DEPARTMENT OF THE ARMY
TECHNICAL MANUAL

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS AND DEPOT MAINTENANCE REPAIR PARTS LISTS) FOR TELESCOPE MOUNT: M146 (1240-00-864-0348), ELBOW TELESCOPE: M118A2 (1240-01 -092-2693), ELBOW TELESCOPE: M118A3 (1240-01-317-9241), TELESCOPE MOUNT: M145 (1240-00-871-2969), TELESCOPE MOUNT: M145A1 (1240-01-313-6842), PANORAMIC TELESCOPE: M117 (1240-00-864-2930), PANORAMIC TELESCOPE: M117A2 (1240-00-106-7754), FIRE CONTROL QUADRANT: M15 (1290-00-896-2236) PERISCOPE: M42 (1240-00-864-2933), LINKAGE ASSEMBLY (1240-00-871-5475), AND LINKAGE ASSEMBLY (1030-01-317-9117)

HEADQUARTERS, DEPARTMENT OF THE ARMY 28 JULY 1993

WARNING

- Solvents and Cleaning Materials Appropriate safety precautions must be taken while using cleaning materials that may present fire hazards, cause skin irritations, or have toxic effect when breathed in high vapor concentrations.

- Solvent vapors are toxic. Do not use solvent in a confined space. Avoid long periods of breathing solvent vapors and/or contact with skin.

- High Pressure Gas and Air: High pressure nitrogen gas is used during purging and charging of this equipment. Keep face and body clear of release valves. Failure to observe safety precautions may result in severe injury or death.

- Adhesives 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, can bum easily, and may give off harmful vapor.

- Refer to FM 21-11, First Aid For Soldiers, for correct procedures to be taken if personnel are injured.

CHANGE }
NO. 1 }

HEADQUARTERS
DEPARTMENT OF THE ARMY
Washington D.C., 9 March 1998

DIRECT SUPPORT AND GENERAL SUPPORT
MAINTENANCE MANUAL
(INCLUDING REPAIR PARTS AND SPECIAL TOOLS AND DEPOT
MAINTENANCE REPAIR PARTS LISTS)
FOR
TELESCOPE MOUNT: M146 (1240-00-864-0348),
ELBOW TELESCOPE: M118A2 (1240-01-092-2693),
ELBOW TELESCOPE: M118A3 (1240-01-317-9241),
TELESCOPE MOUNT: M145 (1240-00-871-2969),
TELESCOPE MOUNT: M145A1 (1240-01-313-6842),
PANORAMIC TELESCOPE: M117 (1240-00-864-2930),
PANORAMIC TELESCOPE: M117A2 (1240-00-106-7754),
FIRE CONTROL QUADRANT: M15 (1290-00-896-2236),
PERISCOPE: M42 (1240-00-864-2933),
LINKAGE ASSEMBLY (1240-00-871-5475),
AND LINKAGE ASSEMBLY (1030-01-317-9117)

TM 9-1240-401-34&P, 28 July 1993, is changed as follows:

1. Remove old pages and insert new pages as indicated below.

2. New or changed material is indicated by a vertical bar in the margin of the page.

3. Added or revised illustrations are indicated by a vertical bar adjacent to the illustration or by a miniature pointing hand.

Remove Pages	Insert Pages
i through v/(vi blank)	i through v/(vi blank)
1-1 through 1-4	1-1 through 1-4
1-13 through 1-18	1-13 through 1-24
4-37 and 4-38	4-37 and 4-38
5-39 through 5-46	5-39 through 5-46
None	5.1-1 through 5.1-75/(5-1-76 blank)
A-1 and A-2	A-1 and A-2
B-1 and B-2	B-1 and B-2
C-1 and C-2	C-1 and C-2
None	C-13/(C-14 blank)
D-1 and D-2	D-1 and D-2

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

Remove Pages	Insert Pages
D-5 through D-59-1	D-5 through D-76-1/(Bulk)
Bulk	
D-60-1/(Blank)	
I-1 through I-58	I-1 through I-40
E-1 through E-4	E-1 through E-4
Index 1 through Index 8	Index 1 through Index 11/(Index 12 blank)
Front cover and Warning page	Front cover and Warning page

4. File this sheet in the front of the manual for reference purposes.

By Order of the Secretary of the Army:

DENNIS J. REIMER
General, United States Army
Chief of Staff

Official:

JOEL B. HUDSON
Administrative Assistant to the
Secretary of the Army
04417

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TECHNICAL MANUAL

HEADQUARTERS
DEPARTMENT OF THE ARMY

No. 9-1240-401-34&P*

Washington D.C., 28 July 1993

DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE MANUAL (INCLUDING REPAIR PARTS AND SPECIAL TOOLS AND DEPOT MAINTENANCE REPAIR PARTS LISTS) FOR TELESCOPE MOUNT: M146 (1240-00-864-0348), ELBOW TELESCOPE: M118A2 (1240-01-092-2693), ELBOW TELESCOPE: M118A3 (1240-01-317-9241), TELESCOPE MOUNT: M145 (1240-00-871-2969), TELESCOPE MOUNT: M145A1 (1240-01-313-6842), PANORAMIC TELESCOPE: M117 (1240-00-864-2930), PANORAMIC TELESCOPE: M117A2 (1240-00-106-7754), FIRE CONTROL QUADRANT: M15 (1290-00-896-2236), PERISCOPE: M42 (1240-00-864-2933), LINKAGE ASSEMBLY (1240-00-871-5475), AND LINKAGE ASSEMBLY (1030-01-317-9117)

REPORTING ERRORS AND RECOMMENDING IMPROVEMENTS

You can help improve this manual. If you find any mistakes or if you know of a way to improve the procedures, please let us know. Mail your letter, DA Form 2028 (Recommended Changes to Publications and Blank Forms), or DA Form 2028-2 located in the back of this manual direct to: Director, U.S. Army Armament and Chemical Acquisition and Logistics Activity, ATTN: AMSTA-AC-NML Rock Island, Illinois 61299-7630.

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*This manual supersedes TM 9-1290-322-34P, 11 April 1989; including all changes, and TM 9-1290-322-34, 22 May 1987, including all changes.

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Table of Contents - continued

CHAPTER 1
INTRODUCTION

CHAPTER INDEX

Section I. General Information

1-1. SCOPE

Type of manual: Direct and general support maintenance.

Model numbers and equipment name: M146 telescope mount, M118A2/M118A3 elbow telescope, M145/M145A1 telescope mount, M117/M117A2 panoramic telescope, M15 fire control quadrant, M42 periscope, and linkage assembly.

Purpose of equipment: Used on the M109A2/M109A3/M109A4/M109A5/M109A6 howitzer to provide sighting and targeting capabilities.

1-2. MAINTENANCE FORMS, RECORDS, AND REPORTS

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

1-3. OFFICIAL NOMENCLATURE, NAMES, AND DESIGNATIONS

OFFICIAL NOMENCLATURE	COMMON NAME
Howitzer, medium, self-propelled 155mm, M109A2/M109A3/M109A4/M109A5/M109A6	Howitzer
M42 tank periscope	M42 periscope
O-ring	Preformed packing
Quadrant, fire control, M15	M15 quadrant
Wormshaft housing	Cross-level mechanism

1-4. REPORTING EQUIPMENT IMPROVEMENT RECOMMENDATIONS (EIR'S)

If your equipment needs improvement, let us know, send us an EIR. ElRs will be prepared using SF Form 368 (Quality Deficiency Report). ElRs should be mailed directly to Director, U.S. Army Armament and Chemical Acquisition and Logistics Activity, Attn.: AMSTA-AR-QAW-A (R)/Customer Feedback Center, Rock Island, Illinois 61299-7300.

1-4.1. CORROSION PREVENTION AND CONTROL (CPC)

Corrosion Prevention and Control (CPC) of Army materiel is a continuing concern. It is important that any corrosion problem 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 rubbe 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 Standard Form 368, Quality Deficiency Report. Use of key words such as "corrosion", "rust", "deterioration", or "cracking" will assure that the information is identified as a CPC problem.

The form should be submitted to: Commander, U.S. Army Armament Research, Development and Engineering Center, ATTN: AMSTA-AR-QAW-A (R) /Customer Feedback Center, Rock Island, IL 61299-7300.

Section II. Equipment Description and Data

1-5. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES

a. M146 Telescope Mount.

(1) The M146 telescope mount provides an adjustable support for the M118A2/M118A3 elbow telescope. The M146 telescope mount consists of a yoke, a bracket, an elevation bracket, a base plate, an elevation knob mechanism, a deflection knob mechanism, and a cable assembly.

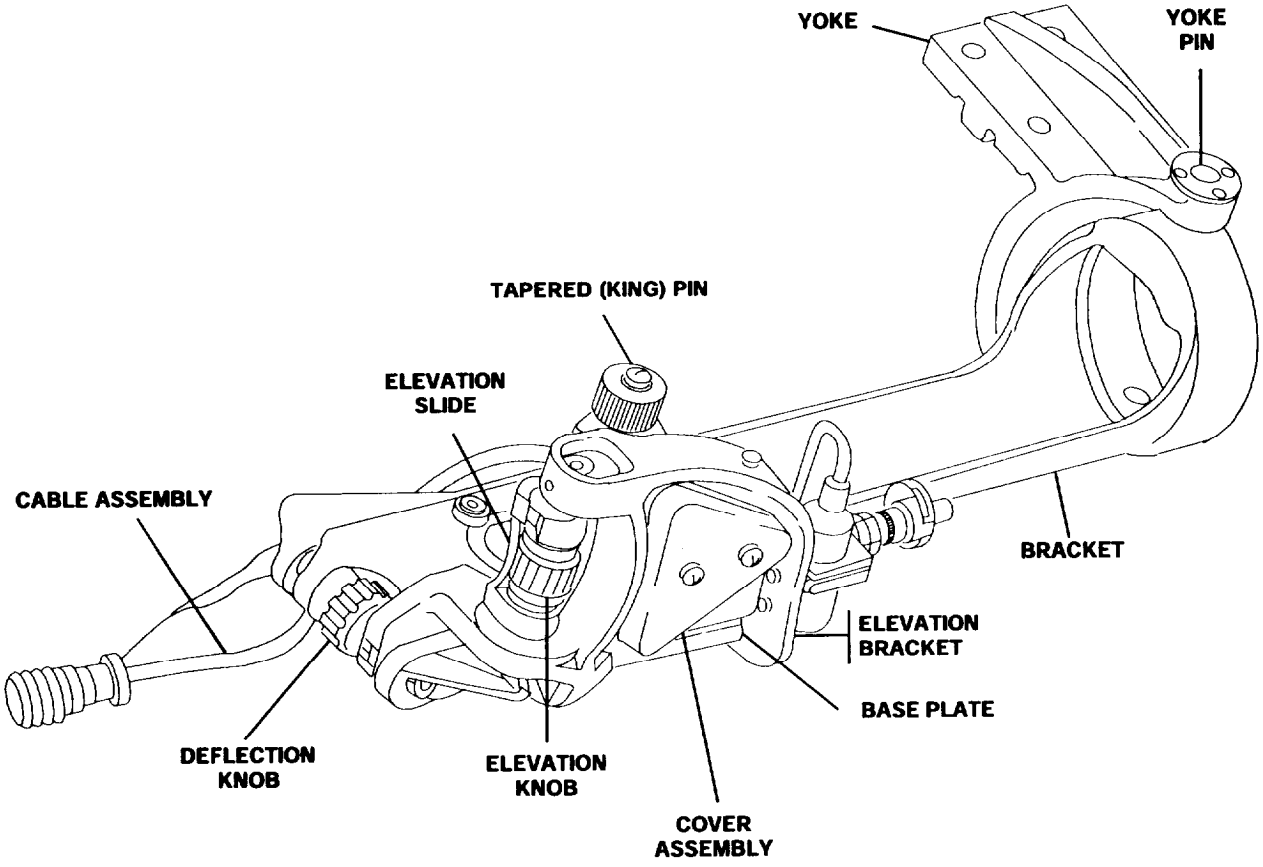
(2) The yoke and the base plate are bolted to the howitzer cradle. The yoke has a pair of machined crosskeys that fit into corresponding slots in pads machined onto the cradle to prevent shifting of the yoke during recoil. The yoke is secured to the bracket by two yoke pins which fit into the opposite ends of a vertical bore in the bracket. The bracket is secured to the main bracket of the M146 telescope mount.

(3) The M118A2/M118A3 elbow telescope is supported in elevation by an elevation slide which travels on an arc about the center of the telescope ball which fits into the forward end of the bracket. A keyed ratchet on the elevation slide engages a slot on the main bracket to brace the M118A2/M118A3 elbow telescope against recoil. Lateral movement of the elevation knob mechanism is prevented by a retainer plate which acts as a "T" slot key. The M118A2/M118A3 elbow telescope is held in position by a tapered (king) pin which fits into matching holes on the telescope housing.

(4) The M146 telescope mount adjusts the M118A2/M11BA3 elbow telescope for boresighting and ballistic corrections by means of an elevation knob machined with an internal acme screw thread. Turning the elevation knob raises the elevation slide, pivoting the M118A2/M118A3 elbow telescope vertically about the telescope ball. Elongated holes in the elevation bracket permit an adjustment of $\pm$10 mils in elevation. Each revolution of the elevation knob represents an 8-mil angular change in elevation, Elevation corrections are measured on a dial of angular deviations scored in tenths of a mil and numbered 1, 2, 3, 4, 5, 6, and 7 mils. A spring-loaded elevation ratchet automatically locks the controls at all even line increments on th elevation dial.

(5) The deflection knob causes the M146 telescope mount to pivot about the yoke pins. Each revolution of the deflection knob represents an 8-mil angular change in deflection. The deflection knob is an acme nut and screw arrangement similar to the elevation knob. A correction dial, similar to that described in (4) is provided for the deflection mechanism. A spring-loaded deflection ratchet automatically locks the controls at all even line increments on the deflection dial.

(6) The cable assembly, which is held to the M146 telescope mount by means of external clips, supplies 24-volt dc power from the vehicle supply to the M118A2/M118A3 elbow telescope through a standard quick-disconnect sealed connector.



M146 TELESCOPE MOUNT

1-5. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES - continued

b. M118A2/M118A3 Elbow Telescope.

(1) The M118A2/M118A3 elbow telescope is the basic direct fire instrument used for positioning the weapon in azimuth and elevation on targets visible from the weapon. The M118A2/M118A3 elbow telescope is mounted, by means of spherical seats and retaining kingpin, on the M146 telescope mount. The M118A2/M118A3 elbow telescope is a 4-power, fixed-focus telescope with a 10° field of view. It consists of three major subassemblies: the eyepiece and erector lens sub assembly (also referred to as the eyepiece arm), the reticle cage and cant corrector subassembly, and the objective and diaphragm subassembly. These are the basis of telescope control and adjustment.

(2) Eyepiece and erector lens subassembly (eyepiece arm).

(a) This subassembly pivots about the line of sight of the M118A2/M118A3 elbow telescope. It is operated by means of an external lock-release lever and can be locked in position at any desired angle. Although the travel of the eyepiece arm is normally limited to ±20 from the horizontal, it is possible to depress the limiting stops to allow 180° rotation of the eyepiece arm. The eyepiece is fitted with a rubber eyeshield which serves to eliminate unnecessary light and to maintain proper eye distance while sighting through the M118A2/M118A3 elbow telescope.

(b) This subassembly also contains the eyelens and field lens, the relay (erector) lenses and the Amici prism.

(c) Enclosed in separate housing on the eyepiece arm is a variable resistor (rheostat) which controls illumination of the reticle.

(d) A valve on the eyepiece arm provides for pressurization of the M118A2/M118A3 elbow telescope.

(3) The reticle cage and cant corrector subassembly. This section provides movement of the M118A2/M118A3 elbow telescope and contains the precollimated ballistic reticle. A pair of wormshaft assembly (cant correction) knobs are used in conjunction with the level assembly. The level vial is used by the gunner to cross-level the cant corrector whenever it is in a canted position. For easy viewing, the level vial is provided with a mirror.

(4) Objective and diaphragm subassembly. This subassembly contains the objective lens, diaphragms, collective lens, and erector lenses.

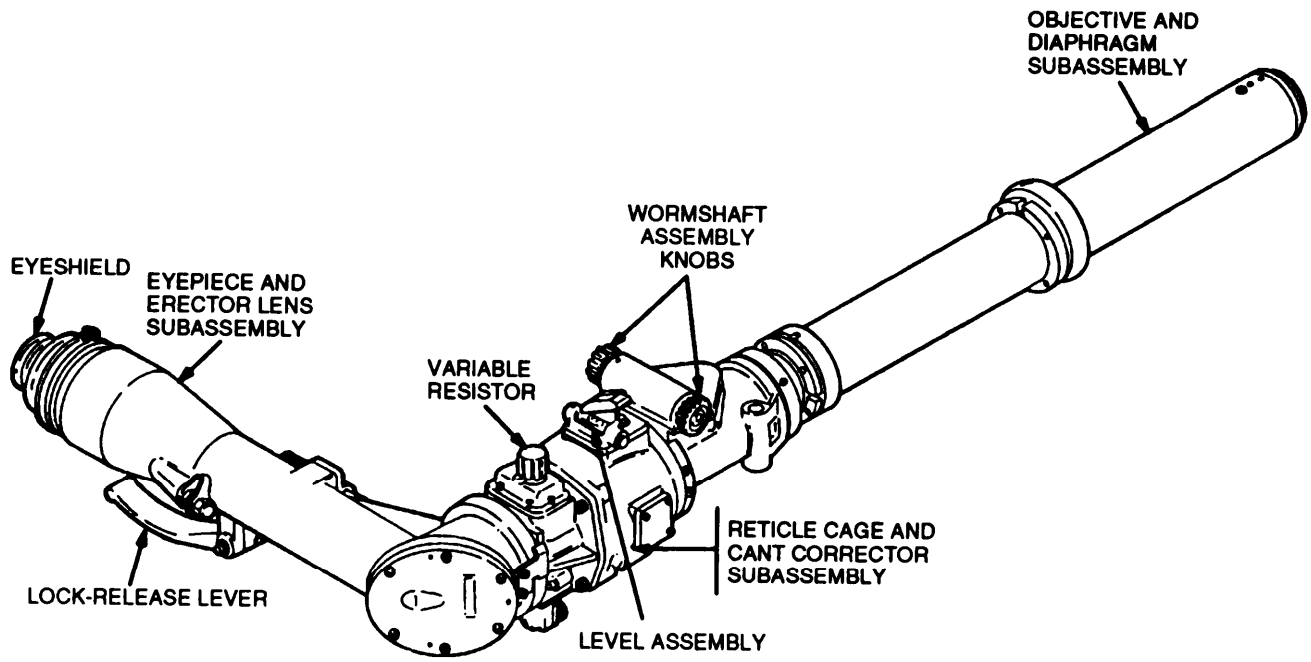
(5) Optical system. All optical components of the M118A2/M118A3 elbow telescope are internally mounted in the three main subassemblies as previously described. The optical system is composed of a window, an objective lens, a diaphragm, a collective lens, a first erector lens, a diaphragm, a second erector lens, a collective lens, three reticles (either of which can be moved into a common focal plane), a first relay (erector) lens, an Amici prism, a second relay (erector) lens, a field lens, and an eyelens. All optical elements are fixed in position and hermetically sealed in the M118A2/M118A3 elbow telescope.

(a) The window is mounted in a threaded cell in the objective end of the forward tube. It protects the optical system from dirt, dust, and moisture.

(b) The objective lens is a cemented doublet-type which is mounted directly behind the window in an independently sealed cell. It forms an inverted and reverted image of the target at the diaphragm.

(c) The diaphragm, which functions as a field of view stop, limits the field of view to the desired value and at the same time provides a well-defined cutoff to the field of view. It is located in the focal plane of the objective lens.

(d) The first collective lens is a piano-convex lens retained in a tubular sleeve by the threaded cell that supports the diaphragm. The function of the collective lens is to form a well-defined image of the target to the first erector lens.



M118A2/M118A3 ELBOW TELESCOPE

1-5 EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES - continued

b. M118A2/M118A3 Elbow Telescope - continued.

(e) The first erector lens isa cemented doublet-type lens. It is mounted in a cell threaded into the tubular sleeve which supports the first collective lens. Its purpose is to transfer the inverted image to the second erector lens.

(f) The second erector lens is similar to the first erector lens described in (e). This erector lens is followed by a second collective lens similar to the first collective lens described in (d). Both lenses function to form an image at the reticle plane.

(g) The M118A2/M118A3 elbow telescope incorporates a standardized mil scale reticle for use on the Ml 09 series self-propelled howitzer. The reticle geometric center is located at the intersection of the vertical centerline and 20 mil line (marked 20).

(h) The first relay (erector) lens functions to relay the inverted image to the Amici prism.

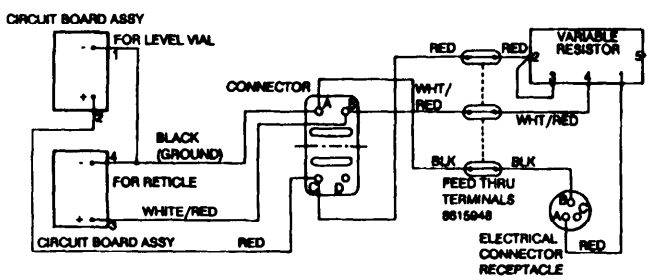
(i) The Amici prism deviates the light rays 90°, reverts the image to normal, and superimposes the image on the second relay lens.

(j) The second relay (erector) lens passes the normal image to the eyepiece field lens.

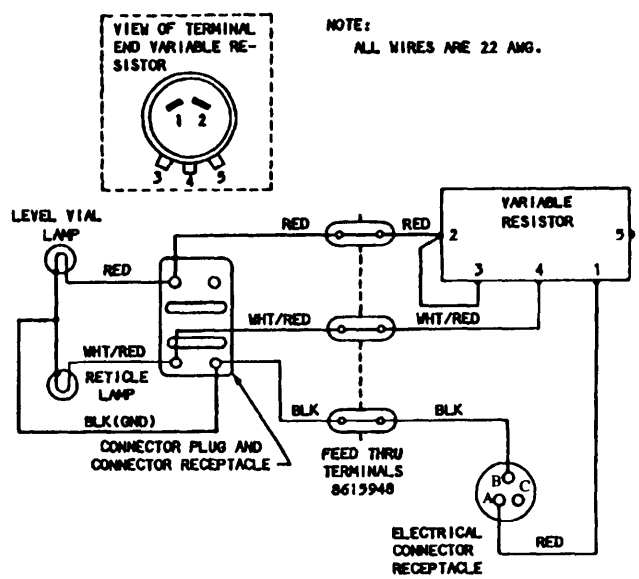
(k) The eyepiece field lens and the eyelens are identical cemented doublet lenses. Together they form the eyepiece, permitting the observer to see a normal, erect, and enlarged image of the target and the reticle pattern.

(6) Electrical system (M118A3). The electrical system provides 24-volt dc power for the reticle and levelvial illumination LEDs. In normal use, this power is obtained by inserting the cable assembly electrical plug connector from the Ml 46 telescope mount into the electrical connector of the M118A3 elbow telescope. The variable resistor (rheostat) controls the illumination of the reticle LEDs. A circuit board assembly containing LEDs edge-lights the retitles. An identical circuit board assembly, with fixed illumination intensity, supplies illumination for the level vial

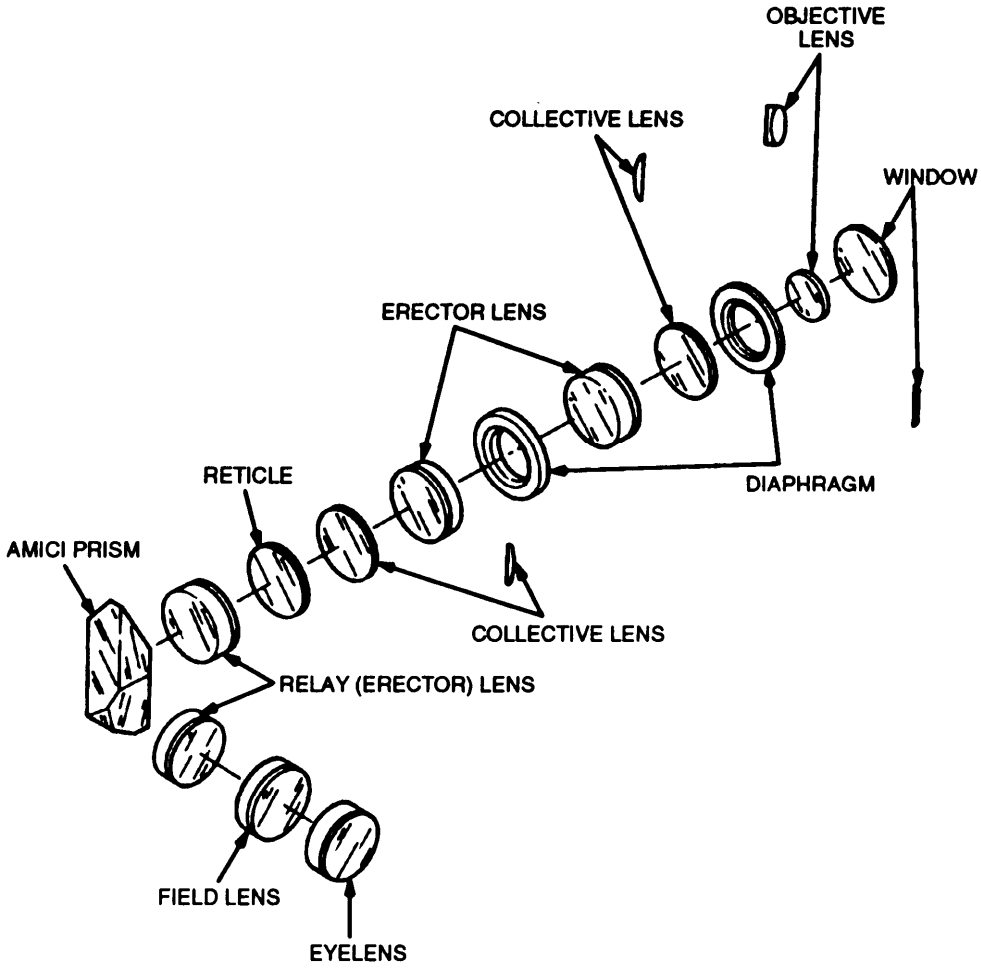
(7) Electrical system (M118A2). The electrical system provides 24-volt dc power for the reticle and level vial incandescent lamps. In normal use, this power is obtained by inserting the cable assembly electrical plug connector from the M146 telescope mount into the electrical connector of the M118A2 elbow telescope. The variable resistor (rheostat) controls the illumination of the reticle lamp. The reticle lamp, mounted in the reticle lamp holder, edge-lights the retitles. An identical lamp, with fixed illumination intensity supplies illumination for the level vial.



M118A3 ELBOW TELESCOPE WIRING DIAGRAM



M118A2 ELBOW TELESCOPE WIRING DIAGRAM


OBJECTIVE LENS
COLLECTIVE LENS
WINDOW
ERECTOR LENS
RETICLE
DIAPHRAGM
AMICI PRISM
COLLECTIVE LENS
RELAY (ERECTOR) LENS
FIELD LENS
EYELENS

1-5. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES - continued

c. M145/M145A1 Telescope Mount.

(1) The M145/M145A1 telescope mount supports and provides an adjustable base for the M117/M117A2 panoramic telescope. It incorporates components which permit accurate adjustment of the weapon in elevation ±10°, and allows one-man weapon operation. The M145/M145A1 telescope mount is rigidly installed in the cab of the vehicle, at the left front side of the weapon breech.

(2) The M145/M145A1 telescope mount is essentially a Hook's universal joint, which allows adjustment of the vertical axis of the M117/M117A2 panoramic telescope to remain plumb regardless of the pitch or cant of the vehicle. The elevation measurements provided by the M145/M145A1 telescope mount and the azimuth measurements provided by the M117/M117A2 panoramic telescope are true weapon elevation and azimuth. The major components of the M145/M145A1 telescope mount are a gun bar pivot which is the basic reference from which elevation and azimuth measurements and adjustment are made; a mount body; a pitch knob, cross-level knob, and elevation handwheel with their associated mechanisms; a rocker; a counter assembly; a mount bracket; and a quadrant support assembly, which is provided for making fine elevation adjustments with a gunner's quadrant. The upper rear portion of the mount body provides the seat for the M117/M117A2 panoramic telescope. A pair of arms which extend upward from the body secures the M117/M117A2 panoramic telescope inaccurate vertical alinement with the body by means of clamping catches. Two tapered keyways on the upper surface of a steel plate provide a wear-resistant mounting surface for the M117/M117A2 panoramic telescope and mate with corresponding tapered keyways on the bottom of the M117/M117A2 panoramic telescope housing.

(3) The mount bracket is bolted to a vertical mounting bracket welded to the trunnion support in the left side of the vehicle cab, forward of the trunnion. An alining plate, which contains keyways for the mount bracket keys, is installed between the mount bracket and the cab bracket so that the planes which contain the vertical surfaces of the keyways are parallel to the trunnion axis. An arm extends forward from each side of the mount bracket to support the main shaft of the M145/M145A1 telescope mount.

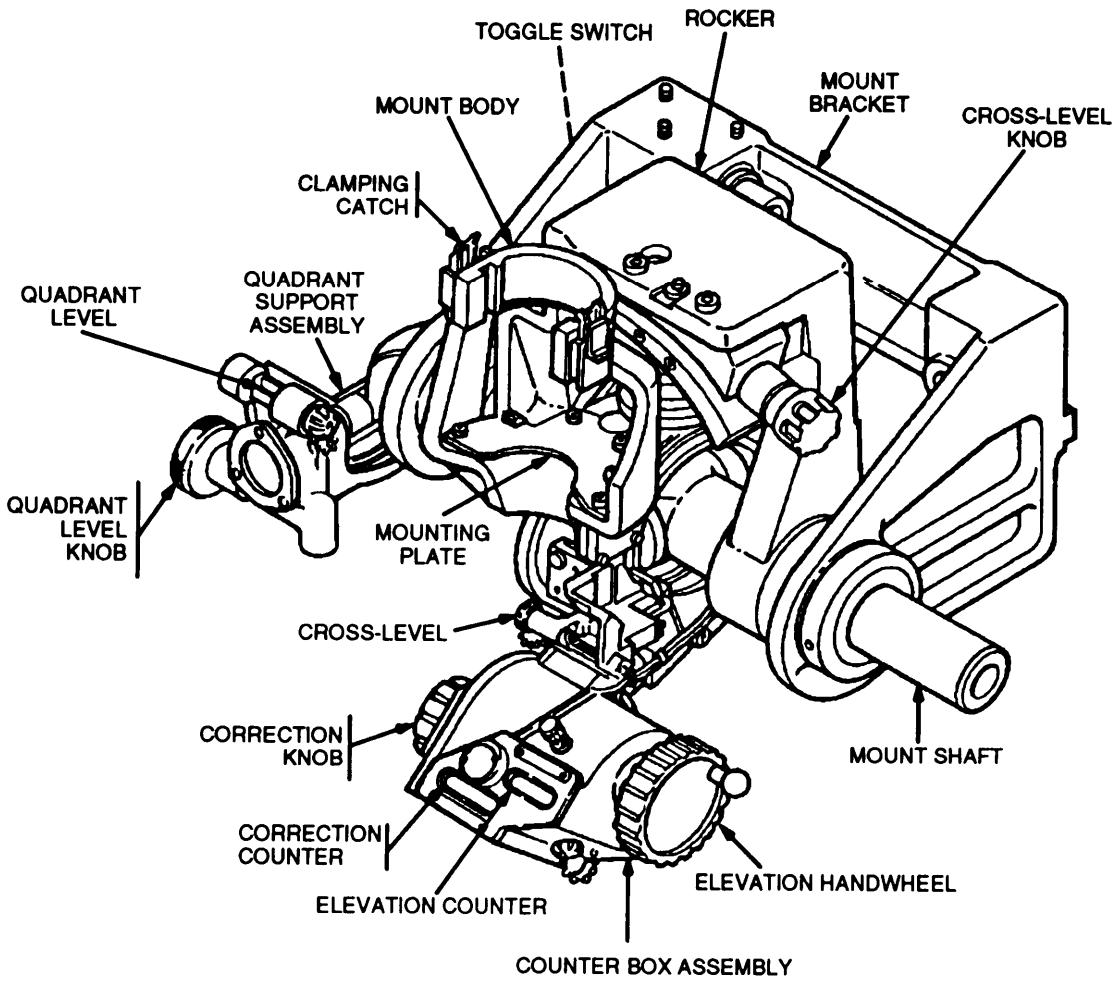
(4) Rotation of the pitch knob orients the vertical axis of the mount body for pitch adjustment within range of $+10^{0}$. The pitch knob, which Operates through a wormshaft and a gear segment, permits the mount body to be adjusted at all times to a position corresponding to zero elevation.

(5) The cross-level knob rotates the mount body for deflection compensation as the weapon is being elevated or depressed. Rotation of the cross-level knob orients the mount body to the true vertical firing plane of the gun. Cross-level adjustment is limited to ±10°.

(6) Rotation of the elevation handwheel elevates or depresses the M145/M145A1 telescope mount.

(7) The pitch level, cross-level, and elevation level are installed in housings integral with the lower portion of the mount body. When the bubbles in the pitch level and cross-level are centered, the vertical axis of the M117/M117A2 panoramic telescope is plumb and in a plane with the true firing plane of the gun. The elevation level gives an indication of true weapon elevation regardless of trunnion cant. Each level vial is protected by a cover and can be adjusted by an eccentric. LEDs, installed at the ends of the level vials, illuminate the bubbles. Mirrors, set at 45° angles, permit viewing of the bubbles.

(8) The elevation counter, located on the lower portion of the mount body, measures and calibrates, in mils, the elevation of the M145/M145A1 telescope mount. The elevation counter is capable of reading from 0000 to 9999 mils. However, a series of stop rings arranged on the elevation handwheel shaft limits rotation of the elevation handwheel so that the effective range of the elevation counter is from 9950 (corresponding to an elevation of -50 mils) upward through 0000 to 1383 mils.



M145/M145A1 TELESCOPE MOUNT

1-5. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES - continued

c. M145/M145A1 Telescope Mount - continued.

(9) The correction counter simplifies correction of elevation values for factors peculiar to the individual weapon and/or its emplacement. When the correction knob is rotated, the elevation counter is driven simultaneously with the correction counter, but in the opposite direction. Thus, the value entered into the elevation level vial disk by returning the elevation counter to its original setting with the elevation handwheel will be equal to the sum of the value on the correction counter and the value which previously appeared on the elevation counter. Incorporated within the correction knob and the knob base is a set of stop rings which limits correction to +50 roils. The correction counter unit consists of two pairs of dials, each pair capable of reading from 00 to 99. The dials rotate simultaneously, but a cam actuated shutter covers the pair of dials not in use at any given time. The dials are so arranged that when a positive (+) correction is set in, weapon elevation is increased, and when a negative (-) correction is set in, weapon elevation decreases.

(10) A toggle switch controls power flow to all LEDs in the M145/M145A1 telescope mount. Flexible cables, held externally to individual components of the mount, carry power to the individual LEDs. A receptacle is provided to connect a cable from the vehicle 24-volt dc power supply to the M145/M145A1 telescope mount. A positive contact, located in the mount body, connects the M117/M117A2 panoramic telescope electrical system to the M145/M 45A1 telescope mount electrical system.

d. Ml 17/M1 17A2 Panoramic Telescope.

(1) The M117/M117A2 panoramic telescope is the basic indirect fire instrument used in laying the weapon in azimuth. The M117/M117A2 panoramic telescope is mounted, by means of clamping catches, directly on the M145/M145A1 telescope mount.

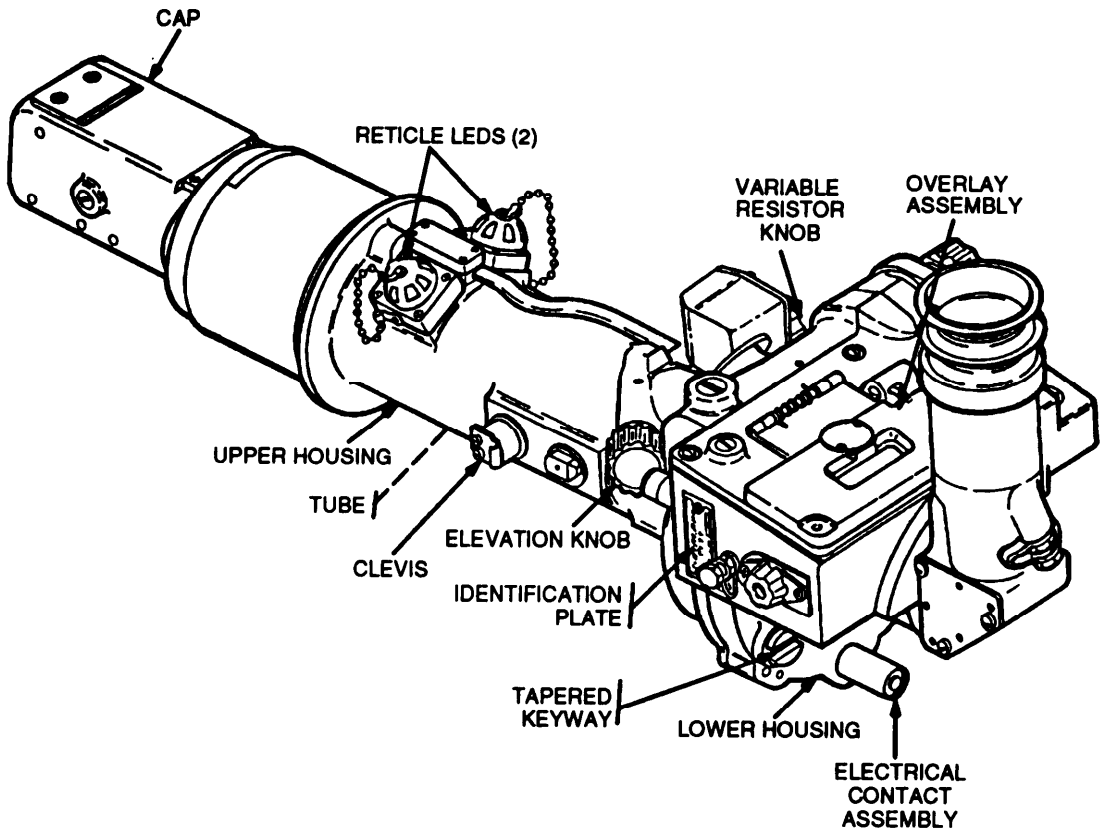
(2) The M117/M117A2 panoramic telescope is a 4-power, fixed focus instrument with a 10° field of view. It is equipped with mechanical counter devices rather than the customary circular deflection scales. The counters are an azimuth counter, a gunners aid counter, and a reset counter. The other major components are the azimuth and elevation mechanisms, the gunner's aid assembly, the variable resistor, and the optical system. The 90-degree prism, objective lenses, reticle, and erector lens are included in a single assembly which permits no relative movement between the reticle and the 90-degree head prism as the assembly rotates in azimuth. All major components of the instrument are contained within the cap, upper housing, lower housing, elbow assembly, counter adapter, and gunner's aid cover. The major opictal components are fitted within the main telescope tube and the elbow assembly.

(3) The optical system is composed of a window, a 90-degree prism, a two-component objective lens system, a reticle, reticle illuminating lenses, an erecting lens, an Amici prism, a diaphragm, a field lens, and an eyelens. The components are arranged with the reticle placed ahead of the dove prism to eliminate deflection errors caused by off-axis rotation of the prism.

(4) The window is located in the rotating head of the telescope, affixed in the cap assembly. It serves both as a window and as a means of protecting the optical system from dirt, dust, and moisture.

(5) The 90-degree (head) prism is located in the rotating head. This prism bends the line of sight 90° and inverts the image. The 90-degree prism, the objective lens system, the reticle, and the first erecting lens may be rotated together through 6400 roils in azimuth. The 90-degree prism also maybe elevated or depressed through an angle of 300 roils to permit selection of aiming points in rough terrain.

(6) The first lens of the objective lens system is a cemented doublet lens which, with the second lens of the objective lens system, forms a reverted image of the target on the reticle. The second lens of the objective lens system is a plano-convex lens.



M117 PANORAMIC TELESCOPE

1-5. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES - continued

d. M117/M117A2 Panoramic Telescope-continued.

(7) The etched sutface of the reticle is located in the focal plane of the objective lenses so that the graduations and the target image can be superimposed. The edge of the reticle is illuminated by LEDs connected to the holders. The reticle pattern consists of a horizontal and a vertical centerline. The horizontal centerline is graduated into 5 mil increments by short vertical lines. Alternate graduations on each side of the vertical centerline are numbered consecutively every 10 mils, from 10 to 80.

(8) The reticle illuminating lens is a plastic piano-convex lens which transmits light from a LED installed in the telescope body to edge-light the reticle.

(9) The erecting lenses are cemented doublet lenses. With the dove prism and the Amici prism, the two erecting lenses assist in presenting a normal image of the target and the reticle pattern in the focal plane of the eyepiece. Primarily, the erecting lenses serve to lengthen the light path through the telescope tube without requiring an increase in the tube diameter. The lenses provide parallel rays of light through the dove prism.

