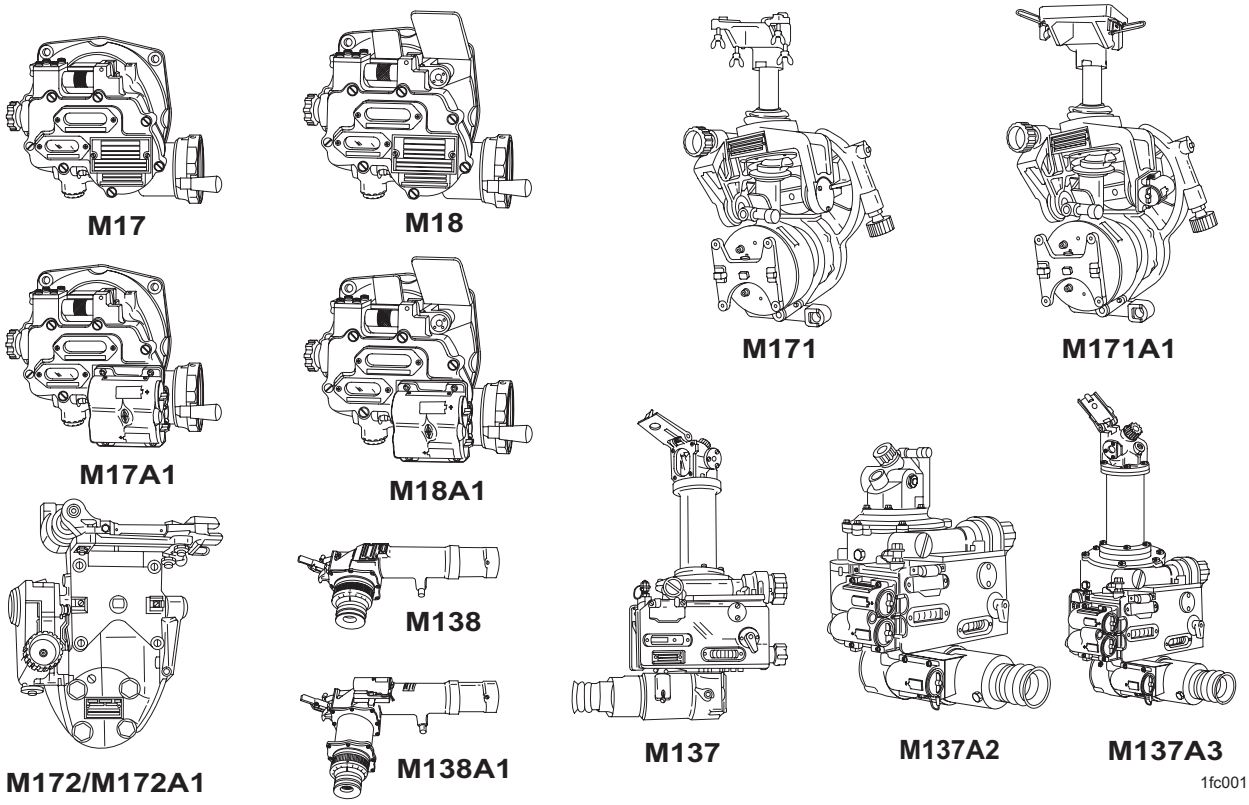
# TM 9-1240-375-34&P

## TECHNICAL MANUAL

**DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST) FOR
QUADRANT, FIRE CONTROL: M17 (1290-01-037-3883)
AND M17A1 (1290-01-515-8260);
QUADRANT, FIRE CONTROL: M18 (1290-01-037-7289)
AND M18A1 (1290-01-515-8262);
MOUNT, TELESCOPE AND QUADRANT: M171 (1240-01-039-7273)
AND M171A1 (1240-01-515-8265);
MOUNT, TELESCOPE AND QUADRANT: M172 (1240-01-037-7290)
AND M172A1 (1240-01-517-2171);
TELESCOPE, PANORAMIC: M137 (1240-01-038-0531),
M137A2 (1240-01-483-6103),
AND M137A3 (1240-01-483-6100); AND
TELESCOPE, ELBOW: M138 (1240-01-038-0530)
AND 138A1 (1240-01-515-8264)**




**SUPERSEDURE NOTICE**—Supersedes TM 9-1240-375-34 dated 26 September 1980, including all changes, and TM 9-1240-375-34P dated 19 September 1980, including all changes.

**DISTRIBUTION STATEMENT A**—Approved for public release; distribution is unlimited.

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**HEADQUARTERS, DEPARTMENT OF THE ARMY
MARCH 2005**

# WARNING SUMMARY

**WARNING**

**RADIATION**  **HAZARD**

## TRITIUM GAS ($H_3$)

This item contains radioactive material. All personnel that operate and/or maintain fire control equipment containing tritium must be aware of the following special precautions and requirements:

Immediately report any suspected lost or damaged tritium fire control equipment to your unit/mission Radiation Safety Officer (RSO). If your RSO cannot be reached, contact the TACOM-RI RSO (DSN 793-2965/6228, Commercial (309) 782-2965/6228) during regular duty hours; or call the Rock Island Police Office at DSN 793-6135 after duty hours.

Unit/mission RSO:_____ Telephone:_____

**A. RULES AND REGULATIONS.** NRC Form 3 - Notice to Employees and Energy Reorganization Act of 1974 Section 206 must be posted and the following regulations and licenses must be available for review at a location frequented by all employees or at the installation Safety Office:

(1) 10 CFR Part 19 - Notices, Instructions and Reports to Workers; Inspections.
(2) 10 CFR Part 20 - Standards for Protection Against Radiation.
(3) 10 CFR Part 21 - Reporting of Defects and Noncompliance.
(4) NRC license and license application.

Copies may be requested or information obtained by contacting the TACOM-RI Safety Office, DSN 793-2965/6228, Commercial (309) 782-2965/6228, or by visiting TACOM-RI web site at http://tri.army.mil.

**B. SAFETY PRECAUTIONS.** The radioactive material used in this instrument is tritium gas ($H_3$) sealed in glass vials. These sources illuminate the instrumentation during night operations. Federal law prohibits tampering with or removal of the sources in the field. In the event there is no illumination, notify the local RSO or TACOM-RI RSO. If skin contact is made with any area contaminated with tritium, wash immediately with soap and water. Notification of the RSO is required.

The beta radiation emitted by tritium is a hazard only if the vial or source is broken. Tritium can be taken into the body by inhalation, ingestion, or skin absorption/injection. If the vial is broken, the tritium gas will dissipate into the surrounding air. If released into a confined space such as a storage locker, container, unventilated room, or military vehicle, the tritium will be absorbed by lungs from inhalation or by skin through contact with contaminated surfaces. However, the body naturally eliminates absorbed tritium. If exposed, notification of the RSO is required.

**C. IDENTIFICATION.** Instruments containing radioactive self-luminous vials are identified by means of radioactive warning label (see above). The radioactive material used in this instrument is tritium gas ($H_3$) sealed in glass vials. These sources illuminate the instrumentation for night operations.

## WARNING SUMMARY - Continued

**D. CONTROL.** Federal law mandates control of this radioactive material. Tampering with or removal of the sources in the field is prohibited.

**E. HAZARDS.** The beta radiation emitted by tritium is a hazard only if the vial or source is broken. Tritium can be taken into the body by inhalation, ingestion, or skin absorption. If the vial is broken, the tritium gas will dissipate into the surrounding air. However, if released inside a confined space such as a storage locker, unventilated room, or military vehicle, tritium oxide will form, which is readily absorbed by lungs from air or by skin from contact with contaminated surfaces.

**F. STORAGE.** Federal law requires secured storage of these items. It is recommended a well-ventilated arms room or unoccupied building be used to store tritium fire control devices.

**G. DISPOSAL.** Non-illuminated or broken instruments will be turned into the unit/mission RSO. The unit/mission RSO will properly secure the material in an area designated for low-level radioactive waste. The unit/mission RSO must contact the Army Field Support Command for further disposition at DSN 793-0338/1883, Commercial (309) 782-0338/1883.

**H. SHIPPING.** Shipping of radioactive devices must be in accordance with 49 CFR, Part 173.423 or International Air Transport Association (45th ed). Broken or non-illuminated and repaired devices must be wipe tested by the unit/mission RSO prior to shipment. The unit/mission RSO or Transportation Officer (TO) will authorize the shipment. New or unused tritium devices do not require a wipe test prior to shipment if new shipping package is used. A material movement form (MMF) must accompany the shipment. The MMF can be obtained at the TACOM-RI web site: http://tri.army.mil under safety office/radiation safety/forms.

**I. EMERGENCY PROCEDURES.** If the tritium fire control device is not illuminated or broken, contact your unit/mission RSO immediately. If skin contact is made with any broken device or surface potentially contaminated with tritium, wash immediately with nonabrasive soap and cold water. The following acronym "**SWIMN**" will help you remember what to do if a tritium device breaks or is not illuminated:

**S**top - and think.
**W**arn - nearby personnel of situation to exit room/vehicle/immediate area.
**I**solate - use gloves (or turn plastic bag inside out over your hand) and place item in plastic bag (item 5, WP 0152 00) (if bag not immediately available, wrap in plastic). Do not handle broken tritium devices with bare hands.
**M**inimize - contamination by opening doors/windows/hatches to ventilate the area. Leave area if possible and wash hands and arms after handling broken items.
**N**otify - call the unit/mission Radiation Safety Officer (RSO).

Before any tritium-illuminated device is purged, ensure that all radioactive light sources are fully illuminated. If not fully illuminated, send to depot for maintenance.

To avoid injury to personnel and damage to equipment, ensure that tritium-illuminated counters are fully illuminated before cover of fire control device is removed.

### BATTERY WARNINGS

Lithium – Thionyl Chloride (Li-$SOCl_2$) batteries present a fire, explosion and severe burn hazard. Do not recharge, disassemble, heat above 212 °F (100 °C), incinerate, or expose contents to water.

Lithium – Thionyl Chloride (Li-$SOCl_2$) batteries contain liquid Thionyl Chloride ($SOCl_2$), which fumes upon exposure to air. The vapor is highly toxic, and the battery must not be abused in any way that may cause it to rupture.

# WARNING SUMMARY - Continued

Immediately turn off equipment if battery or battery enclosure shows signs of overheating or becomes hot to the touch. Allow the battery to cool (at least 60 minutes) before removing it.

If you hear a hissing sound (battery venting), or smell irritating gas, immediately turn off the equipment, and leave the area until any smell or signs of leaking gas have been cleared from the area.

Halon fire extinguishers shall not be used to combat fires involving batteries. Use a class D fire extinguisher to extinguish lithium or a carbon dioxide fire extinguisher to cool surrounding batteries.

Do not package any battery if it is hot/warm. Package batteries only when they are cool to the touch.

Lithium – Thionyl Chloride ($Li\text{-}SOCl_2$) batteries must be disposed of as hazardous waste (EPA HW Number D001 (IGNITABILITY), D003 (REACTIVITY) and D007 (CHROMIUM)). Coordinate with installation environmental office to ensure compliance with local, state, and federal regulations and dispose of batteries through DRMO.

Do not accumulate or store waste batteries for disposal for more than 90 days.

Do not mix hazardous and non-hazardous solid waste in the same package.

When handling batteries that show signs of leaking, bulging, swelling, or deformity, personal protective equipment meeting ANSI or NIOSH/MSHA requirements must be used.

**GENERAL WARNINGS**

Do not drop tank of compressed nitrogen gas. When using in confined areas, use extreme care; gas could cause asphyxiation.

**HAZARDOUS MATERIALS DESCRIPTION**

WARNING

**ADHESIVES, CLEANING SOLVENTS, AND SEALING COMPOUNDS**

Use adhesives, cleaning solvents, and sealing compounds in well-ventilated area away from open flame. Adhesives, cleaning solvents, and sealing compounds are harmful to skin and clothing and may give off harmful vapor.

**FIRST AID**

For further information on first aid, see FM 4-25.11.

## LIST OF EFFECTIVE PAGES/WORK PACKAGES

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Original ..... 0 .....15 March 2005

**TOTAL NUMBER OF PAGES FOR FRONT AND REAR MATTER IS 40 AND TOTAL NUMBER OF WORK PACKAGES IS 152 CONSISTING OF THE FOLLOWING:**

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*TM 9-1240-375-34&P

HEADQUARTERS, DEPARTMENT OF THE ARMY
Washington, D.C., 15 MARCH 2005

# TECHNICAL MANUAL

## DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS LIST) FOR QUADRANT, FIRE CONTROL: M17 (1290-01-037-3883) AND M17A1 (1290-01-515-8260); QUADRANT, FIRE CONTROL: M18 (1290-01-037-7289) AND M18A1 (1290-01-515-8262); MOUNT, TELESCOPE AND QUADRANT: M171 (1240-01-039-7273) AND M171A1 (1240-01-515-8265); MOUNT, TELESCOPE AND QUADRANT: M172 (1240-01-037-7290) AND M172A1 (1240-01-517-2171); TELESCOPE, PANORAMIC: M137 (1240-01-038-0531), M137A2 (1240-02-483-6103), AND M137A3 (1240-01-483-6100); AND, TELESCOPE, ELBOW: M138 (1240-01-038-0530) AND M138A1 (1240-01-515-8264)

Current as of 1 October 2004 for RPSTL WP 0110 00 to WP 0151 00

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# HOW TO USE THIS MANUAL

## GENERAL

References in the manual are to work packages and other technical manuals.

## INDEXES

This manual is organized to help the user quickly find the information needed. There are several useful indexes.

**Table of Contents.** Lists all work packages in numeric order.

**Nomenclature Cross-Reference List.** Gives an alphabetical list of common item names used in the manual. Official nomenclature is given for each item (WP 0001 00).

**List of Abbreviations/Acronyms.** Is an alphabetical list of uncommon abbreviations/acronyms used in the manual (WP 0001 00).

**Malfunction/Symptom Index.** Is an alphabetical list of parts with possible malfunctions. References work package number of the troubleshooting table.

**Alphabetical Index.** Located at the end of the manual. An extensive subject index for everything in the manual. Gives work package number.

## DIRECT SUPPORT AND GENERAL SUPPORT

## GENERAL INFORMATION

### SCOPE

#### Type of Manual

Direct and general support maintenance.

#### Model Numbers and Equipment Names

1. M17 Fire Control Quadrant/M17A1 Fire Control Quadrant.
2. M18 Fire Control Quadrant/M18A1 Fire Control Quadrant.
3. M171 Telescope and Quadrant Mount/M171A1 Telescope and Quadrant Mount.
4. M172 Telescope and Quadrant Mount/M172A1 Telescope and Quadrant Mount.
5. M137 Panoramic Telescope/M137A2 Panoramic Telescope/M137A3 Panoramic Telescope.
6. M138 Elbow Telescope/M138A1 Elbow Telescope.

#### Purpose of Equipment

1. **M17/M17A1 Quadrant:** Measures cannon elevation during one-person operation.
2. **M18/M18A1 Quadrant:** Measures cannon elevation during two-person operation.
3. **M171/M171A1 Mount:** Provides a mount for the M17/M17A1 quadrant and M137/M137A2/M137A3 telescope.
4. **M172/M172A1 Mount:** Provides a mount for the M18/M18A1 quadrant and M138/M138A1 telescope.
5. **M137/M137A2/M137A3 Telescope:** Provides a means of measuring horizontal direction in the indirect fire operation.
6. **M138/M138A1 Telescope:** Provides direction in the direct fire operation.

### MAINTENANCE FORMS, RECORDS, AND REPORTS

Department of the Army forms and procedures used for equipment maintenance will be those prescribed by DA PAM 738-750, Functional Users Manual for The Army Maintenance Management System (TAMMS).

## REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR)

If your equipment needs improvement, let us know. Send us an EIR. You, the user, are the only one who can tell us what you don't like about your equipment. Let us know why you don't like the design or performance. Put it on an SF 368 (Product Quality Deficiency Report). Mail it to us at ATTN: AMSTA-AR-QAW-C, TACOM-ARDEC, 1 Rock Island Arsenal, Rock Island, IL 61299-7300 (Fax: DSN 793-6653, Commercial (309) 782-6653) (E-mail: qawqdrs@ria.army.mil). We will send you a reply.

## CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of Army material is a continuing concern. It is important that any corrosion problems with this item be reported so that the problem can be corrected and improvements can be made to prevent the problem in future items.

While corrosion is typically associated with rusting of metals, it can also include deterioration of other materials, such as rubber and plastic. Unusual cracking, softening, swelling, or breaking of these materials may be a corrosion problem.

If a corrosion problem is identified, it can be reported using SF 368, Product Quality Deficiency Report. Use of key words such as "corrosion," "rust," "deterioration", or "cracking" will ensure that the information is identified as a CPC problem.

The form should be submitted to:

ATTN: AMSTA-AR-QAW-C
TACOM-ARDEC
1 Rock Island Arsenal
Rock Island, IL 61299-7300

Fax: DSN 793-6653, Commercial (309) 782-6653
E-Mail: qawqdrs@ria.army.mil

## DESTRUCTION OF ARMY MATERIEL TO PREVENT ENEMY USE

Refer to TM 9-1025-211-20&P or TM 9-1025-215-25&P.

## PREPARATION FOR STORAGE OR SHIPMENT

Refer to TM 9-1025-211-20&P or TM 9-1025-215-25&P.

### Battery Storage and Shipment

Store batteries in original packaging until ready for use. Examine packages/batteries for bulging, cracking, or signs of leakage before putting the batteries into equipment. Remove any damaged batteries from service and dispose of in accordance with local regulations. NOTE: When handling batteries that show signs of leaking, bulging, swelling, or deformity, personal protective equipment meeting ANSI or NIOSH/MSHA requirements must be used.

Store in cool, dry, well-ventilated areas separated from other combustible and hazardous materials. Storage of batteries over 100 ºF (38 ºC) will cause rapid loss of power.

Do not accumulate or store waste batteries for disposal for more than 90 days.

Do not mix hazardous and non-hazardous waste in the same package.

Do not package any battery if it is hot/warm. Package batteries only when they are cool to the touch.

Batteries for disposal shall be collected, transported, and disposed of in a manner that will prevent short-circuit (isolate by taping metal poles/terminals), compacting, or mutilation to destroy their physical integrity.

Non-usable batteries shall be disposed of in accordance with local regulations. Contact your local environmental office for instructions. Li-$SOCl_2$ batteries are classified as hazardous waste.

## NOTE

A flashing LED light indicates a low battery condition on the M137A2 pantel (counter box). The LED may continue to flash for up to 12 hours. Replace the batteries as soon as possible after encountering this condition.

1.5V alkaline or NiCad batteries may be used in place of the 3.6V Lithium-Thionyl Chloride (Li-$SOCl_2$) batteries for **emergency short-term use only**. Using the 1.5V batteries will severely reduce the battery life and they will not work below 32 ºF (0 ºC).

### NOMENCLATURE CROSS-REFERENCE LIST

| Common Name | Official Nomenclature |
|---|---|
| Adapter | Quadrant testing fire control maintenance final inspection fixture |
| Azimuth counter | Rotating counter |
| Azimuth counter cover | Counter cover |
| Azimuth counter eccentric | Eccentric |
| Azimuth knob | Knob |
| Azimuth knob assembly | Knob assembly |
| Azimuth test fixture | Telescope test fixture |
| Battery | Lithium – Thionyl Chloride (Li-$SOCl_2$) 3V size AA or C |
| Bracket | Rotating eye bracket |
| Collimator telescope | M1A1 infinity aiming reference collimator |
| Correction counter | Rotating counter |
| Correction knob | Knob |
| Correction knob assembly | Knob assembly |
| Counter window | Optical instrument window |
| Cross level knob | Knob |
| Cross level vial | Fire control level vial |
| Deflection counter | Rotating counter |
| Deflection counter eccentric | Eccentric |
| Elevation counter | Rotating counter |
| Elevation knob | Knob assembly |
| Elevation knob | Shouldered knob |
| Elevation knob assembly | Knob assembly |
| Elevation level vial | Fire control level vial |
| Eyeshield | Optical eyeshield |
| Eyeshield | Optical instrument eyeshield |
| Felt | Mechanical preformed felt |
| Felt holder | Felt mechanical holder |
| Grease | Aircraft grease (aircraft instrument) |
| Grease | Aircraft grease (corrosion-resistant) |

## NOMENCLATURE CROSS-REFERENCE LIST - Continued

| Common Name | Official Nomenclature |
|---|---|
| Housing | Worm gear housing |
| Housing | Worm housing body |
| Latch | Lock-release latch |
| Lever | Lock-release lever |
| Lever | Plunger-release lever |
| Locking ring | Ring |
| Lock wire | Nonelectrical wire |
| M17 quadrant | M17 fire control quadrant |
| M17A1 quadrant | M17A1 fire control quadrant |
| M18 quadrant | M18 fire control quadrant |
| M18A1 quadrant | M18A1 fire control quadrant |
| M137 telescope | M137 panoramic telescope |
| M137A2 telescope | M137A2 panoramic telescope |
| M137A3 telescope | M137A3 panoramic telescope |
| M138 telescope | M138 elbow telescope |
| M138A1 telescope | M138A1 elbow telescope |
| M171 mount | M171 telescope and quadrant mount |
| M171A1 mount | M171A1 telescope and quadrant mount |
| M172 mount | M172 telescope and quadrant mount |
| M172A1 mount | M172A1 telescope and quadrant mount |
| Packing | Preformed packing |
| Plunger | Detent plunger |
| Radioactive material caution plate | Instruction plate |
| Support assembly | Quadrant support assembly |
| Telescope head spacer | Optical element spacer |

## LIST OF ABBREVIATIONS/ACRONYMS

| Abbreviation/Acronym | Definition |
|---|---|
| cm/sec | Centimeters per second |
| fpm | Feet per minute |
| ft-lb | Foot-pound |
| in.-lb | Inch-pound |
| in.-oz | Inch-ounce |
| N-m | Newton/meter |
| RSO | Radiation Safety Officer |
| WP | Work Package |

## SAFETY, CARE, AND HANDLING

1. Observe all warnings, safety precautions, and safety regulations in this manual.

2. Safety precautions to be observed during training are prescribed in AR 385-63 and local range regulations.

3. Safety precautions given in this manual must be followed for storing, handling, and repairing fire control equipment and for returning equipment with broken tritium ($H_3$) components.

## END OF WORK PACKAGE

# CHAPTER 1

# DESCRIPTION AND THEORY OF OPERATION

DIRECT SUPPORT AND GENERAL SUPPORT

# EQUIPMENT DESCRIPTION AND DATA

## EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

**M17/M17A1 and M18/M18A1 Fire Control Quadrants:** The dual fire control quadrants are identical with the following exceptions. The M17/M17A1 quadrant contains a left-hand worm shaft assembly and gear, and the M18/M18A1 quadrant contains a right-hand worm shaft assembly and gear. Also, the M18/M18A1 quadrant features a cross level vial, which is not present on the M17/M17A1 quadrant. Both quadrants have the capability of measuring elevation to 1433 mils. The dual equipment permits either the assistant gunner or the gunner to lay the cannon in elevation. The counters and level vials are self-illuminated with radioactive tritium $H_3$ in the M17 and M18 quadrants and illuminated by battery power in the M17A1 and M18A1 quadrants.

**M171/M171A1 Telescope and Quadrant Mount:** The M171/M171A1 mount supports the M137/M137A2/M137A3 telescope and the M17/M17A1 quadrant. The M171/M171A1 mount is installed on the left trunnion of the howitzer. It provides an adjustable base for leveling the M137/M137A2/M137A3 telescope and the M17/M17A1 quadrant. The adjustable base compensates for azimuth and elevation errors introduced by cant when the weapon is elevated. The M171 level vials are illuminated by tritium $H_3$ and the M171A1 level vials are illuminated by battery power.

**M172/M172A1 Telescope and Quadrant Mount:** The M172/M172A1 mount supports and provides an adjustable base for leveling and boresighting the M138/M138A1 telescope and the M18/M18A1 quadrant. The M172/M172A1 mount is installed on the right trunnion of the 155-mm howitzer.

**M137 Panoramic Telescope:** The M137 telescope is a 4-power, 10-degree field of view instrument with digital counters. All counters and the reticle of the M137 telescope are self-illuminated by radioactive isotopes. The M137 telescope is the basic instrument used in laying the M198 howitzer in azimuth. The M137 telescope is mounted to the upper part of the M171 mount. This instrument is hermetically sealed and can be purged with dry nitrogen.

**M137A2/M137A3 Panoramic Telescope:** The M137A2/M137A3 telescope is a 4-power, 10-degree field of view instrument with digital counters. All counters and the reticle of the M137A2/M137A3 telescope are self-illuminated by lithium batteries. The M137A2/M137A3 telescope is the basic instrument used in laying the howitzer in azimuth. The M137A2/M137A3 telescope is mounted to the upper part of the M171/M171A1 mount. This instrument is hermetically sealed and can be purged with dry nitrogen.

**EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES - Continued**

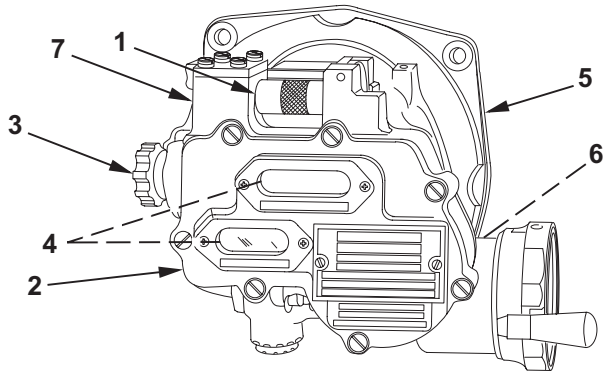
**M138/M138A1 Elbow Telescope:** The elbow telescope is an 8-power, 8-degree field of view instrument. A self-illuminated elevation reticle is provided for direct fire. The M138/M138A1 telescope also has a mil scale reticle that is inscribed in meters for range and is self-illuminated. The M138 is illuminated by tritium $H_3$ and the M138A1 is illuminated by lithium batteries.

The optical system is composed of the following:

A two-component objective lens system
An amici prism
A flat reticle
A reticle lens
A field lens
A center lens
An eye lens

## LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

### M17 Fire Control Quadrant




M17 1fc006

1. Fire Control Elevation Level Assembly (1). The fire control level assembly consists of an elevation level vial in a vial holder. The fire control level assembly is used in checking the M199 cannon in elevation.

2. Cover Assembly (2). The cover assembly of the M17 includes the counter windows, the radioactive sources that illuminate the dials, the identification plate, and the instruction plate.

3. Correction Knob Assembly (3). The correction knob assembly is located on the left side of the M17 quadrant. It is used to set elevation correction increments on the correction counter.

4. Counter Assembly (4). The counter assembly consists of the elevation counter and the correction counter. The counters are mounted in the housing assembly.

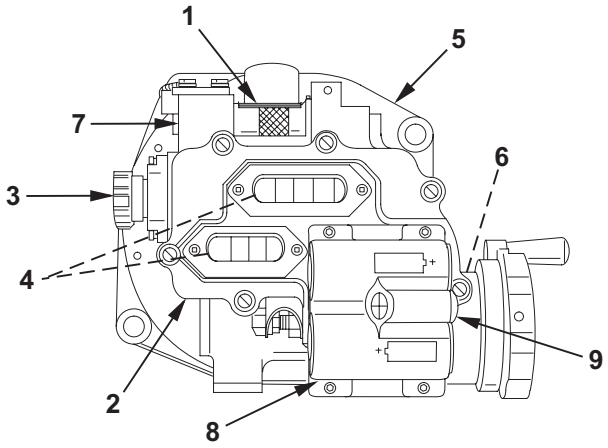
5. Base Assembly (5). The base assembly provides the mounting surface of the M17 quadrant. It also contains a bearing necessary for accurate rotation when setting elevation.

6. Worm Shaft Assembly (6). The worm shaft assembly is located internally and is controlled by the elevation knob. The worm shaft assembly is used to level the M17 quadrant in elevation by moving the elevation and correction counters.

7. Housing Assembly (7). The housing assembly for the M17 quadrant contains an elevation knob assembly, correction knob assembly, counter assembly, fire control level assembly, and a worm shaft assembly.

## LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

### M17A1 Fire Control Quadrant




1. Fire Control Elevation Level Assembly (1). The fire control level assembly consists of an elevation level vial in a vial holder. The fire control level assembly is used in checking the cannon in elevation.

2. Cover Assembly (2). The cover assembly of the M17A1 includes the counter windows, the light-emitting diode (LED) light sources that illuminate the dials, and the battery enclosure assembly with power switch.

3. Correction Knob Assembly (3). The correction knob assembly is located on the left side of the M17A1 quadrant. It is used to set elevation correction increments on the correction counter.

4. Counter Assembly (4). The counter assembly consists of the elevation counter and the correction counter. The counters are mounted in the housing assembly.

5. Base Assembly (5). The base assembly provides the mounting surface for the M17A1 quadrant. It also contains a bearing necessary for accurate rotation when setting elevation.

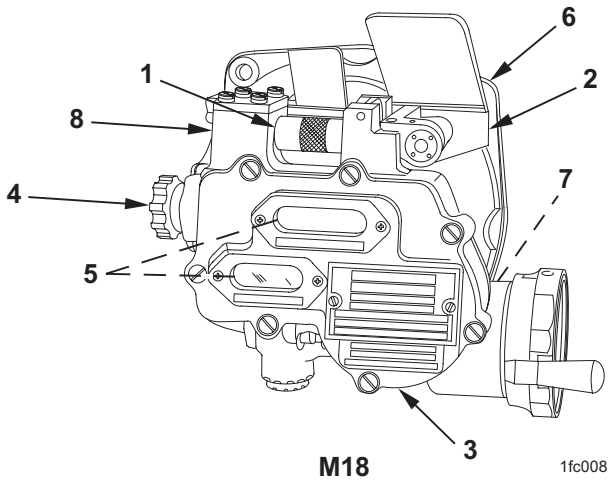
6. Worm Shaft Assembly (6). The worm shaft assembly is located internally and is controlled by the elevation knob. The worm shaft assembly is used to level the M17A1 quadrant in elevation by moving the elevation and correction counters.

7. Housing Assembly (7). The housing assembly for the M17A1 quadrant contains an elevation knob assembly, correction knob assembly, counter assembly, fire control level assembly, and a worm shaft assembly.

8. Battery Enclosure Assembly (8). The battery enclosure is located on the left front side of the M17A1 cover. It is used to hold the batteries and is equipped with a power switch.

9. Battery Power Switch (9). The power switch is located on the left side of the battery enclosure assembly. It is used to cycle the battery power on and off. The power switch has a three-second delay.

**M18 Fire Control Quadrant**




1. Fire Control Elevation Level Assembly (1). The fire control level assembly consists of an elevation level vial in a vial holder. The fire control level assembly is used in checking the M199 cannon in elevation.

2. Fire Control Cross Level Assembly (2). The fire control cross level is located on the upper right side of the M18 quadrant. The fire control level consists of a cross level vial in a vial holder, and is used in checking the howitzer for cross level.

3. Cover Assembly (3). The cover assembly of the M18 quadrant includes the counter windows, the radioactive sources that illuminate the dials, the identification plate, and the instruction plate.

4. Correction Knob Assembly (4). The correction knob assembly is located on the left side of the M18 quadrant. It is used to set elevation correction increments on the correction counter.

5. Counter Assembly (5). The counter assembly consists of the elevation counter and the correction counter. The counters are mounted in the housing assembly.

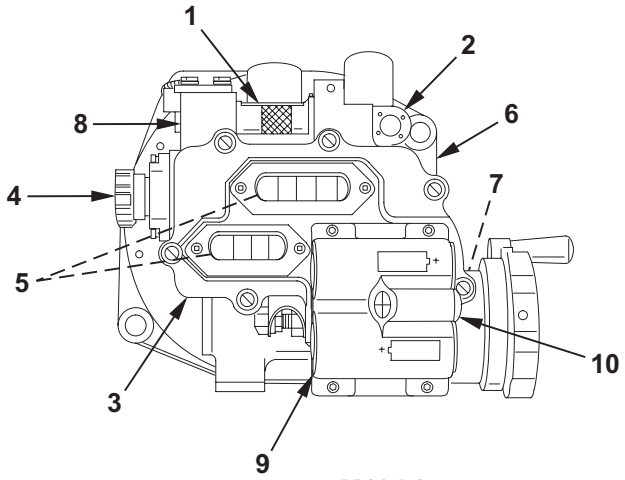
6. Base Assembly (6). The base assembly provides the mounting surface for the M18 quadrant. It also contains a bearing necessary for accurate rotation when setting elevation.

7. Worm Shaft Assembly (7). The worm shaft assembly is located internally and is controlled by the elevation knob. The worm shaft assembly is used to level the M18 quadrant in elevation by moving the elevation and correction counters.

8. Housing Assembly (8). The housing assembly for the M18 quadrant contains an elevation knob assembly, correction knob assembly, counter assembly, level assembly, fire control level assembly, and a worm shaft assembly.

**LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued**

**M18A1 Fire Control Quadrant**




1. Fire Control Elevation Level Assembly (1). The fire control level assembly consists of an elevation level vial in a vial holder. The fire control level assembly is used in checking the cannon in elevation.

2. Cross Level Assembly (2). The cross level assembly is located on the upper right side of the M18A1 quadrant. The level assembly consists of a cross level vial in a vial holder, and is used in checking the howitzer for cross level.

3. Cover Assembly (3). The cover assembly of the M18A1 quadrant includes the counter windows, the LED light sources that illuminate the dials, and the battery enclosure assembly with power switch.

4. Correction Knob Assembly (4). The correction knob assembly is located on the left side of the M18A1 quadrant. It is used to set elevation correction increments on the correction counter.

5. Counter Assembly (5). The counter assembly consists of the elevation counter and the correction counter. The counters are mounted in the housing assembly.

6. Base Assembly (6). The base assembly provides the mounting surface for the M18A1 quadrant. It also contains a bearing necessary for accurate rotation when setting elevation.

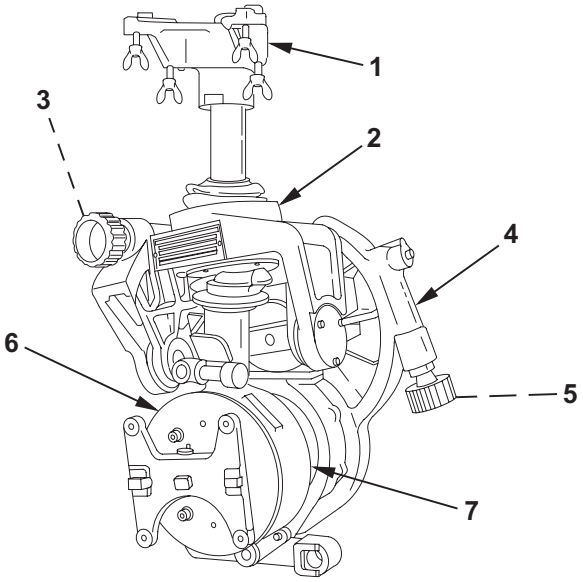
7. Worm Shaft Assembly (7). The worm shaft assembly is located internally and is controlled by the elevation knob. The worm shaft assembly is used to level the M18A1 quadrant in elevation by moving the elevation and correction counters.

8. Housing Assembly (8). The housing assembly for the M18A1 quadrant contains an elevation knob assembly, correction knob assembly, counter assembly, level assembly, fire control level assembly, and a worm shaft assembly.

9. Battery Enclosure Assembly (9). The battery enclosure is located on the left front side of the M18A1 cover. It is used to hold the batteries and is equipped with a power switch.

10. Battery Power Switch (10). The power switch is located on the left front side of the battery enclosure assembly. It is used to cycle the battery power on and off. The power switch has a three-second delay.

**M171 Telescope and Quadrant Mount**




M171

1. Optical Instrument Support (1). The optical instrument support, located at the top of the M171 mount, seats the M137/M137A2/M137A3 telescope.

2. Optical Instrument Rocker Assembly (2). The optical instrument rocker assembly houses the cross-leveling mechanism. In conjunction with the elevation-leveling mechanism located on the housing assembly, the optical instrument rocker assembly establishes the vertical axis reference for azimuth compensation.

3. Worm Shaft Assembly (Cross Level) (3). The worm shaft assembly is located in the optical instrument rocker assembly. The worm shaft assembly is actuated by a cross level knob. This assembly controls the cant of the M171 mount.

4. Housing Assembly (4). The housing assembly houses the elevation-leveling mechanism and supports the plunger assembly. The plunger assembly secures the M171 mount in an upright position on the weapon. A spring-loaded guide is provided to prevent damage to the M171 mount if the elevation limit of the instrument is exceeded.

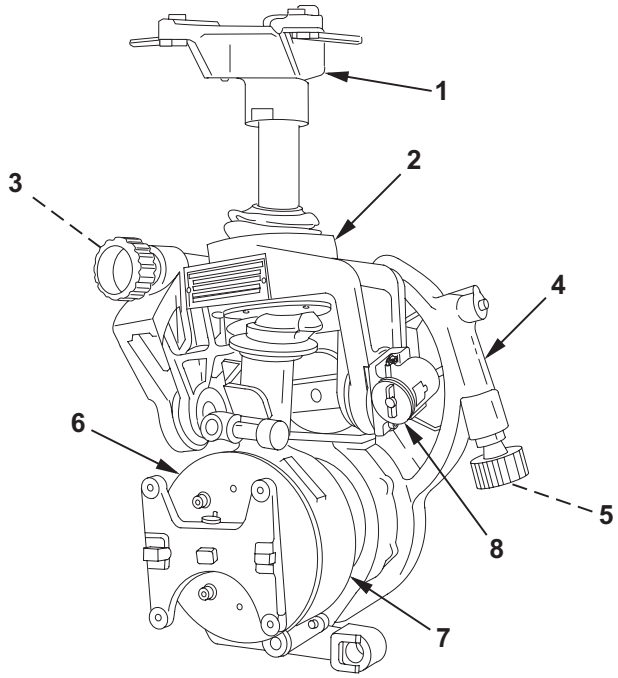
5. Worm Shaft Assembly (Elevation) (5). The worm shaft assembly is located in the housing assembly. It is actuated by the elevation knob.

6. Arm and Adapter Assembly (6). The arm and adapter assembly is located on the face of the arm assembly, and supports the M17 quadrant. The mounting adapter provides the keyed interface for assembling the M171 mount to the pre-qualified mounting adapter on the weapon trunnion. This adapter also houses the bar. It serves as a reference about which the M171 mount is adjusted to compensate in azimuth and elevation for the effects of trunnion cant.

7. Bearing Housing Assembly (7). The bearing housing assembly houses the bearings which permit the smooth, compensating motion when the weapon is elevated. The stem holds the optical instrument support, which seats the M137 telescope. It also provides the bearing in which the M171 mount is cross and elevation leveled. Located at the base of the stem are the cross level vial and elevation level vial.

**LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued**

**M171A1 Telescope and Quadrant Mount**




**M171A1** 1fc011

1. Optical Instrument Support (1). The optical instrument support, located at the top of the M171A1 mount, seats the M137/M137A2/M137A3 telescope.

2. Optical Instrument Rocker Assembly (2). The optical instrument rocker assembly houses the cross-leveling mechanism. In conjunction with the elevation-leveling mechanism located on the housing assembly, the optical instrument rocker assembly establishes the vertical axis reference for azimuth compensation.

3. Worm Shaft Assembly (Cross Level) (3). The worm shaft assembly is located in the optical instrument rocker assembly. The worm shaft assembly is actuated by a cross level knob. This assembly controls the cant of the M171A1 mount.

4. Housing Assembly (4). The housing assembly houses the elevation-leveling mechanism and supports the plunger assembly. The plunger assembly secures the M171A1 mount in an upright position on the weapon. A spring-loaded guide is provided to prevent damage to the M171A1 mount if the elevation limit of the instrument is exceeded.

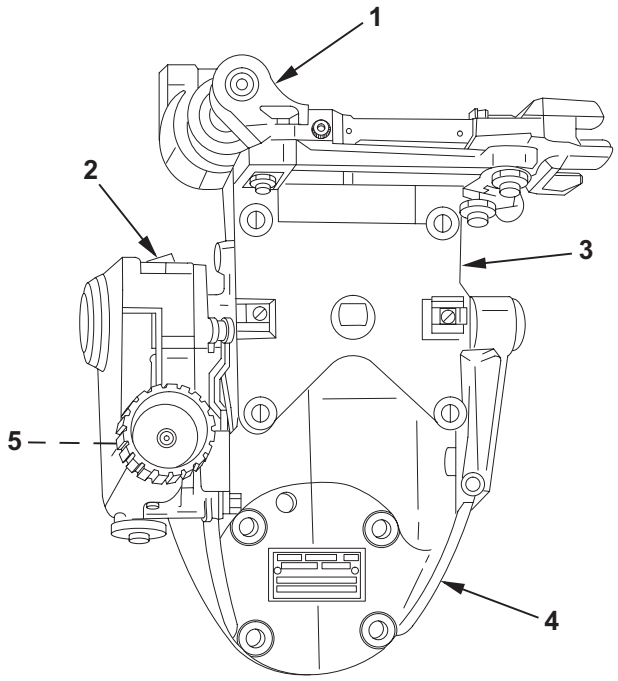
5. Worm Shaft Assembly (Elevation) (5). The worm shaft assembly is located in the housing assembly. It is actuated by the elevation knob.

6. Arm and Adapter Assembly (6). The arm and adapter assembly is located on the face of the arm assembly, and supports the M17A1 quadrant. The mounting adapter provides the keyed interface for assembling the M171A1 mount to the pre-qualified mounting adapter on the weapon trunnion. This adapter also houses the bar. It serves as a reference about which the M171A1 mount is adjusted to compensate in azimuth and elevation for the effects of trunnion cant.

7. Bearing Housing Assembly (7). The bearing housing assembly houses the bearings which permit the smooth, compensating motion when the weapon is elevated. The stem holds the optical instrument support, which seats the M137/M137A2/M137A3 telescope. It also provides the bearing in which the M171A1 mount is cross and elevation leveled. Located at the base of the stem are the cross level vial and elevation level vial.

8. Battery Enclosure Assembly (8). The battery enclosure is located on the optical instrument rocker assembly. It is used to hold the battery.

**M172/M172A1 Telescope and Quadrant Mount**




**M172/M172A1** 1fc012

1. Telescope Mounting Bracket (1). The telescope mounting bracket, attached to the top portion of the adapter assembly, supports the M138/M138A1 telescope. Seats are included to support a M1A2 gunner's quadrant when fine elevation settings are required.

2. Access Cover (2). The access cover is located on top of the housing on the quadrant support assembly. The purpose of the access cover is to protect and aid in alignment of the worm wheel gear sector.

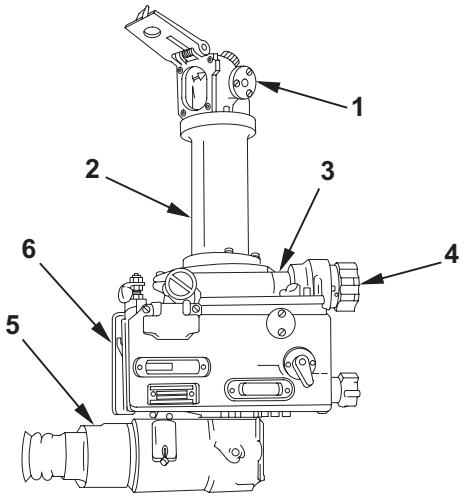
3. Adapter Assembly (3). The adapter assembly supports the M18/M18A1 quadrant. This assembly pivots about an axis, parallel to the weapon bore, to facilitate cross leveling.

4. Quadrant Support Assembly (4). The support assembly provides the keyed interface for assembling the M172/M172A1 mount to the weapon mounting adapter. It also includes the cross-leveling mechanism for the M172/M172A1 mount.

5. Worm Shaft Assembly (5). The worm shaft assembly is located in the housing on the support assembly and is operated using the cross level knob. The worm shaft assembly is used to actuate the adapter assembly.

## LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

### M137 Panoramic Telescope




M137 1fc013

1. Head Assembly (1). The head assembly is capable of 360-degree (6400 mil) revolution. The amount of azimuth travel is indicated by a counter box assembly. The head assembly is adjustable in elevation (± 300 mils) by means of an elevation knob. An entrance window protects the prism and the rest of the M137 telescope against moisture, dirt, and other foreign particles. A window cover, when in the closed position, forms a parallax shield to reduce parallax when viewing a close target.

2. Optical Element Spacer (2). The optical element spacer couples the head assembly to the body assembly at a sufficient height so the line of sight has minimum obstructions.

3. Body Assembly (3). The body assembly includes the main M137 telescope tube and housing and the radioactive sources that illuminate the reticles. This assembly also includes the azimuth knob assembly and associated gearing that rotates the head assembly and drives the counter box assembly. One rotation of the azimuth knob assembly rotates the head assembly 100 mils.

4. Knob Assembly (4). The knob assembly is located on the body assembly. It is used to activate the worm shaft assembly which rotates the head assembly.

5. Elbow Assembly (5). The elbow assembly is located on the bottom of the M137 telescope. The elbow assembly contains the optical cell assembly and adapter assembly.

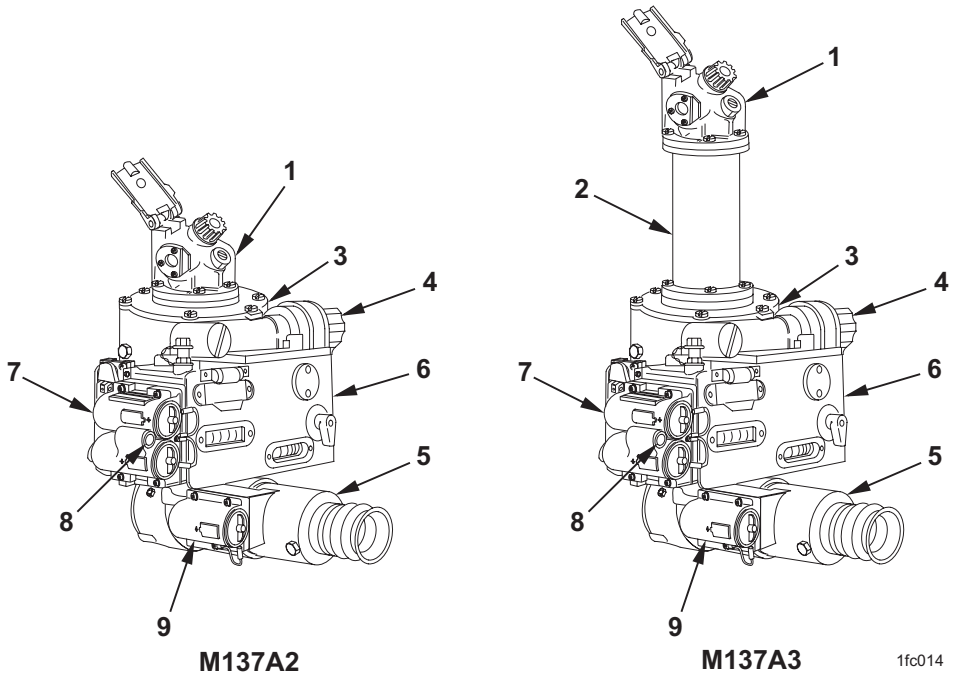
6. Counter Box Assembly (6). The counter box assembly contains the 6400-mil azimuth counter, the 6400-mil deflection counter, and the 95-mil correction counter. It also contains the associated gearing for driving and setting the counters.

   a. The azimuth counter indicates the azimuth angle of the M137 telescope head assembly with respect to the weapon bore.

   b. The deflection counter indicates the azimuth angle in mils. It enables an operator to quickly lay the weapon on a desired deflection setting with respect to the aiming posts or collimator.

   c. The correction counter indicates relatively constant deflection correction.

**M137A2/M137A3 Panoramic Telescope**




1. Head Assembly (1). The head assembly is capable of 360-degree (6400 mil) revolution. The amount of azimuth travel is indicated by a counter box assembly. The head assembly is adjustable in elevation (± 300 mils) by means of an elevation knob. An entrance window protects the prism and the rest of the M137A2/M137A3 telescope against moisture, dirt, and other foreign particles. A window cover, when in the closed position, forms a parallax shield to reduce parallax when viewing a close target.

2. Optical Element Spacer (2). The optical element spacer couples the head assembly to the body assembly at a sufficient height so the line of sight has minimum obstructions.

3. Body Assembly (3). The body assembly includes the main M137A2/M137A3 telescope tube and housing and the LED light sources that illuminate the reticles. This assembly also includes the azimuth knob assembly and associated gearing that rotates the head assembly and drives the counter box assembly. One rotation of the azimuth knob assembly rotates the head assembly 100 mils.

4. Knob Assembly (4). The knob assembly is located on the body assembly. It is used to activate the worm shaft assembly which rotates the head assembly.

5. Elbow Assembly (5). The elbow assembly is located on the bottom of the M137A2/M137A3 telescope. The elbow assembly contains the optical cell assembly and adapter assembly.

6. Counter Box Assembly (6). The counter box assembly contains the 6400-mil azimuth counter, the 6400-mil deflection counter, and the 95-mil correction counter. It also contains the associated gearing for driving and setting the counters.

    a. The azimuth counter indicates the azimuth angle of the M137A2/M137A3 telescope head assembly with respect to the weapon bore.

    b. The deflection counter indicates the azimuth angle in mils. It enables an operator to quickly lay the weapon on a desired deflection setting with respect to the aiming posts or collimator.

    c. The correction counter indicates relatively constant deflection correction.

## LOCATION AND DESCRIPTION OF MAJOR COMPONENTS - Continued

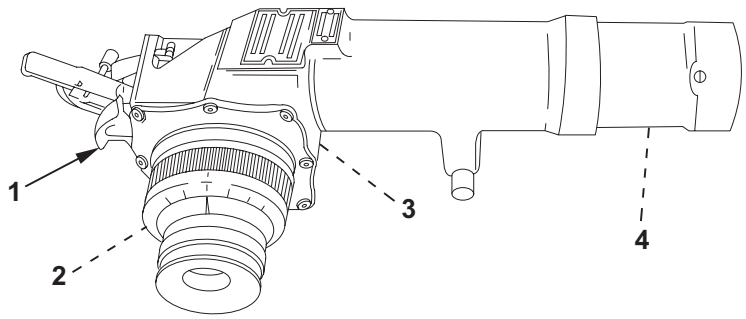
### M137A2/M137A3 Panoramic Telescope - Continued

7. Battery Enclosure Assembly (7). The battery enclosure is located on the counter box assembly. It is used to hold the batteries and is equipped with a power switch.

8. Battery Power Switch (8). The power switch is located on the left side of the battery enclosure assembly. It is used to cycle the battery power on and off. The power switch has a three-second delay.

9. Battery Enclosure Assembly (9). The battery enclosure is located on the elbow telescope. It is used to hold the battery.

### M138 Elbow Telescope




M138 1fc015

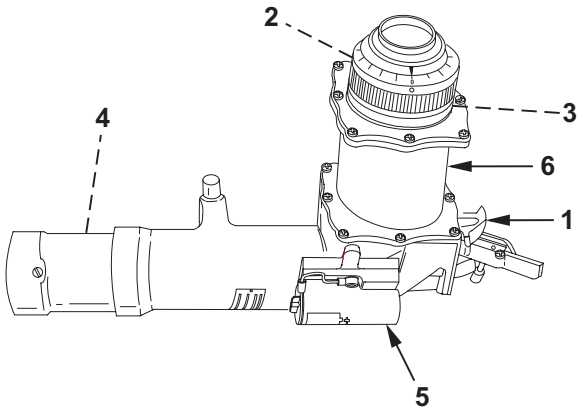
1. Optical Instrument Latch Set (1). The optical instrument latch set is attached to the eyepiece end of the M138 telescope. The optical instrument latch set is used for mounting the telescope to the M172 mount.

2. Eyepiece Cell Assembly (2). The eyepiece cell assembly is inside the diopter adapter assembly, which is attached to the telescope. The eyepiece cell assembly consists of a series of lenses and spacers.

3. Reticle Cell Assembly (3). The reticle cell assembly is inside the rear of the diopter adapter assembly. The reticle cell assembly consists of an optical element cell, and a nuclear lamp for reticle illumination.

4. Objective Cell Assembly (4). The objective cell assembly is located inside the optical instrument housing. The objective cell assembly consists of an optical element cell and an optical instrument lens. An optical instrument eyeshield is attached to the diopter adapter assembly.

### M138A1 Elbow Telescope




M138A1 1fc016

1. Optical Instrument Latch Set (1). The optical instrument latch set is attached to the eyepiece end of the M138A1 telescope. The optical instrument latch set is used for mounting the telescope to the M172/M172A1 mount.

2. Eyepiece Cell Assembly (2). The eyepiece cell assembly is inside the diopter adapter assembly, which is attached to the telescope. The eyepiece cell assembly consists of a series of lenses and spacers.

3. Reticle Cell Assembly (3). The reticle cell assembly is inside the rear of the diopter adapter assembly. The reticle cell assembly consists of an optical element cell and battery powered LEDs for reticle illumination.

4. Objective Cell Assembly (4). The objective cell assembly is located inside the optical instrument housing. The objective cell assembly consists of an optical element cell and an optical instrument lens. An optical instrument eyeshield is attached to the diopter adapter assembly.

5. Battery Enclosure Assembly (5). The battery enclosure is located on the telescope. It is used to hold the battery.

6. Eye Piece Extension (6). The M138A1 telescope is equipped with an eye piece extension for use on the M777 lightweight howitzer.

### EQUIPMENT DATA

| | US CUSTOMARY | METRIC |
|---|---|---|
| **M17 Fire Control Quadrant** | | |
| Correction | ±95 mils | |
| Depression | -280 mils | |
| Elevation | +1433 mils | |
| Least increment reading (counters) | 1 mil | |
| Radioactive material: | | |
| Max surface radiation | 0 millirad per hour | |
| Tritium $H_3$ | 1.86 curies | |
| Weight | 7.5 lb | 3.40 kg |

**EQUIPMENT DATA - Continued**

| | US CUSTOMARY | METRIC |
|---|---|---|
| **M17A1 Fire Control Quadrant** | | |
| Correction | ±95 mils | |
| Depression | -280 mils | |
| Elevation | +1433 mils | |
| Least increment reading (counters) | 1 mil | |
| Batteries: | | |
| Quantity/Cell Size | 2 each/size "C" | |
| Voltage | 3 volts (each) | |
| Weight | 8.5 lb | 3.86 kg |
| **M18 Fire Control Quadrant** | | |
| Correction | ±95 mils | |
| Depression | -280 mils | |
| Elevation | +1433 mils | |
| Least increment reading (counters) | 1 mil | |
| Radioactive material: | | |
| Max surface radiation | 0 millirad per hour | |
| Tritium $H_3$ | 1.95 curies | |
| Weight | 7.5 lb | 3.40 kg |
| **M18A1 Fire Control Quadrant** | | |
| Correction | ±95 mils | |
| Depression | -280 mils | |
| Elevation | +1433 mils | |
| Least increment reading (counters) | 1 mil | |
| Batteries: | | |
| Quantity/Cell Size | 2 each/size "C" | |
| Voltage | 3 volts (each) | |
| Weight | 8.5 lb | 3.86 kg |
| **M171 Telescope and Quadrant Mount** | | |
| Cross level adjustment: | | |
| Left | 178 mils | |
| Right | 178 mils | |
| Depression | -270 mils | |
| Elevation | +1333 mils | |
| Pitch level adjustment: | | |
| Aft | 178 mils | |
| Fore | 178 mils | |
| Radioactive material: | | |
| Max surface radiation | 0 millirad per hour | |
| Tritium $H_3$ | 0.15 curies | |
| Weight: | | |
| Adapter assembly | 3.25 lb | 1.47 kg |
| Mount | 75 lb | 34.02 kg |
| Optical instrument support | 2 lb | 0.91 kg |

| | US CUSTOMARY | METRIC |
|---|---|---|
| **M171A1 Telescope and Quadrant Mount** | | |
| Cross level adjustment: | | |
| Left | 178 mils | |
| Right | 178 mils | |
| Depression | -270 mils | |
| Elevation | +1333 mils | |
| Pitch level adjustment: | | |
| Aft | 178 mils | |
| Fore | 178 mils | |
| Batteries: | | |
| Quantity/Cell Size | 1 each/size "C" | |
| Voltage | 3 volts (each) | |
| Weight: | | |
| Adapter assembly | 3.25 lb | 1.47 kg |
| Mount | 75 lb | 34.02 kg |
| Optical instrument support | 2 lb | 0.91 kg |
| **M172/M172A1 Telescope and Quadrant Mount** | | |
| Boresighting: | | |
| Azimuth | ±18 mils | |
| Elevation | ±15 mils | |
| Cross level adjustment | ±34 degrees | |
| Weight: | | |
| Adapter assembly | 4.75 lb | 2.15 kg |
| Mount | 27.5 lb | 12.47 kg |
| **M137 Panoramic Telescope** | | |
| Field of view | 10 degrees | |
| Movement: | | |
| Azimuth counter | 6400 mils* | |
| Azimuth (deflection) | 6400 mils | |
| Correction (AZ) | ±95 mils | |
| Elevation | ±300 mils | |
| Least increment reading (AZ) | 1.0 mils | |
| Optical characteristics: | | |
| Clear eye distance | 0.88 in. | 2.24 cm |
| Effective focal length: | | |
| Eyeshield | 1.00 in. | 2.54 cm |
| Objective | 4.00 in. | 10.16 cm |
| Exit pupil diameter | | 7 mm |
| Field of view | 10 degrees | |
| Power | 4X | |
| Radioactive material: | | |
| Max surface radiation | 0 millirad per hour | |
| Tritium $H_3$ | 5.1 curies | |
| Weight | 19 lb | 8.62 kg |

*lncreasing counterclockwise.

**EQUIPMENT DATA - Continued**

| | US CUSTOMARY | METRIC |
|---|---|---|
| **M137A2/M137A3 Panoramic Telescope** | | |
| Field of view | 10 degrees | |
| Movement: | | |
| Azimuth counter | 6400 mils* | |
| Azimuth (deflection) | 6400 mils | |
| Correction (AZ) | ±95 mils | |
| Elevation | ±300 mils | |
| Least increment reading (AZ) | 1.0 mils | |
| Optical characteristics: | | |
| Clear eye distance | 0.88 in. | 2.24 cm |
| Effective focal length: | | |
| Eyeshield | 1.00 in. | 2.54 cm |
| Objective | 4.00 in. | 10.16 cm |
| Exit pupil diameter | | 7 mm |
| Field of view | 10 degrees | |
| Power | 4X | |
| Batteries: | | |
| Quantity/Cell Size | 3 each/size "C" | |
| Voltage | 3 volts (each) | |
| Weight | 19 lb | 8.62 kg |
| **M138 Elbow Telescope** | | |
| Elevation | 60 mils | |
| Field of view | 8 degrees | |
| Optical characteristics: | | |
| Diopter adjustment | ±4 diopters | |
| Effective focal length: | | |
| Clear eye distance | 6.6 in. | 16.76 cm |
| Eyeshield | 1.5 in. | 3.81 cm |
| Objective | 10 in. | 25.40 cm |
| Exit pupil diameter | | 7 mm |
| Field of view | 8 degrees | |
| Power | 8X | |
| Radioactive material: | | |
| Max surface radiation | 0 millirad per hour | |
| Tritium $H_3$ | 4.4 curies | |
| Weight | 8 lb | 3.63 kg |

*Increasing counterclockwise.

| | US CUSTOMARY | METRIC |
|---|---|---|
| **M138A1 Elbow Telescope** | | |
| Elevation | 60 mils | |
| Field of view | 8 degrees | |
| Optical characteristics: | | |
| Diopter adjustment | ±4 diopters | |
| Effective focal length: | | |
| Clear eye distance | 6.6 in. | 16.76 cm |
| Eyeshield | 1.5 in. | 3.81 cm |
| Objective | 10 in. | 25.40 cm |
| Exit pupil diameter | | 7 mm |
| Field of view | 8 degrees | |
| Power | 8X | |
| Batteries: | | |
| Quantity/Cell Size | 1 each/size "C" | |
| Voltage | 3 volts (each) | |
| Weight | 9 lb | 4.08 kg |

**END OF WORK PACKAGE**

DIRECT SUPPORT AND GENERAL SUPPORT

# THEORY OF OPERATION

## PURPOSE

The fire control equipment instruments provide radioactive and battery-powered sighting capability for the 155-mm howitzer. The M17/M17A1 and M18/M18A1 fire control quadrants measure elevation of the cannon. The M137/M137A2/M137A3 and M138/M138A1 telescopes provide a means of measuring horizontal direction in indirect or direct fire operations. The M171/M171A1 and M172/M172A1 mounts provide a mount for the fire control quadrants and the telescopes.

## END OF WORK PACKAGE

# CHAPTER 2

# DIRECT SUPPORT TROUBLESHOOTING PROCEDURES FOR M17/M18 AND M17A1/M18A1 FIRE CONTROL QUADRANT

**DIRECT SUPPORT**

**M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT**
**(1290-01-037-3883/1290-01-515-8260/1290-01-037-7289/1290-01-515-8262)**

**TROUBLESHOOTING INDEX**

## INTRODUCTION

**a.** The troubleshooting procedures are limited to those listed in the troubleshooting symptom index. The table lists the common malfunctions, which you may find during the operation of maintenance of the M17/M17A1 and M18/M18A1 Fire Control Quadrant. You should perform the tests/inspections and corrective actions in the order listed.

**b.** This manual cannot list all malfunctions that may occur, or all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**c.** Each work package is headed by an initial setup. This setup outlines what is needed as well as certain conditions, which must be met before starting the task. DON'T START A TASK UNTIL:

You understand the task;

You understand what you are to do;

You understand what is needed to do the work;

You have the things you need.

## MALFUNCTION/SYMPTOM INDEX

**a.** The malfunction/symptom index is a quick reference index for finding troubleshooting procedures. Associated with each symptom name is a work package sequence number representing the starting point in a troubleshooting sequence. Should any one symptom require more than one troubleshooting sequence to arrive at the most likely area of investigation, the additional starting point numbers are presented.

**b.** As the troubleshooting activity progresses to the conclusion of a particular sequence, a reference is made to the next logical troubleshooting sequence by work package sequence number or by referring to the malfunction/symptom index to locate the next failure symptom work package. This type of activity continues until successful fault isolation is achieved.

**MALFUNCTION/SYMPTOM INDEX - Continued**


| Malfunction/Symptom | Work Package |
|---|---|
| **COVER ASSEMBLY** | |
| 1. Counter windows are fogged or have condensation | WP 0007 00 |
| **FIRE CONTROL LEVEL ASSEMBLY** | |
| 1. Bubble in elevation level vial is not synchronized with M198 howitzer tube (M17/M18) | WP 0005 00 |
| 2. Bubble in elevation level vial is not synchronized with M198/M777 howitzer tube (M17A1/M18A1) | WP 0006 00 |
| 3. Elevation level vial and cross level vial cannot be read clearly in mirror (M17/M18) | WP 0005 00 |
| 4. Elevation level vial and cross level vial cannot be read clearly in mirror (M17A1/M18A1) | WP 0006 00 |
| 5. Elevation level vial and cross level vial have no bubble and are not illuminated (M17/M18) | WP 0005 00 |
| 6. Elevation level vial and cross level vial have no bubble, but are still illuminated (M17/M18) | WP 0005 00 |
| 7. Elevation level vial and cross level vial have no bubble, but are still illuminated (M17A1/M18A1) | WP 0006 00 |
| 8. Elevation level vial, cross level vial, and counter dials have no illumination (M17A1/M18A1) | WP 0006 00 |
| 9. Elevation level vial, cross level vial, and counter dials have uneven or no illumination (M17/M18) | WP 0005 00 |


**END OF WORK PACKAGE**

**DIRECT SUPPORT**

# M17/M18 FIRE CONTROL QUADRANT (1290-01-037-3883/1290-01-037-7289)

## TROUBLESHOOTING PROCEDURES FIRE CONTROL LEVEL ASSEMBLY

**INITIAL SETUP:**

**Materials/Parts**

Optical lens cleaning compound (item 11, WP 0152 00)
Plastic bag (item 5, WP 0152 00)
Tape (item 20, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**

TM 9-1025-211-34

**FIRE CONTROL LEVEL ASSEMBLY**

**Table 1. Direct Support Troubleshooting Procedures.**

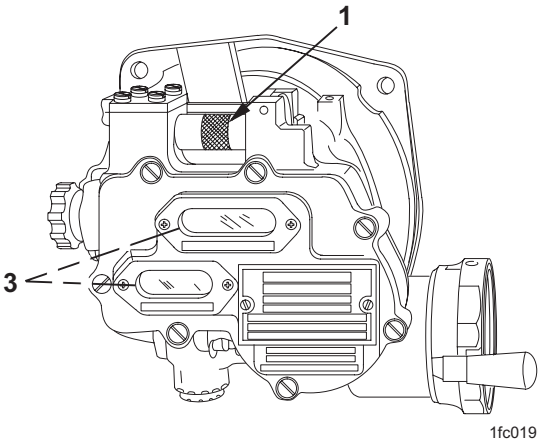
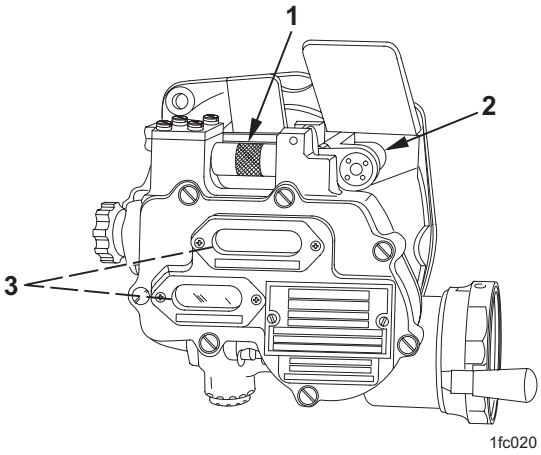
| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| WARNING<br>**RADIATION**   **TRITIUM GAS ($H_3$)**<br>When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.<br>  <br><br>**M17 Quadrant**<br>  <br><br>**M18 Quadrant** | | |
| 1. ELEVATION LEVEL VIAL (1), CROSS LEVEL VIAL (2), AND COUNTER DIALS (3) HAVE UNEVEN OR NO ILLUMINATION. | Observe visually in darkened area. | 1. Contact RSO immediately.<br>2. Perform wipe test under RSO supervision.<br>3. Remove, bag, and secure device under RSO direction and await wipe test results.<br>4. If contaminated, dispose of device per RSO instructions.<br>5. If device is not contaminated, evacuate to next higher level of maintenance. |
| 2. ELEVATION LEVEL VIAL (1) AND CROSS LEVEL VIAL (2) HAVE NO BUBBLE, BUT ARE STILL ILLUMINATED. | Observe visually. | 1. Contact RSO immediately.<br>2. Perform wipe test under RSO supervision.<br>3. Remove, bag, and secure device under RSO direction and await wipe test results. |

**Table 1. Direct Support Troubleshooting Procedures - Continued.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| | | 4. If contaminated, dispose of device per RSO instructions.<br>5. If device is not contaminated, evacuate to next higher level of maintenance. |
| 3. ELEVATION LEVEL VIAL (1) AND CROSS LEVEL VIAL (2) HAVE NO BUBBLE AND ARE NOT ILLUMINATED. | Observe visually. | 1. Contact RSO immediately.<br>2. Perform wipe test under RSO supervision.<br>3. Remove, bag, and secure device under RSO direction and await wipe test results.<br>4. Howitzer should be secured until wipe test results show howitzer is not contaminated.<br>5. If contaminated, dispose of device per RSO instructions.<br>6. If device is not contaminated, evacuate to next higher level of maintenance. |
| 4. BUBBLE IN ELEVATION LEVEL VIAL (1) IS NOT SYNCHRONIZED WITH M198 HOWITZER TUBE. | Observe visually. | 1. Perform the cannon tube synchronization procedure (TM 9-1025-211-34).<br>2. If unable to complete synchronization procedure, notify next higher level of maintenance. |
| 5. ELEVATION LEVEL VIAL (1) AND CROSS LEVEL VIAL (2) CANNOT BE READ CLEARLY IN MIRROR. | Observe visually. | **WARNING**<br>Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.<br>Clean mirror with optical lens cleaning compound (item 11, WP 0152 00). Wipe dry. |

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M17A1/M18A1 FIRE CONTROL QUADRANT**
**(1290-01-515-8260/1290-01-515-8262)**

**TROUBLESHOOTING PROCEDURES**
**FIRE CONTROL LEVEL ASSEMBLY**

**INITIAL SETUP:**

**Materials/Parts**
Battery (2) (item 8, WP 0152 00)
Optical lens cleaning compound (item 11, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
TM 9-1025-211-34
TM 9-1025-215-25&P
WP 0047 00

**FIRE CONTROL LEVEL ASSEMBLY**

WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries.

**FIRE CONTROL LEVEL ASSEMBLY - Continued**

**Table 1. Direct Support Troubleshooting Procedures.**

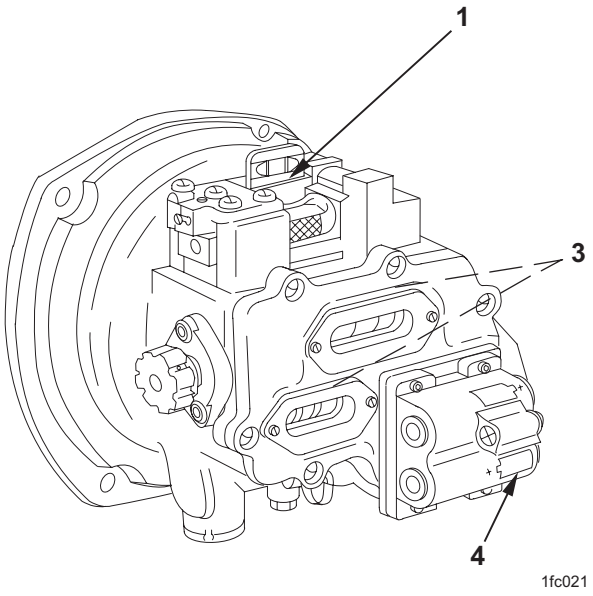
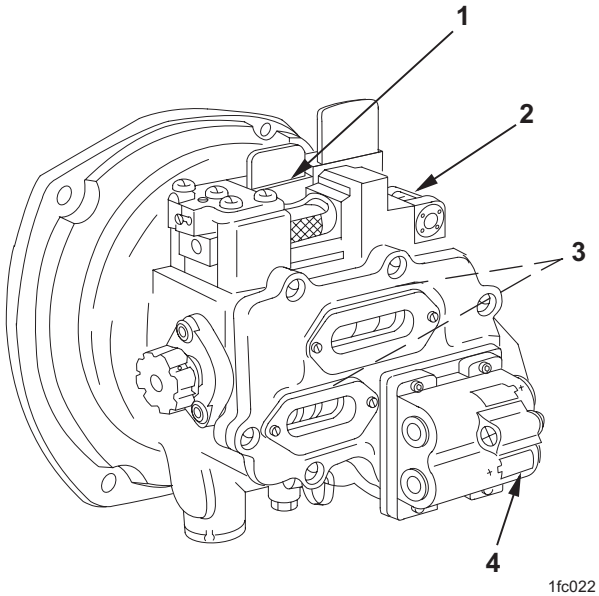
| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
|  <br>1fc021<br>**M17A1 Quadrant** | |  <br>1fc022<br>**M18A1 Quadrant** |
| 1. ELEVATION LEVEL VIAL (1), CROSS LEVEL VIAL (2), AND COUNTER DIALS (3) HAVE NO ILLUMINATION. | Observe visually in darkened area. | 1. Cycle ON/OFF pushbutton switch.<br>a. Press red push-button switch on battery enclosure.<br>**NOTE**<br>Switch has an approximate three-second delay.<br>b. Wait approximately three seconds and check if light-emitting diode (LED) light sources are ON/OFF.<br>c. Repeat above steps until assured of correct operation.<br>2. Check for proper battery installation (same as diagram on battery enclosure). |

**Table 1. Direct Support Troubleshooting Procedures - Continued.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| | | 3. Replace batteries (item 8, WP 0152 00).<br>a. Unscrew battery caps.<br>b. Remove batteries using magnet in battery cap.<br>c. Install new batteries in same direction as diagram on battery enclosure.<br>d. Replace battery caps.<br>4. Replace battery enclosure assembly (4) (WP 0047 00).<br>5. Notify next higher level of maintenance. |
| 2. ELEVATION LEVEL VIAL (1) AND CROSS LEVEL VIAL (2) HAVE NO BUBBLE, BUT ARE STILL ILLUMINATED. | Observe visually. | Notify next higher level of maintenance. |
| 3. BUBBLE IN ELEVATION LEVEL VIAL (1) IS NOT SYNCHRONIZED WITH M198/M777 HOWITZER TUBE. | Observe visually. | 1. Perform the cannon tube synchronization procedure (TM 9-1025-211-34/TM 9-1025-215-25&P).<br>2. If unable to complete synchronization procedure, notify next higher level of maintenance. |
| 4. ELEVATION LEVEL VIAL (1) AND CROSS LEVEL VIAL (2) CANNOT BE READ CLEARLY IN MIRROR. | Observe visually. | **WARNING**<br>Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.<br>Clean mirror with optical lens cleaning compound (item 11, WP 0152 00). Wipe dry. |

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

# M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT (1290-01-037-3883/1290-01-515-8260/1290-01-037-7289/1290-01-515-8262)

## TROUBLESHOOTING PROCEDURES
## COVER ASSEMBLY

**INITIAL SETUP:**

**Materials/Parts**
Soap (item 19, WP 0152 00)

**References**
TM 750-116
WP 0046 00

**COVER ASSEMBLY**

**Table 1. Direct Support Troubleshooting Procedures.**

NOTE

The following steps are written and illustrated for the M17/M18 quadrant but also apply to the M17A1/M18A1 quadrant.

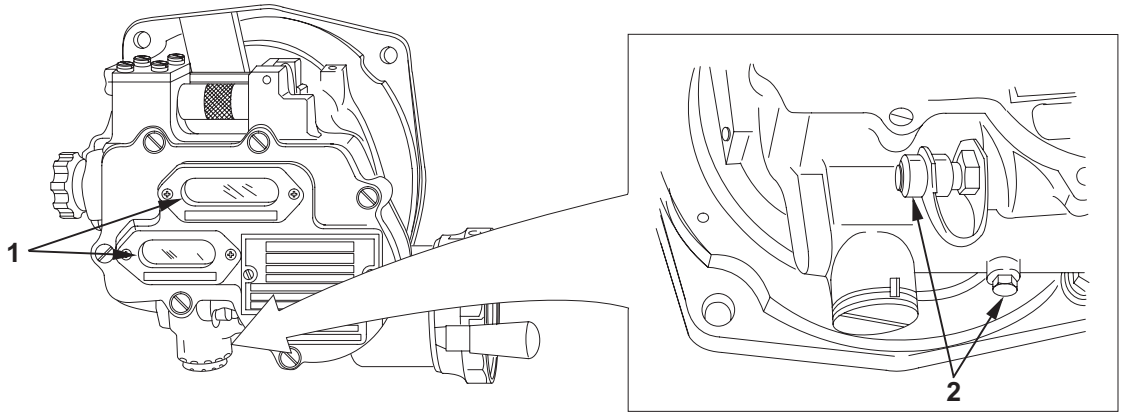
| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|

WARNING

**RADIATION**

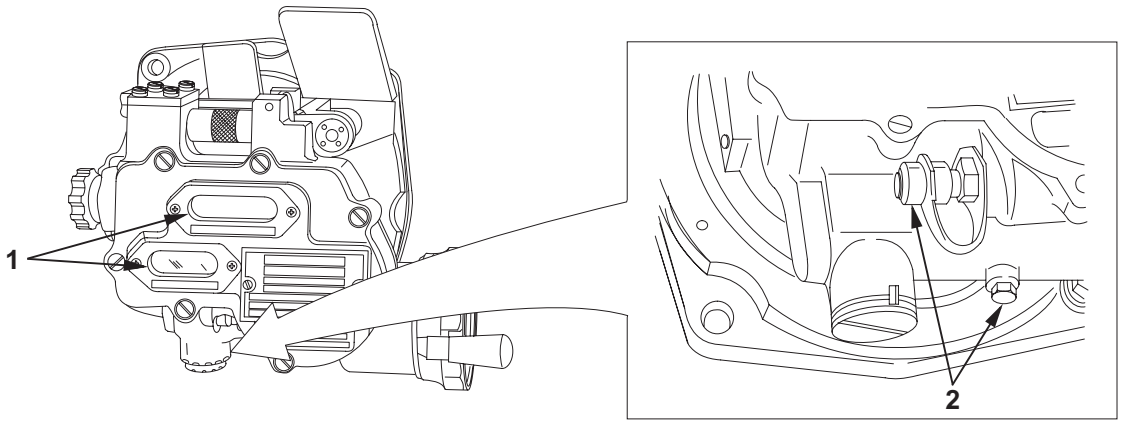
**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.




1fc023

**M17 Quadrant**




1fc024

**M18 Quadrant**

**Table 1. Direct Support Troubleshooting Procedures - Continued.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 1. COUNTER WINDOWS (1) ARE FOGGED OR HAVE CONDENSATION. | NOTE<br>Charge nitrogen pressure to 7 psi (48 kPa). Remove hose. Put soap suds (item 19, WP 0152 00) on valve openings to check for leakage.<br>1. Check for loose or defective valves (2). | 1. Tighten or replace valves (WP 0046 00).<br>2. Purge and charge M17/M18 quadrant with dry nitrogen (TM 750-116).<br>3. If counter windows (1) are still fogged, evacuate to next higher level of maintenance. |

**END OF WORK PACKAGE**

# CHAPTER 3

# GENERAL SUPPORT TROUBLESHOOTING PROCEDURES FOR M17/M18 AND M17A1/M18A1 FIRE CONTROL QUADRANT

## GENERAL SUPPORT

## M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT (1290-01-037-3883/1290-01-515-8260/1290-01-037-7289/1290-01-515-8262)

## TROUBLESHOOTING INDEX

### INTRODUCTION

**a.** The troubleshooting procedures are limited to those listed in the troubleshooting symptom index. The table lists the common malfunctions, which you may find during the operation of maintenance of the M17/M17A1 and M18/M18A1 Fire Control Quadrant. You should perform the tests/inspections and corrective actions in the order listed.

**b.** This manual cannot list all malfunctions that may occur, or all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**c.** Each work package is headed by an initial setup. This setup outlines what is needed as well as certain conditions, which must be met before starting the task. DON'T START A TASK UNTIL:

You understand the task;

You understand what you are to do;

You understand what is needed to do the work;

You have the things you need.

### MALFUNCTION/SYMPTOM INDEX

**a.** The malfunction/symptom index is a quick reference index for finding troubleshooting procedures. Associated with each symptom name is a work package sequence number representing the starting point in a troubleshooting sequence. Should any one symptom require more than one troubleshooting sequence to arrive at the most likely area of investigation, the additional starting point numbers are presented.

**b.** As the troubleshooting activity progresses to the conclusion of a particular sequence, a reference is made to the next logical troubleshooting sequence by work package sequence number or by referring to the malfunction/symptom index to locate the next failure symptom work package. This type of activity continues until successful fault isolation is achieved.

**MALFUNCTION/SYMPTOM INDEX - Continued**


| Malfunction/Symptom | Work Package |
|---|---|
| **CORRECTION KNOB ASSEMBLY (M17/M17A1/M18/M18A1)** | |
| 1. Correction knob binds | WP 0011 00 |
| **COUNTER ASSEMBLY (M17/M17A1/M18/M18A1)** | |
| 1. Correction counter fails to allow +95 to +99 mils max or -95 to -99 mils max | WP 0012 00 |
| 2. Counter numbers are not in horizontal alignment | WP 0012 00 |
| 3. Elevation counter fails to allow 1433 or 9720 mils | WP 0012 00 |
| **COVER ASSEMBLY (M17/M17A1/M18/M18A1)** | |
| 1. Counter windows are fogged or have condensation | WP 0010 00 |
| **FIRE CONTROL LEVEL ASSEMBLIES (M17/M18)** | |
| 1. Bubble in elevation level vial is not level | WP 0009 00 |
| 2. Bubble in elevation level vial is not synchronized with M198 howitzer tube | WP 0009 00 |
| 3. Elevation level vial and cross level vial have no bubble and are not illuminated | WP 0009 00 |
| 4. Elevation level vial and cross level vial have no bubble, but are still illuminated | WP 0009 00 |
| 5. Elevation level vial, cross level vial, and counter dials have uneven or no illumination | WP 0009 00 |
| **WORM SHAFT ASSEMBLY (M17/M17A1/M18/M18A1)** | |
| 1. Elevation knob exceeds 0.7-mil backlash | WP 0013 00 |


**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M17/M18 FIRE CONTROL QUADRANT**
**(1290-01-037-3883/1290-01-037-7289)**

**TROUBLESHOOTING PROCEDURES**
**FIRE CONTROL LEVEL ASSEMBLIES**

**INITIAL SETUP:**

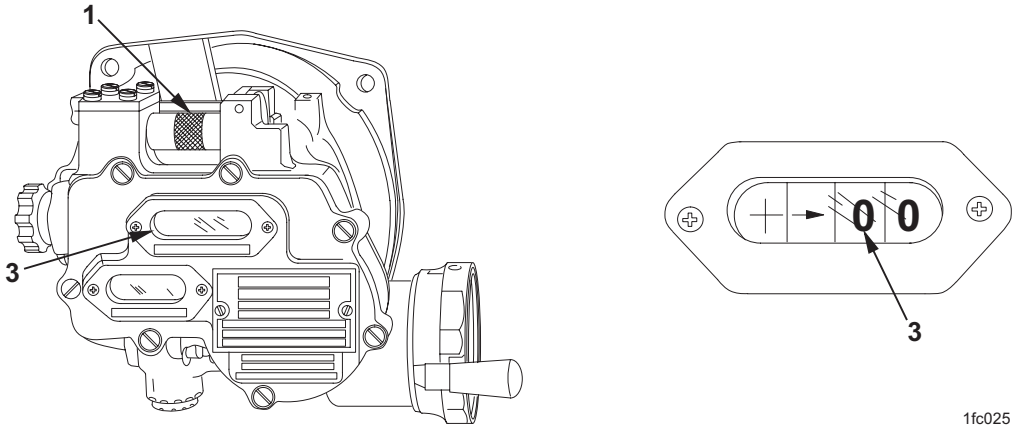
**Materials/Parts**
Plastic bag (item 5, WP 0152 00)
Tape (item 20, WP 0152 00)

**References**
WP 0051 00
WP 0056 00
WP 0057 00

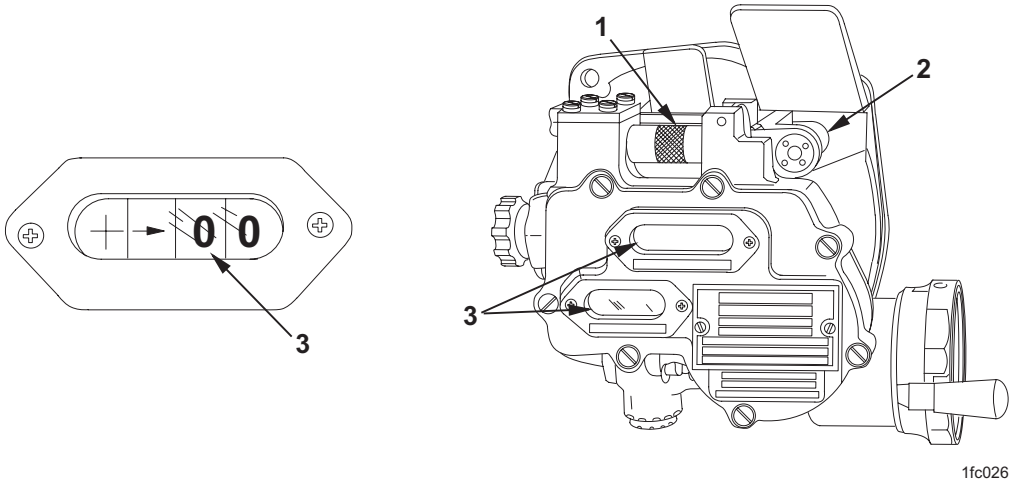
**FIRE CONTROL LEVEL ASSEMBLIES**

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|




**M17 Quadrant**




**M18 Quadrant**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

| | | |
|---|---|---|
| 1. BUBBLE IN ELEVATION LEVEL VIAL (1) IS NOT SYNCHRONIZED WITH M198 HOWITZER TUBE. | Observe visually. | Synchronize elevation level bubble and cannon tube (WP 0057 00). |

**Table 1. Troubleshooting Procedures - Continued.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 2. ELEVATION LEVEL VIAL (1), CROSS LEVEL VIAL (2), AND COUNTER DIALS (3) HAVE UNEVEN OR NO ILLUMINATION. | Observe visually in darkened area. | 1. Contact RSO immediately.<br>2. Perform wipe test under RSO supervision.<br>3. Remove, bag, and secure device under RSO direction and await wipe test results.<br>4. If contaminated, dispose of device per RSO instructions.<br>5. If device is not contaminated, replace elevation level vial (WP 0051 00).<br>6. If device is not contaminated, replace cross level vial (WP 0056 00).<br>7. If device is not contaminated, send to depot for replacement of tritium that illuminates the counter.<br>8. Dispose of replaced vial per RSO instructions. |
| 3. ELEVATION LEVEL VIAL (1) AND CROSS LEVEL VIAL (2) HAVE NO BUBBLE, BUT ARE STILL ILLUMINATED. | Observe visually. | 1. Contact RSO immediately.<br>2. Perform wipe test under RSO supervision.<br>3. Remove, bag, and secure device under RSO direction and await wipe test results.<br>4. If contaminated, dispose of device per RSO instructions.<br>5. If device is not contaminated, replace elevation level vial (WP 0051 00).<br>6. If device is not contaminated, replace cross level vial (WP 0056 00).<br>7. Dispose of replaced vial per RSO instructions. |

**FIRE CONTROL LEVEL ASSEMBLIES - Continued**

**Table 1. Troubleshooting Procedures - Continued.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 4. ELEVATION LEVEL VIAL (1) AND CROSS LEVEL VIAL (2) HAVE NO BUBBLE AND ARE NOT ILLUMINATED. | Observe visually. | 1. Contact RSO immediately.<br>2. Perform wipe test under RSO supervision.<br>3. Remove, bag, and secure device under RSO direction and await wipe test results.<br>4. Howitzer should be secured until wipe test results show howitzer is not contaminated.<br>5. If contaminated, dispose of device per RSO instructions.<br>6. If device is not contaminated, replace elevation level vial (WP 0051 00).<br>7. If device is not contaminated, replace cross level vial (WP 0056 00).<br>8. Dispose of replaced vial per RSO instructions. |
| 5. BUBBLE IN ELEVATION LEVEL VIAL (1) IS NOT LEVEL. | Observe visually. | Adjust eccentric (WP 0051 00). |

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT**
**(1290-01-037-3883/1290-01-515-8260/1290-01-037-7289/1290-01-515-8262)**

**TROUBLESHOOTING PROCEDURES**
**COVER ASSEMBLY**

**INITIAL SETUP:**

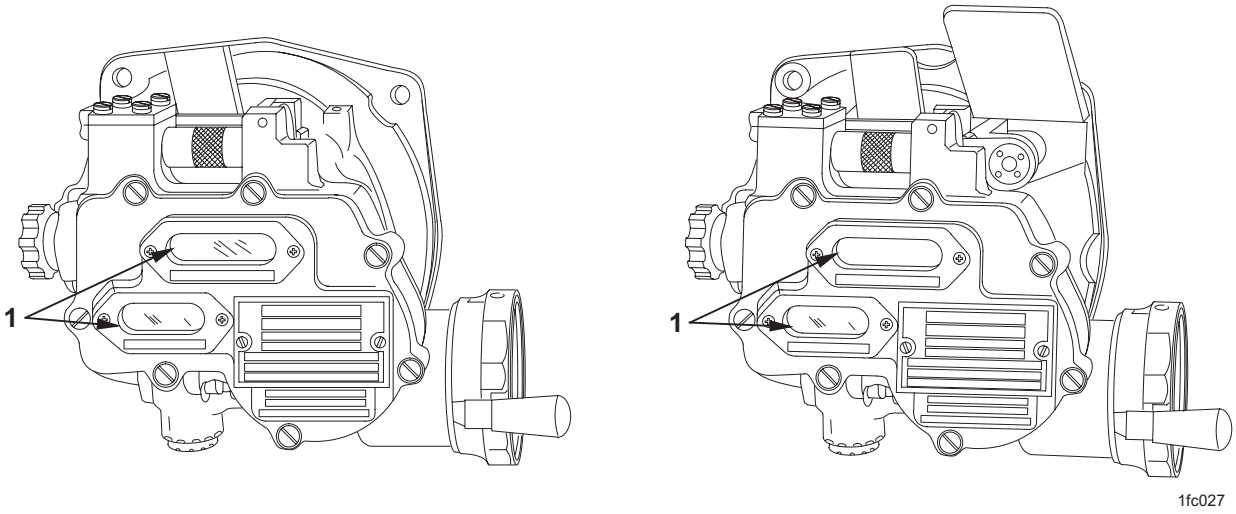
**References**
TM 750-116
WP 0052 00
WP 0053 00

**COVER ASSEMBLY**

**Table 1. Troubleshooting Procedures.**

## NOTE

The following steps are written and illustrated for the M17/M18 quadrant but also apply to the M17A1/M18A1 quadrant.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
|  **M17/M17A1 Quadrant** **M18/M18A1 Quadrant** | | |
| **WARNING** **RADIATION**   **TRITIUM GAS ($H_3$)** When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary. | | |
| 1. COUNTER WINDOWS (1) ARE FOGGED OR HAVE CONDENSATION. | Check for damaged glass or defective or missing parts. | 1. Replace glass if required (WP 0052 00, WP 0053 00).<br>2. Replace defective or missing parts as required and authorized (WP 0052 00, WP 0053 00).<br>3. Purge and charge quadrant with dry nitrogen (TM 750-116). |

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT**
**(1290-01-037-3883/1290-01-515-8260/1290-01-037-7289/1290-01-515-8262)**

**TROUBLESHOOTING PROCEDURES**
**CORRECTION KNOB ASSEMBLY**

**INITIAL SETUP:**

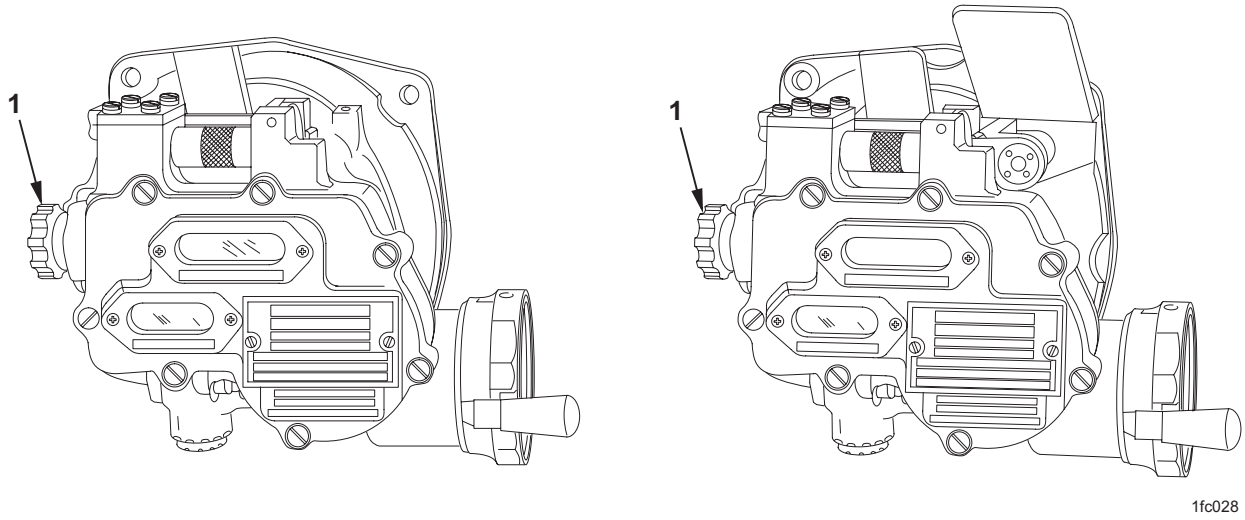
**References**
WP 0049 00
WP 0050 00
WP 0054 00

**CORRECTION KNOB ASSEMBLY**

**Table 1. Troubleshooting Procedures.**

NOTE

The following steps are written and illustrated for the M17/M18 quadrant but also apply to the M17A1/M18A1 quadrant.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
|  **M17/M17A1 Quadrant** **M18/M18A1 Quadrant**<br><br>WARNING<br><br>**RADIATION**   **TRITIUM GAS ($H_3$)**<br><br>When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary. | | |
| 1. CORRECTION KNOB (1) BINDS. | 1. Check for defective correction knob assembly.<br><br>2. Check for defective correction counter. | Replace correction knob assembly (WP 0049 00, WP 0050 00).<br><br>Replace correction counter (WP 0054 00). |

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT**
**(1290-01-037-3883/1290-01-515-8260/1290-01-037-7289/1290-01-515-8262)**

**TROUBLESHOOTING PROCEDURES**
**COUNTER ASSEMBLY**

**INITIAL SETUP:**

**References**
WP 0049 00
WP 0050 00
WP 0054 00

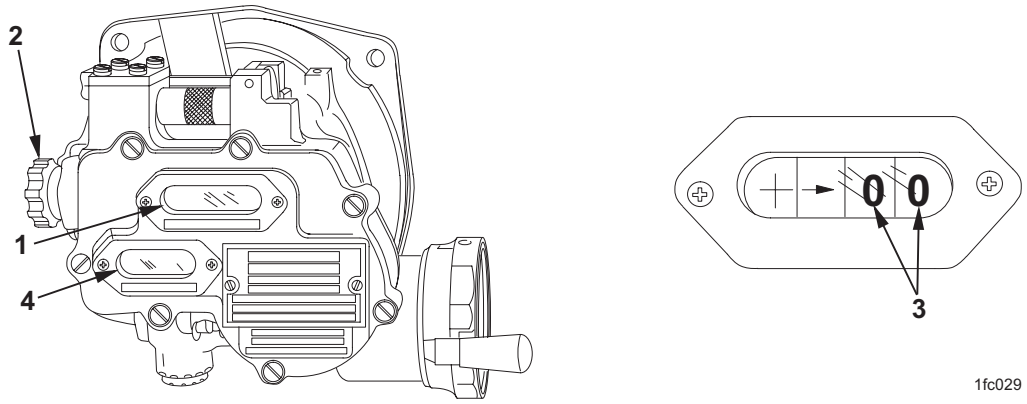
**COUNTER ASSEMBLY**

**Table 1. Troubleshooting Procedures.**

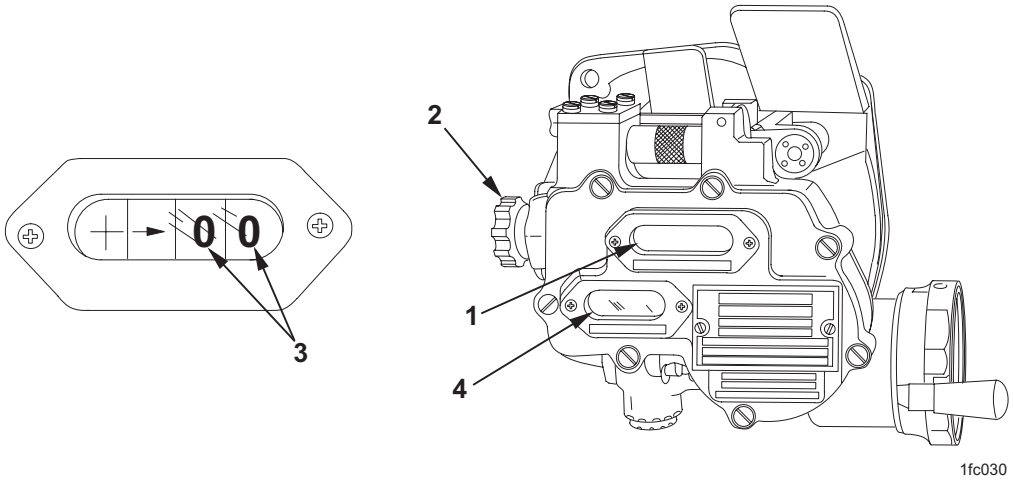
NOTE

The following steps are written and illustrated for the M17/M18 quadrant but also apply to the M17A1/M18A1 quadrant.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|




**M17/M17A1 Quadrant**




**M18/M18A1 Quadrant**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

**COUNTER ASSEMBLY - Continued**

**Table 1. Troubleshooting Procedures – Continued.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 1. CORRECTION COUNTER (1) FAILS TO ALLOW +95 to +99 MILS MAX OR -95 TO -99 MILS MAX. | Check for worn or damaged correction knob assembly (2). | Replace correction knob assembly (WP 0049 00, WP 0050 00). |
| 2. COUNTER NUMBERS (3) ARE NOT IN HORIZONTAL ALIGNMENT. | 1. Observe visually for defective counters. | Replace counter assembly (WP 0054 00). |
| | 2. Check for incorrectly installed counter assembly. | Reinstall counter assembly correctly (WP 0054 00). |
| 3. ELEVATION COUNTER (4) FAILS TO ALLOW 1433 OR 9720 MILS. | 1. Observe visually for defective counter assembly. | Replace counter assembly (WP 0054 00). |
| | 2. Check for incorrectly installed counter assembly. | Reinstall counter assembly correctly (WP 0054 00). |
| | 3. Check for incorrectly installed elevation counter. | Reinstall counter correctly (WP 0054 00). |

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT**
**(1290-01-037-3883/1290-01-515-8260/1290-01-037-7289/1290-01-515-8262)**

**TROUBLESHOOTING PROCEDURES**
**WORM SHAFT ASSEMBLY**

**INITIAL SETUP:**

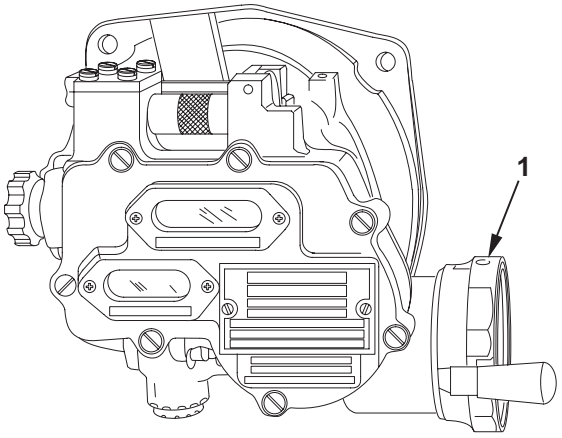
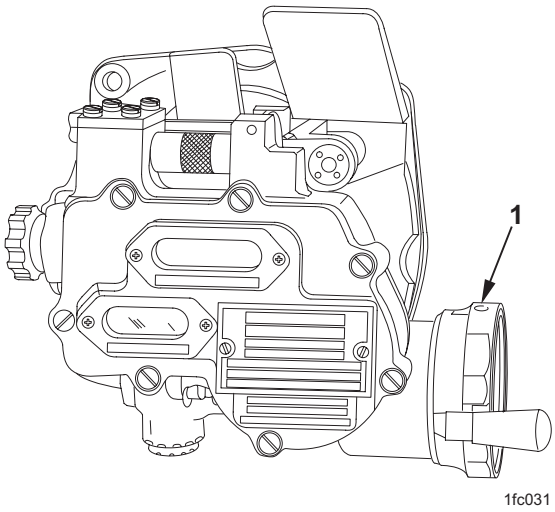
**References**
WP 0055 00

**WORM SHAFT ASSEMBLY**

**Table 1. Troubleshooting Procedures.**

## NOTE

The following steps are written and illustrated for the M17/M18 quadrant but also apply to the M17A1/M18A1 quadrant.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
|  **M17/M17A1 Quadrant**  1fc031 **M18/M18A1 Quadrant** | | |
| **WARNING** **RADIATION**   **TRITIUM GAS ($H_3$)** When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary. | | |
| 1. ELEVATION KNOB (1) EXCEEDS 0.7-MIL BACKLASH. | 1. Check for incorrectly adjusted retainers. | Adjust retainers (WP 0055 00). |
| | 2. Check for worn or damaged parts. | Replace worm shaft assembly and replace parts as required and authorized (WP 0055 00). |

**END OF WORK PACKAGE**

# CHAPTER 4

# DIRECT SUPPORT TROUBLESHOOTING PROCEDURES FOR M171/M171A1 TELESCOPE AND QUADRANT MOUNT

**DIRECT SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

**TROUBLESHOOTING INDEX**

## INTRODUCTION

**a.** The troubleshooting procedures are limited to those listed in the troubleshooting symptom index. The table lists the common malfunctions, which you may find during the operation or maintenance of the M171/M171A1 Telescope and Quadrant Mount. You should perform the tests/inspections and corrective actions in the order listed.

**b.** This manual cannot list all malfunctions that may occur, or all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**c.** Each work package is headed by an initial setup. This setup outlines what is needed as well as certain conditions, which must be met before starting the task. DON'T START A TASK UNTIL:

You understand the task;

You understand what you are to do;

You understand what is needed to do the work;

You have the things you need.

## MALFUNCTION/SYMPTOM INDEX

**a.** The malfunction/symptom index is a quick reference index for finding troubleshooting procedures. Associated with each symptom name is a work package sequence number representing the starting point in the troubleshooting sequence. Should any one symptom require more than one troubleshooting sequence to arrive at the most likely area of investigation, the additional starting point numbers are presented.

**b.** As the troubleshooting activity progresses to the conclusion of a particular sequence, a reference is made to the next logical troubleshooting sequence by work package sequence number or by referring to the malfunction/symptom index to locate the next failure symptom work package. This type of activity continues until successful fault isolation is achieved.

**MALFUNCTION/SYMPTOM INDEX - Continued**


| Malfunction/Symptom | Work Package |
|---|---|
| **BEARING HOUSING ASSEMBLY** | |
| 1. Cross level vial or elevation level vial has no illumination (M171A1) | WP 0017 00 |
| 2. Cross level vial or elevation level vial has uneven or no illumination (M171) | WP 0016 00 |
| 3. Cross level vial or elevation level vial is cracked or bubble is elongated and not illuminated (M171) | WP 0016 00 |
| 4. Cross level vial or elevation level vial is cracked or bubble is elongated but still illuminated (M171) | WP 0016 00 |
| 5. Optical instrument mirror does not clearly reflect images of cross level vial and elevation level vial (M171) | WP 0016 00 |
| 6. Optical instrument mirror does not clearly reflect images of cross level vial and elevation level vial (M171A1) | WP 0017 00 |
| **OPTICAL INSTRUMENT SUPPORT** | |
| 1. Optical instrument support does not seat M137/M137A2/M137A3 telescope correctly | WP 0015 00 |
| 2. Thumbscrews do not secure M137/M137A2/M137A3 telescope correctly (M171) | WP 0015 00 |
| 3. Latches do not secure M137/M137A2/M137A3 telescope correctly (M171A1) | WP 0015 00 |


**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

**TROUBLESHOOTING PROCEDURES**
**OPTICAL INSTRUMENT SUPPORT**

**INITIAL SETUP:**

**Materials/Parts**
Abrasive cloth (item 9, WP 0152 00)
Cleaning compound (item 12, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
WP 0060 00
WP 0061 00

**OPTICAL INSTRUMENT SUPPORT**

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| WARNING<br>RADIATION   TRITIUM GAS ($H_3$)<br>When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary. | | |

**OPTICAL INSTRUMENT SUPPORT - Continued**

**Table 1. Troubleshooting Procedures - Continued.**

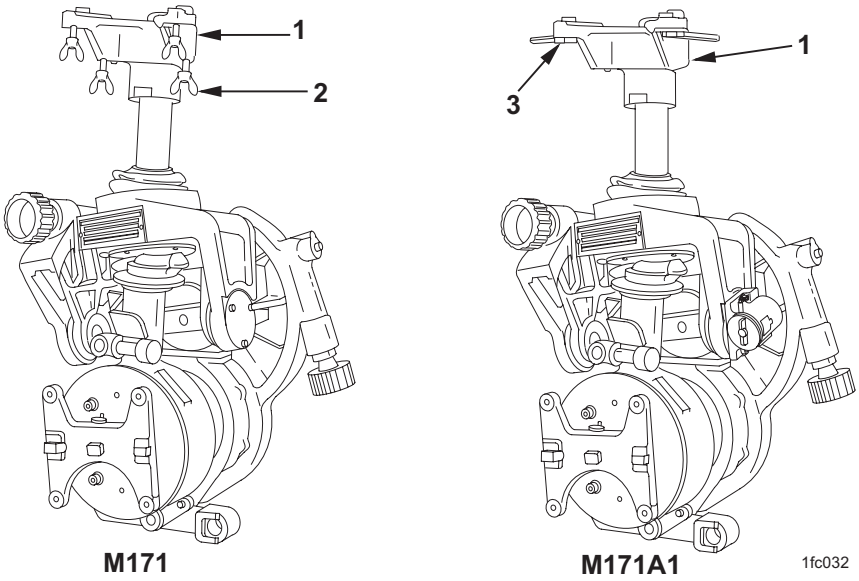
| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
|  | | |
| 1. OPTICAL INSTRUMENT SUPPORT (1) DOES NOT SEAT M137/M137A2/M137A3 TELESCOPE CORRECTLY. | Check mounting surfaces for dirt and burrs. | **WARNING**<br>Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.<br>1. Clean mounting surface with cleaning compound (item 12, WP 0152 00).<br>2. Remove burrs on mounting surface with abrasive cloth (item 9, WP 0152 00) dipped in cleaning compound (item 12, WP 0152 00). |
| 2. THUMBSCREWS (2) DO NOT SECURE M137/M137A2/ M137A3 TELESCOPE CORRECTLY (M171). | Check for serviceability of helicoil inserts on M137/M137A2/M137A3 telescope (pantel).<br>Check for bent or damaged thumbscrews or damaged thumbscrew threads. | Replace thumbscrews (WP 0060 00), if pantel inserts have passed serviceability check. |

**Table 1. Troubleshooting Procedures - Continued.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 3. LATCHES (3) DO NOT SECURE M137/M137A2/ M137A3 TELESCOPE CORRECTLY (M171A1). | Check for serviceability of pins on M137/M137A2/M137A3 telescope (pantel).<br>Check for bent or damaged latches. | Replace latches (WP 0061 00), if pantel pins have passed serviceability check. |

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M171 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273)**

# TROUBLESHOOTING PROCEDURES
# BEARING HOUSING ASSEMBLY

**INITIAL SETUP:**

**Materials/Parts**
Optical lens cleaning compound (item 11, WP 0152 00)
Plastic bag (item 5, WP 0152 00)
Tape (item 20, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
WP 0064 00

**BEARING HOUSING ASSEMBLY**

**Table 1. Troubleshooting Procedures.**

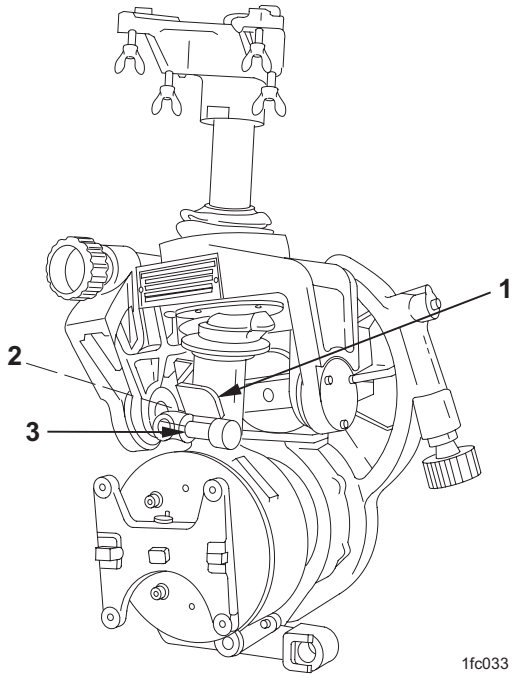
| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| |  | |
| 1. OPTICAL INSTRUMENT MIRROR (1) DOES NOT CLEARLY REFLECT IMAGES OF CROSS LEVEL VIAL (2) AND ELEVATION LEVEL VIAL (3). | Check mirror for dirt, damage, and scars. | **WARNING**<br>Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.<br>1. Clean with cleaning compound (item 11, WP 0152 00).<br>2. Replace mirror (WP 0064 00). |
| 2. CROSS LEVEL VIAL (2) OR ELEVATION LEVEL VIAL (3) HAS UNEVEN OR NO ILLUMINATION. | Observe visually in darkened area. | 1. Contact RSO immediately.<br>2. Perform wipe test under RSO supervision.<br>3. Remove, bag, and secure device under RSO direction and await wipe test results.<br>4. If contaminated, dispose of device per RSO instructions. |

**Table 1. Troubleshooting Procedures - Continued.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| | | 5. If device is not contaminated, evacuate to next higher level of maintenance. |
| 3. CROSS LEVEL VIAL (2) OR ELEVATION LEVEL VIAL (3) IS CRACKED OR BUBBLE IS ELONGATED BUT STILL ILLUMINATED. | Observe visually in darkened area. | 1. Contact RSO immediately.<br>2. Perform wipe test under RSO supervision.<br>3. Remove, bag, and secure device under RSO direction and await wipe test results.<br>4. Howitzer should be secured until wipe test results show howitzer is not contaminated.<br>5. If contaminated, dispose of device per RSO instructions.<br>6. If device is not contaminated, evacuate to next higher level of maintenance. |
| 4. CROSS LEVEL VIAL (2) OR ELEVATION LEVEL VIAL (3) IS CRACKED OR BUBBLE IS ELONGATED AND NOT ILLUMINATED. | Observe visually in darkened area. | 1. Contact RSO immediately.<br>2. Perform wipe test under RSO supervision.<br>3. Remove, bag, and secure device under RSO direction and await wipe test results.<br>4. If contaminated, dispose of device per RSO instructions.<br>5. If device is not contaminated, evacuate to next higher level of maintenance. |

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-515-8265)**

# TROUBLESHOOTING PROCEDURES
# BEARING HOUSING ASSEMBLY

**INITIAL SETUP:**

**Materials/Parts**
Battery (item 8, WP 0152 00)
Cleaning compound (item 12, WP 0152 00)
Optical lens cleaning compound (item 11, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
WP 0063 00
WP 0064 00

## BEARING HOUSING ASSEMBLY

WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries.

**BEARING HOUSING ASSEMBLY - Continued**

**Table 1. Troubleshooting Procedures.**

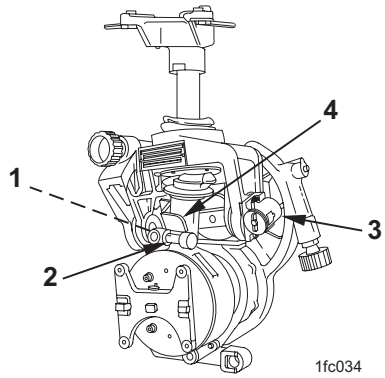
| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| |  | |
| 1. CROSS LEVEL VIAL (1) OR ELEVATION LEVEL VIAL (2) HAS NO ILLUMINATION. | Observe visually in darkened area. | 1. Check for proper battery installation (same as diagram on battery enclosure).<br>2. Replace battery (item 8, WP 0152 00).<br>a. Unscrew battery cap.<br>b. Remove battery using magnet in battery cap.<br>c. Install new battery in same direction as diagram on battery enclosure.<br>d. Replace battery cap.<br>3. Replace battery enclosure assembly (3) (WP 0063 00).<br>4. Notify next higher level of maintenance. |

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 2. OPTICAL INSTRUMENT MIRROR (4) DOES NOT CLEARLY REFLECT IMAGES OF CROSS LEVEL VIAL (1) AND ELEVATION LEVEL VIAL (2). | Check mirror for dirt, damage, and scars. | **WARNING**<br>Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.<br>1. Clean with optical lens cleaning compound (item 11, WP 0152 00).<br>2. Replace mirror (WP 0064 00). |

**END OF WORK PACKAGE**

# CHAPTER 5

# GENERAL SUPPORT TROUBLESHOOTING PROCEDURES FOR M171/M171A1 TELESCOPE AND QUADRANT MOUNT

**GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

**TROUBLESHOOTING INDEX**

## INTRODUCTION

**a.** The troubleshooting procedures are limited to those listed in the troubleshooting symptom index. The table lists the common malfunctions, which you may find during the operation or maintenance of the M171/M171A1 Telescope and Quadrant Mount. You should perform the tests/inspections and corrective actions in the order listed.

**b.** This manual cannot list all malfunctions that may occur, or all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**c.** Each work package is headed by an initial setup. This setup outlines what is needed as well as certain conditions, which must be met before starting the task. DON'T START A TASK UNTIL:

You understand the task;

You understand what you are to do;

You understand what is needed to do the work;

You have the things you need.

## MALFUNCTION/SYMPTOM INDEX

**a.** The malfunction/symptom index is a quick reference index for finding troubleshooting procedures. Associated with each symptom name is a work package sequence number representing the starting point in the troubleshooting sequence. Should any one symptom require more than one troubleshooting sequence to arrive at the most likely area of investigation, the additional starting point numbers are presented.

**b.** As the troubleshooting activity progresses to the conclusion of a particular sequence, a reference is made to the next logical troubleshooting sequence by work package sequence number or by referring to the malfunction/symptom index to locate the next failure symptom work package. This type of activity continues until successful fault isolation is achieved.

**MALFUNCTION/SYMPTOM INDEX - Continued**


| Malfunction/Symptom | Work Package |
|---|---|
| **BEARING HOUSING ASSEMBLY** | |
| 1. Bubble in cross level vial or bubble in elevation level vial does not center within one graduation line (M171) | WP 0019 00 |
| 2. Bubble in cross level vial or bubble in elevation level vial does not center within one graduation line (M171A1) | WP 0020 00 |
| 3. Cross level vial or elevation level vial has no illumination (M171A1) | WP 0020 00 |
| 4. Cross level vial or elevation level vial has uneven or no illumination (M171) | WP 0019 00 |
| 5. Cross level vial or elevation level vial is cracked or broken (M171A1) | WP 0020 00 |
| 6. Cross level vial or elevation level vial is cracked or bubble is elongated but still illuminated (M171) | WP 0019 00 |
| 7. Cross level vial or elevation level vial is cracked or bubble is elongated and not illuminated (M171) | WP 0019 00 |
| 8. M17/M17A1 quadrant does not mount correctly (M171) | WP 0019 00 |
| 9. M17/M17A1 quadrant does not mount correctly (M171A1) | WP 0020 00 |
| 10. Plunger assembly binds (M171) | WP 0019 00 |
| 11. Plunger assembly binds (M171A1) | WP 0020 00 |
| **HOUSING ASSEMBLY** | |
| 1. Elevation control is erratic and rough during movement | WP 0021 00 |
| 2. Elevation knob exceeds 1.5-mil backlash | WP 0021 00 |
| 3. Elevation knob requires torque in excess of 12.00 in.-lb (1.36 N-m) to rotate | WP 0021 00 |
| **OPTICAL INSTRUMENT ROCKER ASSEMBLY** | |
| 1. Cross level control is erratic and rough during movement | WP 0022 00 |
| 2. Cross level knob exceeds 1.5-mil backlash | WP 0022 00 |
| 3. Cross level knob requires torque in excess of 12.00 in.-lb (1.36 N-m) to rotate | WP 0022 00 |


**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M171 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273)**

**TROUBLESHOOTING PROCEDURES**
**BEARING HOUSING ASSEMBLY**

**INITIAL SETUP:**

**Materials/Parts**
Cleaning compound (item 12, WP 0152 00)
Plastic bag (item 5, WP 0152 00)
Tape (item 20, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
WP 0065 00
WP 0072 00
WP 0073 00

**BEARING HOUSING ASSEMBLY**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

**BEARING HOUSING ASSEMBLY - Continued**

**Table 1. Troubleshooting Procedures.**

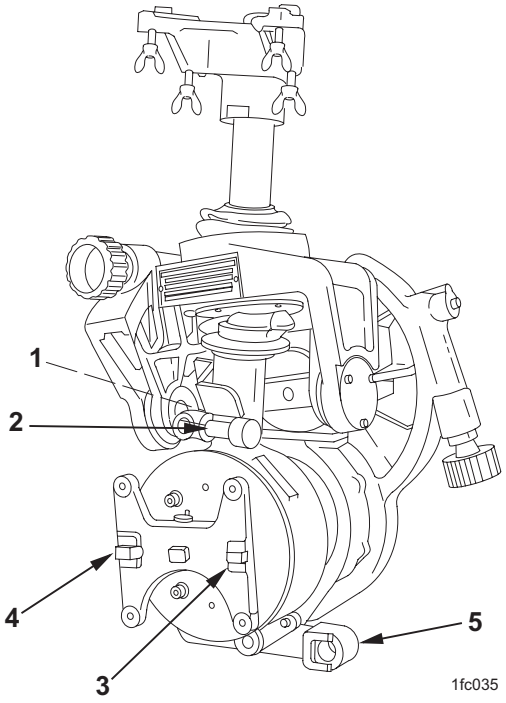
| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
|  | | |
| 1. BUBBLE IN CROSS LEVEL VIAL (1) OR BUBBLE IN ELEVATION LEVEL VIAL (2) DOES NOT CENTER WITHIN ONE GRADUATION LINE. | Check for incorrect adjustment (WP 0073 00). | Adjust bubble in cross level vial (1) or bubble in elevation level vial (2) correctly (WP 0073 00). |
| 2. CROSS LEVEL VIAL (1) OR ELEVATION LEVEL VIAL (2) HAS UNEVEN OR NO ILLUMINATION. | 1. Check cross level vial (1) or elevation level vial (2) for illumination. | 1. Contact RSO immediately.<br>2. Perform wipe test under RSO supervision.<br>3. Remove, bag, and secure device under RSO direction and await wipe test results.<br>4. If contaminated, dispose of device per RSO instructions.<br>5. If device is not contaminated, replace cross level vial (1) or elevation level vial (2) (WP 0065 00).<br>6. Dispose of replaced vial per RSO instructions. |

**Table 1. Troubleshooting Procedures - Continued.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 3. CROSS LEVEL VIAL (1) OR ELEVATION LEVEL VIAL (2) IS CRACKED OR BUBBLE IS ELONGATED BUT STILL ILLUMINATED. | Check cross level vial (1) or elevation level vial (2) for cracks. | 1. Contact RSO immediately.<br>2. Perform wipe test under RSO supervision.<br>3. Remove, bag, and secure device under RSO direction and await wipe test results.<br>4. Howitzer should be secured until wipe test results show howitzer is not contaminated.<br>5. If contaminated, dispose of device per RSO instructions.<br>6. If device is not contaminated, replace cross level vial (1) or elevation level vial (2) (WP 0065 00).<br>7. Dispose of replaced vial per RSO instructions. |
| 4. CROSS LEVEL VIAL (1) OR ELEVATION LEVEL VIAL (2) IS CRACKED OR BUBBLE IS ELONGATED AND NOT ILLUMINATED. | Check cross level vial (1) or elevation level vial (2) for cracks. | 1. Contact RSO immediately.<br>2. Perform wipe test under RSO supervision.<br>3. Remove, bag, and secure device under RSO direction and await wipe test results.<br>4. If contaminated, dispose of device per RSO instructions.<br>5. If device is not contaminated, replace cross level vial (1) or elevation level vial (2) (WP 0065 00).<br>6. Dispose of replaced vial per RSO instructions. |
| 5. M17/M17A1 QUADRANT DOES NOT MOUNT CORRECTLY. | 1. Check for worn or defective keys (3).<br>2. Check for bent or damaged mounting adapter (4). | If worn or defective, replace keys (3) (WP 0072 00).<br>If bent or damaged, replace mounting adapter (WP 0072 00). |

**BEARING HOUSING ASSEMBLY - Continued**

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 6. PLUNGER ASSEMBLY (5) BINDS. | Check for dirt or foreign material. | **WARNING**<br>Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.<br><br>Clean with cleaning compound (item 12, WP 0152 00). |

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-515-8265)**

**TROUBLESHOOTING PROCEDURES**
**BEARING HOUSING ASSEMBLY**

**INITIAL SETUP:**

**Materials/Parts**
Battery (item 8, WP 0152 00)
Cleaning compound (item 12, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
WP 0063 00
WP 0065 00
WP 0072 00
WP 0073 00

**BEARING HOUSING ASSEMBLY**

WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries.

**BEARING HOUSING ASSEMBLY - Continued**

**Table 1. Troubleshooting Procedures.**

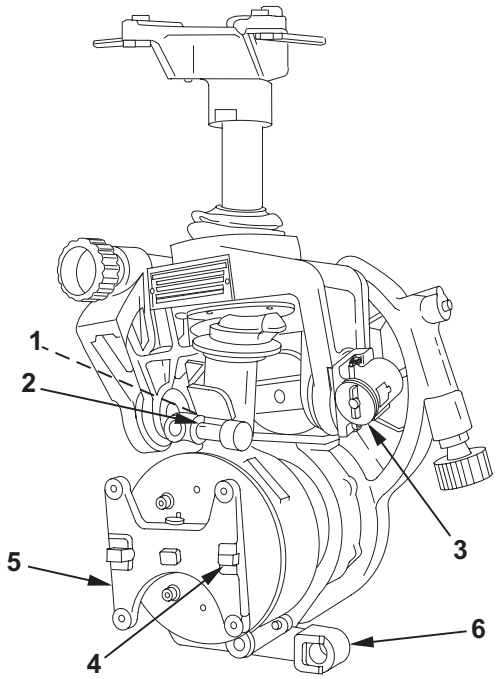
| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
|  1fc035a | | |
| 1. BUBBLE IN CROSS LEVEL VIAL (1) OR BUBBLE IN ELEVATION LEVEL VIAL (2) DOES NOT CENTER WITHIN ONE GRADUATION LINE. | Check for incorrect adjustment (WP 0073 00). | Adjust bubble in cross level vial (1) or bubble in elevation level vial (2) correctly (WP 0073 00). |
| 2. CROSS LEVEL VIAL (1) OR ELEVATION LEVEL VIAL (2) HAS NO ILLUMINATION. | Observe visually. | 1. Check for proper battery installation (same as diagram on battery enclosure).<br>2. Replace battery (item 8, WP 0152 00).<br>a. Unscrew battery cap.<br>b. Remove battery using magnet in battery cap.<br>c. Install new battery in same direction as diagram on battery enclosure.<br>d. Replace battery cap. |

**Table 1. Troubleshooting Procedures - Continued.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| | | 3. Replace battery enclosure assembly (3) (WP 0063 00). |
| 3. CROSS LEVEL VIAL (1) OR ELEVATION LEVEL VIAL (2) IS CRACKED OR BROKEN. | Visually check for cracks or breaks. | **CAUTION**<br>To prevent equipment damage, ensure that elevation level vial and cross level vial are positioned correctly.<br>Replace vials (WP 0065 00). |
| 4. M17/M17A1 QUADRANT DOES NOT MOUNT CORRECTLY. | 1. Check for worn or defective keys (4).<br>2. Check for bent or damaged mounting adapter (5). | If worn or defective, replace keys (4) (WP 0072 00).<br>If bent or damaged, replace mounting adapter (WP 0072 00). |
| 5. PLUNGER ASSEMBLY (6) BINDS. | Check for dirt or foreign material. | **WARNING**<br>Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.<br>Clean with cleaning compound (item 12, WP 0152 00). |

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

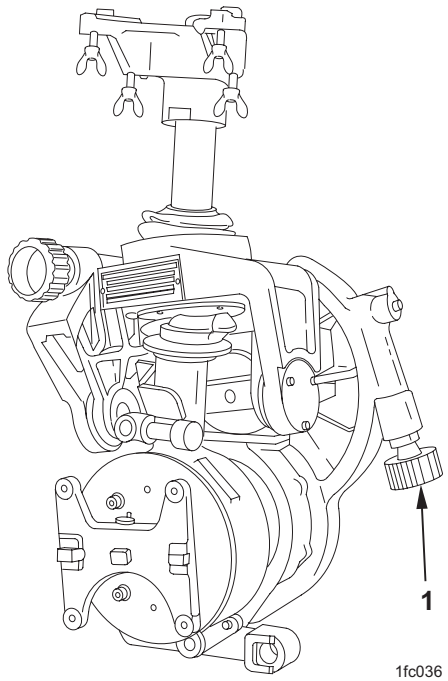
# TROUBLESHOOTING PROCEDURES
# HOUSING ASSEMBLY

**INITIAL SETUP:**

**References**
WP 0070 00

**HOUSING ASSEMBLY**

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| |  | |
| 1. ELEVATION CONTROL IS ERRATIC AND ROUGH DURING MOVEMENT. | 1. Check for worn or defective worm shaft assembly. | If worn or defective, replace worm shaft assembly (WP 0070 00). |
| | 2. Check for worn or defective gears in gear sector. | If worn or defective, replace gear sector (WP 0070 00). |
| 2. ELEVATION KNOB (1) EXCEEDS 1.5-MIL BACKLASH. | 1. Check for loose or worn V-bearing or plain bearing. | Replace V-bearing or plain bearing (WP 0070 00). |
| | 2. Check for worn or defective worm shaft assembly. | If worn or defective, replace worm shaft assembly (WP 0070 00). |
| 3. ELEVATION KNOB (1) REQUIRES TORQUE IN EXCESS OF 12.00 IN.-LB (1.36 N-M) TO ROTATE. | 1. Check V-bearing tightness. | Loosen plug, and adjust torque (WP 0070 00). |
| | 2. Check for defective worm shaft assembly, plain bearing, or V-bearing. | Replace worm shaft assembly, plain bearing, or V-bearing (WP 0070 00). |

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

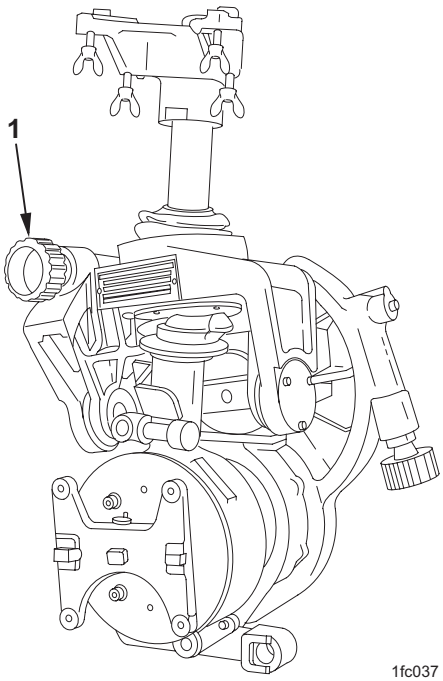
# TROUBLESHOOTING PROCEDURES
# OPTICAL INSTRUMENT ROCKER ASSEMBLY

**INITIAL SETUP:**

**References**
WP 0069 00
WP 0070 00

## OPTICAL INSTRUMENT ROCKER ASSEMBLY

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| |  | |
| 1. CROSS LEVEL CONTROL IS ERRATIC AND ROUGH DURING MOVEMENT. | 1. Check for worn or defective worm shaft assembly. | Replace worm shaft assembly (WP 0069 00). |
| | 2. Check for worn or defective gears in gear sector. | Replace gear sector (WP 0070 00). |
| 2. CROSS LEVEL KNOB (1) EXCEEDS 1.5-MIL BACKLASH. | 1. Check for loose or worn V-bearing or plain bearing. | Replace V-bearing or plain bearing (WP 0069 00). |
| | 2. Check for worn or defective worm shaft assembly. | Replace worm shaft assembly (WP 0069 00). |
| 3. CROSS LEVEL KNOB (1) REQUIRES TORQUE IN EXCESS OF 12.00 IN.-LB (1.36 N-M) TO ROTATE. | 1. Check V-bearing tightness. | Loosen plug, and adjust torque (WP 0069 00). |
| | 2. Check for defective worm shaft assembly, plain bearing, or V-bearing. | Replace worm shaft assembly, plain bearing, or V-bearing (WP 0069 00). |

**END OF WORK PACKAGE**

# CHAPTER 6

# DIRECT SUPPORT TROUBLESHOOTING PROCEDURES FOR M172/M172A1 TELESCOPE AND QUADRANT MOUNT

**DIRECT SUPPORT**

**M172/M172A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-037-7290/1240-01-517-2171)**

**TROUBLESHOOTING INDEX**

## INTRODUCTION

**a.** The troubleshooting procedures are limited to those listed in the troubleshooting symptom index. The table lists the common malfunctions, which you may find during the operation or maintenance of the M172/M172A1 Telescope and Quadrant Mount. You should perform the tests/inspections and corrective actions in the order listed.

**b.** This manual cannot list all malfunctions that may occur, or all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**c.** Each work package is headed by an initial setup. This setup outlines what is needed as well as certain conditions, which must be met before starting the task. DON'T START A TASK UNTIL:

You understand the task;

You understand what you are to do;

You understand what is needed to do the work;

You have the things you need.

## MALFUNCTION/SYMPTOM INDEX

**a.** The malfunction/symptom index is a quick reference index for finding troubleshooting procedures. Associated with each symptom name is a work package sequence number representing the starting point in the troubleshooting sequence. Should any one symptom require more than one troubleshooting sequence to arrive at the most likely area of investigation, the additional starting point numbers are presented.

**b.** As the troubleshooting activity progresses to the conclusion of a particular sequence, a reference is made to the next logical troubleshooting sequence by work package sequence number or by referring to the malfunction/symptom index to locate the next failure symptom work package. This type of activity continues until successful fault isolation is achieved.

**MALFUNCTION/SYMPTOM INDEX - Continued**


| Malfunction/Symptom | Work Package |
|---|---|
| **ADAPTER ASSEMBLY** | |
| 1. Telescope mounting bracket difficult to level | WP 0024 00 |
| **QUADRANT ADAPTER** | |
| 1. M18/M18A1 quadrant does not mount correctly | WP 0025 00 |


**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M172/M172A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-037-7290/1240-01-517-2171)**

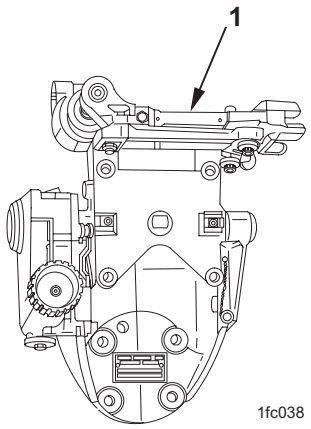
**TROUBLESHOOTING PROCEDURES**
**ADAPTER ASSEMBLY**

**INITIAL SETUP:**

**References**
WP 0076 00

**ADAPTER ASSEMBLY**

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| |  | |
| 1. TELESCOPE MOUNTING BRACKET (1) DIFFICULT TO LEVEL. | Check for defective eccentric stud assembly. | Replace eccentric stud assembly (WP 0076 00). |

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M172/M172A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-037-7290/1240-01-517-2171)**

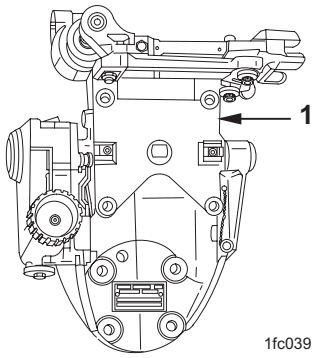
**TROUBLESHOOTING PROCEDURES**
**QUADRANT ADAPTER**

**INITIAL SETUP:**

**Materials/Parts**
Abrasive cloth (item 9, WP 0152 00)
Cleaning compound (item 12, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**QUADRANT ADAPTER**

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| |  | |
| 1. M18/M18A1 QUADRANT DOES NOT MOUNT CORRECTLY. | Check mounting surface (1) for dirt or burrs. | **WARNING**<br>Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever cleaning compound is used.<br>1. Clean mounting surface with cleaning compound (item 12, WP 0152 00). |

**QUADRANT ADAPTER - Continued**

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 1. M18/M18A1 QUADRANT DOES NOT MOUNT CORRECTLY - Continued. | | 2. Remove burrs on mounting surface with abrasive cloth (item 9, WP 0152 00) dipped in cleaning compound (item 12, WP 0152 00). |

**END OF WORK PACKAGE**

# CHAPTER 7

# GENERAL SUPPORT TROUBLESHOOTING PROCEDURES FOR M172/M172A1 TELESCOPE AND QUADRANT MOUNT

## GENERAL SUPPORT

## M172/M172A1 TELESCOPE AND QUADRANT MOUNT (1240-01-037-7290/1240-01-517-2171)

## TROUBLESHOOTING INDEX

### INTRODUCTION

**a.** The troubleshooting procedures are limited to those listed in the troubleshooting symptom index. The table lists the common malfunctions, which you may find during the operation or maintenance of the M172/M172A1 Telescope and Quadrant Mount. You should perform the tests/inspections and corrective actions in the order listed.

**b.** This manual cannot list all malfunctions that may occur, or all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**c.** Each work package is headed by an initial setup. This setup outlines what is needed as well as certain conditions, which must be met before starting the task. DON'T START A TASK UNTIL:

You understand the task;

You understand what you are to do;

You understand what is needed to do the work;

You have the things you need.

### MALFUNCTION/SYMPTOM INDEX

**a.** The malfunction/symptom index is a quick reference index for finding troubleshooting procedures. Associated with each symptom name is a work package sequence number representing the starting point in the troubleshooting sequence. Should any one symptom require more than one troubleshooting sequence to arrive at the most likely area of investigation, the additional starting point numbers are presented.

**b.** As the troubleshooting activity progresses to the conclusion of a particular sequence, a reference is made to the next logical troubleshooting sequence by work package sequence number or by referring to the malfunction/symptom index to locate the next failure symptom work package. This type of activity continues until successful fault isolation is achieved.

**MALFUNCTION/SYMPTOM INDEX - Continued**


| Malfunction/Symptom | Work Package |
|---|---|
| **M172/M172A1 TELESCOPE AND QUADRANT MOUNT** | |
| 1. Cross level control is erratic and rough during movement | WP 0027 00 |
| 2. Cross level knob exceeds 1.5-mil backlash | WP 0027 00 |
| 3. Cross level knob requires torque in excess of 12.00 in.-lb (1.36 N-m) to rotate | WP 0027 00 |
| **TELESCOPE MOUNTING BRACKET** | |
| 1. Telescope mounting bracket does not seat M138/M138A1 telescope correctly | WP 0028 00 |
| 2. Shaft does not seat correctly in M138/M138A1 telescope latch assembly | WP 0028 00 |


**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M172/M172A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-037-7290/1240-01-517-2171)**

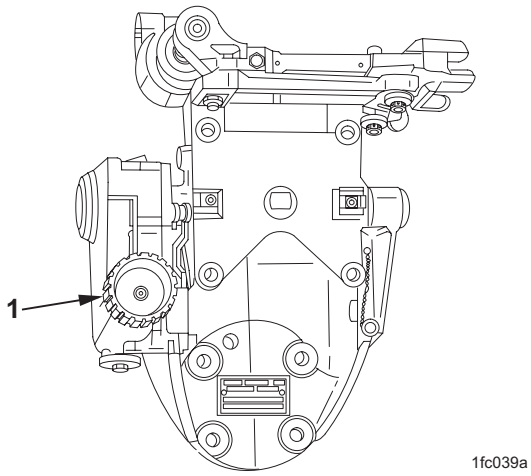
# TROUBLESHOOTING PROCEDURES
# M172/M172A1 TELESCOPE AND QUADRANT MOUNT

**INITIAL SETUP:**

**References**
WP 0077 00
WP 0080 00

## M172/M172A1 TELESCOPE AND QUADRANT MOUNT

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
|  | | |
| 1. CROSS LEVEL CONTROL IS ERRATIC AND ROUGH DURING MOVEMENT. | 1. Check for worn or defective worm shaft assembly. | Replace worm shaft assembly (WP 0077 00). |
| | 2. Check for worn or defective gears in gear sector. | Replace gear sector (WP 0080 00). |
| 2. CROSS LEVEL KNOB (1) EXCEEDS 1.5-MIL BACKLASH. | 1. Check for loose or worn V-bearing or plain bearing. | Replace V-bearing or plain bearing (WP 0077 00). |
| | 2. Check for worn or defective worm shaft assembly. | Replace worm shaft assembly (WP 0077 00). |
| 3. CROSS LEVEL KNOB (1) REQUIRES TORQUE IN EXCESS OF 12.00 IN.-LB (1.36 N-M) TO ROTATE. | 1. Check V-bearing tightness. | Loosen plug, and adjust torque (WP 0077 00). |
| | 2. Check for defective worm shaft assembly, plain bearing, or V-bearing. | Replace worm shaft assembly, plain bearing, or V-bearing (WP 0077 00). |

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M172/M172A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-037-7290/1240-01-517-2171)**

**TROUBLESHOOTING PROCEDURES**
**TELESCOPE MOUNTING BRACKET**

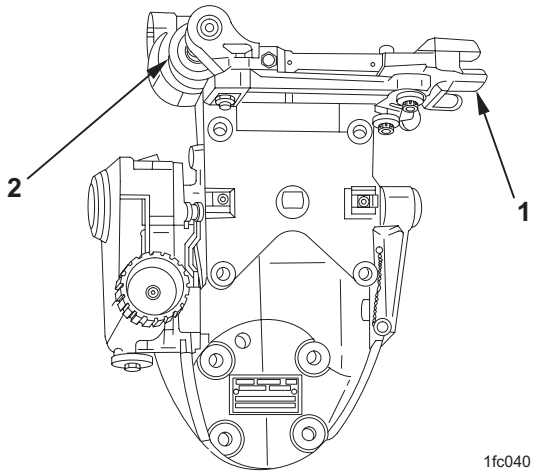
**INITIAL SETUP:**

**Materials/Parts**
Abrasive cloth (item 9, WP 0152 00)
Cleaning compound (item 12, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
WP 0078 00

## TELESCOPE MOUNTING BRACKET

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
|  | | |
| 1. TELESCOPE MOUNTING BRACKET (1) DOES NOT SEAT M138/M138A1 TELESCOPE CORRECTLY. | Check for dirt or burrs on telescope mounting bracket. | **WARNING**<br>Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.<br>1. Clean mounting surface with cleaning compound (item 12, WP 0152 00).<br>2. Remove burrs on mounting surface with abrasive cloth (item 9, WP 0152 00) dipped in cleaning compound (item 12, WP 0152 00). |
| 2. SHAFT (2) DOES NOT SEAT CORRECTLY IN M138/M138A1 TELESCOPE LATCH ASSEMBLY. | Check for damaged or worn shaft. | Replace telescope mounting bracket (WP 0078 00). |

**END OF WORK PACKAGE**

# CHAPTER 8

# DIRECT SUPPORT TROUBLESHOOTING PROCEDURES FOR M137/M137A2/M137A3 PANORAMIC TELESCOPE

**DIRECT SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**TROUBLESHOOTING INDEX**

## INTRODUCTION

**a.** The troubleshooting procedures are limited to those listed in the troubleshooting symptom index. The table lists the common malfunctions, which you may find during the operation or maintenance of the M137/M137A2/M137A3 Panoramic Telescope. You should perform the tests/inspections and corrective actions in the order listed.

**b.** This manual cannot list all malfunctions that may occur, or all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**c.** Each work package is headed by an initial setup. This setup outlines what is needed as well as certain conditions, which must be met before starting the task. DON'T START A TASK UNTIL:

You understand the task;

You understand what you are to do;

You understand what is needed to do the work;

You have the things you need.

## MALFUNCTION/SYMPTOM INDEX

**a.** The malfunction/symptom index is a quick reference index for finding troubleshooting procedures. Associated with each symptom name is a work package sequence number representing the starting point in the troubleshooting sequence. Should any one symptom require more than one troubleshooting sequence to arrive at the most likely area of investigation, the additional starting point numbers are presented.

**b.** As the troubleshooting activity progresses to the conclusion of a particular sequence, a reference is made to the next logical troubleshooting sequence by work package sequence number or by referring to the malfunction/symptom index to locate the next failure symptom work package. This type of activity continues until successful fault isolation is achieved.

**MALFUNCTION/SYMPTOM INDEX - Continued**


| Malfunction/Symptom | Work Package |
|---|---|
| **COUNTER BOX ASSEMBLY** | |
| 1. Azimuth counter cover does not remain open or closed (M137) | WP 0034 00 |
| 2. Azimuth counter cover does not remain open or closed (M137A2/M137A3) | WP 0035 00 |
| 3. Counter box windows are fogged or have condensation (M137) | WP 0034 00 |
| 4. Counter box windows are fogged or have condensation (M137A2/M137A3) | WP 0035 00 |
| 5. Counter dials have uneven or no illumination (M137) | WP 0034 00 |
| 6. Counter dials have no illumination (M137A2/M137A3) | WP 0035 00 |
| **COVER ASSEMBLY (HEAD)** | |
| 1. Cover plate does not latch correctly | WP 0031 00 |
| **ELBOW ASSEMBLY** | |
| 1. Elbow assembly does not latch correctly | WP 0033 00 |
| **HEAD ASSEMBLY** | |
| 1. Head assembly elevation knob binds | WP 0030 00 |
| **KNOB ASSEMBLY (AZIMUTH)** | |
| 1. Azimuth knob does not function properly | WP 0032 00 |
| **OPTICAL ELEMENTS** | |
| 1. Internal optics are fogged or have condensation | WP 0036 00 |
| 2. Reticle and image have parallax | WP 0036 00 |
| 3. Reticle does not illuminate (M137A2/M137A3) | WP 0036 00 |
| 4. Reticle does not illuminate or has uneven illumination (M137) | WP 0036 00 |


**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**TROUBLESHOOTING PROCEDURES**
**HEAD ASSEMBLY**

**INITIAL SETUP:**

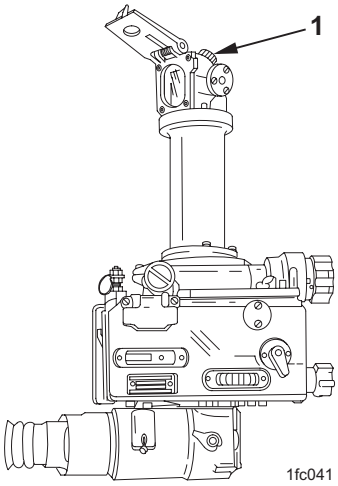
None

**HEAD ASSEMBLY**

**Table 1. Troubleshooting Procedures.**

NOTE

The following steps are written and illustrated for the M137 telescope but also apply to the M137A2/M137A3 telescope.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| |  | |
| 1. HEAD ASSEMBLY ELEVATION KNOB (1) BINDS. | Check for bent actuator. | Notify general support maintenance. |

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**TROUBLESHOOTING PROCEDURES**
**COVER ASSEMBLY (HEAD)**

**INITIAL SETUP:**

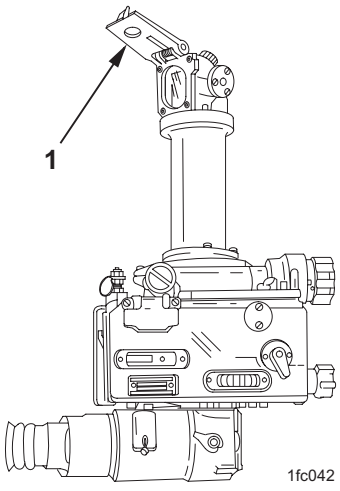
**References**
WP 0086 00

**COVER ASSEMBLY (HEAD)**

**Table 1. Troubleshooting Procedures.**

NOTE

The following steps are written and illustrated for the M137 telescope but also apply to the M137A2/M137A3 telescope.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| |  | |
| 1. COVER PLATE (1) DOES NOT LATCH CORRECTLY. | Check latch for correct operation. | Repair cover assembly (WP 0086 00). |

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**TROUBLESHOOTING PROCEDURES**
**KNOB ASSEMBLY (AZIMUTH)**

**INITIAL SETUP:**

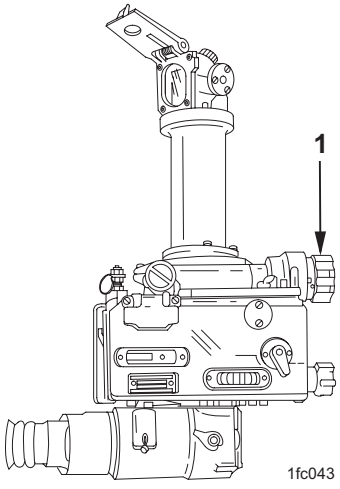
**References**
WP 0084 00

**KNOB ASSEMBLY (AZIMUTH)**

**Table 1. Troubleshooting Procedures.**

NOTE

The following steps are written and illustrated for the M137 telescope but also apply to the M137A2/M137A3 telescope.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| |  | |
| 1. AZIMUTH KNOB (1) DOES NOT FUNCTION PROPERLY. | Check azimuth knob assembly for correct operation. | Replace azimuth knob assembly (WP 0084 00). |

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**TROUBLESHOOTING PROCEDURES**
**ELBOW ASSEMBLY**

**INITIAL SETUP:**

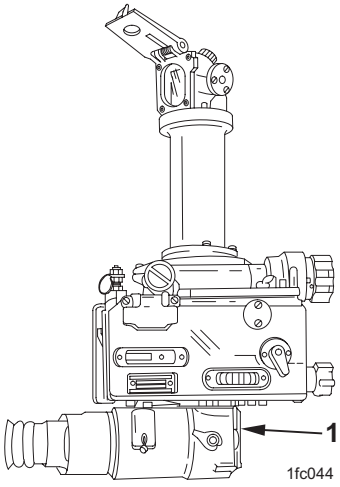
**References**
WP 0088 00

**ELBOW ASSEMBLY**

**Table 1. Troubleshooting Procedures.**

NOTE

The following steps are written and illustrated for the M137 telescope but also apply to the M137A2/M137A3 telescope.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| |  | |
| 1. ELBOW ASSEMBLY (1) DOES NOT LATCH CORRECTLY. | Check latch for correct operation. | Repair plunger (WP 0088 00). |

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M137 PANORAMIC TELESCOPE**
**(1240-01-038-0531)**

**TROUBLESHOOTING PROCEDURES**
**COUNTER BOX ASSEMBLY**

**INITIAL SETUP:**

**Materials/Parts**
Plastic bag (item 5, WP 0152 00)
Tape (item 20, WP 0152 00)

**References**
TM 750-116
WP 0091 00

**COUNTER BOX ASSEMBLY**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

**COUNTER BOX ASSEMBLY - Continued**

**Table 1. Troubleshooting Procedures.**

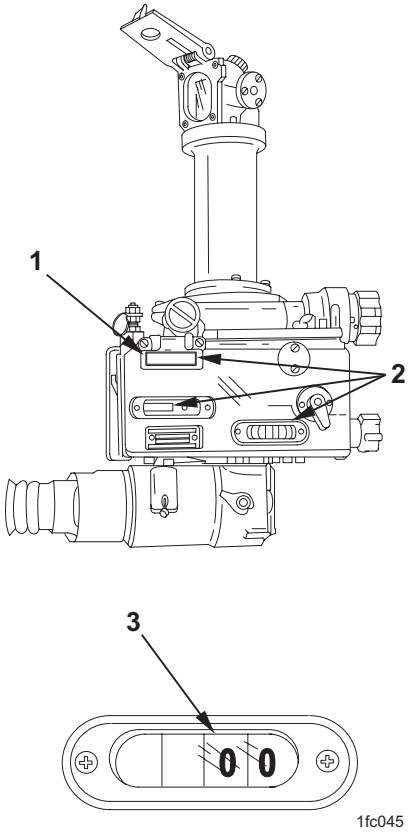
| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| |  | |
| 1. AZIMUTH COUNTER COVER (1) DOES NOT REMAIN OPEN OR CLOSED. | Check cover assembly. | Repair cover assembly (WP 0091 00). |
| 2. COUNTER BOX WINDOWS (2) ARE FOGGED OR HAVE CONDENSATION. | 1. Check for moisture in counter box. | Purge and charge with dry nitrogen. Refer to TM 750-116. |
| | 2. Check for loose purging valve stem or relief valve on counter box. | Tighten purging valve stem or relief valve. |
| 3. COUNTER DIALS (3) HAVE UNEVEN OR NO ILLUMINATION. | Observe visually in darkened area. | 1. Contact RSO immediately.<br>2. Perform wipe test under RSO supervision. |

**Table 1. Troubleshooting Procedures - Continued.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| | | 3. Remove, bag, and secure device under RSO direction and await wipe test results.<br><br>4. If contaminated, dispose of device per RSO instructions.<br><br>5. If device is not contaminated, evacuate to depot for maintenance. |

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-483-6103/1240-01-483-6100)**

**TROUBLESHOOTING PROCEDURES**
**COUNTER BOX ASSEMBLY**

**INITIAL SETUP:**

**Materials/Parts**
Battery (2) (item 8, WP 0152 00)

**References**
TM 750-116
WP 0084 00
WP 0091 00

**COUNTER BOX ASSEMBLY**

WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries.

**COUNTER BOX ASSEMBLY - Continued**

**Table 1. Troubleshooting Procedures - Continued.**

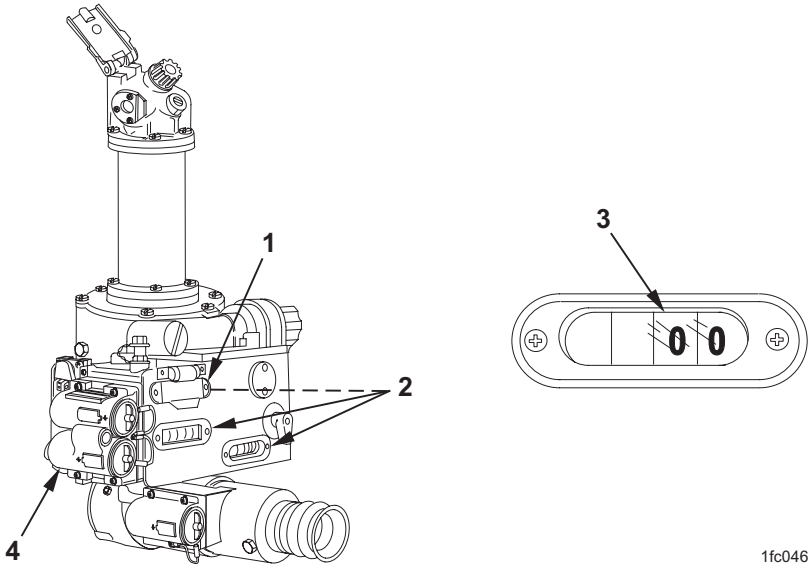
| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
|  | | |
| 1. AZIMUTH COUNTER COVER (1) DOES NOT REMAIN OPEN OR CLOSED. | Check cover assembly. | Repair cover assembly (WP 0091 00). |
| 2. COUNTER BOX WINDOWS (2) ARE FOGGED OR HAVE CONDENSATION. | 1. Check for moisture in counter box. | Purge and charge with dry nitrogen. Refer to TM 750-116. |
| | 2. Check for loose purging valve stem or relief valve on counter box. | Tighten purging valve stem or relief valve. |

**Table 1. Troubleshooting Procedures - Continued.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 3. COUNTER DIALS (3) HAVE NO ILLUMINATION. | Observe visually in darkened area. | 1. Check for proper battery installation (same as diagram on battery enclosure).<br>2. Replace batteries (item 8, WP 0152 00).<br>a. Unscrew battery caps.<br>b. Remove batteries using magnet in battery cap.<br>c. Install new batteries in same direction as diagram on battery enclosure.<br>d. Replace battery caps.<br>3. Replace battery enclosure assembly (4) (WP 0084 00).<br>4. Notify next higher level of maintenance. |

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**TROUBLESHOOTING PROCEDURES**
**OPTICAL ELEMENTS**

**INITIAL SETUP:**

**Materials/Parts**
Battery (2) (item 8, WP 0152 00)
Plastic bag (item 5, WP 0152 00)
Tape (item 20, WP 0152 00)

**References**
WP 0084 00

**OPTICAL ELEMENTS**

**Table 1. Troubleshooting Procedures.**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 1. RETICLE DOES NOT ILLUMINATE OR HAS UNEVEN ILLUMINATION (M137). | Visually inspect in darkened area. | 1. Contact RSO immediately.<br>2. Perform wipe test under RSO supervision.<br>3. Remove, bag, and secure device under RSO direction and await wipe test results.<br>4. If contaminated, dispose of device per RSO instructions.<br>5. If device is not contaminated, evacuate to depot for maintenance. |

**OPTICAL ELEMENTS - Continued**

**Table 1. Troubleshooting Procedures - Continued.**

WARNING




Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 2. RETICLE DOES NOT ILLUMINATE (M137A2/ M137A3). | Observe visually in darkened area. | 1. Replace batteries (item 8, WP 0152 00) in panoramic telescope.<br>a. Unscrew battery caps.<br>b. Remove batteries using magnet in battery cap.<br>c. Install new batteries in same direction as diagram on battery enclosure.<br>d. Replace battery caps.<br>2. Replace battery enclosure assembly (4) (WP 0084 00).<br>3. Replace light source adapter assembly (WP 0084 00).<br>4. Notify general support maintenance. |
| 3. RETICLE AND IMAGE HAVE PARALLAX. | Visually inspect. | Notify general support maintenance. |
| 4. INTERNAL OPTICS ARE FOGGED OR HAVE CONDENSATION. | 1. Inspect seal between head assembly and body assembly. | Notify general support maintenance. |
| | 2. Inspect seal between body assembly and elbow assembly. | Notify general support maintenance. |

**END OF WORK PACKAGE**

# CHAPTER 9

# GENERAL SUPPORT TROUBLESHOOTING PROCEDURES FOR M137/M137A2/M137A3 PANORAMIC TELESCOPE

## GENERAL SUPPORT

## M137/M137A2/M137A3 PANORAMIC TELESCOPE (1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)

## TROUBLESHOOTING INDEX

### INTRODUCTION

**a.** The troubleshooting procedures are limited to those listed in the troubleshooting symptom index. The table lists the common malfunctions, which you may find during the operation or maintenance of the M137/M137A2/M137A3 Panoramic Telescope. You should perform the tests/inspections and corrective actions in the order listed.

**b.** This manual cannot list all malfunctions that may occur, or all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**c.** Each work package is headed by an initial setup. This setup outlines what is needed as well as certain conditions, which must be met before starting the task. DON'T START A TASK UNTIL:

You understand the task;

You understand what you are to do;

You understand what is needed to do the work;

You have the things you need.

### MALFUNCTION/SYMPTOM INDEX

**a.** The malfunction/symptom index is a quick reference index for finding troubleshooting procedures. Associated with each symptom name is a work package sequence number representing the starting point in the troubleshooting sequence. Should any one symptom require more than one troubleshooting sequence to arrive at the most likely area of investigation, the additional starting point numbers are presented.

**b.** As the troubleshooting activity progresses to the conclusion of a particular sequence, a reference is made to the next logical troubleshooting sequence by work package sequence number or by referring to the malfunction/symptom index to locate the next failure symptom work package. This type of activity continues until successful fault isolation is achieved.

**MALFUNCTION/SYMPTOM INDEX - Continued**


| Malfunction/Symptom | Work Package |
|---|---|
| **BODY ASSEMBLY** | |
| 1. Azimuth mechanism body assembly is loose or binding | WP 0038 00 |
| 2. Reticle and image have parallax | WP 0038 00 |
| **COUNTER BOX ASSEMBLY** | |
| 1. Counters have excessive backlash | WP 0039 00 |
| 2. Correction knob binds | WP 0039 00 |
| 3. Counter numbers are not in horizontal alignment | WP 0039 00 |
| 4. Counter windows are fogged or have condensation | WP 0039 00 |
| **OPTICAL ELEMENTS** | |
| 1. Internal optics are fogged or have condensation | WP 0040 00 |


**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**TROUBLESHOOTING PROCEDURES**
**BODY ASSEMBLY**

**INITIAL SETUP:**

**References**
WP 0095 00

**BODY ASSEMBLY**

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 1. RETICLE AND IMAGE HAVE PARALLAX. | Observe visually. | Turn in instrument. |
| 2. AZIMUTH MECHANISM BODY ASSEMBLY IS LOOSE OR BINDING. | Check azimuth mechanism for worn, bent, broken, or damaged parts. | Replace defective parts (WP 0095 00). |

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

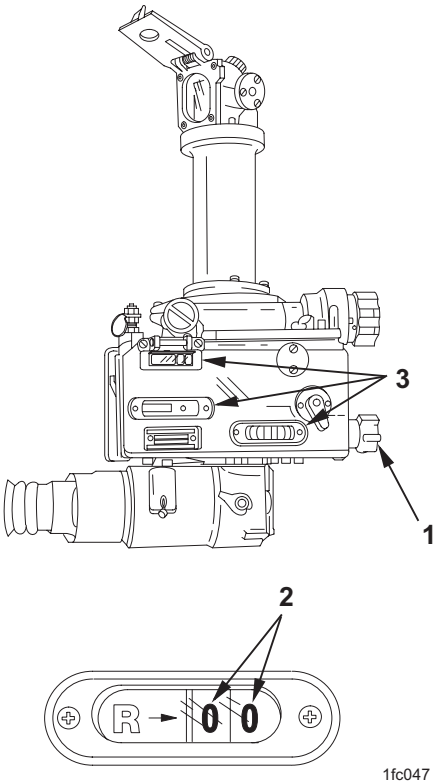
**TROUBLESHOOTING PROCEDURES**
**COUNTER BOX ASSEMBLY**

**INITIAL SETUP:**

**References**
WP 0098 00
WP 0099 00

**COUNTER BOX ASSEMBLY**

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| |  | |
| 1. CORRECTION KNOB (1) BINDS. | Check correction knob assembly for correct operation. | Replace correction knob assembly (WP 0098 00). |
| 2. COUNTER NUMBERS (2) ARE NOT IN HORIZONTAL ALIGNMENT. | Check counters for correct operation. | Replace counters (WP 0099 00). |
| 3. COUNTERS (3) HAVE EXCESSIVE BACKLASH. | 1. Check for loose counter mechanism mounting screws. | Tighten mounting screws (WP 0099 00). |
| | 2. Check for worn or damaged counters. | Replace counters (WP 0099 00). |
| 4. COUNTER WINDOWS ARE FOGGED OR HAVE CONDENSATION. | Check for defective seals. | Replace defective seals (WP 0098 00). |

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**TROUBLESHOOTING PROCEDURES**
**OPTICAL ELEMENTS**

**INITIAL SETUP:**

**References**
WP 0092 00
WP 0093 00

**OPTICAL ELEMENTS**

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 1. INTERNAL OPTICS ARE FOGGED OR HAVE CONDENSATION. | 1. Inspect seal between head assembly and body assembly.<br>2. Inspect seal between body assembly and elbow assembly.<br>3. Inspect seal in head assembly between cover assembly and window. | 1. Replace defective seal (WP 0092 00).<br>2. Replace defective seal (WP 0092 00).<br>3. Replace defective seal (WP 0093 00). |

**END OF WORK PACKAGE**

# CHAPTER 10

# DIRECT SUPPORT TROUBLESHOOTING PROCEDURES FOR M138/M138A1 ELBOW TELESCOPE

**DIRECT SUPPORT**

**M138/M138A1 ELBOW TELESCOPE**
**(1240-01-038-0530/1240-01-515-8264)**

**TROUBLESHOOTING INDEX**

## INTRODUCTION

**a.** The troubleshooting procedures are limited to those listed in the troubleshooting symptom index. The table lists the common malfunctions, which you may find during the operation or maintenance of the M138/M138A1 Elbow Telescope. You should perform the tests/inspections and corrective actions in the order listed.

**b.** This manual cannot list all malfunctions that may occur, or all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective actions, notify your supervisor.

**c.** Each work package is headed by an initial setup. This setup outlines what is needed as well as certain conditions, which must be met before starting the task. DON'T START A TASK UNTIL:

You understand the task;

You understand what you are to do;

You understand what is needed to do the work;

You have the things you need.

## MALFUNCTION/SYMPTOM INDEX

**a.** The malfunction/symptom index is a quick reference index for finding troubleshooting procedures. Associated with each symptom name is a work package sequence number representing the starting point in the troubleshooting sequence. Should any one symptom require more than one troubleshooting sequence to arrive at the most likely area of investigation, the additional starting point numbers are presented.

**b.** As the troubleshooting activity progresses to the conclusion of a particular sequence, a reference is made to the next logical troubleshooting sequence by work package sequence number or by referring to the malfunction/symptom index to locate the next failure symptom work package. This type of activity continues until successful fault isolation is achieved.

**MALFUNCTION/SYMPTOM INDEX - Continued**


| Malfunction/Symptom | Work Package |
|---|---|
| **M138 TELESCOPE** | |
| 1. Reticle has uneven or no illumination | WP 0042 00 |
| 2. Reticle is fogged or has condensation | WP 0042 00 |
| **M138A1 TELESCOPE** | |
| 1. Reticle has no illumination | WP 0043 00 |
| 2. Reticle is fogged or has condensation | WP 0043 00 |
| **OPTICAL INSTRUMENT LATCH SET** | |
| 1. Optical instrument latch set does not operate correctly | WP 0044 00 |


**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M138 ELBOW TELESCOPE**
**(1240-01-038-0530)**

**TROUBLESHOOTING PROCEDURES**
**M138 TELESCOPE**

**INITIAL SETUP:**

**Materials/Parts**
Plastic bag (item 5, WP 0152 00)
Tape (item 20, WP 0152 00)

**References**
TM 750-116

**M138 TELESCOPE**

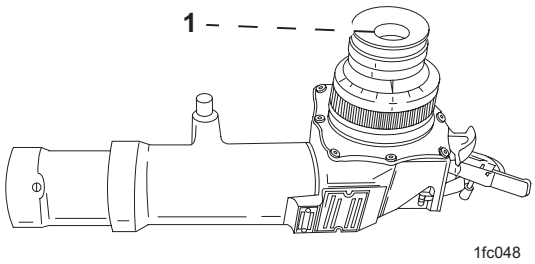
WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
|  | | |
| 1. RETICLE (1) HAS UNEVEN OR NO ILLUMINATION. | Observe visually in darkened area. | 1. Contact RSO immediately.<br>2. Perform wipe test under RSO supervision. |

**M138 TELESCOPE - Continued**

**Table 1. Troubleshooting Procedures - Continued.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 1. RETICLE (1) HAS UNEVEN OR NO ILLUMINATION - Continued. | | 3. Remove, bag, and secure device under RSO direction and await wipe test results.<br><br>4. If contaminated, dispose of device per RSO instructions.<br><br>5. If device is not contaminated, evacuate to depot maintenance. |
| 2. RETICLE (1) IS FOGGED OR HAS CONDENSATION. | Check for moisture in telescope. | Purge and charge with dry nitrogen. Refer to TM 750-116. |

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M138A1 ELBOW TELESCOPE**
**(1240-01-515-8264)**

**TROUBLESHOOTING PROCEDURES**
**M138A1 TELESCOPE**

**INITIAL SETUP:**

**Materials/Parts**
Battery (item 8, WP 0152 00)

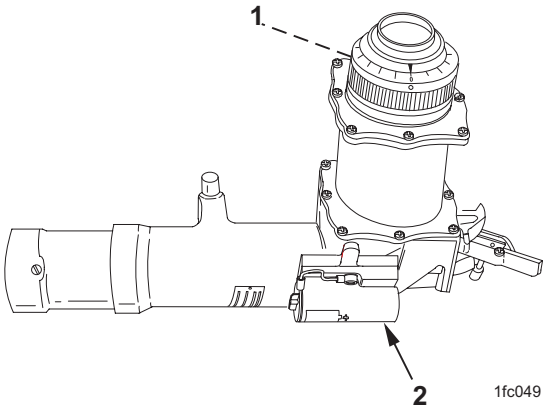
**References**
TM 750-116
WP 0103 00

**M138A1 TELESCOPE**

WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries.

**Table 1. Troubleshooting Procedures.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
|  | | |
| 1. RETICLE (1) HAS NO ILLUMINATION. | Check for illumination in reticle. | 1. Check for proper battery installation (same as diagram on battery enclosure). |

**M138A1 TELESCOPE - Continued**

**Table 1. Troubleshooting Procedures - Continued.**

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
| 1. RETICLE (1) HAS NO ILLUMINATION- Continued. | | 2. Replace battery (item 8, WP 0152 00).<br>a. Unscrew battery cap.<br>b. Remove battery using magnet in battery cap.<br>c. Install new battery in same direction as diagram on battery enclosure.<br>d. Replace battery cap.<br>3. Replace battery enclosure assembly (2) (WP 0103 00).<br>4. Notify next higher level of maintenance. |
| 2. RETICLE (1) IS FOGGED OR HAS CONDENSATION. | Check for moisture in telescope. | Purge and charge with dry nitrogen. Refer to TM 750-116. |

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

# M138/M138A1 ELBOW TELESCOPE (1240-01-038-0530/1240-01-515-8264)

## TROUBLESHOOTING PROCEDURES OPTICAL INSTRUMENT LATCH SET

**INITIAL SETUP:**

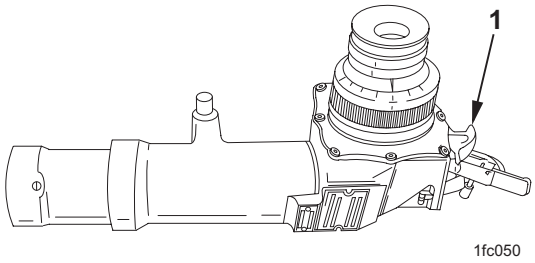
**References**
WP 0104 00

**OPTICAL INSTRUMENT LATCH SET**

**Table 1. Troubleshooting Procedures.**

NOTE

The following steps apply to both the M138 and M138A1 elbow telescopes.

| MALFUNCTION | TEST OR INSPECTION | CORRECTIVE ACTION |
|---|---|---|
|  | | |
| 1. OPTICAL INSTRUMENT LATCH SET (1) DOES NOT OPERATE CORRECTLY. | 1. Check for incorrectly assembled optical instrument latch set. | Reassemble optical instrument latch set correctly (WP 0104 00). |
| | 2. Check for worn, damaged, or missing parts. | Replace parts (WP 0104 00) as required and authorized. |

**END OF WORK PACKAGE**

# CHAPTER 11

# DIRECT SUPPORT MAINTENANCE INSTRUCTIONS FOR M17/M18 AND M17A1/M18A1 FIRE CONTROL QUADRANT

**DIRECT SUPPORT**

**M17/M18 AND M17A1/M18A1 FIRE CONTROL QUADRANT (1290-01-037-3883/1290-01-037-7289 AND 1290-01-515-8260/1290-01-515-8262)**

**SERVICE UPON RECEIPT SERVICE UPON RECEIPT OF MATERIEL**

## SERVICE UPON RECEIPT OF MATERIEL

### Unpacking

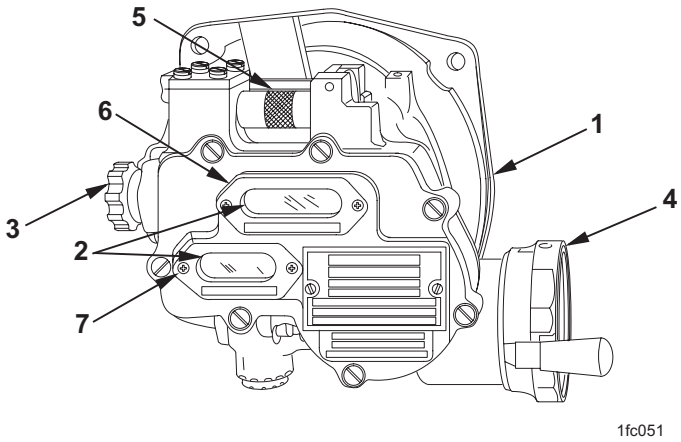
When a new or reconditioned M17/M18 or M17A1/M18A1 Fire Control Quadrant is received, be aware of any shipping damage to packaging materiel. Report any damage on SF 364, Report of Discrepancy (ROD), as prescribed in AR 735-11-2. Retain packaging materiel for future use.

### Checking Unpacked Equipment

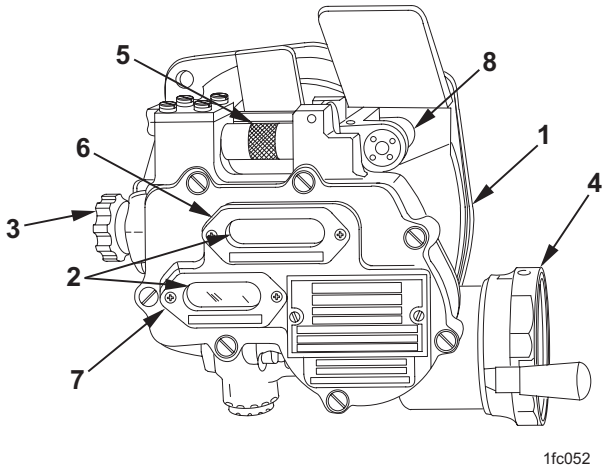
1. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 361, Transportation Discrepancy Report.

2. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with applicable service instructions (e.g., for Army instructions, see DA PAM 738-750).

3. Check to see whether the equipment has been modified.




**M17 Quadrant**



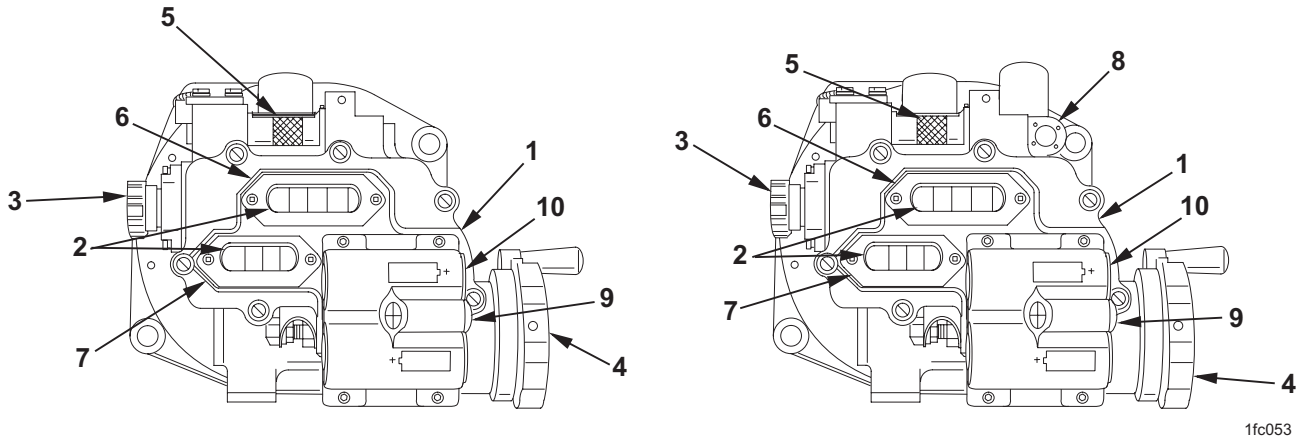

**M18 Quadrant**

4. Check M17/M18 or M17A1/M18A1 quadrant (1) for dents, scuff marks, bare spots, missing parts, and missing lock wire. Inspect M17/M17A1 quadrant for cleanness. Check for missing or illegible instruction plates or identification plates.

5. Check counter windows (2) for moisture. Look for broken, cracked, or chipped glass.

6. Operate correction knob (3). Check that operation is smooth without binding or rough motion.

**SERVICE UPON RECEIPT OF MATERIEL - Continued**




**M17A1 Quadrant** **M18A1 Quadrant**

7. Operate elevation knob (4). Check that operation is smooth without binding or rough motion.

## WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When inspecting radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

8. Check radioactive (M17/M18) or LED (M17A1/M18A1) light sources.

   a. Check that light is present and even throughout the elevation level vial (5). Check that elevation level vial graduations are present and legible.

   b. Check that light is present and even throughout the correction counter (6). Check that correction counter numbers are clear and legible.

   c. Check that light is present and even throughout the elevation counter (7). Check that elevation counter numbers are clear and legible.

   d. Check that light is present and even throughout the cross level vial (8). Check that cross level vial graduations are present and legible (M18/M18A1 only).

## NOTE

Switch has an approximate three-second delay. Press red push-button switch; then wait approximately three seconds and check if LED light sources are ON/OFF. Repeat until assured of correct operation.

9. For M17A1/M18A1 only, check operation of red push-button ON/OFF switch (9) on battery enclosure assembly (10).

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

# M17/M18 FIRE CONTROL QUADRANT (1290-01-037-3883/1290-01-037-7289)

## M17/M18 FIRE CONTROL QUADRANT MAINTENANCE DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**

Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**

Lockwasher (6) (item 4, WP 0111 00)
Lockwasher (2) (item 9, WP 0111 00) (M18)
Lockwasher (6) (item 13, WP 0111 00)
Lock wire (item 21, WP 0152 00)
Sealing compound (item 13, WP 0152 00)
Solvent cleaning compound (item 12, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**

TM 750-116
WP 0048 00
WP 0111 00
WP 0114 00

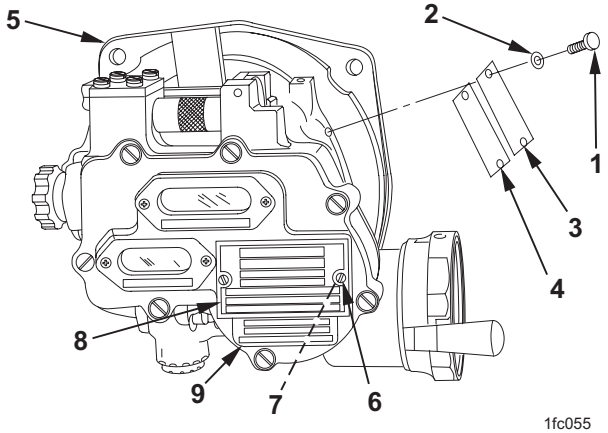
**DISASSEMBLY**

**WARNING**

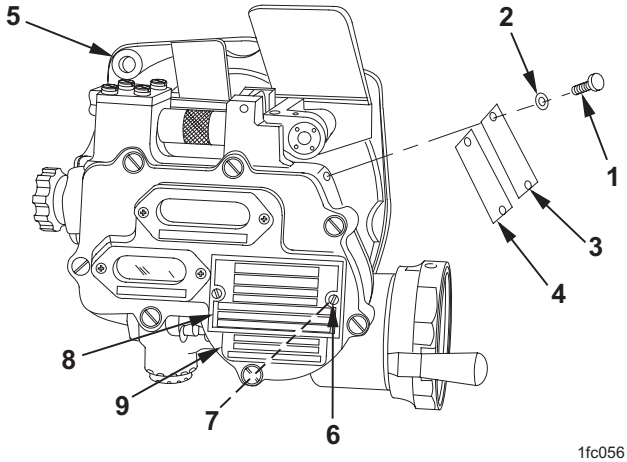
**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.




**M17 Quadrant**



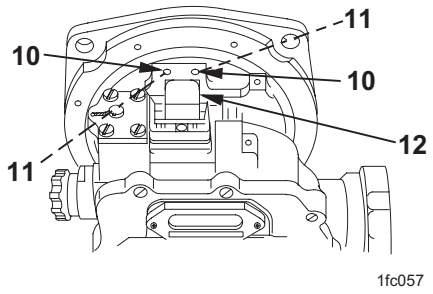

**M18 Quadrant**

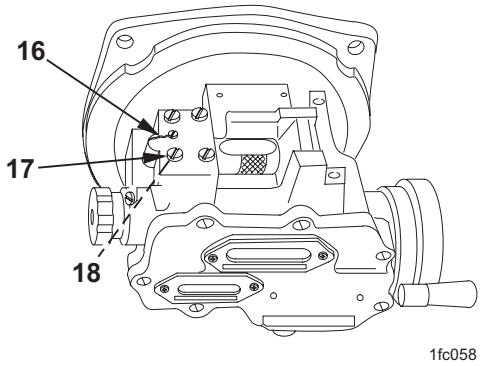
**DISASSEMBLY - Continued**

1. If damaged, remove four machine screws (1), four lockwashers (2), and two instruction plates (3 and 4) from side of quadrant (5). Discard lockwashers.

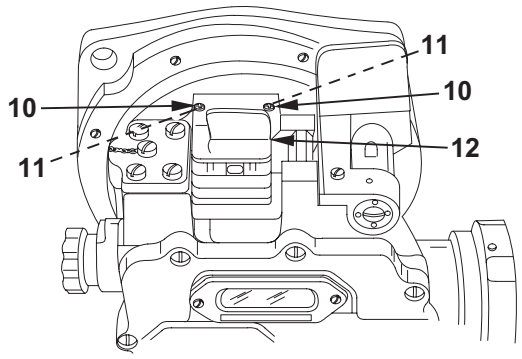
2. If damaged, remove two machine screws (6), two lockwashers (7), and identification plate (8) from quadrant (5). Discard lockwashers.

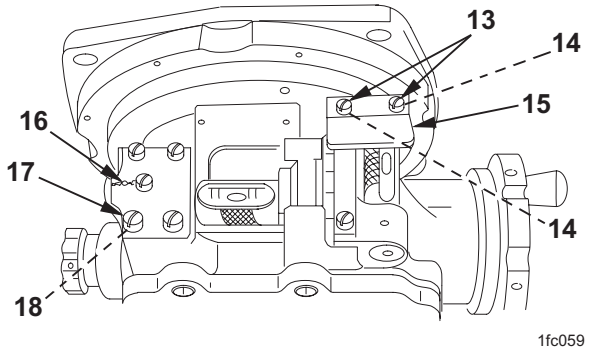
3. If damaged or illegible, remove instruction plate (9) from quadrant (5).




**M17 Quadrant**



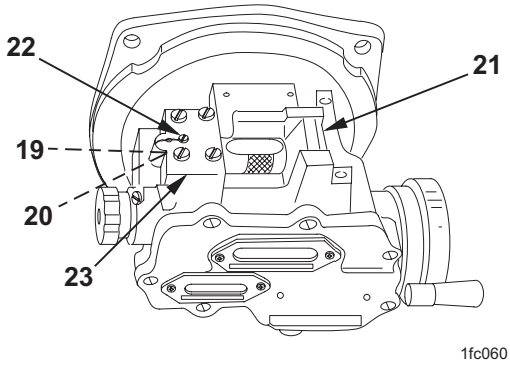




**M18 Quadrant**

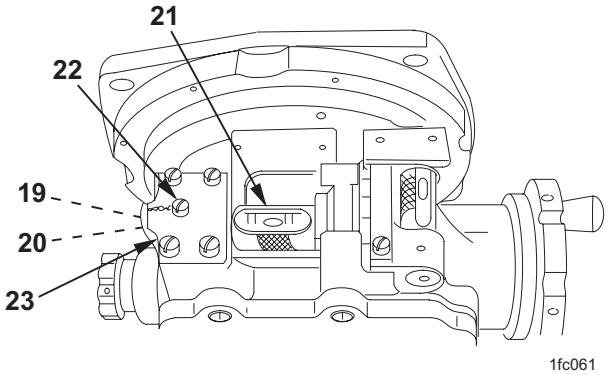
4. Remove two machine screws (10), two lockwashers (11), and reflector (12). Discard lockwashers.

5. Remove two machine screws (13), two lockwashers (14), and reflector (15) (M18 only). Discard lockwashers.

6. Remove lock wire (16), four machine screws (17), and four lockwashers (18). Discard lock wire and lockwashers.




**M17 Quadrant**



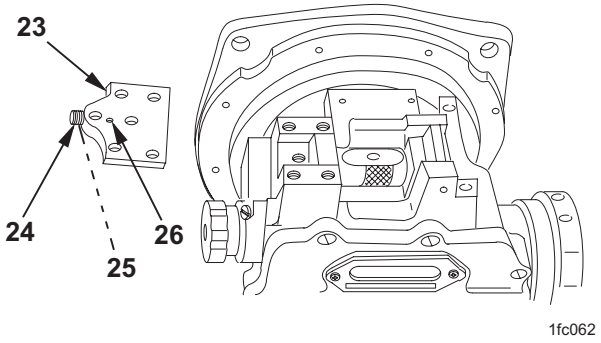

**M18 Quadrant**

7. Loosen, but do not remove, setscrew (19) and cushioning pad (20) from fire control level assembly (21).

8. Remove machine screw (22) from adjusting plate (23).

## NOTE

The following steps are written and illustrated for the M17 quadrant but also apply to the M18 quadrant.




