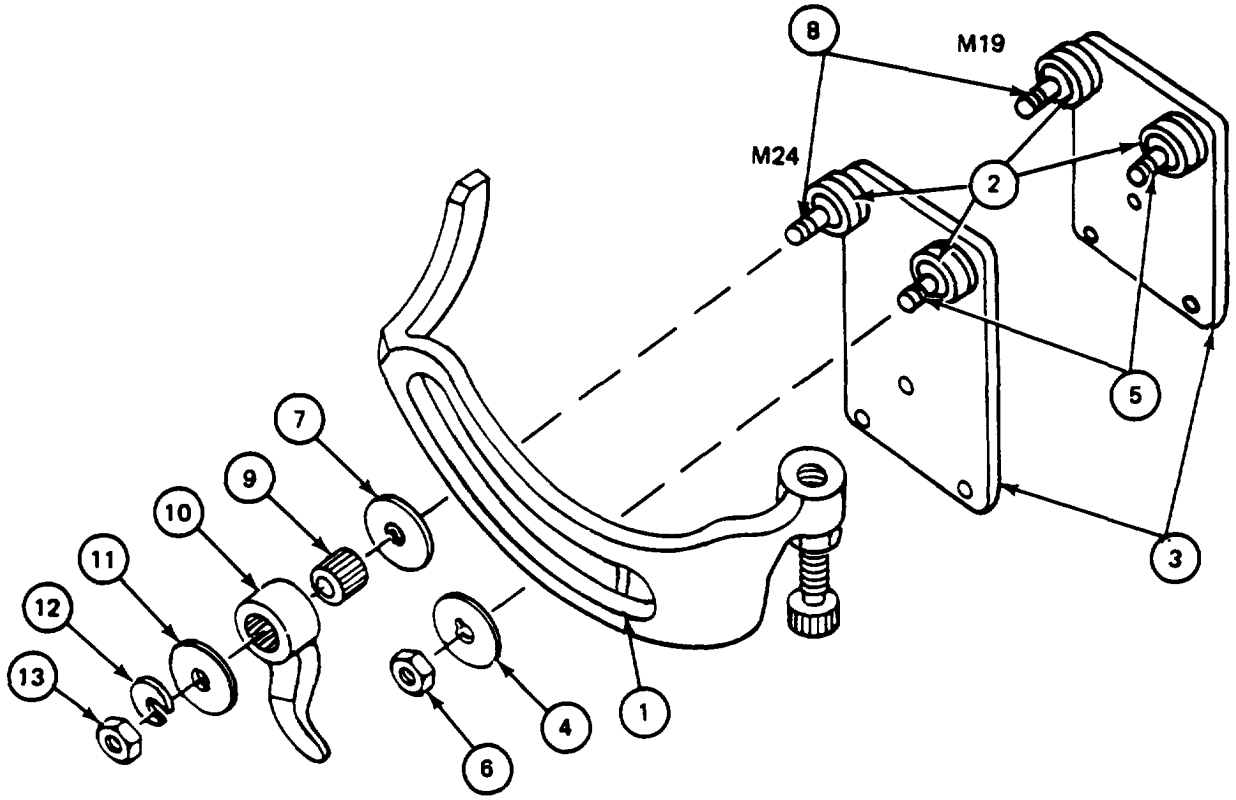
4-11. ELEVATION LOCK ASSEMBLY ASSEMBLY (CONT)



4-11. ELEVATION LOCK ASSEMBLY ASSEMBLY (CONT)

FRAME 2

Step	Procedure
1.	Place slot of segment (1) over bearing (2) on plate assembly (3).
2.	Place special washer (4) on short stud (5) of plate assembly (3). Slide small notch in washer (4) into groove in stud (5).
3.	Using open end wrench, put nut (6) into short stud (5) of plate assembly (3).
4.	Place key washer (7) on long stud (8) of plate assembly (3).
5.	Line up splines of round nut (9) with splines in lever (10).
6.	Using soft face hammer, drive round nut (9) into lever (10).
7.	Screw lever (10) onto long stud (8) of plate assembly (3).
8.	Place key washer (11) on long stud (8).
9.	Place washer (12) in groove in long stud (8).
10.	Using open end wrench, put nut (13) into long stud (8) of plate assembly (3).
	END OF TASK



4-12. ELEVATION LOCK ASSEMBLY INSTALLATION

TOOLS: 1/4" flat tip screwdriver
#2 Phillips screwdriver

SUPPLIES: Grease (item 2, App A)

PERSONNEL: One

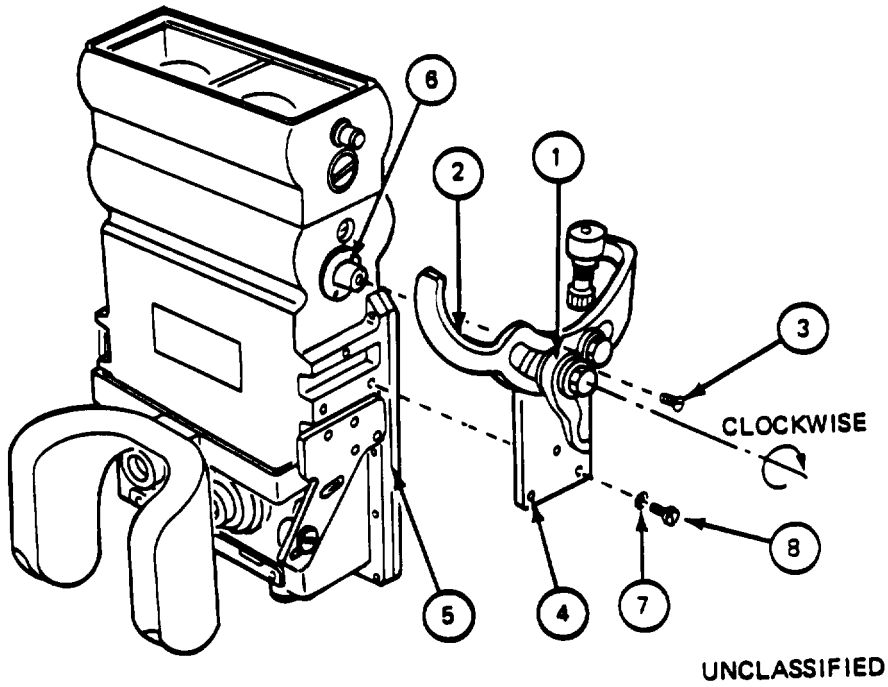
REFERENCES: JPG 41C for lubricating sliding parts

EQUIPMENT CONDITION: Lock assembly and body assembly on work bench; power supply disconnected

FRAME 1

Step	Procedure
1.	Turn lever (1) counterclockwise to loosen segment (2).
	NOTE
	Do step 2 for M24 configurations only.
2.	Move segment (2) to line up notch over installed screw.
3.	Turn lever (1) clockwise and tighten segment (2).
4.	Hold lock assembly (4) in position on body assembly (5).
	NOTE
	Do step 5 for M24 configurations only.
5.	Using screwdriver, tighten screw (3) into support (6).
6.	Using screwdriver, put on and tighten three washers (7) and three screws (8).
7.	Lubricate sliding parts (JPG).
	NOTE
	FOLLOW-ON MAINTENANCE
	Do checkout procedure (Vol I, para 2-2).
	END OF TASK

4-12. ELEVATION LOCK ASSEMBLY INSTALLATION (CONT)



Section 4. BODY COVER

4-13. BODY COVER MAINTENANCE PROCEDURES INDEX

Step	Reference (para)
Removal	4-14
Installation	4-15

4-14. BODY COVER REMOVAL

TOOLS: 1 /4" flat tip screwdriver

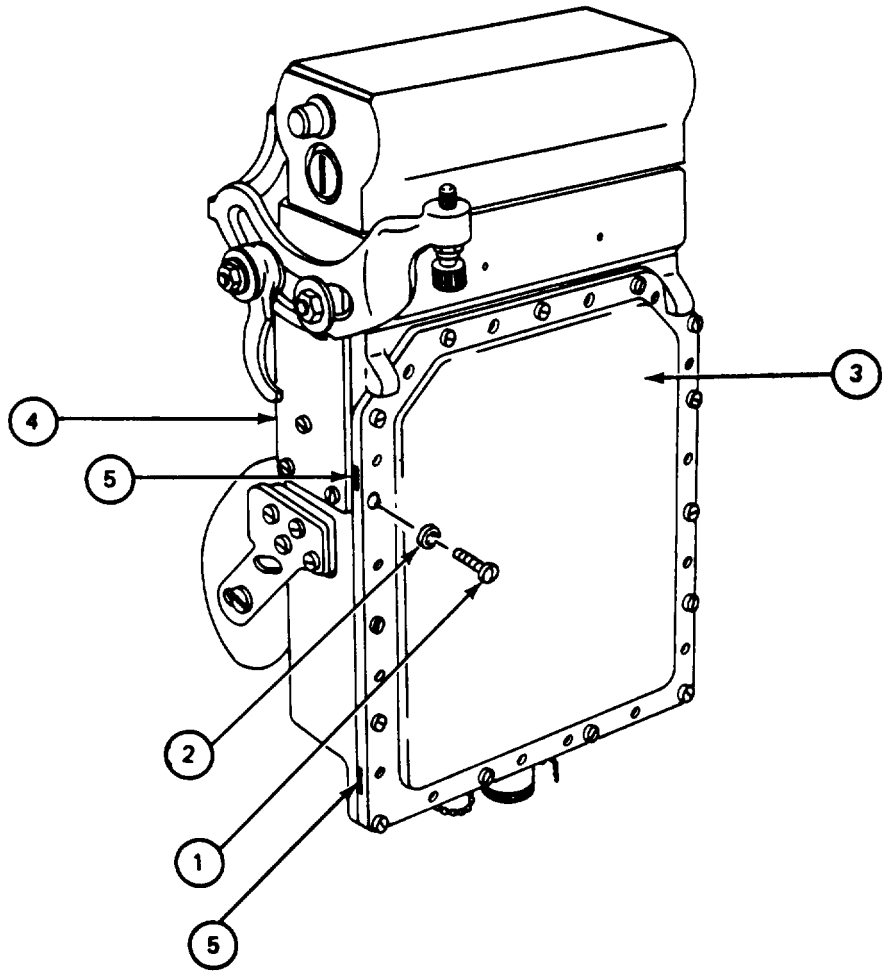
PERSONNEL: One

EQUIPMENT CONDITION: Body assembly on work bench; power disconnected

FRAME 1

Step	Procedure
1.	Using screwdriver, remove 15 screws (1) and 15 lockwashers (2) holdhing cover (3) to body assembly (4).
	CAUTION Take care not to damage cover or body assembly when prying cover from body assembly.
2.	Using screwdriver, carefully pry cover (3) from body assembly (4) by placing tip of flat tip screwdriver in any of the eight slots (5) in cover (3).
	END OF TASK

4-14. BODY COVER REMOVAL (CONT)



4-15. BODY COVER INSTALLATION

TOOLS: Hydraulic sealing gun
1/4" flat tip screwdriver
Pocket knife

SUPPLIES: Sealing compound (item 8, App A)
Dry cleaning solvent (item 9, App A)
Cloth (item 1, App A)

PERSONNEL: One

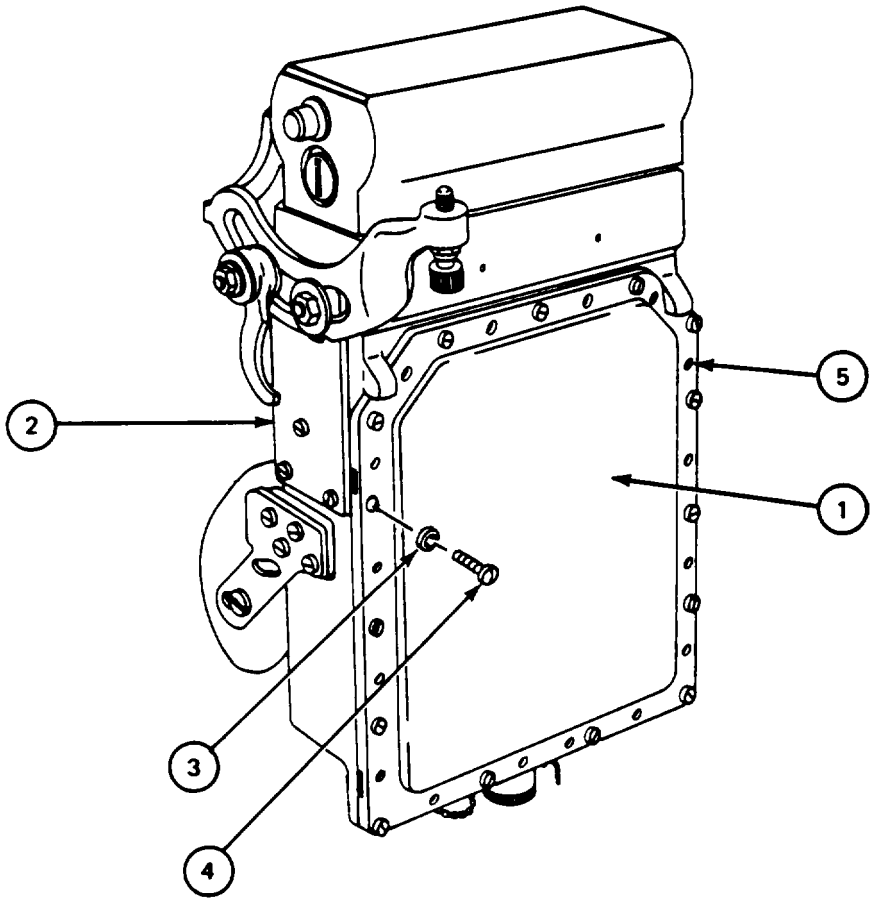
REFERENCES: JPG 4lC for sealing procedures

EQUIPMENT CONDITION: Body assembly on work bench; power disconnected

FRAME 1

Step	Procedure
	WARNING Dry cleaning solvent can catch on fire. Keep it and all material that can catch on fire away from flames. Use only in room with a lot of fresh air.
1.	Using pocket knife, scrape off old sealing compound. Using dry cleaning solvent on cloth, clean off any remaining old sealing compound from cover (1) and body assembly (2).
2.	Place cover (1) on body assembly (2).
3.	Using screwdriver, put in and tighten 15 lockwashers (3) and 15 screws (4).
4.	Using sealing gun, force sealing compound in 8 sealing holes (5) of cover (1) until completely sealed (JPG).
	NOTE FOLLOW-ON MAINTENANCE Do final inspection (para 5-1).
	END OF TASK

4-15. BODY COVER INSTALLATION (CONT)



Section 5. BOARD ASSEMBLY AND GROUND WIRE ASSEMBLY

4-16. BOARD ASSEMBLY AND GROUND WIRE ASSEMBLY MAINTENANCE PROCEDURES INDEX

Task	Reference (para)
Removal	4-17
Installation	4-18

4-17. BOARD ASSEMBLY AND GROUND WIRE ASSEMBLY REMOVAL

TOOLS: 3/ 16“ flat tip screwdriver

PERSONNEL: One

REFERENCES: JPG 41C for tagging wires

EQUIPMENT CONDITION: Body assembly on work bench; power disconnected

PRELIMINARY PROCEDURES: Remove cover (para 4-14)

NOTE

Frames 1 and 2 are for M19 and M24 old configurations.
Frame 3 is for M19 and M24 new configurations.