(10) The dove (or rotating) prism is a refracting type prism. The parallel rays of light from the erecting lenses strike the upper 45-egree face of the dove prism and are refracted toward the center of the longest surface of the prism, which in turn reflects the light rays toward the lower 45-degree surface of the dove prism. The rays are refracted once again as they pass from the dove prism. The dove prism is rotated at one-half the speed of the 90-degree prism of the Amici prism, and with these prisms assures that the target image, as seen by the observer, does not rotate about the line of sight as the head and/or the eyepiece are rotated in azimuth.

(11) The Amici prism bends the light rays 90° and inverts and reverts the image so that an erect and normal image of both target and reticle pattern are formed in the focal lens of the eyepiece.

(12) The diaphragm located in the eyepiece focal plane, functions as a stop to exclude undesirable light from the image.

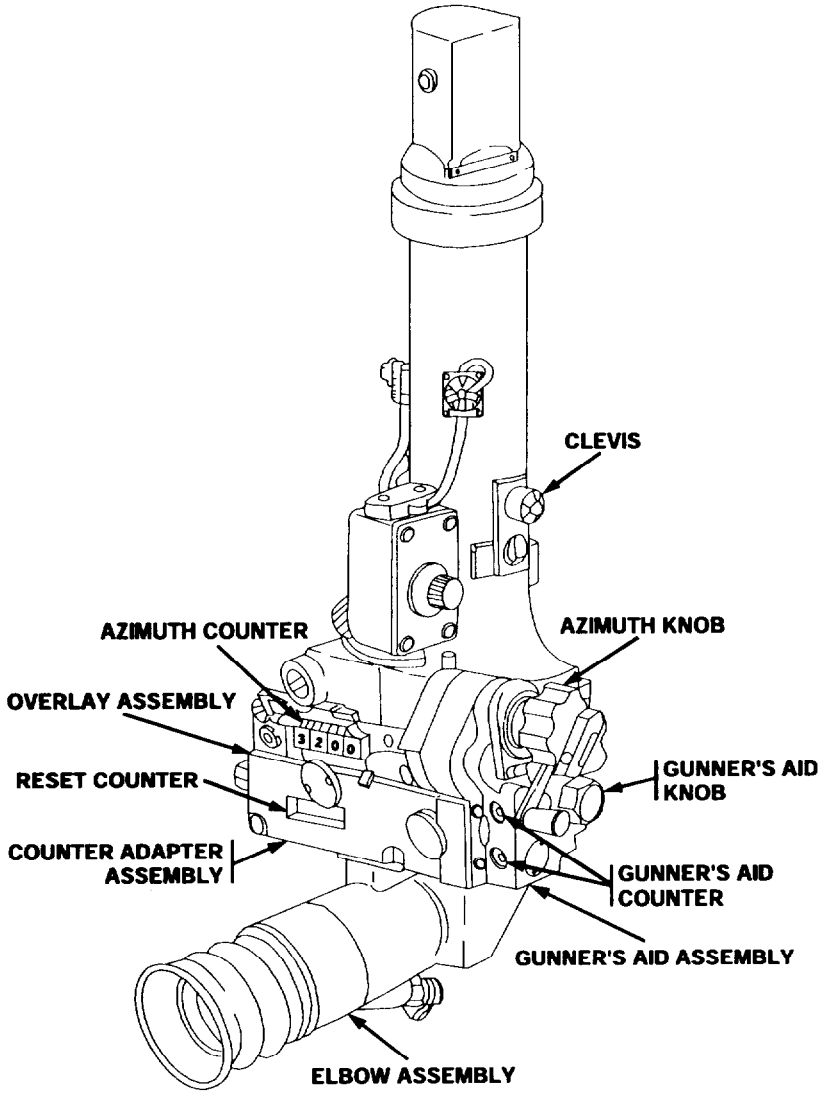
(13) The field lens and the eyelens are similar cemented doublet lenses. Together they form the eyepiece, which permits the observer to see a normal, erect, and enlarged image of the target and reticle pattern.

(14) Rotation of the azimuth knob causes the 90-degree prism to rotate in cross-level. The azimuth knob also causes rotation of the dove prism assembly at half the speed of the 90-degree prism.

(15) The counters are part of a counter adapter assembly which fits into the lower telescope housing. Rotation of the azimuth knob causes the azimuth counter to register azimuth travel in mils. The azimuth counter assembly is a 3-dial, 4-digit instrument with a numerical range from 0000 to 6399. A series of graduation marks divides the area into quarter-roil increments for greater accuracy insetting. The external end of the countershaft is slotted so that it may be pushed in and turned with a screw driverto set the counter to a reading of 3200 roils for boresighting. A spring-loaded door covers the dial of the azimuth counter on the face of the counter adapter assembly. A rod, when pushed, disengages the detent which holds this door shut, causing the door to snap open. An overlay assembly containing LEDs, mounted on the counter adapter between the azimuth counter and the reset counter, illuminates the two counter dials.

(16) The azimuth counter is connected to a 3200-mil reset counter. The reset counter is a standard 4-digit, high-speed counter with a numerical range from 0000 to 9999. The right-hand dial is graduated in quarter-roil increments for greater accuracy insetting. An index line is marked on the cover of the reset counter. Normally, the reset counter is driven to register the telescope azimuth travel, in mils, when the azimuth knob is rotated. The reset counter maybe reset at any time to 3200 roils by pushing in and turning the reset knob.

(17) Rotation of the elevation knob causes the 90-degree prism to be elevated or lowered through a travel of ±300 roils. Clockwise rotation of the elevation knob causes the 90-degree prism to tilt upward and counterclockwise rotation causes the 90-degree prism to tilt downward.



M117A2 PANORAMIC TELESCOPE

1-5. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES - continued

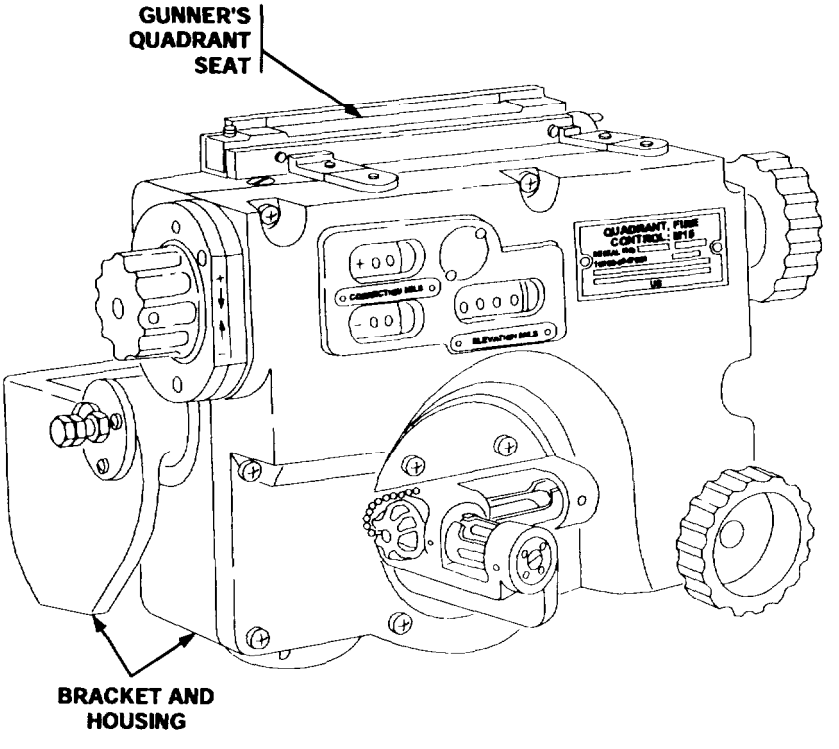
d. M117/M117A2 Panoramic Telescope - continued.

(18) The gunner's aid counters in the gunner's aid housing assembly are connected to the reset counter and to the gunner's aid knob. Rotating the gunner's aid knob drives both the gunner's aid counters and the reset counter simultaneously. Provided the gunner's aid counters are initially set at zero and the reading on the reset counter is observed, the M117/M117A2 panoramic telescope operator can set in a given deviation with the gunnel's aid knob. The magnitude of the deviation appears in the dials of the gunner's aid counters and changes the reading in the reset counter. Left deviations, which move the strike point to the left, are read in the upper gunner's aid counter window; tight deviations, which move the strike point to the right, are read in the lower window. A series of stop rings limit the gunner's aid knob to 10 turns, or $\pm$ 50 mils of correction.

(19) A tapered keyway under the front side of the lower M117/M117A2 panoramic telescope housing rests upon mating tapered keys on the M145/M145A1 telescope mount. A key on each side of the upper telescope housing fits into keyways in the M145/M145A1 telescope mount to support the M117/M117A2 panoramic telescope. A clevis on each side of the upper telescope housing is engaged by a clamping catch on the M145/M145A1 telescope mount to hold the M117/M117A2 panoramic telescope in place.

(20) Placing the M117/M117A2 panoramic telescope on the M145/M145A1 telescope mount automatically connects the electrical power needed to operate the reticle, and counter LEDs. An insulated positive contact assembly mates with a corresponding contact built into the M145/M145A1 telescope mount, Single-conductor wires connect to the variable resistors and to the LEDs. The LEDs are grounded to the telescope body and the circuit is completed through the metal-to-metal mating surfaces between the M117/M117A2 panoramic telescope and the M145/M145A1 telescope mount. Rotation of the variable resistor knobs on the lower portion of the upper telescope housing dims or brightens the reticle LEDs and the LEDs in the overlay assembly which illuminate the counters.

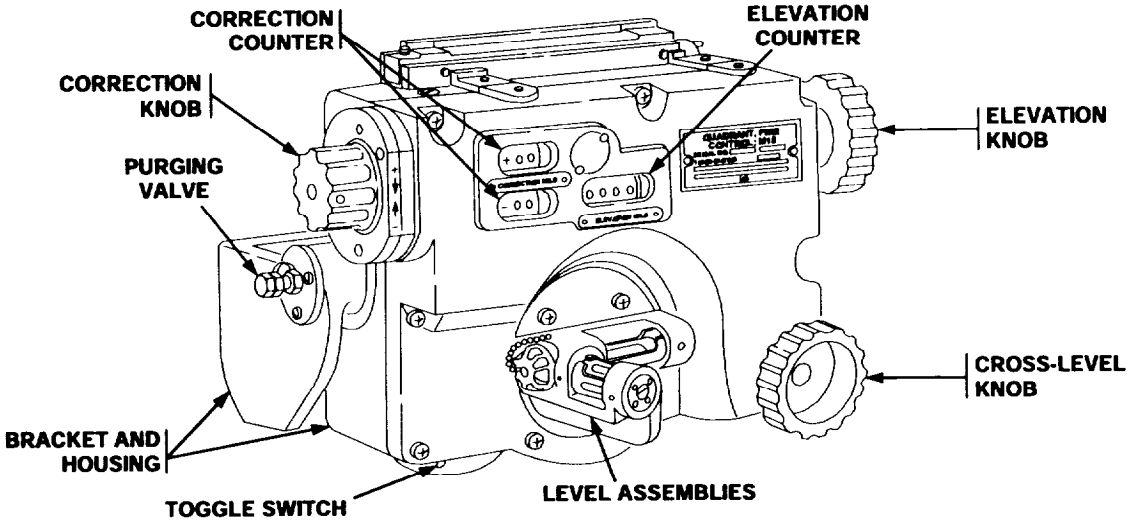
e. M15 Fire Control Quadrant.



(1) The M15 fire control quadrant, used on the M109 series howitzers, measures the angle of elevation of the gun tube.

(2) A circular projection, centered lengthwise on the back side of the bracket, is machined flat for a mounting pad. A horizontal keyway across the pad center provides for quadrant alinement. The mounting pad is drilled for four attaching cap screws of corrosion-resistant steel.

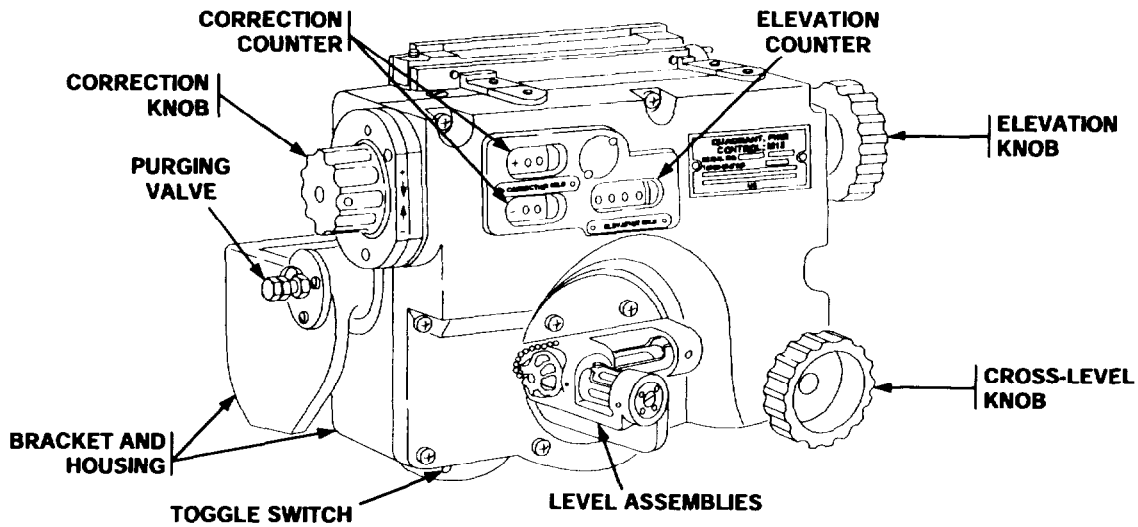
(3) The cast housing pivots on two shafts held in the ends of the bracket and forming an axis parallel to the bracket mounting pad keyway. A gunner's quadrant seat bar is permanently mounted on top of the housing.



(4) The cross-level knob operates a wormshaft meshed with a gear sector fixed on the right bracket shaft in the housing to adjust the quadrant to a vertical position, correcting for any cant in the gun carriage. This position is established by centering the bubble in the cross-level fire control level incorporated in the level assembly.

(5) The elevation knob operates a shaft on which are mounted worm and spur gears, The worm gear is meshed with a gear sector pivoted on a fixed, transverse shaft, The level assembly is mounted on the hub of the gear sector. The spur gear drives the elevation counter through a differential assembly. Turning the elevation knob clockwise causes the gear sector and level assembly to rotate clockwise and increases the number of mils indicated on the elevation counter. Counterclockwise knob rotation does the opposite. At zero gun elevation, the bracket mounting pad keyway is horizontal, the elevation fire control level bubble is centered, and the elevation counter reads 0000 mils.

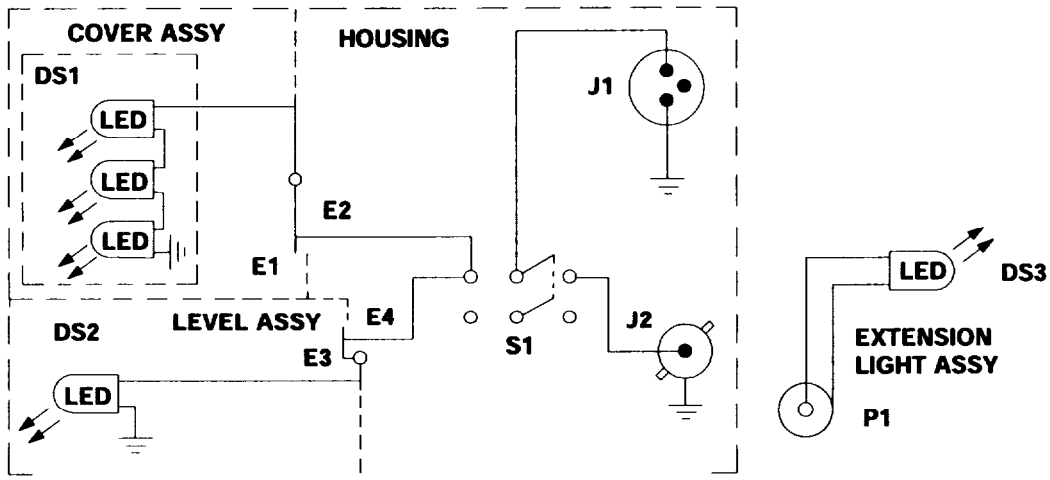
e. M15 Fire Control Quadrant - continued.



(6) The four-digit counter located behind the window above the level assembly indicates mils of gun elevation directly. Mils of depression angle must be determined by deducting from the maximum elevation reading of 9999, the amount of depression. Example: Elevation 9999 mils at a depression of 50 mils will record a reading of 9949 mils.

(7) Two perpendicular level vial tubes are supported in a bracket casting mounted on the elevation gear sector. The elevation level is parallel to the circular bracket flange, and its axis lies in a plane parallel to the housing pivot axis. The cross level vial tube is perpendicular to the bracket flange and pivot axis. When centered, the elevation level bubble indicates that the quadrant bracket keyway has been elevated or depressed the correct number of mils to offset rotation of the level assembly from its zero position (as read on the elevation counter). Centering the cross-level bubble by means of the cross-level knob places the quadrant housing upright to offset any cant of the gun carnage and the quadrant bracket attached to it.

(8) The correction knob contains a spring loaded detent ball which drops successively into each of ten depressions around the detent plate under the knob, causing ten clicks per revolution. Each click corresponds to a change of one mil indicated on either the upper “+” or the lower “-” section of the correction counter. The two counter sections are visible through windows in the quadrant cover to the left of the elevation counter window. Clockwise rotation of the correction knob from the "00" position of both counter sections causes an increasing number of mils to be registered on the counter “+” section, while the "-" section is covered. From the "00" position, counterclockwise knob rotation places an increasing reading in mils on the "-" section, while the "+" section is coveted. These functions are indicated by arrows and "+" and "-" symbols engraved on a flat at the front edge of the annular base which clamps the detent plate. The knob is mounted on spur gear-shaft provided with 12 stop rings which permit over 11 revolutions. The spur gearshaft drives both the correction counter and another gear shaft which alters the elevation counter reading, driving through a differential assembly. Mils registered on the correction counter "+" section are deducted from the elevation reading, requiring a small clockwise movement of the elevation knob to restore the original elevation reading in mils, and this requires slight additional gun elevation to center the elevation level bubble. A "-" correction reverses the movements.



Wiring Diagram

Reference designation	Item	Part no.
DS1	Overlay assembly	12599270-1 or 12599270-2
DS2	LED, T1-3/4 based	12360905-2
DS3	LED, T1-3/4 based	12360905-2
E1	Electrical contact	10553922
E2	Electrical contact	8202570
E3	Electrical contact	8262017
E4	Electrical contact	8262018
J1	Electrical receptacle assembly	
J2	Electrical receptacle connector	8215804
P1	Electrical plug connector	ML-C-39012/16-0001
S1	Toggle switch	MS35059-21

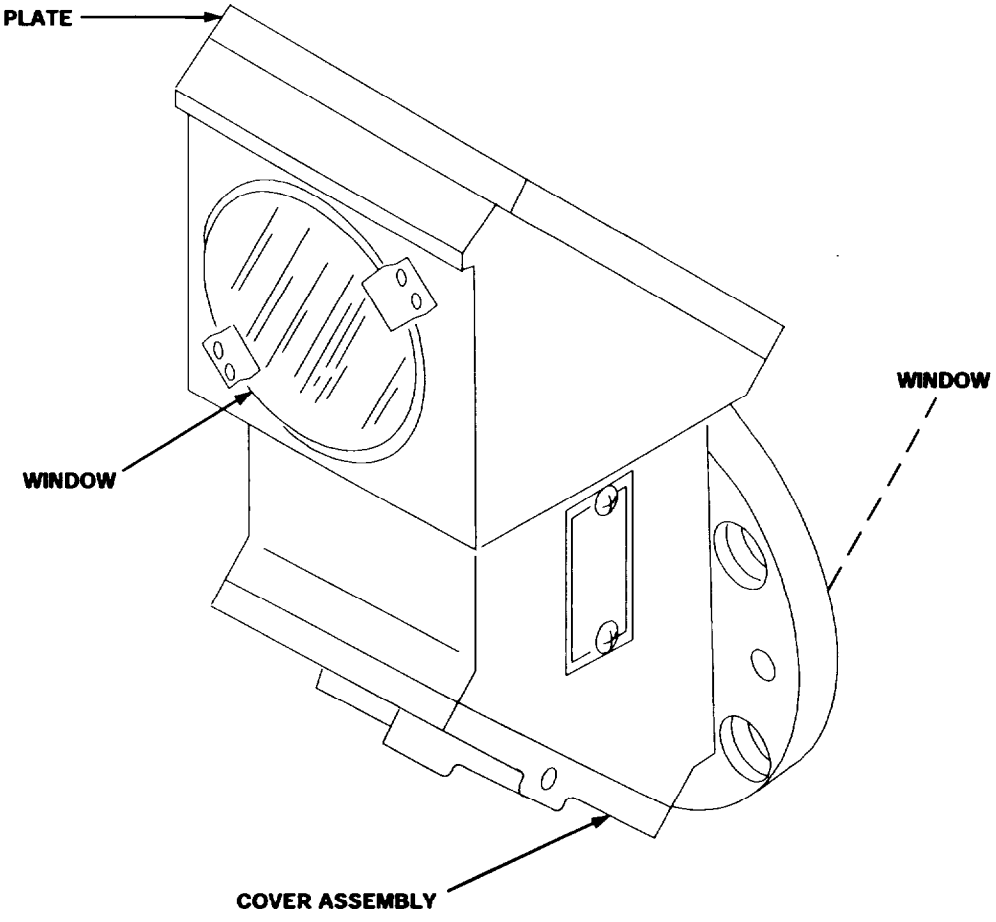
(9) An external source of direct current electrical power is connected to the receptacle at the upper right rear corner of the quadrant housing. A three-position, center OFF, toggle switch mounted through the bottom of the housing controls current to the branch of the circuit serving counter and level LEDs and the branch serving the extension light. The latter assembly is held by a spring clip behind the housing and connected by a wiled cord and bayonet locking connector to a receptacle at the lower, left, rear corner of the housing. Spring contacts connect electrical cables in the housing to those in the cover leading to counter and level LEDs, thus permitting removal of the cover assembly without disconnecting cables. Watertight, bayonet locking metal caps cover level LEDs and an overlay assembly containing LEDs covers the counters.

1-5. EQUIPMENT CHARACTERISTICS, CAPABILITIES, AND FEATURES - continued

f. M42 Periscope.

(1) The M42 periscope is mounted above the cradle on the upper right-hand portion of the howitzer mount and is used with the M118A2/M118A3 elbow telescope. It provides a clear field-of-view when the gun muzzle brake is used. The M42 periscope consists of two clear windows, a stationary mirror, and an adjustable mirror mounted in a housing.

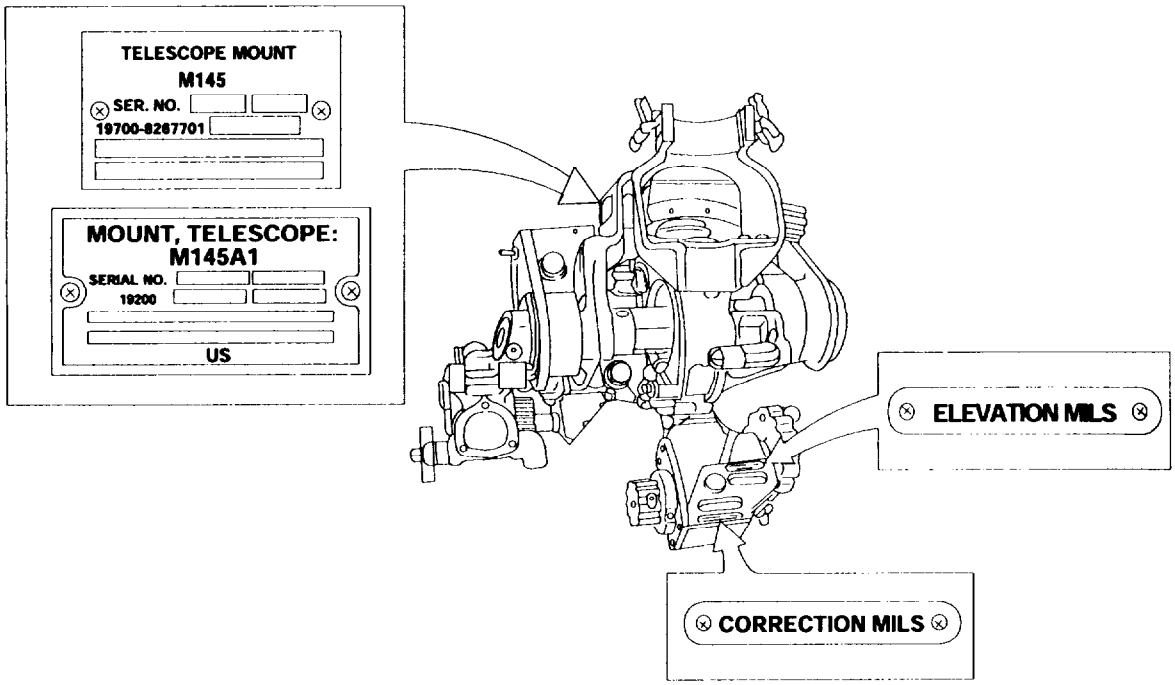
(2) The windows are mounted in the housing and secured with sealing compound. They pass the image to and from the mirrors with a minimum optical distortion. The stationary mirror is cemented to a plate which is mounted on the left side of the housing. The adjustable mirror is secured to a cover assembly which is mounted on the right side of the housing. The cover assembly contains provisions for adjusting the position of the mirror to obtain minimum image tilt and collimation.

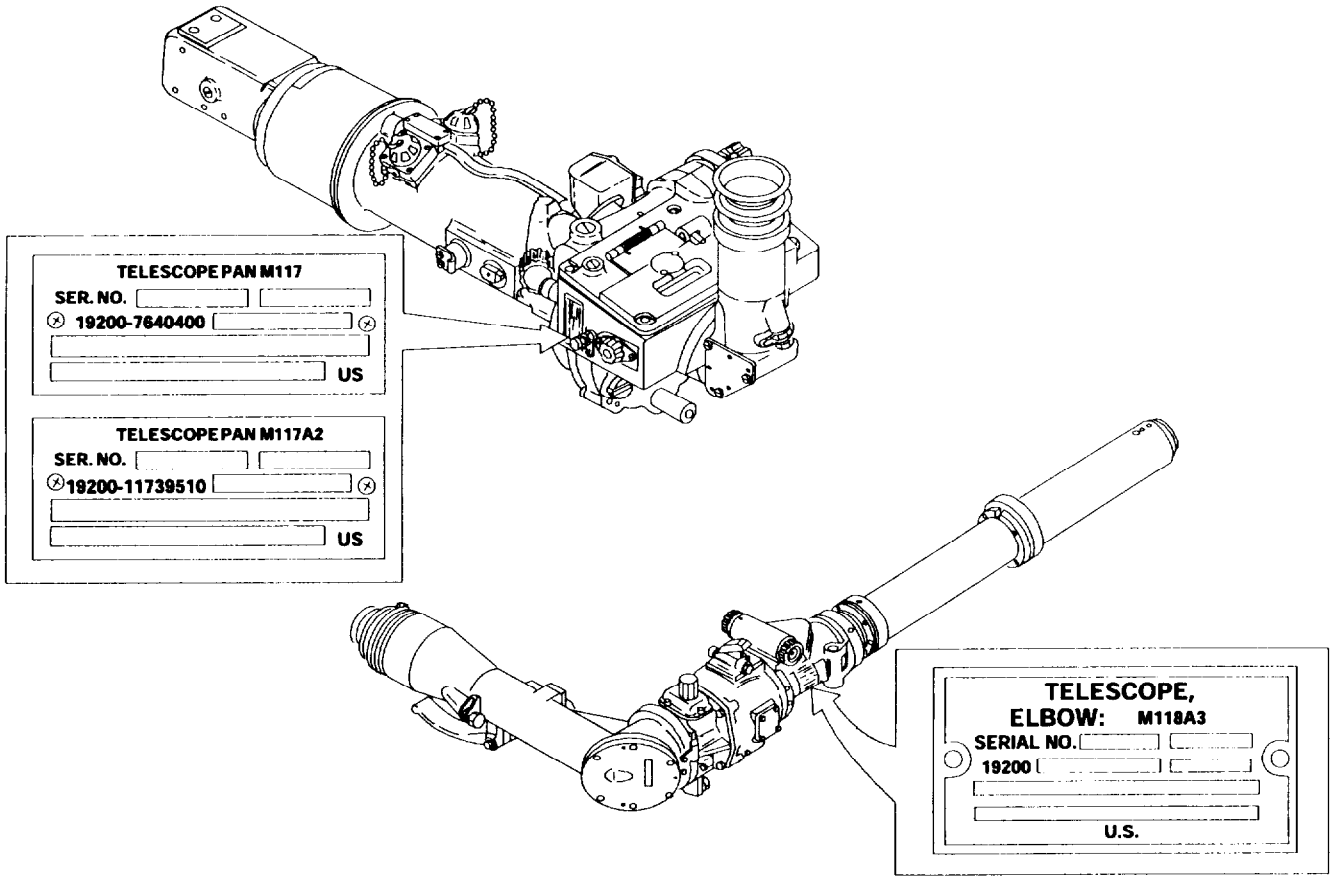


1-6. LOCATION AND DESCRIPTION OF MAJOR COMPONENTS

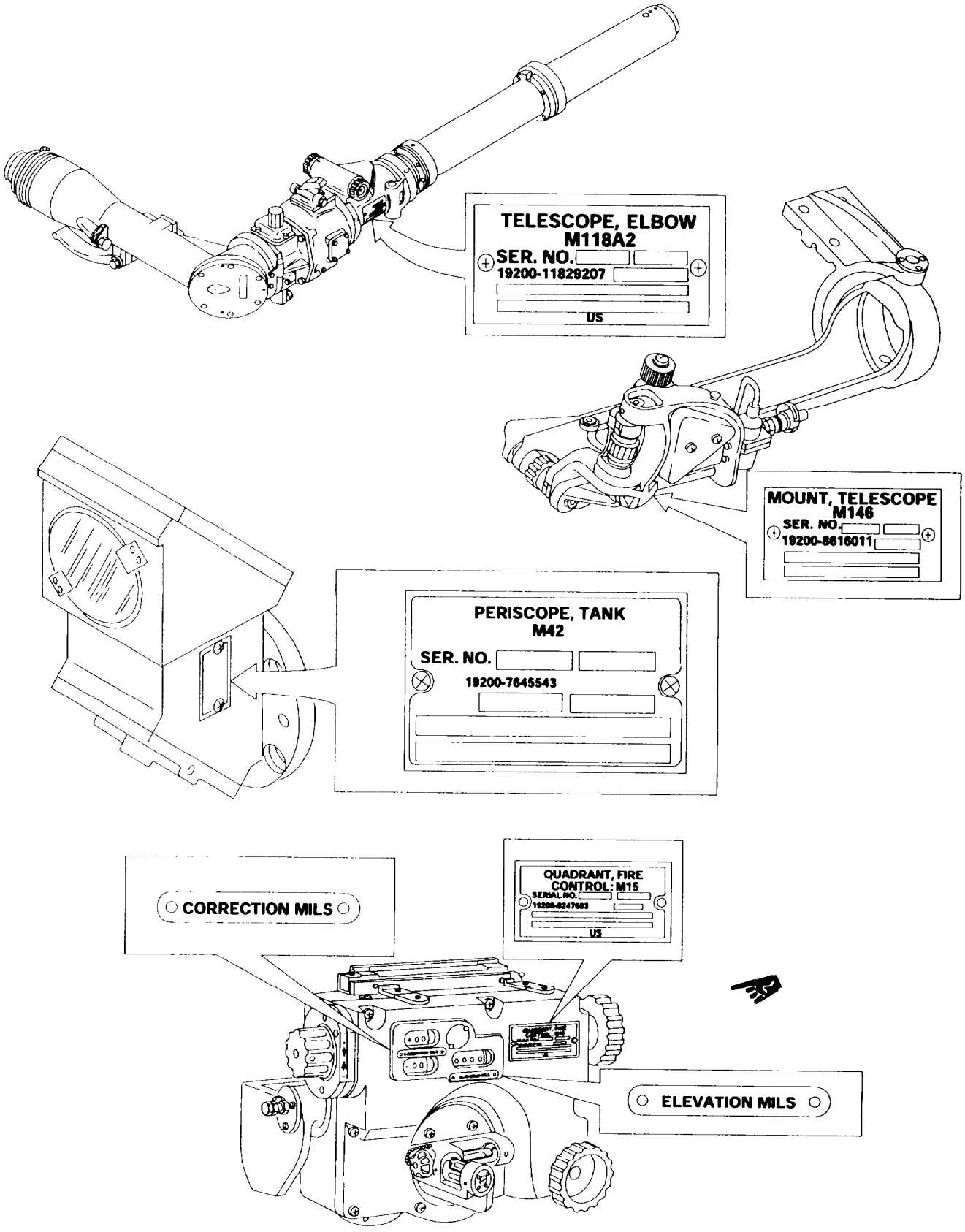
Refer to paragraph 1-5, Equipment Characteristics, Capabilities, and Features for external components.

1-7. DATA PLATES





1-7. DATA PLATES - continued



1-8. DIFFERENCES BETWEEN MODELS

a. M145/M145A1 Telescope Mount. The M145A1 has a modified quadrant support assembly that is stabilized through use of a V-bearing, spring retainer, and new gearshaft assemblies.

b. M118A2/M118A3 Elbow Telescope. The M118A2 uses incandescent lamps and light conductors for illuminating of reticle and level assembly. The M118A3 uses light emitting diodes mounted on circuit board assemblies that are not replaceable without opening the telescope assembly.

c. M117/M117A2 Panoramic Telescope. The major differences between the M117 and M117A2 panoramic telescopes are external. The upper housing and electrical assemblies vary in configuration. When repairs are made on early production models, update in accordance with most recent procedures, MWOs and ECOs.

d. M15 Fire Control Quadrant. M15 quadrants within the categories listed below have design differences as stated. As a minimum, all instruments must be provided with a means for removing moisture and condensation at time of repair.

(1) Early Configurations.

These M15 quadrants were altered to provide removal of moisture and condensation utilizing one of the following methods:

(a) Utilizing a valve assembly in the cover assembly and utilizing one of two identification plate screw holes as the exit port.

(b) Utilizing latest configuration of shafts, part numbers 10553923 and 10553932.

(c) M15 quadrants received with purging facilities utilizing shafts, part numbers 10553923 and 10553932, or with serial numbers above 5500, will not be altered to use purging valve in cover assembly. M15 quadrants not having purging facilities will be altered using either of the above methods.

(2) Configurations Without Purging Ports.

These M15 quadrants do not provide a means to purge and must be altered to provide purging capabilities by installing latest configurations of shafts, part numbers 10553923 and 10553932.

(3) Latest Configuration.

These M15 quadrants incorporate the latest design improvements which provide the means to purge and charge. They are in accordance with repair instructions and illustrations contained in this TM. The design change incorporates preformed packings and gaskets to hermetically seal the instrument and locate the valve assembly and exhaust port on pivot shafts of the mounting bracket. This configuration also incorporates an overlay and change of lamps from incandescent to LEDs.

e. M42 periscope. The difference between early production models and later models is location of the purging valve. The early model requires use of an adapter to attach the purging hose; the later model does not require an adapter.

1-9. EQUIPMENT DATA

M146 TELESCOPE MOUNT

PHYSICAL CHARACTERISTICS

Length	19.875 in. (504.8 mm)
Width	6 in. (152.4 mm)
Height	6.25 in. (158.8 mm)
Weight	33 lb (14.97 kg)

ADJUSTMENT RANGES

Boresight elevation	±110 mils
Boresight deflection	±10 mils

M118A2/M118A3 ELBOW TELESCOPE

PHYSICAL CHARACTERISTICS

Length	38 in. (965.2 mm)
Width, including eyepiece	18 in. (457.2 mm)
Height	7.5 in. (190.5 mm)
Weight	44 lbs (19.96 kg)

OPTICAL CHARACTERISTICS

Power	4X
Field of View	10°
Exit pupil diameter	0.236 in. (5.99 mm)
Effective focal length:	
Objective	7.037 in. (178.74 mm)
Eyepiece	1.771 in. (44.98 mm)

MOVEMENT

Axial cant correction	+5°
Minor, level	100°
Eyepiece arm operative range	±20°

M145/M145A1 TELESCOPE MOUNT

PHYSICAL CHARACTERISTICS

Length	21 in. (533.4 mm)
Width (with attaching bolts)	20.5 in. (520.7 mm)
Height	20.5 in. (520.7 mm)
Weight:	
Mount	96 lbs (43.54 kg)
Plates	11 lbs (4.99 kg)
Linkage	31 lbs (14.06 kg)

MOVEMENT

Elevation	-50 to +1333 mils
Correction (elevation).	± 50 mils
Cross-level adjustment	± 10
Pitch adjustment	± 10
Incremental reading (counters)	1 mil

M117/M117A2 PANORAMIC TELESCOPE

PHYSICAL CHARACTERISTICS

Length	9 in. (228.6 mm)
Width	8.25 in. (209.55 mm)
Height	20 in. (508 mm)
Weight	14 lb 6 oz (6.520 kg)

OPTICAL CHARACTERISTICS

Power	4X
Field of view	10°
Exit pupil diameter	0.165 in. (4.191 mm)
Effective focal point:	
Objective	4.004 in. (101.702 mm)
Eyepiece	1.250 in. (31.750 mm)
Clear eye distance	0.700 in. (17.780 mm)

MOVEMENT

Deflection (azimuth)	6400 mils
Incremental reading (deflection)	1/4 mil
Elevation	± 300 mils
Correction (deflection)	± 50 mils

1-9. EQUIPMENT DATA - continued

M15 FIRE CONTROL QUADRANT

PHYSICAL CHARACTERISTICS

Length	12 in. (30.48 cm)
Width	9 in. (22.86 cm)
Height	9 in. (22.86 cm)
Weight	23-1/4 lb (10.55 kg)

RANGE IN THE VERTICAL PLANE

Elevation (minimum)	1383 mils
Depression (minimum)	228 mils

RANGE OF ELEVATION CORRECTION

Add (minimum)	50 mils
Deduct (minimum)	50 mils

RANGE OF CROSS-LEVELING CORRECTION FOR CANT OF GUN CARRIAGE

Right (minimum)	34 degrees
Left (minimum)	34 degrees

ELECTRICAL POWER REQUIREMENTS

Type of current	Direct
Power source potential	2 4 volts

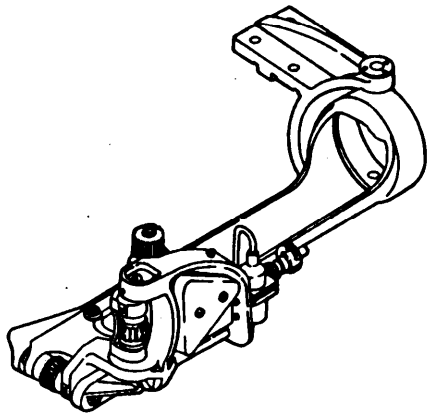
M42 PERISCOPE

Length	5.5 in. (139 mm)
Width	5 in. 127.0 mm)
Height	10.25 in. (260.4 mm)
Weight	8 lb (3.63 kg)

Section III. Principles of Operation

Refer to paragraph 1-5, Equipment Characteristics, Capabilities, and Features.

CHAPTER 2
M146 TELESCOPE MOUNT MAINTENANCE INSTRUCTIONS



CHAPTER OVERVIEW

This chapter contains maintenance procedures for the M146 telescope mount. Information on repair parts and special tools and detailed procedures for troubleshooting and maintenance of the M146 telescope mount are included.

CHAPTER INDEX

Section I. Repair Parts; Special Tools; Test, Measurement, and Diagnostic Equipment (TMDE); and Support Equipment

2-1. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE), CTA 50-970, applicable to your unit.

2-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special tools, TMDE, and support equipment required and authorized for repair of the M146 telescope mount are listed in the repair parts and special tools list, appendix D. Fabricated tools are listed in appendix C.

2-3 REPAIR PARTS

Repair parts are listed and illustrated in the repair parts and special tools list, appendix D.

Section II. Inspections

2-4. GENERAL

a. Inspection is performed primarily to determine the following:

(1) Completeness.

(2) The nature of unserviceability.

(3) The work, repair parts, and supplies required to return the materiel to serviceability.

(4) That the work in process is being performed properly.

(5) That completed work complies fully with serviceabilty standards.

b. The M146 telescope mount is considered serviceable when:

(1) It is complete and properly performs its intended function.

(2) All modification work orders (MWO's) have been applied.

(3) All defects disclosed by the inspection have been corrected.