**M17/M18 Quadrant**

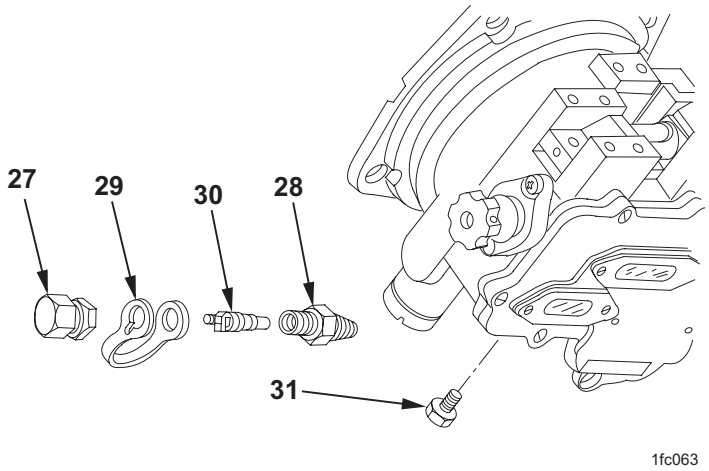
9. Remove adjusting plate (23).

10. If damaged, remove setscrew (19) and cushioning pad (20).

11. Loosen setscrew (24) and cushioning pad (25) from adjusting plate (23). If damaged, remove.

12. Loosen setscrew (26) from adjusting plate (23). If damaged, remove.

**DISASSEMBLY - Continued**




**M17/M18 Quadrant**

13. Unscrew air valve cap (27) from purging valve stem (28) and remove from valve cap strap (29).
14. Remove purging valve stem (28).
15. Remove valve cap strap (29) and valve core (30) from purging valve stem (28).
16. Remove safety relief valve (31).

**CLEANING**

WARNING

Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.

Clean all parts with cleaning compound (item 12, WP 0152 00). Wipe off excess cleaning compound with a clean wiping rag (item 18, WP 0152 00).

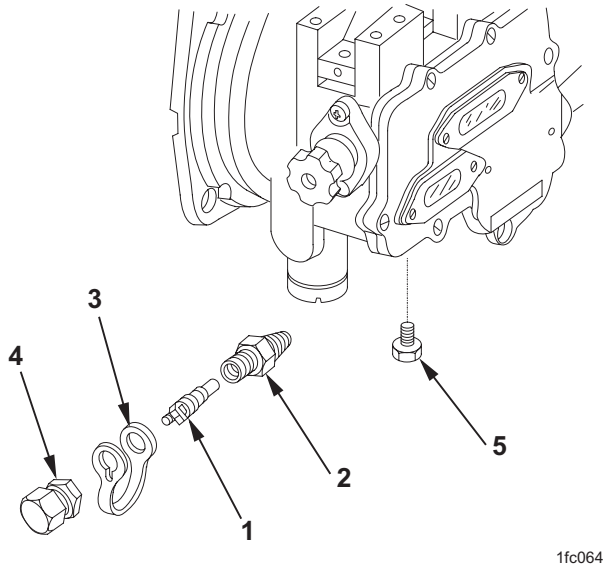
**REPAIR OR REPLACEMENT**

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0111 00 and WP 0114 00.

**ASSEMBLY**

## NOTE

The following steps are written and illustrated for the M17 quadrant but also apply to the M18 quadrant.




**M17/M18 Quadrant**

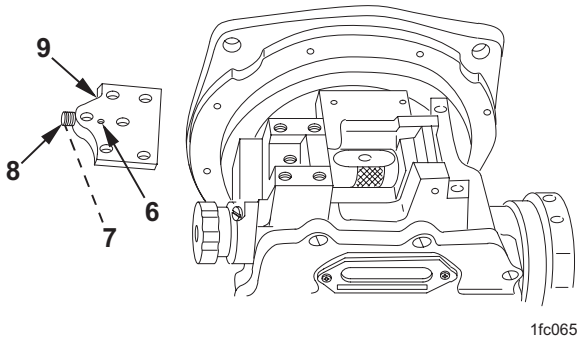
1. Install valve core (1) in purging valve stem (2).
2. Place valve cap strap (3) on purging valve stem (2) and air valve cap (4).

## WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

3. Apply sealing compound (item 13, WP 0152 00) to purging valve stem (2) and install.
4. Install air valve cap (4) on purging valve stem (2).
5. Apply sealing compound (item 13, WP 0152 00) to safety relief valve (5) and install.

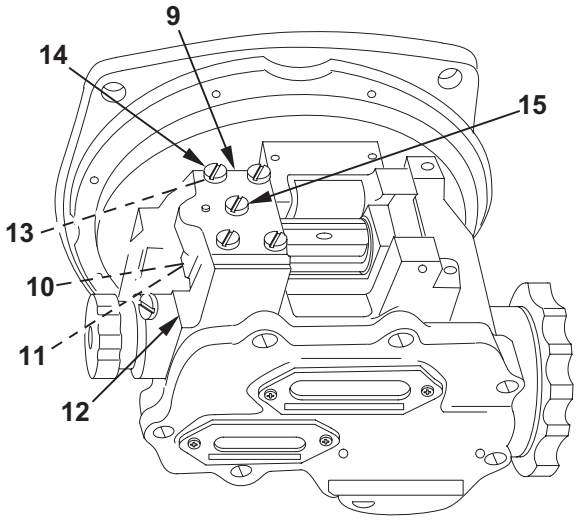
**ASSEMBLY - Continued**

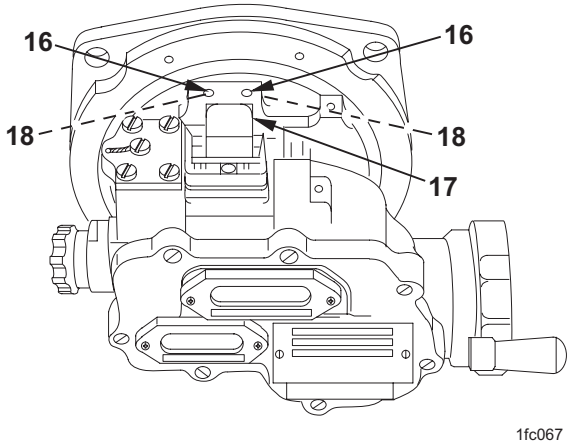



**M17/M18 Quadrant**

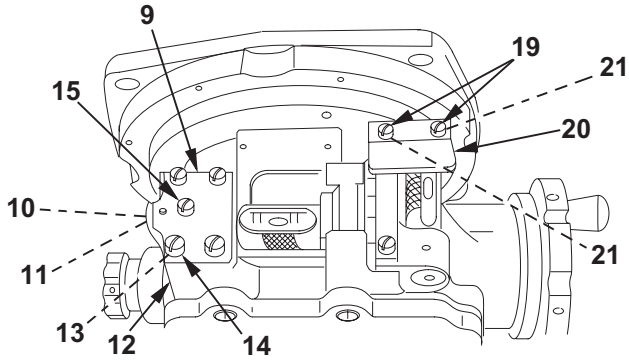
6. If removed, install new setscrew (6). Do not tighten setscrew.

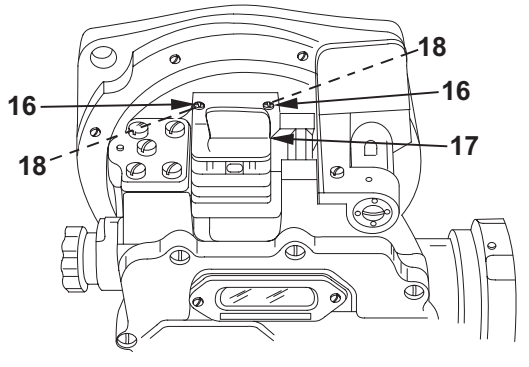
7. If removed, install new cushioning pad (7) and new setscrew (8) in adjusting plate (9). Do not tighten setscrew.




**M17 Quadrant**




**M18 Quadrant**

8. If removed, install new cushioning pad (10) and new setscrew (11) to fire control level assembly (12). Do not tighten setscrew.

9. Install adjusting plate (9) on fire control level assembly (12).

10. Install four new lockwashers (13) (item 4, WP 0111 00) and four machine screws (14). Tighten machine screws and fill heads with sealing compound (item 13, WP 0152 00).

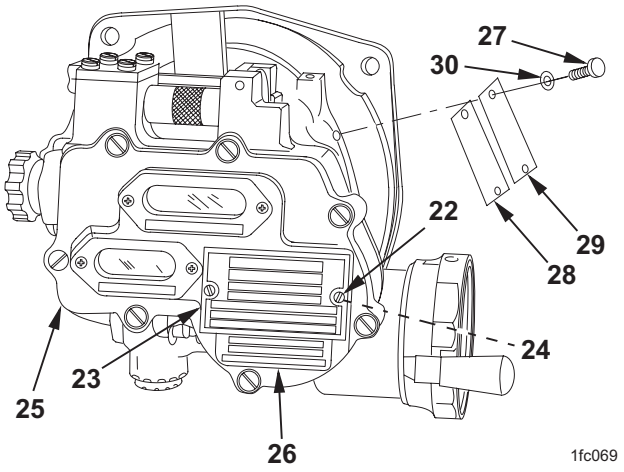
11. Start screw (15) into adjusting plate (9) but do not tighten. Screw will be tightened and locked with setscrew (11) during adjustment (WP 0048 00).

12. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (16).

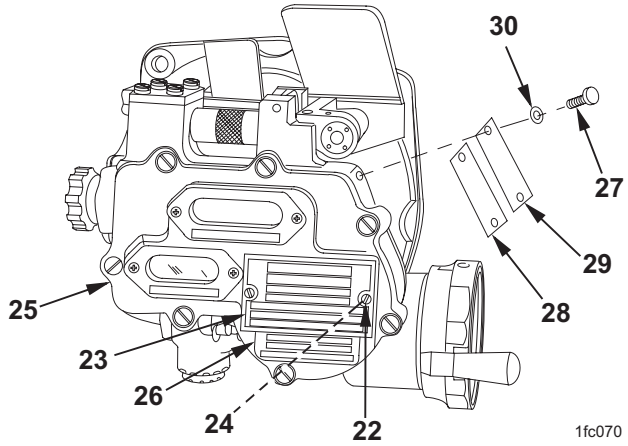
13. Install reflector (17) with two new lockwashers (18) (item 4, WP 0111 00) and two machine screws (16). Tighten machine screws.

14. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (19).

15. Install reflector (20) with two new lockwashers (21) (item 9, WP 0111 00) and two machine screws (19). Tighten machine screws (M18 only).




**M17 Quadrant**




**M18 Quadrant**

16. If removed, apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (22).

17. If removed, install identification plate (23), two new lockwashers (24) (item 13, WP 0111 00), and two machine screws (22) on quadrant (25).

18. If removed, install new instruction plate (26) on quadrant (25).

19. If removed, apply sealing compound (item 13, WP 0152 00) to threads of four machine screws (27).

20. If removed, install two new instruction plates (28 and 29) on side of quadrant (25) using four new lockwashers (30) (item 13, WP 0111 00) and four machine screws (27).

21. Perform fire control level assembly adjustment maintenance (WP 0048 00).

22. Purge and charge M17/M18 fire control quadrant (TM 750-116).

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

# M17A1/M18A1 FIRE CONTROL QUADRANT (1290-01-515-8260/1290-01-515-8262)

## M17A1/M18A1 FIRE CONTROL QUADRANT MAINTENANCE DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**

Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**

Gasket (item 26, WP 0111 00)
Lockwasher (6) (item 4, WP 0111 00)
Lockwasher (2) (item 9, WP 0111 00) (M18A1)
Lockwasher (2) (item 13, WP 0111 00)
Lockwasher (item 20, WP 0111 00)
Lockwasher (4) (item 24, WP 0111 00)
Lock wire (item 21, WP 0152 00)
Sealing compound (item 13, WP 0152 00)
Solvent cleaning compound (item 12, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**

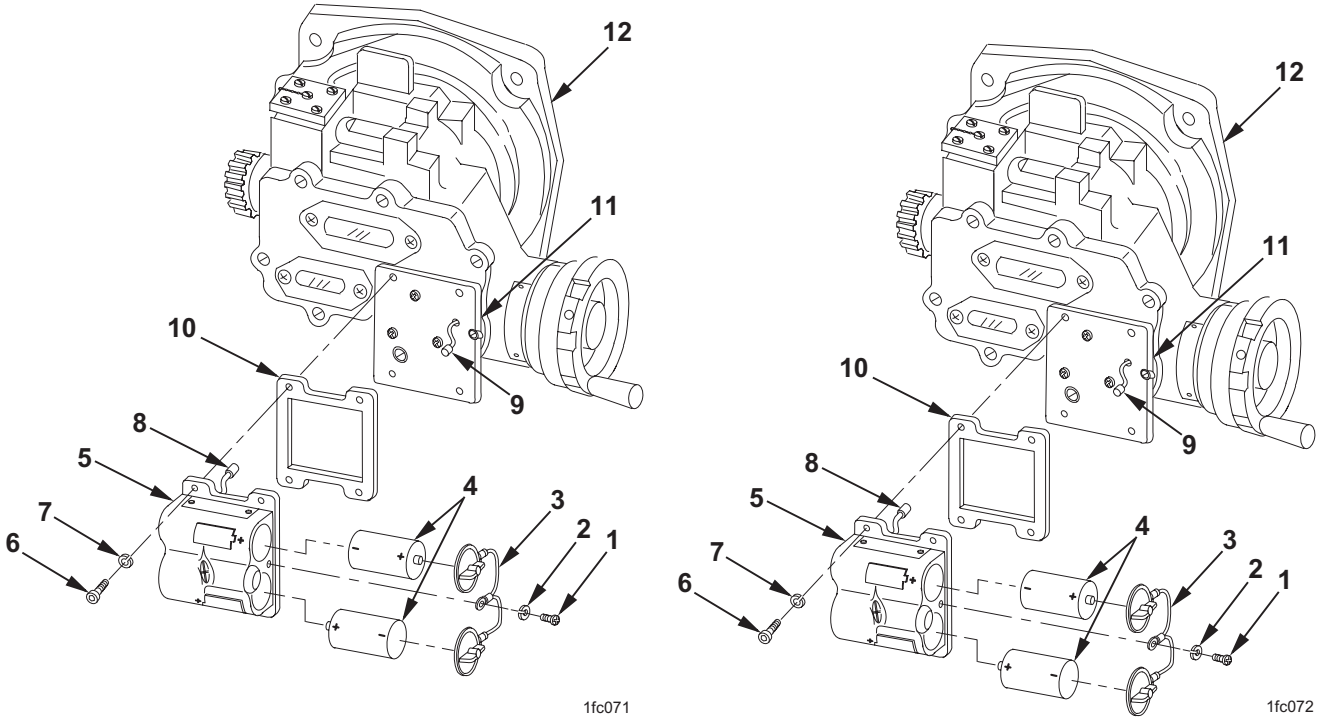
TM 750-116
WP 0048 00
WP 0111 00

**DISASSEMBLY**

WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries.

**DISASSEMBLY - Continued**




**M17A1 Quadrant** **M18A1 Quadrant**

1. Remove machine screw (1), lockwasher (2), cap and retainer assembly (3), and two batteries (4) from battery enclosure assembly (5). Discard lockwasher.

2. Remove four machine screws (6) and four lockwashers (7). Discard lockwashers.

## CAUTION

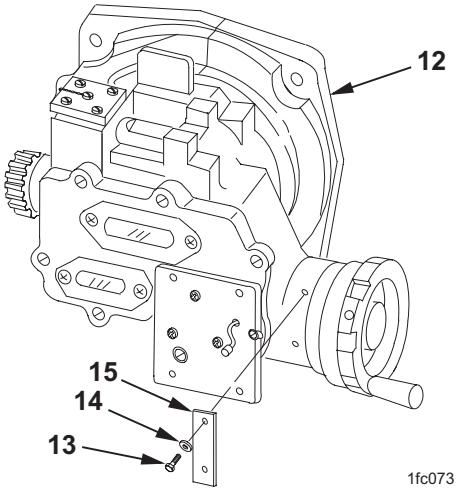
Use extreme care when removing battery enclosure assembly. A short wire harness and connector on battery enclosure assembly are connected to a connector on a short wire harness that passes through adapter plate on quadrant assembly. These connectors and wire harnesses are easily damaged.

3. Carefully disconnect connector (8) from connector (9) and remove battery enclosure assembly (5).

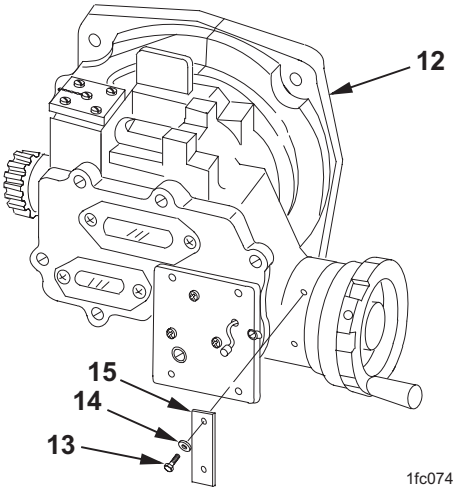
## CAUTION

Do not attempt to remove adapter plate between battery enclosure assembly and cover assembly. The wire harness passing through adapter plate cannot be removed without damaging the equipment. The adapter plate can only be removed or installed by the manufacturer.

4. Remove gasket (10) from adapter plate (11) on quadrant (12). Discard gasket.

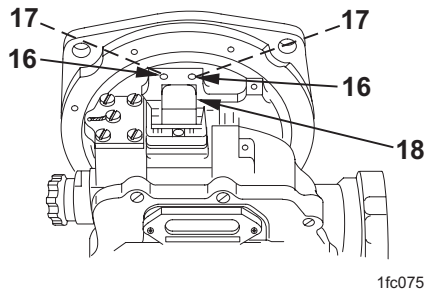


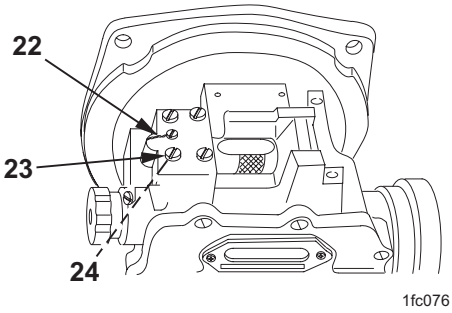

**M17A1 Quadrant**



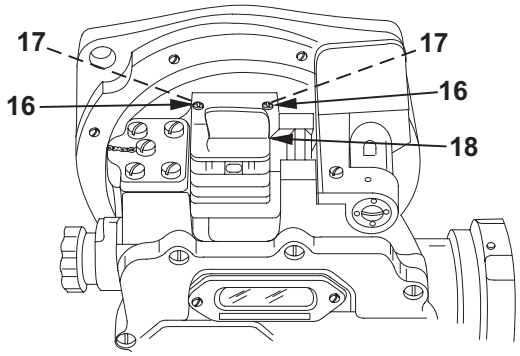

**M18A1 Quadrant**

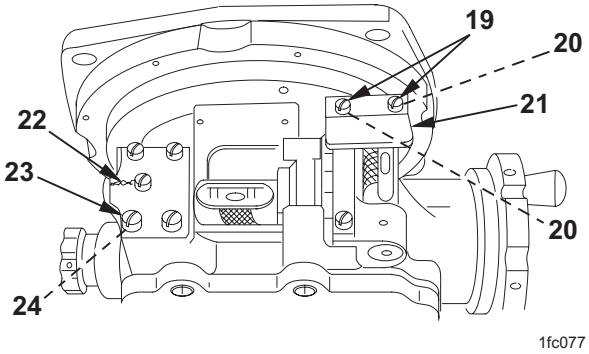
5. If damaged, remove two machine screws (13), two lockwashers (14), and identification plate (15) from quadrant (12). Discard lockwashers.




**M17A1 Quadrant**



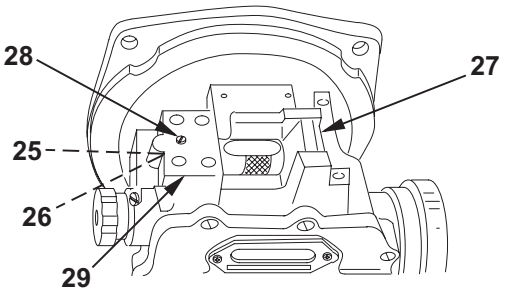

**M18A1 Quadrant**

6. Remove two machine screws (16), two lockwashers (17), and reflector (18). Discard lockwashers.

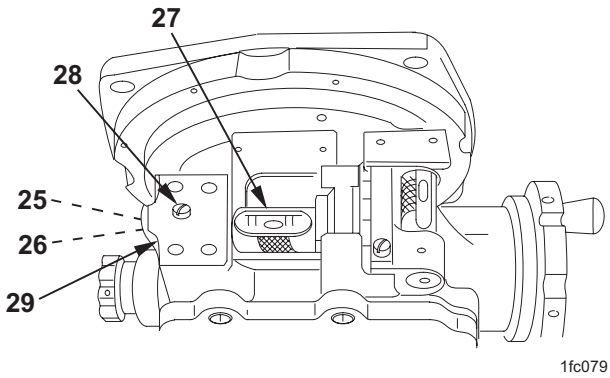
7. Remove two machine screws (19), two lockwashers (20), and reflector (21) (M18A1 only). Discard lockwashers.

8. Remove lock wire (22), four machine screws (23), and four lockwashers (24). Discard lock wire and lockwashers.

**DISASSEMBLY - Continued**




**M17A1 Quadrant**



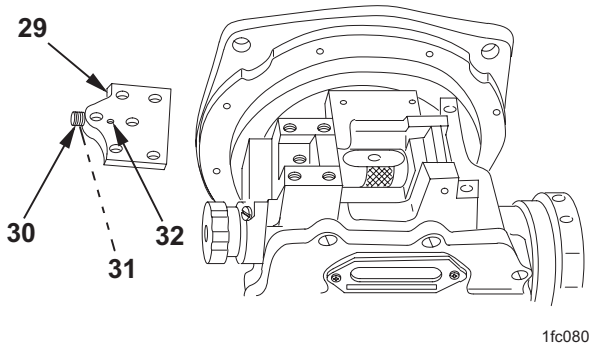

**M18A1 Quadrant**

9. Loosen, but do not remove, setscrew (25) and cushioning pad (26) from fire control level assembly (27).

10. Remove machine screw (28) from adjusting plate (29).

## NOTE

The following steps are written and illustrated for the M17A1 quadrant but also apply to the M18A1 quadrant.



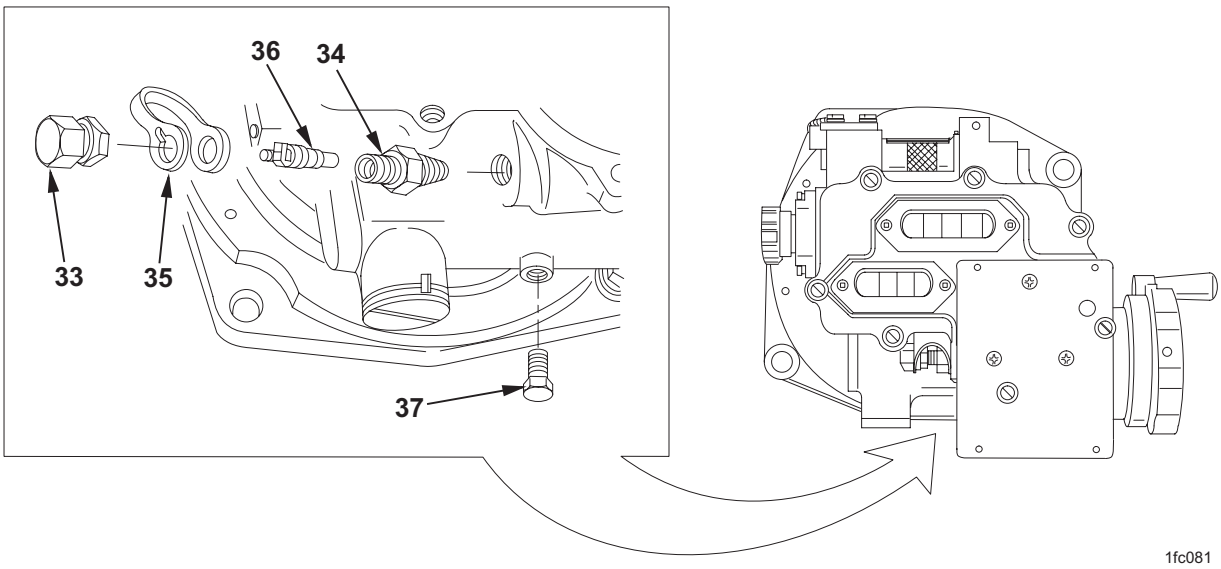

**M17A1/M18A1 Quadrant**

11. Remove adjusting plate (29).

12. If damaged, remove setscrew (25) and cushioning pad (26).

13. Loosen setscrew (30) and cushioning pad (31) from adjusting plate (29). If damaged, remove.

14. Loosen setscrew (32) from adjusting plate (29). If damaged, remove.




**M17A1/M18A1 Quadrant**

15. Unscrew air valve cap (33) from purging valve stem (34) and remove from valve cap strap (35).
16. Remove purging valve stem (34).
17. Remove valve cap strap (35) and valve core (36) from purging valve stem (34).
18. Remove safety relief valve (37).

## CLEANING

WARNING

Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.

Clean all parts with cleaning compound (item 12, WP 0152 00). Wipe off excess cleaning compound with a clean wiping rag (item 18, WP 0152 00).

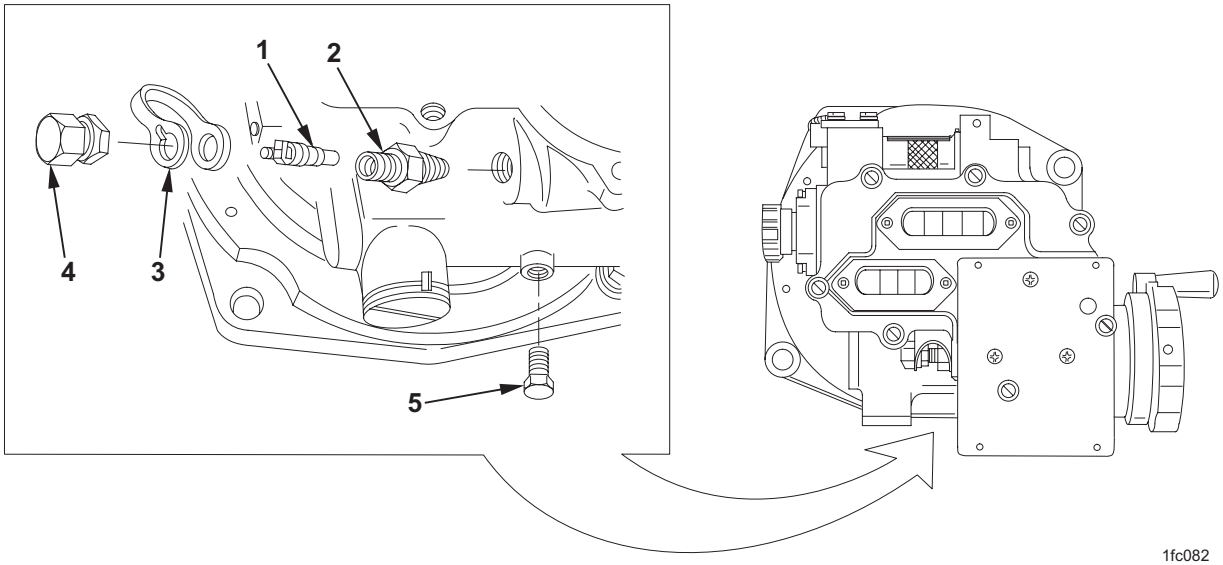
## REPAIR OR REPLACEMENT

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0111 00.

**ASSEMBLY**

## NOTE

The following steps are written and illustrated for the M17A1 quadrant but also apply to the M18A1 quadrant.



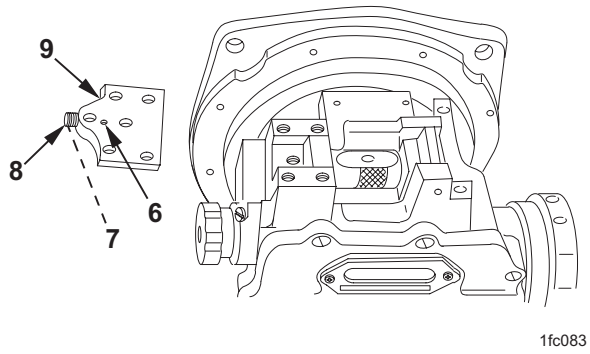

**M17A1/M18A1 Quadrant**

1. Install valve core (1) in purging valve stem (2).
2. Place valve cap strap (3) on purging valve stem (2) and air valve cap (4).

## WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

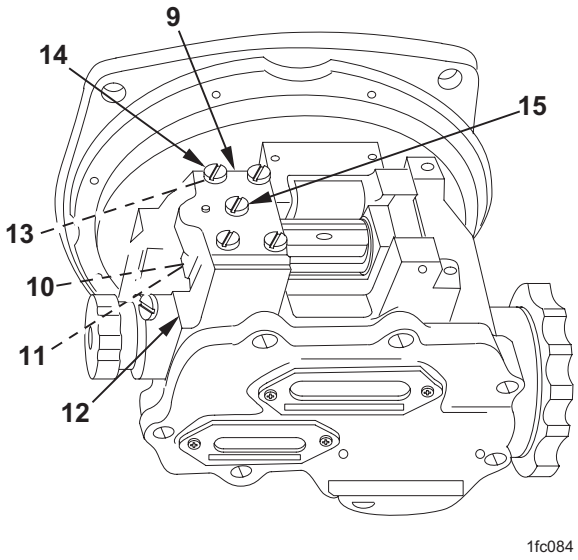
3. Apply sealing compound (item 13, WP 0152 00) to purging valve stem (2) and install.
4. Install air valve cap (4) on purging valve stem (2).
5. Apply sealing compound (item 13, WP 0152 00) to safety relief valve (5) and install.

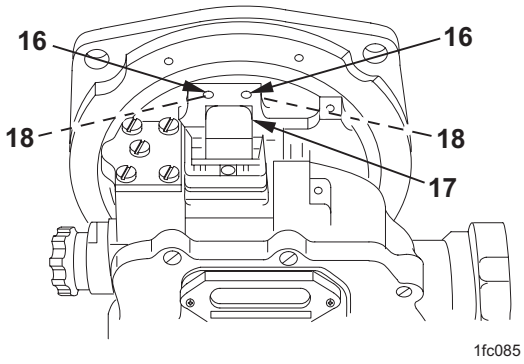



**M17A1/M18A1 Quadrant**

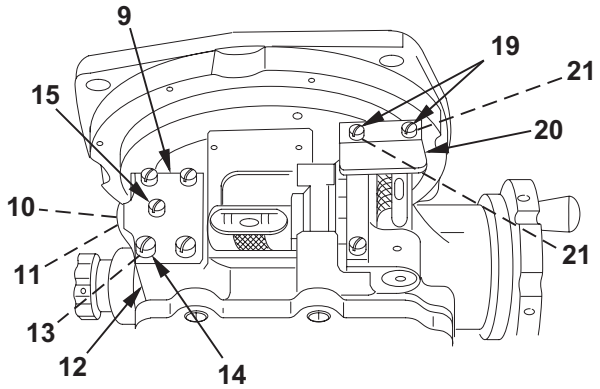
6. If removed, install new setscrew (6). Do not tighten setscrew.

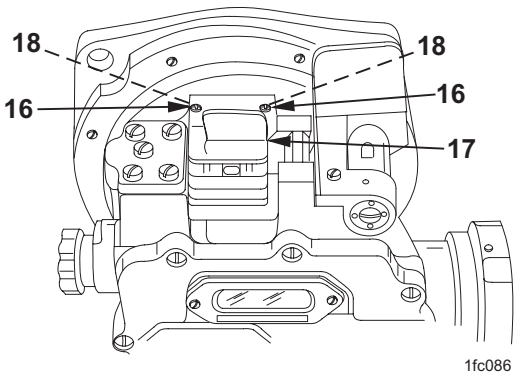
7. If removed, install new cushioning pad (7) and new setscrew (8) in adjusting plate (9). Do not tighten setscrew.




**M17A1 Quadrant**




**M18A1 Quadrant**

**ASSEMBLY - Continued**

8. If removed, install new cushioning pad (10) and new setscrew (11) to fire control level assembly (12). Do not tighten setscrew.

9. Install adjusting plate (9) on fire control level assembly (12).

10. Install four new lockwashers (13) (item 4, WP 0111 00) and four machine screws (14). Tighten machine screws and fill heads with sealing compound (item 13, WP 0152 00).

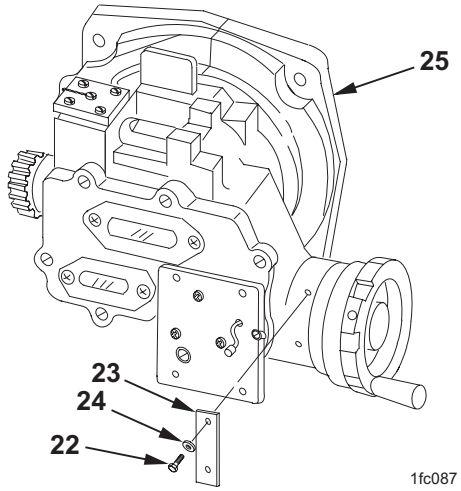
11. Start screw (15) into adjusting plate (9) but do not tighten. Screw will be tightened and locked with setscrew (11) during adjustment.

12. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (16).

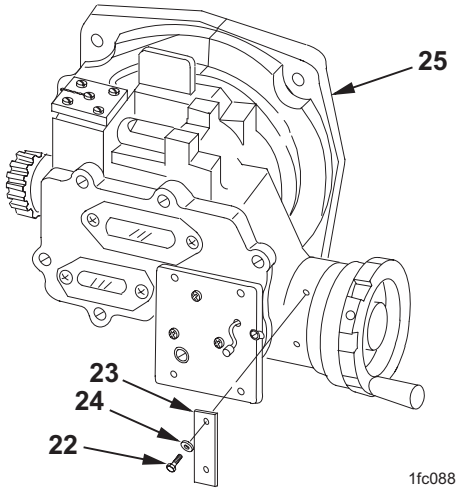
13. Install reflector (17) with two new lockwashers (18) (item 4, WP 0111 00) and two machine screws (16). Tighten machine screws.

14. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (19).

15. Install reflector (20) with two new lockwashers (21) (item 9, WP 0111 00) and two machine screws (19). Tighten machine screws (M18A1 only).



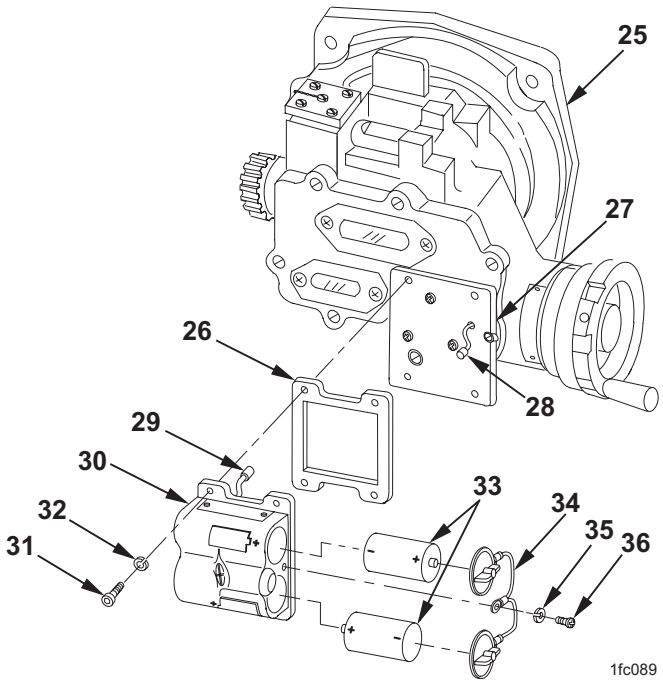

**M17A1 Quadrant**



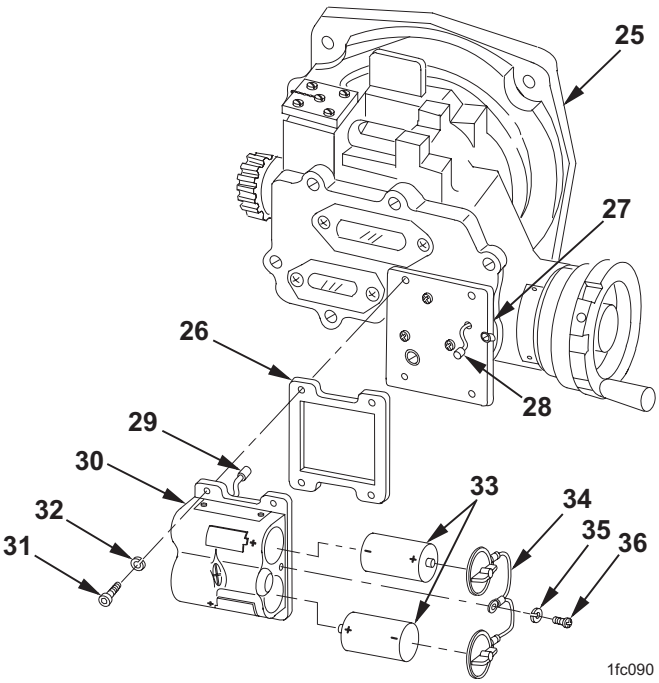

**M18A1 Quadrant**

16. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (22).

17. Install identification plate (23), two new lockwashers (24) (item 13, WP 0111 00), and two machine screws (22) on side of quadrant (25).




**M17A1 Quadrant**




**M18A1 Quadrant**

18. Install new gasket (26) (item 26, WP 0111 00) onto adapter plate (27) on quadrant (25).

19. Carefully connect connector (28) on adapter plate (27) to connector (29) on battery enclosure assembly (30).

## CAUTION

Be careful when assembling components. Do not pinch wire leads or connectors between parts.

20. Apply sealing compound (item 13, WP 0152 00) to threads of four machine screws (31).

21. Install four new lockwashers (32) and four machine screws (31) to secure battery enclosure assembly (30) and gasket (26) to adapter plate (27) on quadrant (25).

## WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries.

## CAUTION

Do not install batteries backwards. Severe equipment damage may result. Pay careful attention to diagram on battery enclosure.

22. Install two batteries (33) into battery enclosure assembly (30).

23. Install cap and retainer assembly (34) and secure on battery enclosure assembly (30) with new lockwasher (35) (item 20, WP 0111 00) and machine screw (36).

**ASSEMBLY - Continued**

24. Perform fire control level assembly adjustment maintenance (WP 0048 00).

25. Purge and charge M17A1/M18A1 fire control quadrant (TM 750-116).

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

# M17/M17A1 FIRE CONTROL QUADRANT (1290-01-037-3883/1290-01-515-8260)

## FIRE CONTROL LEVEL ASSEMBLY MAINTENANCE DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY, ADJUSTMENT

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Lock wire (item 21, WP 0152 00)
Sealing compound (item 13, WP 0152 00)

**References**
WP 0113 00

**Equipment Conditions**
M17/M17A1 fire control quadrant mounted on M198 howitzer with cannon at zero elevation (TM 9-1025-211-10)

**DISASSEMBLY**

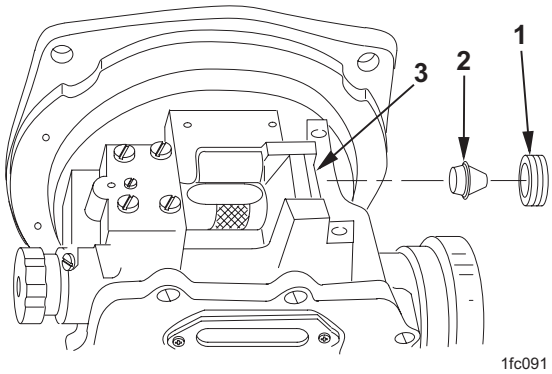
## WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

## NOTE

The following steps are written and illustrated for the M17 quadrant but also apply to the M17A1 quadrant.




**M17/M17A1 Quadrant**

Remove sealing compound and remove externally threaded ring (1) and eccentric (2) from vial holder (3).

**REPAIR OR REPLACEMENT**

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0113 00.

**ASSEMBLY**

## WARNING

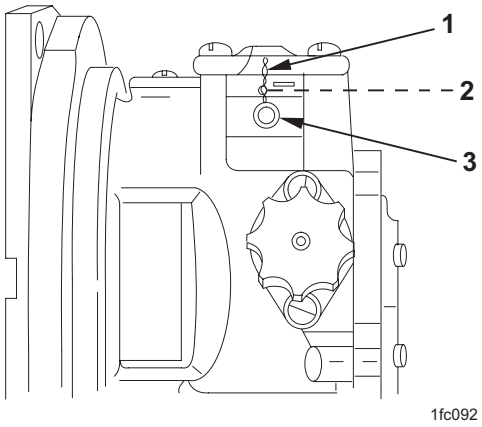
Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

Apply sealing compound (item 13, WP 0152 00) to eccentric (2) and externally threaded ring (1) and install into vial holder (3). Proceed to Adjustment.

**ADJUSTMENT**

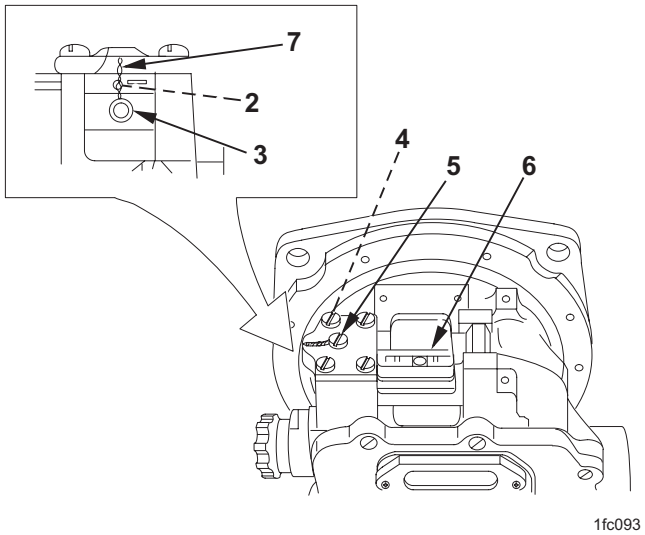
## NOTE

Correction and elevation counters must be set at zero.




**M17/M17A1 Quadrant**

1. Remove and discard lock wire (1).
2. Loosen two setscrews (2 and 3).




**M17/M17A1 Quadrant**

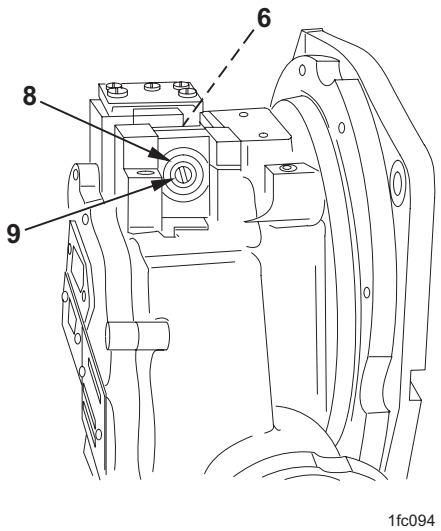
3. Turn setscrew (4) and machine screw (5) until bubble in elevation level (6) levels.
4. Tighten setscrews (2 and 3). Fill heads of setscrews (2, 3, and 4) with sealing compound (item 13, WP 0152 00) after final adjustment.

**ADJUSTMENT - Continued**

## NOTE

If bubble in elevation level cannot be adjusted within one graduation, more adjustment is required. Perform steps 6 through 11. Otherwise, perform step 5.

5. Install new lock wire (7) (item 21, WP 0152 00).




**M17 Quadrant**

6. Remove externally threaded ring (8) and eccentric (9).

7. Place a dab of sealing compound (item 13, WP 0152 00) on slotted end of eccentric (9) and to threads of externally threaded ring (8).

8. Reinstall eccentric (9) and externally threaded ring (8) and turn eccentric until bubble in elevation level (6) centers.

9. Tighten externally threaded ring (8).

10. Apply sealing compound (item 13, WP 0152 00) to outside of externally threaded ring (8).

11. Install new lock wire (item 21, WP 0152 00).

**END OF WORK PACKAGE**

# CHAPTER 12

# GENERAL SUPPORT MAINTENANCE INSTRUCTIONS FOR M17/M18 AND M17A1/M18A1 FIRE CONTROL QUADRANT

**GENERAL SUPPORT**

# M17/M18 FIRE CONTROL QUADRANT (1290-01-037-3883/1290-01-037-7289)

## M17/M18 FIRE CONTROL QUADRANT MAINTENANCE DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

### Tools and Special Tools

Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

### Materials/Parts

Grease (item 15, WP 0152 00)
Grease (item 16, WP 0152 00)
Lockwasher (4) (item 4, WP 0111 00)
Lockwasher (9) (item 18, WP 0111 00)
Lockwasher (3) (item 19, WP 0112 00)
Lock wire (item 21, WP 0152 00)
O-ring (item 17, WP 0111 00)
O-ring (item 36, WP 0111 00)
O-ring (item 14, WP 0112 00)
O-ring (item 17, WP 0112 00)
O-ring (item 22, WP 0112 00)
Sealing compound (item 13, WP 0152 00)
Solvent cleaning compound (item 12, WP 0152 00)
Spring tension washer (item 12, WP 0112 00)
Wiping rag (item 18, WP 0152 00)

### References

WP 0048 00
WP 0056 00
WP 0111 00
WP 0112 00

### Equipment Conditions

M17/M18 fire control quadrant removed from howitzer (TM 9-1025-211-20&P/TM 9-1025-215-25&P)

**DISASSEMBLY**

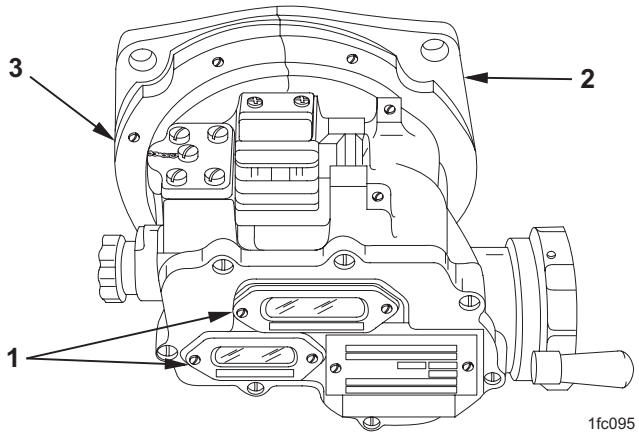
## WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

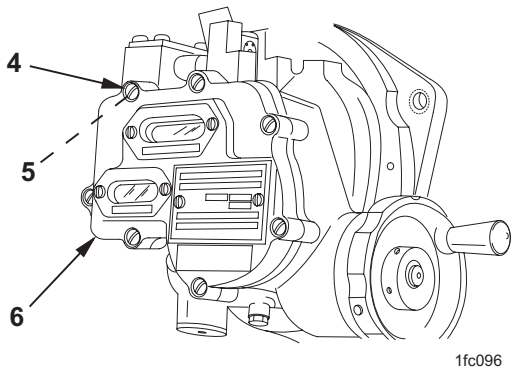
## NOTE

The following steps are written and illustrated for the M17 quadrant but also apply to the M18 quadrant.




**M17/M18 Quadrant**

1. Set counters (1) at zero. Scribe a line on base assembly (2) and housing assembly (3) to facilitate correct counter installation.

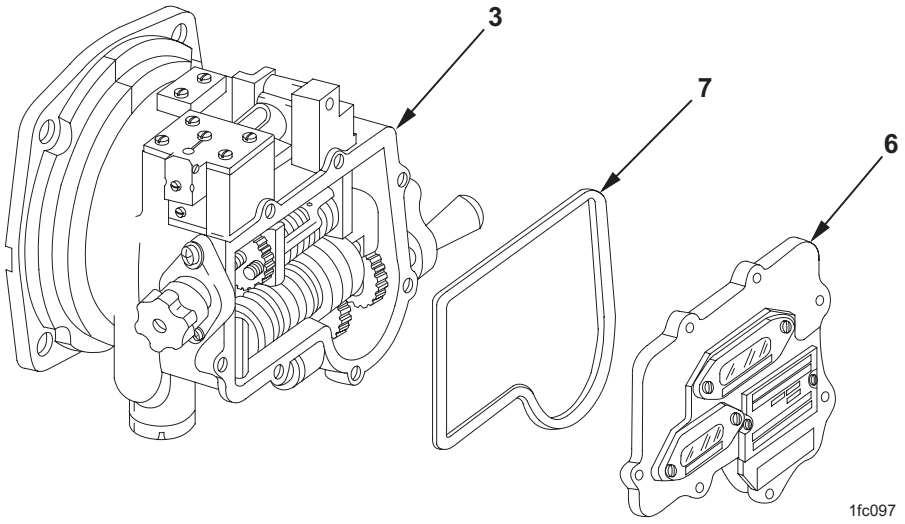



**M17/M18 Quadrant**

## WARNING

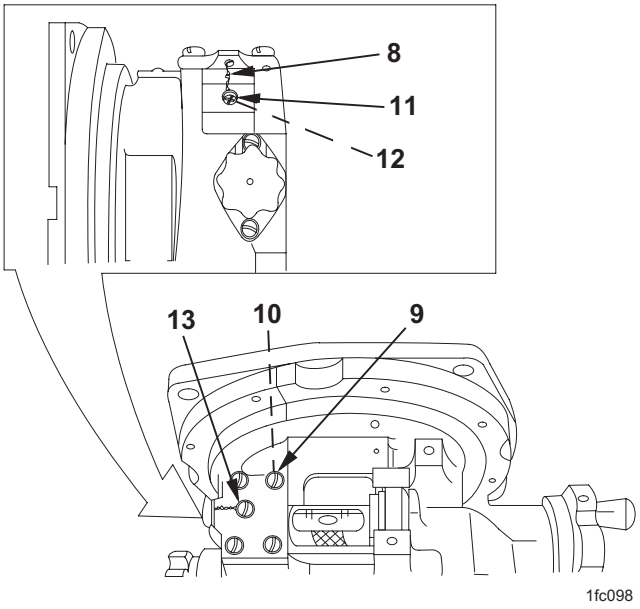
To avoid injury to personnel and damage to equipment, cover assembly will only be removed if counters are fully illuminated. Place cover assembly in secure area and exercise caution to avoid breakage of nuclear lamps.

2. Remove seven machine screws (4) and seven lockwashers (5) from cover assembly (6). Discard lockwashers.




**M17/M18 Quadrant**

3. Remove cover assembly (6) and O-ring (7) from housing assembly (3). Discard O-ring.




**M17/M18 Quadrant**

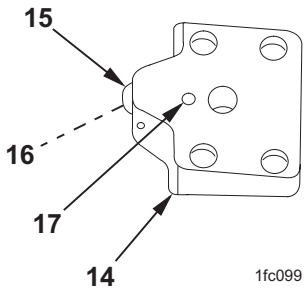
4. Remove and discard lock wire (8).

5. Remove four machine screws (9) and four lockwashers (10). Discard lockwashers.

6. Loosen setscrew (11) and cushioning pad (12).

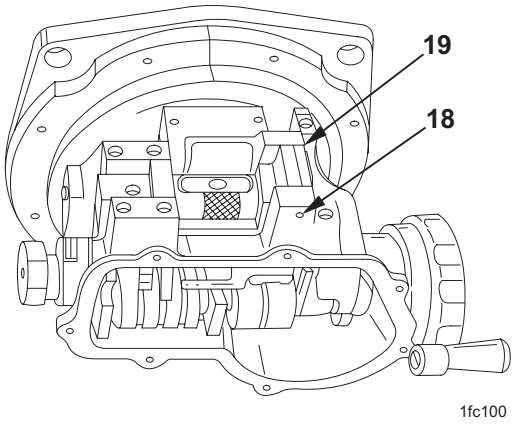
7. Remove machine screw (13).

**DISASSEMBLY - Continued**




**M17/M18 Quadrant**

8. Remove adjusting plate (14).
9. Loosen setscrew (15) and cushioning pad (16).
10. Loosen setscrew (17).

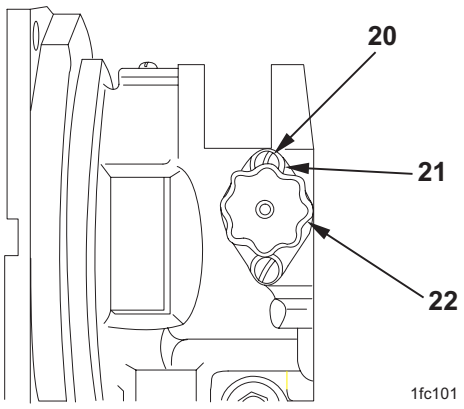



**M17/M18 Quadrant**

## NOTE

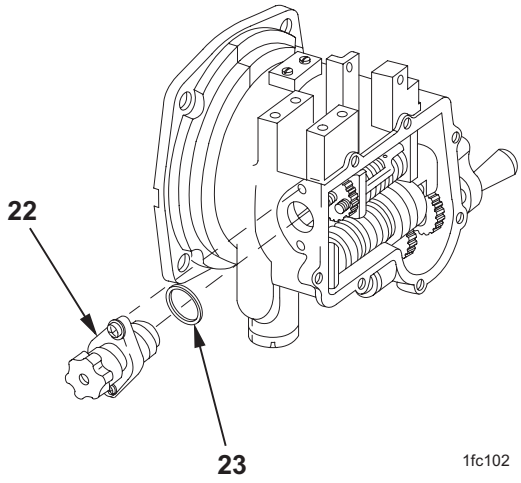
Replacement of fire control level assembly parts can be done without removing fire control level assembly from M17/M18 quadrant.

11. Drive out headless straight pin (18).
12. Lift off fire control level assembly (19) and remove sealing compound.




**M17/M18 Quadrant**

13. Remove two machine screws (20) and two lockwashers (21) from correction knob assembly (22). Discard lockwashers.



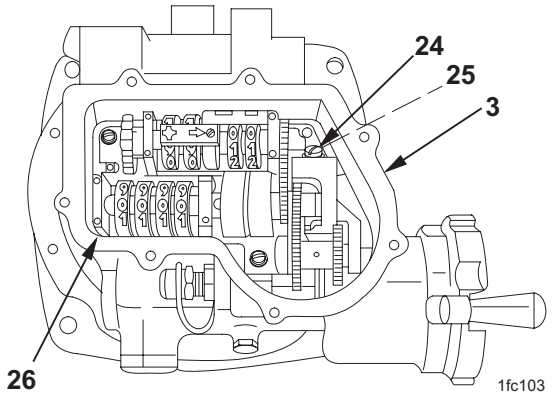

**M17/M18 Quadrant**

## CAUTION

Correction knob assembly must be removed carefully, or internal M17/M18 quadrant parts could be damaged.

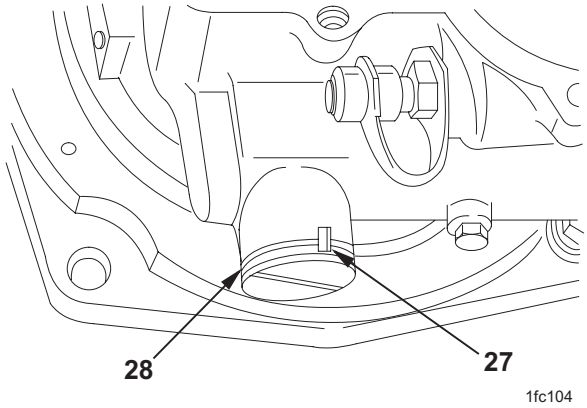
14. Remove correction knob assembly (22) and O-ring (23). Discard O-ring.

**DISASSEMBLY - Continued**



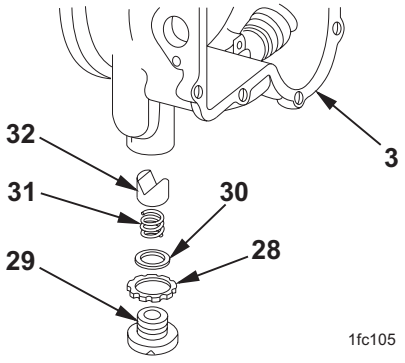

**M17/M18 Quadrant**

15. Remove three machine screws (24), three lockwashers (25), and counter assembly (26) from housing assembly (3). Discard lockwashers.




**M17/M18 Quadrant**

16. Straighten locking ear (27) on key washer (28).




**M17/M18 Quadrant**

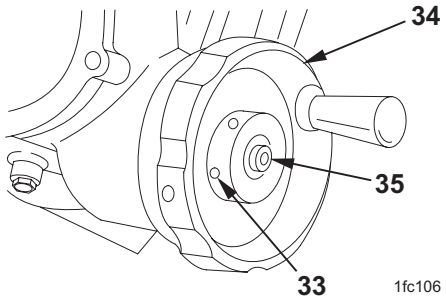
17. Unscrew and remove spring plug retainer (29) from housing assembly (3).

18. Remove O-ring (30) and key washer (28) from spring plug retainer (29). Discard O-ring.

19. Remove compression helical spring (31) and V-type bearing (32) from housing assembly (3).

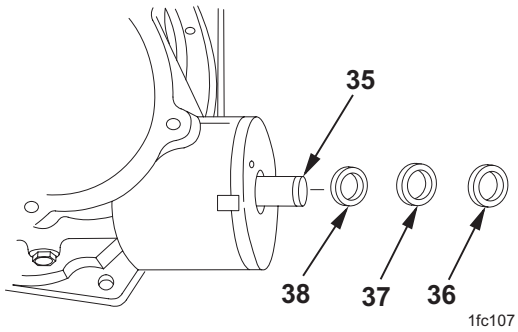
## CAUTION

Support elevation knob in V block on solid surface to prevent damage to worm shaft assembly.




**M17/M18 Quadrant**

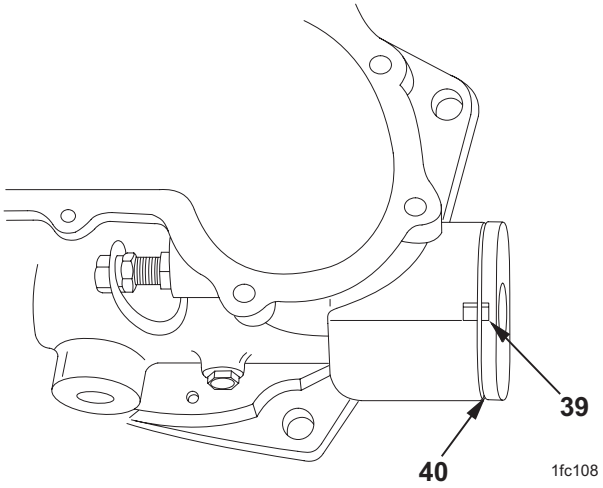
20. Remove headless straight pin (33) and elevation knob assembly (34) from worm shaft assembly (35).




**M17/M18 Quadrant**

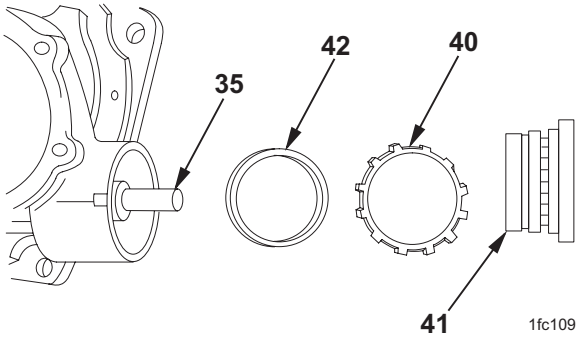
21. Remove spring tension washer (36), packing retainer (37), and O-ring (38) from worm shaft assembly (35). Discard O-ring and spring tension washer.

**DISASSEMBLY - Continued**




**M17/M18 Quadrant**

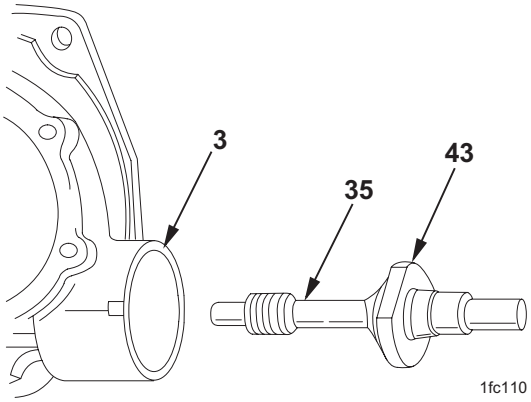
22. Straighten locking ear (39) on key washer (40).




**M17/M18 Quadrant**

23. Remove elevation retainer (41) with O-ring (42) and key washer (40) from worm shaft assembly (35).

24. Remove O-ring (42) and key washer (40) from elevation retainer (41). Discard O-ring.




**M17/M18 Quadrant**

## NOTE

Note position of flat (43) on worm shaft assembly (35) in relationship to housing assembly (3).

25. Rotate and remove worm shaft assembly (35) from housing assembly (3).

## NOTE

For maintenance of the fire control level (cross level vial) on the M18 quadrant, refer to WP 0056 00.

### CLEANING

## WARNING

Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.

Clean all parts with cleaning compound (item 12, WP 0152 00). Wipe off excess cleaning compound with a clean wiping rag (item 18, WP 0152 00).

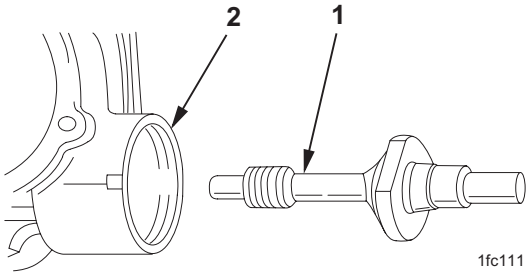
### REPAIR OR REPLACEMENT

1. Inspect gears for missing teeth and stripped gears.
2. Inspect bearing surfaces for nicks and burrs.
3. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0111 00 and WP 0112 00.

### ASSEMBLY

## NOTE

The following steps are written and illustrated for the M17 quadrant but also apply to the M18 quadrant.




**M17/M18 Quadrant**

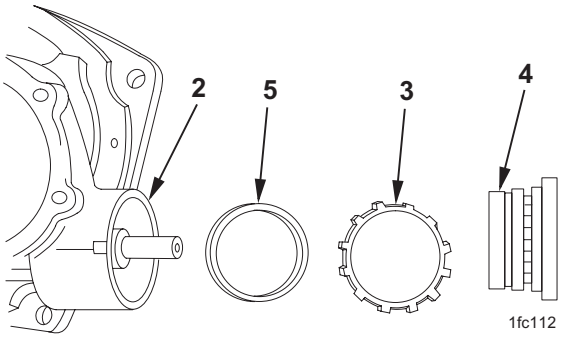
1. Apply a light coat of grease (item 15, WP 0152 00) to worm shaft assembly (1).

**ASSEMBLY - Continued**

## NOTE

Ensure flat on worm shaft assembly is in proper position for counter assembly clearance (as noted during disassembly).

2. Install worm shaft assembly (1) in housing assembly (2) by turning shaft.

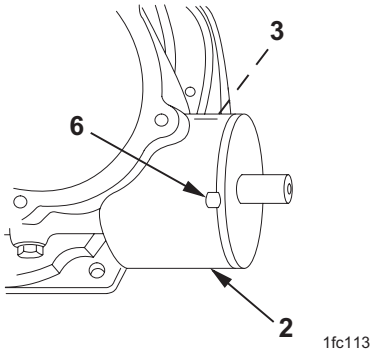



**M17/M18 Quadrant**

3. Install key washer (3) on elevation retainer (4).

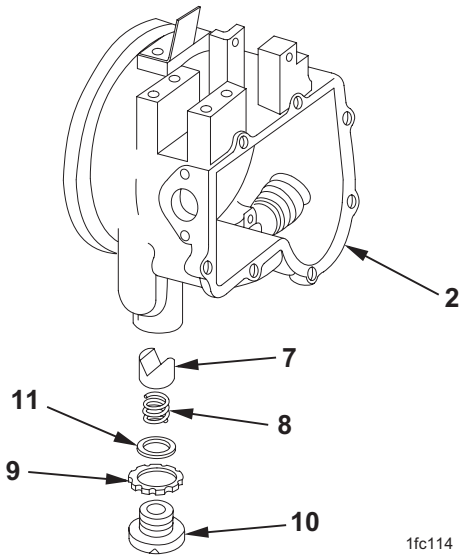
4. Apply a light coat of grease (item 16, WP 0152 00) to new O-ring (5) (item 17, WP 0112 00) and install on elevation retainer (4).

5. Screw elevation retainer (4) in housing assembly (2) until tight.




**M17/M18 Quadrant**

6. Bend locking ear (6) to secure key washer (3) to housing assembly (2).



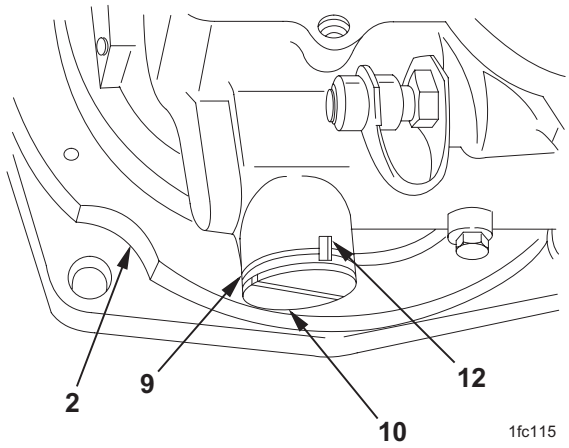

**M17/M18 Quadrant**

7. Apply a light coat of grease (item 15, WP 0152 00) to V-type bearing (7), and install in housing assembly (2).

8. Install compression helical spring (8) in housing assembly (2).

9. Place key washer (9) on spring plug retainer (10).

10. Apply a light coat of grease (item 16, WP 0152 00) on new O-ring (11) (item 22, WP 0112 00), and install on spring plug retainer (10).

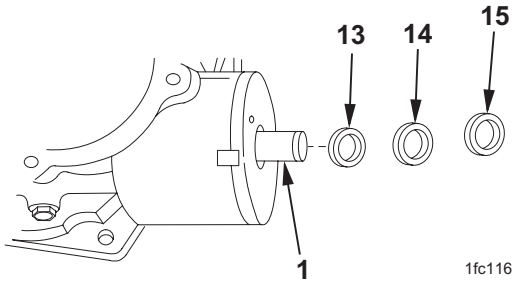



**M17/M18 Quadrant**

11. Screw spring plug retainer (10) into housing assembly (2) until tight.

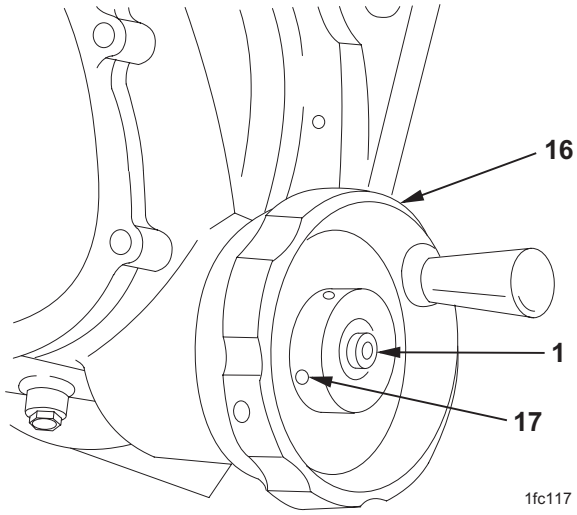
12. Bend locking ear (12) on key washer (9) to secure spring plug retainer (10) to housing assembly (2).

**ASSEMBLY - Continued**




**M17/M18 Quadrant**

13. Apply a light coat of grease (item 16, WP 0152 00) to new O-ring (13) (item 14, WP 0112 00). Install O-ring, packing retainer (14), and new spring tension washer (15) over worm shaft assembly (1).




**M17/M18 Quadrant**

## NOTE

Perform steps 14 and 15, and continue with step 17, if new worm shaft assembly has been installed. Perform step 16 if previously-installed components are used.

14. Install elevation knob assembly (16) on worm shaft assembly (1) and secure with setscrew, NSN 5305-00-282-8902. Using the pilot hole located on the knob, drill hole through worm shaft assembly.

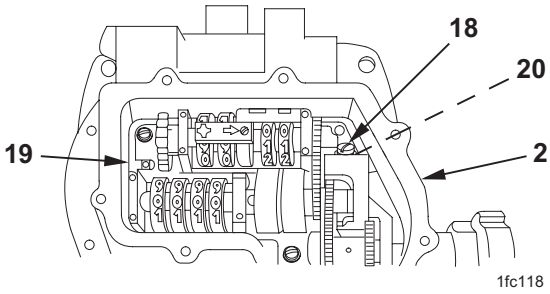
15. Remove setscrew from elevation knob assembly (16).

16. Install elevation knob assembly (16) on worm shaft assembly (1).

## CAUTION

Support elevation assembly knob in V block on solid surface to prevent damage to worm shaft assembly.

17. Install headless straight pin (17) in elevation knob assembly (16) and worm shaft assembly (1).




**M17/M18 Quadrant**

## WARNING

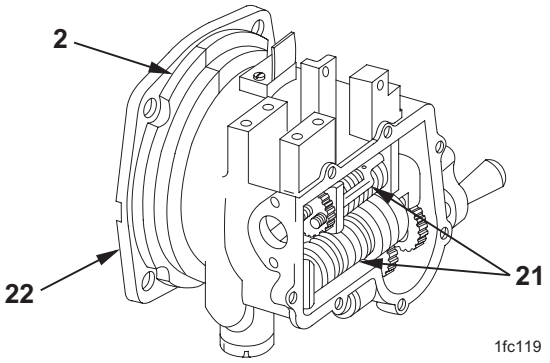
Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

## NOTE

Ensure counters are set to zero and scribe lines on M17/M18 quadrant housing assembly are aligned.

18. Apply sealing compound (item 13, WP 0152 00) to threads of three machine screws (18).

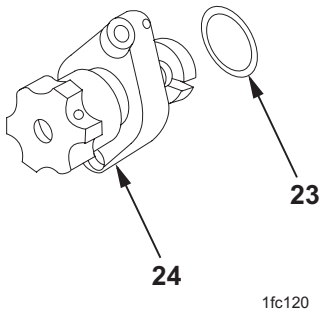
19. Position counter assembly (19) in housing assembly (2) and secure with three new lockwashers (20) (item 19, WP 0112 00) and three machine screws (18).




**M17/M18 Quadrant**

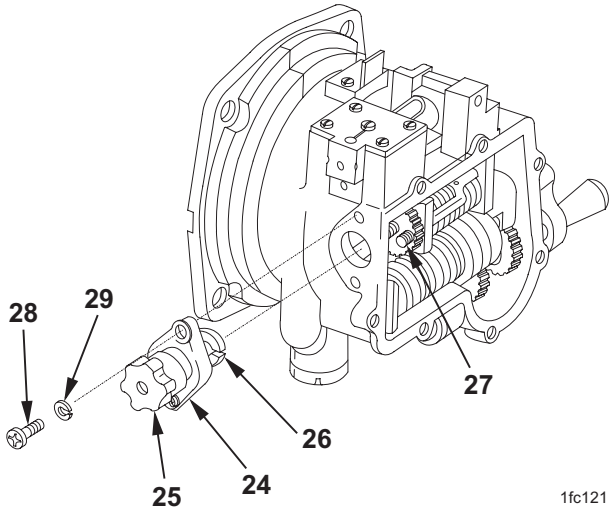
20. Check to ensure counters (21) are zeroed, with scribe lines on base assembly (22) and housing assembly (2) aligned.

**ASSEMBLY - Continued**



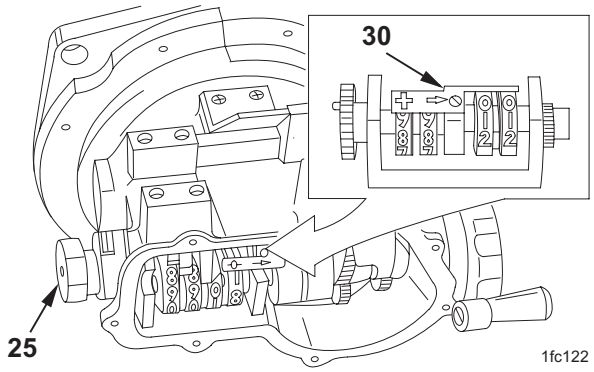

**M17/M18 Quadrant**

21. Place new O-ring (23) (item 36, WP 0111 00) on correction knob assembly (24). Apply grease (item 16, WP 0152 00).




**M17/M18 Quadrant**

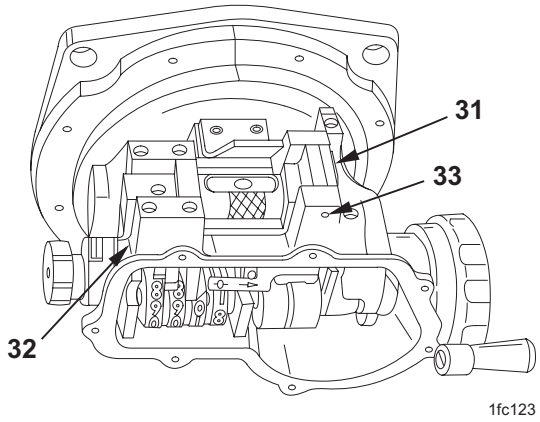
22. Ensure rotation of knob (25) is smooth through 19-1/4 revolutions.
    a. Turn knob (25) clockwise until it stops.
    b. Then turn counterclockwise 9-1/2 turns.
23. Install correction knob assembly (24) and align slot (26) with headless straight pin (27).
24. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (28).
25. Install two new lockwashers (29) (item 18, WP 0111 00) and two machine screws (28).




**M17/M18 Quadrant**

26. Turn knob (25) and ensure correction counter (30) indicates reading from +95 to +99 mils and -95 to -99 mils.

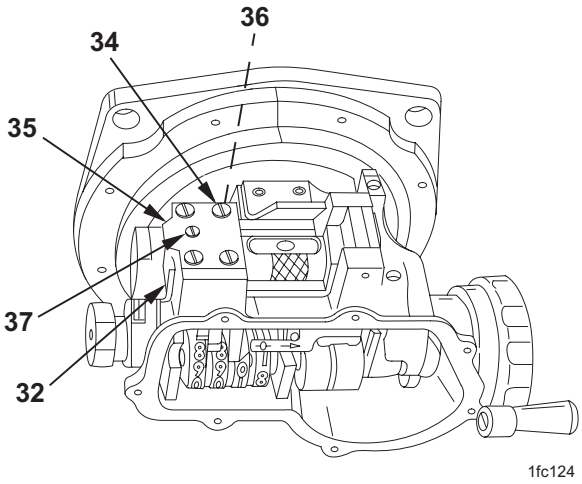
27. Return correction counter (30) to 00.




**M17/M18 Quadrant**

28. Place fire control level assembly (31) in bracket (32) and install headless straight pin (33).

**ASSEMBLY - Continued**

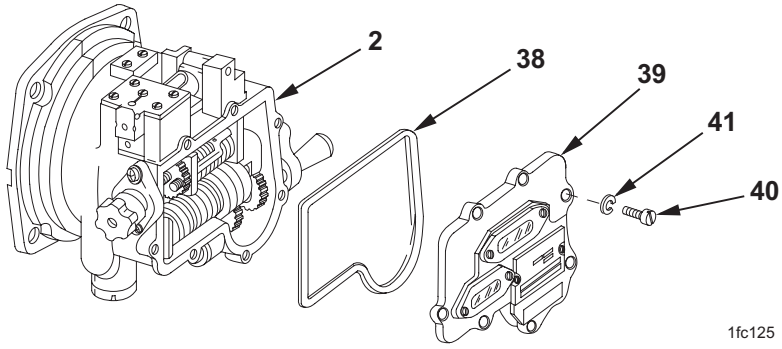



**M17/M18 Quadrant**

29. Apply sealing compound (item 13, WP 0152 00) to threads of four machine screws (34).

30. Place adjusting plate (35) on top of bracket (32) and install with four new lockwashers (36) (item 4, WP 0111 00) and four machine screws (34). Tighten machine screws. Install new lock wire (item 21, WP 0152 00).

31. Apply sealing compound (item 13, WP 0152 00) to threads of machine screw (37) and install, but do not tighten.




**M17/M18 Quadrant**

32. Apply light coat of grease (item 16, WP 0152 00) on new O-ring (38) (item 17, WP 0111 00). Place cover assembly (39) with new O-ring on housing assembly (2).

33. Apply sealing compound (item 13, WP 0152 00) to threads of seven machine screws (40).

34. Install cover assembly (39) and O-ring (38) on housing assembly (2) with seven new lockwashers (41) (item 18, WP 0111 00) and seven machine screws (40).

35. Perform adjustment of fire control level assembly. Refer to WP 0048 00.

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

# M17A1/M18A1 FIRE CONTROL QUADRANT (1290-01-515-8260/1290-01-515-8262)

## M17A1/M18A1 FIRE CONTROL QUADRANT MAINTENANCE DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**

Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**

Grease (item 15, WP 0152 00)
Grease (item 16, WP 0152 00)
Lockwasher (4) (item 4, WP 0111 00)
Lockwasher (9) (item 18, WP 0111 00)
Lockwasher (3) (item 19, WP 0112 00)
Lock wire (item 21, WP 0152 00)
O-ring (item 17, WP 0111 00)
O-ring (item 36, WP 0111 00)
O-ring (item 14, WP 0112 00)
O-ring (item 17, WP 0112 00)
O-ring (item 22, WP 0112 00)
Sealing compound (item 13, WP 0152 00)
Solvent cleaning compound (item 12, WP 0152 00)
Spring tension washer (item 12, WP 0112 00)
Wiping rag (item 18, WP 0152 00)

**References**

TM 750-116
WP 0047 00
WP 0048 00
WP 0111 00
WP 0112 00

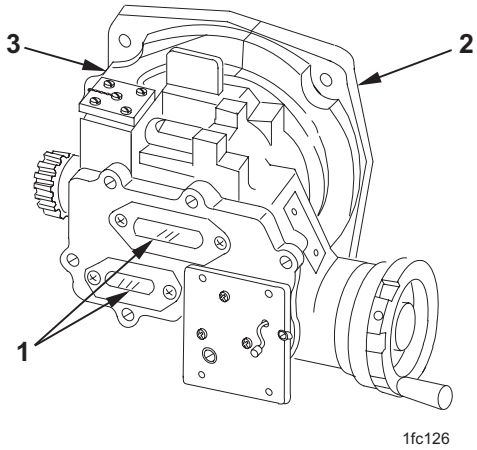
**Equipment Conditions**

M17A1/M18A1 fire control quadrant removed from howitzer (TM 9-1025-211-20&P/TM 9-1025-215-25&P)
Battery enclosure and gasket removed from M17A1/M18A1 fire control quadrant (WP 0047 00)

**DISASSEMBLY**

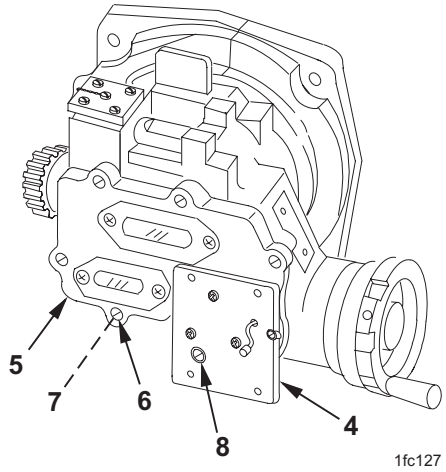
## NOTE

The following steps are written and illustrated for the M17A1 quadrant but also apply to the M18A1 quadrant.




**M17A1/M18A1 Quadrant**

1. Set counters (1) at zero. Scribe a line on base assembly (2) and housing assembly (3) to facilitate correct counter installation.



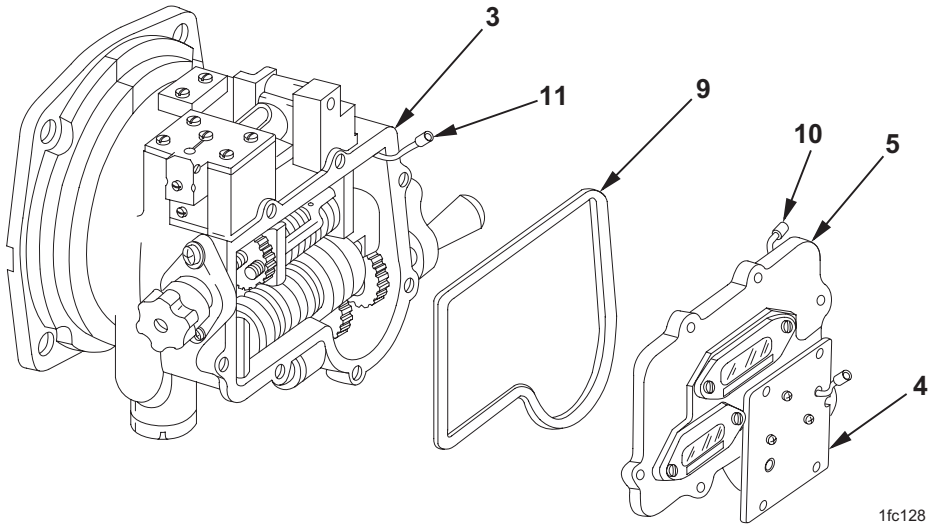

**M17A1/M18A1 Quadrant**

## CAUTION

Do not attempt to remove adapter plate (4) from cover assembly (5). A short wire harness passing through adapter plate cannot be removed without damaging equipment. Adapter plate can only be removed or installed by the manufacturer. Two access holes are provided in adapter plate to allow cover assembly removal.

2. Remove seven machine screws (6) and seven lockwashers (7) from cover assembly (5). Discard lockwashers.

3. Remove plug (8) from adapter plate (4).

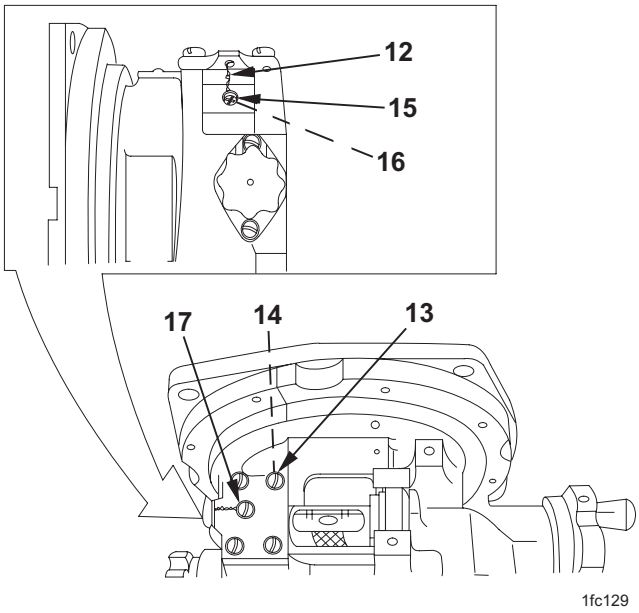



**M17A1/M18A1 Quadrant**

## CAUTION

Use extreme care when removing cover assembly. A connector on a short wire harness on cover is connected to a connector on a short wire harness on quadrant. These connectors and wire harnesses are easily damaged.

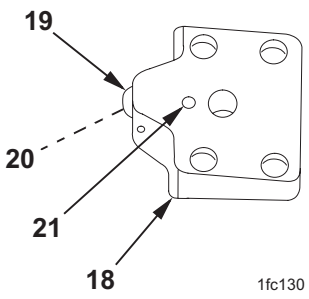
4. Carefully pull cover assembly (5) and O-ring (9) away from housing assembly (3) and disconnect connector (10) from connector (11). Remove cover assembly and O-ring. Discard O-ring.




**M17A1/M18A1 Quadrant**

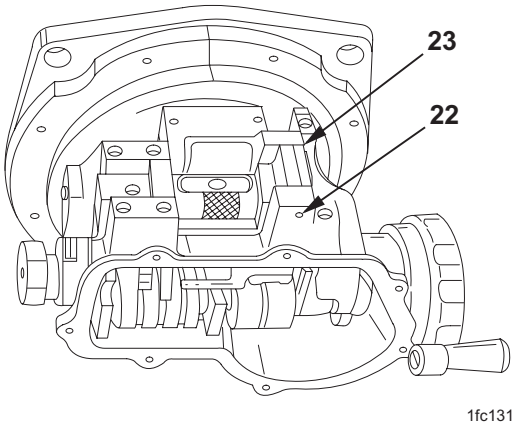
5. Remove and discard lock wire (12).
6. Remove four machine screws (13) and four lockwashers (14). Discard lockwashers.
7. Loosen setscrew (15) and cushioning pad (16).
8. Remove machine screw (17).

**DISASSEMBLY - Continued**




**M17A1/M18A1 Quadrant**

9. Remove adjusting plate (18).
10. Loosen setscrew (19) and cushioning pad (20).
11. Loosen setscrew (21).

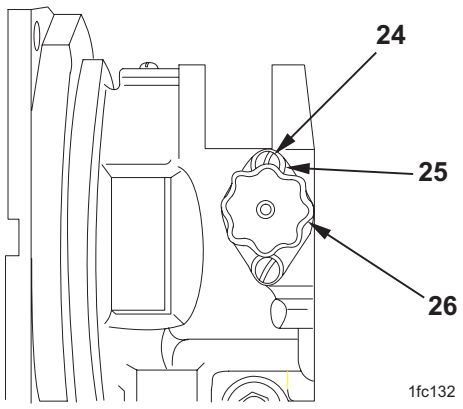



**M17A1/M18A1 Quadrant**

## NOTE

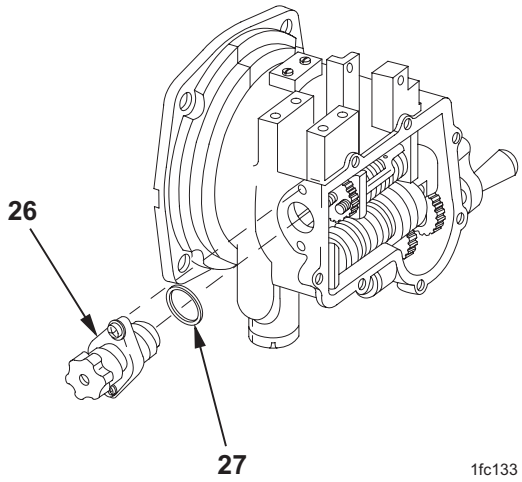
Replacement of fire control level assembly parts can be done without removing fire control level assembly from M17A1/M18A1 quadrant.

12. Drive out headless straight pin (22).
13. Lift off fire control level assembly (23) and remove sealing compound.




**M17A1/M18A1 Quadrant**

14. Remove two machine screws (24) and two lockwashers (25) from correction knob assembly (26). Discard lockwashers.



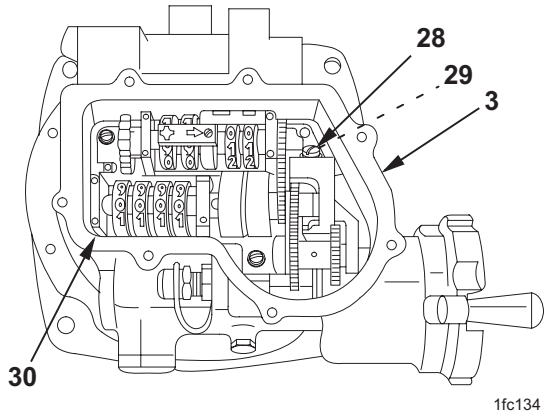

**M17A1/M18A1 Quadrant**

## CAUTION

Correction knob assembly must be removed carefully, or internal M17A1/M18A1 quadrant parts could be damaged.

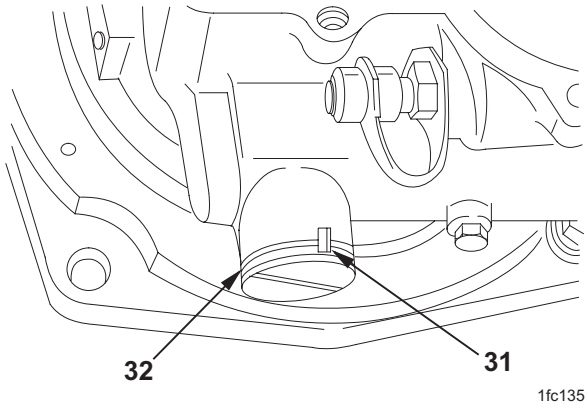
15. Remove correction knob assembly (26) and O-ring (27). Discard O-ring.

**DISASSEMBLY - Continued**



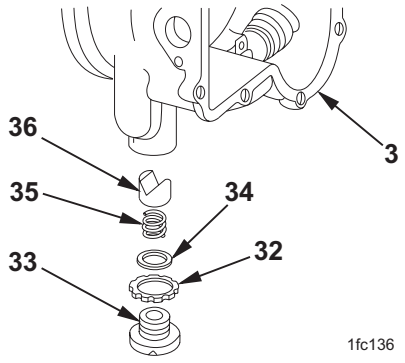

**M17A1/M18A1 Quadrant**

16. Remove three machine screws (28), three lockwashers (29), and counter assembly (30) from housing assembly (3). Discard lockwashers.




**M17A1/M18A1 Quadrant**

17. Straighten locking ear (31) on key washer (32).




**M17A1/M18A1 Quadrant**

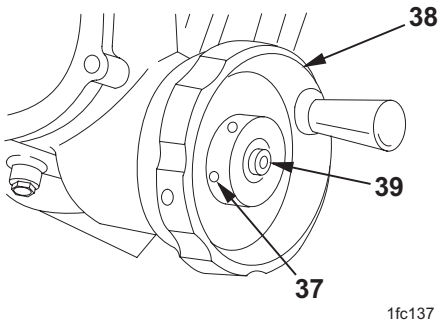
18. Unscrew and remove spring plug retainer (33) from housing assembly (3).

19. Remove O-ring (34) and key washer (32) from spring plug retainer (33). Discard O-ring.

20. Remove compression helical spring (35) and V-type bearing (36) from housing assembly (3).

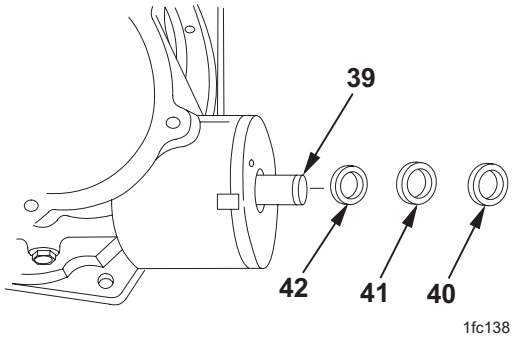
## CAUTION

Support elevation knob in V block on solid surface to prevent damage to worm shaft assembly.




**M17A1/M18A1 Quadrant**

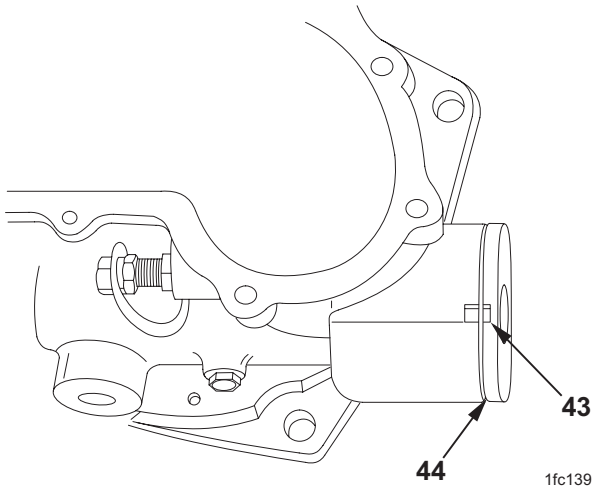
21. Remove headless straight pin (37) and elevation knob assembly (38) from worm shaft assembly (39).




**M17A1/M18A1 Quadrant**

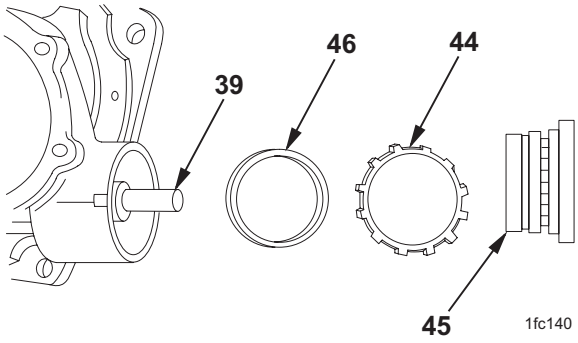
22. Remove spring tension washer (40), packing retainer (41), and O-ring (42) from worm shaft assembly (39). Discard O-ring and spring tension washer.

**DISASSEMBLY - Continued**




**M17A1/M18A1 Quadrant**

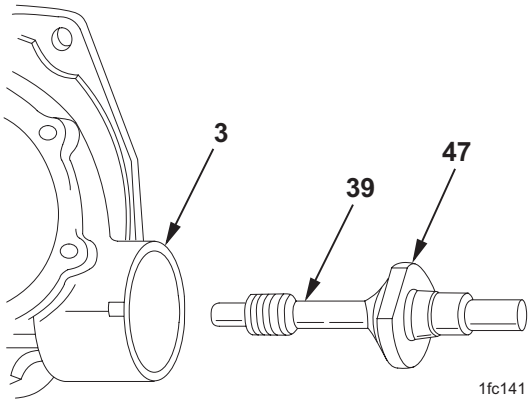
23. Straighten locking ear (43) on key washer (44).




**M17A1/M18A1 Quadrant**

24. Remove elevation retainer (45) with O-ring (46) and key washer (44) from worm shaft assembly (39).

25. Remove O-ring (46) and key washer (44) from elevation retainer (45). Discard O-ring.




**M17A1/M18A1 Quadrant**

## NOTE

Note position of flat (47) on worm shaft assembly (39) in relationship to housing assembly (3).

26. Rotate and remove worm shaft assembly (39) from housing assembly (3).

### CLEANING

## WARNING

Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.

Clean all parts with cleaning compound (item 12, WP 0152 00). Wipe off excess cleaning compound with a clean wiping rag (item 18, WP 0152 00).

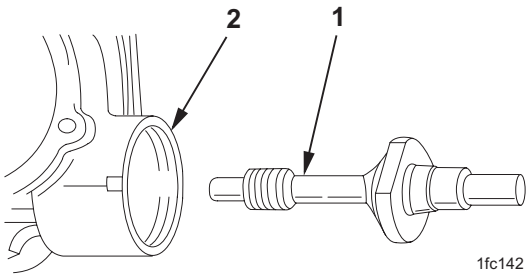
### REPAIR OR REPLACEMENT

1. Inspect gears for missing teeth and stripped gears.
2. Inspect bearing surfaces for nicks and burrs.
3. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0111 00 and WP 0112 00.

### ASSEMBLY

## NOTE

The following steps are written and illustrated for the M17A1 quadrant but also apply to the M18A1 quadrant.




**M17A1/M18A1 Quadrant**

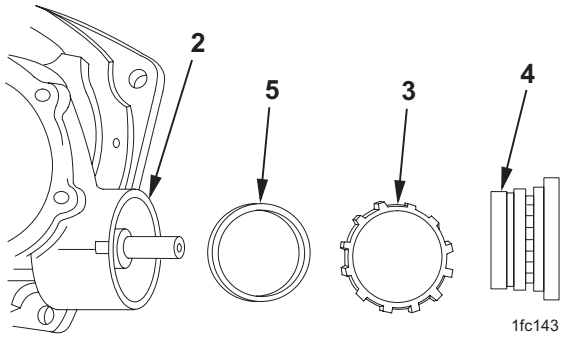
1. Apply a light coat of grease (item 15, WP 0152 00) to worm shaft assembly (1).

**ASSEMBLY - Continued**

## NOTE

Ensure flat on worm shaft assembly is in proper position for counter assembly clearance (as noted during disassembly).

2. Install worm shaft assembly (1) in housing assembly (2) by turning shaft.

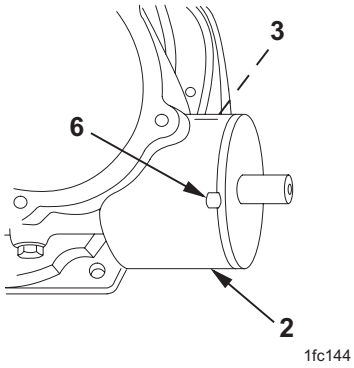



**M17A1/M18A1 Quadrant**

3. Install key washer (3) on elevation retainer (4).

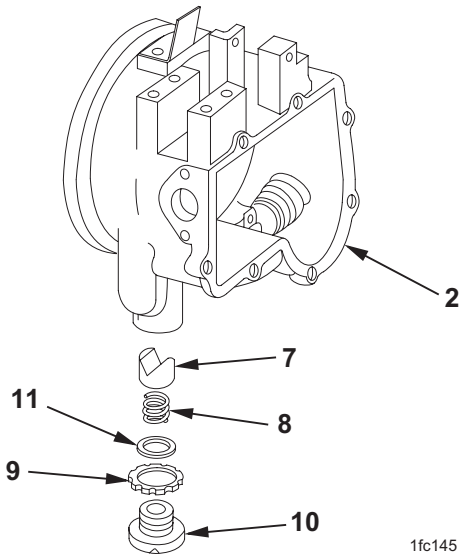
4. Apply a light coat of grease (item 16, WP 0152 00) to new O-ring (5) (item 17, WP 0112 00) and install on elevation retainer (4).

5. Screw elevation retainer (4) in housing assembly (2) until tight.




**M17A1/M18A1 Quadrant**

6. Bend locking ear (6) to secure key washer (3) to housing assembly (2).



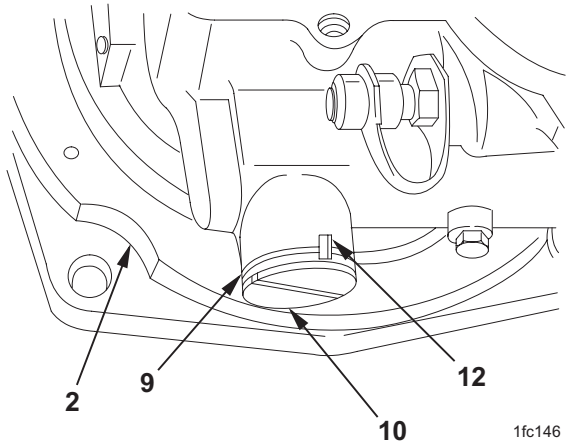

**M17A1/M18A1 Quadrant**

7. Apply a light coat of grease (item 15, WP 0152 00) to V-type bearing (7), and install in housing assembly (2).

8. Install compression helical spring (8) in housing assembly (2).

9. Place key washer (9) on spring plug retainer (10).

10. Apply a light coat of grease (item 16, WP 0152 00) on new O-ring (11) (item 22, WP 0112 00), and install on spring plug retainer (10).

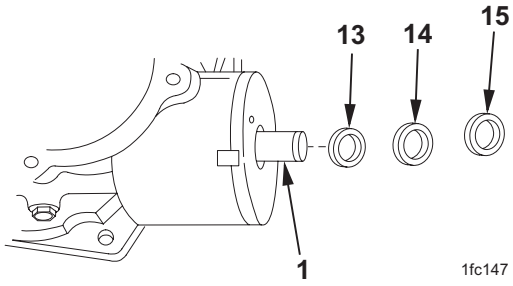



**M17A1/M18A1 Quadrant**

11. Screw spring plug retainer (10) into housing assembly (2) until tight.

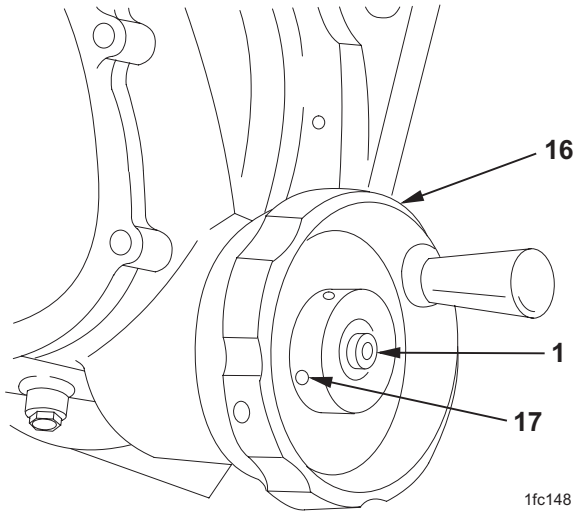
12. Bend locking ear (12) on key washer (9) to secure spring plug retainer (10) to housing assembly (2).

**ASSEMBLY - Continued**




**M17A1/M18A1 Quadrant**

13. Apply a light coat of grease (item 16, WP 0152 00) to new O-ring (13) (item 14, WP 0112 00). Install O-ring, packing retainer (14), and new spring tension washer (15) over worm shaft assembly (1).




**M17A1/M18A1 Quadrant**

## NOTE

Perform steps 14 and 15, and continue with step 17, if new worm shaft assembly has been installed. Perform step 16 if previously-installed components are used.

14. Install elevation knob assembly (16) on worm shaft assembly (1) and secure with setscrew, NSN 5305-00-282-8902. Using the pilot hole located on the knob, drill hole through worm shaft assembly.

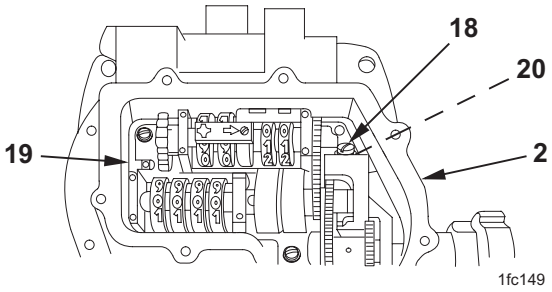
15. Remove setscrew from elevation knob assembly (16).

16. Install elevation knob assembly (16) on worm shaft assembly (1).

## CAUTION

Support elevation assembly knob in V block on solid surface to prevent damage to worm shaft assembly.

17. Install headless straight pin (17) in elevation knob assembly (16) and worm shaft assembly (1).




**M17A1/M18A1 Quadrant**

## WARNING

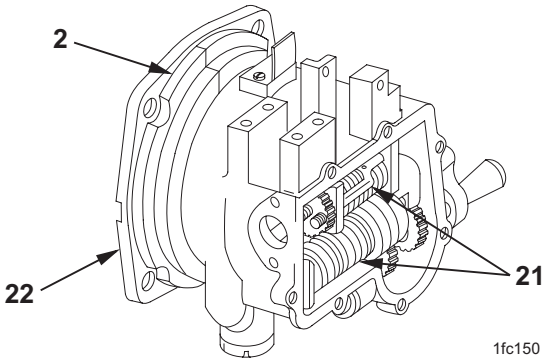
Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

## NOTE

Ensure counters are set to zero and scribe lines on M17A1/M18A1 quadrant housing assembly are aligned.

18. Apply sealing compound (item 13, WP 0152 00) to threads of three machine screws (18).

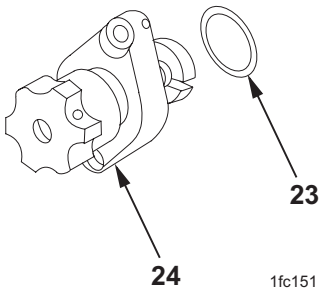
19. Position counter assembly (19) in housing assembly (2) and secure with three new lockwashers (20) (item 19, WP 0112 00) and three machine screws (18).




**M17A1/M18A1 Quadrant**

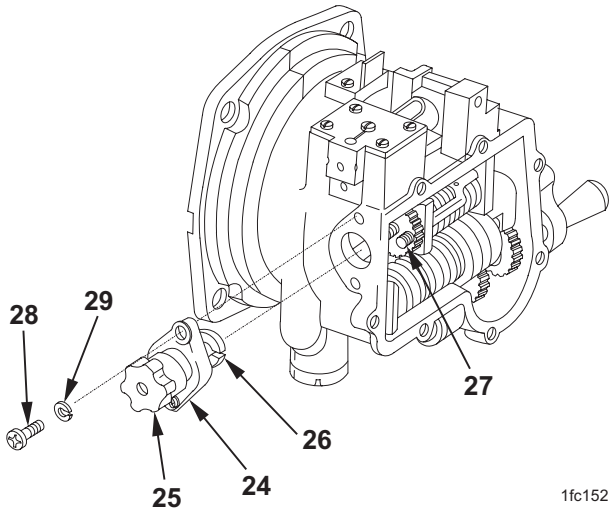
20. Check to ensure counters (21) are zeroed, with scribe lines on base assembly (22) and housing assembly (2) aligned.

**ASSEMBLY - Continued**



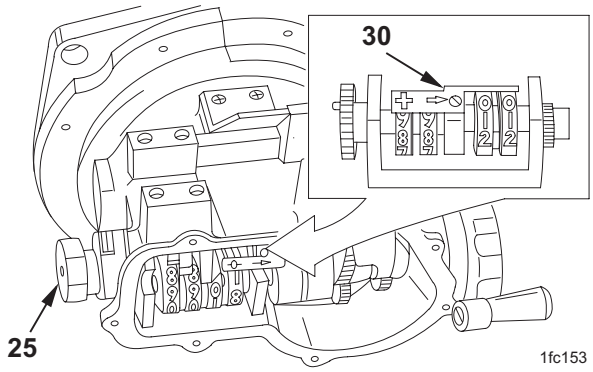

**M17A1/M18A1 Quadrant**

21. Place new O-ring (23) (item 36, WP 0111 00) on correction knob assembly (24). Apply grease (item 16, WP 0152 00).




**M17A1/M18A1 Quadrant**

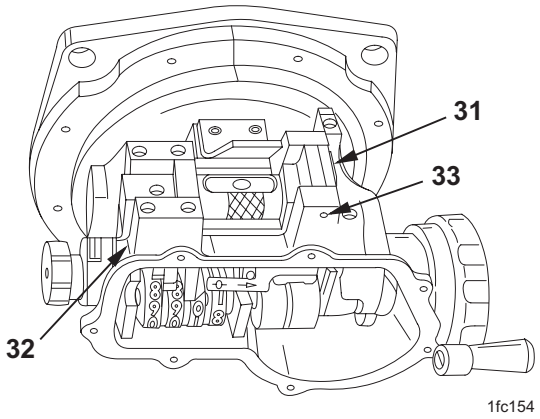
22. Ensure rotation of knob (25) is smooth through 19-1/4 revolutions.
    a. Turn knob (25) clockwise until it stops.
    b. Then turn counterclockwise 9-1/2 turns.
23. Install correction knob assembly (24) and align slot (26) with headless straight pin (27).
24. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (28).
25. Install two new lockwashers (29) (item 18, WP 0111 00) and two machine screws (28).




**M17A1/M18A1 Quadrant**

26. Turn knob (25) and ensure correction counter (30) indicates reading from +95 to +99 mils and -95 to -99 mils.

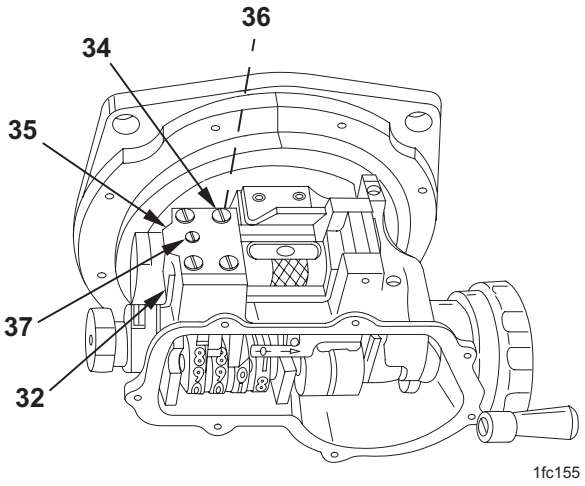
27. Return correction counter (30) to 00.




**M17A1/M18A1 Quadrant**

28. Place fire control level assembly (31) in bracket (32) and install headless straight pin (33).

**ASSEMBLY - Continued**

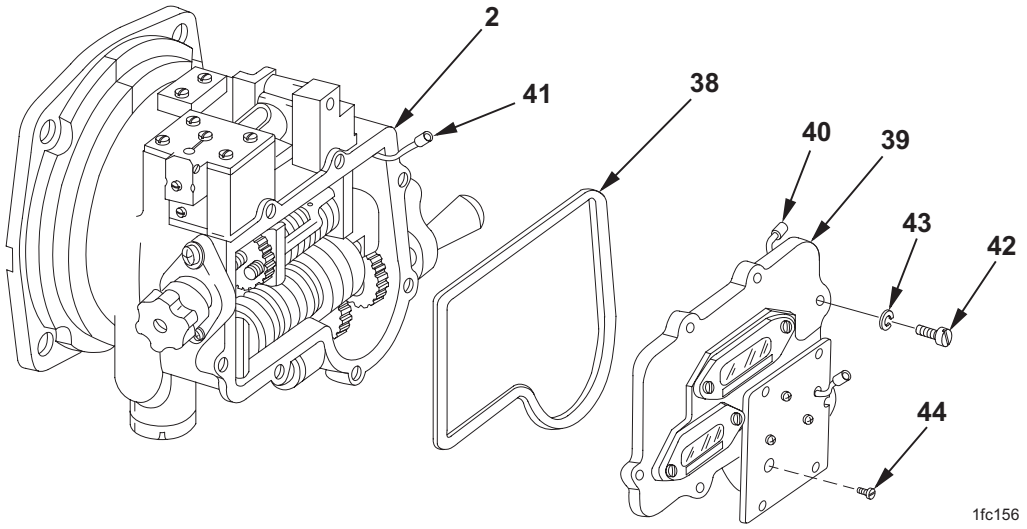



**M17A1/M18A1 Quadrant**

29. Apply sealing compound (item 13, WP 0152 00) to threads of four machine screws (34).

30. Place adjusting plate (35) on top of bracket (32) and install with four new lockwashers (36) (item 4, WP 0111 00) and four machine screws (34). Tighten machine screws. Install new lock wire (item 21, WP 0152 00).

31. Apply sealing compound (item 13, WP 0152 00) to threads of machine screw (37) and install, but do not tighten.




**M17A1/M18A1 Quadrant**

32. Apply light coat of grease (item 16, WP 0152 00) on new O-ring (38) (item 17, WP 0111 00). Place O-ring on cover assembly (39).

33. Connect connector (40) on cover assembly (39) to connector (41) on housing assembly (2).

34. Apply sealing compound (item 13, WP 0152 00) to threads of seven machine screws (42).

## CAUTION

Use extreme care during assembly. Do not pinch wires or connectors between parts.

35. Install cover assembly (39) and O-ring (38) on housing assembly (2) with seven new lockwashers (43) (item 18, WP 0111 00) and seven machine screws (42).

36. Install plug (44) to cover assembly (39).

37. Install battery enclosure and gasket. Refer to WP 0047 00.

38. Purge and charge with dry nitrogen. Refer to TM 750-116.

39. Perform adjustment of fire control level assembly. Refer to WP 0048 00.

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M17/M18 FIRE CONTROL QUADRANT**
**(1290-01-037-3883/1290-01-037-7289)**

**FIRE CONTROL LEVEL ASSEMBLY (ELEVATION LEVEL VIAL ASSEMBLY) MAINTENANCE**
**REMOVAL, DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY, INSTALLATION, ADJUSTMENT**

**INITIAL SETUP:**

**Test Equipment**
Mounting bracket (item 2, WP 0149 00)
Optical equipment test fixture (item 8, WP 0149 00)
Plate-mounted level (item 12, WP 0149 00)

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Lockwasher (4) (item 4, WP 0111 00)
Lock wire (item 21, WP 0152 00)
Plastic bag (item 5, WP 0152 00)
Sealing compound (item 13, WP 0152 00)
Tape (item 20, WP 0152 00)

**References**
WP 0111 00
WP 0113 00

**REMOVAL**

WARNING

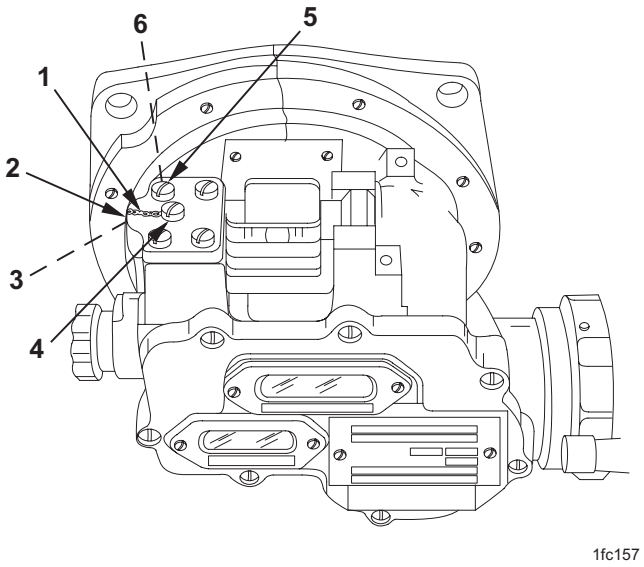
**RADIATION**   **TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

NOTE

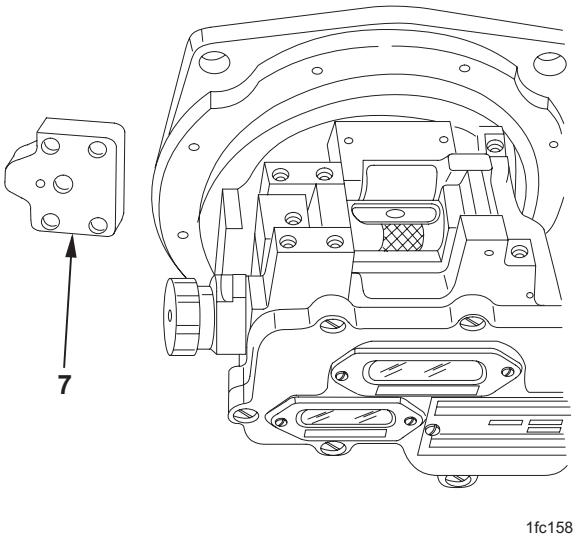
General support maintenance instructions for the M18 quadrant fire control level assembly are identical to the M17 quadrant fire control level assembly.

**REMOVAL - Continued**



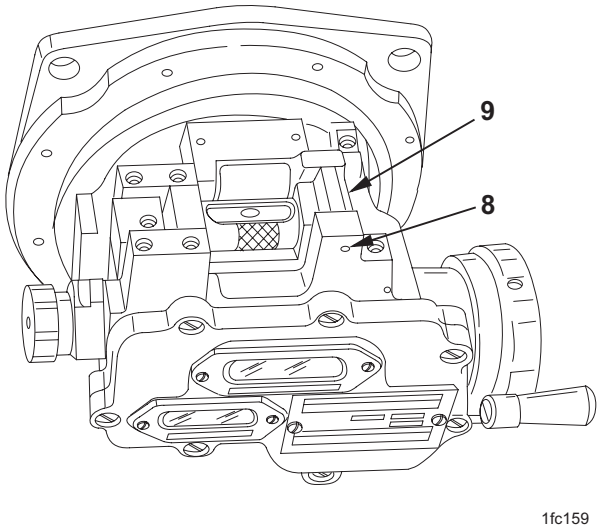

**M17/M18 Quadrant**

1. Remove and discard lock wire (1).
2. Loosen, but do not remove, setscrew (2) and cushioning pad (3).
3. Remove machine screw (4).
4. Remove four machine screws (5) and four lockwashers (6). Discard lockwashers.




**M17/M18 Quadrant**

5. Remove adjusting plate (7).



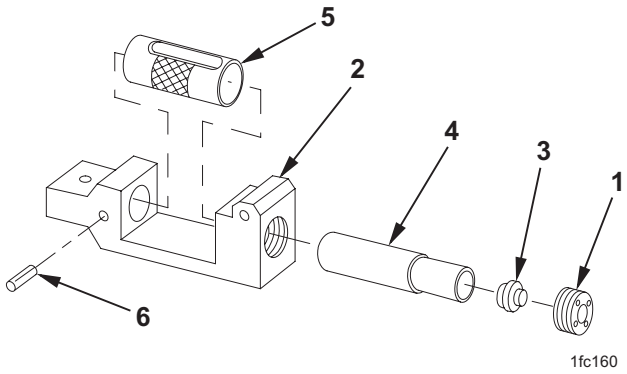

**M17/M18 Quadrant**

## NOTE

Removal of fire control level assembly parts can be done without removing fire control level assembly from M17/M18 quadrant.

6. Drive out headless straight pin (8). Lift fire control level assembly (9) and remove sealing compound.

### DISASSEMBLY




**M17/M18 Quadrant**

1. Remove externally threaded ring (1) from vial holder (2).
2. Remove eccentric (3).
3. Slide fire control level (4) and remove from vial holder (2).
4. Lift level cover (5) from vial holder (2).
5. If damaged, remove headless straight pin (6).

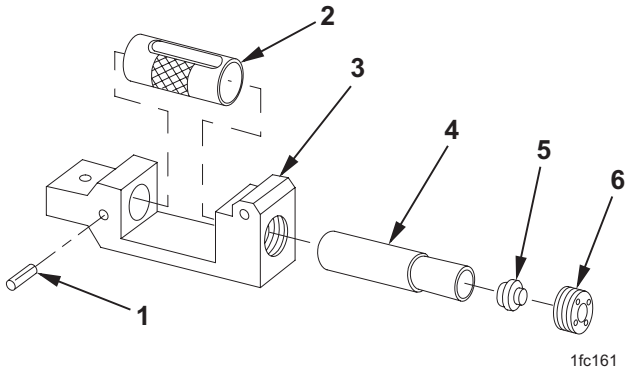
## REPAIR OR REPLACEMENT

1. Replace fire control level assembly if any threads are stripped or vial holder is damaged.

2. Fire control level may be replaced if it is cracked but still illuminated. Dispose of broken fire control level in accordance with RSO instructions. If fire control level is cracked and not illuminated, notify RSO. Perform wipe test under RSO supervision. Remove, bag, and secure assembly under RSO direction and await wipe test results. If contaminated, dispose of assembly per RSO instructions. If assembly is not contaminated, replace fire control level. Dispose of replaced fire control level per RSO instructions.

3. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0111 00 and WP 0113 00.

## ASSEMBLY



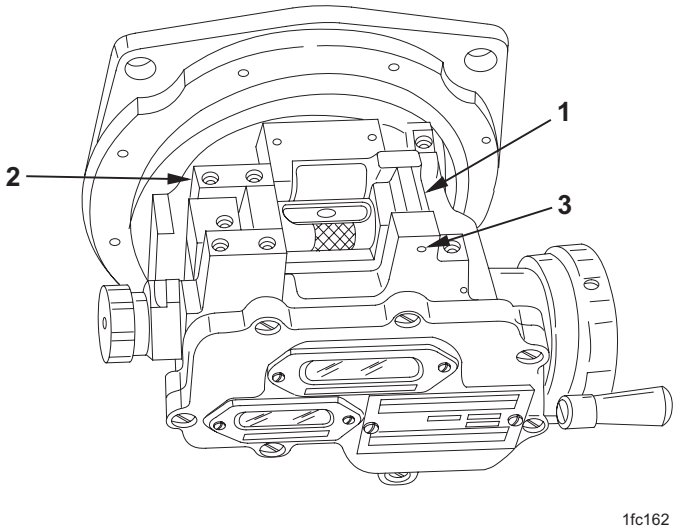

**M17/M18 Quadrant**

1. If removed, install new headless straight pin (1).

2. Place level cover (2) in vial holder (3).

3. Slide fire control level (4) into vial holder (3) and secure with eccentric (5) and externally threaded ring (6).

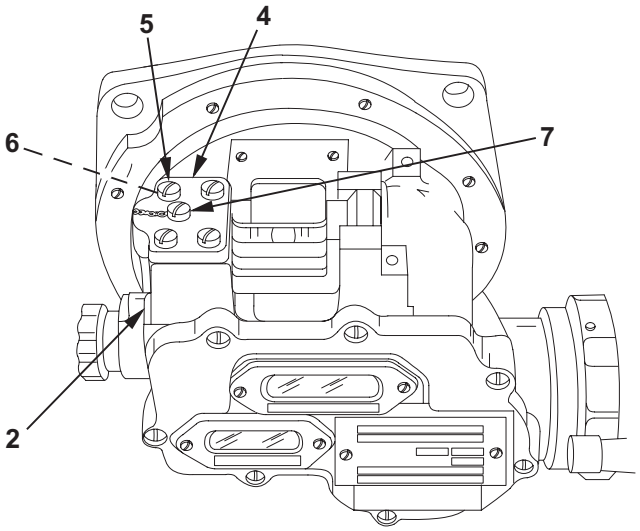
## INSTALLATION




**M17/M18 Quadrant**

1. Install fire control level assembly (1) in bracket (2) and secure with headless straight pin (3).

**INSTALLATION - Continued**




2. Install adjusting plate (4) on top of bracket (2).

WARNING

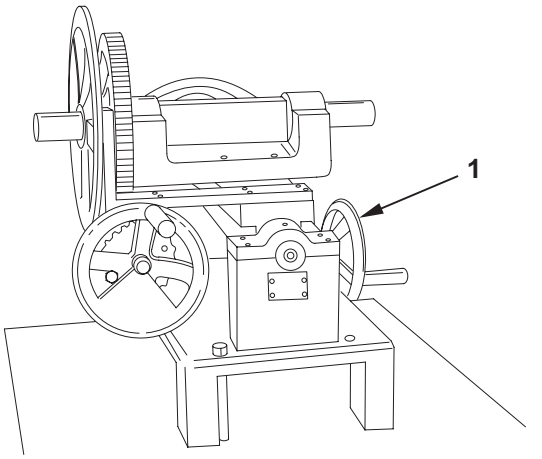
Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

3. Apply sealing compound (item 13, WP 0152 00) to threads of four machine screws (5).

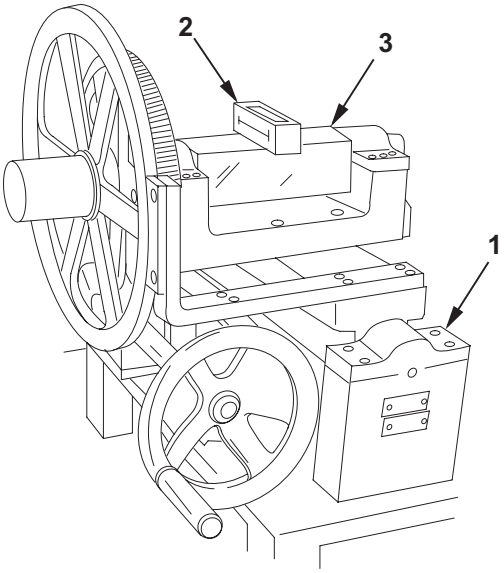
4. Install four new lockwashers (6) (item 4, WP 0111 00) and four machine screws (5). Tighten machine screws.

5. Apply sealing compound (item 13, WP 0152 00) to threads of machine screw (7). Install machine screw into adjusting plate (4) but do not tighten. Screw will be tightened and locked during adjustment.

**ADJUSTMENT**

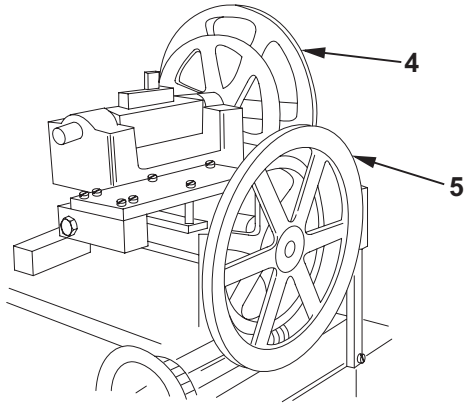



1. Secure optical equipment test fixture (1) on test bench.

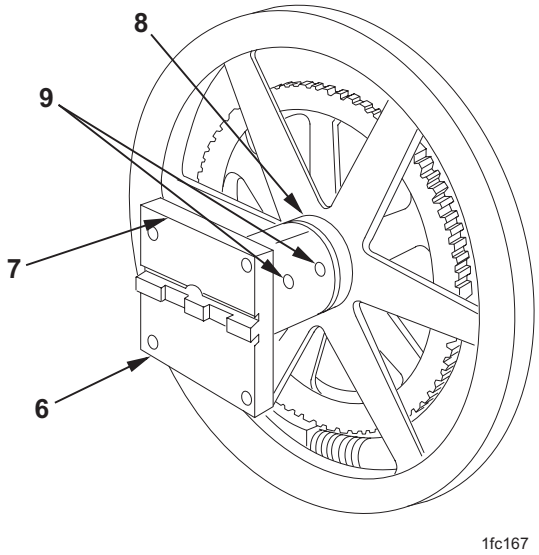



2. Place plate-mounted level (2) on block (3), perpendicular to axis of rotation.
3. Cross-level the optical equipment test fixture (1).

**ADJUSTMENT - Continued**




4. Set cant vernier scale (4) and elevation vernier scale (5) to zero.



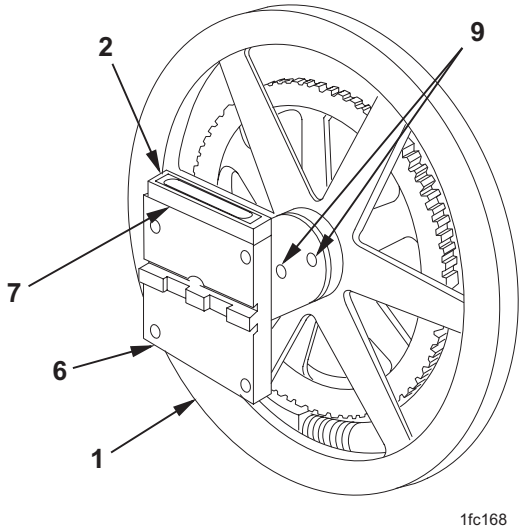

## NOTE

Ensure precision ground surfaces are free of nicks and burrs.

When installing mounting bracket (6), ensure precision ground surface (7) is parallel to top of block within 0.1 mil.

5. Install mounting bracket (6) on end of cross-leveling shaft (8).

6. Hand tighten six setscrews (9).




7. Place plate-mounted level (2) on precision ground surface (7) of mounting bracket (6).

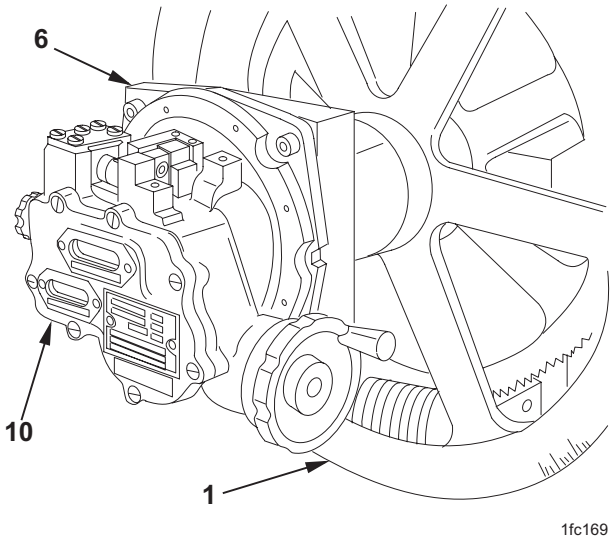
8. Check that bubble in plate-mounted level (2) is level.

9. Tighten setscrews (9). Recheck optical equipment test fixture (1), plate-mounted level (2), and precision ground surface (7).

10. Rotate plate-mounted level (2) 180 degrees from original position, and check again that bubble in plate-mounted level (2) is centered.

## NOTE

Check to make sure that optical equipment test fixture is still level in elevation and cant.




**M17/M18 Quadrant**

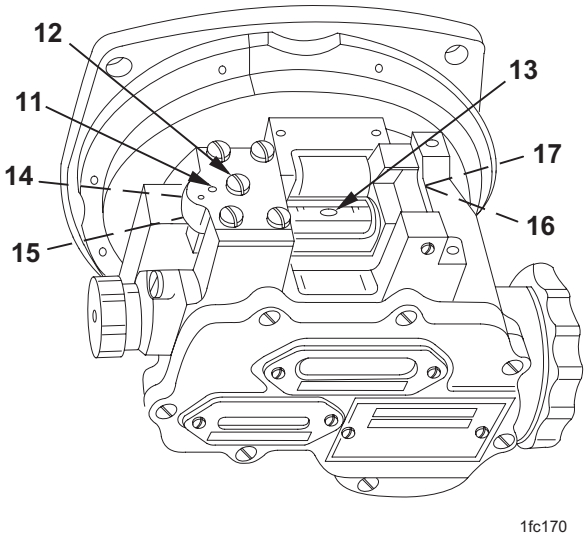
11. Install M17/M18 quadrant (10) on mounting bracket (6) of optical equipment test fixture (1).

**ADJUSTMENT - Continued**

## NOTE

Correction and elevation counters must be set at zero when adjusting fire control level.

A combination of adjustment procedures in steps 12 through 17 is necessary to center bubble in fire control level.



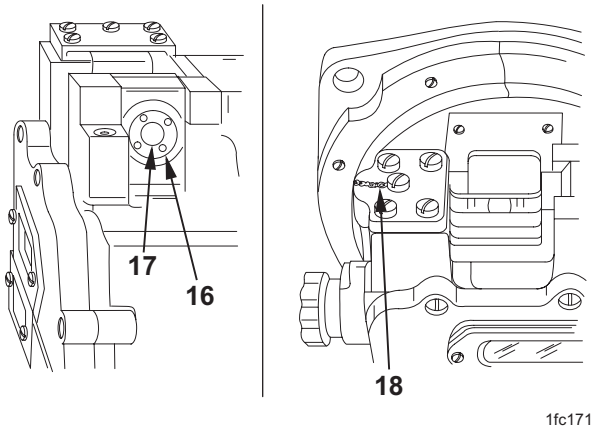

**M17/M18 Quadrant**

12. Turn setscrew (11) and machine screw (12) until bubble (13) centers.

## NOTE

If elevation level bubble can be adjusted within one graduation, perform steps 13, 18, and 19 only. Otherwise, perform steps 13 through 19.

If eccentric adjustment is required on M18 quadrant, the level assembly (cross level) must be removed.




**M17/M18 Quadrant**

13. Tighten setscrews (14 and 15).

14. Remove externally threaded ring (16) and eccentric (17).

15. Place a dab of sealing compound (item 13, WP 0152 00) on slotted end of eccentric (17) and to threads of externally threaded ring (16).

16. Reinstall eccentric (17) and externally threaded ring (16) and turn eccentric until bubble (13) centers.

17. Tighten externally threaded ring (16).

18. Apply sealing compound (item 13, WP 0152 00) to outside of externally threaded ring (16).

19. Install new lock wire (18) (item 21, WP 0152 00).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M17/M18 FIRE CONTROL QUADRANT**
**(1290-01-037-3883/1290-01-037-7289)**

# COVER ASSEMBLY MAINTENANCE
# REMOVAL, DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY, INSTALLATION

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Grease (item 16, WP 0152 00)
Lockwasher (7) (item 18, WP 0111 00)
Lockwasher (4) (item 2, WP 0114 00)
Lockwasher (4) (item 8, WP 0114 00)
O-ring (item 17, WP 0111 00)
Sealing compound (item 13, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
TM 750-116
WP 0111 00
WP 0114 00

**REMOVAL**

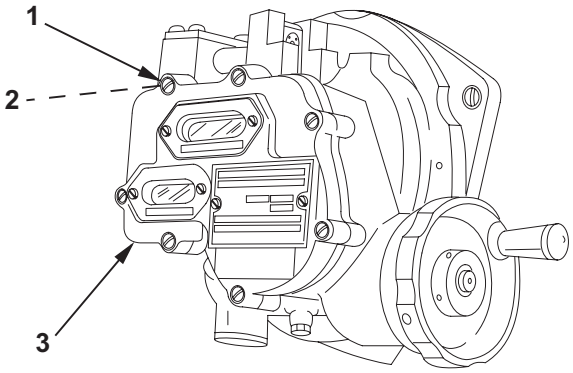
## WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

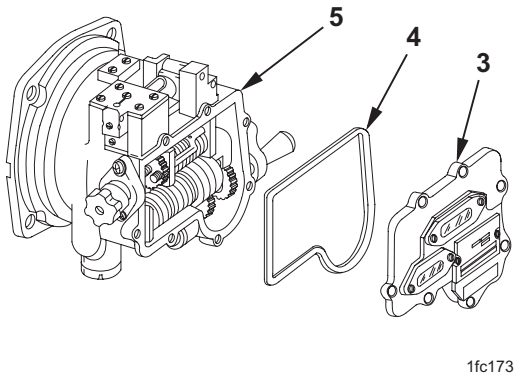
When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

## NOTE

General support maintenance instructions for the M18 quadrant cover assembly are identical to the M17 quadrant cover assembly.




1fc172




1fc173

**M17/M18 Quadrant**

## WARNING

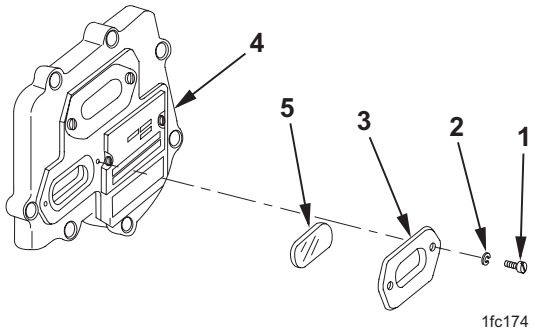
To avoid injury to personnel and damage to equipment, cover assembly will only be removed if counters are fully illuminated. Place cover assembly in secure area and exercise caution to avoid breakage of nuclear lamps.

Remove seven machine screws (1), seven lockwashers (2), cover assembly (3), and O-ring (4) from housing assembly (5). Discard lockwashers and O-ring.

**DISASSEMBLY**

## CAUTION

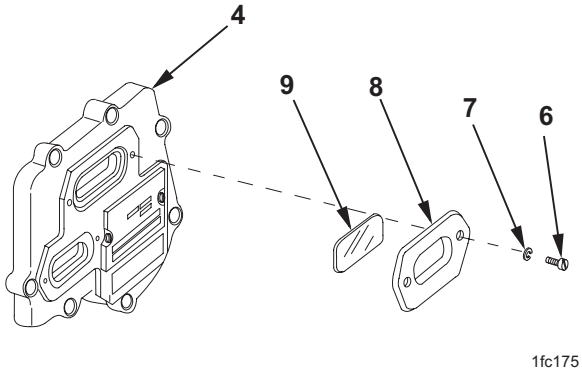
Exercise special care when removing optical instrument windows to ensure that tritium vials are not damaged.




**M17/M18 Quadrant**

1. Remove two machine screws (1), two lockwashers (2), and window plate (3) from quadrant cover (4). Discard lockwashers.

2. Remove sealing compound from edge of optical instrument window (5) and remove window.




**M17/M18 Quadrant**

3. Remove two machine screws (6), two lockwashers (7), and window plate (8) from quadrant cover (4). Discard lockwashers.

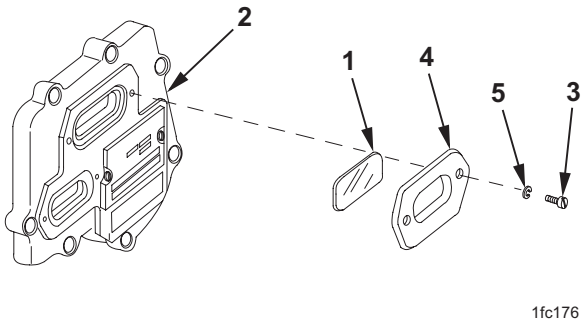
4. Remove sealing compound from edge of optical instrument window (9) and remove window.

## REPAIR OR REPLACEMENT

1. Replace entire cover assembly if cracked, broken, or damaged in any way that would allow foreign matter to enter interior of the M17/M18 quadrant.

2. Repair by replacing authorized parts that do not meet inspection criteria. Refer to WP 0111 00 and WP 0114 00.

**ASSEMBLY**




**M17/M18 Quadrant**

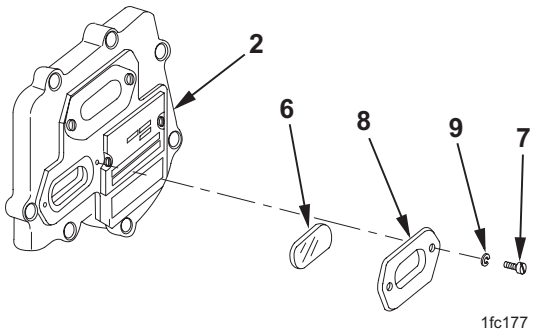
1. Install optical instrument window (1) in quadrant cover (2).

WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

2. Apply a light coat of sealing compound (item 13, WP 0152 00) in channel around optical instrument window (1) and to threads of two machine screws (3).

3. Install window plate (4), two new lockwashers (5) (item 8, WP 0114 00), and two machine screws (3). Tighten machine screws.



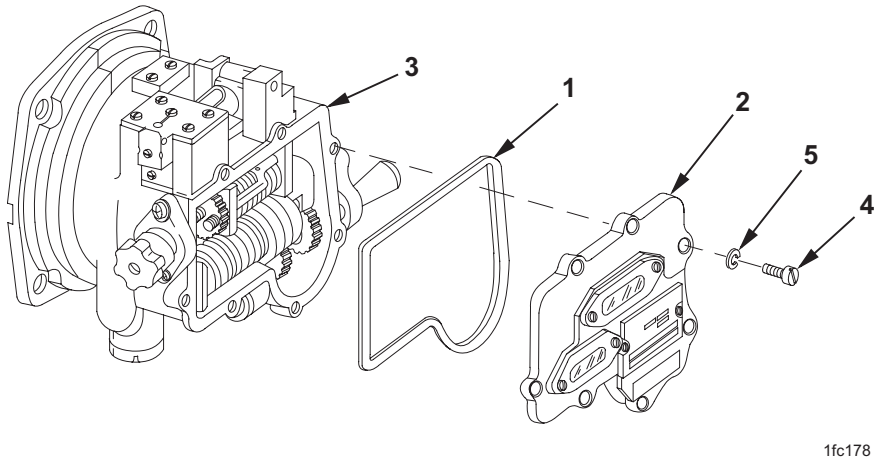

**M17/M18 Quadrant**

4. Install optical instrument window (6) in quadrant cover (2).

5. Apply a light coat of sealing compound (item 13, WP 0152 00) in channel around optical instrument window (6) and to threads of two machine screws (7).

6. Install window plate (8), two new lockwashers (9) (item 8, WP 0114 00), and two machine screws (7). Tighten machine screws.

## INSTALLATION




**M17/M18 Quadrant**

1. Apply light coat of grease (item 16, WP 0152 00) on new O-ring (1) (item 17, WP 0111 00) and place cover assembly (2) with new O-ring on housing assembly (3).
2. Apply sealing compound (item 13, WP 0152 00) to threads of seven machine screws (4).
3. Install seven new lockwashers (5) (item 18, WP 0111 00) and seven machine screws (4).
4. Purge and charge M17/M18 quadrant (TM 750-116).

## END OF WORK PACKAGE

**GENERAL SUPPORT**

**M17A1/M18A1 FIRE CONTROL QUADRANT**
**(1290-01-515-8260/1290-01-515-8262)**

# COVER ASSEMBLY MAINTENANCE
# REMOVAL, DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY, INSTALLATION

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Grease (item 15, WP 0152 00)
Lockwasher (7) (item 18, WP 0111 00)
Lockwasher (4) (item 8, WP 0114 00)
O-ring (item 17, WP 0111 00)
Sealing compound (item 13, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
TM 750-116
WP 0047 00
WP 0111 00
WP 0114 00

**Equipment Conditions**
Battery enclosure and gasket removed (WP 0047 00)

## REMOVAL

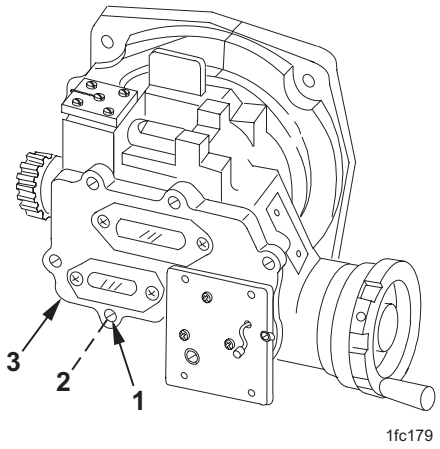
### NOTE

General support maintenance instructions for the M18A1 quadrant cover assembly are identical to the M17A1 quadrant cover assembly.

**REMOVAL - Continued**

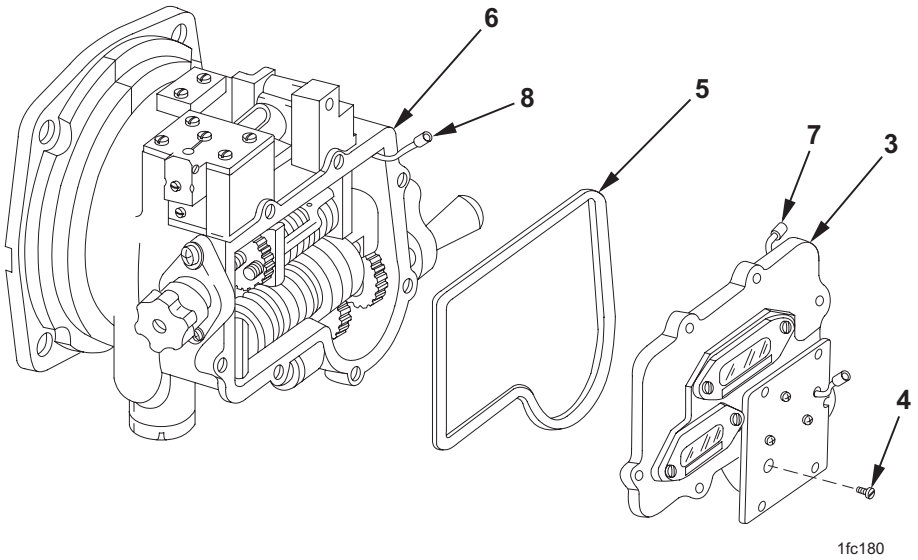
## CAUTION

Do not attempt to remove adapter plate from cover assembly. A short wire harness passing through adapter plate cannot be removed without damaging equipment. Adapter plate can only be removed or installed by the manufacturer. Two access holes are provided in adapter plate to allow cover assembly removal.




**M17A1/M18A1 Quadrant**

1. Remove seven machine screws (1) and seven lockwashers (2) from cover assembly (3). Discard lockwashers.




**M17A1/M18A1 Quadrant**

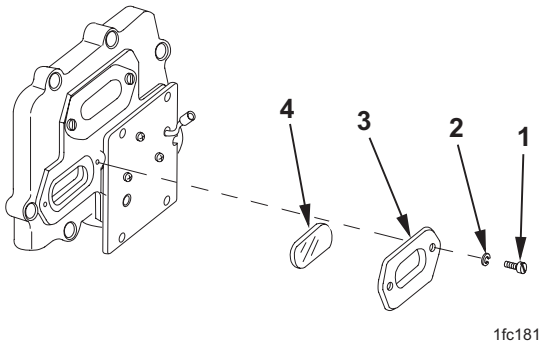
2. Remove plug (4) from cover assembly (3).

## CAUTION

Use extreme care when removing cover assembly. A connector on a short wire harness on cover is connected to a connector on a short wire harness on quadrant. These connectors and wire harnesses are easily damaged.

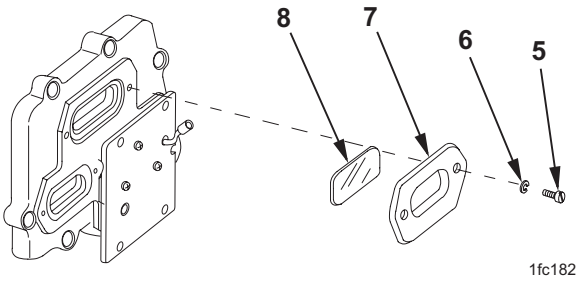
3. Carefully pull cover assembly (3) and O-ring (5) away from housing assembly (6) and disconnect connector (7) from connector (8). Remove cover assembly and O-ring. Discard O-ring.

### DISASSEMBLY




**M17A1/M18A1 Quadrant**

1. Remove two machine screws (1), two lockwashers (2), window plate (3), and optical instrument window (4). Discard lockwashers.




**M17A1/M18A1 Quadrant**

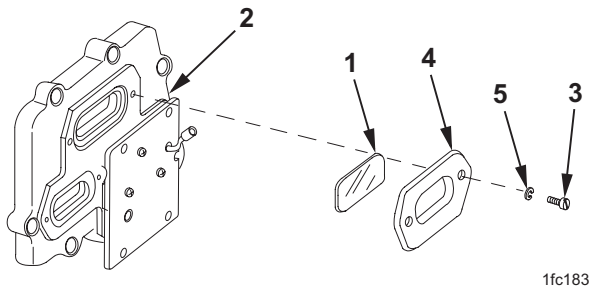
2. Remove two machine screws (5), two lockwashers (6), window plate (7), and optical instrument window (8). Discard lockwashers.

### REPAIR OR REPLACEMENT

1. Replace entire cover assembly if cracked, broken, or damaged in any way that would allow foreign matter to enter interior of the M17A1/M18A1 quadrant.

2. Repair by replacing authorized parts that do not meet inspection criteria. Refer to WP 0111 00 and WP 0114 00.

**ASSEMBLY**




**M17A1/M18A1 Quadrant**

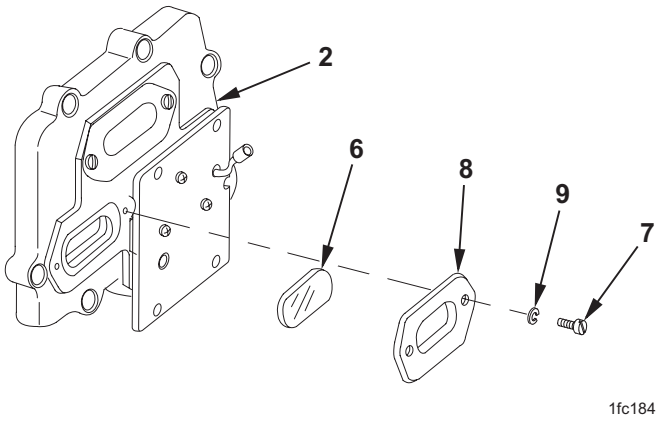
1. Install optical instrument window (1) in quadrant cover (2).

**WARNING**

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

2. Apply a light coat of sealing compound (item 13, WP 0152 00) in channel around optical instrument window (1) and to threads of two machine screws (3).

3. Install window plate (4), two new lockwashers (5) (item 8, WP 0114 00), and two machine screws (3).



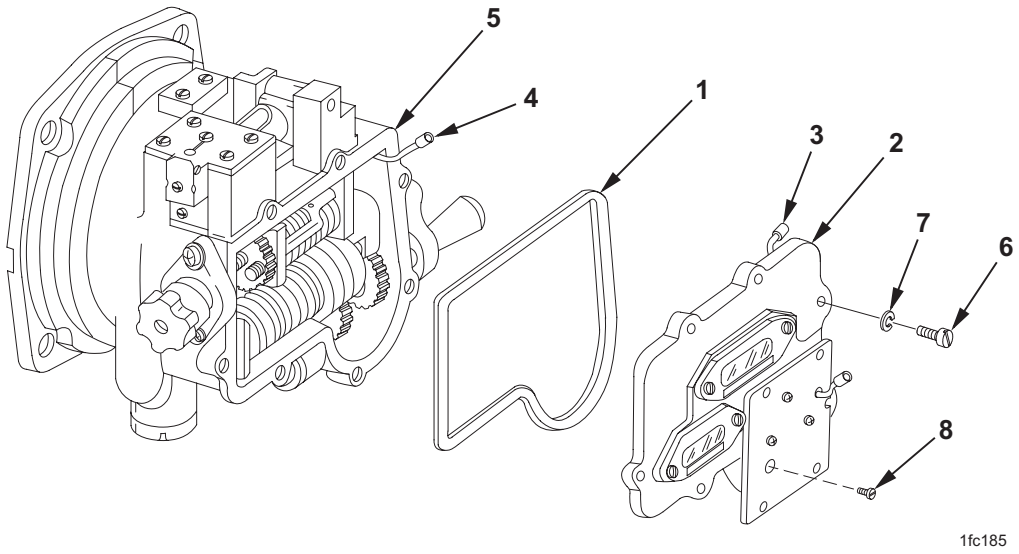

**M17A1/M18A1 Quadrant**

4. Install optical instrument window (6) in quadrant cover (2).

5. Apply a light coat of sealing compound (item 13, WP 0152 00) in channel around optical instrument window (6) and to threads of two machine screws (7).

6. Install window plate (8), two new lockwashers (9) (item 8, WP 0114 00), and two machine screws (7).

## INSTALLATION




**M17A1/M18A1 Quadrant**

1. Apply light coat of grease (item 15, WP 0152 00) on new O-ring (1) (item 17, WP 0111 00) and place on cover assembly (2).

2. Connect connector (3) on cover assembly (2) to connector (4) on housing assembly (5).

### CAUTION

Use extreme care during assembly. Do not pinch wires or connectors between parts.

3. Apply sealing compound (item 13, WP 0152 00) to threads of seven machine screws (6).

4. Install cover assembly (2) and O-ring (1) on housing assembly (5) with seven new lockwashers (7) (item 18, WP 0111 00) and seven machine screws (6).

5. Install plug (8) in cover assembly (2).

6. Install battery enclosure and gasket. Refer to WP 0047 00.

7. Purge and charge with dry nitrogen. Refer to TM 750-116.

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M17/M18 AND M17A1/M18A1 FIRE CONTROL QUADRANT**
**(1290-01-037-3883/1290-01-037-7289 AND 1290-01-515-8260/1290-01-515-8262)**

**COUNTER ASSEMBLY MAINTENANCE**
**REMOVAL, DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY, INSTALLATION**

**INITIAL SETUP:**

**Tools and Special Tools**
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)
Torque wrench adapter (item 15, WP 0149 00)

**Materials/Parts**
Grease (item 16, WP 0152 00)
Lockwasher (3) (item 19, WP 0112 00)
Lockwasher (4) (item 19, WP 0115 00)
Sealing compound (item 13, WP 0152 00)
Solvent cleaning compound (item 12, WP 0152 00)
Spring pin (item 8, WP 0115 00)
Wiping rag (item 18, WP 0152 00)

**References**
WP 0049 00
WP 0050 00
WP 0112 00
WP 0115 00

**Equipment Conditions**
Cover assembly removed (WP 0049 00, WP 0050 00)
Correction knob assembly removed (WP 0049 00, WP 0050 00)

**REMOVAL**

WARNING

**RADIATION**

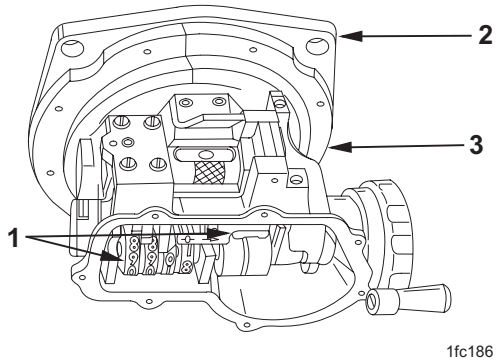
**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

NOTE

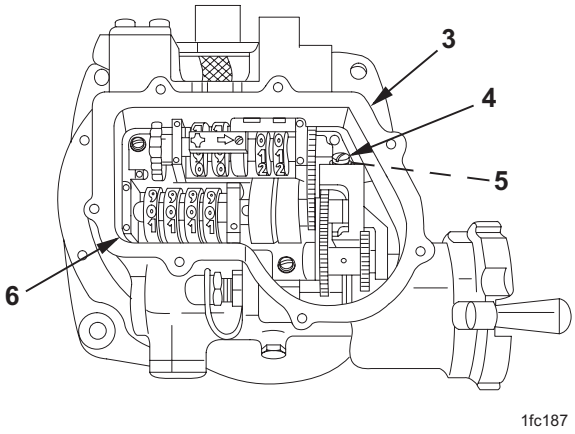
General support maintenance instructions for the M18/M18A1 quadrant counter assembly are identical to those for the M17/M17A1 quadrant counter assembly.

**REMOVAL - Continued**




**M17/M17A1 and M18/M18A1 Quadrant**

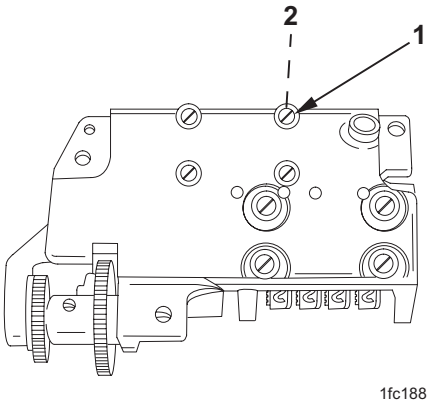
1. Set counters (1) at zero. Scribe line on base assembly (2) and housing assembly (3).



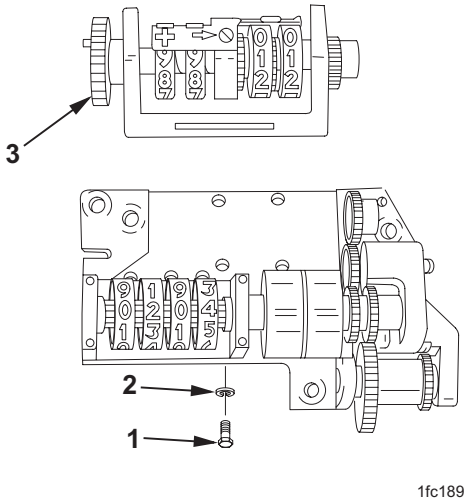

**M17/M17A1 and M18/M18A1 Quadrant**

2. Remove three machine screws (4), three lockwashers (5), and counter assembly (6) from housing assembly (3). Discard lockwashers.

## DISASSEMBLY

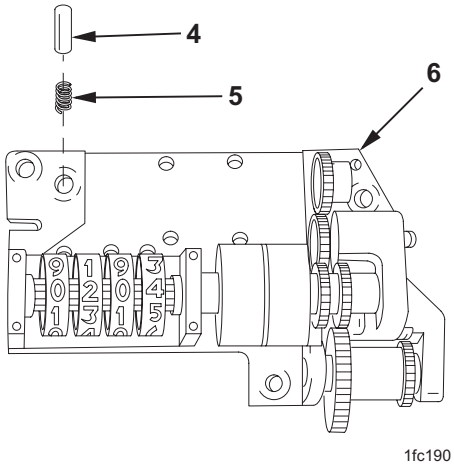



**Bottom View**



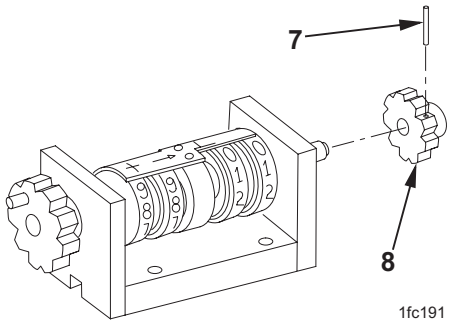

**Top View**

1. Remove four machine screws (1), four lockwashers (2), and correction counter (3). Discard lockwashers.




**Top View**

2. Remove detent plunger (4) and compression helical spring (5) from support (6).




### CAUTION

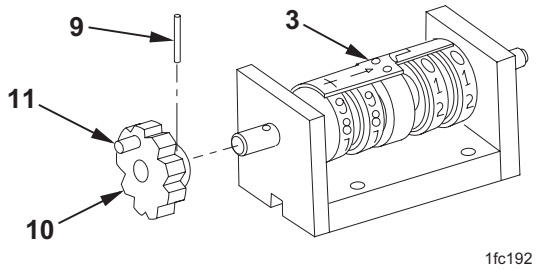
Support spur gear in V block on solid surface to prevent damage to shaft.

3. Remove headless straight pin (7) and spur gear (8).

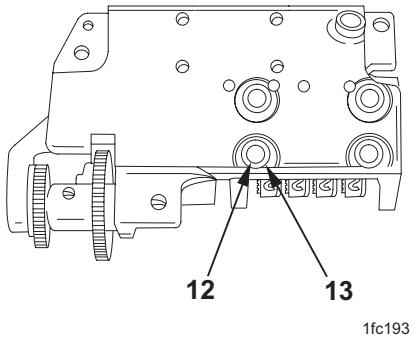
**DISASSEMBLY - Continued**

## CAUTION

Support counter detent in V block on solid surface to prevent damage to shaft.

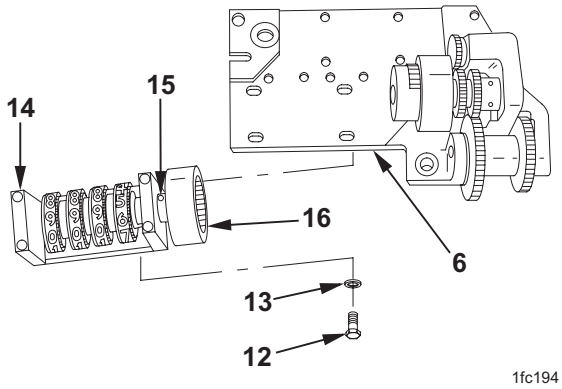



4. Remove headless straight pin (9), counter detent (10), and headless straight pin (11) from correction counter (3).




**Bottom View**

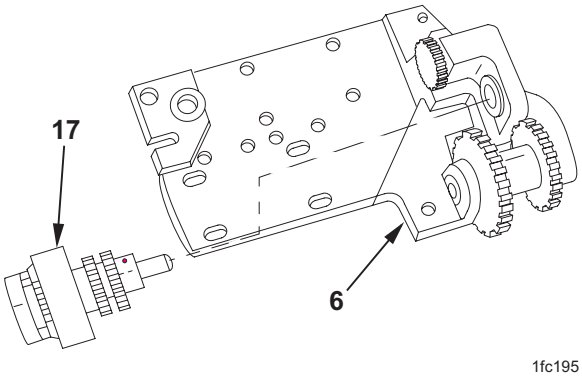
5. Remove four machine screws (12) and four flat washers (13).




**Top View**

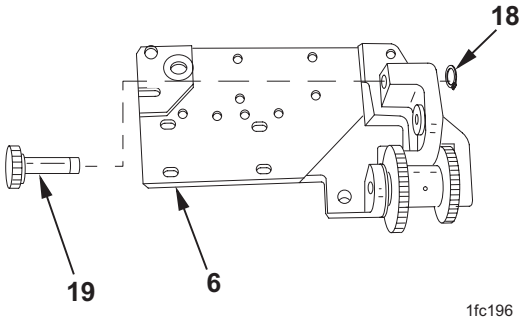
6. Remove elevation counter (14) from support (6).

7. Remove spring pin (15) and internal gear (16) from elevation counter (14). Discard spring pin.




**Top View**

8. Remove spider assembly (17) from support (6).




**Top View**

9. Remove retaining ring (18) and spur gearshaft (19) from support (6).

## CLEANING

### WARNING

Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.

### CAUTION

Do not clean correction counter or elevation counter with cleaning compound.

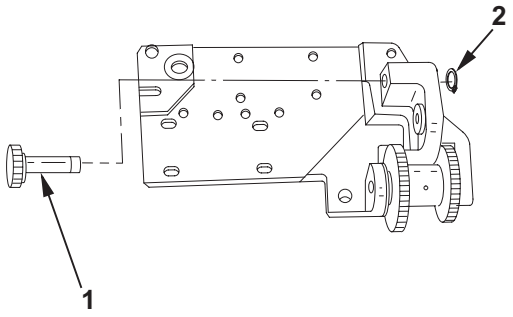
Clean all parts except correction counter and elevation counter with cleaning compound (item 12, WP 0152 00). Wipe off excess cleaning compound with a clean wiping rag (item 18, WP 0152 00).

## REPAIR OR REPLACEMENT

1. Replace counter assembly if counters cannot be adjusted. This condition will affect accuracy of the sighting procedures.

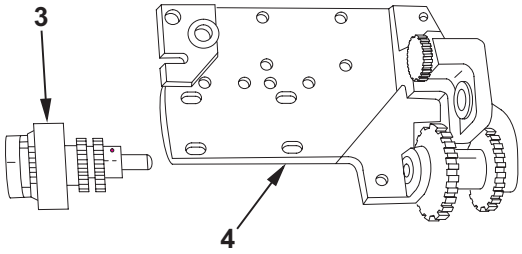
2. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0112 00 and WP 0115 00.

## ASSEMBLY



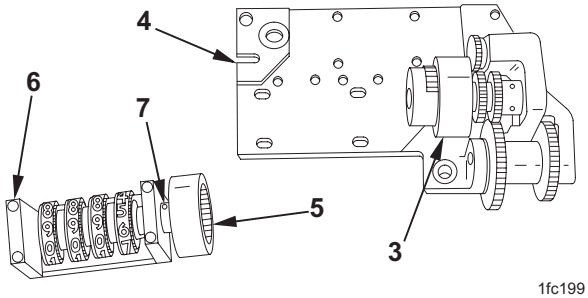
1fc197

1. Apply a light coat of grease (item 16, WP 0152 00) to spur gearshaft (1) and install. Secure with retaining ring (2).



1fc198

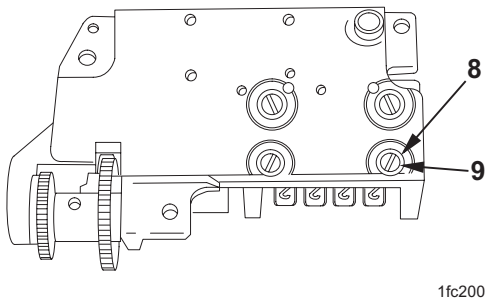
3. Apply a light coat of grease (item 16, WP 0152 00) to spider assembly (3) and place in support (4).



1fc199

4. Place internal gear (5) on elevation counter (6) and secure with new spring pin (7) (item 8, WP 0115 00).

5. Place elevation counter (6) on support (4) and slide onto spider assembly (3).

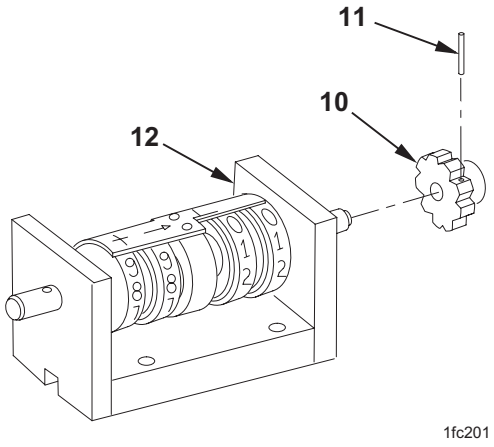



**Bottom View**

## WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

6. Apply a thin coat of sealing compound (item 13, WP 0152 00) to four flat washers (8) and four machine screws (9) and install.

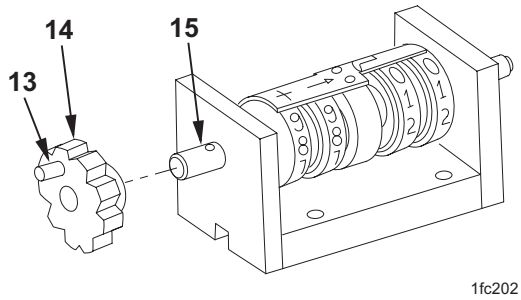



## CAUTION

Support spur gear in V block on solid surface to prevent damage to shaft.

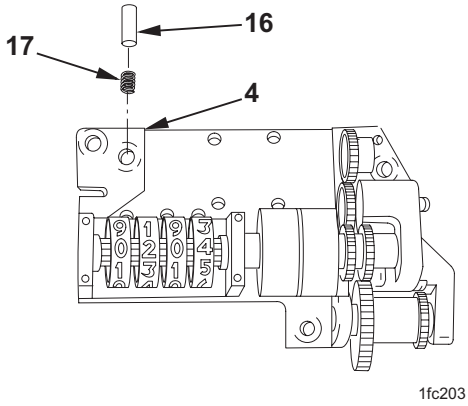
7. Install spur gear (10) and headless straight pin (11) on correction counter (12).

**ASSEMBLY - Continued**

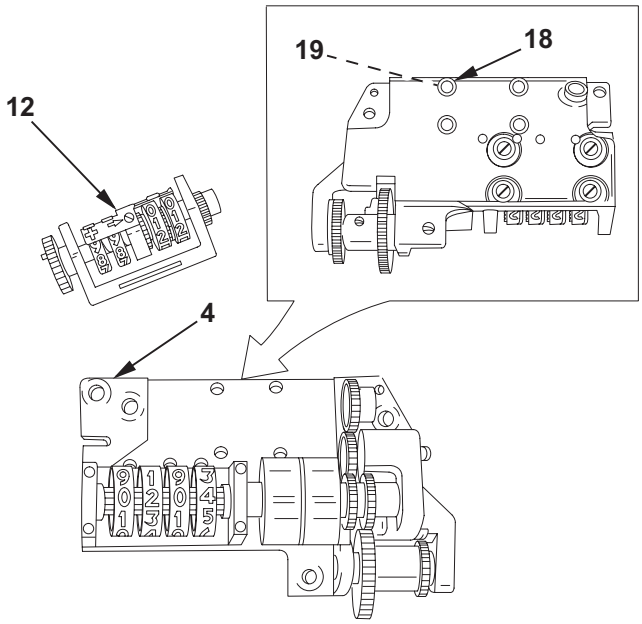



8. Install headless straight pin (13) in counter detent (14).

9. Slide counter detent (14) onto counter shaft (15).

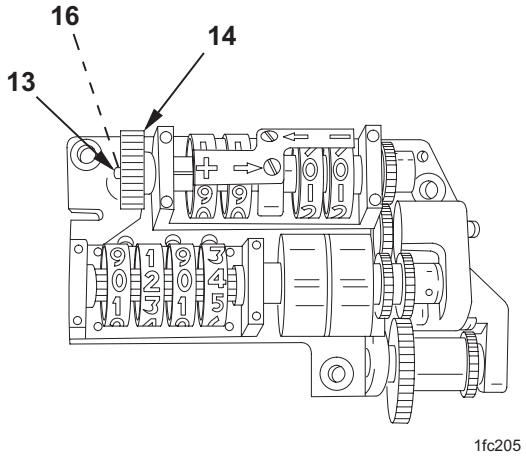



10. Apply a light coat of grease (item 16, WP 0152 00) to detent plunger (16). Install compression helical spring (17) and detent plunger in support (4).



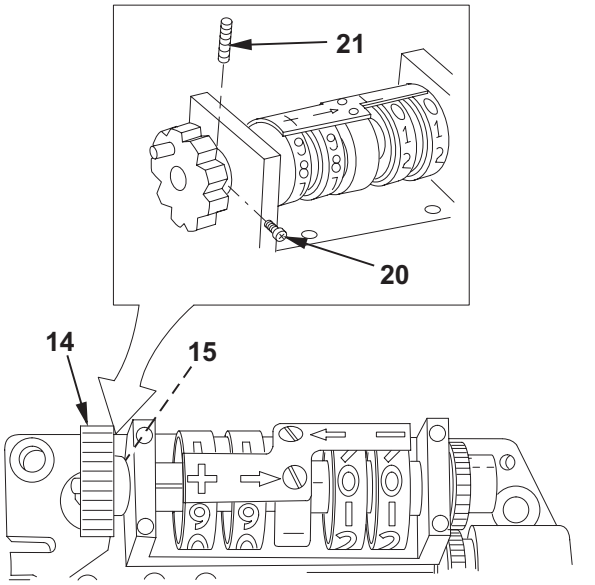
11. Apply sealing compound (item 13, WP 0152 00) to threads of four machine screws (18).

12. Position correction counter (12) on support (4) and fasten in place using four new lockwashers (19) (item 19, WP 0115 00) and four machine screws (18). Zero correction counter.




13. Apply a light coat of grease (item 16, WP 0152 00) to counter detent (14) and align with detent plunger (16), making sure headless straight pin (13) is in uppermost position.

**ASSEMBLY - Continued**




## NOTE

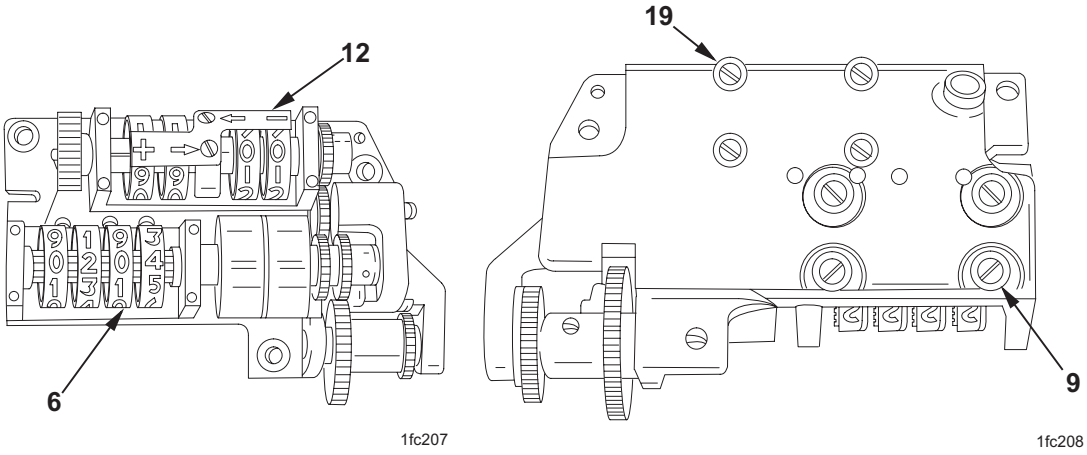
Perform step 14 only if correction counter or counter detent has been replaced.

14. Install and tighten screw (20) (No. 2X56) in counter detent (14). Drill and ream 0.0625 in. diameter hole through counter detent and counter shaft (15).

## CAUTION

Support counter detent in V block on solid surface to prevent damage to shaft.

15. Install headless straight pin (21) and remove screw (20), if present.



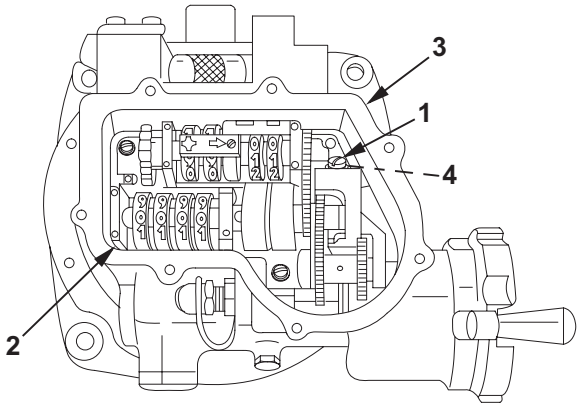

**Top View** **Bottom View**

16. Check elevation counter (6) and correction counter (12) for smooth rotation. If movement is not smooth, loosen four machine screws (9) and four machine screws (19), and reposition counters.

**INSTALLATION**

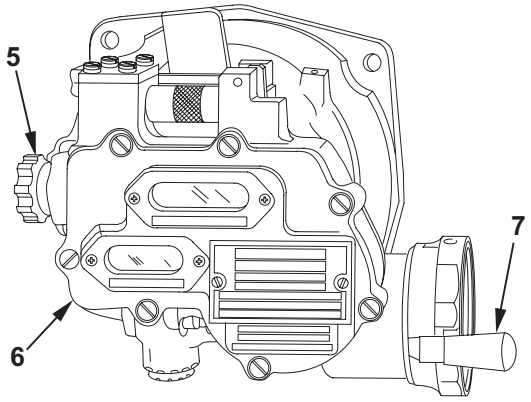
## NOTE

Check that correction and elevation counters are set at zero before installation of counter assembly. Ensure scribe lines are aligned on M17/M18 quadrant housing assembly.




1fc209

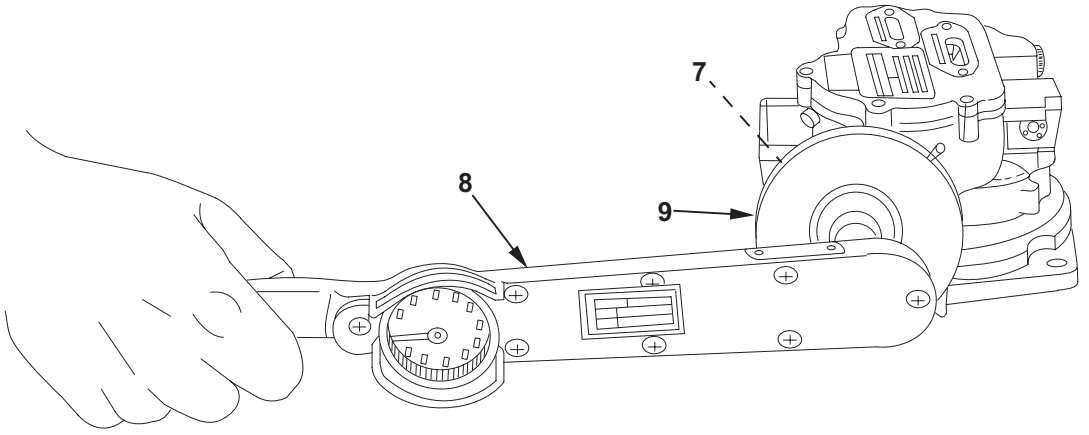
1. Apply sealing compound (item 13, WP 0152 00) to threads of three machine screws (1).
2. Place counter assembly (2) in housing assembly (3) and secure with three new lockwashers (4) (item 19, WP 0112 00) and three machine screws (1).




1fc210

3. Install correction knob assembly (5) and cover assembly (6). Refer to WP 0049 00 or WP 0050 00.
4. Turn elevation knob (7) in one direction to 1433 mils.
5. Turn elevation knob (7) in opposite direction to 9720 mils.

**INSTALLATION - Continued**




## NOTE

Starting torque should be no greater than 10 in.-lb. (1.13 N-m) or less than 3 in.-lb. (0.34 N-m).

6. Apply torque wrench (8) with torque wrench adapter (9) to elevation knob (7).

7. Measure torque. If torque cannot be met, remove and reinstall spring plug retainer. Refer to WP 0049 00 or WP 0050 00.

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M17/M18 AND M17A1/M18A1 FIRE CONTROL QUADRANT**
**(1290-01-037-3883/1290-01-037-7289 and 1290-01-515-8260/1290-01-515-8262)**

# WORM SHAFT ASSEMBLY MAINTENANCE
# REMOVAL, CLEANING, REPAIR OR REPLACEMENT, INSTALLATION, ADJUSTMENT

**INITIAL SETUP:**

**Tools and Special Tools**
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Grease (item 15, WP 0152 00)
Grease (item 16, WP 0152 00)
O-ring (item 14, WP 0112 00)
O-ring (item 17, WP 0112 00)
O-ring (item 22, WP 0112 00)
Solvent cleaning compound (item 12, WP 0152 00)
Spring tension washer (item 12, WP 0112 00)
Wiping rag (item 18, WP 0152 00)

**References**
WP 0049 00
WP 0050 00
WP 0054 00
WP 0057 00
WP 0112 00

**Equipment Conditions**
Cover assembly removed (WP 0049 00, WP 0050 00)
Counter assembly removed (WP 0054 00)

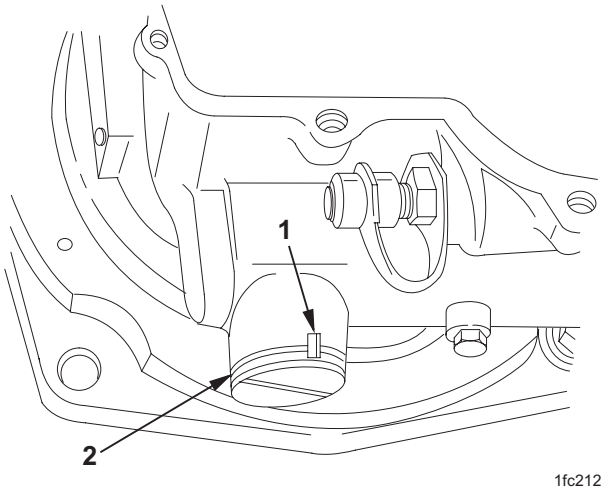
**REMOVAL**

WARNING

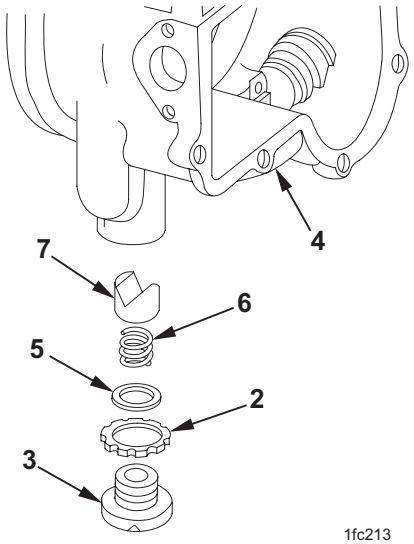
**RADIATION**

**TRITIUM GAS ($H_3$)**

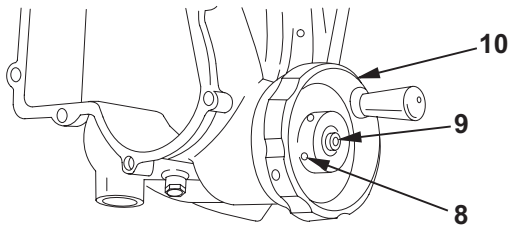
When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.




1. Straighten locking ear (1) on key washer (2).




2. Unscrew spring plug retainer (3) from housing assembly (4).
3. Remove O-ring (5) and key washer (2) from spring plug retainer (3). Discard O-ring.
4. Remove compression helical spring (6) from housing assembly (4).
5. Remove V-type bearing (7) from housing assembly (4).

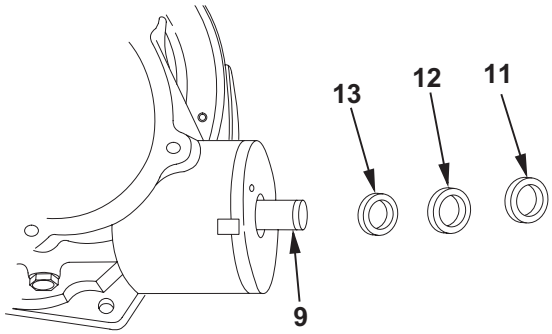



## CAUTION

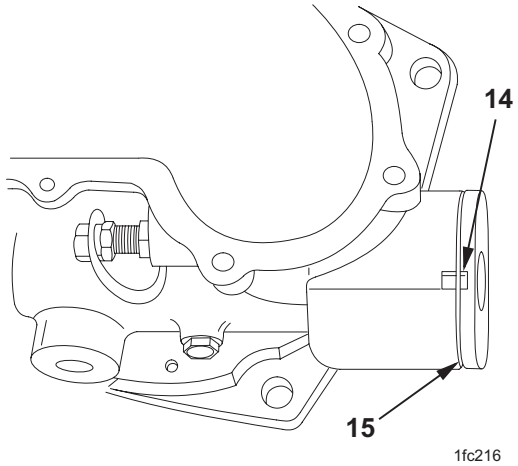
Support elevation knob in V block on solid surface to prevent damage to worm shaft.

6. Remove headless straight pin (8) from worm shaft assembly (9).

7. Remove elevation knob assembly (10) from worm shaft assembly (9).

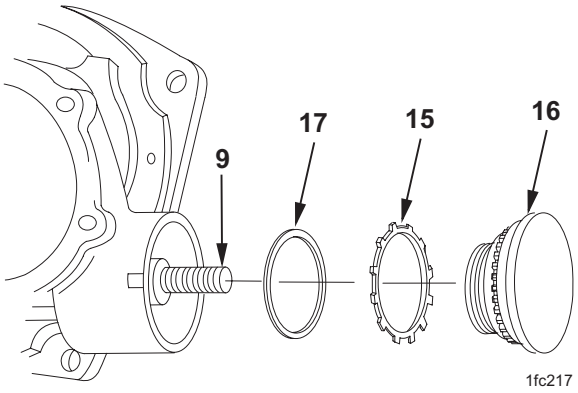



8. Remove spring tension washer (11), packing retainer (12), and O-ring (13) from worm shaft assembly (9). Discard O-ring and spring tension washer.