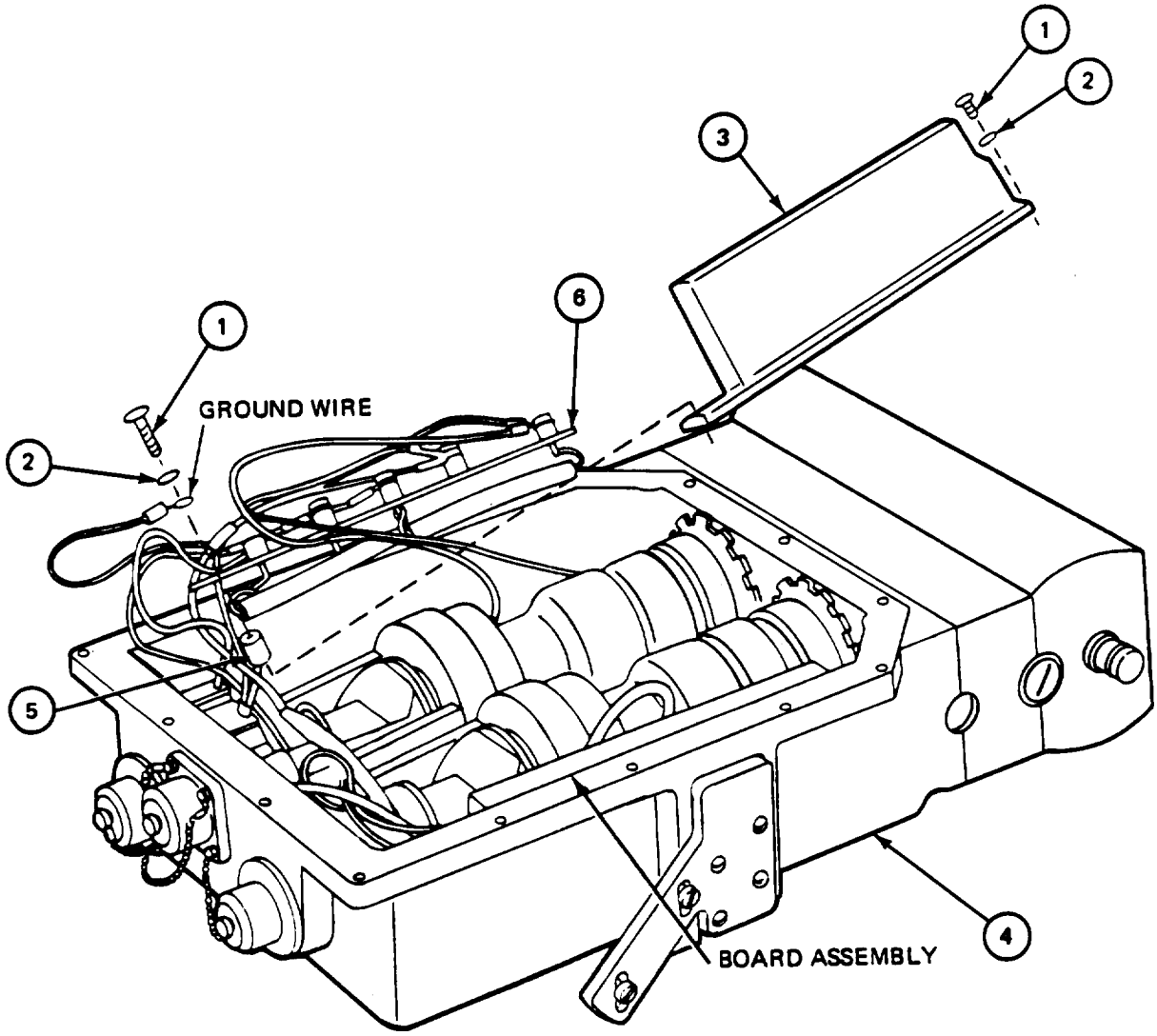
NOTE

This procedure is for either board assembly.

FRAME 1

Step	Procedure
1.	Using screwdriver, remove two screws (1) and two lockwashers (2) which hold terminal housing (3) to body assembly (4).
2.	Remove spacer (5).
3.	Slide terminal housing (3) off of board assembly (6).
	GO TO FRAME 2

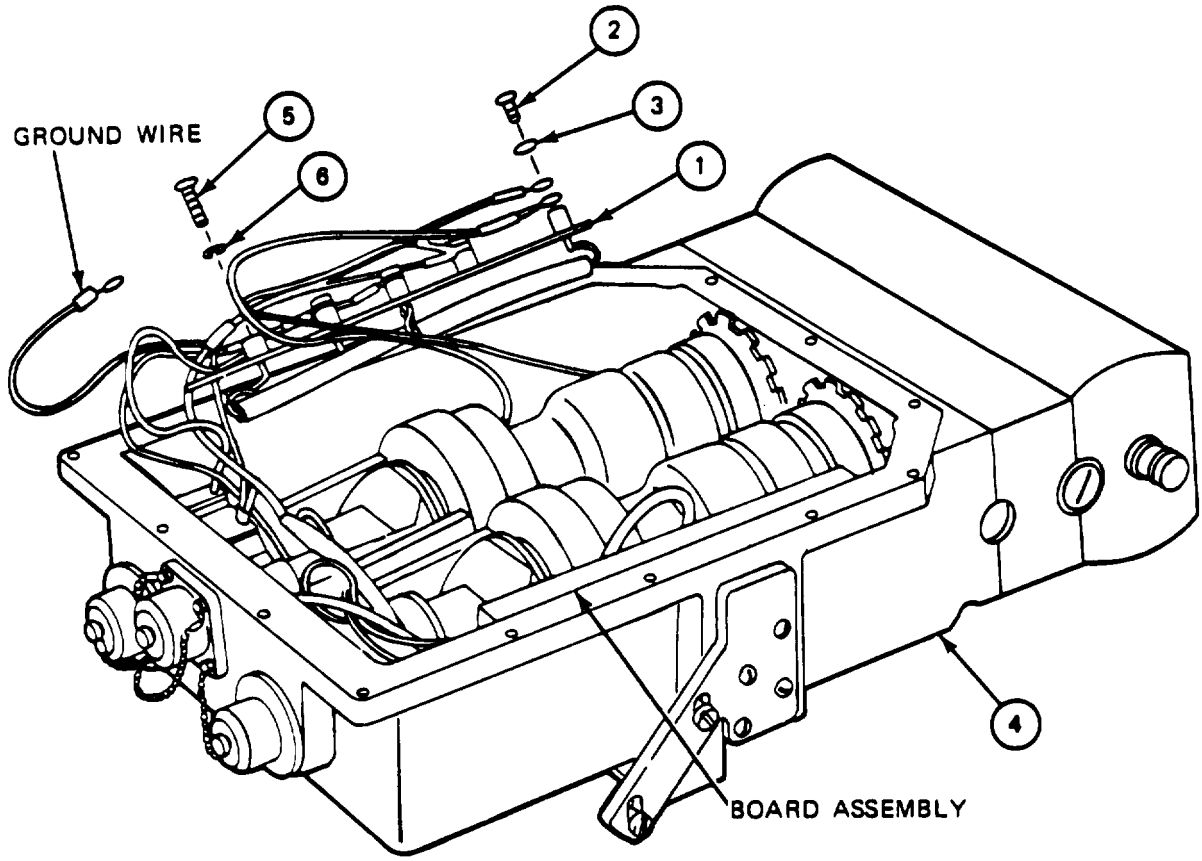
4-17. BOARD ASSEMBLY AND GROUND WIRE ASSEMBLY REMOVAL (CONT)



4-17. BOARD ASSEMBLY AND GROUND WIRE ASSEMBLY REMOVAL (CONT)

FRAME 2

Step	Procedure
1.	Tag each wire attached to board assembly (1) (JPG).
2.	Using screwdriver, remove five screws (2) and five lockwashers (3).
3.	Remove board assembly (1) from body assembly (4).
	NOTE Do step 4 only when replacing ground wire.
4.	Using screwdriver, remove screw (5) and washer (6). Then remove ground wire from board assembly (1).
	END OF TASK



4-17. BOARD ASSEMBLY AND GROUND WIRE ASSEMBLY REMOVAL (CONT)

NOTE

Do frame 3 for M19 and M24 new configurations only.

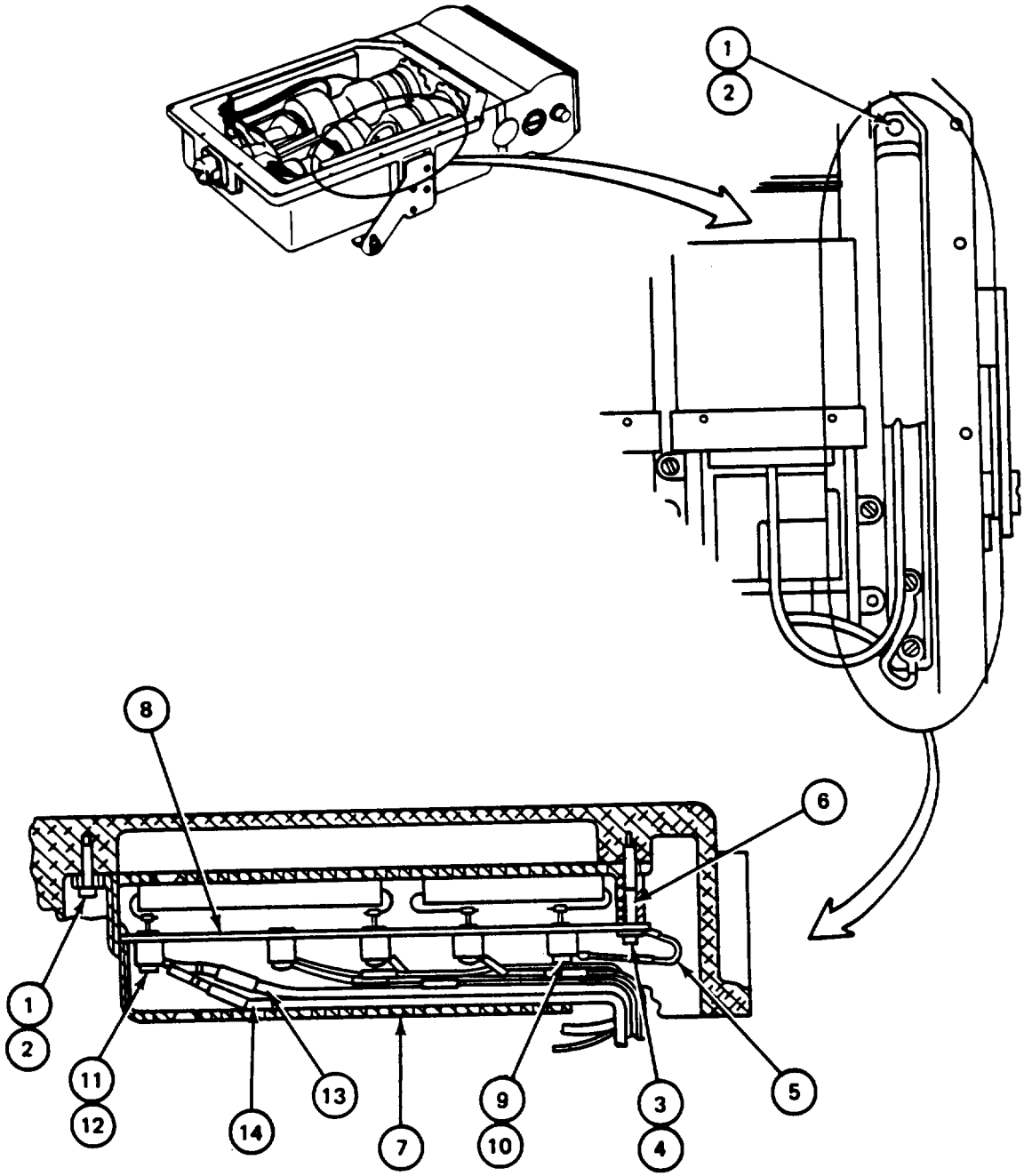
NOTE

This procedure is for either the left-hand or right-hand board assembly, but only the right-hand side has ground wire.

FRAME 3

Step	Procedure
1.	Using screwdriver, remove screw (1) and lockwasher (2).
2.	Using screwdriver, remove screw (3), lockwasher (4), ground wire (5), and spacer.
3.	Lift terminal board housing (7) and slide off from terminal board (8).
4.	Tag each wire attached to terminal board (8) (JPG).
5.	Using screwdriver, remove screw (9), washer (10), and ground wire (5).
6.	Using screwdriver, remove screw (11), washer (12), and wires (13) and (14).
7.	Remove terminal board (8).
	END OF TASK

4-17. BOARD ASSEMBLY AND GROUND WIRE ASSEMBLY REMOVAL (CONT)



4-18. BOARD ASSEMBLY AND GROUND WIRE ASSEMBLY INSTALLATION

TOOLS: 3/16" flat tip screwdriver

PERSONNEL: One

EQUIPMENT CONDITION: Body assembly on work bench with head assembly removed; power supply disconnected

NOTE

Frame 1 is for M19 and M24 new configurations. Frame 2 is for M19 and M24 old configurations.

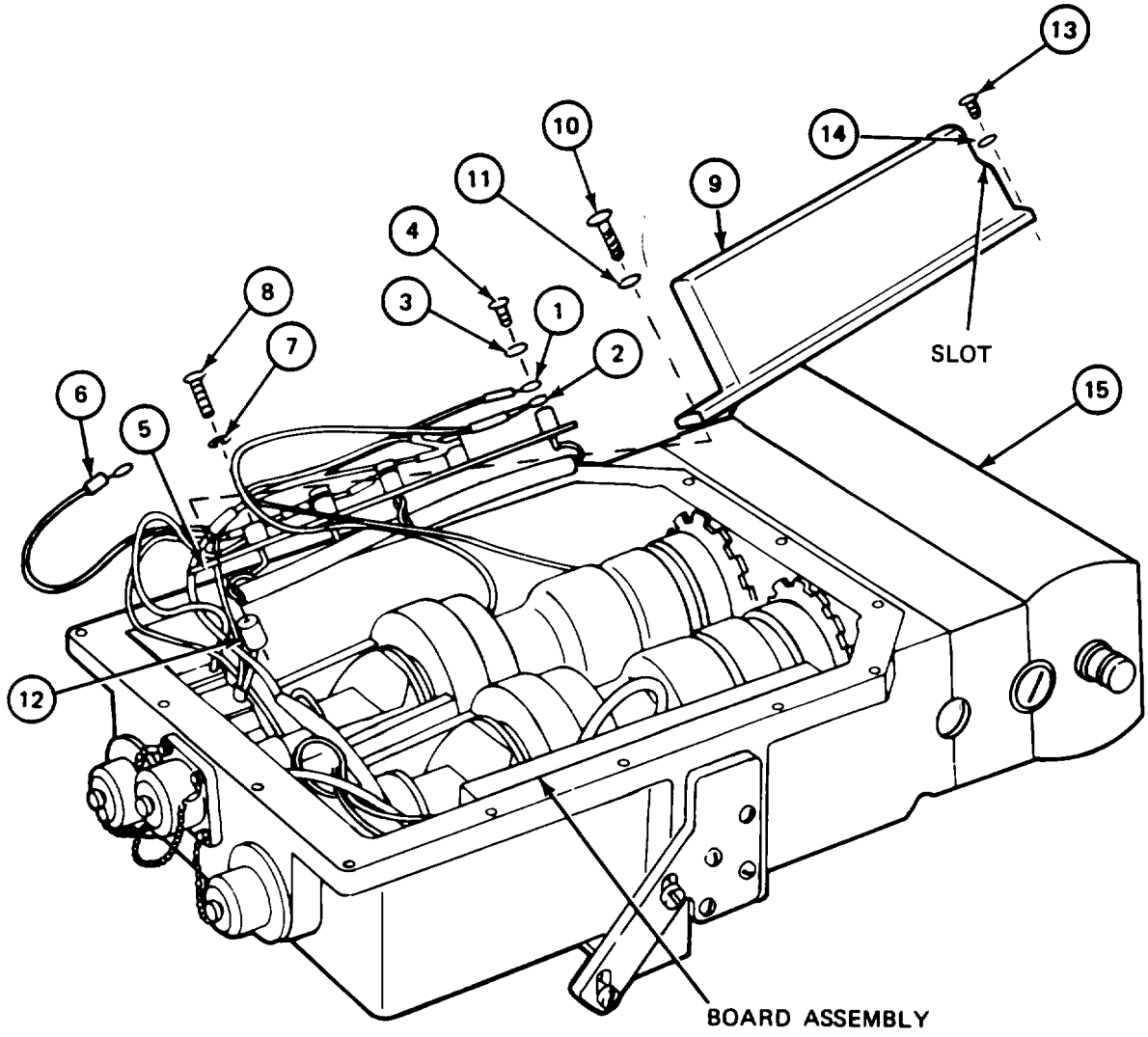
NOTE

This procedure is for either the left-hand or right-hand board assembly, but only the right-hand side has ground wire.