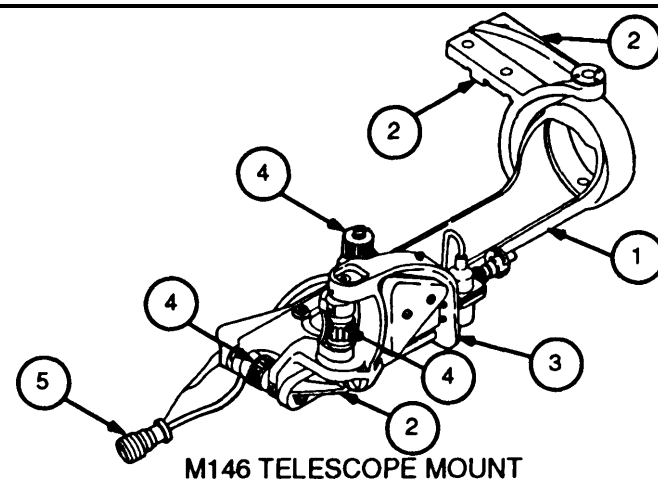
c. Applicable MWO's are listed in DA Form 2408-5 and DA Form 2409.

2-5. CATEGORIES OF INSPECTION

a. An initial inspection (ref. para 2-6) is performed immediately on receipt of the M146 telescope mount for maintenance. This inspection will determine the amount and type of work to be performed.

b. A final inspection (ref. para 2-1 5) is performed after repairs have been completed to ensure the item meets serviceability standards.

2-6. INITIAL INSPECTION



M146 TELESCOPE MOUNT

Item No.	Item To Be Inspected	Procedures
1	M146 TELESCOPE MOUNT	Examine M146 telescope mount (1) for good overall appearance with all parts securely tightened in place.
2	MOUNTING SURFACES	Check mounting surfaces (2) for burrs and corrosion
3	BRACKET ASSEMBLY	Check that elevation bracket (3) slides freely without binding . Visually observe elevation bracket for evidence of excessive wear.
4	KNOBS	Operate knobs (4). Verify that operation is smooth without binding or rough motion and that adjustment provides 2–1/2 revolutions minimum total movement.
5	CABLE ASSEMBLY	Visually inspect cable assembly (5) for damage. Test continuity in cable circuit using multimeter.

Section III. Troubleshooting

2-7. GENERAL

a. The symptom index can be used as a quick guide to troubleshooting. Common malfunctions are listed in alphabetical oder with page number reference to the troubleshooting table, where a test or inspection and corrective action are provided.

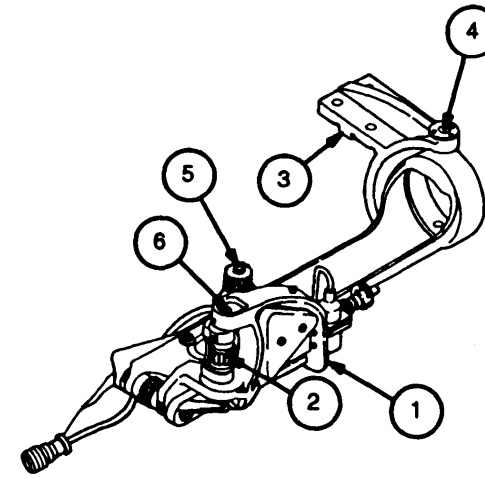
b. The direct support troubleshooting table (ref. para 2-9) lists the common malfunctions which maybe found during maintenance of the M146 telescope mount. Perform the tests/inspections and corrective actions in the order listed.

c. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective action, notify general support maintenance.

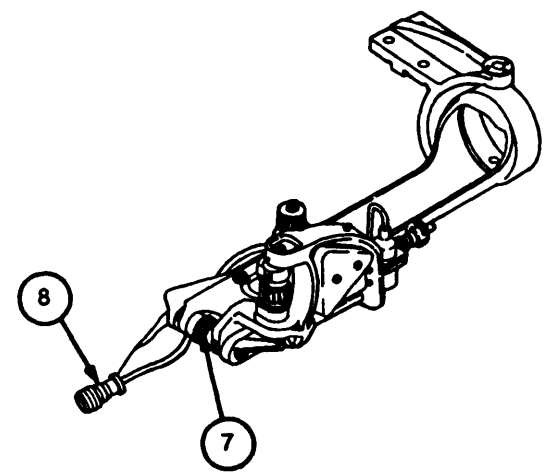
2-8. DIRECT SUPPORT SYMPTOM INDEX

2-9. DIRECT SUPPORT TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION
BRACKET ASSEMBLY	
1. ELEVATION BRACKET (1) DOES NOT SLIDE FREELY.	
Rotate elevation knob (2) from stop to stop.	
Adjust three self-locking nuts (ref. para 2–11).	
M146 TELESCOPE MOUNT	
2. YOKE 3) CANNOT BE ROTATED THROUGH 180 DEGREES WITHOUT BINDING.	
Move yoke from side to side.	
a. Remove burrs from mating surfaces.	
b. Replace headed grooved pin and related parts located inside yoke pin (4) (ref. para 2-11).	
3. **TAPERED PIN (KING PIN) (5) BINDS.**	
Remove tapered pin (king pin) (5) and inspect for smooth rotation of knob.	
a. Remove burrs from tapered pin.	
b. Replace worn or damaged parts as required (ref. para 2-11).	
4. ELEVATION KNOB 2 IS ERRATIC AND ROUGH DURING MOVEMENT.	
Rotate elevation knob from stop to stop.	
a. Adjust elevation shoulder screw (6) (ref. para 2-15).	
b. Replace damaged elevation shoulder screw parts (ref. para 2-11).	



2-9. DIRECT SUPPORT TROUBLESHOOTING - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION
5. DEFLECTION KNOB 7) IS ERRATIC AND ROUGH DURING MOVEMENT. Rotate deflection knob from stop to stop. a. Adjust deflection knob mechanism (7) (ref. para 2-15). b. Replace damaged deflection knob mechanism parts (ref. para 2-11). c. Install shims between plate spacer and mount as required (ref. para 2-11). CABLE ASSEMBLY 6. CABLE ASSEMBLY RECEPTACLE (8) DOES NOT PROVIDE POWER FOR THE M118A2/M118A3 ELBOW TELESCOPE. Perform continuity check of cable assembly a. Check soldered connections. b. Replace damaged or missing parts (ref. para 2-13.	

Section IV. Direct Support Maintenance Procedures

2-10. GENERAL

LIST OF TASKS

Task No.	Task	Task Ref (Page)	Troubleshooting Ref No. (Page)
1	Maintain M146 telescope mount		2-5, 2-6
	a. Disassemble	2-8	
	b. Repair	2-11	
	c. Assemble	2-11	
2	Maintain bracket assembly		2-5
	a. Disassemble	2-16	
	b. Repair	2-16	
	c. Assemble	2-16	
3	Maintain cable assembly		2-6
	a. Disassemble	2-17	
	b. Repair	2–19	
	c. Assemble	2–19	

2-11. M146 TELESCOPE MOUNT MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools and Special Tools

Spanner wrench, fabricated (fig. C-5, appx C)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

V-block (Item 25, appx F)

Materials/Parts

Grease (Item 6, appx B)
Grease (Item 7, appx B)
Lockwashers (2) (Item 66, appx E)
Lockwashers (2) (Item 69, appx E)
Lockwashers (5) (Item 70, appx E)
Lockwashers (6) (Item 71, appx E)
Lockwashers (3) (Item 72, appx E)
Preformed packings (2) (Item 20, appx E)
Preformed packings (2) (Item 22, appx E)
Self-locking nuts (2) (Item 13, appx E)
Self-locking nuts (3) (Item 14, appx E)
Shim stock (Item 19, appx B)

References

TM 9-254

Equipment Condition

M146 telescope mount removed from howitzer (TM 9-2350-311-20-2)

2-11. M146 TELESCOPE MOUNT MAINTENANCE INSTRUCTIONS - continued

a. Disassembly

1 Remove three cap screws (1) and three lockwashers (2). Discard lockwashers.

2 Lift retaining ring (3), headed grooved pin (4), spring (5), and yoke pin (6) as a unit from M146 telescope mount.

WARNING

Headed grooved pin (4) is under spring tension.

3 Disengage retaining ring (3) and remove headed grooved pin (4) and spring (5) from yoke pin (6).

4 Remove three cap screws (7) and three lockwashers (8). Discard lockwashers.

5 Remove yoke pin (9) and yoke (10) from bracket (11).

6 Remove chain assembly (12) by removing two machine screws (13) and two lockwashers (14). Discard lockwashers.

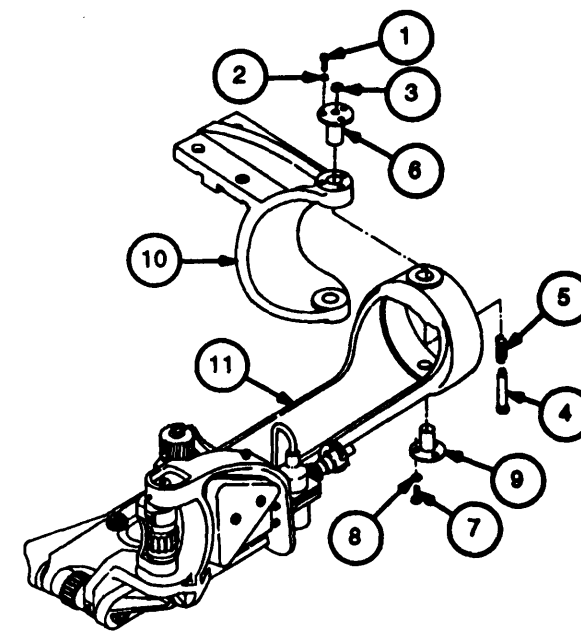
7 Remove setscrew (15) and insert (16).

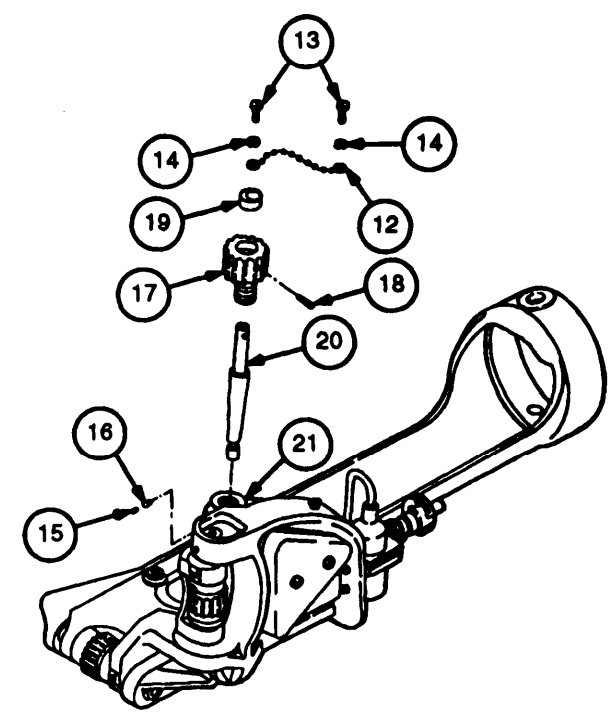
8 Unscrew and remove knob (17), tapered pin (18), shaft collar (19), and tapered pin (20) as a unit from elevation slide (21).

9 Scribe a matching mark on shaft collar (19) and tapered pin (20).

10 Aline access holes in knob (17) with tapered pin (18).

11 Support knob (17) with a V-block and drive tapered pin (18) from tapered pin (20) and shaft collar (19).





12 Remove shaft collar (19) and knob (17) from tapered pin (20).

13 Remove cover assembly (22) by removing two cap screws (23) and two lockwashers (24). Discard lockwashers

14 Remove setscrews (25 and 26).

15 Remove self-locking nut (27). Discard self-locking nut.

16 Remove elevation shoulder screw (28) while turning elevation shoulder screw (28) and knob (29) counterclockwise.

17 Remove three self-locking nuts (30) and retainer plate (31). Discard self-locking nuts.

18 Remove elevation slide (21) and associated parts.

19 Remove flat washer (32).

20 Remove two studs (33) and stud (34) from elevation slide (21).

21 Unscrew threaded ring (35) from elevation slide (21) using fabricated spanner wrench.

22 Remove concave washer (36), keyed ratchet (37), dial ratchet (38), spring washer (39), ratchet shield (40), concave washer (41), and knob (29) with associated parts from elevation slide (21).

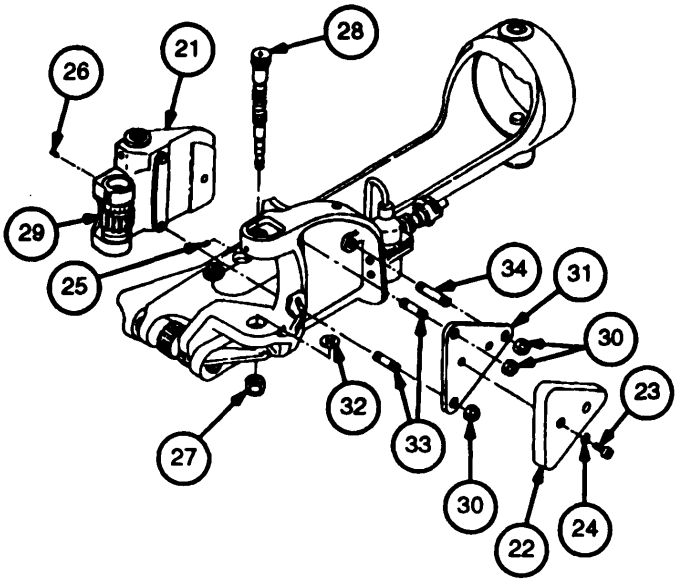
23 Remove two headless straight pins (42 and 43) from knob (29).

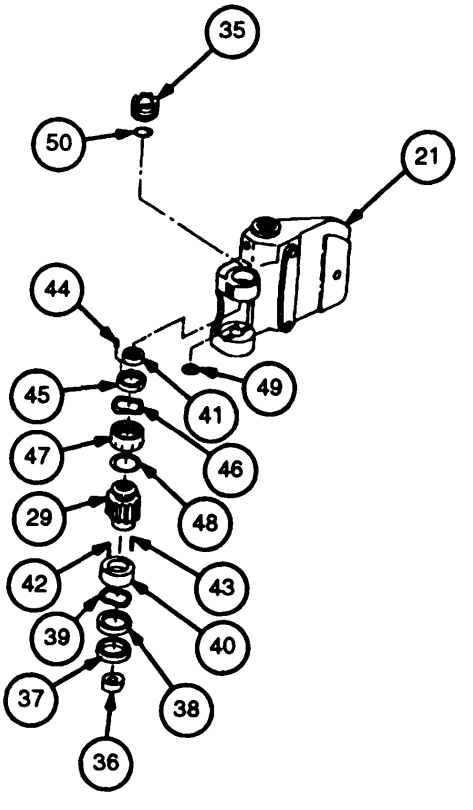
24 Remove setscrew (44) from round nut (45).

25 Remove round nut (45), spring washer (46), elevation dial (47), and disk (48) from knob (29).

26 Remove preformed packing (49) from elevation slide (21). Discard preformed packing.

27 Remove preformed packing (50) from threaded ring (35). Discard preformed packing.





2-11. M146 TELESCOPE MOUNT MAINTENANCE INSTRUCTIONS - continued

a. Disassembly - continued

28 Remove setscrew (51) from base plate (52).

29 Remove setscrew (53) that locks threaded ring (54) into Ml 46 telescope mount.

30 Remove and discard self-locking nut (55) from deflection shoulder screw (56).

31 Remove deflection shoulder screw (56) by turning knob (57) and deflection shoulder screw (56) counterclockwise.

32 Remove base plate (52) from Ml 46 telescope mount.

33 Remove threaded ring (54) from Ml 46 telescope mount using fabricated spanner wrench.

34 Remove flat washer (58), concave washer (59), keyed ratchet (60), dial ratchet (61), spring washer (62), and ratchet shield (63).

35 Remove two headless straight pins (64) from ratchet shield (63).

36 Remove knob (57) and associated parts.

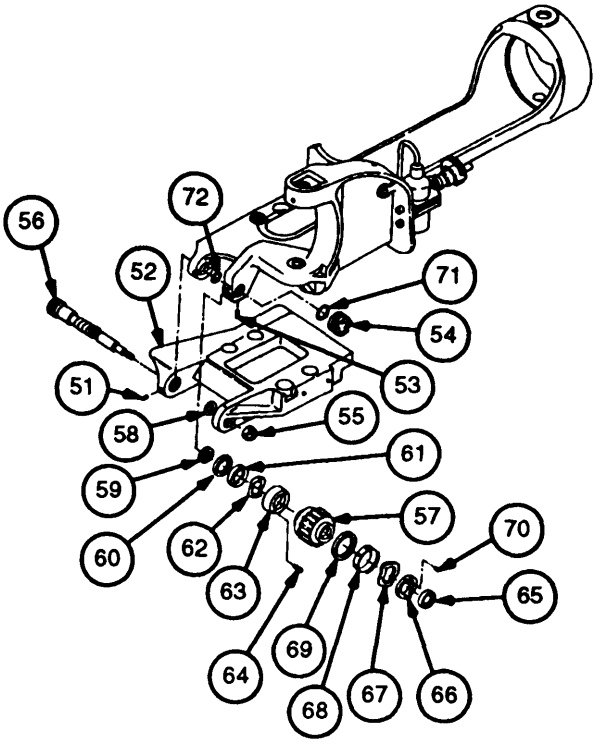
37 Remove concave washer (65), round nut (66), spring washer (67), scale dial (68), and disk (69) from knob (57).

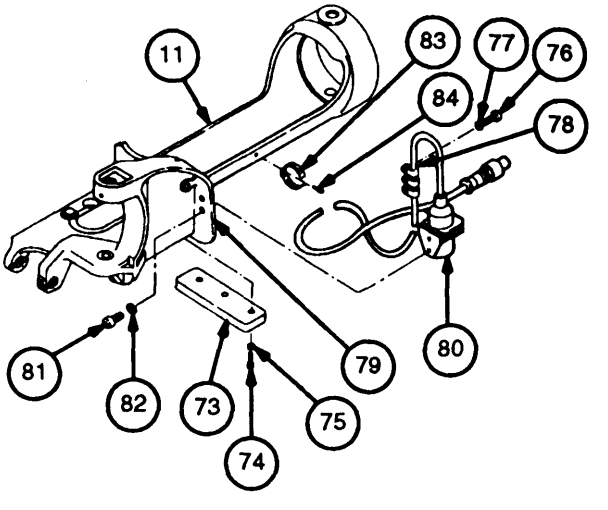
38 Remove setscrew (70) from round nut (66).

39 Remove and discard preformed packing (71) from threaded ring (54).

40 Remove and discard preformed packing (72) from Ml 46 telescope mount.

41 Remove plate spacer (73) by removing three cap screws (74) and three lockwashers (75). Discard lockwashers. If installed, remove shims and retain for reassembly.





42 Remove three machine screws (76) and three lockwashers (77) to free three clamps (78) from elevation bracket (79). Discard lockwashers.

43 Remove cable assembly (80) by removing two cap screws (81) and two lockwashers (82). Discard lockwashers

44 Remove spring clip (83) from bracket(11) by removing machine screw (84).

b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly

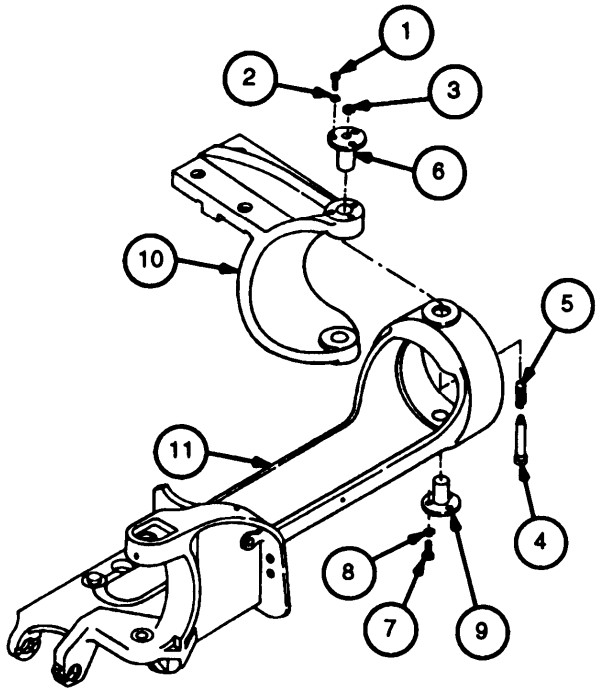
1 Apply grease (item 6, appx B) to bearing surfaces of bracket (11) and yoke (10).

2 Position yoke (10) on bracket (11).

3 Install yoke pin (9) in bracket (11) and yoke (10) and secure with three new lockwashers (8) and three cap screws (7).

4 Install spring (5) and headed grooved pin (4) in yoke pin (6) and secure with retaining ring (3).

5 Install retaining ring (3), headed grooved pin (4), spring (5), and yoke pin (6) as a unit in yoke (10) and bracket (11). Secure with three new lockwashers (2) and three cap screws (1).



2-11. M146 TELESCOPE MOUNT MAINTENANCE INSTRUCTIONS - continued

c. Assembly - continued

6 Install one stud (34) and two studs (33).

7 Apply grease (item 7, appx B) to new preformed packing (49) and install in elevation slide (21).

8 Apply grease (item 7, appx B) to new preformed packing (50) and install in threaded ring (35).

9 Install threaded ring (35) in elevation slide (21).

10 Apply grease (item 6, appx B) to machined surfaces of elevation slide (21) and mount and install elevation slide in mount.

11 Slide retainer plate (31) over studs (33 and 34).

12 Install and adjust three new self-locking nuts (30) so that elevation slide (21) moves freely without binding. A maximum of 0.002-inch (0.005-mm) clearance must be maintained on machined surfaces between bottom of elevation slide (21) and elevation bracket (79).

NOTE

Elevation shoulder screw should be temporarily installed prior to installation of knobband related parts to ensure that elevation slide moves freely without binding.

13 Install cover assembly (22) using two new lockwashers (24) and two cap screws (23).

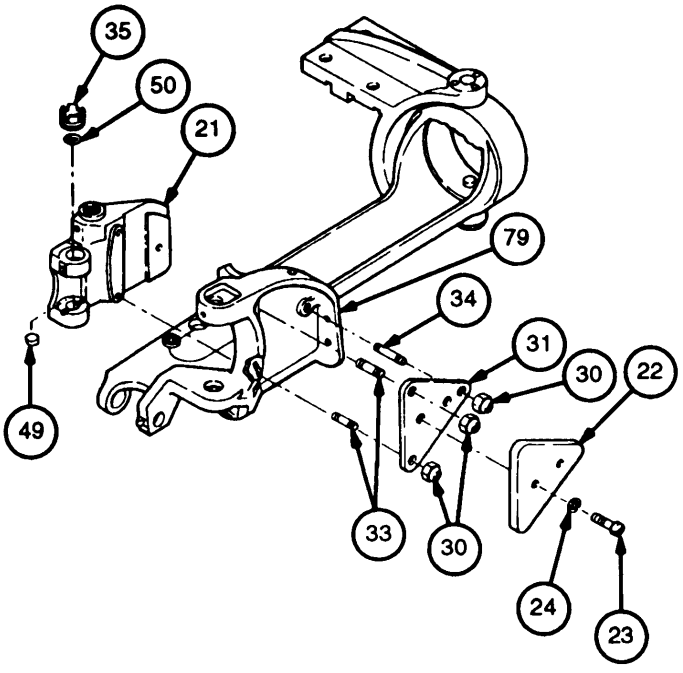
14 Apply grease (item 6, appx B) to disk (48) and install on knob (29).

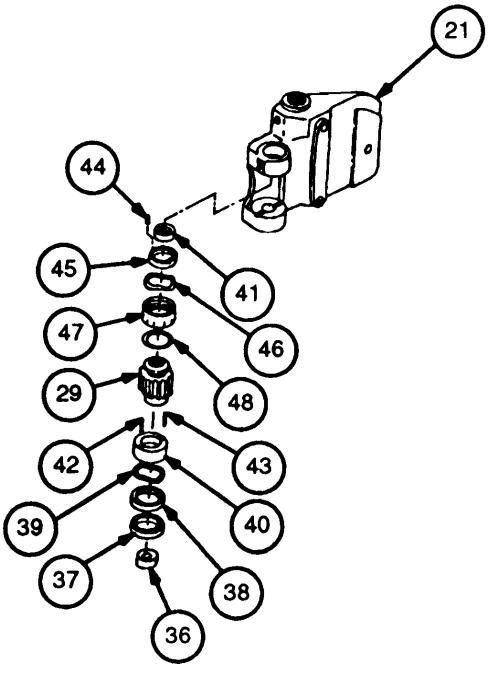
15 Install elevation dial (47) with numbers inverted on knob (29).

16 Install spring washer (46) and round nut (45) on knob (29).

17 Tighten round nut (45) enough that elevation dial (47) fits snug on knob (29).

18 Install setscrew (44) in round nut (45).





19 Install two straight headless pins (42 and 43) in knob (29).

20 Install ratchet shield (40), spring washer (39), dial ratchet (38), keyed ratchet (37), concave washer (36), and concave washer (41) in elevation slide (21).

21 Using fabricated spanner wrench tighten threaded ring (35) in elevation slide (21).

22 Apply grease (item 6, appx B) to worm gear of elevation shoulder screw (28).

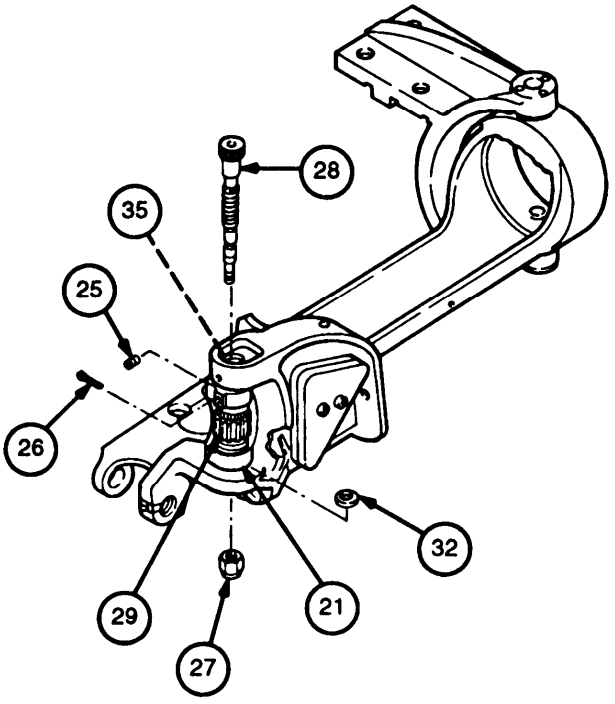
23 Install flat washer (32).

24 Install elevation shoulder screw (28) through mount and knob (29) by turning elevation shoulder screw (28) and knob (29) clockwise.

25 Install setscrew (25) in mount to secure elevation shoulder screw (28). If the tapped hole is not present in the elevation bracket, the hole must be drilled and tapped and setscrew (25) installed.

26 Install setscrew (26) in elevation slide (21) to secure threaded ring (35).

27 Install new self-locking nut (27).



2-11. M146 TELESCOPE MOUNT MAINTENANCE INSTRUCTIONS - continued

c. Assembly- continued

28 Apply grease (item 7, appx B) to new preformed packing (72) and install on elevation bracket (79).

29 Apply grease (item 7, appx B) to new preformed packing (71) and install on threaded ring (54).

30 Install threaded ring (54) in mount.

31 Install two headless straight pins (64) in ratchet shield (63).

32 Install ratchet shield (63), spring washer (62), dial ratchet (61), keyed ratchet (60), and concave washer (59) on knob (57). .

33 Install flat washer (58) in base plate (52).

34 Lubricate disk (69) with grease (item 6, appx B) and install on knob (57).

35 Install scale dial (68) and spring washer (67) on knob (57).

36 Install round nut (66) on knob (57). Tighten round nut (66) sufficiently to provide a snug fit of the scale dial (68) and knob (57).

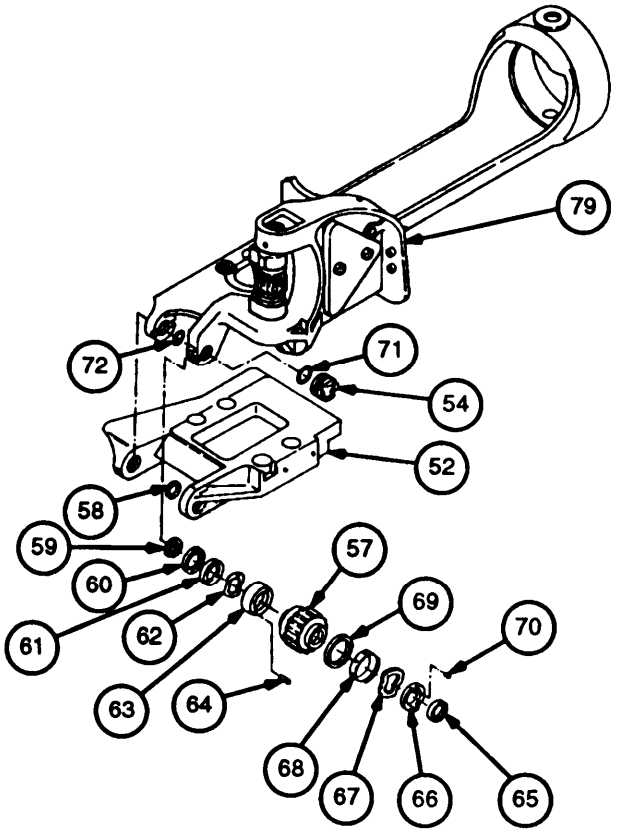
37 Install setscrew (70) to lock round nut (66).

38 Install concave washer (65).

39 Position base plate (52) on elevation bracket (79).

40 Position assembled knob (57) as a unit in elevation bracket (79).

41 Apply grease (item 6, appx B) to worm portion of deflection shoulder screw (56) and install deflection shoulder screw by turning both deflection shoulder screw (56) and knob (57) clockwise.



42 Install new self-locking nut (55) on deflection shoulder screw (56),

43 Apply grease (item 6, appx B) to machined surface of elevation bracket (79).

44 Secure plate spacer (73) to mount with three new lockwashers (75) and three cap screws (74). Install original and new shims as necessary between plate spacer (73) and mount to maintain a maximum clearance of 0.002 inch (0.005mm).

45 Install setscrew (51) in base plate (52).

46 Install setscrew (53) in mount.

47 Place knob (17) and shaft collar(19) on tapered pin (20) and aline scribe marks.

48 Aline the holes on knob (17) with holes in shaft collar (19) and tapered pin (20).

49 Support knob(17) with V-block and install tapered pin (18).

50 Install knob (17), shaft collar (19), tapered pin (20), and tapered pin (18) as a unit in elevation slide (21).

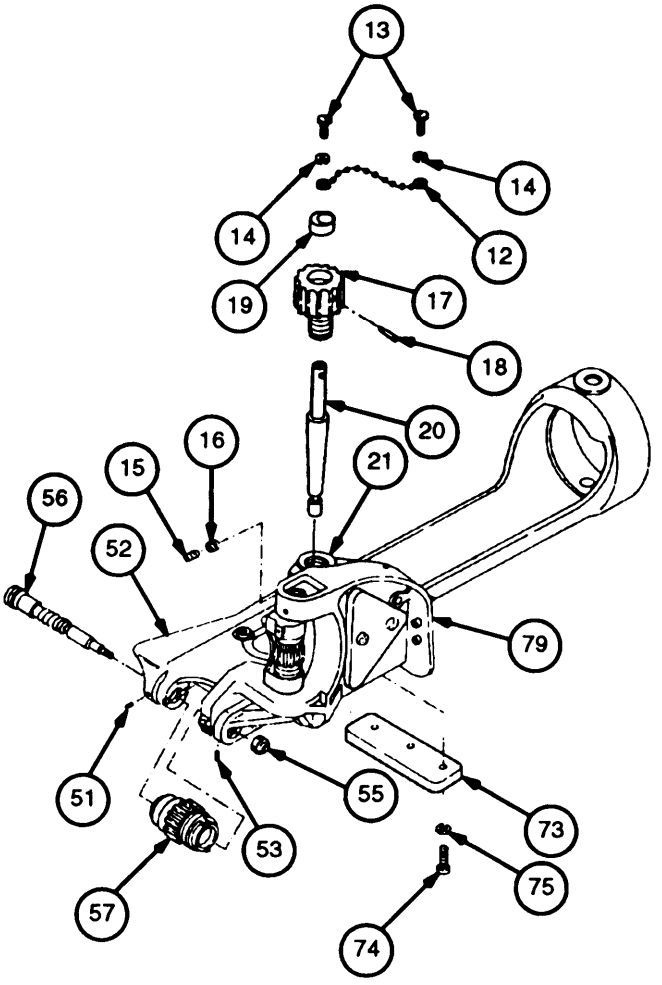
51 Install chain assembly (12) and secure with two new lockwashers (14) and two machine screws (13).

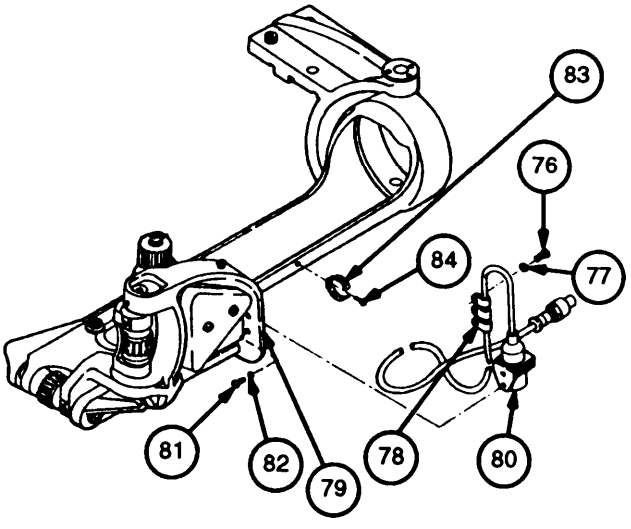
52 Install insert (16) and setscrew(15) in elevation slide (21).

53 Install spring clip (83) and secure with machine screw (84).

54 Install cable assembly (80) and secure with two new lockwashers (82) and two cap screws (81).

55 Secure three clamps (78) to elevation bracket (79) with three new lockwashers (77) and three machine screws (76).





2-12. BRACKET ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Dissassembly b. Repair c. Assembly

INIAL SETUP UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC51 80-95-CL-B29)
5180-01-168-0487

Materials/Parts

Lockwashers (4) (Item 72, appx E)

References

TM 9-254

Equipment Condition

M146 telescope mount removed from howitzer (TM 9-2350-312-20-2)

Disassemble M146 telescope mount (ref. para 2-11)

a. Disassemble

Remove arm (1) from elevation bracket (2) by removing four cap screws (3), four lockwashers (4), and two headless straight pins (5). Discard lockwashers

b. Repair

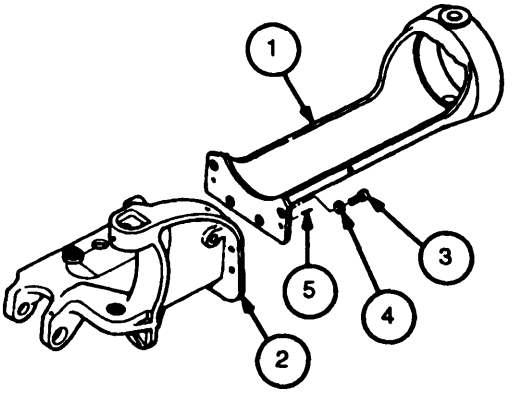
1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assemblv

Install arm (1) on elevation bracket (2) by installing two headless straight pins (5), four new lockwashers (4), and four cap screws (3).



2-13. CABLE ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Soldering iron, electric (Item 24, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Materials/Parts

Flux (Item 5, appx B)
Gaskets (2) (Item 6, appx E)
Gaskets (2) (Item 7, appx E)
LockWashers (4) (Item 68, appx E)
Solder (Item 18, appx B)

References

TM 9-254

Equipment Condition

Ml 46 telescope mount removed from howitzer (TM 9-235-311-20-2)

Cable assembly removed from Ml 46 telescope mount (ref. para 2-11).

a. DIsassembly

1 Remove machine screw (1) and shoulder pin (2) and then remove plate (3) and receptacle shell (4) as a unit.

2 Remove four machine screws (5) and four lockwashers (6) from bushing insulator (7). Discard lockwashers.

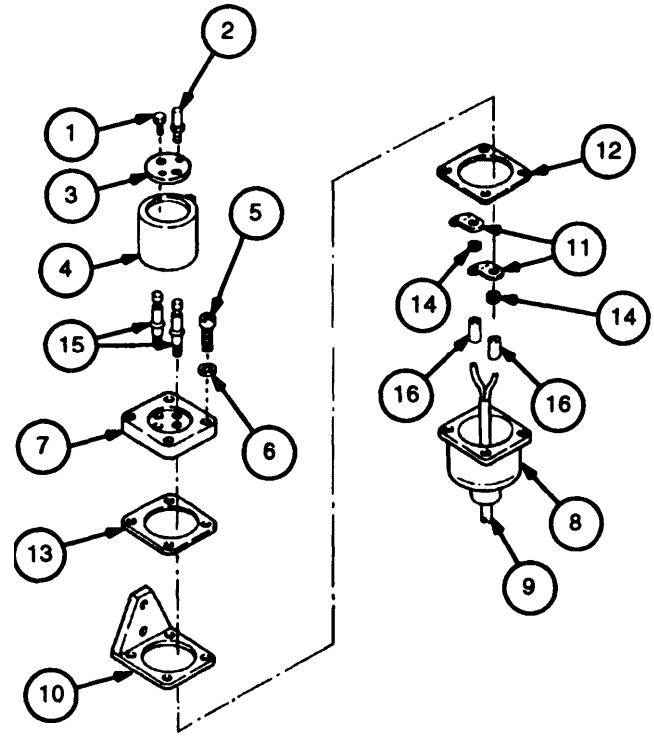
3 Slide electrical shell connector (8) down cable (9) away from angle bracket (10).

4 Unsolder cable leads from two lug terminals (11).

5 Remove gasket (12), angle bracket (10), and gasket (13) from bushing insulator (7). Discard gasket.

6 Remove two lug terminals (11) from bushing insulator (7) by removing two nuts(14) and two electrical contacts (15).

7 Remove two insulation sleevings (16) from leads of cable (9).



2-13. CABLE ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

a. Disassembly - continued

8 Unscrew and remove bushing (17), flat washer (18), and preformed packing (19) from electrical shell connector (8).

9 Remove electrical shell connector (8), preformed packing (19), flat washer (18), and bushing (17) from cable (9).

10 Remove gasket (20) from electrical plug connector (21). Discard gasket.

11 Unscrew and remove bushing (22) from connector shell (23).

12 Remove flat washer (24) and preformed packing (25) from connector shell (23).

13 Unscrew connector shell (23) from electrical plug connector (21) and slide connector shell (23) along cable (9) away from electrical plug connector (21).

14 Remove electrical plug connector (21) from cable (9) by unsoldering leads of cable.

15 Remove and discard gasket (26).

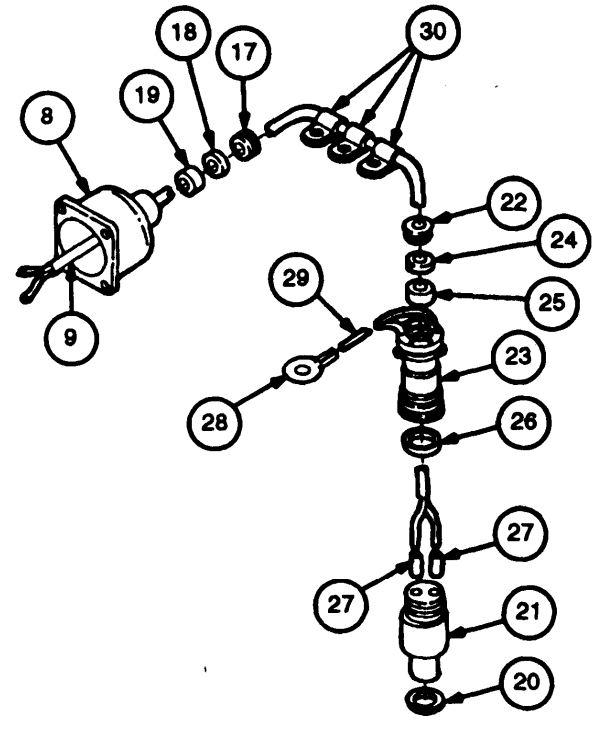
16 Remove two insulation sleevings (27) from cable (9) leads.

17 Remove connector shell (23), preformed packing (25), flat washer (24), and bushing (22) from cable (9).

18 Remove lug terminal (28) from wire (29).

19 Remove wire (29) from connector shell (23).

20 Remove three clamps (30) from cable (9).



b. Repair

1 Remove corrosion grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assemblv

1 Install three clamps (30) on cable (9).

2 Install wire (29) to connector shell (23); then install lug terminal (28) on wire.

3 Slide bushing (22), flat washer (24), preformed packing' (25), connector shell (23), lug terminal (28) and wire (29) onto cable (9).