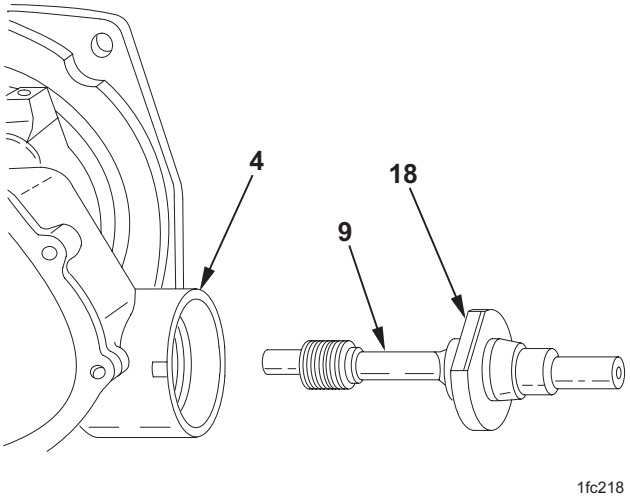

9. Straighten locking ear (14) on key washer (15).

**REMOVAL - Continued**




10. Remove elevation retainer (16) from worm shaft assembly (9).

11. Remove O-ring (17) and key washer (15) from elevation retainer (16). Discard O-ring.




## NOTE

Check position of flat (18) on worm shaft assembly (9) in relationship to housing assembly (4).

12. Rotate worm shaft assembly (9) and remove.

## CLEANING

### WARNING

Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.

Clean all parts with cleaning compound (item 12, WP 0152 00). Wipe off excess cleaning compound with a clean wiping rag (item 18, WP 0152 00).

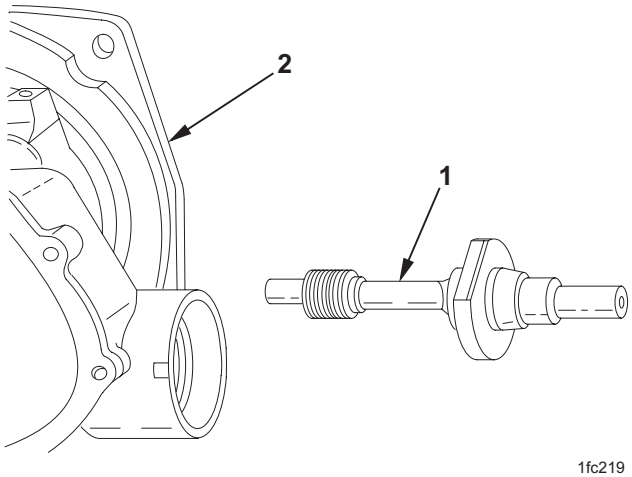
## REPAIR OR REPLACEMENT

1. Inspect gears for missing teeth or stripped gears.
2. Inspect bearing surfaces for nicks or burrs.
3. Replace worm shaft assembly if bent or damaged in a way that would affect the accuracy of the elevation adjustments.
4. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0112 00.

## INSTALLATION

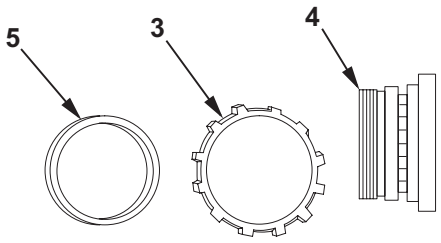
### NOTE

Ensure flat on worm shaft assembly is in proper position for counter assembly clearance.



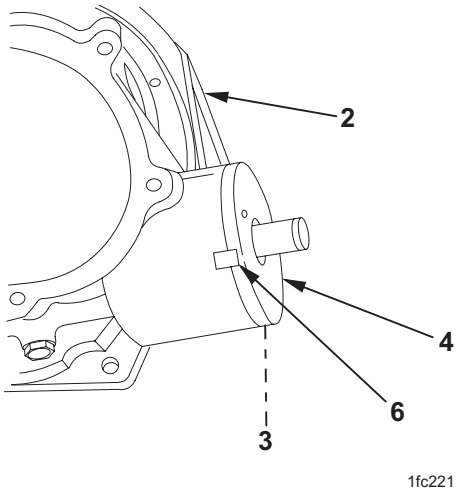

1. Apply light coat of grease (item 15, WP 0152 00) to worm shaft assembly (1).
2. Insert worm shaft assembly (1) in housing assembly (2) by turning shaft.

**INSTALLATION - Continued**



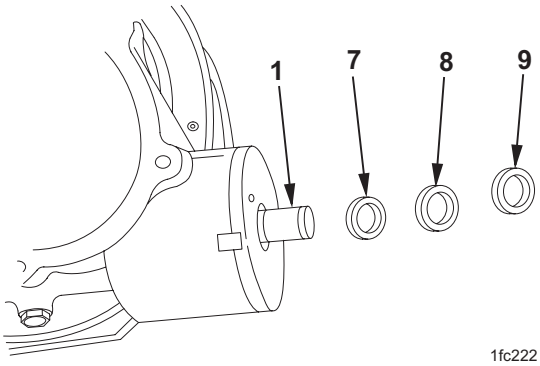

3. Install key washer (3) on elevation retainer (4).

4. Apply light coat of grease (item 16, WP 0152 00) to new O-ring (5) (item 17, WP 0112 00), and install on elevation retainer (4).



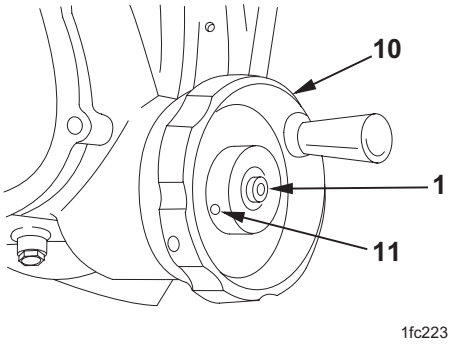

5. Screw elevation retainer (4) into housing assembly (2) until tight.

6. Bend locking ear (6) to secure key washer (3) to housing assembly (2).




7. Apply a light coat of grease (item 16, WP 0152 00) to new O-ring (7) (item 14, WP 0112 00).

8. Install O-ring (7), packing retainer (8), and new spring tension washer (9) (item 12, WP 0112 00) over worm shaft assembly (1).




## NOTE

Perform steps 9 and 10, and continue with step 12, if new worm shaft assembly has been installed. Perform step 11 if previously-installed components are used.

9. Install elevation knob assembly (10) on worm shaft assembly (1) and secure with setscrew, NSN 5305-00-282-8902. Using the pilot hole located on the knob, drill hole through worm shaft assembly.

10. Remove setscrew from elevation knob assembly (10).

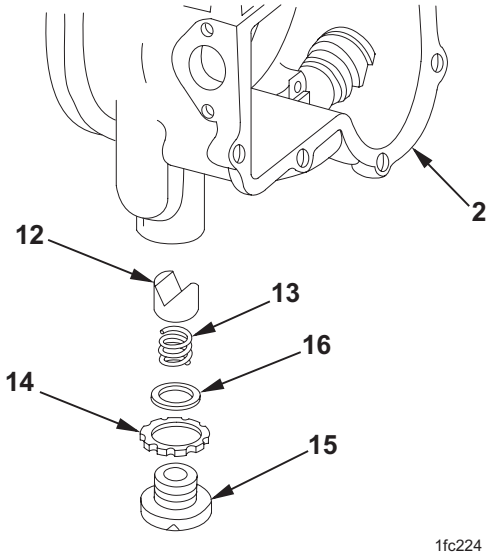
11. Install elevation knob assembly (10) on worm shaft assembly (1).

## CAUTION

Support elevation knob assembly in V block on solid surface to prevent damage to worm shaft.

12. Install headless straight pin (11) in elevation knob assembly (10) and worm shaft assembly (1).

**INSTALLATION - Continued**



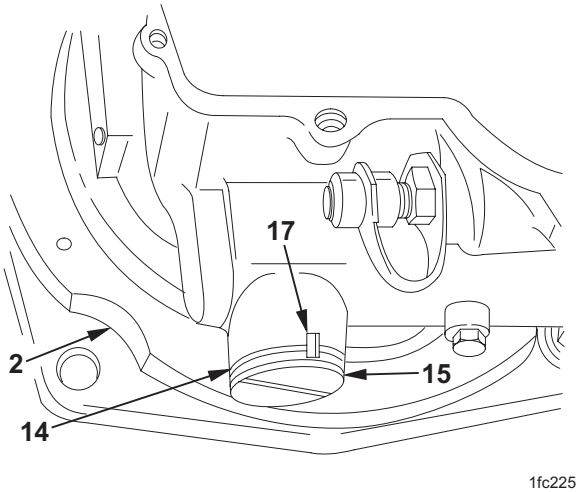

13. Apply a light coat of grease (item 15, WP 0152 00) to V-type bearing (12), and install in housing assembly (2).

14. Install compression helical spring (13) in housing assembly (2).

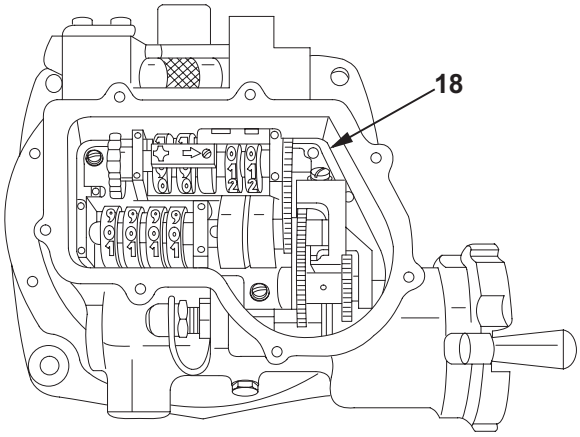
15. Place key washer (14) on spring plug retainer (15).

16. Apply a light coat of grease (item 16, WP 0152 00) to new O-ring (16) (item 22, WP 0112 00), and install on spring plug retainer (15).

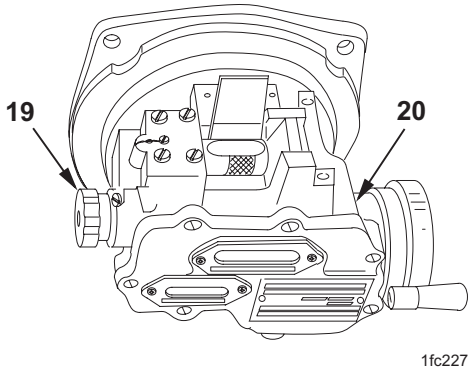
17. Screw spring plug retainer (15) into housing assembly (2) until tight.




18. Bend locking ear (17) on key washer (14) to secure spring plug retainer (15) to housing assembly (2).

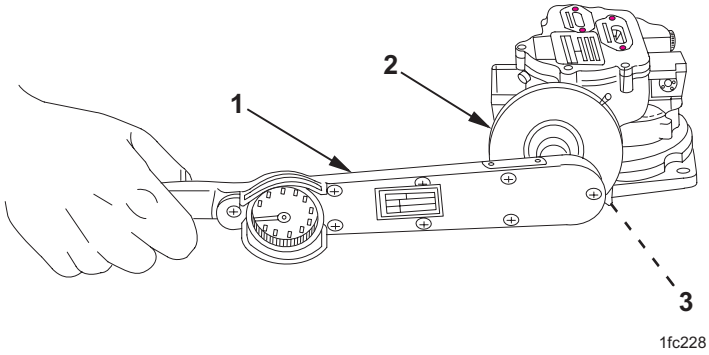



19. Install counter assembly (18) (WP 0054 00).

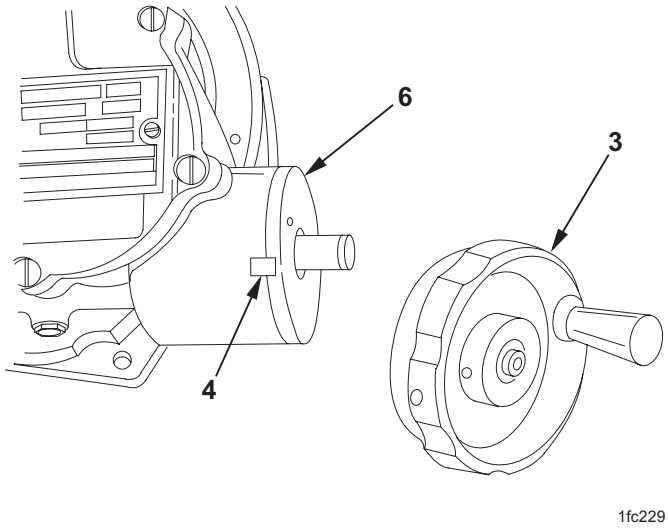


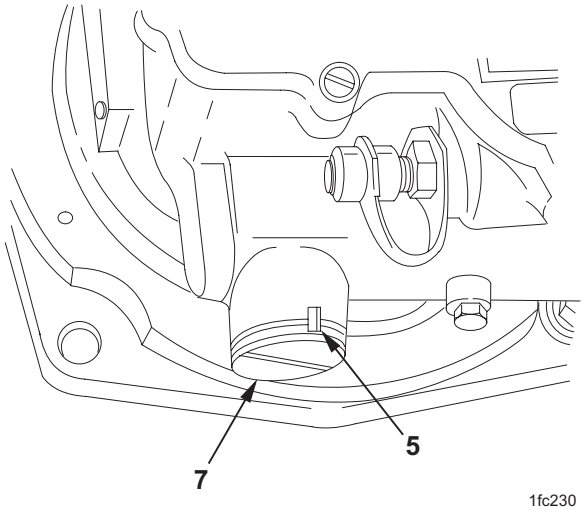

20. Install correction knob assembly (19) and cover assembly (20) (WP 0049 00 or WP 0050 00).

## ADJUSTMENT




1. Using torque wrench (1) with torque wrench adapter (2), measure torque. Torque reading required to start elevation knob assembly (3) should be no greater than 10 in.-lb (1.13 N-m) or less than 3 in.-lb (0.34 N-m).




2. If torque readings are not as specified, remove elevation knob assembly (3) and straighten locking ears (4 and 5).

3. Tighten elevation retainer (6) and spring plug retainer (7) to increase torque, or loosen retainers to decrease torque.

4. Check for backlash (WP 0057 00).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M18/M18A1 FIRE CONTROL QUADRANT**
**(1290-01-037-7289/1290-01-515-8262)**

**FIRE CONTROL LEVEL ASSEMBLY (CROSS LEVEL VIAL ASSEMBLY) MAINTENANCE**
**REMOVAL, DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY, INSTALLATION, ADJUSTMENT**

**INITIAL SETUP:**

**Test Equipment**
Mounting bracket (item 2, WP 0149 00)
Optical equipment test fixture (item 8, WP 0149 00)

**Tools and Special Tools**
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Lockwasher (2) (item 9, WP 0111 00)
Lockwasher (item 11, WP 0111 00)
Plastic bag (item 5, WP 0152 00)
Sealing compound (item 13, WP 0152 00)
Tape (item 20, WP 0152 00)

**References**
WP 0111 00
WP 0116 00

**Equipment Conditions**
Optical equipment test fixture set up and adjusted (WP 0057 00)

**REMOVAL**

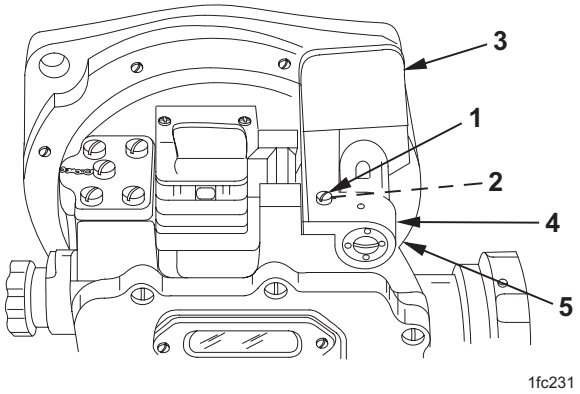
WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

NOTE

Replacement of level assembly parts can be done without removing level assembly from M18 quadrant.



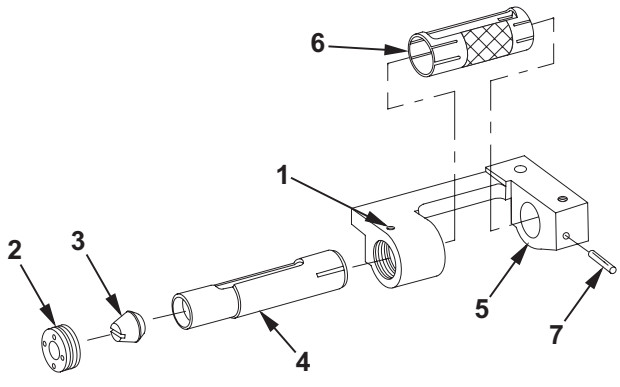

1. Remove three machine screws (1), three lockwashers (2), and reflector (3) from level assembly (4). Discard lockwashers.

NOTE

Level assembly of M18A1 quadrant is hardwired to housing assembly and cannot be removed by General Support maintenance but components of level assembly can be replaced.

2. Remove level assembly (4) from housing assembly (5) (M18 only).

**DISASSEMBLY**

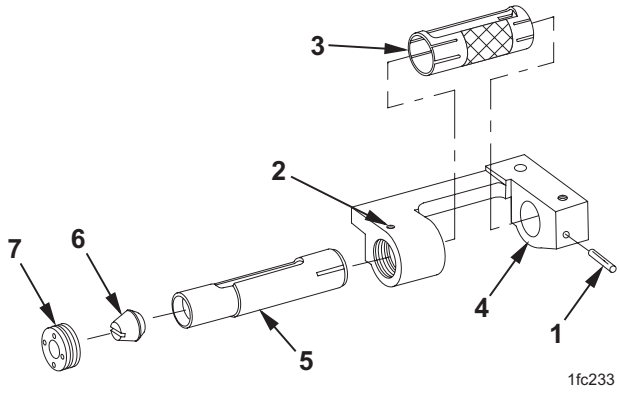


1. Remove sealing compound and loosen setscrew (1).
2. Remove sealing compound from level assembly and remove externally threaded ring (2).
3. Remove eccentric (3).
4. Slide fire control level (4) from vial bracket (5), and lift out level cover (6).
5. If damaged, remove setscrew (1).
6. If damaged, remove headless straight pin (7).

## REPAIR OR REPLACEMENT

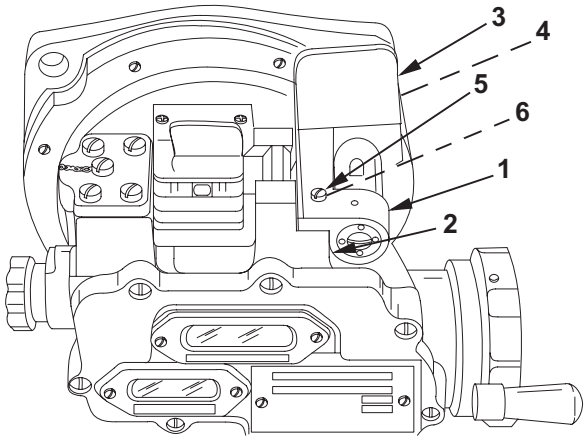
1. Replace fire control level assembly if any threads are stripped or vial bracket is damaged.
2. Fire control level may be replaced if it is cracked but still illuminated. Dispose of broken fire control level in accordance with RSO instructions. If fire control level is cracked and not illuminated, notify RSO. Perform wipe test under RSO supervision. Remove, bag, and secure assembly under RSO direction and await wipe test results. If contaminated, dispose of assembly per RSO instructions. If assembly is not contaminated, replace fire control level. Dispose of replaced fire control level per RSO instructions.
3. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0111 00 and WP 0116 00.

## ASSEMBLY




1. If removed, install new headless straight pin (1).
2. If removed, install, but do not tighten, new setscrew (2).
3. Place level cover (3) in vial bracket (4).
4. Slide fire control level (5) into vial bracket (4) and level cover (3).
5. Install eccentric (6), and screw in externally threaded ring (7).

**INSTALLATION**




1fc234

1. Place level assembly (1) on housing assembly (2).

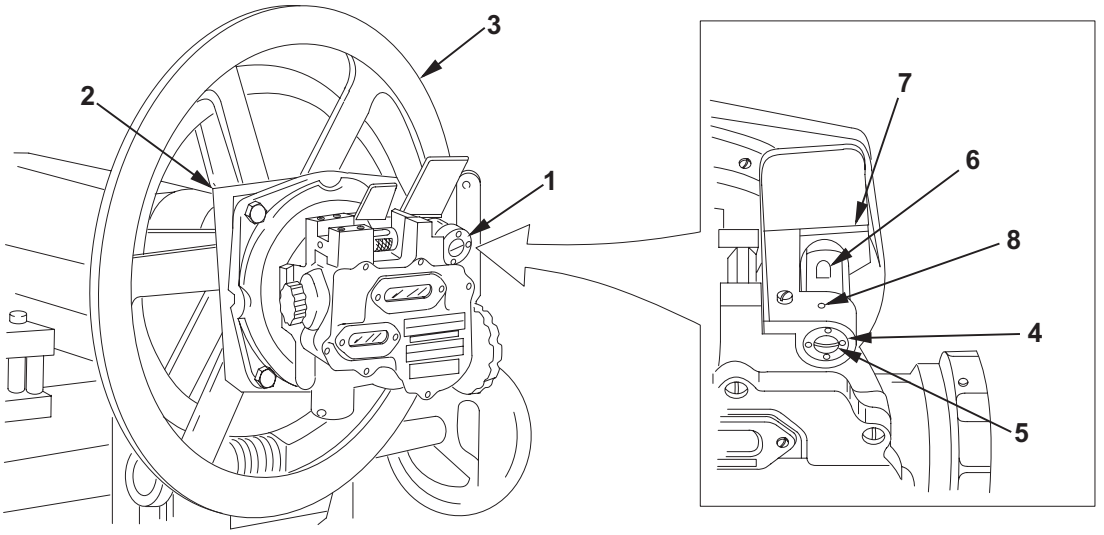
2. Place reflector (3) on level assembly (1).

**WARNING**

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

3. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (4) and machine screw (5), and install three new lockwashers (6) (items 9 and 11, WP 0111 00) and three machine screws in housing assembly (2).

**ADJUSTMENT**




1. Install M18 quadrant (1) on adapter (2).
2. Recheck level of optical equipment test fixture (3).
3. Remove externally threaded ring (4) and eccentric (5).
4. Place a dab of sealing compound (item 13, WP 0152 00) on slotted end of eccentric (5) and to threads of externally threaded ring (4).
5. Reinstall eccentric (5) and externally threaded ring (4) and turn eccentric until bubble (6) in level assembly (7) centers.
6. Tighten externally threaded ring (4) and setscrew (8).
7. Apply sealing compound (item 13, WP 0152 00) to outside of externally threaded ring (4) and setscrew (8).

**END OF WORK PACKAGE**

# CHAPTER 13

# GENERAL SUPPORT
# FINAL INSPECTION INSTRUCTIONS
# FOR
# M17/M18 AND M17A1/M18A1 FIRE CONTROL QUADRANT

**GENERAL SUPPORT**

**M17/M18 AND M17A1/M18A1 FIRE CONTROL QUADRANT (1290-01-037-3883/1290-01-037-7289 AND 1290-01-515-8260/1290-01-515-8262)**

**FINAL INSPECTION INSTRUCTIONS TEST AND INSPECTION**

## INITIAL SETUP:

### Test Equipment

Extension adapter (item 3, WP 0149 00)
Fire control quadrant (item 10, WP 0149 00)
Mounting bracket (item 2, WP 0149 00)
Optical equipment test fixture (item 8, WP 0149 00)
Plate-mounted level (item 12, WP 0149 00)
Torque wrench adapter (item 14, WP 0149 00)
Torque wrench adapter (item 15, WP 0149 00)

### Tools and Special Tools

Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

### References

TM 750-116
TM 9-1025-211-10
TM 9-1025-211-20&P
TM 9-1025-211-34
TM 9-1025-215-10
TM 9-1025-215-25&P
WP 0048 00
WP 0049 00

### Equipment Conditions

M17/M18 or M17A1/M18A1 quadrant removed from M198/M777 howitzer (TM 9-1025-211-20&P/TM 9-1025-215-25&P)

### Special Environmental Conditions

Ambient temperature of +60 °F (+16 °C) to +90 °F (+32 °C)

## TEST AND INSPECTION

**WARNING**

**RADIATION**

**TRITIUM GAS ($H_3$)**

When testing or inspecting radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

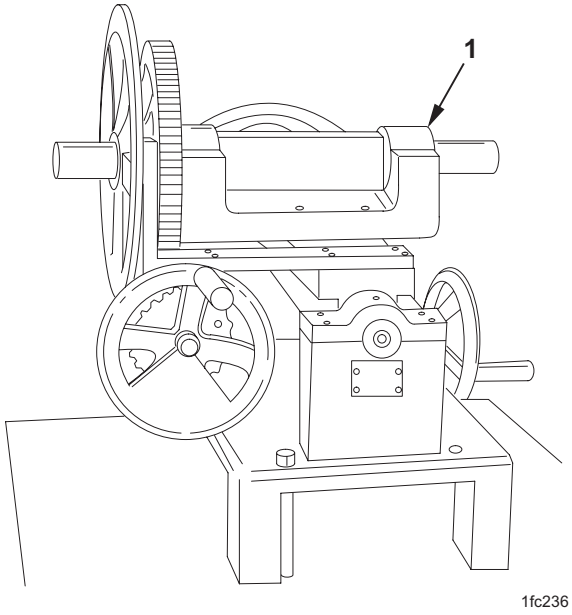
**TEST AND INSPECTION - Continued**

## NOTE

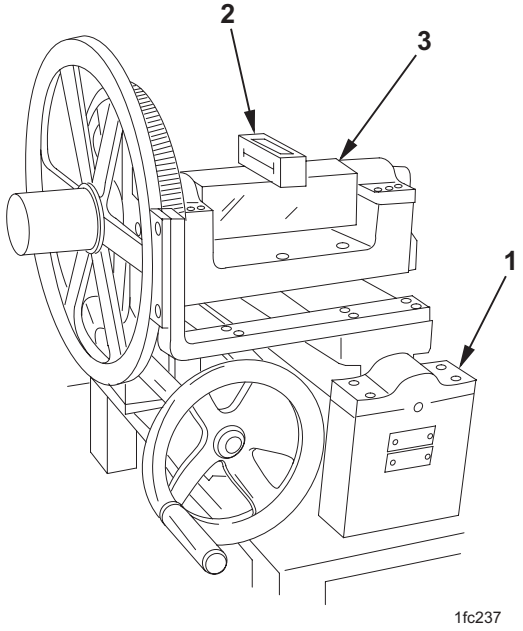
If the M17/M18 or M17A1/M18A1 quadrant being inspected fails to meet the required standards, ensure all maintenance authorized at the applicable level has been performed correctly. Then send the M17/M18 or M17A1/M18A1 quadrant to depot maintenance.

A final inspection will be performed prior to returning a M17/M18 or M17A1/M18A1 quadrant to the using unit or the supply system.

### Setting Up and Adjusting the Optical Equipment Test Fixture and Adapter

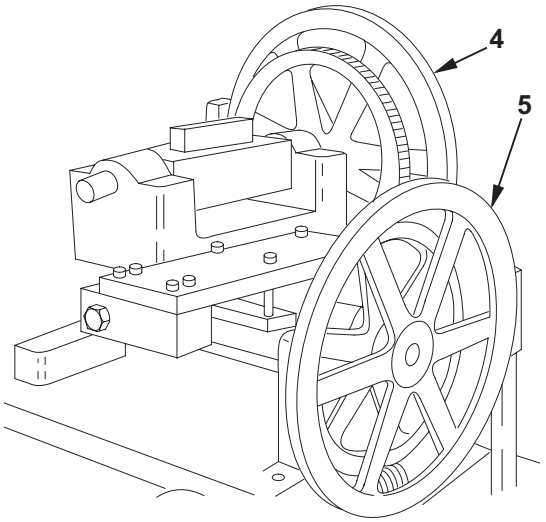



1. Secure optical equipment test fixture (1) on test bench.



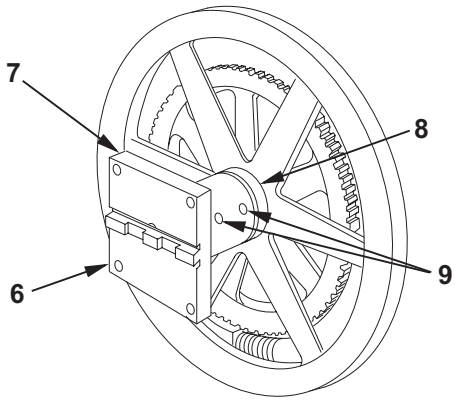
2. Place plate-mounted level (2) on block (3), perpendicular to axis of rotation.

3. Cross-level the optical equipment test fixture (1).




1fc238

4. Set cant vernier scale (4) and elevation vernier scale (5) to zero.




1fc239

## NOTE

Ensure precision ground surfaces are free of nicks and burrs.

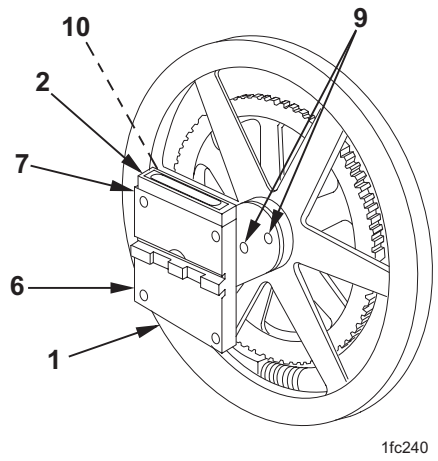
When installing mounting bracket (6), ensure precision ground surface (7) is parallel to top of block within 0.1 mil.

5. Install mounting bracket (6) on end of cross-leveling shaft (8).

6. Lightly tighten six setscrews (9).

**TEST AND INSPECTION - Continued**

**Setting Up and Adjusting the Optical Equipment Test Fixture and Adapter - Continued**




7. Place plate-mounted level (2) on precision ground surface (7) of mounting bracket (6).

8. Check that bubble (10) in plate-mounted level (2) is level.

9. Tighten setscrews (9). Recheck optical equipment test fixture (1), plate-mounted level (2), and precision ground surface (7).

NOTE

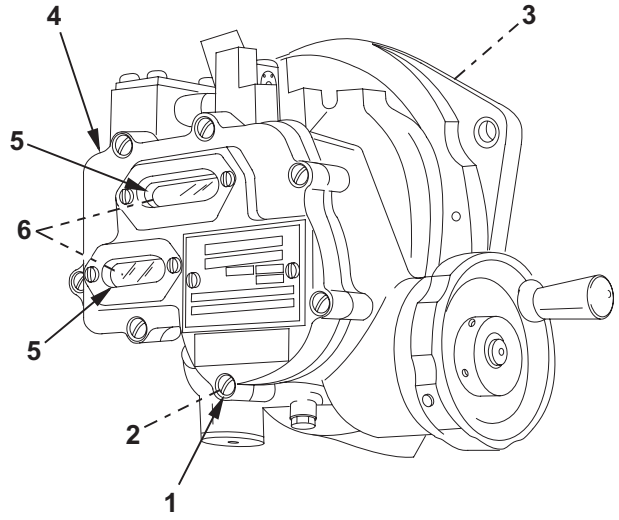
Adjust bubble in plate-mounted level, if not centered.

10. Rotate plate-mounted level (2) 180 degrees from original position, and check again that bubble (10) in plate-mounted level is level.

**Visual Inspection**

## NOTE

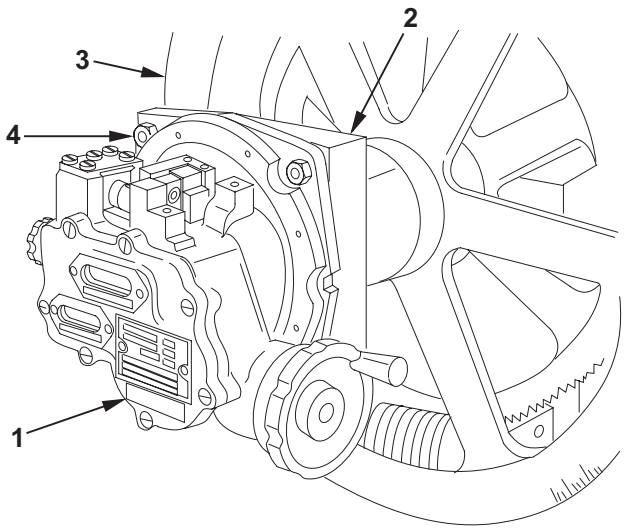
Check to make sure that optical equipment test fixture is still level in elevation and cant.




1. All machine screws (1) and lockwashers (2) must be present and tight.
2. Mounting surface (3) must be clean and free of nicks and burrs.
3. M17/M18 or M17A1/M18A1 quadrant (4) must be free of dirt, rust, and foreign matter. All parts must be present.
4. Counter windows (5) must be free of condensation.
5. Counter numbers (6) must be in horizontal alignment.

**TEST AND INSPECTION - Continued**

**Mounting M17/M18 or M17A1/M18A1 Quadrant on Optical Equipment Test Fixture**

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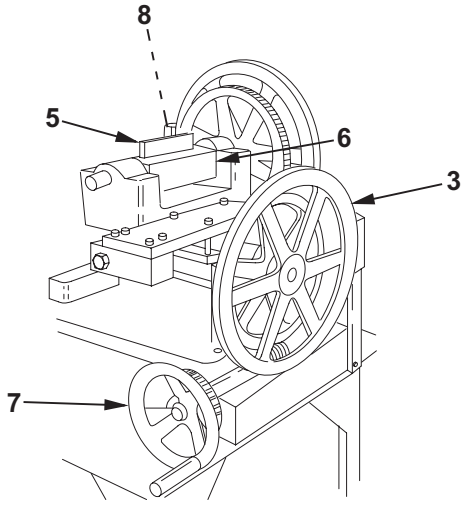
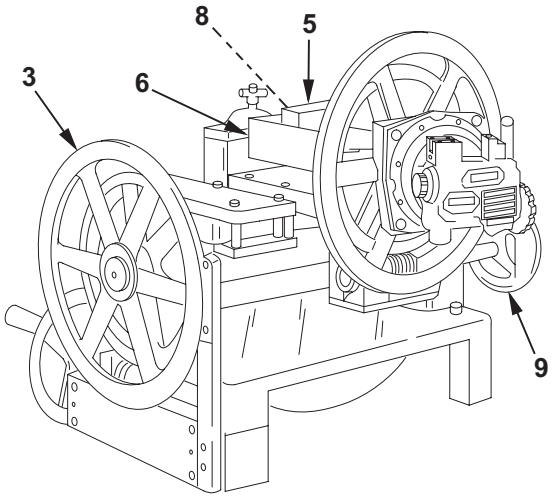
1. Position M17/M18 or M17A1/M18A1 quadrant (1) on adapter (2) of optical equipment test fixture (3).
2. Install and tighten four machine bolts (4).



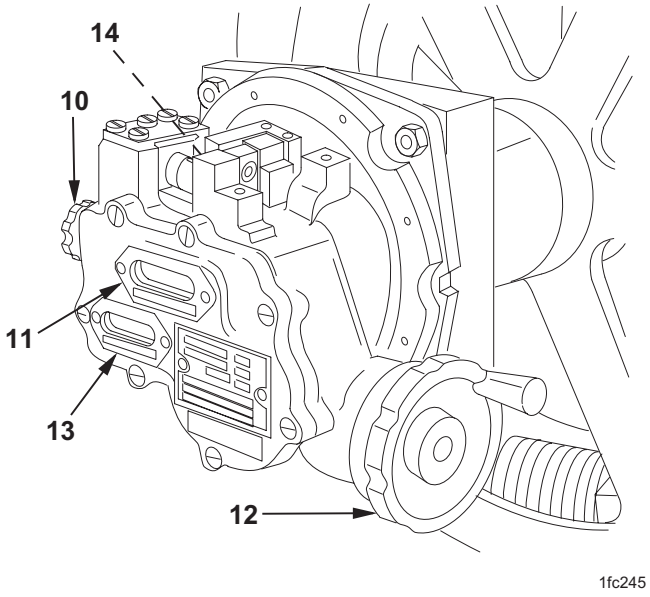

1fc243

3. Place plate-mounted level (5) parallel to block (6) of optical equipment test fixture (3).
4. Rotate cant handwheel (7) until bubble (8) in plate-mounted level (5) centers.




5. Place plate-mounted level (5) at 90 degree angle to block (6) of optical equipment test fixture (3).

6. Turn elevation handwheel (9) until bubble (8) in plate-mounted level (5) centers.




7. Using correction knob (10), set correction counter (11) at zero mils.

8. Using elevation knob (12), set elevation counter (13) at zero mils.

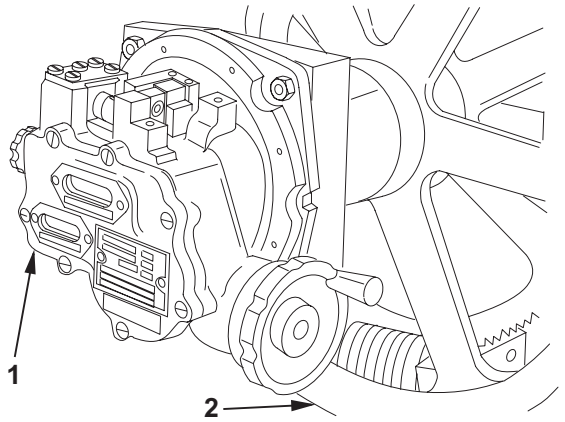
9. Ensure that bubble in elevation level (14) is centered. If not centered, adjust. Refer to WP 0048 00.

**TEST AND INSPECTION - Continued**

**Backlash Inspection**

NOTE

Ensure adapter mounting surfaces and M17/M18 or M17A1/M18A1 quadrant mounting surfaces are clean and free of nicks and burrs.

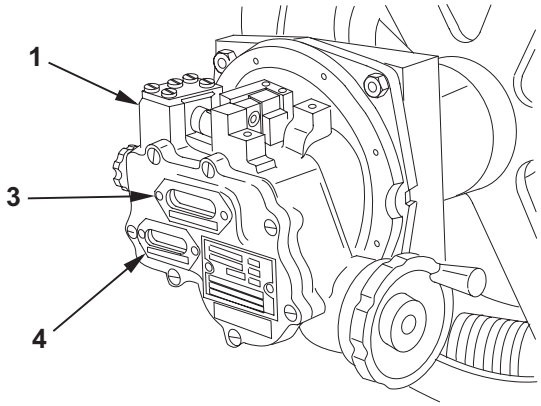



1fc246

1. Mount M17/M18 or M17A1/M18A1 quadrant (1) on optical equipment test fixture (2). Refer to Mounting M17/M18 or M17A1/M18A1 Quadrant on Optical Equipment Test Fixture.

NOTE

Turn elevation knob clockwise. Do not overtravel zero.

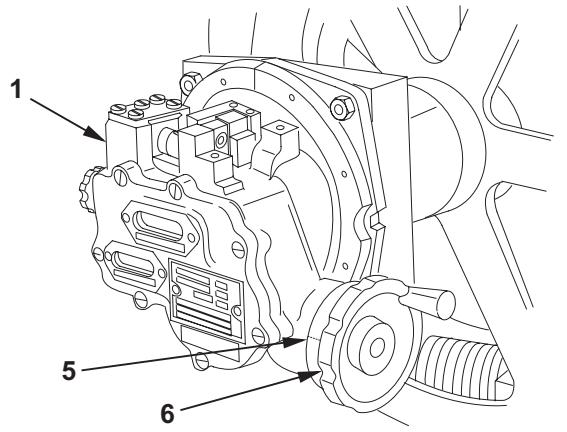



1fc247

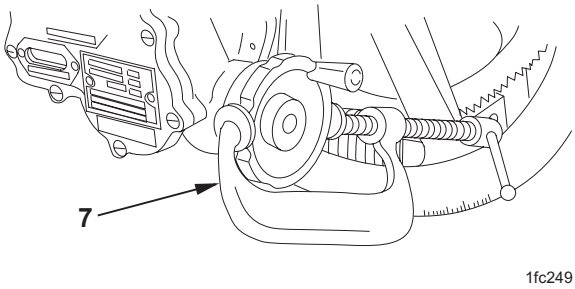
2. Zero correction counter (3) and elevation counter (4) of M17/M18 or M17A1/M18A1 quadrant (1).

NOTE

Ensure optical equipment test fixture is level in elevation and cant.

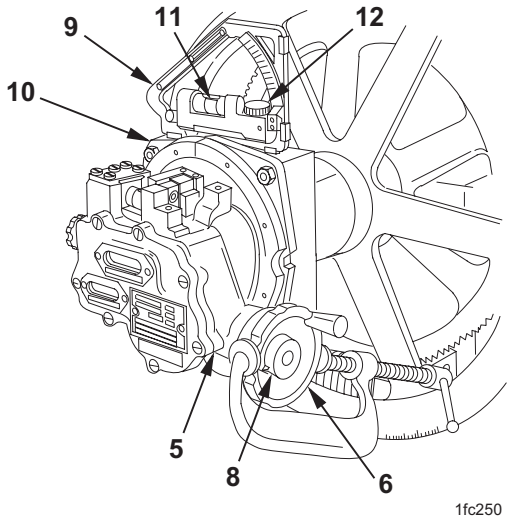



3. Scribe index line (5) on M17/M18 or M17A1/M18A1 quadrant (1) near elevation knob (6).




## NOTE

An index pointer may be made from 1/16 in. diameter rod with a sharp point on one end. The index pointer may be held in place using a small C-clamp (7).

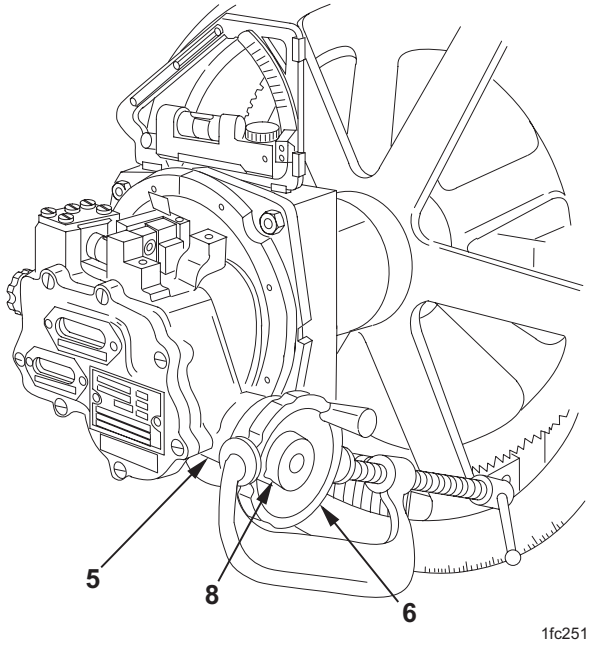



4. Place index pointer (8) on the elevation knob (6) directly opposite the scribed index line (5). The index pointer may have to be moved for each elevation setting.

5. Place fire control quadrant (9) on top of mounting bracket (10) and level bubble in fire control quadrant level (11) using micrometer knob (12) and record reading.

**TEST AND INSPECTION - Continued**

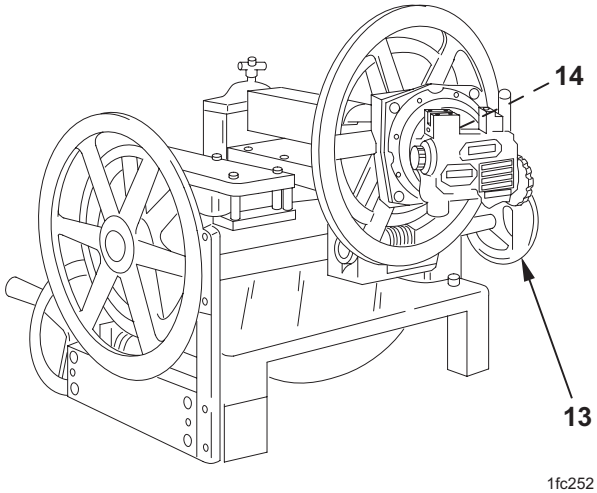
**Backlash Inspection - Continued**



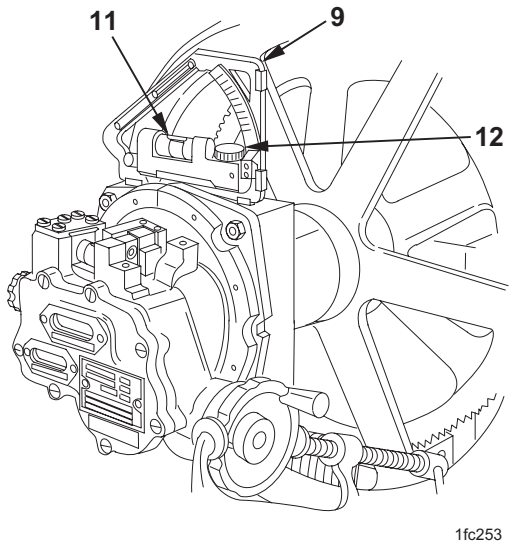

## NOTE

Do not go past scribed line when turning counterclockwise. Ensure scribed index line and index pointer are in perfect alignment.

6. Rotate elevation knob (6) at least 1/2-turn clockwise. Then turn counterclockwise until index pointer (8) aligns with scribed index line (5).




7. Rotate elevation handwheel (13) until bubble in M17/M18 or M17A1/M18A1 quadrant elevation level (14) is centered.




8. Using micrometer knob (12) on fire control quadrant (9), center bubble in fire control quadrant level (11) and record reading.

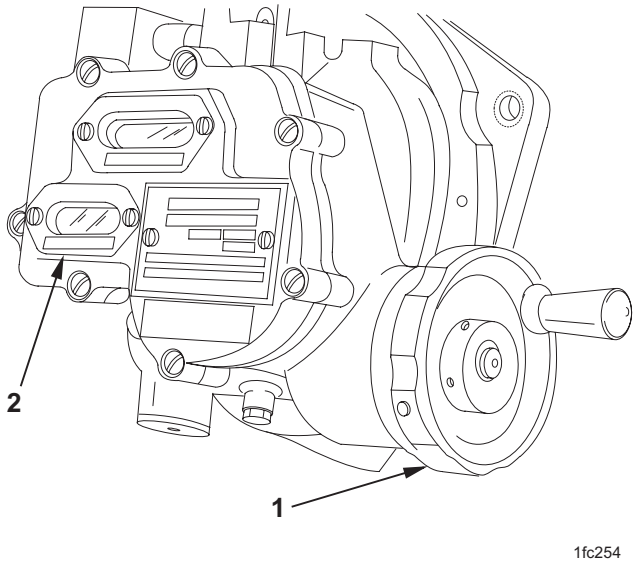
## NOTE

The difference between the readings recorded in steps 5 and 8 will give the amount of backlash.

Backlash shall not exceed 0.7 mil at any elevation or depression setting.

9. Repeat steps 4 through 8 at elevation settings of 150-mil depression, 200-mil elevation, 800-mil elevation, and 1400-mil elevation. Use fire control quadrant set on optical equipment test fixture adapter to initially set elevations.

### Elevation Counter and Correction Counter Excursion Range Inspection

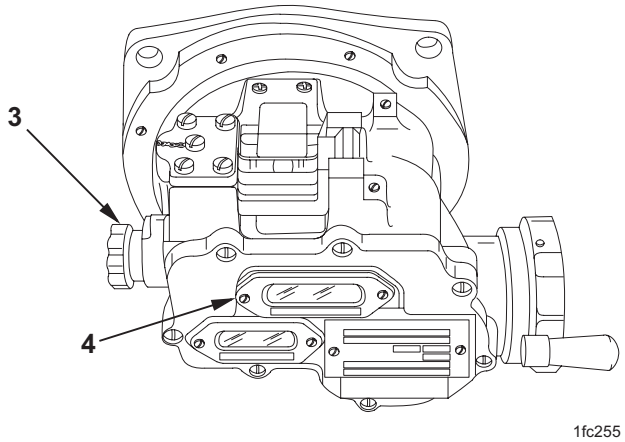



1. Turn elevation knob (1) clockwise as far as possible. Elevation counter (2) must read 1433 mils or greater.

**TEST AND INSPECTION - Continued**

**Elevation Counter and Correction Counter Excursion Range Inspection - Continued**

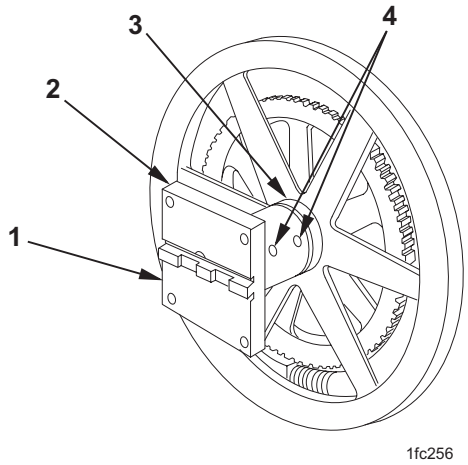
2. Turn elevation knob (1) counterclockwise as far as possible. Elevation counter (2) must read 9720 mils or less.




3. Turn correction knob (3) clockwise as far as possible. Correction counter (4) must read on or between -95 mils and -99 mils.

4. Turn correction knob (3) counterclockwise as far as possible. Correction counter (4) must read on or between +95 mils and +99 mils.

**Elevation Accuracy Inspection (200-Mil Increments)**

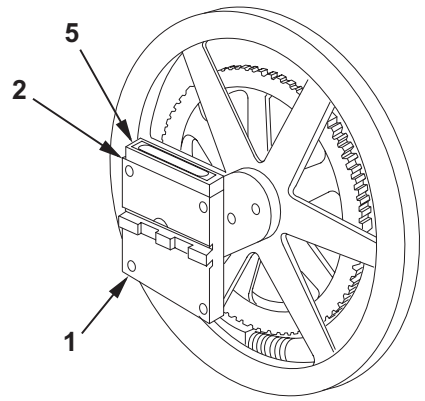



NOTE

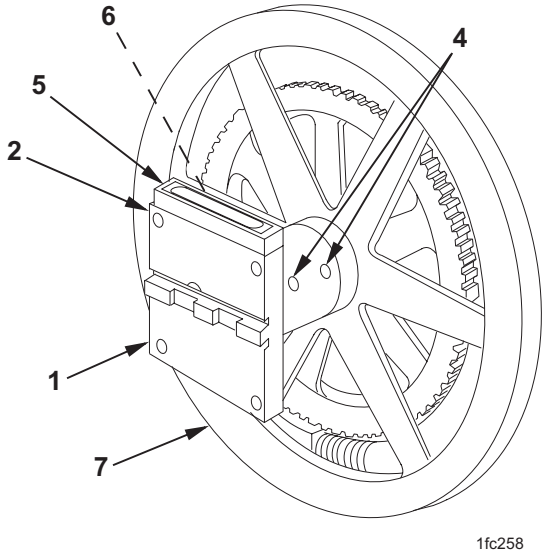
When installing mounting bracket (1), ensure precision ground surface (2) is parallel to top of block within 0.1 mil.

1. Install mounting bracket (1) on end of cross-leveling shaft (3).

2. Lightly tighten six setscrews (4).




3. Place plate-mounted level (5) on precision ground surface (2) of mounting bracket (1).



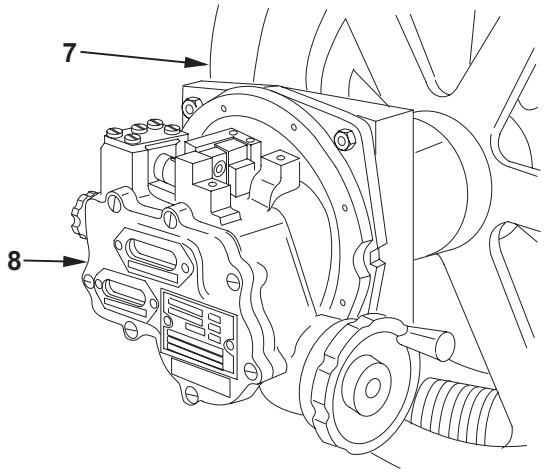

4. Check that bubble (6) in plate-mounted level (5) is level.

5. Tighten setscrews (4). Recheck optical equipment test fixture (7), plate-mounted level (5), and precision ground surface (2).

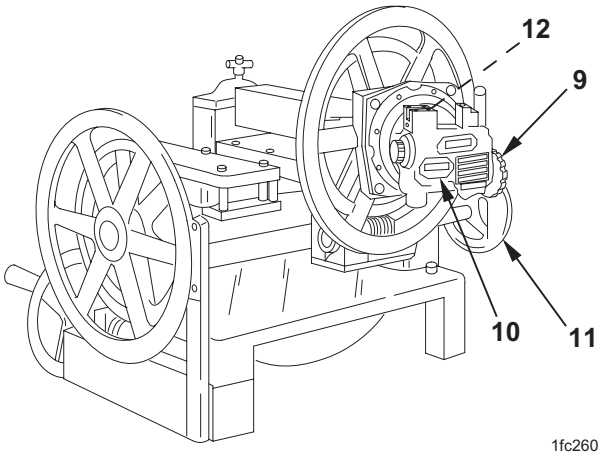
6. Rotate plate-mounted level (5) 180 degrees from original position, and check again that bubble (6) in plate-mounted level is level.

**TEST AND INSPECTION - Continued**

**Elevation Accuracy Inspection (200-Mil Increments) - Continued**

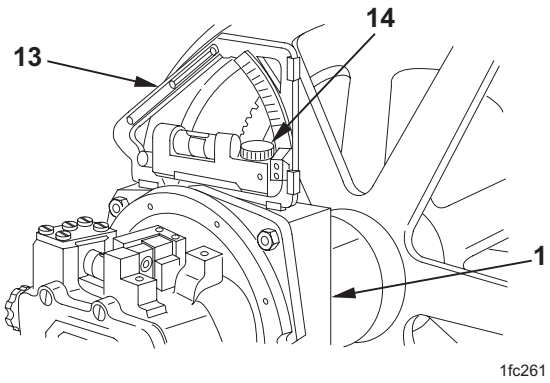



7. Mount M17/M18 or M17A1/M18A1 quadrant (8) on optical equipment test fixture (7). Refer to Mounting M17/M18 or M17A1/M18A1 Quadrant on Optical Equipment Test Fixture.




8. Turn elevation knob (9) until elevation counter (10) reads 200 mils.

9. Turn elevation handwheel (11) until bubble in elevation level (12) centers.



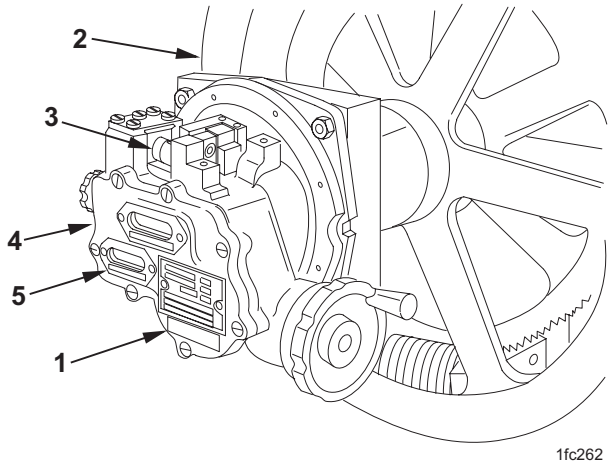
10. Set fire control quadrant (13) to 200 mils. Place on top of mounting bracket (1) and zero using micrometer knob (14).

NOTE

Micrometer dial will indicate any error. Error should not exceed 0.5 mil (1.0-mil total spread).

11. Repeat steps 1 through 10 with fire control quadrant set at elevations of 400, 600, 800, 1000, 1200, and 1400 mils. Error should not exceed 0.5 mil.

**Checking the Effect of the Correction Counter Setting on the Elevation Counter and Level Bubble**




1. Mount M17/M18 or M17A1/M18A1 quadrant (1) on optical equipment test fixture (2). Refer to Mounting M17/M18 or M17A1/M18A1 Quadrant on Optical Equipment Test Fixture.

NOTE

Observe bubble in elevation level (3) during steps 2 through 5. It must remain centered within one vial graduation.

2. Turn correction knob (4) clockwise to -50 mils.

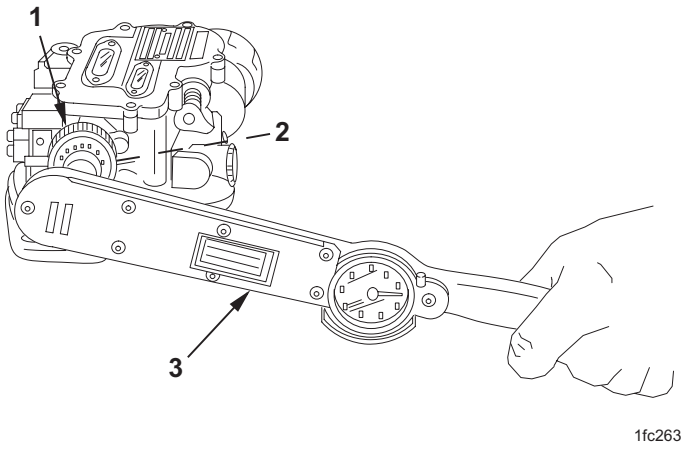
3. Check that elevation counter (5) reads 50 ± 0.5 mils.

4. Turn correction knob (4) counterclockwise to 50 mils.

5. Check that elevation counter (5) reads 9950 ± 0.5 mils.

**TEST AND INSPECTION - Continued**

**Torque Inspection**

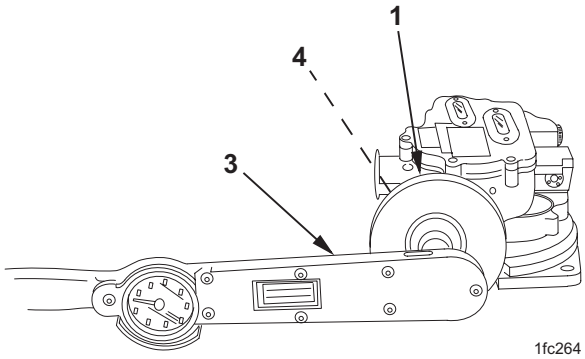



1. Place torque wrench adapter (1) (item 14, WP 0149 00) over correction knob (2).
2. Place torque wrench (3) on torque wrench adapter (1).
3. Measure torque.

NOTE

Torque required for continuous turning should be between 1 in.-lb (0.11 N-m) and 4 in.-lb (0.45 N-m).

4. If torque cannot be met, remove correction knob (2) (WP 0049 00) and check for possible bent shaft.




5. Place torque wrench adapter (1) (item 15, WP 0149 00) and torque wrench (3) over elevation knob (4).
6. Measure torque.

NOTE

Torque required for continuous turning should be between 3 in.-lb (0.34 N-m) and 10 in.-lb (1.13 N-m).

7. If torque cannot be met, remove and reinstall spring plug retainer (WP 0049 00).

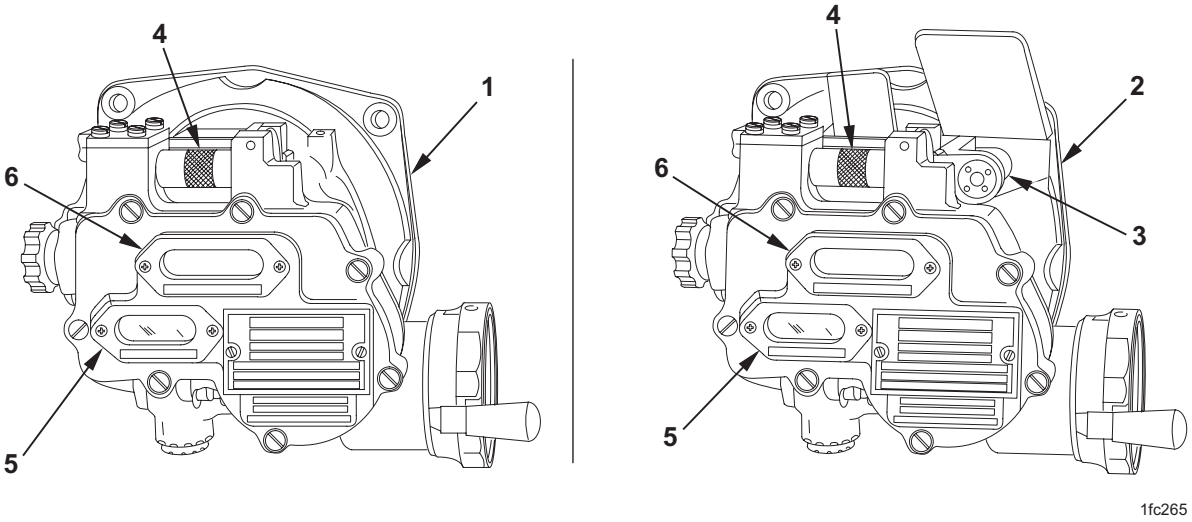
### Illumination Inspection

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When inspecting radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.




1. Take M17 quadrant (1) or M18 quadrant (2) into dark area, and wait 15 minutes.
2. Take M17A1 quadrant (1) or M18A1 quadrant (2) into dark area, and turn on switch.

NOTE

Bubble in cross level (3) applies to M18/M18A1 quadrant only.

3. Check that bubble in cross level (3), bubble in elevation level (4), elevation counter (5), and correction counter (6) are clearly visible with even illumination.

### Purging

Purge and charge M17/M18 or M17A1/M18A1 quadrant (TM 750-116).

### M17/M18 or M17A1/M18A1 Quadrant and Cannon Tube Synchronization Procedure

1. Mount quadrant to howitzer (TM 9-1025-211-20&P/TM 9-1025-215-25&P). Then perform synchronization procedure (TM 9-1025-211-34/TM 9-1025-215-25&P).

**TEST AND INSPECTION - Continued**

**M17/M18 or M17A1/M18A1 Quadrant and Cannon Tube Synchronization Procedure - Continued**

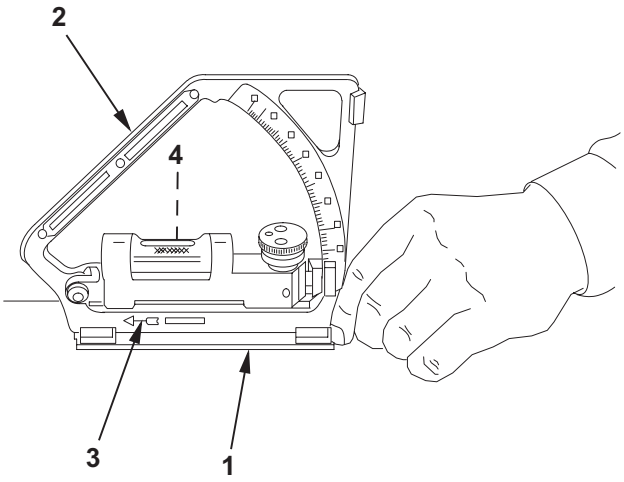
NOTE

M18/M18A1 quadrant is required for proper cannon tube synchronization.

Perform the following synchronization procedure whenever a cannon assembly or tube is removed.

Before beginning synchronization procedure, cannon tube must be depressed to zero mils and trunnions leveled (TM 9-1025-211-10/TM 9-1025-215-10).

Whenever the M17/M18 or M17A1/M18A1 quadrants are replaced, the following synchronization procedure should be performed.




NOTE

Before using cannon leveling pad (1), check for cleanness.

The fire control quadrant should be set on the higher cannon leveling pad when leveling the cannon tube.

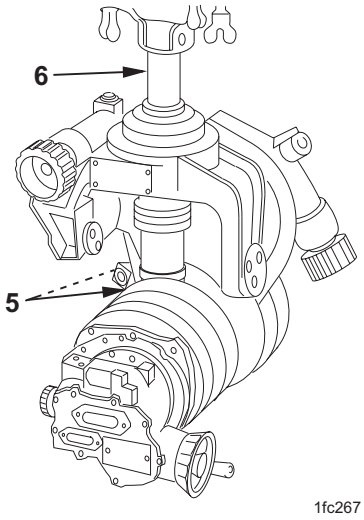
2. Test fire control quadrant (2) before using.

3. Place fire control quadrant (2) on cannon leveling pad (1) with LINE OF FIRE arrow (3) pointed toward the muzzle.

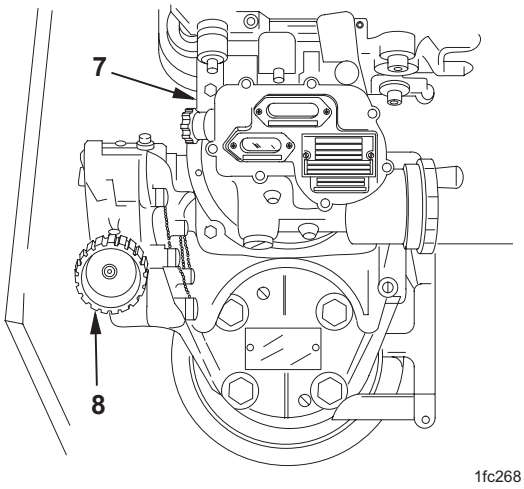
4. Depress or elevate the cannon tube with the elevating handwheel until bubble (4) in fire control quadrant level (2) centers.

## NOTE

Elevation counter of M17/M18 and M17A1/M18A1 quadrants shall reflect tube elevation and shall not exceed 1.0-mil deviation, excluding backlash.




5. Level elevation and cross level vials (5) of M171/M171A1 mount (6).



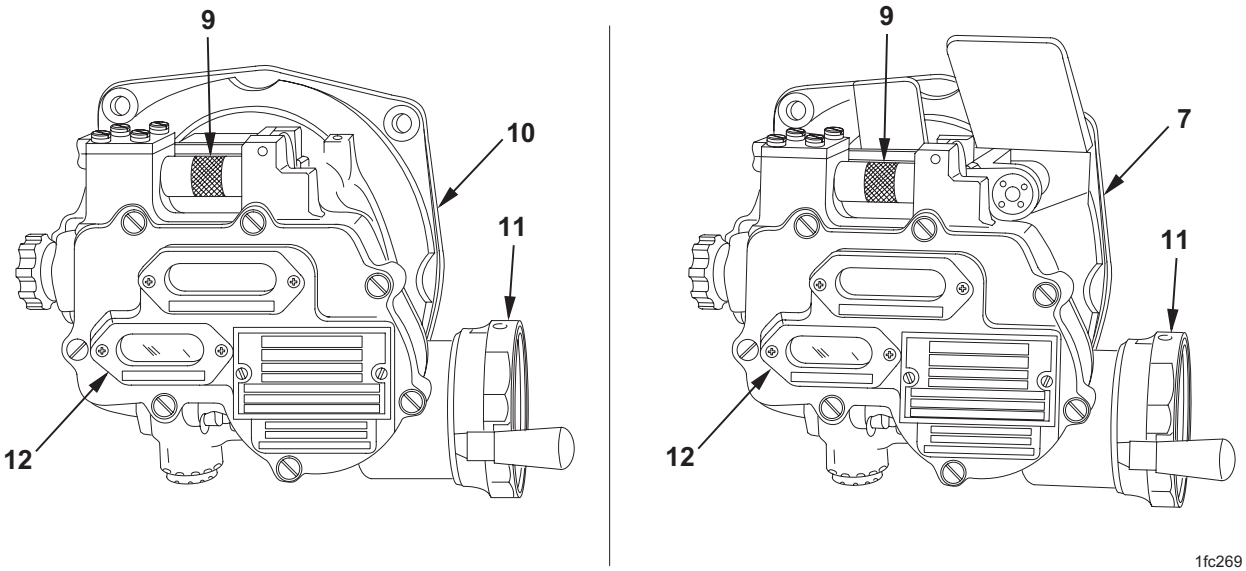

## NOTE

In the following steps, eliminate backlash by always making the last movement in the counter mechanisms a low-number-to-high-number movement.

6. Cross-level M18/M18A1 quadrant (7) using M172/M172A1 mount cross level knob (8).

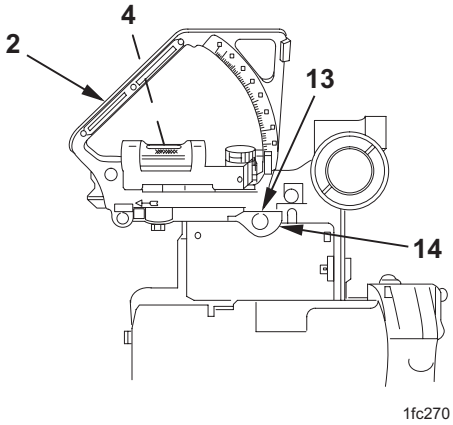
**TEST AND INSPECTION - Continued**

**M17/M18 or M17A1/M18A1 Quadrant and Cannon Tube Synchronization Procedure - Continued**




7. Center bubbles in elevation level (9) on M17/M17A1 quadrant (10) and M18/M18A1 quadrant (7) using elevation knob (11).

8. Elevation counter (12) in both quadrants should be zero. If not zero, turn elevation knob (11) to set counter at zero and adjust bubbles in elevation level (9) as necessary (WP 0048 00).




9. Place fire control quadrant (2) on seats on M172/M172A1 mount. Bubble (4) in fire control quadrant level should center.

10. If bubble (4) in fire control quadrant level (2) is not centered, adjust eccentric stud assembly (13).

11. Loosen eccentric stud assembly (13) to disengage from spline plate (14).

12. Turn and engage spline plate (14). Tighten eccentric stud assembly (13).

13. Repeat step 10. If bubble (4) in fire control quadrant level (2) does not center, repeat steps 11 and 12 until centered.

**END OF WORK PACKAGE**

# CHAPTER 14

# DIRECT SUPPORT MAINTENANCE INSTRUCTIONS FOR M171/M171A1 TELESCOPE AND QUADRANT MOUNT

**DIRECT SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

**SERVICE UPON RECEIPT**
**SERVICE UPON RECEIPT OF MATERIEL**

## SERVICE UPON RECEIPT OF MATERIEL

### WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries.

### Unpacking

When a new or reconditioned M171/M171A1 Telescope and Quadrant Mount is received, be aware of any shipping damage to packaging materiel. Report any damage on SF 364, Report of Discrepancy (ROD), as prescribed in AR 735-11-2. Retain packaging materiel for future use.

### Checking Unpacked Equipment

1. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 361, Transportation Discrepancy Report.
2. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with applicable service instructions (e.g., for Army instructions, see DA PAM 738-750).

**SERVICE UPON RECEIPT - Continued**

**Checking Unpacked Equipment - Continued**

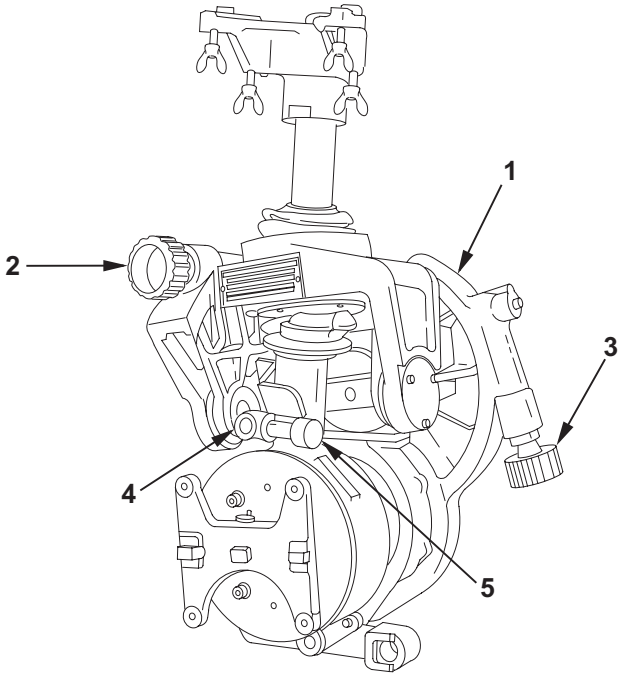
3. Check to see whether the equipment has been modified.
4. Check M171 mount (1) for bare spots, dents, scuff marks, and damaged parts. Inspect M171 mount for cleanness.
5. Operate cross level knob (2). Check that operation is smooth without binding or rough motion.
6. Operate elevation knob (3). Check that operation is smooth without binding or rough motion.

**WARNING**

**RADIATION**   **TRITIUM GAS ($H_3$)**

When inspecting radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M171 only).

7. Check cross level vial (4). Bubble must move freely. Glass must not be broken or cracked. Light must be present and even throughout the cross level vial.
8. Check elevation level vial (5). Bubble must move freely. Glass must not be broken or cracked. Light must be present and even throughout the elevation level vial.

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**END OF WORK PACKAGE**

**DIRECT SUPPORT**

# M171/M171A1 TELESCOPE AND QUADRANT MOUNT (1240-01-039-7273/1240-01-515-8265)

## M171/M171A1 MOUNT MAINTENANCE DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**

Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Artillery and Turret Mechanic's: Ordnance (SC 5180-95-A12)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**

Lockwasher (2) (item 7, WP 0120 00)
Sealing compound (item 13, WP 0152 00)

**References**

WP 0120 00

**DISASSEMBLY**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

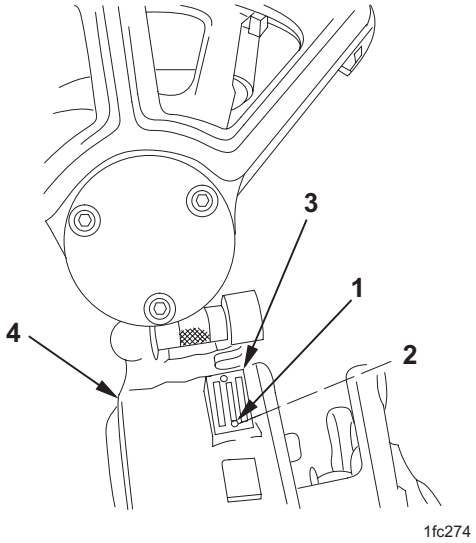
When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries.

**DISASSEMBLY - Continued**

Remove two machine screws (1), two lockwashers (2), and instruction plate (3) from bearing housing assembly (4). Discard lockwashers. Illustration shows M171 only.




**REPAIR OR REPLACEMENT**

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0120 00.

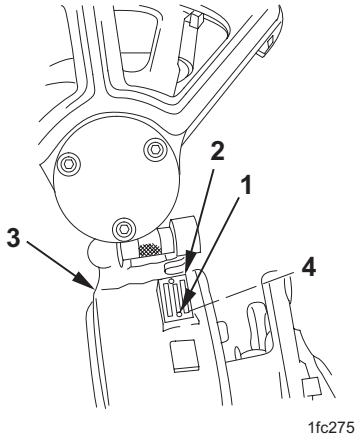
**ASSEMBLY**

WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

1. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (1).

2. Position instruction plate (2) on bearing housing assembly (3) and secure with two new lockwashers (4) (item 7, WP 0120 00) and two machine screws (1).




**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M171 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273)**

**OPTICAL INSTRUMENT SUPPORT MAINTENANCE**
**DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY**

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Lockwasher (4) (item 5, WP 0121 00)
Lockwasher (2) (item 8, WP 0121 00)
Sealing compound (item 13, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
WP 0121 00

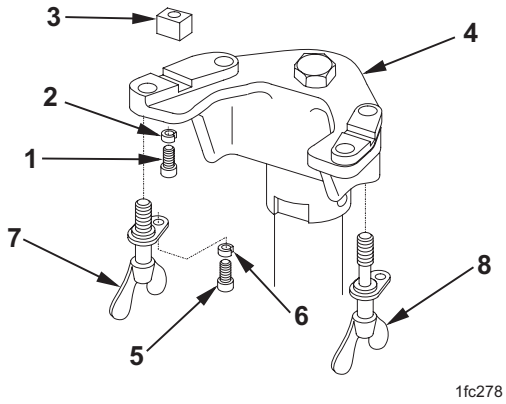
**Equipment Conditions**
M171 mount removed from M198 howitzer (TM 9-1025-211-34)

## DISASSEMBLY

WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

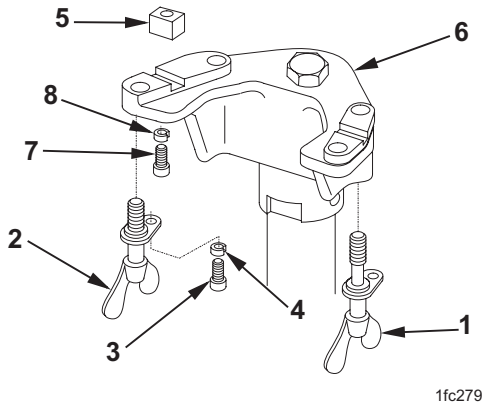



1. Remove two socket capscrews (1) and two lockwashers (2). Discard lockwashers.
2. Pry two machine keys (3) out of grooves in optical instrument support (4).
3. Remove four socket capscrews (5), four lockwashers (6), two thumbscrews (7), and two thumbscrew assemblies (8). Discard lockwashers.

## REPAIR OR REPLACEMENT

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0121 00.

**ASSEMBLY**




1. Install two thumbscrew assemblies (1) and two thumbscrews (2).

WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

2. Apply a light coat of sealing compound (item 13, WP 0152 00) to threads of four socket capscrews (3). Install four new lockwashers (4) (item 5, WP 0121 00) and four socket capscrews.

3. Install two machine keys (5) in grooves of optical instrument support (6).

4. Apply a light coat of sealing compound (item 13, WP 0152 00) to threads of two socket capscrews (7). Wipe off excess sealing compound with clean wiping rag (item 18, WP 0152 00). Install two new lockwashers (8) (item 8, WP 0121 00) and two socket capscrews.

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-515-8265)**

**OPTICAL INSTRUMENT SUPPORT MAINTENANCE**
**DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY**

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Lockwasher (2) (item 8, WP 0121 00)
Sealing compound (item 13, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
WP 0121 00

**Equipment Conditions**
M171A1 mount removed from M198/M777 howitzer (TM 9-1025-211-34/TM 9-1025-215-25&P)

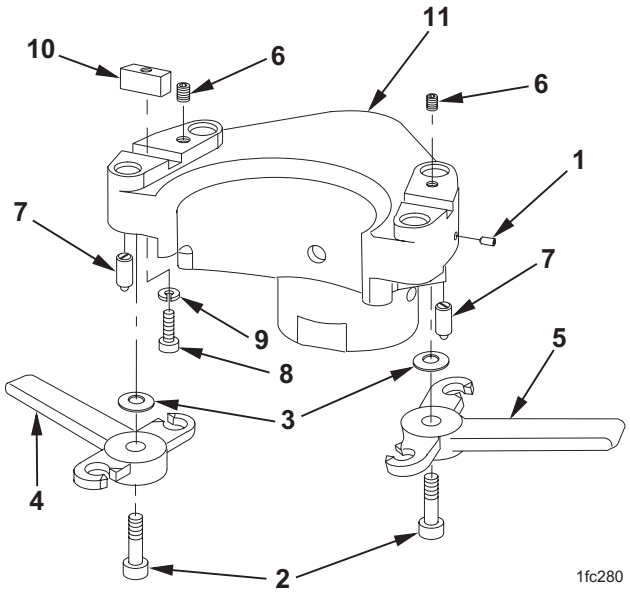
## DISASSEMBLY

### WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

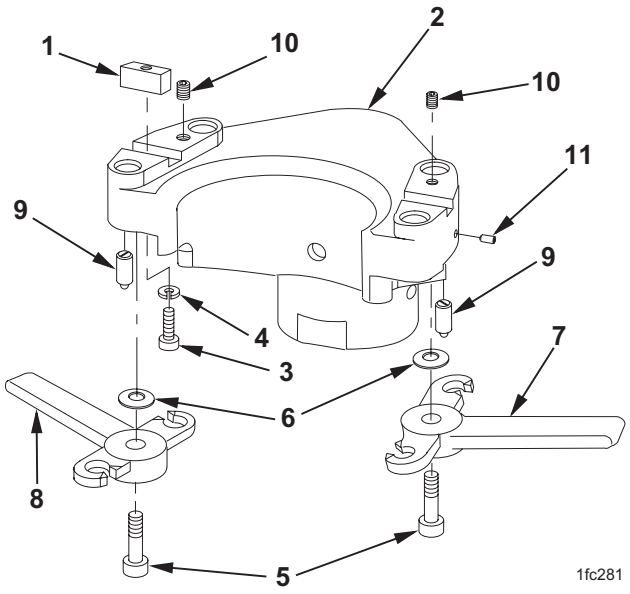



1. Loosen two setscrews (1).
2. Remove two socket head capscrews (2), two spring tension washers (3), left manual control handle (4), and right manual control handle (5). Discard spring tension washers, if unserviceable.
3. Remove sealing compound and remove two setscrews (6). Remove two detent plungers (7).
4. Remove two socket head capscrews (8) and two lockwashers (9). Discard lockwashers.
5. Pry two machine keys (10) out of grooves in optical instrument support (11).

## REPAIR OR REPLACEMENT

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0121 00.

**ASSEMBLY**




1. Install two machine keys (1) in grooves of optical instrument support (2).

**WARNING**

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

2. Apply a light coat of sealing compound (item 13, WP 0152 00) to threads of two socket capscrews (3). Install two new lockwashers (4) (item 8, WP 0121 00) and two socket capscrews.

3. Apply a light coat of sealing compound (item 13, WP 0152 00) to threads of two socket head capscrews (5). Wipe off excess sealing compound with a clean wiping rag. Install two spring tension washers (6), bevel down, and two socket head capscrews onto left manual control handle (7) and right manual control handle (8). Tighten capscrews until snug.

4. Install two detent plungers (9). Tighten to positive stop and turn back one-half turn.

5. Install two setscrews (10) and apply sealing compound (item 13, WP 0152 00).

6. Loosen two socket head capscrews (5) one-quarter turn. If properly adjusted, latch will feel slightly loose.

7. Apply sealing compound (item 13, WP 0152 00) to threads of two setscrews (11). Install setscrews and tighten. Cover heads with sealing compound.

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M171 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273)**

# OPTICAL INSTRUMENT ROCKER ASSEMBLY MAINTENANCE DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Lockwasher (2) (item 8, WP 0122 00)
Sealing compound (item 13, WP 0152 00)

**References**
WP 0122 00

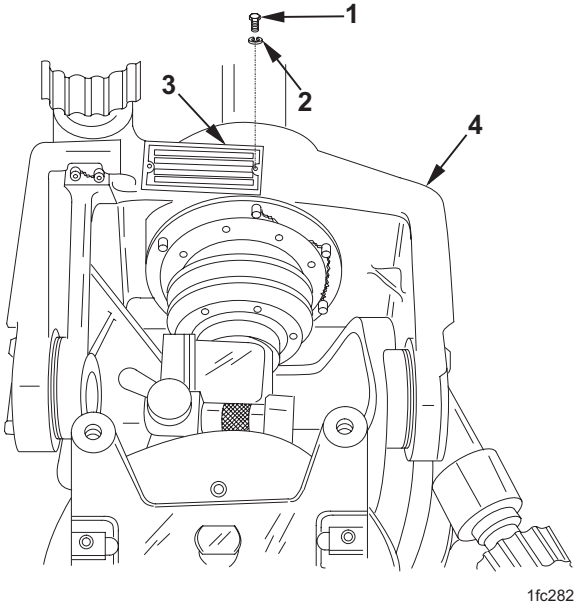
**Equipment Conditions**
M171 mount removed from M198 howitzer (TM 9-1025-211-34)

## DISASSEMBLY

WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M171 only).

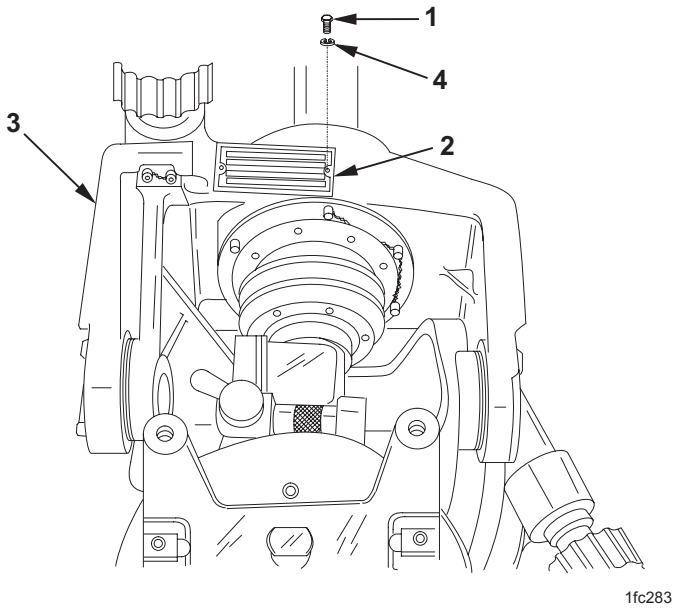



Remove two machine screws (1), two lockwashers (2), and identification plate (3) from optical instrument rocker (4). Discard lockwashers.

## REPAIR OR REPLACEMENT

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0122 00.

**ASSEMBLY**




**WARNING**

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

1. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (1).

2. Position identification plate (2) on optical instrument rocker (3) and secure with two new lockwashers (4) (item 8, WP 0122 00) and two machine screws (1).

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-515-8265)**

# OPTICAL INSTRUMENT ROCKER ASSEMBLY MAINTENANCE
# DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Gasket (item 25, WP 0118 00)
Lockwasher (3) (item 27, WP 0118 00)
Lockwasher (2) (item 8, WP 0122 00)

**References**
WP 0118 00
WP 0122 00

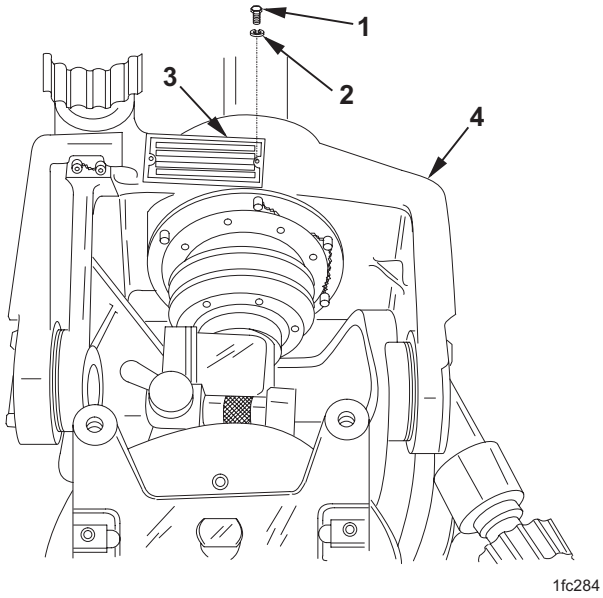
**Equipment Conditions**
M171A1 mount removed from M198/M777 howitzer (TM 9-1025-211-34/TM 9-1025-215-25&P)

**DISASSEMBLY**

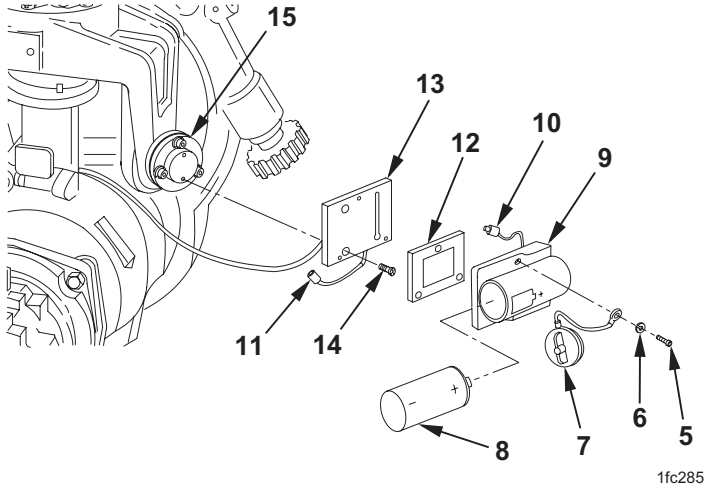
WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries.

**DISASSEMBLY - Continued**




1. Remove two machine screws (1), two lockwashers (2), and identification plate (3) from optical instrument rocker (4). Discard lockwashers.




2. Remove three screws (5), three lockwashers (6), cap and retainer assembly (7), and battery (8) from battery enclosure (9). Support battery enclosure. Discard lockwashers.

## CAUTION

Use extreme care when removing battery enclosure. A short wire harness and connector on the battery enclosure is connected to a short wire harness and connector on the plate assembly. These connectors and wire harnesses are easily damaged.

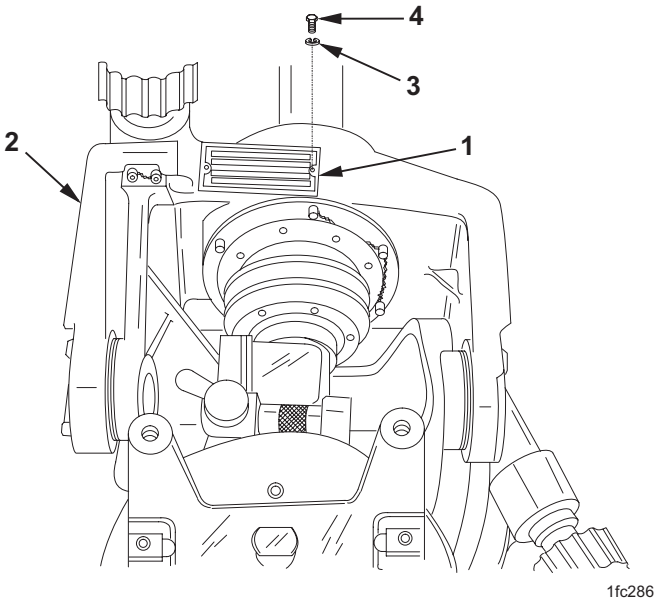
3. Carefully disconnect battery enclosure connector (10) from plate assembly connector (11) and remove battery enclosure (9) and gasket (12) from plate assembly (13). Discard gasket.

4. Remove two socket capscrews (14) and plate assembly (13) from spacer (15).

### REPAIR OR REPLACEMENT

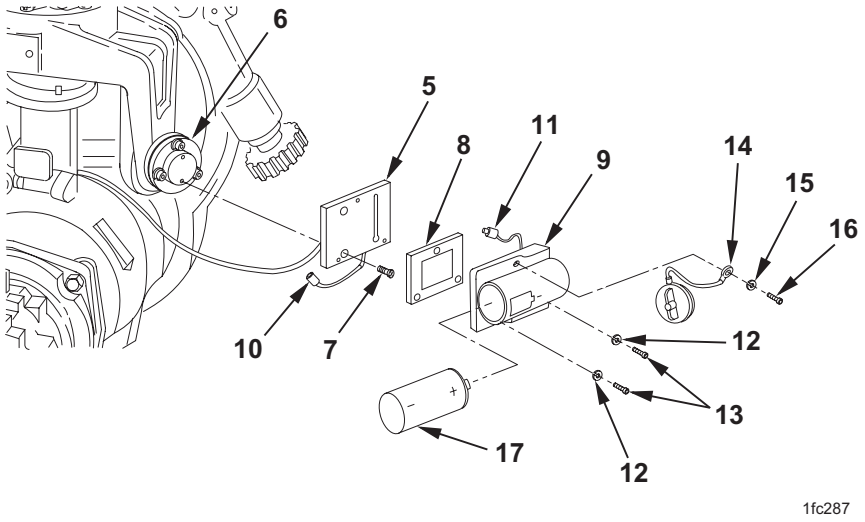
Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0118 00 and WP 0122 00.

### ASSEMBLY




1. Position identification plate (1) on optical instrument rocker (2) and secure with two new lockwashers (3) (item 8, WP 0122 00) and two machine screws (4).

**ASSEMBLY - Continued**




2. Install plate assembly (5) on spacer (6) and secure with two socket capscrews (7).

3. Position new gasket (8) (item 25, WP 0118 00) on battery enclosure (9).

4. Carefully connect plate assembly connector (10) to battery enclosure connector (11).

## CAUTION

Be careful when assembling components. Do not pinch wire leads or connectors between parts.

5. Install battery enclosure (9) on plate assembly (5) with two new lockwashers (12) (item 27, WP 0118 00) and two screws (13).

6. Install cap and retainer assembly (14) on battery enclosure (9), using new lockwasher (15) (item 27, WP 0118 00) and screw (16).

7. Install battery (17) into battery enclosure (9) and secure with cap and retainer assembly (14).

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

# M171/M171A1 TELESCOPE AND QUADRANT MOUNT (1240-01-039-7273/1240-01-515-8265)

## BEARING HOUSING ASSEMBLY MAINTENANCE DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Lockwasher (2) (item 9, WP 0126 00)
Sealing compound (item 13, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
WP 0126 00

**Equipment Conditions**
M171/M171A1 mount removed from M198/M777 howitzer (TM 9-1025-211-34/TM 9-1025-215-25&P)

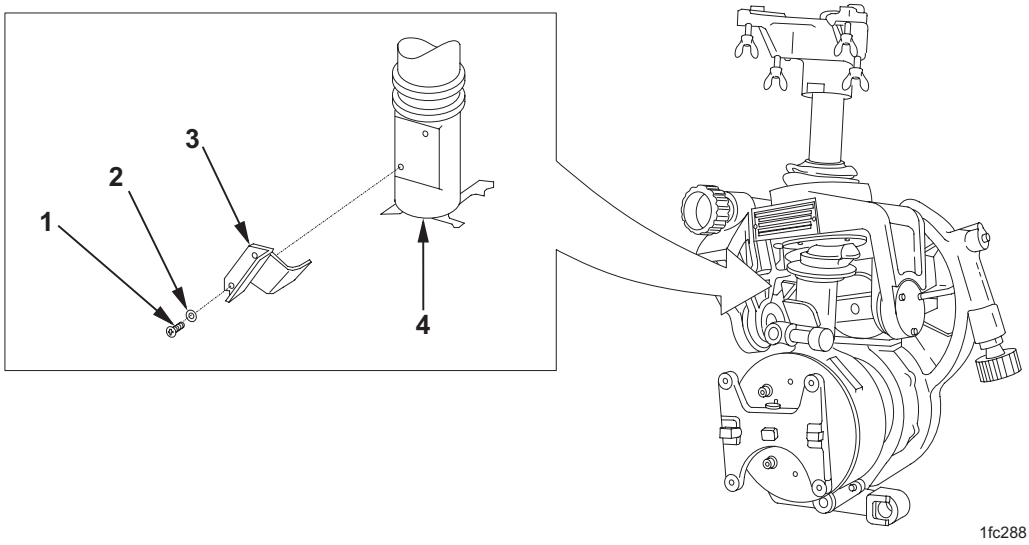
**DISASSEMBLY**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M171 only).

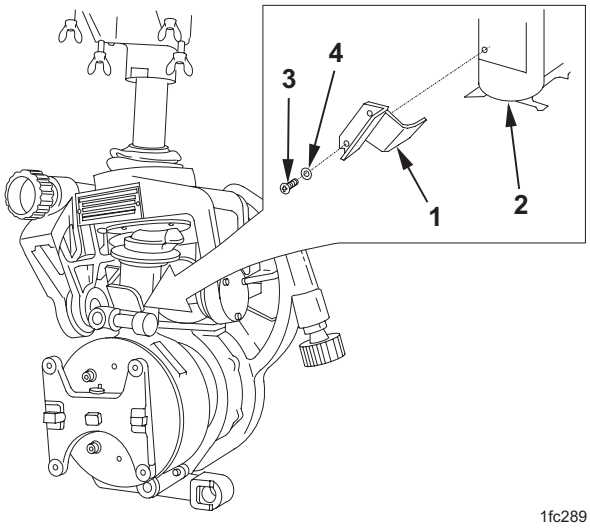



Remove two machine screws (1), two lockwashers (2), and optical instrument mirror (3) from bearing housing assembly (4). Discard lockwashers.

**REPAIR OR REPLACEMENT**

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0126 00.

**ASSEMBLY**




1. Position optical instrument mirror (1) on bearing housing assembly (2).

WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

2. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (3). Wipe off excess sealing compound with a clean wiping rag (item 18, WP 0152 00). Install two new lockwashers (4) (item 9, WP 0126 00) and two machine screws. Tighten machine screws.

**END OF WORK PACKAGE**

# CHAPTER 15

# GENERAL SUPPORT MAINTENANCE INSTRUCTIONS FOR M171/M171A1 TELESCOPE AND QUADRANT MOUNT

**GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

**M171/M171A1 MOUNT MAINTENANCE**
**DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY**

**INITIAL SETUP:**

**Tools and Special Tools**

Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**

Gasket (item 25, WP 0118 00)
Gasket (item 9, WP 0119 00)
Grease (item 15, WP 0152 00)
Grease (item 16, WP 0152 00)
Lockwasher (item 5, WP 0118 00)
Lockwasher (12) (item 10, WP 0118 00)
Lockwasher (6) (item 14, WP 0118 00)
Lockwasher (3) (item 27, WP 0118 00)
Lockwasher (4) (item 2, WP 0119 00)
Lockwasher (5) (item 5, WP 0119 00)
Lockwasher (4) (item 7, WP 0119 00)
Lockwasher (4) (item 2, WP 0124 00)
Lockwasher (2) (item 6, WP 0126 00)
Lock wire (item 21, WP 0152 00)
Lock wire (item 22, WP 0152 00)
O-ring (item 10, WP 0119 00)
O-ring (item 12, WP 0119 00)
O-ring (item 13, WP 0119 00)
Plastic bag (item 5, WP 0152 00)
Sealing compound (item 13, WP 0152 00)
Solvent cleaning compound (item 12, WP 0152 00)
Tape (item 20, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**

WP 0118 00
WP 0119 00
WP 0120 00
WP 0124 00
WP 0126 00

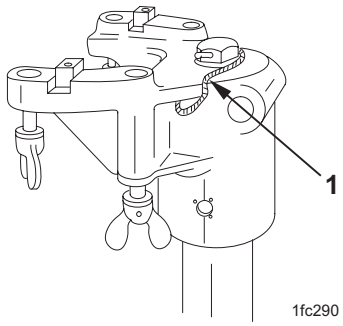
**DISASSEMBLY**

## WARNING

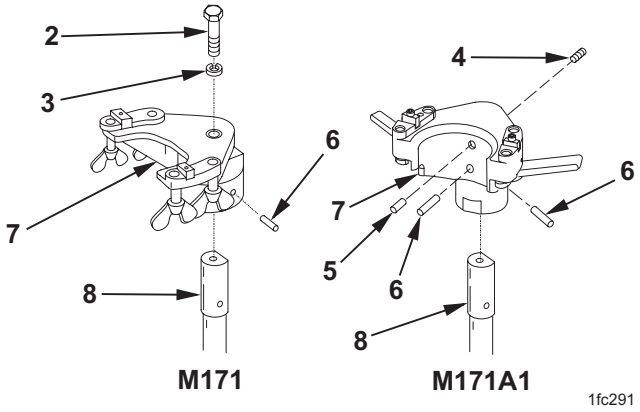
**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.




1. Remove and discard lock wire (1) (M171 only).



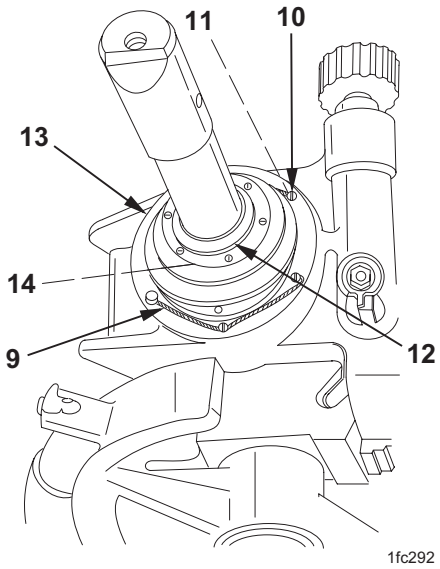

2. Remove hexagon capscrew (2) and lockwasher (3). Discard lockwasher (M171 only).

3. Remove setscrew (4) (M171A1 only).

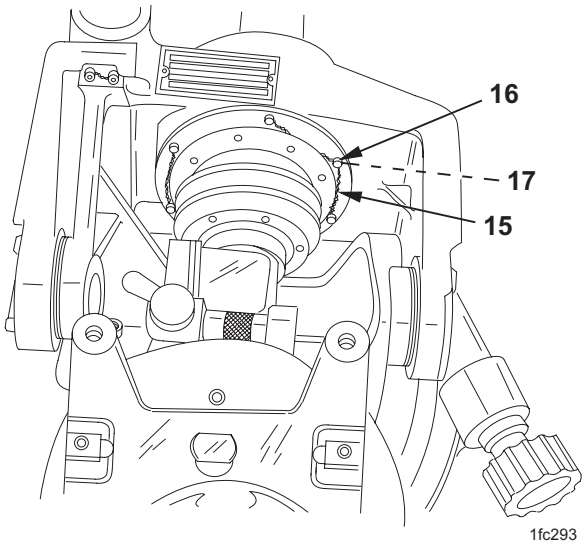
4. If damaged, remove straight pin (5) (M171A1 only).

5. Drive out plain tapered pin(s) (6) (M171 and M171A1).

6. Remove optical instrument support (7) from bearing housing assembly (8).

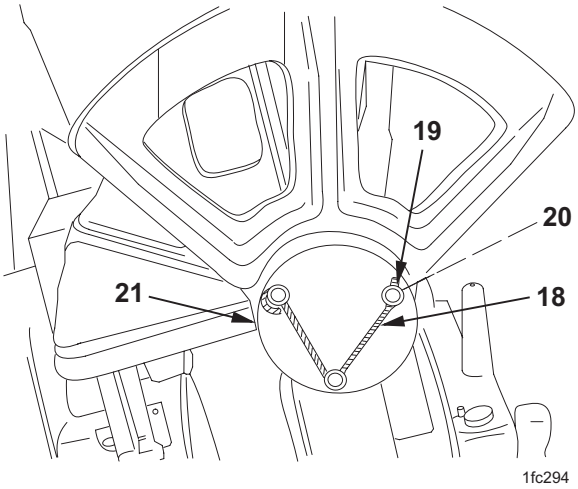



7. Remove and discard lock wire (9).
8. Remove six machine screws (10) and six lockwashers (11). Discard lockwashers.
9. Remove retaining ring (12), protection bellows (13), and retaining ring (14).



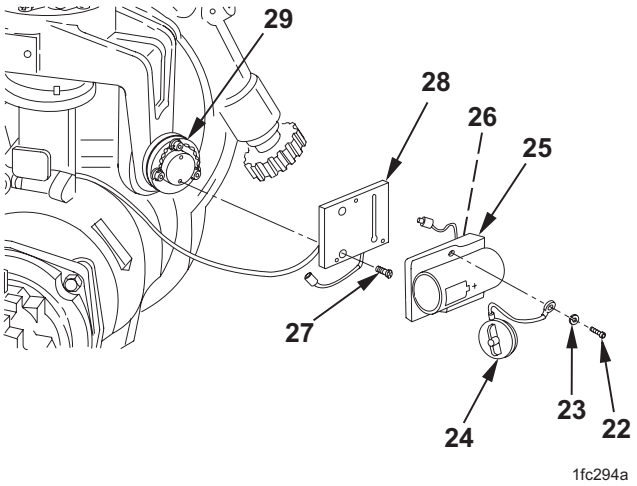

10. Remove and discard lock wire (15).
11. Remove six machine screws (16) and six lockwashers (17). Discard lockwashers.

**DISASSEMBLY - Continued**




12. Remove and discard lock wire (18).

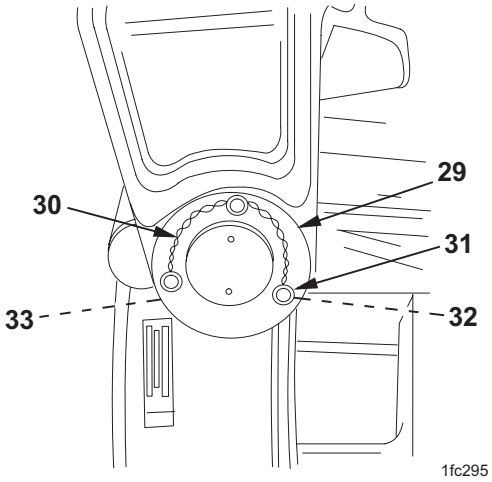
13. Remove three socket capscrews (19), three lockwashers (20), and shoulder pin (21).




14. Remove three screws (22), three lockwashers (23), and cap and retainer assembly (24) from battery box cover (25) (M171A1 only). Discard lockwashers.

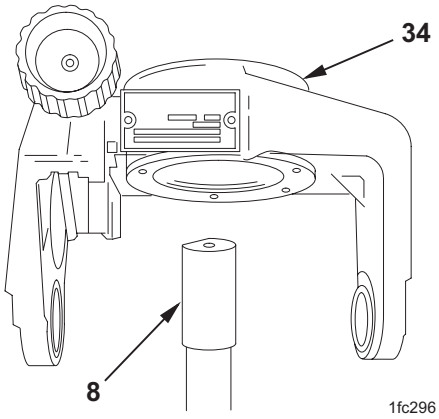
15. Remove and discard gasket (26) (M171A1 only).

16. Remove two socket capscrews (27) and plate (28) from plate spacer (29) (M171A1 only).

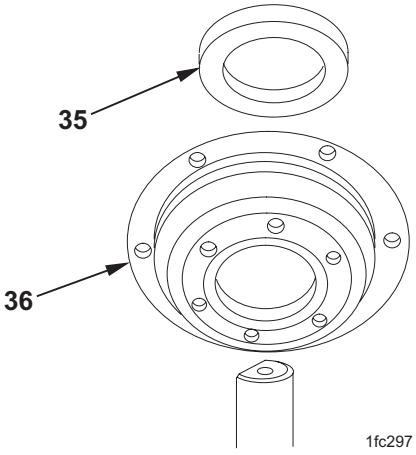



17. Remove and discard lock wire (30).

18. Remove three socket capscrews (31), three lockwashers (32), plate spacer (29), and shoulder pin (33). Discard lockwashers.

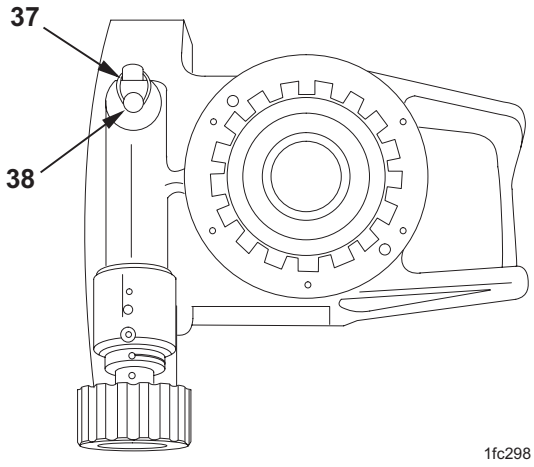



19. Remove optical instrument rocker assembly (34) from bearing housing assembly (8).

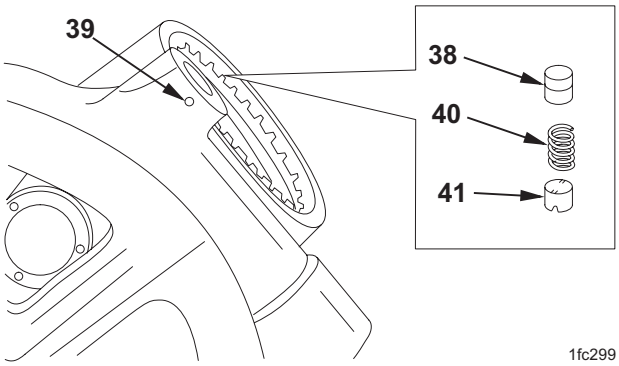



20. Remove retaining ring (35) and protection bellows (36).

**DISASSEMBLY - Continued**




21. Remove and discard lock wire (37) from machine thread plug (38).

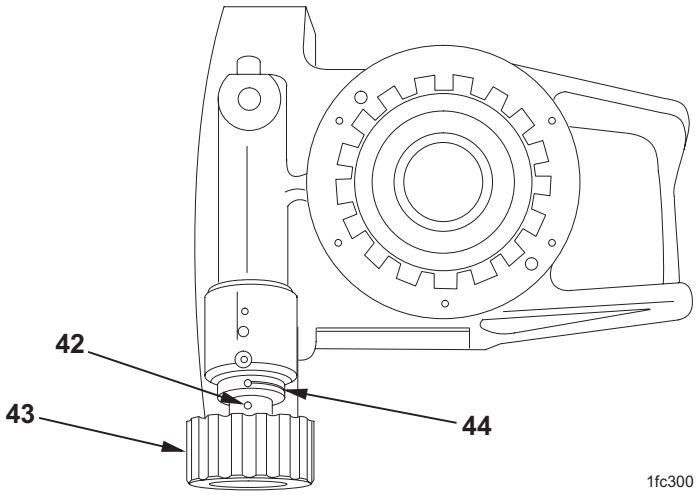



22. Loosen setscrew (39).

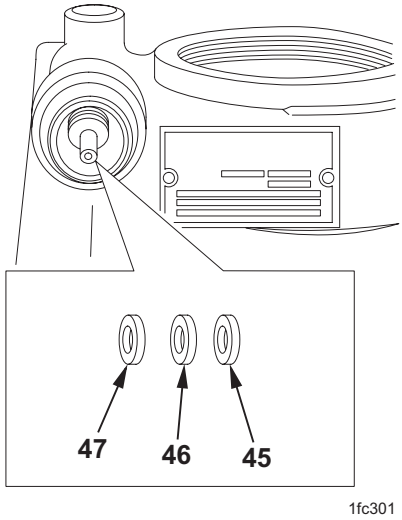
23. Remove machine thread plug (38), helical compression spring (40), and V bearing (41).

## CAUTION

Support cross level knob in V block on solid surface to prevent damage to worm shaft.

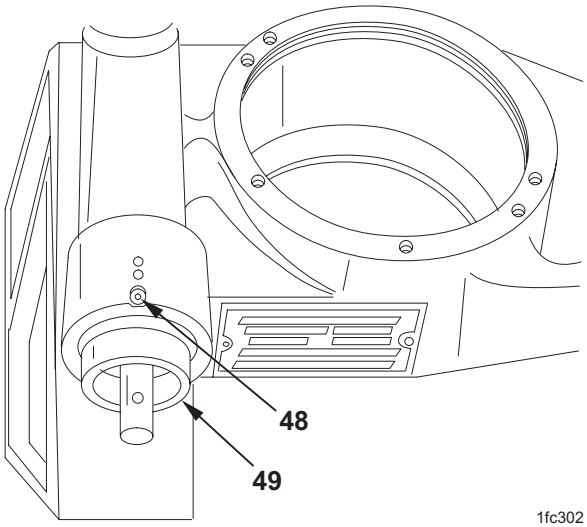



24. Drive out headless straight pin (42).
25. Remove knob (43).
26. Remove and discard lock wire (44).



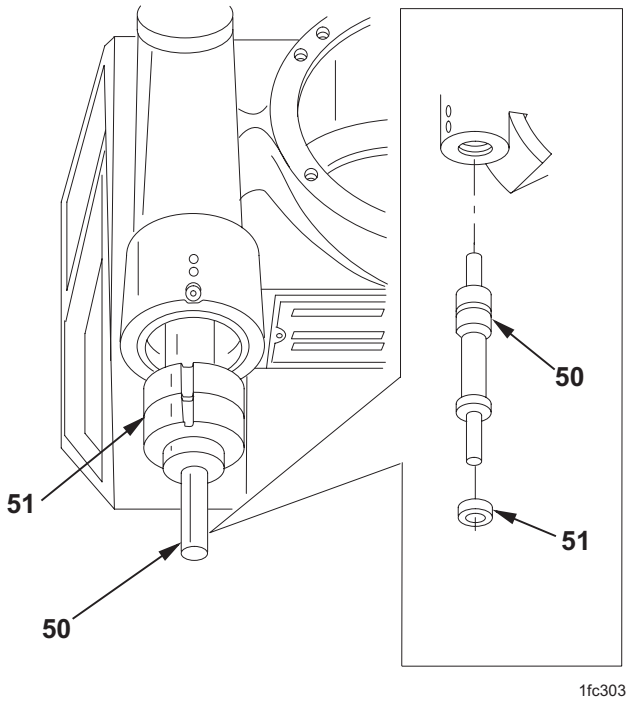

27. Remove flat washer (45), mechanical felt (46), and flat washer (47).

**DISASSEMBLY - Continued**




28. Loosen setscrew (48).

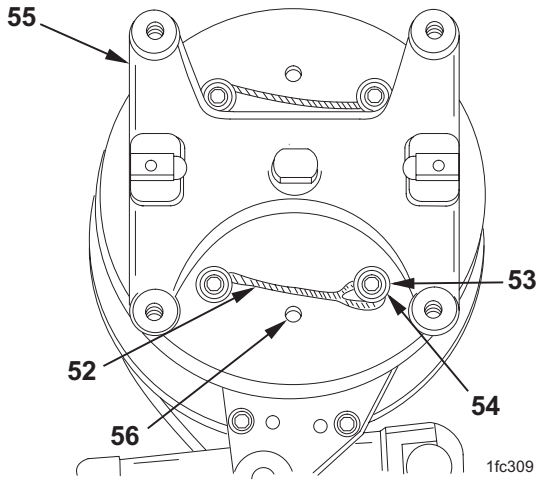
29. Remove externally threaded ring (49).




30. Partially remove worm shaft assembly (50).

31. Remove plain bearing (51).

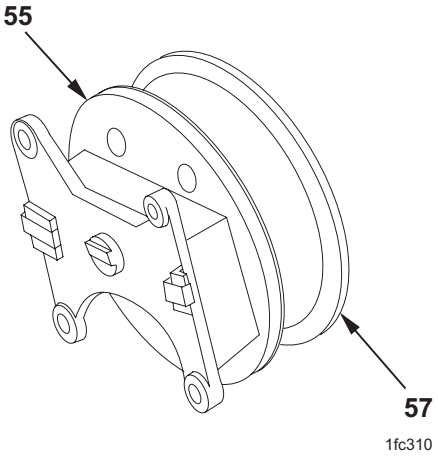
32. Remove worm shaft assembly (50).




33. Remove and discard lock wire (52).

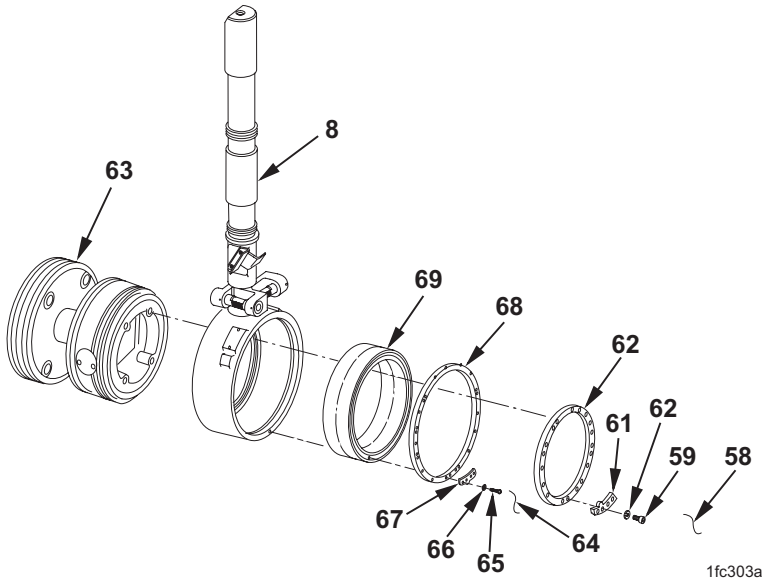
34. Remove four socket capscrews (53) and four lockwashers (54). Discard lockwashers.

35. Lift mounting adapter (55) clear of straight pins (56), and remove.




36. Remove plain encased seal (57) from mounting adapter (55).

**DISASSEMBLY - Continued**




37. Remove and discard lock wire (58).

38. Remove two socket head capscrews (59), two lockwashers (60), and locking dog (61). Discard lockwashers.

39. Remove inner round plain nut (62).

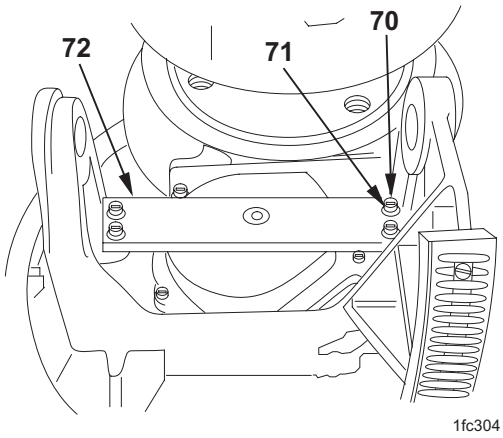
40. Remove bearing housing assembly (8) from arm assembly (63).

41. Remove and discard lock wire (64).

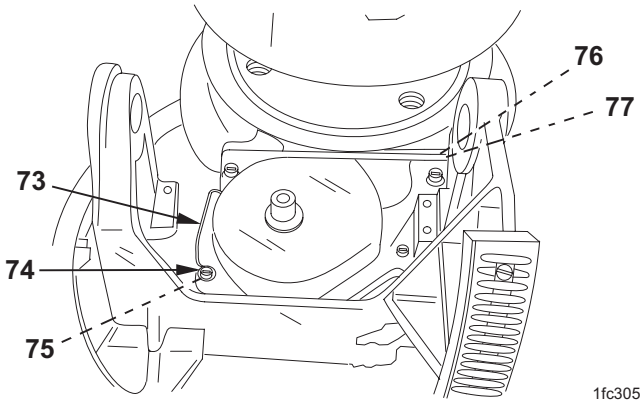
42. Remove two socket head capscrews (65), two lockwashers (66), and locking dog (67). Discard lockwashers.

43. Remove outer externally threaded ring (68).

44. Remove duplex ball bearing (69) from bearing housing assembly (8).

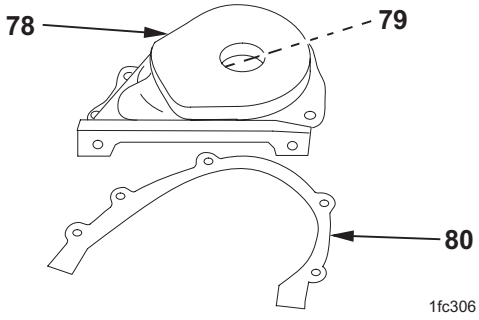



45. Remove four shoulder screws (70), four lockwashers (71, and retaining plate (72). Discard lockwashers.



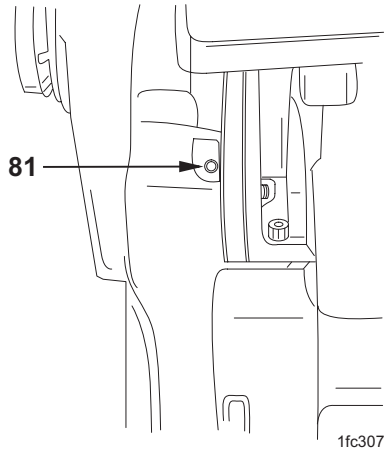

46. Remove and discard lock wire (73).

47. Remove five socket head capscrews (74), five lockwashers (75), two socket capscrews (76), and two lockwashers (77). Discard lockwashers.

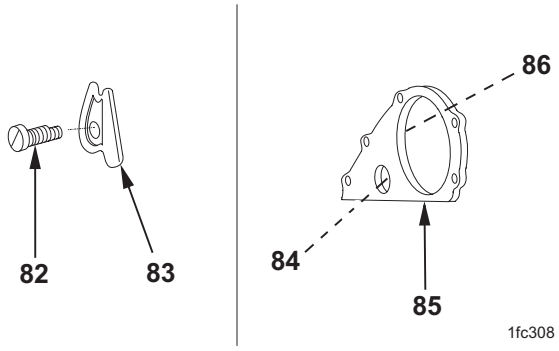



48. Remove access cover (78), O-ring (79), and gasket (80). Discard O-ring and gasket.

**DISASSEMBLY - Continued**

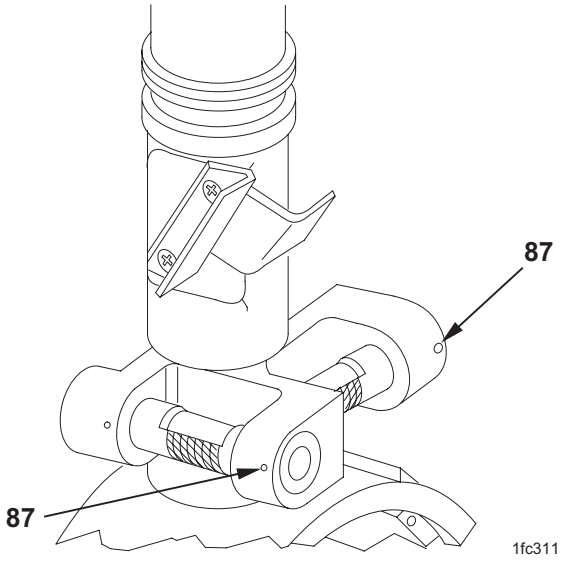



49. Loosen setscrew (81).

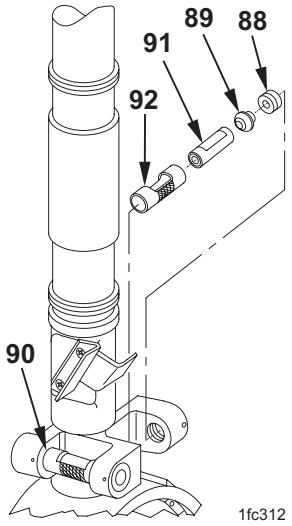



50. Remove close tolerance screw (82) and pawl (83).

51. Remove O-ring (84), retaining plate (85), and O-ring (86). Discard O-rings.




52. Remove sealing compound from two setscrews (87). Loosen two setscrews.




53. Remove two externally threaded rings (88), two eccentrics (89), cross level vial (90), elevation level vial (91), and two level covers (92).

**CLEANING**

WARNING

Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.

Clean all parts with cleaning compound (item 12, WP 0152 00). Wipe off excess cleaning compound with a clean wiping rag (item 18, WP 0152 00).

**REPAIR OR REPLACEMENT**

1. Replace fire control level assembly if any threads are stripped or vial holder is damaged.

2. Fire control level may be replaced if it is cracked but still illuminated. Dispose of broken fire control level in accordance with RSO instructions. If fire control level is cracked and not illuminated, notify RSO. Perform wipe test under RSO supervision. Remove, bag, and secure assembly under RSO direction and await wipe test results. If contaminated, dispose of assembly per RSO instructions. If assembly is not contaminated, replace fire control level. Dispose of replaced fire control level per RSO instructions.

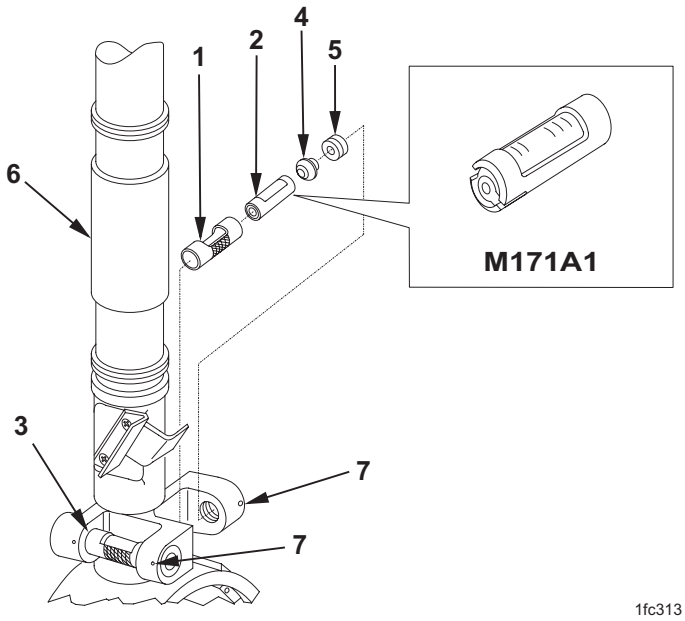
3. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0118 00, WP 0119 00, WP 0120 00, WP 0124 00, and WP 0126 00.

**ASSEMBLY**

## NOTE

Apply light coat of grease (item 15, WP 0152 00) to all machined surfaces.

Apply light coat of grease (item 16, WP 0152 00) to all O-rings.




## CAUTION

To prevent equipment damage of M171A1 mount, ensure that elevation level vial and cross level vial are positioned correctly. Visually check for special slot in elevation level vial.

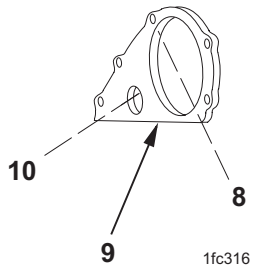
1. Install two level covers (1), elevation level vial (2), cross level vial (3), two eccentrics (4), and two externally threaded rings (5) in bearing housing assembly (6).

## WARNING

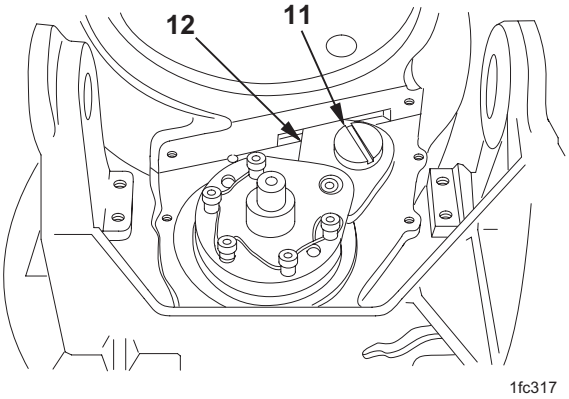
Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

2. Apply sealing compound (item 13, WP 0152 00) to threads of two setscrews (7). Wipe off excess sealing compound with a clean wiping rag (item 18, WP 0152 00) and tighten setscrews.

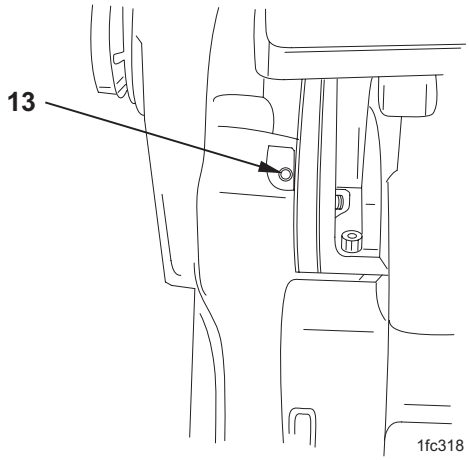
3. Cover two setscrews (7) with sealing compound (item 13, WP 0152 00).




4. Install new O-ring (8) (item 12, WP 0119 00), retaining plate (9), and new O-ring (10) (item 10, WP 0119 00).

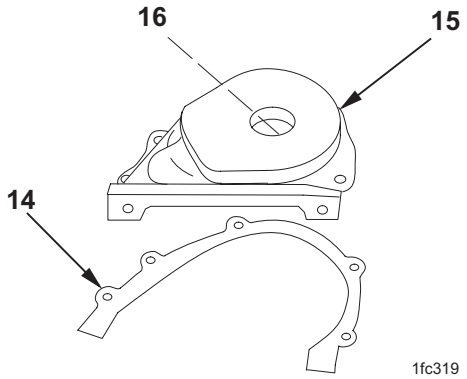



5. Apply sealing compound (item 13, WP 0152 00) to threads of close tolerance screw (11). Wipe off excess sealing compound with a clean wiping rag (item 18, WP 0152 00). Install pawl (12) and close tolerance screw.

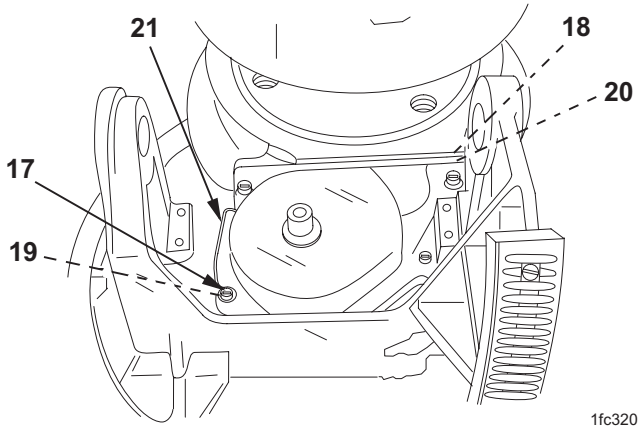



6. Apply sealing compound (item 13, WP 0152 00) to setscrew (13). Wipe off excess sealing compound with a clean wiping rag (item 18, WP 0152 00). Tighten setscrew.

**ASSEMBLY - Continued**



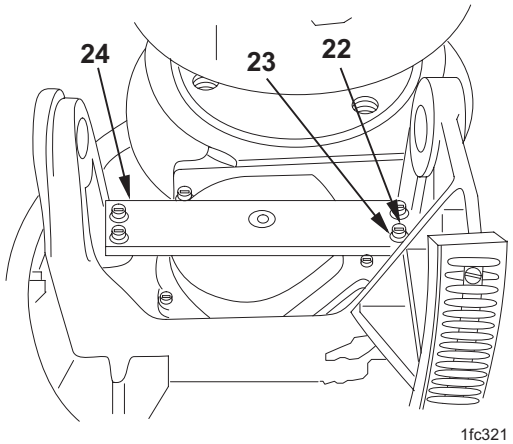

7. Install new gasket (14) (item 9, WP 0119 00) and access cover (15) with new O-ring (16) (item 13, WP 0119 00).




8. Apply sealing compound (item 13, WP 0152 00) to threads of five socket capscrews (17) and two socket capscrews (18).

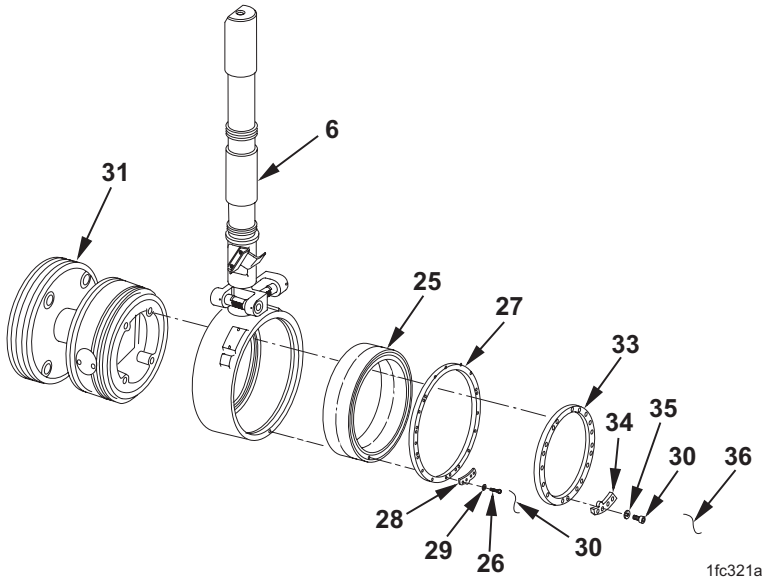
9. Install five new lockwashers (19) (item 5, WP 0119 00), five socket capscrews (17), two new lockwashers (20) (item 7, WP 0119 00), and two socket capscrews (18).

10. Install new lock wire (21) (item 21, WP 0152 00).



11. Apply sealing compound (item 13, WP 0152 00) to threads of four shoulder screws (22). Wipe off excess sealing compound with a clean wiping rag (item 18, WP 0152 00).

12. Install four new lockwashers (23) (item 2, WP 0119 00) and four shoulder screws (22) on retaining plate (24) to secure on M171 mount. Tighten shoulder screws.




13. Install duplex ball bearing (25) into bearing housing assembly (6).

14. Apply sealing compound (item 13, WP 0152 00) to threads of two socket head capscrews (26).

15. Align outer externally threaded ring (27) and secure with locking dog (28), two new lockwashers (29) (item 6, WP 0126 00), and two socket head capscrews (26).

16. Install new lock wire (30) (item 21, WP 0152 00).

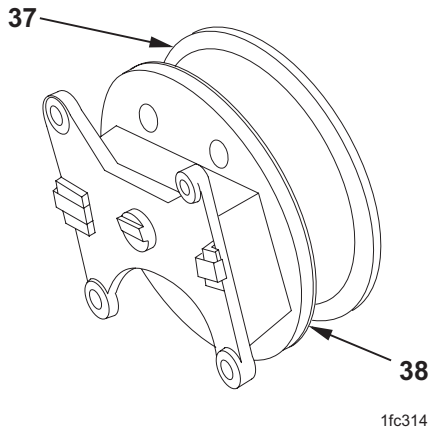
17. Install bearing housing assembly (6) on arm assembly (31).

18. Apply sealing compound (item 13, WP 0152 00) to threads of two socket head capscrews (32).

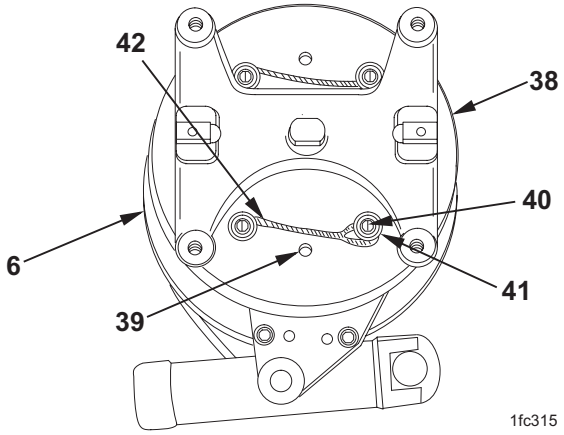
19. Align inner plain round nut (33) and secure with locking dog (34), two new lockwashers (35) (item 7, WP 0119 00), and two socket head capscrews (32).

20. Install new lock wire (36) (item 21, WP 0152 00).

**ASSEMBLY - Continued**



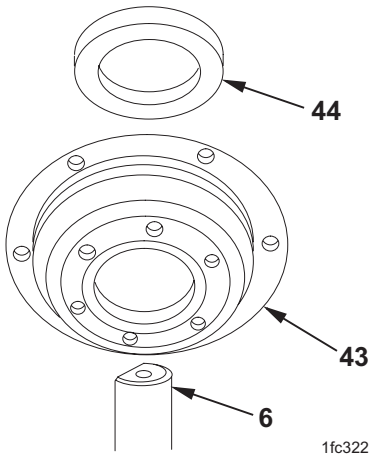

21. Install plain encased seal (37) on mounting adapter (38) and lubricate with grease (item 15, WP 0152 00).



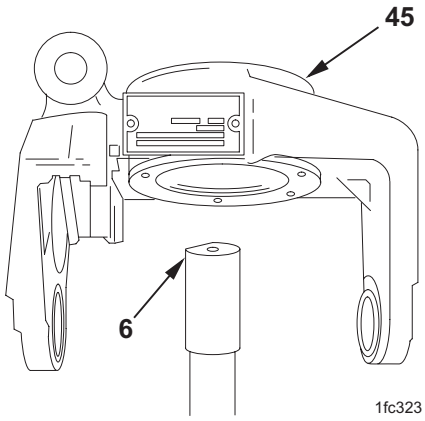

22. Install mounting adapter (38) on bearing housing assembly (6) over straight pins (39).

23. Apply sealing compound (item 13, WP 0152 00) to threads of four socket capscrews (40). Install four new lockwashers (41) (item 2, WP 0124 00) and four socket capscrews. Tighten socket capscrews.

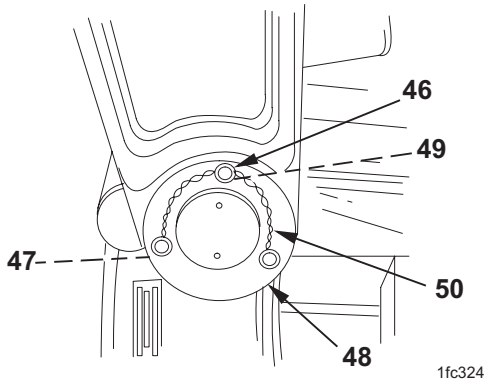
24. Install new lock wire (42) (item 22, WP 0152 00).




25. Install protection bellows (43) and retaining ring (44) on bearing housing assembly (6).




26. Install optical instrument rocker assembly (45) on bearing housing assembly (6).

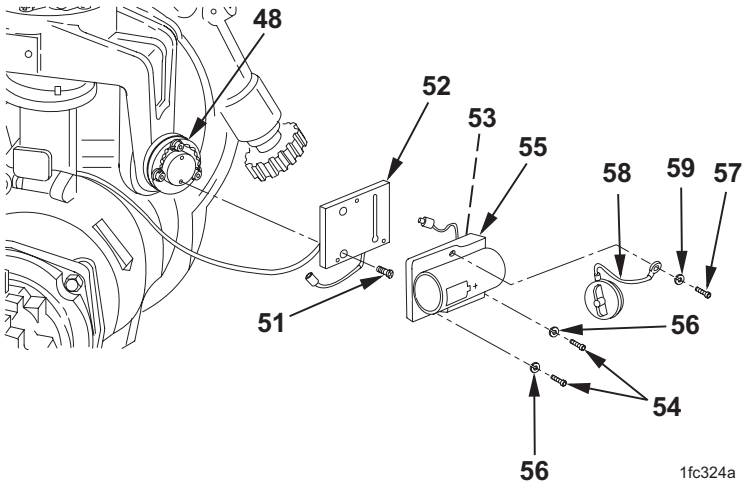



27. Apply sealing compound (item 13, WP 0152 00) to threads of three socket capscrews (46).

28. Install shoulder pin (47), plate spacer (48), three new lockwashers (49) (item 14, WP 0118 00), and three socket capscrews (46).

29. Install new lock wire (50) (item 22, WP 0152 00).

**ASSEMBLY - Continued**



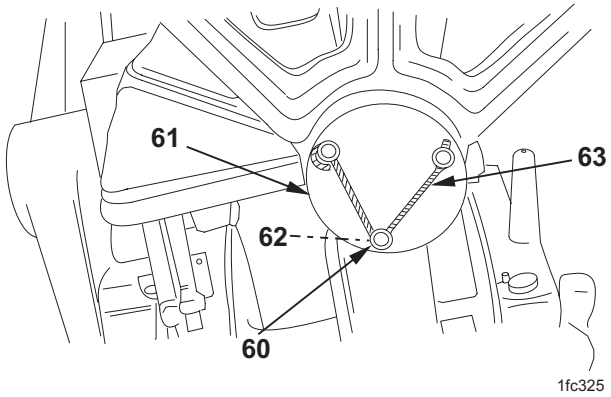

30. Apply sealing compound (item 13, WP 0152 00) to threads of two socket capscrews (51) (M171A1 only).

31. Install plate (52) on plate spacer (48) and secure with two socket capscrews (51) (M171A1 only).

32. Install new gasket (53) (item 25, WP 0118 00) (M171A1 only).

33. Apply sealing compound (item 13, WP 0152 00) to two screws (54) and install battery box cover (55) on plate (52) with two new lockwashers (56) (item 27, WP 0118 00) and two screws (M171A1 only).

34. Apply sealing compound (item 13, WP 0152 00) to screw (57) and install cap and retainer assembly (58) with new lockwasher (59) (item 27, WP 0118 00) and screw (M171A1 only).



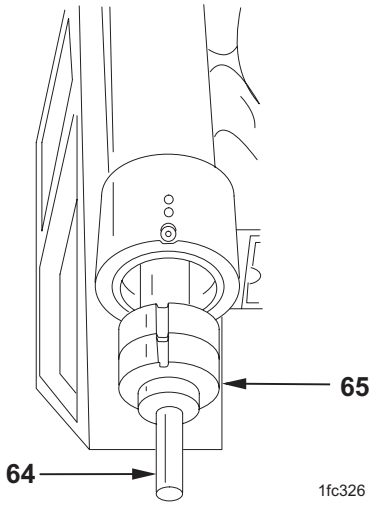

35. Apply sealing compound (item 13, WP 0152 00) to threads of three socket capscrews (60).

36. Install shoulder pin (61), three new lockwashers (62) (item 14, WP 0118 00), and three socket capscrews (60).

37. Install new lock wire (63) (item 22, WP 0152 00).

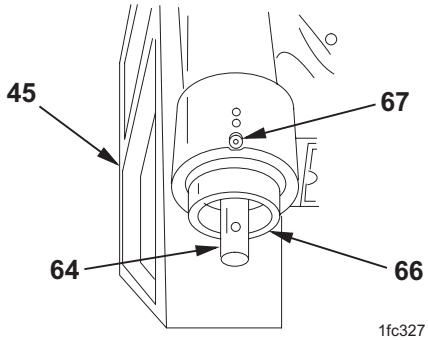
## NOTE

Make sure slot in plain bearing aligns with guide pin in housing assembly.




38. Install worm shaft assembly (64).

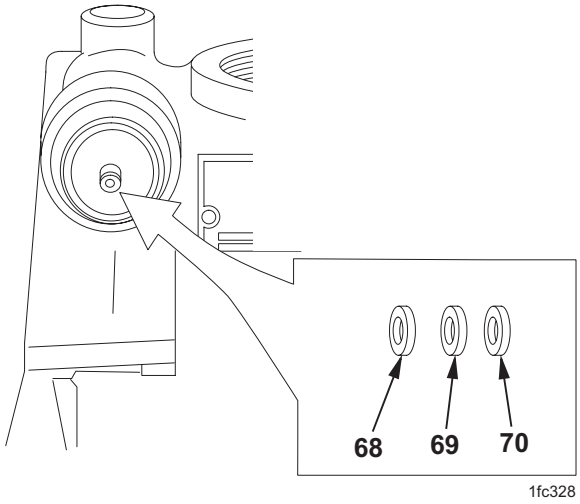
39. Install plain bearing (65) on worm shaft assembly (64).



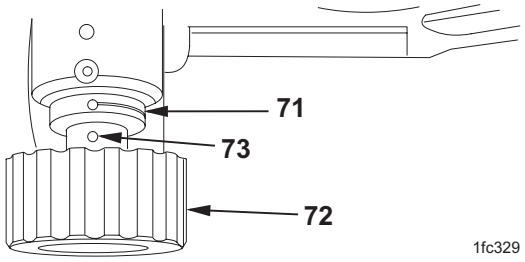

40. Install externally threaded ring (66) in optical instrument rocker assembly (45) and tighten until worm shaft assembly (64) rotates with a drag.

41. Apply sealing compound (item 13, WP 0152 00) on setscrew (67). Wipe off excess sealing compound with a clean wiping rag (item 18, WP 0152 00). Tighten setscrew.

**ASSEMBLY - Continued**




42. Install flat washer (68), mechanical felt (69), and flat washer (70).




43. Install new lock wire (71) (item 21, WP 0152 00).

## NOTE

Perform steps 44 and 45, and continue with step 47, if new worm shaft assembly has been installed. Perform step 46 if previously-installed components are used.

44. Install knob (72) on worm shaft assembly (64) and secure with setscrew, NSN 5305-00-655-9246. Using the pilot hole located on the knob, drill hole through worm shaft assembly.

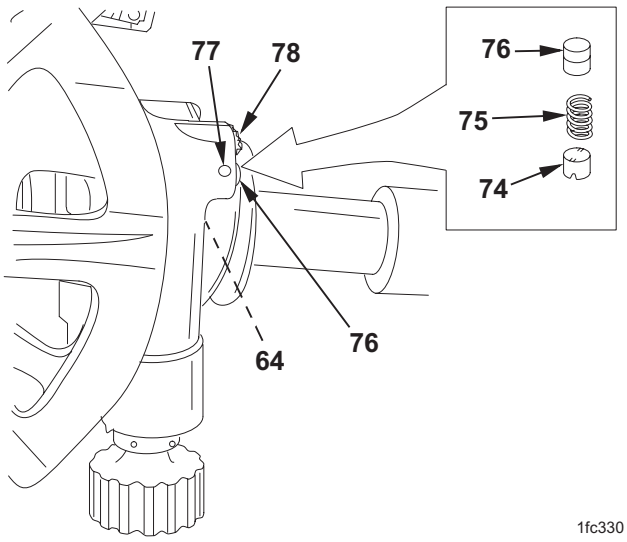
45. Remove setscrew from knob (72).

46. Install knob (72).

## CAUTION

Support knob in V block on solid surface to prevent damage to worm shaft.

47. Drive in headless straight pin (73).

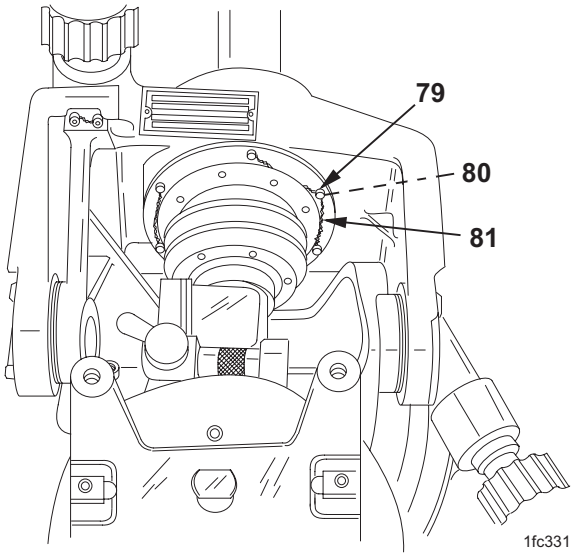



48. Install V bearing (74), helical compression spring (75), and machine thread plug (76).

49. Tighten machine thread plug (76) until V bearing (74) bottoms on worm shaft assembly (64), and then back off 1/4 turn.

50. Apply sealing compound (item 13, WP 0152 00) on setscrew (77). Wipe off excess sealing compound with a clean wiping rag (item 18, WP 0152 00). Tighten setscrew.

51. Install new lock wire (78) (item 22, WP 0152 00) in machine thread plug (76).

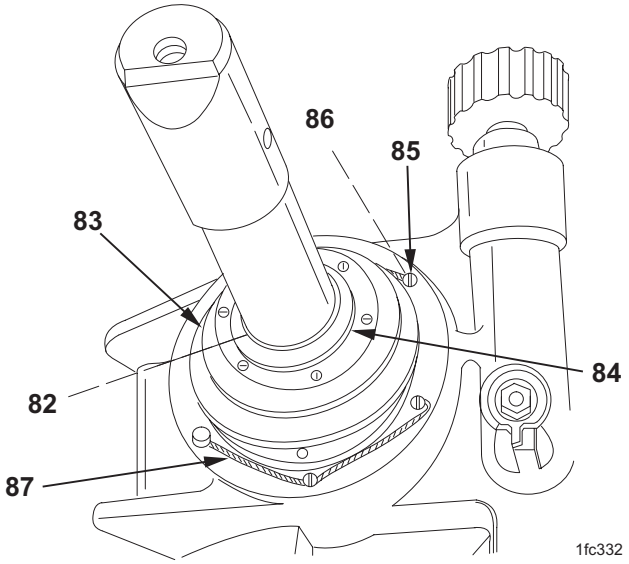



52. Apply sealing compound (item 13, WP 0152 00) to threads of six machine screws (79).

53. Install six new lockwashers (80) (item 10, WP 0118 00) and six machine screws (79).

54. Install new lock wire (81) (item 22, WP 0152 00).

**ASSEMBLY - Continued**

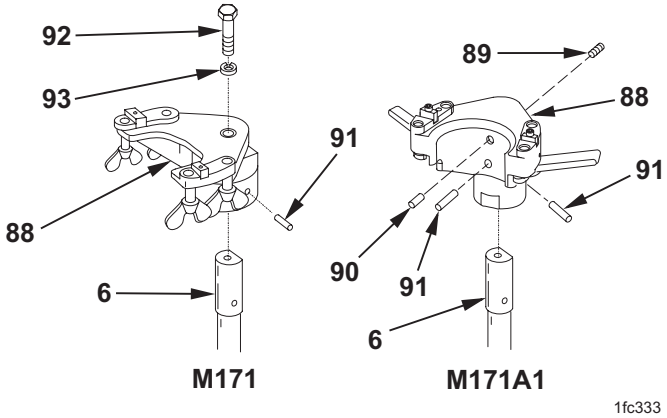



55. Install retaining ring (82), protection bellows (83), and retaining ring (84).

56. Apply sealing compound (item 13, WP 0152 00) to threads of six machine screws (85).

57. Install six new lockwashers (86) (item 10, WP 0118 00) and six machine screws (85).

58. Install new lock wire (87) (item 22, WP 0152 00).




59. Install optical instrument support (88) on bearing housing assembly (6).

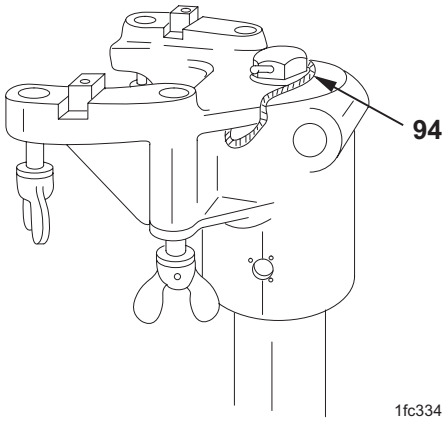
60. Apply sealing compound (item 13, WP 0152 00) to setscrew (89) and install to align optical instrument support (88) (M171A1 only).

61. If removed or missing, install straight pin (90) (M171A1 only).

62. Align plain tapered pin(s) (91) on pin holes and drive in.

63. Apply sealing compound (item 13, WP 0152 00) to threads of hexagon capscrew (92) (M171 only).

64. Install new lockwasher (93) (item 5, WP 0118 00) and hexagon capscrew (92) and tighten (M171 only).




65. Install new lock wire (94) (item 22, WP 0152 00) (M171 only).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

**OPTICAL INSTRUMENT SUPPORT MAINTENANCE**
**REMOVAL, REPAIR OR REPLACEMENT, INSTALLATION**

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Lockwasher (item 5, WP 0118 00)
Lock wire (item 22, WP 0152 00)
Sealing compound (item 13, WP 0152 00)

**References**
WP 0121 00

**Equipment Conditions**
M171/M171A1 mount removed from M198/M777 howitzer (TM 9-1025-211-34/TM 9-1025-215-25&P

**REMOVAL**

WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

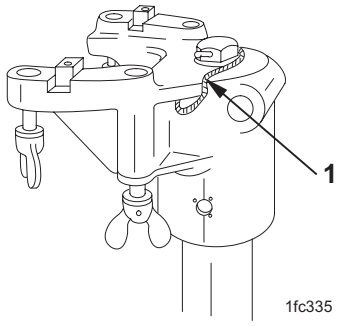
When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

WARNING

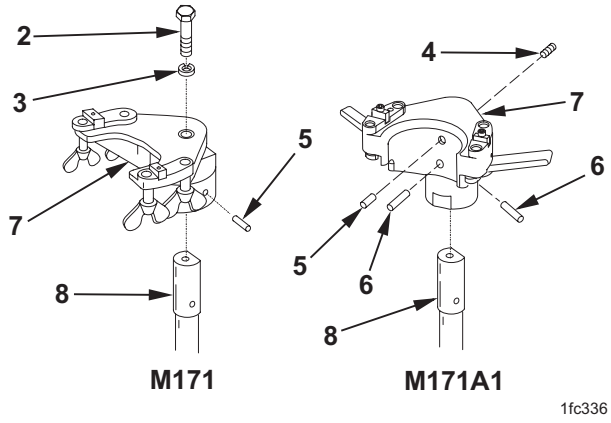
   

When maintaining battery illuminated fire control equipment follow battery warnings in warning summary.

**REMOVAL - Continued**




1. Remove and discard lock wire (1) (M171 only).

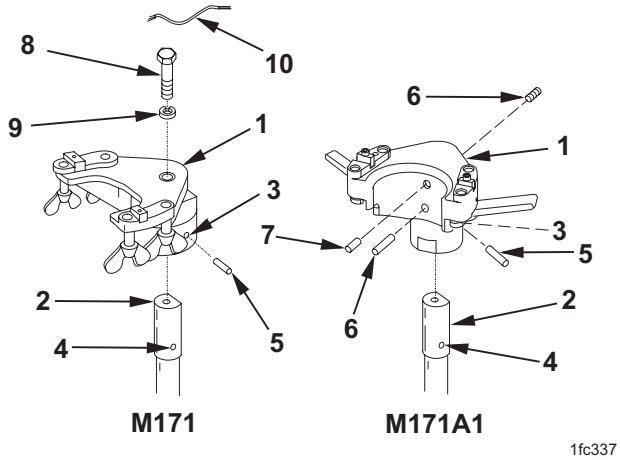



2. Remove hexagon capscrew (2) and lockwasher (3). Discard lockwasher (M171 only).
3. Remove setscrew (4) (M171A1 only).
4. If damaged, remove straight pin (5) (M171A1 only).
5. Drive out plain tapered pin (6) (M171 only).
6. Drive out two plain tapered pins (6) (M171A1 only).
7. Remove optical instrument support (7) from bearing housing assembly (8).

**REPAIR OR REPLACEMENT**

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0121 00.

**INSTALLATION**




1. Place optical instrument support (1) on bearing housing assembly (2).
2. Align hole (3) in optical instrument support (1) with hole (4) in bearing housing assembly (2).
3. Install plain tapered pin (5) (M171 only).
4. Install two plain tapered pins (5) (M171A1 only).

**WARNING**

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

5. Apply sealing compound (item 13, WP 0152 00) to threads of setscrew (6) (M171A1 only).
6. Install setscrew (6) to align optical instrument support (1) (M171A1 only).
7. If removed or missing, install straight pin (7) (M171A1 only).
8. Apply sealing compound (item 13, WP 0152 00) to threads of hexagon capscrew (8) (M171 only).
9. Install new lockwasher (9) (item 5, WP 0118 00) and hexagon capscrew (8) and tighten (M171 only).
10. Install new lock wire (10) (item 22, WP 0152 00) (M171 only).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

# OPTICAL INSTRUMENT ROCKER ASSEMBLY MAINTENANCE DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)
Torque adapter (item 19, WP 0149 00)

**Materials/Parts**
Grease (item 15, WP 0152 00)
Sealing compound (item 13, WP 0152 00)
Solvent cleaning compound (item 12, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
WP 0122 00

**DISASSEMBLY**

WARNING

**RADIATION**

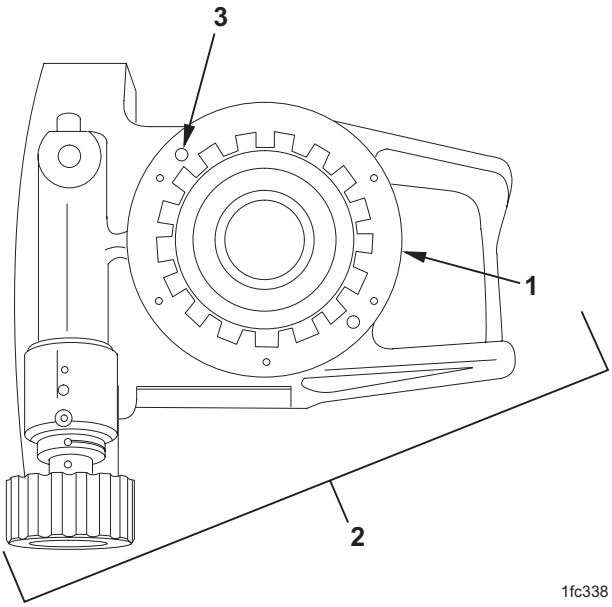
**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

WARNING

When maintaining battery illuminated fire control equipment follow battery warnings in warning summary.

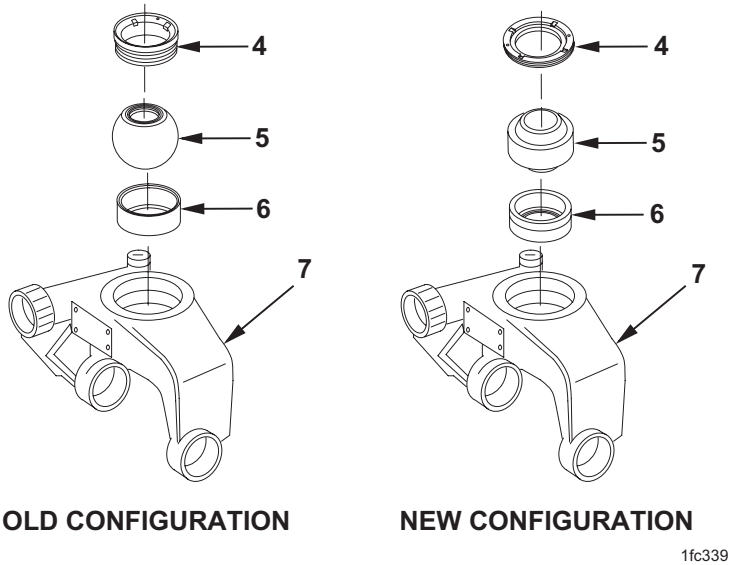
**DISASSEMBLY - Continued**




## NOTE

Scribe a line across key washer (1) and optical instrument rocker assembly (2) for reference during installation.

1. Remove two machine screws (3) and key washer (1) from optical instrument rocker assembly (2).




2. Remove bearing seat (4), plain bearing (5), and bearing seat (6) from optical instrument rocker (7).

## NOTE

Replace optical instrument rocker if it has been damaged to the extent that it can no longer perform its intended function.

**CLEANING**

WARNING

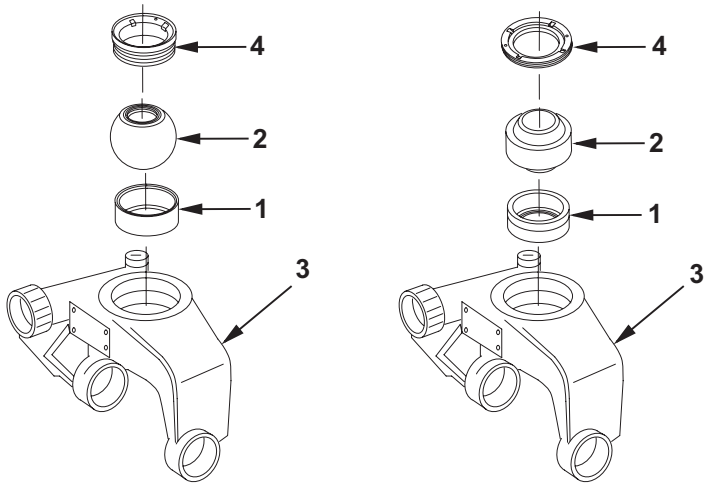
Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.

Clean all parts with cleaning compound (item 12, WP 0152 00).

**REPAIR OR REPLACEMENT**

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0122 00.

**ASSEMBLY**




**OLD CONFIGURATION** **NEW CONFIGURATION**

1fc340

NOTE

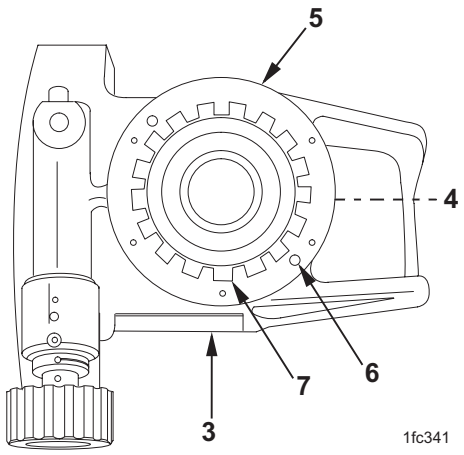
The old configuration bearing parts can be cleaned and repacked but, if replacement is necessary, bearing parts will be replaced with new configuration items.

1. Apply light coat of grease (item 15, WP 0152 00) to bearing seat (1) and plain bearing (2). Install bearing seat and plain bearing in optical instrument rocker (3).

2. Apply light coat of grease (item 15, WP 0152 00) to bearing seat (4).

3. Install bearing seat (4) and tighten. Torque to 16 to 18 in.-lb (1.80 to 2.03 N-m) for M171 mount or 150 in.-lb (17.06 N-m) for M171A1 mount using torque adapter.

**ASSEMBLY - Continued**




4. Position key washer (5) on optical instrument rocker (3).

5. Align reference line on key washer (5) with reference line on optical instrument rocker assembly (3).

WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

6. Apply sealing compound (item 13, WP 0152 00) to two machine screws (6). Wipe off excess sealing compound with a clean wiping rag. Install machine screws.

7. Bend tang (7) to fit notch in bearing seat (4).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

**OPTICAL INSTRUMENT ROCKER MAINTENANCE**
**DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY**

**INITIAL SETUP:**

**Tools and Special Tools**
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**References**
WP 0122 00
WP 0123 00

**Equipment Conditions**
M171/M171A1 mount removed from M198/M777 howitzer (TM 9-1025-211-34/TM 9-1025-215-25&P)
Cross level knob and worm shaft assembly removed (WP 0065 00)

**DISASSEMBLY**

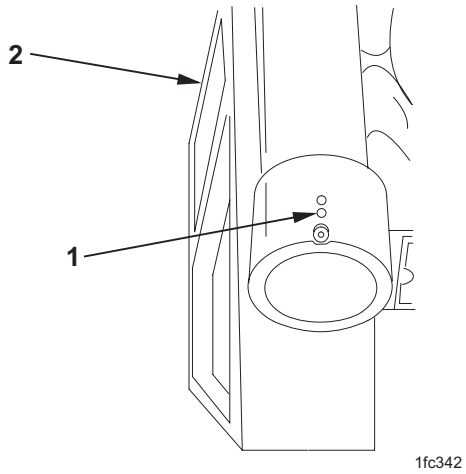
WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

**DISASSEMBLY - Continued**




Remove two headless straight pins (1) from rocker (2).

NOTE

Replace entire optical instrument rocker if damaged, causing the cross level control to be erratic or rough during movement.

**REPAIR OR REPLACEMENT**

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0122 00 and WP 0123 00.

**ASSEMBLY**

Install two headless straight pins (1) in rocker (2).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

# WORM SHAFT ASSEMBLY MAINTENANCE
# REMOVAL, CLEANING, REPAIR OR REPLACEMENT, INSTALLATION

## INITIAL SETUP:

### Tools and Special Tools
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)
Torque wrench adapter (item 18, WP 0149 00)

### Materials/Parts
Grease (item 15, WP 0152 00)
Lock wire (item 21, WP 0152 00)
Sealing compound (item 13, WP 0152 00)
Solvent cleaning compound (item 12, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

### References
WP 0123 00

### Equipment Conditions
M171/M171A1 mount removed from M198/M777 howitzer (TM 9-1025-211-34/TM 9-1025-215-25&P)

## REMOVAL

**WARNING**

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

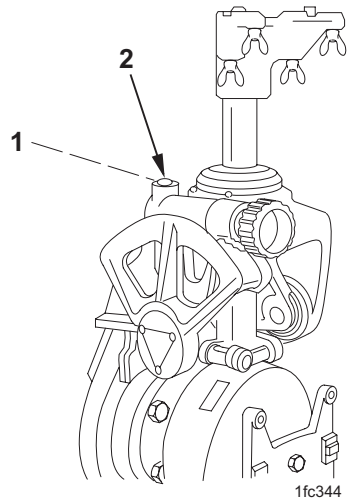
**WARNING**

When maintaining battery illuminated fire control equipment follow battery warnings in warning summary.

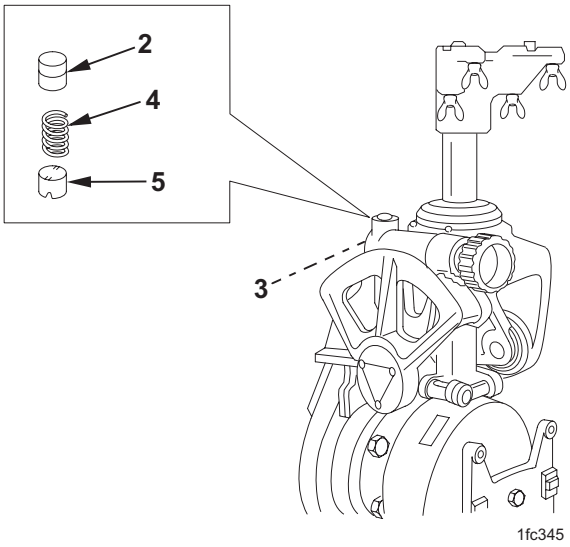
**NOTE**

The following procedures are applicable to both the elevating and cross level worm shafts.

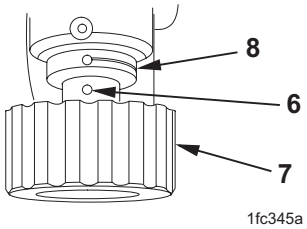
**REMOVAL - Continued**




1. Remove and discard lock wire (1) from machine thread plug (2).




2. Loosen setscrew (3).
3. Remove machine thread plug (2), helical compression spring (4), and V bearing (5).



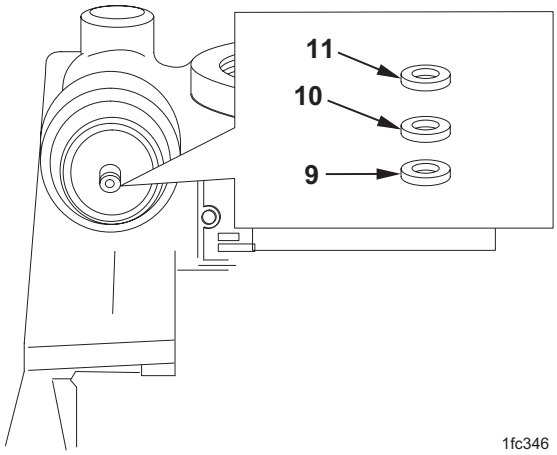

## CAUTION

Support cross level knob in V block on solid surface to prevent damage to worm shaft.

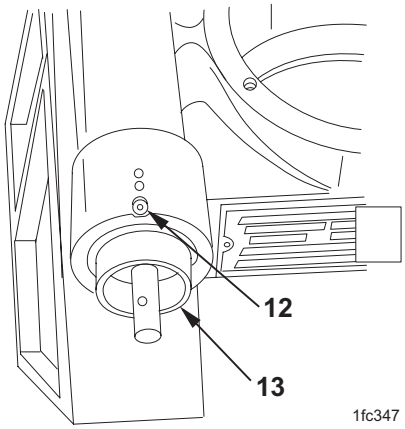
4. Drive headless straight pin (6) out.

5. Remove knob (7).

6. Remove and discard lock wire (8).



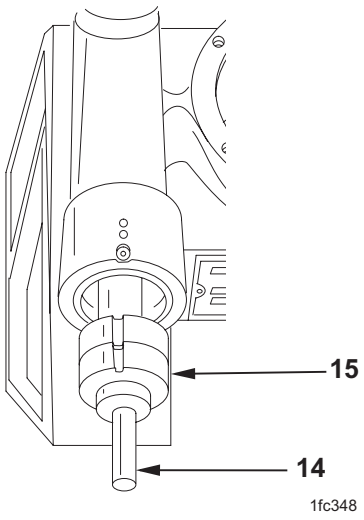

7. Remove flat washer (9), mechanical felt (10), and flat washer (11).




8. Loosen setscrew (12).

9. Unscrew and remove externally threaded ring (13).

**REMOVAL - Continued**




10. Partially remove worm shaft assembly (14).
11. Remove plain bearing (15).
12. Remove worm shaft assembly (14).

NOTE

Replace entire worm shaft assembly if knob has excessive backlash or rough movement caused by damaged worm shaft assembly.

**CLEANING**

WARNING

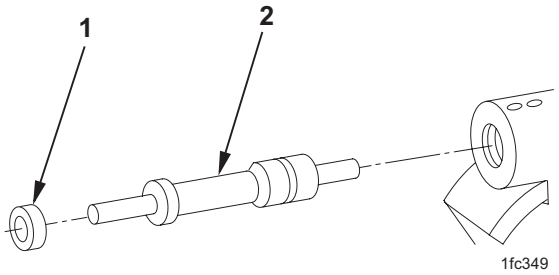
Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.

Clean all parts with cleaning compound (item 12, WP 0152 00).

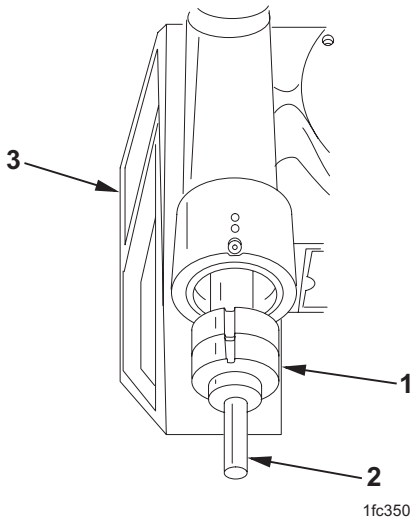
**REPAIR OR REPLACEMENT**

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0123 00.

**INSTALLATION**

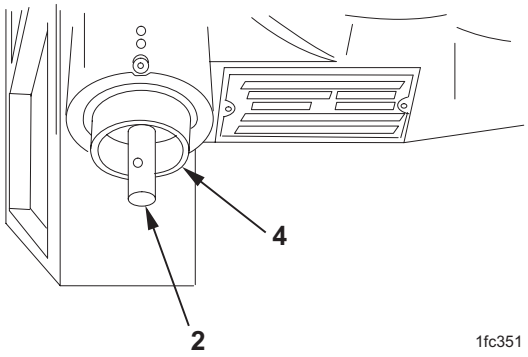



1. Apply light coat of grease (item 15, WP 0152 00) on plain bearing (1) and install on worm shaft assembly (2).



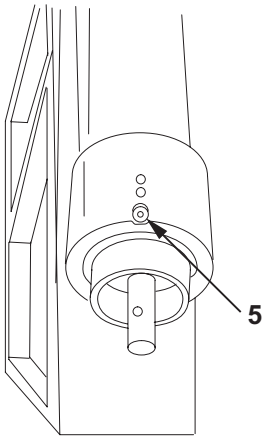

2. Apply light coat of grease (item 15, WP 0152 00) on worm shaft assembly (2) and install in optical instrument rocker assembly (3).

3. Align slot in plain bearing (1) with guide pin in optical instrument rocker assembly (3).

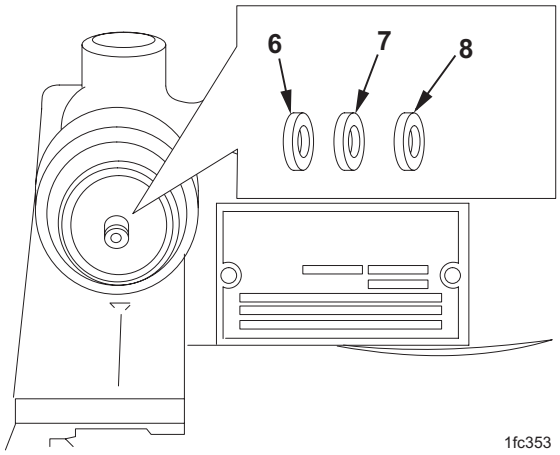



4. Install externally threaded ring (4) and tighten until worm shaft assembly (2) rotates with a drag.

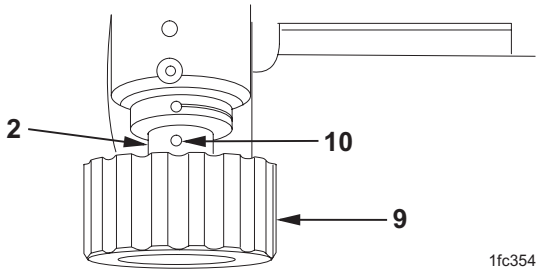
**INSTALLATION - Continued**




5. Tighten setscrew (5).




6. Install flat washer (6), mechanical felt (7), and flat washer (8) in order.




## NOTE

Perform steps 7 and 8, and continue with step 10, if new worm shaft assembly has been installed. Perform step 9 if previously-installed components are used.

7. Install knob (9) on worm shaft assembly (2) and secure with setscrew, NSN 5305-00-655-9246. Using the pilot hole located on the knob, drill hole through worm shaft assembly.

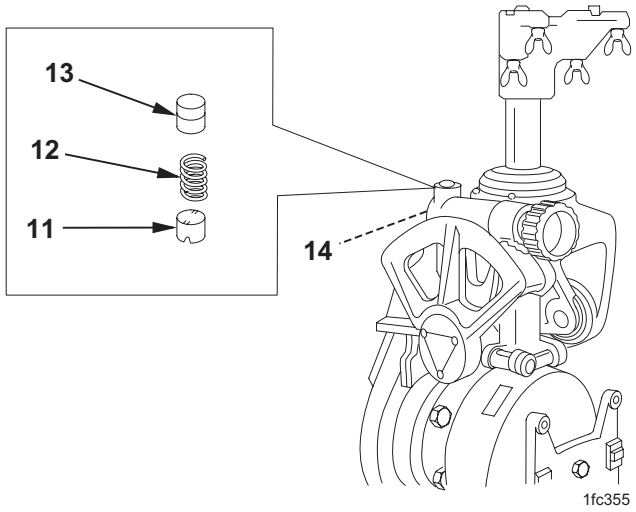
8. Remove setscrew from knob (9).

9. Install knob (9).

## CAUTION

Support knob in V block on solid surface to prevent damage to worm shaft.

10. Install headless straight pin (10).



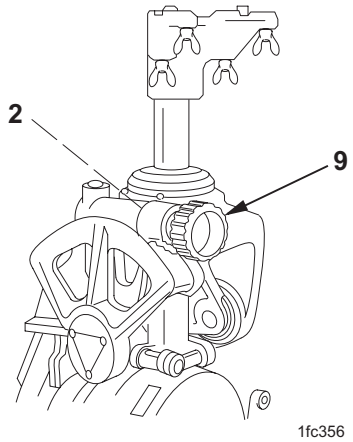

## NOTE

After replacement of V bearing (11) and helical compression spring (12), screw machine thread plug (13) until V bearing bottoms on worm shaft assembly, and then back off 1/4 turn.

11. Apply light coat of grease (item 15, WP 0152 00) on V bearing (11) and install.

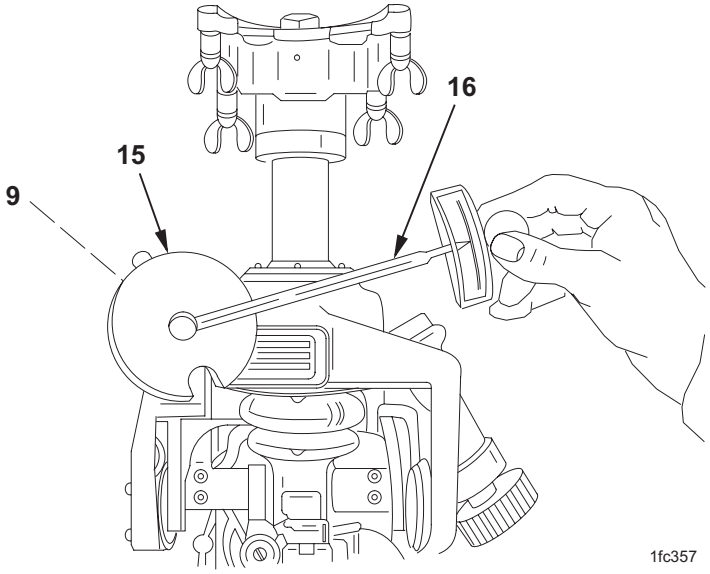
12. Install helical compression spring (12) and machine thread plug (13).

13. Tighten setscrew (14).



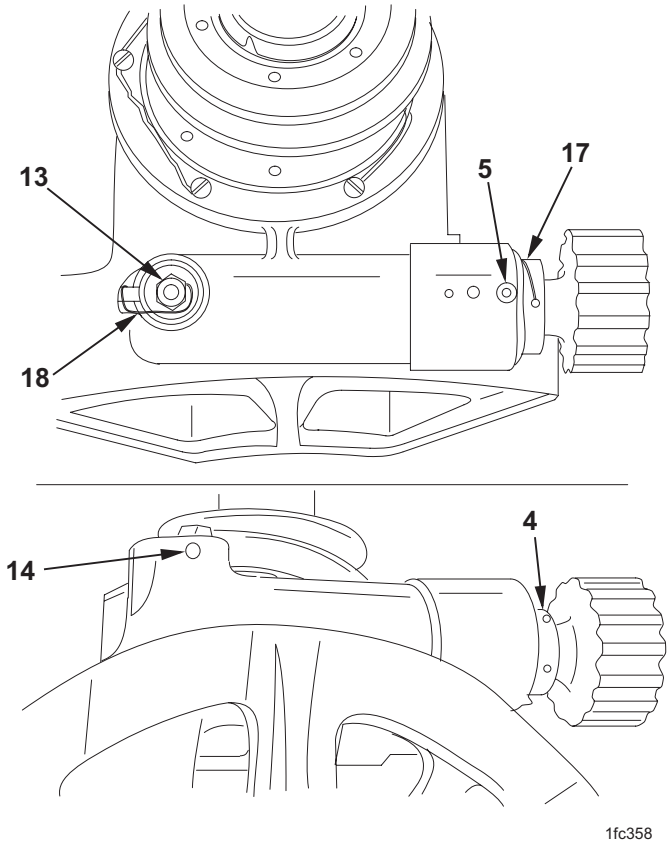

14. Rotate knob (9) and worm shaft assembly (2) through full travel of gear. Check for binding.

**INSTALLATION - Continued**




15. Install torque wrench adapter (15) on knob (9).

16. Attach torque wrench (16) to torque wrench adapter (15).




17. Measure torque. If torque does not read between 4 in.-lb (0.45 N-m) and 12 in.-lb (1.35 N-m), loosen two setscrews (14 and 5). Tighten or loosen externally threaded ring (4) or machine thread plug (13).

WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

18. Apply sealing compound (item 13, WP 0152 00) to two setscrews (14 and 5). Wipe off excess sealing compound with a clean wiping rag (item 18, WP 0152 00). Tighten setscrews.

19. Install new lock wires (17 and 18) (item 21, WP 0152 00).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

**HOUSING ASSEMBLY MAINTENANCE**
**DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY**

**INITIAL SETUP:**

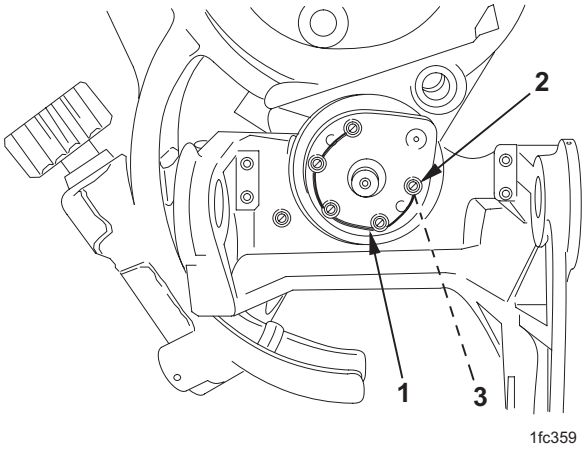
**Tools and Special Tools**
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)
Torque wrench adapter (item 18, WP 0149 00)

**Materials/Parts**
Grease (item 15, WP 0152 00)
Grease (item 16, WP 0152 00)
Lockwasher (2) (item 21, WP 0123 00)
Lockwasher (5) (item 24, WP 0123 00)
Lockwasher (8) (item 27, WP 0123 00)
Lock wire (item 21, WP 0152 00)
Lock wire (item 22, WP 0152 00)
Preformed mechanical felt (item 14, WP 0123 00)
Preformed mechanical felt (4) (item 29, WP 0123 00)
Sealing compound (item 13, WP 0152 00)
Solvent cleaning compound (item 12, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

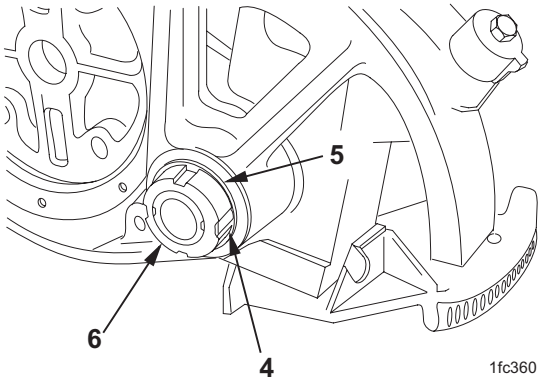
**References**
WP 0065 00
WP 0123 00

**Equipment Conditions**
M171/M171A1 mount removed from M198/M777 howitzer (TM 9-1025-211-34/TM 9-1025-215-25&P)
Optical instrument support removed (WP 0065 00)
Optical instrument rocker assembly removed (WP 0065 00)
Retaining plates, access cover, gasket, and pawl removed (WP 0065 00)

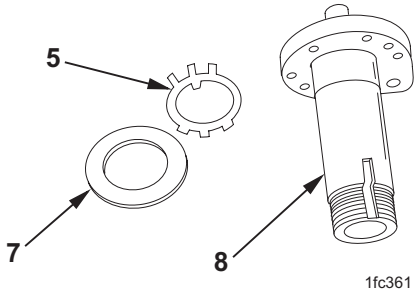
**DISASSEMBLY**



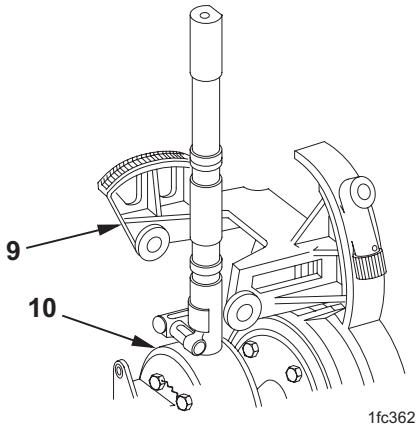

1. Remove and discard lock wire (1).
2. Remove five socket head capscrews (2) and five lockwashers (3). Discard lockwashers.