FRAME 1

Step	Procedure
1.	Using screwdriver, install wires (1) and (2), washer (3), and screw (4) on terminal board (5).
2.	Remove tags from wires.
3.	Using screwdriver, install ground wire (6), washer (7), and screw (8).
4.	Slide terminal board housing (9) over terminal board (5) until you feel the board (5) slip into a slot inside the housing (9).
5.	Place long screw (10) through lockwasher (11), ground wire (6), board assembly (5), spacer (12), and terminal housing (9).
6.	Place short screw (13) through lockwasher (14) and terminal housing (9).
7.	Place terminal housing (9) into body assembly (15).
8.	Using screwdriver, tighten short screw (13) and long screw (10) into body assembly (15).
	NOTE FOLLOW-ON MAINTENANCE Install cover (para 4-15). Do checkout procedure (Vol I, para 2-2).
	END OF TASK

4-18. BOARD ASSEMBLY AND GROUND WIRE ASSEMBLY INSTALLATION (CONT)



4-18. BOARD ASSEMBLY AND GROUND WIRE ASSEMBLY INSTALLATION (CONT)

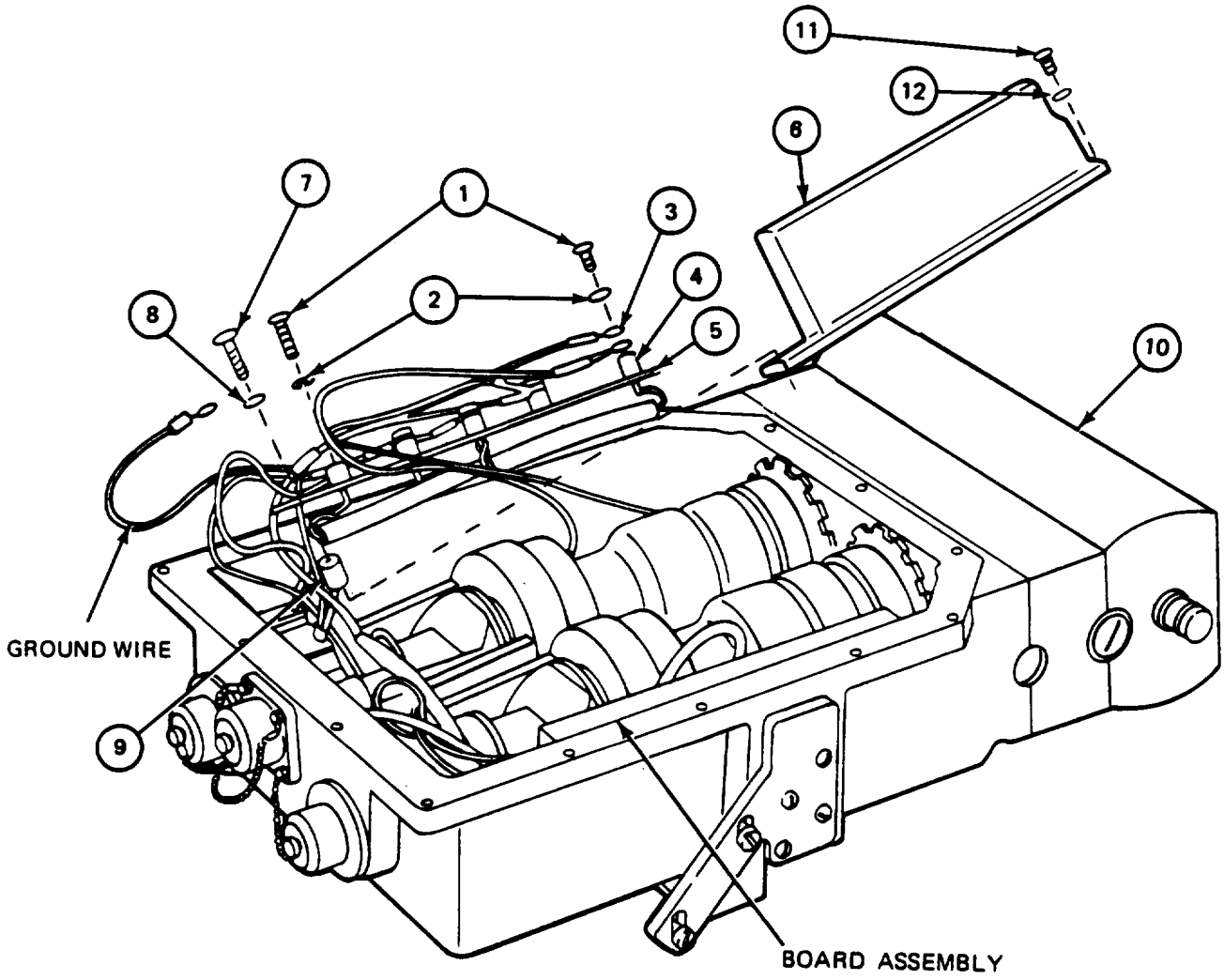
NOTE

This procedure is for installation of either board assembly.

FRAME 2

Step	Procedure
	NOTE If ground wire is the only item to be installed, go to step 4.
1.	Place screw (1) through lockwasher (2) and tagged wire terminal lug (3).
2.	Using screwdriver, put screw (1) into terminal (4) of board assembly (5) while making sure the numbers on, the tags match the number of the terminals (4).
3.	Remove tags from the wires.
4.	Using screwdriver, install screw (1), lockwasher (2) and ground wire to board assembly (5).
5.	Slide terminal housing (6) over board assembly (5).
6.	Place long screw (7) through lockwasher (8), board assembly (5), spacer (9), and terminal housing (6).
7.	Place terminal housing (6) in body assembly (10).
8.	Using screwdriver, put in and tighten long screw (7) into body assembly (10).
9.	Place short screw (11) through lockwasher (12) and terminal housing (6).
10.	Using screwdriver, put short screw (11) into body assembly (10).
	NOTE FOLLOW-ON MAINTENANCE Install cover (para 4-l3). Do checkout procedure (Vol I, para 2-2)
	END OF TASK

4-18. BOARD ASSEMBLY AND GROUND WIRE ASSEMBLY INSTALLATION (CONT)



Section 6. HIGH VOLTAGE CABLE ASSEMBLY

4-19. HIGH VOLTAGE CABLE ASSEMBLY MAINTENANCE PROCEDURES INDEX

Step	Reference (para)
Removal	4-20
Installation	4-21

4-20. HIGH VOLTAGE CABLE ASSEMBLY REMOVAL

TOOLS: 3/16" flat tip screwdriver

PERSONNEL: One

EQUIPMENT CONDITION: Body assembly on work bench with head assembly removed: power supply disconnected

PRELIMINARY PROCEDURES: Remove cover assembly (para 4-13)
Remove terminal board assembly on each side of body assembly (para 4-17) (M 19 and M24 new configurations only)

NOTE

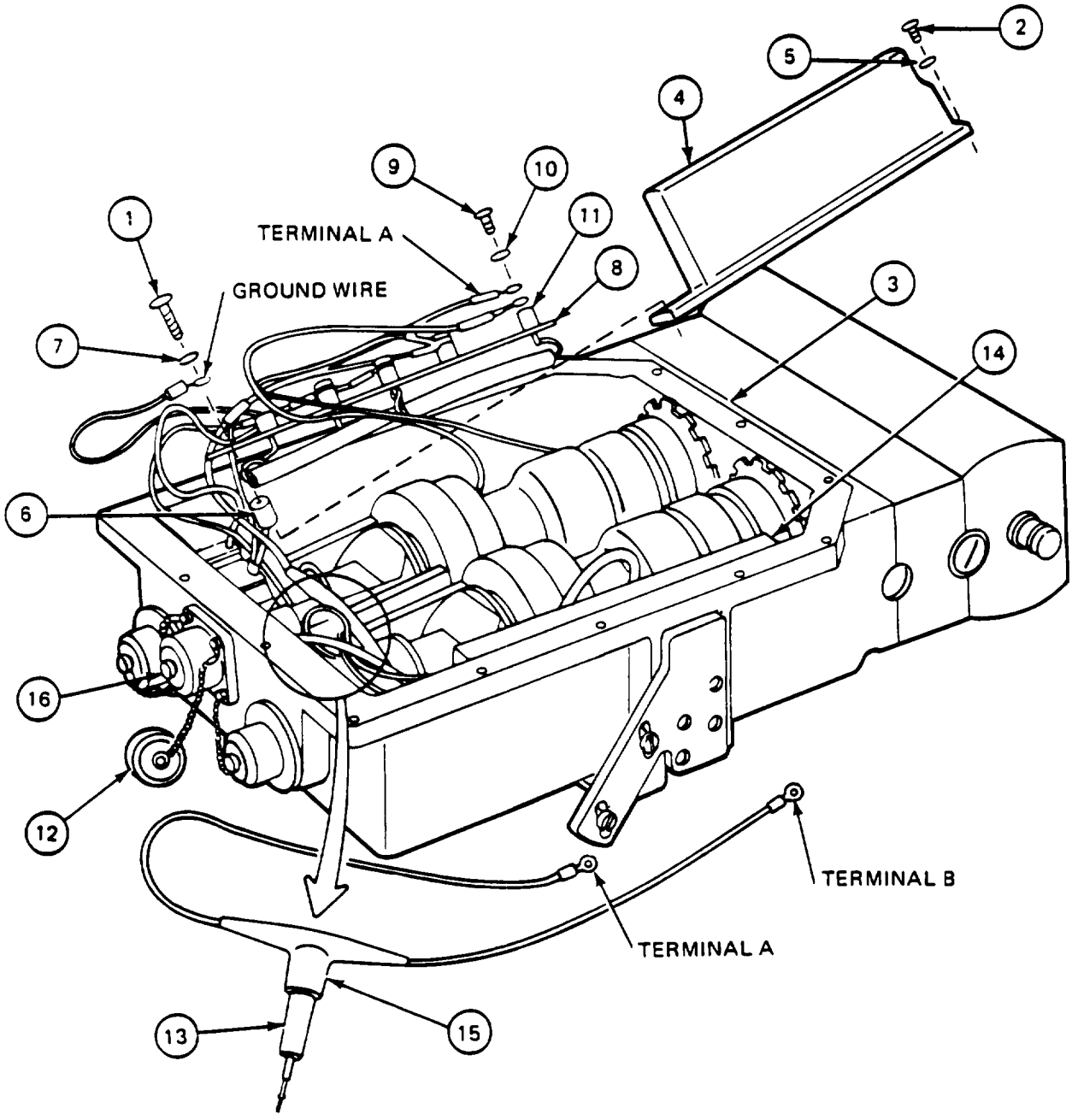
Frame 1 is for M19 and M24 old configurations, Frame 2 is for M19 and M24 new configurations.

FRAME 1

Step	Procedure
1.	Using screwdriver, unscrew long screw (1) and short screw (2) until clear of body assembly (3), Do not remove.
2.	Lift terminal housing (4) from body assembly (3).
3.	Remove short screw (2) and lockwasher (5) from terminal housing (4).
4.	Remove long screw (1) slowly and remove spacer (6), ground wire and lockwasher (7).
5.	Hold board assembly (8) and slide terminal housing (4) off.
6.	Using screwdriver, remove screw (9), lockwasher (10), and cable terminal A from terminal (11) of board assembly (8).
7.	Unscrew receptacle cap (12).
8.	Do steps 1 thru 6 again to disconnect cable terminal B of cable assembly (13) from terminal housing (14) on both sides of body assembly (3).

4-20. HIGH VOLTAGE CABLE ASSEMBLY REMOVAL (CONT)

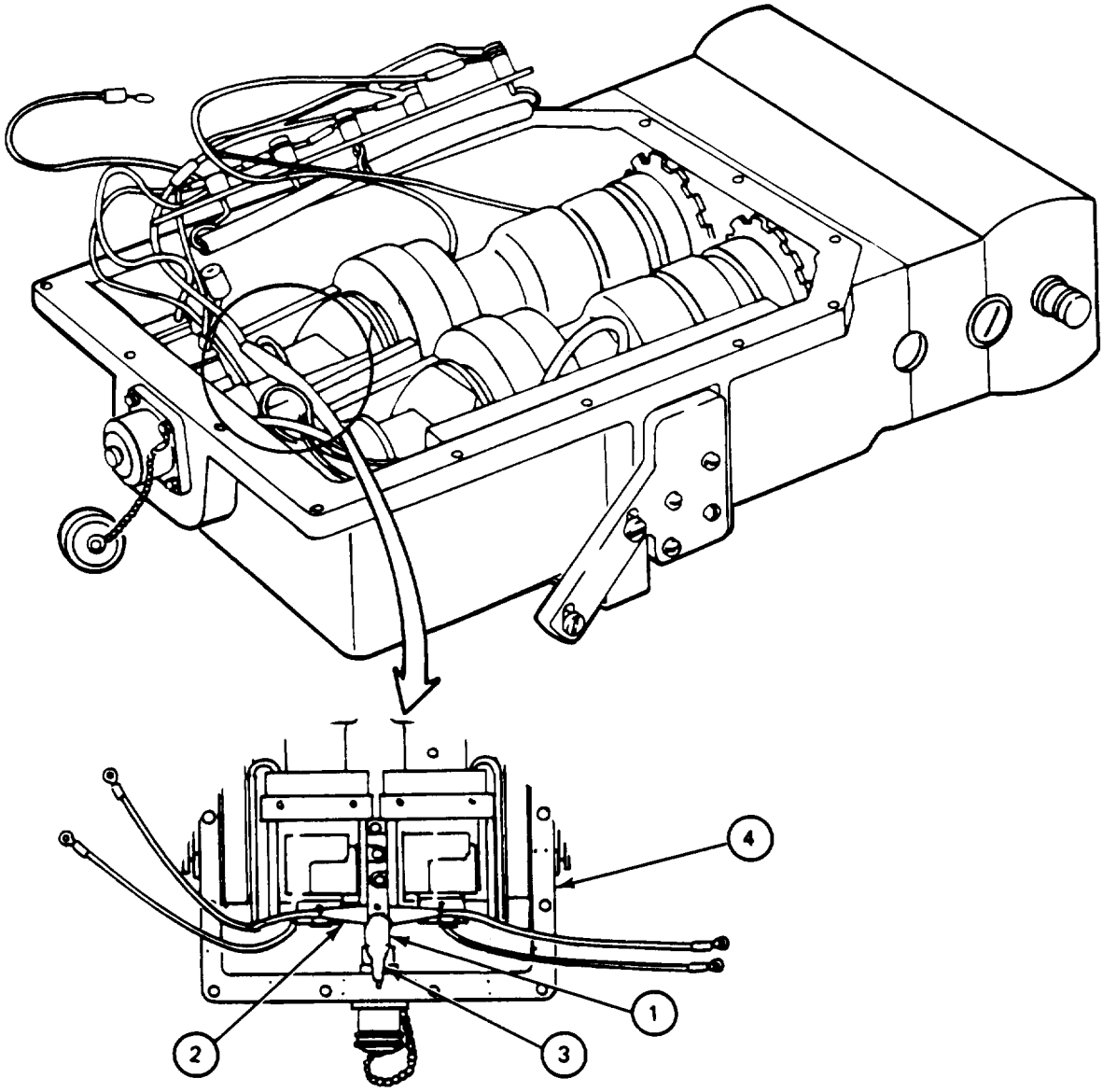
Step	Procedure
9.	Hold the molded tee (15) of high voltage cable assembly (13). Turn tee slightly from side to side and pull until it is out of the high voltage power receptacle (16). END OF TASK



4-20. HIGH VOLTAGE CABLE ASSEMBLY REMOVAL (CONT)

FRAME 2

Step	Procedure
1.	Hold the plastic tee (1) of high voltage cable assembly (2). Turn tee slightly from side to side and pull until tee is out of the high voltage power receptacle (3).
2.	Remove cable assembly (2) from body assembly (4).
	END OF TASK



4-21. HIGH VOLTAGE CABLE ASSEMBLY INSTALLATION

TOOLS: 3/16" flat tip screwdriver

SUPPLIES: Electrical insulating compound (item 2, App A)

PERSONNEL: One

REFERENCES: JPG 4lC for application of eletrical insulating compound

EQUIPMENT CONDITION: Body assembly on work bench; power disconneted

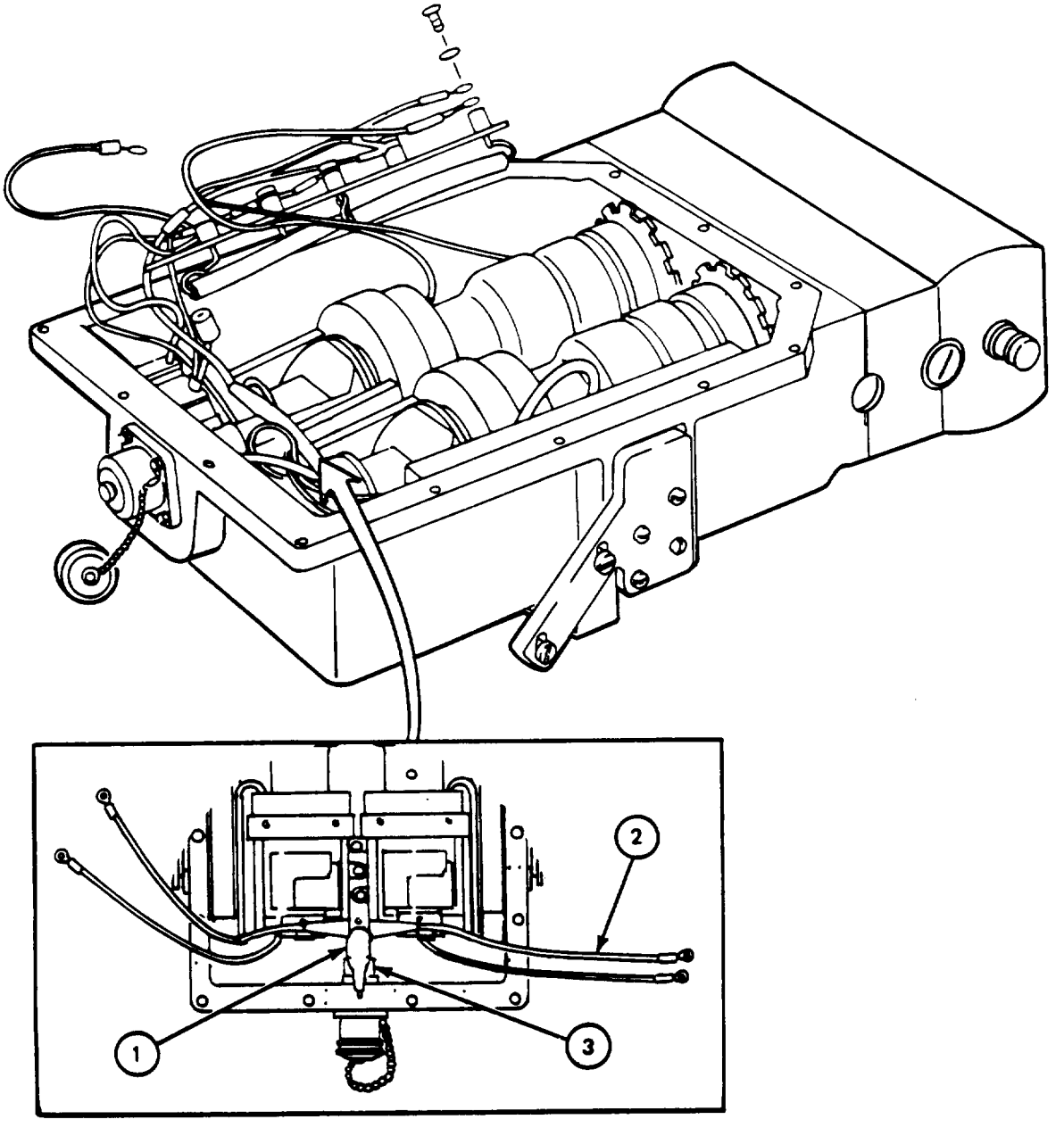
NOTE

Frame 1 is for M19 and M24 new configurations. Frame 2 is for M19 and M24 old configurations.