4 Install preformed packing (25) and flat washer (24) on connector shell (23).

5 Install bushing (22) on connector shell (23). Do not tighten bushing.

6 Install two insulation sleevings (27) on leads of cable (9).

7 Install new gasket (26).

8 Install electrical plug connector (21) on cable (9) by soldering leads of cable using solder and flux.

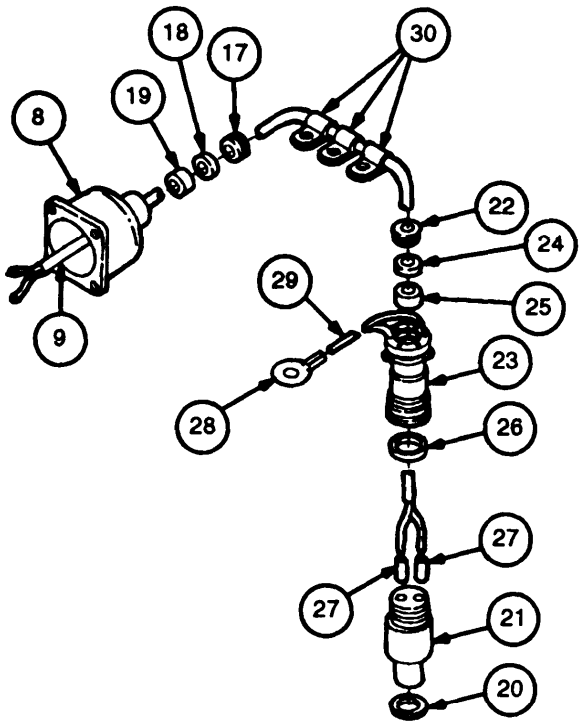
9 Install new gasket (20) on electrical plug connector (21).

10 Slide connector shell (23) along cable (9) toward electrical plug connector (21).

11 Install connector shell (23) on electrical plug connector (21).

12 Install preformed packing (19) and flat washer (18) on electrical shell connector (8).

13 Install bushing (17) on electrical shell connector (8). Do not tighten bushing.



2-13. CABLE ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

c. Assembly - continued

14 Install two insulation sleevings(16) on leads of cable (9).

15 Install two electrical contacts (15) on bushing insulator (7); then install two lug terminals (11) on two electrical contacts (15) by installing two nuts (14).

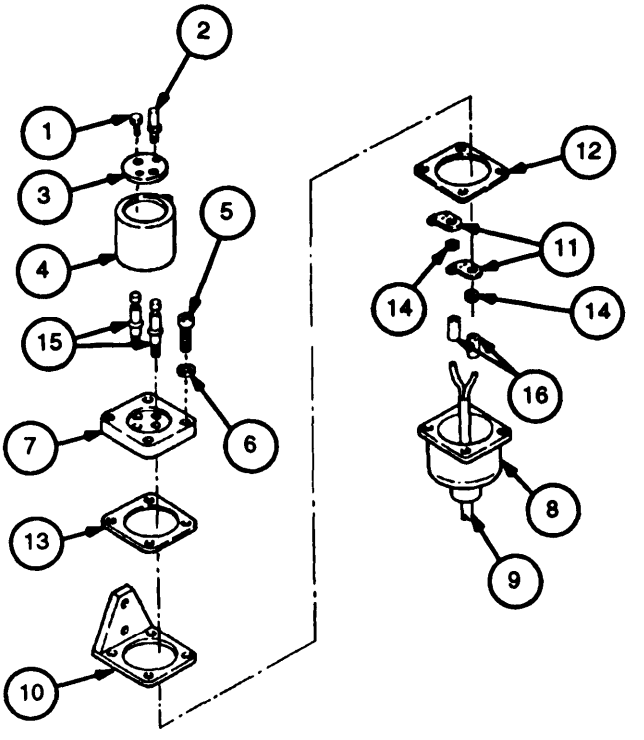
16 Install new gasket (1 3), angle bracket (1 O), and new gasket (12) on bushing insulator (7).

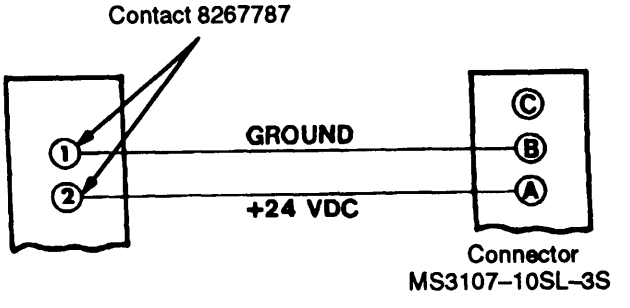
17 Solder cable (9) leads on two lug terminals(11) using solder and flux. Refer to wiring diagram and check continuity of cable assembly.

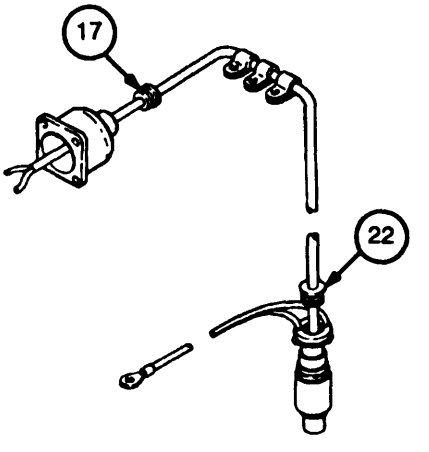
18 Slide electrical shell connector (8) along cable toward angle bracket (10) and secure with four new lockwashers (6) and four machine screws (5).

19 Install receptacle shell (4) and plate (3) on bushing insulator (7) and secure with shoulder pin (2) and machine screw (1).

20 Tighten bushings (17 and 22).







Section V. Direct Support Final Inspection Procedures

2-14. GENERAL

a. This section describes and illustrates the final inspection of the M146 telescope mount. A final inspection will be performed prior to returning the M146 telescope mount to the using unit or to the supply system.

b. If the Ml 46 telescope mount being inspected fails to meet the required standards, ensure all maintenance authorized at the applicable level has been performed correctly.

2-15. M146 TELESCOPE MOUNT FINAL INSPECTION AND ADJUSTMENT

This task covers:

a. Checking elevation slide/elevation bracket end play

b. Checking elevation knob travel

c. Checking elevation knob mechanism running torque

d. Checking deflection knob travel

e. Checking deflection knob mechanism running torque

INITIAL SET-UP

Tools and Special Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC51 80-95-CL-B29)
5180-01-168-0487

Torque adapter (Item 8, appx F)

Torque wrench (in-oz) (Item 35, appx F)

Spanner wrench, fabricated (fig. C_5 appx C)

Matenials/Parts

LockWashers (2) (Item 70, appx E)
Sealing compound (Item 13, appx B)

2-15. M146 TELESCOPE MOUNT FINAL INSPECTION AND ADJUSTMENT - continued

a. CHECKING ELEVATION SLIDE/ELEVATION BRACKET END PLAY

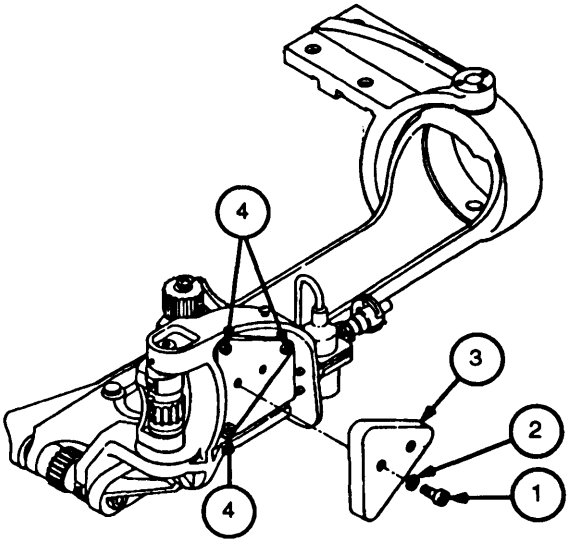
1 Using feeler gage, check that maximum of 0.003-inch (0.008-mm) clearance between machined surface of elevation slide and elevation bracket is maintained when the elevation knob is rotated from stop to stop.

2 Remove two cap screws (1), two lockwashers (2), and cover assembly (3). Discard lockwashers

3 Tighten or loosen three self-ocking nuts (4) until correct clearance is attained.

4 Apply sealing compound to three self-locking nuts (4).

5 Install cover assembly (3), two new lockwashers (2), and two cap screws (1).



b. CHECKING ELEVATION KNOB TRAVEL

1 Rotate elevation knob (1) from stop to stop and check amount of travel.

NOTE

Elevation knob must rotate 2-1/2 complete revolutions. If the 2-1/2 revolutions cannot be met, adjust elevation knob mechanism as directed in steps 2 thru 6.

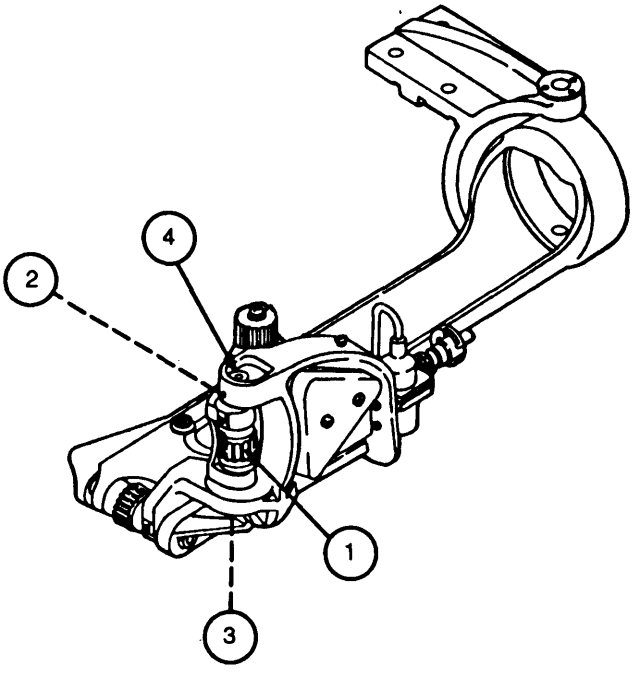
2 Loosen setscrew (2).

3 Loosen self-locking nut (3).

4 Adjust elevation shoulder screw (4) in or out to obtain minimum travel requirements.

5 Tighten setscrew (2).

6 Tighten self-locking nut (3).

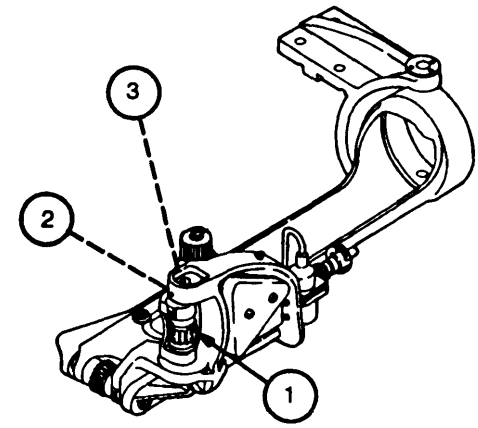


c. CHECKING ELEVATION KNOB MECHANISM RUNNING TORQUE

1 With torque wrench and adapter (8599922), rotate elevation knob (1) clockwise and counterclockwise.

NOTE

Torque wrench should indicate running torque of 56 to 72 ounce-inches (0.395 to 0.508 N-m). If running torque is not within specified limits, adjust as directed in steps 2 thru 4.



2 Loosen setscrew (2).

3 Using fabricated spanner wrench, adjust threaded ring (3) until required running torque is obtained.

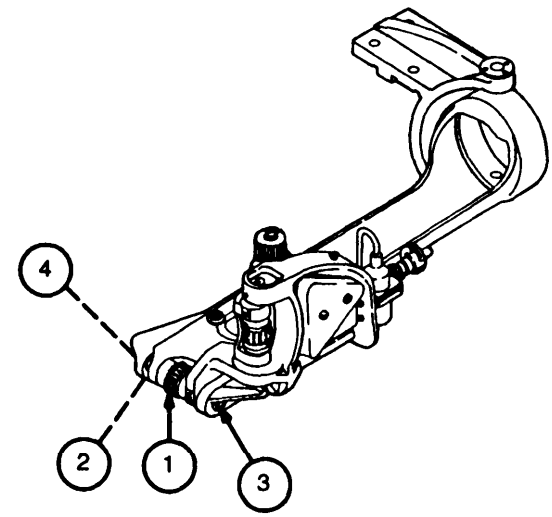
4 Tighten setscrew (2).

d. CHECKING DEFLECTION KNOB TRAVEL

1 Rotate deflection knob (1) from stop to stop and check amount of travel.

NOTE

Deflection knob must rotate 2-1/2 complete revolutions. If the 2-1/2 revolutions cannot be met, adjust mechanism as directed in steps 2 thru 6.



2 Loosen setscrew (2).

3 Loosen self-locking nut (3) on deflection shoulder screw (4).

4 Adjust deflection shoulder screw (4) in or out to obtain minimum travel requirements.

5 Tighten setscrew (2).

6 Tighten self-locking nut (3).

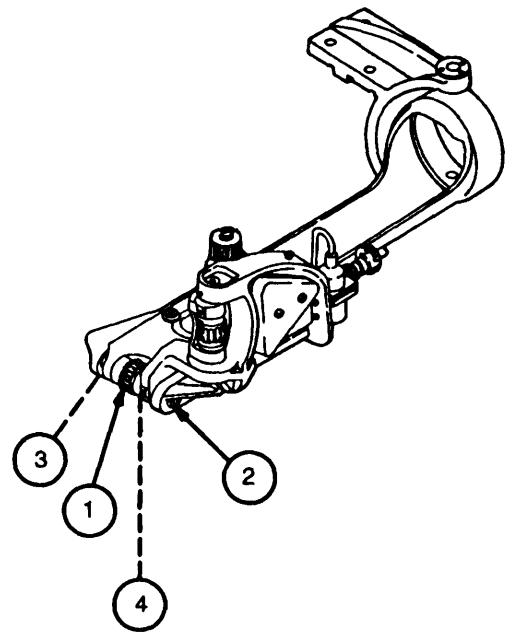
2-15. M146 TELESCOPE MOUNT FINAL INSPECTION AND ADJUSTMENT-continued

e. CHECKING DEFLECTION KNOB MECHANISM RUNNING TORQUE

1 With torque wrench and adapter (8599922), rotate deflection knob (1) clockwise and counterclockwise.

NOTE

Torque wrench should indicate running torque of 56 to 72 ounce-inches (0.395 to 0.508 N-m). If running torque is not within specified limits, adjust as directed in steps 2 thru 6.



2 Loosen self-locking nut (2).

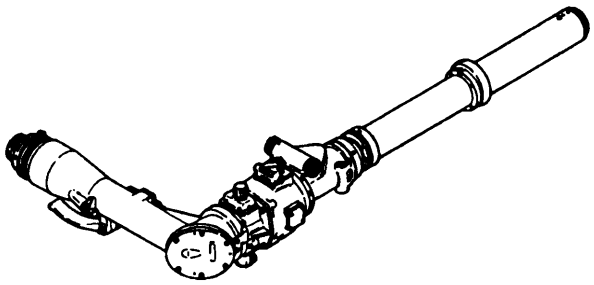
3 Loosen setscrew (3).

4 Using fabricated spanner wrench, adjust threaded ring (4) until required running torque is obtained.

5 Tighten setscrew (3).

6 Tighten self-locking nut (2).

CHAPTER 3
M118A2/M118A3 ELBOW TELESCOPE MAINTENANCE INSTRUCTIONS



CHAPTER OVERVIEW

This chapter contains maintenance procedures for the M118A2/M118A3 elbow telescope. Information on repair parts and special tools and detailed procedures for troubleshooting and maintenance of the elbow telescope are included.

CHAPTER INDEX

CHAPTER INDEX - continued

Section I. Repair Parts; Special Tools; Test, Measurement, and Diagnostic Equipment (TMDE); and Support Equipment

3-1. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE), CTA 50-970, applicable to your unit.

3-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special tools, TMDE, and support equipment required and authorized for repair of the M118A2/M118A3 elbow telescope are listed in the repair parts and special tools list, appendix D. Fabricated tools are listed in appendix C.

3-3. REPAIR PARTS

Repair parts are listed and illustrated in the repair parts and special tool list, appendix D.

Section II. Inspections

3-4. GENERAL

a. Inspection is performed primarily to determine the following:

(1) Completeness.

(2) The nature of serviceability.

(3) The work, repair parts, and supplies required to return the materiel to serviceability.

(4) That the work in process is being performed properly.

(5) That completed work complies fully with serviceability standards.

b. The M118A2/M118A3 elbow telescope is considered serviceable when:

(1) It is complete and property performs its intended function.

(2) All modification work orders (MWO's) have been applied.

(3) All defects disclosed by the inspection have been corrected.

c. DA Form 2408-5 and DA Form 2409 list applicable MWO's.

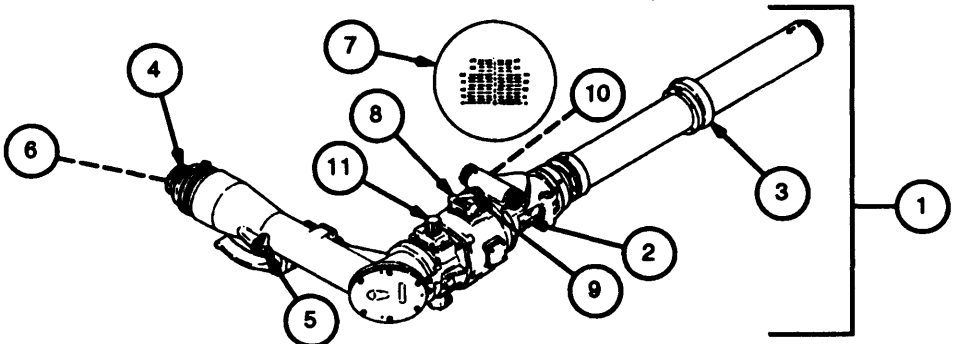
3-5 CATEGORIES OF INSPECTION

Categories of inspection define responsibilities:

a. An initial inspection (ref. para 3-6) is performed immediately on receipt of the M118A2/M118A3 elbow telescope for maintenance. This inspection will determine the amount and type of work to be performed or whether the M118A2/M118A3 elbow telescope should be sent to depot maintenance.

b. A final inspection (ref. para 3-29) of the M118A2/M118A3 elbow telescope is performed after repairs have been completed at General Support Maintenance to ensure the item meets serviceability standards.

3-6. INITIAL INSPECTION



M118A2/M118A3 ELBOW TELESCOPE

Item No.	Item To Be Inspected	Procedures
1	M118A2/M118A3 ELBOW TELESCOPE	Inspect M118A2/M118A3 elbow telescope (1) for completeness and secureness of parts.
2	IDENTIFICATION PLATE	Check that print on identification plate (2) is legible and clearly defined.
3	MOUNTING SURFACE	Check that mounting surface (3) is free of burrs and corrosion.
4	EYESHIELD	Inspect eyeshield (4) for security of attachment and damage such as deterioration, cuts, or tears.
5	VALVE CORE AND AIR VALVE CAP	Inspect valve core and air valve cap (5) for damage such as bends or breaks and ability to hold pressure.
6	OPTICS	Inspect optics (6) for dirt, fungus, scratches, chips or condensation, which may obstruct view through eyepiece. Inspect view through telescope to determine if interfering fractures exist on window, lens, prisms, or reticle; chipped, scratched, or pitted optics that interfere with field of view must be replaced.
7	RETICLE	Check reticle (7) for clarity and illumination.
8	LEVEL ASSEMBLY	Check that level (8) is free of cracks and breaks and that graduations are legible. Check that mirror (9) on level assembly is not scratched.
9	WORMSHAFT ASSEMBLY	Check that knobs on wormshaft assembly (10) move freely without binding or excess torque.
10	VARIABLE RESISTOR	Check that variable resistor knob (11) moves freely and that light changes from dim to bright and bright to dim.

Section III. Troubleshooting

3-7. GENERAL

a. The symptom index can be used as a quick guide to troubleshooting. Common malfunctions are listed in alphabetical order with a page number reference to the troubleshooting table, where a test or inspection and corrective action are provided.

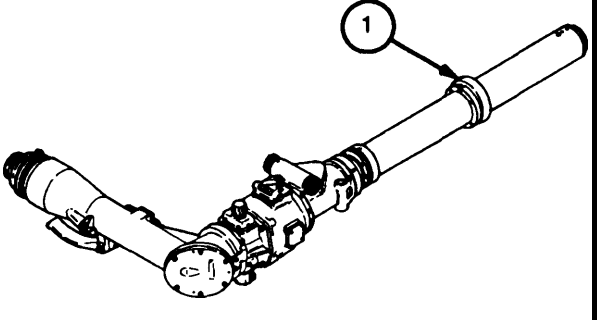
b. The direct support troubleshooting table (ref. para 3-9) lists the common malfunctions which may be found during maintenance oft he M118A2/M118A3 elbow telescope. Perform the test/inspections and corrective actions in the order listed.

c. The general support troubleshooting table (ref. para 3-11) lists the common malfunctions which may be found during maintenance of the M118A2/M118A3 elbow telescope. Perform the tests/inspections and corrective actions in the order listed.

d. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed, or is not corrected by listed corrective action, notify the next higher level of maintenance.

3-8. DIRECT SUPPORT SYMPTOM INDEX

3-9. DIRECT SUPPORT TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION
1. MOUNTING SURFACE (1) DOES NOT SEAT M118A2/M118A3 ELBOW TELESCOPE CORRECTLY. Observe visually. a. Clean mounting surface (1) with cleaning compound (item 3, appx B). b. Remove burrs with abrasive cloth (item 4, appx B) dipped in cleaning compound (item 3, appx B).	

3-9. DIRECT SUPPORT TROUBLESHOOTING - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION

2. EYEPIECE ARM (2) DOES NOT MOVE EASILY OR REMAIN IN LOCKED POSITION.

   Move eyepiece arm (2) from stop to stop.

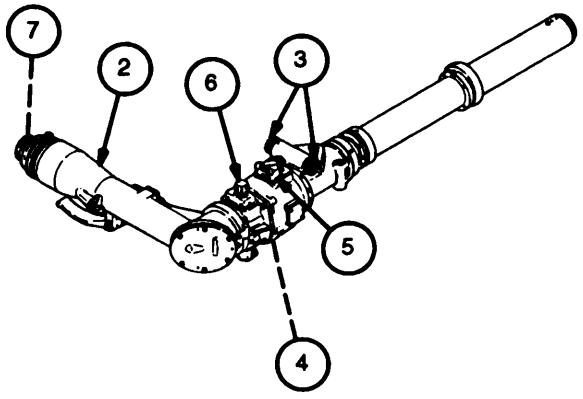
   a. Repair lock-release lever (ref. para 3-13).

   b. Replace bellows assembly (ref. para 3-13).

3. KNOBS (3) ON WORMSHAFT ASSEMBLY BIND.

   Rotate knobs (3) on wormshaft assembly.

   Repair wormshaft assembly (ref. para 3-15).



4. RETICLE (4) OR LEVEL VIAL (5) ARE NOT ILLUMINATED.

   Turn variable resistor knob (6).

   a. Replace incandescent lamp for Ml 18A2 (ref. para 3-17) for cover assembly and para 3-19 for level).

   b. Replace circuit board assembly for M118A3 (ref. para 3-18 for level).

   c. Replace variable resistor (ref. para 3-13).

5. LEVEL (5) HAS NO BUBBLE.

   Observe visually.

   Repair level assembly, M118A2 (ref. para 3-19).
   Repair level assembly, M118A3 (ref. para 3-18).

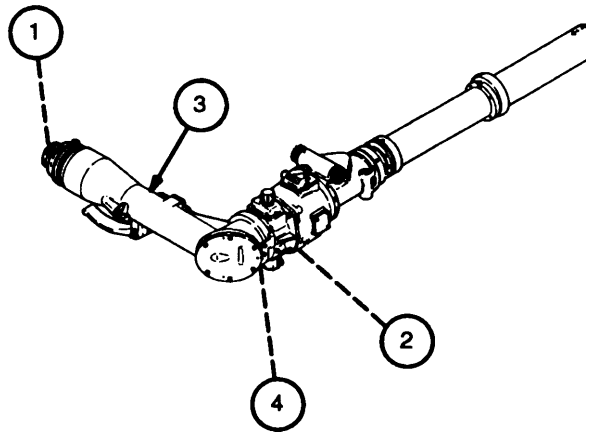
6, LENS (7) IS FOGGED OR CONDENSATION IS PRESENT.

   Observe visually.

   Purge and charge M118A2/M118A3 elbow telescope (TM 750-116).

3-10. GENERAL SUPPORT SYMPTOM INDEX

3-11. GENERAL SUPPORT TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION
1. LENS(1) WILL NOT FOCUS. Observe visually. Repair eyepiece and erector lens subassembly (ref. para 3-22). 2. LENS (1) IS DAMAGED. Observe visually. Repair eyepiece and erector lens subassembly (ref. para 3-22). 3. RETICLE (2) IS NOT ILLUMINATED. Observe visually. a. Replace circuit board assembly for M118A3 (ref. para 3-24). b. Repair wiring harness (ref. para 3-26). 4. EYEPIECE ARM (3) WILL NOT REMAIN IN STOWED POSITION. Operate lock-release lever. Repair ratchet (4) (ref. para 3-22).	

Section IV. Direct Support Maintenance Procedures

3-12. GENERAL

LIST OF TASKS

Task No.	Task	Task Ref (Page)	Troubleshooting Ref No. (Page)
1	Maintain eyepiece and erector lens subassembly		3-6
	a. Disassemble	3-10	
	b. Repair	3-12	
	c. Assemble	3-12	
2	Maintain cell assembly		
	a. Remove	3-15	
	b. Install	3-15	
3	Maintain wormshaft assembly		3-6
	a. Remove	3-16	
	b. Disassemble	3-16	
	c. Repair	3-17	
	d. Assemble	3-18	
	e. Install	3-19	
4	Maintain cover assembly (M118A3)		3-6
	a. Remove	3-19	
	b. Disassemble	3-20	
	c. Repair	3-20	
	d. Assemble	3-20	
	e. Install	3-20	
5	Maintain cover assembly (M118A2)		3-6
	a. Remove	3-21	
	b. Disassemble	3-22	
	c. Repair	3-22	
	d. Assemble	3-22	
	e. Install	3-23	
6	Maintain level assembly (M118A3)		3-6
	a. Remove	3-24	
	b. Disassemble	3-24	
	c. Repair	3-24	
	d. Assemble	3-25	
	e. Install	3-26	
	f. Adjustment	3-26	

LIST OF TASKS			
Task No.	Task	Task Ref (Page)	Troubleshooting Ref No. (Page)
7	Maintain level assembly (M118A2)		3–6
	a. Remove	3-27	
	b. Disassemble	3-28	
	c. Repair	3-28	
	d. Assemble	3-28	
	e. Install	3-30	
	f. Adjustment	3–30	

3-13. EYEPIECE AND ERECTOR LENS SUBASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Soldering iron, electric (Item 24, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

V-block (Item 25, appx F)

Materials/Parts

Flux (Item 5, appx B)
Gasket (Item 8, appx E)
Gasket (Item 9, appx E)
Gasket (Item 10, appx E)
Grease (Item 6, appx B)
Grease (Item 7, appx B)
Insulation sleeving (Item 16, appx B)
Lockwashers (2) (Item 65, appx E)
Lockwashers (14) (Item 68, appx E)
Lockwashers (2) (Item 71, appx E)
Preformed packing (Item 19, appx E)
Sealing compound (Item 13, appx B)
Solder (Item 18, appx B)
Tape (Item 20, appx B)

References

TM 9-254
TM 750-116

Equipment Condition

M118A2/M118A3 elbow telescope removed from howitzer (TM 9-2350-311-10)

3-13. EYEPIECE AND ERECTOR LENS SUBASSEMBLY MAINTENANCE INSTRUCTIONS - continued

a. Disassembly

1 Remove retaining ring (1) and flat washer (2) from manual control lever (3).

2 Remove two setscrews (4) from lock-release lever (5).

3 Remove manual control lever (3) from lock-release lever (5).

4 Remove lock-release lever (5) from eyepiece arm (6).

5 Remove two setscrews (7).

WARNING

Lever spool is under spring tension. Exercise care when removing tapered pin which secures lever spool.

6 Support lever spool (8) with a V-block and drive out tapered pin (9) from bellows assembly (10).

7 Pull lever spool (8) and helical spring (11) from bellows assembly (10).

8 Remove threaded ring (12) from bracket (13).

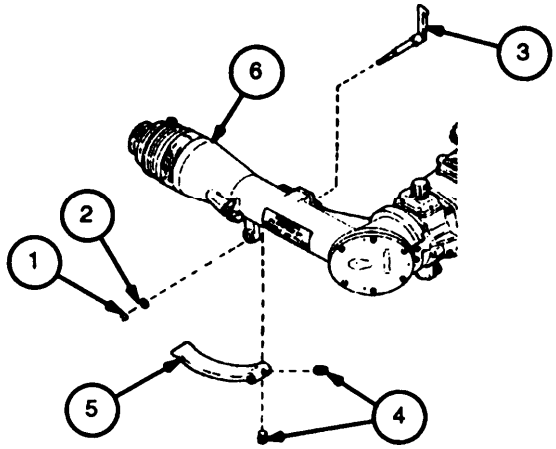
9 Remove two machine screws (14) and two lockwashers (15) from bracket (13). Discard lockwashers.

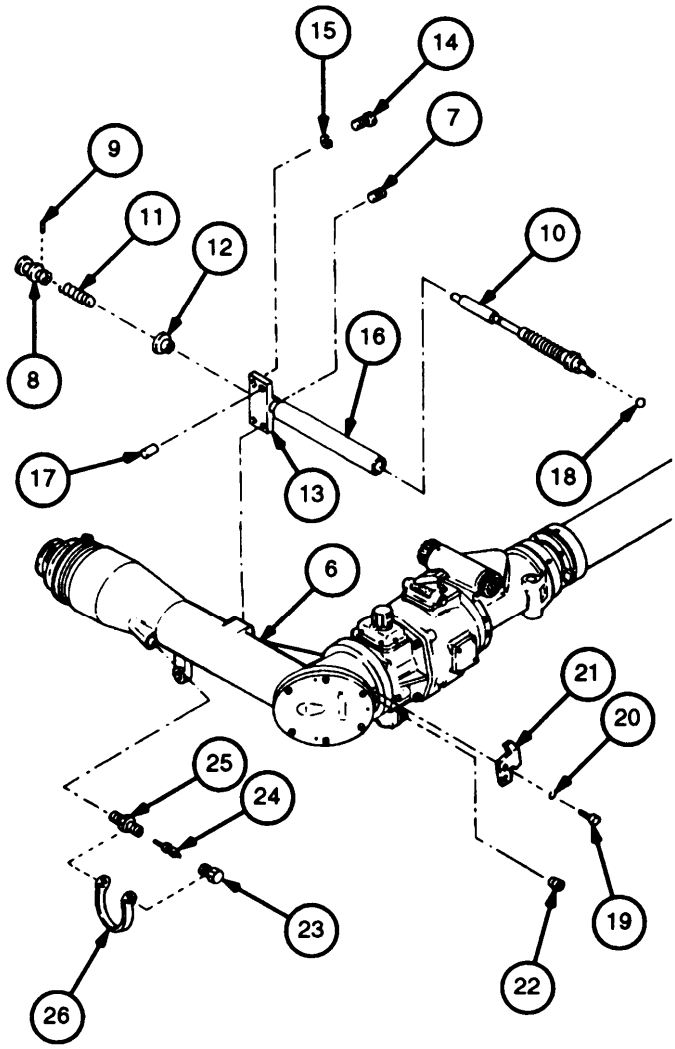
10 Unscrew bellows assembly (10) to disengage it from eyepiece arm (6). Remove bracket (13) containing tube (16) and bellows assembly (10) from eyepiece arm (6).

11 Remove two headless straight pins (17) only if damaged.

12 Carefully pull bellows assembly (10) through tube (16). Remove tube (16) from bracket (13).

13 Remove preformed packing (18) from end of bellows assembly (10). Discard preformed packing.





14 Remove two cap screws (19), two lockwashers (20), and limit plate (21) to gain access to plug (22). Discard lockwashers. Remove plug (22) only if necessary to seal.

15 Remove air valve cap (23), valve core (24), purging valve stem (25), and retaining strap (26) from eyepiece arm (6).

16 Remove six machine screws (27) and six lockwashers (28). Discard lockwashers.

17 Pull variable resistor housing (29) as far as wiring will permit.

18 Slide insulation sleeving from terminals of variable resistor (30).

19 Using tape, tag and unsolder wire leads from variable resistor (30).

20 Remove variable resistor housing (29) from rear housing (31).

21 Remove setscrew (32) and knob (33).

NOTE

Nut and lockwasher are part of variable resistor. Retain for assembly.

22 Remove nut (34) and lockwasher (35) from variable resistor (30). Remove variable resistor (30) from variable resistor housing (29).

23 Remove gasket (36) from rear housing (31) and discard.

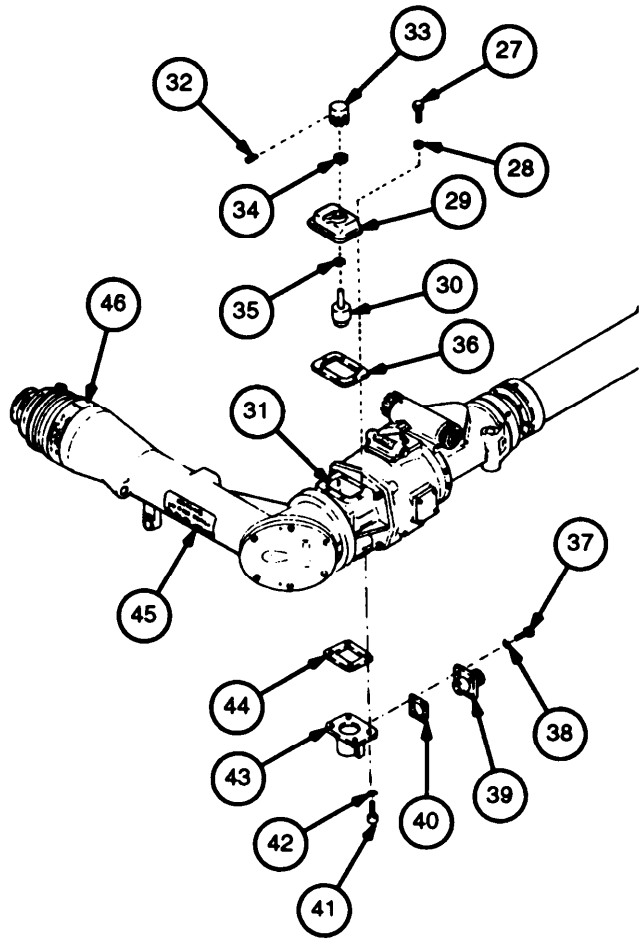
24 Remove four machine screws (37) and four lockwashers (38). Discard lockwashers.

25 Pull receptacle connector (39) from rear housing (31) as far as wiring will permit.

26 Remove insulation sleeving from terminals of receptacle connector (39). Using tape, tag and unsolder wire leads from receptacle connector (39) and gasket (40). Discard gasket.

27 Remove four machine screws (41), four lockwashers (42), mount telescope adapter (43), and gasket (44) from rear housing (31). Discard lockwashers and gasket.

28 Remove warning labels (45 and 46) only if damaged.



3-13. EYEPIECE AND ERECTOR LENS SUBASSEMBLY MAINTENANCE INSTRUCTIONS - continued

b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing and damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly

1 Position new gasket (44) and mount telescope adapter (43) over wire leads on rear housing (31) and secure with four new lockwashers (42) and four machine screws (41).

2 Install new gasket (40) over wire leads and position receptacle connector (39) in front of leads. Slide new insulation sleeving over wire leads and solder leads to receptacle connector (39) using solder and flux. Remove tags.

3 Secure receptacle connector (39) to mount telescope adapter (43) with four new lockwashers (38) and four machine screws (37).

4 Position new gasket (36) on rear housing (31).

NOTE

Nut and lockwasher are part of variable resistor.

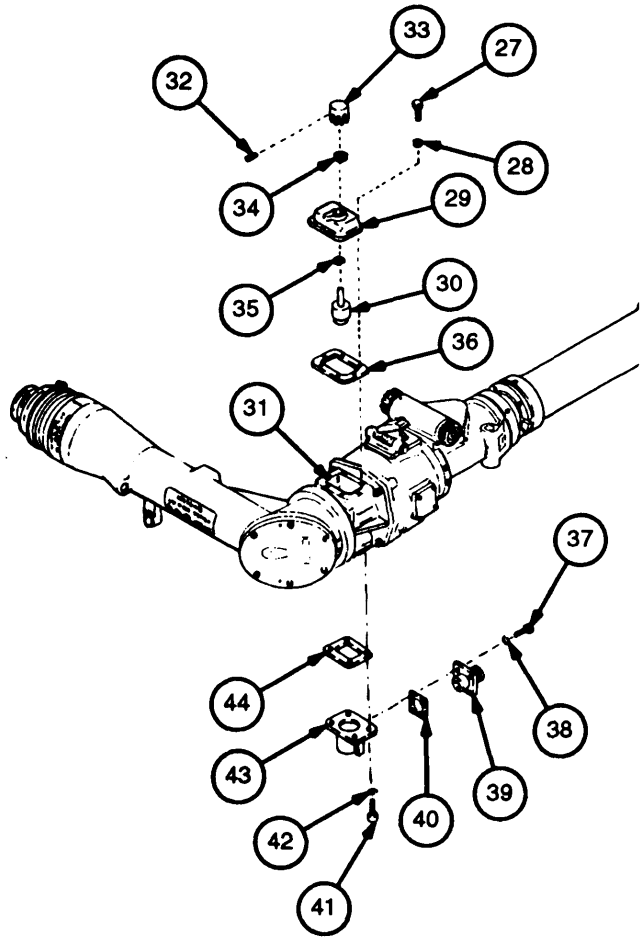
5 Assemble variable resistor (30) in variable resistor housing (29) and secure with nut (34) and lockwasher (35).

6 Position knob (33) on shaft of variable resistor (30) and secure with setscrew (32).

NOTE

See para 3-26 for wiring diagram.

7 Slide insulation sleeving over wire leads and solder wire leads to variable resistor (30) using solder and flux. Remove tags.



8 Position variable resistor housing (29) on rear housing (31) and secure with six new lockwashers (28) and six machine screws (27).

9 Install retaining strap (26) on purging valve stem (25).

10 Apply sealing compound to threads of purging valve stem (25) and install in eyepiece arm (6).

11 Install valve core (24) in purging valve stem (25).

12 Attach air valve cap (23) to the end of retaining strap (26) and thread air valve cap (23) onto purging valve stem (25).

13 If removed, apply sealing compound to threads of plug (22) and install in eyepiece arm (6).

14 Install limit plate (21) and secure with two new Iockwashers (20) and two cap screws (19).

15 Apply grease (item 6, appx B) to shaft of bellows assembly (10). Screw bellows assembly (10) into tube (16).

16 Install tube (16) in unthreaded end of bracket (13).

17 Apply grease (item 7, appx B) to the threads of threaded ring (12) and install into bracket (13).

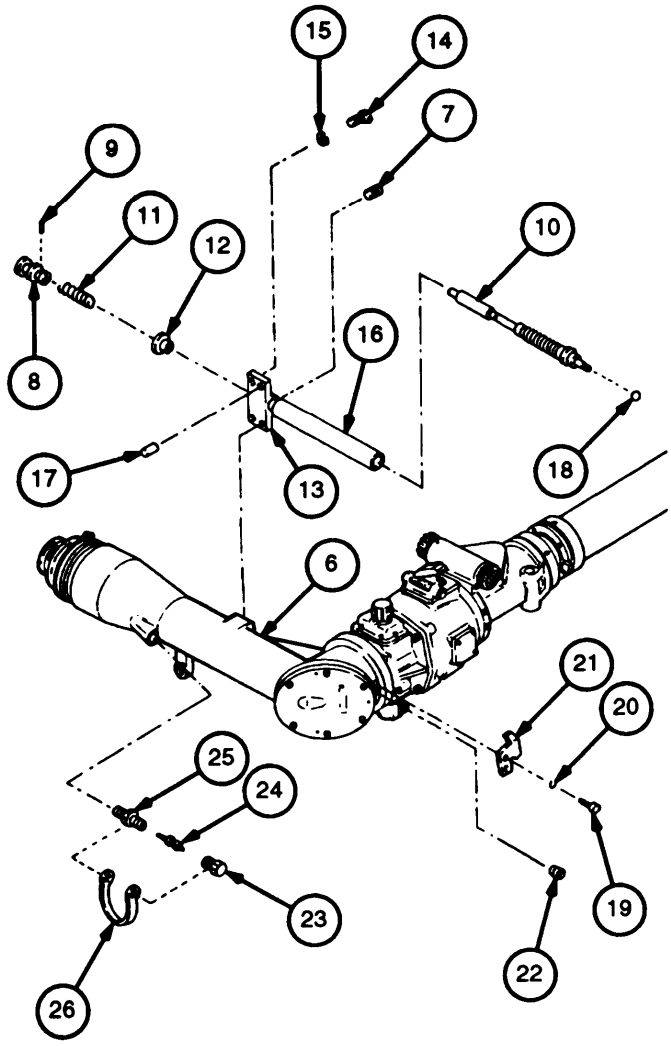
18 Apply grease (item 7, appx B) to new preformed packing (18) and install on bellows assembly (10).