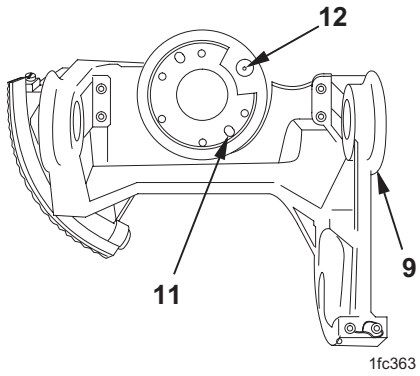

3. Bend tang (4) of key washer (5) from groove of round plain nut (6).
4. Unscrew and remove round plain nut (6).



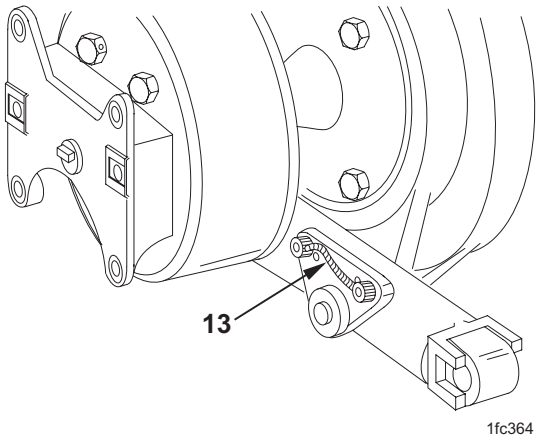

5. Remove key washer (5) and flat washer (7).
6. Drive out camshaft (8) and remove.




7. Remove sector gear cluster (9) from worm wheel housing (10).

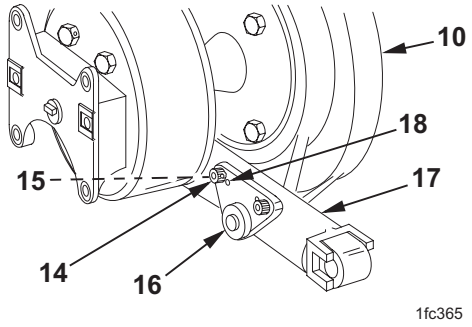



8. Remove two headless straight pins (11) and headless straight pin (12) from sector gear cluster (9).




9. Remove and discard lock wire (13).

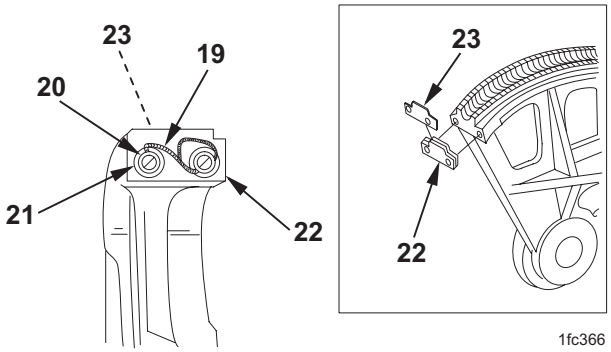
**DISASSEMBLY - Continued**




10. Remove two socket capscrews (14) and two lock washers (15) from worm wheel housing (10). Discard lockwashers.

11. Remove rotating eye bracket (16) and plunger assembly (17).

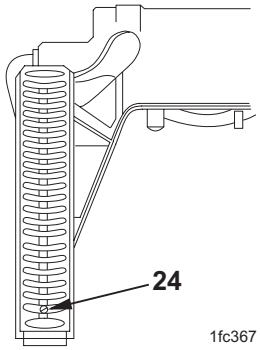
12. Remove two headless straight pins (18).



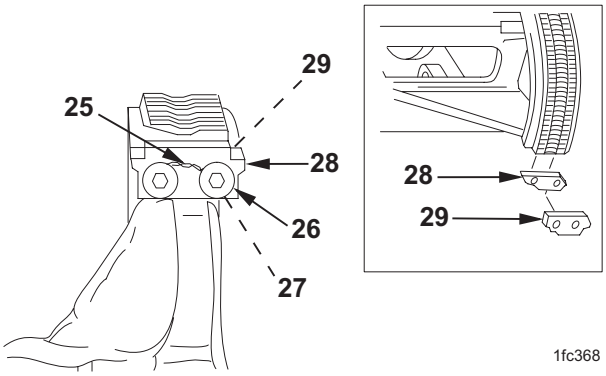

13. Remove and discard two lock wires (19).

14. Remove four socket head capscrews (20) and four lockwashers (21). Discard lockwashers.

15. Remove two mechanical felt holders (22) and two preformed mechanical felts (23). Discard preformed mechanical felts.



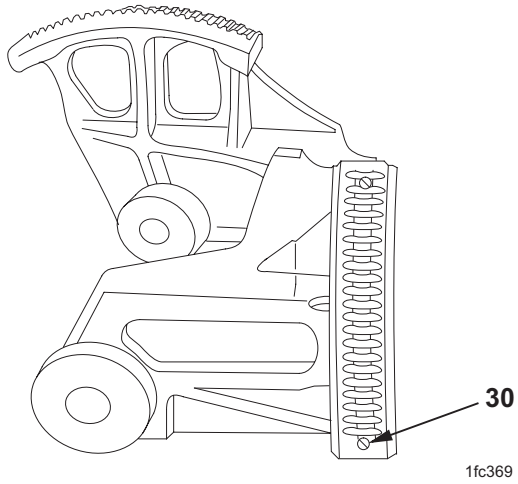

16. Remove two machine screws (24) only if damaged or loose.




17. Remove and discard two lock wires (25).

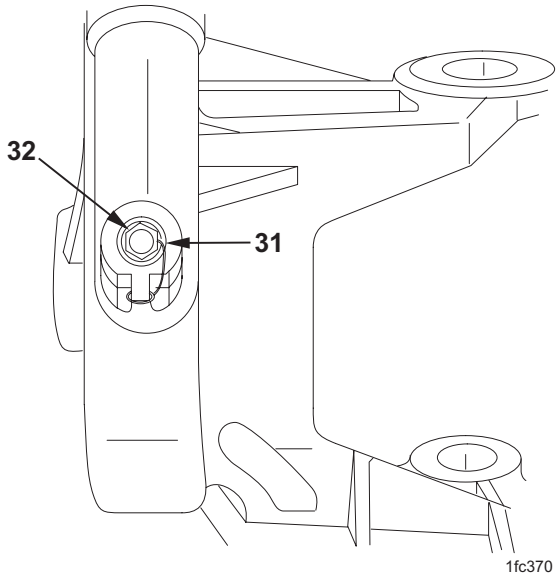
18. Remove four socket head capscrews (26) and four lockwashers (27). Discard lockwashers.

19. Remove two mechanical felt holders (28) and two preformed mechanical felts (29). Discard preformed mechanical felts.

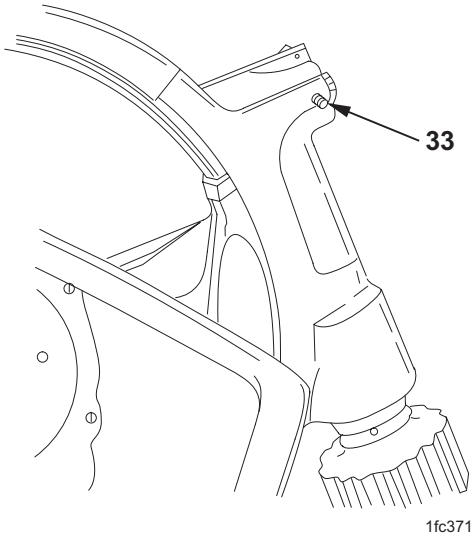



20. Remove two machine screws (30) only if damaged or loose.

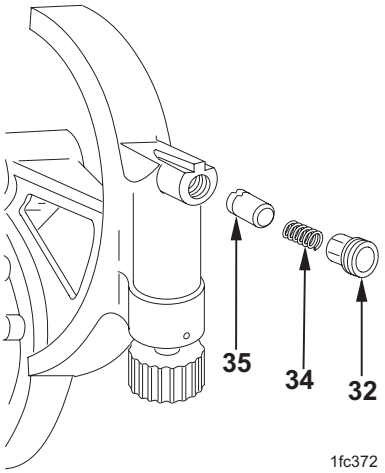
**DISASSEMBLY - Continued**



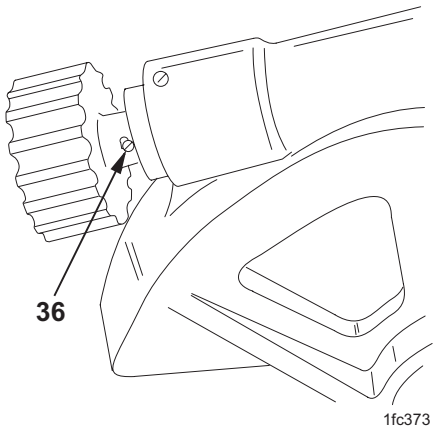

21. Remove and discard lock wire (31) from machine thread plug (32).




22. Loosen setscrew (33).



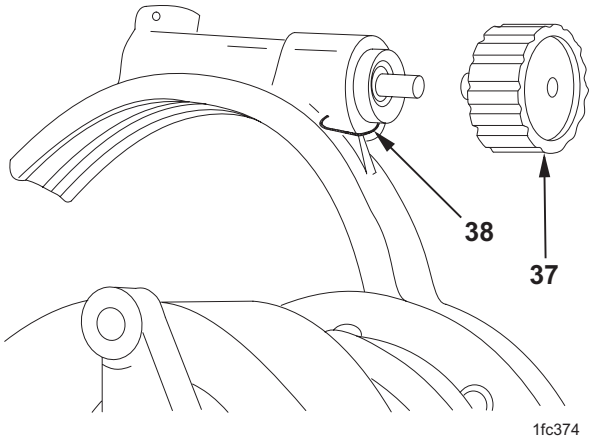

23. Remove machine thread plug (32), compression helical spring (34), and V bearing (35).




## CAUTION

Support elevation knob in V block on solid surface to prevent damage to worm shaft.

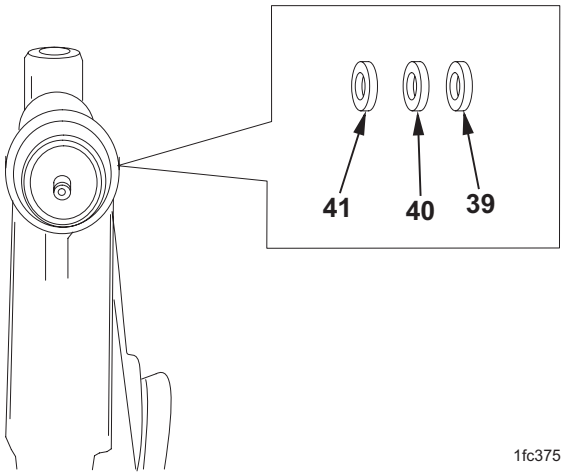
24. Drive headless straight pin (36) out.



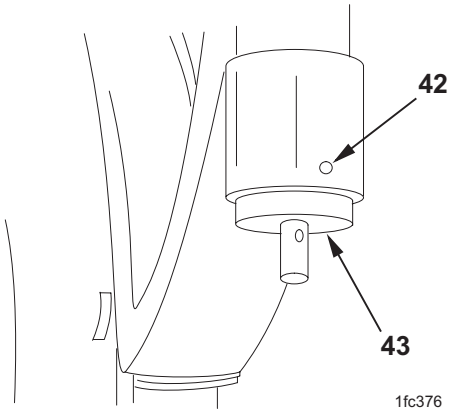

25. Remove knob (37).

26. Remove and discard lock wire (38).

**DISASSEMBLY - Continued**

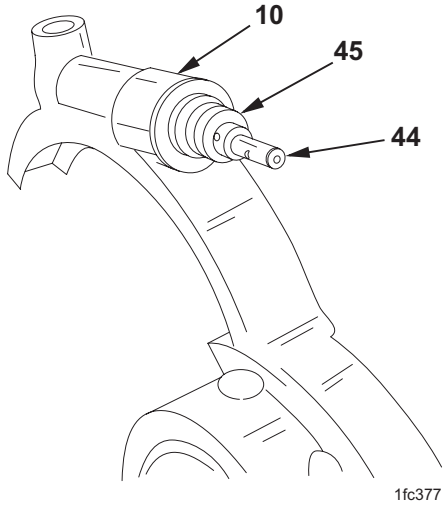



27. Remove flat washer (39), preformed mechanical felt (40), and flat washer (41). Discard preformed mechanical felt.



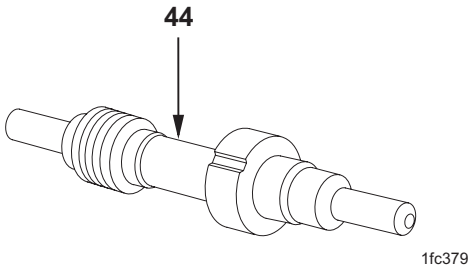

28. Loosen setscrew (42).

29. Remove externally threaded ring (43).




30. Partially remove worm shaft assembly (44) from worm wheel housing (10).

31. Remove plain bearing (45) from worm shaft assembly (44).




32. Remove worm shaft assembly (44).

**CLEANING**

WARNING

Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.

Clean all parts with cleaning compound (item 12, WP 0152 00).

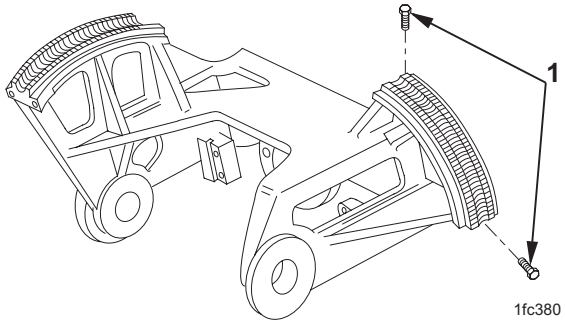
**REPAIR OR REPLACEMENT**

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0123 00.

**ASSEMBLY**

## NOTE

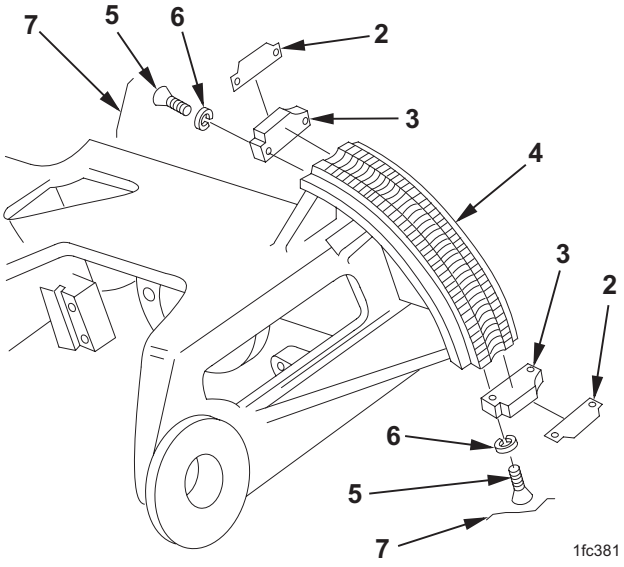
Apply light coat of grease (item 15, WP 0152 00) on all machined surfaces and preformed mechanical felts.




## WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

1. Apply sealing compound (item 13, WP 0152 00) to two machine screws (1). Wipe off excess sealing compound with a clean wiping rag. Install and tighten machine screws.



## NOTE

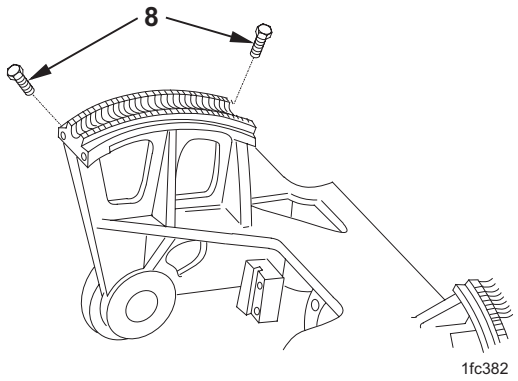
Two preformed mechanical felts and two mechanical felt holders must be installed in exact alignment with end of gear sector (elevation).

2. Position two new preformed mechanical felts (2) (item 29, WP 0123 00) and two mechanical felt holders (3) on end of gear sector (elevation) (4).

3. Apply sealing compound (item 13, WP 0152 00) to threads of four socket head capscrews (5).

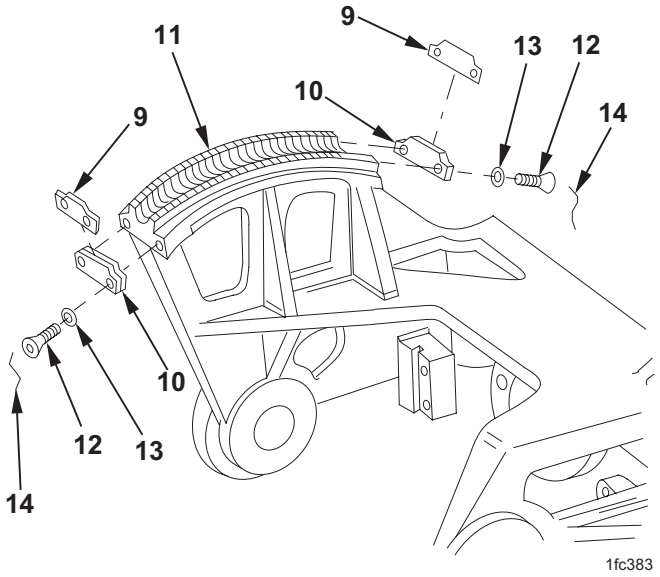
4. Install four new lockwashers (6) (item 27, WP 0123 00) and four socket head capscrews (5). Tighten socket head capscrews.

5. Install two new lock wires (7) (item 21, WP 0152 00).




6. Apply sealing compound (item 13, WP 0152 00) to two machine screws (8). Wipe off excess sealing compound with a clean wiping rag (item 18, WP 0152 00). Install and tighten machine screws.

**ASSEMBLY - Continued**




## NOTE

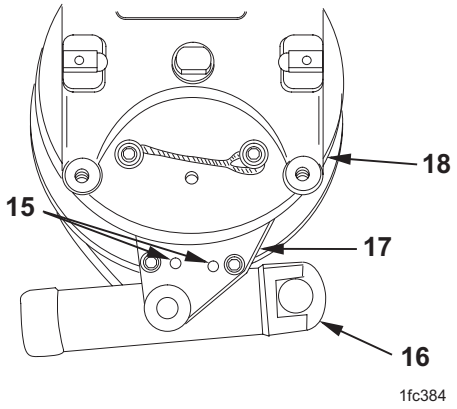
Two preformed mechanical felts and two mechanical felt holders must be installed in exact alignment with the end of gear sector (cant).

7. Position two new preformed mechanical felts (9) (item 29, WP 0123 00) and two mechanical felt holders (10) on end of gear sector (cant) (11).

8. Apply sealing compound (item 13, WP 0152 00) to threads of four socket head capscrews (12).

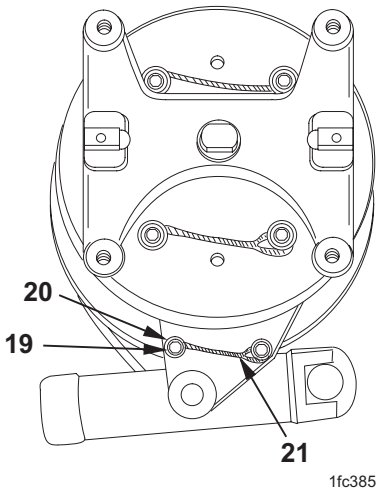
9. Install four new lockwashers (13) (item 27, WP 0123 00) and four socket head capscrews (12). Tighten socket head capscrews.

10. Install two new lock wires (14) (item 21, WP 0152 00).



11. Install two headless straight pins (15).

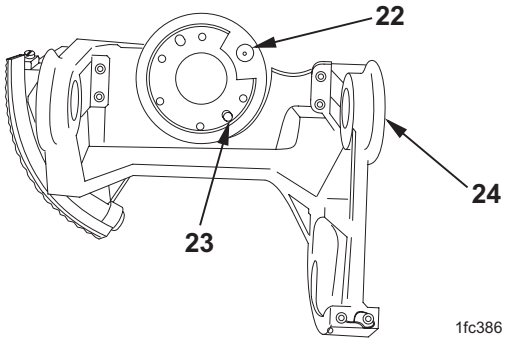
12. Position plunger assembly (16) and rotating eye bracket (17) over two headless straight pins (15) on worm wheel housing (18).




13. Apply sealing compound (item 13, WP 0152 00) to threads of two socket capscrews (19).

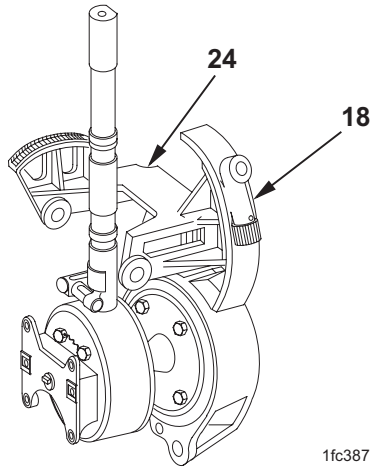
14. Install two new lockwashers (20) (item 21, WP 0123 00) and two socket capscrews (19). Tighten socket capscrews.

15. Install new lock wire (21) (item 22, WP 0152 00).

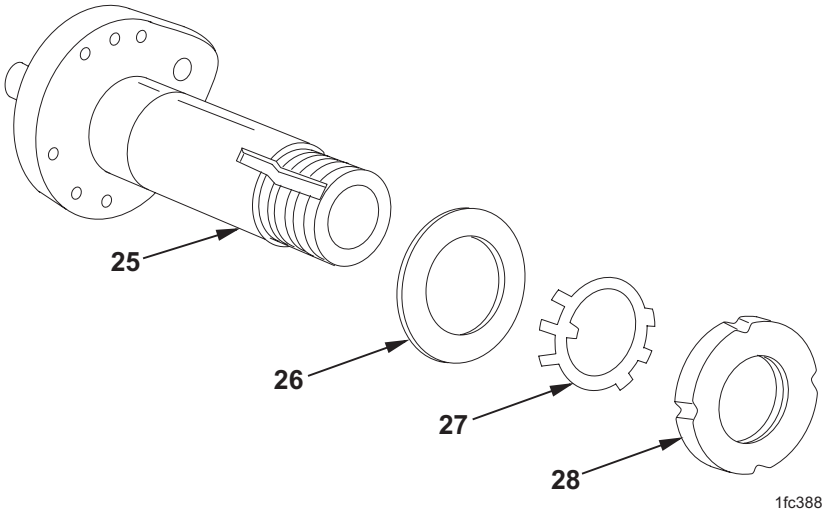



16. Install headless straight pin (22) and two headless straight pins (23) in sector gear cluster (24).

**ASSEMBLY - Continued**



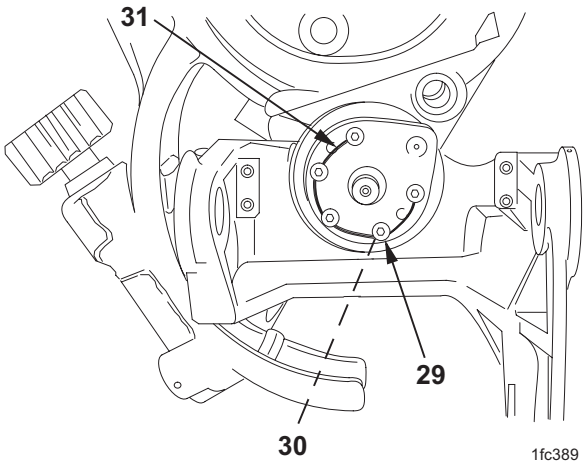

17. Position sector gear cluster (24) on worm wheel housing (18).




18. Apply light coat of grease (item 15, WP 0152 00) to camshaft (25) and install.

19. Install flat washer (26) and key washer (27).

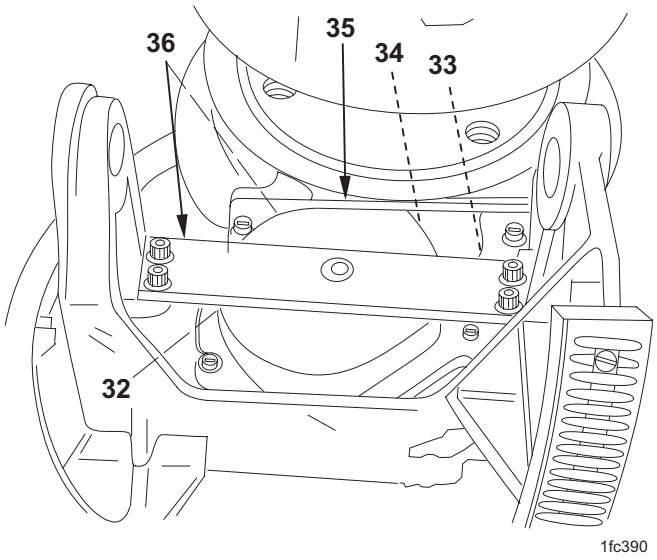
20. Install plain round nut (28). Tighten to torque of 6 in.-lb (0.68 N-m) to 12 in.-lb (1.35 N-m). Bend tang on key washer (27) into groove of plain round nut.




21. Apply sealing compound (item 13, WP 0152 00) to threads of five socket head capscrews (29).

22. Install five new lockwashers (30) (item 24, WP 0123 00) and five socket head capscrews (29).

23. Install new lock wire (31) (item 22, WP 0152 00).

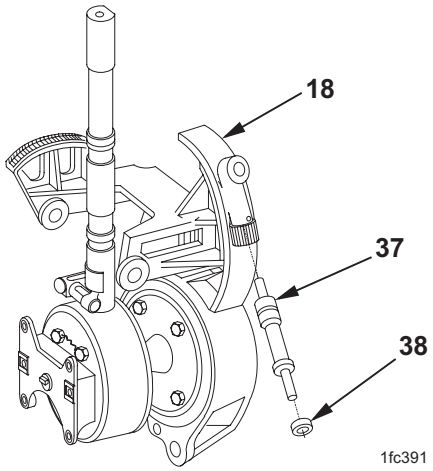



24. Install gasket (32). Refer to WP 0065 00.

25. Apply sealing compound (item 13, WP 0152 00) to threads of tolerance screw (33). Wipe off excess sealing compound with a clean wiping rag. Install pawl (34) and close tolerance screw. Refer to WP 0065 00.

26. Install access cover (35) and retaining plate (36). Refer to WP 0065 00.

**ASSEMBLY - Continued**

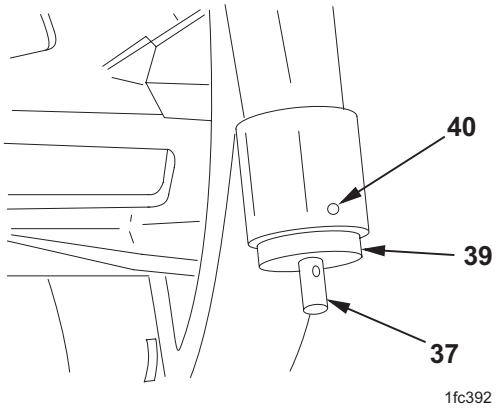



27. Place worm shaft assembly (37) in worm wheel housing (18).

28. Apply grease (item 15, WP 0152 00) on plain bearing (38) and install on worm shaft assembly (37).

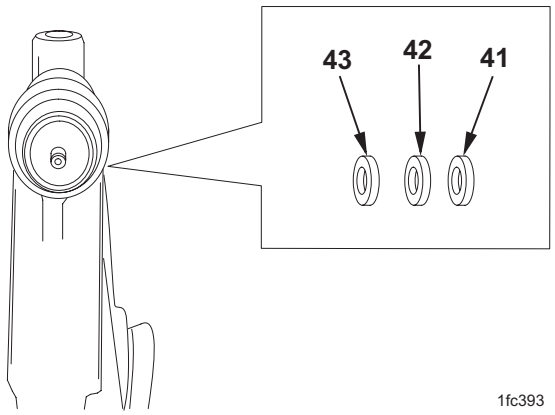
NOTE

Make sure slot in plain bearing aligns with guide pin in worm wheel housing.

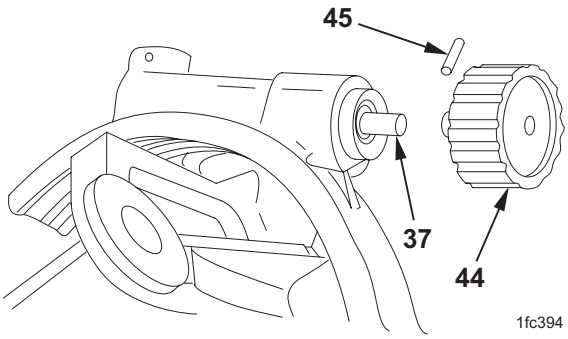



29. Install externally threaded ring (39) and tighten until worm shaft assembly (37) rotates with a drag.

30. Tighten setscrew (40).




31. Install flat washer (41), new preformed mechanical felt (42) (item 14, WP 0123 00), and flat washer (43) in order.




## NOTE

Perform steps 32 and 33, and continue with step 35, if new worm shaft assembly has been installed. Perform step 34 if previously-installed components are used.

32. Install knob (44) on worm shaft assembly (37) and secure with setscrew, NSN 5305-00-655-9246. Using the pilot hole located on the knob, drill hole through worm shaft assembly.

33. Remove setscrew from knob (44).

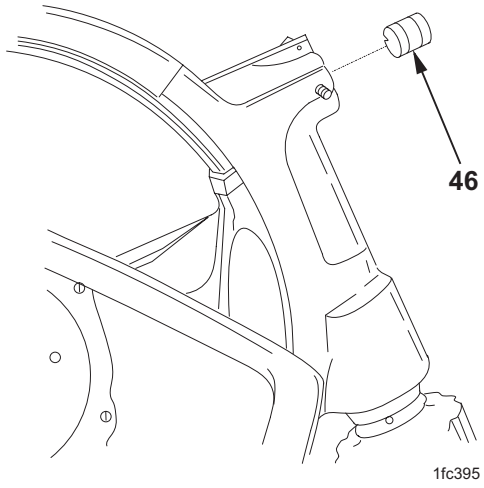
34. Install knob (44).

## CAUTION

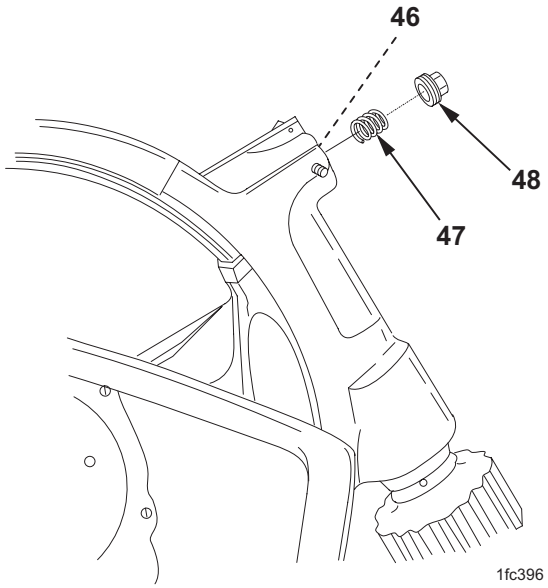
Support knob in V block on solid surface to prevent damage to worm shaft.

35. Install headless straight pin (45).

**ASSEMBLY - Continued**

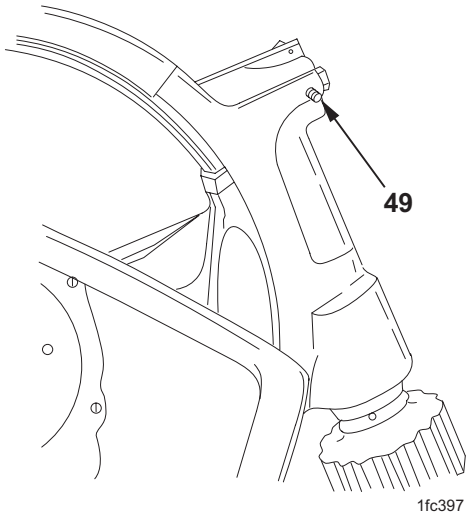



36. Apply grease (item 15, WP 0152 00) to V bearing (46) and install.

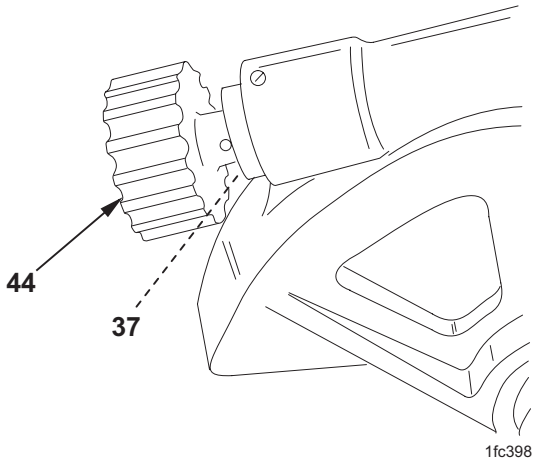



37. Install compression helical spring (47) and machine thread plug (48).

38. Screw machine thread plug (48) until V bearing (46) bottoms on worm shaft assembly, and then back off 1/4 turn.

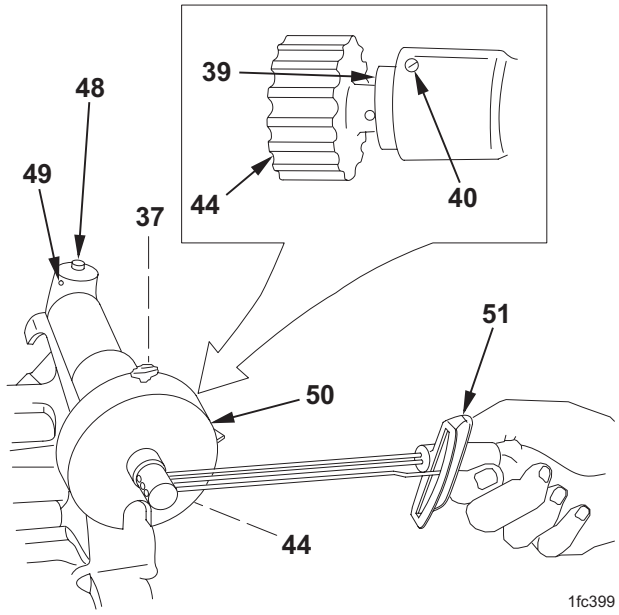



39. Tighten setscrew (49).



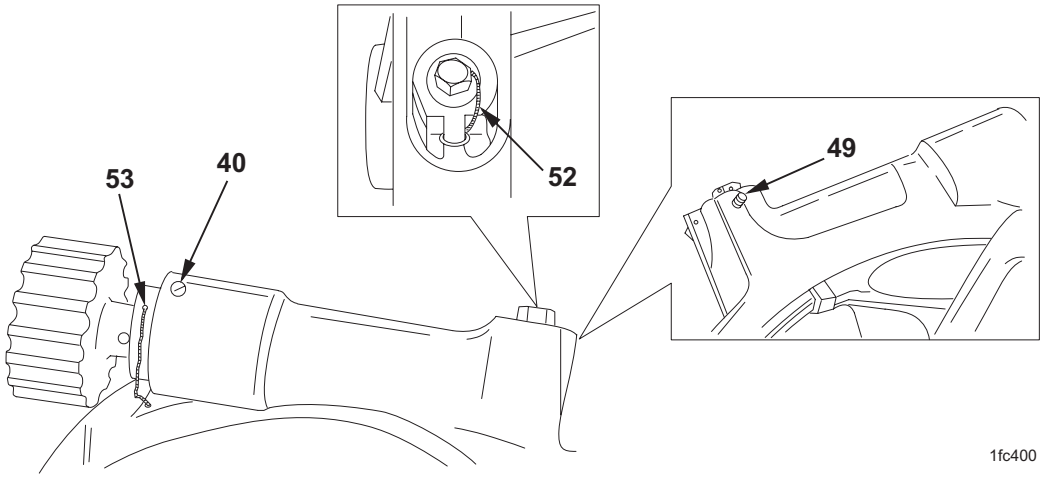

40. Rotate knob (44) and worm shaft assembly (37) through full travel of gear. Check for binding.

**ASSEMBLY - Continued**




41. Install torque wrench adapter (50) on knob (44).

42. Attach torque wrench (51) to torque wrench adapter (50), and measure torque required to turn worm shaft assembly (37). If torque does not read between 4 in.-lb (0.45 N-m) and 12 in.-lb (1.35 N-m), loosen two setscrews (49 and 40). Tighten or loosen externally threaded ring (39) or machine thread plug (48).




43. Apply sealing compound (item 13, WP 0152 00) to two setscrews (49 and 40). Tighten setscrews.

44. Install new lock wires (52 and 53) (item 22, WP 0152 00).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

**PLUNGER ASSEMBLY MAINTENANCE**
**REMOVAL, REPAIR OR REPLACEMENT, INSTALLATION**

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC5180-95-B29)

**Materials/Parts**
Grease (item 16, WP 0152 00)
Lockwasher (2) (item 21, WP 0123 00)
Lock wire (item 21, WP 0152 00)
Sealing compound (item 13, WP 0152 00)

**References**
WP 0123 00

**Equipment Conditions**
M171/M171A1 mount removed from M198/M777 howitzer (TM 9-1025-211-34/TM 9-1025-215-25&P)

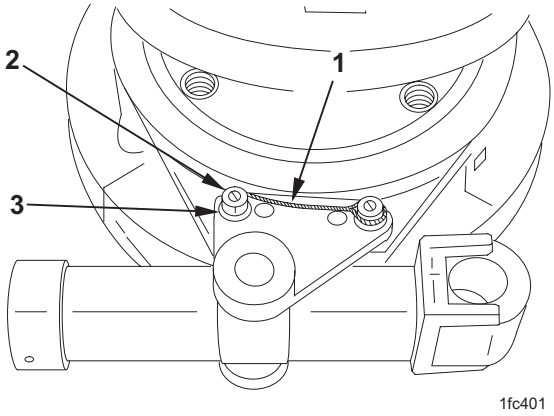
**REMOVAL**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

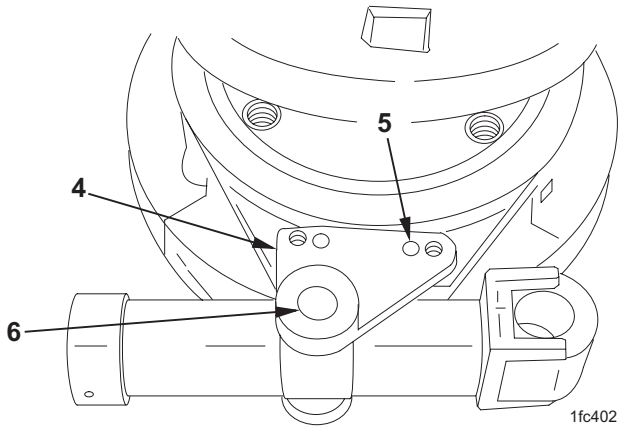
When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.



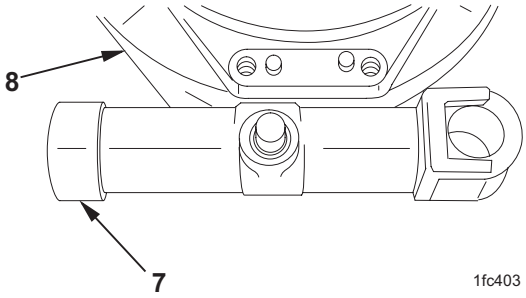

1. Remove and discard lock wire (1).

2. Remove two socket capscrews (2) and two lockwashers (3). Discard lockwashers.

**REMOVAL - Continued**




3. Pry rotating eye bracket (4) from two headless straight pins (5) and plunger stud (6).



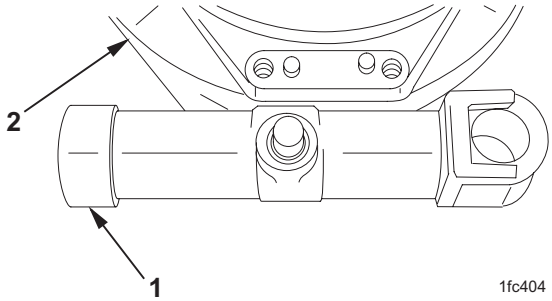

4. Remove plunger assembly (7) from housing assembly (8).

**REPAIR OR REPLACEMENT**

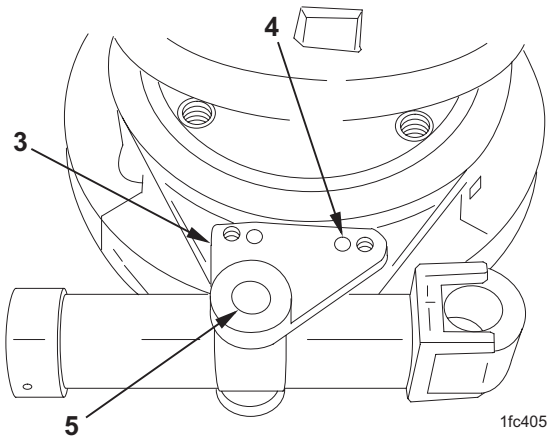
1. Replace plunger assembly if damaged to the extent that improper tension is applied to the M171/M171A1 mount.

2. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0123 00.

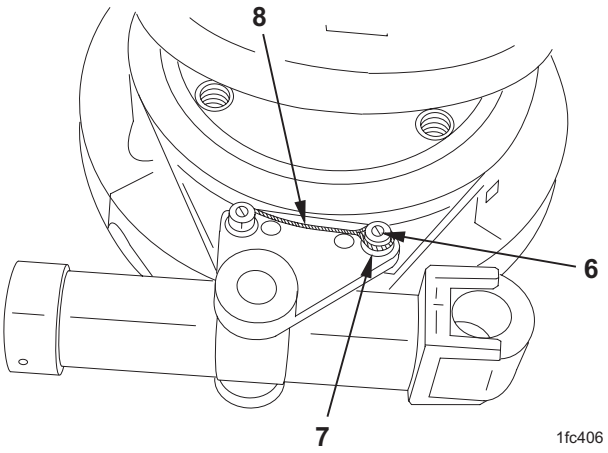
**INSTALLATION**




1. Apply light coat of grease (item 15, WP 0152 00) to mating surfaces of plunger assembly (1) and install in housing assembly (2).




2. Install rotating eye bracket (3) on two headless straight pins (4) and plunger stud (5).




**WARNING**

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

3. Apply sealing compound (item 13, WP 0152 00) to threads of two socket capscrews (6).

4. Install two new lockwashers (7) (item 21, WP 0123 00) and two socket capscrews (6).

5. Install new lock wire (8) (item 21, WP 0152 00).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

**MOUNTING ADAPTER MAINTENANCE**
**REMOVAL, DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY, INSTALLATION**

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Lock wire (item 22, WP 0152 00)
Lockwasher (4) (item 2, WP 0124 00)
Lockwasher (2) (item 3, WP 0125 00)

**References**
WP 0124 00
WP 0125 00

**REMOVAL**

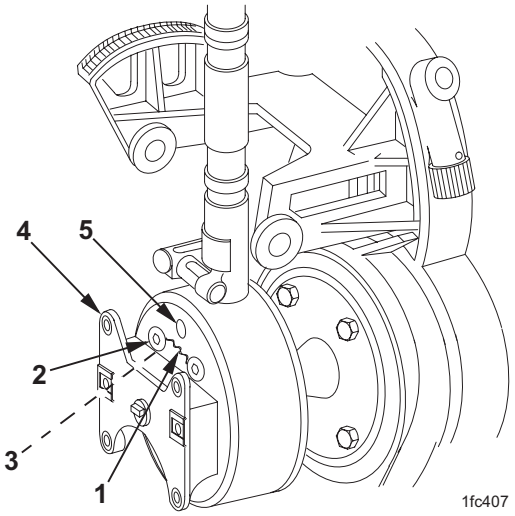
WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

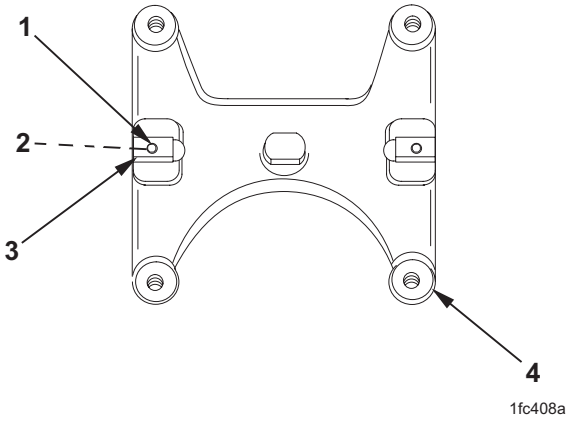
When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

**REMOVAL - Continued**




1. Remove and discard lock wire (1).
2. Remove four socket capscrews (2) and four lockwashers (3). Discard lockwashers.
3. Lift mounting adapter (4) clear of two straight pins (5), and remove.
4. Remove two straight pins (5).

**DISASSEMBLY**




Remove two socket capscrews (1), two lockwashers (2), and two machine keys (3) from adapter (4). Discard lockwashers.

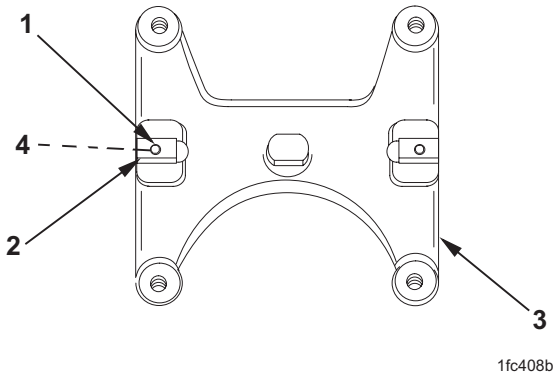
## REPAIR OR REPLACEMENT

### NOTE

Replace adapter if bent or otherwise damaged causing M17 quadrant to mount incorrectly.

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0124 00 and WP 0125 00.

## ASSEMBLY



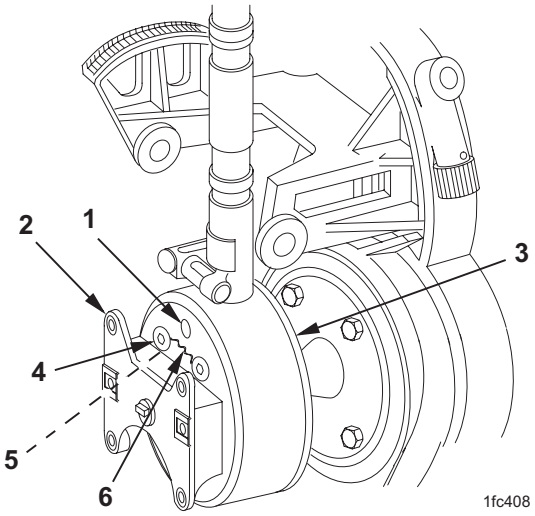

### WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

1. Apply sealing compound (item 13, WP 0152 00) to two socket capscrews (1).

2. Position two machine keys (2) on adapter (3) and secure using two new lockwashers (4) (item 3, WP 0125 00) and two socket capscrews (1).

**INSTALLATION**




1. Install two straight pins (1).

NOTE

Ensure mounting adapter is positioned with flat side on top.

2. Install mounting adapter (2) on bearing housing assembly (3) over two straight pins (1).
3. Apply sealing compound (item 13, WP 0152 00) to four socket capscrews (4).
4. Install four new lockwashers (5) (item 2, WP 0124 00) and four socket capscrews (4) and tighten.
5. Install new lock wire (6) (item 22, WP 0152 00).

**END OF WORK PACKAGE**

# CHAPTER 16

# GENERAL SUPPORT
# FINAL INSPECTION INSTRUCTIONS
# FOR
# M171/M171A1 TELESCOPE AND QUADRANT MOUNT

**GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

**FINAL INSPECTION INSTRUCTIONS**
**TEST AND INSPECTION**

**INITIAL SETUP:**

**Test Equipment**
Cross-leveling fixture (item 8, WP 0149 00)
Fire control quadrant (item 10, WP 0149 00)
Inspection fixture (item 11, WP 0149 00)
Mechanical adapter (item 4, WP 0149 00)
Sighting device (item 6, WP 0149 00)
Spring resiliency tester (item 9, WP 0149 00)
Torque adapter (item 19, WP 0149 00)

**Tools and Special Tools**
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Artillery and Turret Mechanic's: Ordnance (SC 5180-95-A12)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Sealing compound (item 13, WP 0152 00)

**References**
WP 0021 00
WP 0022 00

**Special Environmental Conditions**
Ambient temperature +60 °F (+16 °C) to +90 °F (+32 °C)

**TEST AND INSPECTION**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

**TEST AND INSPECTION - Continued**

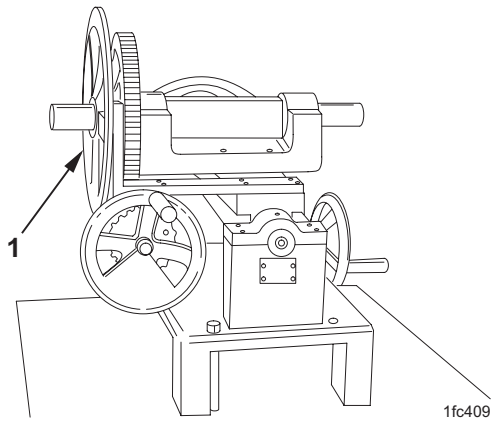
## NOTE

If the M171/M171A1 mount being inspected fails to meet the required standards, ensure all maintenance authorized at the applicable level has been performed correctly. Then send the M171/M171A1 mount to the next level of maintenance.

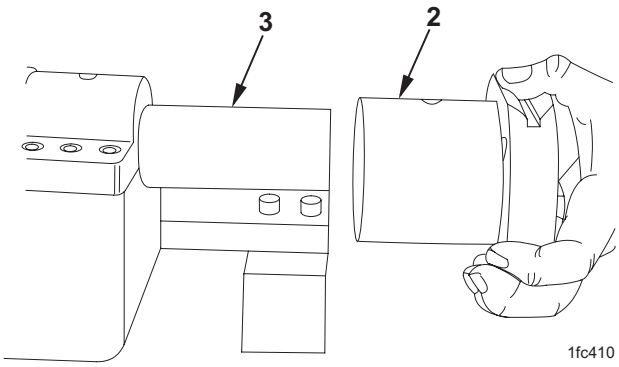
For testing of M171A1 mount, a M198 damper must be installed.

For testing of M171A1 mount, sighting device (item 6, WP 0149 00) must have four quick release pins (item 5A, WP 0133 00) installed.

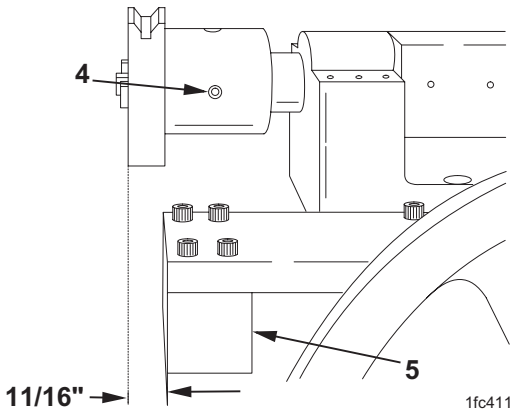
### Setting Up and Adjusting the Cross-Leveling Fixture




1. Secure cross-leveling fixture (1) on test bench.



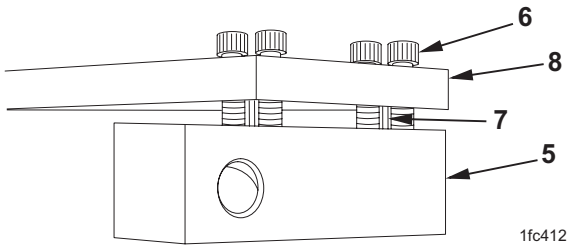

2. Install test fixture adapter (2) on cross-leveling shaft end (3).



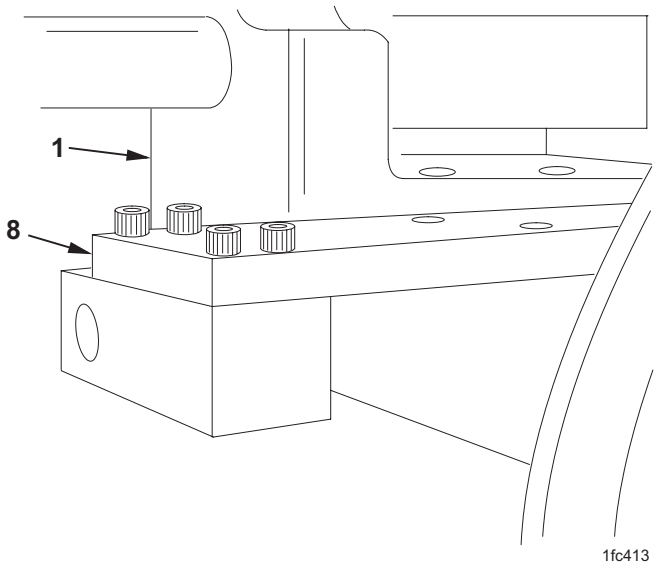

3. Tighten setscrew (4). Test fixture adapter face should be approximately 11/16 in. (1.75 cm) from block (5).

## NOTE

The mechanical adapter (P/N 10555619) illustrated below is for use with the M198 howitzer.




4. Assemble four screws (6), block (5), and two pins (7) on adapter plate (8).

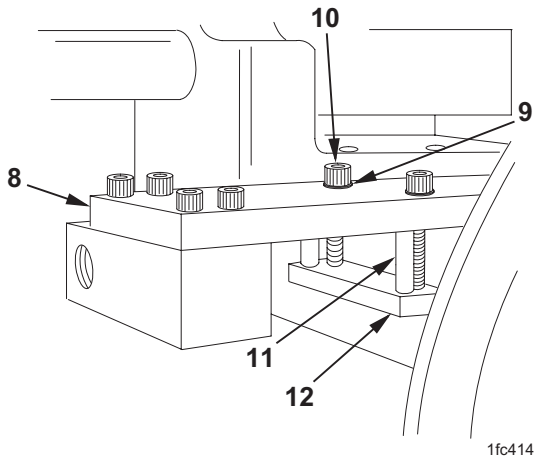



5. Place adapter plate (8) on cant position of cross-leveling fixture (1).

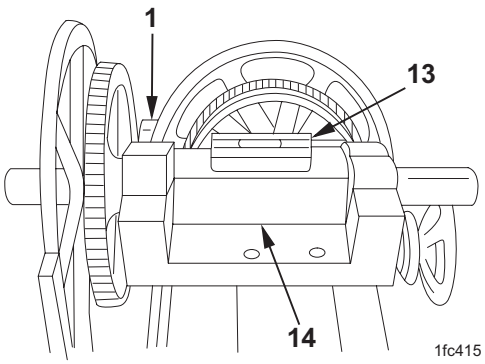
6. Lightly clamp adapter plate (8).

**TEST AND INSPECTION - Continued**

**Setting Up and Adjusting the Cross-Leveling Fixture - Continued**




7. Install four lockwashers (9), four screws (10), four posts (11), and two plates (12) on adapter plate (8). Tighten screws.

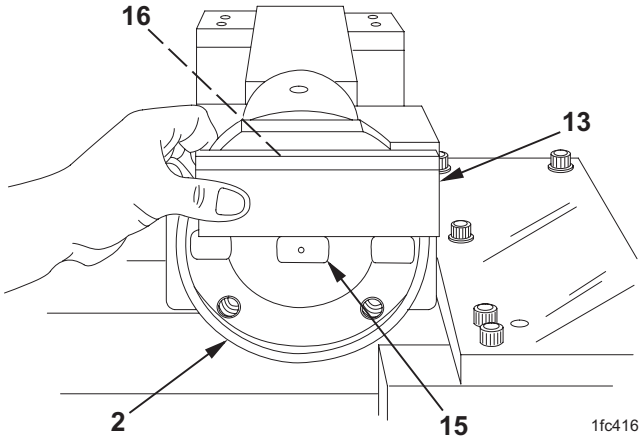



8. Place precision level (13) on block (14), perpendicular to axis of rotation.

9. Level the cross-leveling fixture (1) in both cant and elevation.

## NOTE

When installing test fixture adapter (2), ensure adapter keys (15) are parallel to top of block within 0.1 mil.



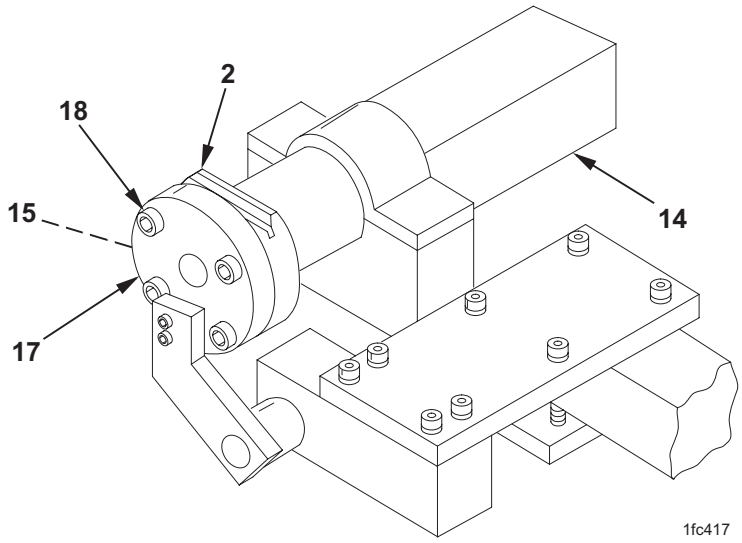

10. Place precision level (13) on adapter keys (15).

11. Check that bubble (16) precision level (13) is level.

12. Tighten test fixture adapter (2) securely and recheck for level.

## NOTE

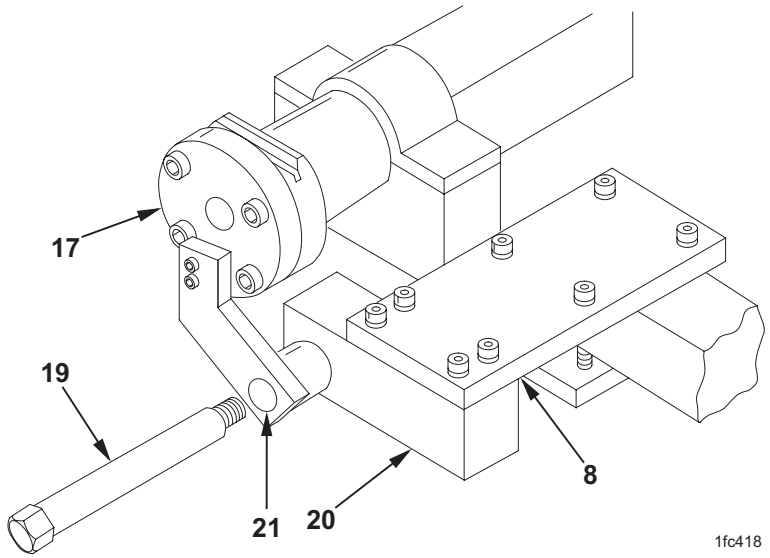
Ensure that adapter keys (15) and block (14) are parallel within 0.1 mil while performing steps 13 through 17.




13. Secure alignment tool (17) to test fixture adapter (2) with four screws (18).

**TEST AND INSPECTION - Continued**

**Setting Up and Adjusting the Cross-Leveling Fixture - Continued**




NOTE

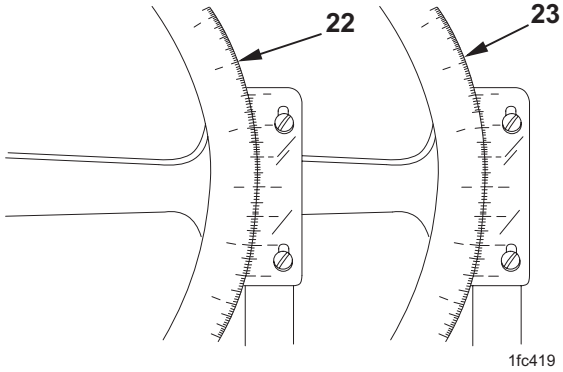
It may be necessary to shim adapter plate (8) for proper alignment of pin (19).

14. Align block assembly (20) with alignment tool (17) so that pin (19) will guide fit through both bores (21) without binding.

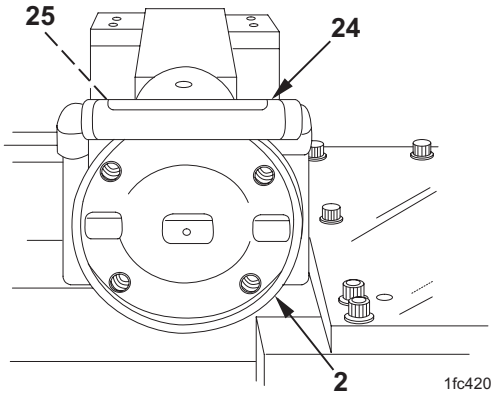
15. Secure adapter plate (8) in position.

16. Recheck pin alignment.

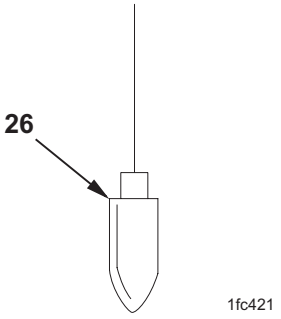
17. Remove alignment tool (17).




18. Set cant vernier scale (22) and elevation vernier scale (23) to zero.

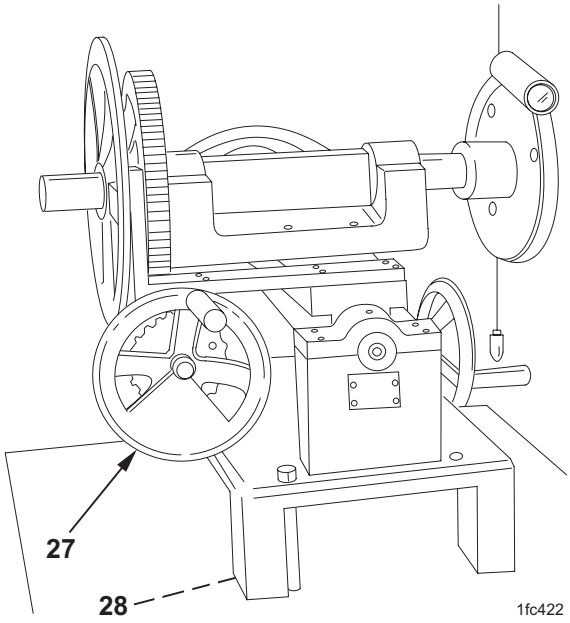



19. Place collimator telescope (24) in V portion (25) of test fixture adapter (2).




20. Position plumbline (26) approximately 10 feet (3.0 m) from collimator telescope.

21. Check that plumbline (26) is in view of the collimator telescope line of sight.

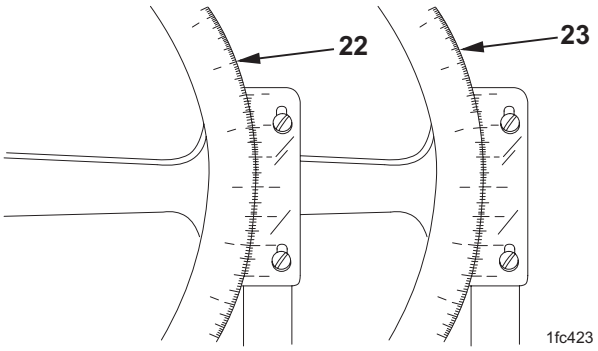



22. Rotate elevation handwheel (27) and observe parallel between optical axis of collimator telescope and plumbline.

23. If optical axis is not parallel with plumbline, adjust using shims (28).

**TEST AND INSPECTION - Continued**

**Setting Up and Adjusting the Cross-Leveling Fixture - Continued**

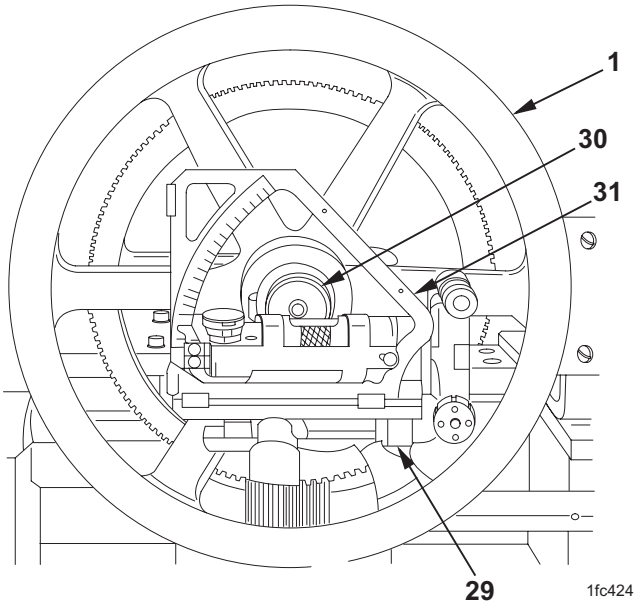



24. Reset cant vernier scale (22) to zero, if necessary.

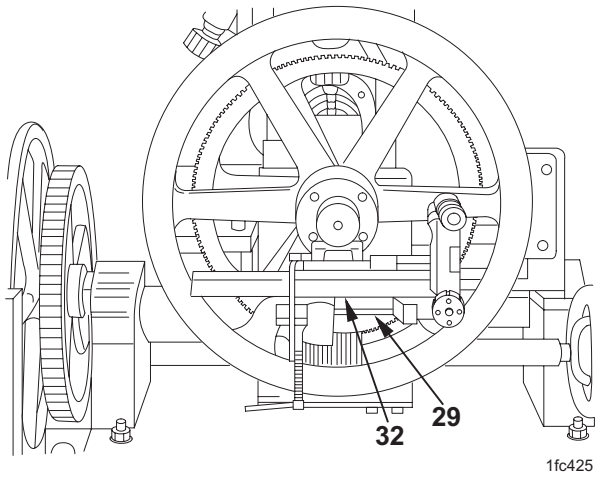
25. Return elevation vernier scale (23) to zero elevation, if necessary.

## NOTE

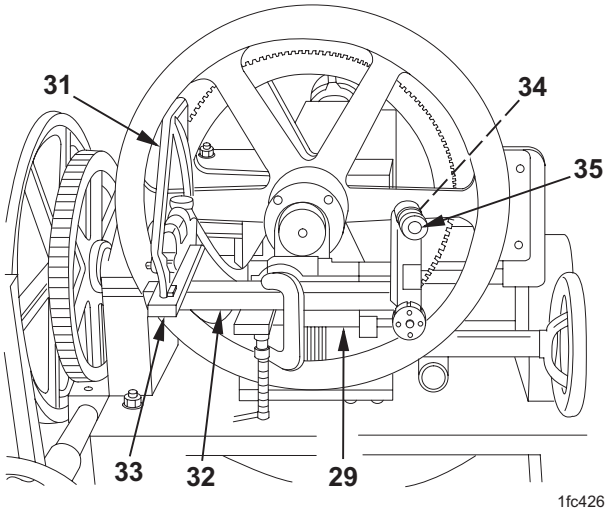
Check to make sure that cross-leveling fixture is still level in elevation and cant.




26. Assemble inspection aid support assembly (29) to elevation shaft (30) on the elevation vernier scale side of the cross-leveling fixture (1). Set fire control quadrant (31) on inspection aid support assembly, set at zero, and level inspection aid support assembly in elevation.




27. Place leveling bar (32) on seat of inspection aid support assembly (29).




28. Place leveling bar (33) across leveling bar (32).

29. Level inspection aid support assembly (29) in cant using leveling bars (32 and 33) and fire control quadrant (31).

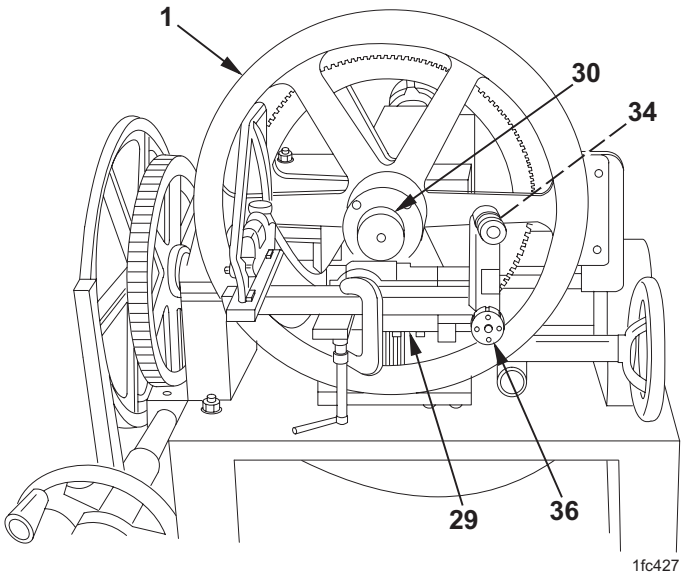
30. Center level bubble (34) in inspection aid support assembly (29) by rotating eccentric (35), if not already centered.

31. Rotate elevation handwheel until elevation vernier scale reads 60 degrees or 1066 mils. Check that level bubble (34) in inspection aid support assembly (29) stays centered.

32. Repeat steps 30 and 31, checking that level bubble (34) in inspection aid support assembly (29) stays centered at 0 and 1066 mils elevation. If necessary, adjust eccentric (35).

**TEST AND INSPECTION - Continued**

**Setting Up and Adjusting the Cross-Leveling Fixture - Continued**




33. Return cross-leveling fixture (1) to zero elevation and securely tighten inspection aid support assembly (29) to elevation shaft (30).

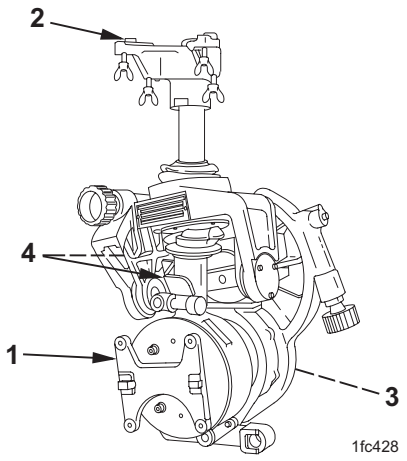
34. Turn knob (36) on inspection aid support assembly (29) to either limit stop; back off approximately 7-3/4 turns. Level bubble (34) of inspection aid support assembly should be in approximate center of level vial.

35. Ensure all mounting surfaces are level and adjusted correctly by visually inspecting mount mating surfaces.

**Visual Inspection**

1. Check that all screws and lockwashers are present and tight.

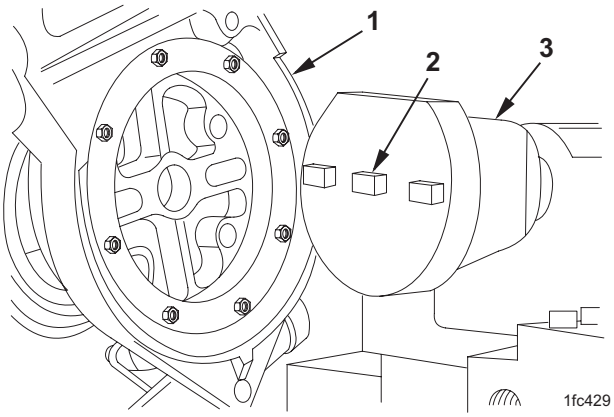
2. Check that lock wire is secure.



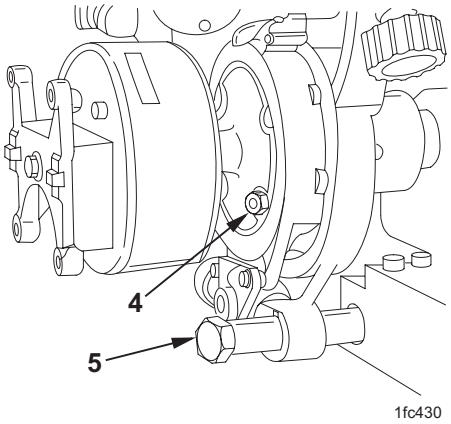
3. Check that mounting surface (1) for M17/M17A1 quadrant mounting surface, (2) for M137/M137A2/M137A3 telescope, and mounting surface (3) for M171/M171A1 mount are clean and free of nicks and burrs.

4. Check mirrors (4) for clear reflection of vials.

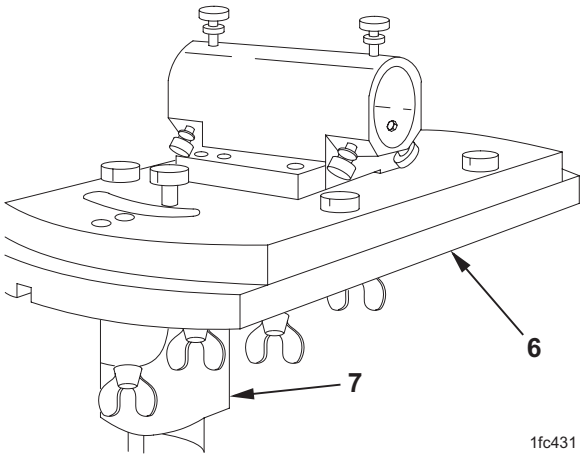
### Mounting the M171/M171A1 Mount on Cross-Leveling Fixture




1. Position M171/M171A1 mount (1) on adapter keys (2) of test fixture adapter (3).



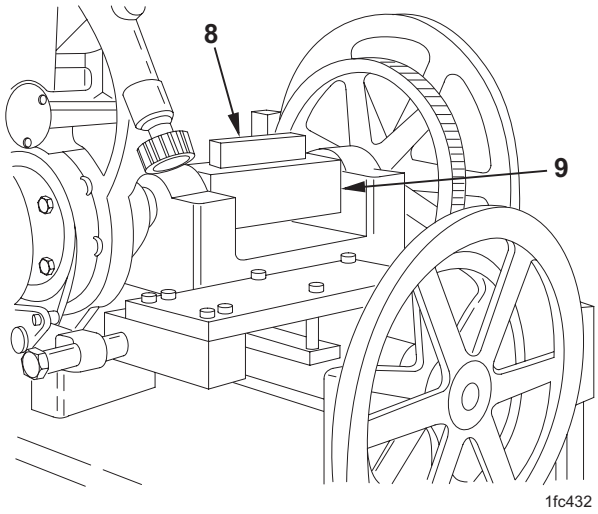

2. Install four hexagon capscrews (4) and pin (5).



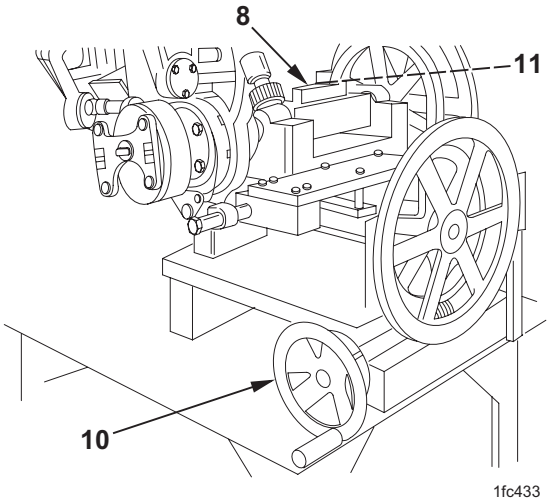

3. Fasten adapter plate (6) to optical instrument support (7).

**TEST AND INSPECTION - Continued**

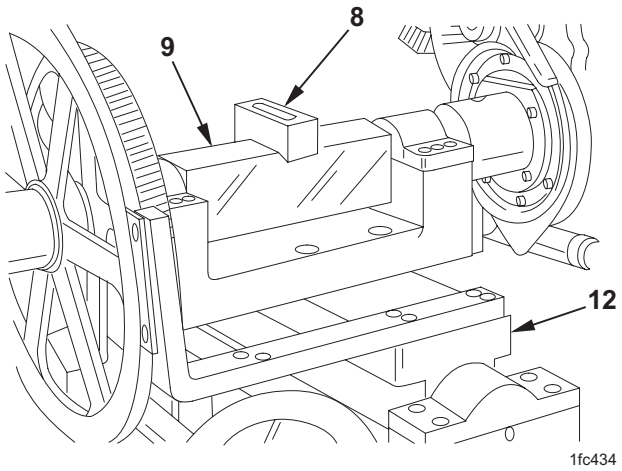
**Mounting the M171/M171A1 Mount on Cross-Leveling Fixture - Continued**



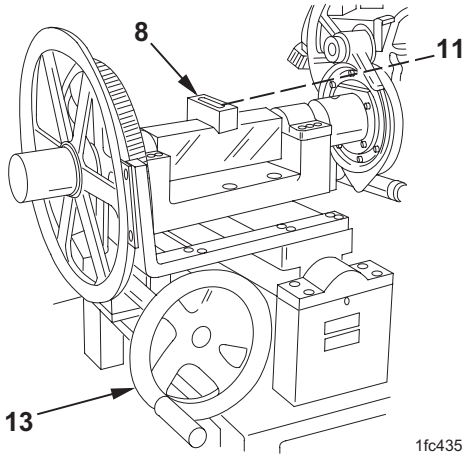

4. Place precision level (8) parallel to block (9).




5. Rotate cant handwheel (10) until bubble (11) in precision level (8) centers.




6. Place precision level (8) perpendicular to block (9) of shaft on cross-leveling fixture (12).



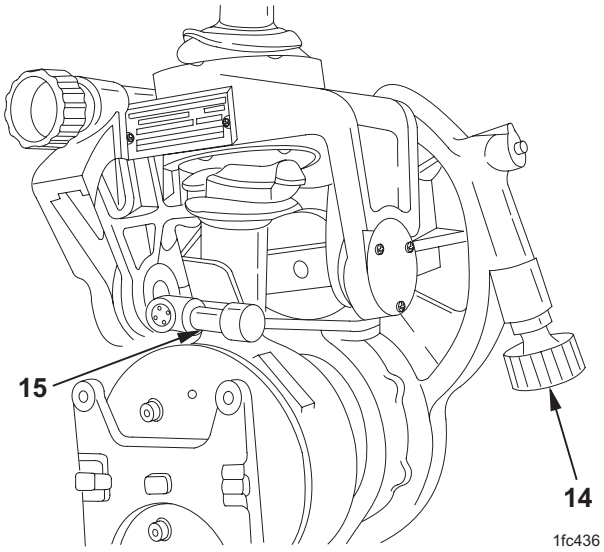

7. Rotate elevation handwheel (13) until bubble (11) in precision level (8) centers.

**TEST AND INSPECTION - Continued**

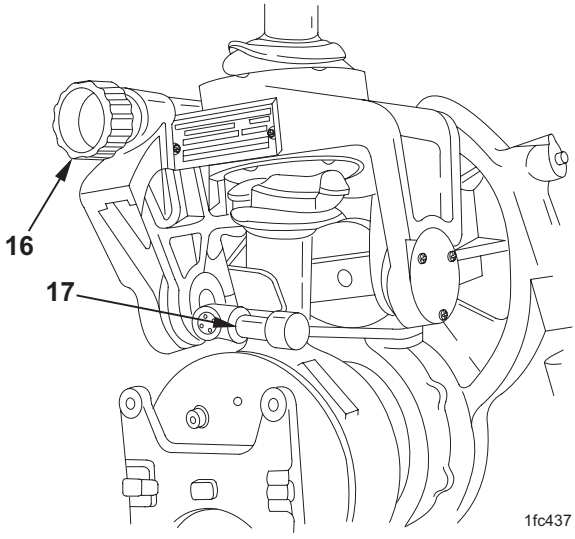
**Mounting the M171/M171A1 Mount on Cross-Leveling Fixture - Continued**

NOTE

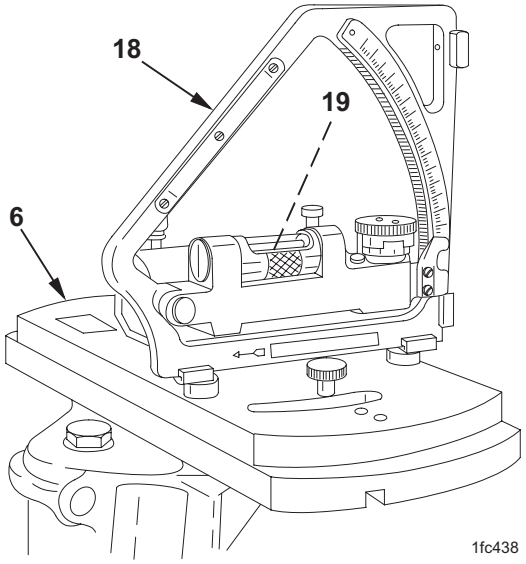
If new elevation or cross level vials were installed, do not perform steps 8 and 9. Instead, proceed to step 10.




8. Turn elevation knob (14) until bubble in elevation level vial (15) centers.




9. Turn cross level knob (16) until bubble in cross level vial (17) centers.

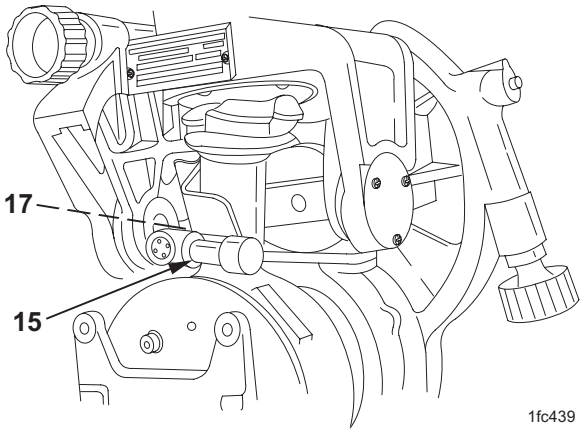



10. Set fire control quadrant (18) at zero mils plus correction factor, if any, and place on adapter plate (6).

## NOTE

Fire control quadrant line of fire arrow should be toward cant vernier scale for pitch level check and toward elevation vernier scale for cross level check.

11. Level bubble (19) in fire control quadrant (18) should center in both cant and elevation. If not, center level bubble using either the elevation knob or cross level knob as required.



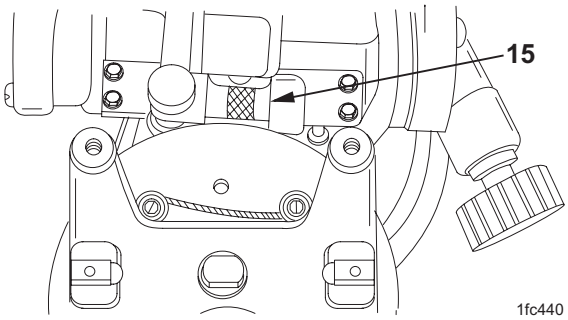

12. If bubble in elevation level vial (15) and bubble in cross level vial (17) do not center, adjust by performing the following steps.

**TEST AND INSPECTION - Continued**

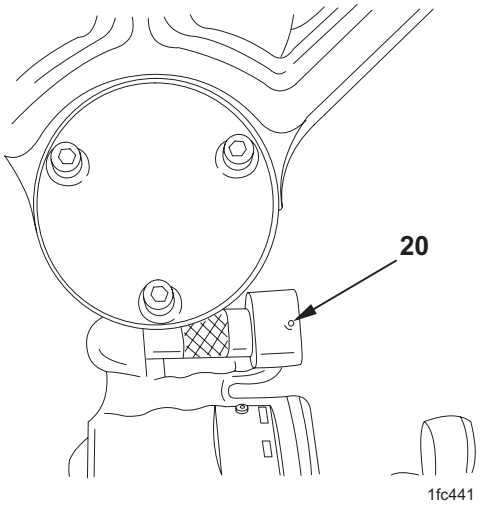
**Mounting the M171/M171A1 Mount on Cross-Leveling Fixture - Continued**

NOTE

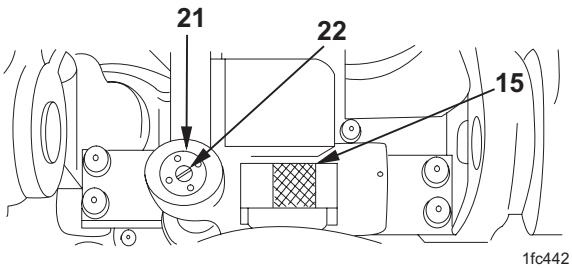
The procedures for adjustment of the cross level vial and elevation level vial are the same.




13. Remove sealing compound from the end of elevation level vial (15).




14. Loosen setscrew (20).




15. Remove externally threaded ring (21) using a spanner wrench and remove eccentric (22).

**WARNING**

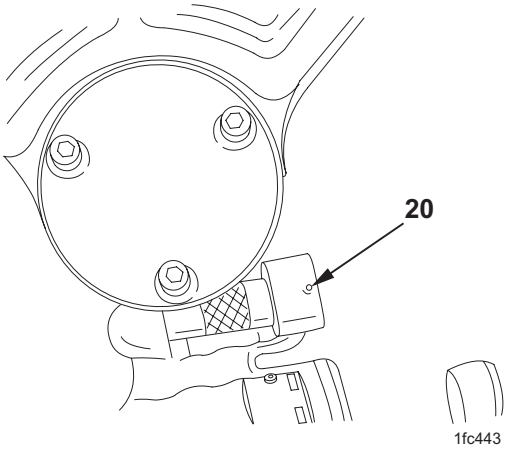
Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

16. Place a dab of sealing compound (item 13, WP 0152 00) on slotted end of eccentric (22) and to threads of externally threaded ring (21).

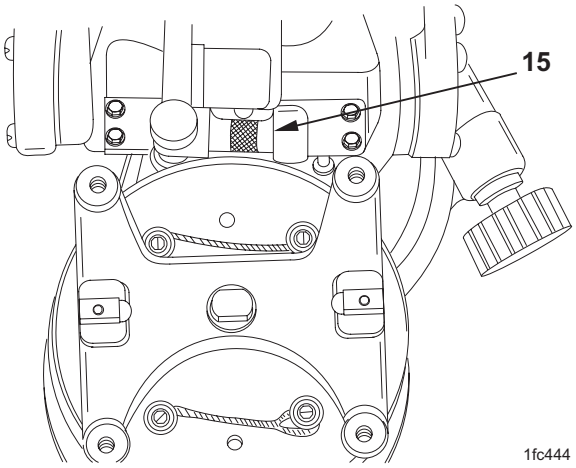
17. Reinstall eccentric (22) and externally threaded ring (21) and turn eccentric until bubble in elevation level vial (15) centers.

18. Tighten externally threaded ring (21).

19. Ensure bubble in elevation level vial (15) is centered.



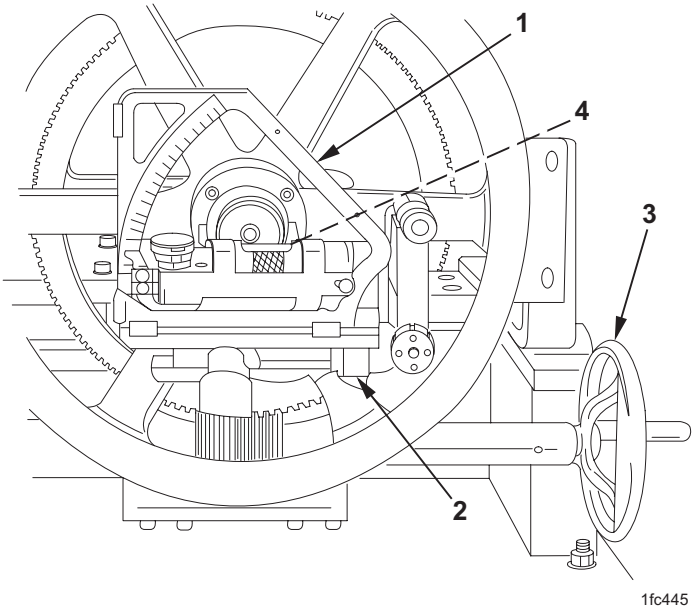

20. Apply sealing compound (item 13, WP 0152 00) to setscrew (20). Tighten setscrew.




21. Apply sealing compound (item 13, WP 0152 00) to outside of externally threaded ring (21) and to end of elevation level vial (15).

**TEST AND INSPECTION - Continued**

**Elevation Travel and Travel Deviation Inspection**

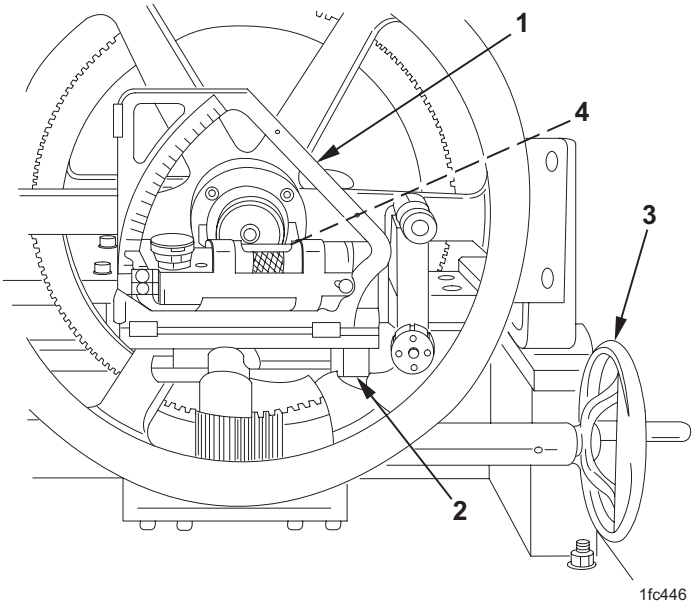



1. Set fire control quadrant (1) to 1333 mils for elevation check, and place on inspection aid support assembly (2). Turn elevation handwheel (3) clockwise until level bubble (4) in fire control quadrant centers.

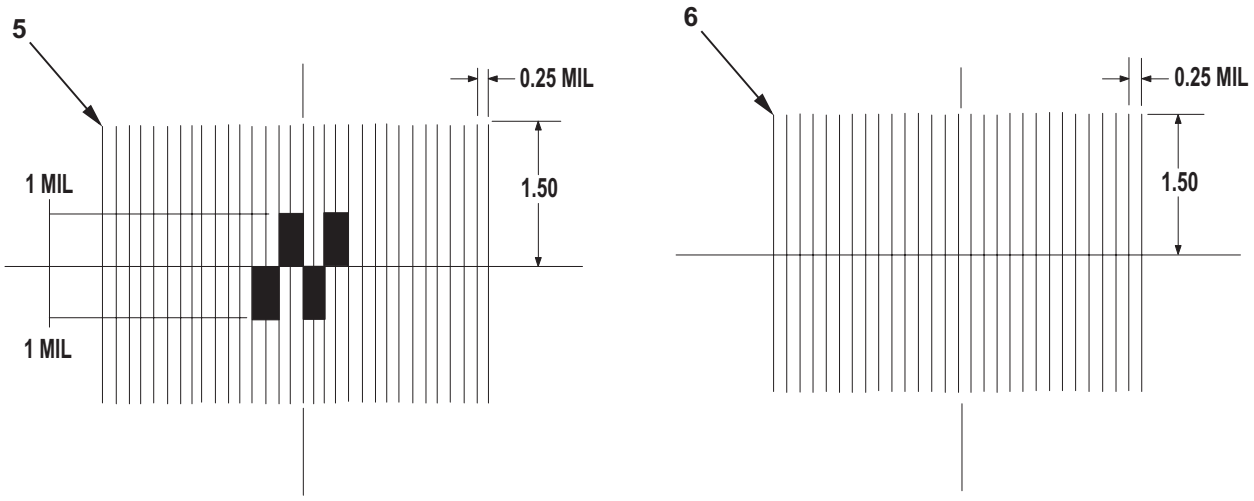
2. Set fire control quadrant (1) to 270 mils for depression and place on inspection aid support assembly (2). Turn elevation handwheel (3) counterclockwise until level bubble (4) in fire control quadrant centers.

NOTE

If level bubble in fire control quadrant does not center in either step 1 or 2, the M171/M171A1 mount does not have sufficient travel. Return to depot maintenance.



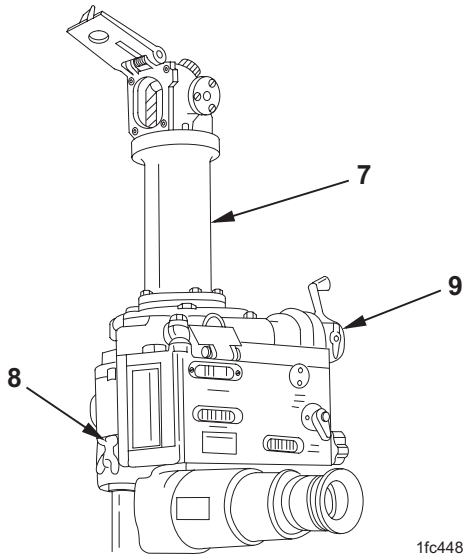
3. Set fire control quadrant (1) to zero and place on inspection aid support assembly (2). Turn elevation handwheel (3) clockwise until level bubble (4) in fire control quadrant centers.




4. Use any suitable material to locally fabricate targets (5 and 6).

## NOTE

Target and plumbline should be positioned at a minimum of 40 feet (12.2 m) from cross-leveling fixture and aligned to M137A2/M137A3 telescope set at 4800 mils. The line of sight of the M137A2/M137A3 telescope will be across the elevation vernier scale of cross-leveling fixture.




5. Secure M137A2/M137A3 telescope (7) to optical instrument support (8).

6. Ensure cross-leveling fixture and M171/M171A1 mount are cross leveled.

7. Turn azimuth knob (9) clockwise to 4800 mils. Align plumbline and target to the M137A2/M137A3 telescope reticle.

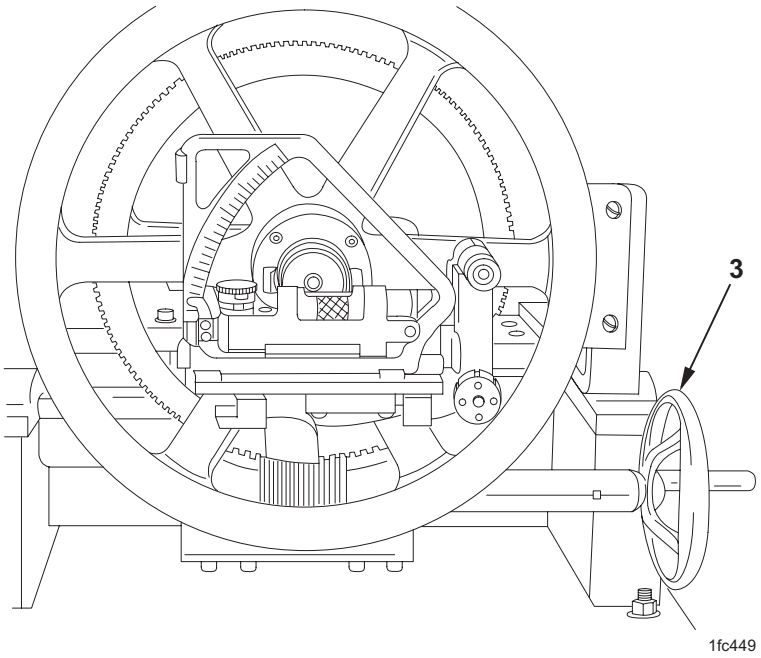
**TEST AND INSPECTION - Continued**

**Elevation Travel and Travel Deviation Inspection - Continued**

## NOTE

If testing M171A1 mount, four quick release pins (item 5A, WP 0133 00) must be installed on M137 panoramic telescope used for testing.

To ensure accuracy of travel deviation inspection, two maintenance personnel may be required.

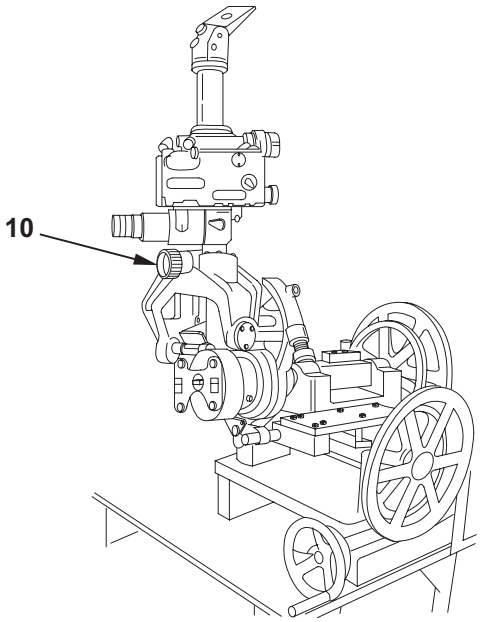



8. Rotate elevation handwheel (3) from 270 mils depression through 800 mils elevation (line of sight must not deviate more than 0.25 mil); rotate from 801 mils elevation through 1333 mils elevation (line of sight must not deviate more than 0.50 mil).

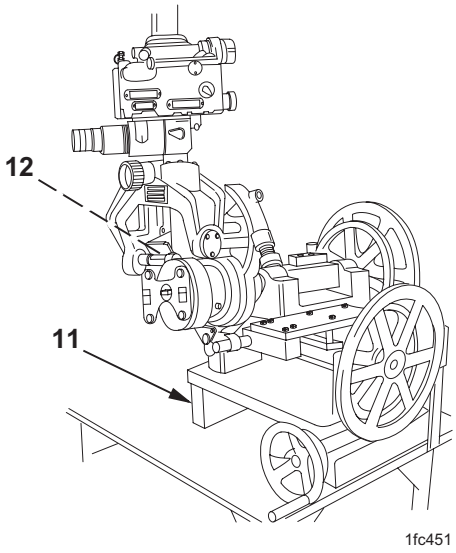
## NOTE

Use fire control quadrant on adapter plate to ensure that optical instrument support is parallel and perpendicular to mounting surface of M171/M171A1 mount within 0.5 mil.

If deviation exceeds 0.25 mil from -270 to 800 mils or 0.50 mil from 801 to 1333 mils, the M137/M137A2/M137A3 telescope reticle line must be brought in coincidence with center line of wall target. To accomplish this, perform the following steps.




9. Rotate cross level knob (10) clockwise and stop when coincidence is obtained.



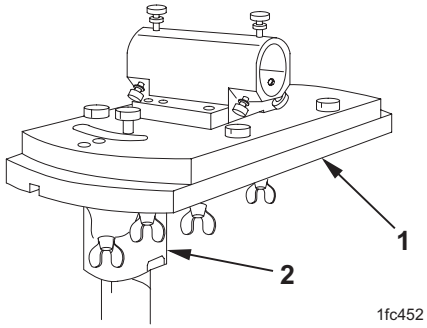

10. Return cross-leveling fixture (11) to zero elevation.

11. Re-center bubble in cross level vial (12). Refer to Mounting the M171/M171A1 Mount on Cross-Leveling Fixture, steps 13 through 20.

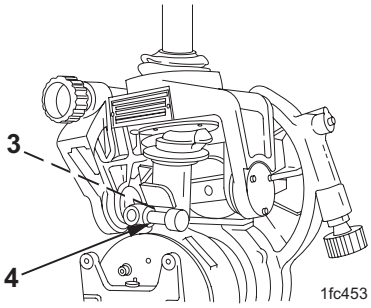
12. Sight on target and repeat step 8 above until deviation is less than 0.25 mil for -270 to 800 mils elevation and 0.50 mil for 801 through 1333 mils elevation. If either deviation cannot be eliminated, the M171/M171A1 mount is defective. Return M171/M171A1 mount to depot maintenance.

**TEST AND INSPECTION - Continued**

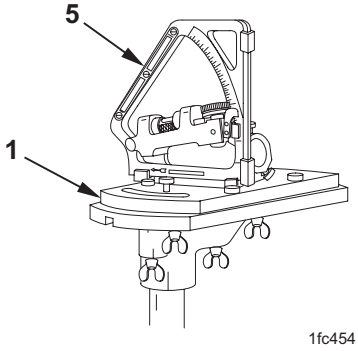
**Cant Travel Inspection**



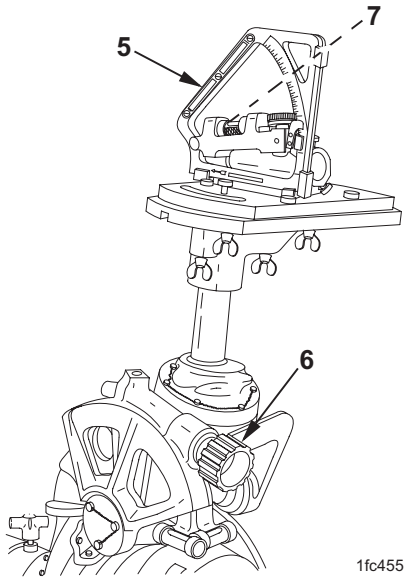

1. Mount adapter plate (1) on optical instrument support (2).




2. Center bubble in cross level vial (3) and bubble in elevation level vial (4).




3. Set fire control quadrant (5) to 178 mils and place on adapter plate (1).

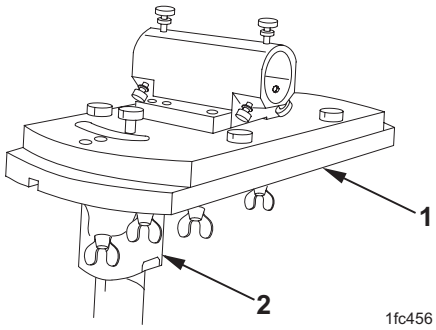



4. Turn cross level knob (6) until level bubble (7) in fire control quadrant (5) centers. If bubble does not center, M171/M171A1 mount is defective.

5. Reverse fire control quadrant (5).

6. Turn cross level knob (6) until level bubble (7) in fire control quadrant (5) centers. If level bubble does not center, M171/M171A1 mount is defective.

### Cant Backlash Inspection



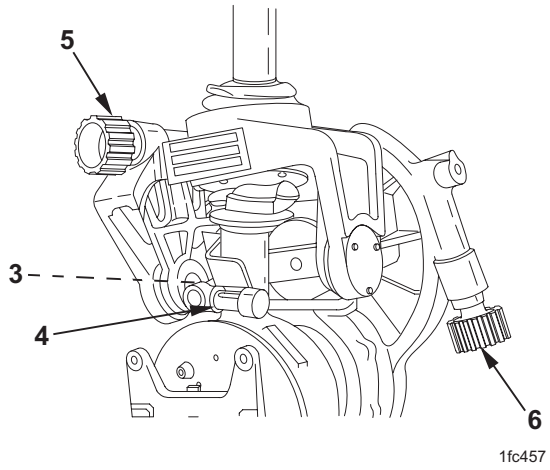

1. Fasten adapter plate (1) to optical instrument support (2).

**TEST AND INSPECTION - Continued**

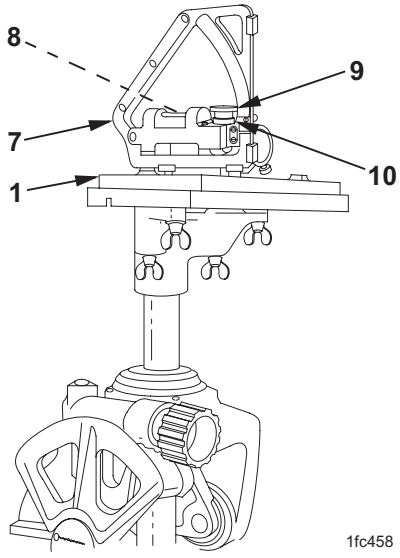
**Cant Backlash Inspection - Continued**

NOTE

When centering cross level vial and elevation level vial, final movement of cross level knob and elevation knob should be a clockwise motion.




2. Center bubble in cross level vial (3) and bubble in elevation level vial (4) using cross level knob (5) and elevation knob (6).




3. Set fire control quadrant (7) to zero, and place on adapter plate (1).

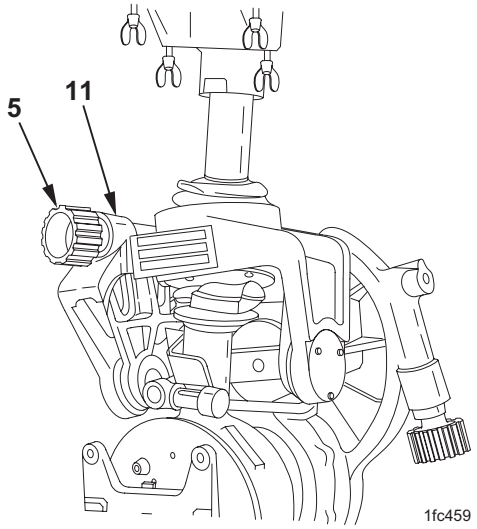
4. Check that level bubble (8) in fire control quadrant (7) is centered.

5. If level bubble (8) in fire control quadrant (7) is not centered, use micrometer knob (9) to center.

6. Record reading of micrometer (10).

## NOTE

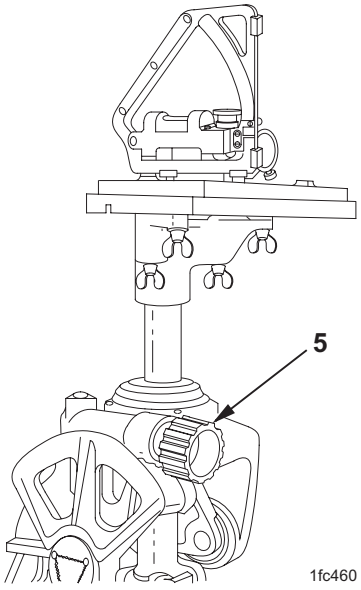
While performing backlash check, a C-clamp and pointer may be used instead of a scribed line on cross level knob.




7. Scribe one line across both cross level knob (5) and optical instrument rocker assembly (11).

## NOTE

Do not go past the scribed line when turning cross level knob counterclockwise. Ensure scribed lines are in perfect alignment.

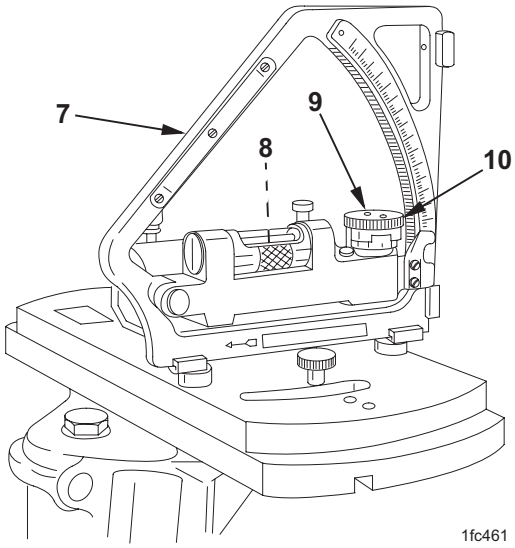



8. Turn cross level knob (5) at least 1/2 turn clockwise.

9. Turn cross level knob (5) counterclockwise until scribed lines are aligned.

**TEST AND INSPECTION - Continued**

**Cant Backlash Inspection - Continued**




10. With scribed lines aligned, recenter level bubble (8) in fire control quadrant (7) if necessary, using micrometer knob (9).

11. Record reading of micrometer (10).

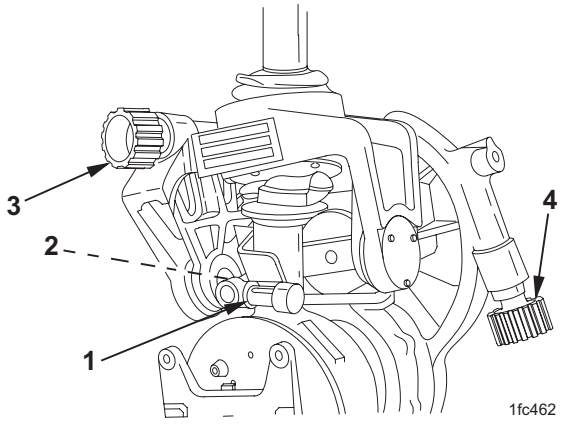
12. Compare reading with reading recorded in step 6.

13. If readings differ over 1.5 mils, backlash is excessive. Refer to WP 0022 00 for troubleshooting. If backlash is still excessive, return to depot maintenance.

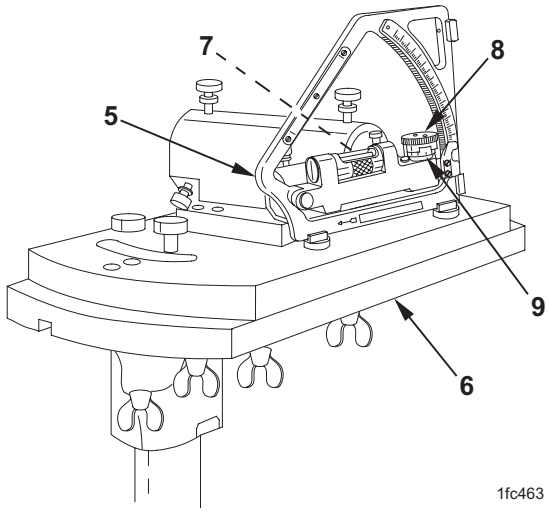
**Pitch Level Backlash Inspection**

NOTE

Final movement of cross level knob and elevation knob should be a clockwise motion when centering cross level vial and elevation level vial.



1. Center bubble in elevation level vial (1) and bubble in cross level vial (2) using cross level knob (3) and elevation knob (4).



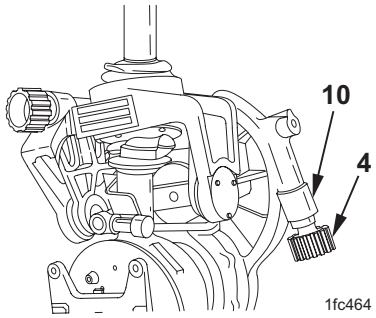

2. Set fire control quadrant (5) at zero, and place on adapter plate (6).

3. Level bubble (7) in fire control quadrant (5) should be centered. If level bubble is not centered, use micrometer knob (8) to center.

4. Record reading on micrometer (9).

## NOTE

A C-clamp and pointer may be used instead of a scribed line on elevation knob while performing backlash check.



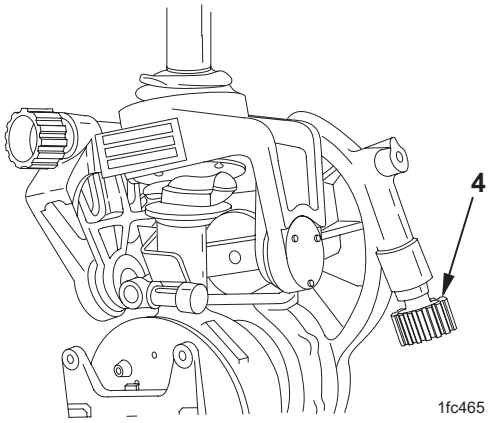

5. Scribe one line across both elevation knob (4) and housing assembly (10).

**TEST AND INSPECTION - Continued**

**Pitch Level Backlash Inspection - Continued**

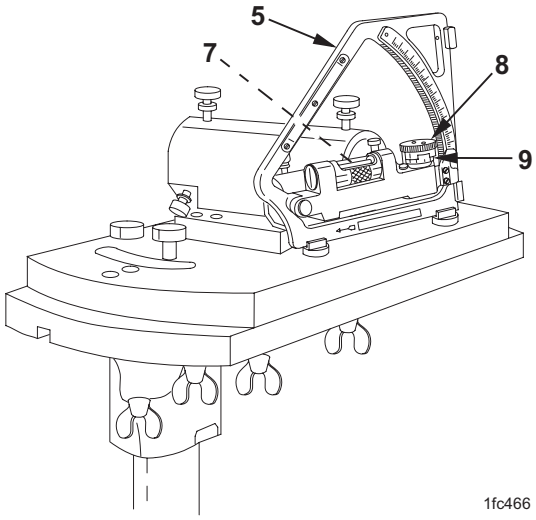
## NOTE

Do not go past scribed line when turning elevation knob counterclockwise. Ensure scribed lines are in perfect alignment.




6. Turn elevation knob (4) at least 1/2 turn clockwise.

7. Turn elevation knob (4) counterclockwise until scribed lines are aligned.



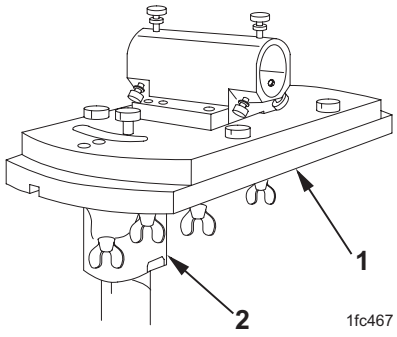

8. With scribed lines aligned, re-center level bubble (7) in fire control quadrant (5) if necessary using micrometer knob (8).

9. Record reading of micrometer (9).

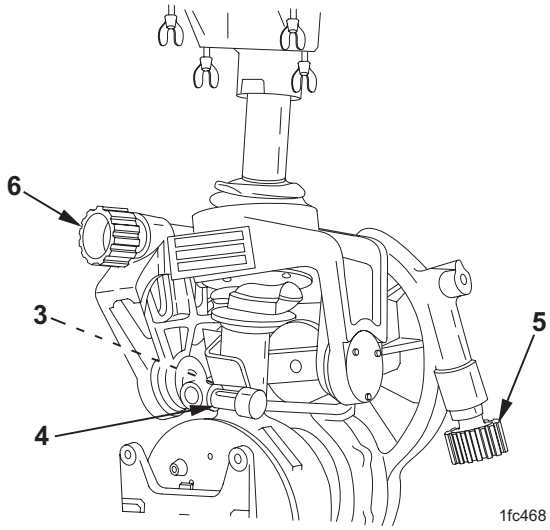
10. Compare reading with reading recorded in step 4.

11. If readings differ over 1.5 mils, backlash is excessive. Refer to WP 0021 00 for troubleshooting. If backlash is still excessive, return to depot maintenance.

**Pitch Level and Plumb Travel Inspection**



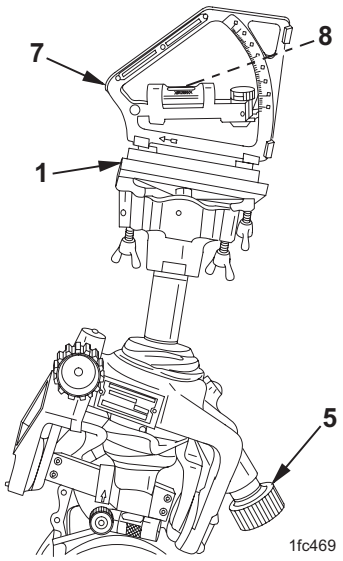

1. Mount adapter plate (1) on optical instrument support (2).




2. Center bubble in cross level vial (3) and bubble in elevation level vial (4), using elevation knob (5) and cross level knob (6).

**TEST AND INSPECTION - Continued**

**Pitch Level and Plumb Travel Inspection - Continued**

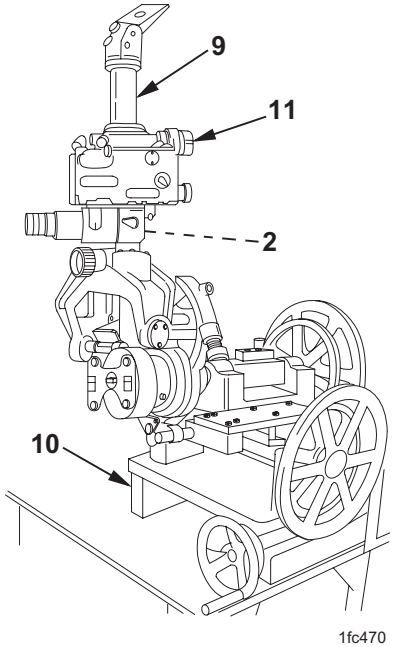



3. Set fire control quadrant (7) to 178 mils and place on adapter plate (1).

4. Turn elevation knob (5) until level bubble (8) in fire control quadrant (7) centers. If level bubble does not center, M171/M171A1 mount is defective.

5. Reverse fire control quadrant (7).

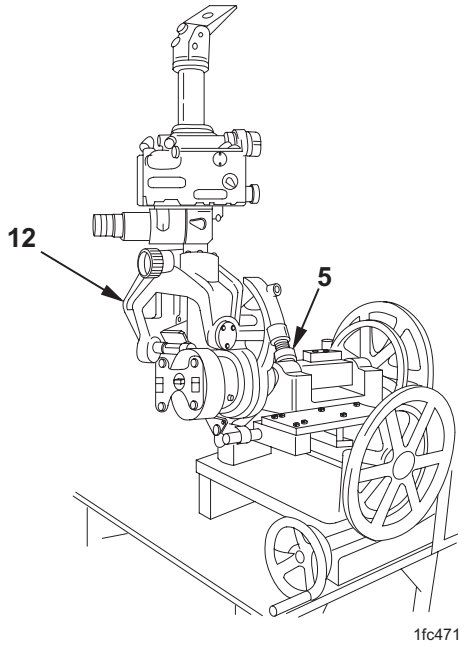
6. Turn elevation knob (5) until level bubble (8) in fire control quadrant (7) centers. If level bubble does not center, M171/M171A1 mount is defective.



7. Secure M137/M137A2/M137A3 telescope (9) to optical instrument support (2).

8. Level cross-leveling fixture (10) and re-center the bubble in cross level vial and bubble in elevation level vial. Refer to Mounting the M171/M171A1 Mount on Cross-Leveling Fixture, steps 13 through 20.

9. Rotate azimuth knob (11) clockwise to 0000 mils. Align plumbline to M137/M137A2/M137A3 telescope reticle.



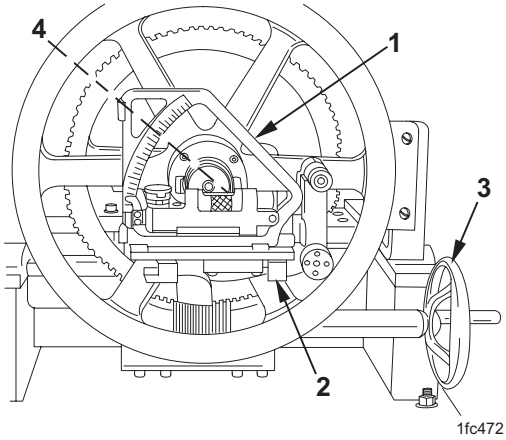

10. Turn elevation knob (5) clockwise until it stops.

11. Turn elevation knob (5) counterclockwise until it stops.

12. Line of sight on M171/M171A1 mount (12) must not deviate over 0.5 mil (total spread). If deviation is in excess of 0.5 mil, return to depot maintenance.

**TEST AND INSPECTION - Continued**

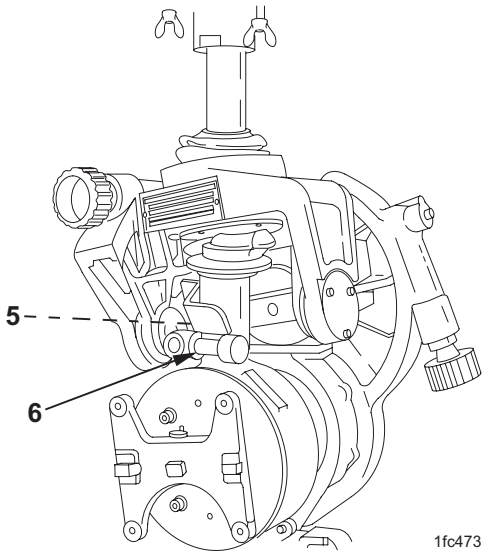
**Mount Rigidity Inspection**



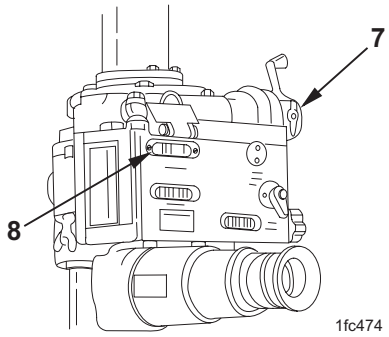

1. Set fire control quadrant (1) to zero mil.
2. Place fire control quadrant (1) on inspection aid support assembly (2) and turn elevation handwheel (3) until level bubble (4) in fire control quadrant centers.

NOTE

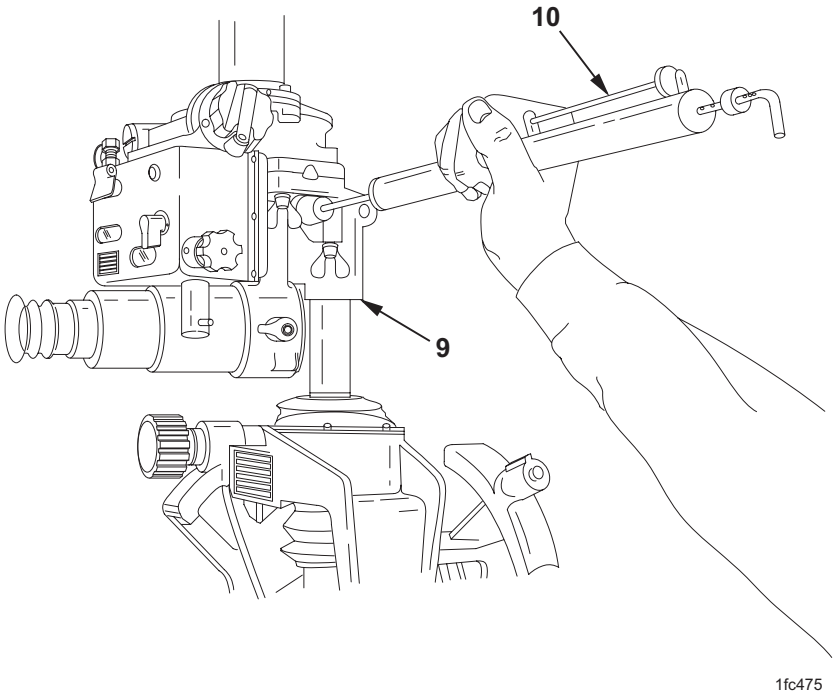
Cross-leveling fixture should be re-leveled in elevation and cant before checking zero setting on elevation vernier scale.




3. Center bubble in cross level vial (5) and bubble in elevation level vial (6).




4. Rotate azimuth knob (7) clockwise to 4800 mils on azimuth counter (8). Align target to reticle line.




5. While sighting optical instrument support (9) on target, use push-pull gage (10), and apply 20-lb (9.07 kg) load on right side, 2.3 in. (5.84 cm) from center of optical instrument support.

6. Release load and record amount of movement.

7. Place push-pull gage (10) on left side of optical instrument support (9), and apply 20-lb (9.07 kg) load, 2.3 in. (5.84 cm) from center of optical instrument support.

8. Release load and record amount of movement.

9. Total of steps 6 and 8 must not exceed total movement listed in Table 1.

## NOTE

If movement exceeds amount allowed in Table 1, recheck M171/M171A1 mount for proper assembly. If movement still exceeds amount allowed in Table 1, return to depot maintenance.

10. Repeat steps 1 through 9 using elevations listed in Table 1.

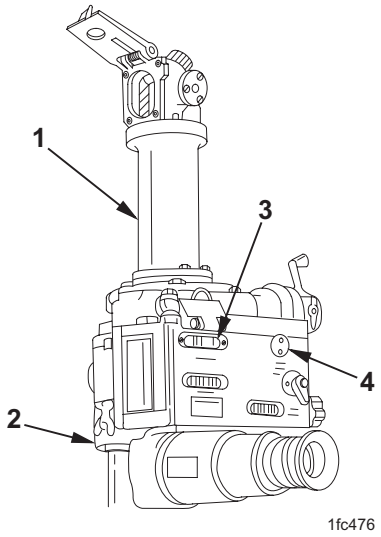
**TEST AND INSPECTION - Continued**

**Mount Rigidity Inspection - Continued**

**Table 1. Mount Rigidity Inspection—Elevation, Cant, and Total Movement Data.**

| Elevation (mils) | Elevation (degrees and minutes) | Cant angle (mils) | Total movement (mils) |
|---|---|---|---|
| 0 | 0° | 0 | 0.25 |
| 800 | 44° 54' | 0 | 0.75 |
| 1100 | 51° 53' | 0 | 1.75 |
| 1333 | 74° 59' | 0 | 3.50 |

**Azimuth Correction Inspection**

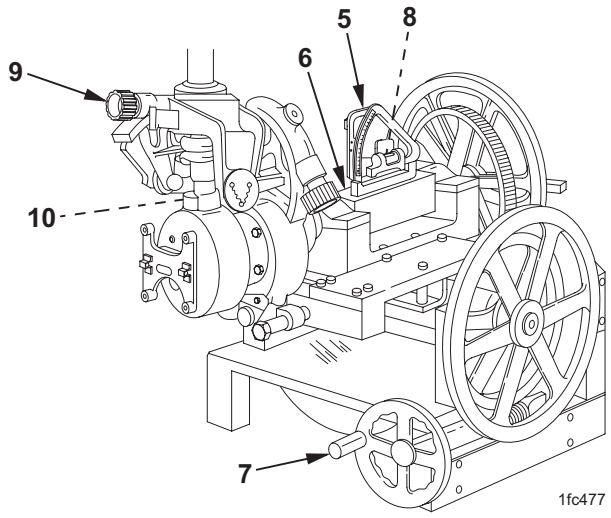



1. Secure M137/M137A2/M137A3 telescope (1) to optical instrument support (2).
2. Level the cross-leveling fixture in elevation and cant.

NOTE

Ensure bubble in cross level vial and bubble in elevation level vial on M171/M171A1 mount are centered.

3. Set azimuth counter (3) at 4800 mils.
4. Release azimuth counter eccentric (4), align M137/M137A2/M137A3 telescope reticle line on wall target, and engage azimuth counter eccentric.




5. Set fire control quadrant (5) at 88.9 mils and place on block (6).

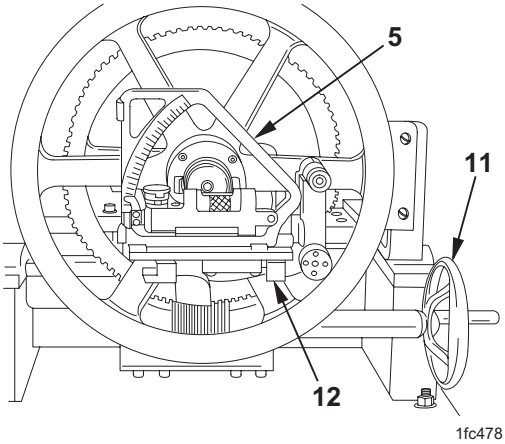
6. Turn cant handwheel (7) until level bubble (8) in fire control quadrant (5) centers.

7. Turn cross level knob (9) to recenter bubble in cross level (10).

## NOTE

After cant is set into the cross-leveling fixture, recenter level bubble in inspection aid support assembly when elevation settings are applied.

If test fixture is not equipped with inspection aid support assembly, set vernier scale at 16° 56' elevation.




8. Turn elevation handwheel (11) until fire control quadrant (5), set at 300 mils, on inspection aid support assembly (12) reads level.

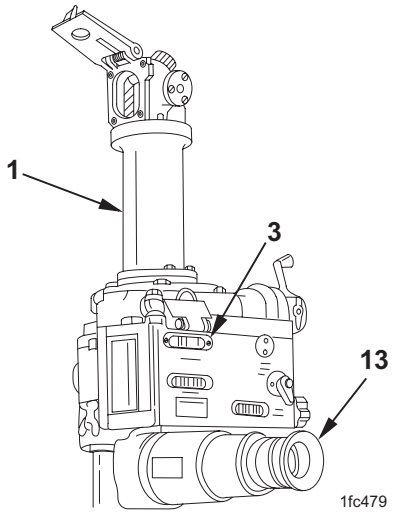
**TEST AND INSPECTION - Continued**

**Azimuth Correction Inspection - Continued**

## NOTE

After each elevation setting, recenter bubble in elevation level vial.

When M137/M137A2/M137A3 telescope is aligned on target, final movement of azimuth knob should be in a clockwise direction.




9. Look through eyeshield (13) of M137 telescope (1) and align M137/M137A2/M137A3 telescope reticle line on wall target.

## NOTE

The variance in readings is dependent upon which way the 88.9 mils is applied to the fixture. The 27 ± 0.3 mils would be subtracted from the 4800-mil reading.

10. Azimuth counter (3) should read 4837 ± 0.3 mils or 4773 ± 0.3 mils.

11. Repeat steps 5 through 10 using elevations, cant angles, azimuth corrections, and tolerances in Table 2.

12. Repeat steps 5 through 10, setting cant in opposite direction.

## NOTE

If azimuth counter readings cannot be obtained, check to ensure proper maintenance procedures were followed when the M171/M171A1 mount was reassembled. If azimuth correction readings are still unobtainable, there is a possibility of excessively worn or bent depot parts. Return the M171/M171A1 mount to depot maintenance.

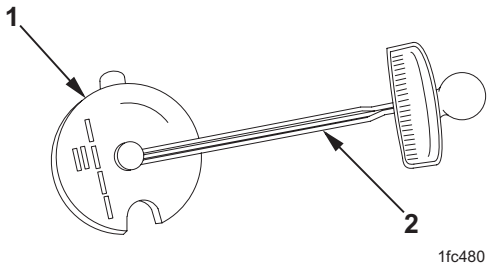
**Table 2. Azimuth Correction Data.**

| Reference elevation (mils) | Cant angle (mils) | Azimuth correction (mils) | Tolerance (mils) |
|---|---|---|---|
| 300 | 88.9 | 27.0 | 0.3 |
| 600 | 88.9 | 59.6 | 0.7 |
| 900 | 88.9 | 108.8 | 1.5 |
| 1200 | 88.9 | 216.8 | 1.8 |
| 300 | 177.8 | 54.5 | 0.6 |
| 600 | 177.8 | 120.3 | 1.0 |
| 1100 | 177.8 | 342.4 | 2.0 |

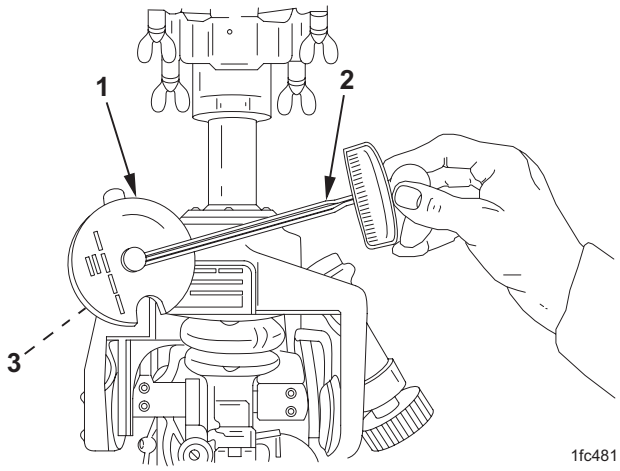
**NOTE**

When M171/M171A1 mount is canted 88.9 and 177.8 mils below zero, the azimuth corrections will be added to the 4800-mil azimuth counter reading. When M171/M171A1 mount is canted 88.9 and 177.8 mils above zero, the azimuth corrections will be subtracted from the 4800-mil azimuth counter reading.

### Torque Inspection



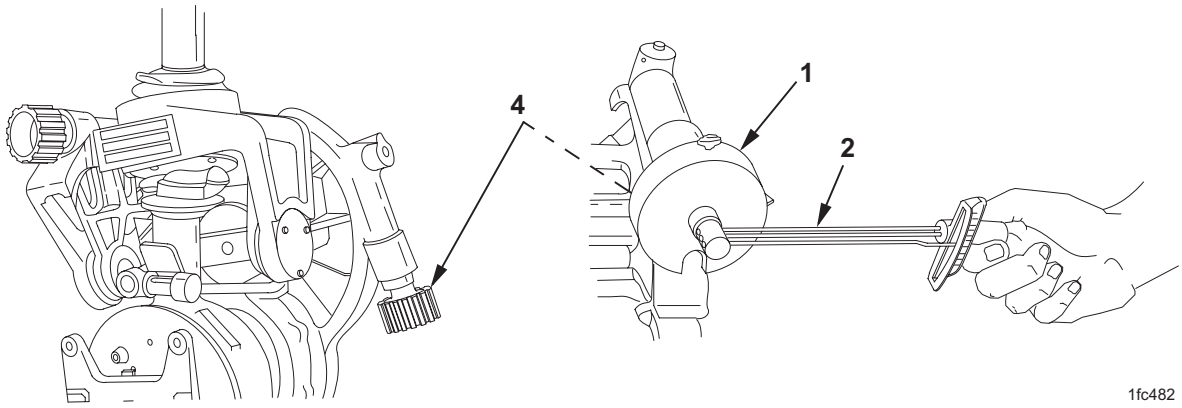

1. Place torque adapter (1) on torque wrench (2).



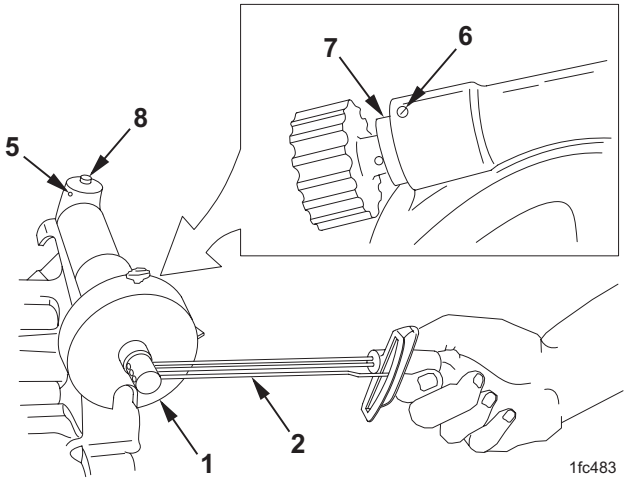

2. Place torque wrench (2) with torque adapter (1) over cross level knob (3). Torque required for continuous movement (running torque) must be between 4 in.-lb (0.45 N-m) and 12 in.-lb (1.35 N-m).

**TEST AND INSPECTION - Continued**

**Torque Inspection - Continued**




3. Place torque wrench (2) with torque adapter (1) over elevation knob (4). Torque required for continuous movement (running torque) must be between 4 in.-lb (0.45 N-m) and 12 in.-lb (1.35 N-m).

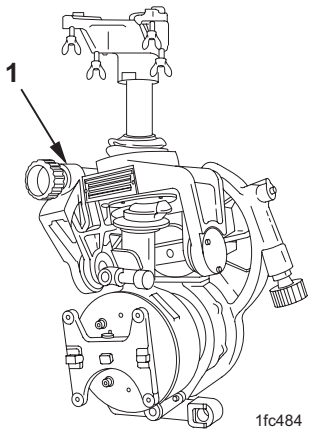



4. If torque is not met for cross level knob (3) or elevation knob (4), loosen setscrews (5 and 6). Tighten or loosen externally threaded ring (7) or machine thread plug (8).

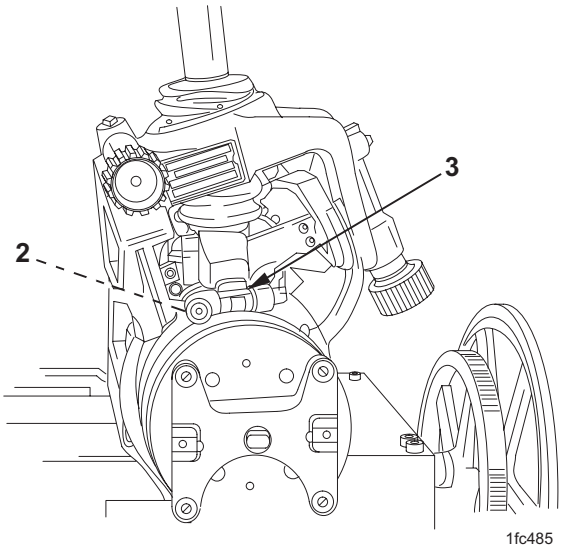
**Illumination Inspection**

## WARNING

When inspecting radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.




1. Take M171 mount (1) inside dark room and wait 15 minutes.




2. Check bubble in cross level vial (2) and bubble in elevation level vial (3) for even illumination and sufficient illumination to see bubbles and vial graduations.

**END OF WORK PACKAGE**

# CHAPTER 17

# DIRECT SUPPORT MAINTENANCE INSTRUCTIONS FOR M172/M172A1 TELESCOPE AND QUADRANT MOUNT

**DIRECT SUPPORT**

**M172/M172A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-037-7290/1240-01-517-2171)**

**SERVICE UPON RECEIPT**
**SERVICE UPON RECEIPT OF MATERIEL**

## SERVICE UPON RECEIPT OF MATERIEL

### Unpacking

When a new or reconditioned M172/M172A1 Telescope and Quadrant Mount is received, be aware of any shipping damage to packaging materiel. Report any damage on SF 364, Report of Discrepancy (ROD), as prescribed in AR 735-11-2. Retain packaging materiel for future use.

### Checking Unpacked Equipment

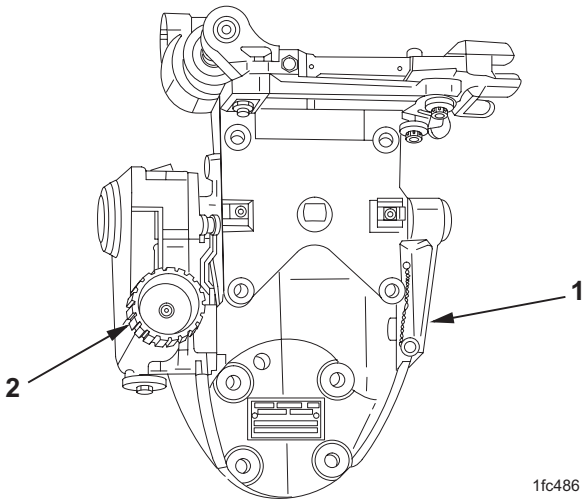
1. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 361, Transportation Discrepancy Report.

2. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with applicable service instructions (e.g., for Army instructions, see DA PAM 738-750).

3. Check to see whether the equipment has been modified.

4. Check M172/M172A1 mount (1) for bare spots, dents, scuff marks, and damaged parts. Inspect M172/M172A1 mount for cleanness.

5. Operate cross level knob (2). Check that rotation is free and smooth without binding or rough motion.




**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M172/M172A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-037-7290/1240-01-517-2171)**

**M172/M172A1 MOUNT MAINTENANCE**
**DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY**

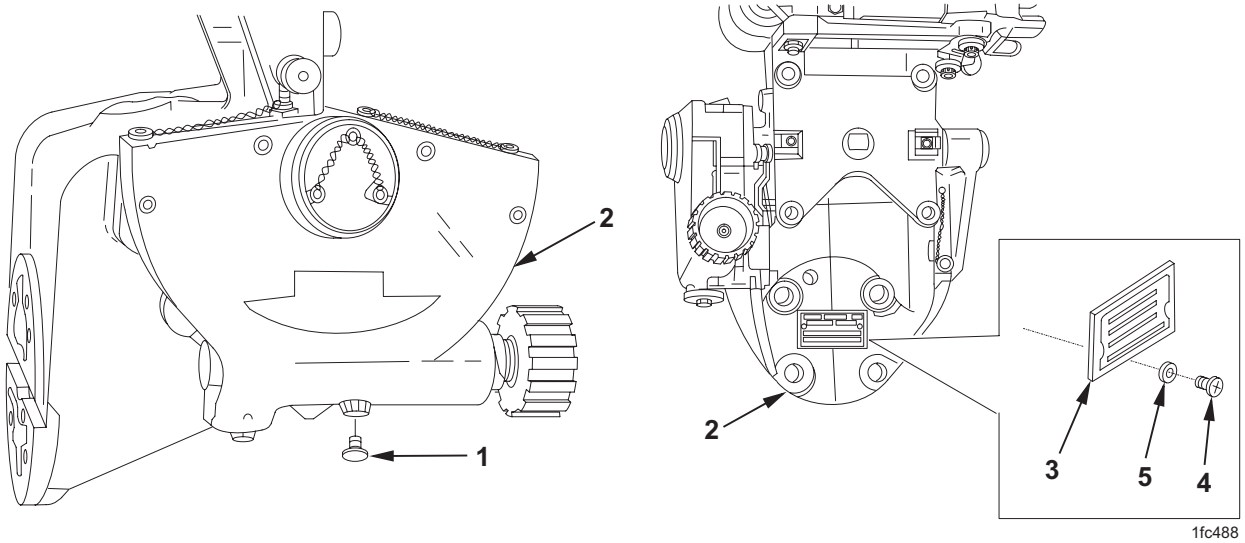
**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Artillery and Turret Mechanic's: Ordnance (SC 5180-95-A12)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Lockwashers (2) (item 2, WP 0129 00)
Sealing compound (item 13, WP 0152 00)

**References**
WP 0129 00

**DISASSEMBLY**



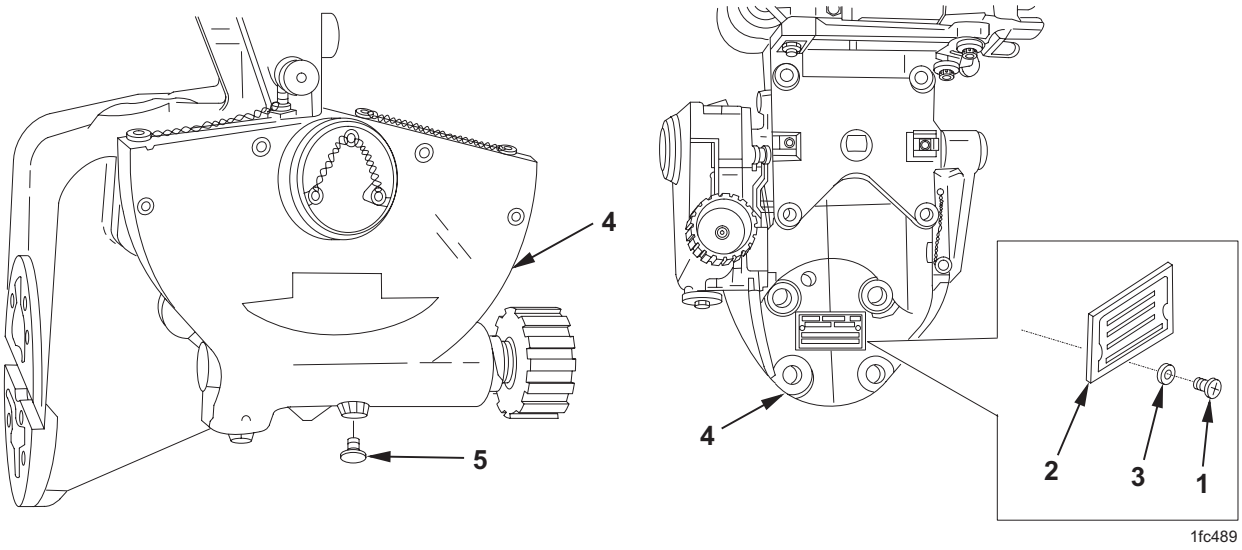

1. Inspect oil cup (1). If damaged, remove oil cup from M172/M172A1 mount (2).

2. Inspect identification plate (3). If damaged, remove two machine screws (4), two lockwashers (5), and identification plate from M172/M172A1 mount (2). Discard lockwashers.

## REPAIR OR REPLACEMENT

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0129 00.

## ASSEMBLY




WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

1. If removed, apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (1).
2. If removed, install new identification plate (2) using two new lockwashers (3) (item 2, WP 0129 00) and two machine screws (1) on M172/M172A1 mount (4).
3. If removed, install new oil cup (5) on M172/M172A1 mount (4).

## END OF WORK PACKAGE

**DIRECT SUPPORT**

# M172/M172A1 TELESCOPE AND QUADRANT MOUNT (1240-01-037-7290/1240-01-517-2171)

## ADAPTER ASSEMBLY MAINTENANCE DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

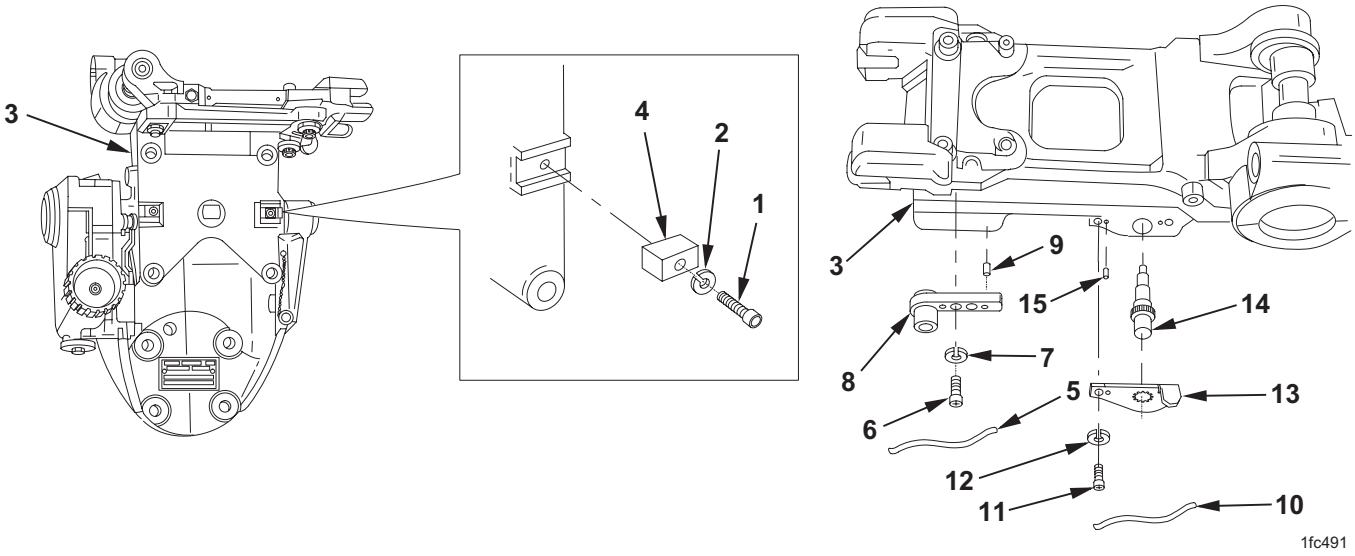
**Tools and Special Tools**
Fire control quadrant (item 10, WP 0149 00)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Grease (item 16, WP 0152 00)
Lockwasher (6) (item 2, WP 0131 00)
Lock wire (item 21, WP 0152 00)
Sealing compound (item 13, WP 0152 00)

**References**
TM 9-1025-211-10
TM 9-1025-215-10
WP 0131 00

**Equipment Conditions**
M172/M172A1 mount removed from M198/M777 howitzer (TM 9-1025-211-34/TM 9-1025-215-25&P)

## DISASSEMBLY

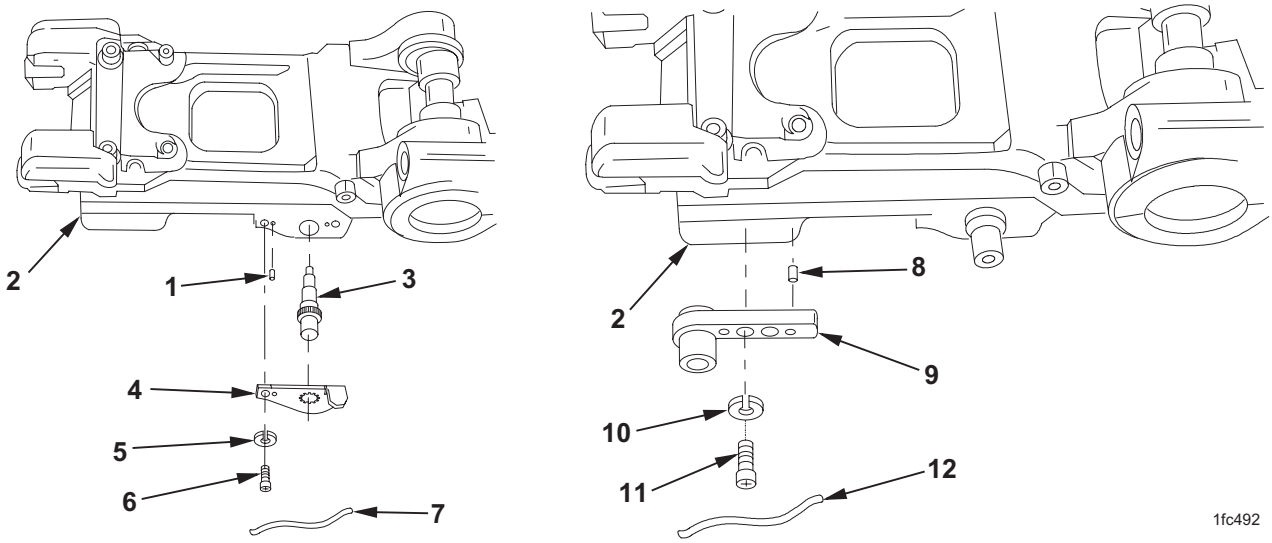



1. Remove two socket head capscrews (1) and two lockwashers (2) from quadrant adapter (3). Discard lockwashers.
2. Remove two machine keys (4).
3. Remove and discard lock wire (5).
4. Remove two socket head capscrews (6) and two lockwashers (7) from quadrant adapter (3). Discard lockwashers.
5. Remove spline plate (8).
6. Remove two headless straight pins (9).
7. Remove and discard lock wire (10).
8. Remove two socket head capscrews (11) and two lockwashers (12) from quadrant adapter (3). Discard lockwashers.
9. Remove spline plate (13).
10. Remove eccentric stud assembly (14).
11. Remove two headless straight pins (15).

## REPAIR OR REPLACEMENT

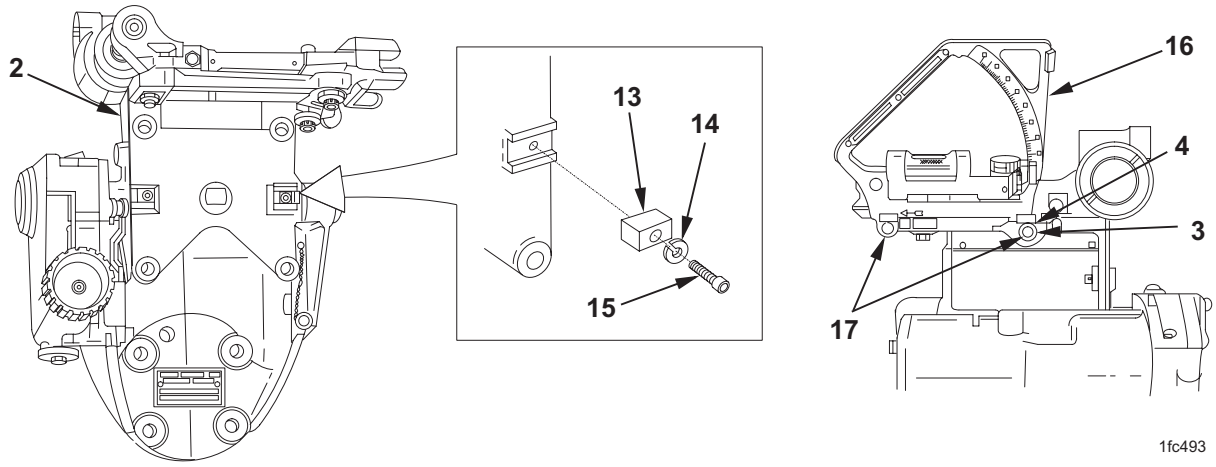
Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0131 00.

**ASSEMBLY**




1. Install two headless straight pins (1) in quadrant adapter (2).
2. Apply light coat of grease (item 16, WP 0152 00) to eccentric stud assembly (3) and install.
3. Install spline plate (4), two new lockwashers (5) (item 2, WP 0131 00), and two socket head capscrews (6).
4. Install new lock wire (7) (item 21, WP 0152 00).
5. Install two headless straight pins (8) in quadrant adapter (2).
6. Install spline plate (9), two new lockwashers (10) (item 2, WP 0131 00), and two socket head capscrews (11).
7. Install new lock wire (12) (item 21, WP 0152 00).

**ASSEMBLY - Continued**




8. Position two machine keys (13) on quadrant adapter (2).

**WARNING**

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

9. Apply sealing compound (item 13, WP 0152 00) to two socket head capscrews (15).

10. Install two new lockwashers (14) (item 2, WP 0131 00) and two socket head capscrews (15) and tighten.

**NOTE**

To adjust eccentric stud assembly the M172/M172A1 mount and M18/M18A1 quadrant must be installed on the M198/M777 howitzer (TM 9-1025-211-10/TM 9-1025-215-10). Also, the cannon tube must be set to zero elevation and the M18/M18A1 quadrant level assembly leveled (TM 9-1025-211-10/TM 9-1025-215-10).

11. Place fire control quadrant (16) on seats (17) of M172/M172A1 mount. Fire control quadrant level bubble should center.

12. If bubble is not centered, adjust eccentric stud assembly (3).

    a. Loosen eccentric stud assembly (3) to disengage spline plate (4).

    b. Turn eccentric stud assembly (3) and engage spline plate (4); tighten eccentric stud assembly.

13. Repeat step 11. If fire control quadrant level bubble is still not centered, repeat step 12 above until bubble is centered.

**END OF WORK PACKAGE**

# CHAPTER 18

# GENERAL SUPPORT MAINTENANCE INSTRUCTIONS FOR M172/M172A1 TELESCOPE AND QUADRANT MOUNT

**GENERAL SUPPORT**

# M172/M172A1 TELESCOPE AND QUADRANT MOUNT (1240-01-037-7290/1240-01-517-2171)

# M172/M172A1 MOUNT MAINTENANCE DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**

Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**

Grease (item 16, WP 0152 00)
Lockwasher (3) (item 6, WP 0128 00)
Lockwasher (6) (item 9, WP 0128 00)
Lock wire (item 21, WP 0152 00)
Mechanical felt (item 7, WP 0129 00)
Sealing compound (item 13, WP 0152 00)
Solvent cleaning compound (item 12, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

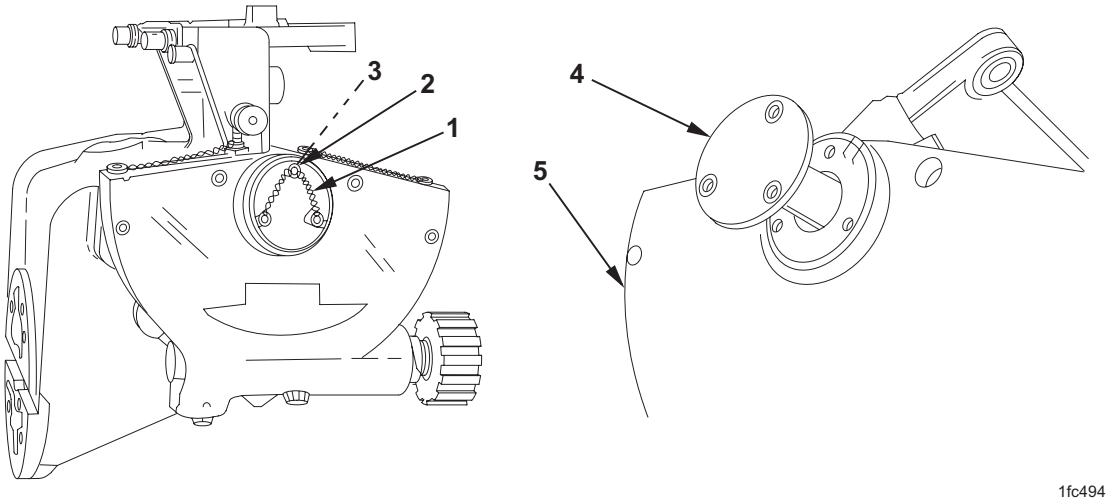
**References**

WP 0127 00
WP 0128 00
WP 0129 00

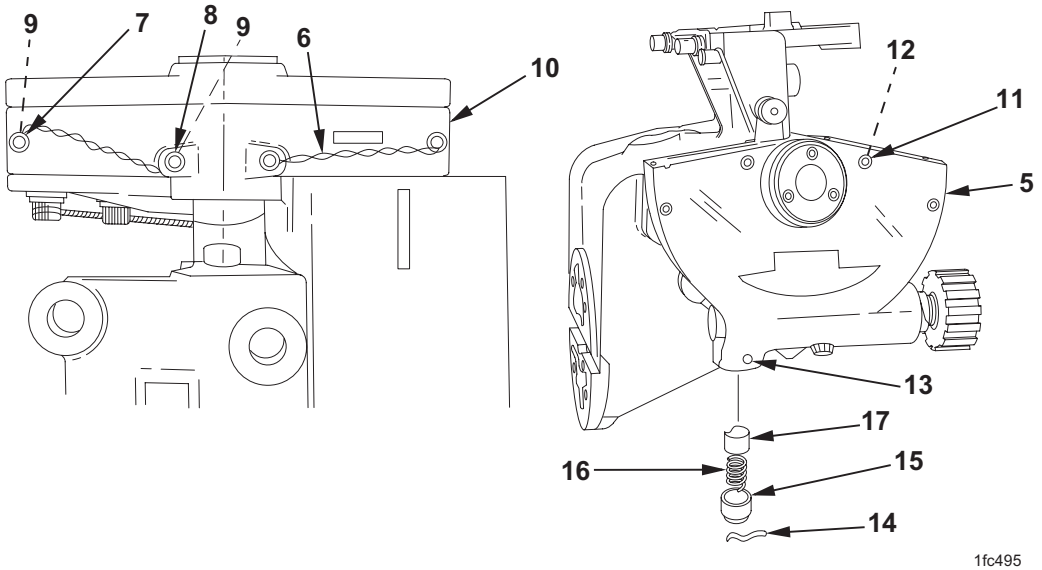
**Equipment Conditions**

M172/M172A1 telescope and quadrant mount removed from M198/M777 howitzer (TM 9-1025-211-34/ TM 9-1025-215-25&P)

**DISASSEMBLY**




1. Remove and discard lock wire (1).
2. Remove three socket head capscrews (2) and three lockwashers (3). Discard lockwashers.
3. Remove pin pivot (4) from quadrant support housing (5).




4. Remove and discard lock wire (6).
5. Remove two socket head capscrews (7), two socket head capscrews (8), and four lockwashers (9) from access cover (10). Discard lockwashers.
6. Remove two socket head capscrews (11), two lockwashers (12), and access cover (10). Discard lockwashers.

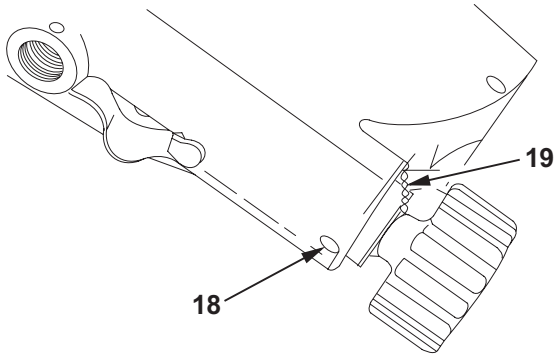
7. Loosen setscrew (13).

8. Remove and discard lock wire (14).

## NOTE

Scribe a line across machine thread plug and housing, and V bearing and housing for reference during reassembly.

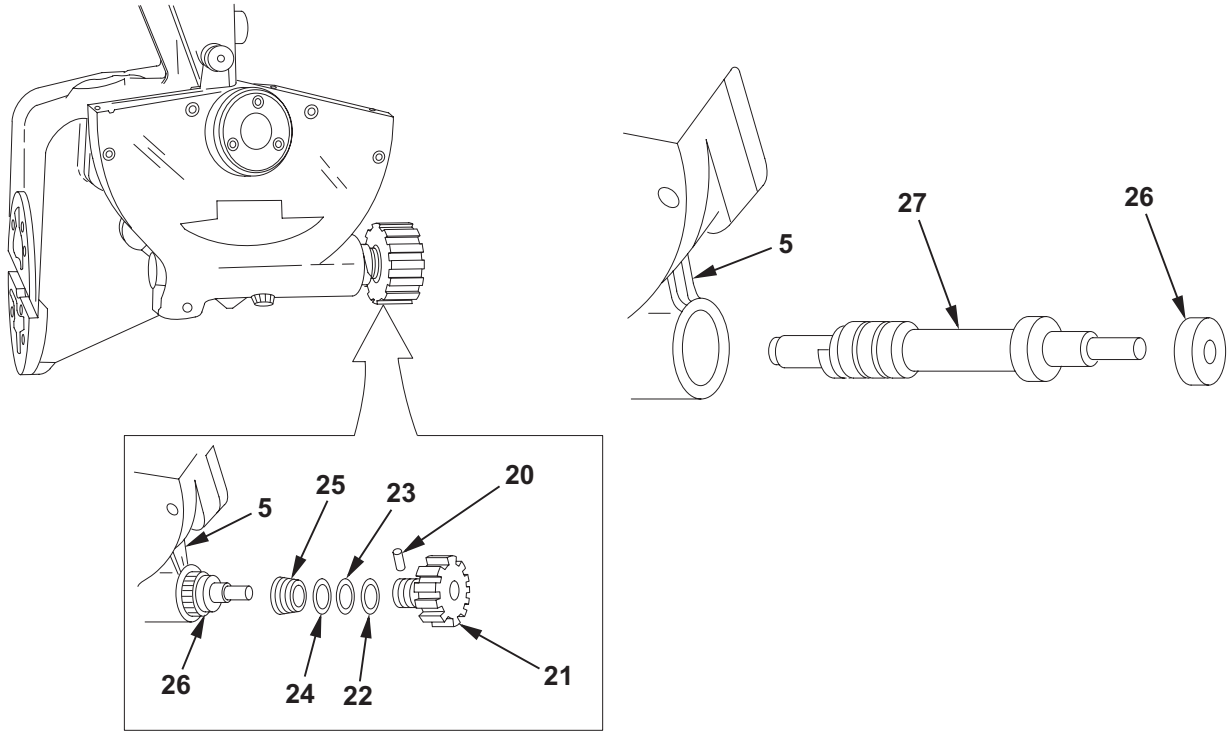
9. Remove machine thread plug (15), compression helical spring (16), and V bearing (17) from quadrant support housing (5).




10. Loosen setscrew (18).

11. Remove and discard lock wire (19).

**DISASSEMBLY - Continued**

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## CAUTION

Support cross level knob in V block on solid surface to prevent damage to worm shaft.

## NOTE

Scribe a line across cross level knob and worm shaft assembly for reference during reassembly.

12. Drive out headless straight pin (20).

13. Remove knob (21), flat washer (22), mechanical felt (23), and flat washer (24). Discard mechanical felt.

14. Remove externally threaded ring (25) and spherical plain bearing (26) from worm shaft assembly (27).

15. Remove worm shaft assembly (27) from quadrant support housing (5).

**CLEANING**

WARNING

Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.

Clean all parts with cleaning compound (item 12, WP 0152 00). Wipe off excess cleaning compound with clean wiping rag (item 18, WP 0152 00).

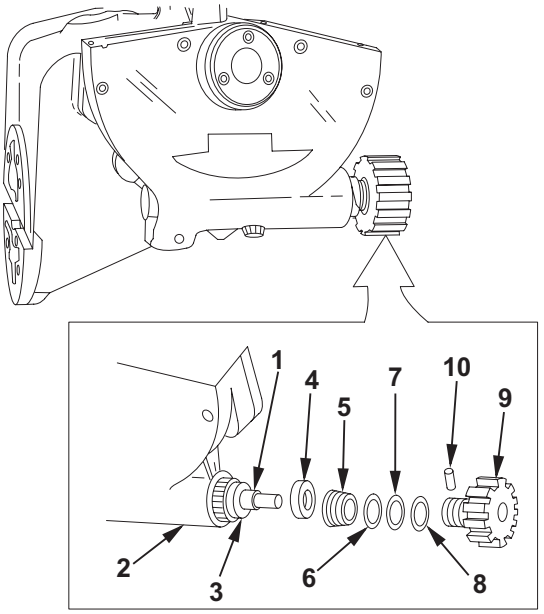
**REPAIR OR REPLACEMENT**

NOTE

Replace M172/M172A1 telescope and quadrant mount when damaged to the extent that the M18/M18A1 fire control quadrant will not function properly.

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0127 00, WP 0128 00, and WP 0129 00.

**ASSEMBLY**




1. Apply a light coat of grease (item 16, WP 0152 00) to worm shaft assembly (1) and install in quadrant support housing (2) ensuring that slot in bearing (3) is aligned with guide pin in quadrant support housing.

2. Install spherical plain bearing (4), ensuring that slot is aligned with guide pin in quadrant support housing (2). Install externally threaded ring (5) on worm shaft assembly (1). Tighten externally threaded ring.

3. Apply a light coat of grease (item 16, WP 0152 00) to flat washer (6), new mechanical felt (7) (item 7, WP 0129 00), and flat washer (8), and install on worm shaft assembly (1).

## NOTE

Perform steps 4 and 5, and continue with step 7, if new worm shaft assembly has been installed. Perform step 6 if previously-installed components are used.

4. Install knob (9) on worm shaft assembly (1) and secure with setscrew, NSN 5305-00-655-9246. Using the pilot hole located on the knob, drill hole through worm shaft assembly.

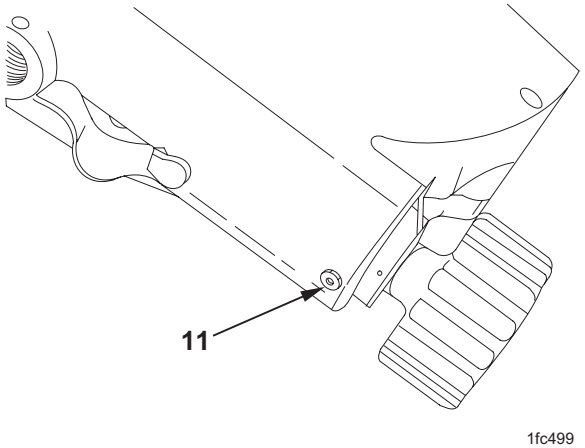
5. Remove setscrew from knob (9).

6. Align reference marks and install knob (9) on worm shaft assembly (1).

## CAUTION

Support cross level knob in V block on solid surface to prevent damage to worm shaft.

7. Install headless straight pin (10).



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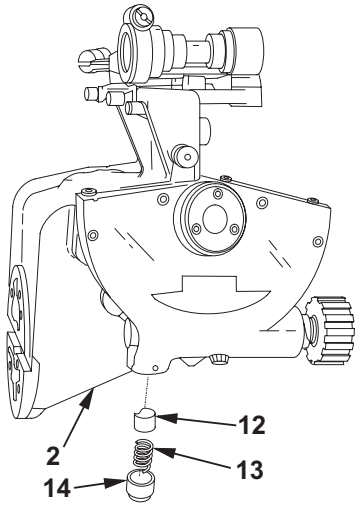

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8. Tighten setscrew (11).

9. Apply a light coat of grease (item 16, WP 0152 00) to V bearing (12). Align reference marks and install in quadrant support housing (2).

## NOTE

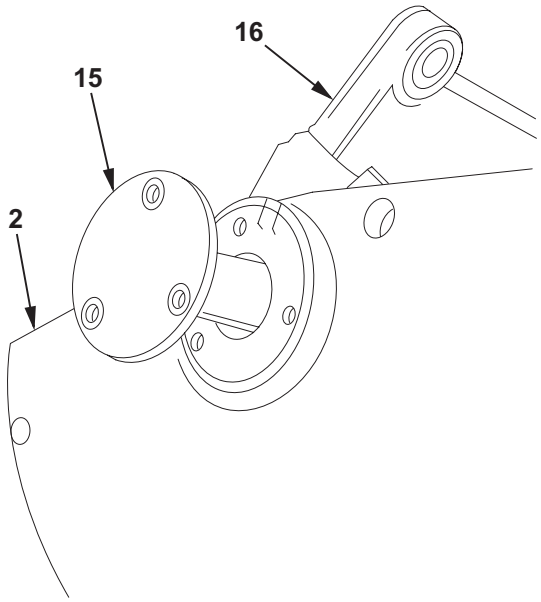
When installing machine thread plug, ensure reference marks are aligned.

10. Install compression helical spring (13) and machine thread plug (14) in quadrant support housing (2). Tighten machine thread plug until reference marks are aligned.

## NOTE

After installing V bearing and compression helical spring, screw machine thread plug in until V bearing bottoms on worm shaft assembly, and then back off machine thread plug 1/4 turn.

**ASSEMBLY - Continued**

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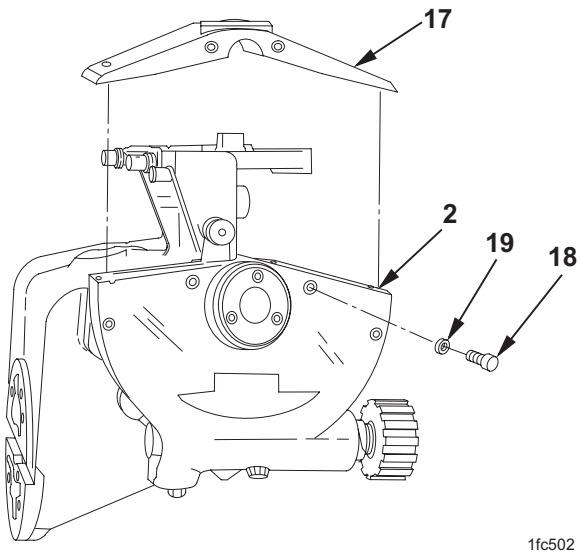


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11. Apply a light coat of grease (item 16, WP 0152 00) to sleeve of pin pivot (15).

**WARNING**

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

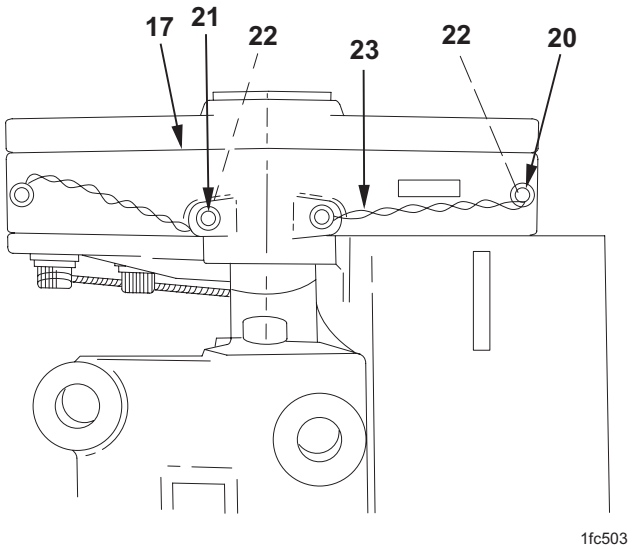
12. Apply a light coat of sealing compound (item 13, WP 0152 00) to mating surface of pin pivot (15).

13. Install pin pivot (15) through quadrant support housing (2) and into shaft of adapter assembly (16).

14. Apply sealing compound (item 13, WP 0152 00) to mating surfaces of access cover (17) and install on quadrant support housing (2).

15. Apply sealing compound (item 13, WP 0152 00) to threads of two socket head capscrews (18).

16. Install two new lockwashers (19) (item 9, WP 0128 00) and two socket head capscrews (18).

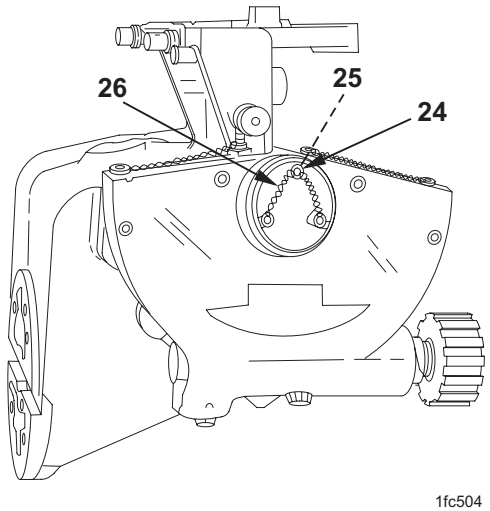



17. Apply sealing compound (item 13, WP 0152 00) to threads of two socket head capscrews (20) and two socket head capscrews (21).

18. Install four new lockwashers (22) (item 9, WP 0128 00), two socket head capscrews (20), and two socket head capscrews (21), making sure the two longer socket head capscrews are installed in the center of the access cover (17).

19. Install two new lock wires (23) (item 21, WP 0152 00) by bending sharp ends into tops of four socket head capscrews (20 and 21).

20. Cover heads of four socket head capscrews (20 and 21) with sealing compound (item 13, WP 0152 00).




21. Apply sealing compound (item 13, WP 0152 00) to threads of three socket head capscrews (24).

22. Install three new lockwashers (25) (item 6, WP 0128 00) and three socket capscrews (24).

**ASSEMBLY - Continued**

23. Install new lock wire (26) (item 21, WP 0152 00) by bending sharp ends into tops of three socket head capscrews (24).

24. Cover heads of three socket head capscrews (24) with sealing compound (item 13, WP 0152 00).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M172/M172A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-037-7290/1240-01-517-2171)**

**TELESCOPE MOUNTING BRACKET MAINTENANCE**
**REMOVAL, REPAIR OR REPLACEMENT, INSTALLATION**

## INITIAL SETUP:

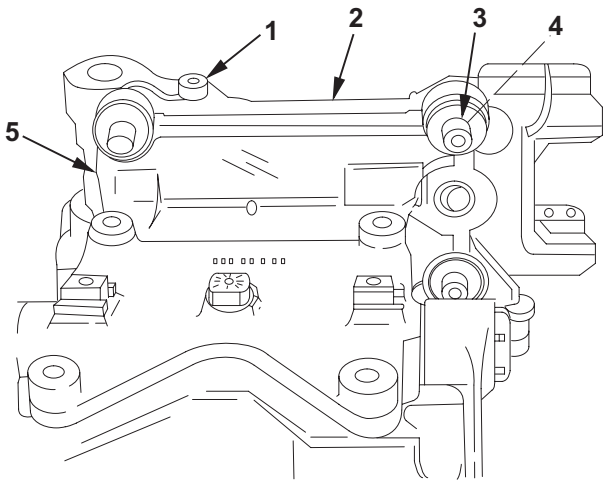
### Tools and Special Tools
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

### Materials/Parts
Grease (item 16, WP 0152 00)
Sealing compound (item 13, WP 0152 00)

### References
WP 0127 00
WP 0128 00

### Equipment Conditions
M172/M172A1 telescope and quadrant mount removed from M198/M777 howitzer (TM 9-1025-211-34/ TM 9-1025-215-25&P)

## REMOVAL




1. Loosen socket head capscrew (1) to relieve tension on telescope mounting bracket (2).
2. Remove four socket capscrews (3) and four flat washers (4).
3. Lift up and remove telescope mounting bracket (2) from adapter assembly (5).

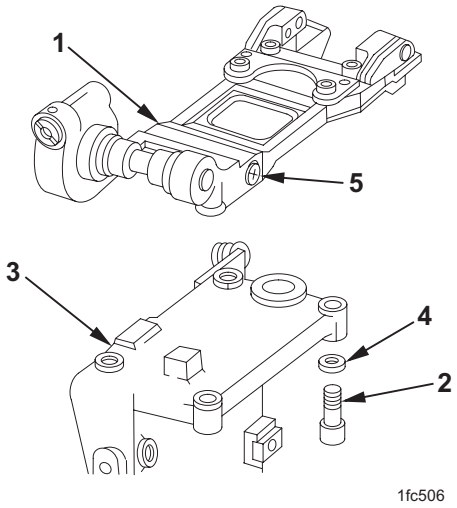
## REPAIR OR REPLACEMENT

### NOTE

Replace telescope mounting bracket when it will not permit the M138/M138A1 telescope to seat and operate correctly.

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0127 00 and WP 0128 00.

## INSTALLATION




1. Coat mating surfaces of telescope mounting bracket (1) with a thin coat of grease (item 16, WP 0152 00).

### WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

2. Apply a light coat of sealing compound (item 13, WP 0152 00) to mating surface of four socket capscrews (2).

3. Install telescope mounting bracket (1) on adapter assembly (3) and secure using four flat washers (4) and four socket capscrews (2).

4. Tighten socket head capscrew (5).

## END OF WORK PACKAGE

**GENERAL SUPPORT**

**M172/M172A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-037-7290/1240-01-517-2171)**

**ACCESS COVER MAINTENANCE**
**REMOVAL, REPAIR OR REPLACEMENT, INSTALLATION**

**INITIAL SETUP:**

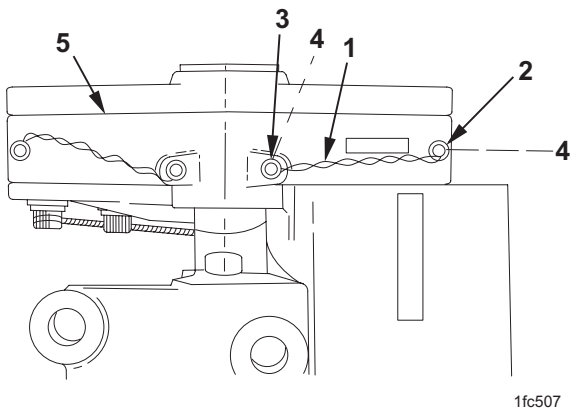
**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

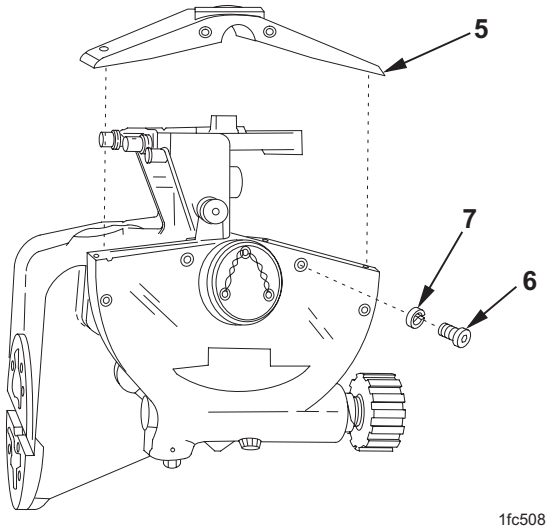
**Materials/Parts**
Lockwasher (6) (item 9, WP 0128 00)
Lock wire (item 21, WP 0152 00)
Sealing compound (item 13, WP 0152 00)

**References**
WP 0127 00
WP 0128 00

**Equipment Conditions**
M172/M172A1 telescope and quadrant mount removed from M198/M777 howitzer (TM 9-1025-211-34/ TM 9-1025-215-25&P)

**REMOVAL**



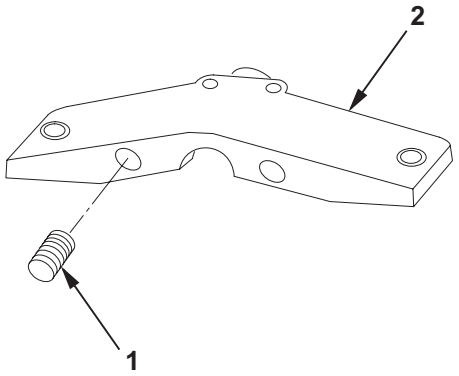




1. Remove and discard lock wire (1).

2. Remove two socket head capscrews (2), two socket head capscrews (3), and four lockwashers (4) from access cover (5). Discard lockwashers.