FRAME 1

Step	Procedure
1.	Put a thin coat of electrical insulating compound on center leg (1) of cable assembly (2) (JPG).
2.	Put center leg (1) of cable assembly (2) in receptacle (3) until shoulder on center leg touches receptacle (3).
	NOTE FOLLOW-ON MAINTENANCE Install both terminal board assemblies (para 4-18, frame 1 only). Do checkout procedure (Vol I, para 2-2).
	END OF TASK

4-21. HIGH VOLTAGE CABLE ASSEMBLY INSTALLATION (CONT)

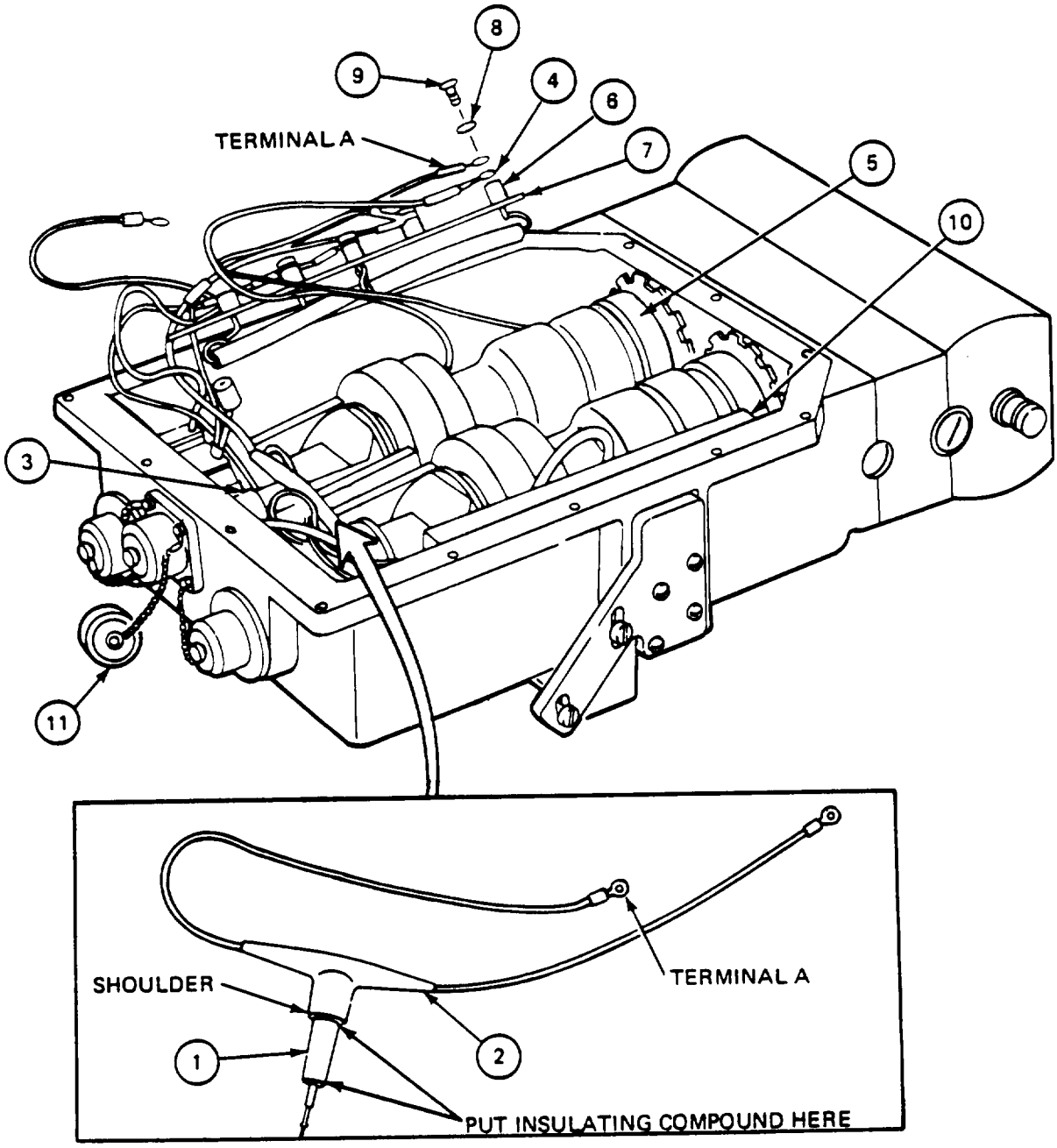


4-21. HIGH VOLTAGE CABLE ASSEMBLY INSTALLATION (CONT)

FRAME 2

Step	Procedure
1.	Put a thin coat of electrical insulating compound on center leg (1) of cable assembly (2) (JPG).
2.	Put center leg (1) of cable assembly (2) into receptacle (3) until shoulder on center leg touches receptacle.
3.	Make sure that terminal of white wire (4) from electron tube (5) is also connected to terminal (6) of board assembly (7).
4.	Using screwdriver, attach terminal A of cable assembly (2) to terminal (6) of board assembly (7) with lockwasher (8) and screw (9).
5.	Do steps 3 and 4 again to connect terminal B of cable assembly (2) to terminal of board assembly inside terminal housing (10).
6.	Screw receptacle cap (11) onto receptacle (3).
	NOTE FOLLOW-ON MAINTENANCE Install board assembly (para 4-18, frame 2, step 4). Do checkout procedure (Vol I, para 2-2).
	END OF TASK

4-21. HIGH VOLTAGE CABLE ASSEMBLY INSTALLATION (CONT)



Section 7. RECEPTACLE

4-22. RECEPTACLE MAINTENANCE PROCEDURES INDEX

Task	Reference (para)
Removal	4-23
Installation	4-24

4-23. RECEPTACLE REMOVAL

TOOLS: 3/16" flat tip screwdriver

PERSONNEL: One

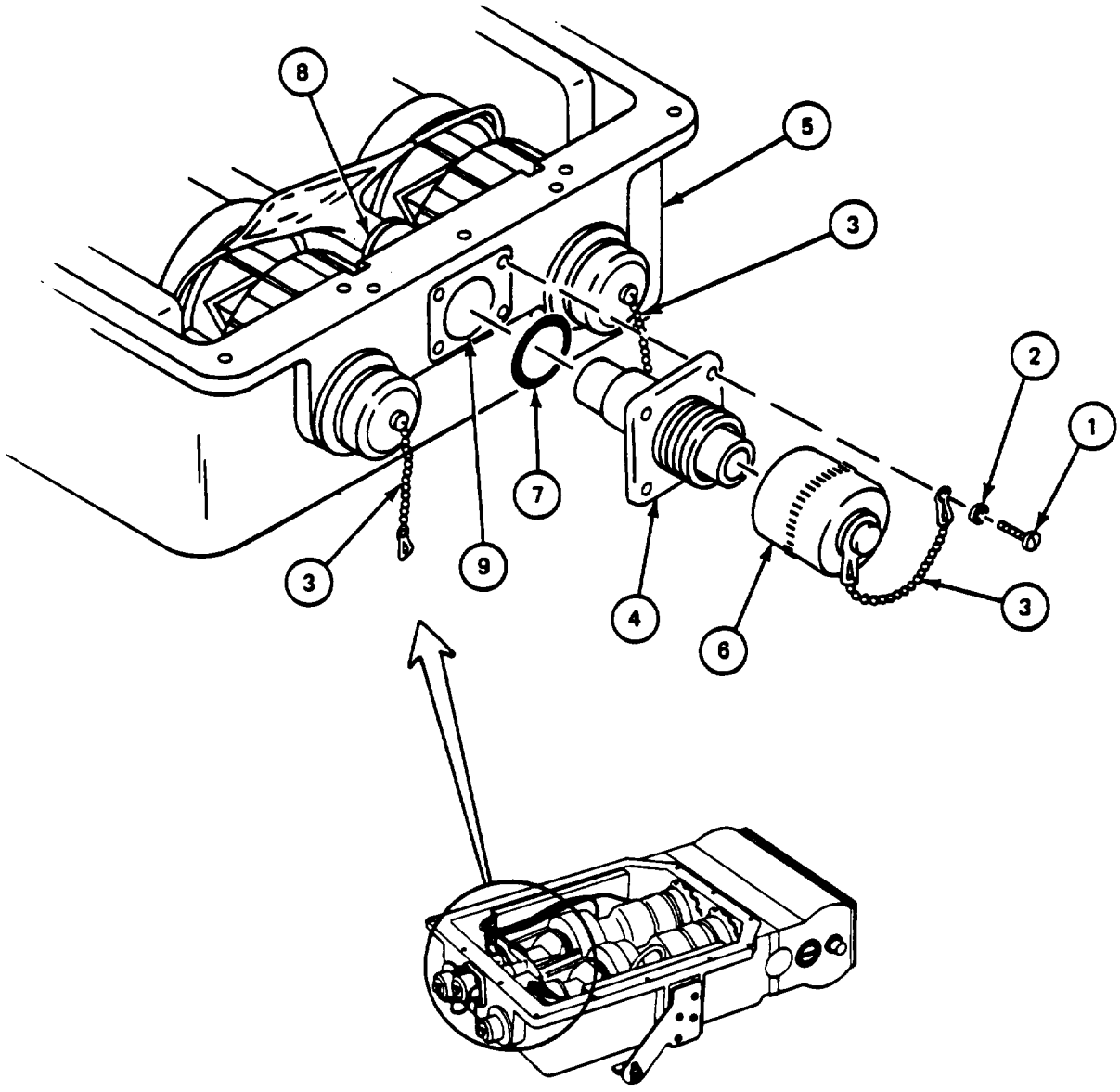
EQUIPMENT CONDITION: Body assembly on work bench; power disconnected

PRELIMINARY PROCEDURES: Remove cover assembly (para 4-14)

FRAME 1

Step	Procedure
1.	Using screwdriver, remove four screws (1), four lockwashers (2), and three chains (3) from receptacle (4) and body assembly (5).
2.	Unscrew and remove receptacle cap (6).
3.	Using your hand, turn receptacle (4) slightly from side to side and pull until receptacle (4) is out of body assembly (5).
4.	Remove preformed packing (O-ring) (7) from groove in hole in body assembly (5) where receptacle (4) was removed.
5.	Using your fingers, from inside of body assembly (5) pull high voltage cable (8) in through hole (9).
	END OF TASK

4-23. RECEPTACLE REMOVAL (CONT)



4-24. RECEPTACLE INSTALLATION

TOOLS: 3/16" flat tip screwdriver
Hydraulic sealing gun (with adapter)

SUPPLIES: Sealing compound (item 7, App A)
Dry cleaning solvent (item 9 App A)
Cleaning cloth (item 1, App A)

PERSONNEL: One

REFERENCES: JPG 4lC for sealing

EQUIPMENT CONDITION: Body assembly on work bench; power disconnected

FRAME 1

Step	Procedure
	WARNING Dry cleaning solvent can catch on fire. Keep it and all material that can catch on fire away from flames. Use only in a room with a lot of fresh air.
1.	Using cloth dampened with dry cleaning solvent, remove all old sealing compound from receptacle (1) and receptacle hole in body assembly (2).
2.	Install preformed packing (O-ring) (3) in groove in receptacle hole of body assembly (2),
3.	Install and position receptacle (1) into body assembly (2).
4.	Install receptacle cap (4) on receptacle (1).
	NOTE In step 5, three of the four lockwashers and screws hold cap chains (5).
5.	Using screwdriver, install three chains (5), four lockwashers (6), and four screws (7).
6.	Using sealing gun with adapter, force sealing compound in receptacle sealing hole (8) in body assembly (2) until receptacle (1) is completely sealed (JPG).

4-24. RECEPTACLE INSTALLATION (CONT)

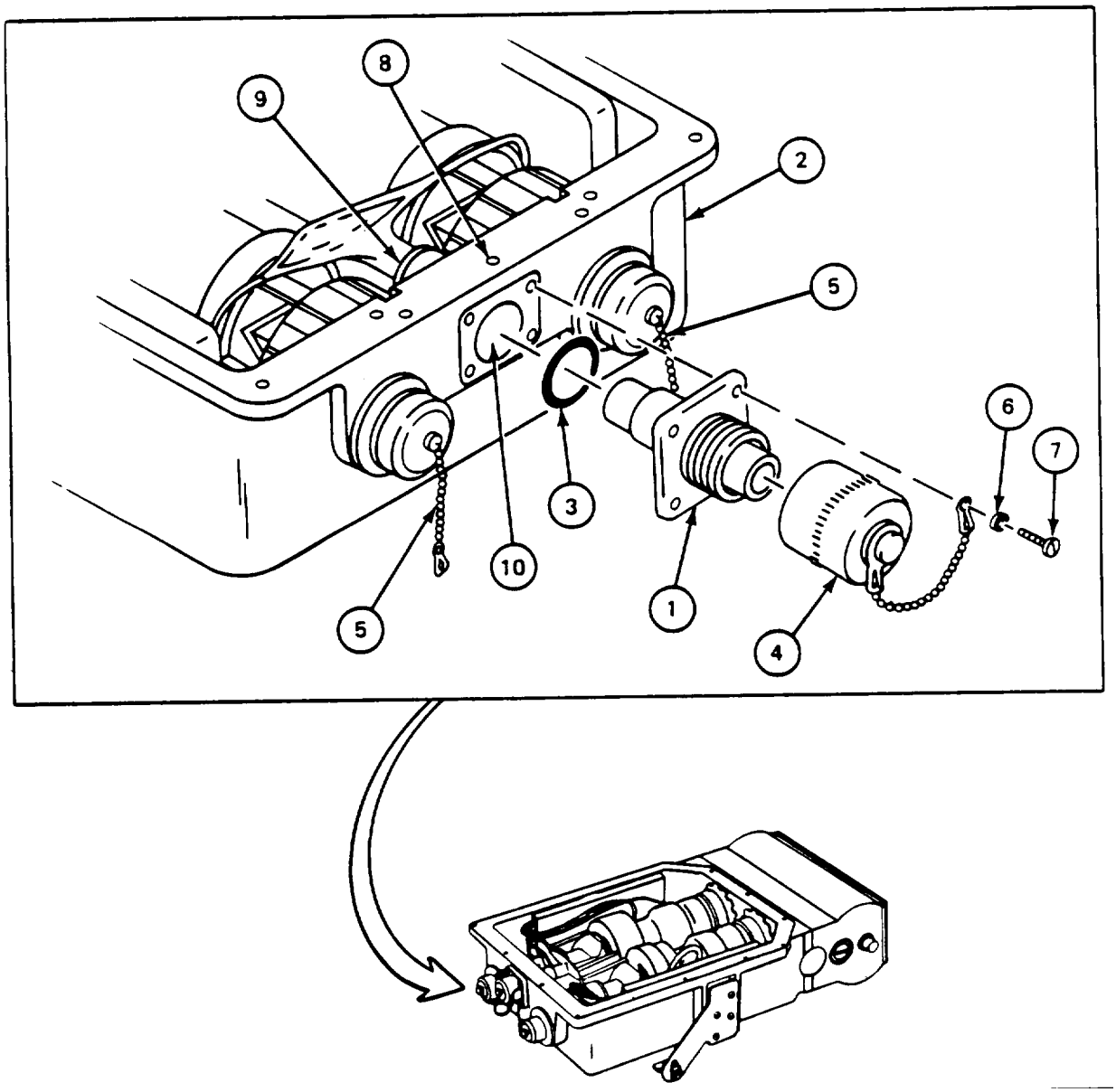
Step	Procedure
7.	Using fingers, put center leg of high voltage cable assembly (9) into receptacle hole (10).