19 Position bracket (13) over two headless straight pins (17) and install bellows assembly (10) in hole on eyepiece arm (6).

20 Secure bracket (13) in place with two new lockwashers (15) and two machine screws (14).

21 Install helical spring (11), lever spool (8), and tapered pin (9).

22 Install two setscrews (7).



3-13. EYEPIECE AND ERECTOR LENS SUBASSEMBLY MAINTENANCE INSTRUCTIONS - continued

c. Assembly - continued

23 Apply a thin coat of grease (item 6, appx B) to the round surface of manual control lever (3) and to the tip of the manual control lever that engages the lever spool (8).

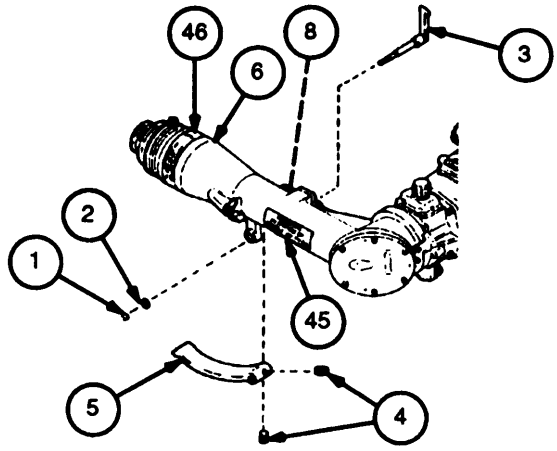
24 Position lock-release lever (5) between flanges on eyepiece arm (6) with lock-release lever (5) pointing toward eyeshield end of eyepiece arm (6).

25 Slide manual control lever (3) through flanges on eyepiece arm (6) and lock-release lever (5). Ensure that manual control lever (3) engages lock-release lever (5).

26 Secure manual control lever (3) to flanges of eyepiece arm (6) with flat washer (2) and retaining ring (1).

27 Apply sealing compound to setscrew holes and install two setscrews (4).

28 Install warning labels (45 and 46) if removed.



3-14. CELL ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Removal b. Installation

INITIAL SET-UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance(SC5180-95-CL-B29)
5180-01-168-0487

Tubular spanner wrench, 1-11/16 and 1-45/64 inch (Item 31, appx F)

Tubular spanner wrench, 2 and 2-1/64 inch (Item 33, appx F)

Materials/Parts

Adhesive (Item 2, appx B)
Grease (Item 6, appx B)
Preformed Packing (Item 35, appx E)
Preformed Packing (Item 41, appx E)
Sealing compound (Item 13, appx B)

References

TM 9-254

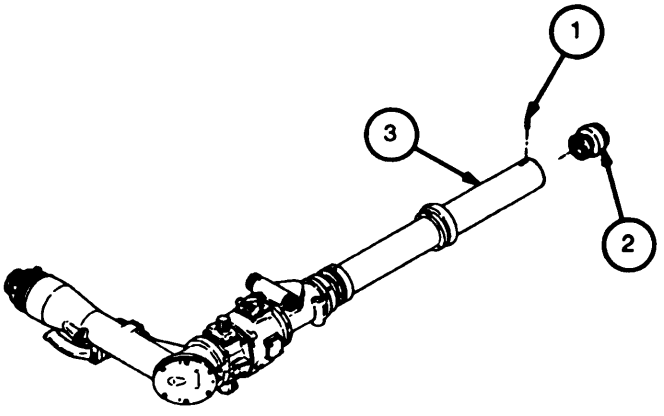
Equipment Condition

M118A2/M118A3 elbow telescope removed from howitzer (TM 9-2350-311-10)

a. Removal

1 Remove setscrew (1)

2 Remove cell assembly (2) from tube assembly (3) using 2 and 2-1/64 inch tubular spanner wrench (item 33, appx F).



b. Installation

1 Apply grease to threads of cell assembly (2) before installation.

2 Install cell assembly (2) using 2 and 2-1/64 inch tubular spanner wrench (item 33, appx F).

3 Install setscrew (1) into tube assembly (3) to secure cell assembly (2).

3-15. WORMSHAFT ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Removal b. Disassembly c. Repair d. Assembly e. Installation

INITIAL SET-UP

Tools

Drill bit No. 32 (0.116) (Item 14, appx F)

Drill, electric 1/2" (Item 12, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29) 5180-01-168-0487

V-block (Item 25, appx F)

Materials/Parts

Adhesive (Item 2, appx B)
Grease (Item 6, appx B)
Grease (Item 7, appx B)
Lockwashers (3) (Item 77, appx E)
Preformed packing (Item 28, appx E)
Preformed packing (Item 38, appx E)
Preformed packings (2) (Item 27, appx E)
Sealing compound (Item 13, appx B)
Shim (Item 54, appx E)
Shim (Item 55, appx E)
Shim (Item 56, appx E)

References

TM 9-254

Equipment Condition

M118A2/M118A3 elbow telescope removed from howitzer (TM 9-2350-311-10)

a. Removal

1 Remove three cap screws (1) three lockwashers (2), wormshaft assembly (3), and shims (4,5 and 6). Discard lockwashers and shims.

2 Remove two headless straight pins (7), only if damged.

b. Disassembly

1 Scribe a reference mark on knob (8) and worm shaft (9).

2 Support knob (8) with a V-block and drive out tapered pin (10). Remove knob (8) from end of worm shaft (9).

3 Remove spring washer (11) and two ratchets (12) from worm shaft (9).

4 Scribe a reference mark on knob (13) and worm shaft (9).

5 Support knob (13) with a V-block and drive out tapered pin (14). Remove knob (13) from end of worm shaft (9).

6 Remove setscrew (15) from worm shaft housing (16).

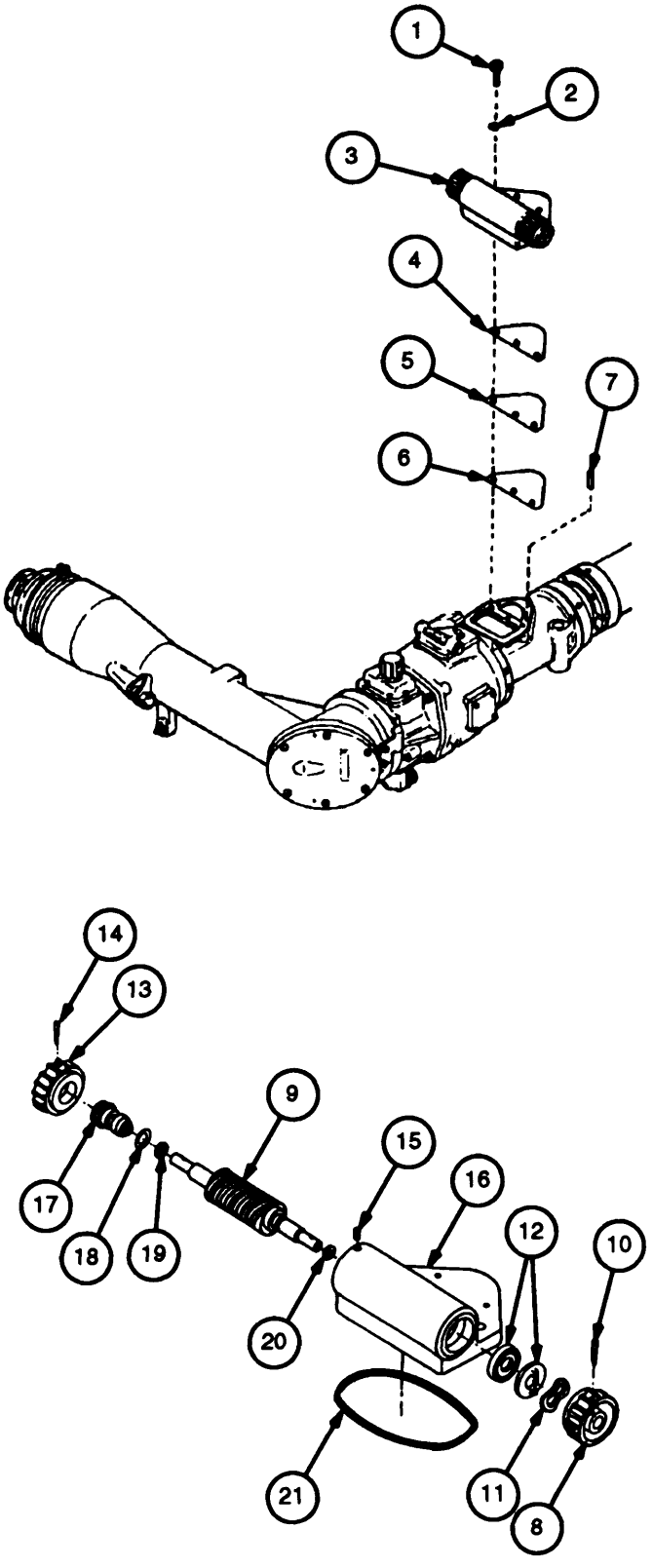
7 Remove bushing (17) from worm shaft housing (16).

8 Remove preformed packing (18) from bushing (17). Discard preformed packing.

9 Remove worm shaft (9) from worm shaft housing (16).

10 Remove two preformed packings (19 and 20) from worm shaft (9). Discard preformed packing.

11 Remove preformed packing (21) from worm shaft housing (16). Discard preformed packing.



c. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

3-15. WORMSHAFT ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

d. Assembly

1 Apply grease (item 7, appx B) to new preformed packings (19 and 20) and install in grooves on worm shaft (9).

2 Apply grease (item 6, appx B) to ends of worm shaft (9) adjacent to preformed packings (19 and 20). Install worm shaft (9) in worm shaft housing (16).

3 Apply grease (item 7, appx B) to new preformed packing (18) and install on bushing (1 7).

4 Install bushing (17) in worm shaft housing (1 6).

5 Apply sealing compound to setscrew hole in worm shaft housing (16). Install setscrew (15).

6 Aline reference mark on knob (13) and worm shaft (9).

7 Place knob (13) on end of worm shaft (9). Support knob (13) with a V-block and drive in tapered pin (14).

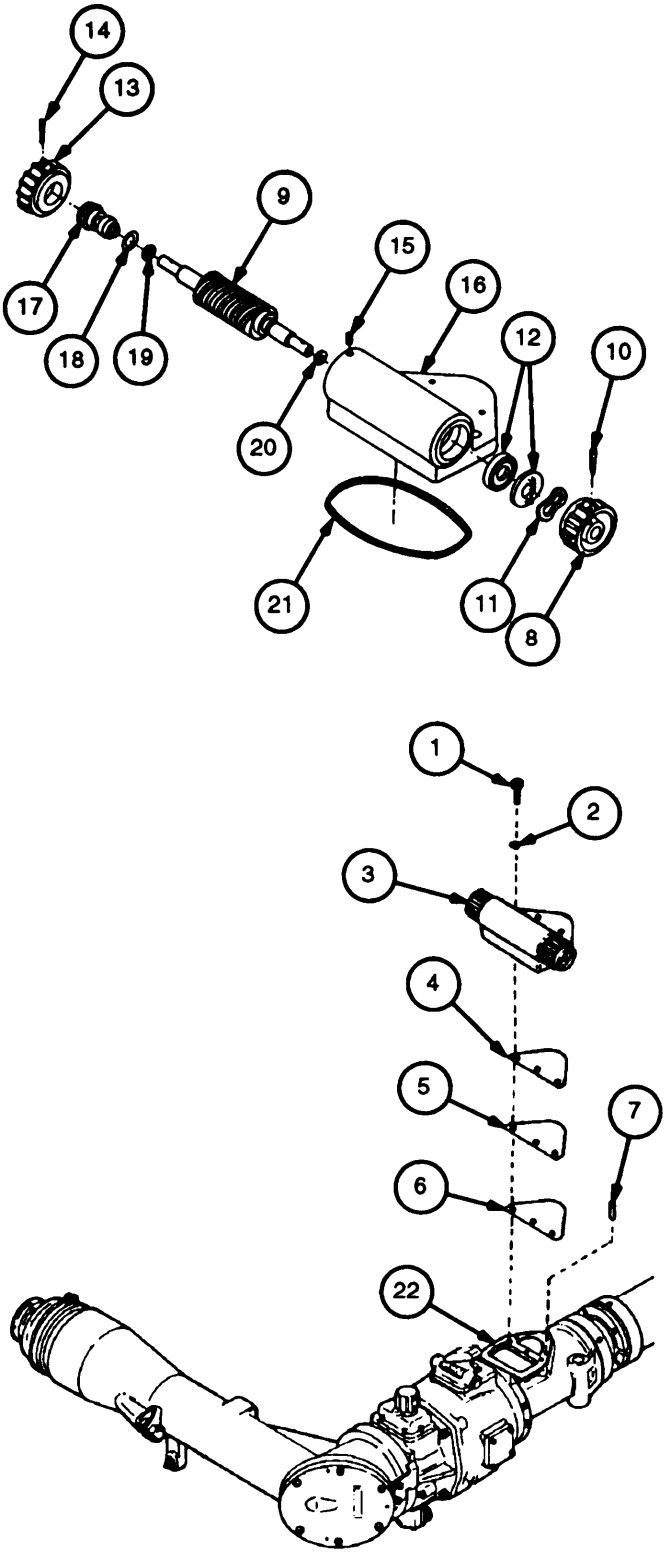
8 Apply grease (item 6, appx B) to spring washer (11) and two ratchets (12),

9 Install two ratchets (12), spring washer (11), and knob (8) on worm shaft (9).

10 Aline reference mark on knob (8) and worm shaft (9).

11 Support knob (8) with a V-block and drive in tapered pin (10); stake tapered pins (10 and 14).

12 Apply adhesive to one side of new preformed packing (21) and into groove in worm shaft housing (16). Install preformed packing in worm shaft housing.



e. Installation

1 If two headless straight pins (7) were removed, redrill using No. 32 (0.116) drill. Drill into housing 7/8 inch (22.23 mm) deep; ream for drive fit in outer sleeve (22) and slip fit in worm shaft assembly (3).

2 Install three new shims (4,5, and 6) as required to obtain minimum backlash. Apply grease (item 6, appx B) to teeth of worm shaft assembly (3) and position over two headless straight pins (7). Secure with three new lockwashers (2) and three cap screws (1).

3-16. COVER ASSEMBLY MAINTENANCE INSTRUCTIONS (M118A3)

This task covers: a. Removal b. Disassembly c. Repair d. Assembly e. Installation

INITIAL SET-UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Materials/Parts

Adhesive (Item 1, appx B)
Lockwashers (4) (Item 68, appx E)
Preformed packing (Item 42, appx E)
Sealing Compound (Item 13, appx B)
Shim (Item 49, appx E)

References

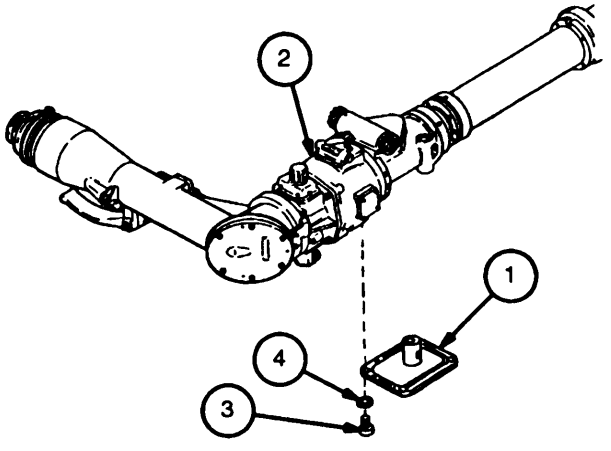
TM 9-254
TM 750-116

Equipment Condition

M118A3 elbow telescope removal from howitzer (TM 9-2350-311-10)

a. Removal

Remove cover assembly (1) from housing (2) by removing four machine screws (3) and four lockwashers (4). Discard lockwashers.



3-16. COVER ASSEMBLY MAINTENANCE INSTRUCTIONS (M118A3) - continued

b. Disassemble

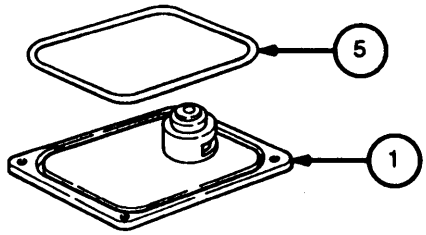
Remove preformed packing (5) from groove in cover assembly (1) and discard.

c. repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing and damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.



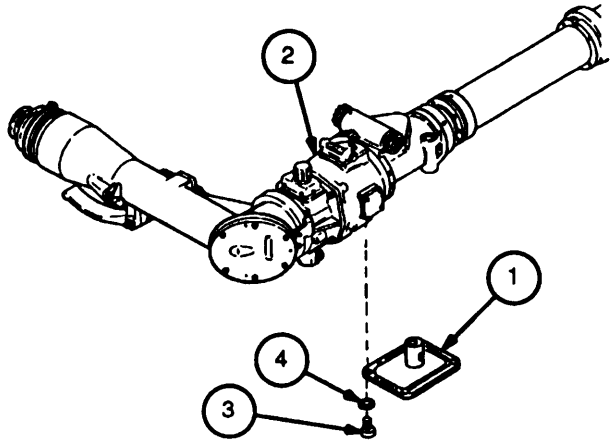
d. Assembly

NOTE

Seal over external side of adapter 10543763 and lamp MS25236-8623 using sealing compound if it has not already been done. New manufactured covers will not contain the adapter and lamp.

1 Apply adhesive to the groove of cover assembly (1).

2 Install new preformed packing (5) in cover assembly (1).



e. Installation

1 Position cover assembly (1) on bottom of housing (2).

2 Secure cover assembly (1) to housing (2) with four new lockwashers (4) and four machine screws (3).

3-17. COVER ASSEMBLY MAINTENANCE INSTRUCTIONS (M118A2)

This task covers: a. Removal b. Disassembly c. Repair d. Assembly e. Installation

INITIAL SET-UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Materials/Parts

Adhesive (Item 2, appx B)
Lockwashers (4) (Item 68, appx E)
Preformed packing (Item 42, appx E)
Sealing compound (Item 15, appx B)
Tape (Item 20, appx B)

References

TM 9-254
TM 750-116

Equipment Condition

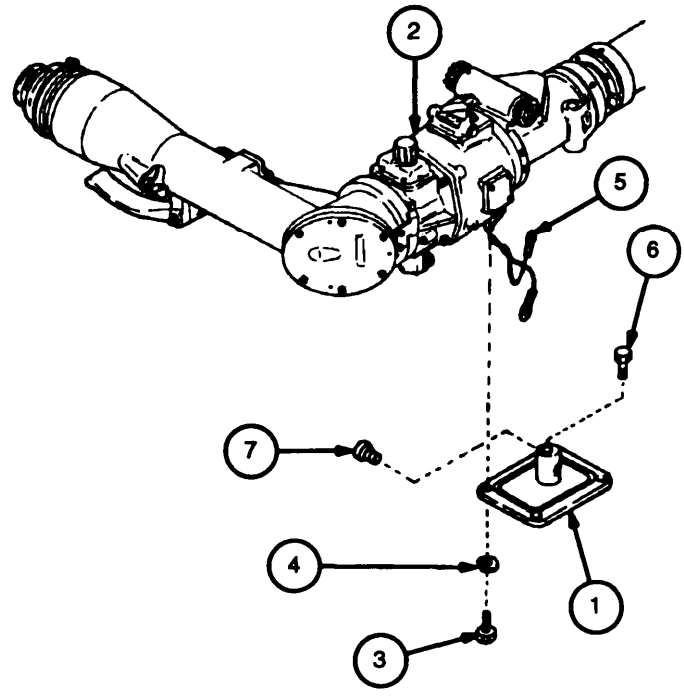
M118A2 elbow telescope removed from howitzer (TM 9-2350-311-10)

a. Removal

1 Remove cover assembly (1) from housing (2) by removing four machine screws (3) and four lockwashers (4). Discard lockwashers.

2 Using tape, tag wires on wiring harness (5).

3 Remove machine screws (6 and 7) and disconnect wiring harness (5) from cover assembly (1).



3-17. COVER ASSEMBLY MAINTENANCE INSTRUCTIONS (M118A2) - continued

b. Disassembly

1 Remove incandescent lamp (8) from plate cover (9).

2 Remove holder (10) from plate cover (9).

3 Remove telescope subassembly (11) and sleeve spacer (12) from plate cover (9).

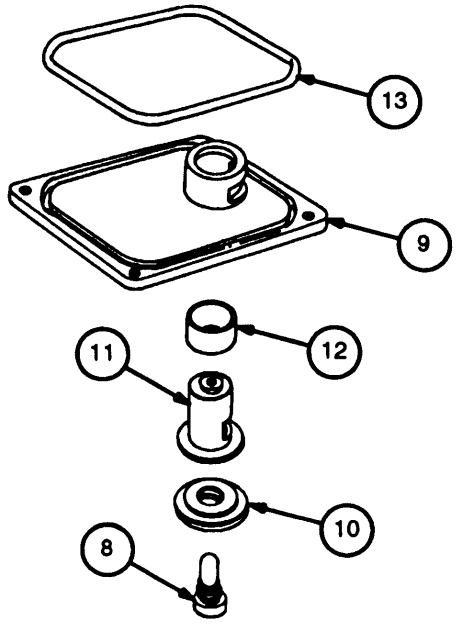
4 Remove preformed packing (13) from groove in plate cover (9) and discard.

c. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing and damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.



d. Assembly

1 Install sleeve spacer (12) on telescope subassembly (11).

2 Install telescope subassembly (11) in plate cover (9) with windows alined.

3 Apply sealing compound to outside threads of holder (10).

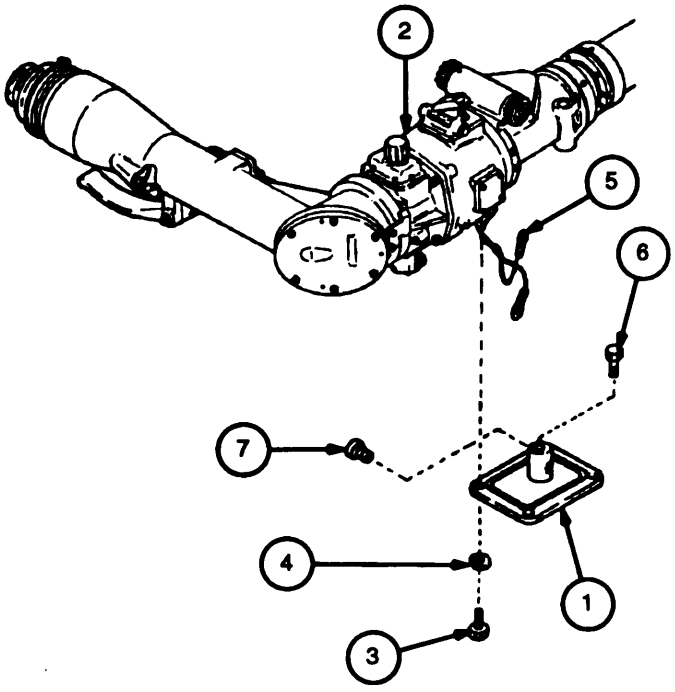
4 Install holder (10) in plate cover (9).

5 Install incandescent lamp (8) in holder (10).

6 Apply adhesive to the groove on the bottom of plate cover (9) and to one side of new preformed packing (13).

7 Install preformed packing (13) in plate cover (9).

e. Installation



1 Position cover assembly (1) on bottom of housing (2). Attach wires from wiring harness (5) and secure with machine screws (6 and 7). Remove tags.

2 Secure cover assembly (1) to housing (2) with four new lockwashers (4) and four machine screws (3).

3-18. LEVEL ASSEMBLY MAINTENANCE INSTRUCTIONS (M118A3)

This task covers: a. Removal b. Disassembly c. Repair d. Assembly e. Installation f. Adjustment

INITIAL SET-UP

Tools and Special Tools

Drill bit no. 44 (0.086) (Item 15, appx F)

Drill bit no. 54 (0.055) (Item 16, appx F)

Drill, electric 1/2” (Item 12, appx F)

Eccentric tool, fabricated (fig. C-3, appx C)

Tool Kit, Electronic System, Repair, field Maintenance (SC5180-95-CL-B29) 5180-01-168-0487

Tubular spanner wrench, 1-25/32 and 1-51/64 inch (Item 32, appx F)

Materials/Parts

Adhesive (Item 2, appx B)
Lockwashers (2) (Item 61, appx E)
Lockwashers (4) (Item 68, appx E)
Lockwashers (2) (Item 75, appx E)
Lockwashers (2) (Item 76, appx E)
Preformed packing (Item 39, appx E)
sealing compound (Item 13, appx B)
Sealing compound (Item 15, appx B)
Shim (Item 49, appx E)
Tape (Item 20, appx B)

References

TM 9-254
TM 750-116

Equipment Condition

M118A3 elbow telescope removed from howitzer (TM 9-2350-311-10)

3-18. LEVEL ASSEMBLY MAINTENANCE INSTRUCTIONS (M118A3) - continued

a. Removal

1 Remove four machine screws (1) and four lockwashers (2). Discard lockwashers.

2 Remove level assembly (3).

3 Using tape, tag and disconnect wires (4) by removing two lockwashers (5) and two nuts (6) from circuit board assembly (7). Discard lockwashers.

4 Remove two headless straight pins (8) only if damaged.

b. Disassembly

1 Remove threaded ring (9) from mount (10).

2 Remove holder (11), cam (12), and level (13).

3 Remove two cap screws (14), two lockwashers (15), and mirror (16). Discard lockwashers.

4 Remove two headless straight pins (17 and 18) only if damaged.

5 Remove two machine screws (19), two lockwashers (20), circuit board assembly (7), and two sleeve spacers (21).

6 Using 1-25/32 and 1-51/64 inch tubular spanner wrench, remove retainer (22), shim (23), and window (24). Discard shim.

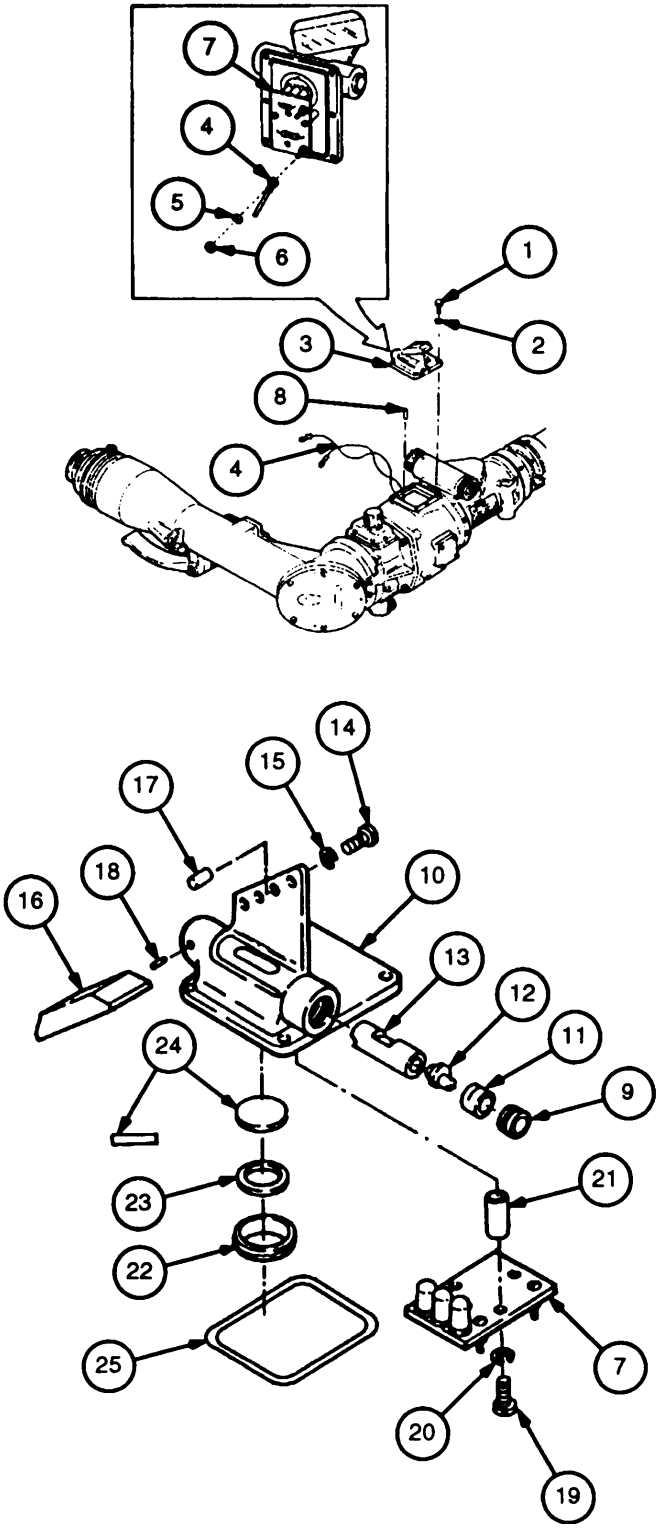
7 Remove preformed packing (25) from mount (10) and discard.

c. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.



d. Assembly

NOTE

Seal over external side of adapter 10543763 and lamp MS25236-8623 using sealing compound (item 13, appx B) if it has not already been done. New manufactured level mounts will not contain an adapter and lamp.

1 Apply sealing compound (item 13, appx B) to the surface of mount (10) where window (24) is seated. Install window (24) and apply additional sealing compound around the window. Install new shim (23) and using 1-25/32 and 1-51/64 inch tubular spanner wrench, install retainer (22).

2 If headless straight pin (18) was removed, redrill using No. 54 (0.055) drill; ream for drive fit in mount (10). End of headless straight pin (18) must protrude far enough into hole in mount to engage slot in end of level (13) when installed.

3 Install level (13), making sure that slot in end of level engages headless straight pin (18).

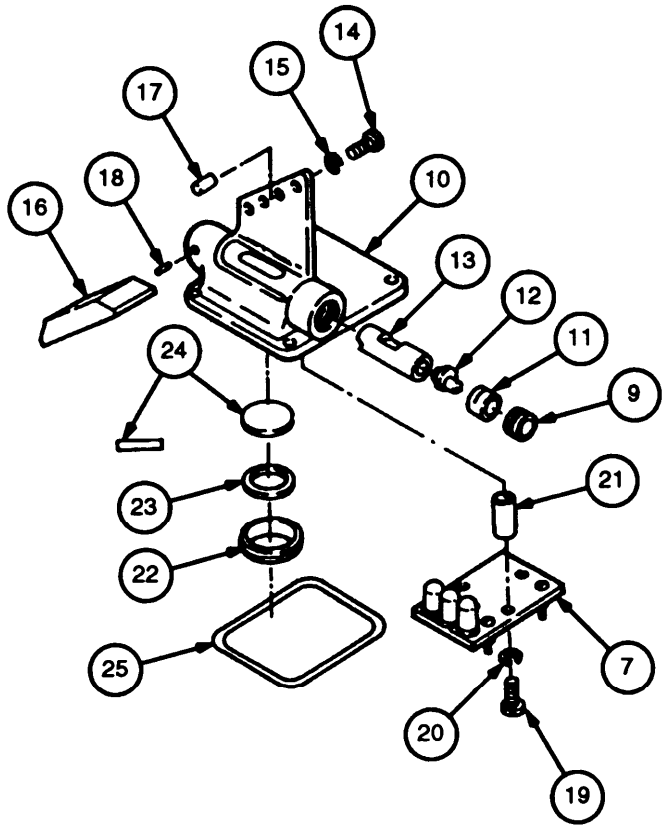
4 Install cam (12), holder (11), and threaded ring (9) in front of level (13). Do not tighten threaded ring (9) until adjustment of level (13) has been completed (ref. p 3-26).

5 Install two sleeve spacers (21), circuit board assembly (7), two new lockwashers (20), and two machine screws (19).

6 If headless straight pins (17) were not removed, install mirror (16) over headless straight pins (17) and secure with two new lockwashers (15) and two cap screws (14).

7 If headless straight pins (17) were removed, redrill using No. 54 (0.055) drill; drill 0.450 inch (11.43 mm) deep. Ream for drive fit in mount (10) and slip fit in mirror (16). Install mirror (16) over headless straight pins (17) and secure with two new lockwashers (15) and two cap screws (14).

8 Apply adhesive to groove on bottom of mount (10) and to one side of new preformed packing (25). Install preformed packing (25) in groove.



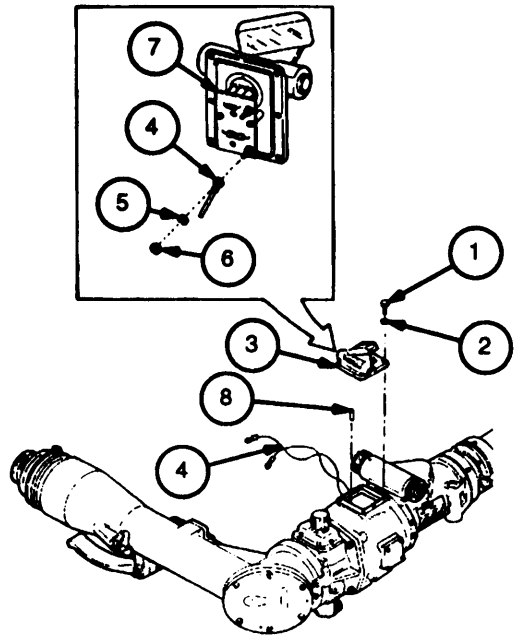
3-18. LEVEL ASSEMBLY MAINTENANCE INSTRUCTIONS (M118A3) - continued

e. Installation

1 If two headless straight pins (8) were removed, redrill using No. 44 (0.086) drill, drill 3/8 inch (9.53 mm) deep. Ream for drive fit in housing and slip fit in level assembly (3).

2 Position level assembly (3) over housing and attach wires (4); red wire to positive (+) terminal and the black wire to the negative (-) terminal of the circuit board assembly (7) using two new lockwashers (5) and two nuts (6).

3 Install level assembly (3) over two headless straight pins (8) and secure with four new lockwashers (2) and four machine screws (1).



f. Adjustment

1 Install M118A3 elbow telescope on howitzer and level trunnions (ref. TM 9-2350-311-10).

2 Check that level (13) vial bubble is within the center graduation marks of the vial. If bubble is not within the center graduation marks, go to step 3.

3 Loosen threaded ring (9).

4 Engage fabricated eccentric tool into holder (11) and threaded ring (9).

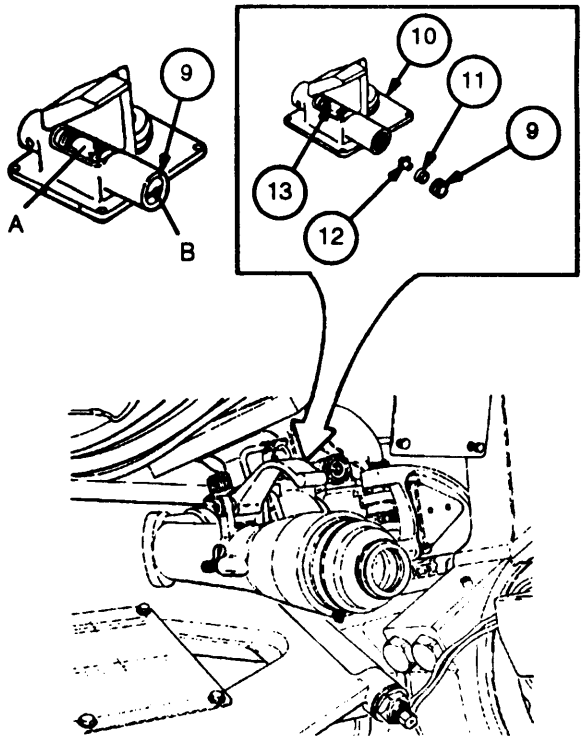
5 Insert a straight blade screwdriver through the center hole in the eccentric tool.

6 Adjust cam (12) until level (13) vial bubble is centered.

7 Tighten threaded ring (9), being careful not to disturb setting of vial.

8 Apply sealing compound (item 15, appx B) in the space (A) between brass portion of level (13) vial assembly and mount (10).

9 Apply sealing compound (item 13, appx B) to slot (B) of threaded ring (9) and threads of mount (10).



3-19. LEVEL ASSEMBLY MAINTENANCE INSTRUCTIONS (MI 18A2)

This task covers: a. Removal b. Disassembly c. Repair d. Assembly e. Installation f. Adjustment

INITIAL SET-UP

Tools

Drill bit no. 44 (0.086) (Item 15, appx F)

Drill bit no. 54 (0.055) (Item 16, appx F)

Drill, electric 1/2" (Item 12, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance(SC5180-95-CL-B29)
5180-01-168-0487

Tubular spanner wrench, 1-25/32 and 1-51/64 inch (Item 32, appx F)

Materials/Parts

Adhesive (Item 2, appx B)
Lockwashers (4) (Item 68, appx E)
Lockwashers (2) (Item 75, appx E)
Preformed packing (Item 39, appx E)
Sealing compound (Item 13, appx B)
Sealing compound (Item 15, appx B)
Shim (Item 49, appx E)
Tape (Item 20, appx B)

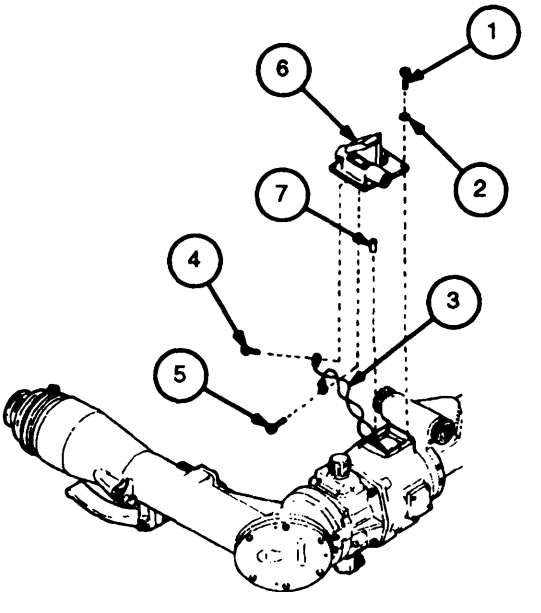
References

TM 9-254
TM 750-116

Equipment Condition

M118A2 elbow telescope removed from howitzer (TM 9-2350-311-10)

a. Removal



1 Remove four machine screws (1) and four lockwashers (2). Discard lockwashers.

2 Using tape, tag and disconnect two wires (3) by removing machine screws (4 and 5).

3 Remove level assembly (6).

4 Remove two straight headless pins (7) only if damaged.

3-19. LEVEL ASSEMBLY MAINTENANCE INSTRUCTIONS (M118A2) - continued

b. Disassembly

1 Remove incandescent lamp (8) from mount (9).

2 Remove holder (10) from mount (9).

3 Remove telescope subassembly (11) and sleeve spacer (12).

4 Remove threaded ring (13) from mount (9).

5 Remove holder (14), cam (15), and level (16).

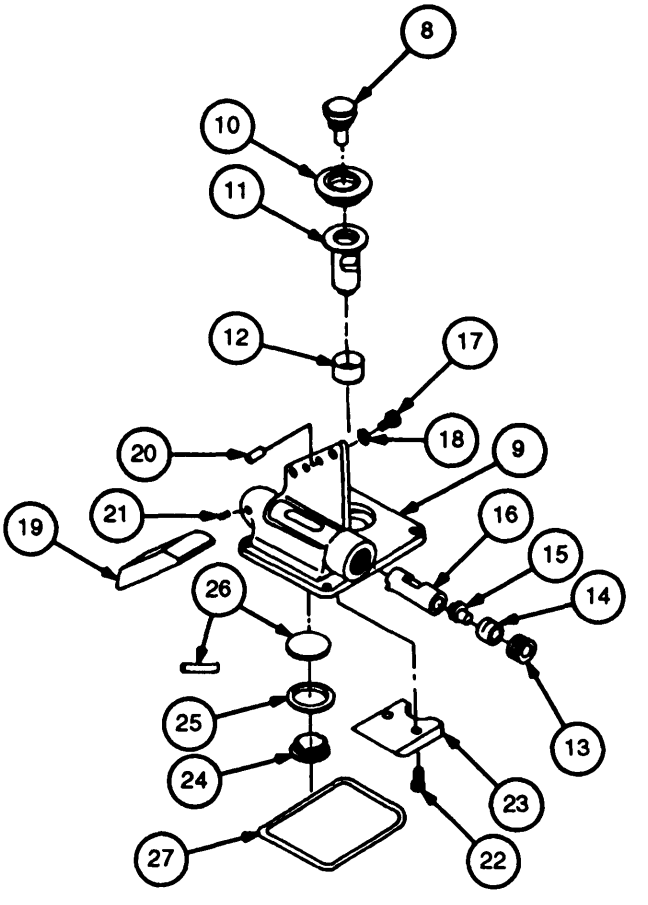
6 Remove two cap screws (17), two lockwashers (18), and mirror (19). Discard lockwashers.