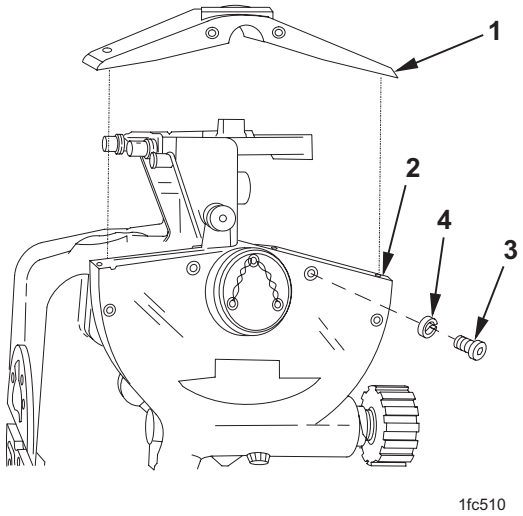
3. Remove two socket head capscrews (6), two lockwashers (7), and access cover (5). Discard lockwashers.

## REPAIR OR REPLACEMENT




1. If damaged, remove two screw thread inserts (1) from cover (2).
2. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0127 00 and WP 0128 00.
3. If removed, install two new screw thread inserts (1) in cover (2).

## INSTALLATION



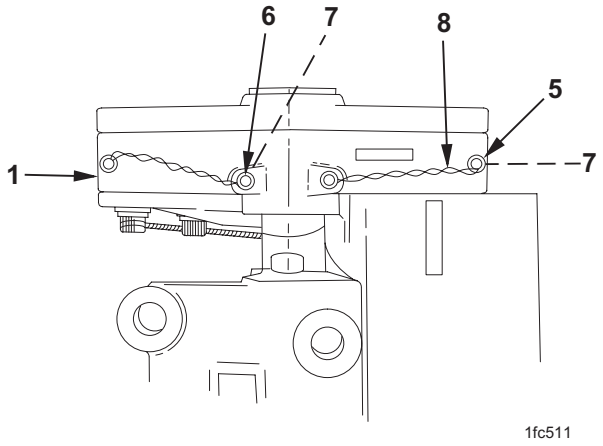
## WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

1. Apply sealing compound (item 13, WP 0152 00) to mating surfaces of access cover (1) and install on quadrant support housing (2).

2. Apply sealing compound (item 13, WP 0152 00) to threads of two socket head capscrews (3).

3. Install two new lockwashers (4) (item 9, WP 0128 00) and two socket head capscrews (3).




4. Apply sealing compound (item 13, WP 0152 00) to threads of two socket head capscrews (5) and two socket head capscrews (6).

5. Install four new lockwashers (7) (item 9, WP 0128 00), two socket head capscrews (5), and two socket head capscrews (6), making sure the two longer socket head capscrews are installed in the center of the access cover (1).

6. Install two new lock wires (8) (item 21, WP 0152 00) by bending sharp ends into tops of four socket head capscrews (5 and 6).

7. Cover heads of four socket head capscrews (5 and 6) with sealing compound (item 13, WP 0152 00).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M172/M172A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-037-7290/1240-01-517-2171)**

**ADAPTER ASSEMBLY MAINTENANCE**
**REMOVAL, DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY, INSTALLATION**

**INITIAL SETUP:**

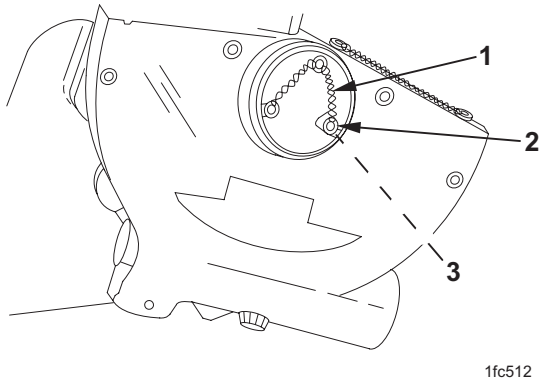
**Tools and Special Tools**
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

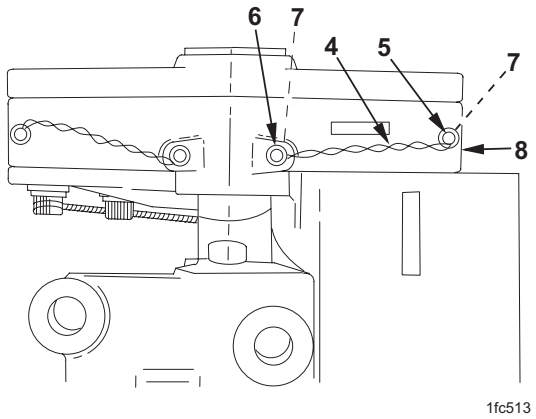
**Materials/Parts**
Grease (item 16, WP 0152 00)
Lockwasher (3) (item 6, WP 0128 00)
Lockwasher (5) (item 4B, WP 0128 00)
Lockwasher (6) (item 9, WP 0128 00)
Lock wire (item 21, WP 0152 00)
Mechanical felt (item 11, WP 0128 00)
Sealing compound (item 13, WP 0152 00)
Solvent cleaning compound (item 12, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
WP 0077 00
WP 0128 00
WP 0131 00

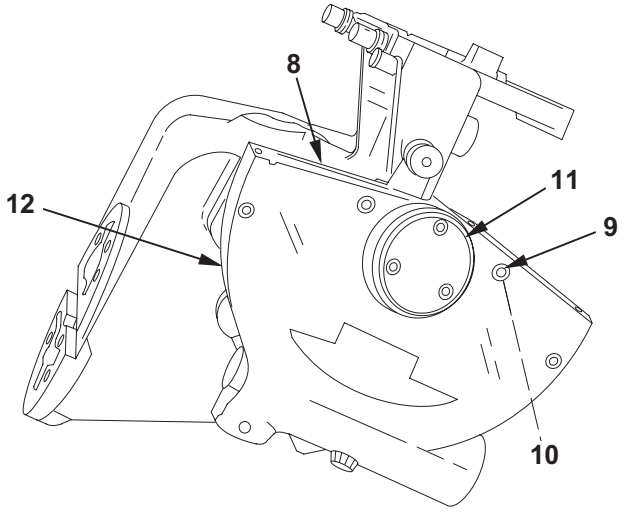
**Equipment Conditions**
M172/M172A1 telescope and quadrant mount removed from M198/M777 howitzer (TM 9-1025-211-34/ TM 9-1025-215-25&P)
Worm shaft assembly removed (WP 0077 00)

**REMOVAL**

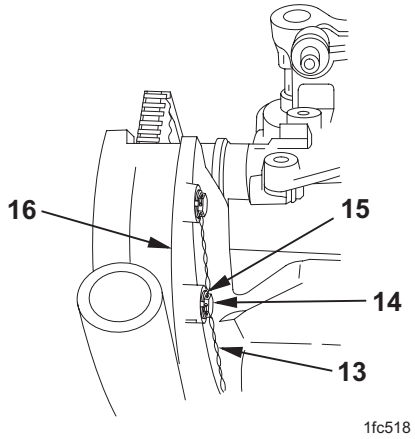



1. Remove and discard lock wire (1).
2. Remove three socket head capscrews (2) and three lockwashers (3). Discard lockwashers.
3. Remove and discard lock wire (4).
4. Remove two socket head capscrews (5), two socket head capscrews (6), and four lockwashers (7) from access cover (8). Discard lockwashers.

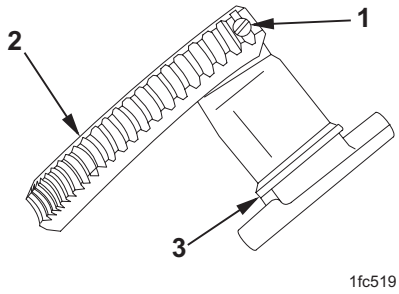



5. Remove two socket head capscrews (9), two lockwashers (10), and access cover (8). Discard lockwashers.
6. Remove pin pivot (11) from quadrant support housing (12).




7. Remove and discard lock wire (13) from five socket head capscrews (14).
8. Remove five socket head capscrews (14) and five lockwashers (15). Discard lockwashers.
9. Remove housing cover (16).

**DISASSEMBLY**




1. Remove two machine screws (1) from worm wheel gear sector (2).
2. Remove mechanical felt (3) from worm wheel gear sector (2). Discard mechanical felt.

**CLEANING**

**WARNING**

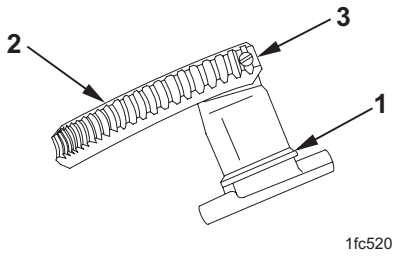
Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.

Clean all parts with cleaning compound (item 12, WP 0152 00). Wipe off excess cleaning compound with clean wiping rag (item 18, WP 0152 00).

## REPAIR OR REPLACEMENT

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0128 00 and WP 0131 00.

## ASSEMBLY



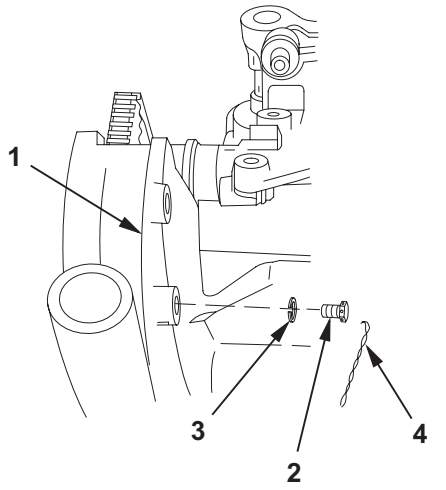

1. Saturate new mechanical felt (1) (item 11, WP 0128 00) with grease (item 16, WP 0152 00) and install on worm wheel gear sector (2).

WARNING

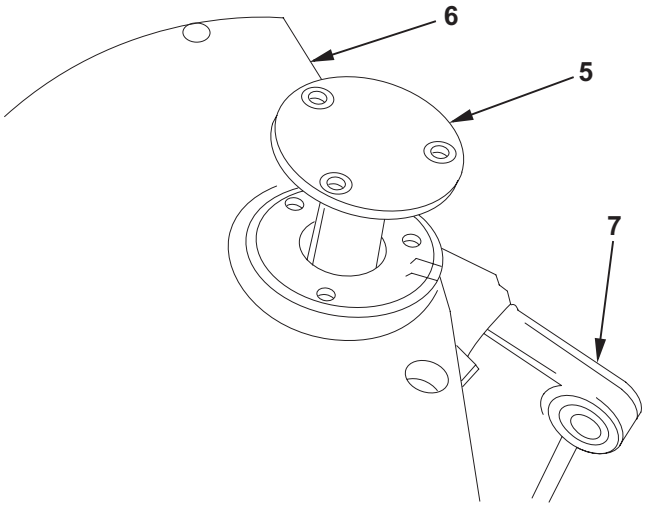
Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

2. Apply a light coat of sealing compound (item 13, WP 0152 00) to two machine screws (3) and install on worm wheel gear sector (2).

**INSTALLATION**



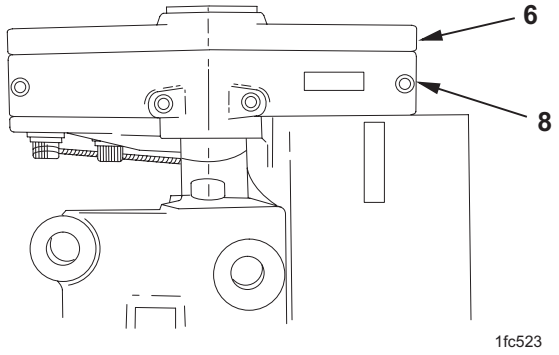

1fc521

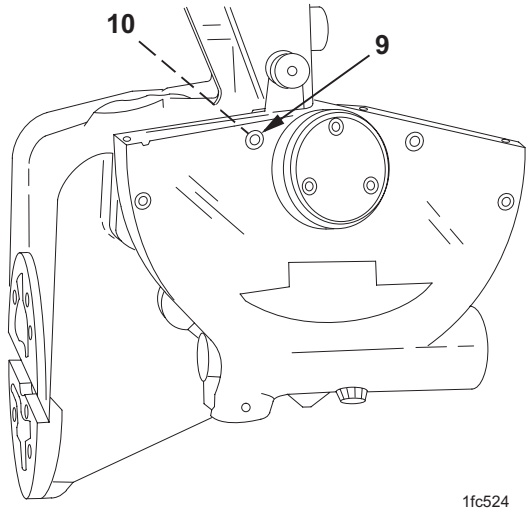



1fc522

1. Position housing cover (1).
2. Apply sealing compound (item 13, WP 0152 00) to threads of five socket head capscrews (2).
3. Install five new lockwashers (3) (item 4B, WP 0128 00) and five socket head capscrews (2).
4. Install new lock wire (4) (item 21, WP 0152 00).
5. Apply a light coat of grease (item 16, WP 0152 00) to sleeve of pin pivot (5).
6. Apply a light coat of sealing compound (item 13, WP 0152 00) to mating surface of pin pivot (5).
7. Install pin pivot (5) through quadrant support housing (6) and into shaft of adapter assembly (7).
8. Install worm shaft assembly (WP 0077 00).

**INSTALLATION - Continued**

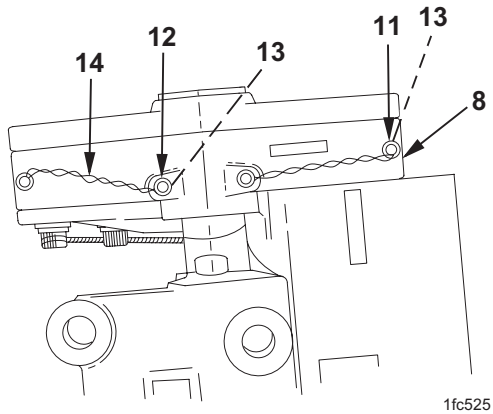


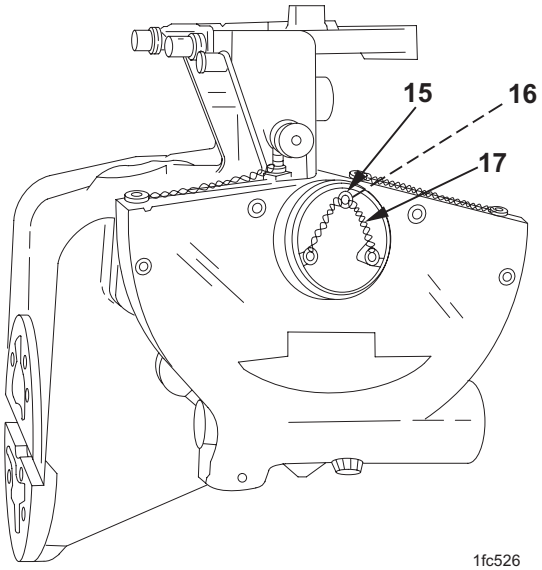




9. Apply sealing compound (item 13, WP 0152 00) to mating surfaces of access cover (8) and install on quadrant support housing (6).

10. Apply sealing compound (item 13, WP 0152 00) to threads of two socket head capscrews (9).

11. Install two new lockwashers (10) (item 9, WP 0128 00) and two socket head capscrews (9).




12. Apply sealing compound (item 13, WP 0152 00) to threads of two socket head capscrews (11) and two socket head capscrews (12).

13. Install four new lockwashers (13) (item 9, WP 0128 00), two socket head capscrews (11), and two socket head capscrews (12), making sure the two longer socket head capscrews are installed in the center of the access cover (8).

14. Install two new lock wires (14) (item 21, WP 0152 00) by bending sharp ends into tops of four socket head capscrews (11 and 12).

15. Cover heads of four socket head capscrews (11 and 12) with sealing compound (item 13, WP 0152 00).

16. Apply sealing compound (item 13, WP 0152 00) to threads of three socket head capscrews (15).

17. Install three new lockwashers (16) (item 6, WP 0128 00) and three socket head capscrews (15).

18. Install new lock wire (17) (item 21, WP 0152 00) by bending sharp ends into tops of three socket head capscrews (15).

19. Cover heads of three socket head capscrews (15) with sealing compound (item 13, WP 0152 00).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M172/M172A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-037-7290/1240-01-517-2171)**

**QUADRANT ADAPTER MAINTENANCE**
**REPAIR OR REPLACEMENT**

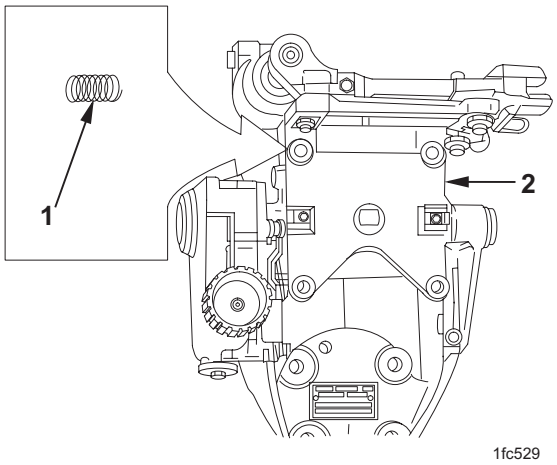
**INITIAL SETUP:**

**Tools and Special Tools**
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**References**
WP 0131 00

**Equipment Conditions**
M172/M172A1 telescope and quadrant mount removed from M198/M777 howitzer (TM 9-1025-211-34/ TM 9-1025-215-25&P)

**REPAIR OR REPLACEMENT**




1. If damaged, remove four screw thread inserts (1) from quadrant adapter (2).
2. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0131 00.
3. If removed, install four new screw thread inserts (1) in quadrant adapter (2).

**END OF WORK PACKAGE**

# CHAPTER 19

# GENERAL SUPPORT
# FINAL INSPECTION INSTRUCTIONS
# FOR
# M172/M172A1 TELESCOPE AND QUADRANT MOUNT

**GENERAL SUPPORT**

**M172/M172A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-037-7290/1240-01-517-2171)**

**FINAL INSPECTION INSTRUCTIONS**
**TEST AND INSPECTION**

**INITIAL SETUP:**

**Test Equipment**
Fire control quadrant (item 10, WP 0149 00)
Mechanical adapter (item 4, WP 0149 00)
Mounting bracket (item 1, WP 0149 00)
Optical equipment test fixture (item 8, WP 0149 00)
Plate-mounted level (item 12, WP 0149 00)
Torque wrench adapter (item 18, WP 0149 00)

**Tools and Special Tools**
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Lock wire (item 21, WP 0152 00)
Sealing compound (item 13, WP 0152 00)

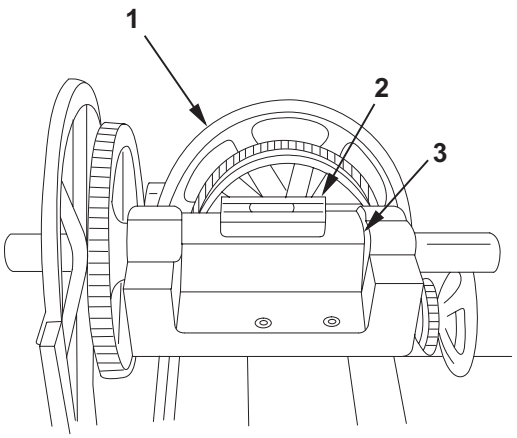
**Special Environmental Conditions**
Ambient temperature +60 °F (+16 °C) to +90 °F (+32 °C)

## TEST AND INSPECTION

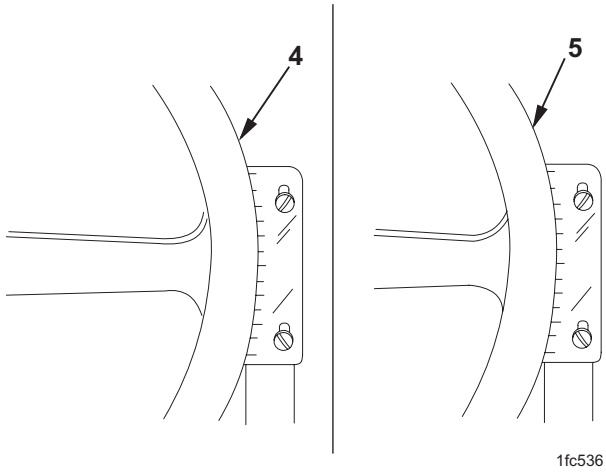
### NOTE

If the M172/M172A1 mount being inspected fails to meet the required standards, ensure all maintenance authorized at the applicable level has been performed correctly. Then send the M172/M172A1 mount to the next higher level of maintenance.

### Setting Up and Adjusting Optical Equipment Test Fixture

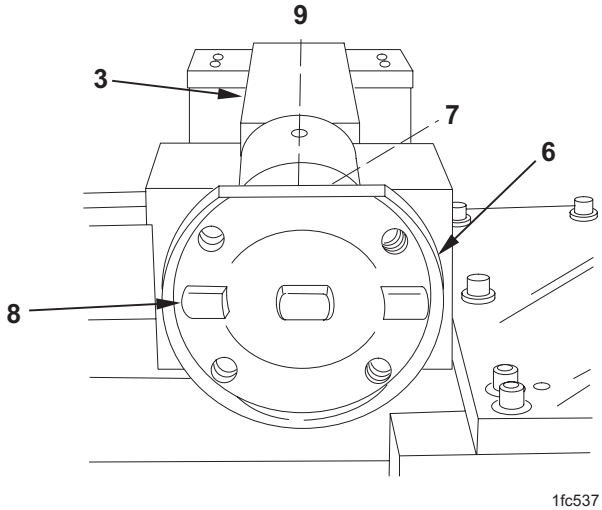


1fc535



1fc536

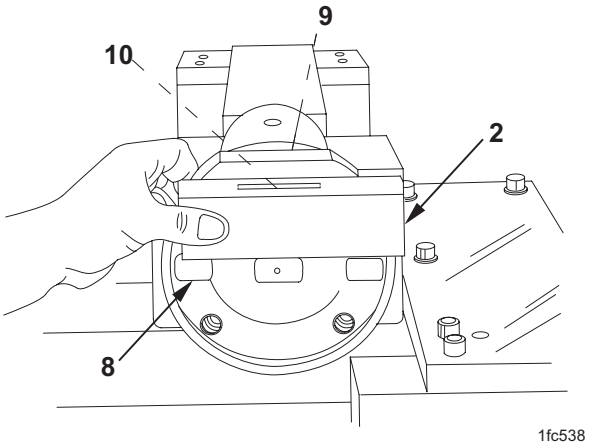
1. Secure optical equipment test fixture (1) on solid stand bolted to floor.
2. Place plate-mounted level (2) on block (3), perpendicular to axis of rotation.
3. Level optical equipment test fixture (1) in cant and elevation.
4. Set cant vernier scale (4) and elevation vernier scale (5) to 0 for both cant and elevation.



1fc537

5. Install mechanical adapter (6) on cross-leveling shaft end (7). Ensure that adapter keys (8) are parallel with top of block (3), within 0.1 mil.

6. Tighten setscrew (9) lightly.



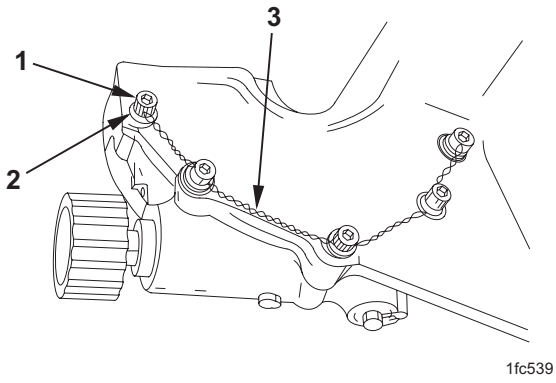

7. Place plate-mounted level (2) on adapter keys (8).

8. Check that bubble (10) in plate-mounted level (2) is centered.

9. Tighten setscrew (9); recheck cross level and adapter keys.

10. Rotate plate-mounted level (2) 180 degrees from original position, and check again that bubble (10) is centered.

### Visual Inspection

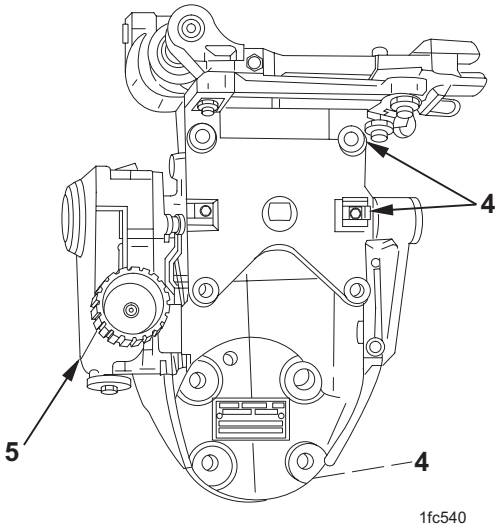



1. Check that all screws (1) and lockwashers (2) are present and tight.

2. Ensure that all lock wires (3) are present and secure.

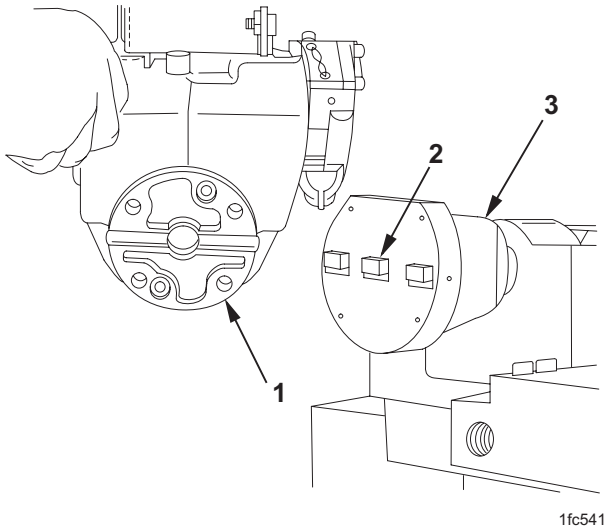
**TEST AND INSPECTION - Continued**

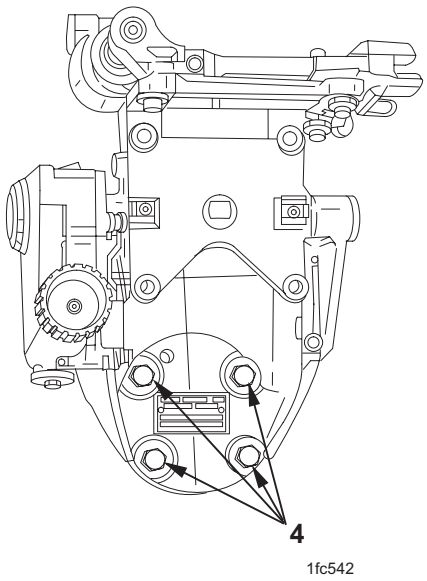
**Visual Inspection - Continued**



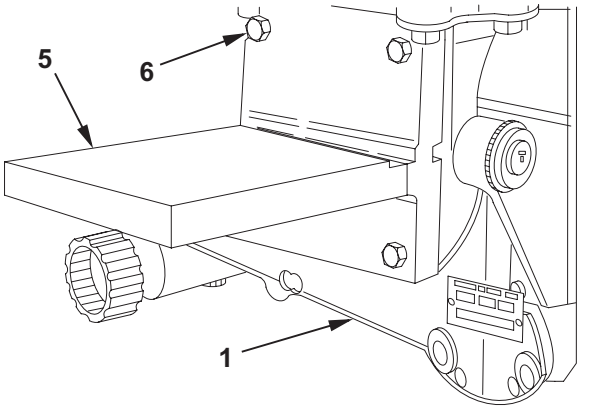

3. Ensure that all mounting surfaces (4) are clean and free of nicks and burrs.
4. Check that M172/M172A1 mount (5) is free of dirt, rust, and foreign matter.
5. Check M172/M172A1 mount (5) to ensure that paint is not chipped.
6. Check M172/M172A1 mount (5) to ensure that all parts are present.

**Mounting M172/M172A1 Mount on Optical Equipment Test Fixture**




1. Position M172/M172A1 mount (1) on adapter keys (2) of mechanical adapter (3).
2. Install four hexagon cap screws (4) and tighten.



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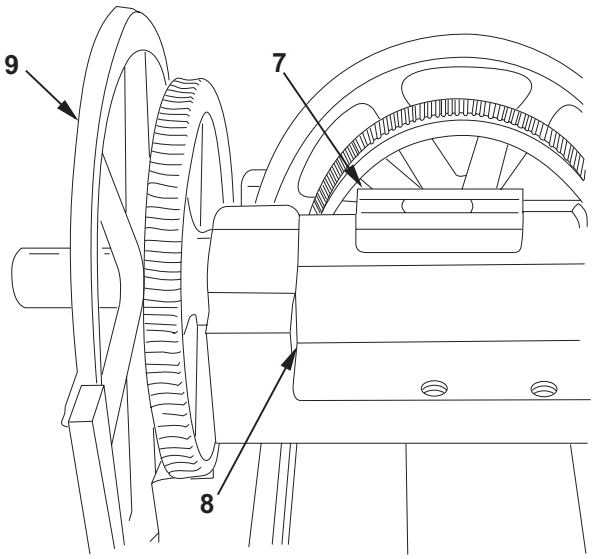

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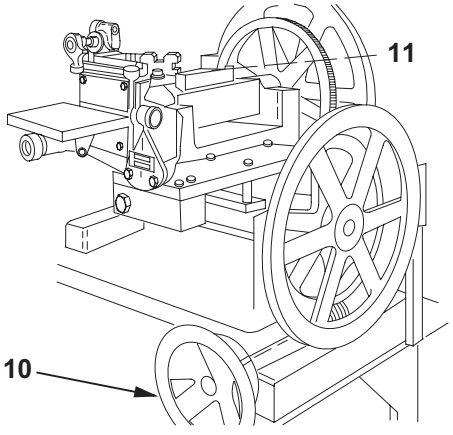
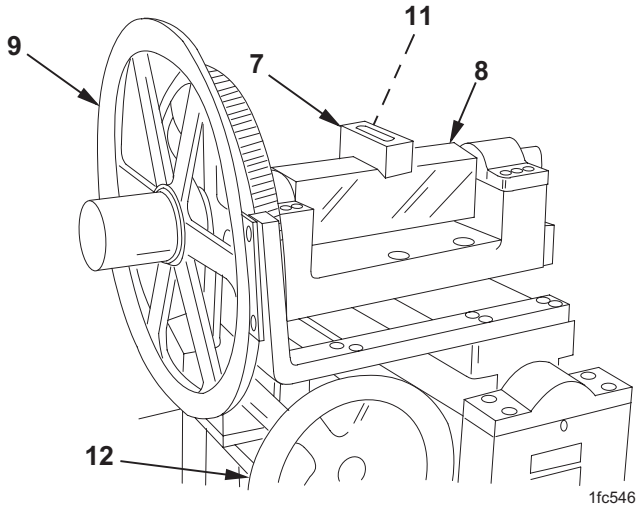
3. Position mounting bracket (5) on M172/M172A1 mount (1).
4. Install four bolts (6) to secure mounting bracket (5) to M172/M172A1 mount (1).
5. Place plate-mounted level (7) parallel to block (8) of shaft on optical equipment test fixture (9).



1fc545



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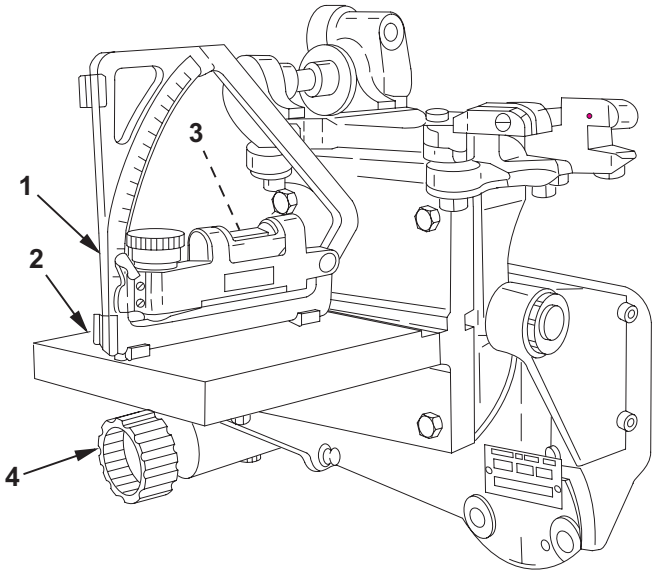
6. Turn cant handwheel (10) until bubble (11) in plate-mounted level (7) centers.
7. Place plate-mounted level (7) 90 degrees to block (8) on optical equipment test fixture (9).
8. Turn elevation handwheel (12) until bubble (11) in plate-mounted level (7) centers.

**TEST AND INSPECTION - Continued**

**Cross Level Mechanism Backlash Inspection**

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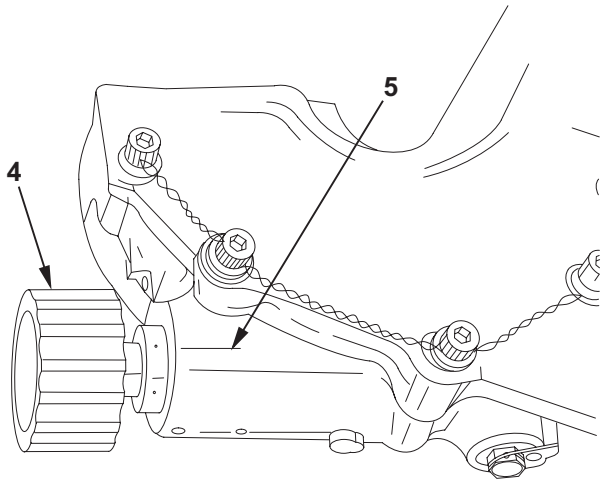
1. Set fire control quadrant (1) at 0.
2. Place fire control quadrant (1) on mounting bracket (2).

NOTE

When bringing M172/M172A1 mount level with fire control quadrant, rotate cross level knob in clockwise direction to center fire control quadrant level bubble. Do not overtravel when centering fire control quadrant level bubble.

3. Center level bubble (3) in fire control quadrant (1) using cross level knob (4).

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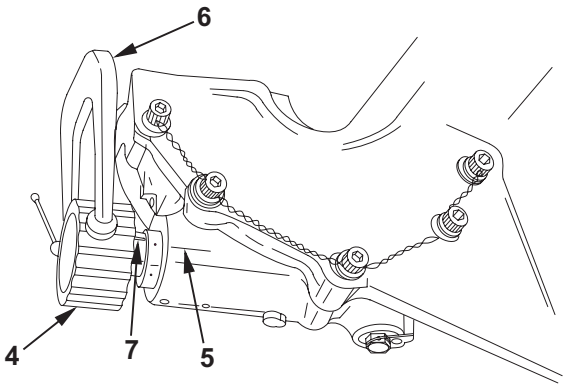
4. Scribe index line (5) on M172/M172A1 mount casting nearest to the cross level knob (4).




1fc549

## NOTE

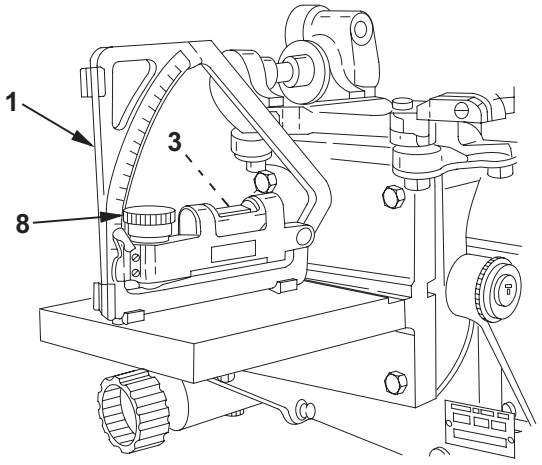
An index pointer may be made from 1/16 inch diameter rod with sharp point on end. The index pointer may be held in place mechanically by a small C-clamp (6).

5. Place index pointer (7) on the cross level knob (4) directly opposite scribed index line (5).

## NOTE

Do not go past scribed index line when turning counterclockwise. Ensure scribed index line and index pointer are in perfect alignment.

6. Rotate cross level knob (4) at least 1/2 turn clockwise. Turn counterclockwise until index pointer (7) aligns with scribed line (5).




1fc550

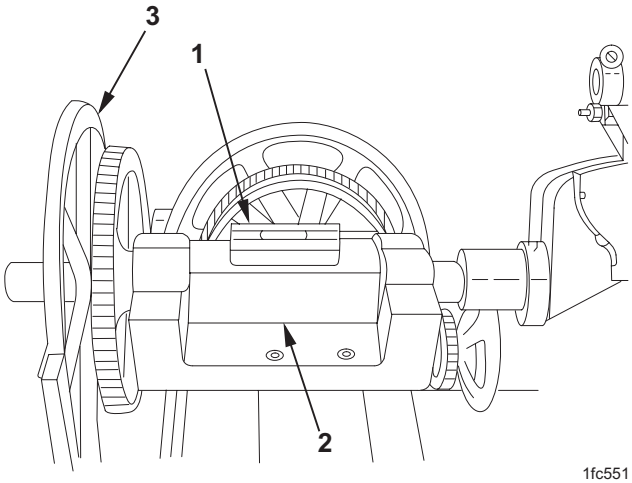
7. Check fire control quadrant (1) to ensure that level bubble (3) is centered when index pointer is aligned with scribed index line. If not centered, use micrometer knob (8) to center.
8. Take reading from micrometer. If the reading has changed more than 1.5 mils, the backlash is excessive.

## NOTE

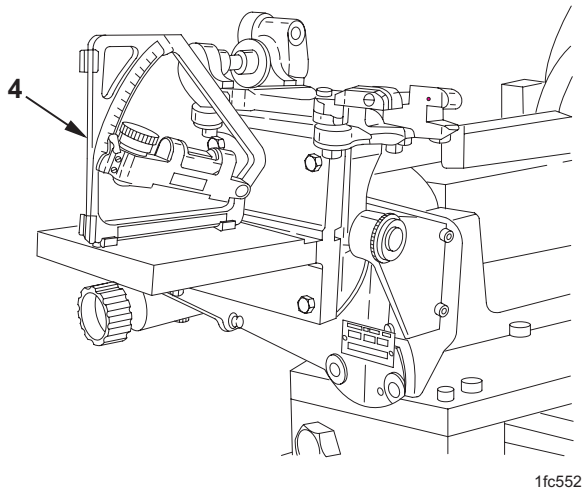
Repeat steps 1 through 8 as necessary with readings of 150, 300, and 450 mils set on fire control quadrant. This backlash procedure will be repeated at 0, 150, 300, and 450 mils in the opposite direction of cant, performed in steps 1 through 8.

**TEST AND INSPECTION - Continued**

**Cross Level Mechanism Travel Inspection**

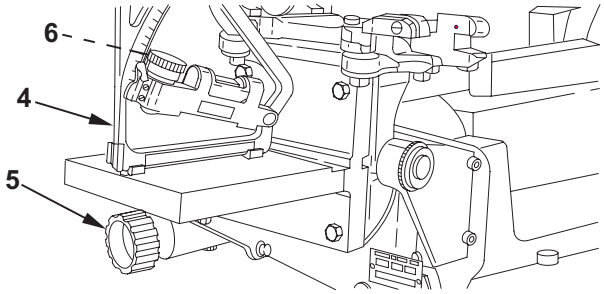


1fc551

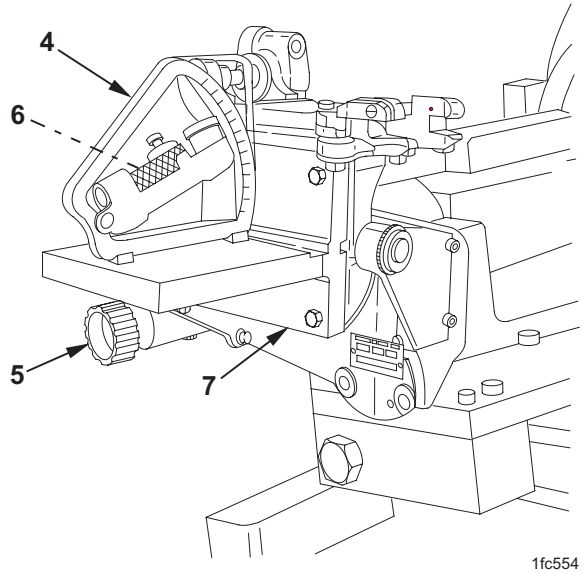


1fc552

1. Place plate-mounted level (1) on block (2), perpendicular to axis of rotation.
2. Level optical equipment test fixture (3) in cant and elevation.
3. Set fire control quadrant (4) at 600 mils.



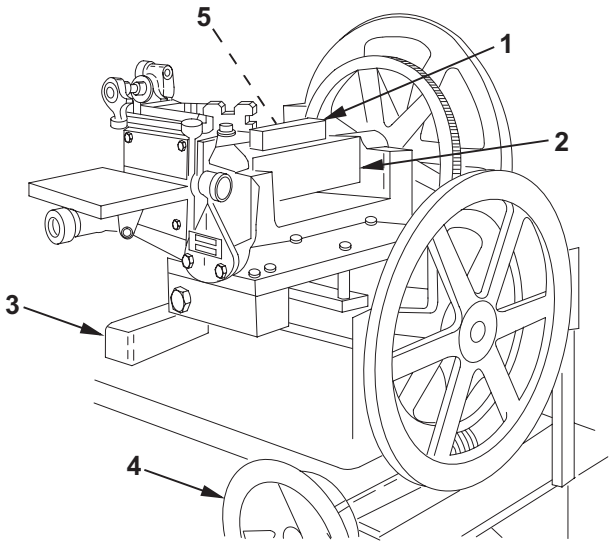
1fc553



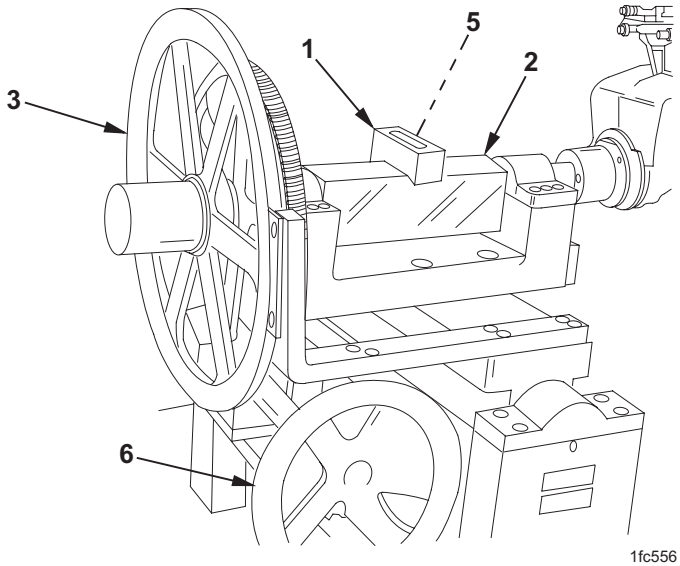
1fc554

4. Turn cross level knob (5) until level bubble (6) in fire control quadrant (4) centers.
5. If cross level knob (5) stops before level bubble (6) in fire control quadrant (4) centers, M172/M172A1 mount is defective.
6. Reverse fire control quadrant (4).
7. Turn cross level knob (5) until level bubble (6) in fire control quadrant (4) centers.
8. If cross level knob (5) stops before level bubble (6) in fire control quadrant (4) is centered, M172/M172A1 mount is defective.
9. Set fire control quadrant (4) to zero and relevel mounting bracket (7).

**Eccentric Stud Assembly Adjustment**

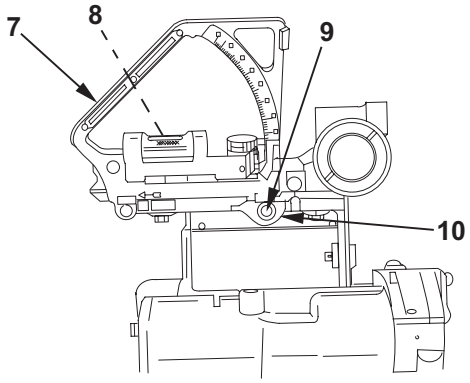



1fc555




1fc556

1. Place plate-mounted level (1) parallel to block (2) on shaft of optical equipment test fixture (3).
2. Turn cant handwheel (4) until bubble (5) in plate-mounted level (1) centers.
3. Place plate-mounted level (1) 90 degrees to block (2) on optical equipment test fixture (3).
4. Turn elevation handwheel (6) until bubble (5) in plate-mounted level (1) centers.

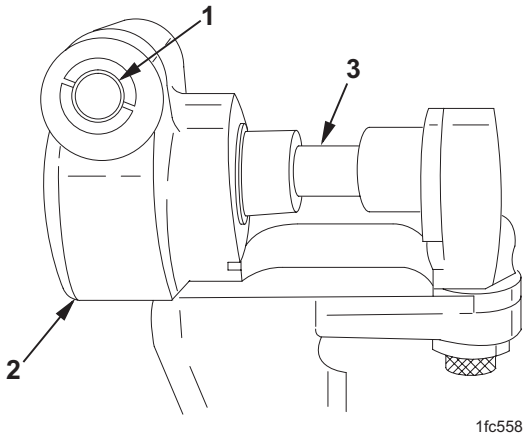



1fc557

5. Place fire control quadrant (7) on seats on M172/M172A1 mount. Level bubble (8) in fire control quadrant should center.
6. If level bubble (8) is not centered, adjust eccentric stud assembly (9).
   a. Loosen eccentric stud assembly (9) to disengage from spline plate (10).
   b. Turn eccentric stud assembly (9) and engage spline plate (10). Tighten eccentric stud assembly.
7. Repeat step 5. If level bubble in fire control quadrant does not center, repeat step 6 until centered.

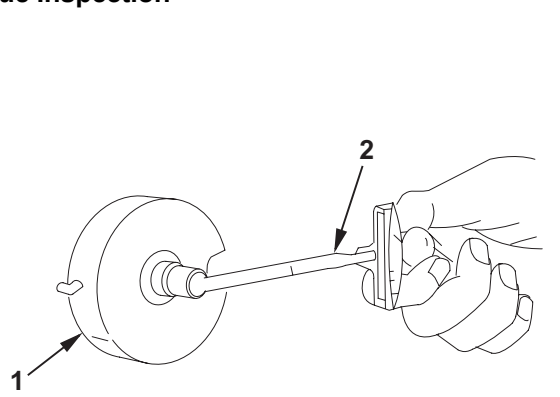
**TEST AND INSPECTION - Continued**

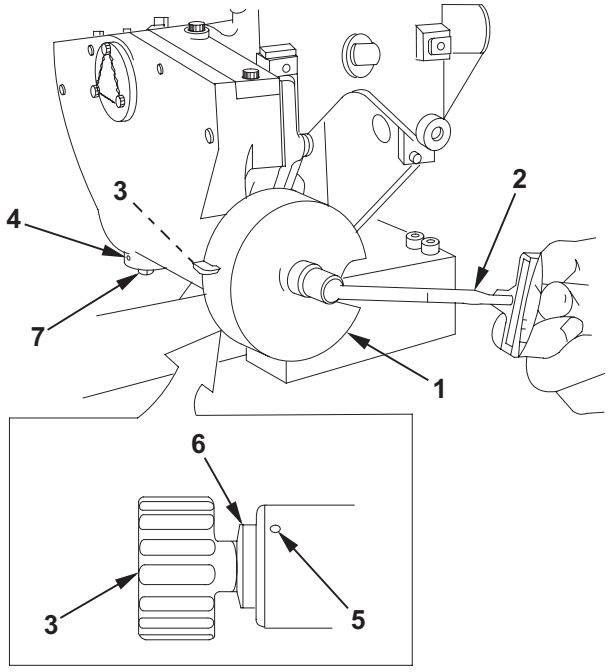
**Boresight Adjustment Inspection**




Turn boresight screw (1) on bracket assembly (2) and observe shaft (3). When boresight screw is turned, shaft should also turn.

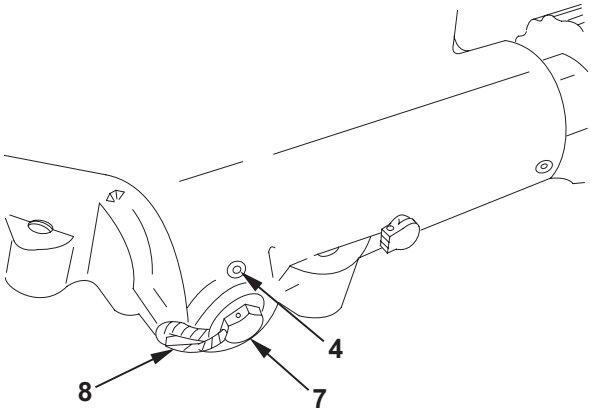
**Torque Inspection**



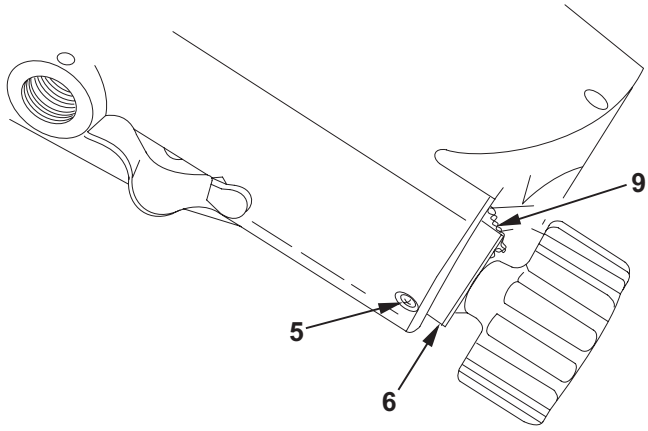




1. Place torque wrench adapter (1) on torque wrench (2).
2. Place torque wrench adapter (1) and torque wrench (2) over cross level knob (3).
3. Measure torque.
4. Torque required to start cross level knob (3) moving (starting torque) must not exceed 18 in.-lb (2.03 N-m).
5. Torque required to keep cross level knob (3) turning (running torque) must be between 4 in.-lb (0.45 N-m) and 12 in.-lb (1.35 N-m).

6. If torque requirements cannot be met, loosen two setscrews (4 and 5). Tighten or loosen externally threaded ring (6) or machine thread plug (7).




1fc561




1fc562

7. Install new lock wire (8) (item 21, WP 00 0152 00) and setscrew (4) and tighten setscrew, making sure lock wire is attached so that tension is applied if machine thread plug (7) attempts to loosen.

**WARNING**

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

8. Apply sealing compound (item 13, WP 00 0152 00) and tighten setscrew (4).

9. Apply sealing compound (item 13, WP 00 0152 00) to sharp ends of lock wire (8).

10. Install new lock wire (9) (item 21, WP 00 0152 00) and setscrew (5), making sure lock wire is attached so that tension is applied if externally threaded ring (6) attempts to loosen.

11. Apply sealing compound (item 13, WP 00 0152 00) and tighten setscrew (5).

12. Apply sealing compound (item 13, WP 00 0152 00) to sharp ends of lock wire (9).

**END OF WORK PACKAGE**

# CHAPTER 20

# DIRECT SUPPORT MAINTENANCE INSTRUCTIONS FOR M137/M137A2/M137A3 PANORAMIC TELESCOPE

**DIRECT SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**SERVICE UPON RECEIPT**
**SERVICE UPON RECEIPT OF MATERIEL**

## SERVICE UPON RECEIPT OF MATERIEL

### Unpacking

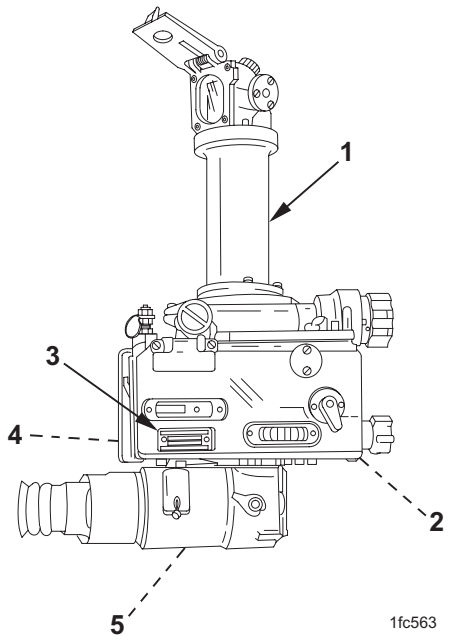
When a new or reconditioned M137/M137A2/M137A3 Panoramic Telescope is received, be aware of any shipping damage to packaging materiel. Report any damage on SF 364, Report of Discrepancy (ROD), as prescribed in AR 735-11-2. Retain packaging materiel for future use.

### Checking Unpacked Equipment

1. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 361, Transportation Discrepancy Report.

2. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with applicable service instructions (e.g., for Army instructions, see DA PAM 738-750).

3. Check to see whether the equipment has been modified.



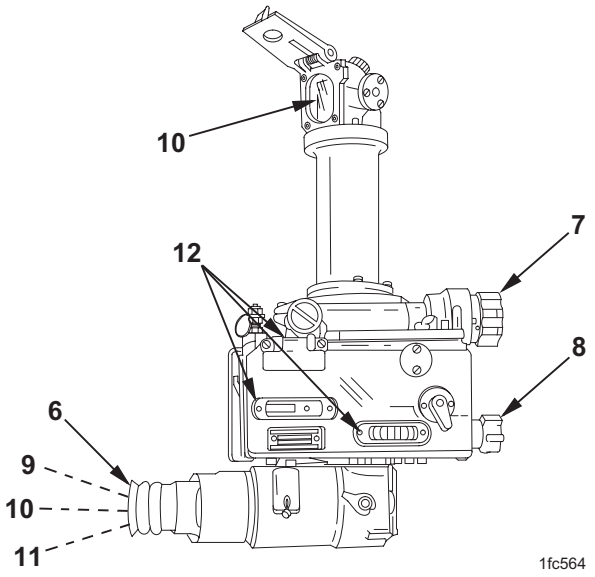

4. Check M137/M137A2/M137A3 telescope (1) for bare spots, dents, scuff marks, and damaged parts. Inspect M137/ M137A2/M137A3 telescope for cleanness.

5. Check mounting surface (2). Mounting surface must be clean and free of nicks and burrs.

6. Instruction plate (3), identification plate (4), and instruction plate (5) must be present and readable.

**SERVICE UPON RECEIPT OF MATERIEL - Continued**

**Checking Unpacked Equipment - Continued**




7. Eyeshield (6) must not be torn or missing.

8. Rotate azimuth knob assembly (7). It must turn smoothly and rotate the head assembly and azimuth counter.

9. Rotate azimuth knob assembly (7) in DIRECT mode. Counter should move 5 mils for each click.

10. Rotate the correction knob assembly (8). It must turn smoothly and turn the correction counter.

11. Check window (9) and lenses (10) for dirt or condensation.

WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

12. Check reticle (11) for dirt or condensation. Inspect reticle for illumination. Illumination must be present and even.

13. Inspect counter box windows (12) for illumination. Illumination must be present and even.

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

# M137/M137A2/M137A3 PANORAMIC TELESCOPE (1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)

# M137/M137A2/M137A3 PANORAMIC TELESCOPE MAINTENANCE DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**

Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**

Gasket (item 19, WP 0134 00)
Lockwasher (4) (item 11, WP 0133 00)
Lockwasher (3) (item 15, WP 0133 00)
Lockwasher (2) (item 23, WP 0133 00)
Sealing compound (item 13, WP 0152 00)

**References**

TM 9-254
WP 0132 00
WP 0133 00

**DISASSEMBLY**

## WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

1. If damaged, remove two machine screws (1), two lockwashers (2), and identification plate (3) from panoramic telescope (4) (M137 only). If damaged, remove two machine screws (5), two lockwashers (6), and identification plate (3) from panoramic telescope (M137A2/M137A3 only).

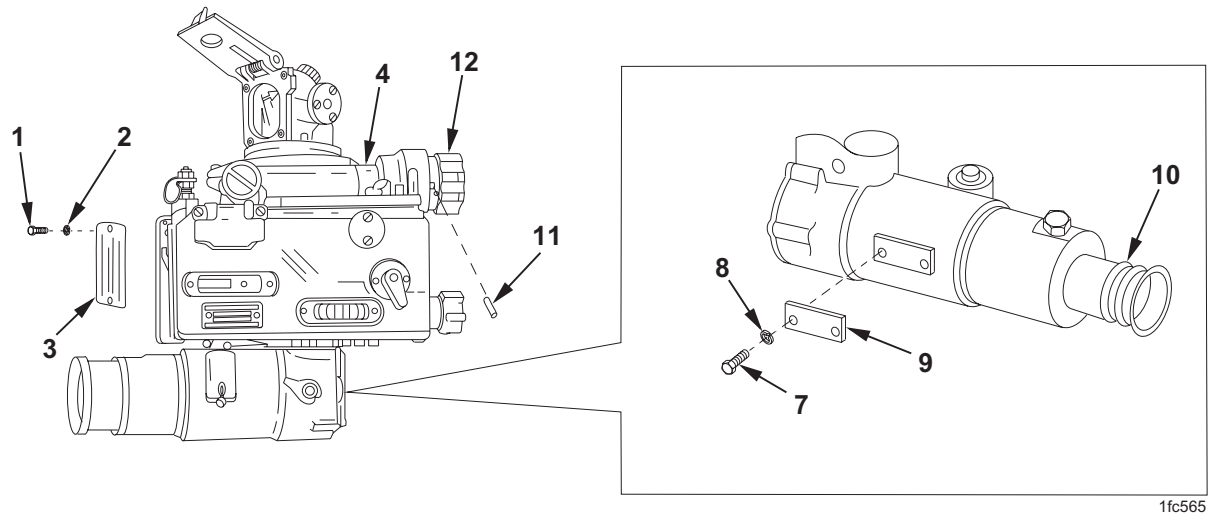
2. If damaged, remove two machine screws (7), two lockwashers (8), and instruction plate (9) from panoramic telescope (4) (M137 only).

3. Remove optical eyeshield (10) from panoramic telescope (4).

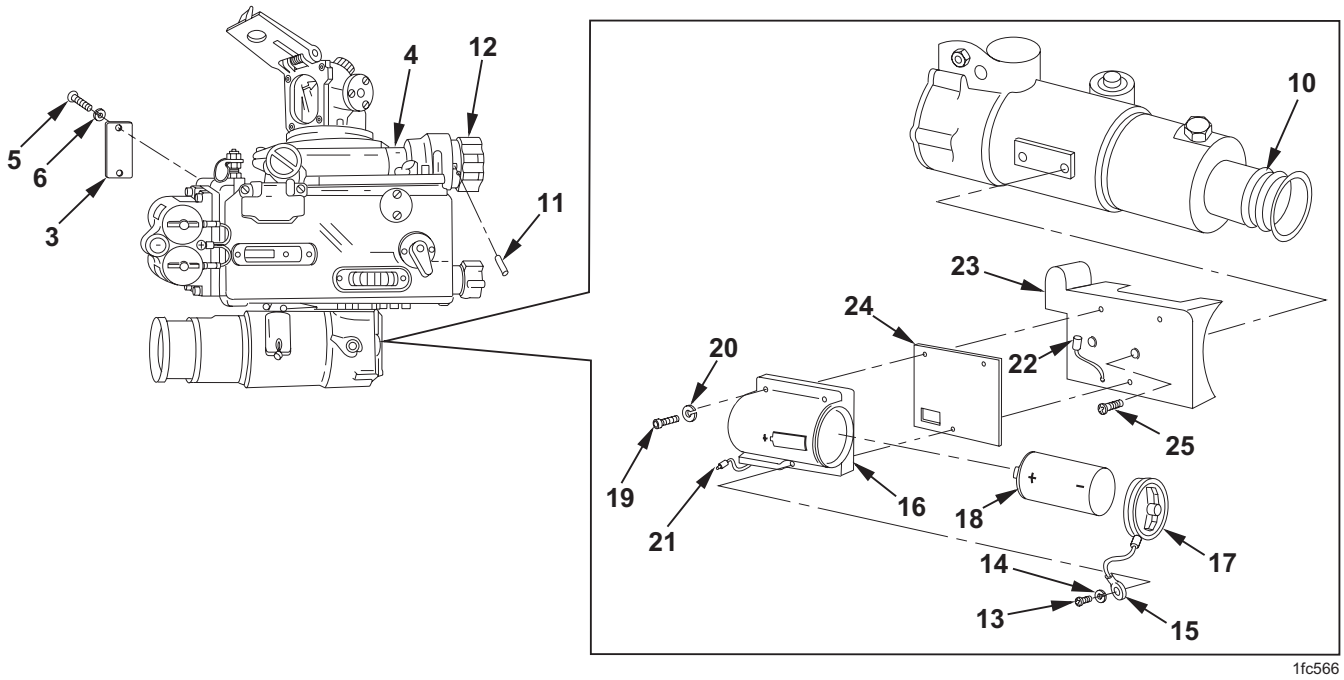
## CAUTION

Support azimuth knob assembly in V block on solid surface to prevent damage to worm shaft.

4. Drive out headless straight pin (11) and remove knob assembly (12) from panoramic telescope (4).




**M137**




**M137A2/M137A3**

5. Remove screw (13) and lockwasher (14) from wire rope assembly (15) on battery box cover (16). Discard lockwasher (M137A2/M137A3 only).

## WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries (M137A2/M137A3 only).

6. Remove protective cap-plug (17) and battery (18). If damaged, remove protective cap-plug from wire rope assembly (15) (M137A2/M137A3 only).

7. Remove top two screws (19) and top two lockwashers (20) from battery box cover (16). Discard lockwashers (M137A2/M137A3 only).

## CAUTION

Use extreme care when removing battery box cover. A short wire harness and connector on the battery box cover is connected to a connector on a short wire harness on the electrical bracket. These connectors and wire harnesses are easily damaged (M137A2/M137A3 only).

8. Carefully remove battery box cover (16) and disconnect connector (21) from connector (22) on electrical bracket (23) (M137A2/M137A3 only).

**DISASSEMBLY - Continued**

9. Remove and discard gasket (24) from electrical bracket (23) (M137A2/M137A3 only).

10. Remove two machine screws (25) from electrical bracket (23) and remove electrical bracket from elbow of panoramic telescope (4) (M137A2/M137A3 only).

**CLEANING**

Clean all parts per TM 9-254.

**REPAIR OR REPLACEMENT**

1. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0132 00 and WP 0133 00.

2. Stamp M137/M137A2/M137A3 panoramic telescope serial number on new identification plate.

**ASSEMBLY**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

CAUTION

Support azimuth knob assembly in V block on solid surface to prevent damage to worm shaft.

1. Install knob assembly (1) on panoramic telescope (2) and secure with headless straight pin (3).

2. Install optical eyeshield (4) on panoramic telescope (2).

WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

3. If removed, apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (5) (M137 only).

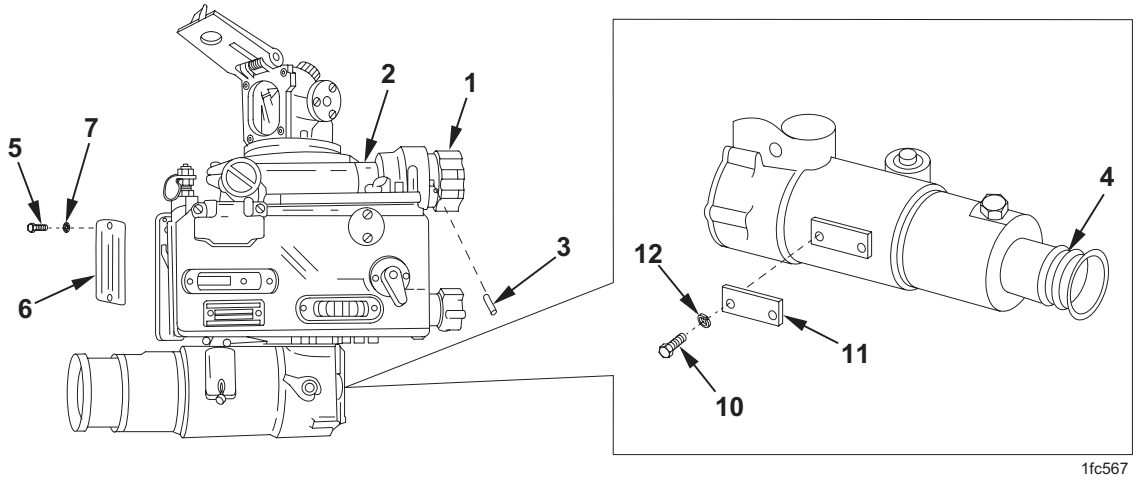
4. If removed, install identification plate (6) on side of counter box of panoramic telescope (2) and secure with two new lockwashers (7) (item 11, WP 0133 00) and two machine screws (5) (M137 only).

5. If removed, apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (8) (M137A2/M137A3 only).

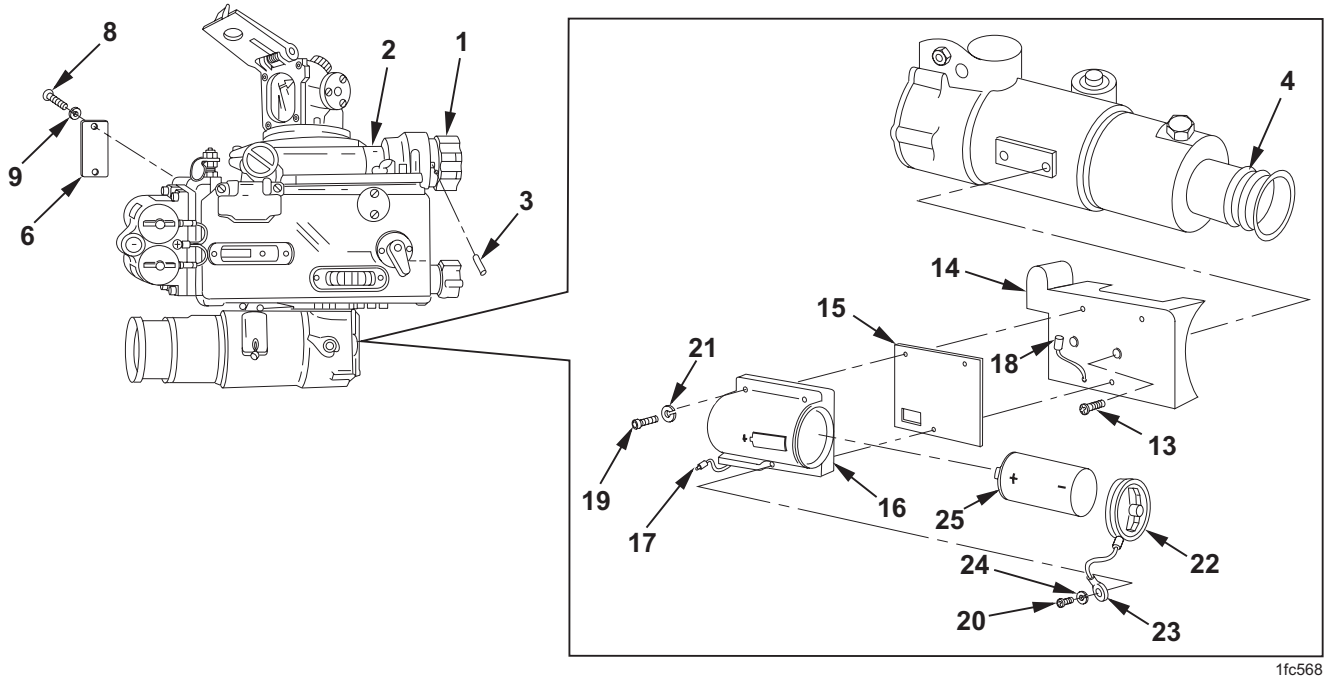
6. If removed, install identification plate (6) on back of counter box of panoramic telescope (2). Secure with two new lockwashers (9) (item 23, WP 0133 00) and two machine screws (8) (M137A2/M137A3 only).

7. If removed, apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (10) (M137 only).

8. If removed, install instruction plate (11) on panoramic telescope (2) and secure with two new lockwashers (12) (item 11, WP 0133 00) and two machine screws (10) (M137 only).




**M137**




**M137A2/M137A3**

**ASSEMBLY - Continued**

9. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (13) (M137A2/M137A3 only).

10. Install two machine screws (13) through electrical bracket (14) and into elbow of panoramic telescope (2) (M137A2/M137A3 only).

11. Install new gasket (15) (item 19, WP 0133 00) on mating surface of battery box cover (16) with cutout aligned for wire (M137A2/M137A3 only).

12. Carefully connect connector (17) on battery box cover (16) to connector (18) on electrical bracket (14) (M137A2/M137A3 only).

13. Apply sealing compound (item 13, WP 0152 00) to threads of three machine screws (19 and 20) (M137A2/M137A3 only).

## CAUTION

Be careful when assembling components. Do not pinch wire leads or connectors between parts (M137A2/M137A3 only).

14. Install battery box cover (16) with top two machine screws (19) and top two new lockwashers (21) (item 15, WP 0133 00) (M137A2/M137A3 only).

15. If removed, install new protective cap-plug (22) on wire rope assembly (23).

16. Install machine screw (20) with new lockwasher (24) (item 15, WP 0133 00) through wire rope assembly (23) into bottom mounting hole of battery box cover (16) (M137A2/M137A3 only).

## WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries (M137A2/M137A3 only).

## CAUTION

Do not install batteries backwards. Severe equipment damage may result. Pay careful attention to polarity diagram on battery holder.

17. Install battery (25) into battery box cover (16) and secure with protective cap-plug (22).

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**HEAD ASSEMBLY MAINTENANCE**
**DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY**

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Grease (item 15, WP 0152 00)
O-ring (item 8, WP 0134 00)
Sealing compound (item 13, WP 0152 00)

**References**
TM 9-254
WP 0134 00

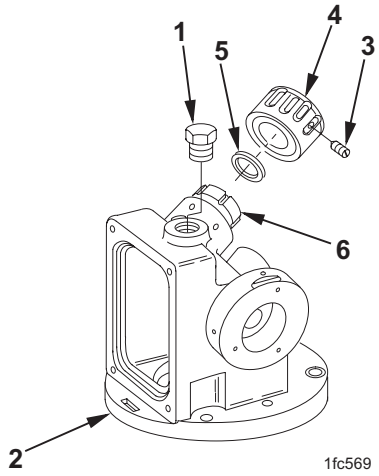
**DISASSEMBLY**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).




1. Unscrew and remove safety relief valve (1) from head housing (2).
2. Remove two setscrews (3) and shouldered knob (4).
3. Remove and discard O-ring (5) from inside of machine threaded bushing (6).

**CLEANING**

Clean all parts per TM 9-254.

**REPAIR OR REPLACEMENT**

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0134 00.

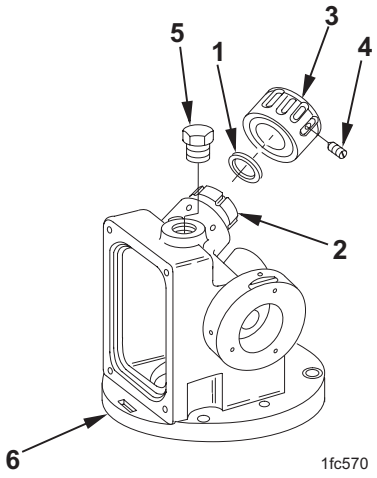
**ASSEMBLY**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).




1. Apply a light coat of grease (item 15, WP 0152 00) to new O-ring (1) and install in machine threaded bushing (2).

2. Install shouldered knob (3) using two setscrews (4) which have been coated with sealing compound (item 13, WP 0152 00).

WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

3. Apply a light coat of sealing compound (item 13, WP 0152 00) to safety relief valve (5) and install on head housing (6).

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

# M137/M137A2/M137A3 PANORAMIC TELESCOPE (1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)

## COVER ASSEMBLY (HEAD) MAINTENANCE DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**

Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**

Grease (item 16, WP 0152 00)
Sealing compound (item 14, WP 0152 00)

**References**

TM 9-254
WP 0135 00

**DISASSEMBLY**

WARNING

**RADIATION**

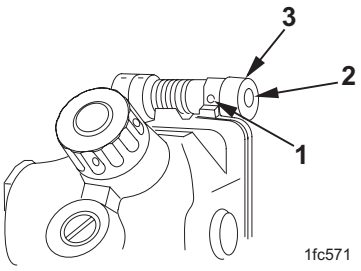
**TRITIUM GAS ($H_3$)**

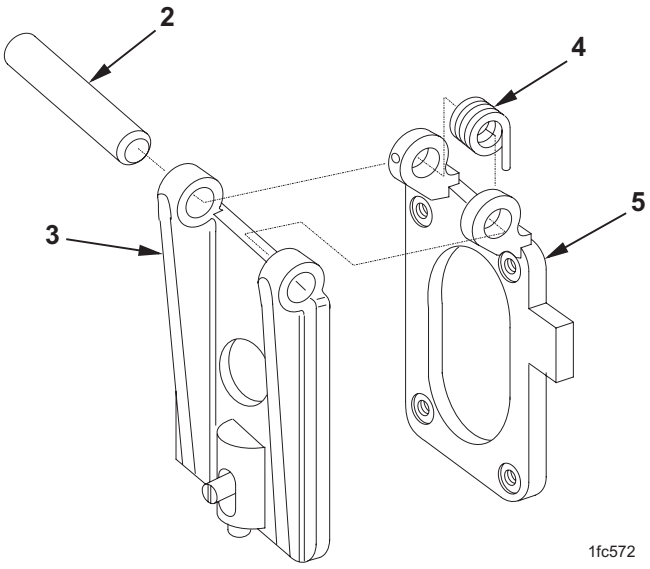
When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

CAUTION

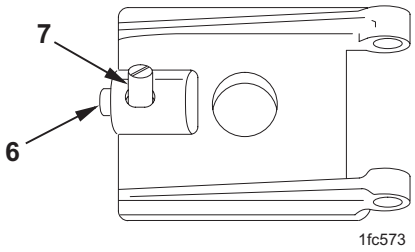
Support cover plate in V block on solid surface to prevent damage to shaft.

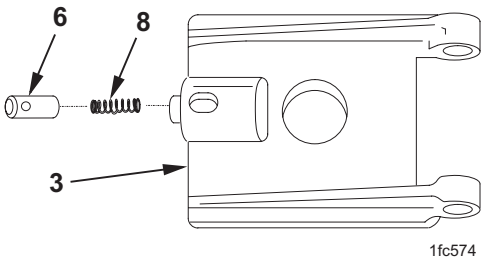
**DISASSEMBLY - Continued**




1. Remove headless straight pin (1) and headless straight pin (2) from cover plate (3).
2. Remove torsion helical spring (4) and cover plate (3) from optical element retainer (5).




3. Depress and hold detent plate (6). Unscrew post (7) and release detent plate. Remove detent plate and compression helical spring (8) from cover plate (3).

**CLEANING**

Clean all parts per TM 9-254.

**REPAIR OR REPLACEMENT**

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0135 00.

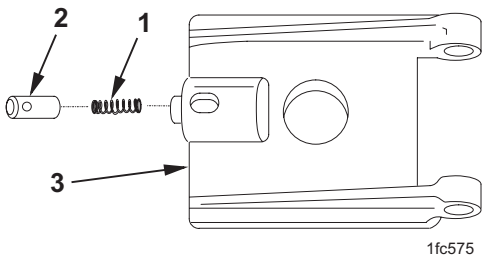
**ASSEMBLY**

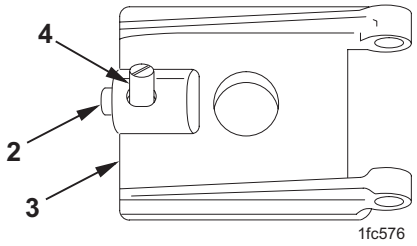
WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).




1. Apply a light coat of grease (item 16, WP 0152 00) to compression helical spring (1) and detent plate (2) and install in cover plate (3).

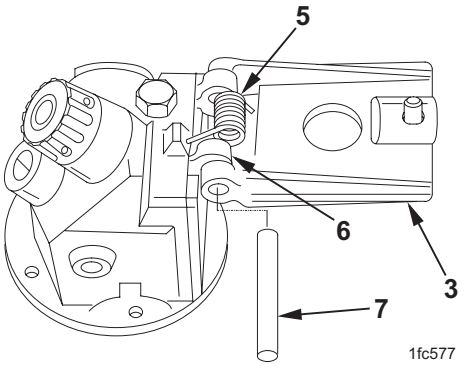
WARNING

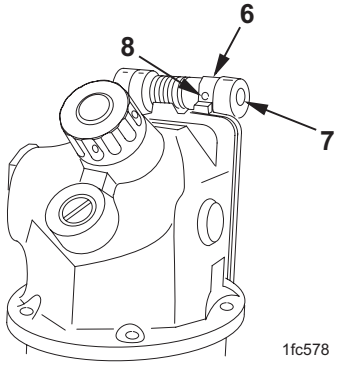
Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

2. Apply a light coat of sealing compound (item 14, WP 0152 00) to threads of post (4).

3. Align threaded hole in detent plate (1) with slot in cover plate (3) and install post (4).

**ASSEMBLY - Continued**




4. Install long end of torsion helical spring (5) in cover plate (3) and short end in optical element retainer (6).

5. Install headless straight pin (7) through optical element retainer (6) and cover plate (3).

6. Install headless straight pin (8) to secure headless straight pin (7) in optical element retainer (6).

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**BODY ASSEMBLY MAINTENANCE**
**DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY**

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Sealing compound (item 13, WP 0152 00)

**References**
TM 9-254
WP 0137 00

**DISASSEMBLY**

WARNING

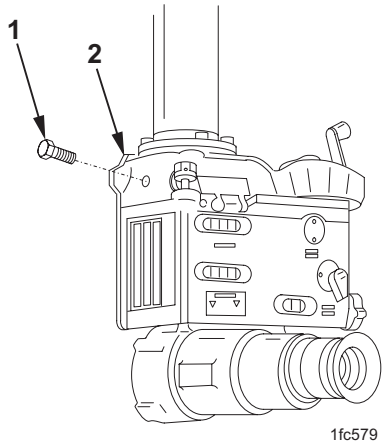
**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

NOTE

M137 panoramic telescope is illustrated but procedure also applies to M137A2 and M137A3 panoramic telescopes.




Remove safety relief valve (1) from telescope subasssembly body (2).

## CLEANING

Clean all parts per TM 9-254.

## REPAIR OR REPLACEMENT

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0137 00.

## ASSEMBLY

WARNING

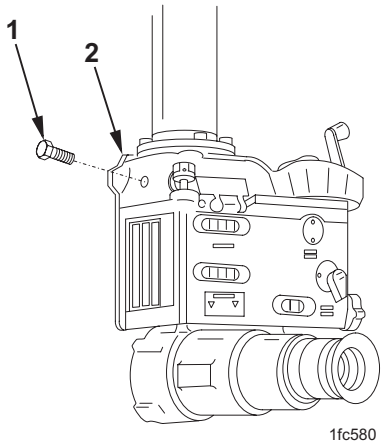
**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

Apply a light coat of sealing compound (item 13, WP 0152 00) to threads of safety relief valve (1) and install in telescope subassembly body (2).




**END OF WORK PACKAGE**

**DIRECT SUPPORT**

# M137/M137A2/M137A3 PANORAMIC TELESCOPE (1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)

## ELBOW ASSEMBLY MAINTENANCE DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Grease (item 16, WP 0152 00)
Sealing compound (item 13, WP 0152 00)

**References**
TM 9-254
WP 0139 00

**Equipment Conditions**
Battery enclosure assembly removed from elbow assembly (WP 0084 00)

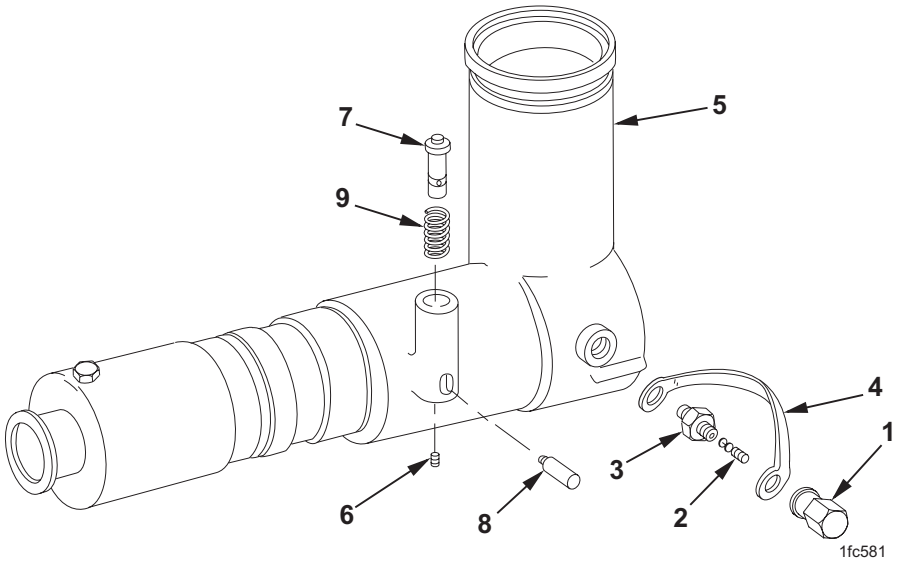
## DISASSEMBLY

**WARNING**

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).




1. Remove air valve cap (1), valve core (2), fluid valve stem (3), and retaining strap (4) from telescope elbow (5).
2. Remove setscrew (6).
3. Depress detent plunger (7) and unscrew and remove plunger release lever (8).
4. Carefully remove detent plunger (7) and compression helical spring (9) from telescope elbow (5).

## CLEANING

Clean all parts per TM 9-254.

## REPAIR OR REPLACEMENT

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0139 00.

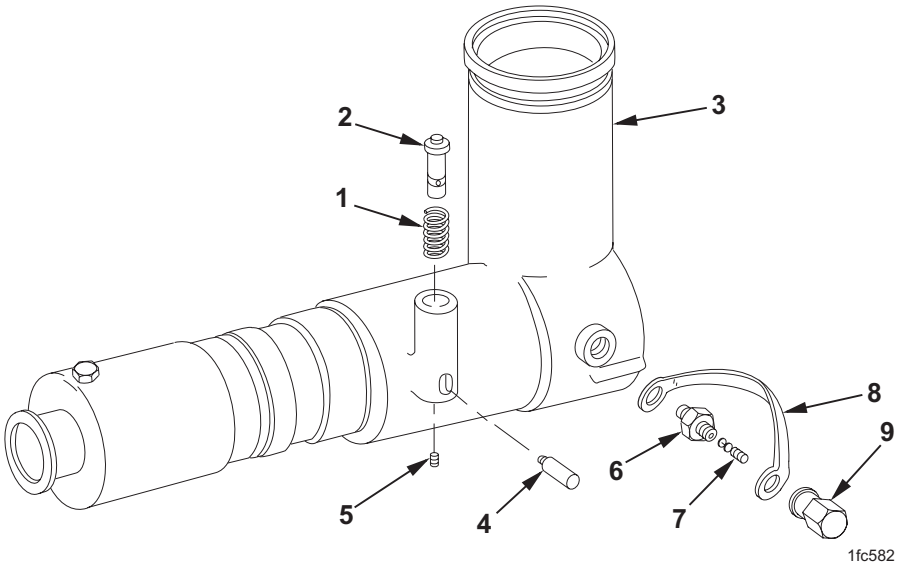
**ASSEMBLY**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).




1. Apply a light coat of grease (item 16, WP 0152 00) to compression helical spring (1) and detent plunger (2), and install in telescope elbow (3).

2. Depress and hold detent plunger (2), and align threaded hole in detent plunger with slot in telescope elbow (3).

3. Install plunger release lever (4) and tighten.

4. Install setscrew (5). Tighten and apply light coat of sealing compound (item 13, WP 0152 00) over setscrew.

WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

5. Apply a light coat of sealing compound (item 13, WP 0152 00) to threads of fluid valve stem (6). Install valve core (7).

**ASSEMBLY - Continued**

6. Install one end of retaining strap (8) over threaded end of fluid valve stem (6) and install fluid valve stem in telescope elbow (3).

7. Install free end of retaining strap (8) on air valve cap (9), and install air valve cap on fluid valve stem (6).

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

# OPTICAL CELL ASSEMBLY MAINTENANCE
# DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

## INITIAL SETUP:

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Sealing compound (item 13, WP 0152 00)

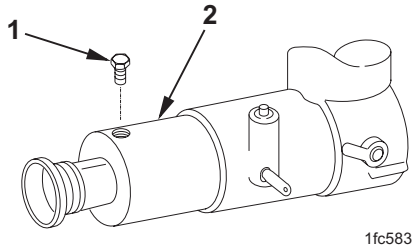
**References**
TM 9-254
WP 0140 00

## DISASSEMBLY

**WARNING**

**RADIATION**   **TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).




Remove safety relief valve (1) from optical element cell (2).

## CLEANING

Clean all parts per TM 9-254.

## REPAIR OR REPLACEMENT

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0140 00.

**ASSEMBLY**

WARNING

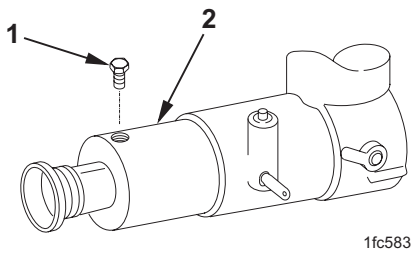
**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

Apply a light coat of sealing compound (item 13, WP 0152 00) to threads of safety relief valve (1) and install in optical element cell (2).




**END OF WORK PACKAGE**

**DIRECT SUPPORT**

# M137/M137A2/M137A3 PANORAMIC TELESCOPE (1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)

## COUNTER BOX ASSEMBLY MAINTENANCE DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**

Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**

Adhesive (item 2, WP 0152 00)
Lockwasher (4) (item 15, WP 0141 00)
Lockwasher (2) (item 33, WP 0141 00)
Lockwasher (2) (item 36, WP 0141 00)
Lockwasher (5) (item 42, WP 0141 00)
Sealing compound (item 13, WP 0152 00)
Soap (item 19, WP 0152 00)

**References**

TM 9-254
WP 0141 00

**Equipment Conditions**

Counter box assembly partially disassembled (WP 0084 00)

**DISASSEMBLY**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

NOTE

Charge nitrogen pressure to 7 psi (0.49 kg/cm$^2$). Remove hose. Put soap suds (item 19, WP 0152 00) on valve opening to check for leakage. If valve leaks, replace valve stem and/or valve core.

**DISASSEMBLY - Continued**

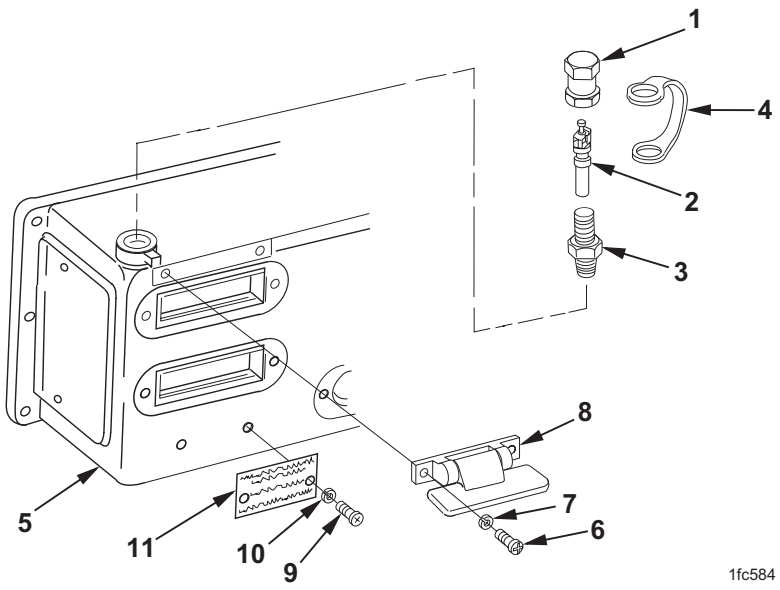
1. Remove air valve cap (1), valve core (2), fluid valve stem (3), and retaining strap (4) from counter box assembly (5).

2. Remove two machine screws (6), two lockwashers (7), and cover assembly (8). Discard lockwashers.

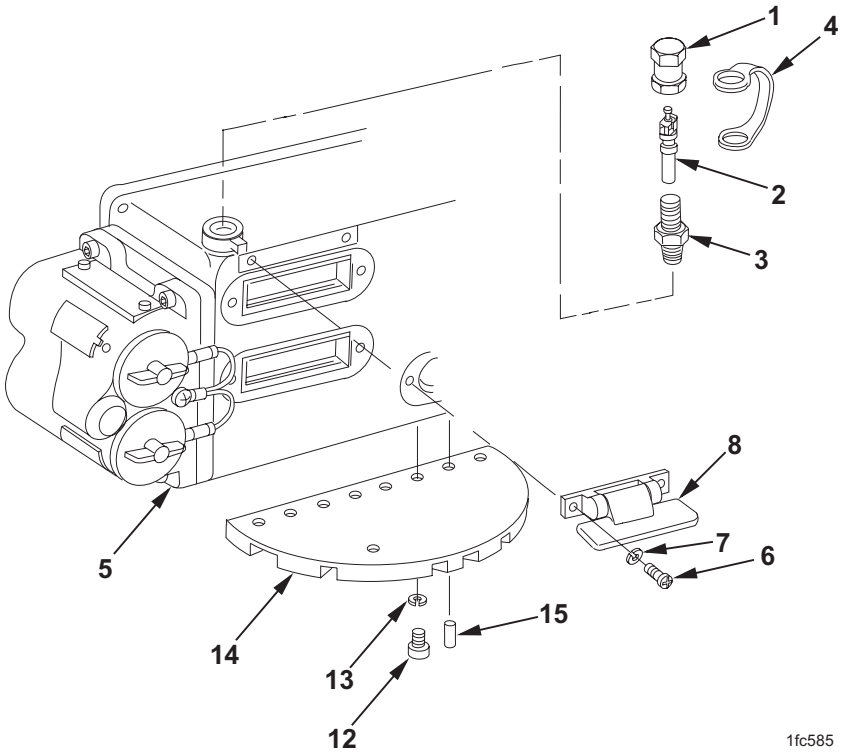
3. If damaged, remove two machine screws (9), two lockwashers (10), and instruction plate (11). Discard lockwashers (M137 only).

4. Remove four machine screws (12), four lockwashers (13), and stop plate (14). Discard lockwashers (M137A2/M137A3 only).

5. If loose or damaged, remove two headless straight pins (15) (M137A2/M137A3 only).




**M137**

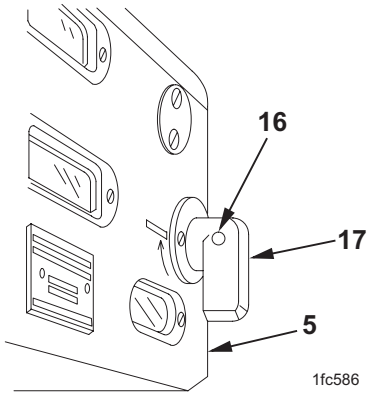



**M137A2/M137A3**

## CAUTION

Support knob in V block on solid surface to prevent damage to shaft.

6. Drive headless straight pin (16) from knob (17), and remove knob from counter box assembly (5).



**DISASSEMBLY - Continued**

## WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries (M137A2/M137A3 only).

7. Remove machine screw (18), lockwasher (19), retaining strap (20), two protective cap-plugs (21), and two batteries (22) from battery box (23). If damaged, remove retaining strap from protective cap-plugs (M137A2/M137A3 only).

8. Remove four machine screws (24) and four lockwashers (25) (M137A2/M137A3 only).

## CAUTION

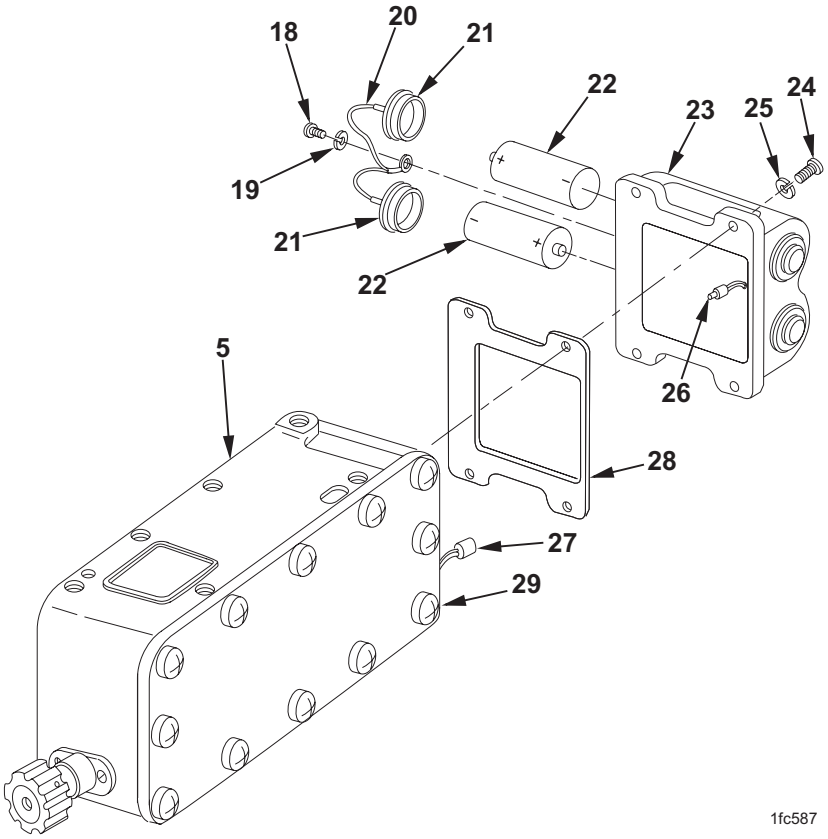
Use extreme care when removing battery box. A short wire harness and connector on the battery box are connected to a connector on a short wire harness that passes through the adapter plate on the counter box assembly. These connectors and wire harnesses are easily damaged (M137A2/M137A3 only).

9. Carefully remove battery box (23) and disconnect connector (26) from connector (27) (M137A2/M137A3 only).

## CAUTION

Do not attempt to remove adapter plate between the battery box and the counter box assembly. The wire harness passing through the adapter plate cannot be removed without damaging the equipment. The adapter plate can only be removed or installed by the manufacturer (M137A2/M137A3 only).

10. Remove gasket (28) from adapter plate (29) on counter box assembly (5). Discard gasket (M137A2/M137A3 only).




**M137A2/M137A3**

## CLEANING

Clean all parts per TM 9-254.

## REPAIR OR REPLACEMENT

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0141 00.

**ASSEMBLY**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

1. If instruction plate (1) is to be replaced, stamp 2.7 curies blank and stamp month and year light source was manufactured on new instruction plate. Install instruction plate (1) with two new lockwashers (2) (item 33, WP 0141 00) and two machine screws (3) (M137 only).

WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

2. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (4).

3. Install cover assembly (5), two new lockwashers (6) (item 36, WP 0141 00), and two machine screws (4).

4. Apply sealing compound (item 13, WP 0152 00) to fluid valve stem (7).

5. Install one end of retaining strap (8) on fluid valve stem (7) and install in counter box assembly (9).

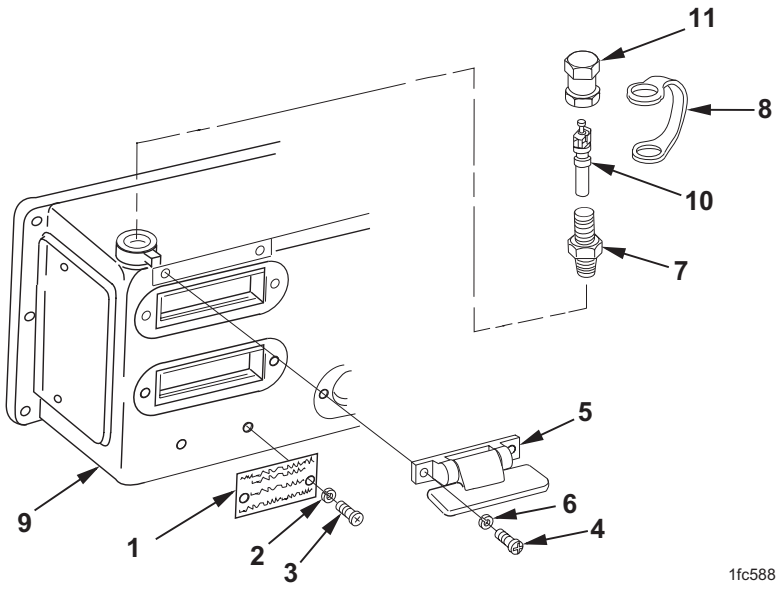
6. Install valve core (10).

7. Install the other end of retaining strap (8) on air valve cap (11) and install.

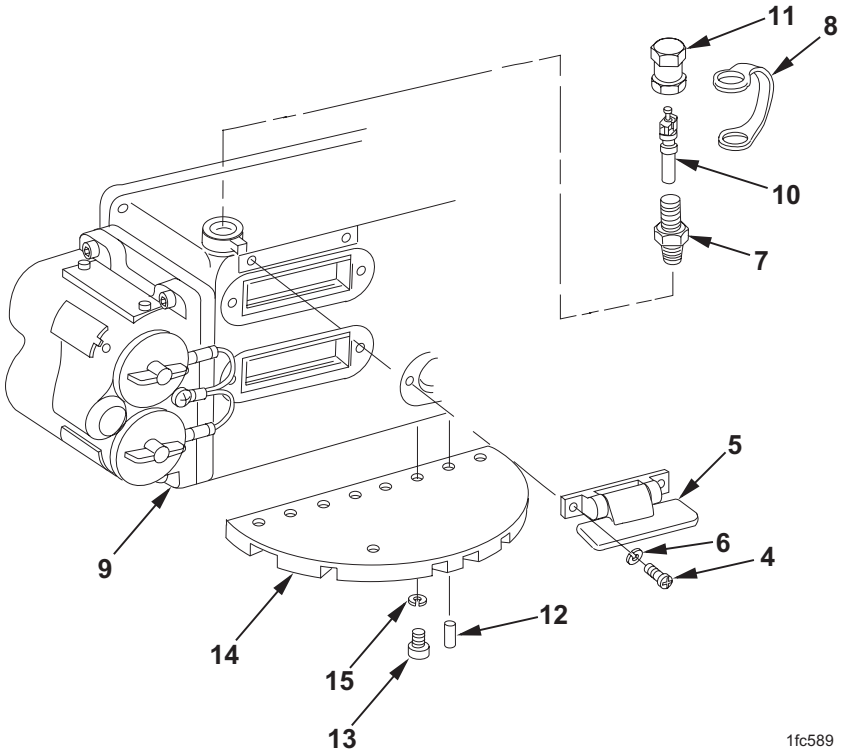
8. If removed, install two headless straight pins (12) in bottom of counter box assembly (9). If headless straight pins are loose, ream holes for next larger size headless straight pins and install (M137A2/ M137A3 only).

9. Apply sealing compound (item 13, WP 0152 00) to threads of four machine screws (13) (M137A2/M137A3 only).

10. Position stop plate (14) on counter box assembly (9) and secure in place with four new lockwashers (15) (item 15, WP 0141 00) and four machine screws (13) (M137A2/M137A3 only).




M137



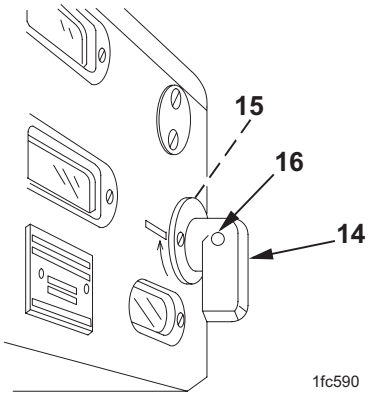

M137A2/M137A3

**ASSEMBLY - Continued**

## CAUTION

Support knob in V block on solid surface to prevent damage to shaft.

11. Position knob (14) on eccentric (15) and secure with headless straight pin (16).




## WARNING

Use adhesive in well-ventilated area away from open flame. Adhesive is harmful to skin and clothing and may give off harmful vapor.

## NOTE

Apply a thin layer of adhesive (item 2, WP 0152 00) on edges of battery box to keep gasket in place.

12. Install new gasket (17) (item 44, WP 0141 00) on battery box (18) (M137A2/M137A3 only).

## CAUTION

Be careful when assembling components. Do not pinch wire leads or connectors between parts (M137A2/M137A3 only).

13. Carefully connect connector (19) on adapter plate (20) to connector (21) on battery box (18) (M137A2/M137A3 only).

14. Apply sealing compound (item 13, WP 0152 00) to threads of four machine screws (22) (M137A2/M137A3 only).

15. Install four new lockwashers (23) (item 42, WP 0141 00) and four machine screws (22) to secure battery box (18) and gasket (17) to adapter plate (20) on counter box assembly (9) (M137A2/M137A3 only).

## WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries (M137A2/M137A3 only).

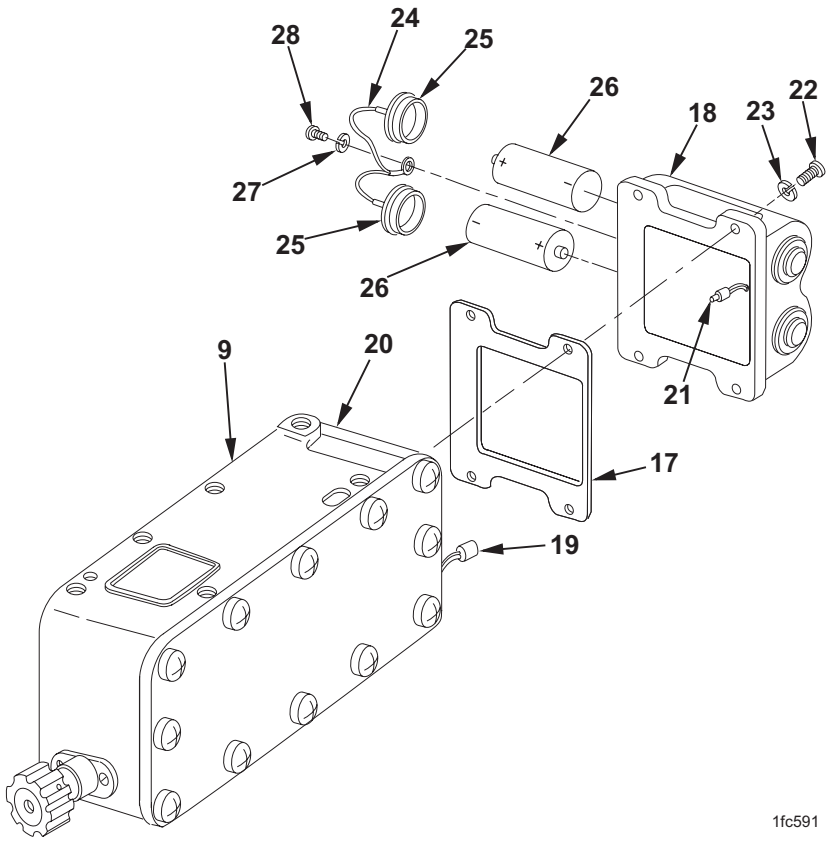
## CAUTION

Do not install batteries backwards. Severe equipment damage may result. Pay careful attention to diagram on battery holder.

16. If removed, install new retaining strap (24) on two protective cap-plugs (25) (M137A2/M137A3 only).

17. Install two batteries (26) into battery box (18) and secure with two protective cap-plugs (25) and retaining strap (24) (M137A2/M137A3 only).

18. Secure retaining strap (24) with new lockwasher (27) (item 42, WP 0141 00) and machine screw (28) (M137A2/M137A3 only).




**M137A2/M137A3**

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

# COVER ASSEMBLY (AZIMUTH COUNTER) MAINTENANCE
# DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Cleaning compound (item 10, WP 0152 00)
Grease (item 16, WP 0152 00)

**References**
WP 0144 00

**Equipment Conditions**
Cover assembly removed from counter box assembly (WP 0090 00)

## DISASSEMBLY

### WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

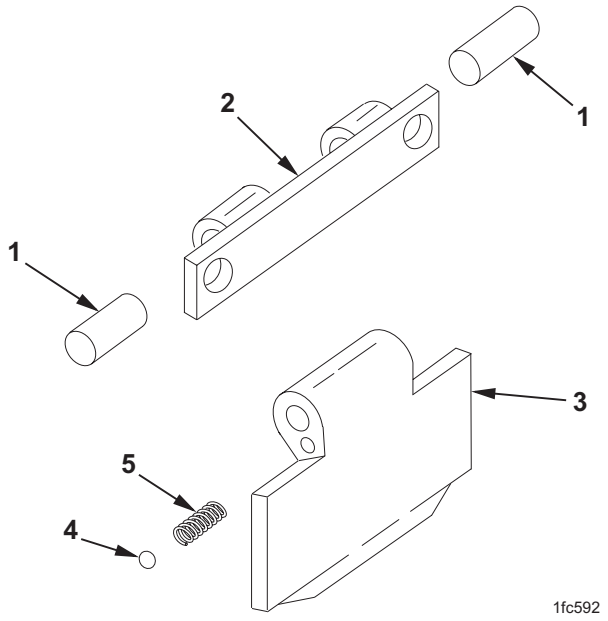
1. Remove two headless straight pins (1) from cover bracket (2).

### NOTE

Use pressure against ball and spring to prevent loss.

2. Remove counter cover (3) from cover bracket (2).

3. Remove bearing ball (4) and compression helical spring (5) from counter cover (3).




## CLEANING

Clean all parts with cleaning compound (item 10, WP 0152 00).

## REPAIR OR REPLACEMENT

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0144 00.

**ASSEMBLY**

WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

1. Apply a light coat of grease (item 16, WP 0152 00) to compression helical spring (5) and bearing ball (4). Install in counter cover (3) and hold in place with finger.

2. Position cover bracket (2) on counter cover (3).

3. Install two headless straight pins (1) in cover bracket (2).

**END OF WORK PACKAGE**

# CHAPTER 21

# GENERAL SUPPORT MAINTENANCE INSTRUCTIONS FOR M137/M137A2/M137A3 PANORAMIC TELESCOPE

**GENERAL SUPPORT**

# M137/M137A2/M137A3 PANORAMIC TELESCOPE (1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)

# M137/M137A2/M137A3 PANORAMIC TELESCOPE MAINTENANCE DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

## INITIAL SETUP:

### Tools and Special Tools
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

### Materials/Parts
Grease (item 15, WP 0152 00)
Lens paper (item 17, WP 0152 00)
Lockwasher (9) (item 2, WP 0133 00)
Optical lens cleaning compound (item 11, WP 0152 00)
O-ring (item 3, WP 0133 00)
O-ring (item 6, WP 0133 00)
Seal (item 4, WP 0141 00)
Sealing compound (item 14, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

### References
TM 9-254
WP 0132 00
WP 0133 00
WP 0141 00

### Equipment Conditions
Identification plate and instruction plate removed (WP 0084 00)
Eyeshield removed (WP 0084 00)

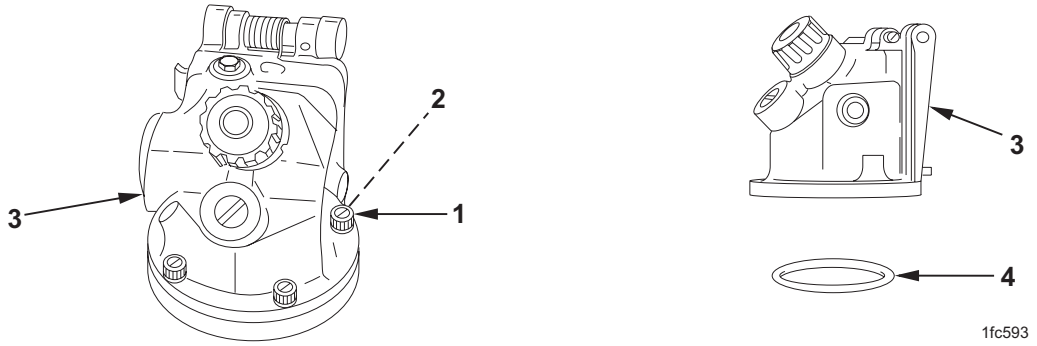
## DISASSEMBLY

**WARNING**

**RADIATION**   **TRITIUM GAS ($H_3$)**

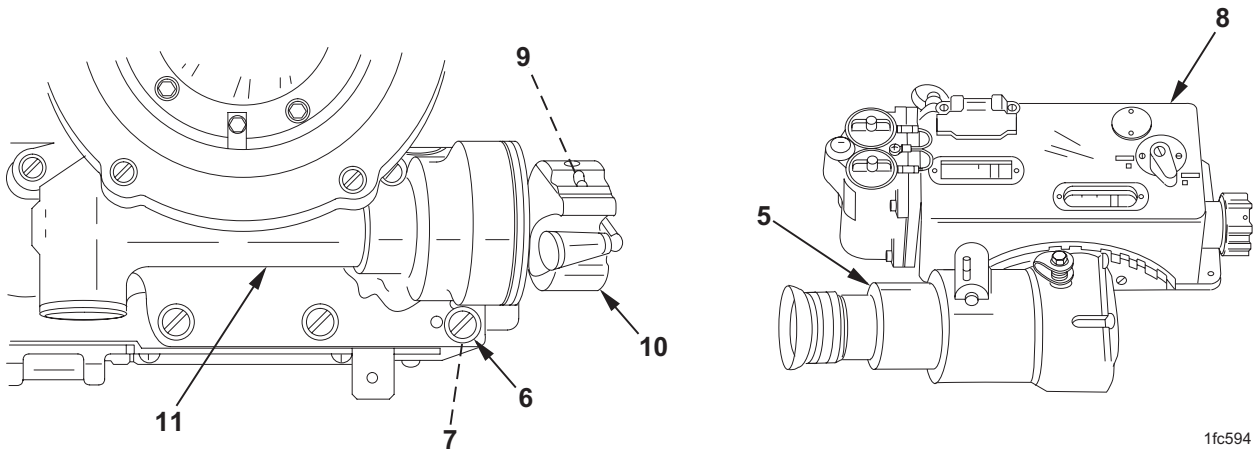
When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

**DISASSEMBLY - Continued**




1. Remove four socket head capscrews (1), four lockwashers (2), and head assembly (3). Discard lockwashers.

2. Remove O-ring (4) from head assembly (3). Discard O-ring.



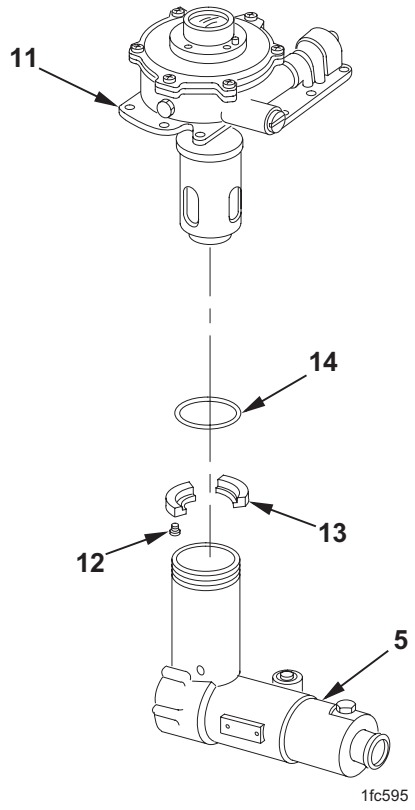

3. Rotate elbow assembly (5) to the left position.

## WARNING

Elbow assembly will only be removed from counter box assembly if radioactive light sources are fully illuminated. If not fully illuminated, send device to depot for maintenance.

4. Remove five machine screws (6) and five lockwashers (7). Pull counter box assembly (8) downward and remove. Discard lockwashers.

5. Remove headless straight pin (9) and knob assembly (10) from body assembly (11).




## WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

## CAUTION

When removing body assembly from elbow assembly, ensure that radioactive light sources are not damaged or removed.

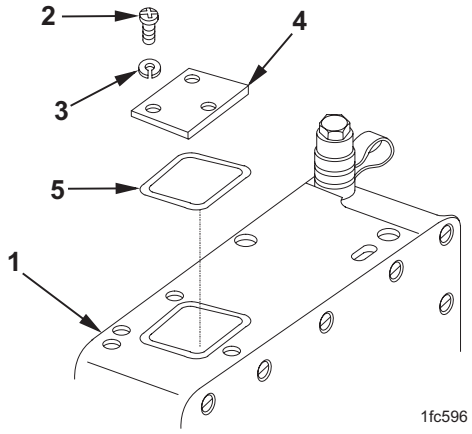
6. Remove four machine screws (12) and two elbow retainers (13) from body assembly (11). Carefully separate body assembly from elbow assembly (5), and remove O-ring (14). Discard O-ring.

### CLEANING

Clean lenses per TM 9-254.

## REPAIR OR REPLACEMENT

1. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0132 00 and WP 0133 00.




2. If counter box assembly (1) is replaced, remove three machine screws (2), three lockwashers (3), access cover (4), and seal (5) from the new counter box assembly. Install access cover, lockwashers, and machine screws on discarded counter box assembly. Forward discarded counter box assembly to depot maintenance.

3. Apply a light coat of grease (item 15, WP 0152 00) to new seal (5) (item 4, WP 0141 00) and install on the new counter box assembly (1).

## ASSEMBLY

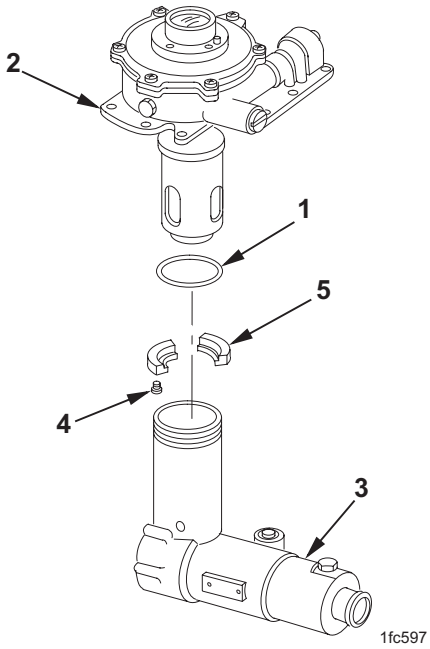
### WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

### CAUTION

When installing body assembly on elbow assembly, ensure that radioactive light sources are not damaged (M137 only).



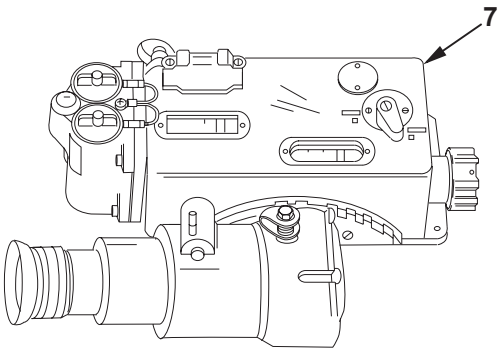

1. Apply light coat of grease (item 15, WP 0152 00) on new O-ring (1) (item 6, WP 0133 00). Install body assembly (2) and O-ring on elbow assembly (3).

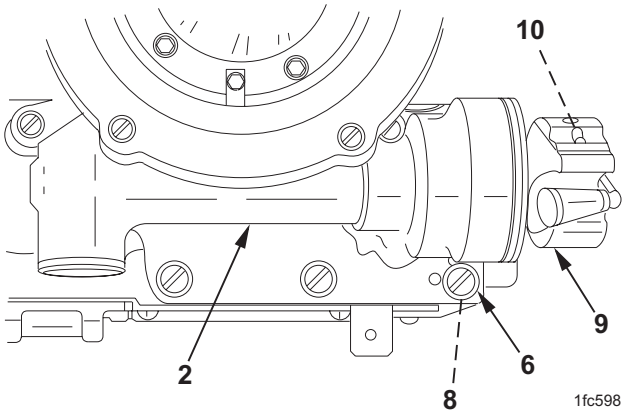
**WARNING**

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

2. Apply light coat of sealing compound (item 14, WP 0152 00) to threads of four machine screws (4). Position two elbow retainers (5) on elbow assembly (3) and secure with four machine screws.

**ASSEMBLY - Continued**



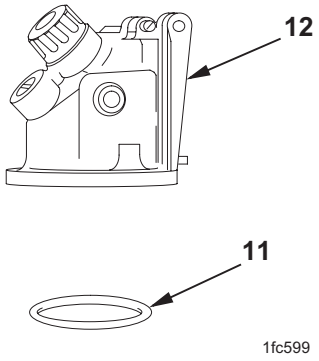

## CAUTION

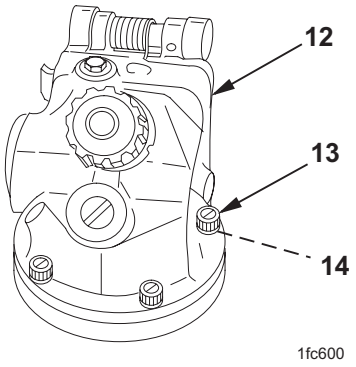
Ensure gears are meshed correctly while installing counter box assembly.

3. Apply light coat of sealing compound (item 14, WP 0152 00) to threads of five machine screws (6).

4. Push counter box assembly (7) upward against body assembly (2), and secure with five new lockwashers (8) (item 2, WP 0133 00) and five machine screws (6).

5. Install knob assembly (9) and headless straight pin (10) on body assembly (2).




6. Apply light coat of grease (item 15, WP 0152 00) to new O-ring (11) (item 3, WP 0133 00) and install in head assembly (12).

7. Apply light coat of sealing compound (item 14, WP 0152 00) to threads of four socket head capscrews (13).

8. Install head assembly (12), four new lockwashers (14) (item 2, WP 0133 00), and four socket head capscrews (13).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**HEAD ASSEMBLY MAINTENANCE**
**DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY**

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Cleaning compound (item 10, WP 0152 00)
Denatured alcohol (item 3, WP 0152 00)
Grease (item 15, WP 0152 00)
Grease (item 16, WP 0152 00)
Lens paper (item 17, WP 0152 00)
O-ring (item 8, WP 0134 00)
O-ring (2) (item 14, WP 0134 00)
Sealing compound (item 13, WP 0152 00)
Technical acetone (item 1, WP 0152 00)

**References**
TM 9-254
WP 0134 00

**Equipment Conditions**
Telescope head assembly removed from body assembly (WP 0092 00)

**DISASSEMBLY**

## WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

1. Remove safety relief valve (1) from head housing (2).
2. Remove two setscrews (3) and knob (4).
3. Remove sealing compound and setscrew (5).
4. Unscrew machine threaded bushing (6) and remove.
5. Remove O-ring (7) from inside of machine threaded bushing (6) and discard.
6. Remove external screw (8).
7. Remove telescope actuator (9), plunger (10), and flat washer (11) from head housing (2).
8. Unscrew plunger (10) from telescope actuator (9).
9. Unscrew machine threaded plug (12).
10. Remove compression helical spring (13), detent plunger (14), and O-ring (15). Discard O-ring.
11. Remove four machine screws (16) and cover assembly (17) from head housing (2).
12. Carefully remove nonmetallic round seal (18).

## CAUTION

Glass can be damaged and scratched if handled carelessly and excessively.

13. Remove sealing compound and remove optical instrument window (19).
14. Remove sealing compound and unscrew prism pivot (20).
15. Remove three machine screws (21) and plate cover (22).

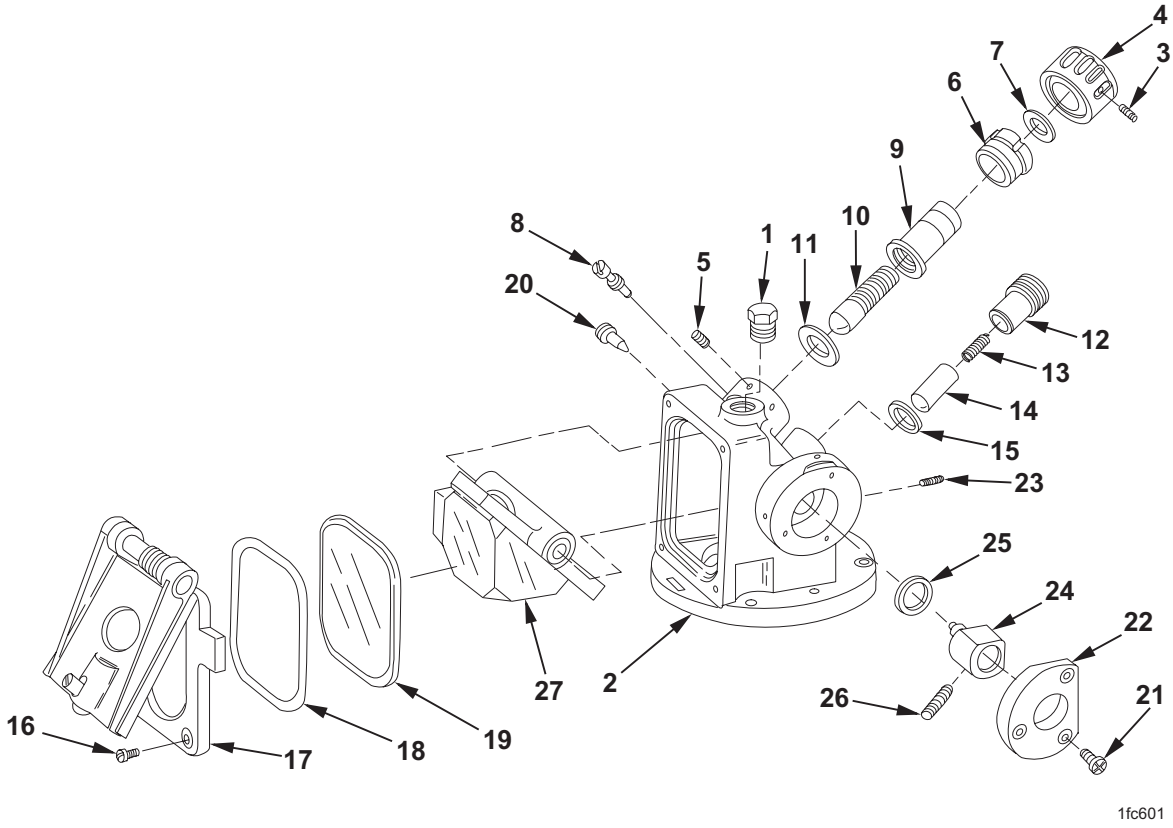
## NOTE

Check position of prism pivot before removing four setscrews.

16. Remove sealing compound and four setscrews (23).
17. Pull prism pivot (24) from head housing (2).
18. Remove O-ring (25) from prism pivot (24). Discard O-ring.

19. If damaged, remove quick release plunger (26).

20. Remove optical instrument prism (27) from head housing (2).




**CLEANING**

WARNING

Use cleaning compounds in well-ventilated area away from open flame. Cleaning compounds are harmful to skin and clothing and may give off harmful vapor.

1. Remove rust, corrosion, dirt, and grease from metal parts. Remove dirt and grease using cleaning compound (item 10, WP 0152 00).

2. Clean optical instrument prism using technical acetone (item 1, WP 0152 00) or denatured alcohol (item 3, WP 0152 00) and lens paper (item 17, WP 0152 00).

NOTE

General procedures for cleaning metal parts and optics, removing corrosion, staking pins, and other procedures are contained in TM 9-254.

## REPAIR OR REPLACEMENT

1. Refer to TM 9-254 for general repair instructions.
2. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0134 00.

## ASSEMBLY

**WARNING**

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

1. Position optical instrument prism (1) in head housing (2).
2. Apply a light coat of grease (item 15, WP 0152 00) to new O-ring (3) (item 14, WP 0134 00) and install in prism pivot (4).
3. If removed, screw quick release plunger (5) into prism pivot (4) until edge of quick release plunger thread is tangent to prism pivot diameter.
4. Install optical instrument prism (1) with bearing aligned over the hole for prism pivot (6).

**WARNING**

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

5. Apply sealing compound (item 13, WP 0152 00) to threads of prism pivot (6).
6. Install prism pivot (6) in head housing (2) and align with bearings in optical instrument prism (1).

**NOTE**

The flats on prism pivot should be properly oriented in head housing.

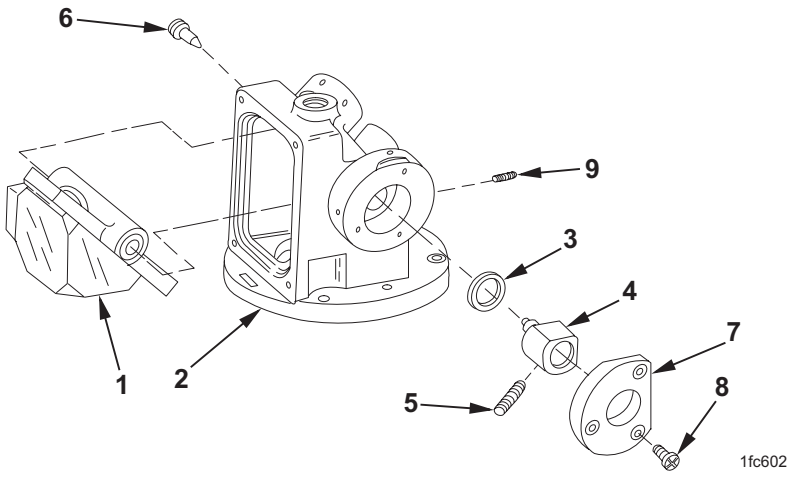
7. Shift optical instrument prism (1) to align bearings with pivot hole for prism pivot (4) and install prism pivot.
8. Install plate cover (7) and secure with three machine screws (8).

9. Install four setscrews (9) in head housing (2).

## NOTE

Sealing compound should not be applied to setscrews (9) until prism pivot (4) has been checked for plumb.

10. Fill holes for four setscrews (9) and three machine screws (8) with sealing compound (item 13, WP 0152 00).



**ASSEMBLY - Continued**

11. Apply 0.063 in. (1.600 mm) bead of sealing compound (item 13, WP 0152 00) around entire rim of optical instrument window (10). Place optical instrument window in head housing (2).

12. Apply a light coat of grease (item 15, WP 0152 00) to nonmetallic round seal (11) and install over optical instrument window (10).

13. Place cover assembly (12) in position on head housing (2).

14. Apply a coat of sealing compound (item 13, WP 0152 00) to threads of four machine screws (13) and install to secure cover assembly (12).

15. Apply a coat of grease (item 15, WP 0152 00) to new O-ring (14) (item 14, WP 0134 00) and install on threaded machine plug (15).

16. Apply a light coat of grease (item 16, WP 0152 00) to detent plunger (16) and install in head housing (2).

17. Apply sealing compound (item 13, WP 0152 00) to threads of machine threaded plug (15).

18. Install compression helical spring (17) and machine threaded plug (15).

19. Apply a coat of grease (item 16, WP 0152 00) to flat washer (18) and install in head housing (2).

20. Apply a light coat of grease (item 16, WP 0152 00) to plunger (19) and screw into telescope actuator (20). Install assembled plunger and telescope actuator into head housing (2).

21. Apply a coat of grease (item 15, WP 0152 00) to new O-ring (21) (item 8, WP 0134 00) and install in machine threaded bushing (22).

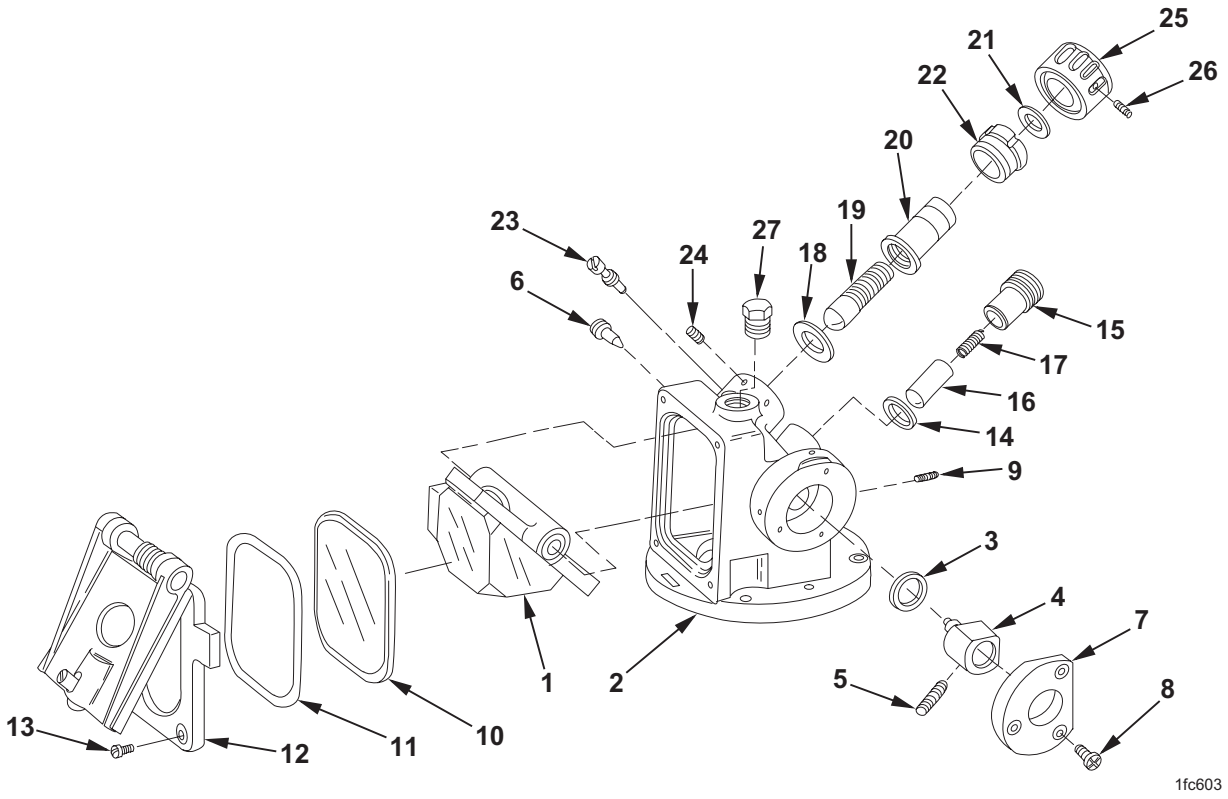
22. Screw machine threaded bushing (22) into head housing (2).

23. Apply sealing compound (item 13, WP 0152 00) to threads of external screw (23) and install.

24. Apply sealing compound (item 13, WP 0152 00) to setscrew (24) and install to prevent machine threaded bushing (22) from turning.

25. Position knob (25) on telescope actuator (20) and secure in place using two setscrews (26) which have been coated with sealing compound (item 13, WP 0152 00).

26. Apply a coat of sealing compound (item 13, WP 0152 00) to threads of safety relief valve (27) and install.




**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M137/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6100)**

# OPTICAL ELEMENT SPACER MAINTENANCE
# REMOVAL, DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY, INSTALLATION

**INITIAL SETUP:**

**Tools and Special Tools**
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)

**Materials/Parts**
Grease (item 16, WP 0152 00)
Lockwasher (4) (item 2, WP 0133 00)
O-ring (item 3, WP 0133 00)
Wiping rag (item 18, WP 0152 00)

**References**
WP 0133 00
WP 0136 00

**Equipment Conditions**
Head assembly removed (WP 0092 00)

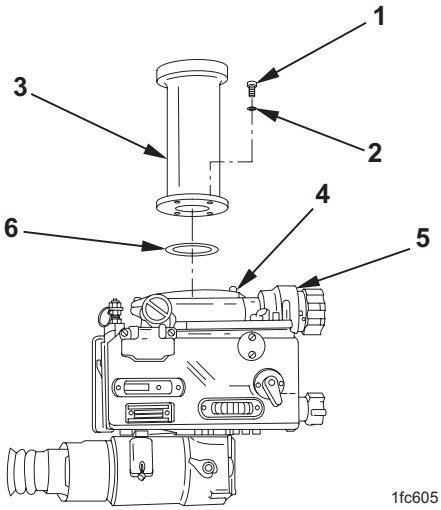
**REMOVAL**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).



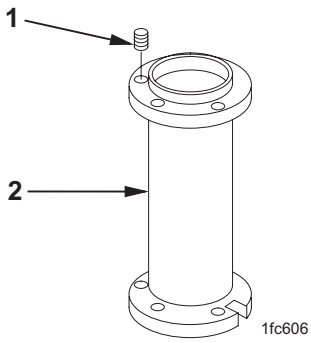

1. Remove four socket head capscrews (1) and four lockwashers (2). Lift optical element spacer (3) from straight pin (4) on body assembly (5). Discard lockwashers.

2. Remove O-ring (6) from body assembly (5). Discard O-ring.

**DISASSEMBLY**

NOTE

Replace telescope head spacer if bent or damaged and will not keep the head assembly in alignment with the elbow assembly.

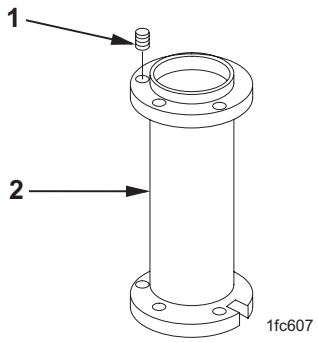



Remove straight pin (1) from telescope head spacer (2).

## REPAIR OR REPLACEMENT

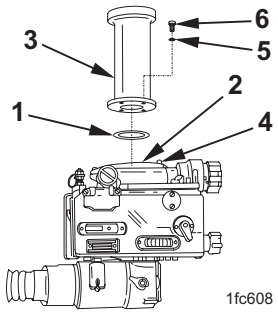
Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0133 00 and WP 0136 00.

## ASSEMBLY




Install straight pin (1) in telescope head spacer (2).

## INSTALLATION




1. Apply light coat of grease (item 16, WP 0152 00) to new O-ring (1) (item 3, WP 0133 00) and install in body assembly (2).

2. Place optical element spacer (3) over straight pin (4) on body assembly (2), and secure with four new lockwashers (5) (item 2, WP 0133 00) and four socket capscrews (6).

3. Install head assembly (WP 0092 00).

## END OF WORK PACKAGE

**GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**BODY ASSEMBLY MAINTENANCE**
**DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY**

**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Cleaning compound (item 10, WP 0152 00)
Grease (item 15, WP 0152 00)
Grease (item 16, WP 0152 00)
Lens paper (item 17, WP 0152 00)
Lockwasher (11) (item 2, WP 0137 00)
Optical lens cleaning compound (item 11, WP 0152 00)
O-ring (item 5, WP 0137 00)
O-ring (item 10, WP 0137 00)
O-ring (item 13, WP 0137 00)
O-ring (item 15, WP 0137 00)
O-ring (item 25, WP 0137 00)
Plastic bag (item 5, WP 0152 00)
Seal (item 6, WP 0137 00)
Seal (item 7, WP 0137 00)
Sealing compound (item 13, WP 0152 00)
Spring tension washer (item 17, WP 0137 00)
Tape (item 20, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
WP 0137 00
WP 0138 00

**Equipment Conditions**
Body assembly removed from panoramic telescope (WP 0092 00)
Knob assembly removed from body assembly (WP 0092 00)

**DISASSEMBLY**

WARNING

**RADIATION**

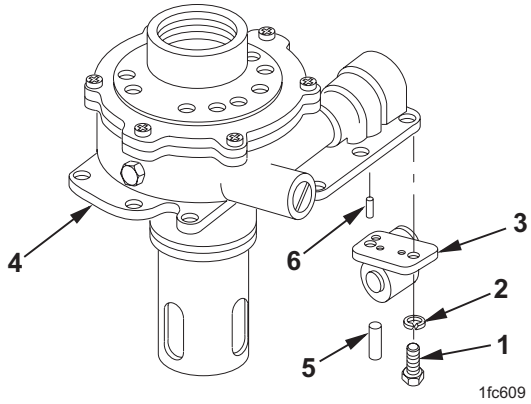
**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

1. Remove two machine screws (1), two lockwashers (2), and gear assembly (3) from worm gear housing body (4). Discard lockwashers.

2. If damaged, remove two headless straight pins (5) from gear assembly (3).

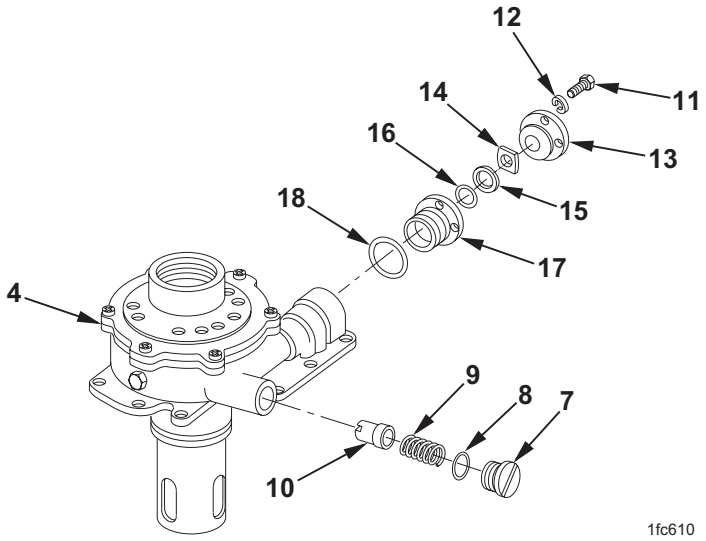
3. If damaged, remove two headless straight pins (6) from worm gear housing body (4).




4. Remove machine threaded plug (7), O-ring (8), compression helical spring (9), and detent plunger (10) from worm gear housing body (4). Discard O-ring.

5. Remove three machine screws (11), three lockwashers (12), plate (13), spring tension washer (14), recessed washer (15), and O-ring (16) from worm gear housing body (4). Discard lockwashers, spring tension washer, and O-ring.

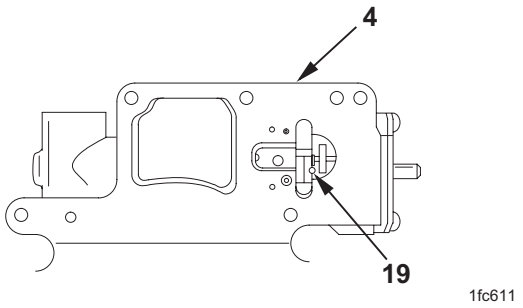
6. Remove wormshaft cap (17) from worm gear housing body (4). Remove O-ring (18) from wormshaft cap. Discard O-ring.




## NOTE

To avoid bottoming in housing, drive pin partially out. Turn worm shaft assembly 180 degrees to remove pin.

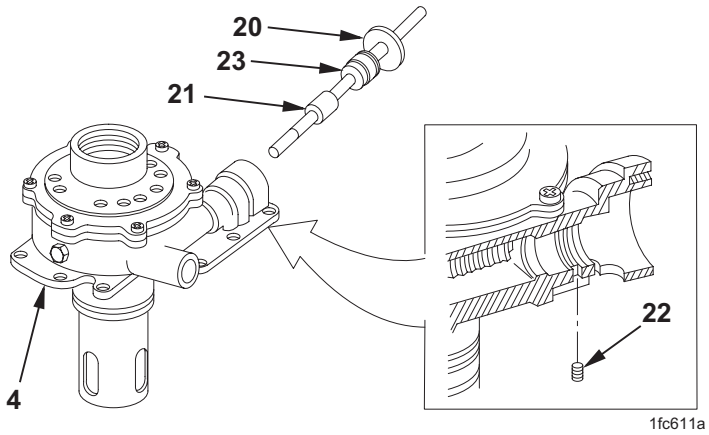
7. Remove headless straight pin (19) from underside of worm gear housing body (4).




8. Remove spur gear (20) from worm shaft assembly (21).

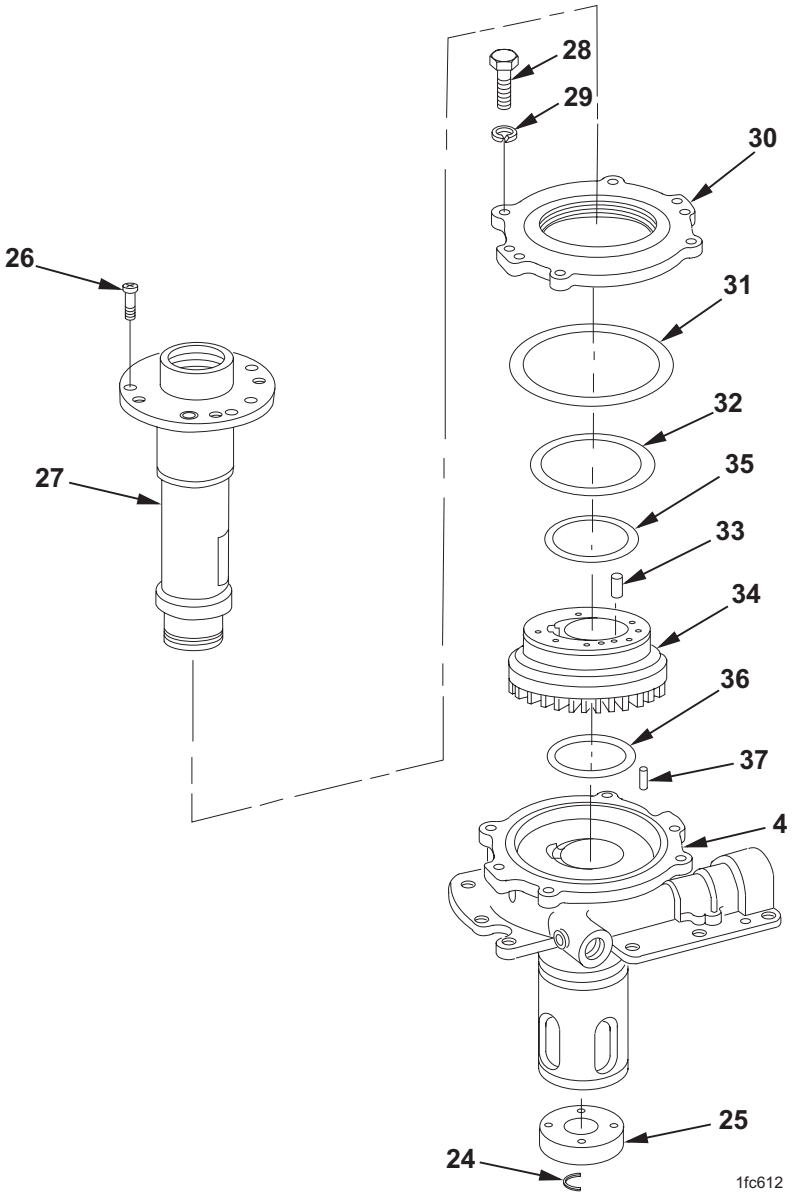
9. Remove sealing compound and loosen setscrew (22).

10. Unscrew seat (23) and remove worm shaft assembly (21) from worm gear housing body (4).



**DISASSEMBLY - Continued**

11. If damaged, remove two retaining rings (24) and cell assembly coupling (25).
12. Remove sealing compound from four machine screws (26) and remove four machine screws.
13. Remove objective and reticle assembly (27).
14. Remove six machine screws (28), six lockwashers (29), and packing retainer (30) from worm gear housing body (4). Discard lockwashers.
15. Remove O-ring (31) and seal (32) from packing retainer (30). Discard O-ring and seal.
16. If damaged, remove headless straight pin (33) from worm gear (34).
17. Remove worm gear (34).
18. Remove seal (35) from worm gear (34). Discard seal.
19. Remove O-ring (36) from worm gear housing body (4). Discard O-ring.
20. If damaged, remove two headless straight pins (37) from worm gear housing body (4).




**CLEANING**

**WARNING**

Use cleaning compounds in well-ventilated area away from open flame. Cleaning compounds are harmful to skin and clothing and may give off harmful vapor.

1. Clean lenses with optical lens cleaning compound (item 11, WP 0152 00) and lens paper (item 17, WP 0152 00).

2. Clean all other parts with cleaning compound (item 10, WP 0152 00).

## REPAIR OR REPLACEMENT

1. Check for cracks or loss of illumination (M137 only).

2. If no cracks are observed and light sources are illuminated, proceed with maintenance actions (M137 only).

3. If cracks are observed but light sources are still illuminated, remove body assembly and notify local Radiation Safety Officer (RSO). Perform wipe test under RSO supervision. Seal body assembly in a double plastic bag (item 5, WP 0152 00), secure with tape (item 20, WP 0152 00), and await wipe test results. If contaminated, dispose of assembly per RSO instructions. If assembly is not contaminated, replace parts as authorized (M137 only).

4. If no illumination is observed, check for illumination in a dark room. Notify RSO of results and follow procedure in step 3 above (M137 only).

5. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0137 00 and WP 0138 00.

## ASSEMBLY

**WARNING**

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

1. Apply a light coat of grease (item 15, WP 0152 00) to new O-ring (1) (item 15, WP 0137 00). Install in worm gear housing body (2).

2. If removed, install two new headless straight pins (3) in worm gear housing body (2).

3. Apply a light coat of grease (item 15, WP 0152 00) to new seal (4) (item 7, WP 0137 00). Install seal in worm gear (5).

**NOTE**

Grease (item 16, WP 0152 00) should be applied to worm gear and bearing surfaces of worm gear and worm gear housing body.

4. Install worm gear (5) in worm gear housing body (2).

5. If removed, install headless straight pin (6) in worm gear (5).

6. Apply a light coat of grease (item 15, WP 0152 00) to new O-ring (7) (item 10, WP 0137 00) and new seal (8) (item 6, WP 0137 00) and install in packing retainer (9).

## WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

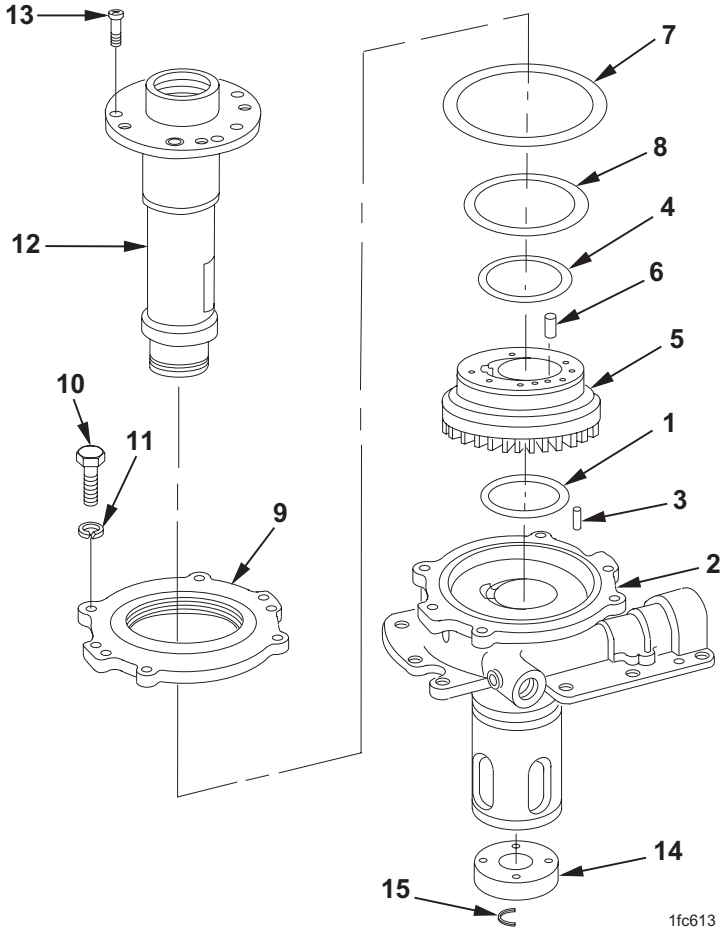
7. Apply sealing compound (item 13, WP 0152 00) to threads of six machine screws (10).

8. Install packing retainer (9), six new lockwashers (11) (item 2, WP 0137 00), and six machine screws (10) to worm gear housing body (2).

9. Install objective and reticle assembly (12).

10. Install four machine screws (13) to secure objective and reticle assembly (12) to worm gear (5).

11. Tighten four machine screws (13) and fill heads flush with sealing compound (item 13, WP 0152 00).



**ASSEMBLY - Continued**

12. If parts were removed, apply a light coat of grease (item 16, WP 0152 00) to cell assembly coupling (14) and install cell assembly coupling and two retaining rings (15).

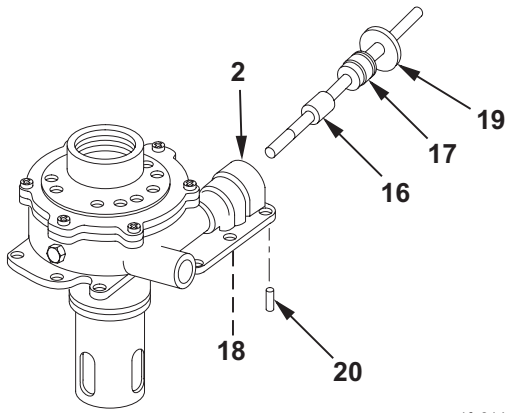
13. Apply a light coat of grease (item 16, WP 0152 00) to worm shaft assembly (16) and install in worm gear housing body (2).

14. Screw seat (17) into worm gear housing body (2) and tighten.

15. Tighten setscrew (18) and cover with sealing compound (item 13, WP 0152 00).

16. Install spur gear (19) on worm shaft assembly (16).

17. Install headless straight pin (20).

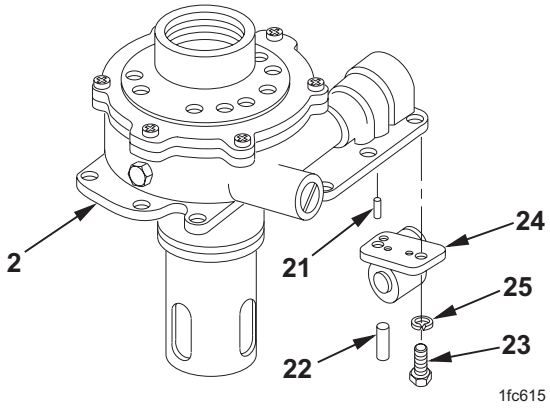



18. If removed, install two headless straight pins (21).

19. If removed, install two headless straight pins (22).

20. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (23).

21. Install gear assembly (24), two new lockwashers (25) (item 2, WP 0137 00), and two machine screws (23) on worm gear housing body (2).




22. Apply a light coat of grease (item 15, WP 0152 00) to new O-ring (26) (item 5, WP 0137 00) and install in wormshaft cap (27). Install wormshaft cap in worm gear housing body (2).

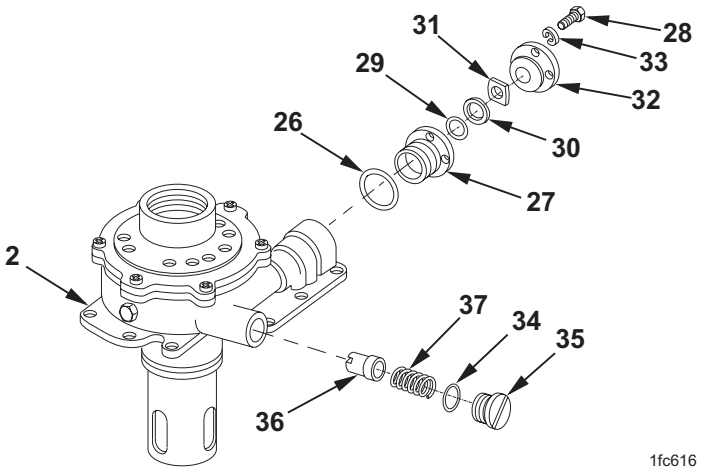
23. Apply sealing compound (item 13, WP 0152 00) to threads of three machine screws (28).

24. Apply a light coat of grease (item 15, WP 0152 00) to new O-ring (29) (item 13, WP 0137 00). Install O-ring, recessed washer (30), new spring tension washer (31) (item 17, WP 0137 00), plate (32), three new lockwashers (33) (item 2, WP 0137 00), and three machine screws (28) to worm gear housing body (2).

25. Apply a light coat of grease (item 15, WP 0152 00) to new O-ring (34) (item 25, WP 0137 00). Install new O-ring on machine threaded plug (35).

26. Apply a light coat of grease (item 16, WP 0152 00) to detent plunger (36) and place detent plunger and compression helical spring (37) in worm gear housing body (2).

27. Apply a coat of sealing compound (item 13, WP 0152 00) to threads of machine threaded plug (35) and install in worm gear housing body (2).



**ASSEMBLY - Continued**

## NOTE

Perform steps 28 and 29 if new worm shaft assembly has been installed.

28. Install knob on worm shaft assembly (16) (WP 0092 00). Secure with setscrew, NSN 5305-00-728-1478. Using the pilot hole located on the knob, drill hole through worm shaft assembly.

29. Remove setscrew from knob and remove knob (WP 0092 00).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

# ELBOW ASSEMBLY MAINTENANCE
# DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY, ADJUSTMENT

**INITIAL SETUP:**

**Tools and Special Tools**
Dioptometer (item 13, WP 0149 00)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Cleaning compound (item 10, WP 0152 00)
Denatured alcohol (item 3, WP 0152 00)
Grease (item 15, WP 0152 00)
Lens paper (item 17, WP 0152 00)
Lockwasher (8) (item 4, WP 0139 00)
O-ring (item 2, WP 0139 00)
O-ring (item 15, WP 0139 00)
Sealing compound (item 13, WP 0152 00)
Technical acetone (item 1, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
TM 9-254
WP 0139 00

**Equipment Conditions**
Panoramic telescope elbow assembly partially disassembled (WP 0088 00)

**DISASSEMBLY**

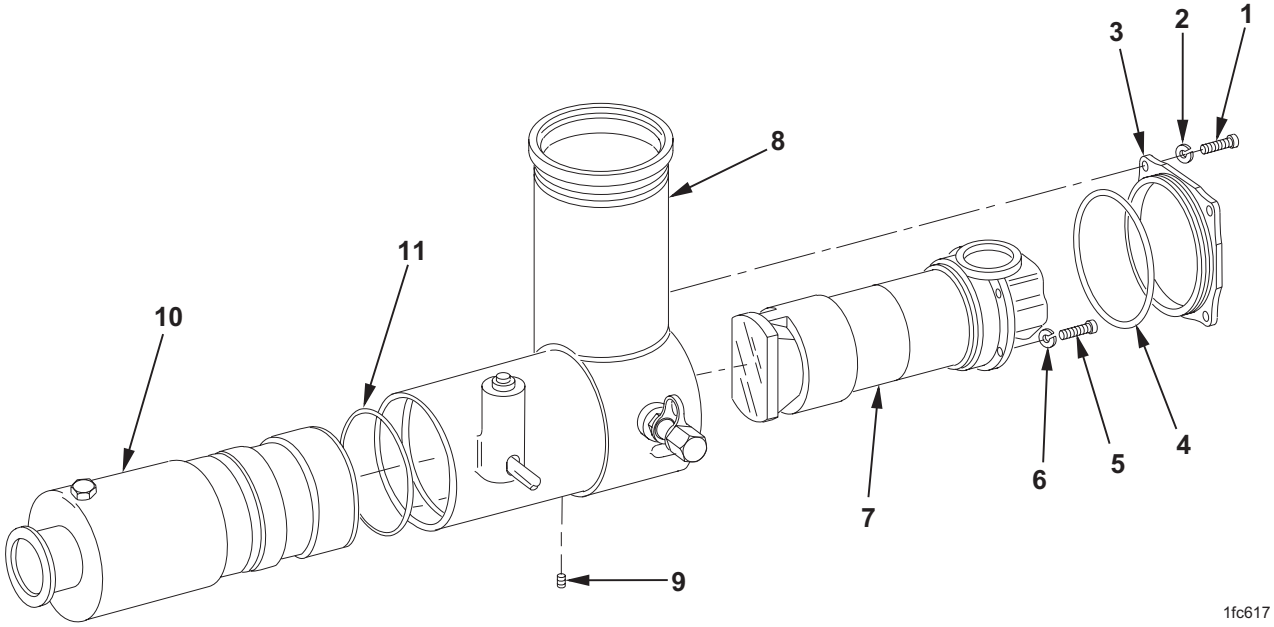
WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

1. Remove four machine screws (1), four lockwashers (2), and elbow access cover (3). Discard lockwashers.
2. Remove O-ring (4) from elbow access cover (3). Discard O-ring.
3. Remove four socket head capscrews (5) and four lockwashers (6). Discard lockwashers.
4. Pull optical cell assembly (adapter) (7) from elbow telescope (8).
5. Remove sealing compound from two setscrews (9) and remove setscrews from elbow telescope.
6. Remove optical cell assembly (10) and O-ring (11) from elbow telescope (8). Discard O-ring.



## CLEANING

### WARNING

Use cleaning compounds in well-ventilated area away from open flame. Cleaning compounds are harmful to skin and clothing and may give off harmful vapor.

1. Remove rust, corrosion, dirt, and grease from metal parts. Remove dirt and grease using cleaning compound (item 10, WP 0152 00).

2. Clean optical lenses and prisms using technical acetone (item 1, WP 0152 00) or denatured alcohol (item 3, WP 0152 00) and lens paper (item 17, WP 0152 00).

### NOTE

General procedures for cleaning metal parts and optics, removing corrosion, staking pins, and other procedures are contained in TM 9-254.

## REPAIR OR REPLACEMENT

1. Refer to TM 9-254 for general repair instructions.

2. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0139 00.

## ASSEMBLY

### WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

1. Apply a light coat of grease (item 15, WP 0152 00) to new O-ring (1) (item 2, WP 0139 00) and install 1.80 in. (45.72 mm) inside elbow telescope (2).

2. Place optical cell assembly (3) inside elbow telescope (2).

3. Install two setscrews (4) to retain optical cell assembly (3).

**ASSEMBLY - Continued**

**WARNING**

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

4. Fill holes of two setscrews (4) with sealing compound (item 13, WP 0152 00).

5. Place optical cell assembly (adapter) (5) in elbow telescope (2). Align slot in optical cell assembly (adapter) over locating pin in elbow telescope.

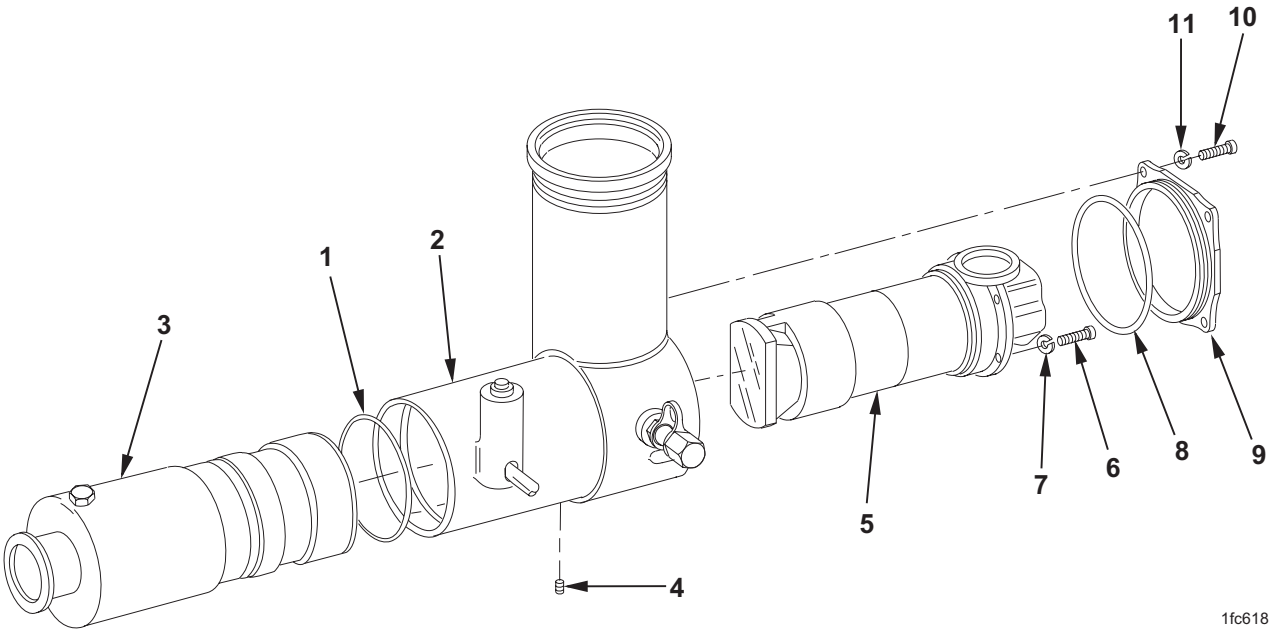
6. Apply sealing compound (item 13, WP 0152 00) to threads of four socket head capscrews (6).

7. Install four new lockwashers (7) (item 4, WP 0139 00) and four socket head capscrews (6) to hold optical cell assembly (adapter) (5).

8. Apply a coat of grease (item 15, WP 0152 00) to new O-ring (8) (item 15, WP 0139 00) and install in elbow access cover (9).

9. Apply sealing compound (item 13, WP 0152 00) to threads of four machine screws (10).

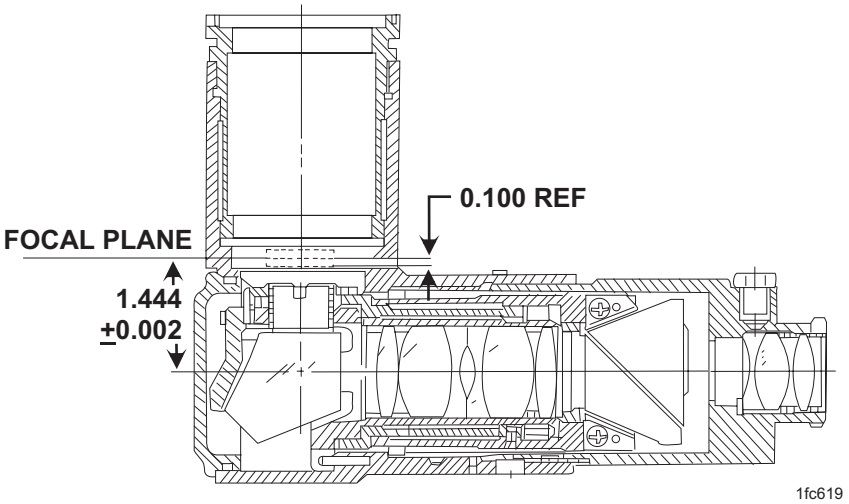
10. Position elbow access cover (9) on elbow telescope (2) and secure in place using four new lockwashers (11) (item 4, WP 0139 00) and four machine screws (10).



## ADJUSTMENT

### Eyepiece Focus

Viewing a crossbar target placed in the focal plane as shown, the eyepiece focus of the crossbar image should lie between -0.5 and -1.0 diopters, measured at the eyepiece using a dioptometer.




**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

# OPTICAL CELL ASSEMBLY MAINTENANCE
# DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

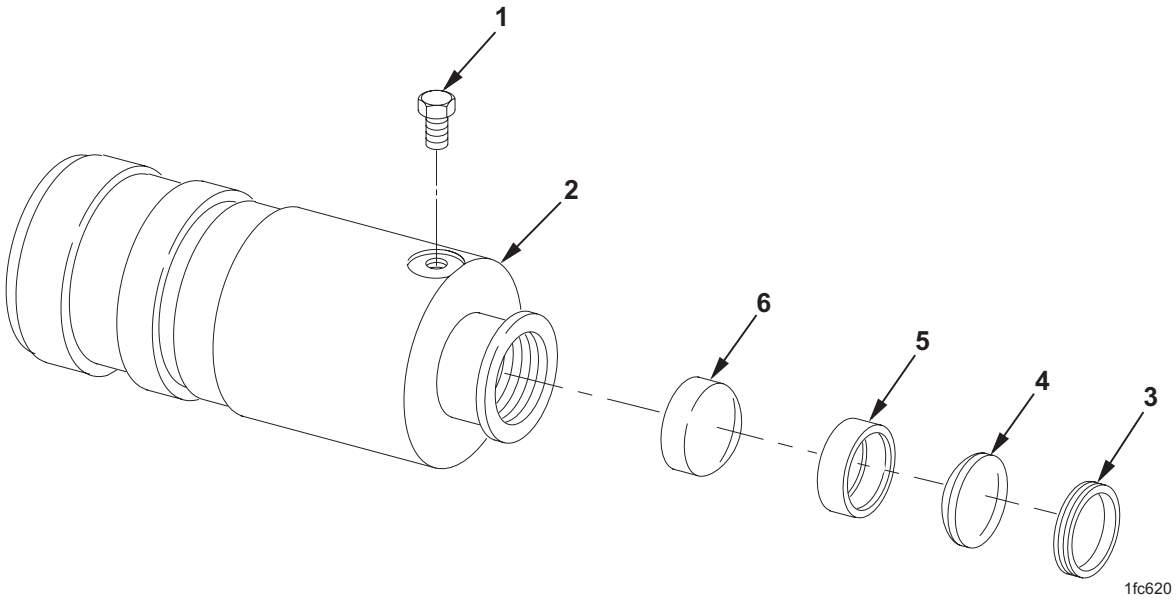
**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Lens paper (item 17, WP 0152 00)
Optical lens cleaning compound (item 11, WP 0152 00)
Sealing compound (item 13, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
TM 9-254
WP 0140 00

## DISASSEMBLY

1. Remove safety relief valve (1) from optical element cell (2).
2. Remove externally threaded ring (3) from optical element cell (2).
3. Carefully remove sealing compound from optical instrument lens (4) and remove from optical element cell (2).
4. Remove spacer (5) and optical instrument lens (6) from optical element cell (2).




## CLEANING

Clean all parts per TM 9-254.

## REPAIR OR REPLACEMENT

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0140 00.

## ASSEMBLY

1. Position optical instrument lens (6), spacer (5), and optical instrument lens (4) in optical element cell (2).
2. Install and tighten externally threaded ring (3) in optical element cell (2).

WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

3. Inject sealing compound (item 13, WP 0152 00) into two drilled holes in optical element cell (2) to secure optical instrument lens (4) and externally threaded ring (3).

4. Apply a light coat of sealing compound (item 13, WP 0152 00) to safety relief valve (1) and install in optical element cell (2).

WARNING

Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.

5. Clean optical instrument lens (4) with optical lens cleaning compound (item 11, WP 0152 00) and lens paper (item 17, WP 0152 00).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

# COUNTER BOX ASSEMBLY (EXTERNAL PARTS) MAINTENANCE DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Cleaning compound (item 10, WP 0152 00)
Gasket (item 10, WP 0141 00)
Grease (item 15, WP 0152 00)
Lens paper (item 17, WP 0152 00)
Lockwasher (12) (item 12, WP 0141 00)
Lockwasher (4) (item 15, WP 0141 00)
Lockwasher (4) (item 19, WP 0141 00)
Nonmetallic seal (item 4, WP 0141 00)
Optical lens cleaning compound (item 11, WP 0152 00)
O-ring (item 21, WP 0141 00)
Sealing compound (item 13, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
TM 9-254
WP 0141 00

**Equipment Conditions**
Counter box assembly removed from panoramic telescope (WP 0092 00)
Fluid valve stem, valve core, retaining strap, and air valve cap removed from counter box assembly (WP 0090 00)
Battery enclosure assembly removed from M137A2/M137A3 counter box assembly (WP 0090 00)
Stop plate removed from M137A2/M137A3 counter box assembly (WP 0090 00)

**DISASSEMBLY**

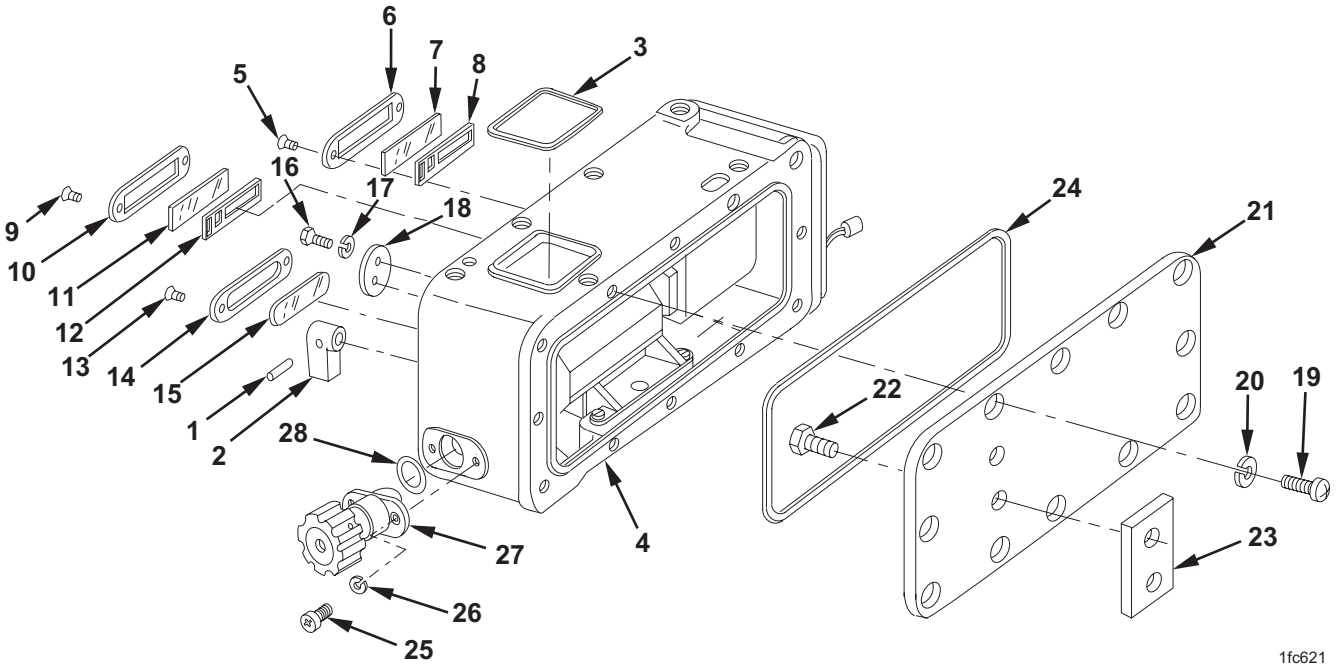
WARNING

**RADIATION**

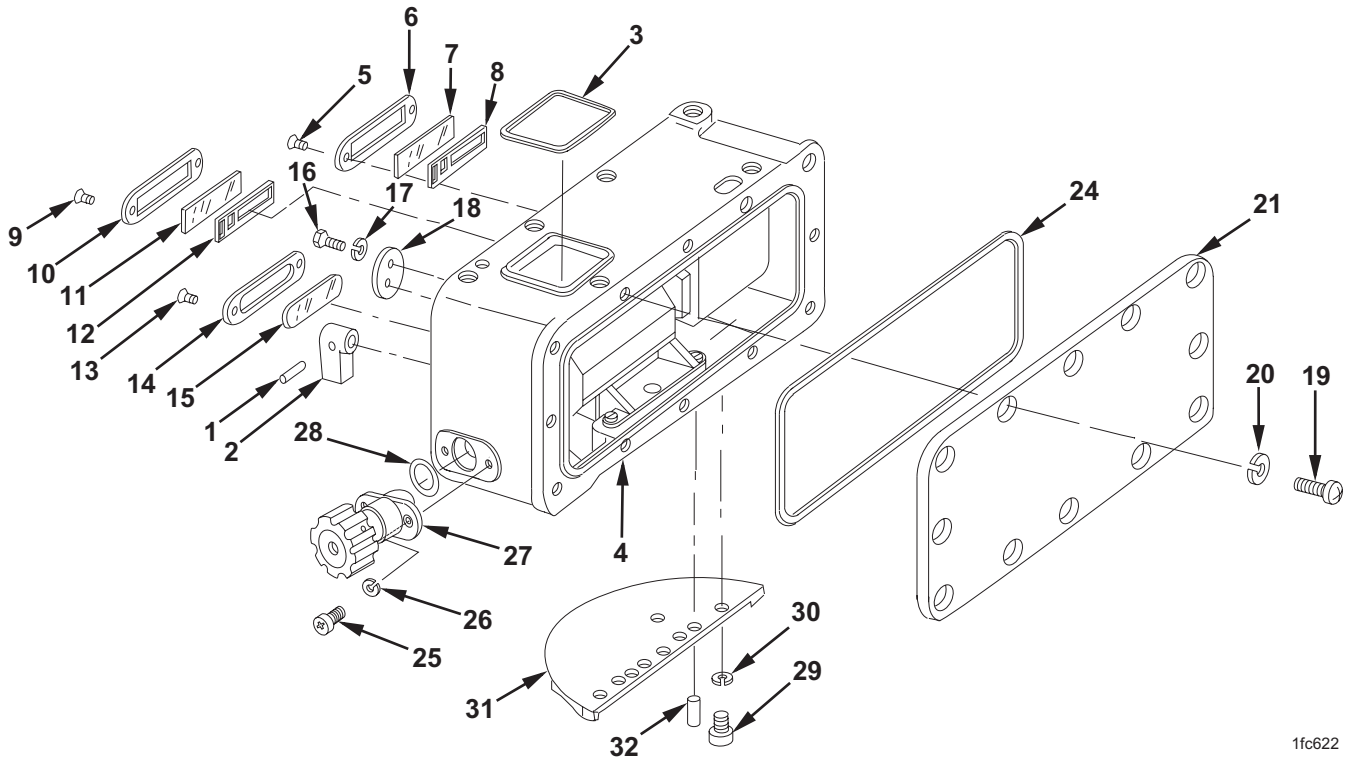
**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

1. Remove headless straight pin (1) from knob (2) and remove knob.
2. Remove nonmetallic seal (3) from counter box assembly (4). Discard nonmetallic seal.
3. Remove two machine screws (5) and window retaining plate (6).
4. Carefully remove sealing compound from edge of optical instrument window (7). Remove optical instrument window and window mask (8).
5. Remove two machine screws (9) and window retaining plate (10).
6. Carefully remove sealing compound from edge of optical instrument window (11). Remove optical instrument window and window mask (12).
7. Remove two machine screws (13) and window retaining plate (14).
8. Carefully remove sealing compound from edge of optical instrument window (15). Remove optical instrument window.
9. Remove two externally relieved screws (16), two lockwashers (17), and access cover (18). Discard lockwashers.
10. Remove 12 machine screws (19), 12 lockwashers (20), and counter housing cover (21). Discard lockwashers.
11. If damaged, remove two machine screws (22) and spacer (23) from counter housing cover (21) (M137A2/M137A3 only).
12. Remove and discard gasket (24).
13. Remove two machine screws (25), two lockwashers (26), and knob assembly (27). Discard lockwashers.
14. Remove O-ring (28) from knob assembly (27). Discard O-ring.
15. Remove four machine screws (29), four lockwashers (30), and stop plate (31) (M137 only). Discard lockwashers.
16. If loose or damaged, remove two headless straight pins (32) (M137 only).




**M137A2/M137A3 Counter Box Assembly**




**M137 Counter Box Assembly**

**CLEANING**

WARNING

Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever cleaning compound is used.

Remove rust, corrosion, dirt, and grease from metal parts. Remove dirt and grease using cleaning compound (item 10, WP 0152 00).

NOTE

General procedures for cleaning metal parts and optics, removing corrosion, staking pins, and other procedures are contained in TM 9-254.

**REPAIR OR REPLACEMENT**

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0141 00.

**ASSEMBLY**

WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

1. If removed, install two headless straight pins (1) in bottom of counter box assembly (2). If headless straight pins are loose, ream holes for next larger standard size headless straight pins and install (M137 only).

WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

2. Apply sealing compound (item 13, WP 0152 00) to threads of four machine screws (3) (M137 only).

3. Position stop plate (4) on counter box assembly (2) and secure in place with four new lockwashers (5) (item 15, WP 0141 00) and four machine screws (3) (M137 only).

4. Apply a light coat of grease (item 15, WP 0152 00) to new O-ring (6) (item 21, WP 0141 00) and install on knob assembly (7).

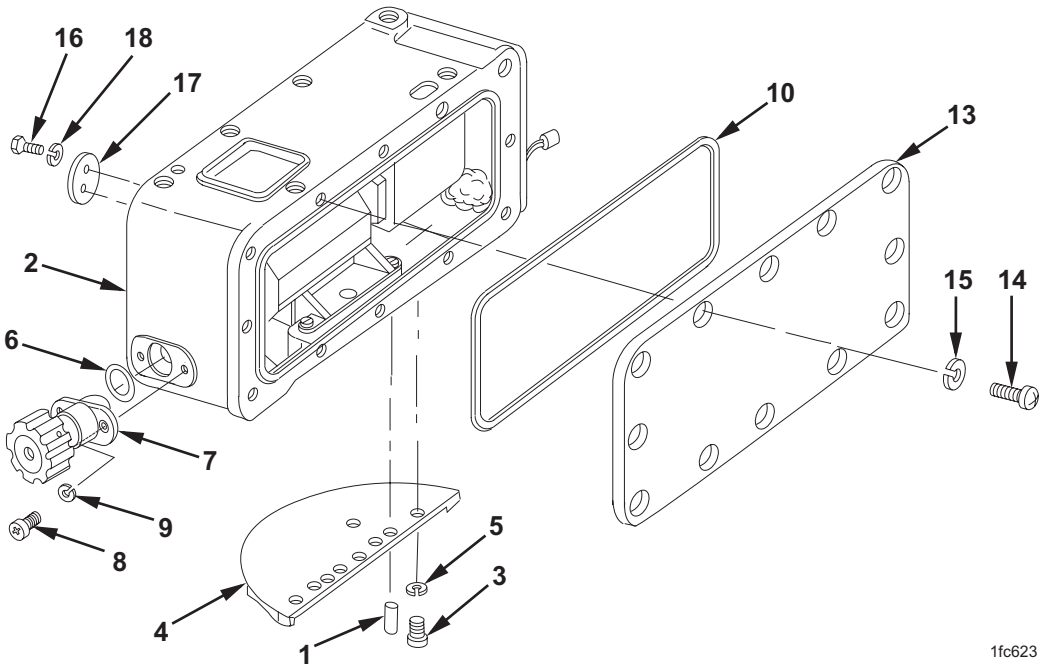
5. Turn knob assembly (7) clockwise until it stops.

## NOTE

Correction counter should read ON or between R-95 and R-99.

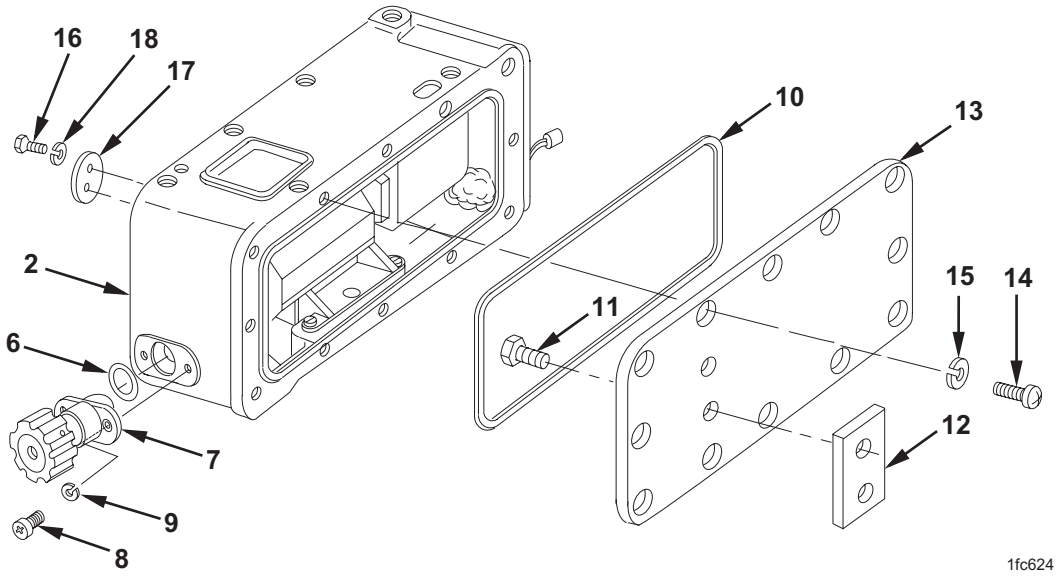
6. Install knob assembly (7) and be sure that the shaft of knob assembly engages coupling pin of correction counter.