NOTE

FOLLOW-ON MAINTENANCE

Install cover (para 4-15).
Do checkout procedure (Vol I, para 2-2).

END OF TASK



Section 8. TRUNNION, LATCH, ECCENTRIC, AND RELATED PARTS

4-25. TRUNNION, LATCH, ECCENTRIC, AND RELATED PARTS MAINTENANCE PROCEDURES INDEX

Task	Reference (para)
Removal	4-26
Installation	4-27

4-26. TRUNNION, LATCH, ECCENTRIC, AND RELATED PARTS REMOVAL

TOOLS: 1/16" socket head screw key (Allen wrench or equivalent)
Periscope clip wrench

PERSONNEL: One

REFERENCES: TM 10 for removing head assembly (TM 9-2350-215-10 for M60A1, TM 9-2350-257-10 for M60Al Rise, TM 9-2350-260-10 for M60, and TM 9-2350-222-10 for M728)

EQUIPMENT CONDITION: Body assembly on work bench with head assembly removed; power supply disconnected

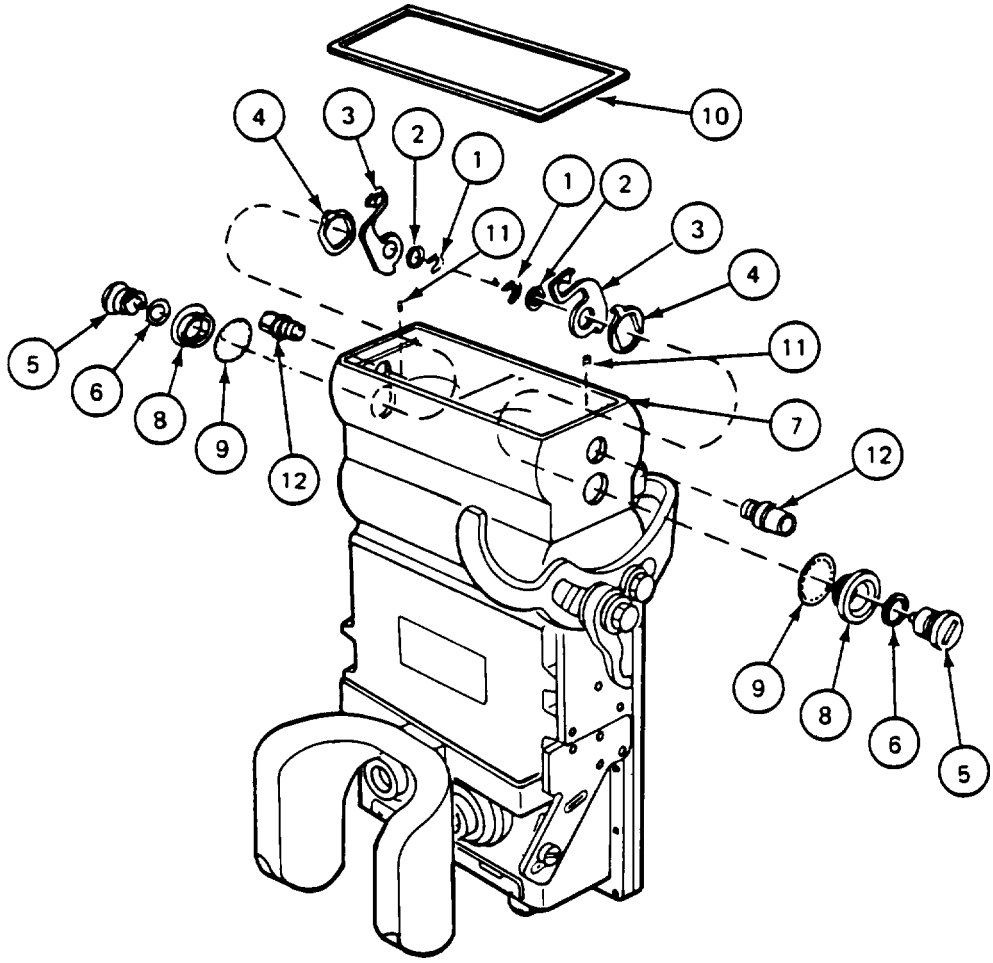
PRELIMINARY PROCEDURES: Remove head assembly (TM 10)

FRAME 1

Step	Procedure
1.	Using periscope clip wrench, remove spring clip (1).
2.	Slide spring washer (2), latch (3), and key washer (4) off end of eccentric (5).
3.	Remove eccentric (5) and packing (6) from body assembly (7). Remove packing (6).
	NOTE Do steps 4, 6, and 7 only if bushing (8) or trunnion (12) is being replaced.
4.	Unscrew bushing (8) and remove lockwasher (9).
5.	Remove gasket (10).
6.	Using Allen wrench, remove setscrew (11).
7.	Unscrew trunnion (12).

4-26. TRUNNION, LATCH, ECCENTRIC, AND RELATED PARTS REMOVAL (CONT)

Step	Procedure
	NOTE If other side is to be disassembled, do steps 1 through 7 again.
	END OF TASK



4-27. TRUNNION, LATCH, ECCENTRIC, AND RELATED PARTS INSTALLATION

TOOLS: 1/16" socket head screw key (Allen wrench or equivalent)
Periscope clip wrench

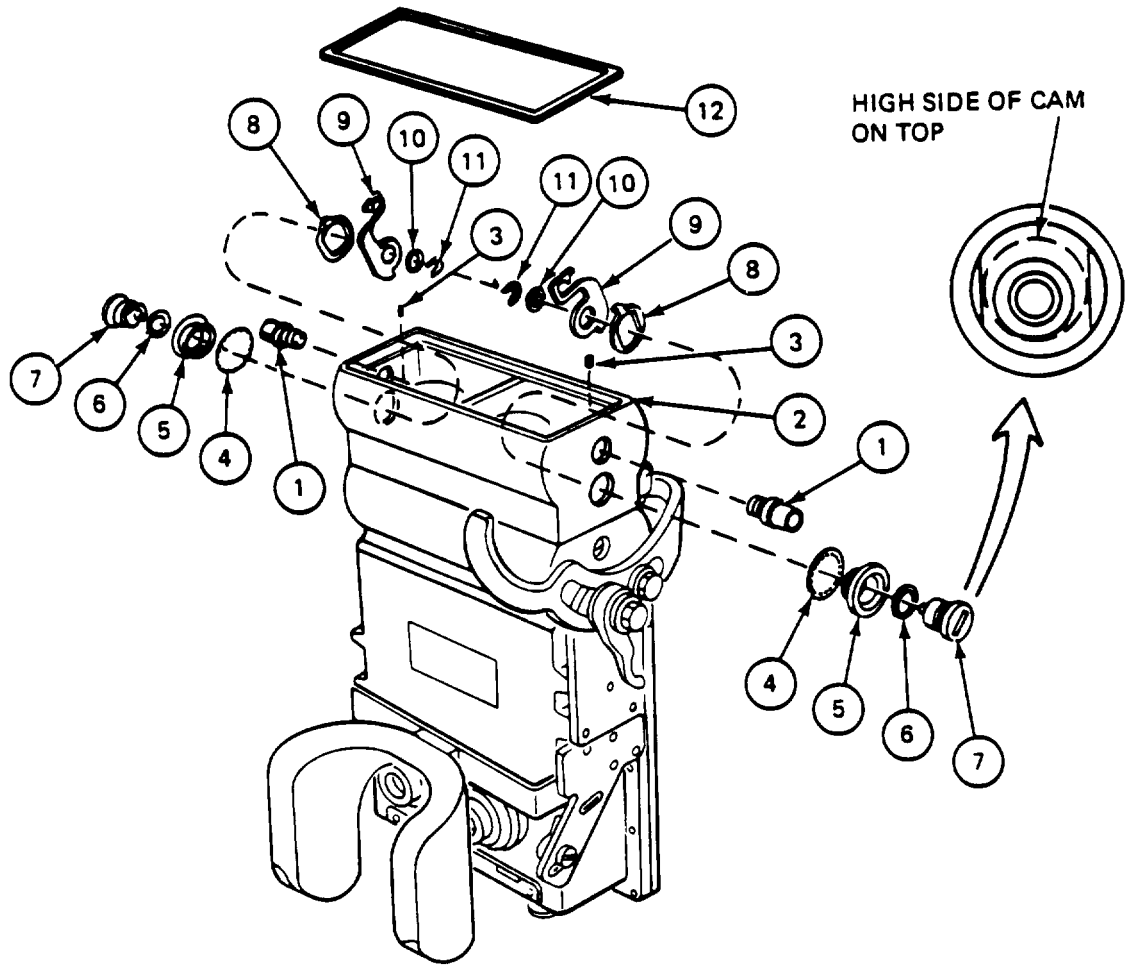
PERSONNEL: One

EQUIPMENT CONDITION: Bodyassembly on work bench with head assembly removed; power supply disconnected

FRAME 1

Step	Procedure
1.	Screw trunnion (1) into body assembly (2).
2.	Using Allen wrench, install setscrew (3).
3.	Put lockwasher (4) and bushing (5) into body assembly (2).
4.	Place packing (6) in groove in eccentric (7).
5.	Position eccentric (7) with high side of cam on top in bushing (5).
6.	Place key washer (8), latch (9), and spring washer (10) on eccentric (7).
7.	Using periscope clip wrench, put on spring clip (11).
	NOTE If both ends of assembly have been disassembled, assemble other end by doing steps 1 through 7.
8.	Put gasket (12) on body assembly (2).
	NOTE FOLLOW-ON MAINTENANCE Do checkout procedure (Vol I, para 2-2).
	END OF TASK

4-27. TRUNNION, LATCH, ECCENTRIC, AND RELATED PARTS INSTALLATION (CONT)



Section 9. IMAGE CONVERTER ELECTRON TUBE

4-28. IMAGE CONVERTER ELECTRON TUBE MAINTENANCE PROCEDURES INDEX

Task	Reference (para)
Removal	4-29
Installation	4-30

4-29. IMAGE CONVERTER ELECTRON TUBE REMOVAL

TOOLS: 3/16" flat tip screwdriver
1/16“ socket head screw key (Allen wrench or equivalent)

EQUIPMENT CONDITION: Body assembly on work bench; power disconnected

PRELIMINARY PROCEDURES: Remove cover (para 4-14)
Remove cable (para 4-20) (M19 and M24 old configurations only)

NOTE

Frame 1 is for M19 and M24 old configurations.
Frame 2 is for M19 and M24 new configurations.

NOTE

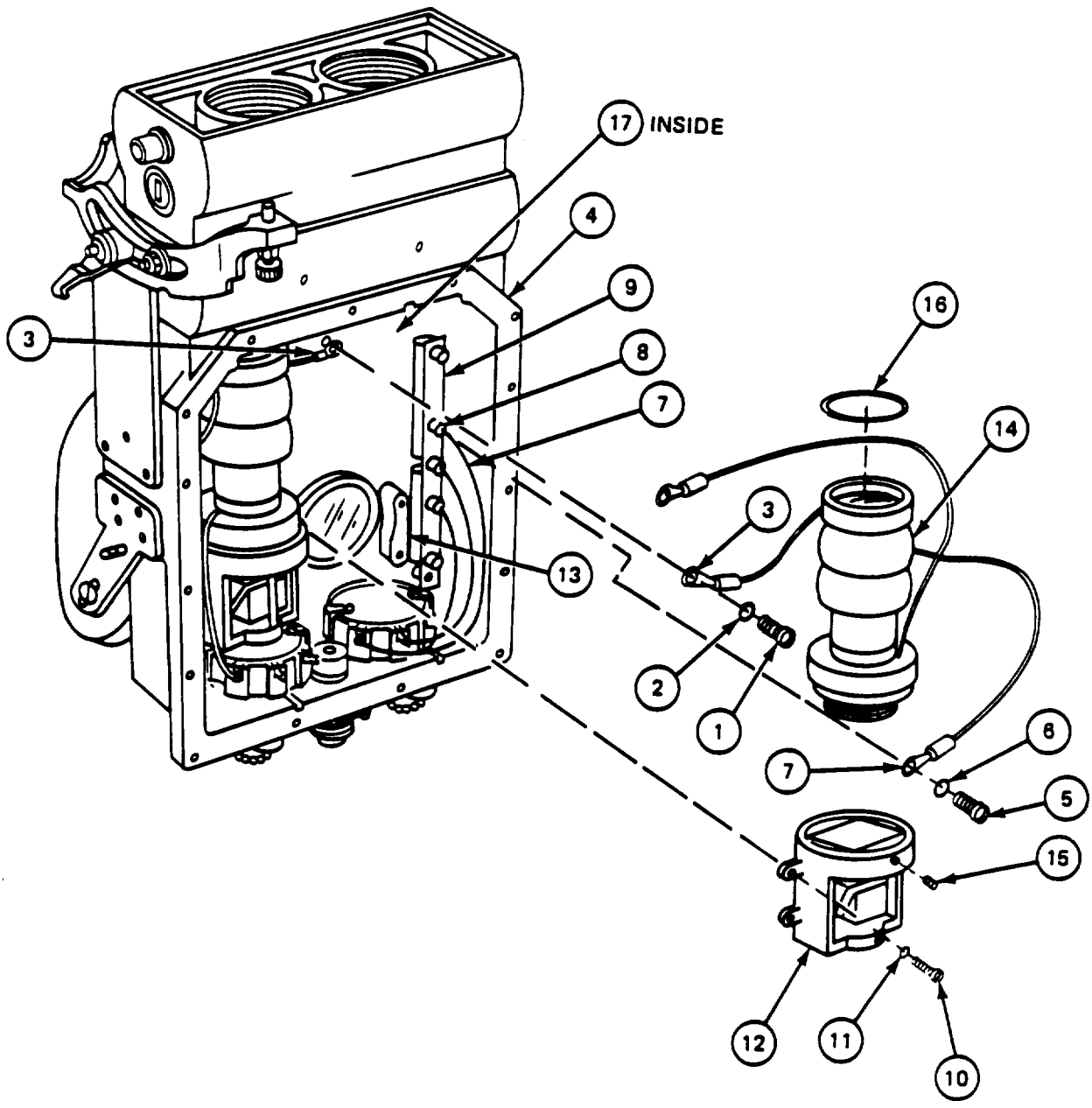
Follow this procedure for each tube.

FRAME 1

Step	Procedure
1.	Using screwdriver, remove screw (1) and lockwasher (2) holding two red wires (3) to body assembly (4).
2.	Using screwdriver, remove screw (5) and lockwasher (6) which holds two black wires (7) to terminal (8) of board assembly (9).
3.	Using screwdriver, remove three screws (10) and three lockwashers (11) which hold tube bracket (12) to body assembly (4).
4.	Take hold of tube bracket (12), lift it from pin (13) and remove tube bracket (12) with electron tube (14) from body assembly (4).

4-29. IMAGE CONVERTER ELECTRON TUBE REMOVAL (CONT)

Step	Procedure
5.	Using Allen wrench, remove two screws (15) in tube bracket (12) and remove electron tube (14).
6.	Remove preformed packing (O-ring) (16) from adapter assembly (17).
	END OF TASK



4-29. IMAGE CONVERTER ELECTRON TUBE REMOVAL (CONT)

NOTE

Do this frame for M19 and M24 new configurations only.