7 Remove two headless straight pins (20 and 21), only if damaged.

8 Remove two cap screws (22) and light conductor (23).

9 Using 1-25/32 and 1-51/64 inch tubular spanner wrench, remove retainer (24), shim (25), and window (26). Discard shim.

10 Remove preformed packing (27) from level mount (9) and discard.



c. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

d. Assembly

1 Apply sealing compound (item 13, appx B) to the surface of mount (9) where window (26) is seated. Install window (26) and apply additional sealing compound around the window. Install new shim (25) and using 1-25/32 and 1-51/64 inch tubular spanner wrench, install retainer (24).

2 If headless straight pin (21) was removed, redrill using No. 54 (.055) drill; ream for drive fit in mount (9). End on headless straight pin (21) must protrude far enough into hole in mount (9) to engage slot in end of level (16) when installed.

3 Install level (16), making sure that slot in end of level engages headless straight pin (21).

4 Install cam (15), holder (14), and threaded ring (13) in front of level (16). Do not tighten threaded ring (13) until adjustment of level (16) has been completed (ref. p 3-30).

5 Apply sealing compound (Item 13, appx B) to mount (9); then install sleeve spacer (12).

6 Apply sealing compound (Item 13, appx B) under rim of telescope subassembly (11) and install into mount (9) with windows alined.

7 Apply sealing compound (item 15, appx B) to outside threads of holder (10).

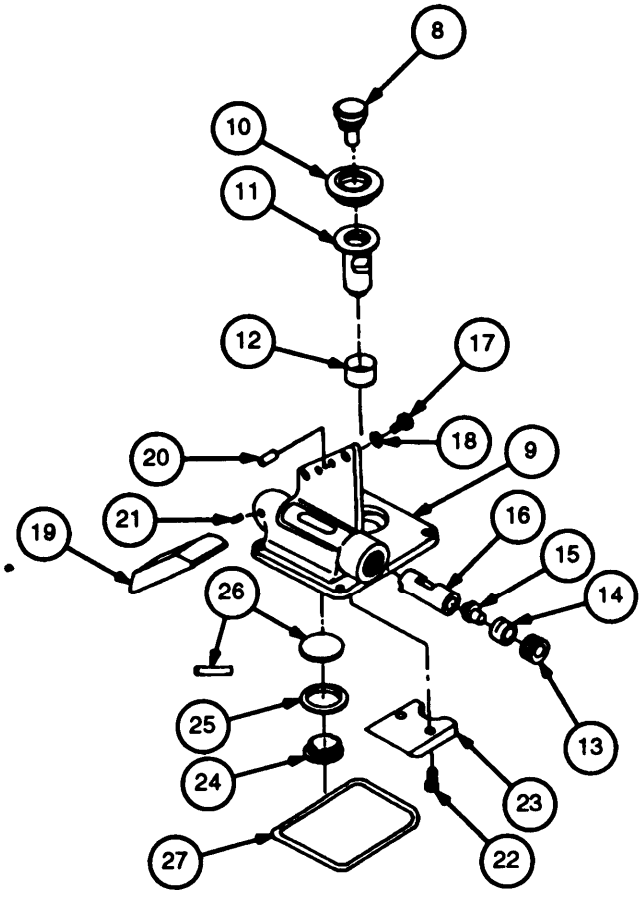
9 Install holder (10) in mount (9), keeping windows of telescope subassembly (11) and mount (9) alined.

10 Install incandescent lamp (8) in holder (10).

11 Apply sealing compound (item 13, appx B) to threads of two cap screws (22). Install light conductor (23) and secure with two cap screws (22).

13 If headless straight pins (20) were removed, redrill using a No. 54 (0.055) drill; drill 0.450 inch (11.43 mm) deep. Ream for drive fit in mount (9) and slip fit in mirror (19). Install mirror (19) over headless straight pins and secure with two new lockwashers (18) and two cap screws (17).

14 Apply adhesive to groove on bottom of mount (9) and to one side of new preformed packing (27). Install preformed packing (27) in groove.



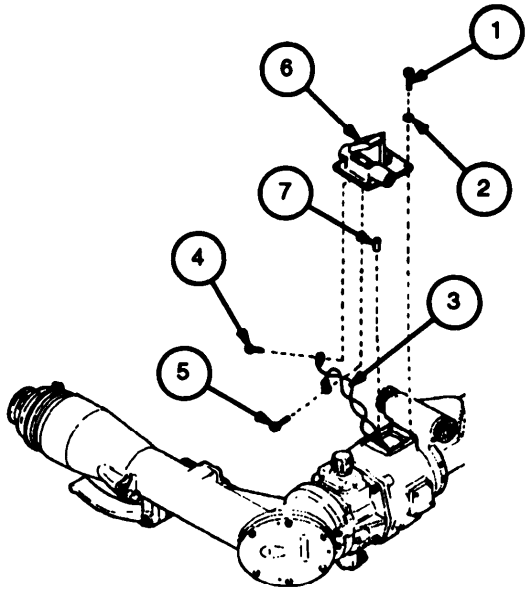
3-19. LEVEL ASSEMBLY MAINTENANCE INSTRUCTIONS (M118A2) - continued

e. Installation

1 If two headless straight pins (7) were removed, redrill using No. 44 (0.086) drill; drill 3/8 inch (9.53 mm) deep. Ream for drive fit in housing and slip fit in level assembly (6).

2 Position level assembly (6) over housing and attach wires (3) from wiring harness assembly using machine screws (4 and 5). Remove tags.

3 Install level assembly (6) over two headless straight pins (7) and secure with four new lockwashers (2) and four machine screws (1).



f. Adjustment

1 Install M118A2 elbow telescope on howitzer and level trunnions (ref. TM 9-2350-311-10).

2 Check that level (16) vial bubble is within the center graduation marks of the vial. If bubble is not within the center graduation marks, go to step 3.

3 Loosen threaded ring (13).

4 Engage fabricated eccentric tool into holder (14) and threaded ring (13).

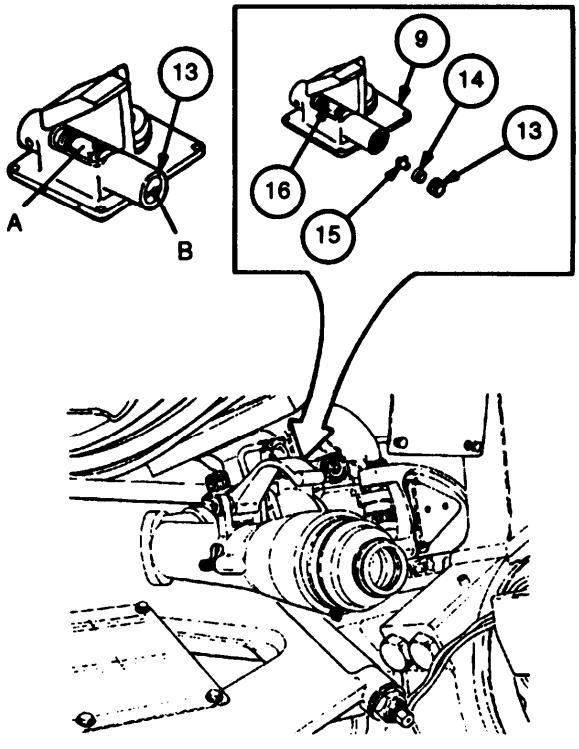
5 Insert a straight blade screwdriver through the center hole in the eccentric tool.

6 Adjust cam (15) until level (16) vial bubble is centered.

7 Tighten threaded ring (13), being careful not to disturb setting of vial.

8 Apply sealing compound (item 15, appx B) in the space (A) between brass portion of level (16) vial assembly and mount (9).

9 Apply sealing compound (item 13, appx B) to slot (B) of threaded ring (13) and threads of mount (9).



Section V. General Support Maintenance Procedures

3-20. GENERAL

LIST OF TASKS

Task No.	Task	Task Ref (Page)	Troubleshooting Ref No. (Page)
1	Maintain M118A2/M118A3 elbow telescope		—
	a. Disassemble	3-32	
	b. Repair	3-33	
	c. Assemble	3-33	
2	Maintain eyepiece and erector lens subassembly		3-7
	a. Disassemble	3–34	
	b. Repair	3-35	
	c. Assemble	3–36	
3	Maintain cell assembly		
	a. Disassemble	3-38	
	b. Repair	3-38	
	c. Assemble	3-39	
4	Maintain reticle cage assembly (M118A3)		3-7
	a. Remove	3-40	
	b. Disassemble	3-40	
	c. Repair	3-40	
	d. Assemble	3-41	
	c. Install	3-41	
5	Maintain reticle cage assembly (M118A2)		—
	a. Remove	3-42	
	b. Repair	3-42	
	c. Install	3-43	
6	Maintain wiring harness		3-7
	a. Remove	3–44	
	b. Disassemble	3–44	
	c. Repair	3-44	
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	e. Install	3-45	
7	Maintain objective and diaphragm subassembly		—
	a. Disassemble	3-46	
	b. Repair	3-46	
	c. Assemble	3-46	

3-21. M218A2/M1 18A3 ELBOW TELESCOPE MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET–UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Materials/Parts

Grease (Item 7, appx B)
Nut, self-locking (Item 11, appx E)
Lockwasher (Item 67, appx E)
Lockwashers (4) (Item 71, appx E)
Lockwashers (4) (Item 77, appx E)
Preformed packing (Item 36, appx E)
Tissue (Item 11, appx B)

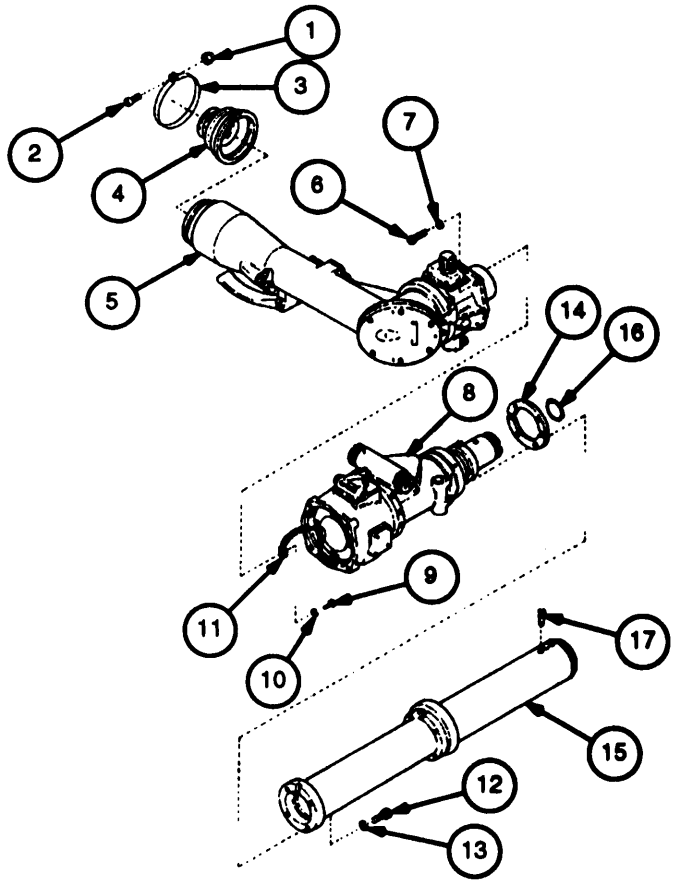
References

TM 9-254

Equipment Condition

M118A2/M118A3 elbow telescope removed from howitzer (TM 9-2350-311-10)

a. Disassembly



1 Remove self-locking nut (1) and machine screw (2). Discard self-locking nut.

2 Remove loop clamp (3) and eyeshield (4) from eyepiece and erector lens subassembly (5).

3 Remove four cap screws (6) and four lockwashers (7). Discard lockwashers. Carefully separate eyepiece and erector lens subassembly (5) from reticle cage and cant corrector subassembly (8).

4 Remove machine screw (9) and lockwasher (10) from connector plug (11) and unplug wiring harness from connector on eyepiece and erector lens subassembly (5). Discard lockwasher.

5 Protect both ends of eyepiece and erector lens subassembly (5) with several thicknesses of tissue to prevent damage (ref. TM 9-254).

6 Remove four cap screws (12), four lockwashers (13), and two clamp rings (14). Discard lockwashers.

7 Remove objective and diaphragm subassembly (15) from reticle cage and cant corrector subassembly (8).

8 Remove preformed packing (16) from reticle cage and cant corrector subassembly (8). Discard preformed packing.

9 Remove purging machine screw (17).

b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly

1 Apply grease to new preformed packing (16) and install on reticle cage and cant corrector subassembly (8).

2 Install objective and diaphragm subassembly (15) on reticle cage and cant corrector subassembly (8).

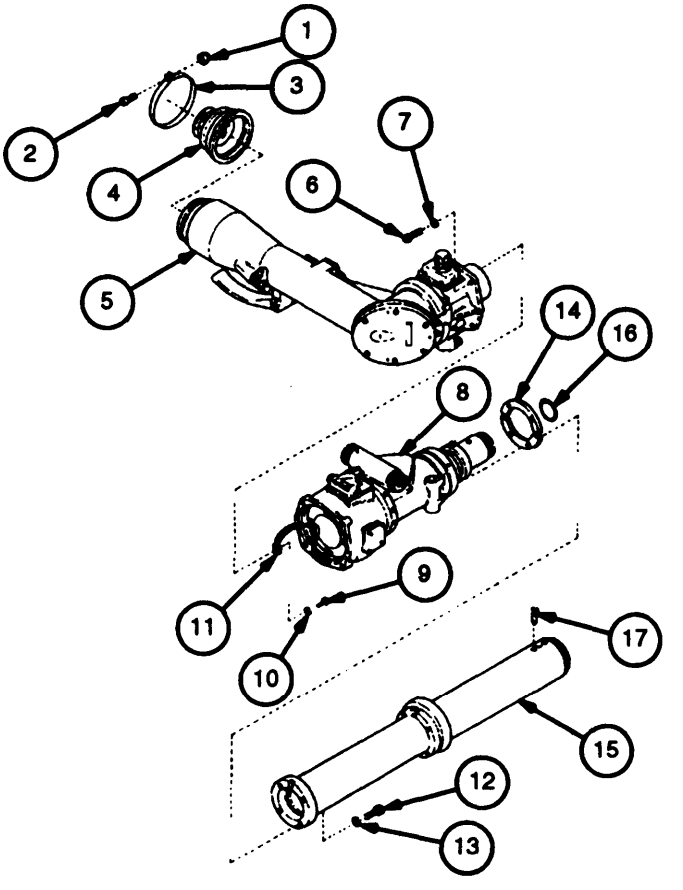
3 Install two clamp rings (14) and secure with four new lockwashers (13) and four cap screws (12).

4 Install purging machine screw (17).

5 Connect connector plug (11) to wiring harness and secure plug in place with new lockwasher (10) and machine screw (9).

6 Install eyepiece and erector lens subassembly (5) on reticle cage and cant corrector subassembly (8) and secure with four new lockwashers (7) and four cap screws (6).

7 Install eyeshield (4) and loop clamp (3) and secure with machine screw (2) and new self-locking nut (1).



3-22. EYEPIECE AND ERECTOR LENS SUBASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Drill bit no. 15 (0.180) (Item 13, appx F)

Drill, electric 1/2" (Item 12, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Tubular spanner wrench, 2-9/16 and 2-37/64 inch (Item 34, appx F)

Materials/Parts

Cotter pins (2) (Item 44, appx E)
Grease (Item 6, appx B)
Grease (Item 7, appx B)
Lockwashers (6) (Item 64, appx E)
Lockwashers (6) (Item 68, appx E)
Preformed packing (Item 24, appx E)
Preformed packing (Item 37, appx E)
Preformed packing (Item 40, appx E)
Shim (Item 53, appx E)

References

TM 9-254

Equipment Condition

M118A2/M118A3 elbow telescope removed from howitzer (TM 9-2350-311-10)

Eyepiece and erector lens subassembly removed from reticle cage and cant corrector subassembly (ref. para 3-21)

a. Disassembly

1 Remove two setscrews(1)

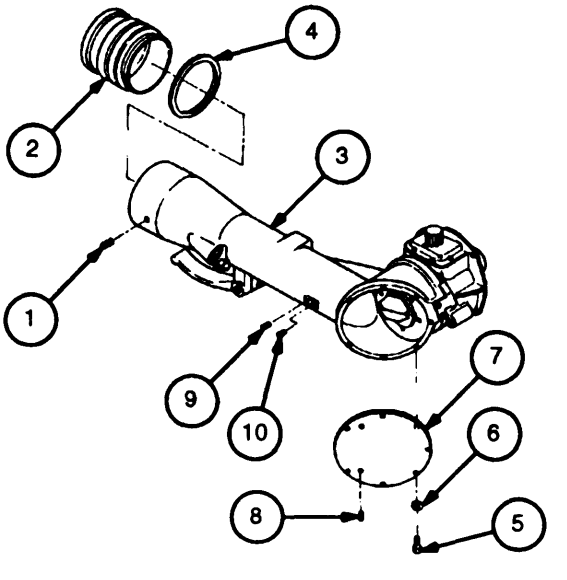
2 Using 2-9/16 and 2-37/64 inch tubular spanner wrench, remove cell assembly (2) from eyepiece arm (3).

3 Remove preformed packing (4) from cell assembly (2). Discard preformed packing.

4 Remove six machine screws (5), six lockwashers (6), and prism cover (7). Discard lockwashers.

5 Remove three setscrews (8) from prism cover (7) only if necessary for replacement.

6 Remove setscrews (9 and 10).



7 Loosen cap screw (11) and remove nut (12) and ring spacer (13).

8 Carefully separate rear housing (14) from eyepiece arm (3).

9 Remove lock-release lever and bellows assembly (ref. para 3-13).

10 Remove arm ratchet (15), shuttle (16), and spring washer (17) from eyepiece arm (3).

11 Remove seal (18), shim (19), and protective cup (20) from eyepiece arm (3). Discard shim.

12 Remove two cotter pins (21) and two flat washers (22). Remove two shouldered pins (23) and two springs (24) from rear housing (14). Discard cotter pins.

13 Remove preformed packing (25) from groove in rear housing (14). Discard preformed packing.

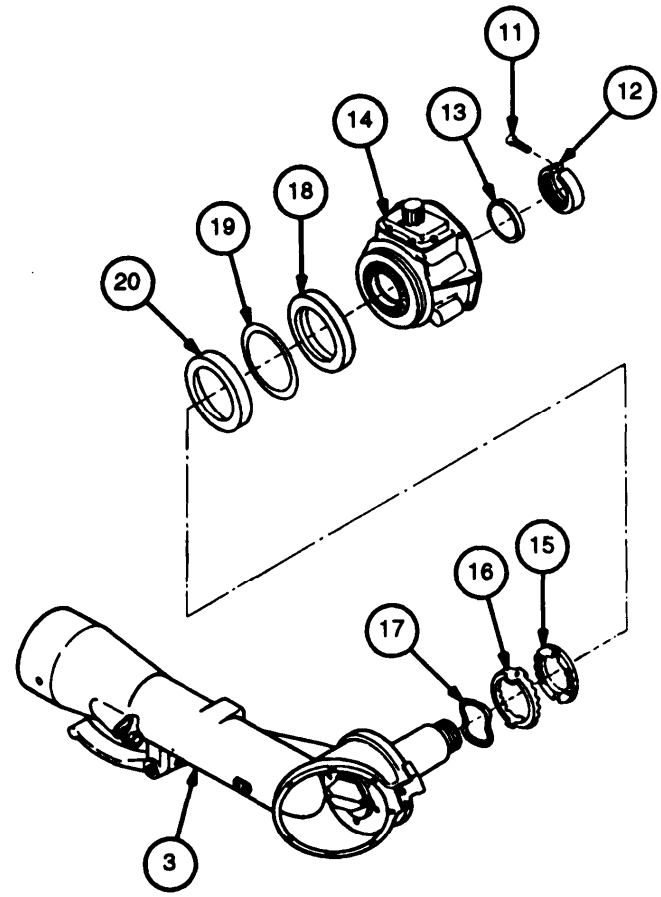
14 Scribe a reference mark on fried ratchet (26) and rear housing (14).

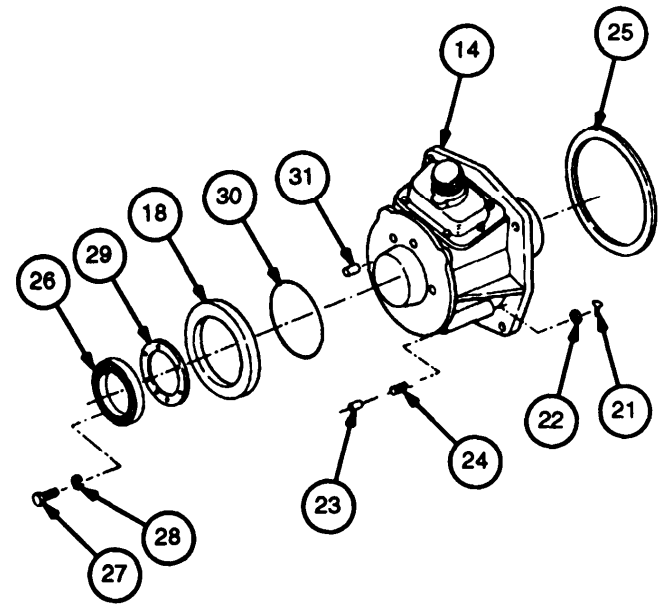
15 Remove six cap screws (27) and six Iockwashers (28) from fixed ratchet (26). Discard lockwashers.

16 Remove fixed ratchet (26), spacer (29), and remaining section of seal (18).

17 Remove preformed packing (30) from remaining section of seal (18). Discard preformed packing.

18 Remove two headless straight pins (31) only if damaged.





b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

3-22. EYEPIECE AND ERECTOR LENS SUBASSEMBLY MAINTENANCE INSTRUCTIONS - continued

c. Assembly

NOTE

If fixed ratchet is to be replaced, perform steps 1 thru 5. If existing parts are reinstalled, proceed to step 6.

1 Apply grease (item 7, appx B) to new preformed packing (30) and install in groove of seal (18).

2 Install section of seal (18) with preformed packing (30) installed, spacer (29), and fixed ratchet (26) on rear housing (14).

3 Position fixed ratchet (26) with area to be drilled in a different location from original pin holes in rear housing (14). Secure fixed ratchet (26) with six new lockwashers (28) and six cap screws (27).

4 Drill holes for two headless straight pins (31), using a No. 15 (0.180) drill; drill into rear housing (14) 3/8 inch (9.53 mm) deep. Ream for drive fit in the rear housing (14) and fixed ratchet (26).

5 Drive two headless straight pins (31) into holes drilled in step 4 above.

NOTE

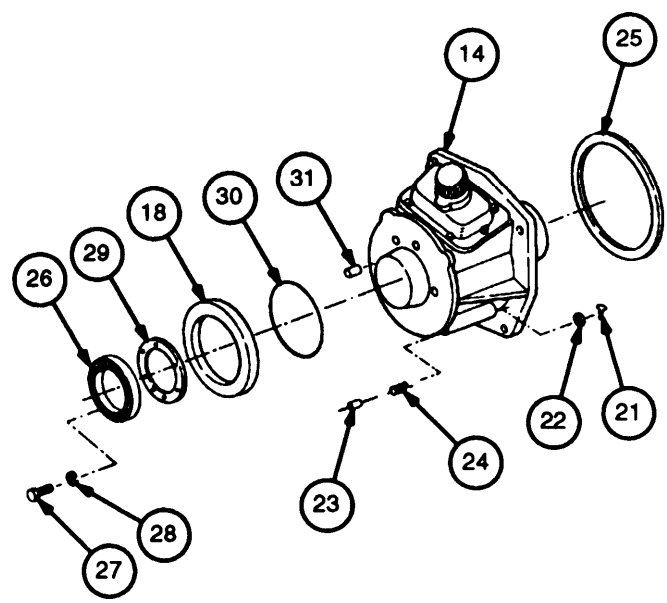
Follow steps 6 thru 10 if reinstalling existing parts.

6 Apply grease (item 7, appx B) to new preformed packing (30) and install in groove of seal (18).

7 Install section of seal (18) with preformed packing (30) installed, spacer (29), and fixed ratchet (26) on rear housing (14).

8 If removed, aline headless straight pins (31) with pin holes in rear housing (14) and secure with six new lockwashers (28) and six cap screws (27).

9 Apply grease (item 7, appx B) to new preformed packing (25) and install in groove of rear housing (14) opposite the side where fixed ratchet (26) has been installed.



10 If removed, install two springs (24) and two shouldered pins (23) in rear housing (14). Secure in place with two flat washers (22) and two new cotter pins (21),

11 Install seal (18) on eyepiece arm (3) with brass ring of seal facing away from new shim (19).

12 Install protective cup (20), shim (19), and seal (18) on eyepiece arm (3).

13 Install spring washer (17) and shuttle (16) over cell housing (32) and onto eyepiece arm (3).

14 Install arm ratchet (15) over cell housing (32) and engage with shuttle (16).

15 Apply grease (item 6, appx B) to unthreaded section of cell housing (32).

16 Install rear housing (14) over cell housing (32) so that arm ratchet (15) engages with housing.

17 Install ring spacer (13) and nut (12) on threaded section of cell housing (32).

18 Install cap screw (11) in nut (12).

19 Install prism cover (7) on eyepiece arm (3) being careful not to damage optical instrument prism.

20 Install six new Iockwashers (6) and six machine screws (5).

21 If removed, install three setscrews (8).

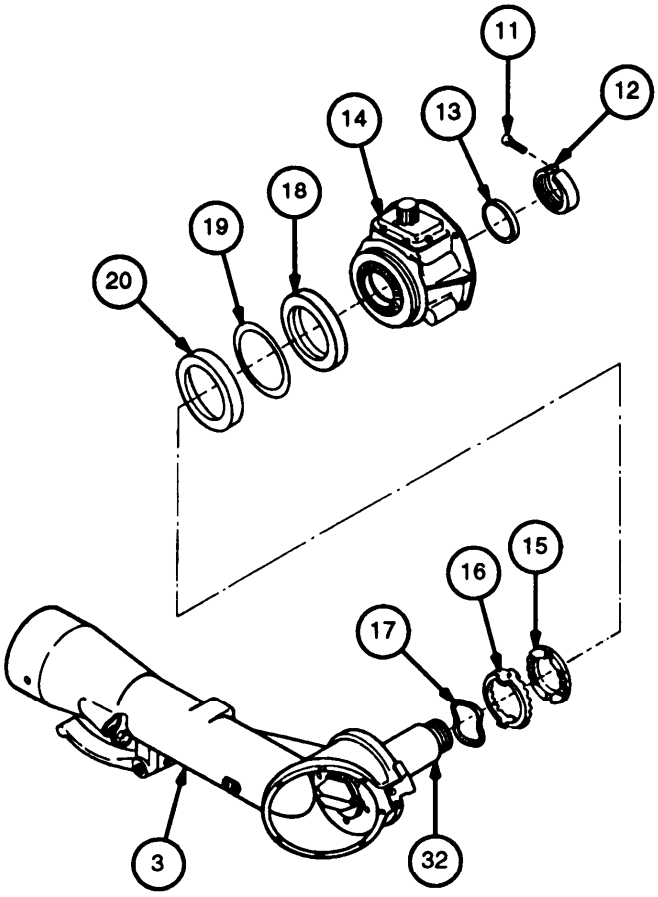
22 Install setscrews (9 and 10). Do not tighten.

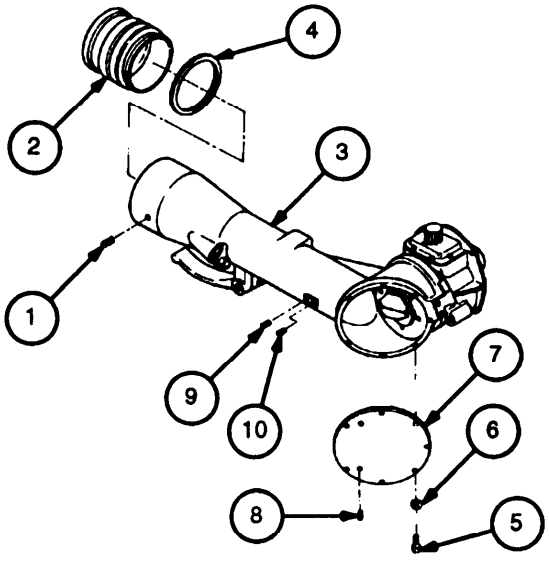
23 Apply grease (item 7, appx B) to new preformed packing (4) and install on cell assembly (2).

24 Using 2-9/16 and 2–37/64 inch tubular spanner wrench, install cell assembly (2) in eyepiece arm (3) until seated.

25 Back out cell assembly (2) two complete turns.

26 Install two setscrews (1) in eyepiece arm (3) to secure cell assembly (2).





3-23. CELL ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET–UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Tubular spanner wrench, 2-9/16 and 2-37/64 inch (Item 34, appx F)

Materials/Parts

Sealing compound (Item 13, appx B)

References

TM 9-254

Equipment Condition

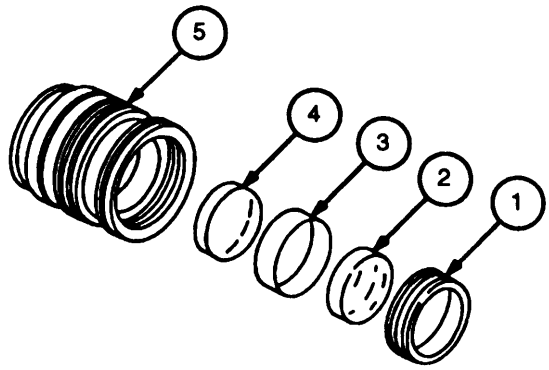
M118A2/M118A3 elbow telescope removed from howitzer (TM 9-2350-311-10)

Cell assembly removed from eyepiece and erector lens subassembly (ref. para 3-22)

a. Disassembly

1 Using 2-9/16 and 2-37/64 inch tubular spanner wrench, remove threaded ring (1).

2 Remove lens (2), spacer (3), and lens (4) from cell (5). Mark lenses for reassembly (ref. TM 9-254).



b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly

1 Apply sealing compound to flange of cell (5) where lens (4) will be seated.

2 Observe reference mark and install lens (4) in cell (5).

3 Install spacer (3) in cell (5).

4 Observe reference mark and install lens (2) in cell (5).

5 Apply sealing compound (spot in three places), to threads of threaded ring (1). Using 2–9/16 and 2–37/64 inch tubular spanner wrench, install threaded ring.

6 Clean excess sealing compound from surfaces of lenses (2 and 4).

3-24. RETICLE CAGE ASSEMBLY MAINTENANCE INSTRUCTIONS (M118A3)

This task covers: a. Removal b. Disassembly c. Repair d. Assembly e. Installation

INITIAL SET-UP

Tools and Special Tools

Spanner wrench, fabricated (fig. C-6, appx C)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Materials/Parts

Grease (Item 7, appx B)
Lockwashers (2) (Item 61, appx E)
Lockwashers (8) (Item 68, appx E)
Lockwashers (2) (Item 76, appx E)
Preformed packing (2) (Item 23, appx E)

References

TM 9-254

Equipment Condition

M118A3 elbow telescope removed from howitzer (TM 9-2350-311-10)

Reticle cage and cant corrector subassembly removed from eyepiece and erector lens subassembly (ref. para 3-21)

3-24. RETICLE CAGE ASSEMBLY MAINTENANCE INSTRUCTIONS (M118A3) - continued

a. Removal

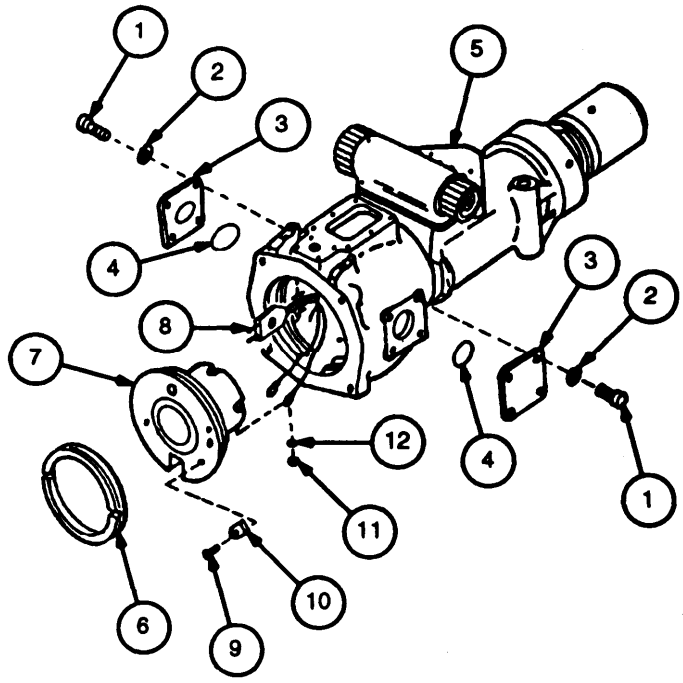
1 Remove eight cap screws (1), eight lockwashers (2), two access covers (3) and two preformed packings (4) from both sides of housing (5). Discard preformed packings and lockwashers.

2 Remove threaded ring (6) from housing (5), using fabricated spanner wrench.

3 Remove reticle cage assembly (7) from housing (5) being careful not to damage wiring harness (8).

4 Remove machine screw (9) and clamp (10). Release wiring harness (8) from side of the reticle cage assembly (7).

5 Disconnect wires of wiring harness (8), by removing two nuts (11) and two lockwashers (12). Discard lockwashers.



b. Disassembly

Remove two machine screws (13), two lockwashers (14), circuit board assembly (15), and two sleeve spacers (16) from reticle cage assembly (7). Discard lockwashers.

c. Repair

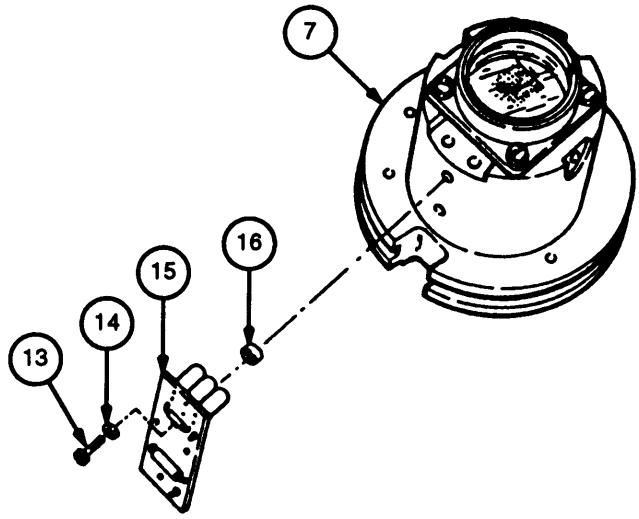
1 Visually inspect for missing or damaged parts.

2 Repair or replace parts in accordance with authorized parts listed in appendix D.

d. Assembly

Install two sleeve spacers (16), circuit board assembly (15), two new Iockwashers (14), and two machine screws (13) to reticle cage assembly (7).

e. Installation



1 Attach wires of wiring harness (8); black wire to negative (-) terminal and white wire to positive (+) terminal on the circuit board assembly (15), using two new Iockwashers (12) and two nuts (1 1).

2 Install wiring harness (8) on side of reticle cage assembly (7) and secure with clamp (10) and machine screw (9).

3 Install reticle cage assembly (7) in housing (5) being careful not to damage wiring harness (8).

4 Install threaded ring (6) in housing (5) using fabricated spanner wrench.

5 Apply grease to two new preformed packings (4) and install in grooves of two access covers (3).

6 Install two access covers (3) on housing (5) and secure with eight new Iockwashers (2) and eight cap screws (1).

3-25. RETICLE CAGE ASSEMBLY MAINTENANCE INSTRUCTIONS (M118A2)

This task covers: a. Removal b. Repair c. Installation

INITIAL SET-UP

Tools and Special Tools

Spanner wrench, fabricated (fig. C-6, appx C)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Materials/Parts

Grease (Item 7, appx B)
Lockwashers (8) (Item 68, appx E)
Preformed packing (2) (Item 23, appx E)

References

TM 9-254

Equipment Condition

M118A2 elbow telescope removed from howitzer (TM 9-2350-311-10)

Reticle cage and cant corrector subassembly removed from eyepiece and erector lens subassembly (ref. para 3-21)

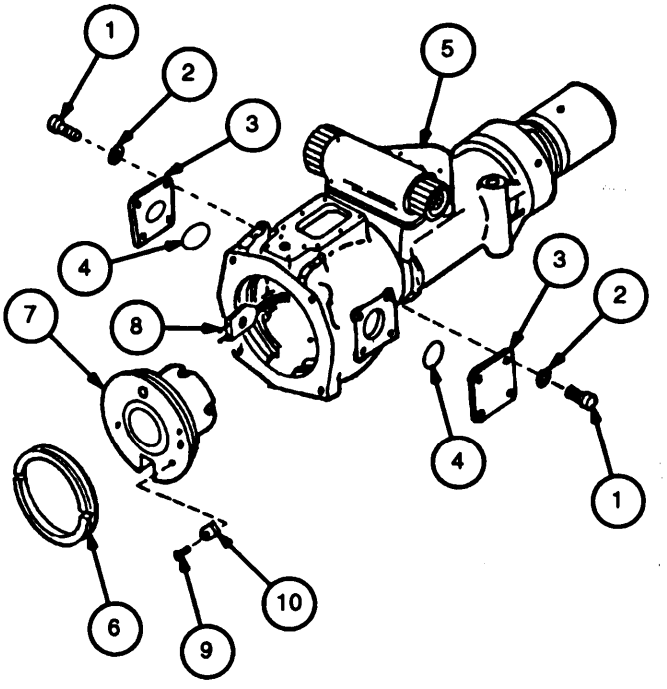
a. Removal

1 Remove eight cap screws (1), eight lockwashers (2), two access covers (3) and two preformed packings (4) from both sides of housing (5). Discard preformed packings and lockwashers.