7. Turn knob assembly (7) counterclockwise until it stops. The corners of the correction counter should read L-95 to L-99. If it does not, adjust the knob assembly accordingly.




**M137 Counter Box Assembly**

**ASSEMBLY - Continued**




**M137A2/M137A3 Counter Box Assembly**

8. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (8).

9. Install two new lockwashers (9) (item 19, WP 0141 00) and two machine screws (8). Tighten screws.

10. Apply a light coat of grease (item 15, WP 0152 00) to new gasket (10) (item 10, WP 0141 00).

11. Install new gasket (10) into counter box assembly (2).

12. If removed, apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (11) (M137A2/M137A3 only).

13. If removed, install spacer (12) on counter housing cover (13) and secure with two machine screws (11). Countersink machine screws (M137A2/M137A3 only).

14. Apply sealing compound (item 13, WP 0152 00) to threads of 12 machine screws (14).

15. Install counter housing cover (13), 12 new lockwashers (15) (item 12, WP 0141 00), and 12 machine screws (14).

16. Apply sealing compound (item 13, WP 0152 00) to threads of two externally relieved screws (16).

17. Place access cover (17) on counter box assembly (2) and secure in place with two new lockwashers (18) (item 19, WP 0141 00) and two externally relieved screws (16).

18. Apply a light coat of sealing compound (item 13, WP 0152 00) around edge of optical instrument window (19) and install.

19. Apply a light coat of sealing compound (item 13, WP 0152 00) to threads of two machine screws (20).

20. Install window retaining plate (21) and two machine screws (20).

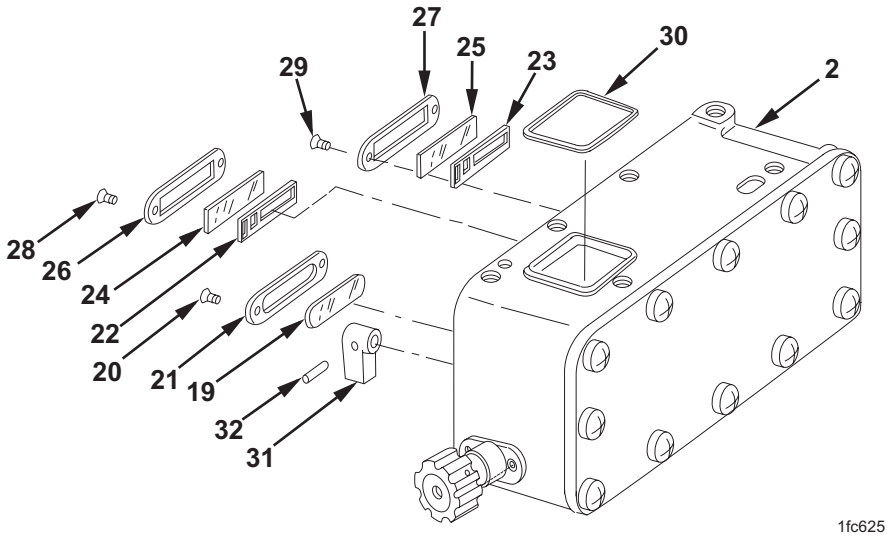
21. Install window masks (22 and 23).

22. Apply a light coat of sealing compound (item 13, WP 0152 00) around edge of optical instrument windows (24 and 25) and install.

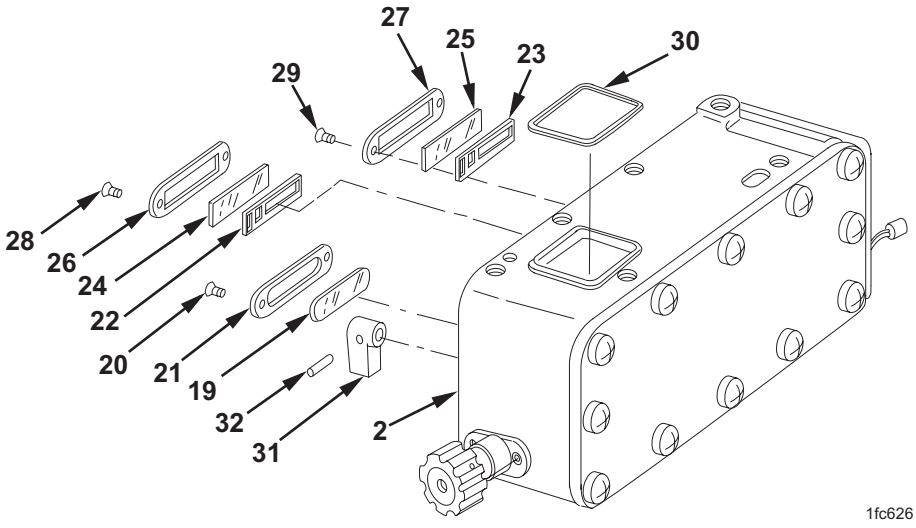
23. Install window retaining plates (26 and 27).

24. Apply a light coat of sealing compound (item 13, WP 0152 00) to threads of four machine screws (28 and 29) and install.

25. Apply a light coat of grease (item 15, WP 0152 00) to new nonmetallic seal (30) (item 4, WP 0141 00) and install in top of counter box assembly (2).




**M137 Counter Box Assembly**




**M137A2/M137A3 Counter Box Assembly**

**ASSEMBLY - Continued**

26. Install knob (31) and secure with headless straight pin (32). If headless straight pin is loose, ream hole for the next larger size of headless straight pin and install.

27. Carefully remove all fingerprints from counter windows using optical lens cleaning compound (item 11, WP 0152 00) and lens paper (item 17, WP 0152 00).

**END OF WORK PACKAGE**

**GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

# COUNTER BOX ASSEMBLY (PARTS) MAINTENANCE
# DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Cleaning compound (item 10, WP 0152 00)
Epoxy adhesive (item 4, WP 0152 00)
Grease (item 15, WP 0152 00)
Lockwasher (15) (item 4, WP 0142 00)
Lockwasher (3) (item 21, WP 0142 00)
O-ring (2) (item 16, WP 0142 00)
Sealing compound (item 13, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**
TM 9-254
WP 0142 00

**Equipment Conditions**
Counter box assembly removed from panoramic telescope (WP 0092 00)
Counter box assembly partially disassembled (WP 0098 00)

**DISASSEMBLY**

## WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

1. Remove two machine screws (1) and two lockwashers (2). Discard lockwashers.

## NOTE

Scribe lines on stop and on counter box assembly to aid in proper realignment during assembly.

2. Lift up and remove stop (3) from counter box assembly (4).
3. Remove pantel eccentric (5).
4. Remove O-ring (6) from pantel eccentric (5). Discard O-ring.
5. Remove two machine screws (7), two lockwashers (8), stop (9), and pantel eccentric (10). Discard lockwashers.
6. Remove O-ring (11) from pantel eccentric (10). Discard O-ring.

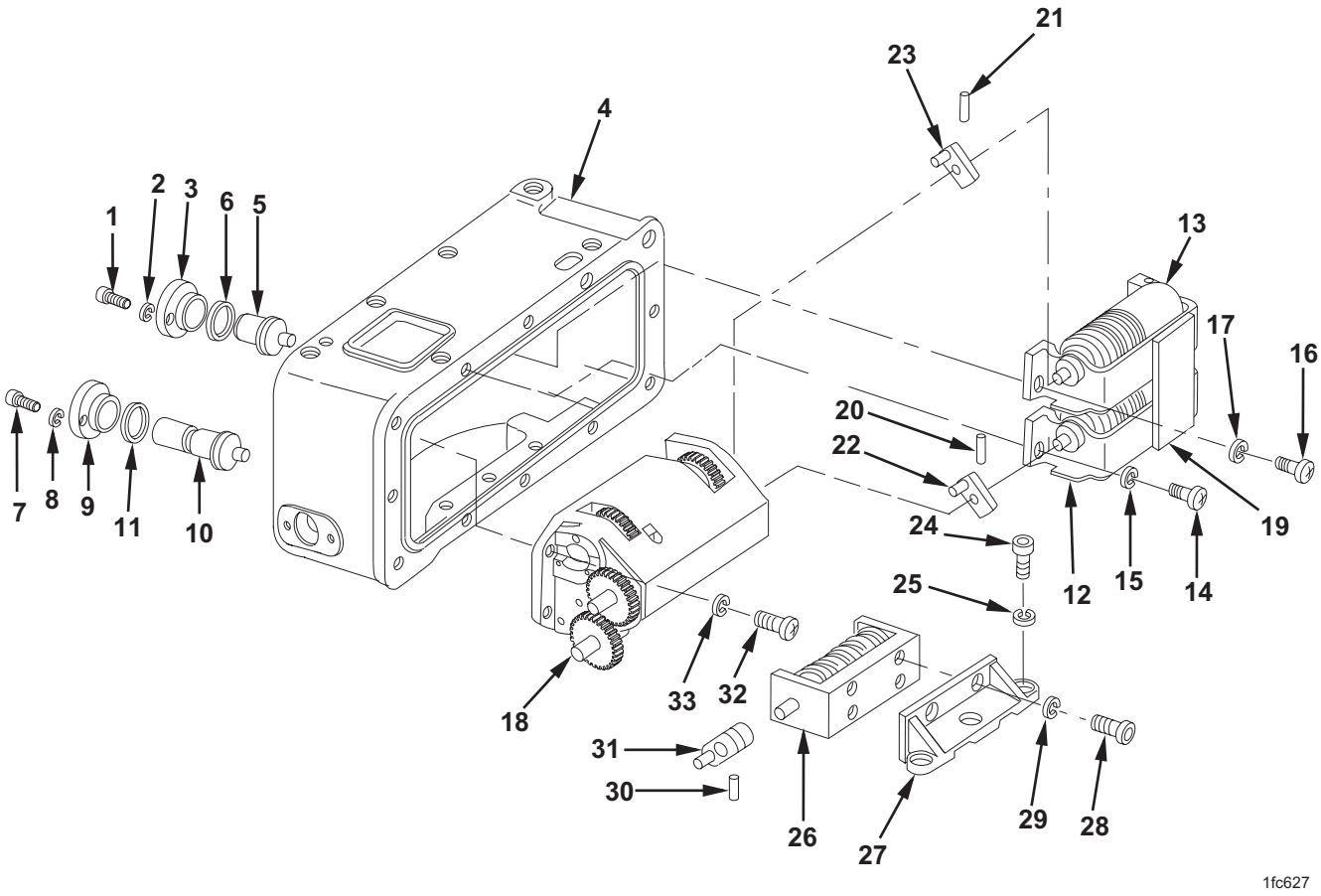
## NOTE

Rotating counters (12 and 13) are not interchangeable. Mark rotating counters to identify for assembly.

7. Remove two machine screws (14) and two lockwashers (15). Discard lockwashers.
8. Remove two machine screws (16) and two lockwashers (17). Discard lockwashers.
9. Rotate lower counter shaft of optical element gear block assembly (18) so that slot in lower counter shaft is in upright position.
10. Rotate upper counter shaft of optical element gear block assembly (18) so that slot in upper counter shaft is in upright position.
11. Remove rotating counters (12 and 13) with bracing plate (19).
12. If either rotating counter (12 and/or 13) is damaged or is being replaced, replace both rotating counters but first remove two headless straight pins (20 and 21) and two couplings (22 and 23).
13. If damaged, discard both rotating counters (12 and 13) with bracing plate (19).
14. Remove three socket head capscrews (24), three lockwashers (25), and rotating counter (26) with counter mount (27). Discard lockwashers.
15. Remove four socket head capscrews (28), four lockwashers (29), and counter mount (27) from rotating counter (26). Discard lockwashers.

16. If damaged or if rotating counter (26) is being replaced, remove headless straight pin (30) and reset coupling (31).

17. Remove three machine screws (32), three lockwashers (33), and optical element gear block assembly (18). Discard lockwashers.




**CLEANING**

## WARNING

Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.

Remove rust, corrosion, dirt, and grease from metal parts. Remove dirt and grease using cleaning compound (item 10, WP 0152 00).

## NOTE

General procedures for cleaning metal parts and optics, removing corrosion, staking pins, and other procedures are contained in TM 9-254.

## REPAIR OR REPLACEMENT

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0142 00.

## ASSEMBLY

WARNING

RADIATION   TRITIUM GAS ($H_3$)

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

1. Place optical element gear block assembly (1) in counter box assembly (2).

WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

2. Apply sealing compound (item 13, WP 0152 00) to threads of three machine screws (3).
3. Install three new lockwashers (4) (item 13, WP 0142 00) and three machine screws (3). Tighten screws.
4. Place counter mount (5) on rotating counter (6).
5. Apply sealing compound (item 13, WP 0152 00) to threads of four socket head capscrews (7).
6. Install four new lockwashers (8) (item 4, WP 0142 00) and four socket head capscrews (7). Tighten capscrews.

NOTE

If new rotating counter or reset coupling is required, timing must be maintained. To accomplish this, follow steps 7 through 14.

If original rotating counter or reset coupling is to be reassembled in counter box assembly, proceed to step 15.

7. Position reset coupling (9) on shaft of rotating counter (6). Install a 0.112-48 thread setscrew in reset coupling; do not tighten at this time.
8. Temporarily install rotating counter (6) and counter mount (5) in counter box assembly (2).
9. Temporarily install knob assembly (WP 0098 00). Set rotating counter so that numbers are aligned as seen through the optical instrument window.

10. Set reset coupling (9) so that setscrew is accessible and tighten.

11. Turn knob to be sure that rotating counter numbers are in correct alignment. If not, loosen setscrew and realign rotating counter (6) until numbers are aligned as seen through optical instrument window. Tighten setscrew.

12. Remove rotating counter (6) with counter mount (5) from counter box assembly (2).

13. Drill pin hole in reset coupling (9) and shaft of rotating counter (6). Install headless straight pin (10).

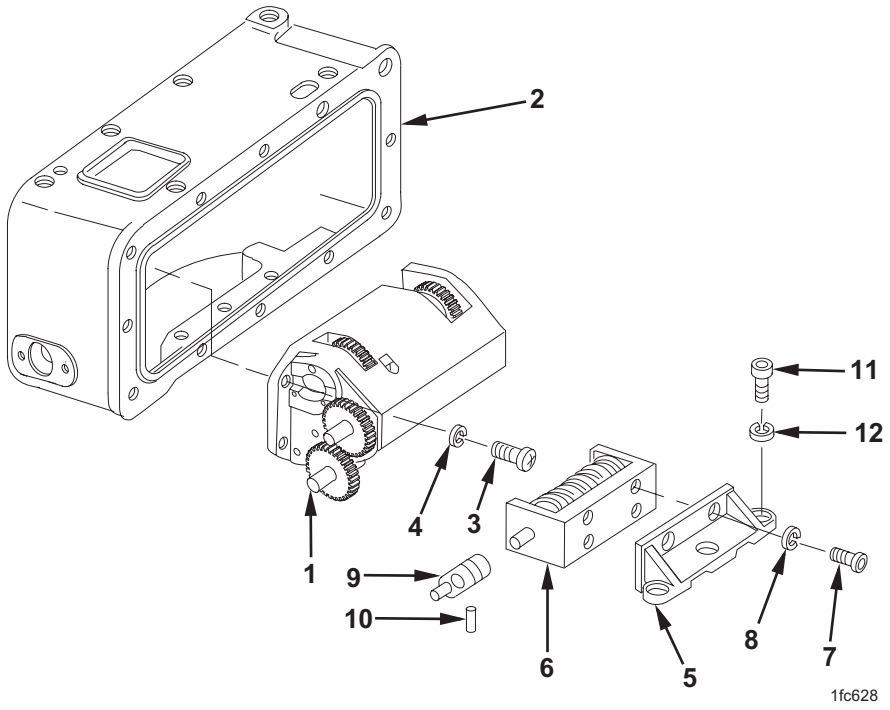
14. Remove setscrew from reset coupling (9).

15. If using original parts, install reset coupling (9) and secure with headless straight pin (10).

16. Set rotating counter (6) to 00 and install.

17. Apply sealing compound (item 13, WP 0152 00) to threads of three socket head capscrews (11).

18. Install three new lockwashers (12) (item 4, WP 0142 00) and three socket head capscrews (11) to secure counter mount (5) to counter box assembly (2).



**ASSEMBLY - Continued**

19. Position coupling (13) on shaft of rotating counter (14) and install headless straight pin (15). If headless straight pin is loose, ream hole for next larger size headless straight pin and install.

20. Position rotating counter (14) in counter box assembly (2).

NOTE

Be sure that headless straight pin (15) in coupling (13) is in slot of upper counter shaft.

21. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (16).

22. Install two new lockwashers (17) (item 4, WP 0142 00) and two machine screws (16).

23. Position coupling (18) on shaft of rotating counter (19) and install headless straight pin (20). If headless straight pin is loose, ream hole for next larger size headless straight pin and install.

24. Position rotating counter (19) in counter box assembly (2).

25. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (21).

26. Install two new lockwashers (22) (item 4, WP 0142 00) and two machine screws (21).

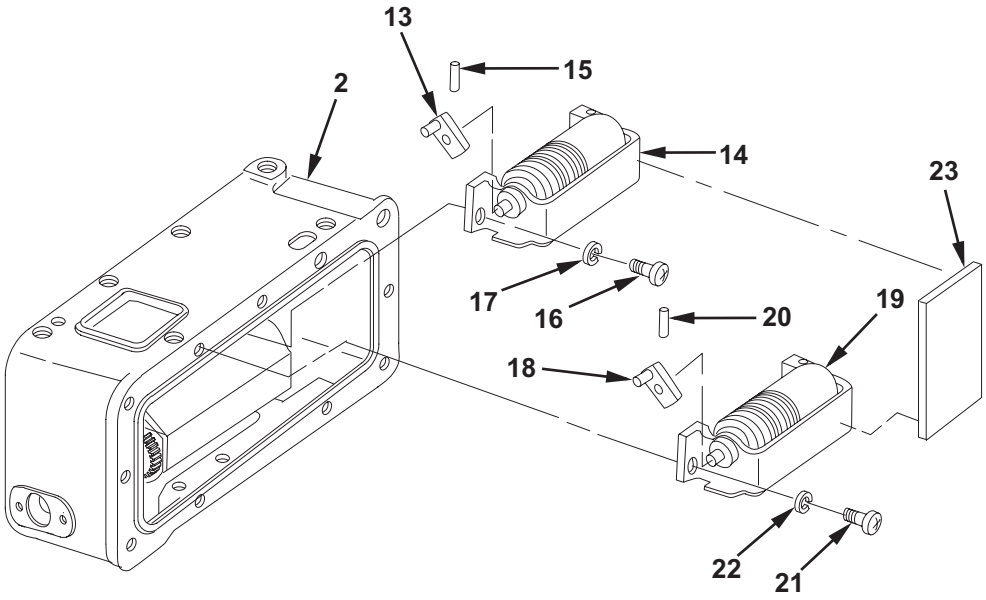
WARNING

Use adhesive in well-ventilated area away from open flame. Adhesive is harmful to skin and clothing and may give off harmful vapor.

27. Apply epoxy adhesive (item 4, WP 0152 00) carefully to two rotating counters (14 and 19), ensuring that no epoxy gets onto number wheels of rotating counters.

28. Place bracing plate (23) onto rotating counters (14 and 19), ensuring that no epoxy gets onto number wheels of rotating counters.

29. Place small weight on bracing plate (23) and allow to cure for 24 hours.




30. Apply a light coat of grease (item 15, WP 0152 00) to new O-ring (24) (item 16, WP 0142 00) and install on pantel eccentric (25).

31. Install pantel eccentric (25) in counter box assembly (2) with lug in downward position.

32. Install stop (26) on pantel eccentric (25) with scribed line aligned with scribed line on counter box assembly (2).

**ASSEMBLY - Continued**

33. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (27).

34. Install two new lockwashers (28) (item 4, WP 0142 00) and two machine screws (27). Tighten screws.

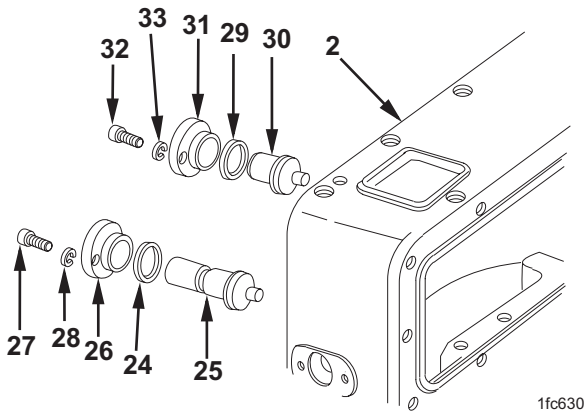
35. Apply a light coat of grease (item 15, WP 0152 00) to new O-ring (29) (item 16, WP 0142 00) and install on pantel eccentric (30).

36. Install pantel eccentric (30) in counter box assembly (2) with lug in downward position.

37. Install stop (31) on pantel eccentric (30) with scribed line aligned with scribed line on counter box assembly (2).

38. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (32).

39. Install two new lockwashers (33) (item 4, WP 0142 00) and two machine screws (32). Tighten screws.




**END OF WORK PACKAGE**

# CHAPTER 22

# GENERAL SUPPORT
# FINAL INSPECTION INSTRUCTIONS
# FOR
# M137/M137A2/M137A3 PANORAMIC TELESCOPE

**GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**FINAL INSPECTION INSTRUCTIONS**
**TEST AND INSPECTION**

## INITIAL SETUP:

### Test Equipment

Azimuth test fixture (item 7, WP 0149 00)
Dioptometer (item 13, WP 0149 00)
Extension adapter (item 3, WP 0149 00)
Fixture adapter (item 5, WP 0149 00)
Infinity aiming reference collimator (item 23, WP 0149 00)
Plate-mounted level (item 12, WP 0149 00)
Surface gage (item 21, WP 0149 00)
Telescope mount holder (item 22, WP 0149 00)

### Tools and Special Tools

Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

### References

TM 750-116

### Special Environmental Conditions

Ambient temperature +60 °F (+16 °C) to +90 °F (+32 °C)

## TEST AND INSPECTION

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M137 only).

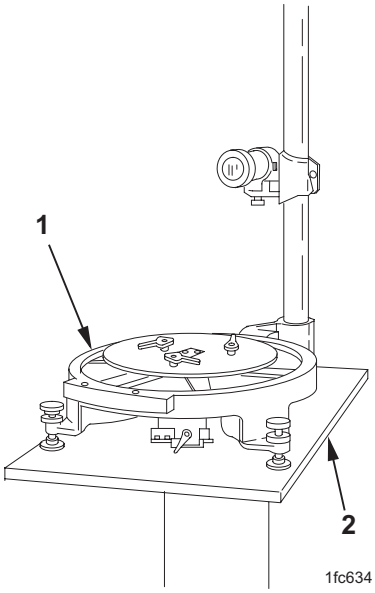
NOTE

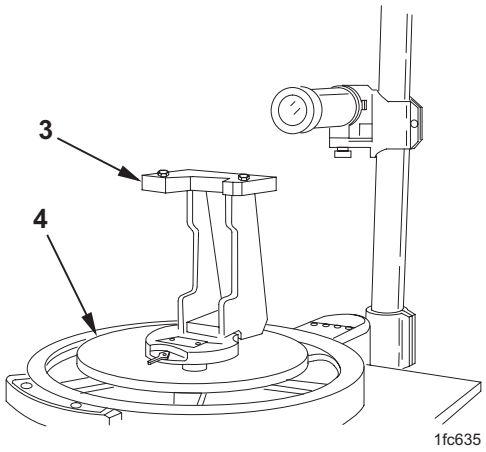
Procedure is written and illustrated for the M137 panoramic telescope but also applies to the M137A2 and M137A3 panoramic telescopes.

For testing of any M137 model with quick release pins, pins must be removed to fit azimuth test fixture.

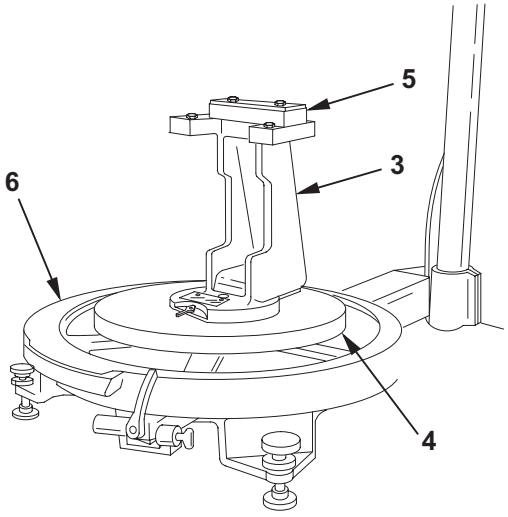
**TEST AND INSPECTION - Continued**

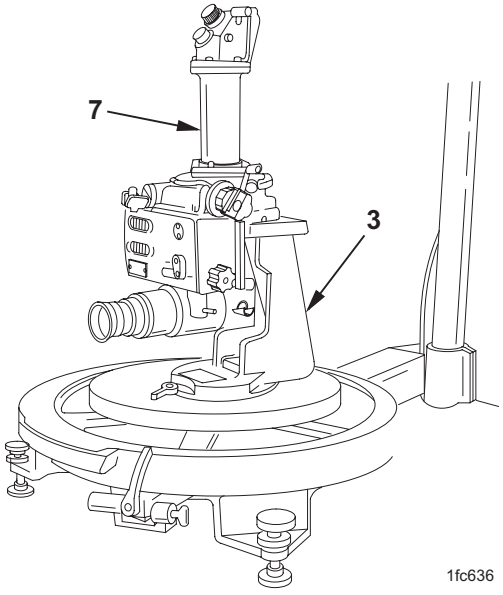
**Setting Up and Adjusting Azimuth Test Fixture**



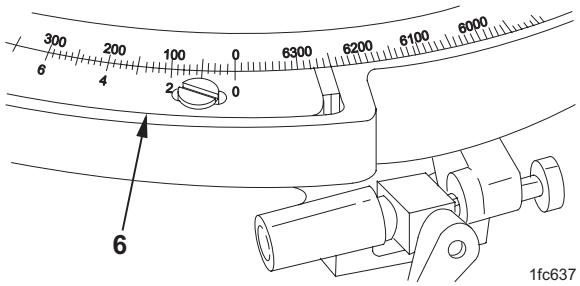




1. Secure azimuth test fixture (1) on test stand (2) at a height suitable for operation.
2. Position fixture adapter (3) on adapter support plate (4) and lightly clamp to hold in place.



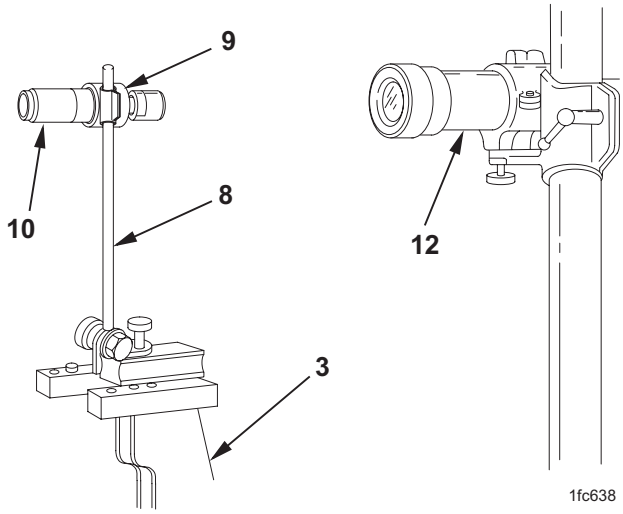




3. Place plate-mounted level (5) on fixture adapter (3) and turn adapter support plate (4).
4. Check that adapter support plate (4) remains level through full rotation of azimuth test fixture scale (6).



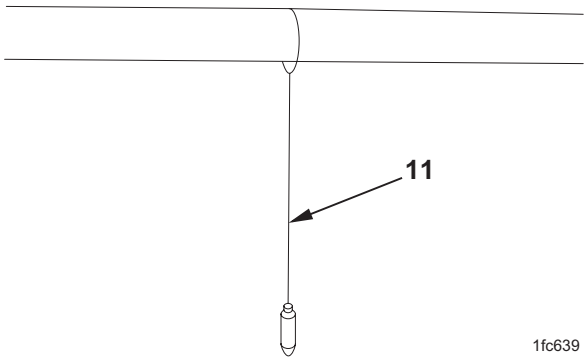

5. Place M137 telescope (7) on fixture adapter (3) and adjust collimator height. Remove M137 telescope from fixture adapter after adjustment.

6. Set azimuth test fixture scale (6) to 0 graduation. Align with 0 graduation on vernier scale. Lock in this position.




7. Position surface gage (telescope holder) (8), with telescope mount holder (9), on fixture adapter (3).

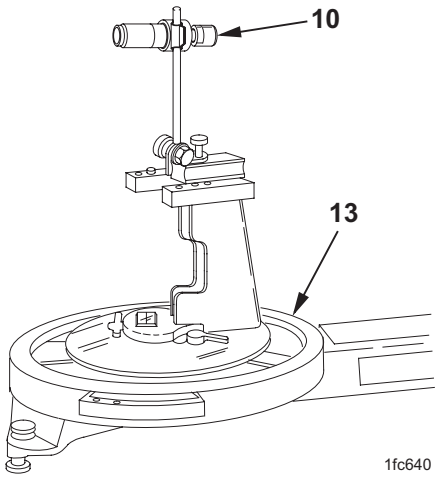
8. Place dioptometer (collimator telescope) (10) on surface gage (telescope holder) (8) and adjust for proper height.




9. Suspend plumbline (11) to one side of the infinity aiming reference collimator (12).

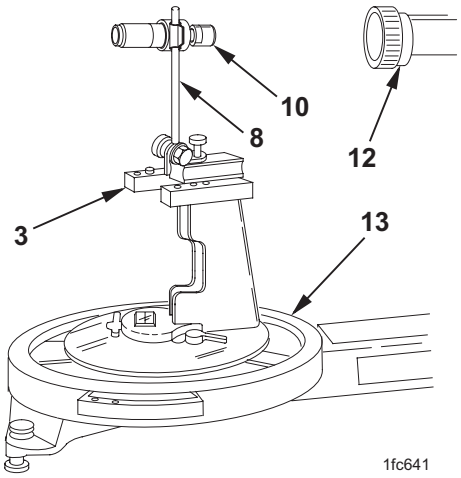
**TEST AND INSPECTION - Continued**

**Setting Up and Adjusting Azimuth Test Fixture - Continued**




10. Turn azimuth ring (13) until the reticle cross line intersection point of dioptometer (collimator telescope) (10) is centered on plumbline.

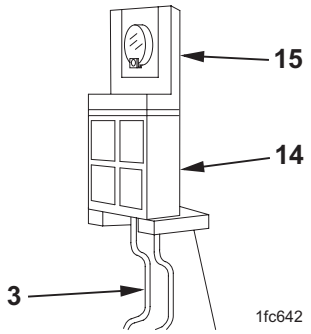
11. Rotate dioptometer (collimator telescope) (10) until vertical reticle line is superimposed on plumbline.




12. Turn azimuth ring (13) back until line of sight of dioptometer (collimator telescope) (10) aligns with line of sight of infinity aiming reference collimator (12).

13. Revolve infinity aiming reference collimator (12) until vertical reticle line coincides with vertical line of dioptometer (collimator telescope) (10).

14. Remove surface gage (telescope holder) (8) from fixture adapter (3).




## NOTE

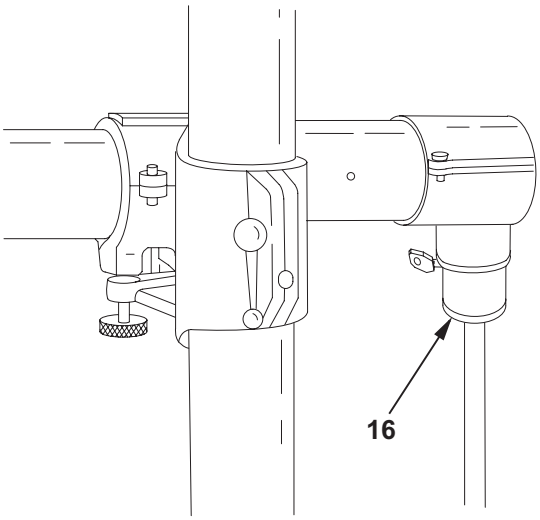
Extension adapter is used only when testing M137 or M137A3 panoramic telescope. When testing M137A2 panoramic telescope, position reflecting mirror assembly on fixture adapter.

15. Place extension adapter (14) on fixture adapter (3).

16. Position reflecting mirror assembly (15) on extension adapter (14).

**TEST AND INSPECTION - Continued**

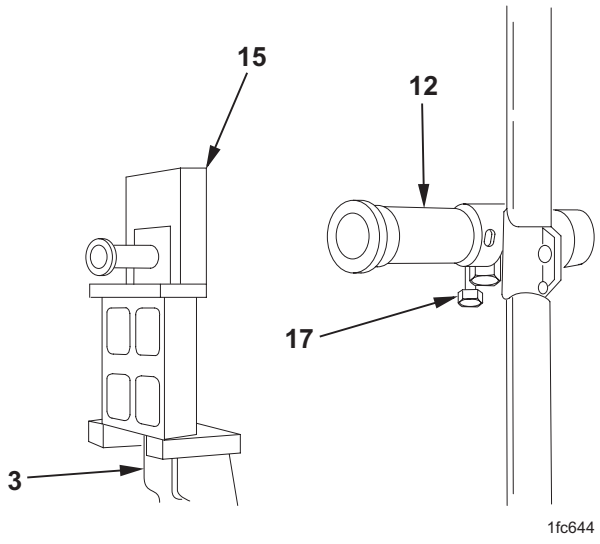
**Setting Up and Adjusting Azimuth Test Fixture - Continued**




17. Relocate infinity aiming reference collimator light (16) to lower position.

NOTE

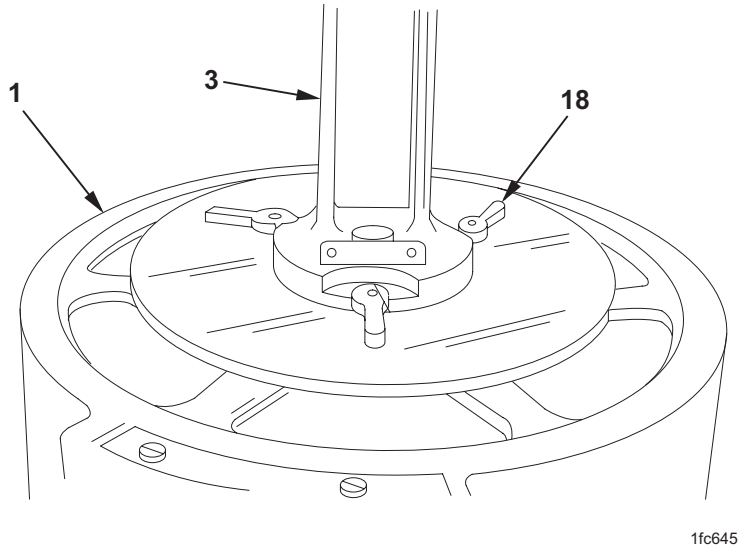
Ensure that locating keys and related keyways are kept in proper contact to ensure correct azimuth autocollimation.




18. Look through infinity aiming reference collimator (12) and focus.

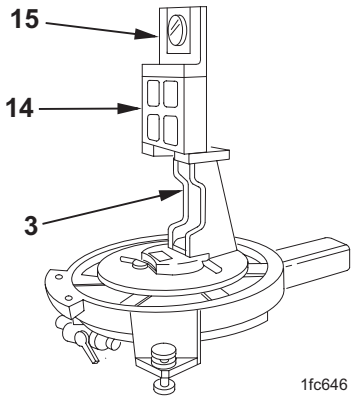
19. Tilt infinity aiming reference collimator (12) in both elevation and depression, using holder screws (17), until test reticle is reflected in reflecting mirror assembly (15) and is superimposed upon itself.

20. If reflected image is not superimposed in azimuth, slightly shift fixture adapter (3) to correct.



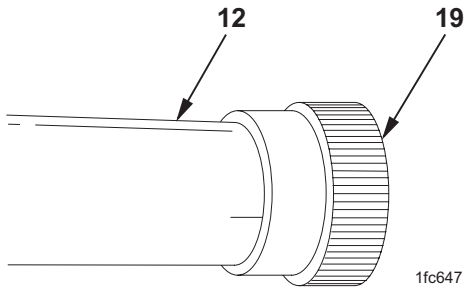

21. When autocollimation is finished, clamp fixture adapter (3) securely to azimuth test fixture (1) with three cam lock screws (18).

22. Recheck autocollimation. Repeat steps above if necessary.




23. Remove reflecting mirror assembly (15) from extension adapter (14).

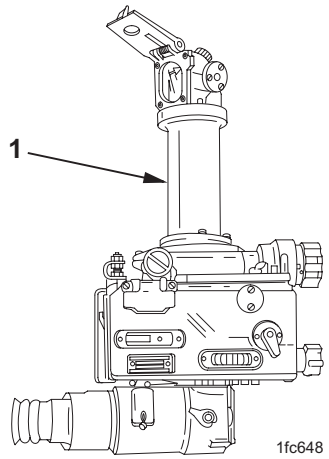
24. Remove extension adapter (14) from fixture adapter (3).



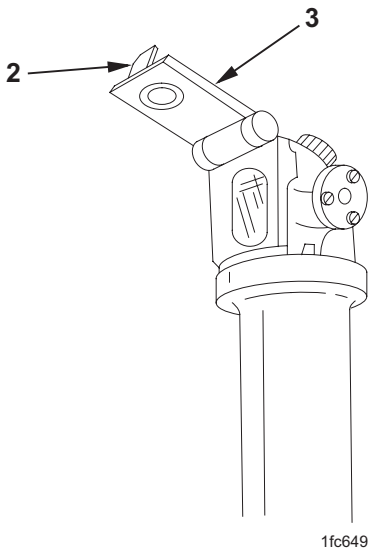

25. Set parallax distance of infinity aiming reference collimator (12) to 130 ± 10 meters by rotating objective end (19).

**TEST AND INSPECTION - Continued**

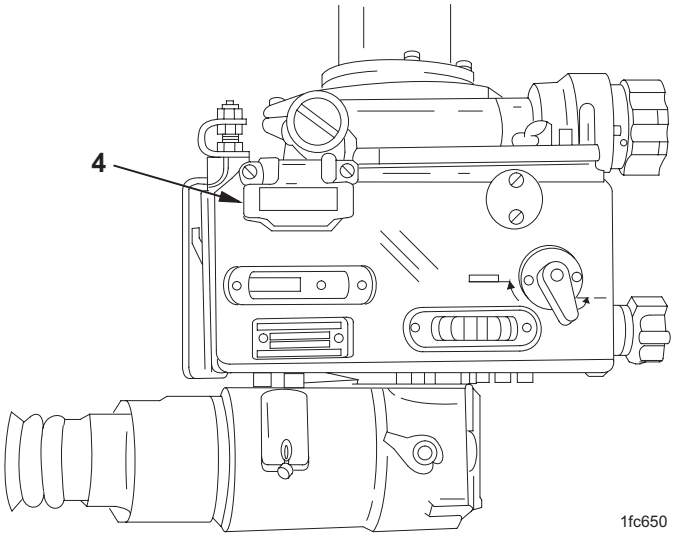
**Visual Inspection**




1. Check that all screws and lockwashers on M137/M137A2/M137A3 telescope (1) are present and secure.
2. Check that mounting surface is clean and free of nicks and burrs.
3. Inspect M137/M137A2/M137A3 telescope (1) for the following: rust, dirt, and foreign matter; missing parts; and chipped paint.

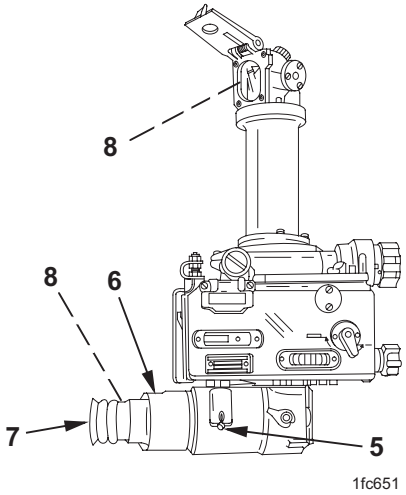



4. Depress detent (2) to open cover assembly (3). Check that cover assembly stays open.
5. Close cover assembly (3). Check that detent (2) holds cover closed.




6. Open azimuth counter cover (4). Check that it stays open.

7. Close azimuth counter cover (4). Check that it stays closed.

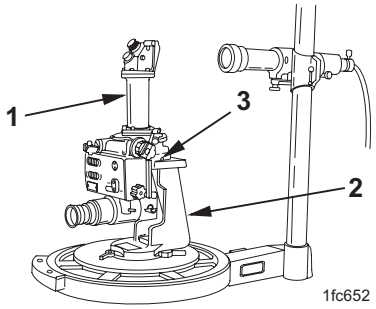



8. Depress lever (5) and move elbow assembly (6) horizontally. Check that elbow assembly moves freely without binding, and that lever stops elbow assembly at different positions during movement.

9. Look through eyeshield (7). Check that no dirt or moisture is present on lenses (8).

**TEST AND INSPECTION - Continued**

**Mounting Telescope to Azimuth Test Fixture**

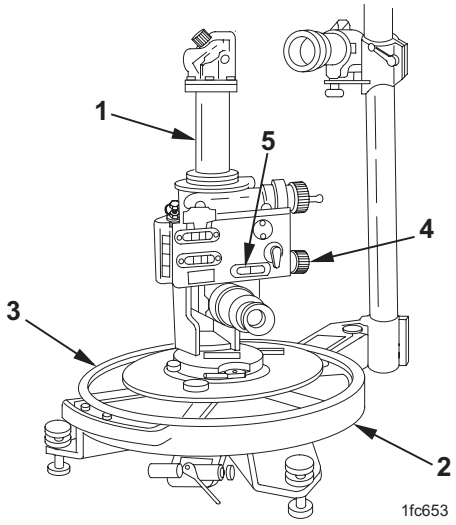



1. Place M137/M137A2/M137A3 telescope (1) on fixture adapter (2).
2. Install four bolts (3) to secure M137/M137A2/M137A3 telescope (1) to fixture adapter (2).

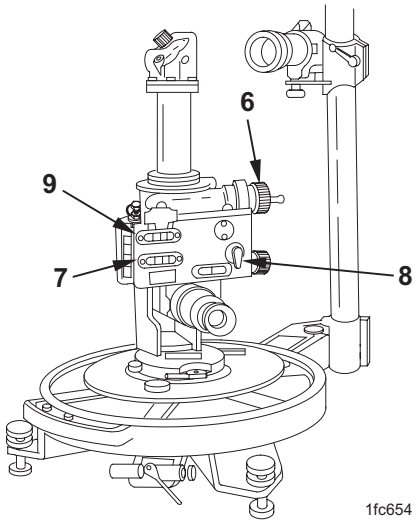
**Boresight Retention Inspection**

NOTE

The cover plate on the head assembly should be closed to help eliminate parallax between the M137/M137A2/M137A3 telescope and the collimator projector, wall targets, and plumblines.




1. Mount M137/M137A2/M137A3 telescope (1) on azimuth test fixture (2). Refer to Mounting Telescope to Azimuth Test Fixture.
2. Set azimuth test fixture scale (3) to 4800 mils.
3. Turn correction knob (4) until correction counter (5) reads zero.

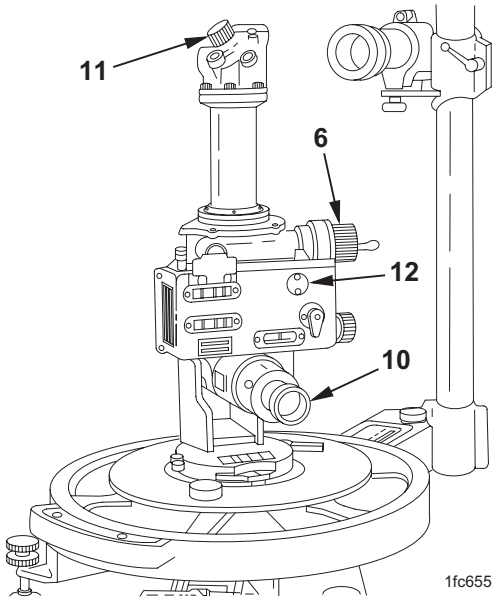



4. Turn azimuth knob (6) until 3200 mils appears on deflection counter (7).

5. Release deflection counter eccentric (8).

6. Turn azimuth knob (6) until 3200 mils appears on azimuth counter (9).

7. Engage deflection counter eccentric (8).



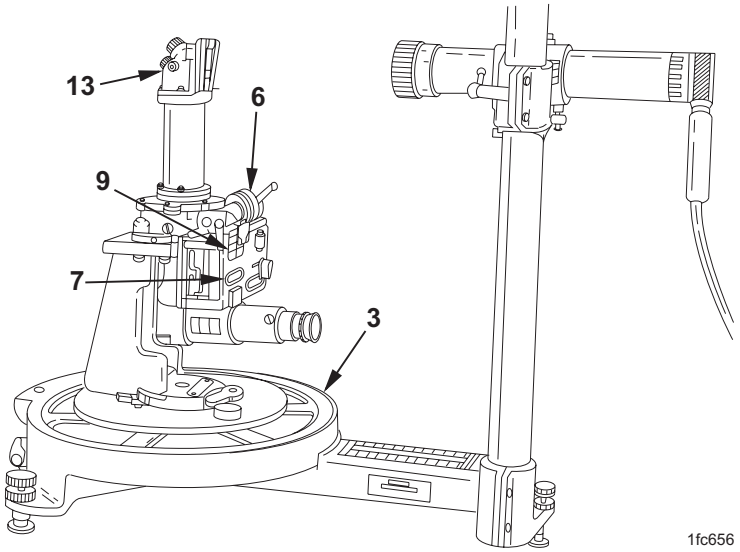

8. Looking through eyeshield (10), turn elevation knob (11) until horizontal reticle line is centered on collimator reticle target.

9. Check that vertical reticle line is centered on collimator reticle target. If not centered, turn azimuth counter to 3200 mils with backlash eliminated and release azimuth counter eccentric (12).

10. Turn azimuth knob (6) until vertical reticle line is centered on collimator reticle target and engage azimuth counter eccentric (12).

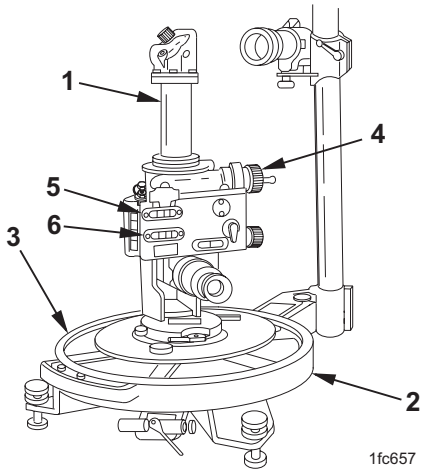
**TEST AND INSPECTION - Continued**

**Boresight Retention Inspection - Continued**




11. Turn azimuth knob (6) until head assembly (13) makes one complete revolution.
12. Check that 3200 appears on azimuth counter (9).
13. Check that vertical reticle line is centered on collimator reticle target or within ± 0.25 mil.
14. Check that reading on deflection counter (7) is within ± 0.25 mil of reading on azimuth counter (9).
15. Rotate azimuth test fixture scale (3) to 1600 mils.
16. Repeat steps 4 through 14 with 0000 on deflection counter (7) and azimuth counter (9).

**Azimuth Knob Backlash Inspection**




1. Mount M137/M137A2/M137A3 telescope (1) on azimuth test fixture (2). Refer to Mounting Telescope to Azimuth Test Fixture.

2. Set azimuth test fixture scale (3) to read 4800 mils.

## NOTE

When checked at 3200 and 0000 mils, backlash in the azimuth mechanism shall not exceed 0.5 mil as read on the azimuth counter and 0.75 mil as read on the deflection counter.

3. Turn azimuth knob (4) clockwise until vertical reticle line is centered with collimator reticle target. Record reading.

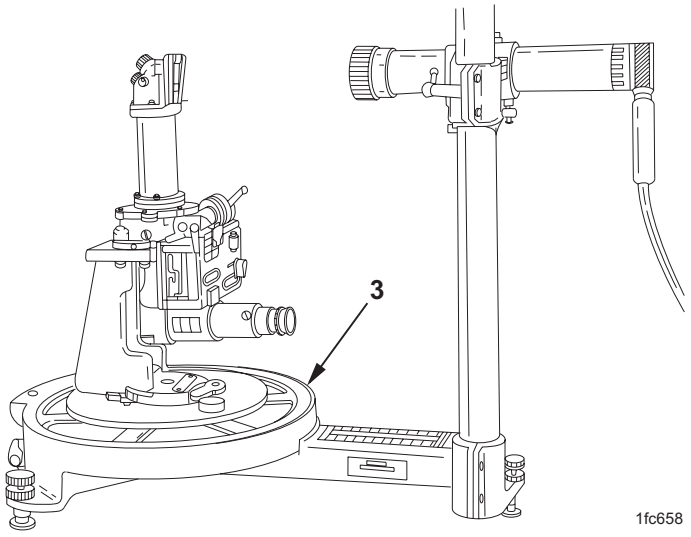
4. Turn azimuth knob (4) clockwise one complete turn.

## NOTE

When turning azimuth knob counterclockwise, be careful not to go past the center of target.

5. Turn azimuth knob (4) counterclockwise until vertical reticle line is centered on collimator reticle target. Record readings on azimuth counter (5) and deflection counter (6).

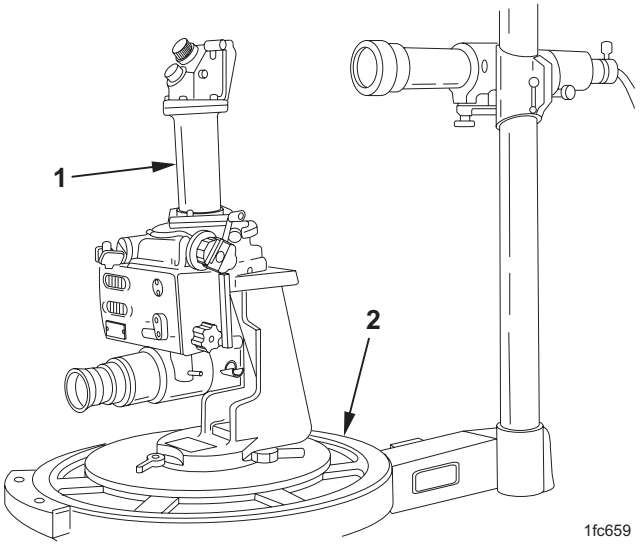
6. Compare with reading recorded in step 3. Difference must not exceed readings stated in note following step 2.



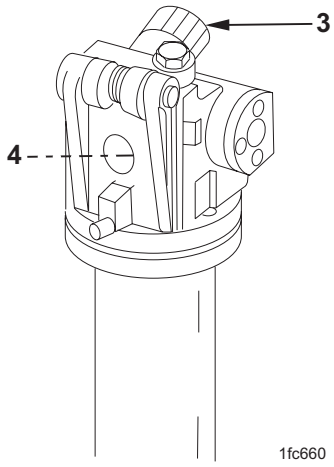

7. Rotate azimuth test fixture scale (3) to 1600 mils and repeat steps 3 through 6.

**TEST AND INSPECTION - Continued**

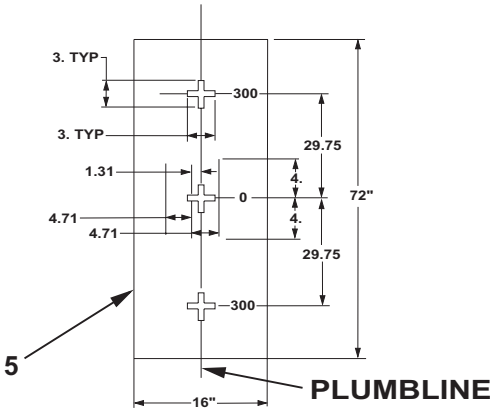
**Head Assembly Excursion and Plumbline Travel Inspection**




1. Mount M137/M137A2/M137A3 telescope (1) on azimuth test fixture (2). Refer to Mounting Telescope to Azimuth Test Fixture.




2. Turn elevation knob (3) until horizontal reticle line (4) is in center of travel.



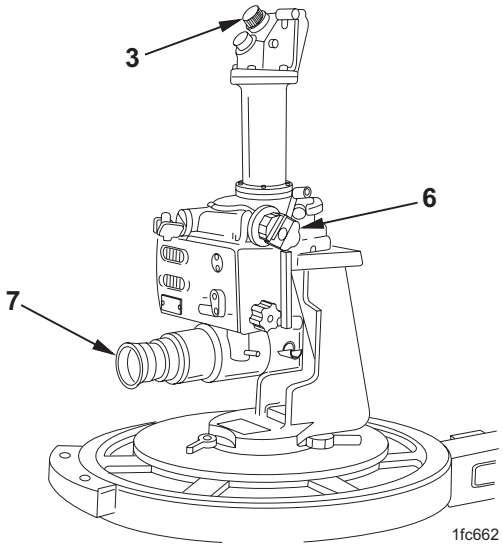

**TARGET DISTANCE 8' (FROM OBJECTIVE LENS)**
**BLACK LINES ON WHITE BACKGROUND**
**LINE THK-3/16**

1fc661

3. Mount test target (5) on wall 8 feet (2.44 m) from azimuth test fixture (2).

4. Rotate azimuth test fixture (2) and sight on test target (5).

5. Check that horizontal reticle line of M137/M137A2/M137A3 telescope (1) is aligned with centered test target (5); if not, adjust target.




6. Rotate azimuth knob (6) until vertical reticle line is aligned with center of test target and plumbline.

## NOTE

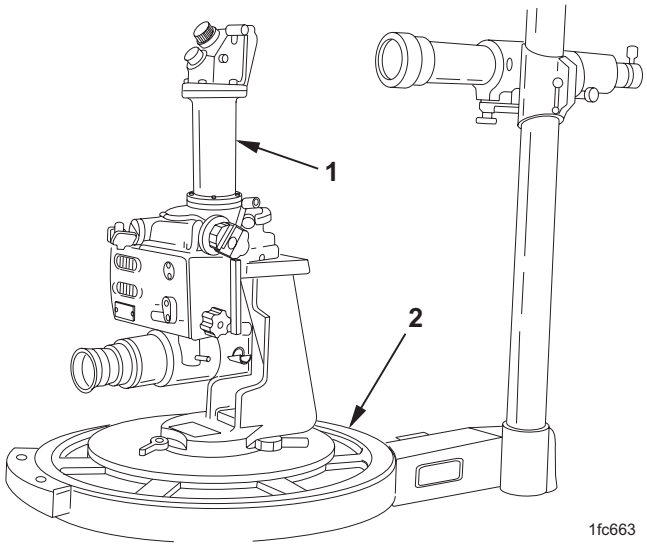
Starting with line of sight in coincidence with a vertical target line, the line of sight shall track the plumbline within 0.5 mil.

7. While looking through eyeshield (7), turn elevation knob (3) clockwise as far as possible. Check that horizontal reticle line reaches 300 mils on test target.

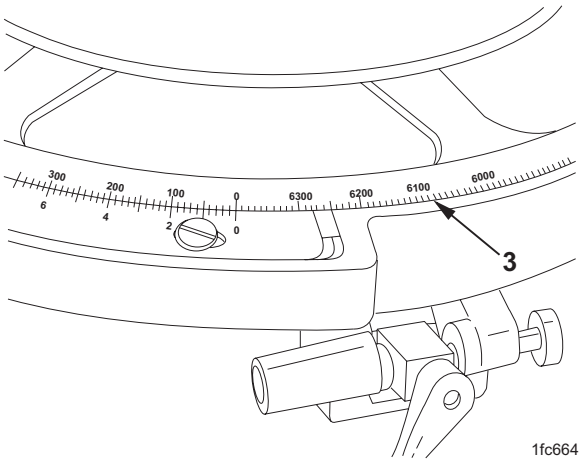
8. Turn elevation knob (3) counterclockwise as far as possible. Check that horizontal reticle line reaches 300 mils on test target.

**TEST AND INSPECTION - Continued**

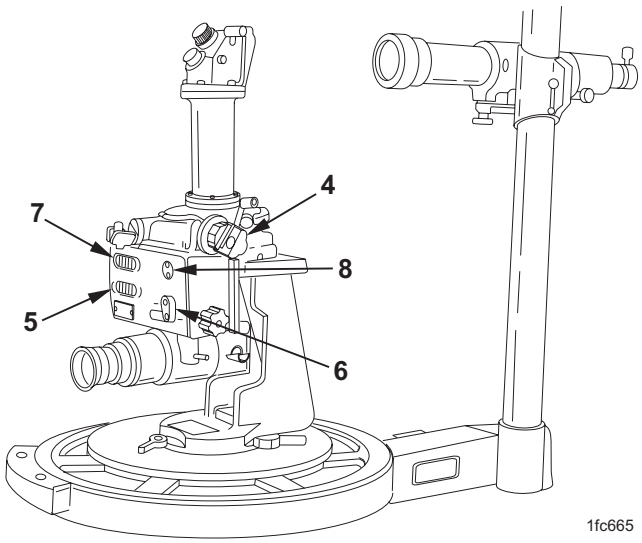
**Azimuth Mechanism 800-mil Steps and Level Travel Inspection**



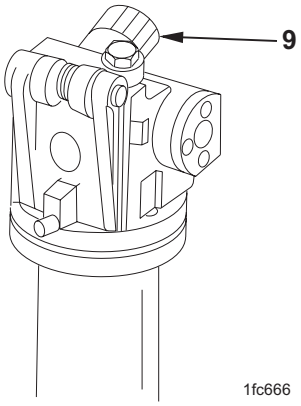

1. Mount M137/M137A2/M137A3 telescope (1) on azimuth test fixture (2). Refer to Mounting Telescope to Azimuth Test Fixture.




2. Set azimuth test fixture scale (3) to 4800 mils.




3. Turn azimuth knob (4) until deflection counter (5) reads 3200 mils.
4. Disengage deflection counter eccentric (6).
5. Turn azimuth knob (4) until azimuth counter (7) reads 3200 mils.
6. Disengage azimuth counter eccentric (8).
7. Turn azimuth knob (4) until vertical reticle line is centered on collimator reticle target.
8. Engage deflection counter eccentric (6) and azimuth counter eccentric (8).




9. Turn elevation knob (9) until horizontal reticle line is centered on collimator reticle target.

**TEST AND INSPECTION - Continued**

**Azimuth Mechanism 800-mil Steps and Level Travel Inspection - Continued**

## NOTE

The following data is required to do steps 10, 11, and 13.

Columns one and two give the required settings, in 800-mil increments, to be used in steps 10 and 11.

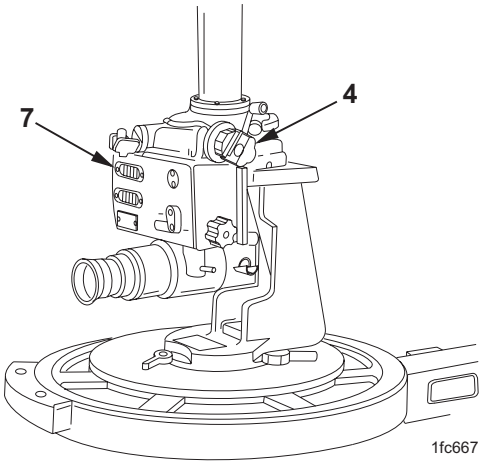
Column three (step 13) gives the reading that should appear on the deflection counter after doing steps 10 and 11.

**Table 1. Azimuth Mechanism Inspection - Settings and Readings.**

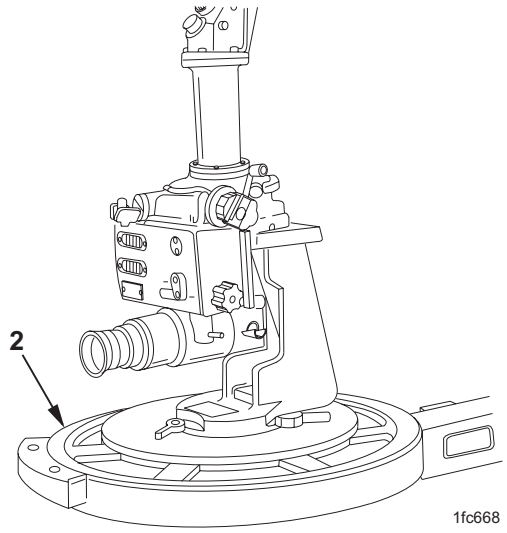
| AZIMUTH KNOB SETTING (MILS) | AZIMUTH TEST STAND SETTING (MILS) | DEFLECTION COUNTER READING (MILS) |
|---|---|---|
| 4000 | 5600 | 4000 |
| 4800 | 0000 | 4800 |
| 5600 | 0800 | 5600 |
| 0000 | 1600 | 0000 |
| 0800 | 2400 | 0800 |
| 1600 | 3200 | 1600 |
| 2400 | 4000 | 2400 |
| 3200 | 4800 | 3200 |

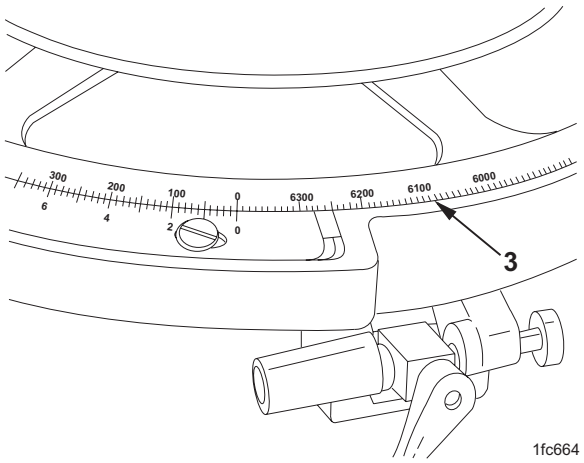
## NOTE

When doing the next step, be careful not to turn azimuth knob past the specified counter setting.

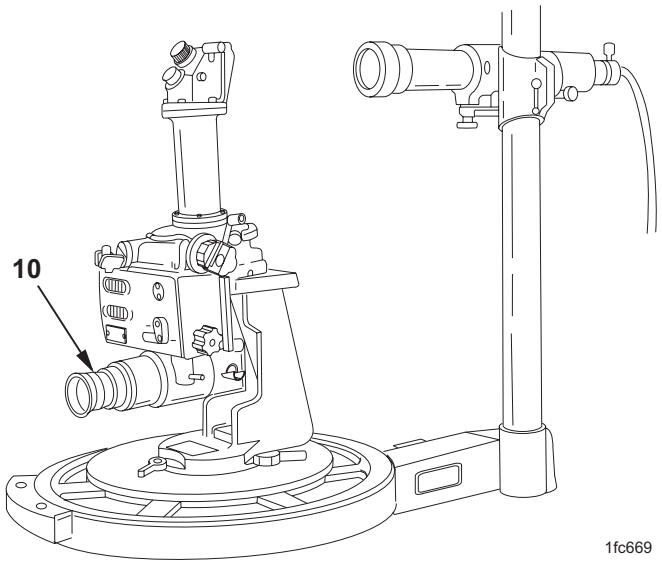



10. Turn azimuth knob (4) clockwise until azimuth counter (7) is set at 4000 mils.




11. Rotate azimuth test fixture (2) until azimuth test fixture scale (3) reads 5600 mils.




## NOTE

The total spread through two full revolutions between the greatest positive error and greatest negative error shall not exceed 1 mil including backlash.

**TEST AND INSPECTION - Continued**

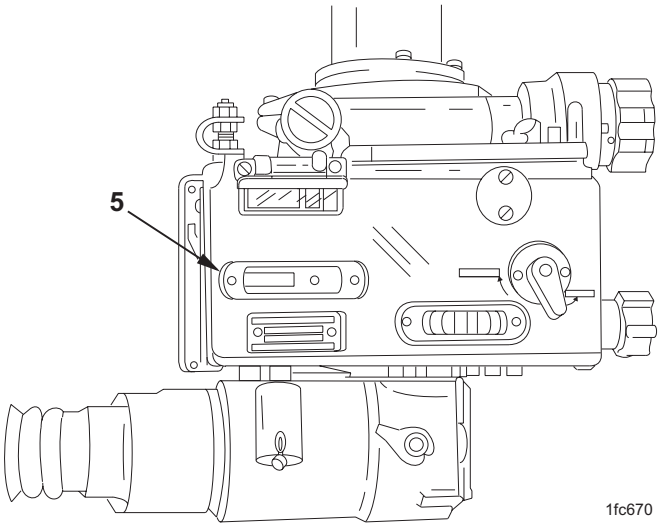
**Azimuth Mechanism 800-mil Steps and Level Travel Inspection - Continued**

12. Looking through eyeshield (10), check the following:

    a. Vertical reticle line must be centered on collimator reticle target within ± 1 mil.

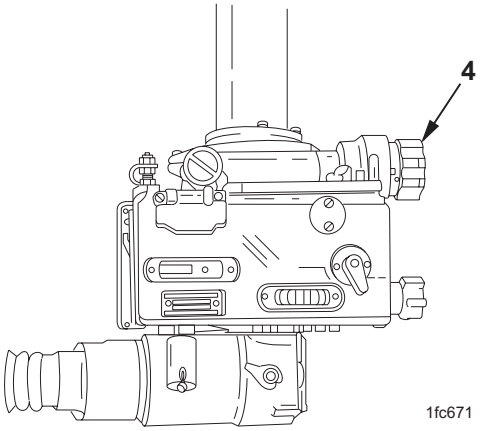
    b. Horizontal reticle line must be centered on collimator reticle target within ± 1 mil (2-mil total spread).

    c. Record readings taken in steps a and b above for two full revolutions and compare readings. Ensure total spread does not exceed specified tolerances for level travel and azimuth error.



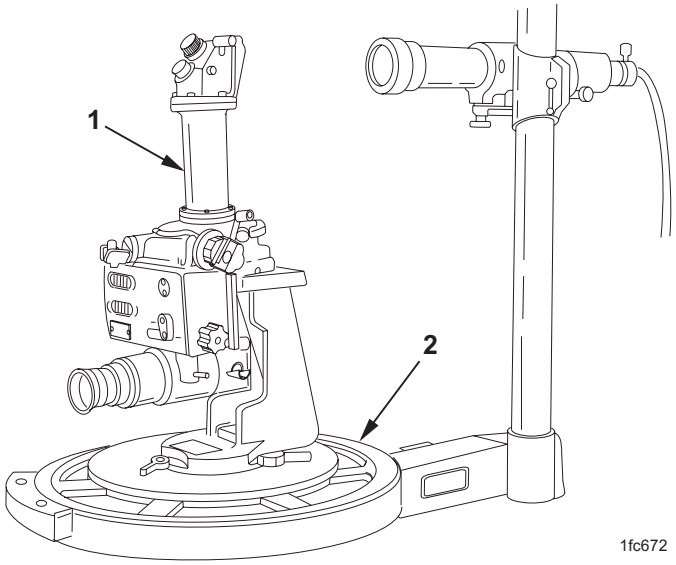

13. Check that reading on deflection counter (5) is 4000 ± 0.25 mil.

14. Repeat steps 10 through 13 using the settings in Table 1, until each reading obtained is verified two times.

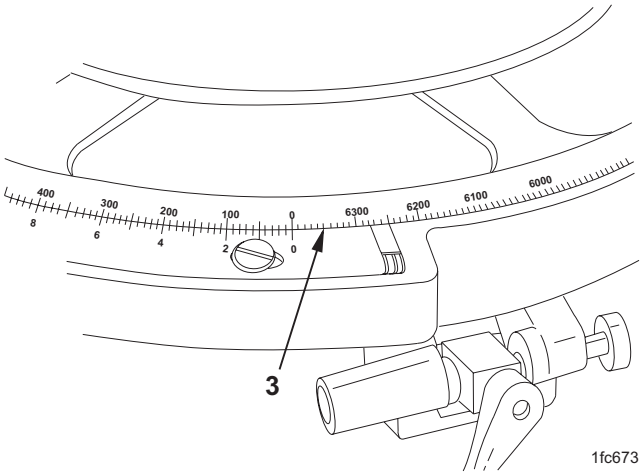



15. Repeat entire test turning azimuth knob (4) counterclockwise.

**Azimuth Mechanism 15-mil Steps Inspection**




1. Mount M137/M137A2/M137A3 telescope (1) on azimuth test fixture (2). Refer to Mounting Telescope to Azimuth Test Fixture.



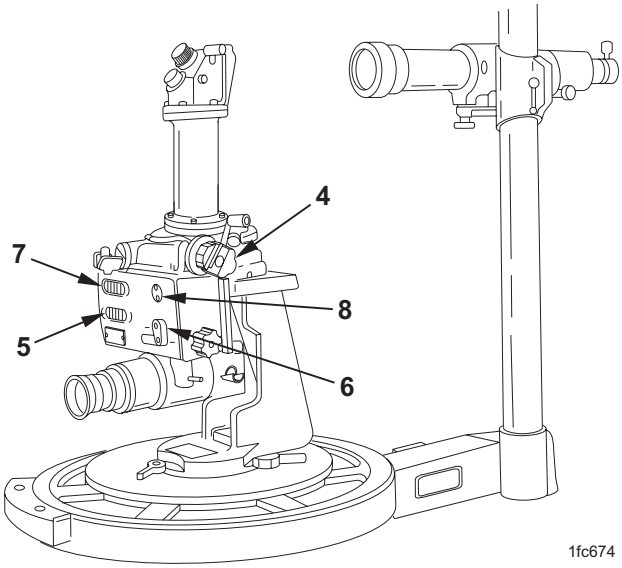

2. Set azimuth test fixture scale (3) to 4800 mils.

**TEST AND INSPECTION - Continued**

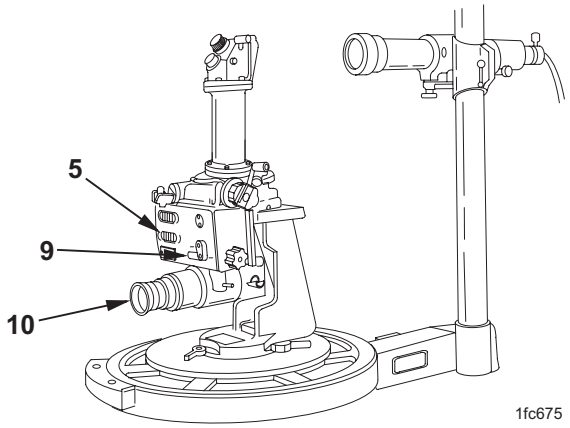
**Azimuth Mechanism 15-mil Steps Inspection - Continued**

NOTE

Eliminate backlash. In steps 3, 5, and 7, azimuth knob must be turned clockwise.




3. Turn azimuth knob (4) until deflection counter (5) reads 3200 mils.
4. Release deflection counter eccentric (6).
5. Turn azimuth knob (4) until azimuth counter (7) reads 3200 mils.
6. Release azimuth counter eccentric (8).
7. Turn azimuth knob (4) until vertical reticle line and horizontal reticle line are centered on collimator reticle target.
8. Engage azimuth counter eccentric (8).
9. Engage deflection counter eccentric (6).




10. Set correction counter (9) at L-15.

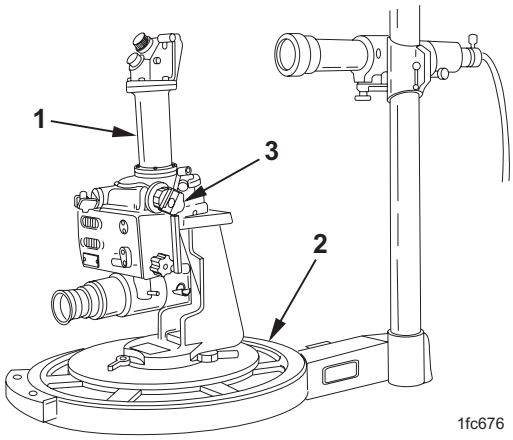
11. Sighting through eyeshield (10), turn azimuth knob (4) clockwise to deflect line of sight 15 mils, as seen on reticle. Check that deflection counter (5) returns to 3200 ± 0.25 mils.

12. Repeat step 2 with settings of 0000, 1600, and 3200 mils, and azimuth counter settings of 4800, 0000, and 1600 mils respectively. Then repeat step 11.

13. Repeat steps 2 through 11 in counterclockwise rotation with backlash eliminated and correction counter set at R-15.

14. Repeat step 2 with settings of 3200, 1600, and 0000 mils, and azimuth counter settings of 1600, 0000, and 4800 mils respectively. Then repeat step 11.

**Azimuth Mechanism Lift Inspection**




1. Mount M137/M137A2/M137A3 telescope (1) on azimuth test fixture (2). Refer to Mounting Telescope to Azimuth Test Fixture.

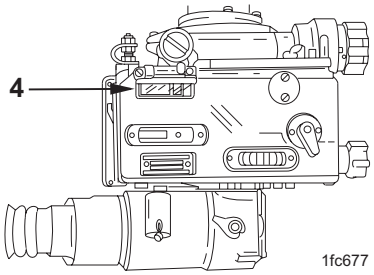
2. Verify boresight. Refer to Boresight Retention Inspection.

**TEST AND INSPECTION - Continued**

**Azimuth Mechanism Lift Inspection - Continued**

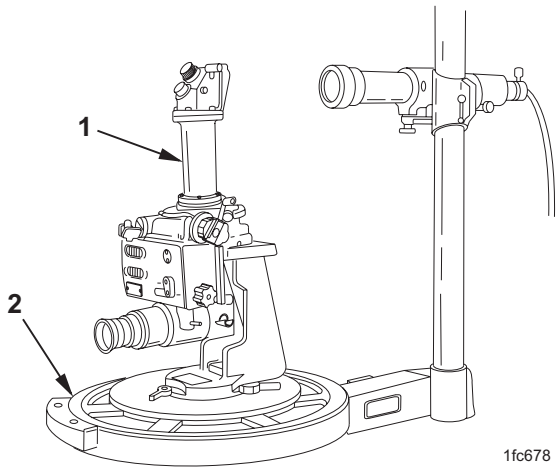
3. Turn azimuth knob (3) clockwise and then counterclockwise.

4. Observe horizontal reticle line. Vertical displacement of the horizontal reticle line must not be more than 0.5 mil.



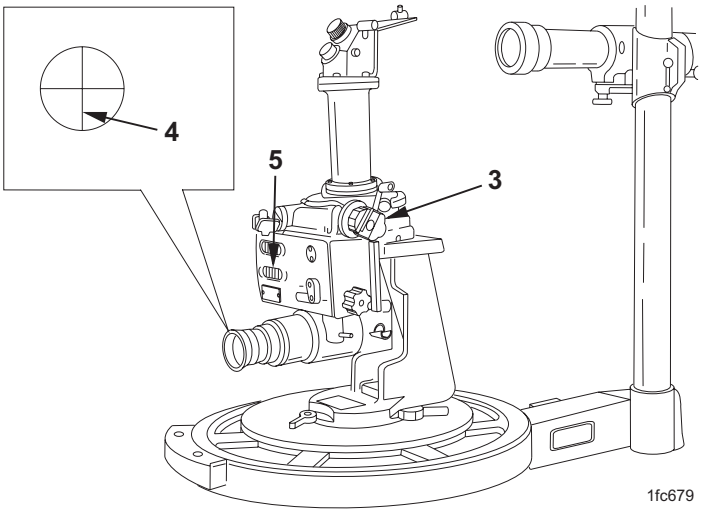

5. Repeat steps 2, 3, and 4 with settings of 4800, 0000, and 1600 mils on azimuth counter (4).

**Azimuth Knob 5-mil Click Lead Mechanism Inspection**




1. Mount M137/M137A2/M137A3 telescope (1) on azimuth test fixture (2). Refer to Mounting Telescope to Azimuth Test Fixture.

2. Verify boresight. Refer to Boresight Retention Inspection.




3. Set azimuth knob (3) to DIRECT. Turn clockwise slowly until detent engages. Be careful not to pass beyond detent engagement point.

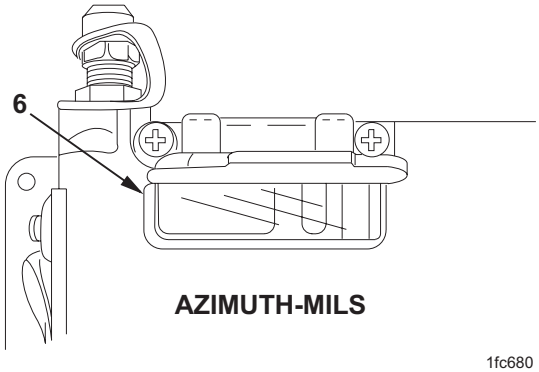
4. Note location of vertical reticle line (4) relative to center of collimator reticle target.

5. Record reading on deflection counter (5) with detent engaged.

6. Slowly turn azimuth knob (3) clockwise until detent engages again.

7. Record reading on deflection counter (5). Compare with reading recorded in step 5. Readings must record increase of 5.0 ± 0.5 mils.

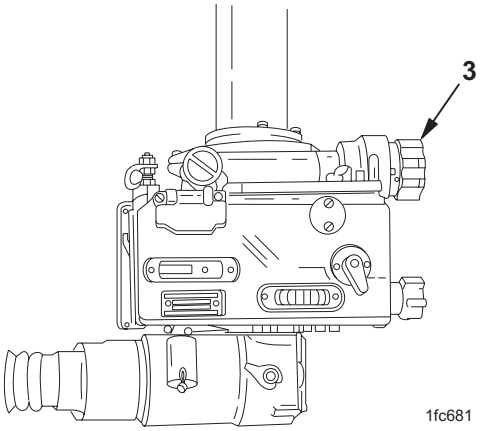
8. Check that vertical reticle line (4) has moved 5 mils from setting in step 4.




9. Repeat steps 3 through 8, using settings of 4800, 0000, and 1600 mils on azimuth counter (6).

**TEST AND INSPECTION - Continued**

**Azimuth Knob 5-mil Click Lead Mechanism Inspection - Continued**



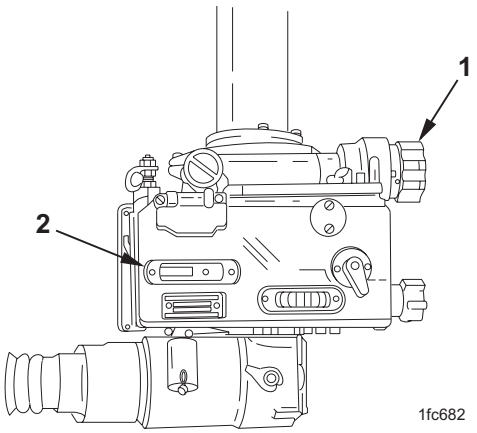

10. Slowly turn azimuth knob (3) through one complete revolution. Check that detent can be heard and felt each 5 mils.

11. Return azimuth knob (3) to INDIRECT.

**Deflection Counter Setting Inspection**

NOTE

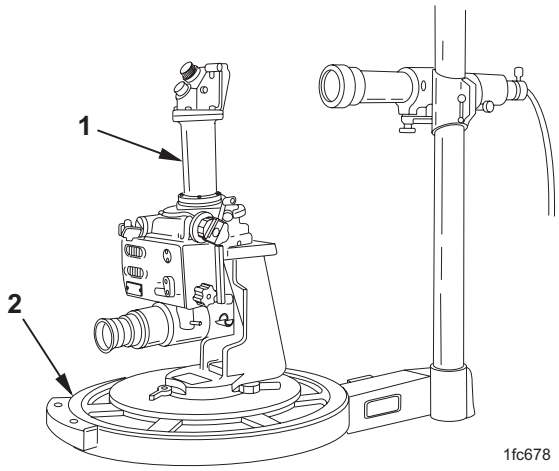
Watch all deflection counter numbers and azimuth counter numbers. Ensure each is legible and all settings between 0000 and 6399 can be made.



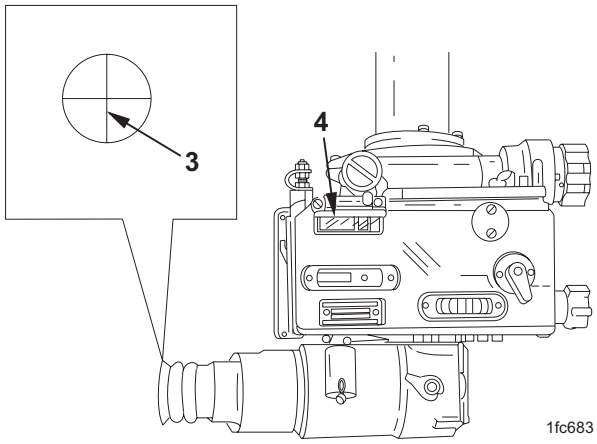

1. Turn azimuth knob (1) until reading of 0000 appears on deflection counter (2).

2. Turn azimuth knob (1) until reading of 6399 appears on deflection counter (2).

**Correction Counter Setting and Excursion Range Inspection**




1. Mount M137/M137A2/M137A3 telescope (1) on azimuth test fixture (2). Refer to Mounting Telescope to Azimuth Test Fixture.



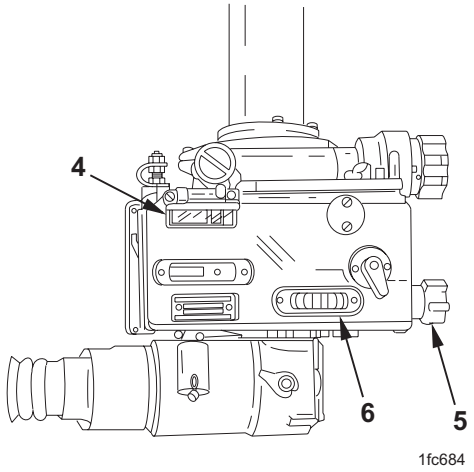

2. Align vertical reticle line (3) on center of collimator reticle target and record reading on azimuth counter (4) to nearest 0.25 mil.

NOTE

Ensure movement of azimuth counter (4) during steps 3 and 5 is not over 0.25 mil.

**TEST AND INSPECTION - Continued**

**Correction Counter Setting and Excursion Range Inspection - Continued**




3. Turn correction knob (5) clockwise as far as possible. Check that correction counter (6) reads on or between R-95 and R-99.

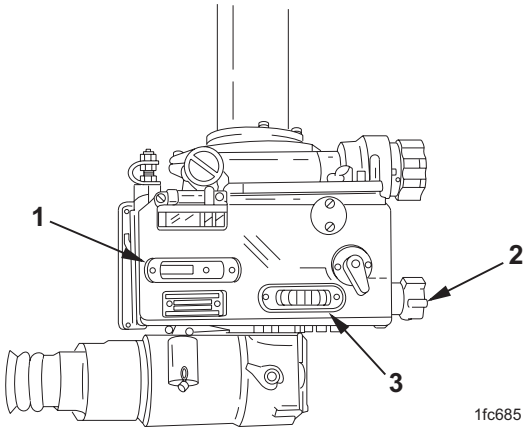
4. Check that vertical reticle line (3) is centered on collimator reticle target within ± 0.1 mil.

5. Turn correction knob (5) counterclockwise as far as possible. Check that correction counter (6) reads on or between L-95 and L-99.

6. Repeat step 4.

7. Turn correction knob (5) to set correction counter (6) at 00.

**Checking Effect of Correction Counter Setting on Deflection Counter**




1. Record reading on deflection counter (1) closest to 0.25 mil.

2. Turn correction knob (2) until correction counter (3) reads R-95.

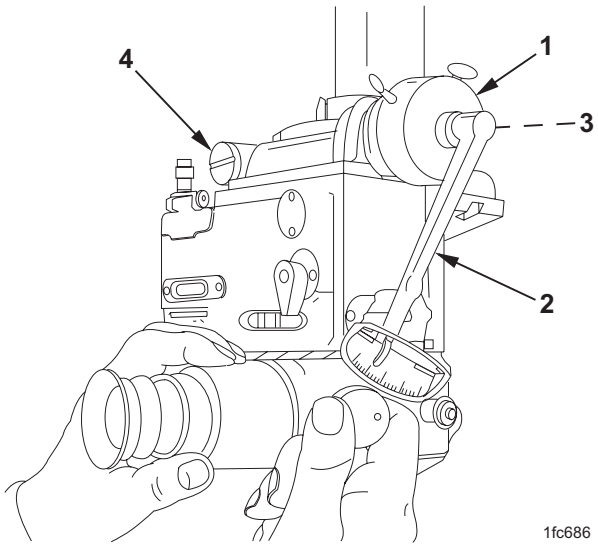
3. Record reading on deflection counter (1).

4. Compare reading on deflection counter (1) recorded in step 1 with this reading. Reading of deflection counter should have increased 95 ± 0.5 mils.

5. Repeat steps 2, 3, and 4 using the L-95 setting on correction counter (3).

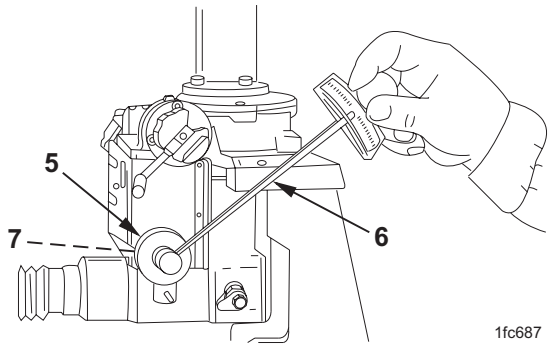
6. Check that reading on deflection counter (1) has decreased 95 ± 0.5 mils.

### Torque Inspection




1. Place torque wrench adapter (1) on torque wrench (2). Place over azimuth knob (3).

2. Move torque wrench (2) and observe readings. Torque must be between 3 in.-lb (0.34 N-m) and 8 in.-lb (0.90 N-m). If torque cannot be met, tighten or loosen retainer (4).

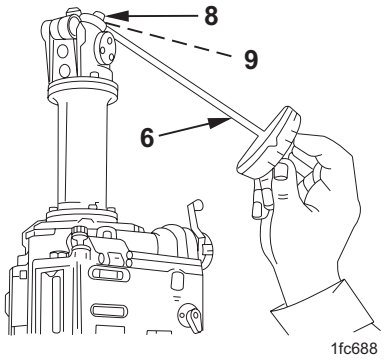



3. Place torque wrench adapter (5) on torque wrench (6). Place over correction knob (7).

4. Move torque wrench (6) and observe readings. Torque must be between 10 in.-oz (0.07 N-m) and 20 in.-oz (0.14 N-m). If torque cannot be met, return M137/M137A2/M137A3 telescope to depot maintenance.

**TEST AND INSPECTION - Continued**

**Torque Inspection - Continued**

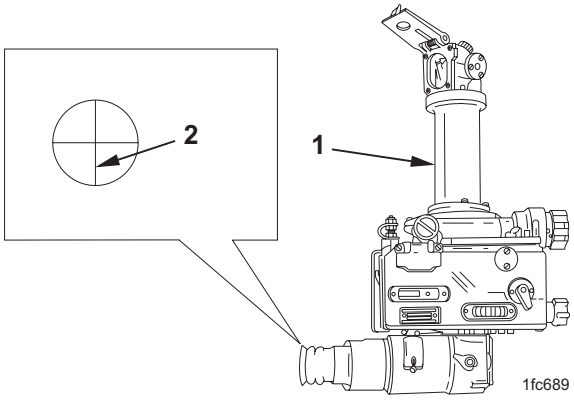



5. Place torque wrench adapter (8) on torque wrench (6). Place over elevation knob (9).

6. Move torque wrench (6) and observe readings. Torque must be between 5 in.-oz (0.03 N-m) and 40 in.-oz (0.28 N-m). If torque cannot be met, return M137/M137A2/M137A3 telescope to depot maintenance.

7. If torque requirements cannot be met, turn in M137/M137A2/M137A3 panoramic telescope.

**Illumination Inspection**




1. Take M137 telescope (1) into darkened area and wait 5 minutes, while eyes adjust to the darkness.

WARNING

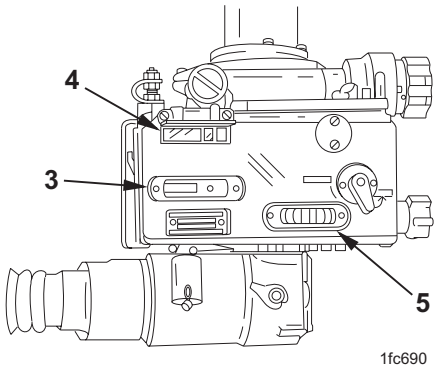
**RADIATION**

**TRITIUM GAS ($H_3$)**

If not illuminated, follow radioactive safety precautions in warning summary.

2. Turn on switch if testing M137A2/M137A3 telescope.

3. Ensure vertical reticle line (2) is clearly visible and illuminated.




4. Ensure deflection counter (3), azimuth counter (4), and correction counter (5) are clearly visible with even illumination.

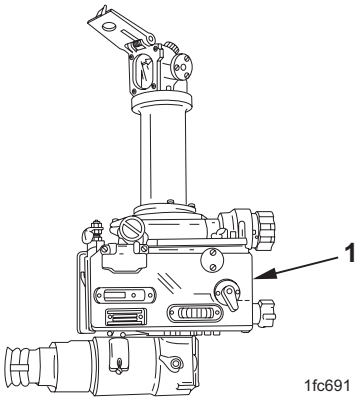
**PURGING**

**WARNING**

**RADIATION**

**TRITIUM GAS ($H_3$)**

Do not purge or charge any instrument that has a damaged or inoperative radioactive light source, to avoid possible radioactive contamination (M137 only).




Purge and charge M137 telescope (1) (refer to TM 750-116).

**END OF WORK PACKAGE**

# CHAPTER 23

# DIRECT SUPPORT MAINTENANCE INSTRUCTIONS FOR M138/M138A1 ELBOW TELESCOPE

**DIRECT SUPPORT**

**M138/M138A1 ELBOW TELESCOPE**
**(1240-01-038-0530/1240-01-515-8264)**

**SERVICE UPON RECEIPT**
**SERVICE UPON RECEIPT OF MATERIEL**

## SERVICE UPON RECEIPT OF MATERIEL

### Unpacking

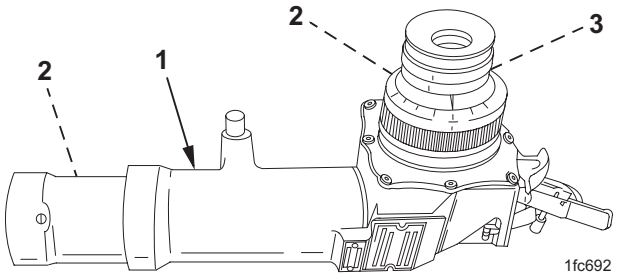
When a new or reconditioned M138/M138A1 elbow telescope is received, be aware of any shipping damage to packaging materiel. Report any damage on SF 364, Report of Discrepancy (ROD), as prescribed in AR 735-11-2. Retain packaging materiel for future use.

### Checking Unpacked Equipment

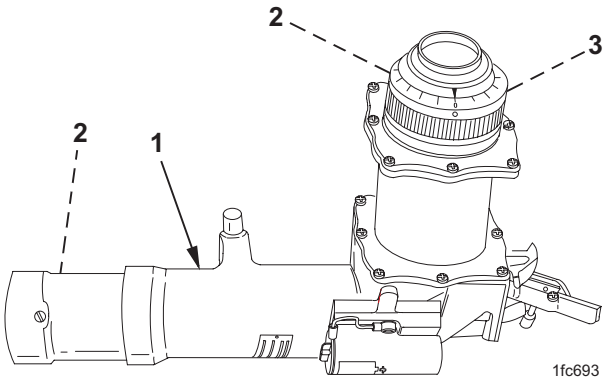
1. Inspect the equipment for damage incurred during shipment. If the equipment has been damaged, report the damage on SF 361, Transportation Discrepancy Report.

2. Check the equipment against the packing slip to see if the shipment is complete. Report all discrepancies in accordance with applicable service instructions (e.g., for Army instructions, see DA PAM 738-750).

3. Check to see whether the equipment has been modified.




**M138**




**M138A1**

4. Check M138/M138A1 elbow telescope (1) for chipped paint, scuff marks, damaged or missing parts, cleanness, and smooth operation.

5. Inspect lenses (2). Lenses must be free of scratches, pits, and moisture.

**SERVICE UPON RECEIPT OF MATERIEL - Continued**

**Checking Unpacked Equipment - Continued**

WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.

WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries.

6. Check light sources (3). Light must be present and even throughout reticle cell assembly.

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

# M138 ELBOW TELESCOPE (1240-01-038-0530)

## M138 ELBOW TELESCOPE MAINTENANCE DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**

Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**

Grease (item 15, WP 0152 00)
Lens paper (item 17, WP 0152 00)
Lockwasher (4) (item 6, WP 0145 00)
Lockwasher (4) (item 9, WP 0145 00)
Lockwasher (8) (item 10, WP 0146 00)
O-ring (item 12A, WP 0146 00)
Optical lens cleaning compound (item 11, WP 0152 00)
Plastic bag (item 5, WP 0152 00)
Sealing compound (item 13, WP 0152 00)
Solvent cleaning compound (item 12, WP 0152 00)
Tape (item 20, WP 0152 00)
Wiping rag (item 18, WP 0152 00)

**References**

WP 0106 00
WP 0145 00
WP 0146 00

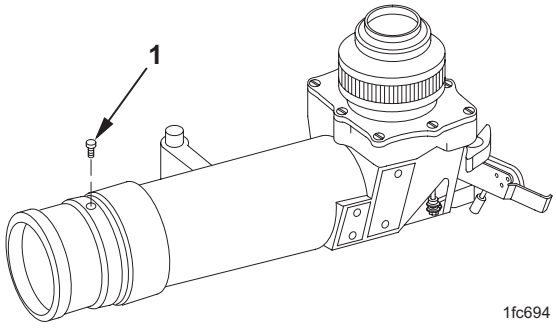
**DISASSEMBLY**

WARNING

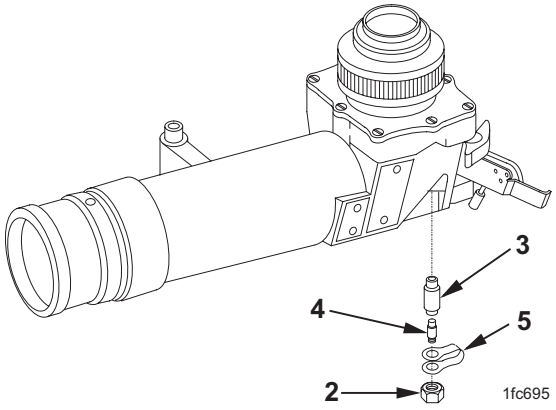
**RADIATION**

**TRITIUM GAS ($H_3$)**

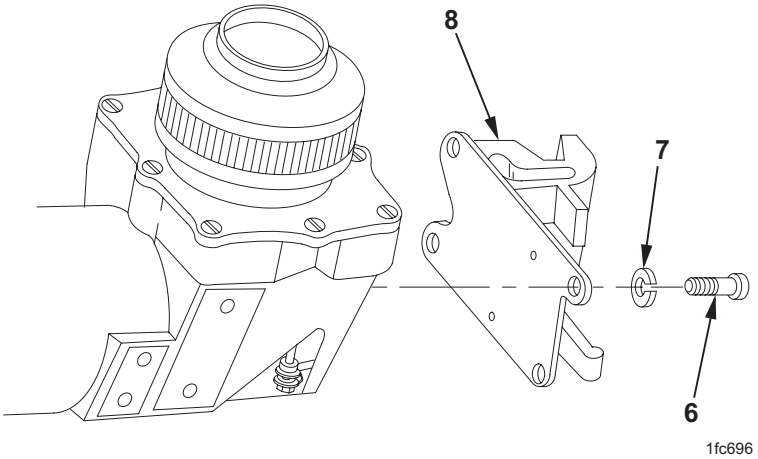
When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary.




1. Unscrew and remove safety relief valve (1).




2. Unscrew air valve cap (2) from fluid valve stem (3).
3. Remove valve core (4) from fluid valve stem (3).
4. Remove fluid valve stem (3).
5. Remove retaining strap (5) from fluid valve stem (3).




6. Remove four machine screws (6) and four lockwashers (7) from optical instrument latch set (8). Discard lockwashers.

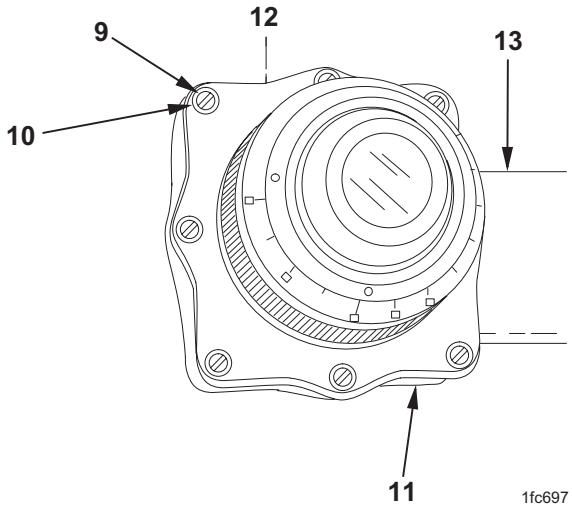
7. Remove optical instrument latch set (8).

## WARNING

If reticle cell assembly is not illuminated, do not perform any maintenance. Notify Radiation Safety Officer (RSO). Perform wipe test. If wipe test passes, place M138 elbow telescope in plastic bag (item 5, WP 0152 00), seal with tape (item 20, WP 0152 00), and send to depot maintenance.

## NOTE

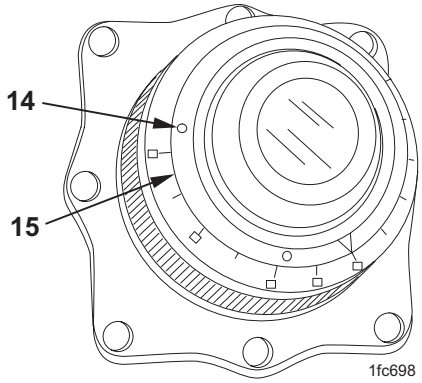
Diopter adapter assembly may be disassembled while installed on M138 elbow telescope.

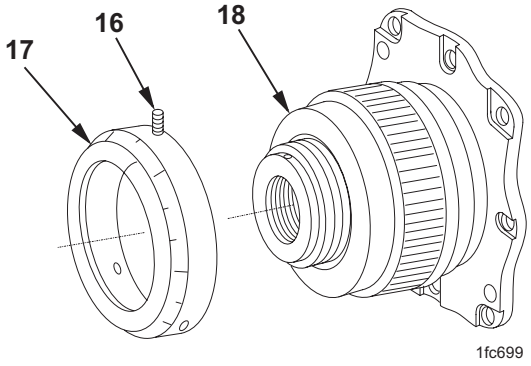


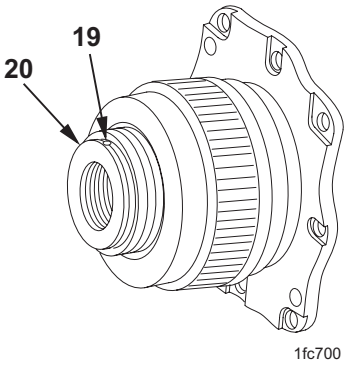

8. Remove eight machine screws (9) and eight lockwashers (10). Discard lockwashers.

9. Lift diopter adapter assembly (11) and O-ring (12) from optical instrument housing (13) being careful not to damage locating pins in optical instrument housing. Remove and discard O-ring.

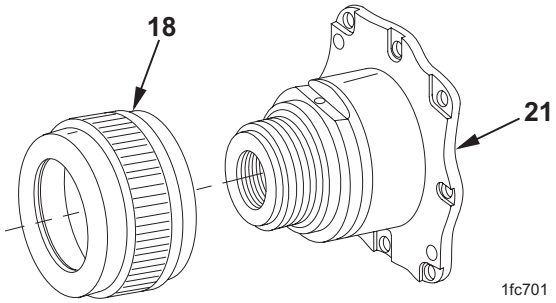
**DISASSEMBLY - Continued**

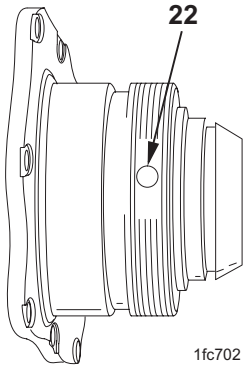


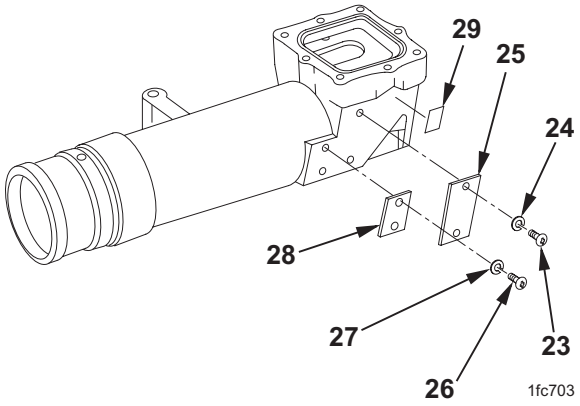




10. Remove sealing compound and loosen two setscrews (14).
11. Lift off dial pointer (15).
12. Loosen three setscrews (16).
13. Remove diopter scale (17) from knob (18).
14. Remove sealing compound and loosen setscrew (19).
15. Unscrew and remove sleeve nut (20).




16. Remove knob (18) from eyepiece cell assembly (21).
17. Remove telescope mount stop (22) by lifting off.




18. Remove two machine screws (23) and two lockwashers (24). Discard lockwashers.

19. Remove identification plate (25).

20. Remove two machine screws (26) and two lockwashers (27). Discard lockwashers.

21. Remove instruction plate (28).

22. If damaged, remove decal (29).

**CLEANING**

WARNING

Use cleaning compounds in well-ventilated area away from open flame. Cleaning compounds are harmful to skin and clothing and may give off harmful vapor. Exercise care whenever cleaning compounds are used.

1. Clean all parts with cleaning compound (item 12, WP 0152 00).

2. Wipe off excess cleaning compound with a clean wiping rag (item 18, WP 0152 00).

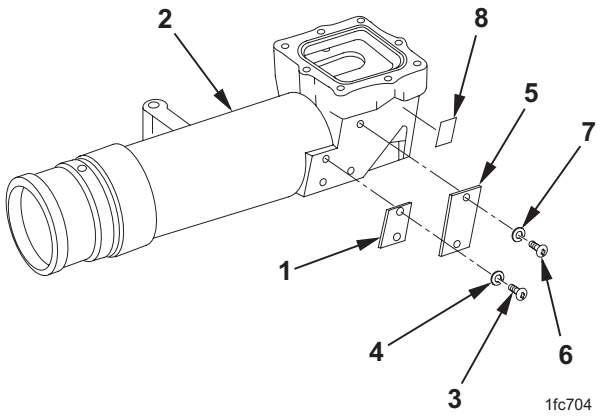
3. Clean reticle cell assembly and eyepiece cell assembly with lens paper (item 17, WP 0152 00) and optical lens cleaning compound (item 11, WP 0152 00).

**REPAIR OR REPLACEMENT**

1. If cracks are observed but light sources are still illuminated, remove body assembly and notify local Radiation Safety Officer (RSO). Perform wipe test under RSO supervision. Seal body assembly in a double plastic bag (item 5, WP 0152 00), secure with tape (item 20, WP 0152 00), and await wipe test results. If contaminated, dispose of assembly per RSO instructions. If assembly is not contaminated, replace parts as authorized (M138 only).

2. Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0145 00 and WP 0146 00.

**ASSEMBLY**

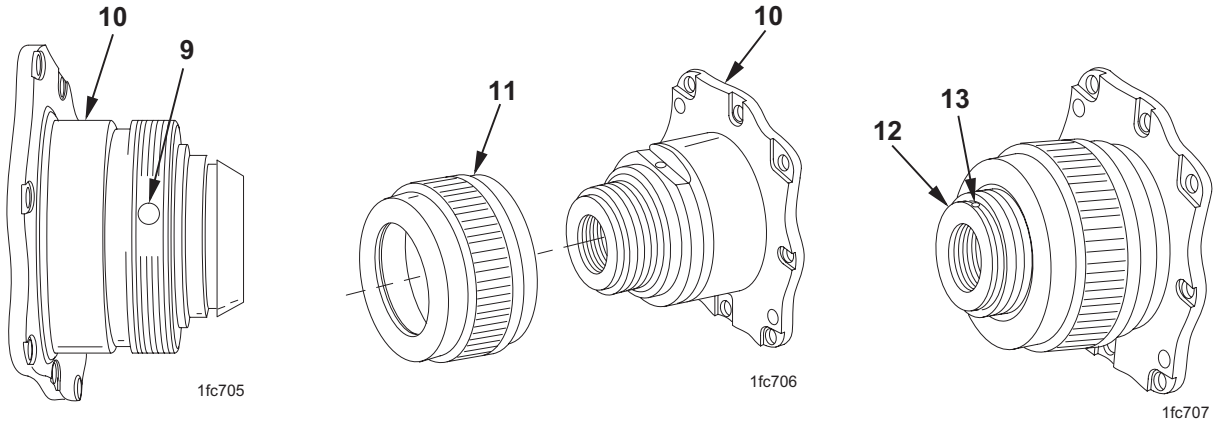



1. Position instruction plate (1) on optical instrument housing (2).

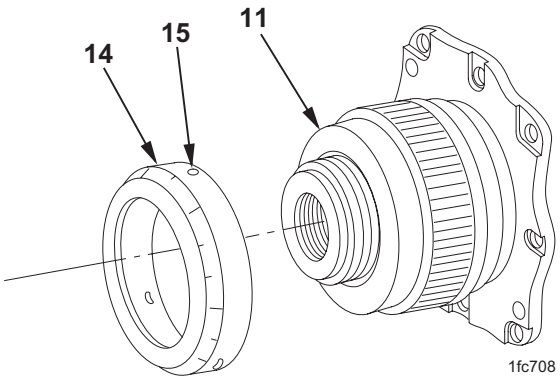
**WARNING**

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

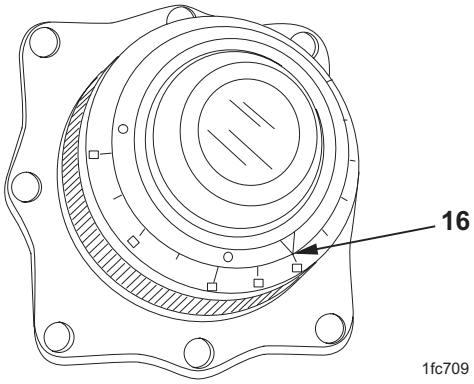
2. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (3).
3. Install two new lockwashers (4) (item 9, WP 0145 00) and two machine screws (3).
4. Position identification plate (5) on optical instrument housing (2).
5. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (6).
6. Install two new lockwashers (7) (item 9, WP 0145 00) and two machine screws (6).
7. If removed, install new decal (8).




8. Place telescope mount stop (9) in slot on eyepiece cell assembly (10).
9. Apply grease (item 15, WP 0152 00) in knob (11) and install on eyepiece cell assembly (10).
10. Screw sleeve nut (12) on tight.
11. Tighten setscrew (13) and apply sealing compound (item 13, WP 0152 00).

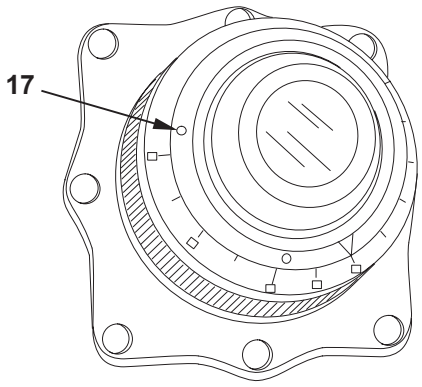



12. Place diopter scale (14) over knob (11).
13. Tighten three setscrews (15).




14. Install dial pointer (16) and set in uppermost position perpendicular to mounting surface.

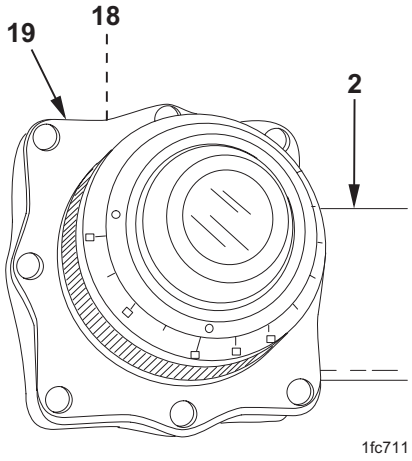
**ASSEMBLY - Continued**

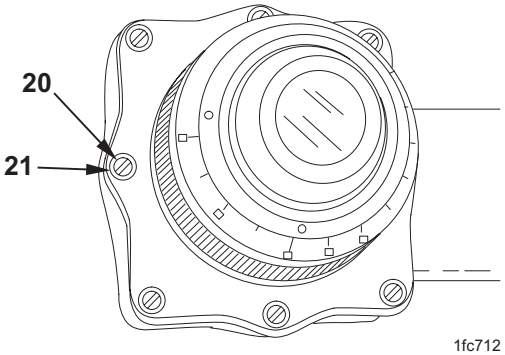



15. Tighten two setscrews (17) and apply sealing compound (item 13, WP 0152 00).

## NOTE

Before installing diopter adapter assembly, ensure that locating pins in optical instrument housing are not damaged.



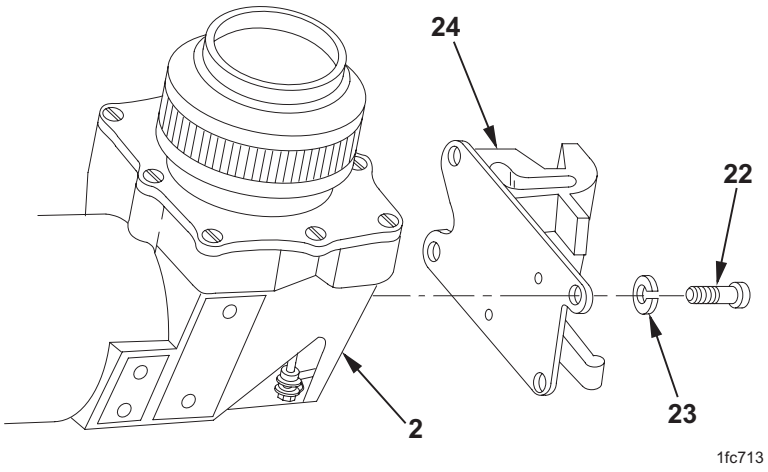




16. Install new O-ring (18) (item 12A, WP 0146 00) in optical instrument housing (2).

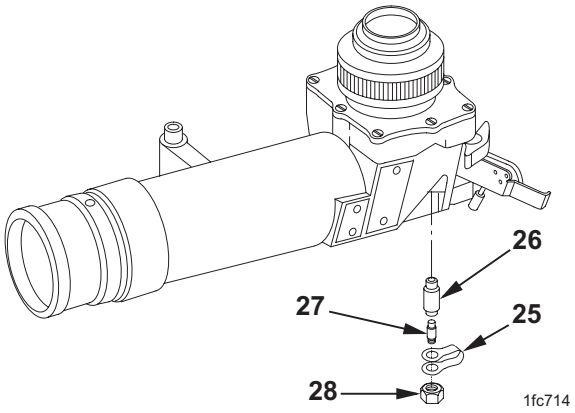
17. Place diopter adapter assembly (19) over locating pins in optical instrument housing (2).

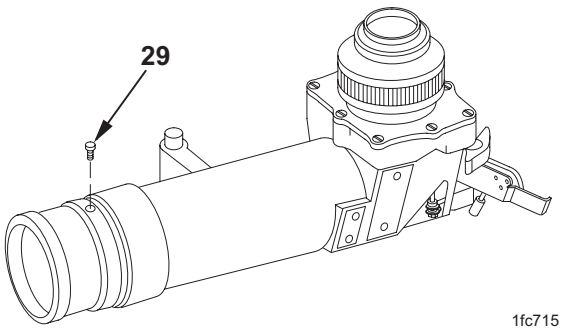
18. Apply sealing compound (item 13, WP 0152 00) to threads of eight machine screws (20).

19. Install and tighten eight new lockwashers (21) (item 10, WP 0146 00) and eight machine screws (20) and perform final inspection (WP 0106 00).




20. Apply sealing compound (item 13, WP 0152 00) to four machine screws (22). Install four new lockwashers (23) (item 6, WP 0145 00) and four machine screws to secure optical instrument latch set (24) to optical instrument housing (2).




21. Install retaining strap (25) on fluid valve stem (26).

22. Apply sealing compound (item 13, WP 0152 00) on fluid valve stem (26) and install.

23. Install valve core (27) and air valve cap (28).

24. Apply sealing compound (item 13, WP 0152 00) on safety relief valve (29) and install.

25. Clean lens with lens paper (item 17, WP 0152 00) and optical lens cleaning compound (item 11, WP 0152 00) after all maintenance and servicing.

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

# M138A1 ELBOW TELESCOPE (1240-01-515-8264)

## M138A1 ELBOW TELESCOPE MAINTENANCE DISASSEMBLY, CLEANING, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

**Tools and Special Tools**

Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**

Gasket (item 28, WP 0146 00)
Grease (item 15, WP 0152 00)
Lens paper (item 17, WP 0152 00)
Lockwasher (4) (item 6, WP 0145 00)
Lockwasher (2) (item 9, WP 0145 00)
Lockwasher (8) (item 10, WP 0146 00)
Lockwasher (3) (item 30, WP 0146 00)
Optical lens cleaning compound (item 11, WP 0152 00)
O-ring (item 12A, WP 0146 00)
Sealing compound (item 13, WP 0152 00)
Solvent cleaning compound (item 12, WP 0152 00)

**References**

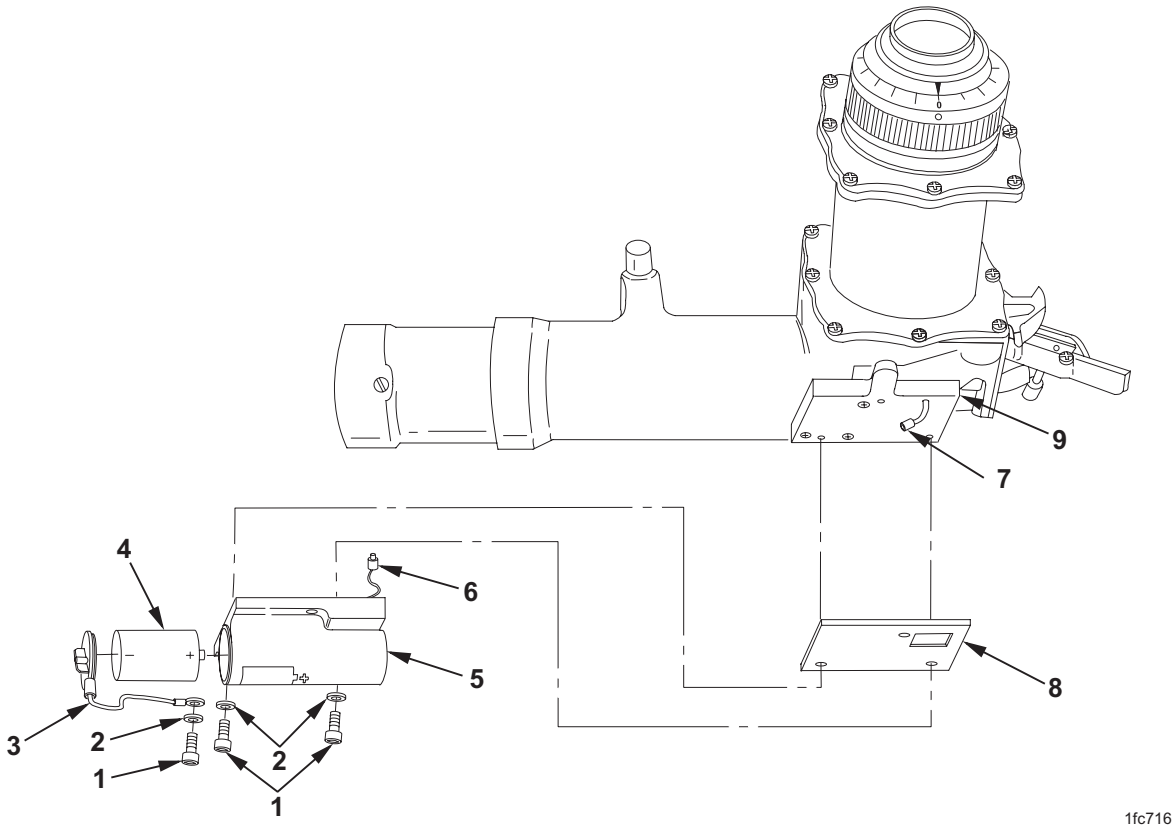
WP 0106 00
WP 0145 00
WP 0146 00

**DISASSEMBLY**

WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries.

**DISASSEMBLY - Continued**




## NOTE

Cap and wire rope assembly can be procured separately (WP 0146 00).

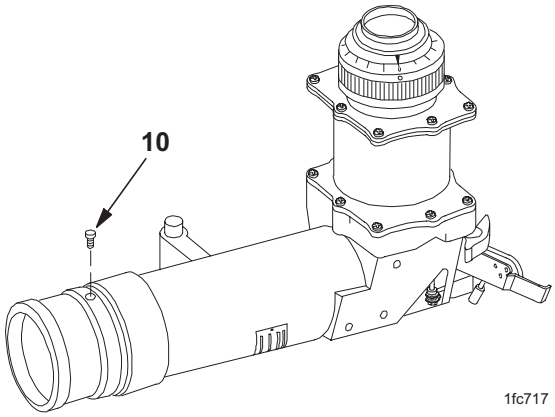
1. Remove three machine screws (1), three lockwashers (2), cap and wire rope assembly (3), and battery (4) from battery enclosure (5). Discard lockwashers.

## CAUTION

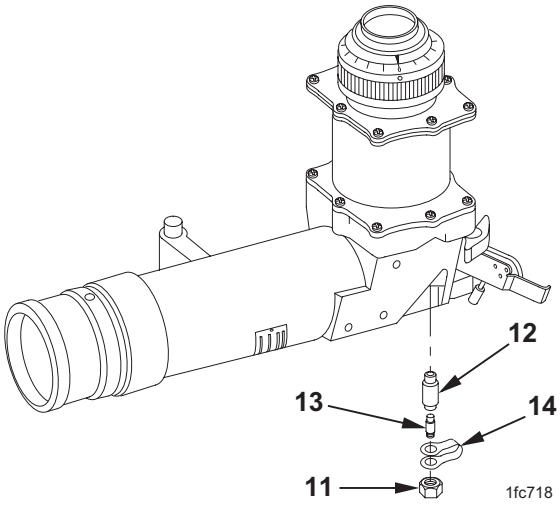
Use extreme care when removing battery enclosure. A short wire harness and connector on the battery enclosure is connected to a connector on a short wire harness on the fire control cover. These connectors and wire harnesses are easily damaged.

2. Carefully disconnect battery enclosure connector (6) from mounting bracket connector (7) and remove battery enclosure (5).

3. Remove gasket (8) from mounting bracket (9). Discard gasket.

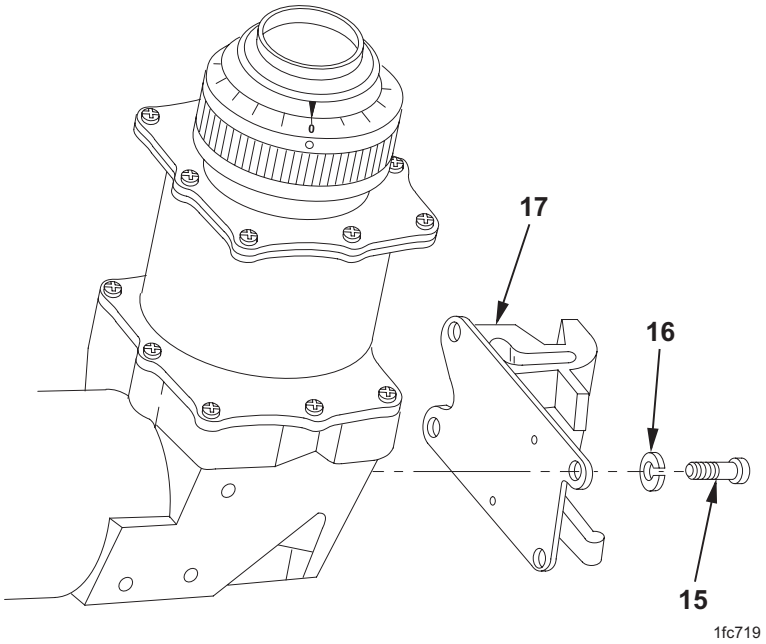



4. Unscrew and remove safety relief valve (10).



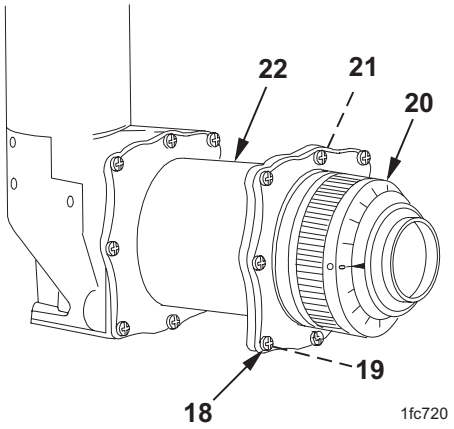

5. Unscrew air valve cap (11) from fluid valve stem (12).
6. Remove valve core (13) from fluid valve stem (12).
7. Remove fluid valve stem (12).
8. Remove retaining strap (14) from fluid valve stem (12).

**DISASSEMBLY - Continued**




9. Remove four machine screws (15) and four lockwashers (16) from optical instrument latch set (17). Discard lockwashers.

10. Remove optical instrument latch set (17).

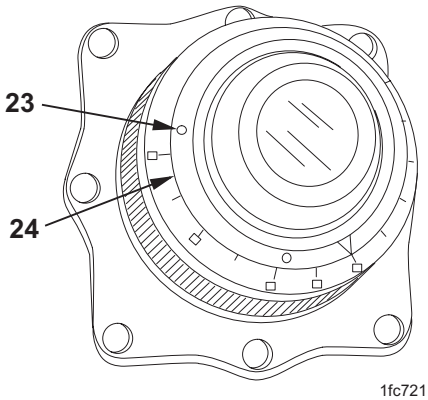



NOTE

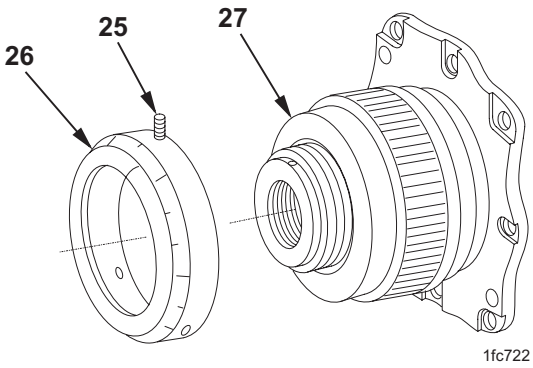
Diopter adapter assembly may be disassembled while installed on M138A1 elbow telescope.

11. Remove eight machine screws (18) and eight lockwashers (19). Discard lockwashers.

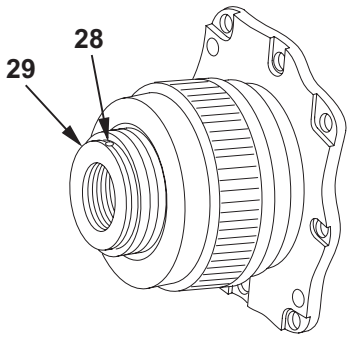
12. Lift diopter adapter assembly (20) and O-ring (21) from optical instrument extension (22) of M138A1 elbow telescope being careful not to damage locating pins in optical instrument extension. Remove and discard O-ring.



1fc721

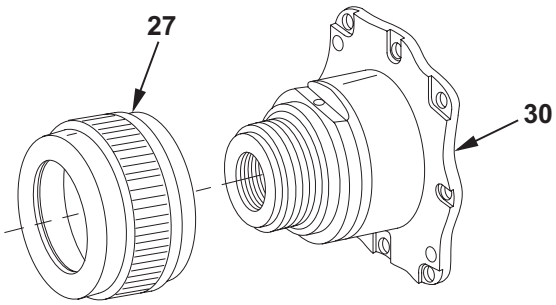


1fc722

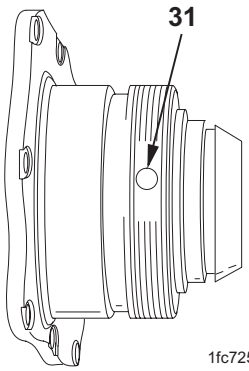


1fc723

13. Remove sealing compound and loosen two setscrews (23).
14. Lift off dial pointer (24).
15. Loosen three setscrews (25).
16. Remove diopter scale (26) from knob (27).
17. Remove sealing compound and loosen setscrew (28).
18. Unscrew and remove sleeve nut (29).



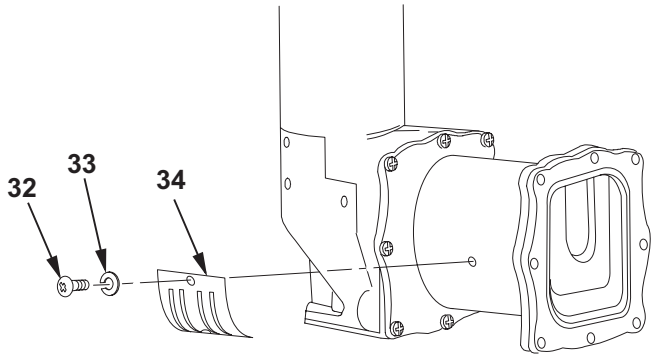
1fc724



1fc725

19. Remove knob (27) from eyepiece cell assembly (30).
20. Remove telescope mount stop (31) by lifting off.

**DISASSEMBLY - Continued**




21. Remove two machine screws (32) and two lockwashers (33). Discard lockwashers.

22. Remove identification plate (34).

**CLEANING**

WARNING

Use cleaning compounds in well-ventilated area away from open flame. Cleaning compounds are harmful to skin and clothing and may give off harmful vapor. Exercise care whenever cleaning compounds are used.

1. Clean all parts with cleaning compound (item 12, WP 0152 00).

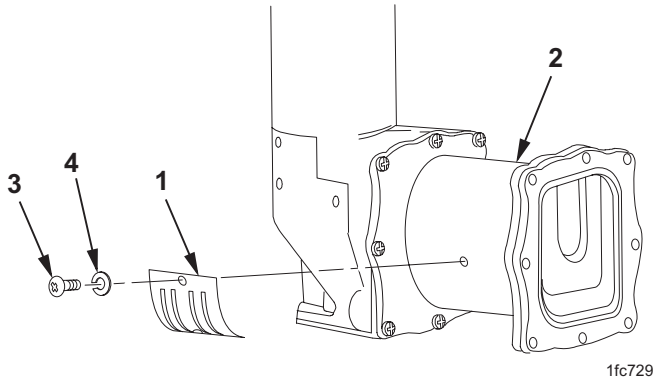
2. Wipe off excess cleaning compound with a clean wiping rag (item 18, WP 0152 00).

3. Clean reticle cell assembly and eyepiece cell assembly with lens paper (item 17, WP 0152 00) and optical lens cleaning compound (item 11, WP 0152 00).

**REPAIR OR REPLACEMENT**

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0145 00 and WP 0146 00.

**ASSEMBLY**



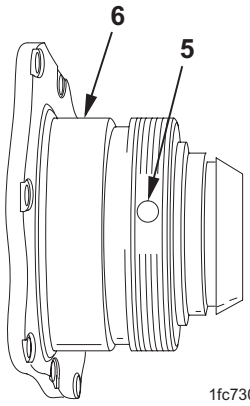

1. Position identification plate (1) on optical instrument extension (2).

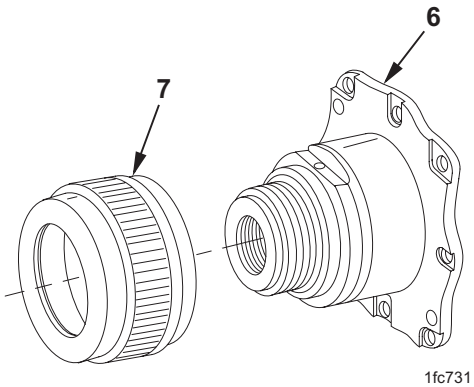
**WARNING**

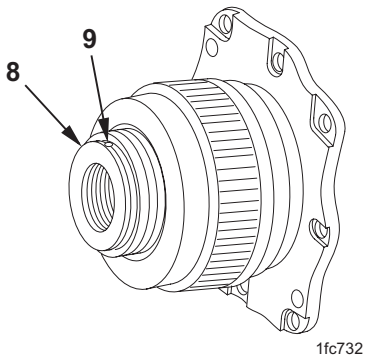
Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

2. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (3).

3. Install two new lockwashers (4) ( item 9, WP 0145 00) and two machine screws (3).



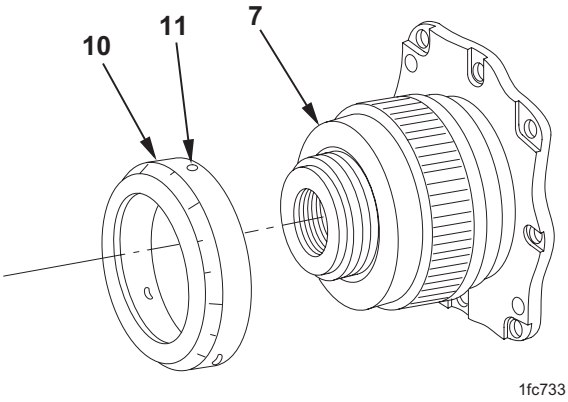

4. Place telescope mount stop (5) in slot on eyepiece cell assembly (6).

5. Apply grease (item 15, WP 0152 00) in knob (7) and install on eyepiece cell assembly (6).

6. Screw sleeve nut (8) on tight.

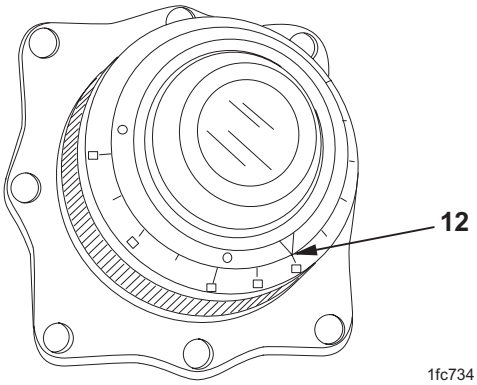
7. Tighten setscrew (9) and apply sealing compound (item 13, WP 0152 00).

**ASSEMBLY - Continued**

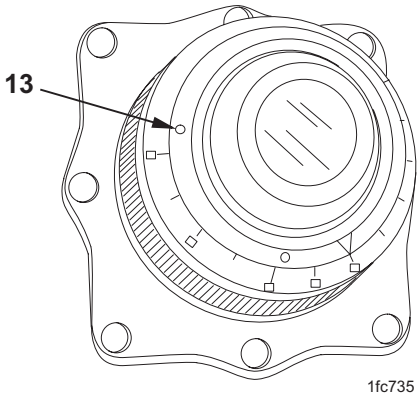



8. Place diopter scale (10) over knob (7).

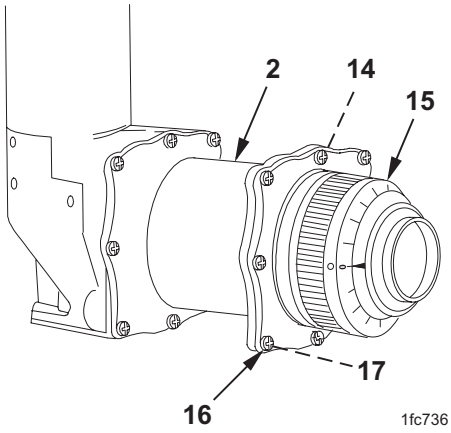
9. Tighten three setscrews (11).




10. Install dial pointer (12) and set in uppermost position perpendicular to mounting surface.




11. Tighten two setscrews (13) and apply sealing compound (item 13, WP 0152 00).




## NOTE

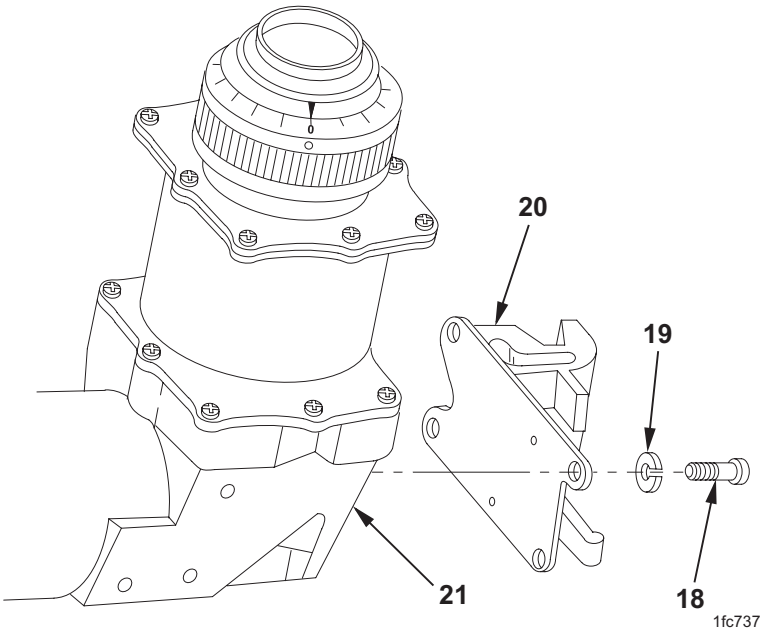
Before installing diopter adapter assembly, ensure that locating pins in eyepiece extension are not damaged.

12. Install new O-ring (14) (item 12A, WP 0146 00) in optical instrument extension (2).

13. Place diopter adapter assembly (15) over locating pins in optical instrument extension (2).

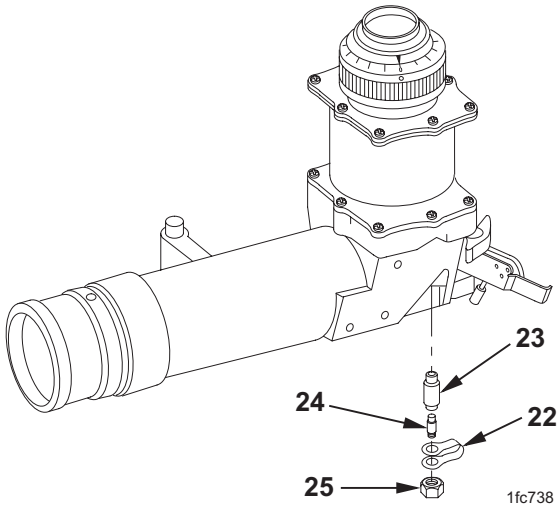
14. Apply sealing compound (item 13, WP 0152 00) to threads of eight machine screws (16).

15. Install and tighten eight new lockwashers (17) (item 10, WP 0146 00) and eight machine screws (16) and perform final inspection (WP 0106 00).

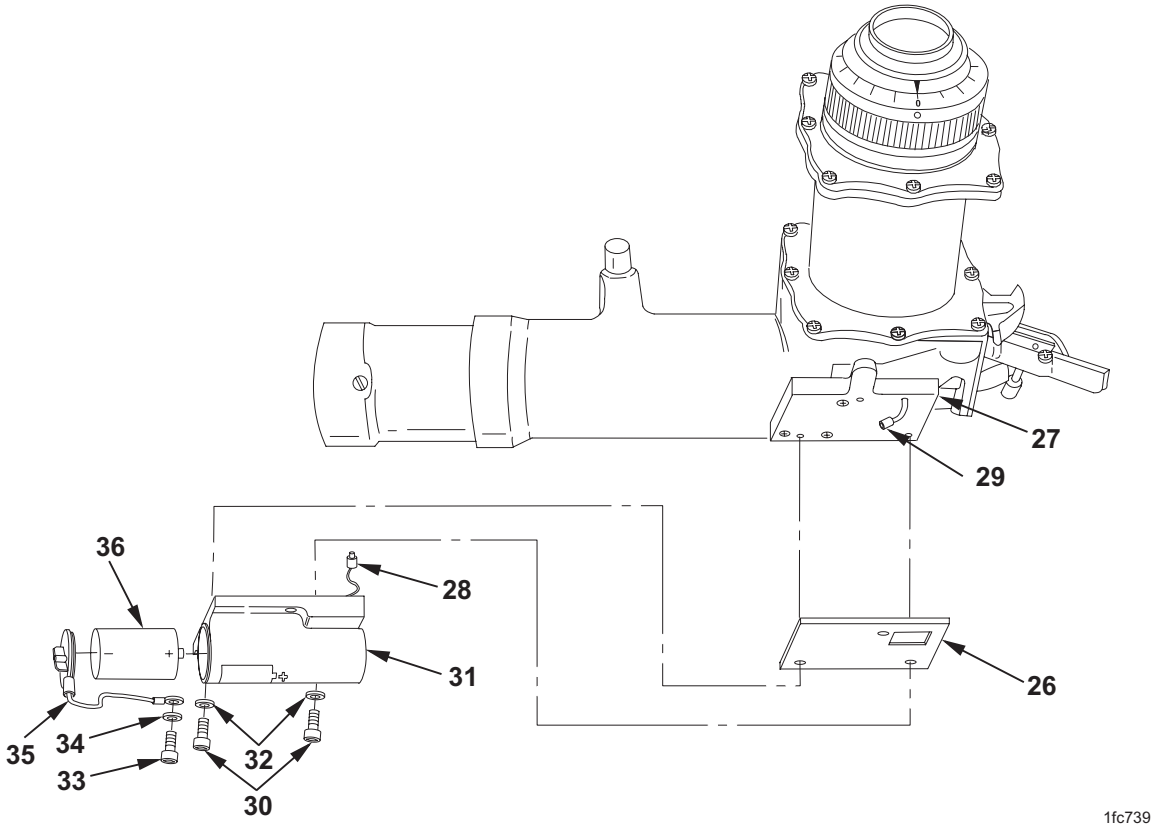



16. Apply sealing compound (item 13, WP 0152 00) to four machine screws (18). Install four new lockwashers (19) (item 6, WP 0145 00) and four machine screws to secure optical instrument latch set (20) to optical instrument housing (21).

**ASSEMBLY - Continued**




17. Install retaining strap (22) on fluid valve stem (23).
18. Apply sealing compound (item 13, WP 0152 00) on fluid valve stem (23) and install.
19. Install valve core (24) and air valve cap (25).



20. Install new gasket (26) (item 28, WP 0146 00) on mounting bracket (27).

21. Carefully connect battery enclosure connector (28) to mounting bracket connector (29).

## CAUTION

Be careful when assembling components. Do not pinch wire leads or connectors between parts.

22. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (30).

23. Install battery enclosure (31) on mounting bracket (27) with two new lockwashers (32) (item 30, WP 0146 00) and two machine screws (30).

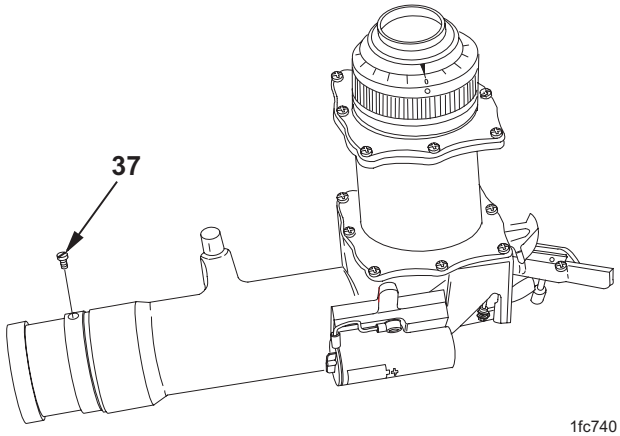
24. Apply sealing compound (item 13, WP 0152 00) to threads of machine screw (33).

## NOTE

If cap or wire rope assembly has been replaced, connect the two components.

25. Install new lockwasher (34) (item 30, WP 0146 00) and machine screw (33) through cap and wire rope assembly (35) into battery enclosure (31).

26. Install battery (36) in battery enclosure (31) and secure with cap and wire rope assembly (35).




27. Apply sealing compound (item 13, WP 0152 00) on safety relief valve (37) and install.

28. Clean lens with lens paper (item 17, WP 0152 00) and optical lens cleaning compound (item 11, WP 0152 00) after all maintenance and servicing.

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

**M138/M138A1 ELBOW TELESCOPE**
**(1240-01-038-0530/1240-01-515-8264)**

**OPTICAL INSTRUMENT LATCH SET MAINTENANCE**
**REMOVAL, DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY, INSTALLATION**

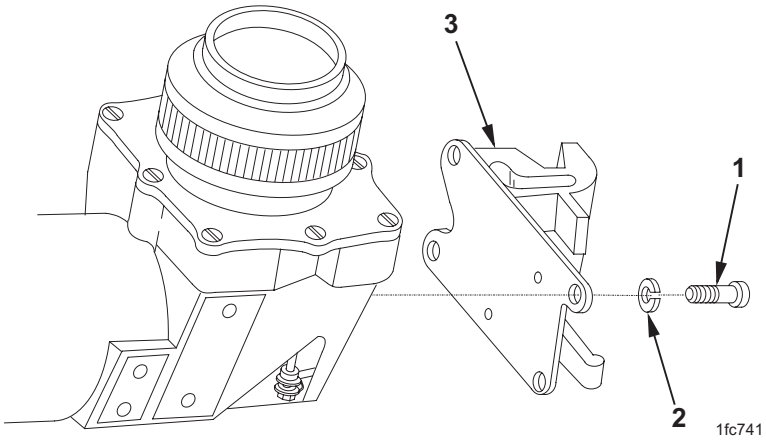
**INITIAL SETUP:**

**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Grease (item 15, WP 0152 00)
Lockwasher (4) (item 6, WP 0145 00)
Sealing compound (item 13, WP 0152 00)

**References**
WP 0145 00
WP 0147 00

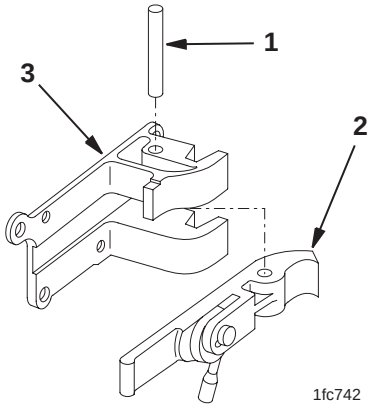
**REMOVAL**




1. Remove four machine screws (1) and four lockwashers (2) from optical instrument latch set (3). Discard lockwashers.

2. Remove optical instrument latch set (3).

**DISASSEMBLY**




1. Remove headless straight pin (1).
2. Remove optical instrument latch (2) from latch holder (3).

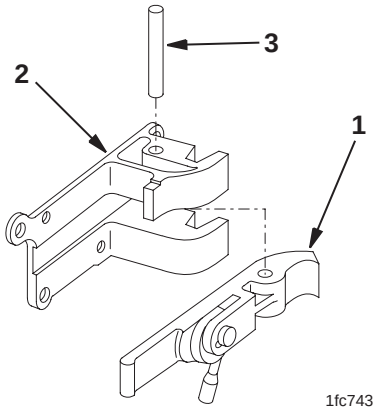
**REPAIR OR REPLACEMENT**

NOTE

Replace entire optical instrument latch set if damaged to the extent that the M138/M138A1 telescope does not lock securely in position.

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0145 00 and WP 0147 00.

**ASSEMBLY**



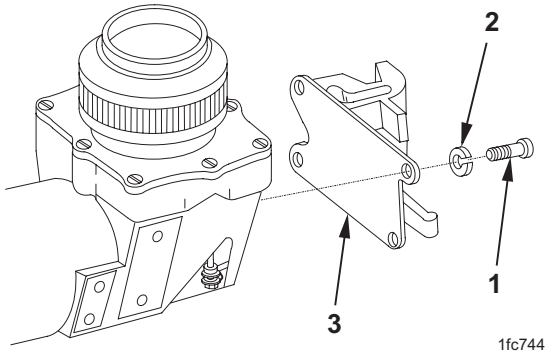

1. Apply light coat of grease (item 15, WP 0152 00) to optical instrument latch (1) and position in latch holder (2).

NOTE

Ensure headless straight pin is below surface of latch holder on both sides.

2. Install headless straight pin (3).

**INSTALLATION**




**WARNING**

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

Apply sealing compound (item 13, WP 0152 00) to four machine screws (1). Install four new lockwashers (2) (item 6, WP 0145 00) and four machine screws to secure optical instrument latch set (3) to M138/M138A1 telescope.

**END OF WORK PACKAGE**

**DIRECT SUPPORT**

# M138/M138A1 ELBOW TELESCOPE (1240-01-038-0530/1240-01-515-8264)

## OPTICAL INSTRUMENT LATCH MAINTENANCE DISASSEMBLY, REPAIR OR REPLACEMENT, ASSEMBLY

**INITIAL SETUP:**

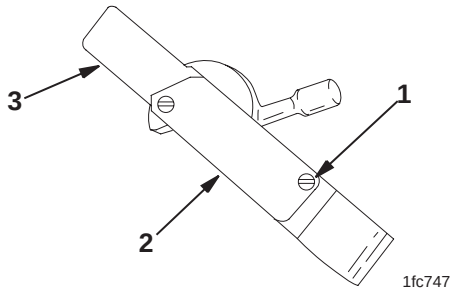
**Tools and Special Tools**
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

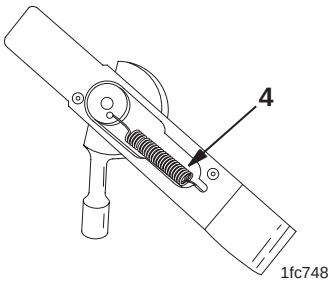
**Materials/Parts**
Grease (item 15, WP 0152 00)
Retaining ring (item 4, WP 0148 00)
Sealing compound (item 13, WP 0152 00)
Spring pin (item 6, WP 0148 00)

**References**
WP 0148 00

**Equipment Conditions**
Optical instrument latch set removed from M138/M138A1 elbow telescope (WP 0104 00)
Optical instrument latch removed from optical instrument latch set (WP 0104 00)

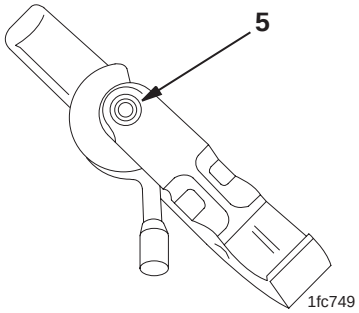
**DISASSEMBLY**

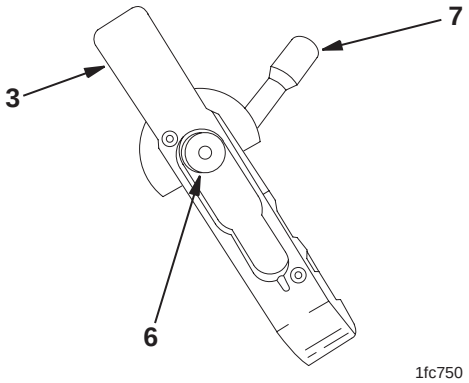


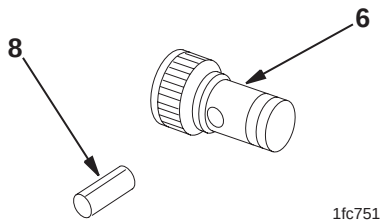

1. Remove two machine screws (1) from access cover (2).
2. Remove access cover (2) from lock-release latch (3).
3. Lift off helical extension spring (4).

**DISASSEMBLY - Continued**




4. Remove and discard retaining ring (5).
5. Remove headed shoulder pin (6) from lock-release lever (7).
6. Remove lock-release lever (7) from lock-release latch (3).




7. Remove spring pin (8) from headed shoulder pin (6). Discard spring pin.

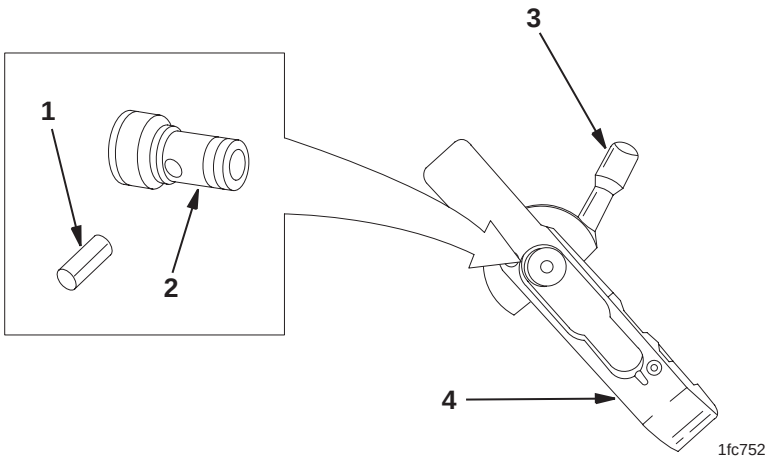
**REPAIR OR REPLACEMENT**

NOTE

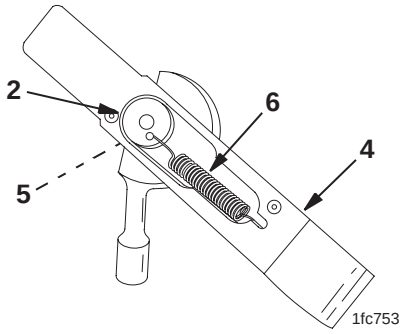
Replace entire optical instrument latch if damaged to the extent that it will not hold the M138/M138A1 elbow telescope in proper position.

Repair is by replacement of authorized parts that do not meet inspection criteria. Refer to WP 0148 00.

**ASSEMBLY**

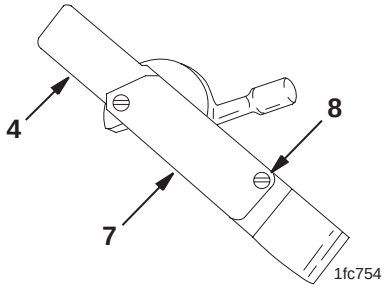



1. Install new spring pin (1) (item 6, WP 0148 00) in headed shoulder pin (2).
2. Apply light coat of grease (item 15, WP 0152 00) in lock-release lever (3) and place on lock-release latch (4).
3. Install headed shoulder pin (2) in lock-release lever (3).




4. Install new retaining ring (5) (item 4, WP 0148 00).
5. Install two ends of helical extension spring (6) in holes of lock-release latch (4) and headed shoulder pin (2).

**ASSEMBLY - Continued**




6. Place access cover (7) on lock-release latch (4).

**WARNING**

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor. Exercise care whenever sealing compound is used.

7. Apply sealing compound (item 13, WP 0152 00) to threads of two machine screws (8) and install to secure access cover (7).

**END OF WORK PACKAGE**

# CHAPTER 24

# DIRECT SUPPORT
# FINAL INSPECTION INSTRUCTIONS
# FOR
# M138/M138A1 ELBOW TELESCOPE

**DIRECT SUPPORT**

**M138/M138A1 ELBOW TELESCOPE**
**(1240-01-038-0530/1240-01-515-8264)**

**FINAL INSPECTION INSTRUCTIONS**
**TEST AND INSPECTION**

**INITIAL SETUP:**

**Test Equipment**
Dioptometer (item 13, WP 0149 00)
Torque wrench adapter (item 17, WP 0149 00)

**Tools and Special Tools**
Shop Set, Instrument and Fire Control: Field Maintenance, Basic Less Power (SC 4931-95-A07)
Tool Kit, Electronic System Maintenance (SC 5180-95-B29)

**Materials/Parts**
Grease (item 16, WP 0152 00)
Sealing compound (item 13, WP 0152 00)
Solvent cleaning compound (item 12, WP 0152 00)

**References**
TM 750-116

**Special Environmental Conditions**
Ambient temperature +60 °F (+16 °C) to +90 °F (+32 °C)

**TASK AND INSPECTION**

WARNING

**RADIATION**

**TRITIUM GAS ($H_3$)**

When maintaining radioactively illuminated fire control equipment, follow radiation hazard procedures in warning summary (M138 only).

WARNING

Read and follow all WARNINGS in the WARNING SUMMARY in the front of this manual. Pay careful attention to those concerning batteries (M138A1 only).

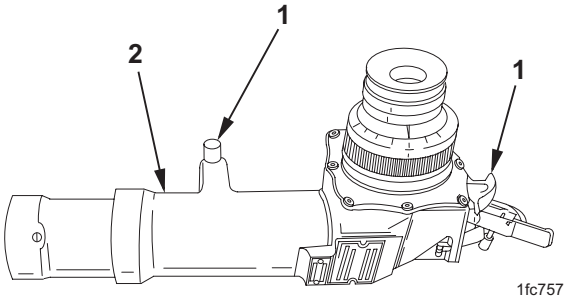
**TEST AND INSPECTION - Continued**

## NOTE

If the M138/M138A1 telescope being inspected fails to meet the required standards, ensure all maintenance authorized at the applicable level has been performed correctly. Then send the M138/M138A1 elbow telescope to the next level of maintenance.

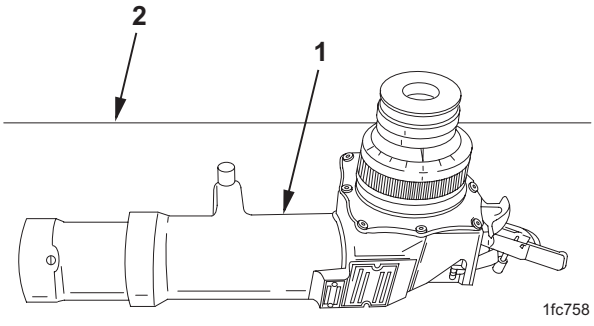
Illustrations show the M138 telescope but also apply to the M138A1 telescope.

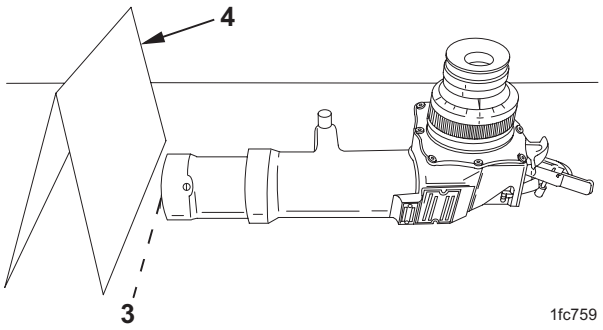
### Visual Inspection



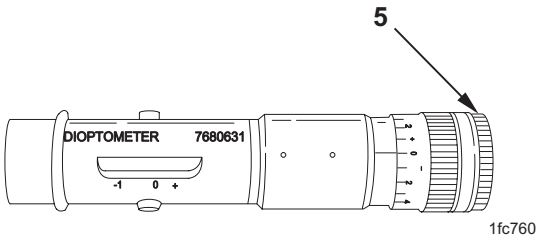

1. Check that all screws and lockwashers are present and tight.
2. Check that mounting surfaces (1) are clean and free of nicks and burrs.
3. Check that M138/M138A1 elbow telescope (2) is free of dirt, rust, and foreign matter; paint is not chipped; and all parts are present.

### Eyepiece Focus Inspection

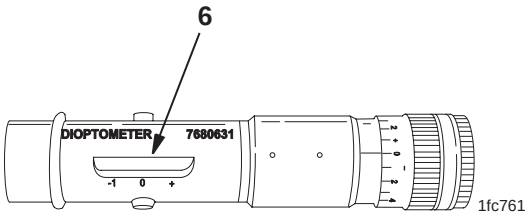


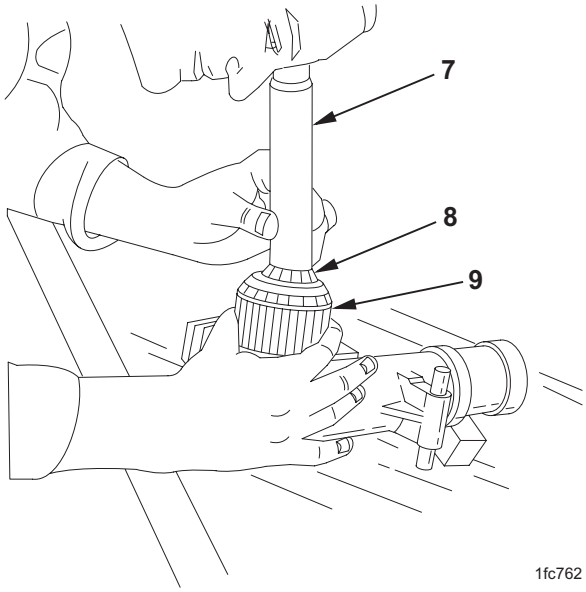




1. Place M138/M138A1 elbow telescope (1) on flat surface (2).
2. Place M138/M138A1 elbow telescope lens (3) close to any light-colored surface (4).




3. Adjust dioptometer eyepiece (5) until the reticle is brought to its sharpest focus.



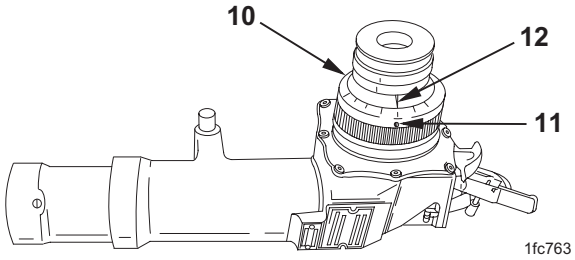

4. Set dioptometer range scale (6) to 0.

5. Place dioptometer (7) over M138/M138A1 elbow telescope eyepiece (8).

6. Turn knob (9) until pattern of reticle is sharpest and darkest.

**TEST AND INSPECTION - Continued**

**Eyepiece Focus Inspection - Continued**



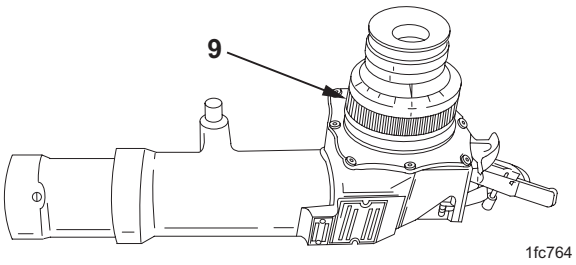

WARNING

Use sealing compound in well-ventilated area away from open flame. Sealing compound is harmful to skin and clothing and may give off harmful vapor.

7. If diopter scale (10) does not read 0, loosen three setscrews (11), adjust diopter scale to read 0, and align dial pointer (12) with 0. Retighten setscrews and apply sealing compound (item 13, WP 0152 00).

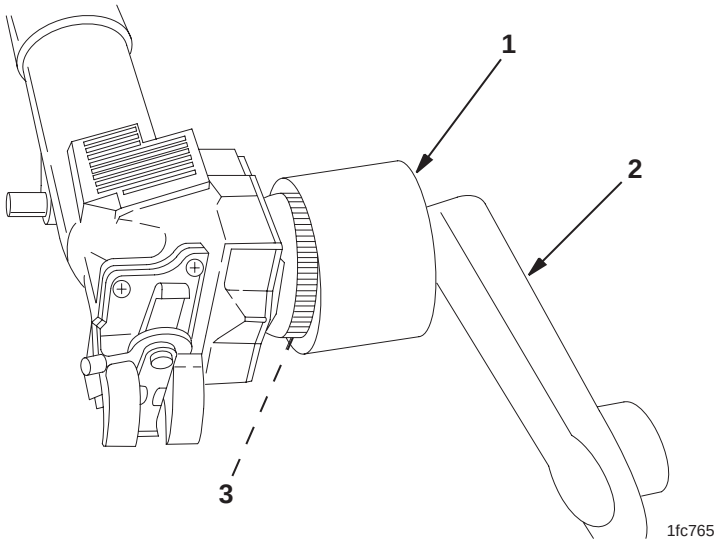
NOTE

Observe focus of the reticle image during step 8. The focus should change over a minimum range of +3 diopters to -3 diopters.




8. Rotate knob (9) clockwise as far as possible and note diopter scale setting. Diopter scale must read -3 diopters or greater. Rotate counterclockwise as far as possible and note diopter scale setting. Diopter scale must read +3 diopters or greater. If readings of -3 through +3 diopters cannot be achieved, repeat steps 3 through 7. If proper readings are still not obtained, return to depot maintenance.

**Torque Inspection**




1. Place torque wrench adapter (1) on torque wrench (2) and place over knob (3).

2. Measure torque. Torque required to move diopter scale should be between 2 in.-lb (0.23 N-m) and 5 in.-lb (0.57 N-m).

WARNING

Use cleaning compound in well-ventilated area away from open flame. Cleaning compound is harmful to skin and clothing and may give off harmful vapor.

3. If above torque cannot be obtained, apply coat of grease (item 16, WP 0152 00) to threads to increase torque or clean threads with cleaning compound (item 12, WP 0152 00) to decrease torque as necessary. If torque still cannot be obtained, return M138/M138A1 elbow telescope to depot maintenance.

**Illumination Inspection - M138 Elbow Telescope**

WARNING

**RADIATION**   **TRITIUM GAS ($H_3$)**

If not illuminated, follow radioactive safety precautions in warning summary.

Take M138 elbow telescope into dark area and wait 15 minutes. Look through eyepiece and check that illumination is present and even.

**TEST AND INSPECTION - Continued**

**Illumination Inspection - M138A1 Elbow Telescope**

Take M138A1 elbow telescope into dark area and look through eyepiece to check that illumination is present.

**Purging**

WARNING

Before any tritium-illuminated device is purged, ensure that all radioactive light sources are fully illuminated. If not fully illuminated, send to depot for maintenance.

Purge and charge M138/M138A1 elbow telescope (TM 750-116).

**END OF WORK PACKAGE**

# CHAPTER 25

# PREEMBARKATION INSPECTION OF MATERIAL

**DIRECT SUPPORT AND GENERAL SUPPORT**

**PREEMBARKATION INSPECTION OF MATERIAL**

**PREPARATION FOR STORAGE OR SHIPMENT**

## PREPARATION FOR STORAGE OR SHIPMENT

### General Instructions

Fire control instruments must be inspected for outward appearance, mechanical condition, and proper operation.

Instruments must approach new equipment standards of operation and appearance. The workmanship and quality must reflect the highest standards attainable.

### Specific Instructions

Fire control instruments must conform to the following specifications for overseas shipment:

1. Condition of optical element. Lenses, prisms, reticles, and windows must be free from scratches, pits, and chips that will affect optical performance of the instrument.

2. Functioning of mechanical parts. Mechanical parts must operate smoothly without binding or rough motion. Parts must be free from grit and must be properly lubricated.

3. Illumination of radioactive parts. The level vials, reticles, and counter dials must illuminate properly.

4. General appearance and condition of the instruments.

    a. All parts of the instruments must be present and free from defects.

    b. Paint must cover all specified surfaces. Repaint if painted surfaces show signs of damage.

    c. All optics must be free from any internal dirt and moisture. Excessive dirt or moisture indicates a breakdown in sealing and is cause for rejection of the instrument.

    d. All scales must be read easily. All numbers and divisions must be clearly defined.

    e. Any fire control instrument failing to meet the requirements of the final inspection is unsatisfactory for overseas shipment.

    f. All warning labels must be present and legible.

**END OF WORK PACKAGE**

# CHAPTER 26

# SUPPORTING INFORMATION

## DIRECT SUPPORT AND GENERAL SUPPORT

## REFERENCES

### SCOPE

This work package lists all field manuals, forms, miscellaneous publications, and technical manuals referenced in this manual.

### FIELD MANUALS

| | |
|---|---|
| FM 4-25.11 | First Aid |

### FORMS

| | |
|---|---|
| DA Form 2028 | Recommended Changes to Publications and Blank Forms |

### MISCELLANEOUS PUBLICATIONS

| | |
|---|---|
| AR 750-1 | Army Materiel Maintenance Policy |
| CTA 8-100 | Army Medical Department Expendable/Durable Items |
| CTA 50-970 | Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items) |
| DA PAM 738-750 | Functional Users Manual for The Army Maintenance Management System (TAMMS) |
| NRC Form 3 | Notice to Employees |
| 10CFR Part 19 | Notices, Instructions and Reports to Workers; Inspections |
| AR 385-63 | Policies and Procedures for Firing Ammunition for Training, Target Practice and Combat |
| SF 368 | Product Quality Deficiency Report |
| SF 364 | Report of Discrepancy |
| 10CFR Part 21 | Reporting of Defects and Noncompliance |
| AR 735-11-2 | Reporting of Item and Packaging Discrepancies |
| 10CFR Part 20 | Standards for Protection against Radiation |
| SF 361 | Transportation Discrepancy Report |

**TECHNICAL MANUALS**

| | |
|---|---|
| TM 9-1025-211-34 | Direct Support and General Support Maintenance Manual for Howitzer, Medium, Towed: 155-MM, M198 (1025-01-026-6648) |
| TM 9-254 | General Maintenance Procedures for Fire Control Materiel |
| TM 750-116 | General Procedures for Purging and Charging of Fire Control |
| TM 9-1025-211-10 | Operator's Manual for Howitzer, Medium, Towed: 155-MM, M198 (1025-01-026-6648) |
| TM 9-1025-215-10/TM-10407A-10/1 | Operator's Manual for Howitzer, Medium, Towed: 155-MM, M777 (NSN 1025-01-445-0991) and Howitzer, Medium, Towed: 155-MM, M777A1 (NSN TBD) |
| TM 9-1025-211-20&P | Organizational Maintenance Manual (Including Repair Parts and Special Tools List) for Howitzer, Medium, Towed: 155-MM, M198 (1025-01-026-6648) |
| TM 9-1025-215-25&P/ TM-10407A-25&P | Unit, Direct Support, and General Support Maintenance Manual (Including Repair Parts and Special Tools List) for Howitzer, Medium, Towed: 155-MM, M777 (NSN 1025-01-445-0991) and Howitzer, Medium, Towed: 155-MM, M777A1 (NSN TBD) |

**END OF WORK PACKAGE**

# DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE

## M198/M777 HOWITZER FIRE CONTROL
## (NSN 1025-01-026-6648/1025-01-445-0991)

## INTRODUCTION TO REPAIR PARTS AND SPECIAL TOOLS LIST (RPSTL)

### SCOPE

This RPSTL lists and authorizes spares and repair parts; special tools; special test, measurement, and diagnostic equipment (TMDE); and other special support equipment required for performance of direct support and general support maintenance of the M198/M777 Howitzer Fire Control. It authorizes the requisitioning, issue, and disposition of spares, repair parts, and special tools as indicated by the source, maintenance, and recoverability (SMR) codes.

### GENERAL

In addition to the Introduction work package, this RPSTL is divided into the following work packages.

1. Repair Parts List Work Packages. Work packages containing lists of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. These work packages also include parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Sending units, brackets, filters, and bolts are listed with the component they mount on. Bulk materials are listed by item name in FIG. BULK at the end of the work packages. Repair parts kits are listed separately in their own functional group and work package. Repair parts for reparable special tools are also listed in a separate work package. Items listed are shown on the associated illustrations.

2. Special Tools List Work Package. Work packages containing lists of special tools, special TMDE, and special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in the DESCRIPTION AND USABLE ON CODE (UOC) column). Tools that are components of common tool sets and/or Class VII are not listed.

3. Cross-Reference Indexes Work Packages. There are two cross-reference index work packages in this RPSTL: the National Stock Number (NSN) Index work package and the Part Number (P/N) Index work package. Both of the work packages refer you to the figure and item number.

### EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGES

ITEM NO. (Column (1)). Indicates the number used to identify items called out in the illustration.

SMR CODE (Column (2)). The SMR code containing supply/requisitioning information, maintenance level authorization criteria, and disposition instruction, as shown in the following breakout:

## EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGES - Continued

| Source Code | Maintenance Code | | Recoverability Code |
|---|---|---|---|
| ___ | ___ | | ___ |
| xx | xx | | x |
| ___ | ___ | | ___ |
| 1st two positions: How to get an item. | 3rd position: Who can install, replace, or use the item. | 4th position: Who can do complete repair* on the item. | 5th position: Who determines disposition action on unserviceable items. |

*Complete Repair: Maintenance capacity, capability, and authority to perform all corrective maintenance tasks of the "Repair" function in a use/user environment in order to restore serviceability to a failed item.

Source Code. The source code tells you how to get an item needed for maintenance, repair, or overhaul of an end item/equipment. Explanations of source codes follow:

| Source Code | Application/Explanation |
|---|---|
| PA<br>PB<br>PC<br>PD<br>PE<br>PF<br>PG | Stock items; use the applicable NSN to requisition/request items with these source codes. They are authorized to the level indicated by the code entered in the 3rd position of the SMR code.<br><br>NOTE: Items coded PC are subject to deterioration. |
| KD<br>KF<br>KB | Items with these codes are not to be requested/requisitioned individually. They are part of a kit which is authorized to the maintenance level indicated in the 3rd position of the SMR code. The complete kit must be requisitioned and applied. |

| | | |
|---|---|---|
| MO- | Made at unit/ AVUM level | Items with these codes are not to be requisitioned/requested individually. They must be made from bulk material which is identified by the P/N in the DESCRIPTION AND USABLE ON CODE (UOC) column and listed in the bulk material group work package of the RPSTL. If the item is authorized to you by the 3rd position code of the SMR code, but the source code indicates it is made at higher level, order the item from the higher level of maintenance. |
| MF- | Made at DS/ AVIM level | |
| MH- | Made at GS level | |
| ML- | Made at SRA | |
| MD- | Made at depot | |

| | | |
|---|---|---|
| AO- | Assembled by unit/AVUM level | Items with these codes are not to be requested/requisitioned individually. The parts that make up the assembled item must be requisitioned or fabricated and assembled at the level of maintenance indicated by the source code. If the 3rd position code of the SMR code authorizes you to replace the item, but the source code indicates the item is assembled at a higher level, order the item from the higher level of maintenance. |
| AF- | Assembled by DS/AVIM level | |
| AH- | Assembled by GS level | |
| AL- | Assembled by SRA | |
| AD- | Assembled by Depot | |

| | |
|---|---|
| XA | Do not requisition an XA-coded item. Order the next higher assembly. (Refer to NOTE below.) |
| XB | If an item is not available from salvage, order it using the CAGEC and P/N. |
| XC | Installation drawings, diagrams, instruction sheets, field service drawings; identified by manufacturer's P/N. |
| XD | Item is not stocked. Order an XD-coded item through normal supply channels using the CAGEC and P/N given, if no NSN is available. |

## NOTE

Cannibalization or controlled exchange, when authorized, may be used as a source of supply for items with the above source codes, except for those source coded "XA" or those aircraft support items restricted by requirements of AR 750-1.

Maintenance Code. Maintenance codes tell you the level(s) of maintenance authorized to use and repair support items. The maintenance codes are entered in the third and fourth positions of the SMR code as follows:

Third Position. The maintenance code entered in the third position tells you the lowest maintenance level authorized to remove, replace, and use an item. The maintenance code entered in the third position will indicate authorization to the following levels of maintenance:

**EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGES - Continued**

| Maintenance Code | | Application/Explanation |
|---|---|---|
| C | - | Crew or operator maintenance done within unit/AVUM maintenance. |
| O | - | Unit level/AVUM maintenance can remove, replace, and use the item. |
| F | - | Direct support/AVIM maintenance can remove, replace, and use the item. |
| H | - | General support maintenance can remove, replace, and use the item. |
| L | - | Specialized repair activity can remove, replace, and use the item. |
| D | - | Depot can remove, replace, and use the item. |

Fourth Position. The maintenance code entered in the fourth position tells you whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (perform all authorized repair functions).

## NOTE

Some limited repair may be done on the item at a lower level of maintenance, if authorized by the Maintenance Allocation Chart (MAC) and SMR codes.

| Maintenance Code | | Application/Explanation |
|---|---|---|
| O | - | Unit/AVUM is the lowest level that can do complete repair of the item. |
| F | - | Direct support/AVIM is the lowest level that can do complete repair of the item. |
| H | - | General support is the lowest level that can do complete repair of the item. |
| L | - | Specialized repair activity is the lowest level that can do complete repair of the item. |
| D | - | Depot is the lowest level that can do complete repair of the item. |
| Z | - | Nonreparable. No repair is authorized. |
| B | - | No repair is authorized. No parts or special tools are authorized for the maintenance of "B" coded item. However, the item may be reconditioned by adjusting, lubricating, etc., at the user level. |

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

| Recoverability Code | | Application/Explanation |
|---|---|---|
| Z | - | Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in the third position of the SMR code. |
| O | - | Reparable item. When uneconomically reparable, condemn and dispose of the item at the unit level. |
| F | - | Reparable item. When uneconomically reparable, condemn and dispose of the item at the direct support level. |
| H | - | Reparable item. When uneconomically reparable, condemn and dispose of the item at the general support level. |
| D | - | Reparable item. When beyond lower level repair capability, return to depot. Condemnation and disposal of item are not authorized below depot level. |
| L | - | Reparable item. Condemnation and disposal not authorized below Specialized Repair Activity (SRA). |
| A | - | Item requires special handling or condemnation procedures because of specific reasons (such as precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions. |

NSN (Column (3)). The NSN for the item is listed in this column.

CAGEC (Column (4)). The Commercial and Government Entity Code (CAGEC) is a five-digit code which is used to identify the manufacturer, distributor, or Government agency/activity that supplies the item.

PART NUMBER (Column (5)). Indicates the primary number used by the manufacturer (individual, company, firm, corporation, or Government activity), which controls the design and characteristics of the item by means of its engineering drawings, specifications, standards, and inspection requirements to identify an item or range of items.

## NOTE

When you use an NSN to requisition an item, the item you receive may have a different P/N from the number listed.

DESCRIPTION AND USABLE ON CODE (UOC) (Column (6)). This column includes the following information:

1. The federal item name and, when required, a minimum description to identify the item.
2. P/Ns of bulk materials are referenced in this column in the line entry to be manufactured or fabricated.

**EXPLANATION OF COLUMNS IN THE REPAIR PARTS LIST AND SPECIAL TOOLS LIST WORK PACKAGES - Continued**

3. Hardness Critical Item (HCI). A support item that provides the equipment with special protection from electromagnetic pulse (EMP) damage during a nuclear attack.

4. The statement END OF FIGURE appears just below the last item description in column (6) for a given figure in both the repair parts list and special tools list work packages.

QTY (Column (7)). The QTY (quantity per figure) column indicates the quantity of the item used in the breakout shown on the illustration/figure, which is prepared for a functional group, subfunctional group, or an assembly. A "V" appearing in this column instead of a quantity indicates that the quantity is variable and quantity may change from application to application. Shims are a good example.

**EXPLANATION OF CROSS-REFERENCE INDEXES WORK PACKAGE FORMAT AND COLUMNS**

1. National Stock Number (NSN) Index Work Package.

STOCK NUMBER Column. This column lists the NSN in National item identification number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN.

| | |
|---|---|
| NSN<br>(e.g., 5385-01-574-1476)<br>NIIN | When using this column to locate an item, ignore the first four digits of the NSN. However, the complete NSN should be used when ordering items by stock number. |

FIG. Column. This column lists the number of the figure where the item is identified/located. The figures are in numerical order in the repair parts list and special tools list work packages.

ITEM Column. The item number identifies the item associated with the figure listed in the adjacent FIG. column. This item is also identified by the NSN listed on the same line.

2. Part Number (P/N) Index Work Package. P/Ns in this index are listed in ascending alphanumeric sequence (vertical arrangement of letter and number combinations which places the first letter or digit of each group in order A through Z, followed by the numbers 0 through 9 and each following letter or digit in like order).

PART NUMBER Column. Indicates the P/N assigned to the item.

FIG. Column. This column lists the number of the figure where the item is identified/located in the repair parts list and special tools list work packages.

ITEM Column. The item number is the number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

**SPECIAL INFORMATION**

UOC. The UOC appears in the lower left corner of the Description Column heading. Usable on codes are shown as "UOC:..." in the Description column (justified left) on the first line under the applicable item/nomenclature. Uncoded items are applicable to all models. Identification of the UOCs used in the RPSTL are:

| Code | Used on |
|---|---|
| F39 | M17 Fire Control Quadrant |
| BM3 | M17A1 Fire Control Quadrant |
| F40 | M18 Fire Control Quadrant |
| BM6 | M18A1 Fire Control Quadrant |
| F41 | M138 Elbow Telescope |
| BM5 | M138A1 Elbow Telescope |
| F42 | M137 Panoramic Telescope |
| BH6 | M137A2 Panoramic Telescope |
| BH5 | M137A3 Panoramic Telescope |
| F43 | M172 Telescope and Quadrant Mount |
| BN3 | M172A1 Telescope and Quadrant Mount |
| F44 | M171 Telescope and Quadrant Mount |
| BM4 | M171A1 Telescope and Quadrant Mount |

Fabrication Instructions. Bulk materials required to manufacture items are listed in the bulk material functional group of this RPSTL. Part numbers for bulk materials are also referenced in the Description Column of the line item entry for the item to be manufactured/fabricated. Detailed fabrication instructions for items source coded to be manufactured or fabricated are found in the appropriate maintenance work packages of this manual.

Index Numbers. Items which have the word BULK in the figure column will have an index number shown in the item number column. This index number is a cross-reference between the NSN / P/N work packages and the bulk material list in the repair parts list work package.

Illustrations List. The illustrations in this RPSTL contain unit authorization items. Illustrations published in the maintenance portion of this manual that contain unit authorized items also appear in this RPSTL.

## HOW TO LOCATE REPAIR PARTS

1. When NSN or P/Ns Are Not Known.

First. Using the table of contents, determine the assembly group to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and lists are divided into the same groups.

Second. Find the figure covering the functional group to which the item belongs.

Third. Identify the item on the figure and note the item number(s).

Fourth. Look in the repair parts list work package for the figure and item numbers. The NSNs and part numbers are on the same line as the associated item numbers.

2. When NSN Is Known.

First. If you have the NSN, look in the STOCK NUMBER column of the NSN index. The NSN is arranged in NIIN sequence. Note the figure and item number next to the NSN.

Second. Turn to the figure and locate the item number. Verify that the item is the one you are looking for.

**HOW TO LOCATE REPAIR PARTS - Continued**

3. When P/N Is Known.

First. If you have the P/N and not the NSN, look in the PART NUMBER column of the P/N index work package. Identify the figure and item number.

Second. Look up the item on the figure in the repair parts list work package.