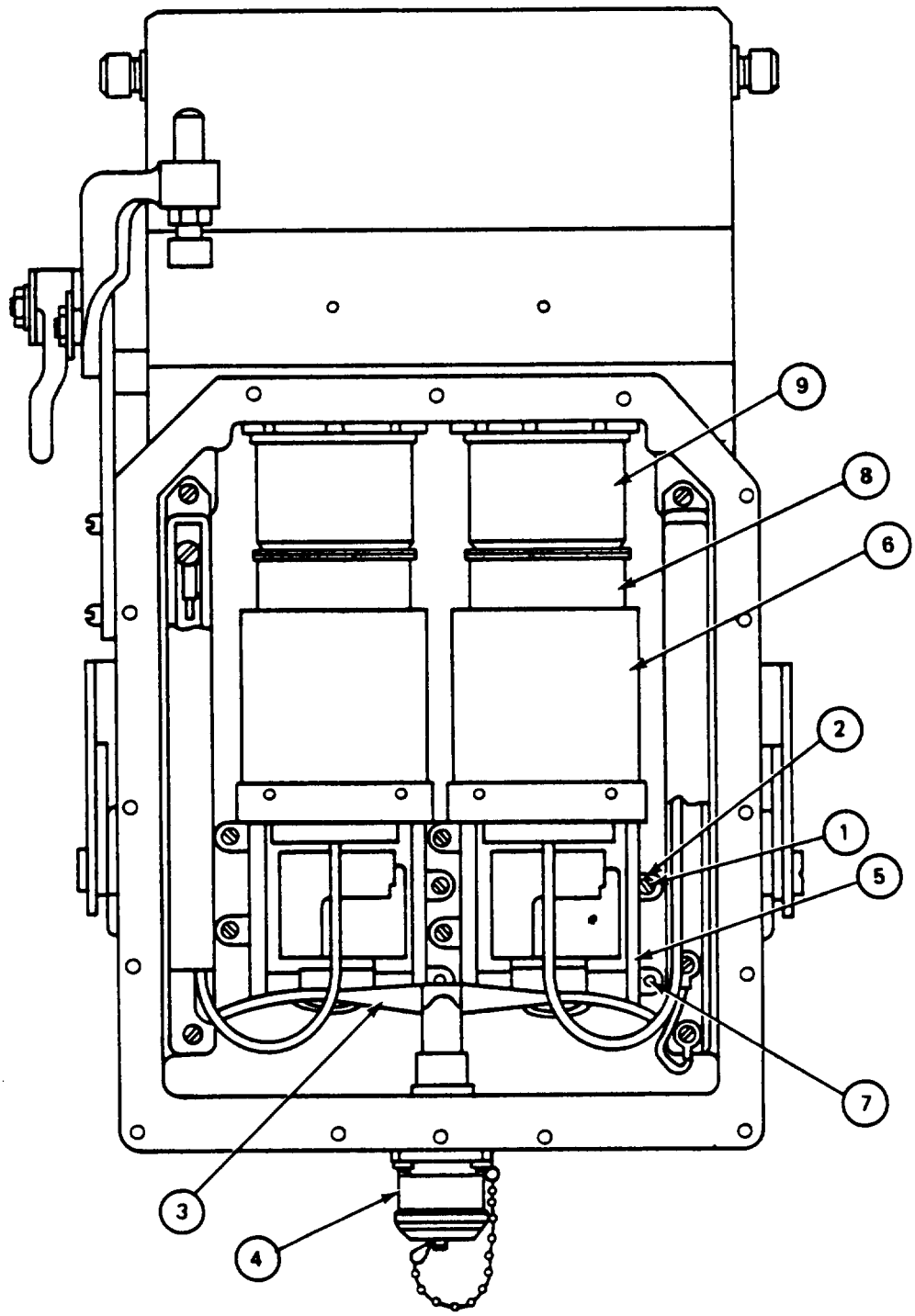
NOTE

This procedure is for either tube.

FRAME 2

Step	Procedure
1.	Using screwdriver, remove three screws (1) and three lockwashers (2).
2.	Hold the plastic tee section of cable assembly (3), and turn tee back and forth while pulling on it until you remove cable (3) from receptacle (4).
3.	Hold bracket (5) in one hand and cell assembly (6) in the other hand. Pull straight up on bracket (5) until bracket is clear of pin (7).
4.	Using both hands, carefully pull bracket (5) and cell assembly (6) and electron tube (8) away from objective assembly (9).
5.	Holding bracket (5), move cell assembly (6) up until electron tube (8) can be removed.
6.	Using hand, remove electron tube (8) from cell assembly (6).
	END OF TASK

4-29. IMAGE CONVERTER ELECTRON TUBE REMOVAL (CONT)



4-30. IMAGE CONVERTER ELECTRON TUBE INSTALLATION

TOOLS: 1/16" socket head screw key (Allen wrench or equivalent)
3/16" flat tip screwdriver
3/16" hand screw starter

SUPPLIES: Insulating compound (item 2, App A)

PERSONNEL: One

REFERENCES: JPG 4lC for use of electrical insulating compound

EQUIPMENT CONDITION: Body assembly on work bench; power disconnected

NOTE

Frame 1 is for M19 and M24 new configurations. Frame 2 is for M19 and M24 old configurations.

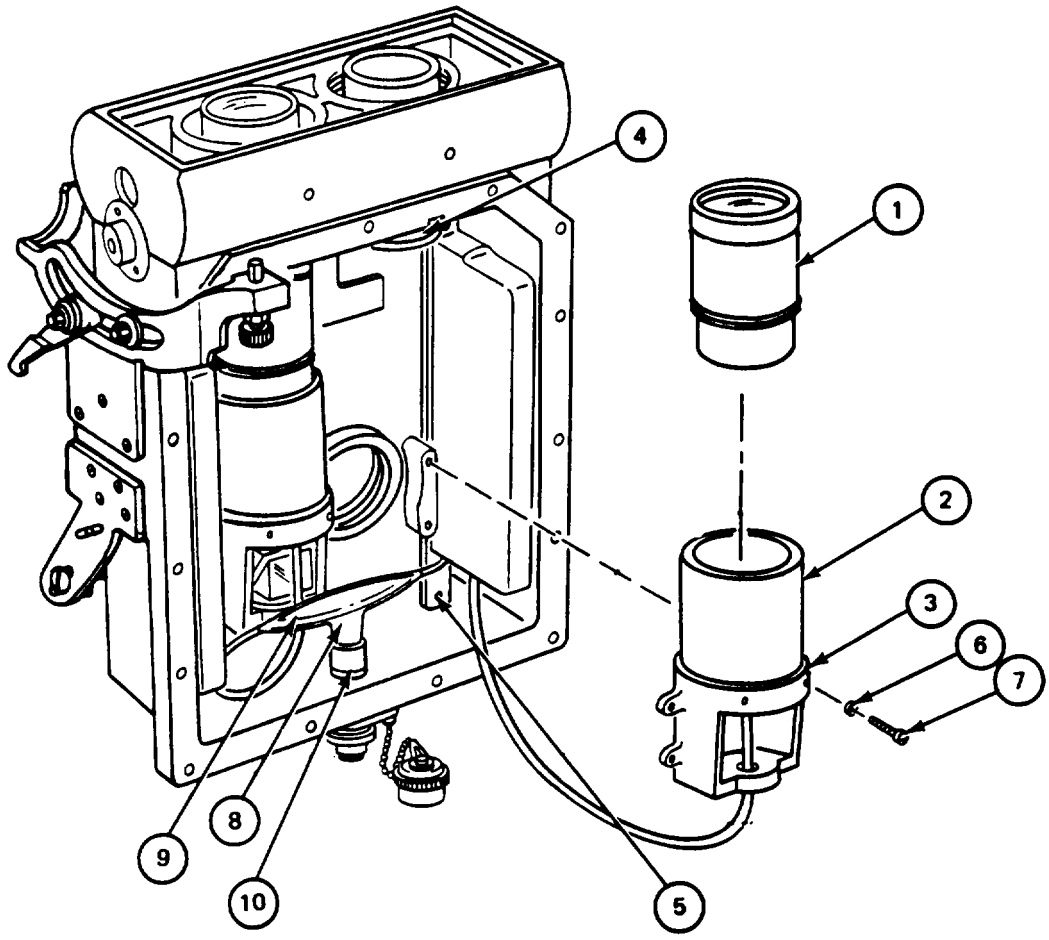
NOTE

This procedure is for either tube.

FRAME 1

Step	Procedure
1.	Put electron tube (l) in cell assembly (2).
2.	Make sure cell assembly (2) is seated in bracket (3).
3.	Using both hands, put end of electron tube (1) in place below objective assembly (4).
4.	Put bracket (3) down over pin (5).
5.	Using screwdriver, install three lockwashers (6) and three screws (7).
6.	Put a thin coat of electrical insulating compound on center leg (8) of cable assembly (9) (JPG).
7.	Put center leg of cable assembly (9) into receptacle (10) until shoulder on center leg touches receptacle (10).
	NOTE FOLLOW-ON MAINTENANCE Install cable (para 4-16, frame 2). Do checkout procedure (Vol I, para 2-2).
	END OF TASK

4-30. IMAGE CONVERTER ELECTRON TUBE INSTALLATION (CONT)



4-30. IMAGE CONVERTER ELECTRON TUBE INSTALLATION (CONT)

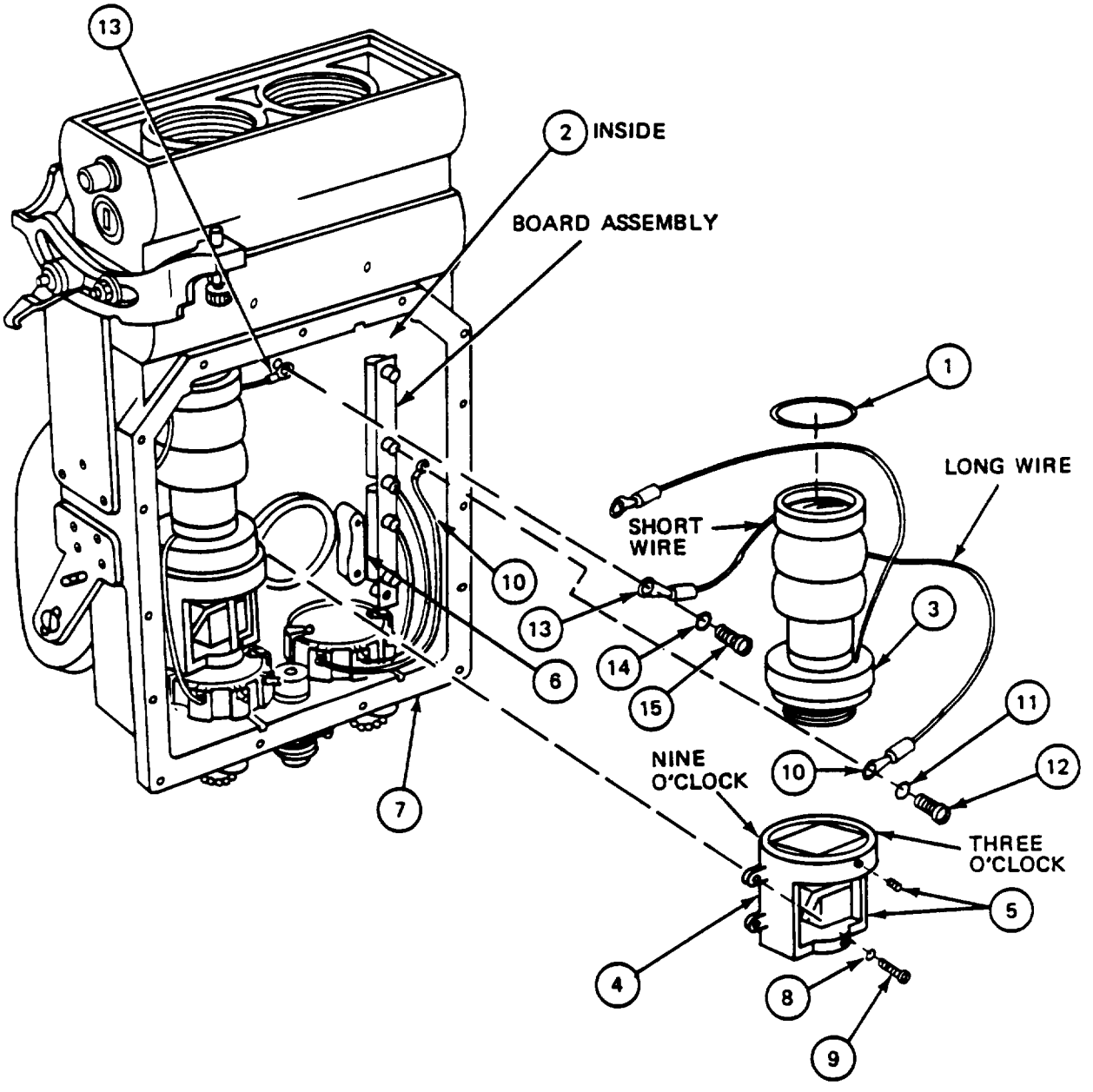
NOTE

This procedure is for either tube.

FRAME 2

Step	Procedure
1.	Install preformed packing (O-ring) (1) on adapter assembly (2).
2.	Install and position potted tube (3) into tube bracket (4) with short wire at nine o'clock and long wire at three o 'clock.
3.	Using Allen wrench, install two screws (5).
4.	Line up with pin (6) and install tube bracket (4) and electron tube (3) in body assembly (7).
5.	Using screw starter, install three lockwashers (8) and three screws (9).
6.	Position two black wires (10). Using screwdriver, install lockwasher (11) and screw (12) to hold two black wires (10).
7.	Position two red wires (13). Using screw starter, install lockwasher (14) and screw (15).
	NOTE FOLLOW-ON MAINTENANCE Install cable (para 4-21, frame 2). Install cover (para 4-1 5). Do checkout procedure (Vol I, para 2-2).
	END OF TASK

4-30. IMAGE CONVERTER ELECTRON TUBE INSTALLATION (CONT)



Section 10. RESISTOR ASSEMBLY

4-31. RESISTOR ASSEMBLY MAINTENANCE PROCEDURES INDEX

Task	Reference (para)
Removal Installation	4-29 4-30

4-32. RESISTOR ASSEMBLY REMOVAL

APPLICABLE CONFIGURATIONS: M19 and M24 old configurations

TOOLS: 1/2" open end wrench
6" long nose pliers
3/16" flat tip screwdriver
6" slip joint pliers
1/16" socket head screw key (Allen wrench or equivalent)

SUPPLIES: Solvent (item 9, App A)

PERSONNEL: One

EQUIPMENT CONDITION: Body assembly on work bench; power disconnected

PRELIMINARY PROCEDURES: Remove cover (para 4-14)
Remove cable (para 4-20)
Remove electron tube (para 4-29)

NOTE

This procedure is for removal of either resistor.

FRAME 1

Step	Procedure
1.	Remove cap (1) and washer (2) from bushing (3).
2.	Using screwdriver, remove screw (4) and lockwasher (5) which hold chain of cap (1) to body assembly (6).
3.	Using open end wrench, remove nut (7) from busting (3).
4.	Using Allen wrench, remove setscrew (8) from bushing (3).

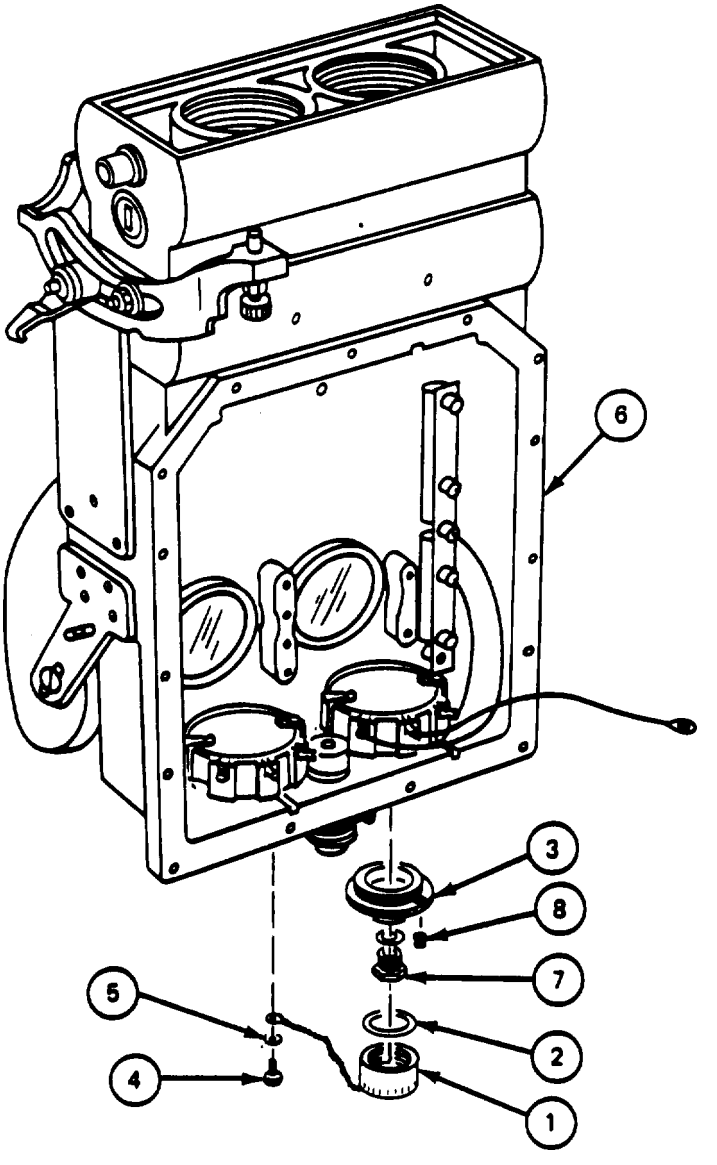
4-32. RESISTOR ASSEMBLY REMOVAL (CONT)

CAUTION

Do not put pliers on threads of bushing (3).