2 Remove threaded ring (6) from housing (5), using fabricated spanner wrench.

3 Remove reticle cage assembly (7) from housing (5) being careful not to damage wiring harness (8).

4 Remove machine screw (9) and clamp (10). Release wiring harness (8) from side of the reticle cage assembly (7).



b. Repair

1 Visually inspect for missing or damaged parts.

2 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Installation

1 Install wiring harness (8) on side of reticle cage assembly (7) and secure with clamp (10) and machine screw (9).

2 Install reticle cage assembly (7) in housing (5) being careful not to damage wiring harness (8).

3 Install threaded ring (6) in housing (5) using fabricated spanner wrench.

4 Apply grease to two new preformed packings (4) and install in grooves of two access covers (3).

5 Install two covers (3) on housing (5) and secure with eight new lockwashers (2) and eight cap screws (1).

3-26. WIRING HARNESS MAINTENANCE INSTRUCTIONS

This task covers: a. Removal b. Disassembly c. Repair d. Assembly e. Installation

INITIAL SET-UP

Tools

Soldering iron, electric (Item 24, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance(SC5180-95-CL-B29)
5180-01-168-0487

Materials/Parts

Flux (Item 5, appx B)
Insulation sleeving (Item 16, appx B)
Solder (Item 18, appx B)
Tape (Item 20, appx B)

References

TM 9-254

Equipment Condition

Reticle cage assembly removed, M118A3 (ref. para 3-24)
Reticle cage assembly removed, M118A2 (ref. para 3-25)

Level assembly removed, M118A3 (ref. para 3-18)
Level assembly removed, M118A32 (ref. para 3-19)

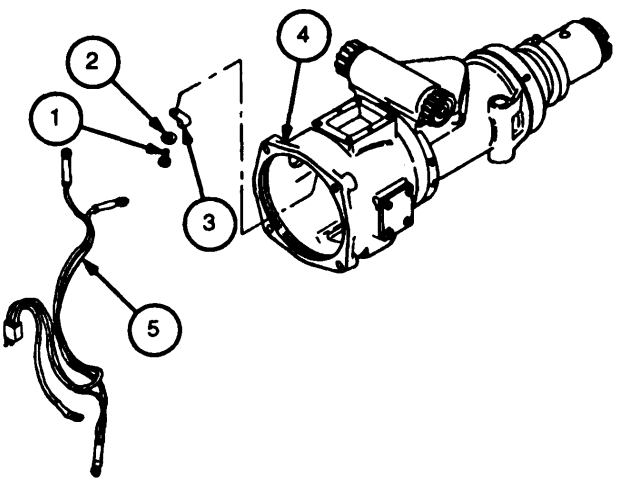
Cover assembly removed, M118A3 (ref. para 3-16)
Cover assembly removed, M118A2 (ref. para 3-17)

3-26. WIRING HARNESS MAINTENANCE INSTRUCTIONS - continued

a. Removal

1 Remove two machine screws (1), two flat washers (2), and two clamps (3) from housing (4).

2 Remove wiring harness (5).

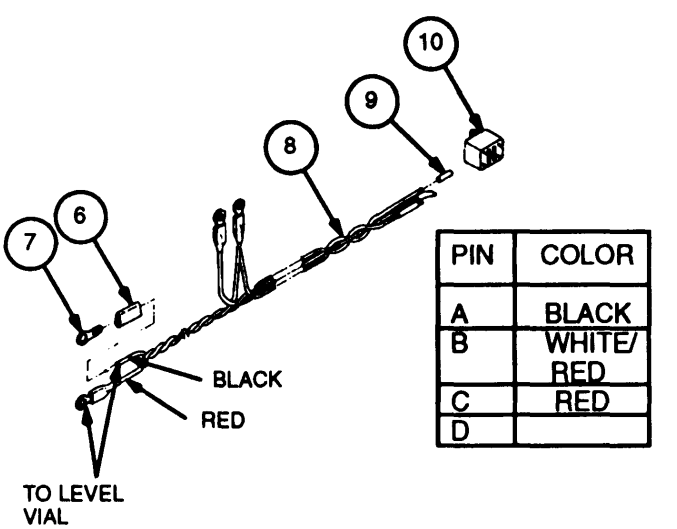


b. Disassembly

1 Remove four pieces of insulation sleeving (6) and unsolder four lug terminals (7) from cable assembly (8).

2 Remove three pieces of insulation sleeving (9) from cable assembly (8).

3 Using tape, tag and unsolder three wires from receptacle connector (10).



PIN	COLOR
A	BLACK
B	WHITE/ RED
C	RED
D	

c. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

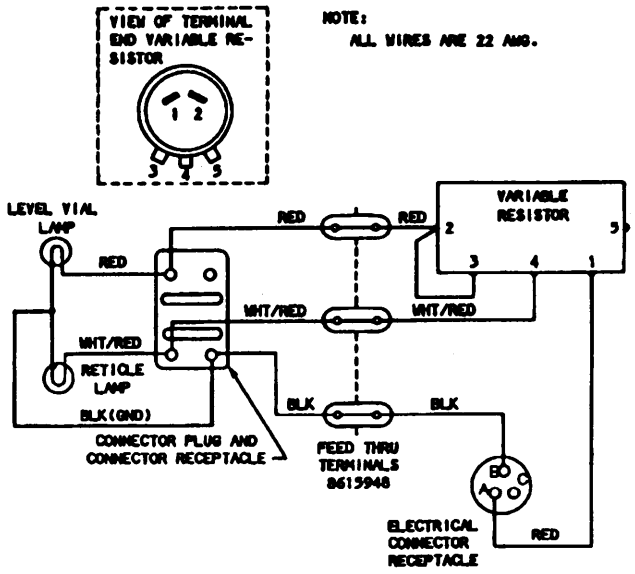
d. Assembly

1 Cut three pieces of insulation sleeving (9) and slide over three wires of cable assembly (8).

2 Solder three wires to receptacle connector (10) using solder and flux. Remove tags.

3 Cut four pieces of insulation sleeving (6) and slide over four wires of cable assembly (8).

4 Solder four lug terminals (7) to four wires of cable assembly (8) using solder and flux.

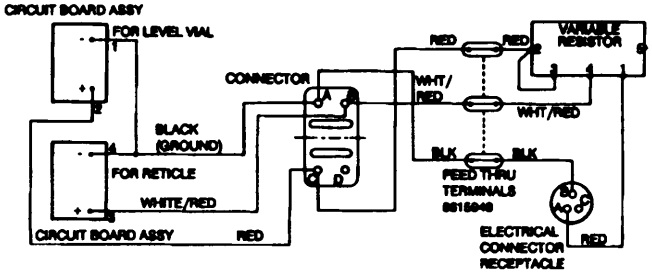


M118A2 ELBOW TELESCOPE WIRING DIAGRAM

e. Installation

1 Position wiring harness (5) in housing (4).

2 Secure wiring harness (5) with two clamps (3), two flat washers (2), and two machine screws (1).



M118A3 ELBOW TELESCOPE WIRING DIAGRAM

3-27. OBJECTIVE AND DIAPHRAGM SUBASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Tubular spanner wrench, 2 and 2-1/64 inch (Item 33, appx F)

References

TM 9-254

Equipment Condition

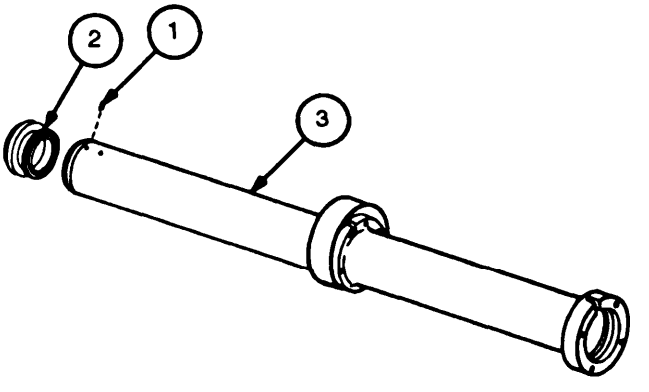
M118A2/M118A3 elbow telescope removed from howitzer (TM 9-2350-311-10)

Elbow telescope subassembly, eyepiece and erector lens subassembly removed from M118A2/M118A3 elbow telescope (ref. para 3-21)

a. Disassemble

1 Remove setscrew (1).

2 Using 2 and 2-1/84 inch tubular spanner wrench, remove cell assembly (2) from tube assembly (3).



b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly

1 Using 2 and 2-1/84 inch tubular spanner wrench, install cell assembly (2) in tube assembly (3).

2 Install setscrew (1) to secure cell assembly (2).

Section VI. General Support Final Inspection Procedures

3-28. GENERAL

a. This section describes and illustrates the final inspection of the M118A2/M118A3 elbow telescope. A final inspection will be performed prior to returning the M118A2/M118A3 elbow telescope to the using unit or to the supply system.

b. If the M118A2/M118A3 elbow telescope being inspected fails to meet the required standards, ensure all maintenance authorized at the applicable level has been performed correctly. Then send the M118A2/M118A3 elbow telescope to the next higher level of maintenance.

c. The M118A2/M118A3 elbow telescope must be purged and charged (TM 750-116) whenever the seal is broken.

3-29. M118A2/M118A3 ELBOW TELESCOPE FINAL INSPECTION AND ADJUSTMENT

This task covers:

a. Setting up telescope fixture

b. Installing M118A2//M118A3 elbow telescope on telescope fixture

c. Parallax adjustment

d. Eyepiece focus adjustment

e. Reticle accuracy inspection

f. Collimation inspection

g. Level adjustment

h. Wormshaft assembly knob torque inspection

INITIAL SET-UP

Test Equipment

Fixture, telescope, with accessories carrying case 5800954

Projector, collimating (Item 21, appx F)

Telescope, collimating (Item 23, appx F)

Tools and Special Tools

Eccentric tool, fabricated (fig. C-3, appx C)

Tool Kit, Electronic System, Repair, Field Maintenance(SC5180-95-CL-B29)
5180-01-168-0487

Torque adapter (Item 9, appx F)

Torque wrench (in-lb) (Item 36, appx F)

Tubular spanner wrench, 1-7/16 and 1-29/64 inch (Item 30, appx F)

Tubular spanner wrench, 2 and 2-1/64 inch (Item 33, appx F)

Materials/Parts

Sealing compound (Item 13, appx B)
Sealing compound (Item 15, appx B)

References

TM 750-116

Equipment Conditions

M118A2/M118A3 elbow telescope removed from howitzer (TM 9-2350-311-10)

3-29. M118A2/M118A3 ELBOW TELESCOPE FINAL INSPECTION AND ADJUSTMENT - continued

a. SETTING UP TELESCOPE FIXTURE

1 Place telescope fixture (1) on a level surface at a height suitable for viewing through telescopes.

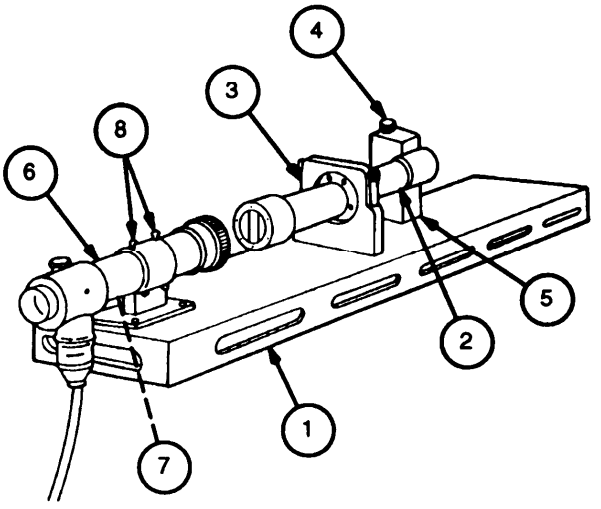
2 Place test bar assembly (2) in position on telescope fixture (1), making certain that the test bar spherical ring is seated in the forward clamping block (3).

3 Insert tapered pin (4) through adapter block (5) and into test bar assembly (2). Secure tapered pin (4).

4 Install collimating projector (6) in its holder on telescope fixture (1), with vertical reticle line approximately plumb.

5 Remove diffusion disk (7) from collimating projector (6).

6 View through the collimating projector (6) and ensure the horizontal and vertical lines of the collimating projector (6) reticle, as reflected by the mirror in the test bar assembly (2), are superimposed on each other. If not, adjust screws (8) on collimating projector (6) holder until the lines are superimposed.



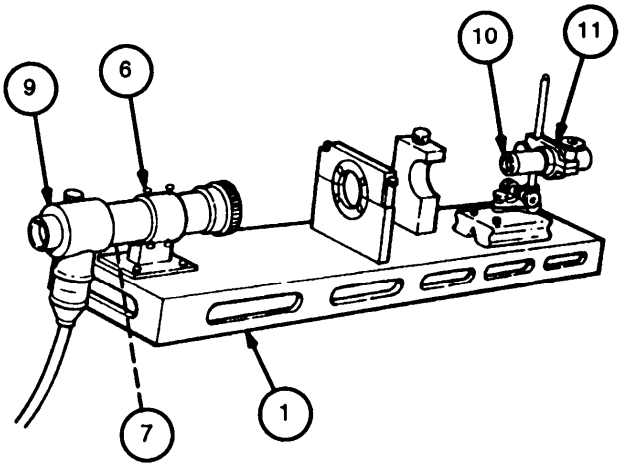
7 Remove test bar assembly (2) from telescope fixture (1).

8 Replace diffusion disk (7) in collimating projector (6). Replace light source (9).

9 Install collimating telescope (10) in collimating telescope holder (11).

10 Adjust height of collimating telescope (10) until reticle crosslines are superimposed on the reticle crosslines of collimating projector (6).

11 Suspend plumbline to one side of telescope fixture (1), approximately 30 feet (9.14 m) from collimating telescope (10).



12 Turn collimating telescope holder (11) and collimating telescope (10) toward plumbline until reticle crossline intersection point is superimposed on plumbline.

13 Revolve collimating telescope holder (11) and collimating telescope (10) until vertical reticle line is superimposed on plumbline. Secure collimating telescope (10) in this position.

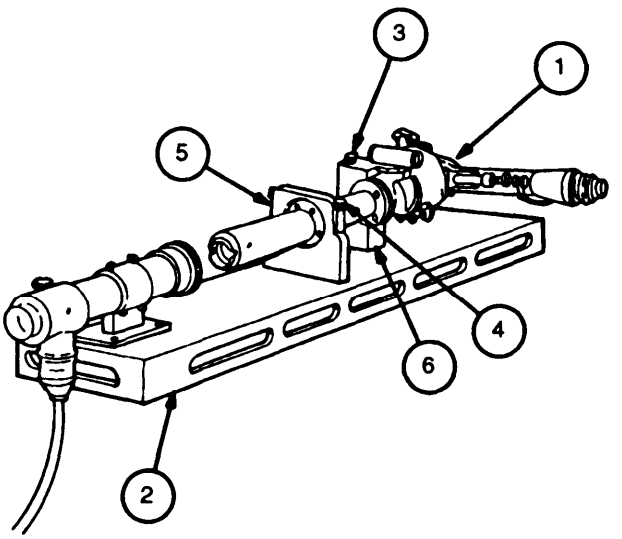
14 Turn collimating telescope holder (11) and collimating telescope (10) back until vertical reticle line is superimposed on vertical reticle line of collimating projector (6).

15 If not superimposed, revolve collimating projector (6) until vertical lines are superimposed. Secure collimating projector (6) in this position.

16 Set collimating projector (6) to 600-meter (650-yard) parallax setting.

b. INSTALLING M118A2/M118A3 ELBOW TELESCOPE ON TELESCOPE FIXTURE

1 Check that mating surfaces are free of dirt, burrs, and other imperfections which may interfere with proper seating, then install M118A2/M118A3 elbow telescope (1) on telescope fixture (2).



2 Insert tapered pin (3) through adapter block (4) and into M118A2/M118A3 elbow telescope (1), making certain the telescope spherical ring is seated in forward clamping block (5).

3 Secure tapered pin (3).

4 Position top holder of forward clamping block (5) with two special screws (6). Allow bearing of M118A2/M118A3 elbow telescope to rotate in clamping block.

3-29. M118A2/M118A3 ELBOW TELESCOPE FINAL INSPECTION AND ADJUSTMENT - continued

c. PARALLAX ADJUSTMENT

1 View through M118A2/M118A3 elbow telescope eyepiece (1) and move head from side to side. Apparent movement between telescope reticle crosslines and target image should not exceed 0.15 mil (the width of reticle line) as measured on collimating projector (2) reticle.

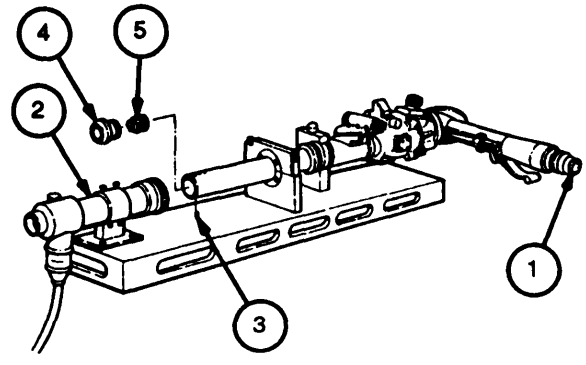
2 If error exists, remove setscrew (3).

3 Using 2 and 2-1/64 inch tubular spanner wrench (Item 33, appx F), remove cell assembly (4).

4 Using 1-7/16 and 1-29/64 inch tubular spanner wrench (Item 30, appx F), make adjustment to cell (5) by rotating cell (5) until reticle crosslines are parallel.

5 Install cell assembly (4) using 2 and 2-1/64 inch tubular spanner wrench (Item 33, appx F).

6 Install setscrew (3).



d. EYEPIECE FOCUS ADJUSTMENT

1 Rotate eyepiece of dioptometer (1) until reticle lines of dioptometer are in sharp focus.

2 Place dioptometer (1) in front of M118A2/M118A3 elbow telescope eyepiece (2).

3 Look through dioptometer (1) and slide dioptometer objective back and forth until M118A2/M118A3 elbow telescope reticle lines appear sharp and clear.

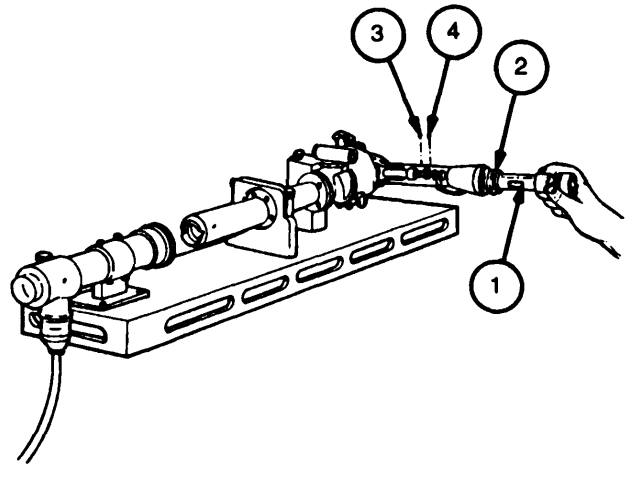
4 Remove dioptometer (1), without disturbing its setting, and note reading on side of dioptometer. Eyepiece focus, as indicated on dioptometer (1), should be-0.75 to-1.0 diopter.

5 If error exists, remove setscrews (3 and 4) from eyepiece arm.

6 Make adjustment to cell assembly through hole where larger setscrew (4) was removed.

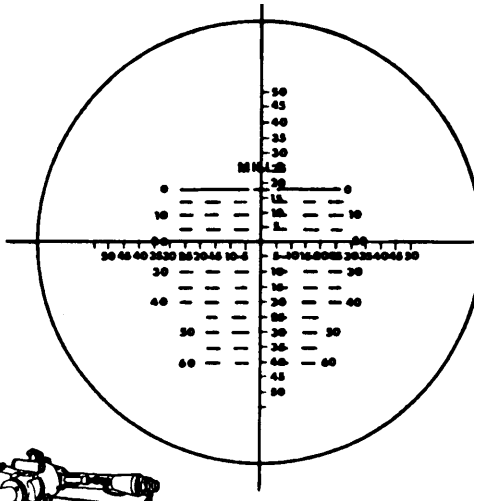
7 Recheck eyepiece focus.

8 Install setscrews (3 and 4). Do not overtighten.



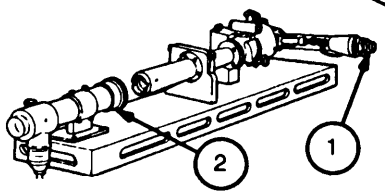
9 Apply sealing compound (item 13, appx B) to setscrew holes.

e. RETICLE ACCURACY INSPECTION



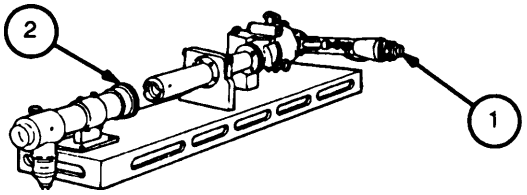
1 View through M118A2/M118A3 elbow telescope eyepiece (1). Check that angular value between zero range mark and maximum range mark (60-mil line) is 60 ± 0.5 mils. Check that boresight mark of the M118A2/M118A3 elbow telescope reticle is on the plus 20-mil mark of the collimating projector (2) and the 60-mil mark of the M118A2/M118A3 elbow telescope reticle is on the 40-mil mark of the collimating projector (2).

2 If error exists, send M118A2/M118A3 elbow telescope to depot maintenance.



f. COLLIMATION INSPECTION

View through M118A2/M118A3 elbow telescope eyepiece (1) and check that the boresight mark is 20 roils (± 1 roil) above the geometric axis of the target of collimating projector (2) and that the vertical reticle line is in coincidence with the vertical target line within 0.5 mil.



g. LEVEL ADJUSTMENT

1 Check that level (1) vial bubble is within the center graduation marks of the level(1) vial.

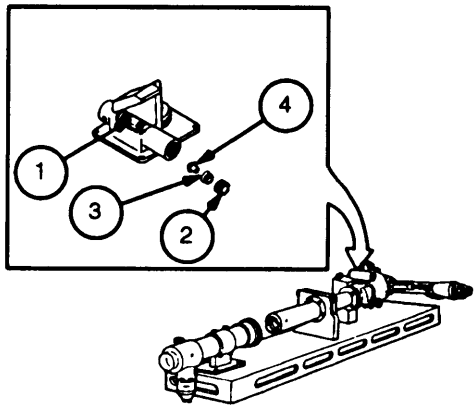
2 Loosen threaded ring (2).

3 Engage fabricated eccentric tool into holder (3) and threaded ring (2).

4 Insert a straight blade screwdriver through the center hole in the eccentric tool.

5 Adjust cam (4) until level vial bubble is centered.

6 Tighten threaded ring (2), being careful not to disturb setting of level vial.

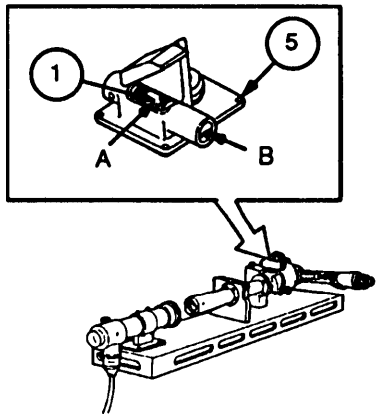


3-29. M118A2/M118A3 ELBOW TELESCOPE FINAL INSPECTION AND ADJUSTMENT - continued

g. LEVEL VIAL ADJUSTMENT - continued

7 Apply sealing compound (item 15, appx B) in space (A) between brass portion of level (1) vial assembly and mount.

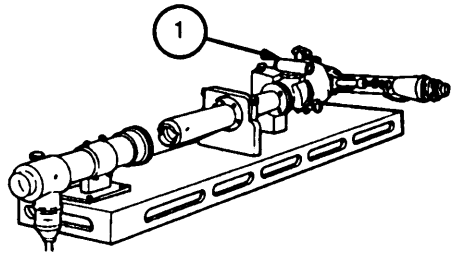
8 Apply sealing compound (item 13, appx B) to slot (B) of plug and threads of mount (5).



h. WORMSHAFT ASSEMBLY KNOB TORQUE INSPECTION

1 With level vial bubble centered and eyepiece arm vertical, use torque adapter (8599927) and torque wrench on wormshaft assembly knob (1), check that running torque is between 6 and 10 pound-inches (0.67 and 1.13 N-m). Rotate wormshaft assembly knob (1) one turn in each direction.

2 If torque requirement is not met in step 1, repair wormshaft assembly (ref. para 3-15).



Section VII. General Support Leak Test Procedures

3-30. MI18A2/M118A3 ELBOW TELESCOPE LEVEL ASSEMBLY LEAKAGE TEST

INITIAL SET-UP

Tools and Special Tools

Adapter, leak test, fabricated (fig. C-1, appx C)

Purging kit (Item 22, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Materials/Parts

Nitrogen, technical (Item 8, appx B)
Wiping rag (Item 12, appx B)

Equipment Condition

M118A2/M1 18A3 elbow telescope removed from howitzer (TM 9-2350-311-10)

Level assembly removed, M118A3 (ref. para 3-18)
Level assembly removed, M118A2 (ref. para 3-19)

1 Secure pressure regulator (1) to a tank containing pressurized nitrogen.

CAUTION

If registered pressure is 100 psi (689.48 kPa) or less, obtain a replacement.

2 Open nitrogen tank valve (2) and observe pressure gage (3). Gage should indicate pressure in nitrogen tank.

3 Adjust pressurized regulator by rotating handle (4) until pressure gage (5) indicates 5 psi (34.47 kPa).

4 Close nitrogen tank valve (2).

CAUTION

Circuit card assembly must be removed from M1 18A3 elbow telescope level assembly prior to securing on fabricated leak test adapter (ref. para 3-1 8).

5 Secure level assembly (6) to fabricated leak test adapter (7) with four machine screws (8) and four wing nuts (9).

6 Connect hose assembly (10)to the inlet port (11) on fabricated leak test adapter (7).

7 Open nitrogen tank valve (2).

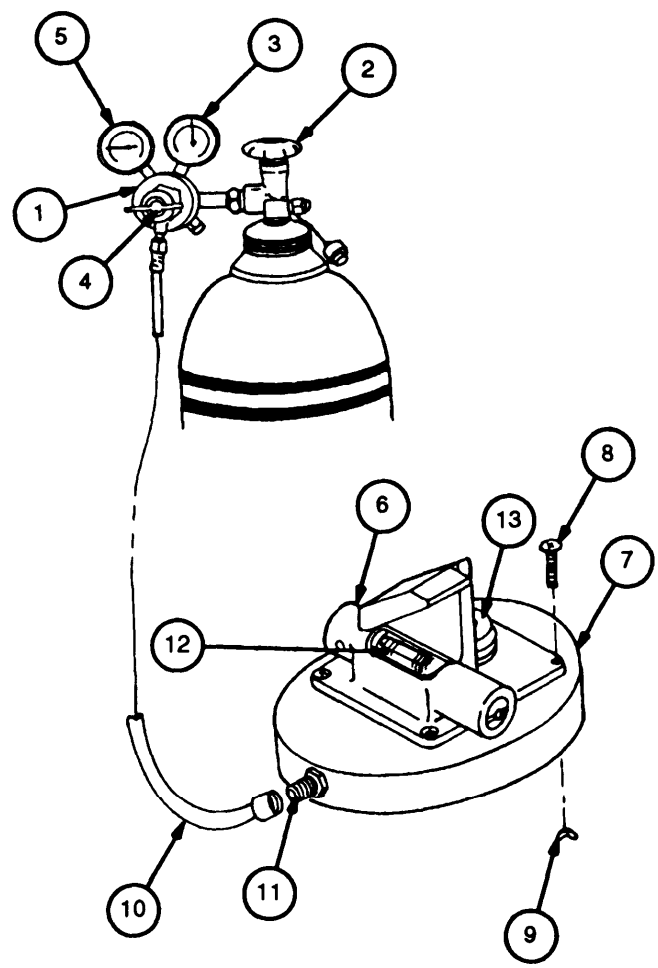
8 Adjust handle (4) counterclockwise until 1 psi (6.89 kPa) is registered on the low pressure gage (5).

9 Maintain a 1-psig (6.89-kPa) pressure for 10 seconds; then adjust handle (4) clockwise to the closed position.

10 Disconnect hose assembly (10) from the inlet port (11) and lay hose assembly (10) aside.

11 Completely immerse level assembly (6) and fabricated leak test adapter (7) in a container of clear water.

12 While level assembly is immersed inspect the areas around the level (12) vial and lamp shell (13) for air bubbles that indicate pressure leaks.



3-30. M118A2/M118A3 ELBOW TELESCOPE LEVEL ASSEMBLY LEAKAGE TEST - continued

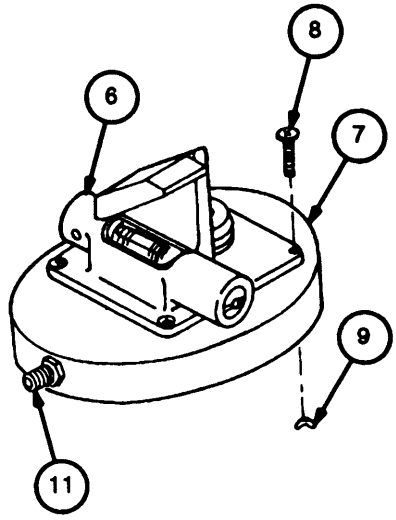
13 Remove level assembly (6) and fabricated leak test adapter (7) from the container of clear water.

14 Release pressure from fabricated leak test adapter (7) at inlet port (11).

15 Remove four wing nuts (9), four machine screws (8), and level assembly (6) from fabricated leak test adapter (7).

16 If air bubbles were detected, repair level assembly (ref. para 3-18 for Ml 18A3; para 3-19 for M118A2) and repeat the level assembly leakage test.

17 If air bubbles were not detected, use a clean, dry wiping rag to dry level assembly.



3-31. M118A2 ELBOW TELESCOPE COVER ASSEMBLY LEAKAGE TEST

INITIAL SET-UP

Tools and Special Tools

Adapter, leak test, fabricated (fig. C-1 appx c)

Purging kit (Item 22, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29) 5180–01-168-0487

Materials/Parts

Nitrogen, technical (Item 8, appx B)
Wiping rag (Item 12, appx B)

Equipment Condition

Ml 18A2/M1 18A3 elbow telescope removed from howitzer (TM 9-2350-311-10)

Cover assembly removed, M118A2 (ref. para 3-17)

1 Secure pressure regulator(1) to a tank containing pressurized nitrogen.

CAUTION

If registered pressure is 100 psi (689.48 kPa) or less, obtain a replacement.

2 Open nitrogen tank valve (2) and observe pressure gage (3). Gage should indicate pressure in nitrogen tank.

3 Adjust pressure regulator (1) by rotating handle (4) until pressure gage (5) indicates 5 psi (34.47 kPa).

4 Close nitrogen tank valve (2).

5 Install preformed packing on bottom of cover assembly (6).

6 Secure cover assembly (6) to fabricated leak test adapter (7) with four machine screws (8) and four wing nuts (9).

7 Connect hose assembly (10) to inlet port(11) on fabricated leak test adapter (7).

8 Adjust handle (4) counterclockwise until 1 psig (6.89 kPa) is registered on the low pressure gage (5).

9 Maintain a 1 psig (6.89-kPa) pressure for 10 seconds, then turn handle (4) clockwise to the closed position.

10 Disconnect hose assembly (10) from the inlet port (11) and lay hose assembly (10) aside.

11 Completely immerse cover assembly (6) and fabricated leak test adapter (7) in a container of clear water.

12 While cover assembly (6) is immersed, inspect the area around the lamp shell (12) for air bubbles that indicate a pressure leak.

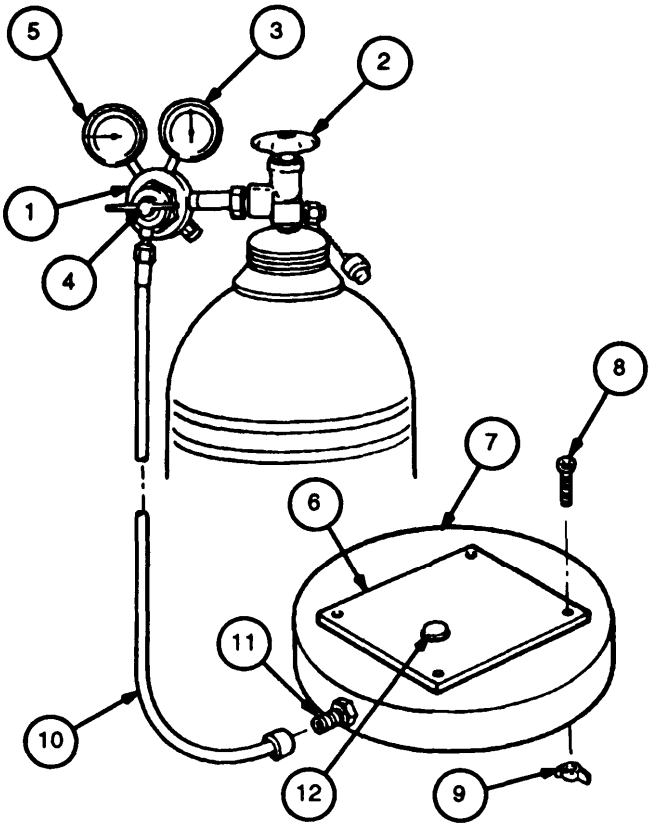
13 Remove cover assembly (6) and fabricated leak test adapter (7) from the container of clear water.

14 Release pressure from fabricated leak test adapter (7) at inlet port (11).

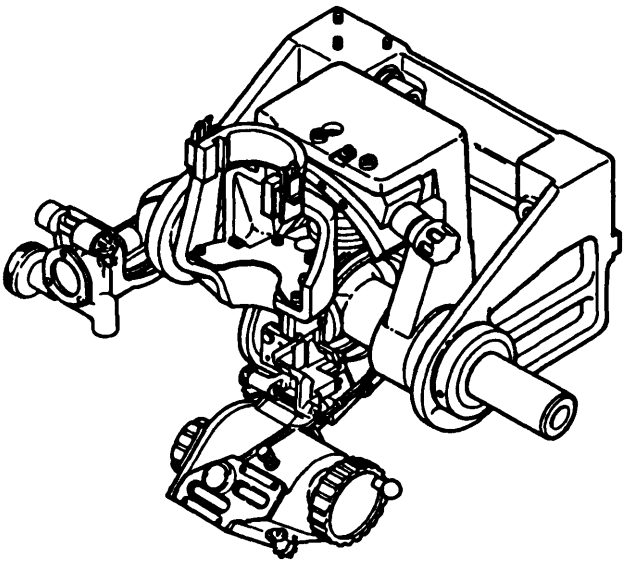
15 Remove four wing nuts (9), four machine screws (8), and cover assembly (6) from fabricated leak test adapter (7).

16 If air bubbles were detected, repair cover assembly (ref. para 3-17) and repeat the cover assembly leakage test.

17 If air bubbles were not detected, use a clean, dry wiping rag to dry cover assembly.



CHAPTER 4
M145/M145A1 TELESCOPE MOUNT MAINTENANCE INSTRUCTIONS



CHAPTER OVERVIEW

This chapter contains maintenance procedures for the M145/M145A1 telescope mount. Information on repair parts and special tools, troubleshooting, and maintenance of the M145/M1 45A1 telescope **mount are included.**

CHAPTER INDEX

CHAPTER INDEX - continued

Section I. Repair Parts; Special Tools; Test, Measurement, and Diagnostic Equipment (TMDE); and Support Equipment

4-1. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE), CTA 50-970, applicable to your unit.

4-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special tools, TMDE, and support equipment required and authorized for repair of the M145/M145A1 telescope mount are listed in the repair parts and special tools list, appendix D.

4-3. REPAIR PARTS

Spares and repair parts are listed and illustrated in the repair parts and special tools list, appendix D. Fabricated tools are listed in appendix C.

Section II. Inspections

4-4. GENERAL

a. Inspection is performed primarily to determine the following

(1) Completeness.

(2) The nature of unserviceability.

(3) The work, repair parts, and supplies required to return the materiel to serviceability.

(4) That the work in process is being performed properly.

(5) That completed work complies fully with serviceability standards.

b. The M145/M145A1 telescope mount is considered serviceable when:

(1) It is complete and properly performs its intended function.

(2) All modification work orders (MWO's) have been applied.

(3) All defects disclosed by the inspection have been corrected.

c. DA Form 2408-5 and DA Form 2409 list applicable MWO's.

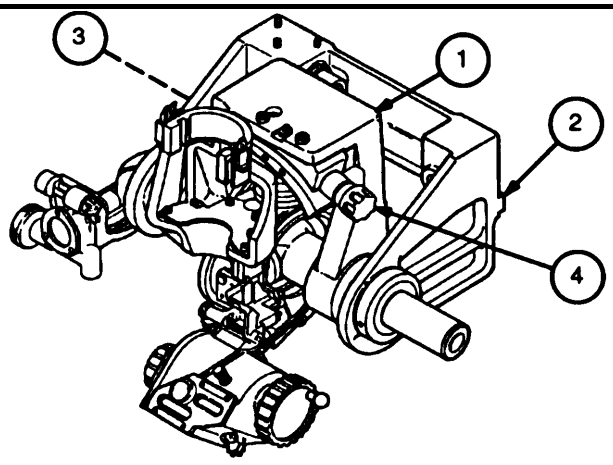
4-5. CATEGORIES OF INSPECTION

Categories of inspection define responsibilities:

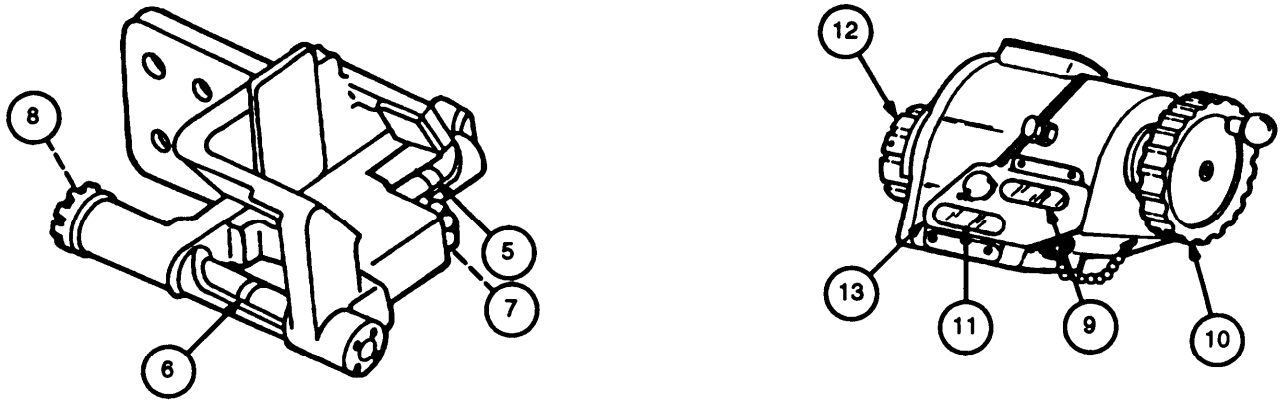
a. An initial inspection (ref. para 4-6 is performed immediately on receipt of the M145/M145A1 telescope mount for maintenance. This inspection will determine the amount and type of work to be performed or whether the M145/M145A1 telescope mount should be sent to depot maintenance.

b. A final inspection (ref. para 4-24) of the M145/M145A1 telescope mount is performed after repairs have been completed at general support maintenance to ensure the item meets serviceability standards.

4-6. INITIAL INSPECTION



Item No.	Item To Be Inspected	Procedures
1	M145/145A1 TELESCOPE MOUNT	Inspect M145/M145A1 telescope mount (1) for good overall appearance with all parts securely tightened in place.
2	MOUNTING SURFACES	Inspect mounting surfaces (2) for burrs and corrosion; must be free of burrs and corrosion.
3	DECAL AND IDENTI-CATION PLATE	Inspect decal and identification plate (3) for legibility; must be legible and clearly defined.
4	CROSS-LEVEL MECHANISN KNOB	Rotate cross-level mechanism knob (4). Cross-level mechanism knob must turn smoothly with 3 to 6 pound-inches (0.339 to 0.678 N–m) running torque. Backlash must not exceed 1.0 mil at 0 setting. Rotation of cross-level mechanism knob must move telescope socket 10° to right and 10° to left without binding.
5, 6	PITCH LEVEL AND CROSS-LEVEL	Check that pitch level (5) bubble and cross-level (6) bubble are centered within one graduation for each vial.
7, 8	LEDS	Check LEDS (7 and 8) to ensure light is sufficient to clearly define marking on level vials.
9	ELEVATION COUNTER	Operate mount through 1383 mils elevation and minus 50 roils depression. The elevation counter (9) must be accurate within 0.5 mil as read on gunner's quadrant.



Item No.	Item To Be Inspected	Procedures
10	ELEVATION HANDWHEEL	Check elevation handwheel (10) to ensure running torque is 8 to 12 pound-inches (0.904 to 1.356 N-m).
11	CORRECTION COUNTER	Check that correction counter (11) adds or subtracts an equal number of roils from the elevation counter (9).
12	CORRECTION KNOB	Check correction knob (12) to ensure running torque is 2 to 4 pound-inches (0.226 to 0.452 N-m).
13	OVERLAY ASSEMBLY	Check overlay assembly (13) to ensure light is sufficient to clearly define markings on counter.

Section Ill. Troubleshooting

4-7. GENERAL

a. The symptom index can be used as a quick guide to troubleshooting. Common malfunctions are listed in alphabetical order with a page number reference to the troubleshooting table, where a test or inspection and corrective action are provided.

b. The direct support troubleshooting table (ref. para 4-9) lists the common malfunctions which maybe found during maintenance of the M145/M145A1 telescope mount. Perform t he tests/inspections and corrective actions in the order listed.

c. The general support troubleshooting table (ref. para 4-11) lists the common malfunctions which maybe found during maintenance of the M145/M145A1 telescope mount. Perform the tests/inspections and corrective actions in the order listed.

d. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective action, notify depot maintenance.

4-8. DIRECT SUPPORT SYMPTOM INDEX

4-9. DIRECT SUPPORT TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION

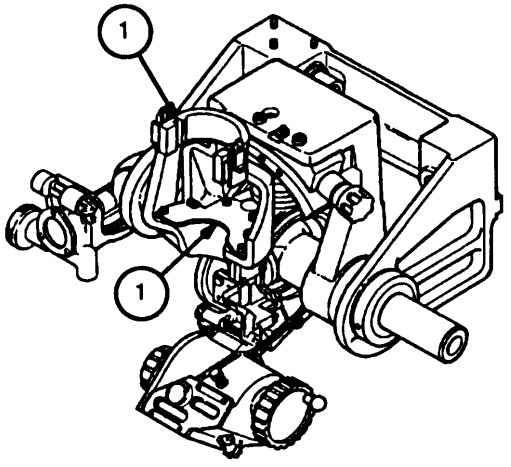
MOUNTING SURFACES

1. MOUNTING SURFACES (1) DO NOT SEAT M117/M117A2 PANORAMIC TELESCOPE CORRECTLY.

   Observe visually.

   a. Clean mounting surfaces with cleaning compound (item 3, appx B).

   b. Remove burrs with abrasive cloth (item 4, appx B) dipped in cleaning compound (item 3, appx B).



MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION

CROSS-LEVEL MECHANISM

2. CROSS-LEVEL MECHANISM KNOB(2) IS ERRATIC AND ROUGH DURING MOVEMENT.

Check for worn wormshaft.

Replace wormshaft assembly (ref. para 4-13).

3. CROSS-LEVEL MECHANISM KNOB (2) EXCEEDS 0.5 MIL BACKLASH.

Step 1. Check for worn bearings.

Replace wormshaft assembly (ref. para 4-13).

Step 2. Check for worn or bent wormshaft.

Replace wormshaft assembly (ref. para 4-13).

4. CROSS-LEVEL MECHANISM KNOB (2) REQUIRES TORQUE IN EXCESS OF 11 POUND-INCHES (1 .24 N-M) TO ROTATE.

Check for worn or bent wormshaft and/or bearings.

Replace wormshaft assembly (ref. para 4-13).