**END OF WORK PACKAGE**

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT (1290-01-037-3883/1290-01-515-8260/1290-01-037-7289/1290-01-515-8262)

# M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT 11729530/13005101/11729525/13005102

**REPAIR PARTS LIST**

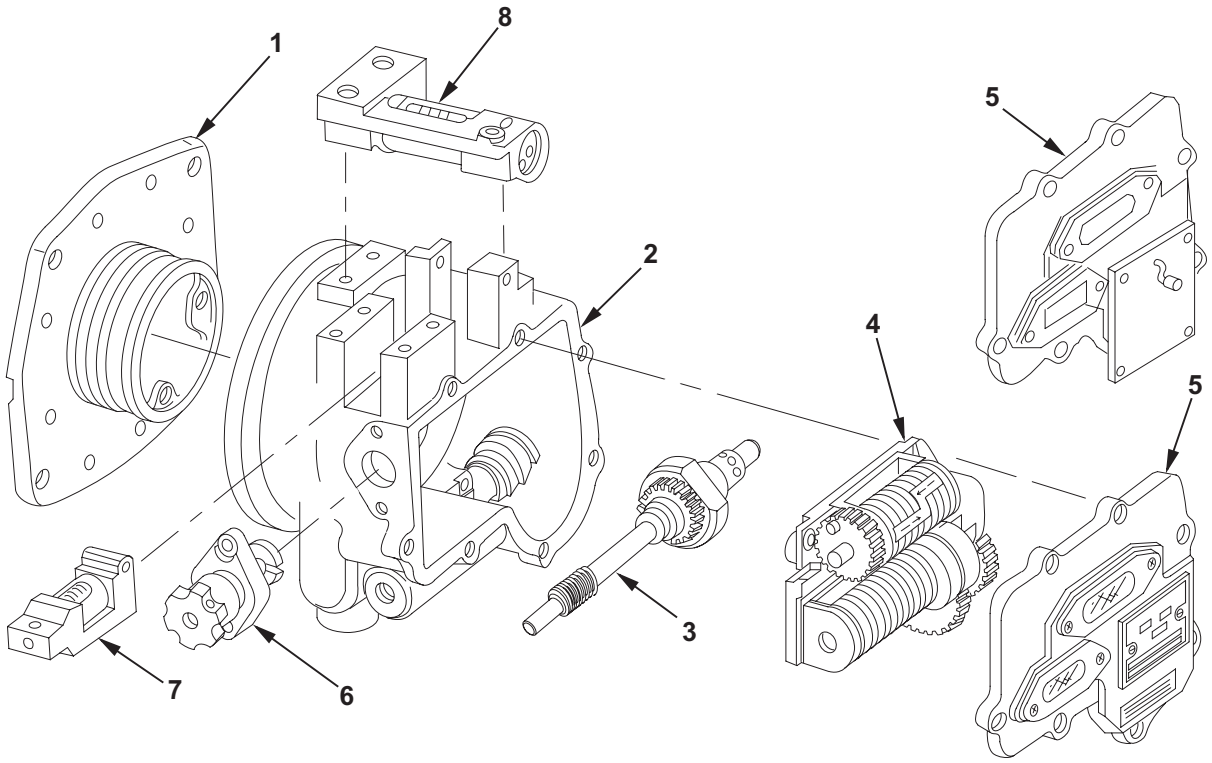



Figure 1. M17 Fire Control Quadrant, 11729530; M17A1 Fire Control Quadrant, 13005101; M18 Fire Control Quadrant, 11729525; and M18A1 Fire Control Quadrant, 13005102.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 1. QUADRANTS, FIRE CONTROL M17, PN 11729530; M18, PN 11729525; M17A1, PN 13005101; M18A1, PN 13005102 | |
| 1 | XAHZZ | | 19200 | 11729578 | BASE ASSEMBLY USED ON M17,M18, M17A1,M18A1..... | 1 |
| 2 | XAHZZ | | 19200 | 11729542 | HOUSING ASSEMBLY USED ON M17,M18, M17A1,M18A1..... | 1 |
| 3 | PAHZZ | 1290010449857 | 19200 | 11729546 | WORM SHAFT ASSEMBLY USED ON THE M17 AND M17A1..... UOC:BM3,F39 | 1 |
| 3 | PAHZZ | 1290010463777 | 19200 | 11729548 | WORM SHAFT ASSEMBLY USED ON THE M18 AND M18A1..... UOC:BM6,F40 | 1 |
| 4 | PAHHH | 1290010437490 | 19200 | 11729529 | COUNTER ASSEMBLY, ROTATING USED ON M17,M18,M17A1,M18A1 SEE FIG 6 FOR ASSY BREAKDOWN..... | 1 |
| 5 | XAHHA | | 19200 | 11729532 | COVER,ACCESS USED ON M17 AND M18 ONLY SEE FIG 5 FOR ASSY BREAKDOWN..... UOC:F39,F40 | 1 |
| 5 | PAHHD | 5340015176141 | 19200 | 13005079 | COVER,ACCESS USED ON M17A1,M18A1 ONLY SEE FIG 5 FOR ASSY BREAKDOWN..... UOC:BM3,BM6 | 1 |
| 6 | PAHZZ | 1290010437491 | 19200 | 11729543 | KNOB ASSEMBLY,CORRE CTION USED ON M17,M18,M17A1,M18A1..... | 1 |
| 7 | PCHHA | 1290010480193 | 19200 | 10554827 | LEVEL ASSEMBLY,FIRE CONTROL (ELEVATION LEVEL VIAL ASSY) USED ON M17 AND M18 ONLY SEE FIG 4 FOR ASSY BREAKDOWN..... UOC:F39,F40 | 1 |
| 7 | PAHHH | 1290015172169 | 19200 | 13005080 | LEVEL ASSEMBLY,FIRE CONTROL (ELEVATION LEVEL VIAL ASSY) USED ON M17A1,M18A1 ONLY SEE FIG 4 FOR ASSY BREAKDOWN..... UOC:BM3,BM6 | 1 |
| 8 | PCHHA | 1290010463687 | 19200 | 11729551 | LEVEL,FIRE CONTROL USED ON M18 (CROSS LEVEL VIAL ASSY) SEE FIG 7 FOR ASSY BREAKDOWN..... UOC:F40 | 1 |
| 8 | PADDD | 1290015172170 | 19200 | 13005081 | LEVEL,FIRE CONTROL CONTROL (CROSS LEVEL VIAL ASSY) USED ON M18A1 SEE FIG 7 FOR ASSY BREAKDOWN..... UOC:BM6 | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT (1290-01-037-3883/1290-01-515-8260/1290-01-037-7289/1290-01-515-8262)

# M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT 11729530/13005101/11729525/13005102 EXTERNAL PARTS

## REPAIR PARTS LIST

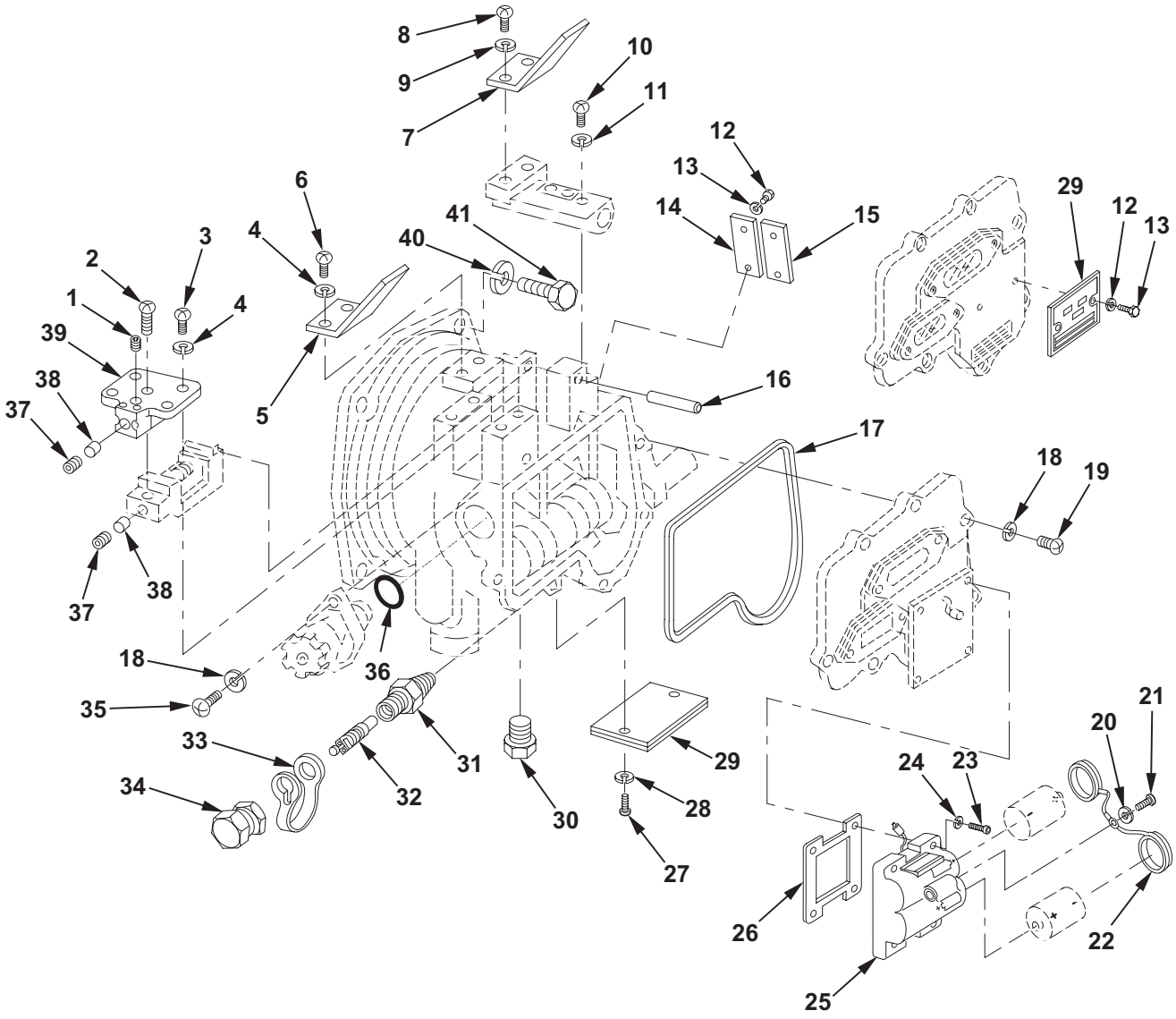



Figure 2. M17 Fire Control Quadrant, 11729530; M17A1 Fire Control Quadrant, 13005101; M18 Fire Control Quadrant, 11729525; and M18A1 Fire Control Quadrant, 13005102, External Parts.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 2. QUADRANTS, FIRE CONTROL M17, PN 11729530; M18, PN 11729525; M17A1, PN 13005101; M18A1, PN 13005102, EXTERNAL PARTS | |
| 1 | PAOZZ | 5305007243478 | 80205 | MS51031-37 | SETSCREW USED ON M17,M18,M17A1, M18A1..... | 1 |
| 2 | PAOZZ | 5305009127281 | 96906 | MS35276-247 | SCREW,MACHINE USED ON M17,M18, M17A1,M18A1..... | 1 |
| 3 | PAFZZ | 5305000546670 | 96906 | MS51957-45 | SCREW,MACHINE USED ON M17,M18, M17A1,M18A1..... | 4 |
| 4 | PAFZZ | 5310009338119 | 80205 | MS35338-137 | WASHER,LOCK USED ON M17,M18,M17A1, M18A1..... | 6 |
| 5 | PAFZZ | 1290010449858 | 19200 | 10556192 | REFLECTOR USED ON M17,M18,M17A1, M18A1..... | 1 |
| 6 | PAFZZ | 5305000546651 | 96906 | MS51957-27 | SCREW,MACHINE USED ON M17,M18, M17A1,M18A1..... | 2 |
| 7 | PAFZZ | 1290010446912 | 19200 | 10556191 | REFLECTOR USED ON M18,M18A1..... UOC:BM6,F40 | 1 |
| 8 | PAFZZ | 5305000546653 | 96906 | MS51957-29 | SCREW,MACHINE USED ON M18,M18A1.... UOC:BM6,F40 | 2 |
| 9 | PAFZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK USED ON M18,M18A1..... UOC:BM6,F40 | 2 |
| 10 | PAHZZ | 5305000546653 | 96906 | MS51957-29 | SCREW,MACHINE USED ON M18,M18A1.... UOC:BM6,F40 | 1 |
| 11 | PAHZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK USED ON M18,M18A1..... UOC:BM6,F40 | 1 |
| 12 | PAFZZ | 5305000545636 | 96906 | MS51957-2 | SCREW,MACHINE USED ON M17,M18..... UOC:F39,F40 | 4 |
| 13 | PAFZZ | 5310009282690 | 80205 | MS35338-134 | WASHER,LOCK USED ON M17,M18..... UOC:F39,F40 | 4 |
| 14 | PAFZZ | 9905002572751 | 19200 | 11729581 | PLATE,INSTRUCTION CURIES QTY LEVEL VIALS USED ON M17,M18..... UOC:F39,F40 | 1 |
| 15 | PAFZZ | 9905002572750 | 19200 | 11729582 | PLATE,INSTRUCTION CURIES QTY COUNTER USED ON M17,M18..... UOC:F39,F40 | 1 |
| 16 | PAFZZ | 5315008340745 | 96906 | MS16555-631 | PIN,STRAIGHT,HEADLE USED ON M17, M18,M17A1,M18A1..... | 1 |
| 17 | PAHZZ | 5331001498859 | 96906 | MS9021-046 | O-RING USED ON M17,M18,M17A1,M18A1. | 1 |
| 18 | PAHZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK USED ON M17,M18,M17A1, M18A1..... | 9 |
| 19 | PAHZZ | 5305000546654 | 96906 | MS51957-30 | SCREW,MACHINE USED ON M17,M18, M17A1,M18A1..... | 7 |
| 20 | PAOZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK USED ON M17A1,M18A1.... UOC:BM3,BM6 | 1 |
| 21 | PAOZZ | 5305000546650 | 96906 | MS51957-26 | SCREW,MACHINE USED ON M17A1,M18A1.. UOC:BM3,BM6 | 1 |
| 22 | PAOZZ | 5340014857535 | 19200 | 12984751 | STRAP,RETAINING USED ON M17A1,M18A1 UOC:BM3,BM6 | 1 |

| SECTION II | | TM9-1240-375-34&P | | | |
|---|---|---|---|---|---|
| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
| 23 | PAOZZ | 5305009591082 | 80205 | MS16995-18 | SCREW,MACHINE USED ON M17A1,M18A1.. UOC:BM3,BM6 | 4 |
| 24 | PAOZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK USED ON M17A1,M18A1.... UOC:BM3,BM6 | 4 |
| 25 | PAOZZ | 6160014857533 | 19200 | 12984725 | BATTERY BOX USED ON M17A1,M18A1.... UOC:BM3,BM6 | 1 |
| 26 | PAOZZ | 5330014858715 | 19200 | 12984723 | GASKET USED ON M17A1,M18A1..... UOC:BM3,BM6 | 1 |
| 27 | PAFZZ | 5305000545635 | 96906 | MS51957-1 | SCREW,MACHINE USED ON M17,M18, M17A1,M18A1..... | 2 |
| 28 | PAFZZ | 5310009282690 | 80205 | MS35338-134 | WASHER,LOCK USED ON M17,M18,M17A1, M18A1..... | 2 |
| 29 | PAFZZ | 9905010686443 | 19200 | 11729593 | PLATE,IDENTIFICATIO MODEL AND SERIAL NUMBER M17 ONLY..... UOC:F39 | 1 |
| 29 | PAFZZ | 9905010482788 | 19200 | 11729588 | PLATE,IDENTIFICATIO MODEL AND SERIAL NUMBER M18 ONLY..... UOC:F40 | 1 |
| 29 | PAFZZ | 9905015172173 | 19200 | 13005107 | PLATE,IDENTIFICATIO MODEL AND SERIAL NUMBER M17A1 ONLY..... UOC:BM3 | 1 |
| 29 | PAFZZ | 9905015172172 | 19200 | 13005108 | PLATE,IDENTIFICATIO MODEL AND SERIAL NUMBER M18A1 ONLY..... UOC:BM6 | 1 |
| 30 | PAFZZ | 4820012109568 | 19200 | 9360120 | VALVE,SAFETY RELIEF USED ON M17, M18,M17A1,M18A1..... | 1 |
| 31 | PAFZZ | 4820001141096 | 96906 | MS51607-1 | STEM,FLUID VALVE USED ON M17,M18, M17A1,M18A1..... | 1 |
| 32 | PAOZZ | 2640000603543 | 96906 | MS51377-2 | VALVE CORE..... | 1 |
| 33 | PAFZZ | 5340004644792 | 19200 | 10516567 | STRAP,RETAINING USED ON M17,M18, M17A1,M18A1..... | 1 |
| 34 | PAOZZ | 4820012350223 | 19200 | 8200055 | CAP,AIR VALVE USED ON M17,M18, M17A1,M18A1..... | 1 |
| 35 | PAHZZ | 5305000546652 | 96906 | MS51957-28 | SCREW,MACHINE USED ON M17,M18, M17A1,M18A1..... | 2 |
| 36 | PAHZZ | 5331005519573 | 81343 | AS3578-017 | O-RING USED ON M17,M18,M17A1,M18A1. | 1 |
| 37 | PAOZZ | 5305007243454 | 80205 | MS51031-35 | SETSCREW USED ON M17,M18,M17A1, M18A1..... | 2 |
| 38 | PAOZZ | 5340010463649 | 19200 | 10554828 | PAD,CUSHIONING USED ON M17,M18, M17A1,M18A1..... | 2 |
| 39 | PAFZZ | 1290010437476 | 19200 | 10554825 | PLATE,ADJUSTING USED ON M17,M18, M17A1,M18A1..... | 1 |
| 40 | PAOZZ | 5310009746623 | 80205 | MS35338-140 | WASHER,LOCK USED ON M17,M18,M17A1, M18A1..... | 4 |
| 41 | PAOZZ | 5306008174989 | 96906 | MS35307-333 | BOLT,MACHINE USED ON M17,M17A1..... UOC:BM3,F39 | 4 |
| 41 | PAOZZ | 5306006387719 | 80205 | MS35308-333 | BOLT,MACHINE USED ON M18,M18A1..... UOC:BM6,F40 | 4 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT (1290-01-037-3883/1290-01-515-8260/1290-01-037-7289/1290-01-515-8262)

# M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT 11729530/13005101/11729525/13005102 INTERNAL PARTS

**REPAIR PARTS LIST**

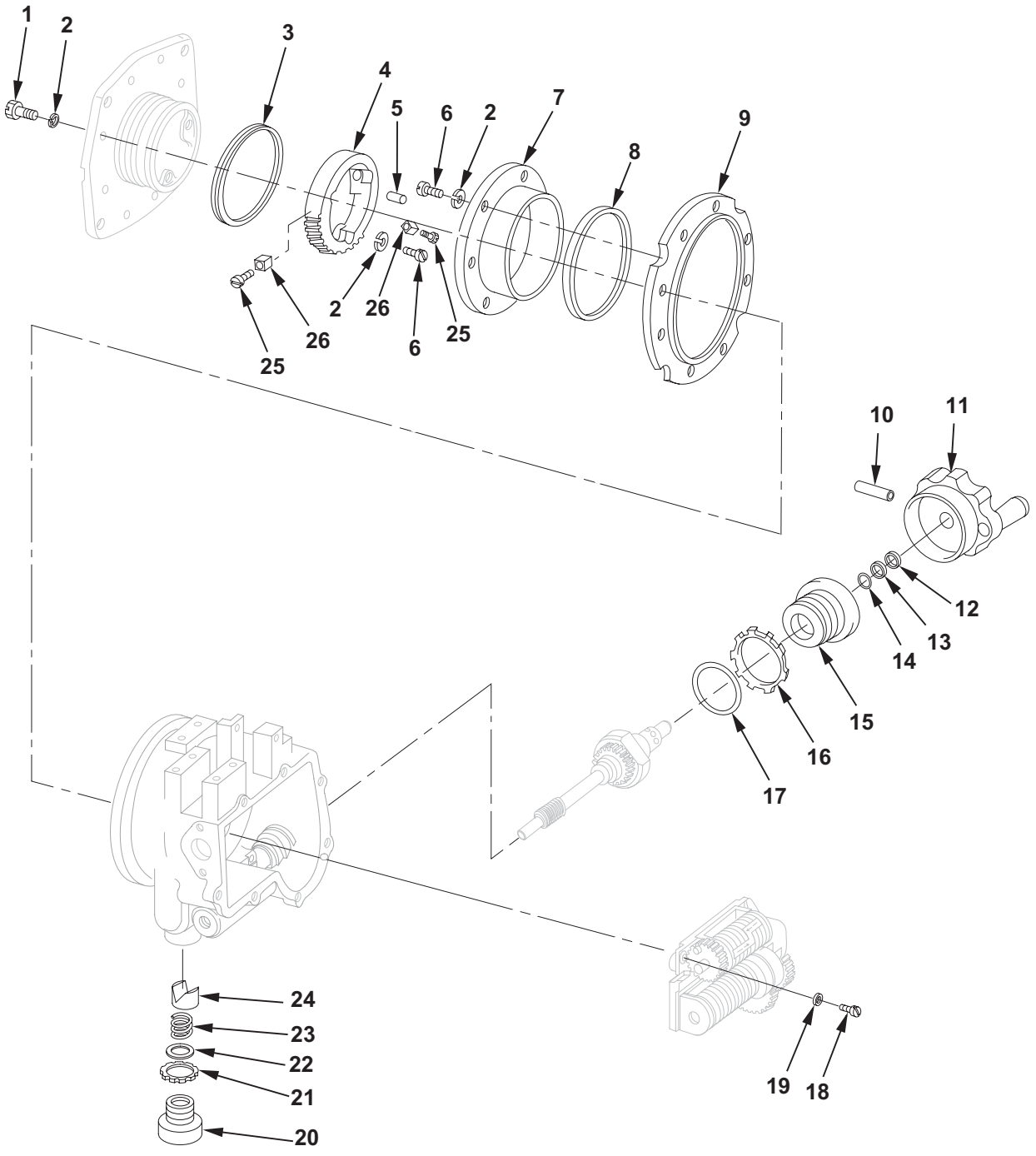



Figure 3. M17 Fire Control Quadrant, 11729530; M17A1 Fire Control Quadrant, 13005101; M18 Fire Control Quadrant, 11729525; and M18A1 Fire Control Quadrant, 13005102, Internal Parts.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 3. QUADRANTS, FIRE CONTROL M17, PN 11729530; M18, PN 11729525; M17A1, PN 13005101; M18A1, PN 13005102, INTERNAL PARTS | |
| 1 | PADZZ | 5305007015061 | 96906 | MS51958-45 | SCREW,MACHINE USED ON M17,M18, M17A1,M18A1..... | 8 |
| 2 | PADZZ | 5310009338119 | 80205 | MS35338-137 | WASHER,LOCK USED ON M17,M18,M17A1, M18A1..... | 17 |
| 3 | PADZZ | 5330013416762 | 19200 | 9360585 | SEAL,PLAIN USED ON M17,M18,M17A1, M18A1..... | 1 |
| 4 | XADZZ | | 19200 | 11729536 | GEAR SECTOR,WORM WHEEL USED ON M17,M17A1..... UOC:BM3,F39 | 1 |
| 4 | XADZZ | | 19200 | 11729535 | GEAR SECTOR,WORM WHEEL USED ON M18,M18A1..... UOC:BM6,F40 | 1 |
| 5 | PADZZ | 5315006821727 | 80205 | MS16555-625 | PIN,STRAIGHT,HEADLE USED ON M17, M18,M17A1,M18A1..... | 1 |
| 6 | PADZZ | 5305000546668 | 96906 | MS51957-43 | SCREW,MACHINE USED ON M17,M18, M17A1,M18A1..... | 9 |
| 7 | XADZZ | | 19200 | 11729553 | INSERT,HOUSING USED ON M17,M18, M17A1,M18A1..... | 1 |
| 8 | XADZZ | | 96906 | MS29513-044 | O-RING USED ON M17,M18,M17A1,M18A1. | 1 |
| 9 | XADZZ | | 19200 | 11729552 | RING USED ON M17,M18,M17A1,M18A1... | 1 |
| 10 | PAHZZ | 5315008340745 | 96906 | MS16555-631 | PIN,STRAIGHT,HEADLE USED ON M17, M18,M17A1,M18A1..... | 1 |
| 11 | PAHZZ | 5355010470490 | 19200 | 11729580 | KNOB USED ON M17,M18,M17A1,M18A1... | 1 |
| 12 | PAHZZ | 5310010470433 | 19200 | 11741635 | WASHER,SPRING TENSI USED ON M17, M18,M17A1,M18A1..... | 1 |
| 13 | PAHZZ | 5330010501549 | 19200 | 11741636 | RETAINER,PACKING USED ON M17,M18, M17A1,M18A1..... | 1 |
| 14 | PAHZZ | 5331002483836 | 81343 | MS29513-12 | O-RING USED ON M17,M18,M17A1,M18A1. | 1 |
| 15 | PAHZZ | 1290010437493 | 19200 | 11729540 | RETAINER,ELEVATION USED ON M17,M18, M17A1,M18A1..... | 1 |
| 16 | PAHZZ | 5310010459594 | 19200 | 11729586 | WASHER,KEY USED ON M17,M18,M17A1, M18A1..... | 1 |
| 17 | PAHZZ | 5331005506617 | 81343 | AS3578-221 | O-RING USED ON M17,M18,M17A1,M18A1. | 1 |
| 18 | PAHZZ | 5305000546652 | 96906 | MS51957-28 | SCREW,MACHINE USED ON M17,M18, M17A1,M18A1..... | 3 |
| 19 | PAHZZ | 5310009338118 | 80205 | MS35338-135 | WASHER,LOCK USED ON M17,M18,M17A1, M18A1..... | 3 |
| 20 | PAHZZ | 1290010437494 | 19200 | 11729558 | RETAINER,SPRING PLU USED ON M17, M18,M17A1,M18A1..... | 1 |
| 21 | PAHZZ | 5310010459595 | 19200 | 11729587 | WASHER,KEY USED ON M17,M18,M17A1, M18A1..... | 1 |
| 22 | PAHZZ | 5331005582310 | 81343 | AS3578-013 | O-RING USED ON M17,M18,M17A1,M18A1. | 1 |
| 23 | PAHZZ | 5360009789584 | 19200 | 8587557 | SPRING,HELICAL,COMP USED ON M17, M18,M17A1,M18A1..... | 1 |
| 24 | PAHZZ | 3120009837313 | 19200 | 8215750 | BEARING,V USED ON M17,M18,M17A1, M18A1..... | 1 |
| 25 | PADZZ | 5305000545647 | 96906 | MS51957-13 | SCREW,MACHINE USED ON M17,M18, M17A1,M18A1..... | 2 |

| SECTION II | | TM9-1240-375-34&P | | | |
|---|---|---|---|---|---|
| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
| 26 | PADZZ | 1290010449856 | 19200 | 11746330 | STOP,SECTOR GEAR USED ON M17,M18, M17A1,M18A1..... | 2 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT (1290-01-037-3883/1290-01-515-8260/1290-01-037-7289/1290-01-515-8262)

## FIRE CONTROL LEVEL ASSEMBLY (ELEVATION LEVEL VIAL ASSEMBLY) 10554827/13005080

**REPAIR PARTS LIST**

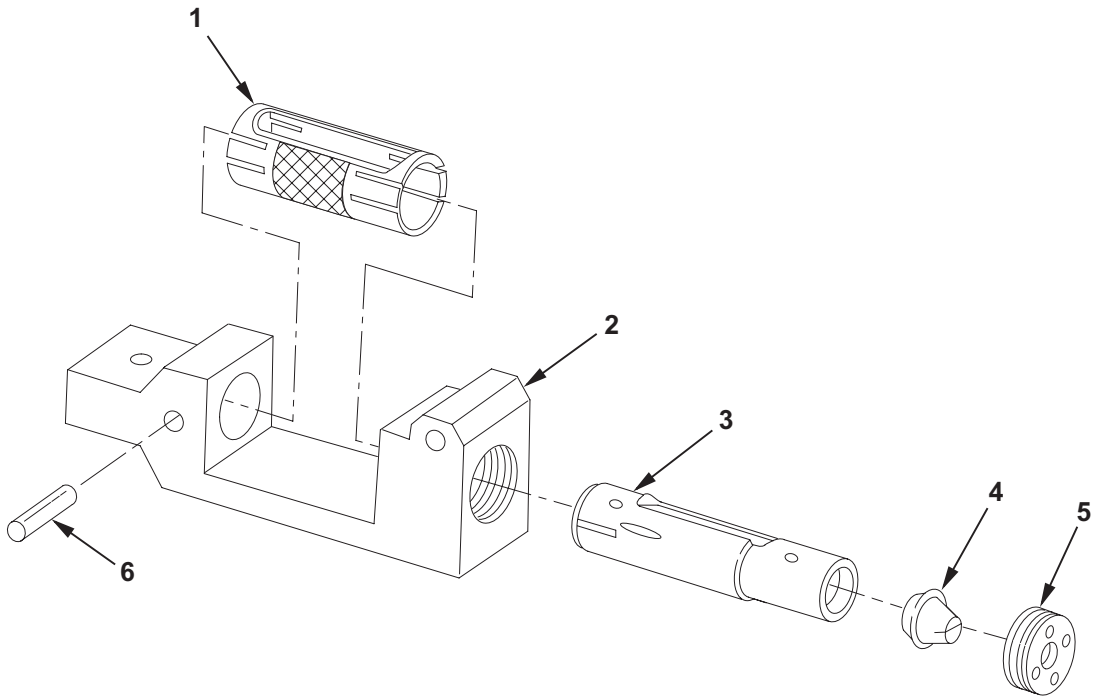



Figure 4. Fire Control Level Assembly (Elevation Level Vial Assembly), 10554827/13005080.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 4. LEVEL ASSEMBLY, FIRE CONTROL (ELEVATION LEVEL VIAL ASSY) M17 AND M18 PN 10554827; M17A1 AND M18A1 PN 13005080 | |
| 1 | PAHZZ | 5340007597626 | 19200 | 7597626 | COVER,ACCESS USED ON M17,M18,M17A1, M18A1..... | 1 |
| 2 | XAHZZ | | 19200 | 10554826 | HOLDER,LEVEL VIAL USED ON M17,M18, M17A1,M18A1..... | 1 |
| 3 | PCHZA | 1290002572769 | 19200 | 11729512 | LEVEL,FIRE CONTROL USED ON M17,M18. UOC:F39,F40 | 1 |
| 3 | PAHZZ | 1290006921493 | 19200 | 8202183 | LEVEL,FIRE CONTROL USED ON M17A1, M18A1..... UOC:BM3,BM6 | 1 |
| 4 | PAFZZ | 5365008962251 | 19200 | 8202177 | BUSHING,ECCENTRIC USED ON M17,M18, M17A1,M18A1..... | 1 |
| 5 | PAFZZ | 5365006921492 | 19200 | 8202181 | RING,EXTERNALLY THR USED ON M17, M18,M17A1,M18A1..... | 1 |
| 6 | PAHZZ | 5315008170889 | 96906 | MS16555-601 | PIN,STRAIGHT,HEADLE USED ON M17, M18,M17A1,M18A1..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT**
**(1290-01-037-3883/1290-01-515-8260/1290-01-037-7289/1290-01-515-8262)**

**ACCESS COVER**
**11729532/13005079**

**REPAIR PARTS LIST**

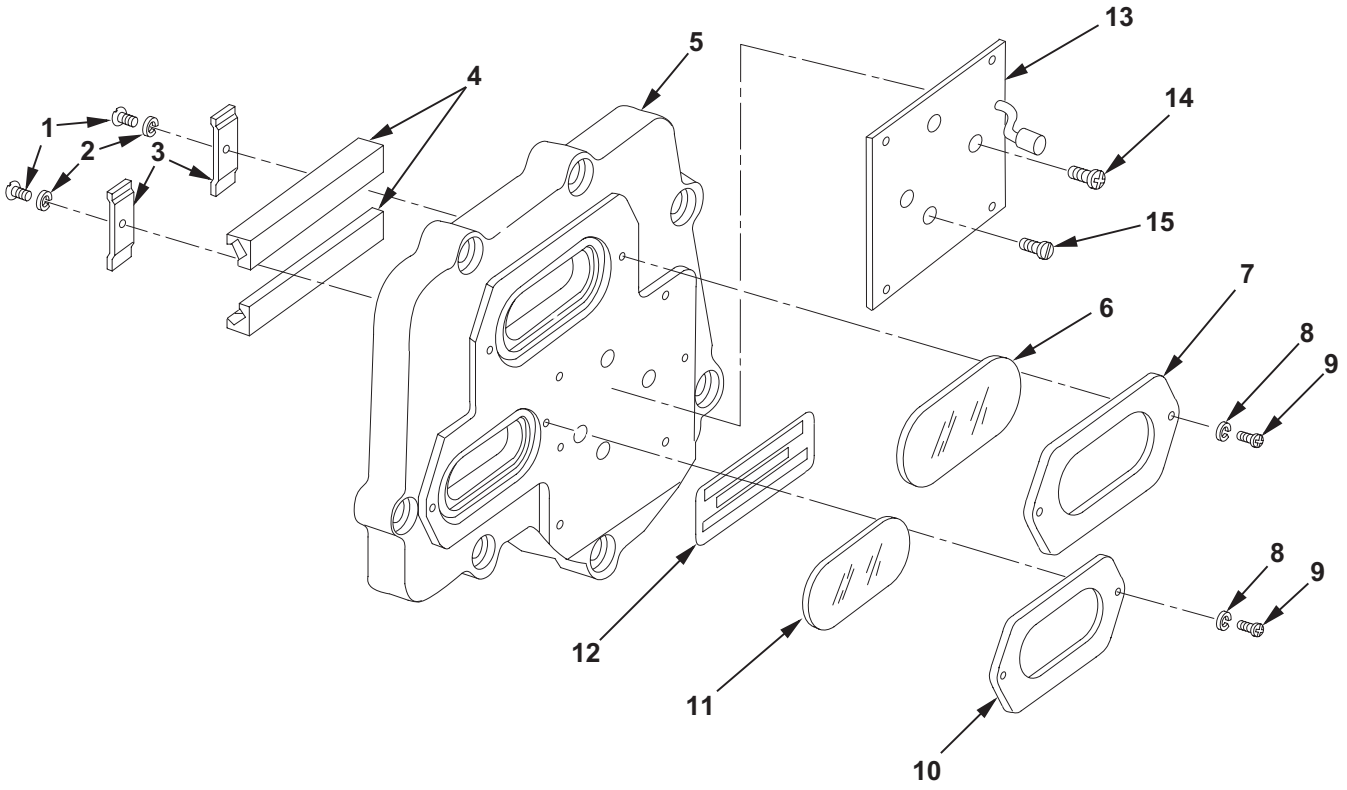



Figure 5. Access Cover, 11729532/13005079.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 5. COVER, ACCESS M17 AND M18 PN 11729532; M17A1 AND M18A1 PN 13005079 | |
| 1 | PADZZ | 5305000545636 | 96906 | MS51957-2 | SCREW,MACHINE USED ON M17,M18..... UOC:F39,F40 | 4 |
| 2 | PADZZ | 5310009282690 | 80205 | MS35338-134 | WASHER,LOCK USED ON M17,M18..... UOC:F39,F40 | 4 |
| 3 | XDDZZ | | 19200 | 11729570 | CLAMP,BRIDGE USED ON M17,M18..... UOC:F39,F40 | 4 |
| 4 | PCDZA | 6240010438209 | 19200 | 11729559 | LAMP,NUCLEAR,ASSEMB USED ON M17,M18 UOC:F39,F40 | 4 |
| 5 | XAHZZ | | 19200 | 11729528 | COVER,QUADRANT USED ON M17,M18, M17A1,M18A1..... | 1 |
| 6 | PAHZZ | 6650000664999 | 19200 | 8626400 | WINDOW,OPTICAL INST USED ON M17, M18,M17A1,M18A1..... | 1 |
| 7 | XAHZZ | | 19200 | 11729556 | PLATE,WINDOW USED ON M17,M18,M17A1, M18A1..... | 1 |
| 8 | PAHZZ | 5310009282690 | 80205 | MS35338-134 | WASHER,LOCK USED ON M17,M18,M17A1, M18A1..... | 4 |
| 9 | PAHZZ | 5305000545636 | 96906 | MS51957-2 | SCREW,MACHINE USED ON M17,M18, M17A1,M18A1..... | 4 |
| 10 | XAHZZ | | 19200 | 11729557 | PLATE,WINDOW USED ON M17,M18,M17A1, M18A1..... | 1 |
| 11 | PAHZZ | 6650000664998 | 19200 | 8626399 | WINDOW,OPTICAL INST USED ON M17, M18,M17A1,M18A1..... | 1 |
| 12 | PAOZZ | 7690002572746 | 19200 | 11731011 | DECAL RADIOACTIVE INSTRUMENT DISPOSAL M17,M18..... UOC:F39,F40 | 1 |
| 13 | PADZZ | 5340015221643 | 19200 | 12984757 | PLATE,MOUNTING USED ON M17A1,M18A1. UOC:BM3,BM6 | 1 |
| 14 | PADZZ | 5305007640066 | 96906 | MS51959-44 | SCREW,MACHINE USED ON M17A1,M18A1.. UOC:BM3,BM6 | 3 |
| 15 | PAHZZ | 5340015220777 | 19200 | 12984828 | PLUG,PROTECTIVE,DUS T AND MOISTURE SEAL USED ON M17A1,M18A1..... UOC:BM3,BM6 | 1 |

END OF FIGURE

# DIRECT SUPPORT AND GENERAL SUPPORT

# M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT
# (1290-01-037-3883/1290-01-515-8260/1290-01-037-7289/1290-01-515-8262)

# COUNTER ASSEMBLY
# 11729529

# REPAIR PARTS LIST

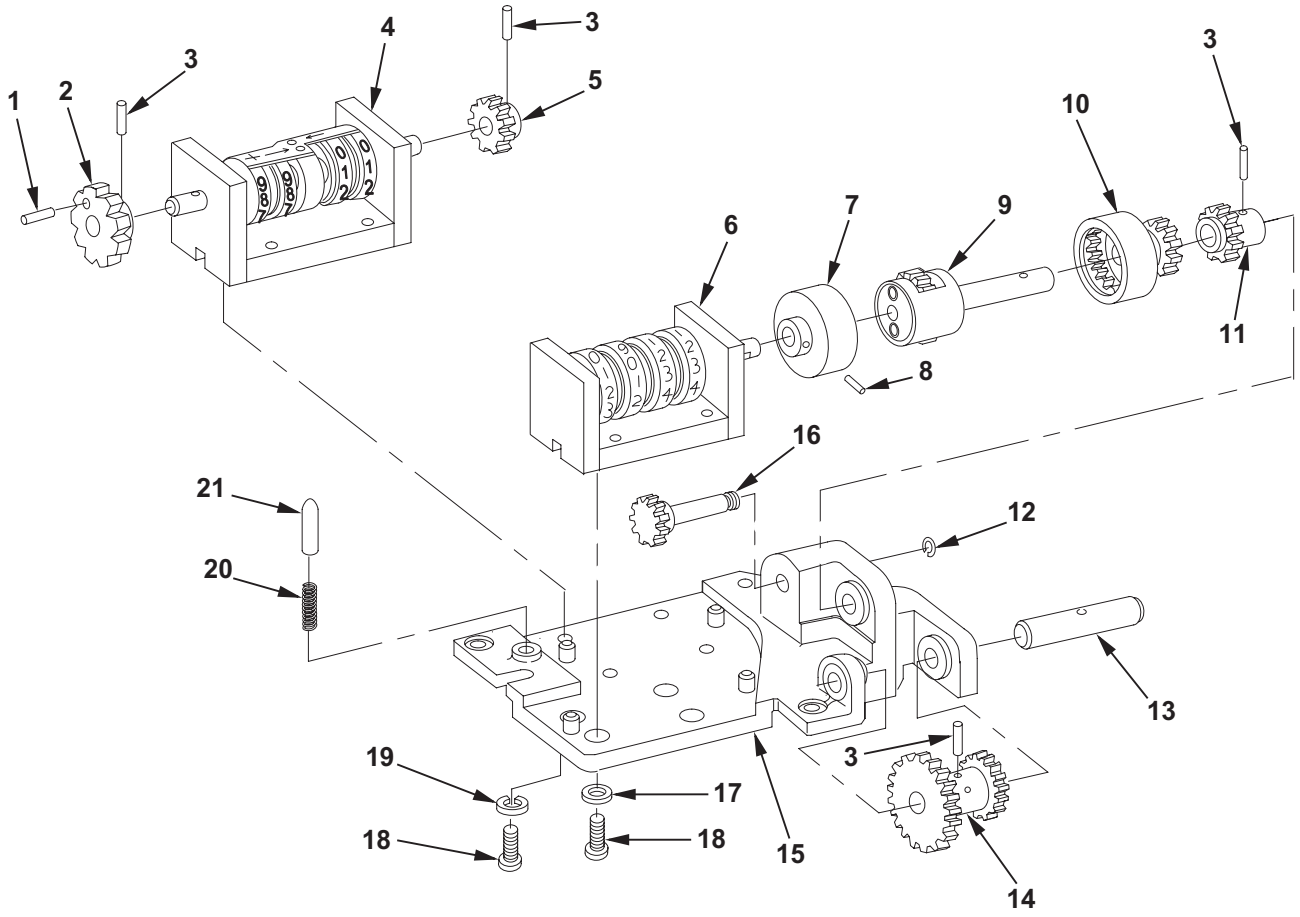



Figure 6. Counter Assembly, 11729529.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 6. COUNTER ASSEMBLY, CORRECTION M17, M18, M17A1, M18A1 PN 11729529 | |
| 1 | PAHZZ | 5315006821726 | 96906 | MS16555-617 | PIN,STRAIGHT,HEADLE USED ON M17, M18,M17A1,M18A1..... | 1 |
| 2 | PAHZZ | 1290010437499 | 19200 | 11729561 | DETENT,COUNTER USED ON M17,M18, M17A1,M18A1..... | 1 |
| 3 | PAHZZ | 5315008067039 | 96906 | MS16555-604 | PIN,STRAIGHT,HEADLE USED ON M17, M18,M17A1,M18A1..... | 4 |
| 4 | PAHZZ | 6680010507647 | 19200 | 11748021 | COUNTER,ROTATING USED ON M17,M18, M17A1,M18A1..... | 1 |
| 5 | PAHZZ | 3020010453970 | 19200 | 11729576 | GEAR,SPUR USED ON M17,M18,M17A1, M18A1..... | 1 |
| 6 | PAHZZ | 6680010495151 | 19200 | 11729591 | COUNTER,ROTATING USED ON M17,M18, M17A1,M18A1..... | 1 |
| 7 | PAHZZ | 3020010479114 | 19200 | 11729554 | GEAR,INTERNAL USED ON M17,M18, M17A1,M18A1..... | 1 |
| 8 | PAHZZ | 5315006231761 | 80205 | MS51923-159 | PIN,SPRING USED ON M17,M18,M17A1, M18A1..... | 1 |
| 9 | PAHZZ | 1290010449859 | 19200 | 11729544 | SPIDER ASSEMBLY USED ON M17,M18, M17A1,M18A1..... | 1 |
| 10 | PAHZZ | 3020010495234 | 19200 | 11729555 | GEAR CLUSTER USED ON M17,M18,M17A1, M18A1..... | 1 |
| 11 | PAHZZ | 3020010486275 | 19200 | 11729575 | GEAR,SPUR USED ON M17,M18,M17A1, M18A1..... | 1 |
| 12 | PAHZZ | 5325005981840 | 96906 | MS16633-4015 | RING,RETAINING USED ON M17,M18, M17A1,M18A1..... | 1 |
| 13 | PAHZZ | 5315010457806 | 19200 | 11729589 | PIN,STRAIGHT,HEADLE USED ON M17, M18,M17A1,M18A1..... | 1 |
| 14 | PAHZZ | 3020010479116 | 19200 | 11729574 | GEAR CLUSTER USED ON M17,M18,M17A1, M18A1..... | 1 |
| 15 | XAHZZ | | 19200 | 11729560 | SUPPORT USED ON M17,M18,M17A1,M18A1 | 1 |
| 16 | PAHZZ | 3040010483741 | 19200 | 11729577 | GEARSHAFT,SPUR USED ON M17,M18, M17A1,M18A1..... | 1 |
| 17 | PAHZZ | 5310005505009 | 80205 | MS15795-704 | WASHER,FLAT USED ON M17,M18,M17A1, M18A1..... | 4 |
| 18 | PAHZZ | 5305000545649 | 96906 | MS51957-15 | SCREW,MACHINE USED ON M17,M18, M17A1,M18A1..... | 8 |
| 19 | PAHZZ | 5310009338118 | 80205 | MS35338-135 | WASHER,LOCK USED ON M17,M18,M17A1, M18A1..... | 4 |
| 20 | PAHZZ | 5360010465865 | 19200 | 11729598 | SPRING,HELICAL,COMP USED ON M17, M18,M17A1,M18A1..... | 1 |
| 21 | PAHZZ | 5340010437511 | 19200 | 11729572 | PLUNGER,DETENT USED ON M17,M18, M17A1,M18A1..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M17/M17A1/M18/M18A1 FIRE CONTROL QUADRANT (1290-01-037-3883/1290-01-515-8260/1290-01-037-7289/1290-01-515-8262)

## FIRE CONTROL LEVEL ASSEMBLY (CROSS LEVEL VIAL ASSEMBLY) 11729551/13005081

**REPAIR PARTS LIST**

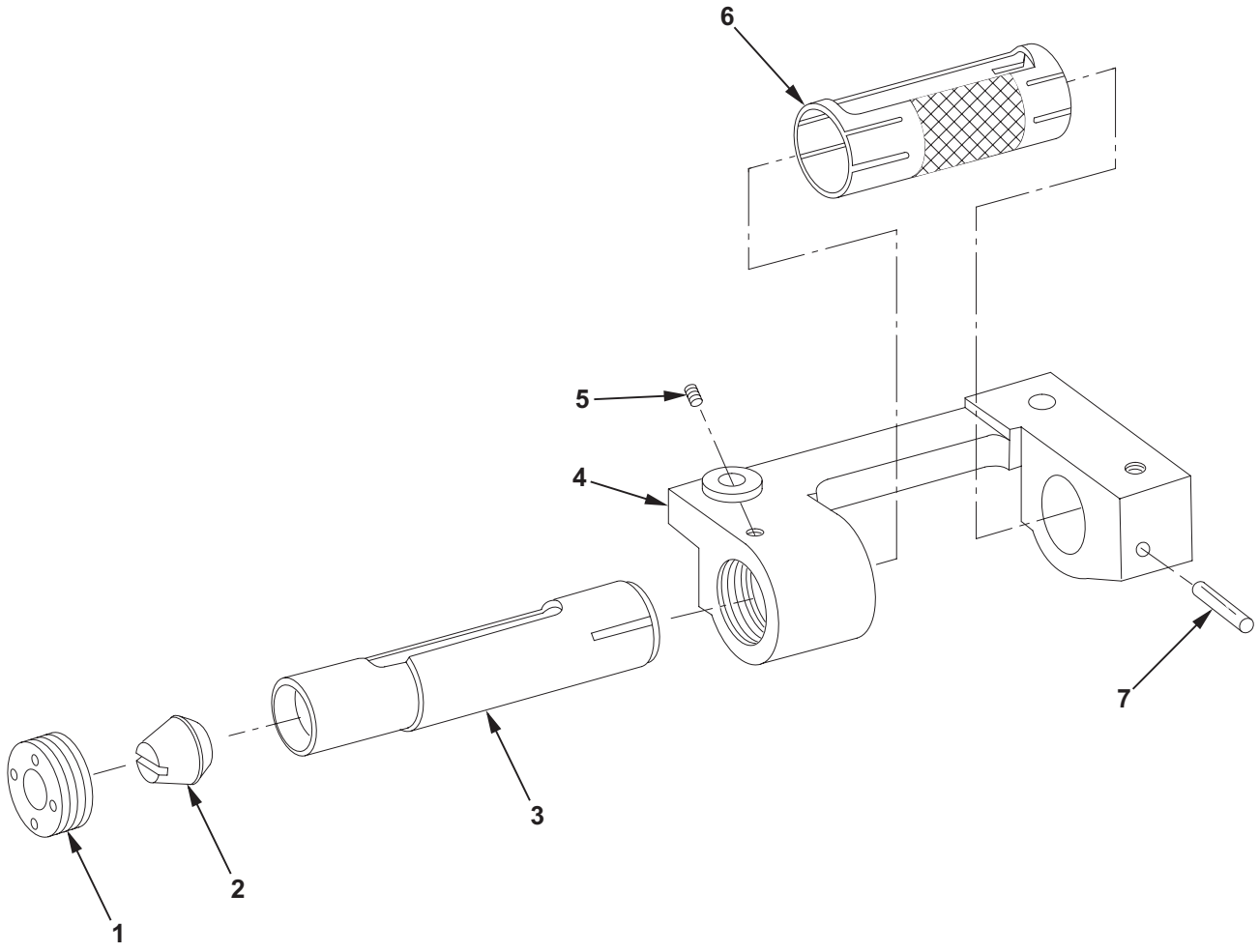



Figure 7. Fire Control Level Assembly (Cross Level Vial Assembly), 11729551/13005081.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 7. LEVEL ASSEMBLY, FIRE CONTROL (CROSS LEVEL VIAL ASSY) M18 PN 11729551, M18A1 PN 13005081 | |
| 1 | PAHZZ | 5365006921492 | 19200 | 8202181 | RING,EXTERNALLY THR USED ON M18, M18A1..... UOC:BM6,F40 | 1 |
| 2 | PAHZZ | 5365008962251 | 19200 | 8202177 | BUSHING,ECCENTRIC USED ON M18,M18A1 UOC:BM6,F40 | 1 |
| 3 | PCHZA | 1290002572769 | 19200 | 11729512 | LEVEL,FIRE CONTROL USED ON M18 ONLY UOC:F40 | 1 |
| 3 | PAHZZ | 1290006921493 | 19200 | 8202183 | LEVEL,FIRE CONTROL USED ON M18A1 ONLY..... UOC:BM6 | 1 |
| 4 | XADZZ | | 19200 | 11729538 | BRACKET,VIAL USED ON M18,M18A1..... UOC:BM6,F40 | 1 |
| 5 | PAHZZ | 5305007176955 | 96906 | MS51963-1 | SETSCREW USED ON M18,M18A1..... UOC:BM6,F40 | 1 |
| 6 | PAHZZ | 5340007597626 | 19200 | 7597626 | COVER,ACCESS USED ON M18,M18A1..... UOC:BM6,F40 | 1 |
| 7 | PAHZZ | 5315008067039 | 96906 | MS16555-604 | PIN,STRAIGHT,HEADLE USED ON M18, M18A1..... UOC:BM6,F40 | 1 |
| | | | | | END OF FIGURE | |

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M171/M171A1 TELESCOPE AND QUADRANT MOUNT (1240-01-039-7273/1240-01-515-8265)

# M171/M171A1 TELESCOPE AND QUADRANT MOUNT 11727800/13005103

**REPAIR PARTS LIST**

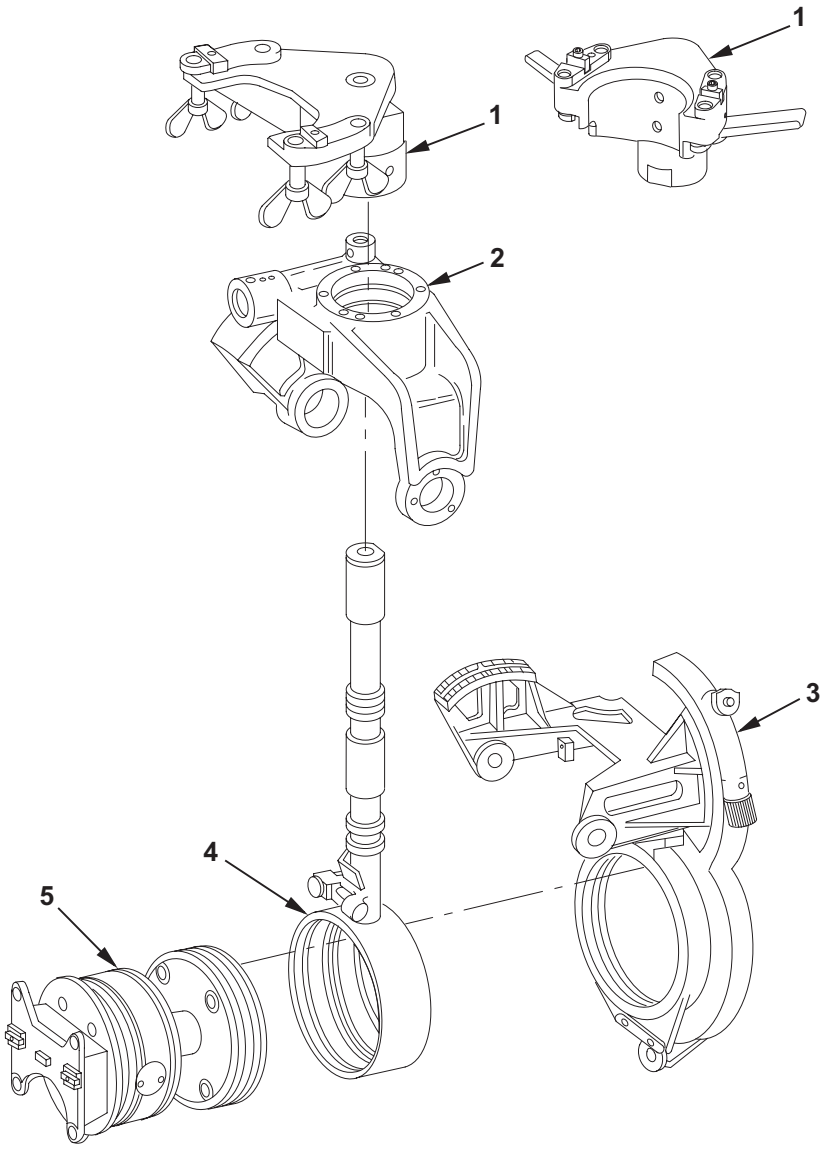



Figure 8. M171 Telescope and Quadrant Mount, 11727800, and M171A1 Telescope and Quadrant Mount, 13005103.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 8. MOUNT, TELESCOPE AND QUADRANT, M171, PN 11727800, M171A1, PN 13005103 | |
| 1 | PAHHH | 1240015210009 | 19200 | 13005037 | SUPPORT,OPTICAL INS TRUMENT M171A1 | |
| | | | | | SEE FIG 12 FOR BREAKDOWN..... | 1 |
| | | | | | UOC:BM4 | |
| 1 | PAHHD | 1240010449852 | 19200 | 11727822 | SUPPORT,OPTICAL INS TRUMENT M171 | |
| | | | | | SEE FIG 12 FOR BREAKDOWN..... | 1 |
| | | | | | UOC:F44 | |
| 2 | XDHHH | | 19200 | 11727801 | ROCKER ASSEMBLY,OPT ICAL INSTRUMENT M171 AND M171A1 | |
| | | | | | SEE FIG 13 FOR BREAKDOWN..... | 1 |
| 3 | XAHHH | | 19200 | 11727804 | HOUSING ASSEMBLY M171 AND M171A1 | |
| | | | | | SEE FIG 14 FOR BREAKDOWN..... | 1 |
| 4 | PAHDD | 3130015179273 | 19200 | 13005082 | BEARING UNIT,BALL M171A1 | |
| | | | | | SEE FIG 17 FOR BREAKDOWN..... | 1 |
| | | | | | UOC:BM4 | |
| 4 | PAHDD | 3130014973341 | 19200 | 11727802 | BEARING UNIT,BALL M171 | |
| | | | | | SEE FIG 17 FOR BREAKDOWN..... | 1 |
| | | | | | UOC:F44 | |
| 5 | PAHDD | 1240014989029 | 19200 | 11727824 | MOUNT SUBASSEMBLY M171 AND M171A1 | |
| | | | | | SEE FIG 15 FOR BREAKDOWN..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M171/M171A1 TELESCOPE AND QUADRANT MOUNT (1240-01-039-7273/1240-01-515-8265)

# M171/M171A1 TELESCOPE AND QUADRANT MOUNT 11727800/13005103 UPPER INTERNAL MOUNT PARTS

**REPAIR PARTS LIST**

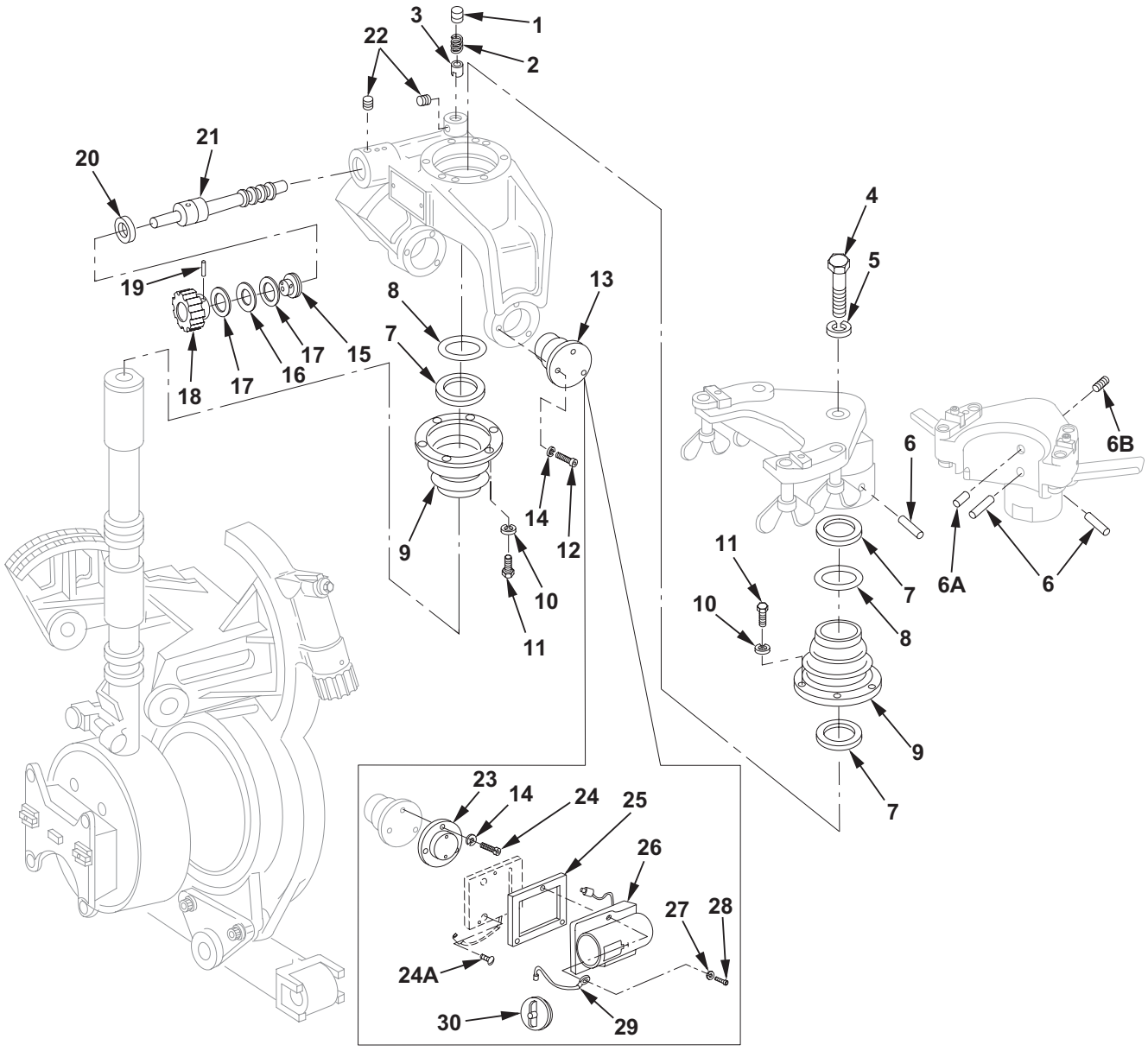



Figure 9. M171 Telescope and Quadrant Mount, 11727800, and M171A1 Telescope and Quadrant Mount, 13005103, Upper Internal Mount Parts.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 9. MOUNT, TELESCOPE AND QUADRANT, M171, PN 11727800, M171A1, PN 13005103, UPPER INTERNAL MOUNT PARTS | |
| 1 | PAHZZ | 5365010506765 | 19200 | 11727887 | PLUG,MACHINE THREAD USED ON M171 AND M171A1 | 1 |
| 2 | PAHZZ | 5360009789584 | 19200 | 8587557 | SPRING,HELICAL,COMP USED ON M171 AND M171A1 | 1 |
| 3 | PAHZZ | 3120010506190 | 19200 | 11727886 | BEARING,V USED ON M171 AND M171A1 | 1 |
| 4 | PAHZZ | 5305011167366 | 96906 | MS51099-115 | SCREW,CAP,HEXAGON H USED ON M171 ONLY<br>UOC:F44 | 1 |
| 5 | PAHZZ | 5310009338778 | 80205 | MS35338-143 | WASHER,LOCK USED ON M171 ONLY<br>UOC:F44 | 1 |
| 6 | PAHZZ | 5315001880240 | 80205 | MS24692-339 | PIN,TAPERED,PLAIN USED ON M171 ONLY<br>UOC:F44 | 1 |
| 6 | PAHZZ | 5315015179274 | 19200 | 12999465 | PIN,TAPERED,PLAIN USED ON M171A1 ONLY<br>UOC:BM4 | 2 |
| 6A | PAHZZ | 5315013362450 | 81349 | M21143/1-50 | PIN,STRAIGHT,HEADLE USED ON M171A1 OPTICAL SUPPORT<br>UOC:BM4 | 1 |
| 6B | PAHZZ | 5305012065456 | 80205 | MS18064-91 | SETSCREW USED ON M171A1 OPTICAL SUPPORT<br>UOC:BM4 | 1 |
| 7 | PAHZZ | 5325010540133 | 96906 | MS90708-4150 | RING,RETAINING USED ON M171 AND M171A1 | 3 |
| 8 | PAHZZ | 5330010491290 | 19200 | 11727871-1 | SEAL,PLAIN ENCASED USED ON M171 AND M171A1 | 2 |
| 9 | PAHZZ | 9390010519545 | 19200 | 11727844 | BELLOWS,PROTECTION USED ON M171 AND M171A1 | 2 |
| 10 | PAHZZ | 5310009338119 | 80205 | MS35338-137 | WASHER,LOCK USED ON M171 AND M171A1 | 12 |
| 11 | PAHZZ | 5305009226286 | 80205 | MS35275-228 | SCREW,MACHINE USED ON M171 AND M171A1 | 12 |
| 12 | PAHZZ | 5305009954659 | 96906 | MS24674-14 | SCREW,CAP,SOCKET HE USED ON M171 ONLY | 6 |
| 13 | PAHZZ | 5315010530237 | 19200 | 11727868 | PIN,SHOULDER,HEADED USED ON M171 AND M171A1 | 2 |
| 14 | PAHZZ | 5310009338120 | 80205 | MS35338-138 | WASHER,LOCK USED ON M171 AND M171A1 | 6 |
| 15 | PAHZZ | 5365010465869 | 19200 | 11727882 | RING,EXTERNALLY THR USED ON M171 AND M171A1 | 1 |
| 16 | PAHZZ | 5330010444883 | 19200 | 11727883 | FELT,MECHANICAL,PRE USED ON M171 AND M171A1 | 1 |
| 17 | PAHZZ | 5310010499175 | 19200 | 11727884 | WASHER,FLAT USED ON M171 AND M171A1 | 2 |
| 18 | PAHZZ | 5355010460732 | 19200 | 11727885 | KNOB USED ON M171 AND M171A1 | 1 |
| 19 | PAHZZ | 5315008100505 | 80205 | MS16555-628 | PIN,STRAIGHT,HEADLE USED ON M171 AND M171A1 | 1 |
| 20 | PAHZZ | 3120010501574 | 19200 | 11727880 | BEARING,PLAIN,SPHER USED ON M171 AND M171A1 | 1 |
| 21 | PAHZZ | 1240010439459 | 19200 | 13005085 | WORM SHAFT ASSEMBLY USED ON M171 AND M171A1 | 1 |

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| 22 | PAHZZ | 5305002813120 | 96906 | MS51023-48 | SETSCREW USED ON M171 AND M171A1... | 2 |
| 23 | PAHZZ | 5365015178451 | 19200 | 12984744 | SPACER,PLATE USED ON M171A1 ONLY... UOC:BM4 | 1 |
| 24 | PAHZZ | 5305000679917 | 96906 | MS24674-15 | SCREW,CAP,SOCKET HE USED ON M171A1 ONLY..... UOC:BM4 | 6 |
| 24A | PAOZZ | 5305007640068 | 80205 | MS51959-45 | SCREW,MACHINE USED ON M171A1 ONLY.. UOC:BM4 | 2 |
| 25 | PAOZZ | 5330014853480 | 11934 | SLB10377 | GASKET USED ON M171A1 ONLY..... UOC:BM4 | 1 |
| 26 | PAOZZ | 6160014851914 | 19200 | 12984693 | COVER,BATTERY BOX USED ON M171A1 ONLY..... UOC:BM4 | 1 |
| 27 | PAOZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK USED ON M171A1 ONLY.... UOC:BM4 | 3 |
| 28 | PAOZZ | 5305009591082 | 80205 | MS16995-18 | SCREW,MACHINE USED ON M171A1 ONLY.. UOC:BM4 | 3 |
| 29 | PAOZZ | 4010014643142 | 19200 | 12984664 | WIRE ROPE ASSEMBLY, USED ON M171A1 ONLY..... UOC:BM4 | 1 |
| 30 | PAOZZ | 5340014643141 | 19200 | 12984661 | CAP-PLUG,PROTECTIVE DUST AND MOISTURE SEAL USED ON M171A1 ONLY..... UOC:BM4 | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M171/M171A1 TELESCOPE AND QUADRANT MOUNT (1240-01-039-7273/1240-01-515-8265)

# M171/M171A1 TELESCOPE AND QUADRANT MOUNT 11727800/13005103 LOWER INTERNAL MOUNT PARTS

**REPAIR PARTS LIST**

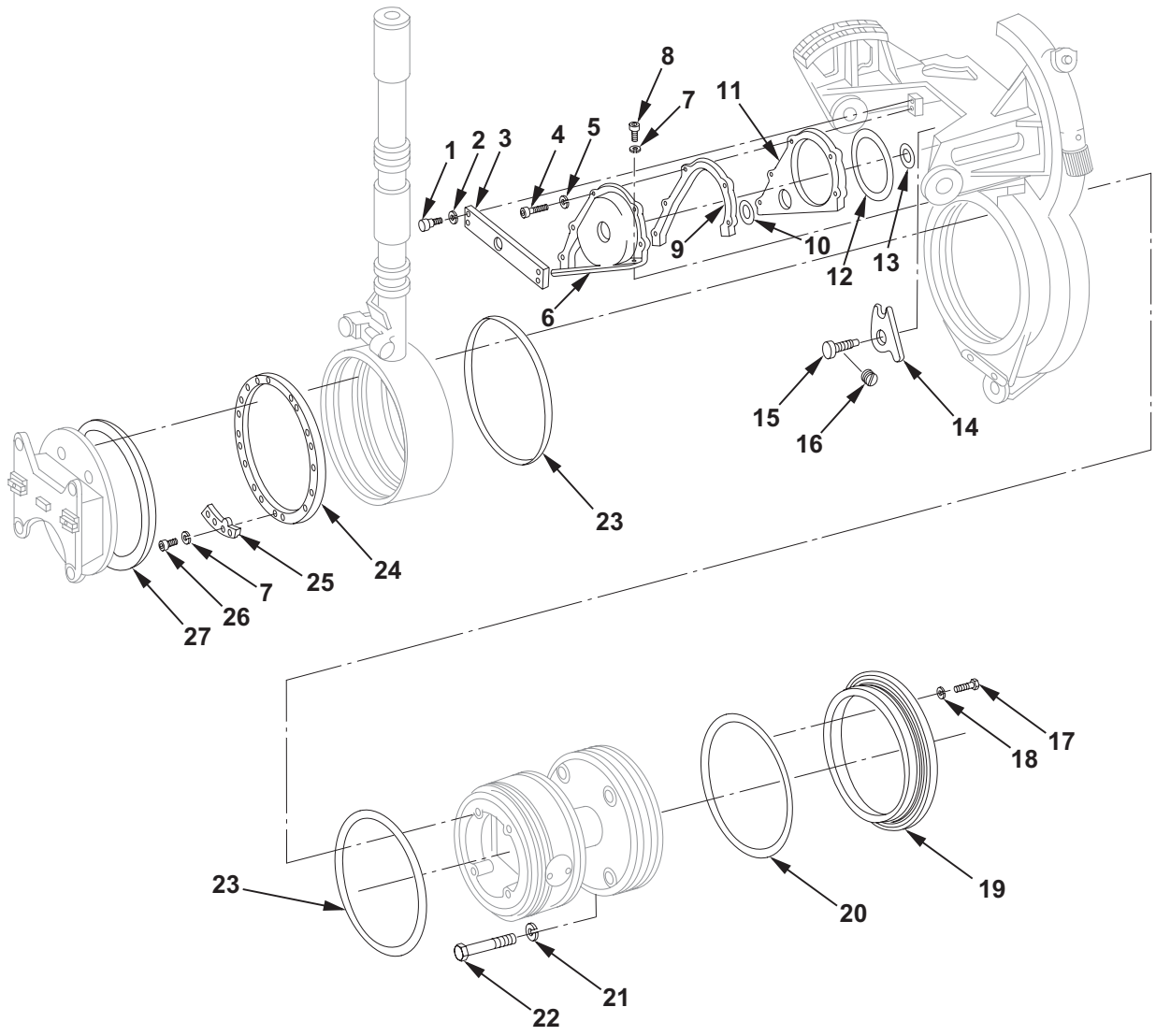



Figure 10. M171 Telescope and Quadrant Mount, 11727800, and M171A1 Telescope and Quadrant Mount, 13005103, Lower Internal Mount Parts.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 10. MOUNT, TELESCOPE AND QUADRANT, M171, PN 11727800, M171A1, PN 13005103, LOWER INTERNAL MOUNT PARTS | |
| 1 | PAHZZ | 5305001465701 | 19200 | 11727876-1 | SCREW,SHOULDER USED ON M171 AND M171A1..... | 4 |
| 2 | PAHZZ | 5310009338121 | 96906 | MS35338-139 | WASHER,LOCK USED ON M171 AND M171A1 | 4 |
| 3 | PAHZZ | 3040015179270 | 19200 | 13005070 | PLATE,RETAINING,SHA USED ON M171 AND M171A1..... | 1 |
| 4 | PAHZZ | 5305008489282 | 80205 | NAS1352C06H8 | SCREW,CAP,SOCKET HE USED ON M171 AND M171A1..... | 5 |
| 5 | PAHZZ | 5310009338119 | 80205 | MS35338-137 | WASHER,LOCK USED ON M171 AND M171A1 | 5 |
| 6 | PAHZZ | 5340010439313 | 19200 | 11727814 | COVER,ACCESS USED ON M171 AND M171A1..... | 1 |
| 7 | PAHZZ | 5310009338119 | 80205 | MS35338-137 | WASHER,LOCK USED ON M171 AND M171A1 | 2 |
| 8 | PAHZZ | 5305009931612 | 96906 | MS24674-8 | SCREW,CAP,SOCKET HE USED ON M171 AND M171A1..... | 2 |
| 9 | PAHZZ | 5330010468020 | 19200 | 11727833 | GASKET USED ON M171 AND M171A1..... | 1 |
| 10 | PAHZZ | 5331002483850 | 81343 | AS29513-116 | O-RING USED ON M171 AND M171A1..... | 1 |
| 11 | PAHZZ | 3040010452059 | 19200 | 11727839 | PLATE,RETAINING,SHA USED ON M171 AND M171A1..... | 1 |
| 12 | PAHZZ | 5331009359226 | 81343 | AS29513-151 | O-RING USED ON M171 AND M171A1..... | 1 |
| 13 | PAHZZ | 5331005841229 | 81343 | AS3578-118 | O-RING USED ON M171 AND M171A1..... | 1 |
| 14 | PAHZZ | 3040010468372 | 19200 | 11727857 | PAWL USED ON M171 AND M171A1..... | 1 |
| 15 | PAHZZ | 5305010485367 | 19200 | 11727866 | SCREW,CLOSE TOLERAN USED ON M171 AND M171A1..... | 1 |
| 16 | PAHZZ | 5305002723533 | 80205 | MS51023-49 | SETSCREW USED ON M171 AND M171A1... | 1 |
| 17 | PAHZZ | 5305009939175 | 96906 | MS24674-16 | SCREW,CAP,SOCKET HE USED ON M171 AND M171A1..... | 8 |
| 18 | PAHZZ | 5310009338120 | 96906 | MS35338-138 | WASHER,LOCK USED ON M171 AND M171A1 | 8 |
| 19 | PAHZZ | 3040010938922 | 19200 | 11727834 | COLLAR,SHAFT USED ON M171 AND M171A1..... | 1 |
| 20 | PAHZZ | 5330010498676 | 19200 | 11727872-1 | SEAL,PLAIN ENCASED USED ON M171 AND M171A1..... | 1 |
| 21 | PAFZZ | 5310009338778 | 96906 | MS35338-143 | WASHER,LOCK USED ON M171 AND M171A1 | 4 |
| 22 | PAHZA | 5305010623346 | 96906 | MS51100-120 | SCREW,CAP,HEXAGON H USED ON M171 AND M171A1..... | 4 |
| 23 | PAHZZ | 5330010480563 | 19200 | 11727871-2 | SEAL,PLAIN ENCASED USED ON M171 AND M171A1..... | 2 |
| 24 | PAHZZ | 5310010494071 | 19200 | 11727838 | NUT,PLAIN,ROUND USED ON M171 AND M171A1..... | 1 |
| 25 | PAHZZ | 1240010449854 | 19200 | 11727854 | DOG,LOCKING USED ON M171 AND M171A1 | 1 |
| 26 | PAHZZ | 5305000679914 | 96906 | MS24674-7 | SCREW,CAP,SOCKET HE USED ON M171 AND M171A1..... | 2 |
| 27 | PAHZZ | 5330010480564 | 19200 | 11727871-3 | SEAL,PLAIN ENCASED USED ON M171 AND M171A1..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M171/M171A1 TELESCOPE AND QUADRANT MOUNT (1240-01-039-7273/1240-01-515-8265)

# M171/M171A1 TELESCOPE AND QUADRANT MOUNT 11727800/13005103 EXTERNAL PARTS INCLUDING LEVEL VIALS

**REPAIR PARTS LIST**

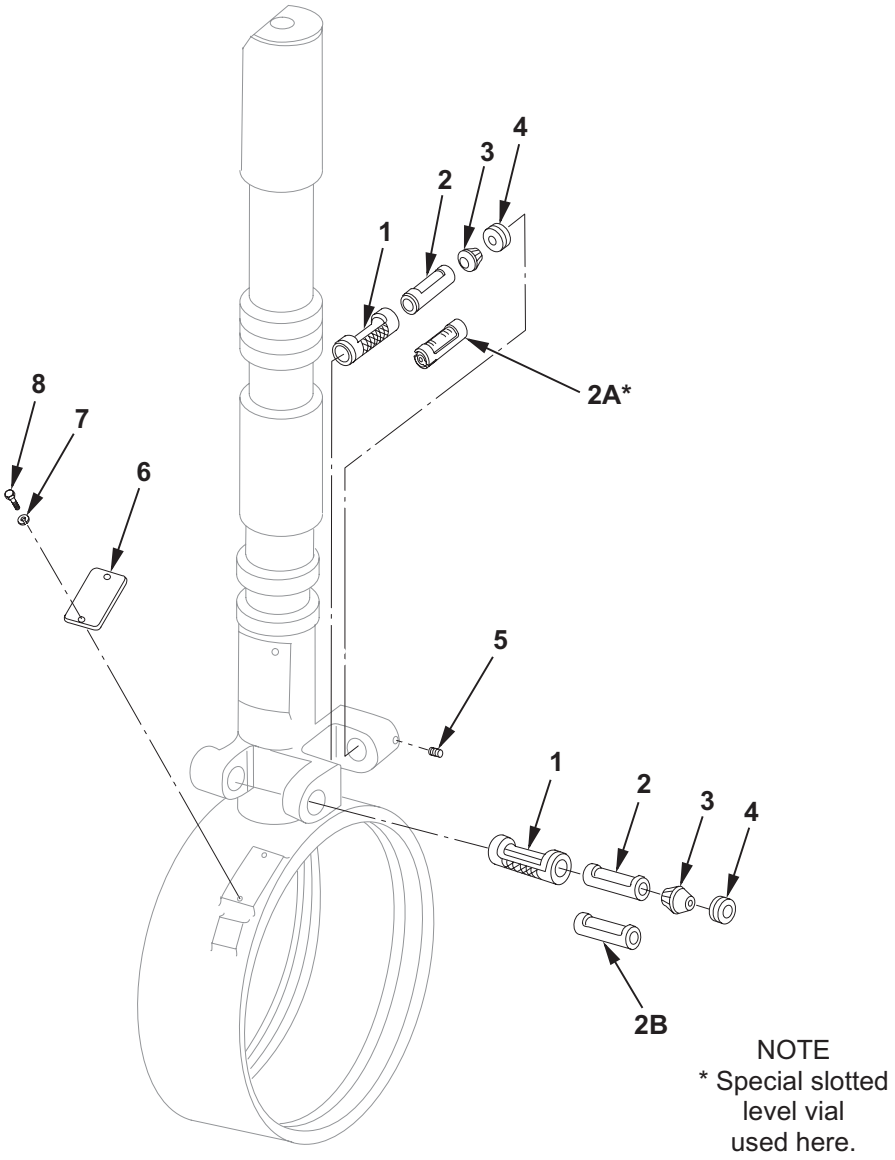



Figure 11. M171 Telescope and Quadrant Mount, 11727800, and M171A1 Telescope and Quadrant Mount, 13005103, External Parts Including Level Vials.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 11. MOUNT, TELESCOPE AND QUADRANT, M171, PN 11727800, M171A1, PN 13005103 EXTERNAL PARTS INCLUDING LEVEL VIALS | |
| 1 | PAHZZ | 5340007597626 | 19200 | 7597626 | COVER,ACCESS USED ON M171 AND M171A1..... | 2 |
| 2 | PCHZA | 1290002572769 | 19200 | 11729512 | LEVEL,FIRE CONTROL USED ON M171 ONLY..... UOC:F44 | 2 |
| 2A | PAHZZ | 1240015179275 | 19200 | 12984745 | LEVEL,FIRE CONTROL USED ON M171A1 ONLY ELEVATION LEVEL VIAL..... UOC:BM4 | 1 |
| 2B | PAHZZ | 1290006921493 | 19200 | 8202183 | LEVEL,FIRE CONTROL USED ON M171A1 ONLY CROSS LEVEL VIAL..... UOC:BM4 | 1 |
| 3 | PAHZZ | 5365008962251 | 19200 | 8202177 | BUSHING,ECCENTRIC USED ON M171 AND M171A1..... | 2 |
| 4 | PAHZZ | 5365006921492 | 19200 | 8202181 | RING,EXTERNALLY THR USED ON M171 AND M171A1..... | 2 |
| 5 | PAHZZ | 5305008007261 | 80205 | MS51021-9 | SETSCREW USED ON M171 AND M171A1... | 2 |
| 6 | PAFZZ | 9905002572751 | 19200 | 11729581 | PLATE,INSTRUCTION RADIOACTIVE CURIES M171..... UOC:F44 | 1 |
| 7 | PAFZZ | 5310005434652 | 96906 | MS35333-69 | WASHER,LOCK USED ON M171 ONLY..... UOC:F44 | 2 |
| 8 | PAFZZ | 5305000545636 | 96906 | MS51957-2 | SCREW,MACHINE USED ON M171 ONLY.... UOC:F44 | 2 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M171/M171A1 TELESCOPE AND QUADRANT MOUNT (1240-01-039-7273/1240-01-515-8265)

# OPTICAL INSTRUMENT SUPPORT 11727822/13005037

**REPAIR PARTS LIST**

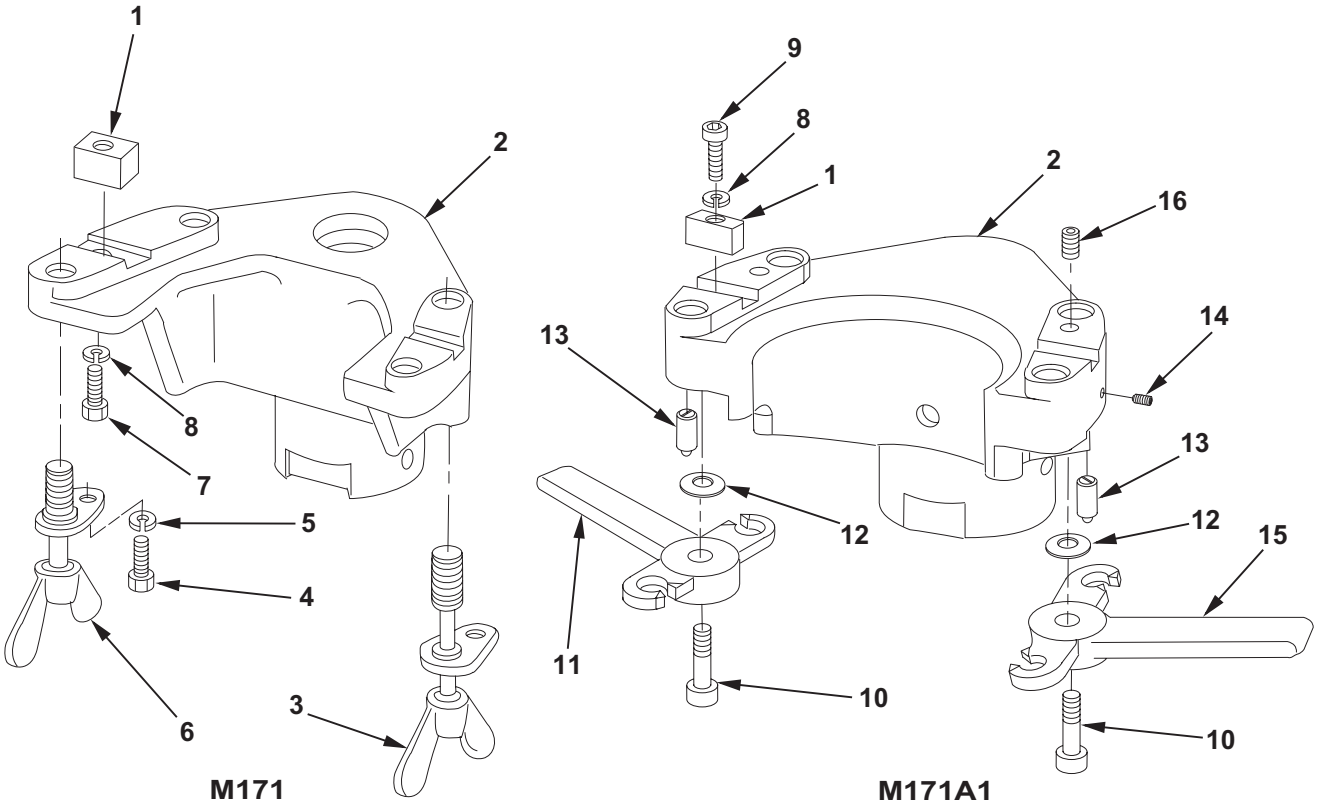



Figure 12. Optical Instrument Support, 11727822/13005037.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 12. SUPPORT, OPTICAL INSTRUMENT M171 PN 11727822, M171A1, PN 13005037 | |
| 1 | PAFZZ | 5315004921962 | 19200 | 11727888 | KEY,MACHINE USED ON M171 AND M171A1 | 2 |
| 2 | XAHZZ | | 19200 | 13005038 | SUPPORT USED ON M171A1 ONLY..... UOC:BM4 | 1 |
| 2 | XAHZZ | | 19200 | 11727818 | SUPPORT USED ON M171 ONLY..... UOC:F44 | 1 |
| 3 | PAFZZ | 5305010476150 | 19200 | 11727842-2 | THUMBSCREW ASSY USED ON M171 ONLY.. UOC:F44 | 2 |
| 4 | PAFZZ | 5305000685276 | 80205 | MS16995-9 | SCREW,CAP,SOCKET HE USED ON M171 ONLY..... UOC:F44 | 4 |
| 5 | PAFZZ | 5310009338118 | 80205 | MS35338-135 | WASHER,LOCK USED ON M171 ONLY..... UOC:F44 | 4 |
| 6 | PAFZZ | 5305010476149 | 19200 | 11727842-1 | THUMBSCREW USED ON M171 ONLY..... UOC:F44 | 2 |
| 7 | PAFZZ | 5305009887601 | 96906 | MS16995-25 | SCREW,CAP,SOCKET HE USED ON M171 ONLY..... UOC:F44 | 2 |
| 8 | PAFZZ | 5310009338119 | 80205 | MS35338-137 | WASHER,LOCK USED ON M171 AND M171A1 | 2 |
| 9 | PAFZZ | 5305009887604 | 80205 | MS16995-28 | SCREW,CAP,SOCKET HE USED ON M171A1 ONLY..... UOC:BM4 | 2 |
| 10 | PAOZZ | 5305009887838 | 80205 | MS16995-64 | SCREW,CAP,SOCKET HE USED ON M171A1 ONLY..... UOC:BM4 | 2 |
| 11 | PAOZZ | 5340015179271 | 19200 | 13005040 | HANDLE,MANUAL CONTR OL LEFT HAND USED ON M171A1 ONLY..... UOC:BM4 | 1 |
| 12 | PAOZZ | 5310015213097 | 19200 | 13005045 | WASHER,SPRING TENSI USED ON M171A1 ONLY..... UOC:BM4 | 2 |
| 13 | PAOZZ | 5340015212989 | 19200 | 13005043 | PLUNGER,DETENT USED ON M171A1 ONLY. UOC:BM4 | 2 |
| 14 | PAOZZ | 5305015219231 | 19200 | 13005044 | SETSCREW USED ON M171A1 ONLY..... UOC:BM4 | 2 |
| 15 | PAOZZ | 5340015178450 | 19200 | 13005039 | HANDLE,MANUAL CONTR OL RIGHT HAND USED ON M171A1 ONLY..... UOC:BM4 | 1 |
| 16 | PAOZZ | 5305008659516 | 80205 | MS51029-48 | SETSCREW USED ON M171A1 ONLY..... UOC:BM4 | 2 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

**OPTICAL INSTRUMENT ROCKER ASSEMBLY**
**11727801**

**REPAIR PARTS LIST**

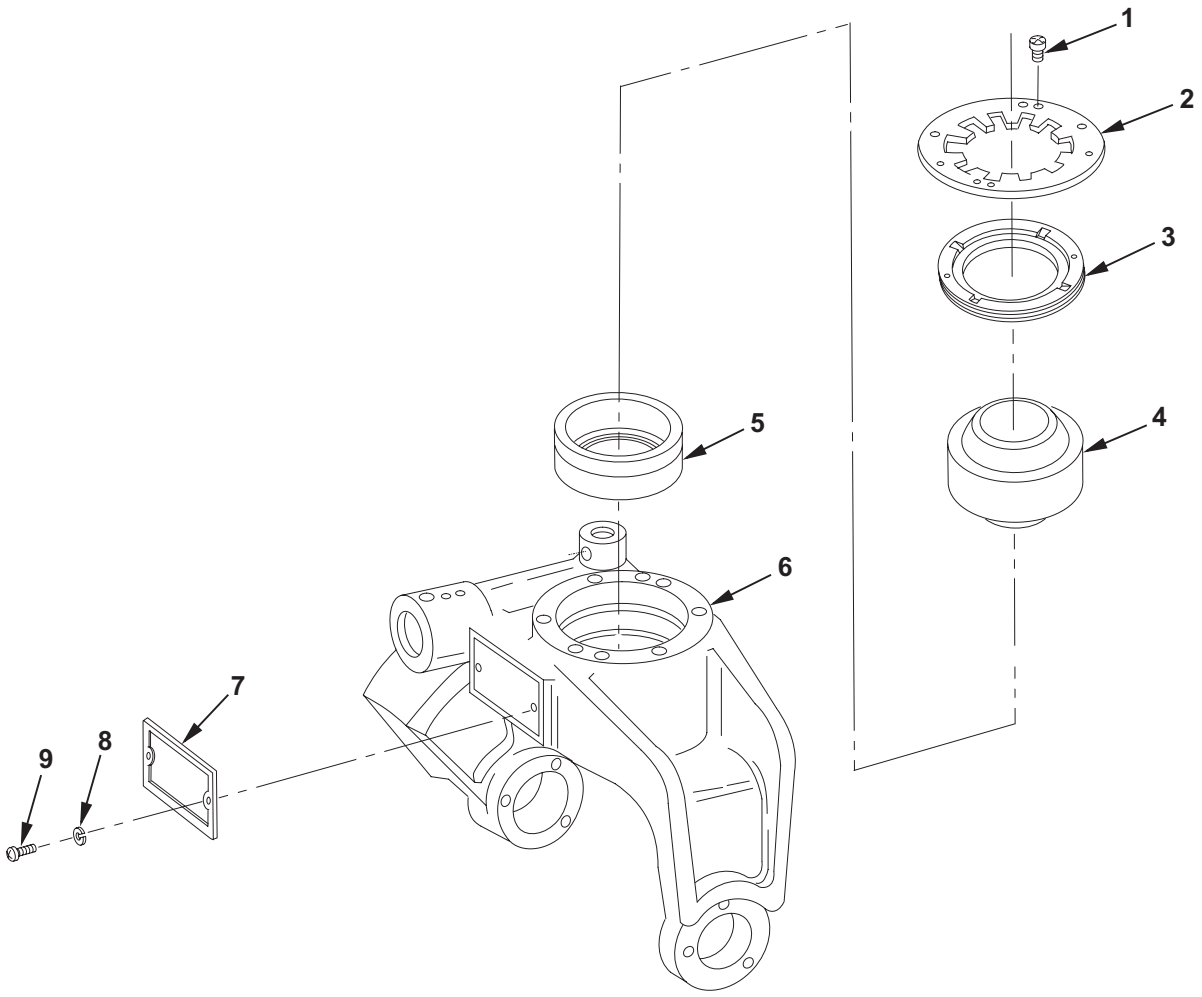



Figure 13. Optical Instrument Rocker Assembly, 11727801.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 13. ROCKER ASSEMBLY, OPTICAL INSTRUMENT 11727801 | |
| 1 | PAHZZ | 5305007702533 | 96906 | MS51959-13 | SCREW,MACHINE USED ON M171 AND M171A1..... | 2 |
| 2 | PAHZA | 5310010465392 | 19200 | 11727851 | WASHER,KEY USED ON M171 AND M171A1. | 1 |
| 3 | PAHZZ | 3110015183219 | 19200 | 13005099 | SEAT,BEARING NEW SEAT REPLACES PN 11727835 MUST ALSO ORDER NEW BEARING PN 13005100 AND NEW SEAT PN 13005098 USED ON M171 AND M171A1 TORQUE TO 150 INCH POUNDS..... | 1 |
| 4 | PAHZZ | 3120015183221 | 19200 | 13005100 | BEARING,PLAIN,SPHER NEW BEARING REPLACES PN 11727875. MUST ALSO ORDER NEW SEATS PN 13005098 AND 13005099. USED ON M171 AND M171A1..... | 1 |
| 5 | PAHZZ | 3110015183217 | 19200 | 13005098 | SEAT,BEARING NEW SEAT REPLACES PN 11727861 MUST ALSO ORDER NEW BEARING PN 13005100 AND SEAT PN 13005099 USED ON M171 AND M171A1..... | 1 |
| 6 | XAHZZ | | 19200 | 11727806 | ROCKER,OPTICAL INST USED ON M171 AND M171A1..... | 1 |
| 7 | PAFZZ | 9905010480646 | 19200 | 11727863 | PLATE,IDENTIFICATIO USED ON M171 ONLY..... UOC:F44 | 1 |
| 7 | PAFZZ | 9905015211615 | 19200 | 13005105 | PLATE,IDENTIFICATIO USED ON M171A1 ONLY..... UOC:BM4 | 1 |
| 8 | PAFZZ | 5310005434652 | 96906 | MS35333-69 | WASHER,LOCK USED ON M171 AND M171A1 | 2 |
| 9 | PAFZZ | 5305000545636 | 96906 | MS51957-2 | SCREW,MACHINE USED ON M171 AND M171A1..... | 2 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

**HOUSING ASSEMBLY**
**11727804**

**REPAIR PARTS LIST**

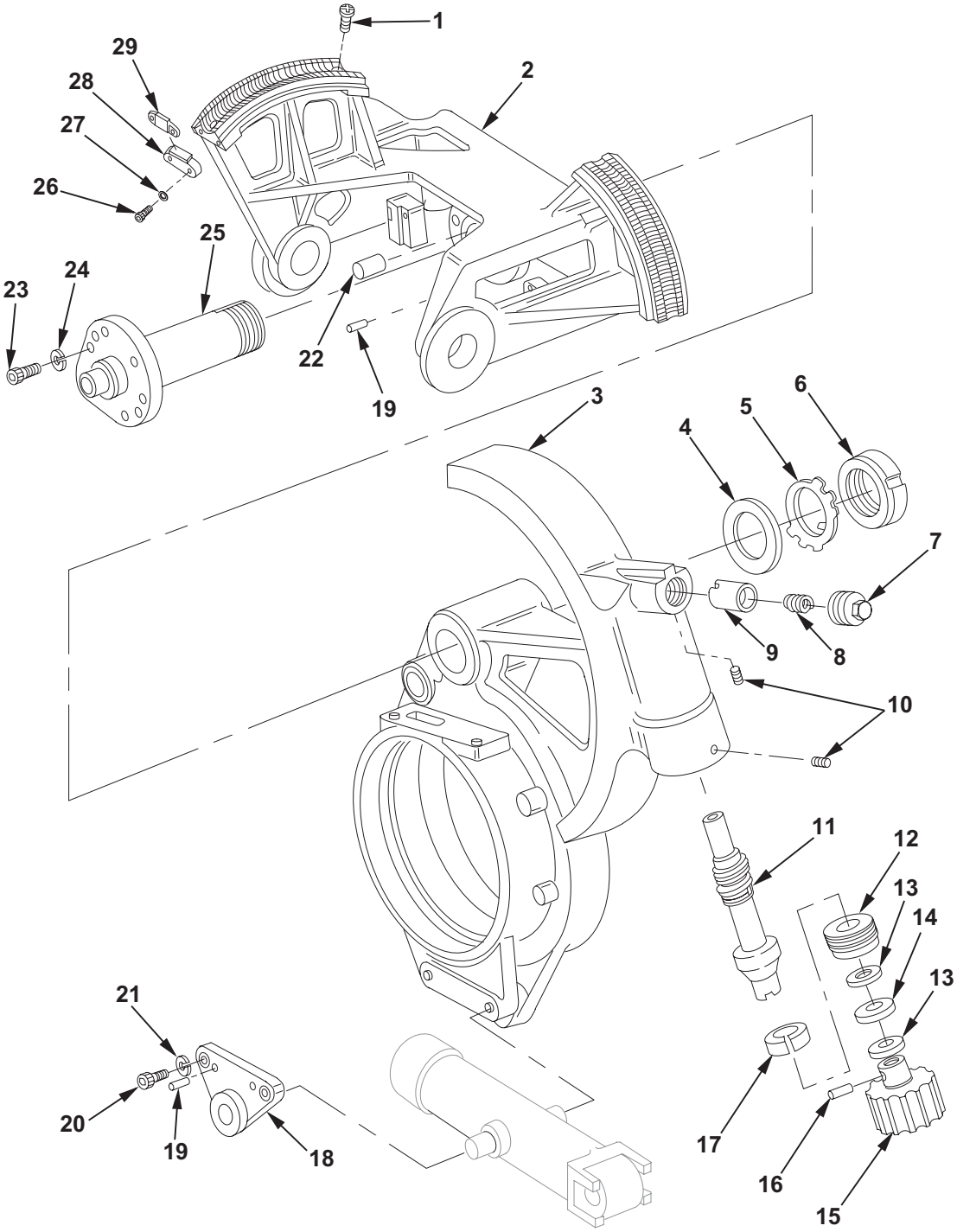



Figure 14. Housing Assembly, 11727804.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 14. HOUSING ASSEMBLY 11727804 | |
| 1 | PAHZZ | 5305009409488 | 96906 | MS35275-226 | SCREW,MACHINE USED ON M171 AND M171A1 | 4 |
| 2 | PAHZZ | 3020015178452 | 19200 | 13005083 | GEAR CLUSTER USED ON M171 AND M171A1 | 1 |
| 3 | XAHZZ | | 19200 | 11727817 | HOUSING,WORM WHEEL USED ON M171 AND M171A1 | 1 |
| 4 | PAHZZ | 5310010465395 | 19200 | 11727897 | WASHER,FLAT USED ON M171 AND M171A1 | 1 |
| 5 | PAHZZ | 5310001861009 | 96906 | MS19070-063 | WASHER,KEY USED ON M171 AND M171A1. | 1 |
| 6 | PAHZZ | 5310004505946 | 96906 | MS19068-063 | NUT,PLAIN,ROUND USED ON M171 AND M171A1 | 1 |
| 7 | PAHZZ | 5365010506765 | 19200 | 11727887 | PLUG,MACHINE THREAD USED ON M171 AND M171A1 | 1 |
| 8 | PAHZZ | 5360009789584 | 19200 | 8587557 | SPRING,HELICAL,COMP USED ON M171 AND M171A1 | 1 |
| 9 | PAHZZ | 3120010506190 | 19200 | 11727886 | BEARING,V USED ON M171 AND M171A1.. | 1 |
| 10 | PAHZZ | 5305002813120 | 96906 | MS51023-48 | SETSCREW USED ON M171 AND M171A1... | 2 |
| 11 | PAHZZ | 1240010439459 | 19200 | 13005085 | WORM SHAFT ASSEMBLY USED ON M171 AND M171A1 | 1 |
| 12 | PAHZZ | 5365010465869 | 19200 | 11727882 | RING,EXTERNALLY THR USED ON M171 AND M171A1 | 1 |
| 13 | PAHZZ | 5310010499175 | 19200 | 11727884 | WASHER,FLAT USED ON M171 AND M171A1 | 2 |
| 14 | PAHZZ | 5330010444883 | 19200 | 11727883 | FELT,MECHANICAL,PRE USED ON M171 AND M171A1 | 1 |
| 15 | PAHZZ | 5355010460732 | 19200 | 11727885 | KNOB USED ON M171 AND M171A1..... | 1 |
| 16 | PAHZZ | 5315008100505 | 96906 | MS16555-628 | PIN,STRAIGHT,HEADLE USED ON M171 AND M171A1 | 1 |
| 17 | PAHZZ | 3120010501574 | 19200 | 11727880 | BEARING,PLAIN,SPHER USED ON M171 AND M171A1 | 1 |
| 18 | PAHZZ | 3040010480767 | 19200 | 11727867 | BRACKET,EYE,ROTATIN USED ON M171 AND M171A1 | 1 |
| 19 | PAHZZ | 5315006821733 | 96906 | MS16555-646 | PIN,STRAIGHT,HEADLE USED ON M171 AND M171A1 | 4 |
| 20 | PAHZZ | 5305006853492 | 96906 | MS24674-25 | SCREW,CAP,SOCKET HE USED ON M171 AND M171A1 | 2 |
| 21 | PAHZZ | 5310009338121 | 96906 | MS35338-139 | WASHER,LOCK USED ON M171 AND M171A1 | 2 |
| 22 | PAHZZ | 5315010439369 | 19200 | 11727892 | PIN,STRAIGHT,HEADLE USED ON M171 AND M171A1 | 1 |
| 23 | PAHZZ | 5305009939175 | 96906 | MS24674-16 | SCREW,CAP,SOCKET HE USED ON M171 AND M171A1 | 5 |
| 24 | PAHZZ | 5310009338120 | 96906 | MS35338-138 | WASHER,LOCK USED ON M171 AND M171A1 | 5 |
| 25 | PAHZZ | 3040015178453 | 19200 | 13005084 | CAMSHAFT USED ON M171 AND M171A1... | 1 |
| 26 | PAHZZ | 5305008489282 | 96906 | MS24674-3 | SCREW,CAP,SOCKET HE USED ON M171 AND M171A1 | 8 |
| 27 | PAHZZ | 5310009338119 | 80205 | MS35338-137 | WASHER,LOCK USED ON M171 AND M171A1 | 8 |
| 28 | PAHZZ | 1240010478183 | 19200 | 11727850 | HOLDER,FELT MECHANI USED ON M171 AND M171A1 | 4 |
| 29 | PAHZZ | 5330010439288 | 19200 | 11727895 | FELT,MECHANICAL,PRE USED ON M171 AND M171A1 | 4 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

**MOUNT SUBASSEMBLY**
**11727824**

**REPAIR PARTS LIST**

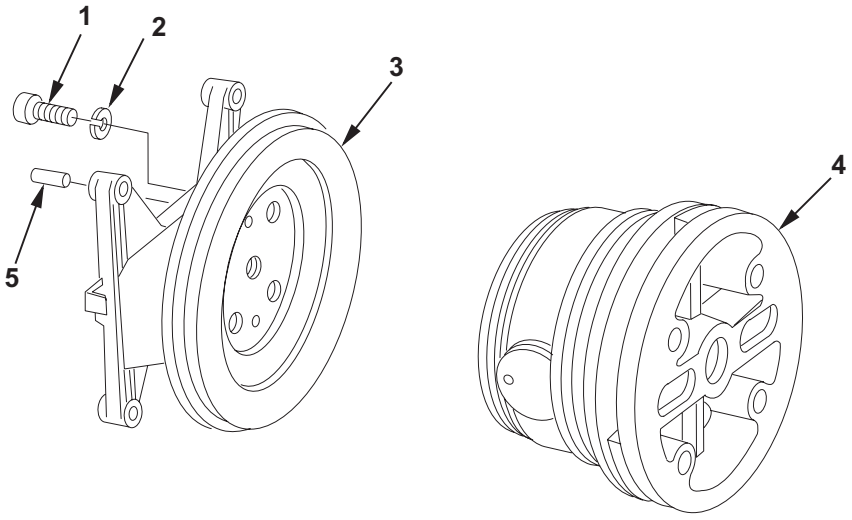



Figure 15. Mount Subassembly, 11727824.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 15. MOUNT SUBASSEMBLY, PN 11727824 | |
| 1 | PAHZZ | 5305002259891 | 96906 | MS24674-35 | SCREW,CAP,SOCKET HE USED ON M171 AND M171A1..... | 4 |
| 2 | PAHZZ | 5310009746623 | 96906 | MS35338-140 | WASHER,LOCK USED ON M171 AND M171A1 | 4 |
| 3 | PAHHD | 1240010467106 | 19200 | 11727821 | ADAPTER MOUNTING USED ON M171 AND M171A1 SEE FIG 16 FOR BREAKDOWN..... | 1 |
| 4 | PADDD | 3040014934172 | 19200 | 11727803 | ACTUATOR,MECHANICAL USED ON M171 AND M171A1 SEE FIG 16 FOR BREAKDOWN..... | 1 |
| 5 | PAHZZ | 5315006821733 | 96906 | MS16555-646 | PIN,STRAIGHT,HEADLE USED ON M171 AND M171A1..... | 2 |

END OF FIGURE

# DIRECT SUPPORT AND GENERAL SUPPORT

# M171/M171A1 TELESCOPE AND QUADRANT MOUNT (1240-01-039-7273/1240-01-515-8265)

# MOUNTING ADAPTER, 11727821 AND MECHANICAL ACTUATOR, 11727803

# REPAIR PARTS LIST

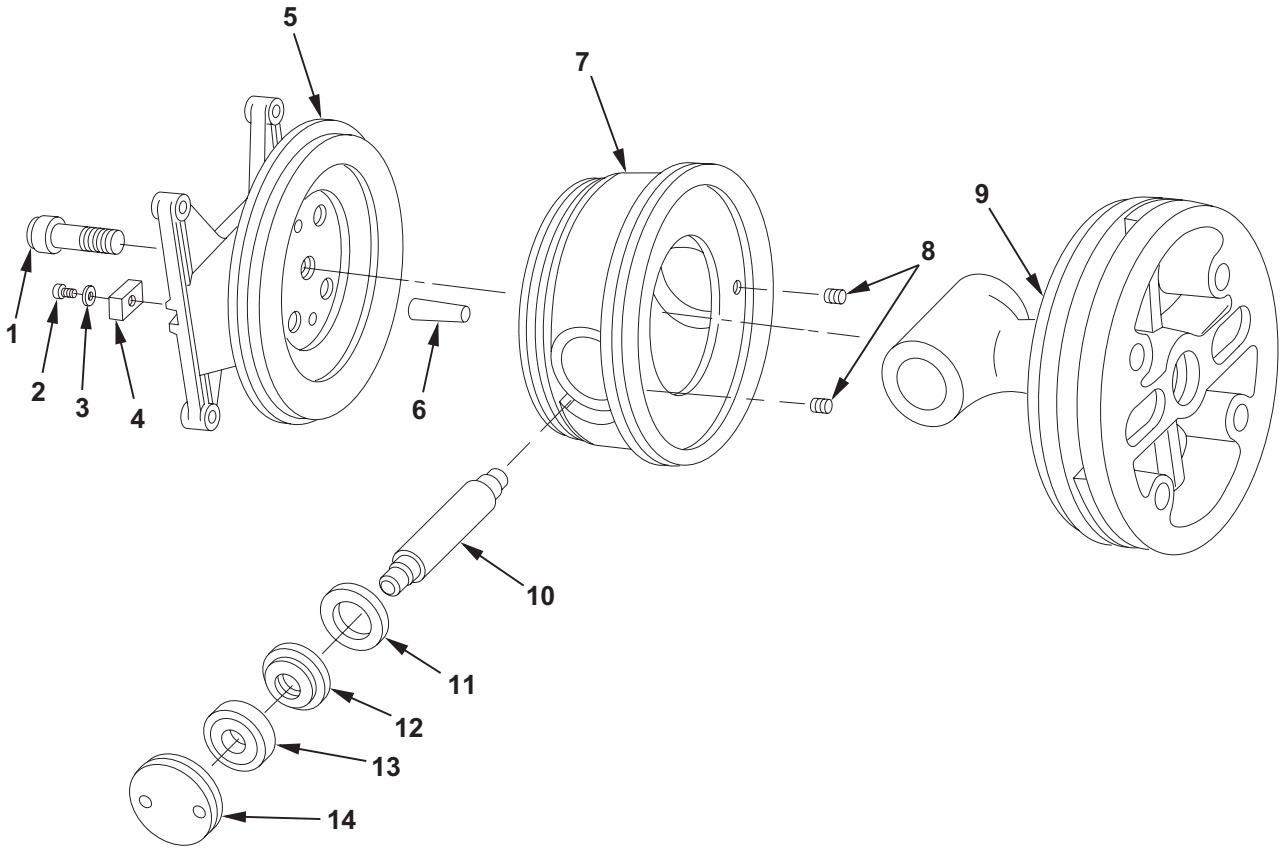



Figure 16. Mounting Adapter, 11727821, and Mechanical Actuator, 11727803.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 16. ADAPTER, MOUNTING, PN 11727821 AND ACTUATOR, MECHANICAL, PN 11727803 | |
| 1 | PAHZZ | 5306010488749 | 19200 | 11727870 | BOLT,SHOULDER USED ON M171 AND M171A1 | 1 |
| 2 | PAHZZ | 5305009590382 | 80205 | MS16995-17 | SCREW,CAP,SOCKET HE USED ON M171 AND M171A1 | 2 |
| 3 | PAHZZ | 5310009338119 | 80205 | MS35338-137 | WASHER,LOCK USED ON M171 AND M171A1 | 2 |
| 4 | PAHZZ | 5315010437428 | 19200 | 11727890 | KEY,MACHINE USED ON M171 AND M171A1 | 2 |
| 5 | XAHZZ | | 19200 | 11727819 | ADAPTER USED ON M171 AND M171A1 | 1 |
| 6 | PAHZZ | 5315000788711 | 80205 | MS24692-225 | PIN,TAPERED,PLAIN USED ON M171 AND M171A1 | 1 |
| 7 | PAHZZ | 1240010449849 | 19200 | 11727808 | RING ASSEMBLY USED ON M171 AND M171A1 | 1 |
| 8 | PAHZZ | 5305002724123 | 80205 | MS51021-23 | SETSCREW USED ON M171 AND M171A1 | 2 |
| 9 | PAHZZ | 3040014947940 | 19200 | 11727816 | HUB,BODY USED ON M171 AND M171A1 | 1 |
| 10 | PAHZZ | 3040010438405 | 19200 | 13005088 | SHAFT,SHOULDERED USED ON M171 AND M171A1 | 1 |
| 11 | PAHZZ | 5310000895966 | 19200 | 8626152 | WASHER,FLAT USED ON M171 AND M171A1 | 2 |
| 12 | PAHZZ | 5310007969592 | 19200 | 8626125 | WASHER,SHOULDERED USED ON M171 AND M171A1 | 2 |
| 13 | PAHZZ | 3110001567513 | 58536 | FF B 171B | BEARING,BALL,ANNULA USED ON M171 AND M171A1 | 2 |
| 14 | PAHZZ | 5365000655319 | 19200 | 8626126 | PLUG,MACHINE THREAD USED ON M171 AND M171A1 | 2 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M171/M171A1 TELESCOPE AND QUADRANT MOUNT**
**(1240-01-039-7273/1240-01-515-8265)**

**BALL BEARING UNIT**
**11727802/13005082**

**REPAIR PARTS LIST**

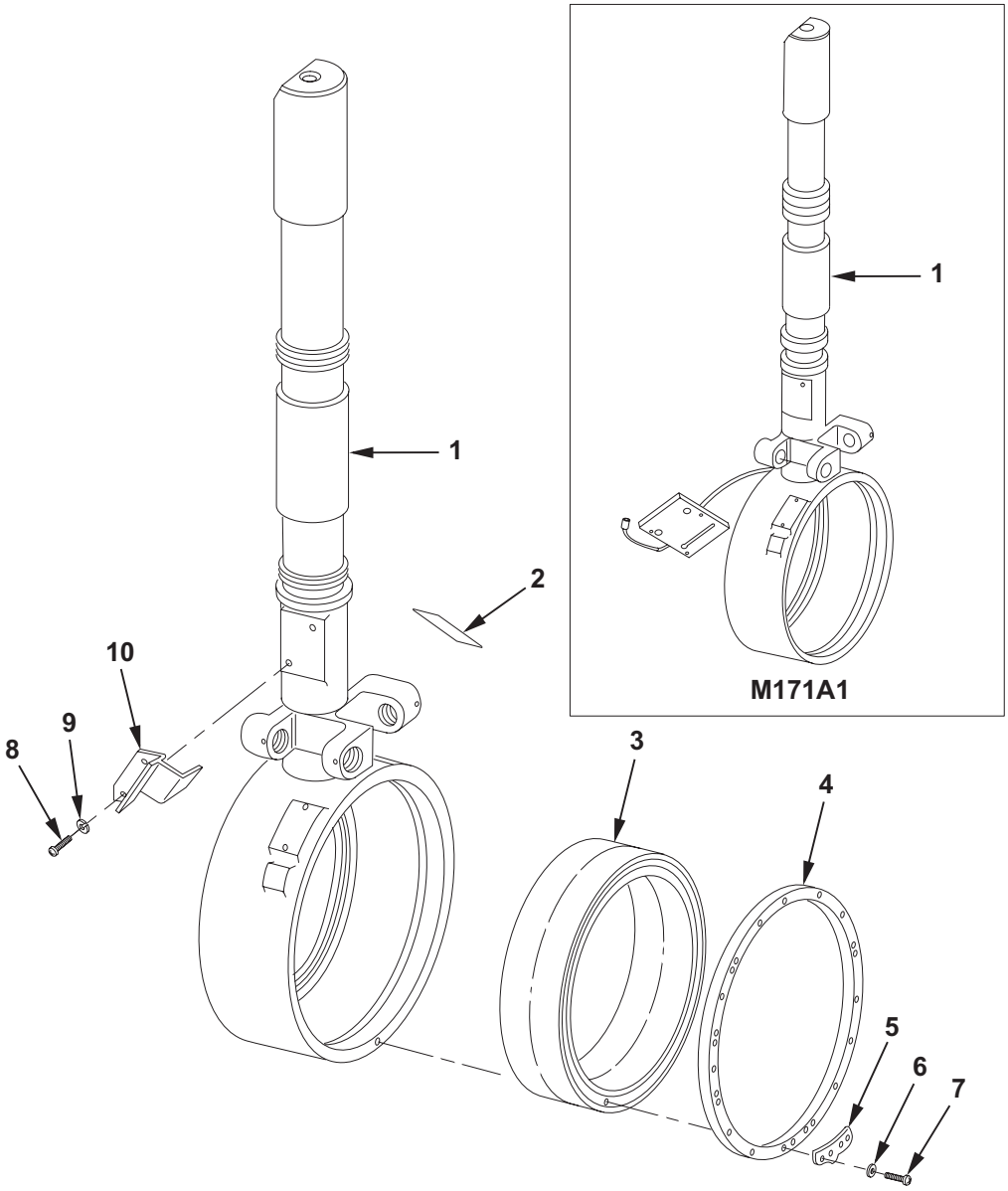



Figure 17. Ball Bearing Unit, 11727802/13005082.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 17. BEARING UNIT, BALL M171, PN 11727802, M171A1, PN 13005082 | |
| 1 | XAHZZ | | 19200 | 11727812 | STEM M171 USED ON M171 ONLY..... UOC:F44 | 1 |
| 1 | XAHZZ | | 19200 | 13005087 | STEM M171A1 USED ON M171A1 ONLY.... UOC:BM4 | 1 |
| 2 | PAOZZ | 9905002572746 | 19200 | 11731011 | PLATE,INSTRUCTION RADIATION INFORMATION..... UOC:F44 | 1 |
| 3 | PAHZZ | 3110001655922 | 19200 | 11727864 | BEARING,BALL,DUPLEX USED ON M171 AND M171A1..... | 1 |
| 4 | PAHZZ | 5365010483048 | 19200 | 11727837 | RING,EXTERNALLY THR USED ON M171 AND M171A1..... | 1 |
| 5 | PAHZZ | 1240010460895 | 19200 | 11727853 | DOG,LOCKING USED ON M171 AND M171A1 | 1 |
| 6 | PAHZZ | 5310009338119 | 80205 | MS35338-137 | WASHER,LOCK USED ON M171 AND M171A1 | 2 |
| 7 | PAHZZ | 5305000679914 | 96906 | MS24674-7 | SCREW,CAP,SOCKET HE USED ON M171 AND M171A1..... | 2 |
| 8 | PAFZZ | 5305000546651 | 96906 | MS51957-27 | SCREW,MACHINE USED ON M171 AND M171A1..... | 2 |
| 9 | PAFZZ | 5310006163555 | 80205 | MS35333-71 | WASHER,LOCK USED ON M171 AND M171A1 | 2 |
| 10 | PAFZZ | 6650010478283 | 19200 | 11727865 | MIRROR,OPTICAL INST USED ON M171 AND M171A1..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M172/M172A1 TELESCOPE AND QUADRANT (1240-01-037-7290/1240-01-517-2171)

# M172/M172A1 TELESCOPE AND QUADRANT 10554823/13005089

**REPAIR PARTS LIST**

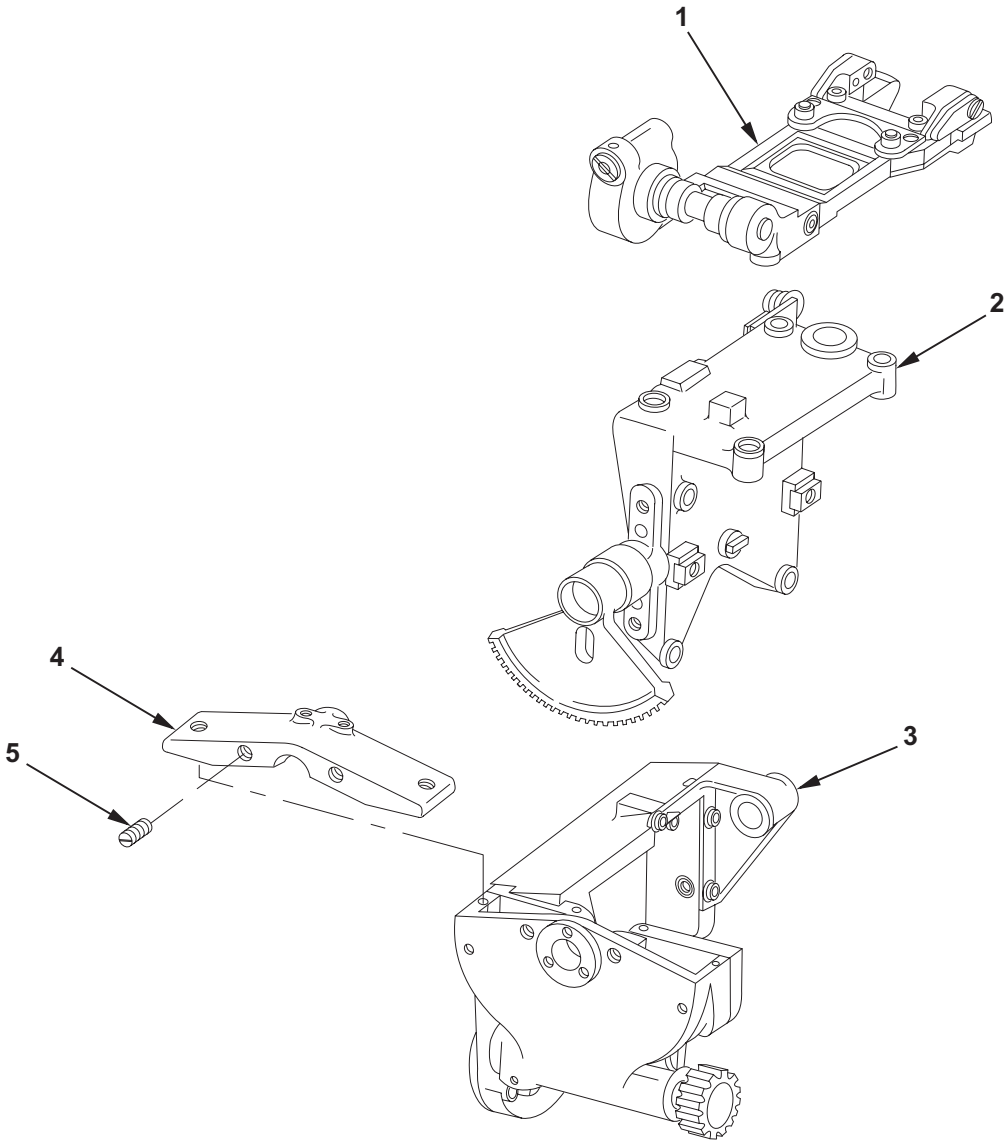



Figure 18. M172 Telescope and Quadrant Mount, 10554823, and M172A1 Telescope and Quadrant Mount, 13005089.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 18. MOUNT, TELESCOPE AND QUADRANT, M172 10554823; M172A1, 13005089 | |
| 1 | PAHHD | 1240010438198 | 19200 | 10554685 | BRACKET TELESCOPE SEE FIG 21 FOR ASSY BRKDWN<br>USED ON BOTH M172 AND M172A1..... | 1 |
| 2 | XAHHH | | 19200 | 13005091 | ADAPTER ASSEMBLY SEE FIG 22 FOR ASSY BRKDWN<br>USED ON BOTH THE M172 AND M172A1.... | 1 |
| 3 | XAHZZ | | 19200 | 13005090 | SUPPORT,QUADRANT USED ON BOTH THE M172 AND M172A1..... | 1 |
| 4 | PAHHH | 5340010444892 | 19200 | 10554811 | COVER,ACCESS USED ON BOTH THE M172 AND M172A1..... | 1 |
| 5 | PAHZZ | 5325005973302 | 96906 | MS124695 | INSERT,SCREW THREAD..... | 2 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M172/M172A1 TELESCOPE AND QUADRANT (1240-01-037-7290/1240-01-517-2171)

# M172/M172A1 TELESCOPE AND QUADRANT 10554823/13005089 PARTS

## REPAIR PARTS LIST

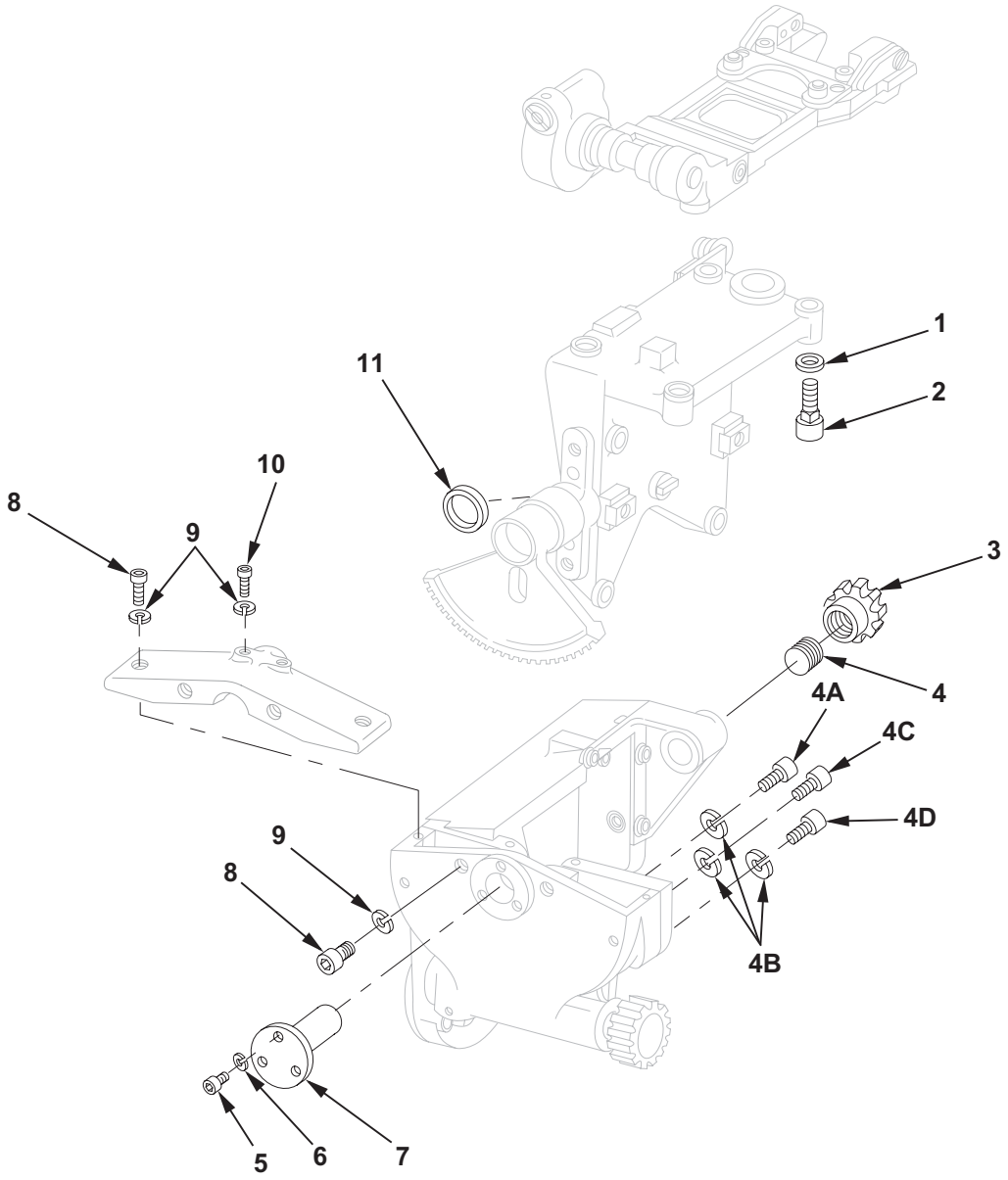



Figure 19. M172 Telescope and Quadrant Mount, 10554823, and M172A1 Telescope and Quadrant Mount, 13005089, Parts.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 19. MOUNT, TELESCOPE AND QUADRANT, M172, 10554823; M172A1, 13005089 PARTS | |
| 1 | PAHZZ | 5310010499174 | 19200 | 10554820 | WASHER,FLAT..... | 4 |
| 2 | PAHZZ | 5305008343385 | 80205 | MS24673-17 | SCREW,CAP,SOCKET HE..... | 4 |
| 3 | XAHZZ | | 96906 | MS27955-4 | NUT,PLAIN,ROUND..... | 1 |
| 4 | XAHZZ | | 19200 | 10554813 | SETSCREW..... | 1 |
| 4A | PAHZZ | 5305008343388 | 80205 | MS24673-16 | SCREW,CAP,SOCKET HE..... | 2 |
| 4B | PAHZZ | 5310009746623 | 80205 | MS35338-140 | WASHER,LOCK..... | 6 |
| 4C | PAHZZ | 5305008343385 | 80205 | MS24673-17 | SCREW,CAP,SOCKET HE..... | 2 |
| 4D | PAHZZ | 5305002353528 | 80205 | MS24673-18 | SCREW,CAP,SOCKET HE..... | 1 |
| 5 | PAHZZ | 5305009894609 | 96906 | MS24674-9 | SCREW,CAP,SOCKET HE..... | 3 |
| 6 | PAHZZ | 5310009338119 | 80205 | MS35338-137 | WASHER,LOCK..... | 3 |
| 7 | PAHZZ | 5315010544904 | 19200 | 11732205 | PIVOT,PIN..... | 1 |
| 8 | PAHZZ | 5305009885308 | 80205 | MS24673-3 | SCREW,CAP,SOCKET HE..... | 4 |
| 9 | PAHZZ | 5310009338120 | 96906 | MS35338-138 | WASHER,LOCK..... | 6 |
| 10 | PAHZZ | 5305006827753 | 80205 | MS24673-7 | SCREW,CAP,SOCKET HE..... | 2 |
| 11 | PAHZZ | 5330010499865 | 19200 | 11732207 | FELT,MECHANICAL,PRE..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M172/M172A1 TELESCOPE AND QUADRANT (1240-01-037-7290/1240-01-517-2171)

# M172/M172A1 TELESCOPE AND QUADRANT 10554823/13005089 PARTS (LOWER RIGHT)

**REPAIR PARTS LIST**

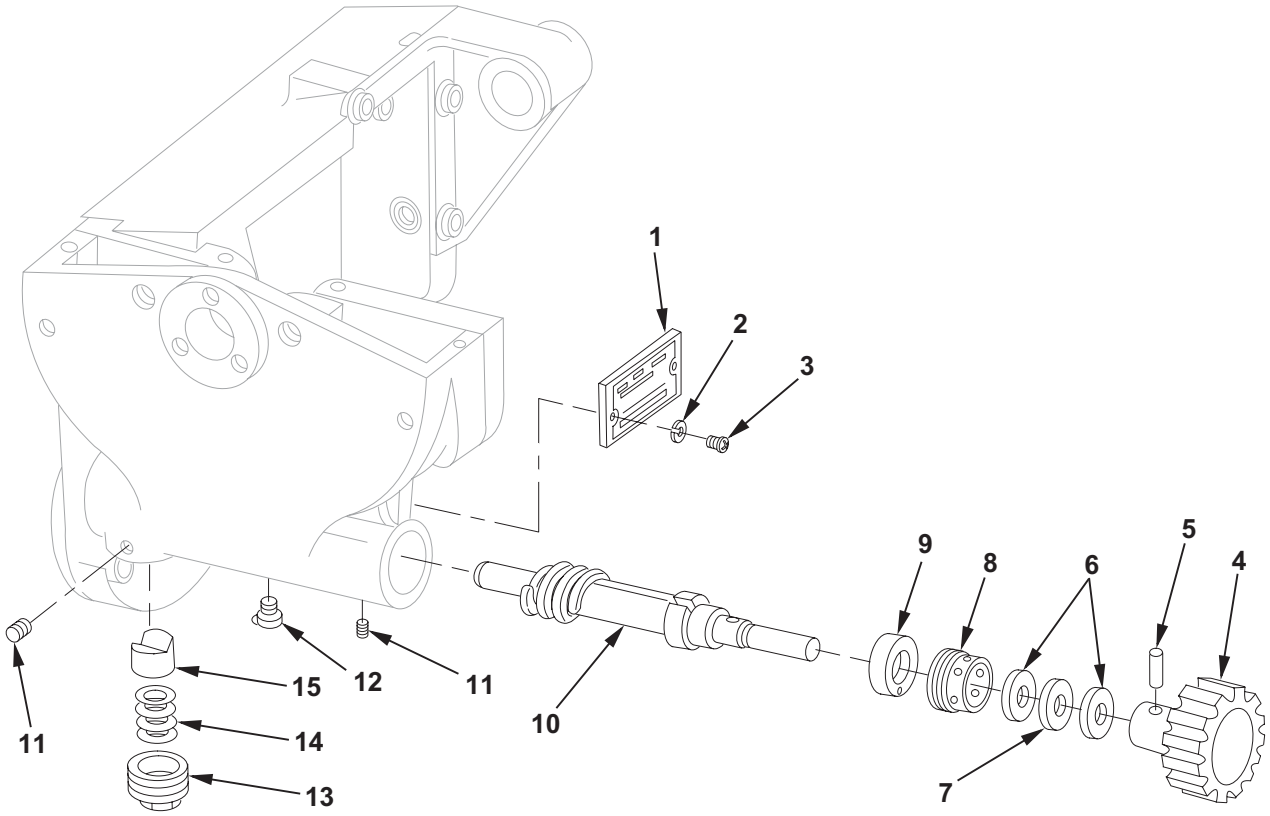



Figure 20. M172 Telescope and Quadrant Mount, 10554823, and M172A1 Telescope and Quadrant Mount, 13005089, Parts (Lower Right).

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 20. MOUNT, TELESCOPE AND QUADRANT, M172 10554823; M172A1, 13005089 PARTS CONTINUED | |
| 1 | PAFZZ | 9905010455843 | 19200 | 10554829 | PLATE,IDENTIFICATIO USED ON M172 ONLY..... UOC:F43 | 1 |
| 1 | PAFZZ | 9905015184505 | 19200 | 13005095 | PLATE,IDENTIFICATIO USED ON M172A1 ONLY..... UOC:BN3 | 1 |
| 2 | PAFZZ | 5310009282690 | 80205 | MS35338-134 | WASHER,LOCK..... | 2 |
| 3 | PAFZZ | 5305000545636 | 96906 | MS51957-2 | SCREW,MACHINE..... | 2 |
| 4 | PAHZZ | 5355010460732 | 19200 | 11727885 | KNOB..... | 1 |
| 5 | PAHZZ | 5315008100505 | 96906 | MS16555-628 | PIN,STRAIGHT,HEADLE..... | 1 |
| 6 | PAHZZ | 5310010499175 | 19200 | 11727884 | WASHER,FLAT..... | 2 |
| 7 | PAHZZ | 5330010444883 | 19200 | 11727883 | FELT,MECHANICAL,PRE..... | 1 |
| 8 | PAHZZ | 5365010465869 | 19200 | 11727882 | RING,EXTERNALLY THR..... | 1 |
| 9 | PAHZZ | 3120010501574 | 19200 | 11727880 | BEARING,PLAIN,SPHER..... | 1 |
| 10 | PAHZZ | 1240010439459 | 19200 | 13005085 | WORM SHAFT ASSEMBLY USED ON BOTH THE M172 AND M172A1..... | 1 |
| 11 | PAHZZ | 5305002813120 | 96906 | MS51023-48 | SETSCREW..... | 2 |
| 12 | PAFZZ | 5340010519968 | 19200 | 10554514 | CAP,PROTECTIVE,DUST..... | 1 |
| 13 | PAHZZ | 5365010506765 | 19200 | 11727887 | PLUG,MACHINE THREAD..... | 1 |
| 14 | PAHZZ | 5360009789584 | 19200 | 8587557 | SPRING,HELICAL,COMP..... | 1 |
| 15 | PAHZZ | 3120010506190 | 19200 | 11727886 | BEARING,V..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M172/M172A1 TELESCOPE AND QUADRANT**
**(1240-01-037-7290/1240-01-517-2171)**

**TELESCOPE MOUNTING BRACKET**
**10554685**

**REPAIR PARTS LIST**

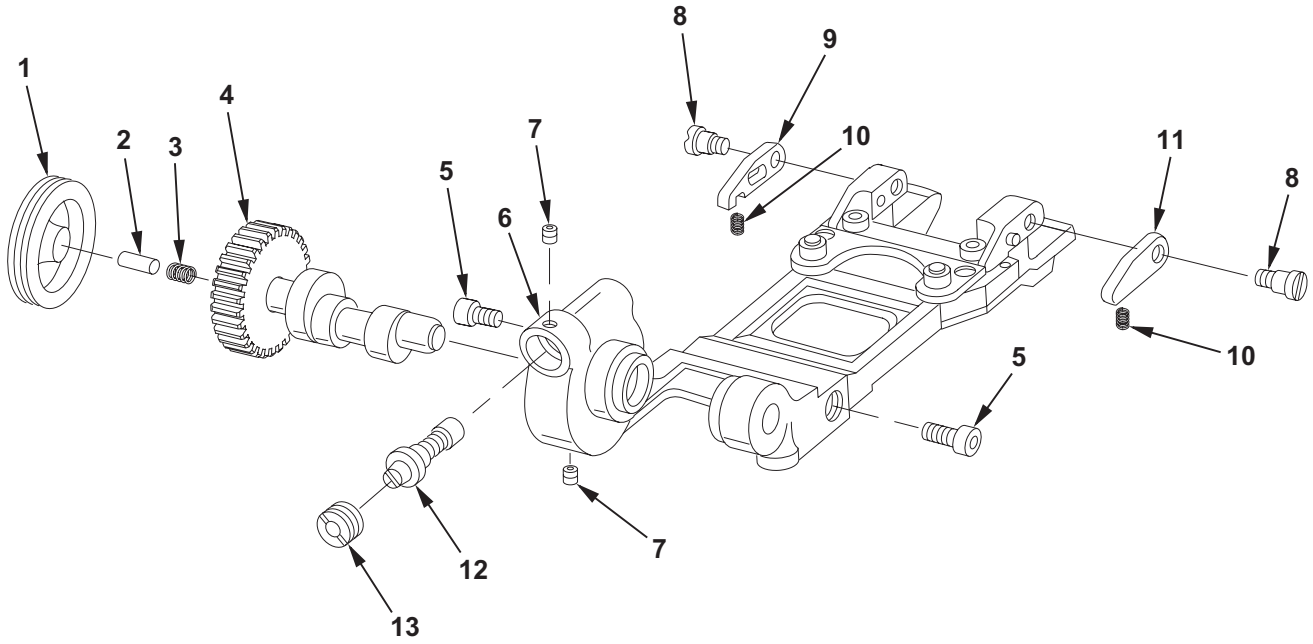



Figure 21. Telescope Mounting Bracket, 10554685.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 21. BRACKET, TELESCOPE MOUNTING 10554685 | |
| 1 | PAHZZ | 3110010470624 | 19200 | 11727757 | PLATE,RETAINING,BEA..... | 1 |
| 2 | PAHZZ | 5315009887409 | 96906 | MS16555-634 | PIN,STRAIGHT,HEADLE..... | 1 |
| 3 | PAHZZ | 5360010376448 | 96906 | MS24585-1025 | SPRING,HELICAL,COMP..... | 1 |
| 4 | PAHZZ | 3040010438293 | 19200 | 11727758 | GEARSHAFT,HELICAL..... | 1 |
| 5 | PAHZZ | 5305008343385 | 80205 | MS24673-17 | SCREW,CAP,SOCKET HE..... | 2 |
| 6 | XAHZZ | | 19200 | 10549069 | BRACKET,EYE,NONROTA..... | 1 |
| 7 | PAHZZ | 5305006559246 | 80205 | MS51021-10 | SETSCREW..... | 2 |
| 8 | PAHZZ | 5305010437326 | 19200 | 10554692 | SCREW,SHOULDER..... | 2 |
| 9 | PAHZZ | 5340010437501 | 19200 | 10549286 | LEVER,LOCK-RELEASE..... | 1 |
| 10 | PAHZZ | 5360009934647 | 96906 | MS24585C75 | SPRING,HELICAL,COMP..... | 2 |
| 11 | PAHZZ | 5340010439453 | 19200 | 10549278 | LEVER,LOCK-RELEASE..... | 1 |
| 12 | PAHZZ | 3040015184504 | 19200 | 13005086 | WORM SHAFT USED ON BOTH THE M172 AND M172A1..... | 1 |
| 13 | PAHZZ | 5365010561804 | 19200 | 10549070 | RING,EXTERNALLY THR..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M172/M172A1 TELESCOPE AND QUADRANT**
**(1240-01-037-7290/1240-01-517-2171)**

**ADAPTER ASSEMBLY**
**13005091**

**REPAIR PARTS LIST**

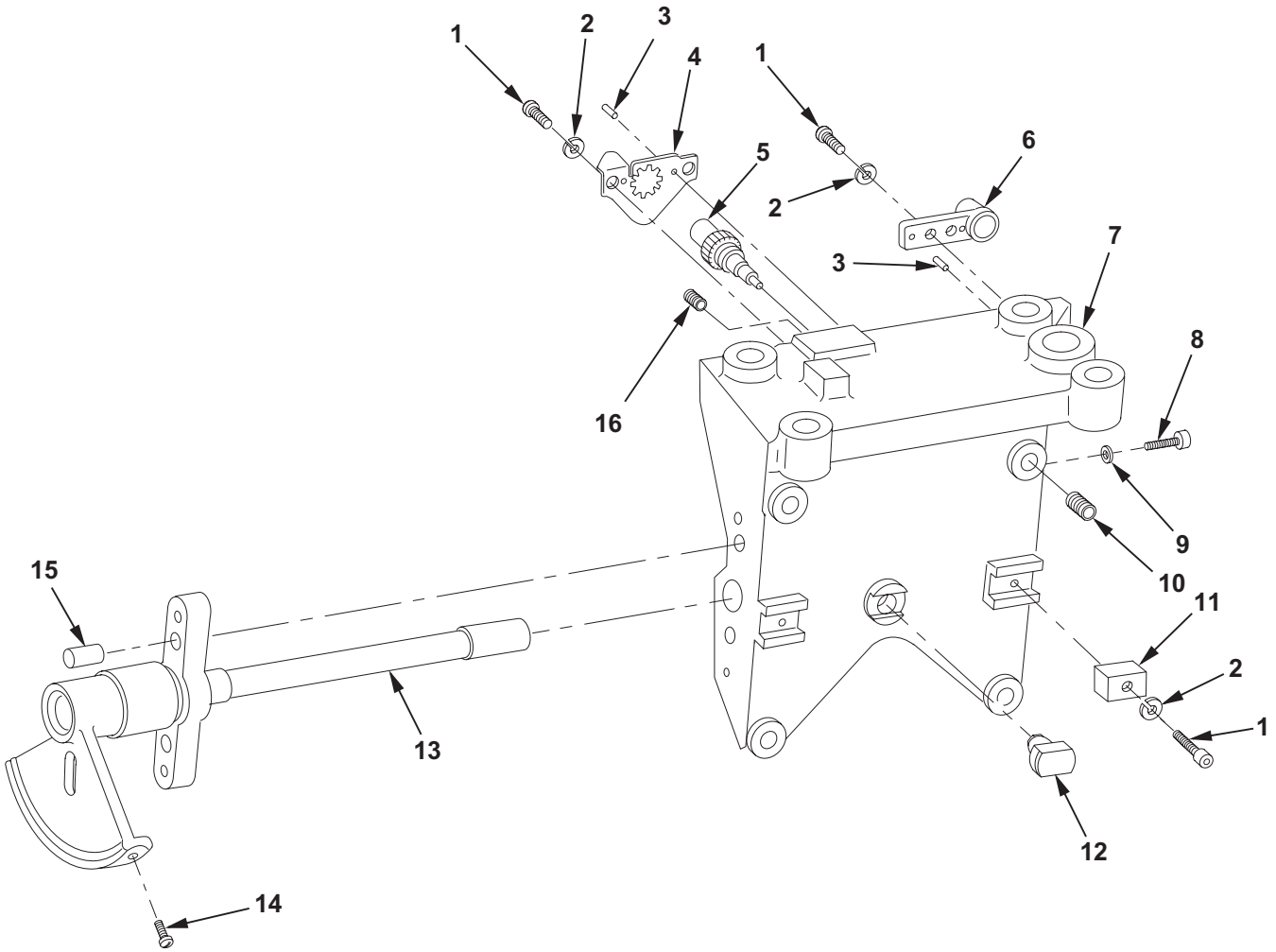



Figure 22. Adapter Assembly, 13005091.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 22. ADAPTER ASSEMBLY 13005091 | |
| 1 | PAFZZ | 5305008489282 | 96906 | MS24674-3 | SCREW,CAP,SOCKET HE..... | 6 |
| 2 | PAFZZ | 5310009338119 | 80205 | MS35338-137 | WASHER,LOCK..... | 6 |
| 3 | PAFZZ | 5315008100505 | 96906 | MS16555-628 | PIN,STRAIGHT,HEADLE..... | 4 |
| 4 | PAFZZ | 1240010438210 | 19200 | 10554818 | PLATE,SPLINE..... | 1 |
| 5 | PAFZZ | 1240010521979 | 19200 | 10554821 | STUD ASSEMBLY,ECCEN..... | 1 |
| 6 | PAFZZ | 1240010438197 | 19200 | 10554815 | PLATE,SPLINE..... | 1 |
| 7 | XAHZZ | | 19200 | 13005093 | ADAPTER,QUADRANT..... | 1 |
| 8 | PAHZZ | 5305009575897 | 96906 | MS24673-11 | SCREW,CAP,SOCKET HE..... | 2 |
| 9 | PAHZZ | 5310009338121 | 96906 | MS35338-139 | WASHER,LOCK..... | 2 |
| 10 | PAHZZ | 5325002913495 | 96906 | MS124697 | INSERT,SCREW THREAD USED ONLY ON THE M172 ADAPTER PN 11729607..... UOC:BN3 | 4 |
| 11 | PAFZZ | 5315010437428 | 19200 | 11727890 | KEY,MACHINE..... | 2 |
| 12 | XAHZZ | | 19200 | 11732206 | PIN,GROOVED,HEADED..... | 1 |
| 13 | XAHZZ | | 19200 | 13005092 | GEAR SECTOR,WORM WH..... | 1 |
| 14 | PAHZZ | 5305009409487 | 96906 | MS35275-225 | SCREW,MACHINE..... | 2 |
| 15 | XAHZZ | | 96906 | MS16555-646 | PIN,STRAIGHT,HEADLE..... | 2 |
| 16 | PAHZZ | 5325002904480 | 96906 | MS124735 | INSERT,SCREW THREAD USED ONLY ON THE M172 ADAPTER PN 11729607..... UOC:BN3 | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M137/M137A2/M137A3 PANORAMIC TELESCOPE (1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)

# M137/M137A2/M137A3 PANORAMIC TELESCOPE 11741101/12984713/12984775

**REPAIR PARTS LIST**

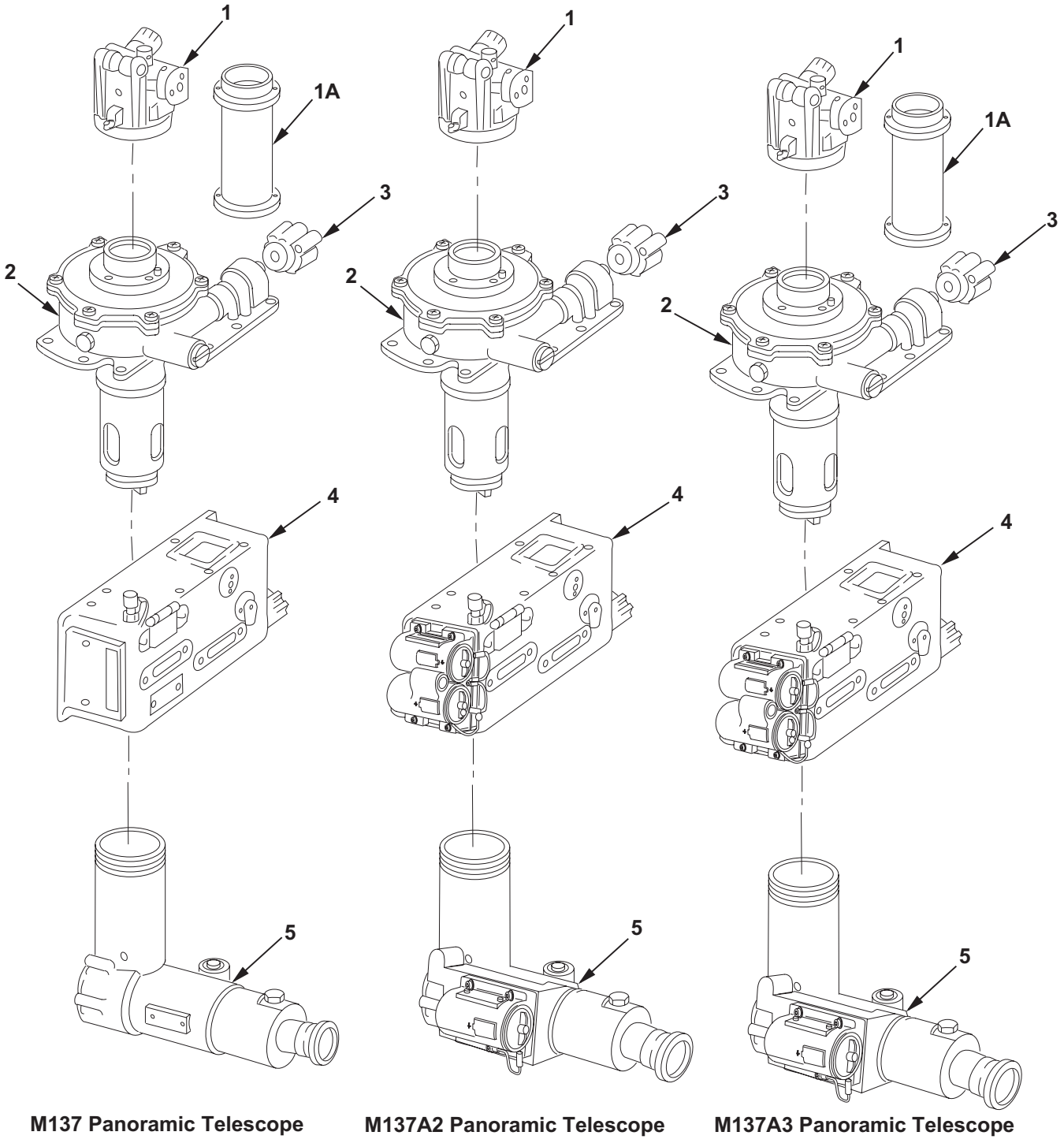



Figure 23. M137 Panoramic Telescope, 11741101; M137A2 Panoramic Telescope, 12984713; and M137A3 Panoramic Telescope, 12984775.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 23. TELESCOPE, PANORAMIC, M137 11741101; M137A2, 12984713; M137A3, 12984775 | |
| 1 | PAHDD | 1240010444561 | 19200 | 11741105 | HEAD ASSEMBLY,TELES USED ON M137, M137A2,M137A3 | |
| | | | | | SEE FIG 25 FOR ASSY BREAKDOWN..... | 1 |
| 1A | PAHHH | 6650010926476 | 19200 | 10554778 | SPACER,OPTICAL ELEM SEE FIG 27 FOR ASSY BREAKDOWN..... | 1 |
| | | | | | UOC:BH5,F42 | |
| 2 | PCHHL | 1240010628264 | 19200 | 11741202 | TELESCOPE SUBASSEMB USED ON M137 ONLY | |
| | | | | | SEE FIG 28 FOR ASSY BREAKDOWN..... | 1 |
| | | | | | UOC:F42 | |
| 2 | PAHDD | 1240014861345 | 19200 | 12961438 | TELESCOPE SUBASSEMB USED ON M137A2 AND M137A3 ONLY | |
| | | | | | SEE FIG 28 FOR ASSY BREAKDOWN..... | 1 |
| | | | | | UOC:BH5,BH6 | |
| 3 | PAFZZ | 5355008986791 | 19200 | 8587348 | KNOB ASSEMBLY..... | 1 |
| 4 | PCHDL | 1240010446915 | 19200 | 11741102-1 | COUNTER BOX ASSEMBL USED ON M137 ONLY | |
| | | | | | SEE FIG 32,33 AND 34 FOR ASSY BREAKDOWN..... | 1 |
| | | | | | UOC:F42 | |
| 4 | PAHDD | 1240014860293 | 19200 | 12984734 | COUNTER BOX ASSEMBL USED ON M137A2 AND M137A3 ONLY | |
| | | | | | SEE FIGS 32,33 AND 34 FOR ASSY BREAKDOWN..... | 1 |
| | | | | | UOC:BH5,BH6 | |
| 5 | PAHDD | 1240010439462 | 19200 | 11741201 | ELBOW ASSEMBLY,PAN USED ON M137 ONLY | |
| | | | | | SEE FIG 30 FOR ASSY BREAKDOWN..... | 1 |
| | | | | | UOC:F42 | |
| 5 | PAHDD | 1240014862738 | 19200 | 12984733 | ELBOW ASSEMBLY,PANT USED ON M137A2 AND M137A3 ONLY | |
| | | | | | SEE FIG 30 FOR ASSY BREAKDOWN..... | 1 |
| | | | | | UOC:BH5,BH6 | |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**11741101/12984713/12984775**
**PARTS**

**REPAIR PARTS LIST**

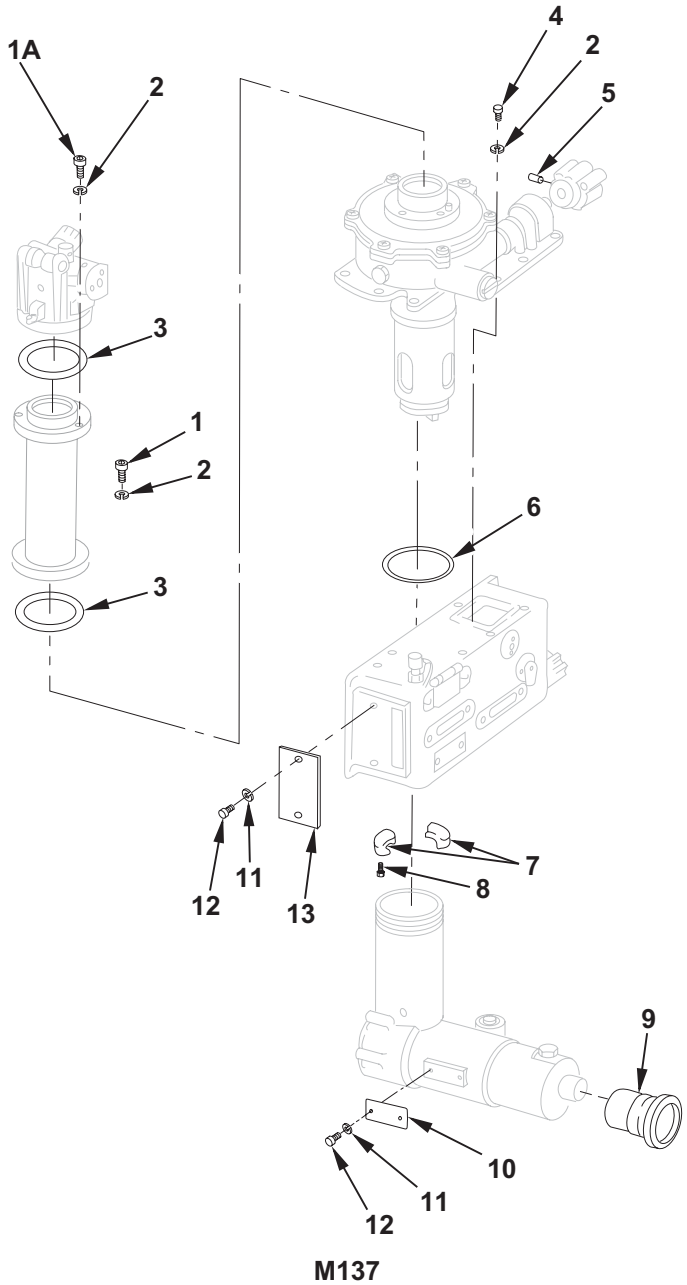



Figure 24. M137 Panoramic Telescope, 11741101; M137A2 Panoramic Telescope, 12984713; and M137A3 Panoramic Telescope, 12984775, Parts (Sheet 1 of 3).

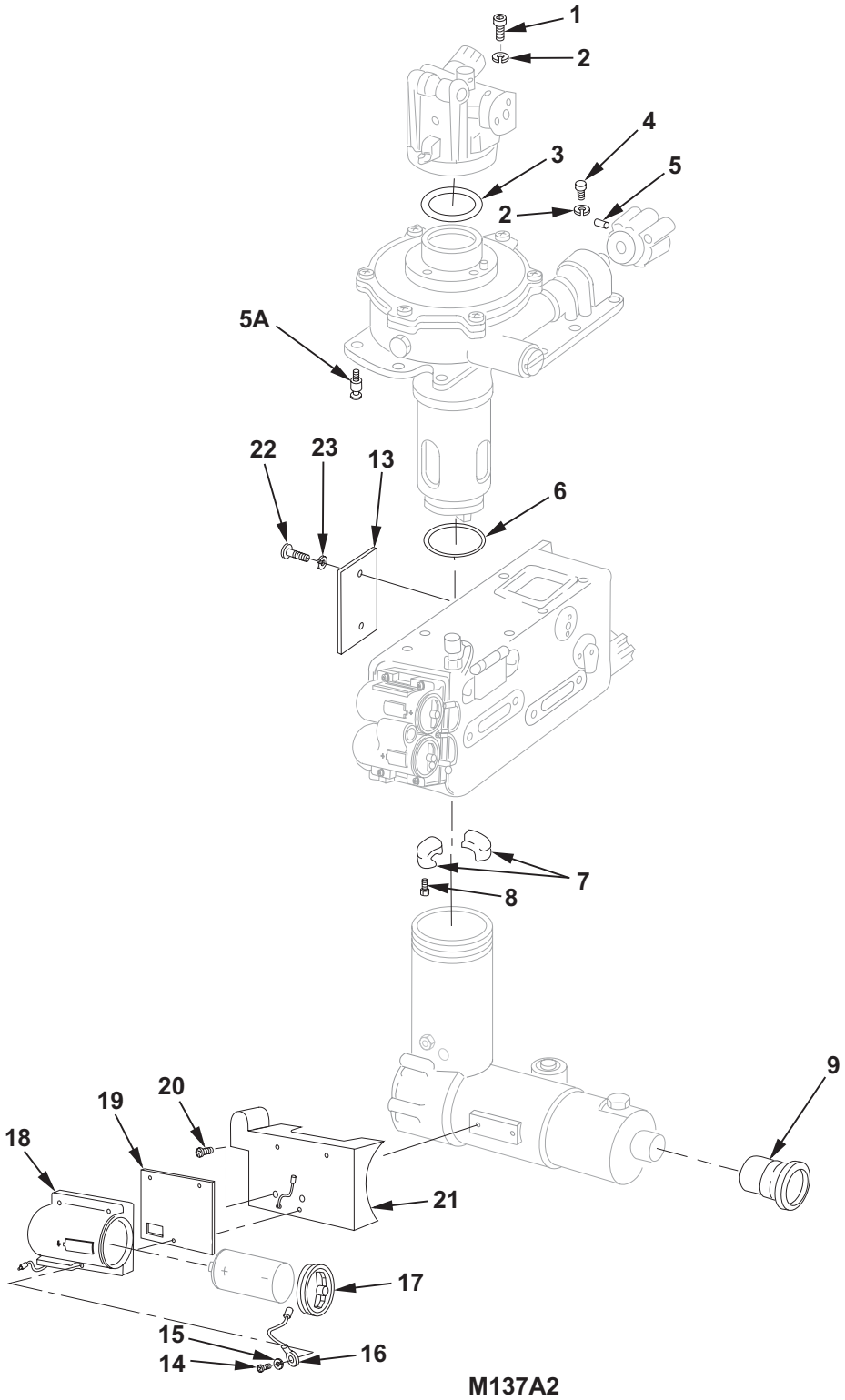



Figure 24. M137 Panoramic Telescope, 11741101; M137A2 Panoramic Telescope, 12984713; and M137A3 Panoramic Telescope, 12984775, Parts (Sheet 2 of 3).

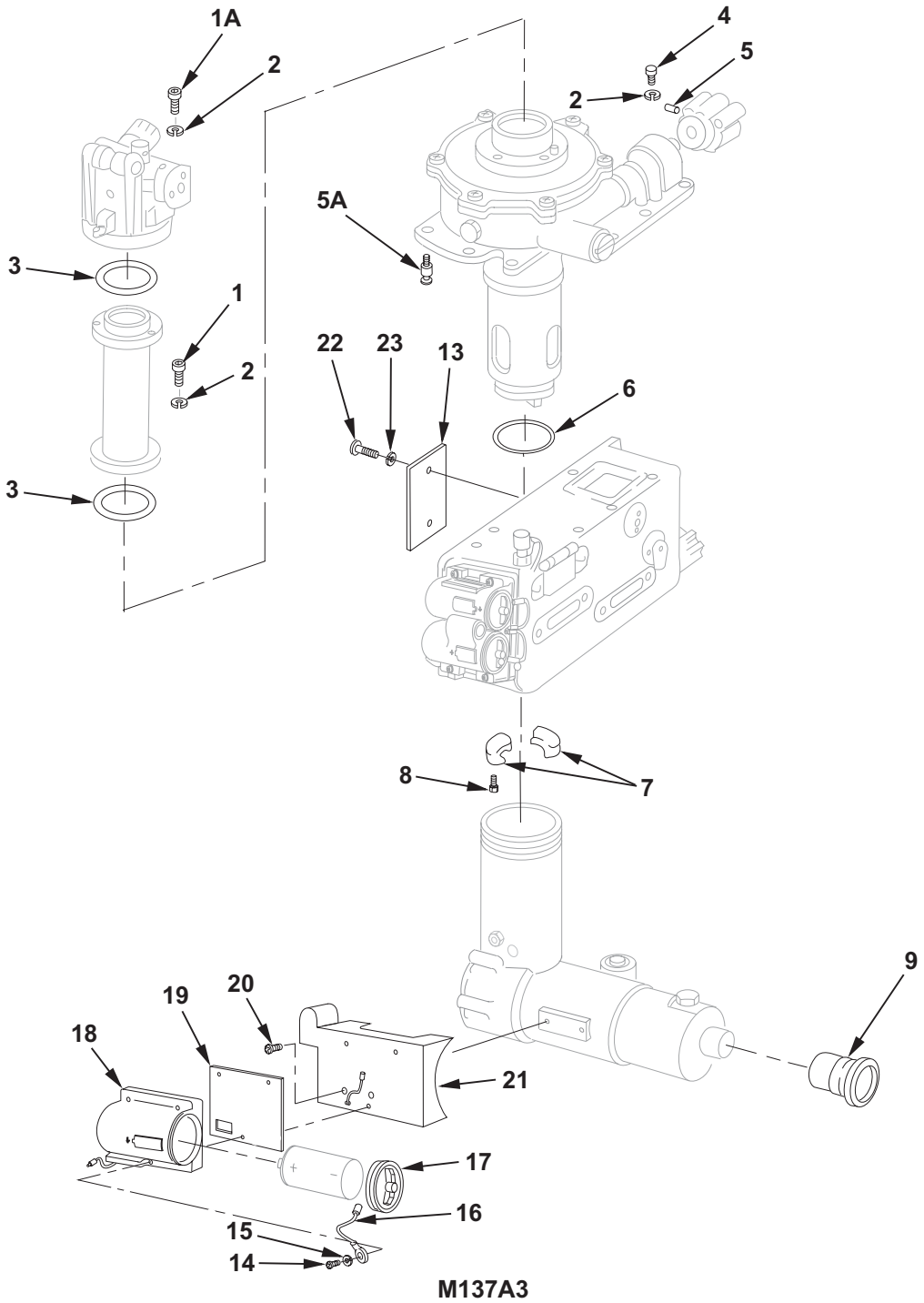



Figure 24. M137 Panoramic Telescope, 11741101; M137A2 Panoramic Telescope, 12984713; and M137A3 Panoramic Telescope, 12984775, Parts (Sheet 3 of 3).

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 24. TELESCOPE, PANORAMIC, M137 11741101; M137A2, 12984713; M137A3, 12984775 PARTS | |
| 1 | PAHZZ | 5305009887604 | 80205 | MS16995-28 | SCREW,CAP,SOCKET HE..... | 4 |
| 1A | PAHZZ | 5305009887602 | 80205 | MS16995-26 | SCREW,CAP,SOCKET HE USED ON M137 AND M137A3 ONLY..... UOC:BH5,F42 | 4 |
| 2 | PAHZZ | 5310009338119 | 80205 | MS35338-137 | WASHER,LOCK..... | 13 |
| 3 | PCHZZ | 5331005841582 | 81343 | AS3578-130 | O-RING..... UOC:BH6 | 1 |
| 3 | PCHZZ | 5331005841582 | 81343 | AS3578-130 | O-RING..... UOC:BH5,F42 | 2 |
| 4 | PAHZZ | 5305000546670 | 96906 | MS51957-45 | SCREW,MACHINE..... | 5 |
| 5 | PAFZZ | 5315008159366 | 80205 | MS16555-622 | PIN,STRAIGHT,HEADLE..... | 1 |
| 5A | PAOZZ | 5315015240124 | 19200 | 13005041 | PIN,QUICK RELEASE..... UOC:BH5,BH6 | 4 |
| 6 | PCHZZ | 5331014650909 | 81343 | AS3578-134 | O-RING..... | 1 |
| 7 | PAHZZ | 1240010439465 | 19200 | 11741182 | RETAINER,ELBOW..... | 2 |
| 8 | PAHZZ | 5305007015078 | 96906 | MS51959-65 | SCREW,MACHINE..... | 4 |
| 9 | PAOZZ | 1240010464258 | 19200 | 10554773 | EYESHIELD,OPTICAL I..... | 1 |
| 10 | PAFZZ | 9905002572756 | 19200 | 11741194 | PLATE,INSTRUCTION..... UOC:F42 | 1 |
| 11 | PAFZZ | 5310009282690 | 80205 | MS35338-134 | WASHER,LOCK..... UOC:F42 | 4 |
| 12 | PAFZZ | 5305000545635 | 96906 | MS51957-1 | SCREW,MACHINE..... UOC:F42 | 4 |
| 13 | PAFZZ | 9905010495129 | 19200 | 11741171 | PLATE,IDENTIFICATIO..... UOC:F42 | 1 |
| 13 | PAFZZ | 9905014857528 | 19200 | 12984738 | PLATE,IDENTIFICATIO..... UOC:BH6 | 1 |
| 13 | PAFZZ | 9905014857527 | 19200 | 12984776 | PLATE,IDENTIFICATIO..... UOC:BH5 | 1 |
| 14 | PAOZZ | 5305009591082 | 80205 | MS16995-18 | SCREW,MACHINE..... UOC:BH5,BH6 | 7 |
| 15 | PAOZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK..... UOC:BH5,BH6 | 7 |
| 16 | PAOZZ | 4010014643142 | 19200 | 12984664 | WIRE ROPE ASSEMBLY..... UOC:BH5,BH6 | 1 |
| 17 | PAOZZ | 5340014643141 | 19200 | 12984661 | CAP-PLUG,PROTECTIVE..... UOC:BH5,BH6 | 1 |
| 18 | PAOZZ | 6160014851914 | 19200 | 12984693 | COVER,BATTERY BOX..... UOC:BH5,BH6 | 1 |
| 19 | PAOZZ | 5330014853480 | 19200 | 12984698 | GASKET..... UOC:BH5,BH6 | 1 |
| 20 | PAOZZ | 5305007640071 | 80205 | MS51959-47 | SCREW,MACHINE..... UOC:BH5,BH6 | 2 |
| 21 | PAOZZ | 5935014857531 | 19200 | 12984719 | BRACKET,ELECTRICAL..... UOC:BH5,BH6 | 1 |
| 22 | PAFZZ | 5305000545636 | 96906 | MS51957-2 | SCREW,MACHINE..... UOC:BH5,BH6 | 2 |
| 23 | PAFZZ | 5310009282690 | 80205 | MS35338-134 | WASHER,LOCK..... UOC:BH5,BH6 | 2 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**HEAD ASSEMBLY**
**11741105**

**REPAIR PARTS LIST**

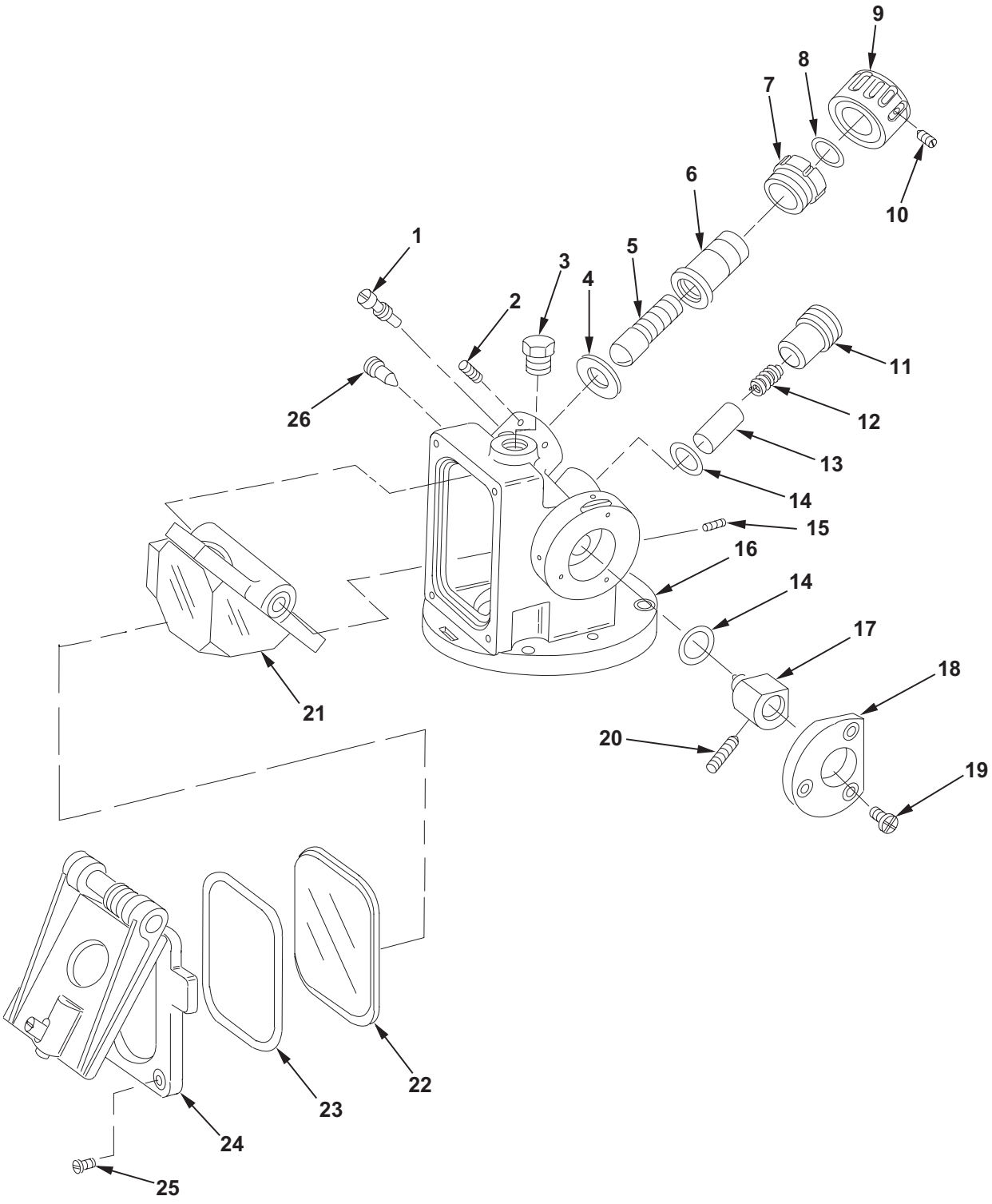



Figure 25. Head Assembly, 11741105.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 25. HEAD ASSEMBLY 11741105 | |
| 1 | PAHZZ | 5305010468323 | 19200 | 10556183 | SCREW,EXTERNALLY RE..... | 1 |
| 2 | PAHZZ | 5305008432841 | 80205 | MS51021-1 | SETSCREW..... | 1 |
| 3 | PAFZZ | 4820010530223 | 19200 | 10556186 | VALVE,SAFETY RELIEF..... | 1 |
| 4 | PAHZZ | 5310011402500 | 19200 | 8626196 | WASHER,FLAT..... | 1 |
| 5 | XBHZZ | | 19200 | 10554774 | PLUNGER..... | 1 |
| 6 | XBHZZ | | 19200 | 8626201 | ACTUATOR,TELESCOPE..... | 1 |
| 7 | XBHZZ | | 19200 | 8626199 | BUSHING,MACHINE THR..... | 1 |
| 8 | PAFZZ | 5331005582310 | 81343 | AS3578-013 | O-RING..... | 1 |
| 9 | PAFZZ | 5355010836241 | 19200 | 8626195 | KNOB..... | 1 |
| 10 | PAFZZ | 5305005767266 | 80205 | MS51021-22 | SETSCREW..... | 2 |
| 11 | PAHZZ | 5365010521298 | 19200 | 11741236 | PLUG,MACHINE THREAD..... | 1 |
| 12 | PAHZZ | 5360010455461 | 96906 | MS24585-1067 | SPRING,HELICAL,COMP..... | 1 |
| 13 | XBHZZ | | 19200 | 11741235 | PLUNGER..... | 1 |
| 14 | PAHZZ | 5331002483836 | 81343 | AS29513-12 | O-RING..... | 2 |
| 15 | PAHZZ | 5305005435832 | 80205 | MS51021-11 | SETSCREW..... | 4 |
| 16 | XAHZZ | | 19200 | 11741106 | HOUSING,HEAD..... | 1 |
| 17 | XBHZZ | | 19200 | 11741174 | PIVOT,PRISM..... | 1 |
| 18 | PAHZZ | 9905014511585 | 19200 | 11741234 | COVER,PLATE..... | 1 |
| 19 | PAHZZ | 5305007702533 | 96906 | MS51959-13 | SCREW,MACHINE..... | 3 |
| 20 | PAHZZ | 5340010480791 | 19200 | 10549273-3 | PLUNGER,QUICK RELEA..... | 1 |
| 21 | PAHZZ | 6650010478287 | 19200 | 11741121 | PRISM,OPTICAL INSTR..... | 1 |
| 22 | PAHZZ | 1240000699363 | 19200 | 8626291 | WINDOW,OPTICAL INST..... | 1 |
| 23 | PAHZZ | 5330000699361 | 19200 | 8626228 | SEAL,NONMETALLIC RO..... | 1 |
| 24 | PAHHH | 1240010444560 | 19200 | 11741126 | COVER ASSEMBLY SEE FIG 26 FOR ASSY BREAKDOWN..... | 1 |
| 25 | PAHZZ | 5305007637822 | 96906 | MS51959-14 | SCREW,MACHINE..... | 4 |
| 26 | XBHZZ | | 19200 | 11741233 | PIVOT,PRISM..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**COVER ASSEMBLY**
**11741126**

**REPAIR PARTS LIST**

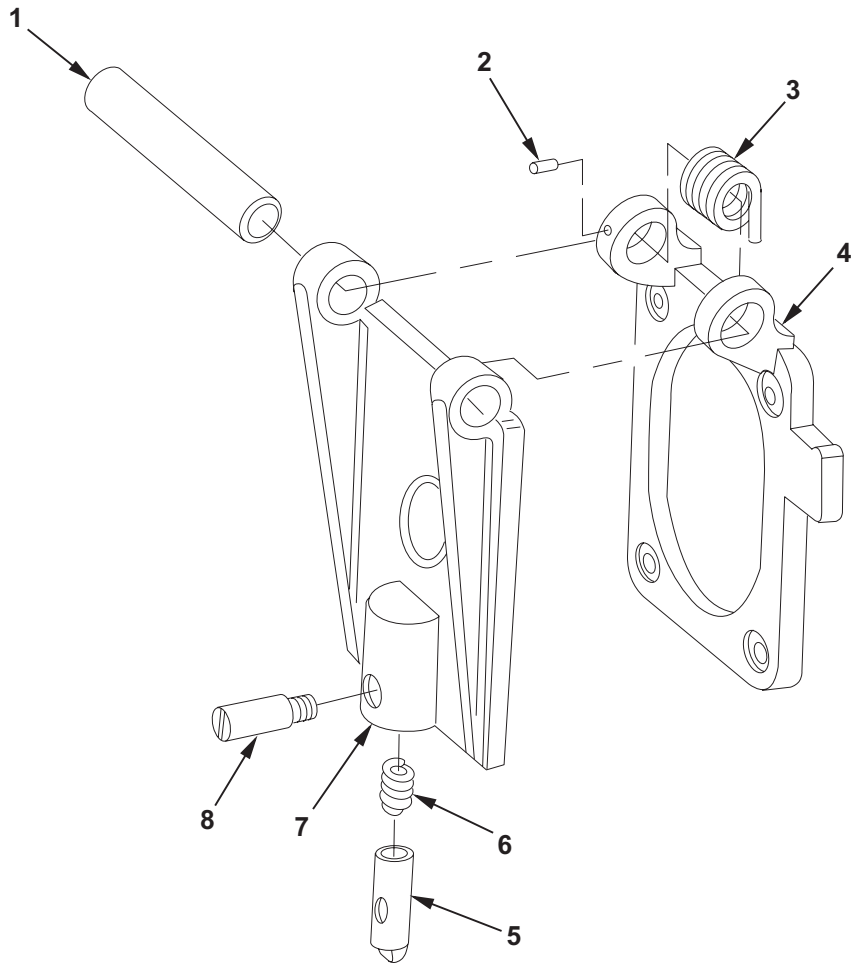



Figure 26. Cover Assembly, 11741126.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 26. COVER ASSEMBLY 11741126 | |
| 1 | PAFZZ | 5315010491390 | 19200 | 8626226 | PIN,STRAIGHT,HEADLE..... | 1 |
| 2 | PAFZZ | 5315008475677 | 96906 | MS16555-626 | PIN,STRAIGHT,HEADLE..... | 1 |
| 3 | PAFZZ | 5360009336573 | 19200 | 8626227 | SPRING,HELICAL,TORS..... | 1 |
| 4 | XAFZZ | | 19200 | 11741173 | RETAINER..... | 1 |
| 5 | PAFZZ | 3040009378289 | 19200 | 8626297 | DETENT PLATE..... | 1 |
| 6 | PAFZZ | 5360008936095 | 19200 | 8262100 | SPRING,HELICAL,COMP..... | 1 |
| 7 | XAFZZ | | 19200 | 11741120 | COVER PLATE..... | 1 |
| 8 | PAFZZ | 5340007641669 | 19200 | 8262098 | POST,ELECTRICAL-MEC..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**OPTICAL ELEMENT SPACER**
**10554778**

**REPAIR PARTS LIST**

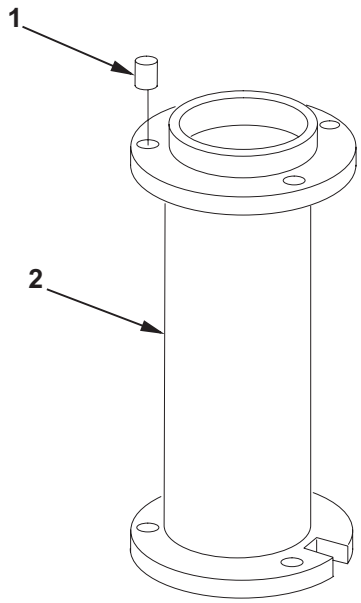



Figure 27. Optical Element Spacer, 10554778.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 27. SPACER, OPTICAL ELEMENT 10554778 | |
| 1 | PAHZZ | 5315009887409 | 96906 | MS16555-634 | PIN,STRAIGHT,HEADLE.....<br>UOC:BH5,F42 | 1 |
| 2 | XAHZZ | | 19200 | 10554778-1 | SPACER, TELESCOPE HEAD.....<br>UOC:BH5,F42 | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M137/M137A2/M137A3 PANORAMIC TELESCOPE (1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)

**TELESCOPE SUBASSEMBLY, M137**
**11741202**
**AND**
**TELESCOPE SUBASSEMBLY, M137A2/M137A3**
**12961438**

**REPAIR PARTS LIST**

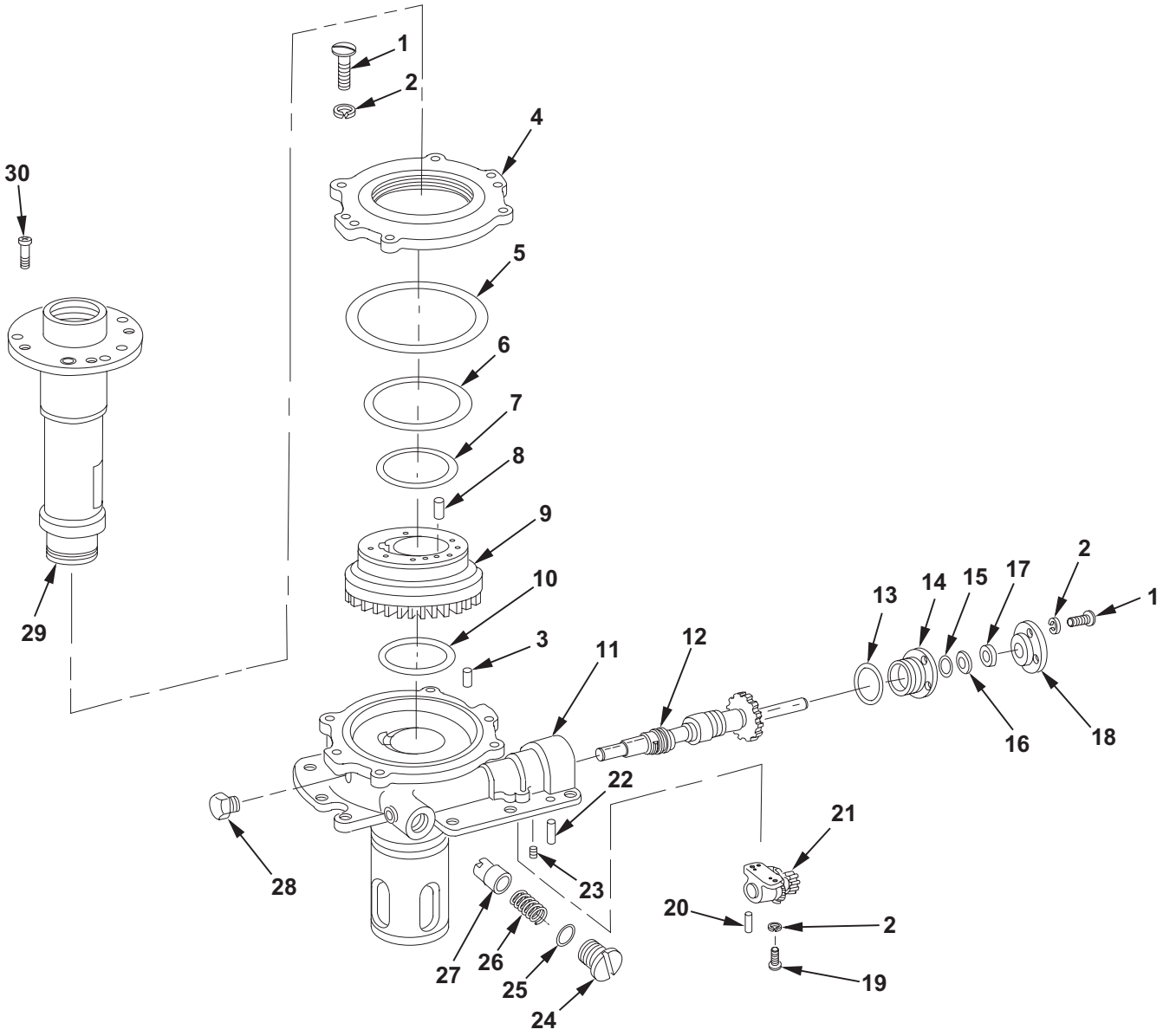



Figure 28. Telescope Subassembly, M137, 11741202, and Telescope Subassembly, M137A2/M137A3, 12961438.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 28. TELESCOPE SUBASSEMBLY M137, 11741202; M137A2 AND M137A3, 12961438 | |
| 1 | PAHZZ | 5305000546654 | 96906 | MS51957-30 | SCREW,MACHINE..... | 9 |
| 2 | PAHZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK..... | 11 |
| 3 | PAHZZ | 5315008251207 | 80205 | MS16555-627 | PIN,STRAIGHT,HEADLE..... | 2 |
| 4 | PAHZZ | 5330010475724 | 19200 | 11741123 | RETAINER,PACKING..... | 1 |
| 5 | PCHZZ | 5331008511020 | 19200 | 8615998 | O-RING..... | 1 |
| 6 | PCHZZ | 5330015232319 | 19200 | 13005078 | SEAL,NONMETALLIC RO..... | 1 |
| 7 | PCHZZ | 5330015232320 | 19200 | 13005077 | SEAL,NONMETALLIC RO..... | 1 |
| 8 | PAHZZ | 5315001766116 | 96906 | MS16555-636 | PIN,STRAIGHT,HEADLE..... | 1 |
| 9 | PAHZZ | 3020015094226 | 19200 | 11741203 | GEAR,WORM WHEEL..... | 1 |
| 10 | PCHZZ | 5331010078595 | 81343 | MS28775-130 | O-RING..... | 1 |
| 11 | XAHZZ | | 19200 | 11741107 | HOUSING BODY, WORM GEAR..... | 1 |
| 12 | PAHZZ | 1240010460896 | 19200 | 11741186 | WORM SHAFT ASSEMBLY..... | 1 |
| 13 | PCHZZ | 5331005313714 | 81343 | AS3578-216 | O-RING..... | 1 |
| 14 | XBHZZ | | 19200 | 11741652 | CAP, WORM SHAFT..... | 1 |
| 15 | PCHZZ | 5331005802278 | 81343 | AS3578-010 | O-RING..... | 1 |
| 16 | PAHZZ | 5310001503792 | 19200 | 10553927 | WASHER,RECESSED..... | 1 |
| 17 | PAHZZ | 5310001503708 | 19200 | 10553928 | WASHER,SPRING TENSI..... | 1 |
| 18 | PAHZZ | 1240010446917 | 19200 | 10554781 | PLATE,M137 TEL PAN..... | 1 |
| 19 | PAHZZ | 5305000546652 | 96906 | MS51957-28 | SCREW,MACHINE..... | 2 |
| 20 | PAHZZ | 5315007029651 | 96906 | MS16555-618 | PIN,STRAIGHT,HEADLE..... | 2 |
| 21 | PAHZZ | 1240010439464 | 19200 | 11741191 | GEAR ASSEMBLY..... | 1 |
| 22 | PAHZZ | 5315000569386 | 96906 | MS16555-640 | PIN,STRAIGHT,HEADLE..... | 2 |
| 23 | PAHZZ | 5305010437710 | 80205 | MS51021-101 | SETSCREW..... | 1 |
| 24 | PAHZZ | 5365010502177 | 19200 | 10555110 | PLUG,MACHINE THREAD..... | 1 |
| 25 | PCHZZ | 5331014493292 | 81343 | AS3578-016 | O-RING..... | 1 |
| 26 | PAHZZ | 5360010468830 | 19200 | 11741160 | SPRING,HELICAL,COMP..... | 1 |
| 27 | PAHZZ | 5340009277290 | 19200 | 8587432 | PLUNGER,DETENT..... | 1 |
| 28 | PAFZZ | 4820010530223 | 19200 | 10556186 | VALVE,SAFETY RELIEF..... | 1 |
| 29 | PCHDD | 1240010439463 | 19200 | 11741200 | OBJECTIVE AND RETIC USED ON M137 ONLY | |
| | | | | | SEE FIG 29 FOR ASSY BREAKDOWN..... UOC:F42 | 1 |
| 29 | PAHDD | 1240014860296 | 19200 | 12961437 | OBJECTIVE AND RETIC USED ON M137A2 AND M137A3 ONLY | |
| | | | | | SEE FIG 29 FOR ASSY BREAKDOWN..... UOC:BH5,BH6 | 1 |
| 30 | PAHZZ | 5305007640068 | 80205 | MS51959-45 | SCREW,MACHINE..... | 4 |

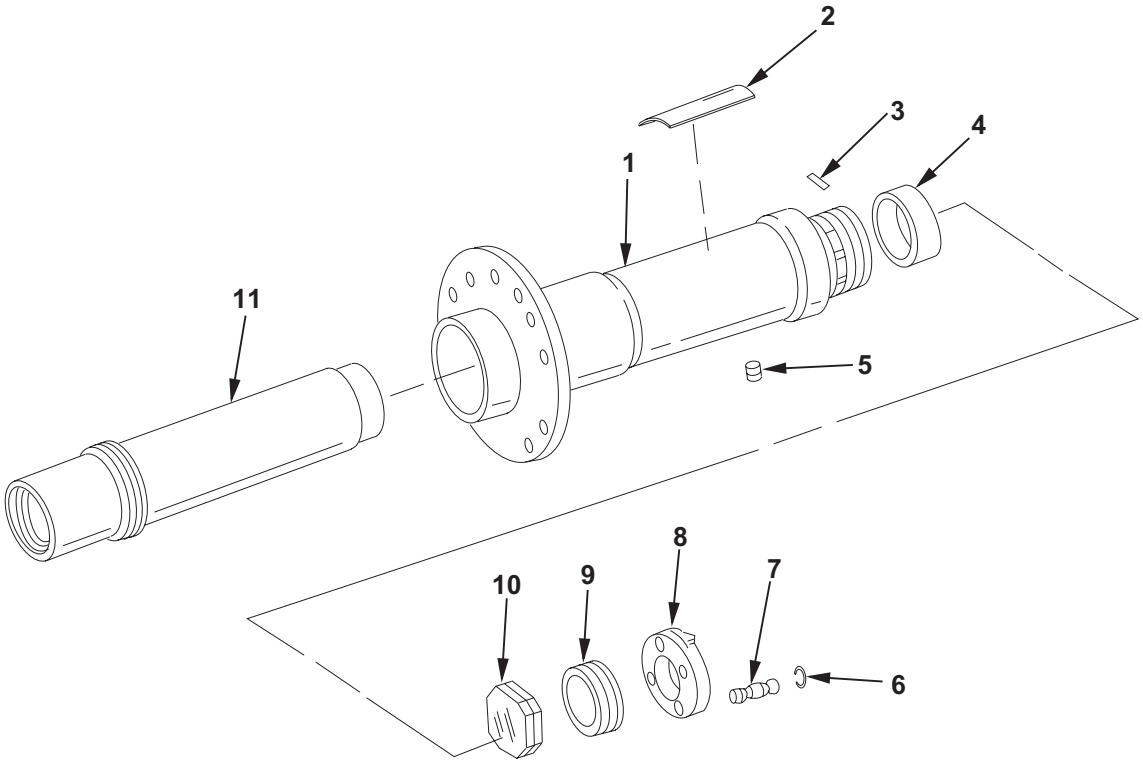
END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

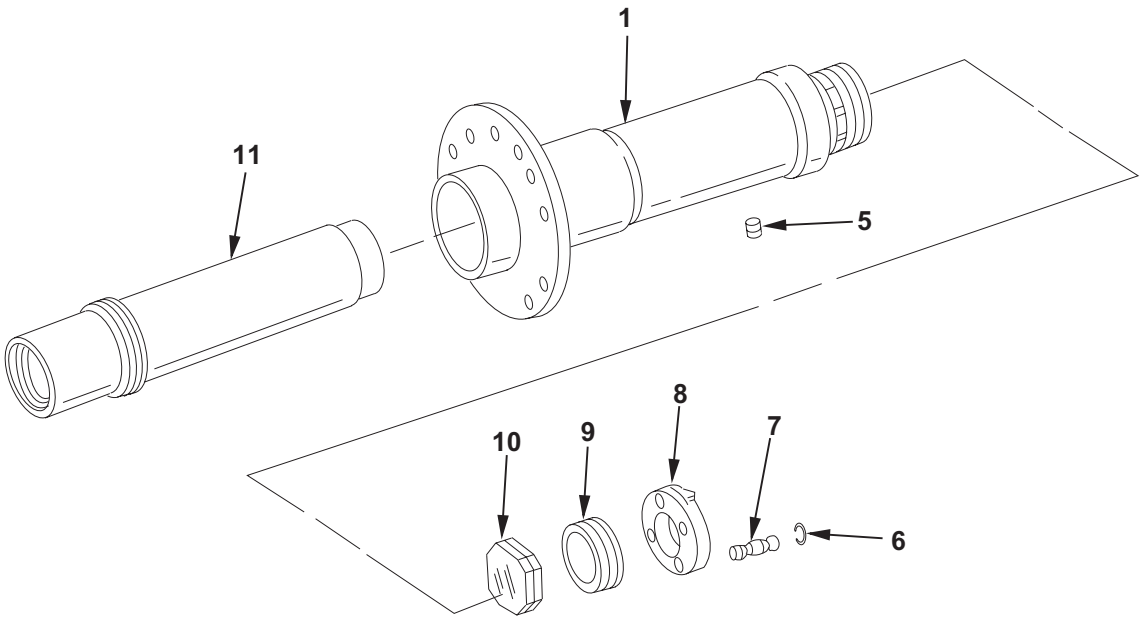
**OBJECTIVE AND RETICLE ASSEMBLY, M137**
**11741200**
**AND**
**OBJECTIVE AND RETICLE ASSEMBLY, M137A2/M137A3**
**12961437**

**REPAIR PARTS LIST**




**M137**

Figure 29. Objective and Reticle Assembly, M137, 11741200, and Objective and Reticle Assembly, M137A2/M137A3, 12961437 (Sheet 1 of 2).