5. Using slip joint pliers, unscrew bushing (3) from body assembly (6).

GO TO FRAME 2

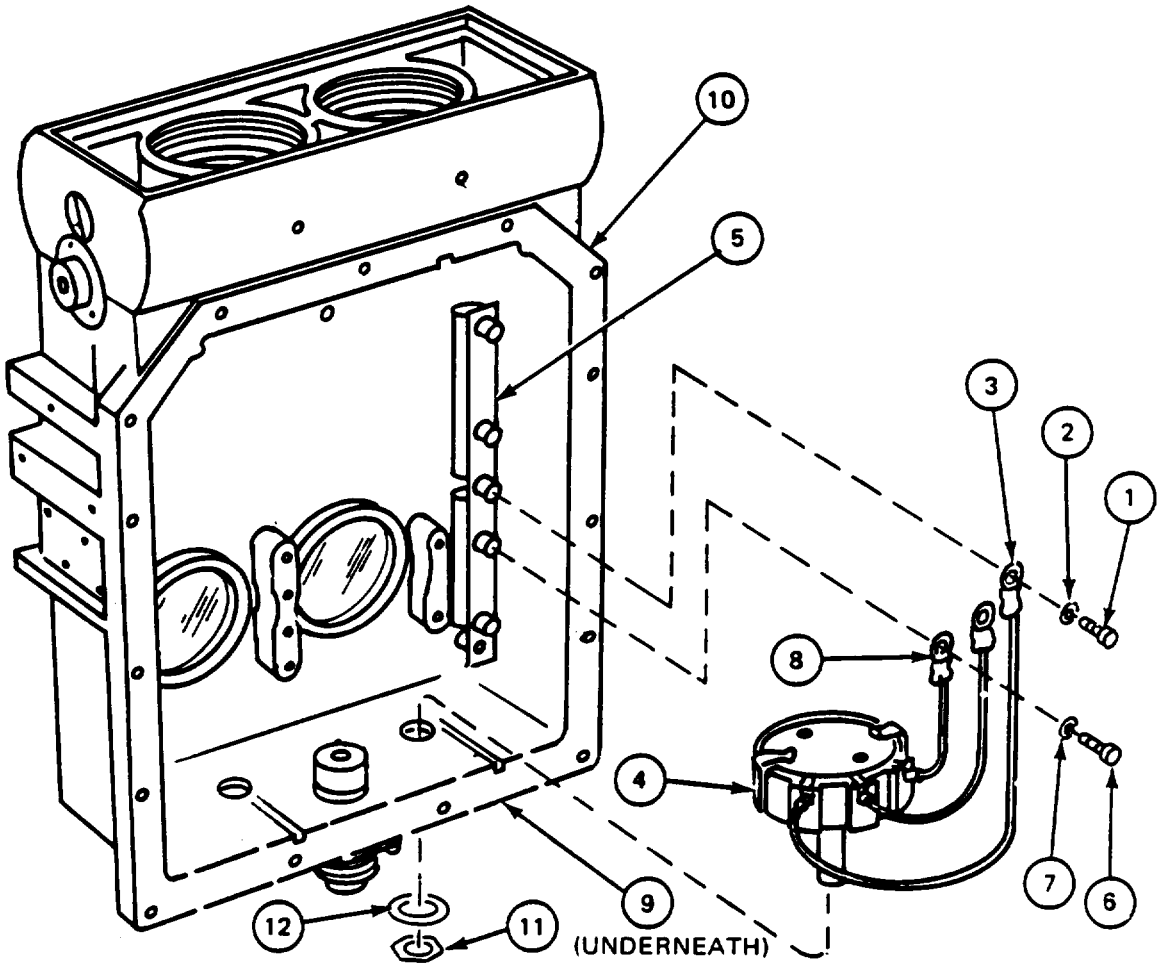


4-32. RESISTOR ASSEMBLY REMOVAL (CONT)

FRAME 2

Step	Procedure
1.	Using screwdriver, remove screw (1) and washer (2) which hold white wire (3) of resistor (4) to terminal board (5).
2.	Using screwdriver, remove screw (6) and washer (7) which hold red wire (8) of resistor (4) to terminal board (5).
	WARNING Dry cleaning solvent can catch on fire. Keep it and all materials that can catch on fire away from flames. Use only in a room with a lot of fresh air.
3.	Clean sealing compound from hole (9) in body assembly (10) where bushing was installed.
4.	Using long nose pliers, remove nut (11) and lockwasher (12) which hold resistor (4) to body assembly (10).
5.	Lift resistor (4) out of body assembly (10).
	END OF TASK

4-32. RESISTOR ASSEMBLY REMOVAL (CONT)



4-33. RESISTOR ASSEMBLY INSTALLATION

APPLICABLE CONFIGURATIONS: M19 and M24 old configurations

TOOLS: 1/16" socket head screw key (Allen wrench or equivalent)
6" slip joint pliers
Hydraulic sealing gun
1/16" flat tip screwdriver
1/2" open end wrench

SUPPLIES: Sealing compound (item 8, App A)

PERSONNEL: One

REFERENCES: JPG 41C for using sealing compound

EQUIPMENT CONDITION: Resistor and body assembly on work bench; power supply disconnected

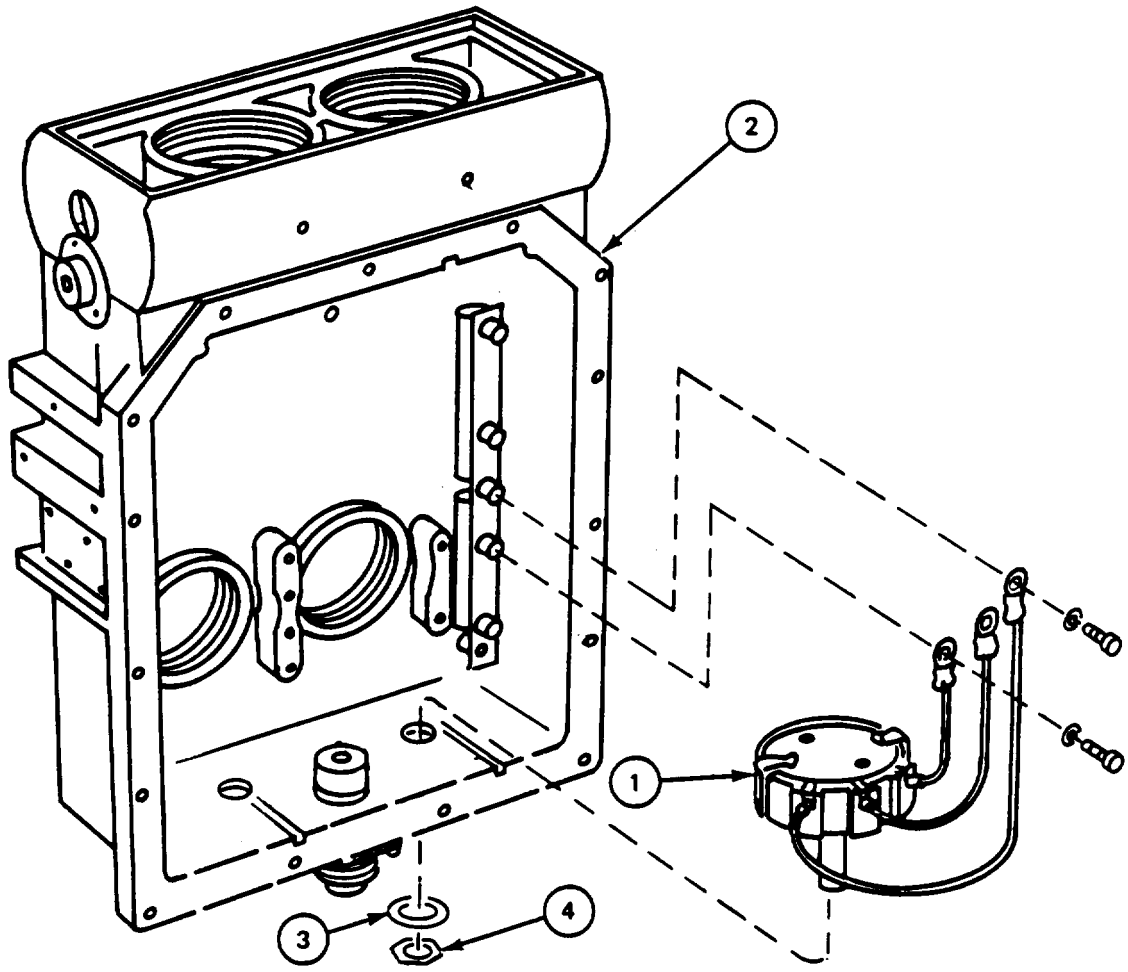
NOTE

This procedure is for installing either resistor.

FRAME 1

Step	Procedure
1.	Place resistor (1) in body assembly (2).
2.	Using long nose pliers, put on lockwasher (3) and nut (4).
	GO TO FRAME 2

4-33. RESISTOR ASSEMBLY INSTALLATION (CONT)

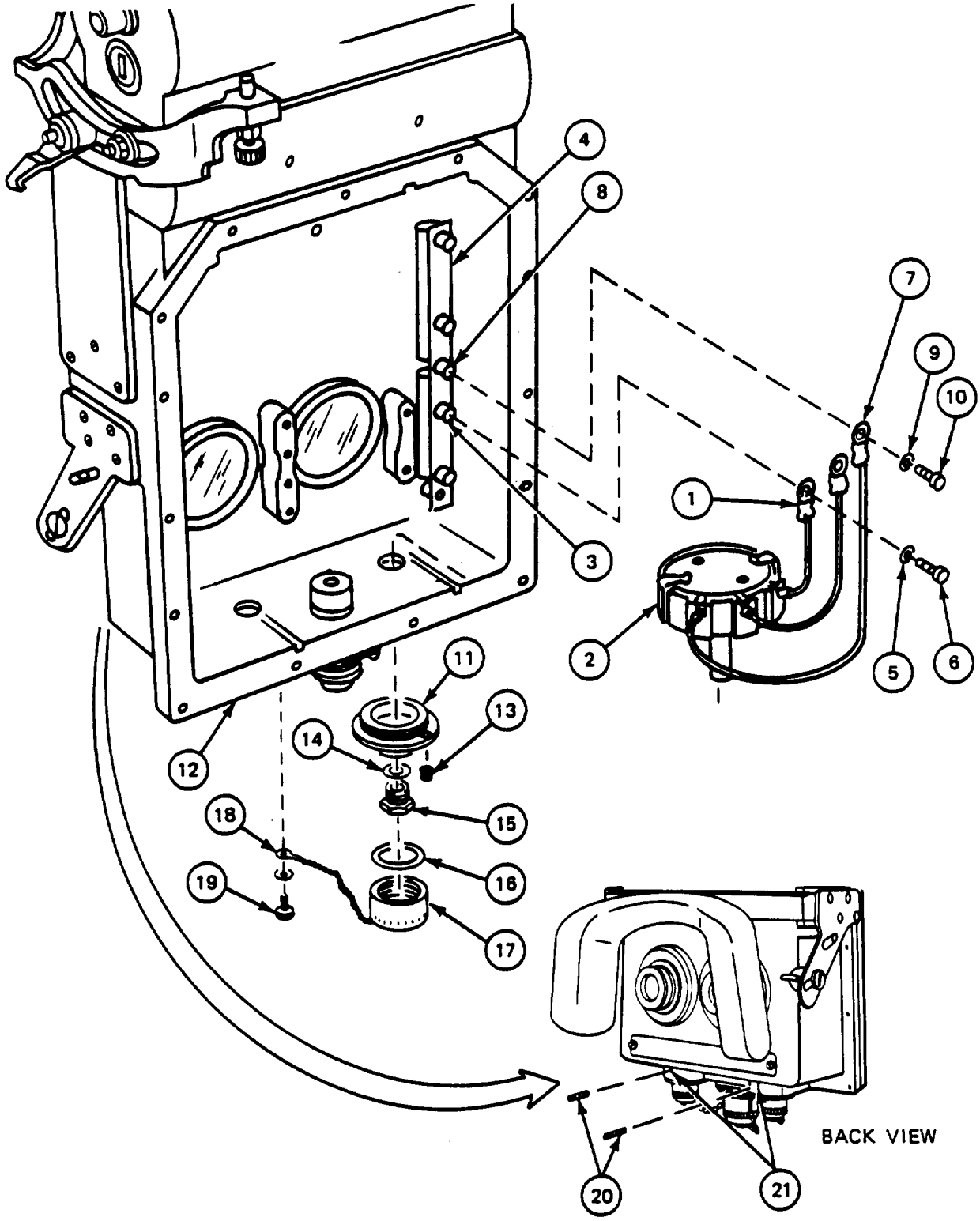


4-33. RESISTOR ASSEMBLY INSTALLATION (CONT)

FRAME 2

Step	Procedure
1.	Place red wire (1) of resistor (2) on terminal (3) of terminal board (4).
2.	Using screwdriver, put on lockwasher (5) and screw (6).
3.	Position white wire (7) of resistor (2) on terminal (8) of terminal board (4).
4.	Using screwdriver, put on lockwasher (9) and screw (10).
5.	Using slip joint pliers, install bushing (11) into body assembly (12).
6.	Using Allen wrench, tighten setscrew (13) to fasten bushing.
7.	Put preformed packing (O-ring) (14) on nut (15).
8.	Using open end wrench, put nut (15) on bushing (11).
9.	Put washer (16) on bushing (11) and install cap (17).
10.	Using screwdriver, fasten chain of cap (17) to body assembly (12) with lockwasher (18) and screw (19).
11.	Using open end wrench, remove two setscrews (20) from body assembly (12).
12.	Using sealing gun, force sealing compound into holes (21).
13.	Using Allen wrench, install two setscrews (20) into two holes (21) in body assembly (12).
	NOTE FOLLOW-ON MAINTENANCE Install electron tube (para 4-30, frame 2). Install cable (para 4-21). Install cover (para 4-15). Do checkout procedure (Vol I, para 2-2).
	END OF TASK

4-33. RESISTOR ASSEMBLY INSTALLATION (CONT)



Section 11. DECAL

4-34. DECAL MAINTENANCE PROCEDURES INDEX

Task	Reference (para)
Removal	4-35
Installation	4-36

4-35. DECAL REMOVAL

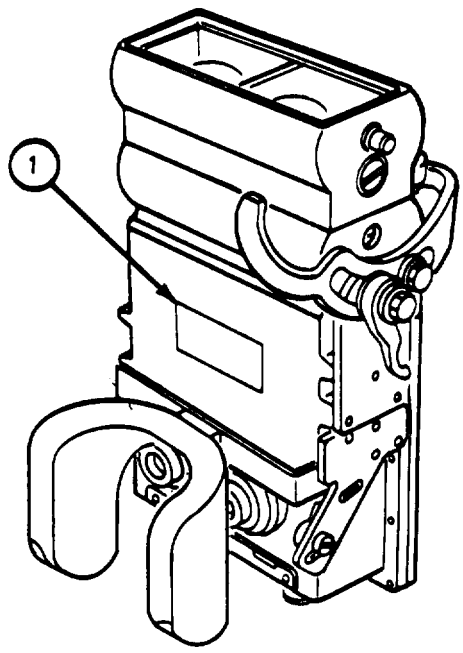
TOOLS: Pocketknife

PERSONNEL: One

EQUIPMENT CONDITION: Body assembly on work bench; power supply disconnected

FRAME 1

Step	Procedure
1.	Using pocket knife, lift up edge. of decal (1) and peel off. END OF TASK



4-36. DECAL INSTALLATION

SUPPLIES: Dry cleaning solvent (item 9, App A)

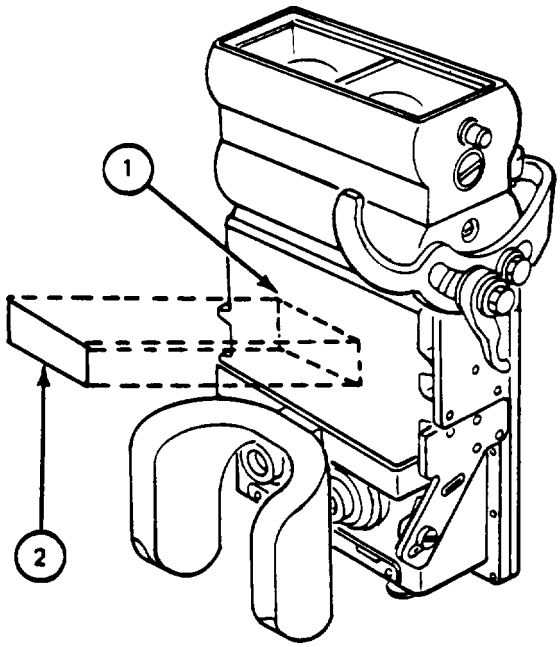
PERSONNEL: One

REFERENCES: JPG 41C for cleaning mounting surface

EQUIPMENT CONDITION: Body assembly on work bench; power disconnected

FRAME 1

Step	Procedure
	W A R N I N G Dry cleaning solvent can catch on fire. Keep it and all materials that can catch on fire away from flames. Use only in a room with a lot of fresh air.
1.	Clean area (1) where decal will be applied with cleaning solvent (JPG).
2.	Put on decal (2) using instructions printed on the back.
	END OF TASK



Section 12. STRAP

4-37. STRAP MAINTENANCE PROCEDURES INDEX

Task	Reference (para)
Removal	4-38
Installation	4-39

4-38. STRAP REMOVAL

APPLICABLE CONFIGURATIONS: M19 and M24 new configurations

TOOLS: 3/16" flat tip screwdriver

PERSONNEL:One

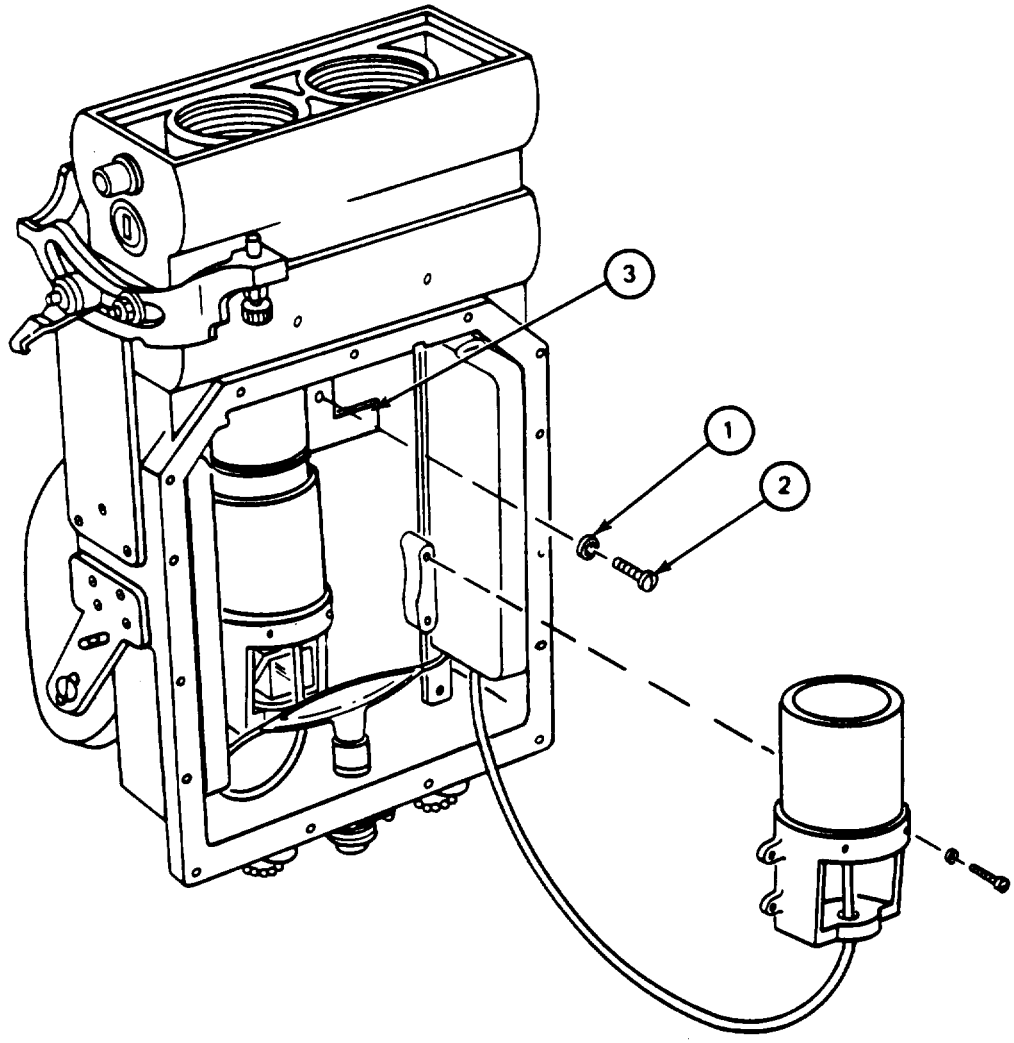
EQUIPMENT CONDITION: Body assembly on work bench; power disconnected

PRELIMINARY PROCEDURES: Remove cover (para 4-14)
Remove electron tube from either side (para 4-29)

FRAME 1

Step	Procedure
1.	Using screwdriver, remove screw (1) and washer (2).
2.	Using hand, remove strap (3).
	END OF TASK

4-38. STRAP REMOVAL (CONT)



4-39. STRAP INSTALLATION

APPLICABLE CONFIGURATIONS: M19 and M24 new configurations

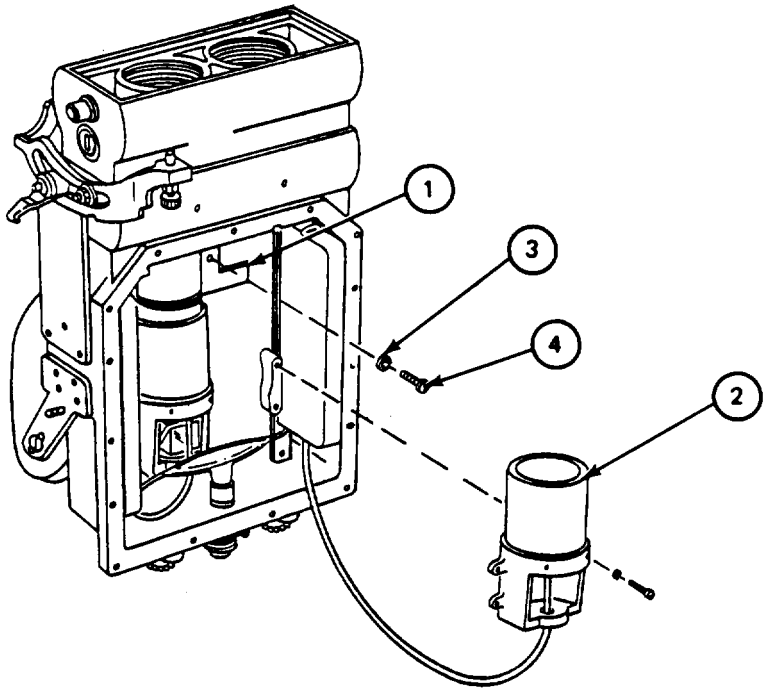
TOOLS: 3/16" flat tip screwdriver

PERSONNEL: One

EQUIPMENT CONDITION: Body assembly on work bench; power disconnected

FRAME 1

Step	Procedure
1.	Using hand, put one side of strap (1) under electron tube (2) that is installed.
2.	Using screwdriver, install washer (3) and screw (4).
	NOTE FOLLOW-ON MAINTENANCE Install tube (para 4-30, frame 1). Install cover (para 4-15). Do checkout procedure (Vol I, para 2-2).
	END OF TASK



CHAPTER 5

FINAL INSPECTION

5-1. SCOPE

This chapter gives final inspection and maintenance procedures to be done after repairing the body assembly of the M19 and M24 Periscopes.

5-2. FINAL INSPECTION JOF BODY ASSEMBLY

PERSONNEL: One

EQUIPMENT CONDITION: Body assembly on work bench with head assembly removed

PRELIMINARY PROCEDURES: Remove head assembly (TM 9-2350-215-10 for M60A1, TM 9-2350-257-10 for M60Al Rise, TM 9-2350-260-10 for M60, TM 9-2350-222-10 for M728)

NOTE

If you find a fault, tell your supervisor. If you do not find a fault, send the good body assembly back to service.

FRAME 1

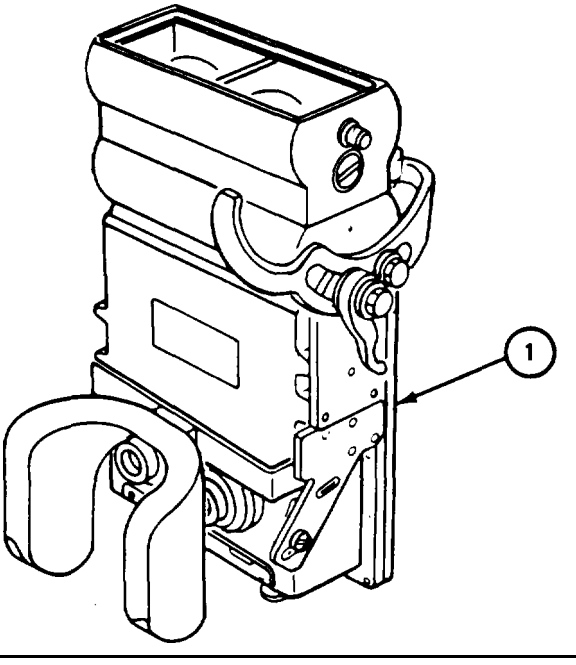
Step	Procedure
1.	Check body assembly (1) for loose or missing parts.
2.	Check body assembly for cleanliness.
3.	Look into optical parts for dirt or moisture.

NOTE

FOLLOW-ON MAINTENANCE

Install head assembly (TM 20-2).

END OF TASK



CHAPTER 6

PACKAGING

6-1. SCOPE

This chapter provides information on packaging of the M19 and M24 periscopes for storage or shipment.

6-2. PREPARATION FOR PACKAGING OF OPTICAL COMPONENTS

Cover all prisms or optical elements with at least four thicknesses of neutral lens tissue and secure in place with water-resistant, pressure, sensitive adhesive tape. Cover the lens tissue with cellulose cushioning material and secure in place with pressure-sensitive tape.

6-3. PACKAGING OF BODY ASSEMBLY

Package and pack the body assembly in accordance with MIL-P-14232/P8589700, packaging level "A" and packaging level "C",

6-4. PACKAGING OF HEADREST ASSEMBLY

Package and pack the headrest assembly in accordance with MIL-P-14232/P10513443, level "C"

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 M19 and M24 Periscopes. 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, grease (item 2, 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 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 1 yard	YD
2	F	9150-00-261-8298	Grease, Aircraft and Instrument 1 can	CN
3	F	597040-224-5277	Insulating Compound, Electrical; synthetic, resin compound, non-rigid 1 can	CN
4	F	8010-00-286-7756	Paint, Enamel, alkaline, gloss TT-E489 Gray gloss 16187 Yellow gloss 13538 12 oz. can (pressurized)	OZ
5	F	8010-00-298-2287	Paint, White enamel 1 qt. can	QT
	F	8010-01-070-0922	Paint, Green type 2 (81348) 1 pt. can	PT
6	F	6040-00436-5000	Paper, Lens tissue 1 ream	RM
7	F	801 04)0-292-1 127	Primer, Paint coating 1 gal. can	GL
	F	8010-00-082-2450	Primer, Green 1 KT	KT
8	F	8030-00-965-2438	Sealing Compound, Non-curing, polysulfide base, MIL-S-11030 1 tube	TU
9	F	6850-00-281-3061	Solvent, Dry Cleaning, FED P-D-680 (81348) 4 oz. can	OZ
	F	6850-00-291-1985	Solvent, Dry cleaning, FED P-D-680 1 gal. can	GL
10	F	7510-00-551-1245	Tape, Pressure-sensitive, adhesive 1 roll	RL

APPENDIX B

MAINTENANCE TASK INDEX

B-1. SCOPE

This appendix helps you find maintenance tasks for the M19 and M24 Periscopes by giving you references to the procedures.

B-2. MAINTENANCE TASK INDEX

PERISCOPE, TANK: M19 OLD CONFIGURATION 6650-00-765-2971 M19 NEW CONFIGURATION 1240-01-005-6035 M24 OLD CONFIGURATION 6650-00-344-4647 M24 NEW CONFIGURATION 1240-01-005-6036	MAINTENANCE TASKS							
NOMENCLATURE	INSPECTION UPON RECEIPT (VOL II)	FINAL INSPECTION (VOL II)	CHECKOUT (VOL I)	TROUBLESHOOT (VOL I)	REMOVAL/INSTALLATION (VOL II)	DISASSEMBLY/ASSEMBLY (VOL II)	TOOLS AND TEST EQUIPMENT (VOL I/VOL II)	NOTES
PERISCOPE, TANK (ALL CONFIGURATIONS)	Para 3-2	Para 5-2	Para 2-2	Para 4-1/ 4-5			Para 1-4/ 2-8	
BOARD ASSEMBLY AND GROUND WIRE ASSEMBLY					Para 4-17/ 4-18			
BODY COVER					Para 4-14/ 4-15			
DECAL					Para 4-35/ 4-36			
ELEVATION LOCK ASSEMBLY					Para 4-9/ 4-12	Para 4-10/ 4-11		
HEADREST ASSEMBLY					Para 4-4/ 4-7	Para 4-5/ 4-6		

B-2. MAINTENANCE TASK INDEX (CONT)

PERISCOPE, TANK: M19 OLD CONFIGURATION 6650-00-765-2971 M19 NEW CONFIGURATION 1240-01-005-6035 M24 OLD CONFIGURATION 6650-00-344-4647 M24 NEW CONFIGURATION 1240-01-005-6036	MAINTENANCE TASKS							
NOMENCLATURE	INSPECTION UPON RECEIPT (VOL II)	FINAL INSPECTION (VOL II)	CHECKOUT (VOL I)	TROUBLESHOOT (VOL I)	REMOVAL/INSTALLATION (VOL II)	DISASSEMBLY/ASSEMBLY (VOL II)	TOOLS AND TEST EQUIPMENT (VOL I/VOL II)	NOTES
HIGH VOLTAGE CABLE ASSEMBLY					Para 4-20/ 4-21			
IMAGE CONVERTER ELECTRON TUBE					Para 4-29/ 4-30			
RECEPTACLE					Para 4-23/ 4-24			
RESISTOR ASSEMBLY					Para 4-32/ 4-33			
STRAP					Para 4-38/ 4-39			
TRUNNION, LATCH, ECCENTRIC, AND RELATED PARTS					Para 4-26/ 4-27			

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 12-41 (Qty req block no. 76) requirements for M19 and M24 Periscopes.

☆ U.S. GOVERNMENT PRINTING OFFICE: 1980-650-087/150

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

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	DATE	TITLE
TM 9-XXXX-XXX-XX	Date of TM	Title of TM

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.	IN THIS SPACE TELL WHAT IS WRONG AND WHAT SHOULD BE DONE ABOUT IT:
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

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

DA FORM 1 AUG 74 2028-2 (TEST)

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

TEAR ALONG DOTTED LINE

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

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	DATE	TITLE
TM 9-1240-216-34	29 Aug 80	PERISCOPE, TANK: M19/M24

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.

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

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

DA FORM 1 AUG 74 2028-2 (TEST)

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

TEAR ALONG DOTTED LINE

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DOD-314

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

TEAR ALONG DOTTED LINE

FOLD BACK

REVERSE OF DA FORM 2028-2 (TEST)

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

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

SOMETHING WRONG WITH THIS MANUAL?

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER	DATE	TITLE
TM 9-1240-216-34	29 Aug 80	PERISCOPE, TANK: M19/M24

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.

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

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

DA FORM 1 AUG 74 2028-2 (TEST)

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

TEAR ALONG DOTTED LINE

FILL IN YOUR UNIT'S ADDRESS

FOLD BACK

DEPARTMENT OF THE ARMY

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DOD-314

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

TEAR ALONG DOTTED LINE

FOLD BACK

REVERSE OF DA FORM 2028-2 (TEST)

RECOMMENDED CHANGES TO EQUIPMENT TECHNICAL MANUALS

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

SOMETHING WRONG WITH THIS MANUAL?

FROM: (YOUR UNIT'S COMPLETE ADDRESS)

DATE

PUBLICATION NUMBER	DATE	TITLE
TM 9-1240-216-34	29 Aug 80	PERISCOPE, TANK: M19/M24

BE EXACT. . .PIN-POINT WHERE IT IS

PAGE NO.	PARAGRAPH	FIGURE NO.	TABLE NO.

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

TYPED NAME, GRADE OR TITLE, AND TELEPHONE NUMBER

SIGN HERE:

DA FORM 1 AUG 74 2028-2 (TEST)

P.S.--IF YOUR OUTFIT WANTS TO KNOW ABOUT YOUR MANUAL "FIND," MAKE A CARBON COPY OF THIS AND GIVE IT TO YOUR HEADQUARTERS.

TEAR ALONG DOTTED LINE

FILL IN YOUR UNIT'S ADDRESS

DEPARTMENT OF THE AR

OFFICIAL BUSINESS

PENALTY FOR PRIVATE USE, $300

POSTAGE AND FEES PAID
DEPARTMENT OF THE ARMY
DOD-314

#1

TM9-1240-216-34

Date	Name

adiness Command

TEAR ALONG DOTTED LINE

REVERSE OF DA FORM 2028-2 (TEST)

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

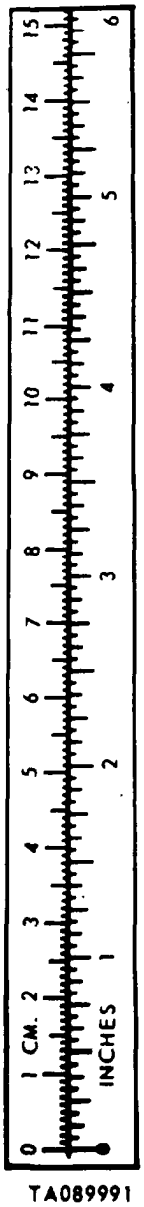
TEMPERATURE

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

APPROXIMATE CONVERSION FACTORS

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

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



TA089991

PIN: 046756-000