M137A2/M137A3

Figure 29. Objective and Reticle Assembly, M137, 11741200, and Objective and Reticle Assembly, M137A2/M137A3, 12961437 (Sheet 2 of 2).

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 29. OBJECTIVE AND RETICLE ASSEMBLY M137, 11741200; M137A2 AND M137A3, 12961437 | |
| 1 | XADZZ | | 19200 | 11741108 | ADAPTER,CELL..... | 1 |
| 2 | PADZZ | 9905010695632 | 19200 | 10556184 | PLATE,IDENTIFICATIO USED ON M137 ONLY..... UOC:F42 | 1 |
| 3 | PCDZA | 6260010519606 | 19200 | 11729515 | LAMP,NUCLEAR USED ON M137 ONLY..... UOC:F42 | 4 |
| 4 | PADZZ | 5365010447070 | 19200 | 11741240 | BUSHING,NONMETALLIC USED ON M137 ONLY..... UOC:F42 | 1 |
| 5 | PADZZ | 5305008007261 | 80205 | MS51021-9 | SETSCREW..... | 1 |
| 6 | PAHZZ | 5325005433981 | 96906 | MS16633-4009 | RING,RETAINING..... | 2 |
| 7 | PADZZ | 5315010480650 | 19200 | 11741207 | PIN,GROOVED,HEADLES..... | 2 |
| 8 | PAHZZ | 1240010444557 | 19200 | 11741178 | COUPLING,CELL ASSEM..... | 1 |
| 9 | PADZZ | 1240010468377 | 19200 | 11741208 | RETAINER,OPTICAL EL..... | 1 |
| 10 | PADZZ | 6650010479214 | 19200 | 11741180 | RETICLE,OPTICAL INS..... | 1 |
| 11 | XADZZ | | 19200 | 11741188 | CELL, OPTICAL ELEMENT..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**ELBOW TELESCOPE, M137**
**11741201**
**AND**
**ELBOW TELESCOPE, M137A2/M137A3**
**12984733**

**REPAIR PARTS LIST**

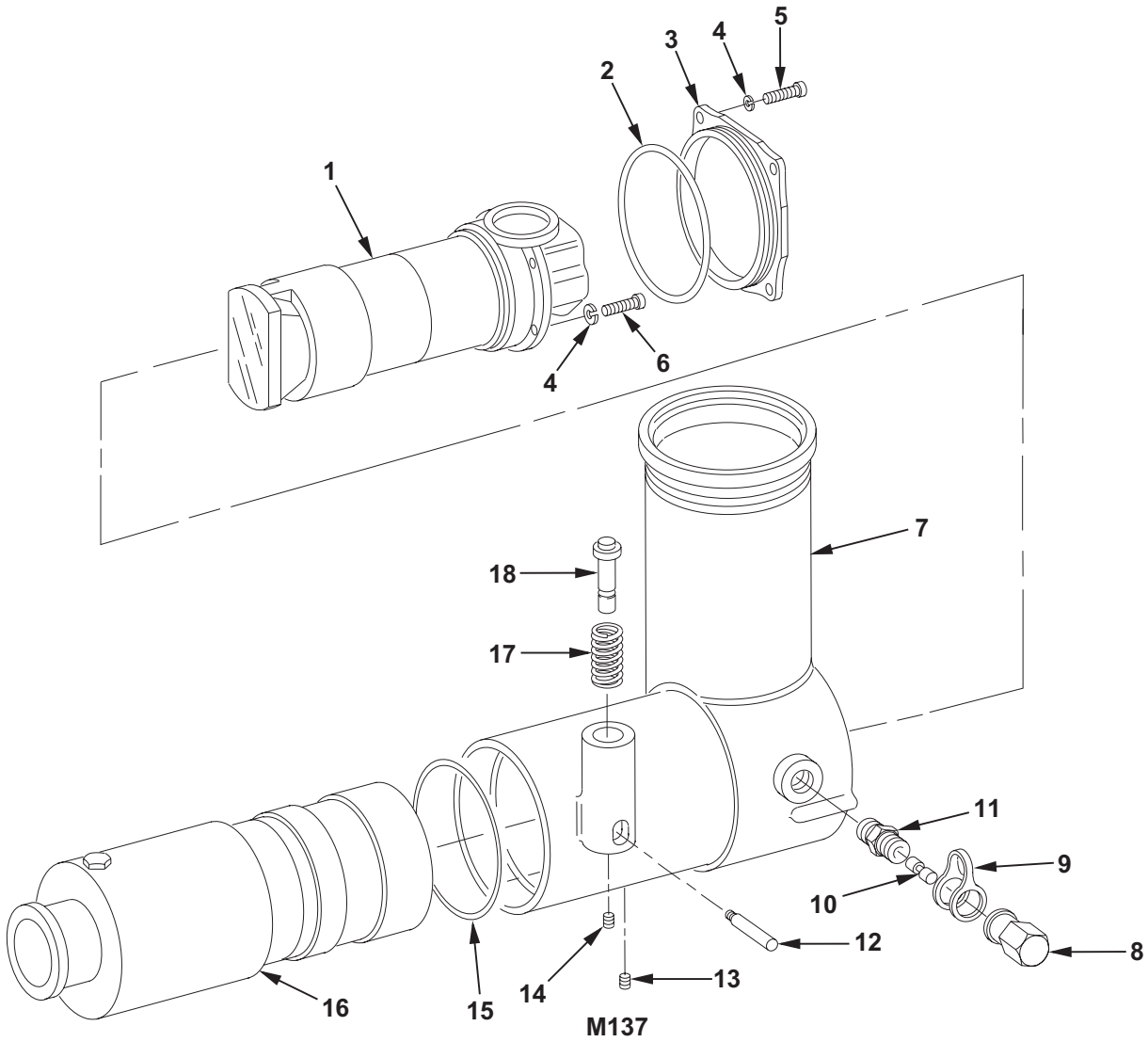



Figure 30. Elbow Assembly, M137, 11741201, and Elbow Assembly, M137A2/M137A3, 12984733 (Sheet 1 of 2).

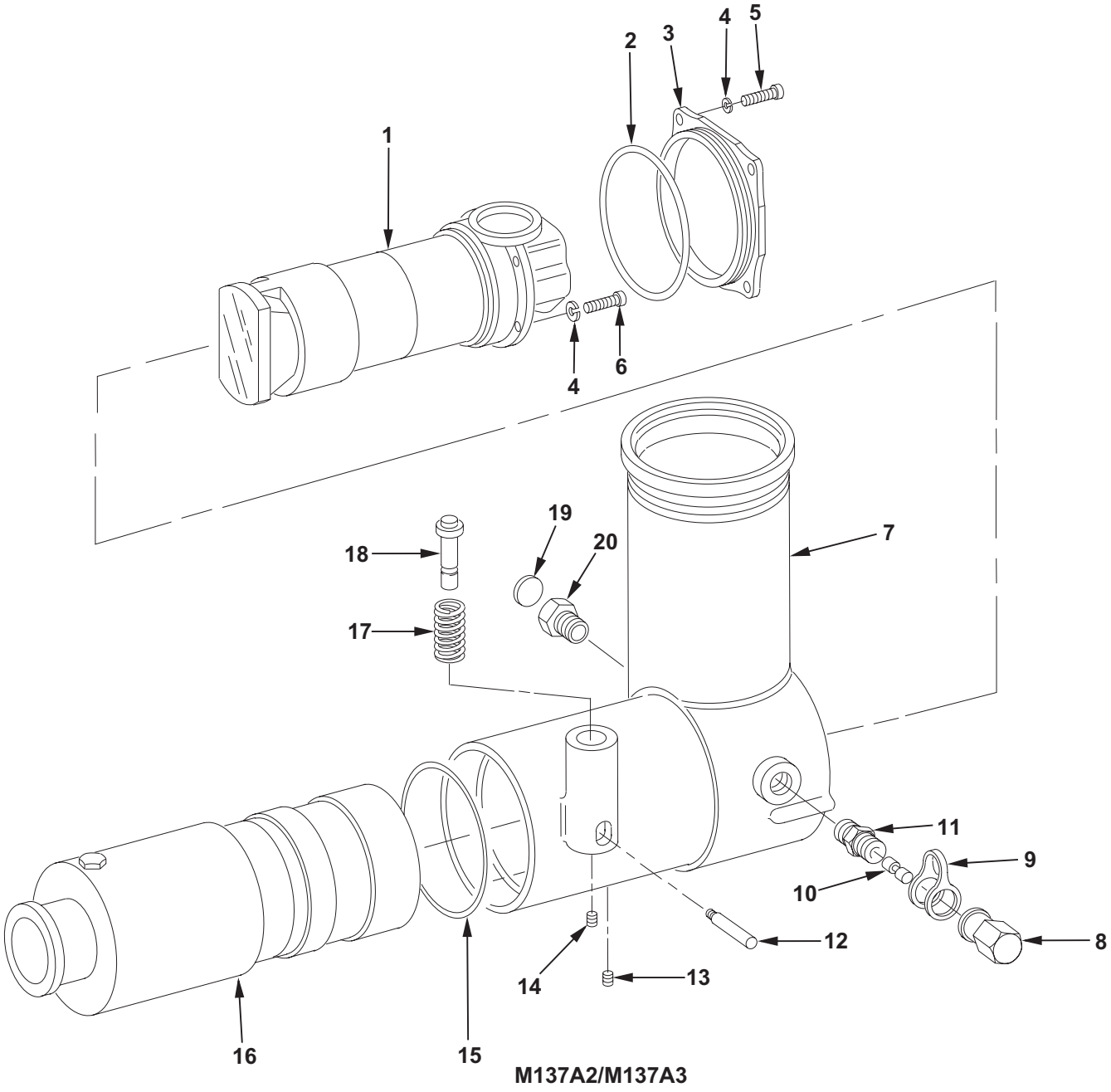



Figure 30. Elbow Assembly, M137, 11741201, and Elbow Assembly, M137A2/M137A3, 12984733 (Sheet 2 of 2).

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 30. ELBOW ASSEMBLY M137, 11741201; M137A2 AND M137A3, 12984733 | |
| 1 | XAHZZ | | 19200 | 11741110 | CELL ASSEMBLY,OPTIC (ADAPTER)..... | 1 |
| 2 | PCHZZ | 5331014712403 | 81343 | AS3578-140 | O-RING..... | 1 |
| 3 | PAHZZ | 5340012449855 | 19200 | 11741179 | COVER,ACCESS ELBOW..... | 1 |
| 4 | PAHZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK..... | 8 |
| 5 | PAHZZ | 5305000546653 | 96906 | MS51957-29 | SCREW,MACHINE..... | 4 |
| 6 | PAHZZ | 5305009591082 | 80205 | MS16995-18 | SCREW,MACHINE..... | 4 |
| 7 | XAHZZ | | 19200 | 11741135 | ELBOW TELESCOPE USED ON M137 ONLY.. UOC:F42 | 1 |
| 7 | XAHZZ | | 19200 | 12961441 | ELBOW TELESCOPE USED ON M137A2 AND M137A3 ONLY..... UOC:BH5,BH6 | 1 |
| 8 | PAOZZ | 4820012350223 | 19200 | 8200055 | CAP,AIR VALVE..... | 1 |
| 9 | PAFZZ | 5340004644792 | 19200 | 10516567 | STRAP,RETAINING..... | 1 |
| 10 | PAOZZ | 2640000603543 | 96906 | MS51377-2 | VALVE CORE..... | 1 |
| 11 | PAFZZ | 4820001141096 | 96906 | MS51607-1 | STEM,FLUID VALVE..... | 1 |
| 12 | PAFZZ | 1240010444556 | 19200 | 11741196 | LEVER,PLUNGER RELEA..... | 1 |
| 13 | PAHZZ | 5305008007261 | 80205 | MS51021-9 | SETSCREW..... | 2 |
| 14 | PAFZZ | 5305008205433 | 96906 | MS51023-10 | SETSCREW..... | 1 |
| 15 | PAHZZ | 5331002526050 | 81343 | AS29513-138 | O-RING..... | 1 |
| 16 | PAHHD | 6650012642348 | 19200 | 11741137 | CELL ASSEMBLY,OPTIC SEE FIG 31 FOR ASSY BREAKDOWN..... | 1 |
| 17 | PAFZZ | 5360010439541 | 19200 | 11741198 | SPRING,HELICAL,COMP..... | 1 |
| 18 | PAFZZ | 5340010439476 | 19200 | 11741197 | PLUNGER,DETENT..... | 1 |
| 19 | PADZZ | 1240014857536 | 19200 | 12984716 | WINDOW,OPTICAL INST..... UOC:BH5,BH6 | 1 |
| 20 | PADZZ | 1240014857530 | 19200 | 12984717 | RETAINER,OPTICAL EL..... UOC:BH5,BH6 | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**OPTICAL CELL ASSEMBLY**
**11741137**

**REPAIR PARTS LIST**

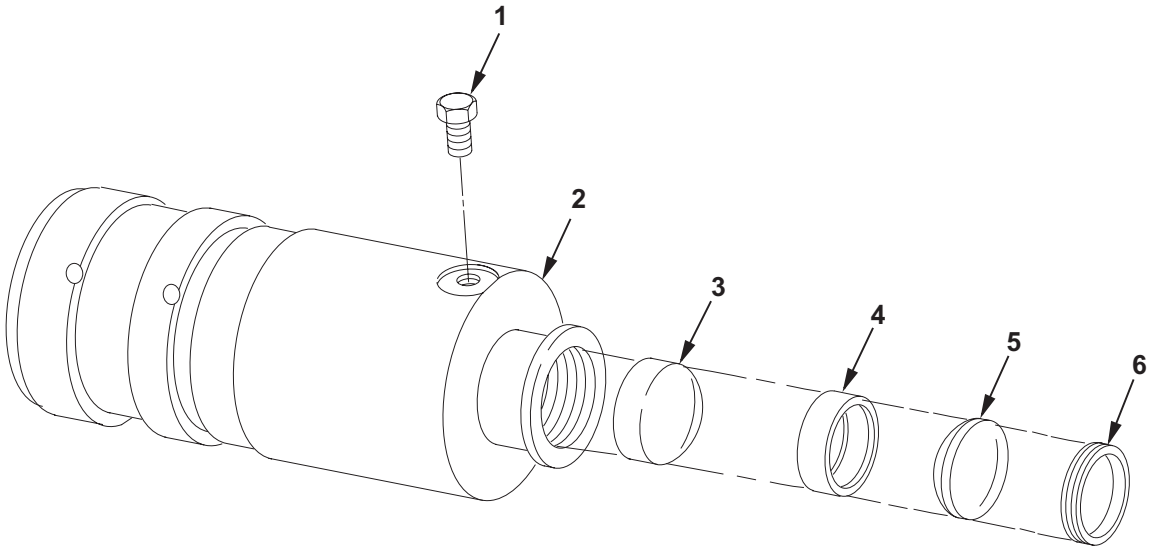



Figure 31. Optical Cell Assembly, 11741137.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 31. CELL ASSEMBLY, OPTICAL 11741137 | |
| 1 | PAFZZ | 4820010530223 | 19200 | 10556186 | VALVE,SAFETY RELIEF..... | 1 |
| 2 | XAHZZ | | 19200 | 11741133 | CELL, OPTICAL ELEMENT..... | 1 |
| 3 | PAHZZ | 6650005049915 | 19200 | 5049915 | LENS,OPTICAL INSTRU..... | 1 |
| 4 | XBHZZ | | 19200 | 8626233 | SPACER,OPTICAL ELEM..... | 1 |
| 5 | PAHZZ | 6650005049914 | 19200 | 5049914 | LENS,OPTICAL INSTRU..... | 1 |
| 6 | PAHZZ | 5365001773931 | 19200 | 8626258 | RING,EXTERNALLY THR..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**COUNTER BOX ASSEMBLY, M137**
**11741102-1**
**AND**
**COUNTER BOX ASSEMBLY, M137A2/M137A3**
**12984734**
**EXTERNAL PARTS**

**REPAIR PARTS LIST**

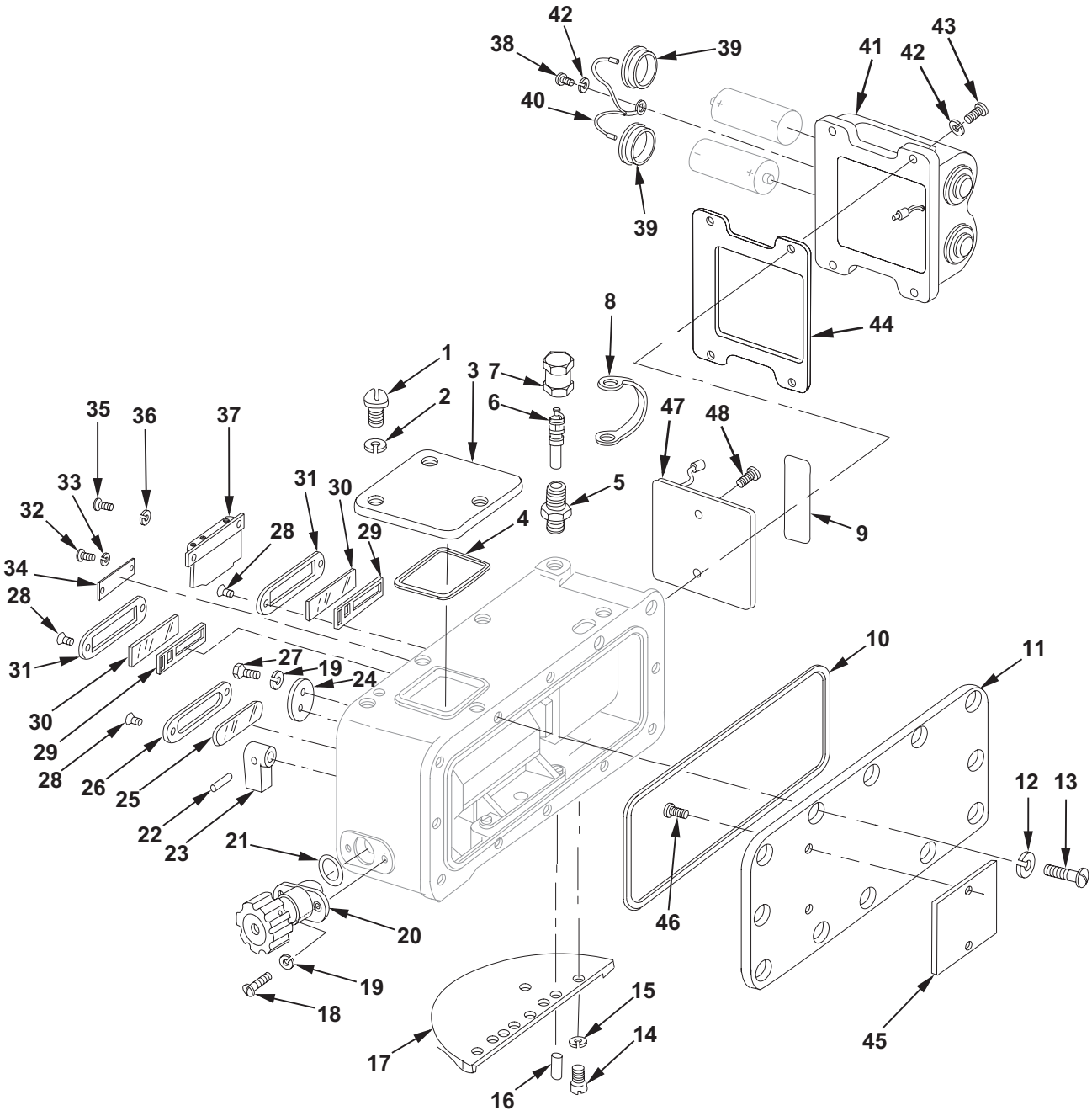



Figure 32. Counter Box Assembly, M137, 11741102-1, and Counter Box Assembly, M137A2/M137A3, 12984734, External Parts.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 32. COUNTER BOX ASSEMBLY M137 11741102; M137A2 AND M137A3, 12984734, EXTERNAL PARTS | |
| 1 | PAHZZ | 5305000546670 | 96906 | MS51957-45 | SCREW,MACHINE (FOR SHIPPING ONLY).. | 3 |
| 2 | PAHZZ | 5310009338119 | 80205 | MS35338-137 | WASHER,LOCK (FOR SHIPPING ONLY).... | 3 |
| 3 | PAHZZ | 5340010439312 | 19200 | 11741230 | COVER,ACCESS (FOR SHIPPING ONLY)... | 1 |
| 4 | PCHZZ | 5330010520009 | 19200 | 11741209 | SEAL,NONMETALLIC SP (FOR SHIPPING ONLY)..... | 1 |
| 5 | PAFZZ | 4820001141096 | 96906 | MS51607-1 | STEM,FLUID VALVE..... | 1 |
| 6 | PAOZZ | 2640000603543 | 96906 | MS51377-2 | VALVE CORE..... | 1 |
| 7 | PAOZZ | 4820012350223 | 19200 | 8200055 | CAP,AIR VALVE..... | 1 |
| 8 | PAFZZ | 5340004644792 | 19200 | 10516567 | STRAP,RETAINING..... | 1 |
| 9 | PAOZZ | 7690002572746 | 19200 | 11731011 | DECAL USED ON M137 ONLY DISPOSAL INSTRUCTIONS TRITIUM INSTRUMENTS..... UOC:F42 | 1 |
| 10 | PAHZZ | 5330010450718 | 19200 | 11741172 | GASKET..... | 1 |
| 11 | XBHZZ | | 19200 | 11741161 | COVER, COUNTER HOUSING..... | 1 |
| 12 | PAHZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK..... | 12 |
| 13 | PAHZZ | 5305000546651 | 96906 | MS51957-27 | SCREW,MACHINE..... | 12 |
| 14 | PAHZZ | 5305000546651 | 96906 | MS51957-27 | SCREW,MACHINE USED AT GS LEVEL FOR M137..... UOC:F42 | 16 |
| 14 | PAFZZ | 5305000546651 | 96906 | MS51957-27 | SCREW,MACHINE USED AT DS LEVEL FOR M137A2 AND M137A3..... UOC:BH5,BH6 | 4 |
| 15 | PAHZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK USED AT GS LEVEL FOR M137..... UOC:F42 | 4 |
| 15 | PAFZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK USED AT DS LEVEL FOR M137A2 AND M137A3..... UOC:BH5,BH6 | 4 |
| 16 | PAHZZ | 5315009408033 | 81343 | MS9390-290 | PIN,STRAIGHT,HEADLE USED AT GS LEVEL FOR M137..... UOC:F42 | 2 |
| 16 | PAFZZ | 5315009408033 | 81343 | MS9390-290 | PIN,STRAIGHT,HEADLE USED AT DS LEVEL FOR M137A2 AND M137A3..... UOC:BH5,BH6 | 2 |
| 17 | PBFZZ | 5340014857534 | 19200 | 12961439 | STOP,MECHANICAL USED AT DS LEVEL FOR M137A2 AND M137A3..... UOC:BH5,BH6 | 1 |
| 17 | PBHZZ | 5340010468343 | 19200 | 10554777 | PLATE,STOP USED AT GS LEVEL FOR M137..... UOC:F42 | 1 |
| 18 | PAHZZ | 5305000545647 | 96906 | MS51957-13 | SCREW,MACHINE..... | 4 |
| 19 | PAHZZ | 5310009338118 | 80205 | MS35338-135 | WASHER,LOCK..... | 4 |
| 20 | PAHZZ | 1240010444558 | 19200 | 11741164 | KNOB ASSEMBLY..... | 1 |
| 21 | PAHZZ | 5331005841222 | 81343 | AS3578-015 | O-RING..... | 1 |
| 22 | PAFZZ | 5315008067040 | 96906 | MS16555-620 | PIN,STRAIGHT,HEADLE..... | 1 |
| 23 | PAFZZ | 5355010463761 | 19200 | 11741146 | KNOB..... | 1 |
| 24 | PAHZZ | 5340010437380 | 19200 | 10556190 | COVER,ACCESS..... | 1 |

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| 25 | PAHZZ | 6650000664999 | 19200 | 8626400 | WINDOW,OPTICAL INST..... | 1 |
| 26 | PAHZZ | 5340010496190 | 19200 | 11741155 | PLATE,RETAINING,WIN..... | 1 |
| 27 | PAHZZ | 5305010718747 | 96906 | MS90402-1 | SCREW,EXTERNALLY RE..... | 2 |
| 28 | PAHZZ | 5305007776039 | 96906 | MS51959-12 | SCREW,MACHINE..... | 6 |
| 29 | PAHZZ | 1240010467104 | 19200 | 10555186 | MASK,WINDOW..... | 2 |
| 30 | PAHZZ | 1240010447056 | 19200 | 10555155 | WINDOW,OPTICAL INST..... | 2 |
| 31 | PAHZZ | 5340010447069 | 19200 | 11741154 | PLATE,RETAINING,WIN..... | 2 |
| 32 | PAFZZ | 5305000545635 | 96906 | MS51957-1 | SCREW,MACHINE USED ON M137 ONLY.... UOC:F42 | 2 |
| 33 | PAFZZ | 5310009282690 | 80205 | MS35338-134 | WASHER,LOCK USED ON M137 ONLY..... UOC:F42 | 2 |
| 34 | PAFZZ | 9905002572750 | 19200 | 11729582 | PLATE,INSTRUCTION USED ON M137 ONLY UOC:F42 | 1 |
| 35 | PAFZZ | 5305000546652 | 96906 | MS51957-28 | SCREW,MACHINE..... | 2 |
| 36 | PAFZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK..... | 2 |
| 37 | PAFFF | 1240010444559 | 19200 | 11741163 | COVER ASSEMBLY SEE FIG 35 FOR ASSY BREAKDOWN..... | 1 |
| 38 | PAOZZ | 5305000546650 | 96906 | MS51957-26 | SCREW,MACHINE USED ON M137A2 AND M137A3 ONLY..... UOC:BH5,BH6 | 1 |
| 39 | PAOZZ | 5340014643141 | 19200 | 12984661 | CAP-PLUG,PROTECTIVE USED ON M137A2 AND M137A3 ONLY..... UOC:BH5,BH6 | 2 |
| 40 | PAOZZ | 5340014857535 | 19200 | 12984751 | STRAP,RETAINING USED ON M137A2 AND M137A3 ONLY..... UOC:BH5,BH6 | 1 |
| 41 | PAOZZ | 6160014857533 | 19200 | 12984725 | BATTERY BOX USED ON M137A2 AND M137A3 ONLY..... UOC:BH5,BH6 | 1 |
| 42 | PAOZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK USED ON M137A2 AND M137A3 ONLY..... UOC:BH5,BH6 | 5 |
| 43 | PAOZZ | 5305009591082 | 80205 | MS16995-18 | SCREW,MACHINE USED ON M137A2 AND M137A3 ONLY..... UOC:BH5,BH6 | 4 |
| 44 | PAOZZ | 5330014858715 | 19200 | 12984723 | GASKET USED ON M137A2 AND M137A3 ONLY..... UOC:BH5,BH6 | 1 |
| 45 | PAHZZ | 5365015172168 | 19200 | 13005052 | SPACER,PLATE USED ON M137A2 AND M137A3 ONLY..... UOC:BH5,BH6 | 1 |
| 46 | PAHZZ | 5305007702533 | 80205 | MS51959-13 | SCREW,MACHINE USED ON M137A2 AND M137A3 ONLY..... UOC:BH5,BH6 | 2 |
| 47 | PADZZ | 5340015232317 | 19200 | 12984726 | PLATE,MOUNTING USED ON M137A2, M137A3..... UOC:BH5,BH6 | 1 |
| 48 | PADZZ | 5305007640066 | 96906 | MS51959-44 | SCREW,MACHINE USED ON M137A2,M137A3 UOC:BH5,BH6 | 2 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**COUNTER BOX ASSEMBLY, M137**
**11741102-1**
**AND**
**COUNTER BOX ASSEMBLY, M137A2/M137A3**
**12984734**
**PARTS**

**REPAIR PARTS LIST**

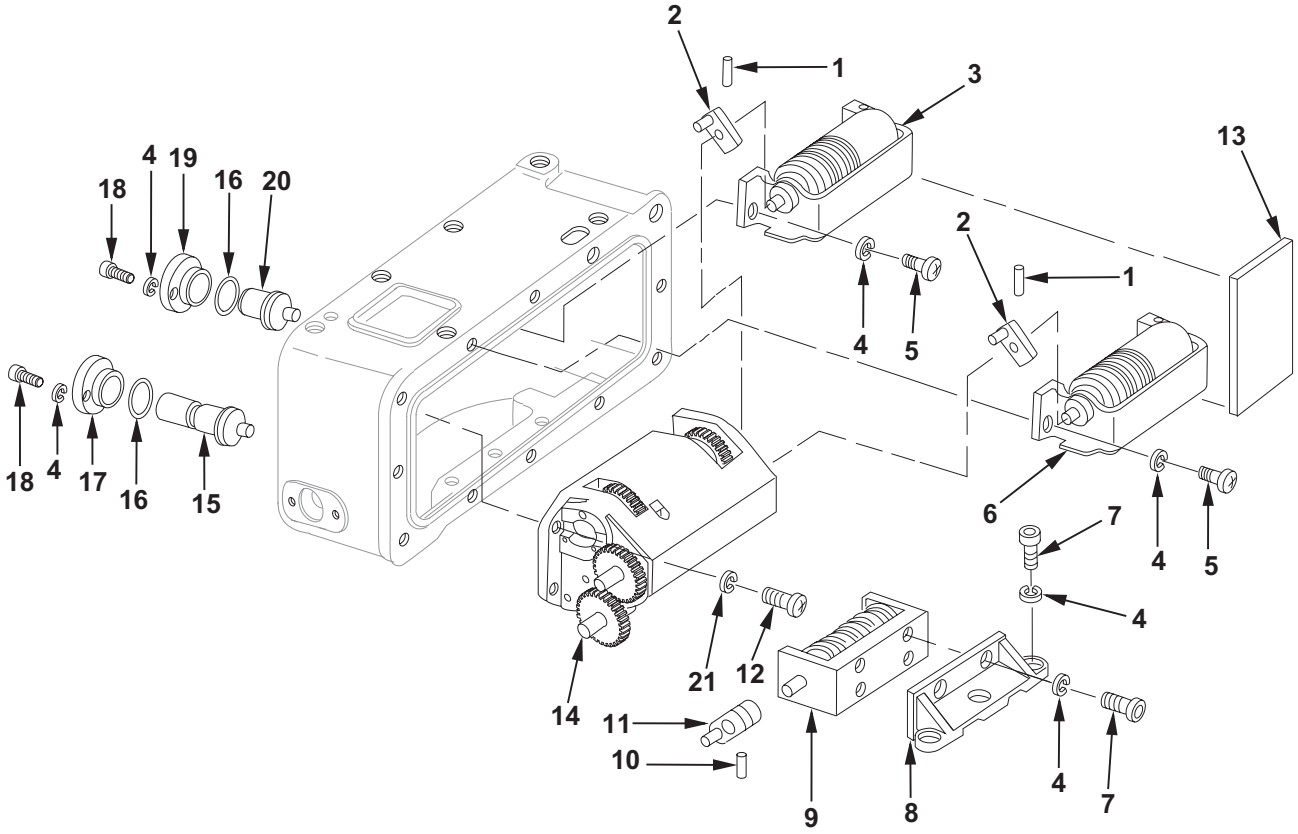



Figure 33. Counter Box Assembly, M137, 11741102-1, and Counter Box Assembly, M137A2/M137A3, 12984734, Parts.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 33. COUNTER BOX ASSEMBLY M137 11741102; M137A2 AND M137A3, 12984734, PARTS | |
| 1 | PAHZZ | 5315007029651 | 96906 | MS16555-618 | PIN,STRAIGHT,HEADLE..... | 2 |
| 2 | XBHZZ | | 19200 | 11741229 | COUPLING..... | 2 |
| 3 | PAHZZ | 6680010518404 | 19200 | 11741118-1 | COUNTER,ROTATING..... | 1 |
| 4 | PAHZZ | 5310009338118 | 80205 | MS35338-135 | WASHER,LOCK..... | 15 |
| 5 | PAHZZ | 5305000545649 | 96906 | MS51957-15 | SCREW,MACHINE..... | 4 |
| 6 | PAHZZ | 6680011000775 | 19200 | 11741118-2 | COUNTER,ROTATING..... | 1 |
| 7 | PAHZZ | 5305009590379 | 80205 | MS16995-10 | SCREW,CAP,SOCKET HE..... | 7 |
| 8 | XBHZZ | | 19200 | 11741111 | MOUNT,COUNTER..... | 1 |
| 9 | PAHZZ | 6680010492865 | 19200 | 11741119 | COUNTER,ROTATING..... | 1 |
| 10 | PAHZZ | 5315008067039 | 96906 | MS16555-604 | PIN,STRAIGHT,HEADLE..... | 1 |
| 11 | XBHZZ | | 19200 | 11741228 | COUPLING,RESET..... | 1 |
| 12 | PAHZZ | 5305000546653 | 96906 | MS51957-29 | SCREW,MACHINE..... | 3 |
| 13 | PAHZZ | 9530015220697 | 19200 | 12999464 | BAR,METAL..... UOC:BH5,BH6 | 1 |
| 14 | PAHZZ | 3020010444562 | 19200 | 11741103 | GEAR,BLOCK ASSEMBLY OPTICAL ELEMENT | 1 |
| 15 | PAHZZ | 1240010439460 | 19200 | 11741224 | ECCENTRIC,PAN TEL..... | 1 |
| 16 | PCHZZ | 5331005840265 | 81343 | MS28775-012 | O-RING..... | 2 |
| 17 | PAHZZ | 1240010659829 | 19200 | 11741147 | STOP..... | 1 |
| 18 | PAHZZ | 5305000545647 | 96906 | MS51957-13 | SCREW,MACHINE..... | 1 |
| 19 | PAHZZ | 1240010659826 | 19200 | 10556189 | STOP..... | 1 |
| 20 | PAHZZ | 1240010439461 | 19200 | 11741223 | ECCENTRIC,PAN TEL..... | 1 |
| 21 | PAHZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK..... | 3 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**COUNTER BOX ASSEMBLY, M137**
**11741102-1**
**AND**
**COUNTER BOX ASSEMBLY, M137A2/M137A3**
**12984734**
**INTERNAL PARTS**

**REPAIR PARTS LIST**

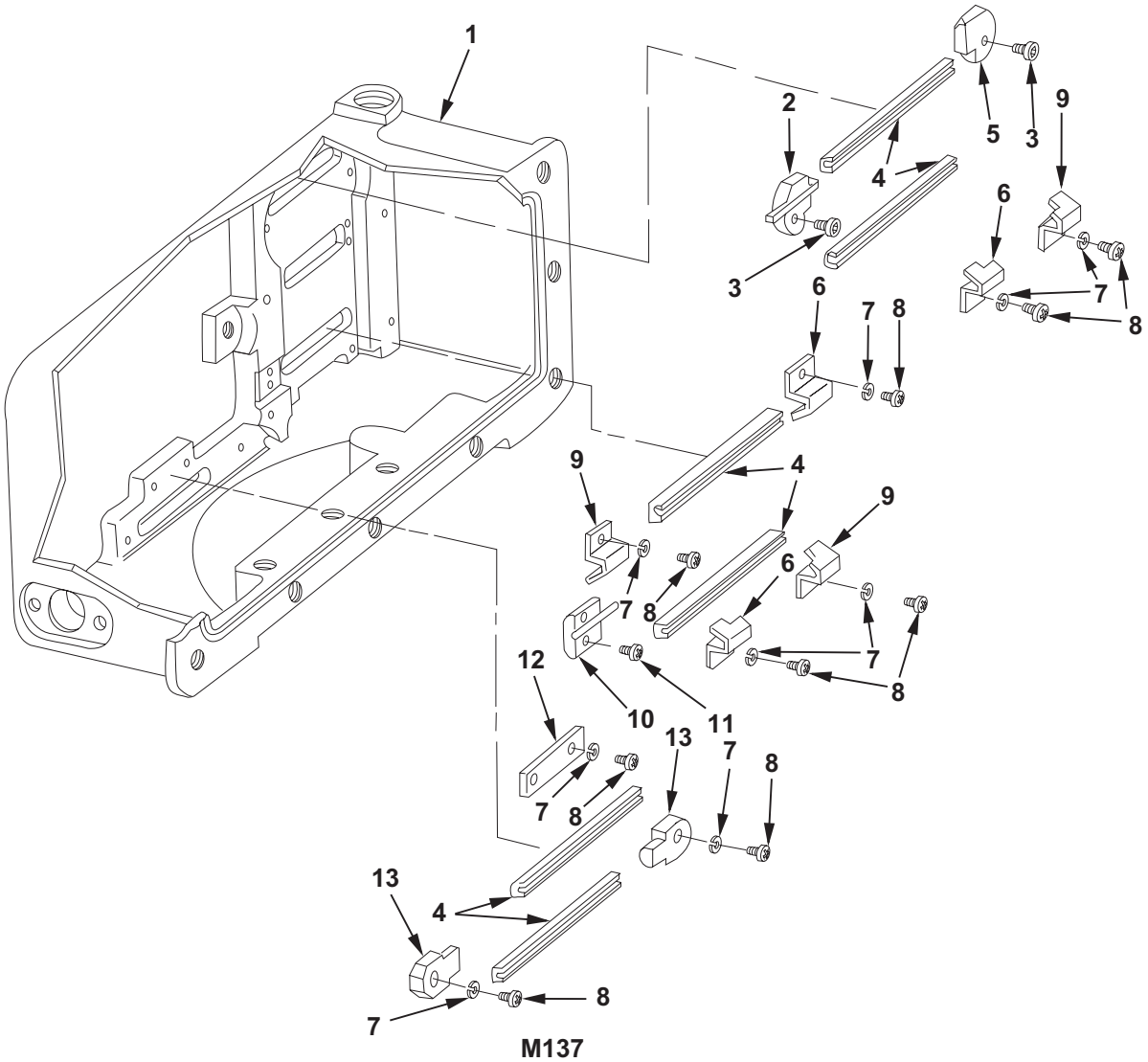
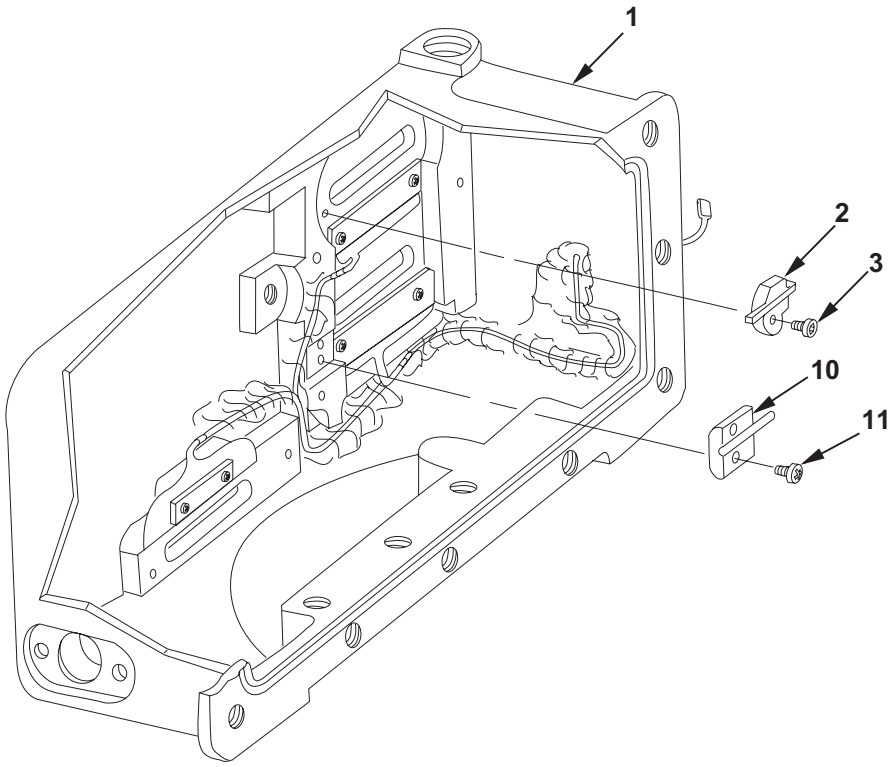



Figure 34. Counter Box Assembly, M137, 11741102-1, and Counter Box Assembly, M137A2/M137A3, 12984734, Internal Parts (Sheet 1 of 2).




M137A2/M137A3

Figure 34. Counter Box Assembly, M137, 11741102-1, and Counter Box Assembly, M137A2/M137A3, 12984734, Internal Parts (Sheet 2 of 2).

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 34. COUNTER BOX ASSEMBLY M137 11741102; M137A2 AND M137A3, 12984734, INTERNAL PARTS | |
| 1 | XADZZ | | 19200 | 12961440 | HOUSING ASSEMBLY USED ON M137A2 AND M137A3 ONLY..... UOC:BH5,BH6 | 1 |
| 1 | XADZZ | | 19200 | 11741104 | HOUSING ASSEMBLY USED ON M137 ONLY. UOC:F42 | 1 |
| 2 | PBDZZ | 5355010498955 | 19200 | 11741195 | POINTER,DIAL..... | 1 |
| 3 | PBDZZ | 5305000685409 | 80205 | MS16995-1 | SCREW,CAP,SOCKET HE..... | 7 |
| 4 | PCDZA | 6240010438209 | 19200 | 11729559 | LAMP,NUCLEAR,ASSEMB USED ON M137 ONLY..... UOC:F42 | 6 |
| 5 | PADZZ | 1240010467105 | 19200 | 11741170 | ADAPTER,COUNTER ASS USED ON M137 ONLY..... UOC:F42 | 1 |
| 6 | PADZZ | 5340010464277 | 19200 | 11741158 | CLIP,SPRING TENSION USED ON M137 ONLY..... UOC:F42 | 3 |
| 7 | PADZZ | 5310009338118 | 80205 | MS35338-135 | WASHER,LOCK USED ON M137 ONLY..... UOC:F42 | 10 |
| 8 | PADZZ | 5305000545646 | 96906 | MS51957-12 | SCREW,MACHINE USED ON M137 ONLY.... UOC:F42 | 10 |
| 9 | PADZZ | 5340010520011 | 19200 | 11741157 | CLIP,SPRING TENSION USED ON M137 ONLY..... UOC:F42 | 3 |
| 10 | PBDZZ | 5355010439292 | 19200 | 11741248 | POINTER,DIAL..... | 1 |
| 11 | PBDZZ | 5305007642966 | 96906 | MS51959-2 | SCREW,MACHINE..... | 2 |
| 12 | XBDZZ | | 19200 | 11741211 | TAB USED ON M137 ONLY..... UOC:F42 | 1 |
| 13 | PADZZ | 5340010546588 | 19200 | 11741159 | CLAMP,SYNCHRO USED ON M137 ONLY.... UOC:F42 | 2 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M137/M137A2/M137A3 PANORAMIC TELESCOPE**
**(1240-01-038-0531/1240-01-483-6103/1240-01-483-6100)**

**COVER ASSEMBLY**
**11741163**

**REPAIR PARTS LIST**

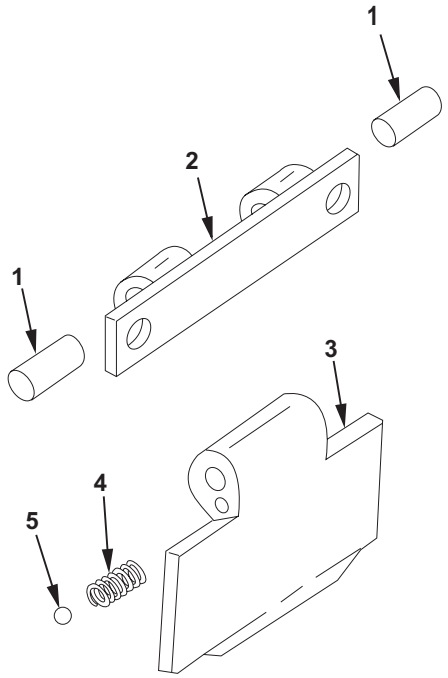



Figure 35. Cover Assembly, 11741163.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 35. COVER ASSEMBLY 11741163 | |
| 1 | PAFZZ | 5315000824858 | 96906 | MS16556-621 | PIN,STRAIGHT,HEADLE..... | 2 |
| 2 | XAFZZ | | 19200 | 10555147 | BRACKET, COVER..... | 1 |
| 3 | XAFZZ | | 19200 | 11741156 | COVER, COUNTER..... | 1 |
| 4 | PAFZZ | 5360010462460 | 19200 | 10555178 | SPRING,HELICAL,COMP..... | 1 |
| 5 | PAFZZ | 3110009900475 | 96906 | MS19060-1006 | BALL,BEARING..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M138/M138A1 ELBOW TELESCOPE (1240-01-038-0530/1240-01-515-8264)

**ELBOW TELESCOPE, M138**
**11741626**
**AND**
**ELBOW TELESCOPE, M138A1**
**13005104**
**PARTS**

**REPAIR PARTS LIST**

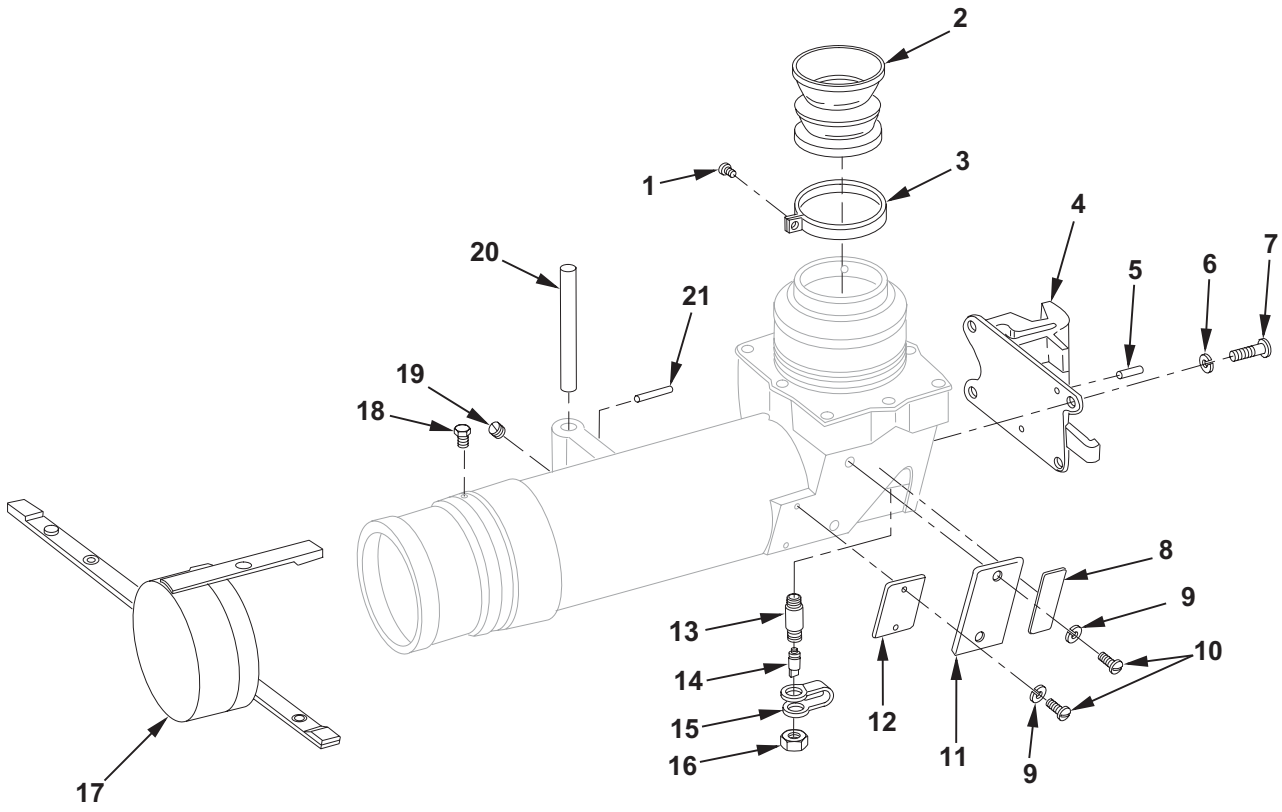



Figure 36. Elbow Telescope, M138, 11741626, and Elbow Telescope, M138A1, 13005104, Parts.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 36. TELESCOPE, ELBOW, M138 11741626, M138A1 13005104 PARTS | |
| 1 | PAOZZ | 5305000570523 | 96906 | MS51958-27 | SCREW,MACHINE..... | 1 |
| 2 | PAOZZ | 1240010437547 | 19200 | 11748011 | EYESHIELD,OPTICAL I..... | 1 |
| 3 | PAOZZ | 5340001710757 | 19200 | 8587448-3 | CLAMP,LOOP..... | 1 |
| 4 | PAFFF | 1240010438248 | 19200 | 10549272 | LATCH SET,OPTICAL I INSTRUMENT SEE FIG 38 FOR ASSY BREAKDOWN..... | 1 |
| 5 | PADZZ | 5315007226591 | 96906 | MS35672-16 | PIN,GROOVED,HEADLES..... | 2 |
| 6 | PAFZZ | 5310009338120 | 96906 | MS35338-138 | WASHER,LOCK..... | 4 |
| 7 | PAFZZ | 5305000509229 | 96906 | MS51957-63 | SCREW,MACHINE..... | 4 |
| 8 | PAOZZ | 9905002572746 | 19200 | 11731011 | DECAL USED ON M138 ONLY DISPOSAL INSTRUCTIONS TRITIUM INSTRUMENTS..... UOC:F41 | 1 |
| 9 | PAFZZ | 5310009282690 | 80205 | MS35338-134 | WASHER,LOCK..... | 4 |
| 10 | PAFZZ | 5305000545636 | 96906 | MS51957-2 | SCREW,MACHINE..... | 4 |
| 11 | PAFZZ | 9905010468337 | 19200 | 10549270 | PLATE,IDENTIFICATIO N M138..... UOC:F41 | 1 |
| 11 | PAFZZ | 9905015193056 | 19200 | 13005106 | PLATE,IDENTIFICATIO N M138A1..... UOC:BM5 | 1 |
| 12 | PAFZZ | 9905002572756 | 19200 | 11741194 | PLATE,INSTRUCTION USED ON M138 ONLY UOC:F41 | 1 |
| 13 | PAFZZ | 4820001141096 | 96906 | MS51607-1 | STEM,FLUID VALVE..... | 1 |
| 14 | PAOZZ | 2640000603543 | 96906 | MS51377-2 | VALVE CORE..... | 1 |
| 15 | PAFZZ | 5340004644792 | 19200 | 10516567 | STRAP,RETAINING..... | 1 |
| 16 | PAOZZ | 4820012350223 | 19200 | 8200055 | CAP,AIR VALVE..... | 1 |
| 17 | PAOZZ | 1240000840280 | 19200 | 10549868 | COVER,FIRE CONTROL..... | 1 |
| 18 | PAFZZ | 4820010530223 | 19200 | 10556186 | VALVE,SAFETY RELIEF..... | 1 |
| 19 | PADZZ | 5305005767266 | 80205 | MS51021-22 | SETSCREW..... | 1 |
| 20 | PADZZ | 5315010483354 | 96906 | MS16555-686 | PIN,STRAIGHT,HEADLE..... | 1 |
| 21 | PADZZ | 5315008414442 | 80205 | MS16562-224 | PIN,SPRING..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M138/M138A1 ELBOW TELESCOPE (1240-01-038-0530/1240-01-515-8264)

# M138/M138A1 ELBOW TELESCOPE 11741626/13005104 PARTS

## REPAIR PARTS LIST

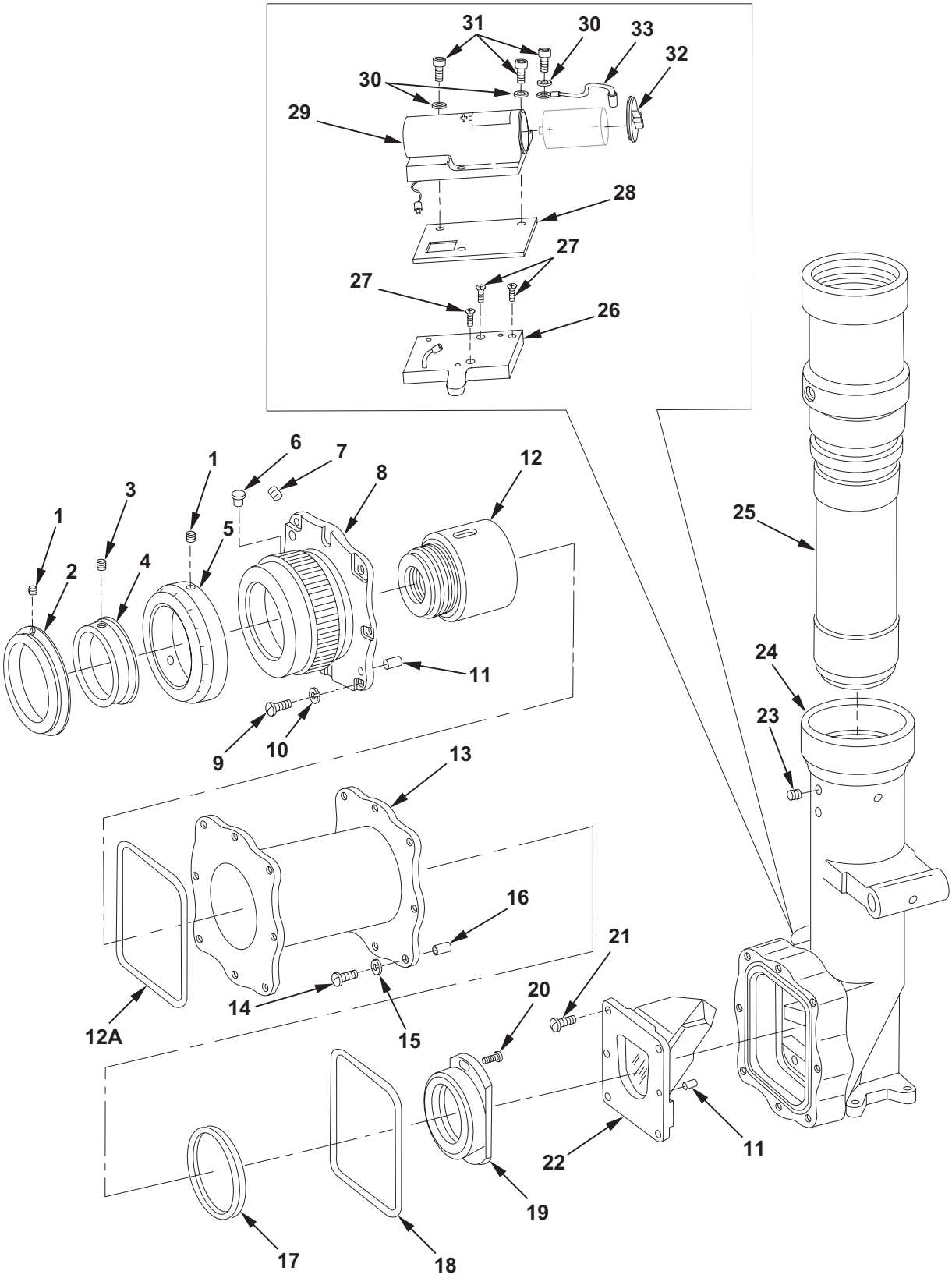



Figure 37. M138/M138A1 Elbow Telescope, 11741626/13005104, Parts.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 37. TELESCOPE, ELBOW, M138 11741626, M138A1 13005104 PARTS CONTINUED | |
| 1 | PAFZZ | 5305008432841 | 80205 | MS51021-1 | SETSCREW | 5 |
| 2 | PAFZZ | 5355010499238 | 19200 | 11748009 | POINTER,DIAL | 1 |
| 3 | PAFZZ | 5305000812651 | 96906 | MS51038-15 | SETSCREW | 1 |
| 4 | PAFZZ | 5310010500478 | 19200 | 11748003 | NUT,SLEEVE | 1 |
| 5 | PAFZZ | 1240010434768 | 19200 | 11748010 | SCALE,DIOPTER | 1 |
| 6 | XAFZZ | | 19200 | 8626451 | STOP,MT TELESCOPE | 1 |
| 7 | PADZZ | 5305010473997 | 80205 | MS51021-103 | SETSCREW | 3 |
| 8 | PAFZZ | 1240012066341 | 19200 | 9386960 | DIOPTER ADAPTER | 1 |
| 9 | PAFZZ | 5305000546651 | 96906 | MS51957-27 | SCREW,MACHINE | 8 |
| 10 | PAFZZ | 5310009338119 | 80205 | MS35338-137 | WASHER,LOCK | 8 |
| 11 | PADZZ | 5315007226591 | 96906 | MS35672-16 | PIN,GROOVED,HEADLES | 4 |
| 12 | PADZZ | 1240010480778 | 19200 | 11741627 | CELL ASSEMBLY,OPTIC AL INSTRUMENT EYEPIECE M138,M138A1 | 1 |
| 12A | PAFZZ | 5331005293723 | 81343 | AS29513-155 | O-RING | 1 |
| 13 | PADZZ | 6650015205989 | 19200 | 13005033 | SPACER,OPTICAL ELEM NSTRUMENT M138A1<br>UOC:BM5 | 1 |
| 14 | PADZZ | 5305000546655 | 96906 | MS51957-31 | SCREW,MACHINE USED ON M138A1 ONLY<br>UOC:BM5 | 8 |
| 15 | PADZZ | 5310009338119 | 80205 | MS35338-137 | WASHER,LOCK USED ON M138A1 ONLY<br>UOC:BM5 | 8 |
| 16 | PADZZ | 5315008253748 | 80205 | MS35672-18 | PIN,GROOVED,HEADLES USED ON M138A1 ONLY<br>UOC:BM5 | 2 |
| 17 | PADZZ | 5331011182080 | 81343 | M83461/1-332 | O-RING | 1 |
| 18 | PADZZ | 5331005293723 | 81343 | AS29513-155 | O-RING<br>UOC:BM5 | 1 |
| 19 | PADZZ | 1240015193054 | 19200 | 12984785 | CELL ASSEMBLY,OPTIC AL INSTRUMENT RETICLE M138A1<br>UOC:BM5 | 1 |
| 19 | PCDZA | 1240010480779 | 19200 | 11729516 | CELL ASSEMBLY,OPTIC AL INSTRUMENT RETICLE M138<br>UOC:F41 | 1 |
| 20 | PADZZ | 5305007261241 | 96906 | MS21090-0412 | SCREW,CAP,SOCKET HE | 2 |
| 21 | PADZZ | 5305000546654 | 96906 | MS51957-30 | SCREW,MACHINE | 4 |
| 22 | PADZZ | 6650010570054 | 19200 | 10554936 | PRISM,OPTICAL INSTR UMENT | 1 |
| 23 | PADZZ | 5305005767266 | 80205 | MS51021-22 | SETSCREW | 2 |
| 24 | PADZZ | 1240010449851 | 19200 | 10549268 | HOUSING,OPTICAL INS TRUMENT | 1 |
| 25 | PADZZ | 1240015193052 | 19200 | 12984837 | CELL ASSEMBLY,OPTIC AL INSTRUMENT OBJECTIVE M138A1<br>UOC:BM5 | 1 |
| 25 | PADZD | 1240010480777 | 19200 | 11741629 | CELL ASSEMBLY,OPTIC AL INSTRUMENT OBJECTIVE M138<br>UOC:F41 | 1 |
| 26 | PADZZ | 5340015193055 | 19200 | 12984783 | BRACKET,MOUNTING USED ON M138A1 ONLY<br>UOC:BM5 | 1 |
| 27 | PADZZ | 5305007640066 | 96906 | MS51959-44 | SCREW,MACHINE USED ON M138A1 ONLY<br>UOC:BM5 | 3 |

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| 28 | PAOZZ | 5330014853480 | 19200 | 12984698 | GASKET USED ON M138A1 ONLY..... UOC:BM5 | 1 |
| 29 | PAOZZ | 6160014851914 | 19200 | 12984693 | COVER,BATTERY BOX USED ON M138A1 ONLY..... UOC:BM5 | 1 |
| 30 | PAOZZ | 5310009296395 | 80205 | MS35338-136 | WASHER,LOCK USED ON M138A1 ONLY.... UOC:BM5 | 3 |
| 31 | PAOZZ | 5305009591082 | 80205 | MS16995-18 | SCREW,MACHINE USED ON M138A1 ONLY.. UOC:BM5 | 3 |
| 32 | PAOZZ | 5340014643141 | 19200 | 12984661 | CAP-PLUG,PROTECTIVE USED ON M138A1 ONLY..... UOC:BM5 | 1 |
| 33 | PAOZZ | 4010014643142 | 19200 | 12984664 | WIRE ROPE ASSEMBLY USED ON M138A1 ONLY..... UOC:BM5 | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

# M138/M138A1 ELBOW TELESCOPE (1240-01-038-0530/1240-01-515-8264)

# OPTICAL INSTRUMENT LATCH SET 10549272

**REPAIR PARTS LIST**

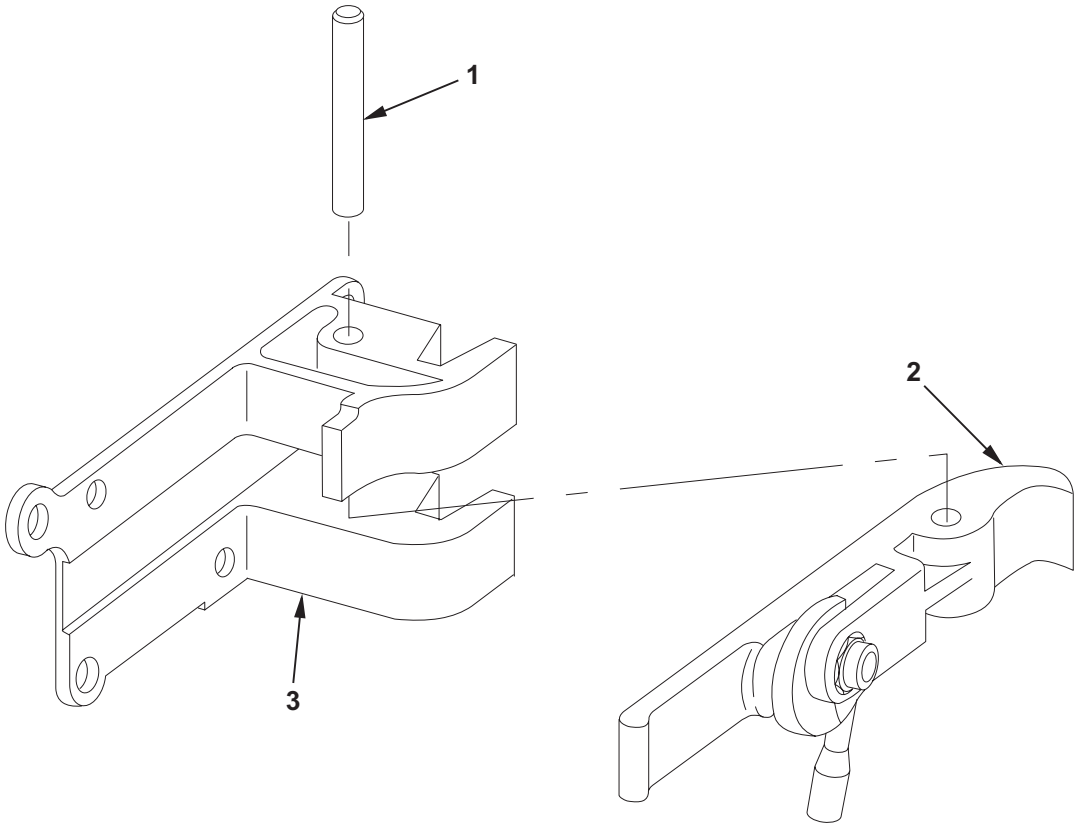



Figure 38. Optical Instrument Latch Set, 10549272.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 38. LATCH SET, OPTICAL INSTRUMENT 10549272 | |
| 1 | PAFZZ | 5315005433986 | 96906 | MS16555-651 | PIN,STRAIGHT,HEADLE..... | 1 |
| 2 | PAFFF | 5340010437489 | 19200 | 10549277 | LATCH,OPTICAL INSTR SEE FIG 39 FOR ASSY BREAKDOWN..... | 1 |
| 3 | XAFZZ | | 19200 | 10549260 | HOLDER,LATCH..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**M138/M138A1 ELBOW TELESCOPE**
**(1240-01-038-0530/1240-01-515-8264)**

**OPTICAL INSTRUMENT LATCH**
**10549277**

**REPAIR PARTS LIST**

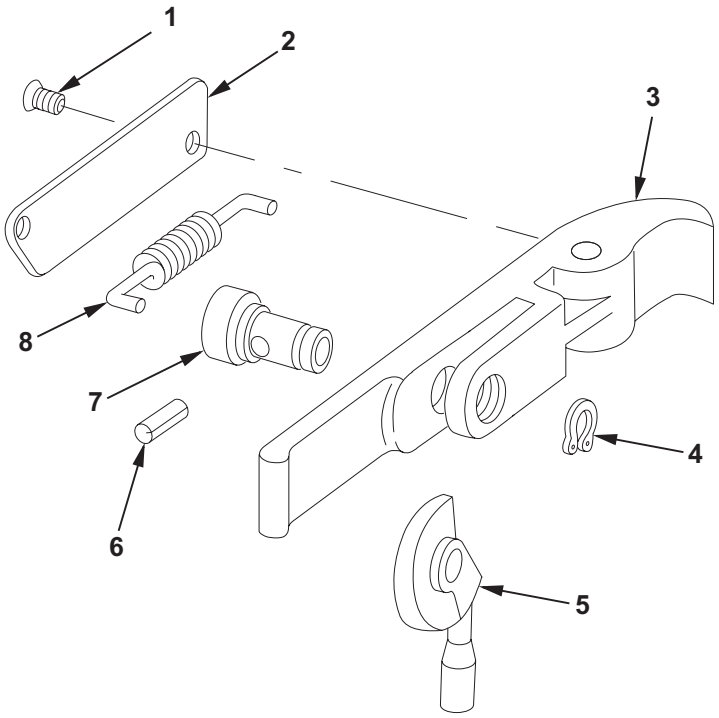



Figure 39. Optical Instrument Latch, 10549277.

SECTION II TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 39. LATCH, OPTICAL INSTRUMENT 10549277 | |
| 1 | PAFZZ | 5305008290105 | 96906 | MS51960-6 | SCREW,MACHINE..... | 2 |
| 2 | PAFZZ | 5340010434440 | 19200 | 10549265 | COVER,ACCESS..... | 1 |
| 3 | XAFZZ | | 19200 | 10549262 | LATCH,LOCK-RELEASE..... | 1 |
| 4 | PAFZZ | 5325001879033 | 96906 | MS16624-5015-1 | RING,RETAINING..... | 1 |
| 5 | PAFZZ | 5340010432209 | 19200 | 10549259 | LEVER,LOCK-RELEASE..... | 1 |
| 6 | PAFZZ | 5315006164736 | 80205 | MS51923-190 | PIN,SPRING..... | 1 |
| 7 | PAFZZ | 5315010437434 | 19200 | 10549264 | PIN,SHOULDER,HEADED..... | 1 |
| 8 | PAFZZ | 5360010505307 | 19200 | 10549263 | SPRING,HELICAL,EXTE..... | 1 |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**QUADRANT, FIRE CONTROL: M17 (1290-01-037-3883);**
**QUADRANT, FIRE CONTROL: M17A1 (1290-01-515-8260);**
**QUADRANT, FIRE CONTROL: M18 (1290-01-037-7289);**
**QUADRANT, FIRE CONTROL: M18A1 (1290-01-515-8262);**
**MOUNT, TELESCOPE AND QUADRANT: M171 (1240-01-039-7273);**
**MOUNT, TELESCOPE AND QUADRANT: M171A1 (1240-01-515-8265);**
**MOUNT, TELESCOPE AND QUADRANT: M172 (1240-01-037-7290);**
**MOUNT, TELESCOPE AND QUADRANT: M172A1 (1240-01-517-2171);**
**TELESCOPE, PANORAMIC: M137 (1240-01-038-0531);**
**TELESCOPE, PANORAMIC: M137A2 (1240-01-483-6103);**
**TELESCOPE, PANORAMIC: M137A3 (1240-01-483-6100);**
**TELESCOPE, ELBOW: M138 (1240-01-038-0530); AND**
**TELESCOPE, ELBOW: M138A1 (1240-01-515-8264)**

**SPECIAL TOOLS**

**REPAIR PARTS LIST**

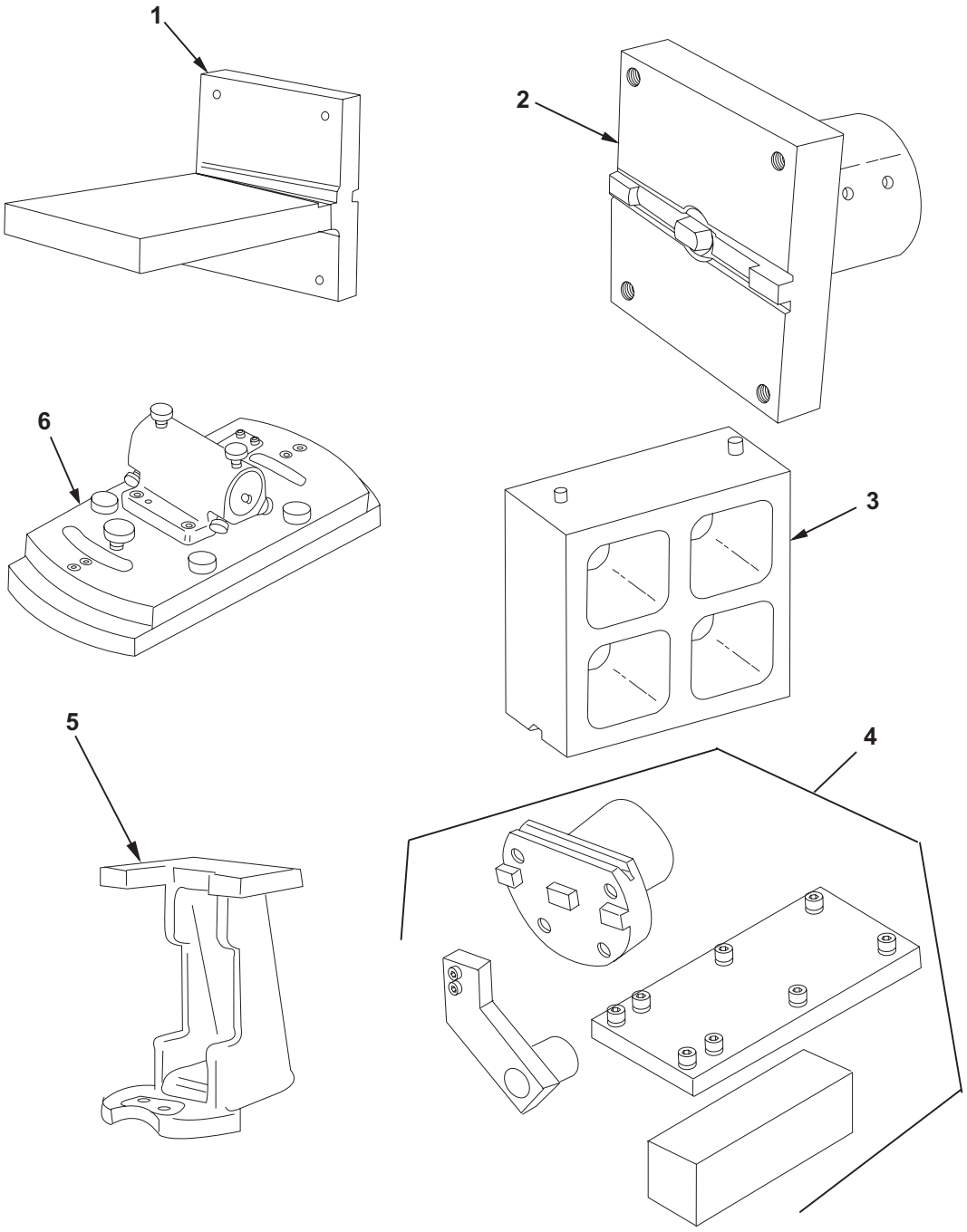



Figure 40. Special Tools (Sheet 1 of 3).

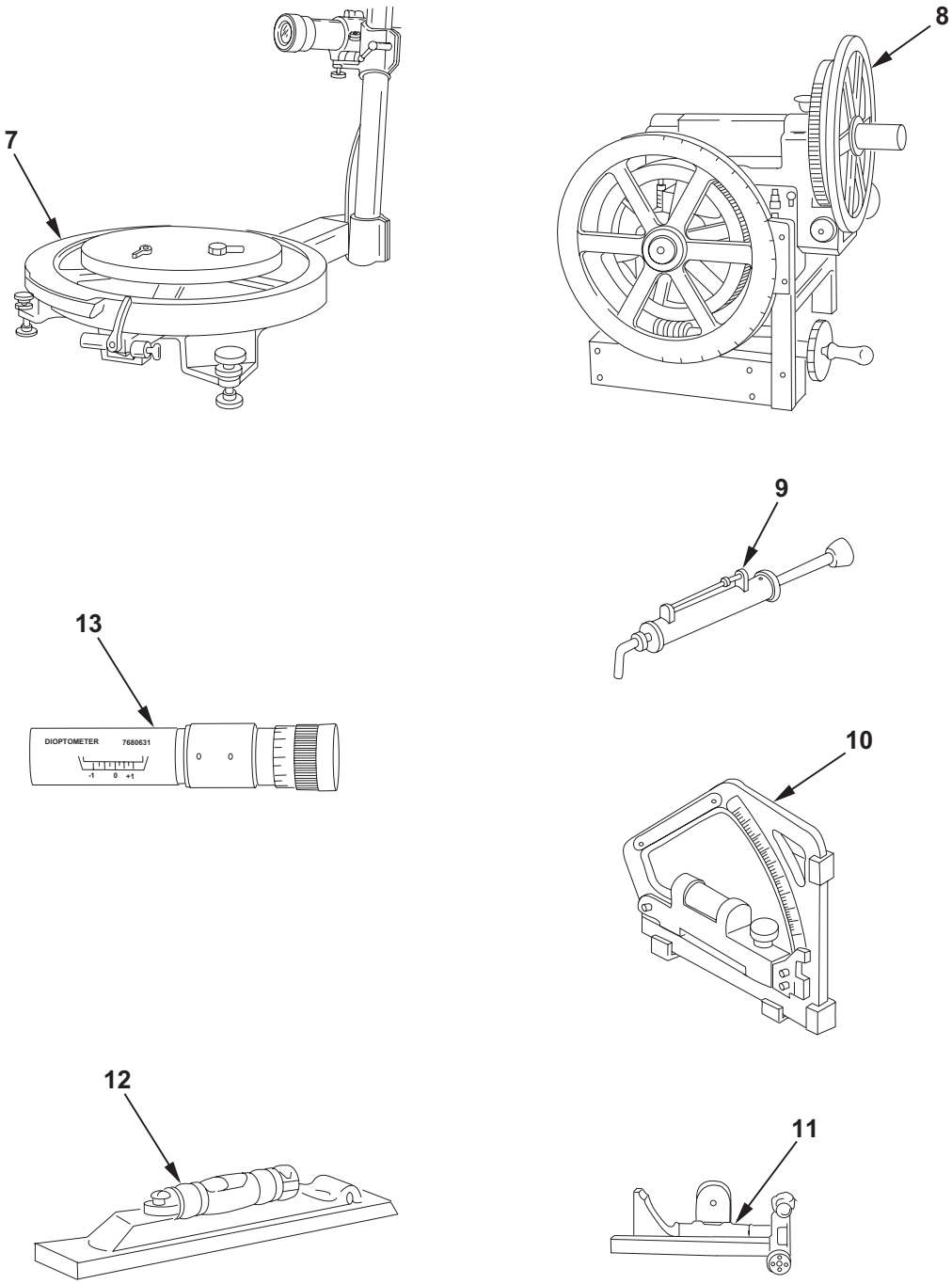



Figure 40. Special Tools (Sheet 2 of 3).

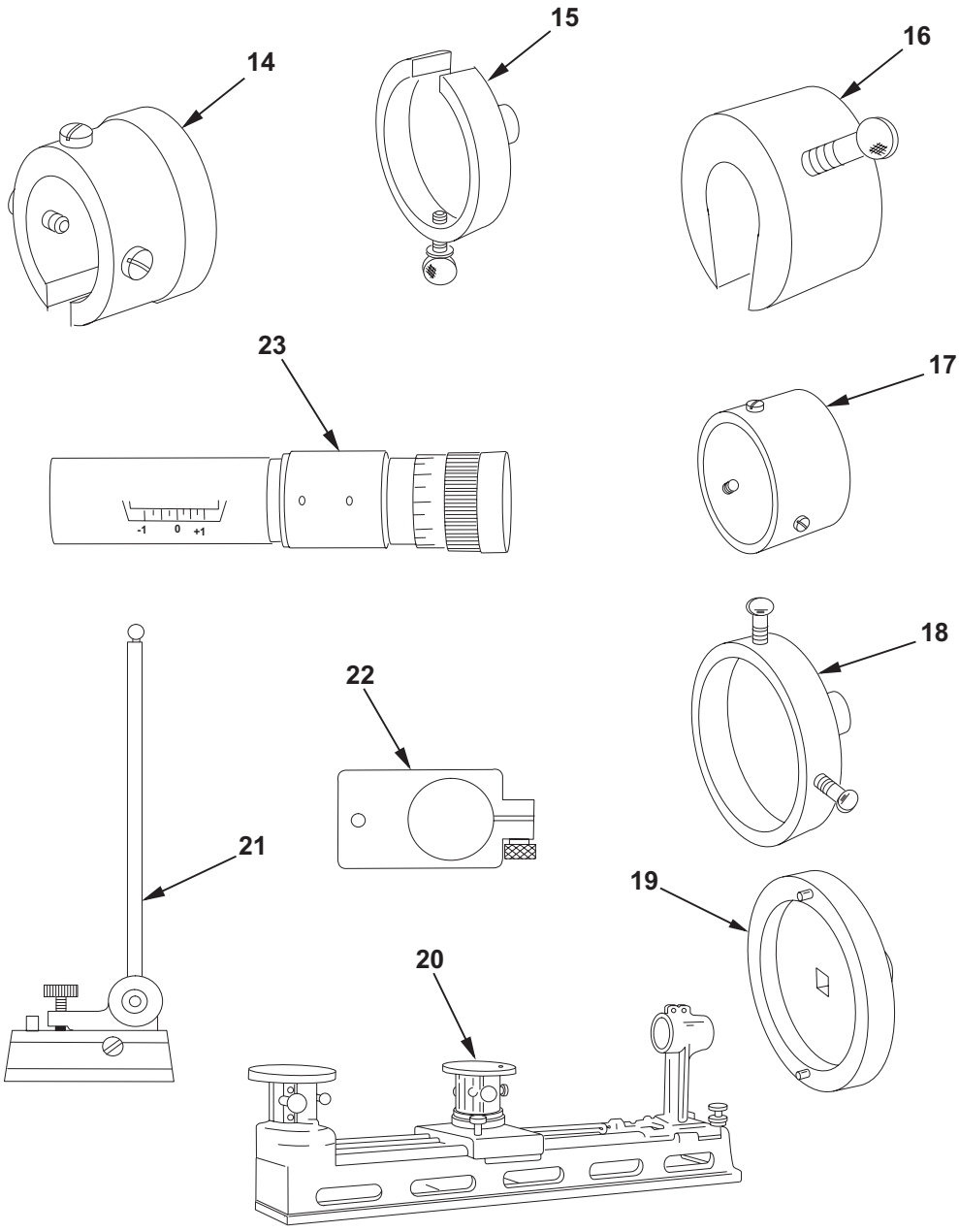



Figure 40. Special Tools (Sheet 3 of 3).

SECTION III TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| | | | | | FIGURE 40. SPECIAL TOOLS AND EQUIPMENT | |
| 1 | PEHZZ | 5340010620275 | 19200 | 10558253-11 | BRACKET,MOUNTING USED ON M171,M172, ALL MODELS..... | |
| 2 | PEHZZ | 5340010620274 | 19200 | 12008990 | BRACKET,MOUNTING (ATTACHMENT FOR LEVELING FIXTURE) USED ON M17 AND M18 ALL MODELS..... | |
| 3 | PEHZZ | 4931010624255 | 19200 | 9327721 | ADAPTER,EXTENSION USED WITH M137 AND M137A3 ONLY..... UOC:BH5,F42 | |
| 4 | PAHZZ | 4940001919215 | 19200 | 10555619 | ADAPTER,MECHANICAL USED ON M171, M172 ALL MODELS..... | |
| 5 | PEHZZ | 4931008016861 | 19200 | 8213899 | ADAPTER,FIXTURE USED WITH M137 ALL MODELS..... | |
| 6 | PAHZZ | 1240011347103 | 19200 | 10555620 | SIGHTING,DEVICE USED ON M171 ALL MODELS..... | |
| 7 | PEHZA | 4931007691596 | 19200 | 7691596 | FIXTURE,TELESCOPE T USED WITH M137 ALL MODELS..... | |
| 8 | PAHHD | 6650006523553 | 19200 | 6523553 | FIXTURE,TEST,OPTICA L EQUIPMENT (MEASURED IN MILS) USED ON M17,M18,M171,M172, ALL MODELS..... | |
| 9 | PAHZZ | 6635007900733 | 11710 | 719-20MRP | TESTER,SPRING RESIL USED ON M171 ALL MODELS..... | |
| 10 | PACHH | 1290008919999 | 19200 | 7197156 | QUADRANT,FIRE CONTR OL USED ON M17,M18,M171,M172 ALL MODELS SEE TM9-1290-200-14&P FOR REPAIR PARTS..... | |
| 11 | PEHZZ | 4931011285862 | 19200 | 10553898 | INSPECTION FIXTURE USED ON M171 ALL MODELS..... | |
| 12 | PEHZZ | 5210005466362 | 19200 | 7686087 | LEVEL,PLATE MOUNTED USED WITH M17, M18,M137,M171,M172 ALL MODELS..... | |
| 13 | PAHZZ | 1240005365557 | 19200 | 7680631 | EYEPIECE ASSEMBLY,O PTICAL INSTRUMENT (DIOPTOMETER) USED WITH M137 AND M138 ALL MODELS..... | |
| 14 | PAHZZ | 5120011518820 | 19200 | 11785506 | ADAPTER,TORQUE WREN CH (FOR CORRECTION KNOB) USED ON M17 AND M18 ALL MODELS..... | |
| 15 | PAHZZ | 5120011518817 | 19200 | 11785502 | ADAPTER,TORQUE WREN CH (FOR ELEVATION KNOB) USED ON M17 AND M18 ALL MODELS..... | |
| 16 | PAHZZ | TBD | 19200 | 11747955 | ADAPTER,TORQUE WREN USED ON M137 ALL MODELS USED ON CLUTCH RELEASE KNOB..... | |
| 17 | PAHZZ | 5120011518819 | 19200 | 11785507 | ADAPTER,TORQUE WREN USE ON DIOPTER SCALE USED ON M138 ALL MODELS..... | |
| 18 | PAHZZ | 3040009473044 | 19200 | 10512992 | ADAPTER,HOUSING USED ON M171 ALL MODELS FOR CROSS LEVEL AND PITCH KNOBS..... | |

SECTION III TM9-1240-375-34&P

| (1) ITEM NO | (2) SMR CODE | (3) NSN | (4) CAGEC | (5) PART NUMBER | (6) DESCRIPTION AND USABLE ON CODES(UOC) | (7) QTY |
|---|---|---|---|---|---|---|
| 19 | PEHZZ | 4931011320654 | 19200 | 9357947 | ADAPTER,TORQUE USED ON M171 ALL MODELS USED ON COLLAR..... | |
| 20 | PEHZZ | 4931005085434 | 19200 | 7197944 | TEST FIXTURE,TELESC USE ON M138 ALL MODELS..... | |
| 21 | PAHZZ | 5210002211842 | 08871 | 5033-012 | GAGE,SURFACE USED WITH M137 ALL MODELS..... | |
| 22 | PAHZZ | 1240001911379 | 19200 | 11738294 | HOLDER,TELESCOPE MO..... | |
| 23 | PAHZZ | 1240007573291 | 19200 | 7573291 | COLLIMATOR,INFINITY..... | |

END OF FIGURE

**DIRECT SUPPORT AND GENERAL SUPPORT**

**QUADRANT, FIRE CONTROL: M17 (1290-01-037-3883);**
**QUADRANT, FIRE CONTROL: M17A1 (1290-01-515-8260);**
**QUADRANT, FIRE CONTROL: M18 (1290-01-037-7289);**
**QUADRANT, FIRE CONTROL: M18A1 (1290-01-515-8262);**
**MOUNT, TELESCOPE AND QUADRANT: M171 (1240-01-039-7273);**
**MOUNT, TELESCOPE AND QUADRANT: M171A1 (1240-01-515-8265);**
**MOUNT, TELESCOPE AND QUADRANT: M172 (1240-01-037-7290);**
**MOUNT, TELESCOPE AND QUADRANT: M172A1 (1240-01-517-2171);**
**TELESCOPE, PANORAMIC: M137 (1240-01-038-0531);**
**TELESCOPE, PANORAMIC: M137A2 (1240-01-483-6103);**
**TELESCOPE, PANORAMIC: M137A3 (1240-01-483-6100);**
**TELESCOPE, ELBOW: M138 (1240-01-038-0530); AND**
**TELESCOPE, ELBOW: M138A1 (1240-01-515-8264)**

**NATIONAL STOCK NUMBER INDEX**

SECTION IV TM9-1240-375-34&P

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NATIONAL STOCK NUMBER INDEX

| STOCK NUMBER | FIG. | ITEM | STOCK NUMBER | FIG. | ITEM |
|---|---|---|---|---|---|
| 5305-00-050-9229 | 36 | 7 | 6650-00-066-4999 | 5 | 6 |
| 5305-00-054-5635 | 2 | 27 | | 32 | 25 |
| | 24 | 12 | 5305-00-067-9914 | 10 | 26 |
| | 32 | 32 | | 17 | 7 |
| 5305-00-054-5636 | 2 | 12 | 5305-00-067-9917 | 9 | 24 |
| | 5 | 1 | 5305-00-068-5276 | 12 | 4 |
| | 5 | 9 | 5305-00-068-5409 | 34 | 3 |
| | 11 | 8 | 5330-00-069-9361 | 25 | 23 |
| | 13 | 9 | 1240-00-069-9363 | 25 | 22 |
| | 20 | 3 | 5315-00-078-8711 | 16 | 6 |
| | 24 | 22 | 5305-00-081-2651 | 37 | 3 |
| | 36 | 10 | 5315-00-082-4858 | 35 | 1 |
| 5305-00-054-5646 | 34 | 8 | 1240-00-084-0280 | 36 | 17 |
| 5305-00-054-5647 | 3 | 25 | 5310-00-089-5966 | 16 | 11 |
| | 32 | 18 | 4820-00-114-1096 | 2 | 31 |
| | 33 | 18 | | 30 | 11 |
| 5305-00-054-5649 | 6 | 18 | | 32 | 5 |
| | 33 | 5 | | 36 | 13 |
| 5305-00-054-6650 | 2 | 21 | 5305-00-146-5701 | 10 | 1 |
| | 32 | 38 | 5331-00-149-8859 | 2 | 17 |
| 5305-00-054-6651 | 2 | 6 | 5310-00-150-3708 | 28 | 17 |
| | 17 | 8 | 5310-00-150-3792 | 28 | 16 |
| | 32 | 13 | 3110-00-156-7513 | 16 | 13 |
| | 32 | 14 | 3110-00-165-5922 | 17 | 3 |
| | 32 | 14 | 5340-00-171-0757 | 36 | 3 |
| | 37 | 9 | 5315-00-176-6116 | 28 | 8 |
| 5305-00-054-6652 | 2 | 35 | 5365-00-177-3931 | 31 | 6 |
| | 3 | 18 | 5310-00-186-1009 | 14 | 5 |
| | 28 | 19 | 5325-00-187-9033 | 39 | 4 |
| | 32 | 35 | 5315-00-188-0240 | 9 | 6 |
| 5305-00-054-6653 | 2 | 8 | 1240-00-191-1379 | 40 | 22 |
| | 2 | 10 | 4940-00-191-9215 | 40 | 4 |
| | 30 | 5 | 5210-00-221-1842 | 40 | 21 |
| | 33 | 12 | 5305-00-225-9891 | 15 | 1 |
| 5305-00-054-6654 | 2 | 19 | 5305-00-235-3528 | 19 | 4D |
| | 28 | 1 | 5331-00-248-3836 | 3 | 14 |
| | 37 | 21 | 5331-00-248-3850 | 10 | 10 |
| 5305-00-054-6655 | 37 | 14 | 5331-00-252-6050 | 30 | 15 |
| 5305-00-054-6668 | 3 | 6 | 7690-00-257-2746 | 5 | 12 |
| 5305-00-054-6670 | 2 | 3 | | 17 | 2 |
| | 24 | 4 | | 32 | 9 |
| | 32 | 1 | | 36 | 8 |
| 5315-00-056-9386 | 28 | 22 | 9905-00-257-2750 | 2 | 15 |
| 5305-00-057-0523 | 36 | 1 | | 32 | 34 |
| 2640-00-060-3543 | 2 | 32 | 9905-00-257-2751 | 2 | 14 |
| | 30 | 10 | | 11 | 6 |
| | 32 | 6 | 9905-00-257-2756 | 24 | 10 |
| | 36 | 14 | | 36 | 12 |
| 5365-00-065-5319 | 16 | 14 | 1290-00-257-2769 | 4 | 3 |
| 6650-00-066-4998 | 5 | 11 | | 7 | 3 |

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## CROSS-REFERENCE INDEXES

### NATIONAL STOCK NUMBER INDEX

| STOCK NUMBER | FIG. | ITEM | STOCK NUMBER | FIG. | ITEM |
|---|---|---|---|---|---|
| 1290-00-257-2769 | 11 | 2 | 5315-00-682-1727 | 3 | 5 |
| 5305-00-272-3533 | 10 | 16 | 5315-00-682-1733 | 14 | 19 |
| 5305-00-272-4123 | 16 | 8 | | 15 | 5 |
| 5305-00-281-3120 | 9 | 22 | 5305-00-682-7753 | 19 | 10 |
| | 14 | 10 | 5305-00-685-3492 | 14 | 20 |
| | 20 | 11 | 5365-00-692-1492 | 4 | 5 |
| 5325-00-290-4480 | 22 | 16 | | 7 | 1 |
| 5325-00-291-3495 | 22 | 10 | | 11 | 4 |
| 5310-00-450-5946 | 14 | 6 | 1290-00-692-1493 | 4 | 3 |
| 5340-00-464-4792 | 2 | 33 | | 7 | 3 |
| | 30 | 9 | | 11 | 2B |
| | 32 | 8 | 5305-00-701-5061 | 3 | 1 |
| | 36 | 15 | 5305-00-701-5078 | 24 | 8 |
| 5315-00-492-1962 | 12 | 1 | 5315-00-702-9651 | 28 | 20 |
| 6650-00-504-9914 | 31 | 5 | | 33 | 1 |
| 6650-00-504-9915 | 31 | 3 | 5305-00-717-6955 | 7 | 5 |
| 4931-00-508-5434 | 40 | 20 | 5315-00-722-6591 | 36 | 5 |
| 5331-00-529-3723 | 37 | 12A | | 37 | 11 |
| | 37 | 18 | 5305-00-724-3454 | 2 | 37 |
| 5331-00-531-3714 | 28 | 13 | 5305-00-724-3478 | 2 | 1 |
| 1240-00-536-5557 | 40 | 13 | 5305-00-726-1241 | 37 | 20 |
| 5325-00-543-3981 | 29 | 6 | 1240-00-757-3291 | 40 | 23 |
| 5315-00-543-3986 | 38 | 1 | 5340-00-759-7626 | 4 | 1 |
| 5310-00-543-4652 | 11 | 7 | | 7 | 6 |
| | 13 | 8 | | 11 | 1 |
| 5305-00-543-5832 | 25 | 15 | 5305-00-763-7822 | 25 | 25 |
| 5210-00-546-6362 | 40 | 12 | 5305-00-764-0066 | 5 | 14 |
| 5310-00-550-5009 | 6 | 17 | | 32 | 48 |
| 5331-00-550-6617 | 3 | 17 | | 37 | 27 |
| 5331-00-551-9573 | 2 | 36 | 5305-00-764-0068 | 9 | 24A |
| 5331-00-558-2310 | 3 | 22 | | 28 | 30 |
| | 25 | 8 | 5305-00-764-0071 | 24 | 20 |
| 5305-00-576-7266 | 25 | 10 | 5340-00-764-1669 | 26 | 8 |
| | 36 | 19 | 5305-00-764-2966 | 34 | 11 |
| | 37 | 23 | 4931-00-769-1596 | 40 | 7 |
| 5331-00-580-2278 | 28 | 15 | 5305-00-770-2533 | 13 | 1 |
| 5331-00-584-0265 | 33 | 16 | | 25 | 19 |
| 5331-00-584-1222 | 32 | 21 | | 32 | 46 |
| 5331-00-584-1229 | 10 | 13 | 5305-00-777-6039 | 32 | 28 |
| 5331-00-584-1582 | 24 | 3 | 6635-00-790-0733 | 40 | 9 |
| | 24 | 3 | 5310-00-796-9592 | 16 | 12 |
| 5325-00-597-3302 | 18 | 5 | 5305-00-800-7261 | 11 | 5 |
| 5325-00-598-1840 | 6 | 12 | | 29 | 5 |
| 5310-00-616-3555 | 17 | 9 | | 30 | 13 |
| 5315-00-616-4736 | 39 | 6 | 4931-00-801-6861 | 40 | 5 |
| 5315-00-623-1761 | 6 | 8 | 5315-00-806-7039 | 6 | 3 |
| 5306-00-638-7719 | 2 | 41 | | 7 | 7 |
| 6650-00-652-3553 | 40 | 8 | | 33 | 10 |
| 5305-00-655-9246 | 21 | 7 | 5315-00-806-7040 | 32 | 22 |
| 5315-00-682-1726 | 6 | 1 | 5315-00-810-0505 | 9 | 19 |

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CROSS-REFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

| STOCK NUMBER | FIG. | ITEM |
|---|---|---|
| 5315-00-810-0505 | 14 | 16 |
| | 20 | 5 |
| | 22 | 3 |
| 5315-00-815-9366 | 24 | 5 |
| 5315-00-817-0889 | 4 | 6 |
| 5306-00-817-4989 | 2 | 41 |
| 5305-00-820-5433 | 30 | 14 |
| 5315-00-825-1207 | 28 | 3 |
| 5315-00-825-3748 | 37 | 16 |
| 5305-00-829-0105 | 39 | 1 |
| 5315-00-834-0745 | 2 | 16 |
| | 3 | 10 |
| 5305-00-834-3385 | 19 | 2 |
| | 19 | 4C |
| | 21 | 5 |
| 5305-00-834-3388 | 19 | 4A |
| 5315-00-841-4442 | 36 | 21 |
| 5305-00-843-2841 | 25 | 2 |
| | 37 | 1 |
| 5315-00-847-5677 | 26 | 2 |
| 5305-00-848-9282 | 10 | 4 |
| | 14 | 26 |
| | 22 | 1 |
| 5331-00-851-1020 | 28 | 5 |
| 5305-00-865-9516 | 12 | 16 |
| 1290-00-891-9999 | 40 | 10 |
| 5360-00-893-6095 | 26 | 6 |
| 5365-00-896-2251 | 4 | 4 |
| | 7 | 2 |
| | 11 | 3 |
| 5355-00-898-6791 | 23 | 3 |
| 5305-00-912-7281 | 2 | 2 |
| 5305-00-922-6286 | 9 | 11 |
| 5340-00-927-7290 | 28 | 27 |
| 5310-00-928-2690 | 2 | 13 |
| | 2 | 28 |
| | 5 | 2 |
| | 5 | 8 |
| | 20 | 2 |
| | 24 | 11 |
| | 24 | 23 |
| | 32 | 33 |
| | 36 | 9 |
| 5310-00-929-6395 | 2 | 9 |
| | 2 | 11 |
| | 2 | 18 |
| | 2 | 20 |
| | 2 | 24 |
| | 9 | 27 |
| | 24 | 15 |
| 5310-00-929-6395 | 28 | 2 |
| | 30 | 4 |
| | 32 | 12 |
| | 32 | 15 |
| | 32 | 15 |
| | 32 | 36 |
| | 32 | 42 |
| | 33 | 21 |
| | 37 | 30 |
| 5360-00-933-6573 | 26 | 3 |
| 5310-00-933-8118 | 3 | 19 |
| | 6 | 19 |
| | 12 | 5 |
| | 32 | 19 |
| | 33 | 4 |
| | 34 | 7 |
| 5310-00-933-8119 | 2 | 4 |
| | 3 | 2 |
| | 9 | 10 |
| | 10 | 5 |
| | 10 | 7 |
| | 12 | 8 |
| | 14 | 27 |
| | 16 | 3 |
| | 17 | 6 |
| | 19 | 6 |
| | 22 | 2 |
| | 24 | 2 |
| | 32 | 2 |
| | 37 | 10 |
| | 37 | 15 |
| 5310-00-933-8120 | 9 | 14 |
| | 10 | 18 |
| | 14 | 24 |
| | 19 | 9 |
| | 36 | 6 |
| 5310-00-933-8121 | 10 | 2 |
| | 14 | 21 |
| | 22 | 9 |
| 5310-00-933-8778 | 9 | 5 |
| | 10 | 21 |
| 5331-00-935-9226 | 10 | 12 |
| 3040-00-937-8289 | 26 | 5 |
| 5315-00-940-8033 | 32 | 16 |
| | 32 | 16 |
| 5305-00-940-9487 | 22 | 14 |
| 5305-00-940-9488 | 14 | 1 |
| 3040-00-947-3044 | 40 | 18 |
| 5305-00-957-5897 | 22 | 8 |
| 5305-00-959-0379 | 33 | 7 |

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CROSS-REFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

| STOCK NUMBER | FIG. | ITEM | STOCK NUMBER | FIG. | ITEM |
|---|---|---|---|---|---|
| 5305-00-959-0382 | 16 | 2 | 5305-01-043-7710 | 28 | 23 |
| 5305-00-959-1082 | 2 | 23 | 1240-01-043-8197 | 22 | 6 |
| | 9 | 28 | 1240-01-043-8198 | 18 | 1 |
| | 24 | 14 | 6240-01-043-8209 | 5 | 4 |
| | 30 | 6 | | 34 | 4 |
| | 32 | 43 | 1240-01-043-8210 | 22 | 4 |
| | 37 | 31 | 1240-01-043-8248 | 36 | 4 |
| 5310-00-974-6623 | 2 | 40 | 3040-01-043-8293 | 21 | 4 |
| | 15 | 2 | 3040-01-043-8405 | 16 | 10 |
| | 19 | 4B | 5330-01-043-9288 | 14 | 29 |
| 5360-00-978-9584 | 3 | 23 | 5355-01-043-9292 | 34 | 10 |
| | 9 | 2 | 5340-01-043-9312 | 32 | 3 |
| | 14 | 8 | 5340-01-043-9313 | 10 | 6 |
| | 20 | 14 | 5315-01-043-9369 | 14 | 22 |
| 3120-00-983-7313 | 3 | 24 | 5340-01-043-9453 | 21 | 11 |
| 5305-00-988-5308 | 19 | 8 | 1240-01-043-9459 | 9 | 21 |
| 5315-00-988-7409 | 21 | 2 | | 14 | 11 |
| | 27 | 1 | | 20 | 10 |
| 5305-00-988-7601 | 12 | 7 | 1240-01-043-9460 | 33 | 15 |
| 5305-00-988-7602 | 24 | 1A | 1240-01-043-9461 | 33 | 20 |
| 5305-00-988-7604 | 12 | 9 | 1240-01-043-9462 | 23 | 5 |
| | 24 | 1 | 1240-01-043-9463 | 28 | 29 |
| 5305-00-988-7838 | 12 | 10 | 1240-01-043-9464 | 28 | 21 |
| 5305-00-989-4609 | 19 | 5 | 1240-01-043-9465 | 24 | 7 |
| 3110-00-990-0475 | 35 | 5 | 5340-01-043-9476 | 30 | 18 |
| 5305-00-993-1612 | 10 | 8 | 5360-01-043-9541 | 30 | 17 |
| 5360-00-993-4647 | 21 | 10 | 1240-01-044-4556 | 30 | 12 |
| 5305-00-993-9175 | 10 | 17 | 1240-01-044-4557 | 29 | 8 |
| | 14 | 23 | 1240-01-044-4558 | 32 | 20 |
| 5305-00-995-4659 | 9 | 12 | 1240-01-044-4559 | 32 | 37 |
| 5331-01-007-8595 | 28 | 10 | 1240-01-044-4560 | 25 | 24 |
| 5360-01-037-6448 | 21 | 3 | 1240-01-044-4561 | 23 | 1 |
| 5340-01-043-2209 | 39 | 5 | 3020-01-044-4562 | 33 | 14 |
| 5340-01-043-4440 | 39 | 2 | 5330-01-044-4883 | 9 | 16 |
| 1240-01-043-4768 | 37 | 5 | | 14 | 14 |
| 5305-01-043-7326 | 21 | 8 | | 20 | 7 |
| 5340-01-043-7380 | 32 | 24 | 5340-01-044-4892 | 18 | 4 |
| 5315-01-043-7428 | 16 | 4 | 1290-01-044-6912 | 2 | 7 |
| | 22 | 11 | 1240-01-044-6915 | 23 | 4 |
| 5315-01-043-7434 | 39 | 7 | 1240-01-044-6917 | 28 | 18 |
| 1290-01-043-7476 | 2 | 39 | 1240-01-044-7056 | 32 | 30 |
| 5340-01-043-7489 | 38 | 2 | 5340-01-044-7069 | 32 | 31 |
| 1290-01-043-7490 | 1 | 4 | 5365-01-044-7070 | 29 | 4 |
| 1290-01-043-7491 | 1 | 6 | 1240-01-044-9849 | 16 | 7 |
| 1290-01-043-7493 | 3 | 15 | 1240-01-044-9851 | 37 | 24 |
| 1290-01-043-7494 | 3 | 20 | 1240-01-044-9852 | 8 | 1 |
| 1290-01-043-7499 | 6 | 2 | 1240-01-044-9854 | 10 | 25 |
| 5340-01-043-7501 | 21 | 9 | 1290-01-044-9856 | 3 | 26 |
| 5340-01-043-7511 | 6 | 21 | 1290-01-044-9857 | 1 | 3 |
| 1240-01-043-7547 | 36 | 2 | 1290-01-044-9858 | 2 | 5 |

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NATIONAL STOCK NUMBER INDEX

| STOCK NUMBER | FIG. | ITEM | STOCK NUMBER | FIG. | ITEM |
|---|---|---|---|---|---|
| 1290-01-044-9859 | 6 | 9 | 1290-01-048-0193 | 1 | 7 |
| 5330-01-045-0718 | 32 | 10 | 5330-01-048-0563 | 10 | 23 |
| 3040-01-045-2059 | 10 | 11 | 5330-01-048-0564 | 10 | 27 |
| 3020-01-045-3970 | 6 | 5 | 9905-01-048-0646 | 13 | 7 |
| 5360-01-045-5461 | 25 | 12 | 5315-01-048-0650 | 29 | 7 |
| 9905-01-045-5843 | 20 | 1 | 3040-01-048-0767 | 14 | 18 |
| 5315-01-045-7806 | 6 | 13 | 1240-01-048-0777 | 37 | 25 |
| 5310-01-045-9594 | 3 | 16 | 1240-01-048-0778 | 37 | 12 |
| 5310-01-045-9595 | 3 | 21 | 1240-01-048-0779 | 37 | 19 |
| 5355-01-046-0732 | 9 | 18 | 5340-01-048-0791 | 25 | 20 |
| | 14 | 15 | 9905-01-048-2788 | 2 | 29 |
| | 20 | 4 | 5365-01-048-3048 | 17 | 4 |
| 1240-01-046-0895 | 17 | 5 | 5315-01-048-3354 | 36 | 20 |
| 1240-01-046-0896 | 28 | 12 | 3040-01-048-3741 | 6 | 16 |
| 5360-01-046-2460 | 35 | 4 | 5305-01-048-5367 | 10 | 15 |
| 5340-01-046-3649 | 2 | 38 | 3020-01-048-6275 | 6 | 11 |
| 1290-01-046-3687 | 1 | 8 | 5306-01-048-8749 | 16 | 1 |
| 5355-01-046-3761 | 32 | 23 | 5330-01-049-1290 | 9 | 8 |
| 1290-01-046-3777 | 1 | 3 | 5315-01-049-1390 | 26 | 1 |
| 1240-01-046-4258 | 24 | 9 | 6680-01-049-2865 | 33 | 9 |
| 5340-01-046-4277 | 34 | 6 | 5310-01-049-4071 | 10 | 24 |
| 5310-01-046-5392 | 13 | 2 | 9905-01-049-5129 | 24 | 13 |
| 5310-01-046-5395 | 14 | 4 | 6680-01-049-5151 | 6 | 6 |
| 5360-01-046-5865 | 6 | 20 | 3020-01-049-5234 | 6 | 10 |
| 5365-01-046-5869 | 9 | 15 | 5340-01-049-6190 | 32 | 26 |
| | 14 | 12 | 5330-01-049-8676 | 10 | 20 |
| | 20 | 8 | 5355-01-049-8955 | 34 | 2 |
| 1240-01-046-7104 | 32 | 29 | 5310-01-049-9174 | 19 | 1 |
| 1240-01-046-7105 | 34 | 5 | 5310-01-049-9175 | 9 | 17 |
| 1240-01-046-7106 | 15 | 3 | | 14 | 13 |
| 5330-01-046-8020 | 10 | 9 | | 20 | 6 |
| 5305-01-046-8323 | 25 | 1 | 5355-01-049-9238 | 37 | 2 |
| 9905-01-046-8337 | 36 | 11 | 5330-01-049-9865 | 19 | 11 |
| 5340-01-046-8343 | 32 | 17 | 5310-01-050-0478 | 37 | 4 |
| 3040-01-046-8372 | 10 | 14 | 5330-01-050-1549 | 3 | 13 |
| 1240-01-046-8377 | 29 | 9 | 3120-01-050-1574 | 9 | 20 |
| 5360-01-046-8830 | 28 | 26 | | 14 | 17 |
| 5310-01-047-0433 | 3 | 12 | | 20 | 9 |
| 5355-01-047-0490 | 3 | 11 | 5365-01-050-2177 | 28 | 24 |
| 3110-01-047-0624 | 21 | 1 | 5360-01-050-5307 | 39 | 8 |
| 5305-01-047-3997 | 37 | 7 | 3120-01-050-6190 | 9 | 3 |
| 5330-01-047-5724 | 28 | 4 | | 14 | 9 |
| 5305-01-047-6149 | 12 | 6 | | 20 | 15 |
| 5305-01-047-6150 | 12 | 3 | 5365-01-050-6765 | 9 | 1 |
| 1240-01-047-8183 | 14 | 28 | | 14 | 7 |
| 6650-01-047-8283 | 17 | 10 | | 20 | 13 |
| 6650-01-047-8287 | 25 | 21 | 6680-01-050-7647 | 6 | 4 |
| 3020-01-047-9114 | 6 | 7 | 6680-01-051-8404 | 33 | 3 |
| 3020-01-047-9116 | 6 | 14 | 9390-01-051-9545 | 9 | 9 |
| 6650-01-047-9214 | 29 | 10 | 6260-01-051-9606 | 29 | 3 |

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| STOCK NUMBER | FIG. | ITEM | STOCK NUMBER | FIG. | ITEM |
|---|---|---|---|---|---|
| 5340-01-051-9968 | 20 | 12 | 9905-01-451-1585 | 25 | 18 |
| 5330-01-052-0009 | 32 | 4 | 5340-01-464-3141 | 9 | 30 |
| 5340-01-052-0011 | 34 | 9 | | 24 | 17 |
| 5365-01-052-1298 | 25 | 11 | | 32 | 39 |
| 1240-01-052-1979 | 22 | 5 | | 37 | 32 |
| 4820-01-053-0223 | 25 | 3 | 4010-01-464-3142 | 9 | 29 |
| | 28 | 28 | | 24 | 16 |
| | 31 | 1 | | 37 | 33 |
| | 36 | 18 | 5331-01-465-0909 | 24 | 6 |
| 5315-01-053-0237 | 9 | 13 | 5331-01-471-2403 | 30 | 2 |
| 5325-01-054-0133 | 9 | 7 | 6160-01-485-1914 | 9 | 26 |
| 5315-01-054-4904 | 19 | 7 | | 24 | 18 |
| 5340-01-054-6588 | 34 | 13 | | 37 | 29 |
| 5365-01-056-1804 | 21 | 13 | 5330-01-485-3480 | 9 | 25 |
| 6650-01-057-0054 | 37 | 22 | | 24 | 19 |
| 5340-01-062-0274 | 40 | 2 | | 37 | 28 |
| 5340-01-062-0275 | 40 | 1 | 9905-01-485-7527 | 24 | 13 |
| 5305-01-062-3346 | 10 | 22 | 9905-01-485-7528 | 24 | 13 |
| 4931-01-062-4255 | 40 | 3 | 1240-01-485-7530 | 30 | 20 |
| 1240-01-062-8264 | 23 | 2 | 5935-01-485-7531 | 24 | 21 |
| 1240-01-065-9826 | 33 | 19 | 6160-01-485-7533 | 2 | 25 |
| 1240-01-065-9829 | 33 | 17 | | 32 | 41 |
| 9905-01-068-6443 | 2 | 29 | 5340-01-485-7534 | 32 | 17 |
| 9905-01-069-5632 | 29 | 2 | 5340-01-485-7535 | 2 | 22 |
| 5305-01-071-8747 | 32 | 27 | | 32 | 40 |
| 5355-01-083-6241 | 25 | 9 | 1240-01-485-7536 | 30 | 19 |
| 6650-01-092-6476 | 23 | 1A | 5330-01-485-8715 | 2 | 26 |
| 3040-01-093-8922 | 10 | 19 | | 32 | 44 |
| 6680-01-100-0775 | 33 | 6 | 1240-01-486-0293 | 23 | 4 |
| 5305-01-116-7366 | 9 | 4 | 1240-01-486-0296 | 28 | 29 |
| 5331-01-118-2080 | 37 | 17 | 1240-01-486-1345 | 23 | 2 |
| 4931-01-128-5862 | 40 | 11 | 1240-01-486-2738 | 23 | 5 |
| 4931-01-132-0654 | 40 | 19 | 3040-01-493-4172 | 15 | 4 |
| 1240-01-134-7103 | 40 | 6 | 3040-01-494-7940 | 16 | 9 |
| 5310-01-140-2500 | 25 | 4 | 3130-01-497-3341 | 8 | 4 |
| 5120-01-151-8817 | 40 | 15 | 1240-01-498-9029 | 8 | 5 |
| 5120-01-151-8819 | 40 | 17 | 3020-01-509-4226 | 28 | 9 |
| 5120-01-151-8820 | 40 | 14 | 5365-01-517-2168 | 32 | 45 |
| 5305-01-206-5456 | 9 | 6B | 1290-01-517-2169 | 1 | 7 |
| 1240-01-206-6341 | 37 | 8 | 1290-01-517-2170 | 1 | 8 |
| 4820-01-210-9568 | 2 | 30 | 9905-01-517-2172 | 2 | 29 |
| 4820-01-235-0223 | 2 | 34 | 9905-01-517-2173 | 2 | 29 |
| | 30 | 8 | 5340-01-517-6141 | 1 | 5 |
| | 32 | 7 | 5340-01-517-8450 | 12 | 15 |
| | 36 | 16 | 5365-01-517-8451 | 9 | 23 |
| 5340-01-244-9855 | 30 | 3 | 3020-01-517-8452 | 14 | 2 |
| 6650-01-264-2348 | 30 | 16 | 3040-01-517-8453 | 14 | 25 |
| 5315-01-336-2450 | 9 | 6A | 3040-01-517-9270 | 10 | 3 |
| 5330-01-341-6762 | 3 | 3 | 5340-01-517-9271 | 12 | 11 |
| 5331-01-449-3292 | 28 | 25 | 3130-01-517-9273 | 8 | 4 |

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| STOCK NUMBER | FIG. | ITEM | STOCK NUMBER | FIG. | ITEM |
|---|---|---|---|---|---|
| 5315-01-517-9274 | 9 | 6 | | | |
| 1240-01-517-9275 | 11 | 2A | | | |
| 3110-01-518-3217 | 13 | 5 | | | |
| 3110-01-518-3219 | 13 | 3 | | | |
| 3120-01-518-3221 | 13 | 4 | | | |
| 3040-01-518-4504 | 21 | 12 | | | |
| 9905-01-518-4505 | 20 | 1 | | | |
| 1240-01-519-3052 | 37 | 25 | | | |
| 1240-01-519-3054 | 37 | 19 | | | |
| 5340-01-519-3055 | 37 | 26 | | | |
| 9905-01-519-3056 | 36 | 11 | | | |
| 6650-01-520-5989 | 37 | 13 | | | |
| 1240-01-521-0009 | 8 | 1 | | | |
| 9905-01-521-1615 | 13 | 7 | | | |
| 5340-01-521-2989 | 12 | 13 | | | |
| 5310-01-521-3097 | 12 | 12 | | | |
| 5305-01-521-9231 | 12 | 14 | | | |
| 9530-01-522-0697 | 33 | 13 | | | |
| 5340-01-522-0777 | 5 | 15 | | | |
| 5340-01-522-1643 | 5 | 13 | | | |
| 5340-01-523-2317 | 32 | 47 | | | |
| 5330-01-523-2319 | 28 | 6 | | | |
| 5330-01-523-2320 | 28 | 7 | | | |
| 5315-01-524-0124 | 24 | 5A | | | |

**END OF WORK PACKAGE**

**DIRECT SUPPORT AND GENERAL SUPPORT**

**QUADRANT, FIRE CONTROL: M17 (1290-01-037-3883);**
**QUADRANT, FIRE CONTROL: M17A1 (1290-01-515-8260);**
**QUADRANT, FIRE CONTROL: M18 (1290-01-037-7289);**
**QUADRANT, FIRE CONTROL: M18A1 (1290-01-515-8262);**
**MOUNT, TELESCOPE AND QUADRANT: M171 (1240-01-039-7273);**
**MOUNT, TELESCOPE AND QUADRANT: M171A1 (1240-01-515-8265);**
**MOUNT, TELESCOPE AND QUADRANT: M172 (1240-01-037-7290);**
**MOUNT, TELESCOPE AND QUADRANT: M172A1 (1240-01-517-2171);**
**TELESCOPE, PANORAMIC: M137 (1240-01-038-0531);**
**TELESCOPE, PANORAMIC: M137A2 (1240-01-483-6103);**
**TELESCOPE, PANORAMIC: M137A3 (1240-01-483-6100);**
**TELESCOPE, ELBOW: M138 (1240-01-038-0530); AND**
**TELESCOPE, ELBOW: M138A1 (1240-01-515-8264)**

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| CAGEC | PART NUMBER | STOCK NUMBER | FIG. | ITEM |
|---|---|---|---|---|
| 81343 | AS29513-116 | 5331-00-248-3850 | 10 | 10 |
| 81343 | AS29513-12 | | 25 | 14 |
| 81343 | AS29513-138 | 5331-00-252-6050 | 30 | 15 |
| 81343 | AS29513-151 | 5331-00-935-9226 | 10 | 12 |
| 81343 | AS29513-155 | 5331-00-529-3723 | 37 | 12A |
| | | | 37 | 18 |
| 81343 | AS3578-010 | 5331-00-580-2278 | 28 | 15 |
| 81343 | AS3578-013 | 5331-00-558-2310 | 3 | 22 |
| | | | 25 | 8 |
| 81343 | AS3578-015 | 5331-00-584-1222 | 32 | 21 |
| 81343 | AS3578-016 | 5331-01-449-3292 | 28 | 25 |
| 81343 | AS3578-017 | 5331-00-551-9573 | 2 | 36 |
| 81343 | AS3578-118 | 5331-00-584-1229 | 10 | 13 |
| 81343 | AS3578-130 | 5331-00-584-1582 | 24 | 3 |
| | | | 24 | 3 |
| 81343 | AS3578-134 | 5331-01-465-0909 | 24 | 6 |
| 81343 | AS3578-140 | 5331-01-471-2403 | 30 | 2 |
| 81343 | AS3578-216 | 5331-00-531-3714 | 28 | 13 |
| 81343 | AS3578-221 | 5331-00-550-6617 | 3 | 17 |
| 58536 | FF B 171B | 3110-00-156-7513 | 16 | 13 |
| 96906 | MS124695 | 5325-00-597-3302 | 18 | 5 |
| 96906 | MS124697 | 5325-00-291-3495 | 22 | 10 |
| 96906 | MS124735 | 5325-00-290-4480 | 22 | 16 |
| 80205 | MS15795-704 | 5310-00-550-5009 | 6 | 17 |
| 96906 | MS16555-601 | 5315-00-817-0889 | 4 | 6 |
| 96906 | MS16555-604 | 5315-00-806-7039 | 6 | 3 |
| | | | 7 | 7 |
| | | | 33 | 10 |
| 96906 | MS16555-617 | 5315-00-682-1726 | 6 | 1 |
| 96906 | MS16555-618 | 5315-00-702-9651 | 28 | 20 |
| | | | 33 | 1 |
| 96906 | MS16555-620 | 5315-00-806-7040 | 32 | 22 |
| 80205 | MS16555-622 | 5315-00-815-9366 | 24 | 5 |
| 80205 | MS16555-625 | 5315-00-682-1727 | 3 | 5 |
| 96906 | MS16555-626 | 5315-00-847-5677 | 26 | 2 |
| 80205 | MS16555-627 | 5315-00-825-1207 | 28 | 3 |
| 80205 | MS16555-628 | 5315-00-810-0505 | 9 | 19 |
| | | | 14 | 16 |
| | | | 20 | 5 |
| | | | 22 | 3 |
| 96906 | MS16555-631 | 5315-00-834-0745 | 2 | 16 |
| | | | 3 | 10 |
| 96906 | MS16555-634 | 5315-00-988-7409 | 21 | 2 |
| | | | 27 | 1 |
| 96906 | MS16555-636 | 5315-00-176-6116 | 28 | 8 |
| 96906 | MS16555-640 | 5315-00-056-9386 | 28 | 22 |
| 96906 | MS16555-646 | 5315-00-682-1733 | 14 | 19 |
| | | | 15 | 5 |
| | | | 22 | 15 |
| 96906 | MS16555-651 | 5315-00-543-3986 | 38 | 1 |
| 96906 | MS16555-686 | 5315-01-048-3354 | 36 | 20 |

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| CAGEC | PART NUMBER | STOCK NUMBER | FIG. | ITEM |
|---|---|---|---|---|
| 96906 | MS16556-621 | 5315-00-082-4858 | 35 | 1 |
| 80205 | MS16562-224 | 5315-00-841-4442 | 36 | 21 |
| 96906 | MS16624-5015-1 | 5325-00-187-9033 | 39 | 4 |
| 96906 | MS16633-4009 | 5325-00-543-3981 | 29 | 6 |
| 96906 | MS16633-4015 | 5325-00-598-1840 | 6 | 12 |
| 80205 | MS16995-1 | 5305-00-068-5409 | 34 | 3 |
| 80205 | MS16995-10 | 5305-00-959-0379 | 33 | 7 |
| 80205 | MS16995-17 | 5305-00-959-0382 | 16 | 2 |
| 80205 | MS16995-18 | 5305-00-959-1082 | 2 | 23 |
| | | | 9 | 28 |
| | | | 24 | 14 |
| | | | 30 | 6 |
| | | | 32 | 43 |
| | | | 37 | 31 |
| 96906 | MS16995-25 | 5305-00-988-7601 | 12 | 7 |
| 80205 | MS16995-26 | 5305-00-988-7602 | 24 | 1A |
| 80205 | MS16995-28 | 5305-00-988-7604 | 12 | 9 |
| | | | 24 | 1 |
| 80205 | MS16995-64 | 5305-00-988-7838 | 12 | 10 |
| 80205 | MS16995-9 | 5305-00-068-5276 | 12 | 4 |
| 80205 | MS18064-91 | 5305-01-206-5456 | 9 | 6B |
| 96906 | MS19060-1006 | 3110-00-990-0475 | 35 | 5 |
| 96906 | MS19068-063 | 5310-00-450-5946 | 14 | 6 |
| 96906 | MS19070-063 | 5310-00-186-1009 | 14 | 5 |
| 96906 | MS21090-0412 | 5305-00-726-1241 | 37 | 20 |
| 96906 | MS24585-1025 | 5360-01-037-6448 | 21 | 3 |
| 96906 | MS24585-1067 | 5360-01-045-5461 | 25 | 12 |
| 96906 | MS24585C75 | 5360-00-993-4647 | 21 | 10 |
| 96906 | MS24673-11 | 5305-00-957-5897 | 22 | 8 |
| 80205 | MS24673-16 | 5305-00-834-3388 | 19 | 4A |
| 80205 | MS24673-17 | 5305-00-834-3385 | 19 | 2 |
| | | | 19 | 4C |
| | | | 21 | 5 |
| 80205 | MS24673-18 | 5305-00-235-3528 | 19 | 4D |
| 80205 | MS24673-3 | 5305-00-988-5308 | 19 | 8 |
| 80205 | MS24673-7 | 5305-00-682-7753 | 19 | 10 |
| 96906 | MS24674-14 | 5305-00-995-4659 | 9 | 12 |
| 96906 | MS24674-15 | 5305-00-067-9917 | 9 | 24 |
| 96906 | MS24674-16 | 5305-00-993-9175 | 10 | 17 |
| | | | 14 | 23 |
| 96906 | MS24674-25 | 5305-00-685-3492 | 14 | 20 |
| 96906 | MS24674-3 | 5305-00-848-9282 | 14 | 26 |
| | | | 22 | 1 |
| 96906 | MS24674-35 | 5305-00-225-9891 | 15 | 1 |
| 96906 | MS24674-7 | 5305-00-067-9914 | 10 | 26 |
| | | | 17 | 7 |
| 96906 | MS24674-8 | 5305-00-993-1612 | 10 | 8 |
| 96906 | MS24674-9 | 5305-00-989-4609 | 19 | 5 |
| 80205 | MS24692-225 | 5315-00-078-8711 | 16 | 6 |
| 80205 | MS24692-339 | 5315-00-188-0240 | 9 | 6 |
| 96906 | MS27955-4 | | 19 | 3 |

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| CAGEC | PART NUMBER | STOCK NUMBER | FIG. | ITEM |
|---|---|---|---|---|
| 81343 | MS28775-012 | 5331-00-584-0265 | 33 | 16 |
| 81343 | MS28775-130 | 5331-01-007-8595 | 28 | 10 |
| 96906 | MS29513-044 | | 3 | 8 |
| 81343 | MS29513-12 | 5331-00-248-3836 | 3 | 14 |
| 96906 | MS35275-225 | 5305-00-940-9487 | 22 | 14 |
| 96906 | MS35275-226 | 5305-00-940-9488 | 14 | 1 |
| 80205 | MS35275-228 | 5305-00-922-6286 | 9 | 11 |
| 96906 | MS35276-247 | 5305-00-912-7281 | 2 | 2 |
| 96906 | MS35307-333 | 5306-00-817-4989 | 2 | 41 |
| 80205 | MS35308-333 | 5306-00-638-7719 | 2 | 41 |
| 96906 | MS35333-69 | 5310-00-543-4652 | 11 | 7 |
| | | | 13 | 8 |
| 80205 | MS35333-71 | 5310-00-616-3555 | 17 | 9 |
| 80205 | MS35338-134 | 5310-00-928-2690 | 2 | 13 |
| | | | 2 | 28 |
| | | | 5 | 2 |
| | | | 5 | 8 |
| | | | 20 | 2 |
| | | | 24 | 11 |
| | | | 24 | 23 |
| | | | 32 | 33 |
| | | | 36 | 9 |
| 80205 | MS35338-135 | 5310-00-933-8118 | 3 | 19 |
| | | | 6 | 19 |
| | | | 12 | 5 |
| | | | 32 | 19 |
| | | | 33 | 4 |
| | | | 34 | 7 |
| 80205 | MS35338-136 | 5310-00-929-6395 | 2 | 9 |
| | | | 2 | 11 |
| | | | 2 | 18 |
| | | | 2 | 20 |
| | | | 2 | 24 |
| | | | 9 | 27 |
| | | | 24 | 15 |
| | | | 28 | 2 |
| | | | 30 | 4 |
| | | | 32 | 12 |
| | | | 32 | 15 |
| | | | 32 | 15 |
| | | | 32 | 36 |
| | | | 32 | 42 |
| | | | 33 | 21 |
| | | | 37 | 30 |
| 80205 | MS35338-137 | 5310-00-933-8119 | 2 | 4 |
| | | | 3 | 2 |
| | | | 9 | 10 |
| | | | 10 | 5 |
| | | | 10 | 7 |
| | | | 12 | 8 |
| | | | 14 | 27 |

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| CAGEC | PART NUMBER | STOCK NUMBER | FIG. | ITEM |
|---|---|---|---|---|
| 80205 | MS35338-137 | 5310-00-933-8119 | 16 | 3 |
| | | | 17 | 6 |
| | | | 19 | 6 |
| | | | 22 | 2 |
| | | | 24 | 2 |
| | | | 32 | 2 |
| | | | 37 | 10 |
| | | | 37 | 15 |
| 80205 | MS35338-138 | 5310-00-933-8120 | 9 | 14 |
| | | | 10 | 18 |
| | | | 14 | 24 |
| | | | 19 | 9 |
| | | | 36 | 6 |
| 96906 | MS35338-139 | 5310-00-933-8121 | 10 | 2 |
| | | | 14 | 21 |
| | | | 22 | 9 |
| 80205 | MS35338-140 | 5310-00-974-6623 | 2 | 40 |
| | | | 15 | 2 |
| | | | 19 | 4B |
| 80205 | MS35338-143 | 5310-00-933-8778 | 9 | 5 |
| | | | 10 | 21 |
| 96906 | MS35672-16 | 5315-00-722-6591 | 36 | 5 |
| | | | 37 | 11 |
| 80205 | MS35672-18 | 5315-00-825-3748 | 37 | 16 |
| 80205 | MS51021-1 | 5305-00-843-2841 | 25 | 2 |
| | | | 37 | 1 |
| 80205 | MS51021-10 | 5305-00-655-9246 | 21 | 7 |
| 80205 | MS51021-101 | 5305-01-043-7710 | 28 | 23 |
| 80205 | MS51021-103 | 5305-01-047-3997 | 37 | 7 |
| 80205 | MS51021-11 | 5305-00-543-5832 | 25 | 15 |
| 80205 | MS51021-22 | 5305-00-576-7266 | 25 | 10 |
| | | | 36 | 19 |
| | | | 37 | 23 |
| 80205 | MS51021-23 | 5305-00-272-4123 | 16 | 8 |
| 80205 | MS51021-9 | 5305-00-800-7261 | 11 | 5 |
| | | | 29 | 5 |
| | | | 30 | 13 |
| 96906 | MS51023-10 | 5305-00-820-5433 | 30 | 14 |
| 96906 | MS51023-48 | 5305-00-281-3120 | 9 | 22 |
| | | | 14 | 10 |
| | | | 20 | 11 |
| 80205 | MS51023-49 | 5305-00-272-3533 | 10 | 16 |
| 80205 | MS51029-48 | 5305-00-865-9516 | 12 | 16 |
| 80205 | MS51031-35 | 5305-00-724-3454 | 2 | 37 |
| 80205 | MS51031-37 | 5305-00-724-3478 | 2 | 1 |
| 96906 | MS51038-15 | 5305-00-081-2651 | 37 | 3 |
| 96906 | MS51099-115 | 5305-01-116-7366 | 9 | 4 |
| 96906 | MS51100-120 | 5305-01-062-3346 | 10 | 22 |
| 96906 | MS51377-2 | 2640-00-060-3543 | 2 | 32 |
| | | | 30 | 10 |
| | | | 32 | 6 |

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| CAGEC | PART NUMBER | STOCK NUMBER | FIG. | ITEM |
|---|---|---|---|---|
| 96906 | MS51377-2 | 2640-00-060-3543 | 36 | 14 |
| 96906 | MS51607-1 | 4820-00-114-1096 | 2 | 31 |
| | | | 30 | 11 |
| | | | 32 | 5 |
| | | | 36 | 13 |
| 80205 | MS51923-159 | 5315-00-623-1761 | 6 | 8 |
| 80205 | MS51923-190 | 5315-00-616-4736 | 39 | 6 |
| 96906 | MS51957-1 | 5305-00-054-5635 | 2 | 27 |
| | | | 24 | 12 |
| | | | 32 | 32 |
| 96906 | MS51957-12 | 5305-00-054-5646 | 34 | 8 |
| 96906 | MS51957-13 | 5305-00-054-5647 | 3 | 25 |
| | | | 32 | 18 |
| | | | 33 | 18 |
| 96906 | MS51957-15 | 5305-00-054-5649 | 6 | 18 |
| | | | 33 | 5 |
| 96906 | MS51957-2 | 5305-00-054-5636 | 2 | 12 |
| | | | 5 | 1 |
| | | | 5 | 9 |
| | | | 11 | 8 |
| | | | 13 | 9 |
| | | | 20 | 3 |
| | | | 24 | 22 |
| | | | 36 | 10 |
| 96906 | MS51957-26 | 5305-00-054-6650 | 2 | 21 |
| | | | 32 | 38 |
| 96906 | MS51957-27 | 5305-00-054-6651 | 2 | 6 |
| | | | 17 | 8 |
| | | | 32 | 13 |
| | | | 32 | 14 |
| | | | 32 | 14 |
| | | | 37 | 9 |
| 96906 | MS51957-28 | 5305-00-054-6652 | 2 | 35 |
| | | | 3 | 18 |
| | | | 28 | 19 |
| | | | 32 | 35 |
| 96906 | MS51957-29 | 5305-00-054-6653 | 2 | 8 |
| | | | 2 | 10 |
| | | | 30 | 5 |
| | | | 33 | 12 |
| 96906 | MS51957-30 | 5305-00-054-6654 | 2 | 19 |
| | | | 28 | 1 |
| | | | 37 | 21 |
| 96906 | MS51957-31 | 5305-00-054-6655 | 37 | 14 |
| 96906 | MS51957-43 | 5305-00-054-6668 | 3 | 6 |
| 96906 | MS51957-45 | 5305-00-054-6670 | 2 | 3 |
| | | | 24 | 4 |
| | | | 32 | 1 |
| 96906 | MS51957-63 | 5305-00-050-9229 | 36 | 7 |
| 96906 | MS51958-27 | 5305-00-057-0523 | 36 | 1 |
| 96906 | MS51958-45 | 5305-00-701-5061 | 3 | 1 |

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| 96906 | MS51959-12 | 5305-00-777-6039 | 32 | 28 |
| 96906 | MS51959-13 | 5305-00-770-2533 | 13 | 1 |
| | | | 25 | 19 |
| | | | 32 | 46 |
| 96906 | MS51959-14 | 5305-00-763-7822 | 25 | 25 |
| 96906 | MS51959-2 | 5305-00-764-2966 | 34 | 11 |
| 96906 | MS51959-44 | 5305-00-764-0066 | 5 | 14 |
| | | | 32 | 48 |
| | | | 37 | 27 |
| 80205 | MS51959-45 | 5305-00-764-0068 | 9 | 24A |
| | | | 28 | 30 |
| 80205 | MS51959-47 | 5305-00-764-0071 | 24 | 20 |
| 96906 | MS51959-65 | 5305-00-701-5078 | 24 | 8 |
| 96906 | MS51960-6 | 5305-00-829-0105 | 39 | 1 |
| 96906 | MS51963-1 | 5305-00-717-6955 | 7 | 5 |
| 96906 | MS9021-046 | 5331-00-149-8859 | 2 | 17 |
| 96906 | MS90402-1 | 5305-01-071-8747 | 32 | 27 |
| 96906 | MS90708-4150 | 5325-01-054-0133 | 9 | 7 |
| 81343 | MS9390-290 | 5315-00-940-8033 | 32 | 16 |
| | | | 32 | 16 |
| 81349 | M21143/1-50 | 5315-01-336-2450 | 9 | 6A |
| 81343 | M83461/1-332 | 5331-01-118-2080 | 37 | 17 |
| 80205 | NAS1352C06H8 | 5305-00-848-9282 | 10 | 4 |
| 11934 | SLB10377 | 5330-01-485-3480 | 9 | 25 |
| 19200 | 10512992 | 3040-00-947-3044 | 40 | 18 |
| 19200 | 10516567 | 5340-00-464-4792 | 2 | 33 |
| | | | 30 | 9 |
| | | | 32 | 8 |
| | | | 36 | 15 |
| 19200 | 10549069 | | 21 | 6 |
| 19200 | 10549070 | 5365-01-056-1804 | 21 | 13 |
| 19200 | 10549259 | 5340-01-043-2209 | 39 | 5 |
| 19200 | 10549260 | | 38 | 3 |
| 19200 | 10549262 | | 39 | 3 |
| 19200 | 10549263 | 5360-01-050-5307 | 39 | 8 |
| 19200 | 10549264 | 5315-01-043-7434 | 39 | 7 |
| 19200 | 10549265 | 5340-01-043-4440 | 39 | 2 |
| 19200 | 10549268 | 1240-01-044-9851 | 37 | 24 |
| 19200 | 10549270 | 9905-01-046-8337 | 36 | 11 |
| 19200 | 10549272 | 1240-01-043-8248 | 36 | 4 |
| 19200 | 10549273-3 | 5340-01-048-0791 | 25 | 20 |
| 19200 | 10549277 | 5340-01-043-7489 | 38 | 2 |
| 19200 | 10549278 | 5340-01-043-9453 | 21 | 11 |
| 19200 | 10549286 | 5340-01-043-7501 | 21 | 9 |
| 19200 | 10549868 | 1240-00-084-0280 | 36 | 17 |
| 19200 | 10553898 | 4931-01-128-5862 | 40 | 11 |
| 19200 | 10553927 | 5310-00-150-3792 | 28 | 16 |
| 19200 | 10553928 | 5310-00-150-3708 | 28 | 17 |
| 19200 | 10554514 | 5340-01-051-9968 | 20 | 12 |
| 19200 | 10554685 | 1240-01-043-8198 | 18 | 1 |
| 19200 | 10554692 | 5305-01-043-7326 | 21 | 8 |

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|---|---|---|---|---|
| 19200 | 10554773 | 1240-01-046-4258 | 24 | 9 |
| 19200 | 10554774 | | 25 | 5 |
| 19200 | 10554777 | 5340-01-046-8343 | 32 | 17 |
| 19200 | 10554778 | 6650-01-092-6476 | 23 | 1A |
| 19200 | 10554778-1 | | 27 | 2 |
| 19200 | 10554781 | 1240-01-044-6917 | 28 | 18 |
| 19200 | 10554811 | 5340-01-044-4892 | 18 | 4 |
| 19200 | 10554813 | | 19 | 4 |
| 19200 | 10554815 | 1240-01-043-8197 | 22 | 6 |
| 19200 | 10554818 | 1240-01-043-8210 | 22 | 4 |
| 19200 | 10554820 | 5310-01-049-9174 | 19 | 1 |
| 19200 | 10554821 | 1240-01-052-1979 | 22 | 5 |
| 19200 | 10554825 | 1290-01-043-7476 | 2 | 39 |
| 19200 | 10554826 | | 4 | 2 |
| 19200 | 10554827 | 1290-01-048-0193 | 1 | 7 |
| 19200 | 10554828 | 5340-01-046-3649 | 2 | 38 |
| 19200 | 10554829 | 9905-01-045-5843 | 20 | 1 |
| 19200 | 10554936 | 6650-01-057-0054 | 37 | 22 |
| 19200 | 10555110 | 5365-01-050-2177 | 28 | 24 |
| 19200 | 10555147 | | 35 | 2 |
| 19200 | 10555155 | 1240-01-044-7056 | 32 | 30 |
| 19200 | 10555178 | 5360-01-046-2460 | 35 | 4 |
| 19200 | 10555186 | 1240-01-046-7104 | 32 | 29 |
| 19200 | 10555619 | 4940-00-191-9215 | 40 | 4 |
| 19200 | 10555620 | 1240-01-134-7103 | 40 | 6 |
| 19200 | 10556183 | 5305-01-046-8323 | 25 | 1 |
| 19200 | 10556184 | 9905-01-069-5632 | 29 | 2 |
| 19200 | 10556186 | 4820-01-053-0223 | 25 | 3 |
| | | | 28 | 28 |
| | | | 31 | 1 |
| | | | 36 | 18 |
| 19200 | 10556189 | 1240-01-065-9826 | 33 | 19 |
| 19200 | 10556190 | 5340-01-043-7380 | 32 | 24 |
| 19200 | 10556191 | 1290-01-044-6912 | 2 | 7 |
| 19200 | 10556192 | 1290-01-044-9858 | 2 | 5 |
| 19200 | 10558253-11 | 5340-01-062-0275 | 40 | 1 |
| 19200 | 11727757 | 3110-01-047-0624 | 21 | 1 |
| 19200 | 11727758 | 3040-01-043-8293 | 21 | 4 |
| 19200 | 11727801 | | 8 | 2 |
| 19200 | 11727802 | 3130-01-497-3341 | 8 | 4 |
| 19200 | 11727803 | 3040-01-493-4172 | 15 | 4 |
| 19200 | 11727804 | | 8 | 3 |
| 19200 | 11727806 | | 13 | 6 |
| 19200 | 11727808 | 1240-01-044-9849 | 16 | 7 |
| 19200 | 11727812 | | 17 | 1 |
| 19200 | 11727814 | 5340-01-043-9313 | 10 | 6 |
| 19200 | 11727816 | 3040-01-494-7940 | 16 | 9 |
| 19200 | 11727817 | | 14 | 3 |
| 19200 | 11727818 | | 12 | 2 |
| 19200 | 11727819 | | 16 | 5 |
| 19200 | 11727821 | 1240-01-046-7106 | 15 | 3 |

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|---|---|---|---|---|
| 19200 | 11727822 | 1240-01-044-9852 | 8 | 1 |
| 19200 | 11727824 | 1240-01-498-9029 | 8 | 5 |
| 19200 | 11727833 | 5330-01-046-8020 | 10 | 9 |
| 19200 | 11727834 | 3040-01-093-8922 | 10 | 19 |
| 19200 | 11727837 | 5365-01-048-3048 | 17 | 4 |
| 19200 | 11727838 | 5310-01-049-4071 | 10 | 24 |
| 19200 | 11727839 | 3040-01-045-2059 | 10 | 11 |
| 19200 | 11727842-1 | 5305-01-047-6149 | 12 | 6 |
| 19200 | 11727842-2 | 5305-01-047-6150 | 12 | 3 |
| 19200 | 11727844 | 9390-01-051-9545 | 9 | 9 |
| 19200 | 11727850 | 1240-01-047-8183 | 14 | 28 |
| 19200 | 11727851 | 5310-01-046-5392 | 13 | 2 |
| 19200 | 11727853 | 1240-01-046-0895 | 17 | 5 |
| 19200 | 11727854 | 1240-01-044-9854 | 10 | 25 |
| 19200 | 11727857 | 3040-01-046-8372 | 10 | 14 |
| 19200 | 11727863 | 9905-01-048-0646 | 13 | 7 |
| 19200 | 11727864 | 3110-00-165-5922 | 17 | 3 |
| 19200 | 11727865 | 6650-01-047-8283 | 17 | 10 |
| 19200 | 11727866 | 5305-01-048-5367 | 10 | 15 |
| 19200 | 11727867 | 3040-01-048-0767 | 14 | 18 |
| 19200 | 11727868 | 5315-01-053-0237 | 9 | 13 |
| 19200 | 11727870 | 5306-01-048-8749 | 16 | 1 |
| 19200 | 11727871-1 | 5330-01-049-1290 | 9 | 8 |
| 19200 | 11727871-2 | 5330-01-048-0563 | 10 | 23 |
| 19200 | 11727871-3 | 5330-01-048-0564 | 10 | 27 |
| 19200 | 11727872-1 | 5330-01-049-8676 | 10 | 20 |
| 19200 | 11727876-1 | 5305-00-146-5701 | 10 | 1 |
| 19200 | 11727880 | 3120-01-050-1574 | 9 | 20 |
| | | | 14 | 17 |
| | | | 20 | 9 |
| 19200 | 11727882 | 5365-01-046-5869 | 9 | 15 |
| | | | 14 | 12 |
| | | | 20 | 8 |
| 19200 | 11727883 | 5330-01-044-4883 | 9 | 16 |
| | | | 14 | 14 |
| | | | 20 | 7 |
| 19200 | 11727884 | 5310-01-049-9175 | 9 | 17 |
| | | | 14 | 13 |
| | | | 20 | 6 |
| 19200 | 11727885 | 5355-01-046-0732 | 9 | 18 |
| | | | 14 | 15 |
| | | | 20 | 4 |
| 19200 | 11727886 | 3120-01-050-6190 | 9 | 3 |
| | | | 14 | 9 |
| | | | 20 | 15 |
| 19200 | 11727887 | 5365-01-050-6765 | 9 | 1 |
| | | | 14 | 7 |
| | | | 20 | 13 |
| 19200 | 11727888 | 5315-00-492-1962 | 12 | 1 |
| 19200 | 11727890 | 5315-01-043-7428 | 16 | 4 |
| | | | 22 | 11 |

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|---|---|---|---|---|
| 19200 | 11727892 | 5315-01-043-9369 | 14 | 22 |
| 19200 | 11727895 | 5330-01-043-9288 | 14 | 29 |
| 19200 | 11727897 | 5310-01-046-5395 | 14 | 4 |
| 19200 | 11729512 | 1290-00-257-2769 | 4 | 3 |
| | | | 7 | 3 |
| | | | 11 | 2 |
| 19200 | 11729515 | 6260-01-051-9606 | 29 | 3 |
| 19200 | 11729516 | 1240-01-048-0779 | 37 | 19 |
| 19200 | 11729528 | | 5 | 5 |
| 19200 | 11729529 | 1290-01-043-7490 | 1 | 4 |
| 19200 | 11729532 | | 1 | 5 |
| 19200 | 11729535 | | 3 | 4 |
| 19200 | 11729536 | | 3 | 4 |
| 19200 | 11729538 | | 7 | 4 |
| 19200 | 11729540 | 1290-01-043-7493 | 3 | 15 |
| 19200 | 11729542 | | 1 | 2 |
| 19200 | 11729543 | 1290-01-043-7491 | 1 | 6 |
| 19200 | 11729544 | 1290-01-044-9859 | 6 | 9 |
| 19200 | 11729546 | 1290-01-044-9857 | 1 | 3 |
| 19200 | 11729548 | 1290-01-046-3777 | 1 | 3 |
| 19200 | 11729551 | 1290-01-046-3687 | 1 | 8 |
| 19200 | 11729552 | | 3 | 9 |
| 19200 | 11729553 | | 3 | 7 |
| 19200 | 11729554 | 3020-01-047-9114 | 6 | 7 |
| 19200 | 11729555 | 3020-01-049-5234 | 6 | 10 |
| 19200 | 11729556 | | 5 | 7 |
| 19200 | 11729557 | | 5 | 10 |
| 19200 | 11729558 | 1290-01-043-7494 | 3 | 20 |
| 19200 | 11729559 | 6240-01-043-8209 | 5 | 4 |
| | | | 34 | 4 |
| 19200 | 11729560 | | 6 | 15 |
| 19200 | 11729561 | 1290-01-043-7499 | 6 | 2 |
| 19200 | 11729570 | | 5 | 3 |
| 19200 | 11729572 | 5340-01-043-7511 | 6 | 21 |
| 19200 | 11729574 | 3020-01-047-9116 | 6 | 14 |
| 19200 | 11729575 | 3020-01-048-6275 | 6 | 11 |
| 19200 | 11729576 | 3020-01-045-3970 | 6 | 5 |
| 19200 | 11729577 | 3040-01-048-3741 | 6 | 16 |
| 19200 | 11729578 | | 1 | 1 |
| 19200 | 11729580 | 5355-01-047-0490 | 3 | 11 |
| 19200 | 11729581 | 9905-00-257-2751 | 2 | 14 |
| | | | 11 | 6 |
| 19200 | 11729582 | 9905-00-257-2750 | 2 | 15 |
| | | | 32 | 34 |
| 19200 | 11729586 | 5310-01-045-9594 | 3 | 16 |
| 19200 | 11729587 | 5310-01-045-9595 | 3 | 21 |
| 19200 | 11729588 | 9905-01-048-2788 | 2 | 29 |
| 19200 | 11729589 | 5315-01-045-7806 | 6 | 13 |
| 19200 | 11729591 | 6680-01-049-5151 | 6 | 6 |
| 19200 | 11729593 | 9905-01-068-6443 | 2 | 29 |
| 19200 | 11729598 | 5360-01-046-5865 | 6 | 20 |

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|---|---|---|---|---|
| 19200 | 11731011 | 7690-00-257-2746 | 5 | 12 |
| | | | 17 | 2 |
| | | | 32 | 9 |
| | | | 36 | 8 |
| 19200 | 11732205 | 5315-01-054-4904 | 19 | 7 |
| 19200 | 11732206 | | 22 | 12 |
| 19200 | 11732207 | 5330-01-049-9865 | 19 | 11 |
| 19200 | 11738294 | 1240-00-191-1379 | 40 | 22 |
| 19200 | 11741102-1 | 1240-01-044-6915 | 23 | 4 |
| 19200 | 11741103 | 3020-01-044-4562 | 33 | 14 |
| 19200 | 11741104 | | 34 | 1 |
| 19200 | 11741105 | 1240-01-044-4561 | 23 | 1 |
| 19200 | 11741106 | | 25 | 16 |
| 19200 | 11741107 | | 28 | 11 |
| 19200 | 11741108 | | 29 | 1 |
| 19200 | 11741110 | | 30 | 1 |
| 19200 | 11741111 | | 33 | 8 |
| 19200 | 11741118-1 | 6680-01-051-8404 | 33 | 3 |
| 19200 | 11741118-2 | 6680-01-100-0775 | 33 | 6 |
| 19200 | 11741119 | 6680-01-049-2865 | 33 | 9 |
| 19200 | 11741120 | | 26 | 7 |
| 19200 | 11741121 | 6650-01-047-8287 | 25 | 21 |
| 19200 | 11741123 | 5330-01-047-5724 | 28 | 4 |
| 19200 | 11741126 | 1240-01-044-4560 | 25 | 24 |
| 19200 | 11741133 | | 31 | 2 |
| 19200 | 11741135 | | 30 | 7 |
| 19200 | 11741137 | 6650-01-264-2348 | 30 | 16 |
| 19200 | 11741146 | 5355-01-046-3761 | 32 | 23 |
| 19200 | 11741147 | 1240-01-065-9829 | 33 | 17 |
| 19200 | 11741154 | 5340-01-044-7069 | 32 | 31 |
| 19200 | 11741155 | 5340-01-049-6190 | 32 | 26 |
| 19200 | 11741156 | | 35 | 3 |
| 19200 | 11741157 | 5340-01-052-0011 | 34 | 9 |
| 19200 | 11741158 | 5340-01-046-4277 | 34 | 6 |
| 19200 | 11741159 | 5340-01-054-6588 | 34 | 13 |
| 19200 | 11741160 | 5360-01-046-8830 | 28 | 26 |
| 19200 | 11741161 | | 32 | 11 |
| 19200 | 11741163 | 1240-01-044-4559 | 32 | 37 |
| 19200 | 11741164 | 1240-01-044-4558 | 32 | 20 |
| 19200 | 11741170 | 1240-01-046-7105 | 34 | 5 |
| 19200 | 11741171 | 9905-01-049-5129 | 24 | 13 |
| 19200 | 11741172 | 5330-01-045-0718 | 32 | 10 |
| 19200 | 11741173 | | 26 | 4 |
| 19200 | 11741174 | | 25 | 17 |
| 19200 | 11741178 | 1240-01-044-4557 | 29 | 8 |
| 19200 | 11741179 | 5340-01-244-9855 | 30 | 3 |
| 19200 | 11741180 | 6650-01-047-9214 | 29 | 10 |
| 19200 | 11741182 | 1240-01-043-9465 | 24 | 7 |
| 19200 | 11741186 | 1240-01-046-0896 | 28 | 12 |
| 19200 | 11741188 | | 29 | 11 |
| 19200 | 11741191 | 1240-01-043-9464 | 28 | 21 |

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|---|---|---|---|---|
| 19200 | 11741194 | 9905-00-257-2756 | 24 | 10 |
| | | | 36 | 12 |
| 19200 | 11741195 | 5355-01-049-8955 | 34 | 2 |
| 19200 | 11741196 | 1240-01-044-4556 | 30 | 12 |
| 19200 | 11741197 | 5340-01-043-9476 | 30 | 18 |
| 19200 | 11741198 | 5360-01-043-9541 | 30 | 17 |
| 19200 | 11741200 | 1240-01-043-9463 | 28 | 29 |
| 19200 | 11741201 | 1240-01-043-9462 | 23 | 5 |
| 19200 | 11741202 | 1240-01-062-8264 | 23 | 2 |
| 19200 | 11741203 | 3020-01-509-4226 | 28 | 9 |
| 19200 | 11741207 | 5315-01-048-0650 | 29 | 7 |
| 19200 | 11741208 | 1240-01-046-8377 | 29 | 9 |
| 19200 | 11741209 | 5330-01-052-0009 | 32 | 4 |
| 19200 | 11741211 | | 34 | 12 |
| 19200 | 11741223 | 1240-01-043-9461 | 33 | 20 |
| 19200 | 11741224 | 1240-01-043-9460 | 33 | 15 |
| 19200 | 11741228 | | 33 | 11 |
| 19200 | 11741229 | | 33 | 2 |
| 19200 | 11741230 | 5340-01-043-9312 | 32 | 3 |
| 19200 | 11741233 | | 25 | 26 |
| 19200 | 11741234 | 9905-01-451-1585 | 25 | 18 |
| 19200 | 11741235 | | 25 | 13 |
| 19200 | 11741236 | 5365-01-052-1298 | 25 | 11 |
| 19200 | 11741240 | 5365-01-044-7070 | 29 | 4 |
| 19200 | 11741248 | 5355-01-043-9292 | 34 | 10 |
| 19200 | 11741627 | 1240-01-048-0778 | 37 | 12 |
| 19200 | 11741629 | 1240-01-048-0777 | 37 | 25 |
| 19200 | 11741635 | 5310-01-047-0433 | 3 | 12 |
| 19200 | 11741636 | 5330-01-050-1549 | 3 | 13 |
| 19200 | 11741652 | | 28 | 14 |
| 19200 | 11746330 | 1290-01-044-9856 | 3 | 26 |
| 19200 | 11747955 | 5120-01-525-1891 | 40 | 16 |
| 19200 | 11748003 | 5310-01-050-0478 | 37 | 4 |
| 19200 | 11748009 | 5355-01-049-9238 | 37 | 2 |
| 19200 | 11748010 | 1240-01-043-4768 | 37 | 5 |
| 19200 | 11748011 | 1240-01-043-7547 | 36 | 2 |
| 19200 | 11748021 | 6680-01-050-7647 | 6 | 4 |
| 19200 | 11785502 | 5120-01-151-8817 | 40 | 15 |
| 19200 | 11785506 | 5120-01-151-8820 | 40 | 14 |
| 19200 | 11785507 | 5120-01-151-8819 | 40 | 17 |
| 19200 | 12008990 | 5340-01-062-0274 | 40 | 2 |
| 19200 | 12961437 | 1240-01-486-0296 | 28 | 29 |
| 19200 | 12961438 | 1240-01-486-1345 | 23 | 2 |
| 19200 | 12961439 | 5340-01-485-7534 | 32 | 17 |
| 19200 | 12961440 | | 34 | 1 |
| 19200 | 12961441 | | 30 | 7 |
| 19200 | 12984661 | 5340-01-464-3141 | 9 | 30 |
| | | | 24 | 17 |
| | | | 32 | 39 |
| | | | 37 | 32 |
| 19200 | 12984664 | 4010-01-464-3142 | 9 | 29 |

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|---|---|---|---|---|
| 19200 | 12984664 | 4010-01-464-3142 | 24 | 16 |
| | | | 37 | 33 |
| 19200 | 12984693 | 6160-01-485-1914 | 9 | 26 |
| | | | 24 | 18 |
| | | | 37 | 29 |
| 19200 | 12984698 | 5330-01-485-3480 | 24 | 19 |
| | | | 37 | 28 |
| 19200 | 12984716 | 1240-01-485-7536 | 30 | 19 |
| 19200 | 12984717 | 1240-01-485-7530 | 30 | 20 |
| 19200 | 12984719 | 5935-01-485-7531 | 24 | 21 |
| 19200 | 12984723 | 5330-01-485-8715 | 2 | 26 |
| | | | 32 | 44 |
| 19200 | 12984725 | 6160-01-485-7533 | 2 | 25 |
| | | | 32 | 41 |
| 19200 | 12984726 | 5340-01-523-2317 | 32 | 47 |
| 19200 | 12984733 | 1240-01-486-2738 | 23 | 5 |
| 19200 | 12984734 | 1240-01-486-0293 | 23 | 4 |
| 19200 | 12984738 | 9905-01-485-7528 | 24 | 13 |
| 19200 | 12984744 | 5365-01-517-8451 | 9 | 23 |
| 19200 | 12984745 | 1240-01-517-9275 | 11 | 2A |
| 19200 | 12984751 | 5340-01-485-7535 | 2 | 22 |
| | | | 32 | 40 |
| 19200 | 12984757 | 5340-01-522-1643 | 5 | 13 |
| 19200 | 12984776 | 9905-01-485-7527 | 24 | 13 |
| 19200 | 12984783 | 5340-01-519-3055 | 37 | 26 |
| 19200 | 12984785 | 1240-01-519-3054 | 37 | 19 |
| 19200 | 12984828 | 5340-01-522-0777 | 5 | 15 |
| 19200 | 12984837 | 1240-01-519-3052 | 37 | 25 |
| 19200 | 12999464 | 9530-01-522-0697 | 33 | 13 |
| 19200 | 12999465 | 5315-01-517-9274 | 9 | 6 |
| 19200 | 13005033 | 6650-01-520-5989 | 37 | 13 |
| 19200 | 13005037 | 1240-01-521-0009 | 8 | 1 |
| 19200 | 13005038 | | 12 | 2 |
| 19200 | 13005039 | 5340-01-517-8450 | 12 | 15 |
| 19200 | 13005040 | 5340-01-517-9271 | 12 | 11 |
| 19200 | 13005041 | 5315-01-524-0124 | 24 | 5A |
| 19200 | 13005043 | 5340-01-521-2989 | 12 | 13 |
| 19200 | 13005044 | 5305-01-521-9231 | 12 | 14 |
| 19200 | 13005045 | 5310-01-521-3097 | 12 | 12 |
| 19200 | 13005052 | 5365-01-517-2168 | 32 | 45 |
| 19200 | 13005070 | 3040-01-517-9270 | 10 | 3 |
| 19200 | 13005077 | 5330-01-523-2320 | 28 | 7 |
| 19200 | 13005078 | 5330-01-523-2319 | 28 | 6 |
| 19200 | 13005079 | 5340-01-517-6141 | 1 | 5 |
| 19200 | 13005080 | 1290-01-517-2169 | 1 | 7 |
| 19200 | 13005081 | 1290-01-517-2170 | 1 | 8 |
| 19200 | 13005082 | 3130-01-517-9273 | 8 | 4 |
| 19200 | 13005083 | 3020-01-517-8452 | 14 | 2 |
| 19200 | 13005084 | 3040-01-517-8453 | 14 | 25 |
| 19200 | 13005085 | 1240-01-043-9459 | 9 | 21 |
| | | | 14 | 11 |

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| 19200 | 13005085 | 1240-01-043-9459 | 20 | 10 |
| 19200 | 13005086 | 3040-01-518-4504 | 21 | 12 |
| 19200 | 13005087 | | 17 | 1 |
| 19200 | 13005088 | 3040-01-043-8405 | 16 | 10 |
| 19200 | 13005090 | | 18 | 3 |
| 19200 | 13005091 | | 18 | 2 |
| 19200 | 13005092 | | 22 | 13 |
| 19200 | 13005093 | | 22 | 7 |
| 19200 | 13005095 | 9905-01-518-4505 | 20 | 1 |
| 19200 | 13005098 | 3110-01-518-3217 | 13 | 5 |
| 19200 | 13005099 | 3110-01-518-3219 | 13 | 3 |
| 19200 | 13005100 | 3120-01-518-3221 | 13 | 4 |
| 19200 | 13005105 | 9905-01-521-1615 | 13 | 7 |
| 19200 | 13005106 | 9905-01-519-3056 | 36 | 11 |
| 19200 | 13005107 | 9905-01-517-2173 | 2 | 29 |
| 19200 | 13005108 | 9905-01-517-2172 | 2 | 29 |
| 08871 | 5033-012 | 5210-00-221-1842 | 40 | 21 |
| 19200 | 5049914 | 6650-00-504-9914 | 31 | 5 |
| 19200 | 5049915 | 6650-00-504-9915 | 31 | 3 |
| 19200 | 6523553 | 6650-00-652-3553 | 40 | 8 |
| 11710 | 719-20MRP | 6635-00-790-0733 | 40 | 9 |
| 19200 | 7197156 | 1290-00-891-9999 | 40 | 10 |
| 19200 | 7197944 | 4931-00-508-5434 | 40 | 20 |
| 19200 | 7573291 | 1240-00-757-3291 | 40 | 23 |
| 19200 | 7597626 | 5340-00-759-7626 | 4 | 1 |
| | | | 7 | 6 |
| | | | 11 | 1 |
| 19200 | 7680631 | 1240-00-536-5557 | 40 | 13 |
| 19200 | 7686087 | 5210-00-546-6362 | 40 | 12 |
| 19200 | 7691596 | 4931-00-769-1596 | 40 | 7 |
| 19200 | 8200055 | 4820-01-235-0223 | 2 | 34 |
| | | | 30 | 8 |
| | | | 32 | 7 |
| | | | 36 | 16 |
| 19200 | 8202177 | 5365-00-896-2251 | 4 | 4 |
| | | | 7 | 2 |
| | | | 11 | 3 |
| 19200 | 8202181 | 5365-00-692-1492 | 4 | 5 |
| | | | 7 | 1 |
| | | | 11 | 4 |
| 19200 | 8202183 | 1290-00-692-1493 | 4 | 3 |
| | | | 7 | 3 |
| | | | 11 | 2B |
| 19200 | 8213899 | 4931-00-801-6861 | 40 | 5 |
| 19200 | 8215750 | 3120-00-983-7313 | 3 | 24 |
| 19200 | 8262098 | 5340-00-764-1669 | 26 | 8 |
| 19200 | 8262100 | 5360-00-893-6095 | 26 | 6 |
| 19200 | 8587348 | 5355-00-898-6791 | 23 | 3 |
| 19200 | 8587432 | 5340-00-927-7290 | 28 | 27 |
| 19200 | 8587448-3 | 5340-00-171-0757 | 36 | 3 |
| 19200 | 8587557 | 5360-00-978-9584 | 3 | 23 |

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| CAGEC | PART NUMBER | STOCK NUMBER | FIG. | ITEM |
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| | | | 14 | 8 |
| | | | 20 | 14 |
| 19200 | 8615998 | 5331-00-851-1020 | 28 | 5 |
| 19200 | 8626125 | 5310-00-796-9592 | 16 | 12 |
| 19200 | 8626126 | 5365-00-065-5319 | 16 | 14 |
| 19200 | 8626152 | 5310-00-089-5966 | 16 | 11 |
| 19200 | 8626195 | 5355-01-083-6241 | 25 | 9 |
| 19200 | 8626196 | 5310-01-140-2500 | 25 | 4 |
| 19200 | 8626199 | | 25 | 7 |
| 19200 | 8626201 | | 25 | 6 |
| 19200 | 8626226 | 5315-01-049-1390 | 26 | 1 |
| 19200 | 8626227 | 5360-00-933-6573 | 26 | 3 |
| 19200 | 8626228 | 5330-00-069-9361 | 25 | 23 |
| 19200 | 8626233 | | 31 | 4 |
| 19200 | 8626258 | 5365-00-177-3931 | 31 | 6 |
| 19200 | 8626291 | 1240-00-069-9363 | 25 | 22 |
| 19200 | 8626297 | 3040-00-937-8289 | 26 | 5 |
| 19200 | 8626399 | 6650-00-066-4998 | 5 | 11 |
| 19200 | 8626400 | 6650-00-066-4999 | 5 | 6 |
| | | | 32 | 25 |
| 19200 | 8626451 | | 37 | 6 |
| 19200 | 9327721 | 4931-01-062-4255 | 40 | 3 |
| 19200 | 9357947 | 4931-01-132-0654 | 40 | 19 |
| 19200 | 9360120 | 4820-01-210-9568 | 2 | 30 |
| 19200 | 9360585 | 5330-01-341-6762 | 3 | 3 |
| 19200 | 9386960 | 1240-01-206-6341 | 37 | 8 |

**END OF WORK PACKAGE**

## DIRECT SUPPORT AND GENERAL SUPPORT

## EXPENDABLE AND DURABLE ITEMS LIST

### INTRODUCTION

#### Scope

This work package lists expendable and durable items that you will need to operate and maintain the M198/M777 fire control equipment. This list is for informational purposes only and is not authority to requisition the listed items. These items are authorized to you by CTA 50-970, Expendable/Durable Items (Except Medical, Class V, Repair Parts, and Heraldic Items), or CTA 8-100, Army Medical Department Expendable/Durable Items.

#### Explanation of Columns in the Expendable/Durable Items List

Column (1) - Item Number. This number is assigned to the entry in the list and is referenced in the narrative instructions to identify the item (e.g., "Apply sealing compound (item 13, WP 0152 00).").

Column (2) - Level. This column identifies the lowest level of maintenance that requires the listed item (O = Unit, F = Direct Support, H = General Support).

Column (3) - National Stock Number (NSN). This is the NSN assigned to the item which you can use to requisition it.

Column (4) - Item Name, Description, Commercial and Government Entity Code (CAGEC), and Part Number (P/N). This column provides the other information you need to identify the item.

Column (5) - Unit of Measure (U/M). This code shows the physical measurement or count of an item, such as gallon, dozen, gross, etc.

### EXPENDABLE AND DURABLE ITEMS LIST

**Table 1. Expendable and Durable Items List.**

| (1) ITEM NUMBER | (2) LEVEL | (3) NATIONAL STOCK NUMBER | (4) ITEM NAME, DESCRIPTION, CAGEC, AND PART NUMBER | (5) U/M |
|---|---|---|---|---|
| 1 | F | 6810-00-184-4796 | ACETONE, TECHNICAL<br>(81346) ASTM 0329<br>5 gal (18.927 l) can, liquid | CN |
| 2 | O | 8040-00-851-0211 | ADHESIVE: 732 Black<br>(81349) MIL-A-46106<br>5 oz (142 g) kit | KT |
| 3 | F | 6810-00-205-6790 | ALCOHOL, DENATURED<br>(OMU53) 27 CFR 20.113 | BT |

**EXPENDABLE AND DURABLE ITEMS LIST - Continued**

**Table 1. Expendable and Durable Items List - Continued.**

| (1) ITEM NUMBER | (2) LEVEL | (3) NATIONAL STOCK NUMBER | (4) ITEM NAME, DESCRIPTION, CAGEC, AND PART NUMBER | (5) U/M |
|---|---|---|---|---|
| 4 | H | | ADHESIVE, EPOXY<br>Loctite Hysol E-120 HP | QT |
| 5 | F | 8105-00-269-4662 | BAG, PLASTIC: waterproof and greaseproof<br>(81349) MIL-B-117<br>20x25, std pkg 25 | PG |
| 6 | O | 8115-00-190-5020 | BOX, SHIPPING<br>(81346) ASTM-D 1974 | BD |
| 7 | O | 6135-01-456-2924 | BATTERY, "C" SIZE: lithium (standard)<br>(4J947) TL-2200 | EA |
| 8 | O | 6135-01-493-2736 | BATTERY, "C" SIZE: lithium (high capacity)<br>(4J947) TL-5920/S | EA |
| 9 | F | 5350-00-268-3116 | CLOTH, ABRASIVE: crocus<br>(80204) ANSI B74.18<br>2 in. wide x 50 yd (45.72 m) | RO |
| 10 | F | 6850-01-377-1809 | COMPOUND, CLEANING<br>(58536) A-A-59601 | GL |
| 11 | F | 6850-00-227-1887 | COMPOUND, CLEANING: optical lens<br>(58536) AA59199-I<br>1 qt (0.95 l) | QT |
| 12 | F | 6850-00-597-9765 | COMPOUND, CLEANING, SOLVENT<br>(80063) 6G236-6<br>1 gal (3.79 l) can | GL |
| 13 | F | 8030-00-837-9935 | COMPOUND, SEALING: black, semi-solid<br>(58536) A-A-59293<br>1 pt (0.473 l) base compound with catalyst | KT |
| 14 | O | 8030-00-081-2329 | COMPOUND, SEALING: locking and retaining<br>(81349) MIL-S-22473<br>0.053 qt (55cc) | BT |
| 15 | F | 9150-00-269-8255 | GREASE, AIRCRAFT: corrosion-resistant grease<br>(81343) AMS-G-4343<br>1.75 lb (0.79 kg) can | CN |

**Table 1. Expendable and Durable Items List - Continued.**

| (1) ITEM NUMBER | (2) LEVEL | (3) NATIONAL STOCK NUMBER | (4) ITEM NAME, DESCRIPTION, CAGEC, AND PART NUMBER | (5) U/M |
|---|---|---|---|---|
| 16 | F | 9150-00-985-7246 | GREASE, AIRCRAFT: grease, aircraft instrument, corrosion and water-resistant<br>(81349) MIL-PRF-23827 TYPE I<br>1.75 lb (0.79 kg) can | CN |
| 17 | F | 6640-00-663-0832 | PAPER, LENS: tissue sheet, type 1<br>(81348) NNN-P-40<br>50 sheets per pkg | BK |
| 18 | F | 7920-00-205-1711 | RAG, WIPING<br>(80244) 7920-00-205-7511<br>50 lb (22.68 kg) package | BE |
| 19 | F | 8520-00-228-0598 | SOAP: liquid<br>(81348) P-S-264<br>6 gal (22.71 l) | CN |
| 20 | F | 7510-00-266-6707 | TAPE, PRESSURE SENSITIVE ADHESIVE<br>(81346) ASTM D-6123<br>3 in. wide x 60 yd (54.86 m) | RO |
| 21 | H | 9505-00-293-4208 | WIRE, NONELECTRICAL: annealed corrosion-resistant steel,<br>0.032-in. (0.085 cm) dia.<br>(80205) MS20995C32<br>1 lb (0.45 kg) | LB |
| 22 | H | 9505-00-076-8640 | WIRE, NONELECTRICAL:<br>0.041-in. (0.104 cm) dia.<br>(80205) MS20995C41<br>1 lb (0.45 kg) | LB |

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| | 0061 00-7 | 0061 00 | | | | Illustration shows wrong design for packing retainer.   |

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# THE METRIC SYSTEM AND EQUIVALENTS

## LINEAR MEASURE

1 Centimeter = 10 Millimeters = 0.01 Meter = 0.3937 Inch
1 Decimeter = 10 Centimeters = 3.94 Inches
1 Meter =10 Decimeters = 100 Centimeters
= 1000 Millimeters = 39.37 Inches.
1 Dekameter = 10 Meters = 32.8 Feet
1 Hectometer =10 Dekameters = 328.08 Feet
1 Kilometer =10 Hectometers = 1000 Meters
= 0.621 Mile = 3,280.8 Feet
Millimeters = Inches times 25.4
Inches = Millimeters divided by 25.4

## WEIGHTS

1 Centigram = 10 Milligrams = 0.154 Grain
1 Decigram = 10 Centigrams = 1.543 Grains
1 Gram = 0.001 Kilogram = 10 Decigrams
=1000 Milligrams = 0.035 Ounce
1 Dekagram = 10 Grams = 0.353 Ounce
1 Hectogram = 10 Dekagrams = 3.527 Ounces
1 Kilogram = 10 Hectograms = 1000 Grams = 2.205 Pounds
1 Quintal = 100 Kilograms = 220.46 Pounds
1 Metric Ton = 10 Quintals = 1000 Kilograms
= 1.1 Short Tons

## LIQUID MEASURE

1 Milliliter = 0.001 Liter = 0.034 Fluid Ounce
1 Centiliter = 10 Milliliters = 0.34 Fluid Ounce
1 Deciliter = 10 Centiliters = 3.38 Fluid Ounces
1 Liter = 10 Deciliters = 1000 Millileters
= 33.82 Fluid Ounces
1 Dekaliter = 10 Liters = 2.64 Gallons
1 Hectoliter = 10 Dekaliters = 26.42 Gallons
1 Kiloliter = 10 Hectoliters = 264.18 Gallons

## SQUARE MEASURE

1 Sq Centimeter = 100 Sq Millimeters = 0.155 Sq Inch
1 Sq Decimeter = 100 Sq Centimeters = 15.5 Sq Inches
1 Sq Meter (Centare) = 10 Sq Decimeters
= 10,000 Sq Centimeters = 10.764 Sq Feet
1 Sq Dekameter (Are) = 100 Sq Meters = 1,076.4 Sq Feet
1 Sq Hectometer (Hectare) = 100 Sq Dekameters
= 2.471 Acres
1 Sq Kilometer = 100 Sq Hectometers
= 1,000,000 Sq Meters = 0.386 Sq Mile

## CUBIC MEASURE

1 Cu Centimeter = 1000 Cu Millimeters = 0.061 Cu Inch
1 Cu Decimeter = 1000 Cu Centimeters = 61.02 Cu Inches
1 Cu Meter = 1000 Cu Decimeters
= 1,000,000 Cu Centimeters= 35.31 Cu Feet

## TEMPERATURE

5/9 (°F - 32°) = °C
9/5 (°C+ 32°) = °F
-35° Fahrenheit is equivalent to -37° Celsius
0° Fahrenheit is equivalent to -18° Celsius
32° Fahrenheit is equivalent to 0° Celsius
90° Fahrenheit is equivalent to 32.2° Celsius
100° Fahrenheit is equivalent to 38° Celsius
212° Fahrenheit is equivalent to 100° Celsius

# 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-Inches | Newton-Meters | 0.11375 |
| Pounds per Square Inch | Kilopascals | 6.895 |
| Ounce-Inches | Newton-Meters | 0.007062 |
| 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 |
| °Fahrenheit | °Celsius | °C = (°F-32)x5/9 |
| °Celsius | °Fahrenheit | °F = (9/5x°C)+32 |

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