LEVEL ASSEMBLY

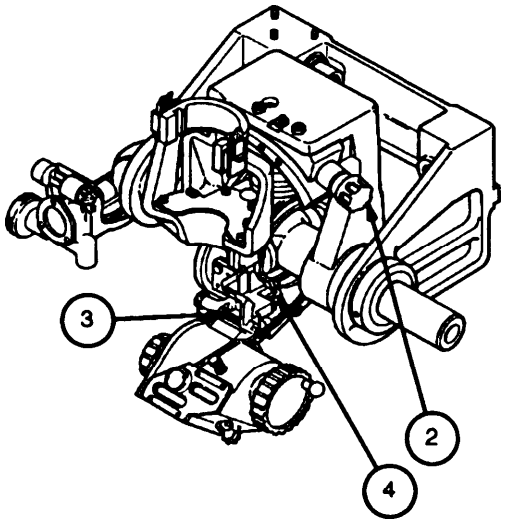
5. NO ILLUMINATION IN CROSS-LEVEL (3) OR PITCH LEVEL (4).

Observe visually.

a. Replace burned out LEDs (ref. para 4-15).

b. Replace defective toggle switch (ref. para 4-15).

c. Clean or replace defective lens cap (ref. para 4-15).



4-10. GENERAL SUPPORT SYMPTOM INDEX

4-11. GENERAL SUPPORT TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION

COUNTER BOX ASSEMBLY

1. ELEVATION HANDWHEEL (1) IS ERRATIC AND ROUGH DURING MOVEMENT.

   step 1. Check for worn wormshaft assembly.

   Notify depot maintenance.

   step 2. Check for worn gears.

   Notify depot maintenance.

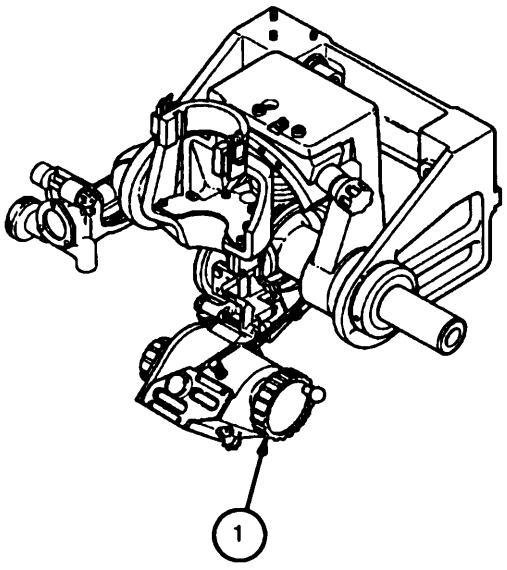
2. ELEVATION HANDWHEEL (1) EXCEEDS 0.5 MIL BACKLASH.

   step 1. Check for loose or worn bearings.

   Notify depot maintenance.

   Step 2. Check for worn wormshaft assembly.

   Notify depot maintenance.



MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION

3. ELEVATION HANDWHEEL (1) REQUIRES TORQUE IN EXCESS OF 11 POUND-INCHES (1.24 N-M) TO ROTATE.

Check for worn wormshaft and/or bearings.

Notify depot maintenance.

CROSS-LEVEL MECHANISM

4. CROSS-LEVEL MECHANISM KNOB (2) REQUIRES TORQUE IN EXCESS OF 11 POUND-INCHES (1.24 N-M) TO ROTATE.

Check v-bearing tightness.

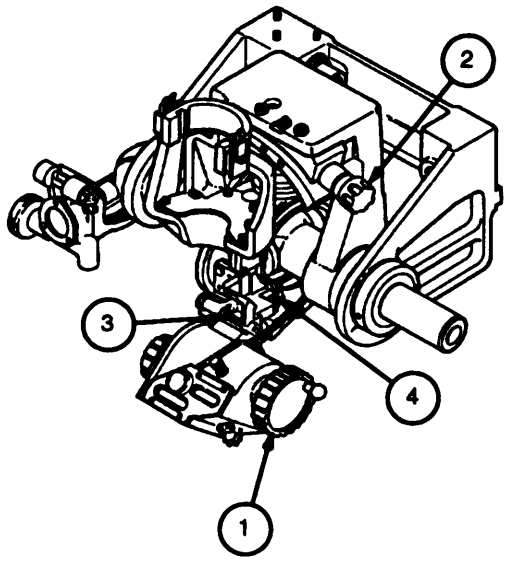
Adjust torque (ref. para 4-24j).

LEVEL ASSEMBLY

5. CROSS-LEVEL (3) BUBBLE OR PITCH LEVEL (4) BUBBLE DOES NOT CENTER WITHIN ONE GRADUATION.

Observe visually

Adjust levels (ref. para 4-24e).



Section IV. Direct Support Maintenance Procedures

4-12. GENERAL

LIST OF TASKS

Task No.	Task	Task Ref (Page)	Troubleshooting Ref No. (Page)
1	Maintain M145/M145A1 telescope mount assembly		4-6
	a. Disassemble	4-11	
	b. Repair	4-14	
	c. Assemble	4-14	
2	Maintain disk assembly		—
	a. Disassemble	4-18	
	b. Repair	4-19	
	c. Assemble	4-19	
	d. Adjust	4-20	
3	Maintain level assembly		4-7
	a. Remove	4-21	
	b. Disassemble	4-22	
	c. Repair	4-22	
	d. Assemble	4-23	
	e. Install	4-24	
	f. Adjust	4-24	
4	Maintain quadrant support assembly		—
	a. Disassemble	4-26	
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	c. Assemble	4-27	
	d. Adjust	4-28	
5	Maintain counter box assembly (knob)		—
	a. Disassemble	4-29	
	b. Repair	4-30	
	c. Assemble	4-30	

4-13. M145/M145A1 TELESCOPE MOUNT MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Soldering iron (Item 24, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance(SC5180-95-CL-B29)
5180-01-168-0487

Torque adapter (Item 6, appx F)

Torque wrench (Item 36, appx F)

Materials/Parts

Flux (Item 5, appx B)
Grease (Item 6, appx B)
Lockwashers (3) (Item 63, appx E)
Lockwashers (5) (Item 64, appx E)
Lockwashers (4) (Item 65, appx E)
Lockwashers (7) (Item 68, appx E)
Lockwashers (2) (Item 70, appx E)
Lockwashers (4) (Item 73, appx E)
Oil, lubricating (Item 9, appx B)
Sealing compound (Item 13, appx B)
Solder (Item 18, appx B)

References

TM 9-254

Equipment Condition

M145/M145A1 telescope mount installed on howitzer.

a. Disassembly

1 Remove three machine screws (1), three lockwashers (2), and plate insulator (3). Discard lockwashers.

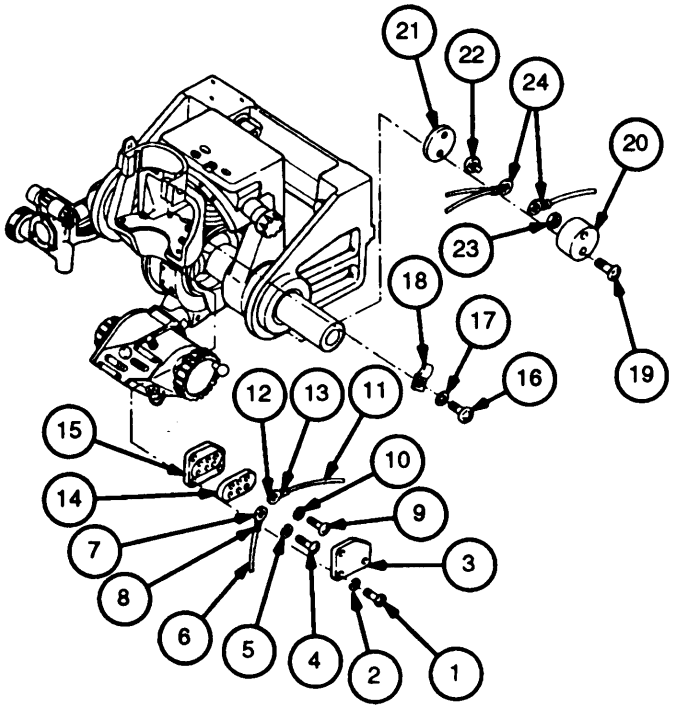
2 Remove three machine screws (4), three lockwashers (5), and three wires (6) with three lug terminals (7) and three sleeves (8) attached. Discard lockwashers.

3 Remove two machine screws (9), two lockwashers (10), two wires (11) with two lug terminals (12) and two sleeves (13) attached, plate (14), and plate insulator (15). Discard lockwashers.

4 Remove machine screw (16), lockwasher (17), and retaining strap (18). Discard lockwasher.

5 Remove two machine screws (19), disk insulator (20), and disk insulator (21).

6 Remove machine screw (22) and nut (23) from two lug terminals (24).



4–13. M145/M145A1 TELESCOPE MOUNT MAINTENANCE INSTRUCTIONS – continued

a. Disassembly-continued

7 Remove two machine screws (25), two lockwashers (26), and two retaining straps (27). Discard lockwashers.

8 Remove machine screw (28), lockwasher (29), and retaining strap (30). Discard lockwasher.

9 Remove three machine screws (31), plate (32), and toggle switch (33) as a unit.

10 Remove nut (34), washer (35), and plate (32) from toggle switch (33).

11 Unsolder wire (36) and wire (37) from toggle switch (33).

12 Remove cap screw (38), lockwasher (39), and lug terminal (40) with attached wire (41).

13 Remove two machine screws (42) and two clamps (43).

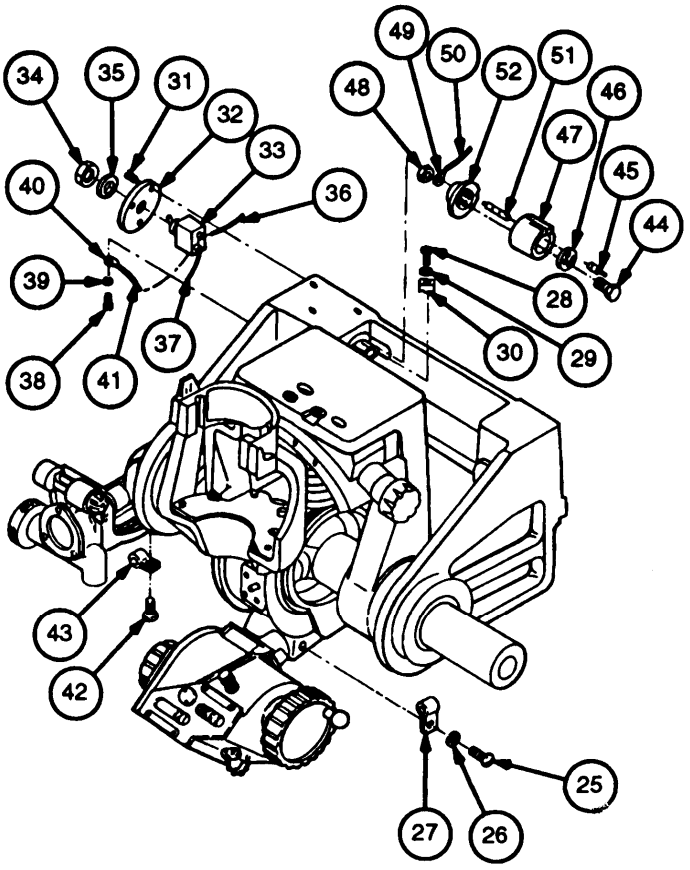
14 Remove machine screw (44), shoulder pin (45), plate (46), and receptacle shell (47).

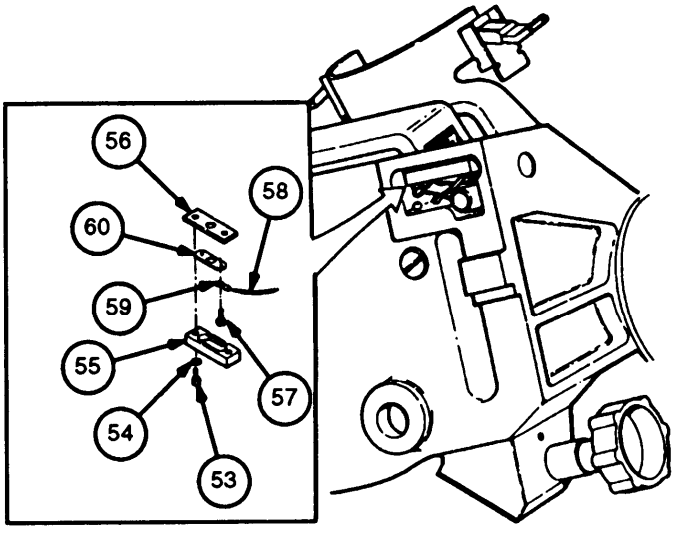
15 Remove two nuts (48) and two lug terminals (49) with wires (50) attached from two contacts (51).

16 Remove insulator (52) only if necessary for replacement.

17 Remove two cap screws (53), two lockwashers (54), plate insulator (55), and plate insulator (56). Discard lockwashers.

18 Remove two machine screws (57), two wires (58) with two lug terminals (59) attached, and plate (60).





19 Using a feeler gage, check the clearance between the cross-level mechanism (61) and the rocker assembly above the cross-level mechanism. Record the reading for use during installation of the cross-level mechanism (61) later.

20 Loosen nut (62) until it is flush with the end of tapered pin (63).

21 Tap nut (62) until sleeve bearing (64) and tapered pin (63) disengage.

22 Remove nut (62), sleeve bearing (64), and tapered pin (63) as a unit.

23 Remove two cap screws (65), two lockwashers (66), two cap screws (67), and two lockwashers (68). Discard lockwashers.

24 Tilt cross-level mechanism (61) forward until it clears rocker assembly and remove cross-level mechanism (61).

25 Remove two clamping catches (69) by removing two machine screws (70) and two lockwashers (71) for each clamping catch (69). Discard lockwashers.

26 Remove plug (72), spring (73), and V-bearing (74).

27 Remove gib key (75) and, if necessary, headless straight pin (76).

28 Remove two machine screws (77), two lockwashers (78), cross-level mechanism knob (79), and indicator (80). Discard lockwashers.

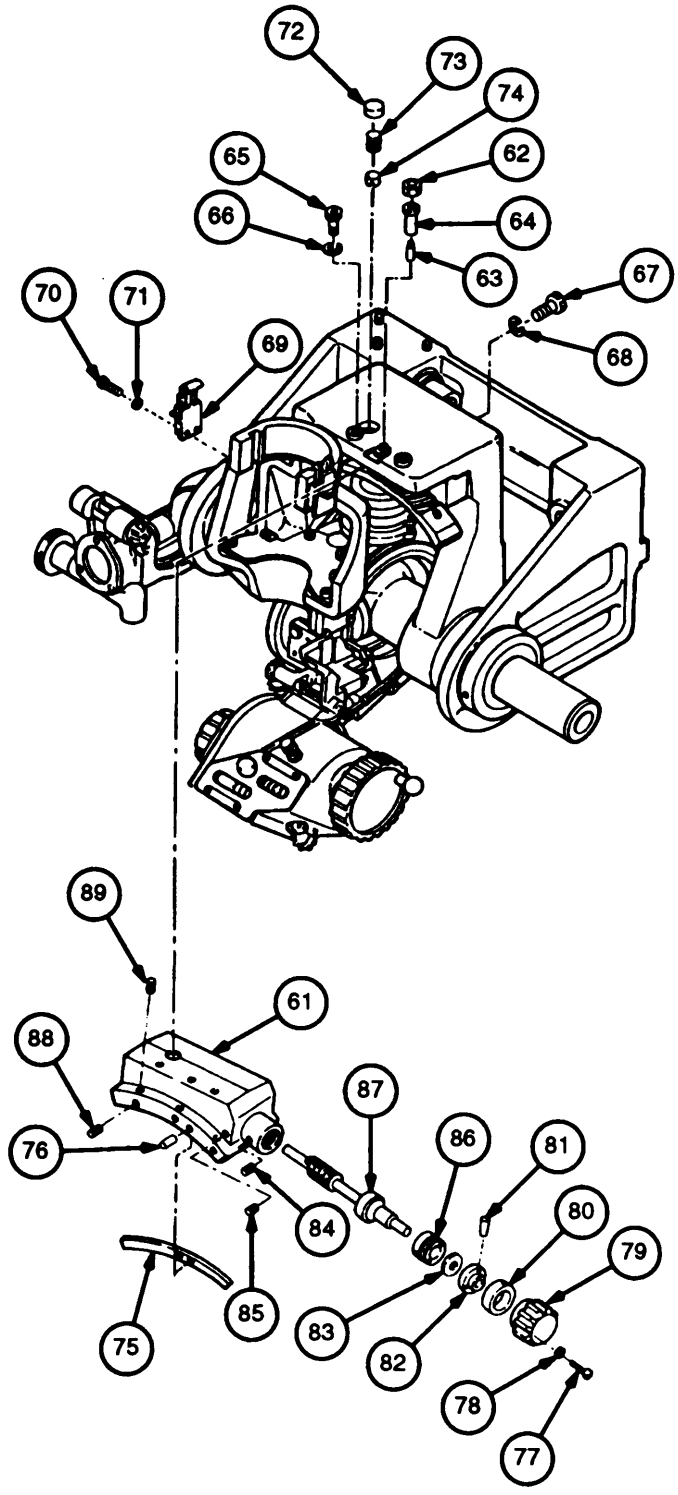
29 Remove tapered pin (81), body hub (82), and flat washer (83).

30 Remove setscrew (84) and setscrew (85).

31 Using adjustable spanner wrench, remove seat (86).

32 Remove wormshaft assembly (87) from cross-level mechanism (61).

33 If necessary for repair, remove three setscrews (88) and three setscrews (89).



4-13. M145/M145A1 TELESCOPE MOUNT MAINTENANCE INSTRUCTIONS - continued

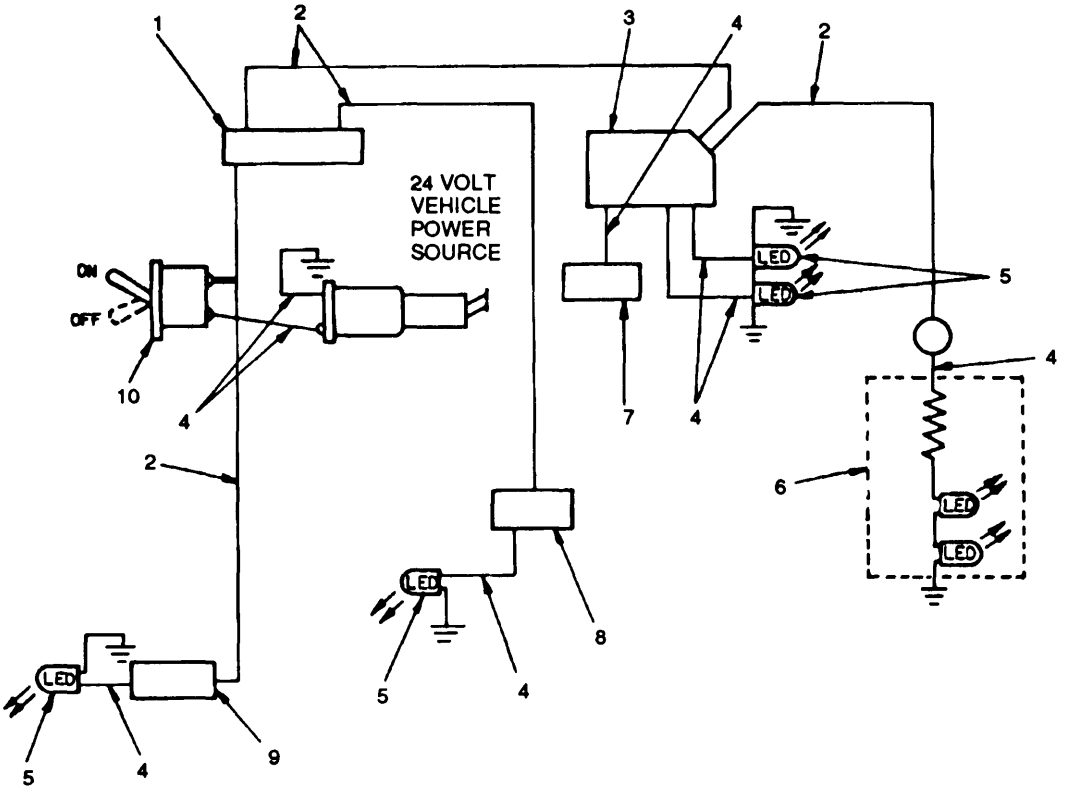
b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly



1. Plate 8267764
2. Cable MIL-M-13486/1-2
3. Insulator, plate 8267720
4. Wire, 26 AWG MIL-W-16878/5-EE26
5. LED, T1-3/4 based 12360905-2
6. Overlay assembly 12599271
7. Contact 8267774
8. Insulator, plate 8267771
9. Insulator, plate 8267763
10. Switch, toggle 11739570

M145/M145A1 TELESCOPE MOUNT ELECTRICAL SYSTEM

1 If removed, apply sealing compound to threads and install three setscrews (88) and three setscrews (89).

2 Apply grease to wormshaft assembly (87) and seat (86).

3 Install wormshaft assembly (87) in cross-level mechanism (61) and secure with seat (86) using adjustable spanner wrench.

4 Apply sealing compound to setscrew (84) and secure seat (86) with setscrew (84).

5 Apply sealing compound to threads and install setscrew (85).

6 Apply oil to flat washer (83) and install with body hub (82). Secure with tapered pin (81).

7 Install indicator (80), cross-level knob (79), two new lockwashers (78), and two machine screws (77).

8 If removed, install headless straight pin (76).

9 Apply grease to gib key (75) and install

10 Apply grease to the worm of segment assembly (90).

11 Rotate pitch knob (91) to move rocker assembly toward rear of M145/M145A1 telescope mount until rocker assembly makes contact with side of cross-level mechanism (61).

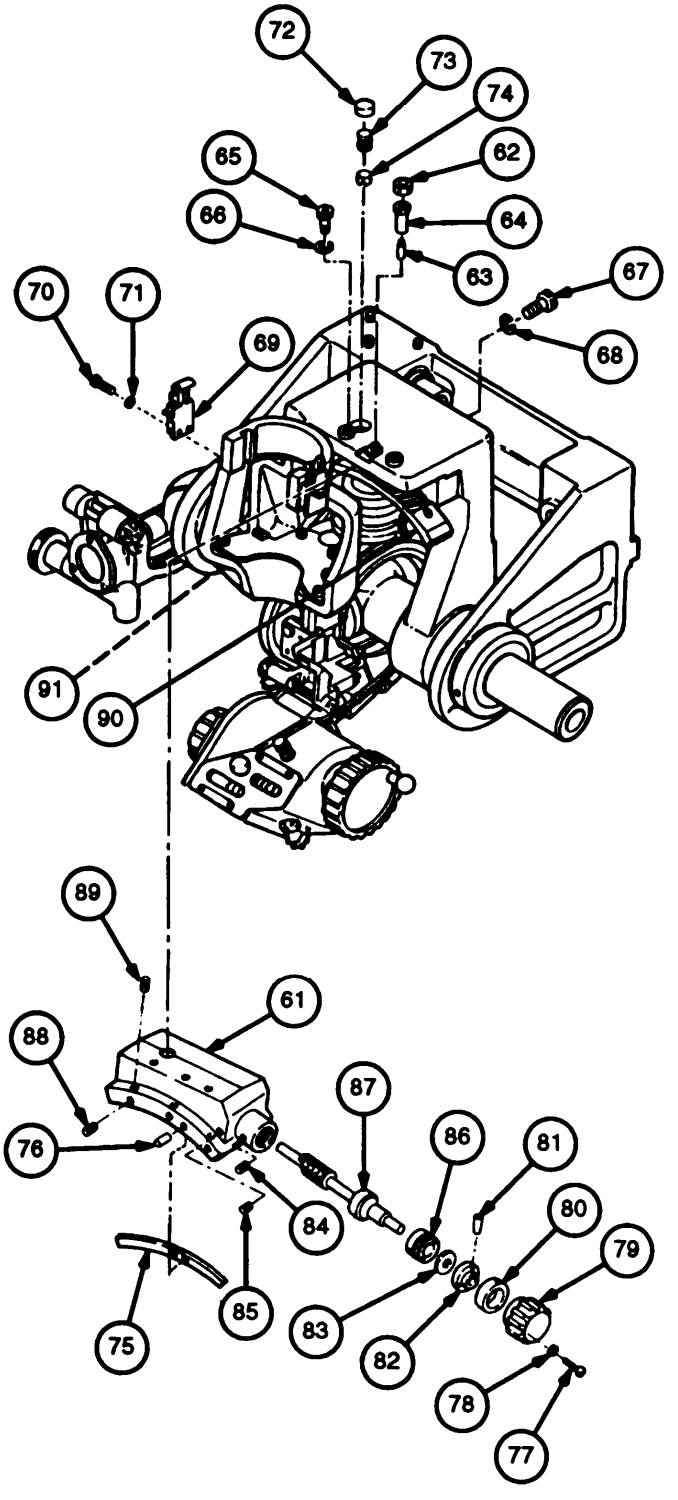
12 Install assembled cross-level mechanism (61) on segment assembly (90).

13 Install two cap screws (67), two new lockwashers (68), two cap screws (65), and two new lockwashers (66) snugly. Rotate cross-level mechanism knob (79) from stop to stop and return to center. Tighten four cap screws (65 and 67).

14 Install two clamping catches (69) using two new lockwashers (71) and two machine screws (70) for each clamping catch (69).

15 Install V-bearing (74), spring (73), and plug (72).

16 Install tapered pin (63), sleeve bearing (64), and nut (62).



4-13. M145/M145A1 TELESCOPE MOUNT MAINTENANCE INSTRUCTIONS - continued

c. Assembly - continued

17 Securely tighten cross-level mechanism knob (79).

18 With torque wrench and torque adapter (8599917), rotate cross-level mechanism knob (79) one turn clockwise and one turn counterclockwise.

19 Measure the torque required to turn cross-level mechanism knob (79). Adjust plug (72) to obtain 3 to 6 pound-inches (0.34 to 0.68 N-m) torque.

20 Install two lug terminals (59) with two wires (58) attached on plate (60) using two machine screws (57).

21 Assemble plate (60) between plate insulator (56) and plate insulator (55) and install on Ml 45/ Ml 45A1 telescope mount using two new lockwashers (54) and two cap screws (53).

22 Install insulator (52), if removed.

23 Install two lug terminals (49) with wires (50) attached on two contacts (51) with two nuts (48).

24 Install receptacle shell (47), plate (46), shoulder pin (45), and machine screw (44).

25 Install lug terminal (40) with attached wire (41) using new lockwasher (39) and cap screw (38).

26 Using solder and flux, solder wire (36) and wire (37) to toggle switch (33) (ref. TM 9-254).

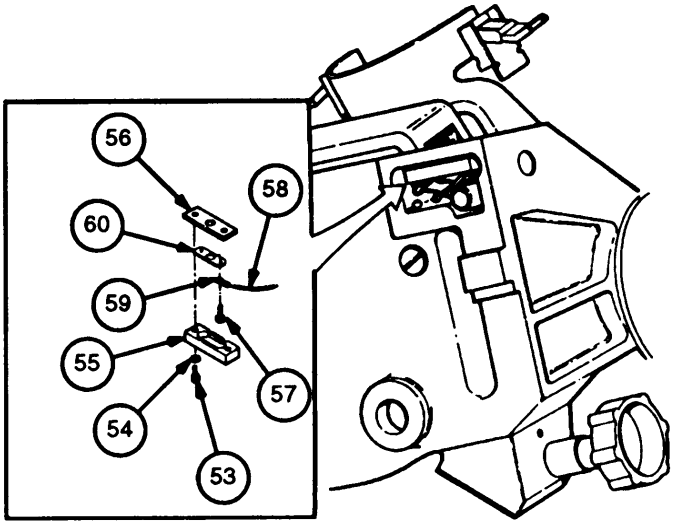
27 Install plate (32) on toggle switch (33) using washer (35) and nut (34).

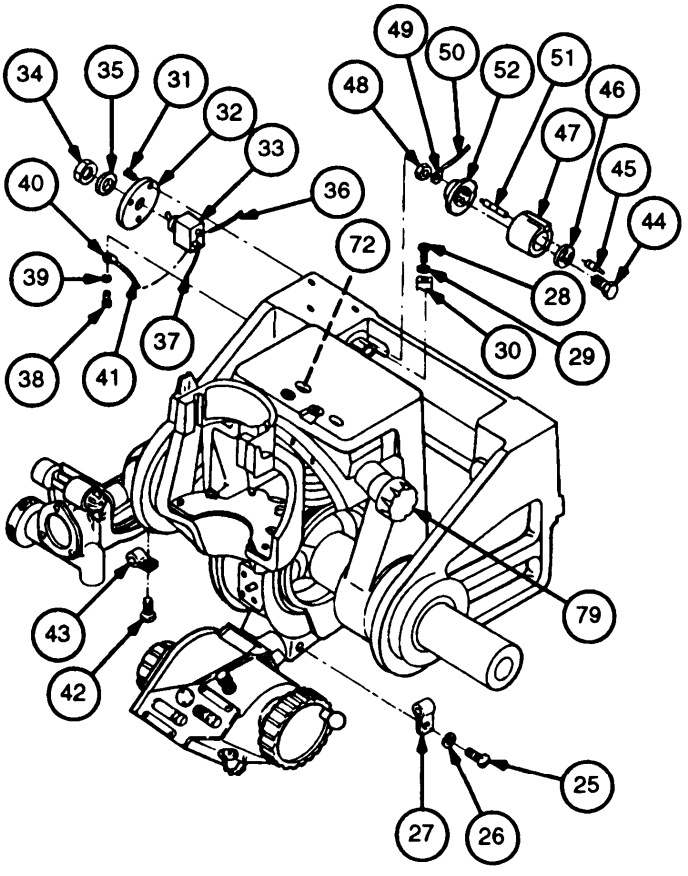
28 Install toggle switch (33) and plate (32) on mount using three machine screws (31).

29 Install retaining strap (30), new lockwasher (29), and machine screw (28).

30 Install two retaining straps (27), two new lockwashers (26), and two machine screws (25).

31 Install two clamps (43) and two machine screws (42).





32 Install two lug terminals (24), machine screw (22), and nut (23).

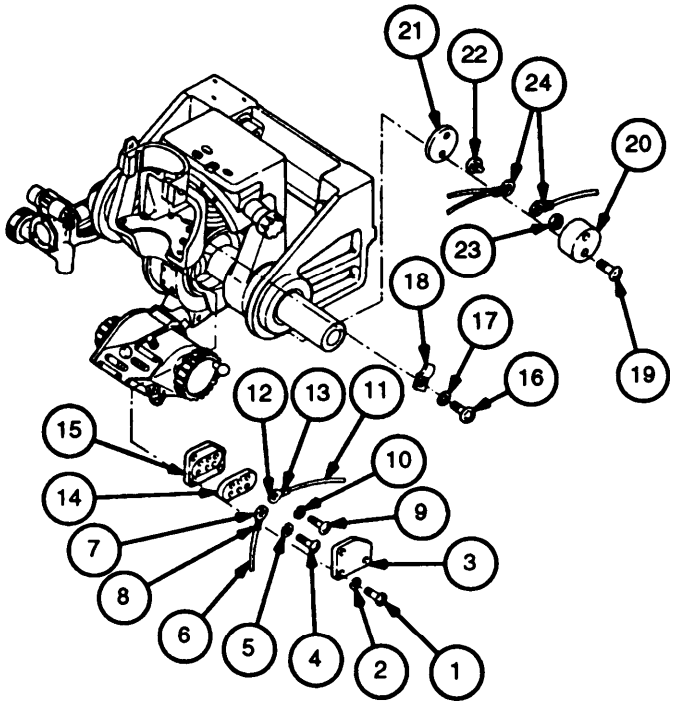
33 Install disk insulator (21) and disk insulator (20) using two machine screws (19).

34 Install retaining strap (18), new Iockwasher (17), and machine screw (16).

35 Install two lug terminals (12) with two sleeves (13) and two wires (11) attached to plate (14) using two machine screws (9) and two new Iockwashers (10).

36 Install three lug terminals (7) with three sleeves (8) and three wires (6) attached to plate (14) using three machine screws (4) and three new lock-washers (5).

37 Install plate (14) between plate insulator (15) and plate insulator (3) and install on M145/M145A1 telescope mount using three new Iockwashers (2) and three machine screws (1).



4-14. DISK ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly d. Adjustment

INITIAL SET-UP

Tools and Special Tools

Eccentric tool, fabricated (fig. C-3, appx C)

Perpendicularity gage 10559200 or parallel bar

Soldering iron (Item 24, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Tubular spanner wrench, 11/16 and 45/64 inch (Item 26, appx F)

Materials/Parts

Flux (Item 5, appx B)
Lockwasher (Item 63, appx E)
Lockwashers (6) (Item 64, appx E)
Sealing compound (Item 13, appx B)
Solder (Item 18, appx B)

References

TM 9-254

Equipment Condition

M145/M145A1 telescope mount installed on howitzer

4-14. DISK ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

[a. Disassembly 1

1 Remove threaded ring (1) using fabricated eccentric tool.

2 Remove cell (2).

3 Slide level (3) out of disk assembly (4), and remove cover (5).

4 Remove two machine screws (6 and 7) and two lockwashers (8 and 9). Discard lockwashers.

5 Remove plate insulator (10) and access cover(11) with related parts.

6 Unsolder wire (12) from lug terminal (13).

7 Remove machine screw (14), lockwasher (1 5), and hub clamp (16). Discard lockwasher.

8 Remove machine screw (17), lug terminal (13), and plate (18) from access cover (11).

9 Remove three machine screws (19), three lockwashers (20), and three retaining straps (21). Discard lockwashers.

10 Remove machine screw (22), lockwasher (23), and electrical cover (24). Discard lockwashers.

NOTE

Old disk assemblies contain lamps in place of LEDs.

11 Remove LED (25).

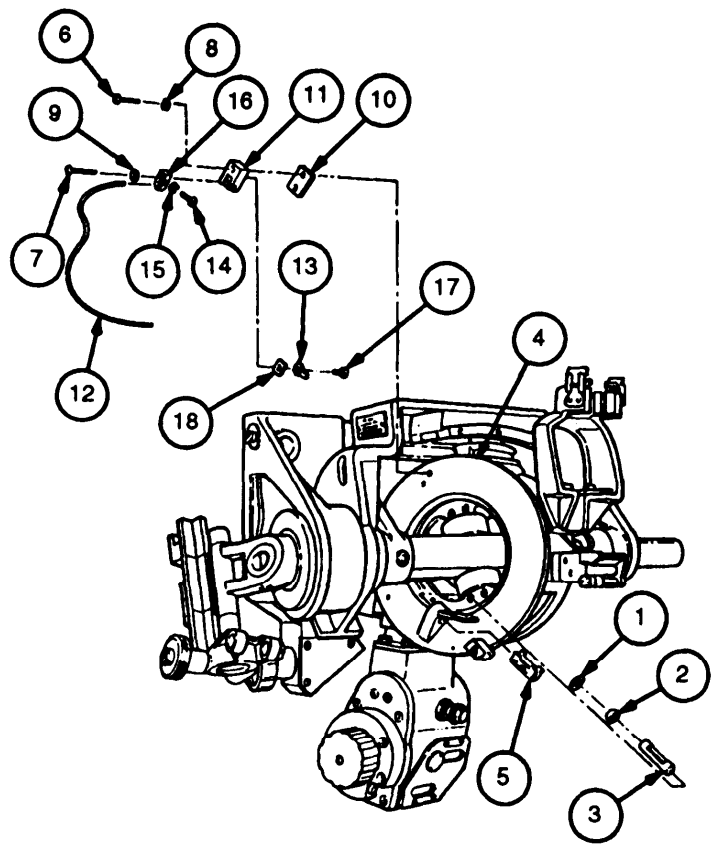
12 Using 11/16 and 45/64 inch tubular spanner wrench, remove threaded ring (26).

13 Remove electrical lead (27).

14 Remove two machine screws (28) and reflector (29), only if necessary for replacement.

15 Remove tapered pin (30), only if damaged.

16 Remove two rivets (31) and mirror (32), only if necessary for replacement.



b. Repair

1 Remove corrosion grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly

1 If removed, install tapered pin (30).

2 If removed, install mirror (32) using two rivets (31).

3 If removed, position reflector (29) on disk assembly (4) and secure with two machine screws (28).

4 Install electrical lead (27) with raised brass portion toward threaded ring (26).

5 Apply sealing compound to threaded ring (26).

6 Using 11/16 and 45/64 inch tubular spanner wrench, install threaded ring (26).

NOTE

Old disk assemblies contain lamps in place of LEDs.

7 Install LED (25).

8 Install electrical cover (24) and secure with new lockwasher (23) and machine screw (22).

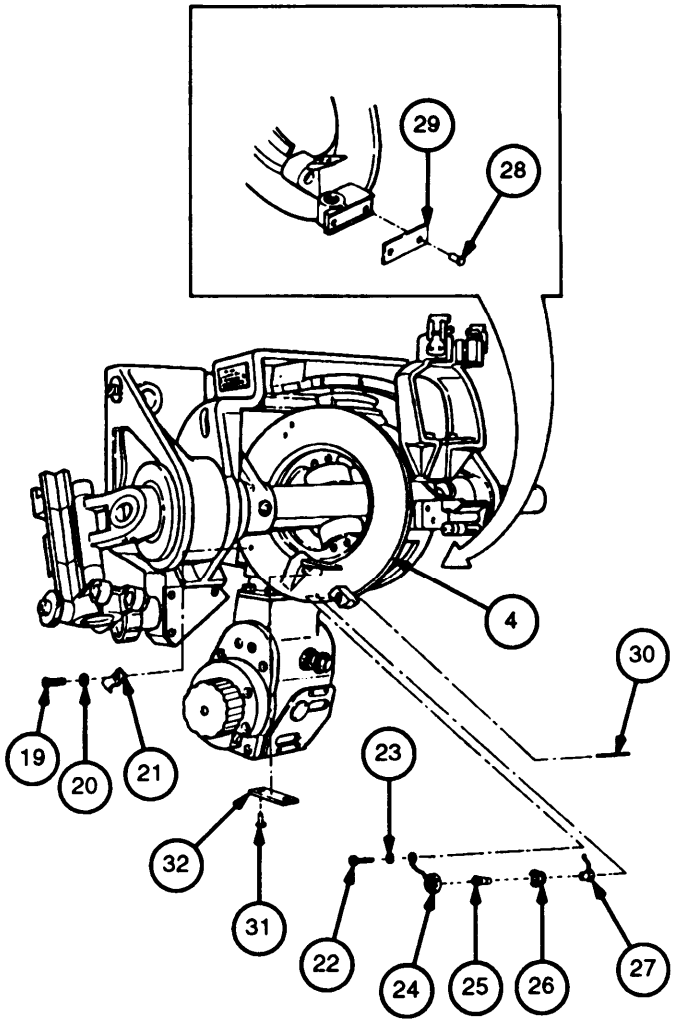
9 Using solder and flux, solder lug terminal (13) to wire (12).

10 Install lug terminal (13) and plate (18) on access cover (11) and secure with machine screw (17).

11 Install hub clamp (16) on access cover(11) and secure with new lockwasher (15) and machine screw (14).

12 Install access cover (11) and plate insulator (9) on disk assembly (4) and secure with two new lockwashers (8 and 9) and two machine screws (6 and 7).

13 Secure wire (12) to disk assembly (4) using three retaining straps (21), three new lockwashers (20), and three machine screws (19).

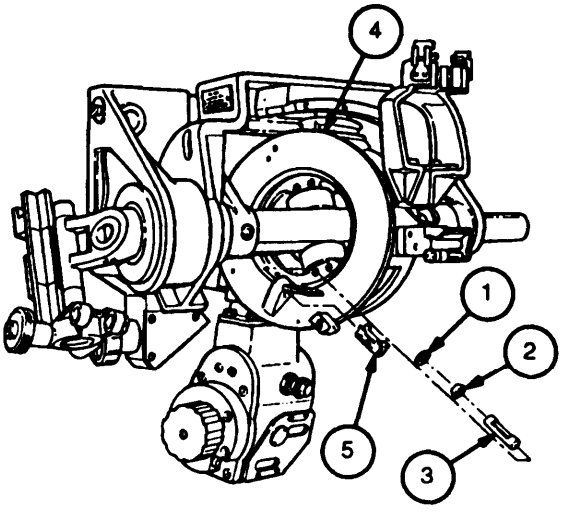


4-14. DISK ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

c. Assembly - continued

14 Install cover (5) between bosses and slide level (3) into disk assembly (4).

15 Using fabricated eccentric tool, install cell (2) and threaded ring (1). Do not tighten pending final adjustment.



d. Adjustment

1 Install perpendicularity gage (33) on M145/M145A1 telescope mount (34) or use two parallel bars across body of mount if perpendicularity gage is not available.

2 Level the cross-leveling fixture in elevation and cross-level.

3 Set the zeroed M1A1 gunner's quadrant (35) on the perpendicularity gage (33).

4 Adjust pitch knob (36) until M1A1 gunner's quadrant level (37) bubble is centered.

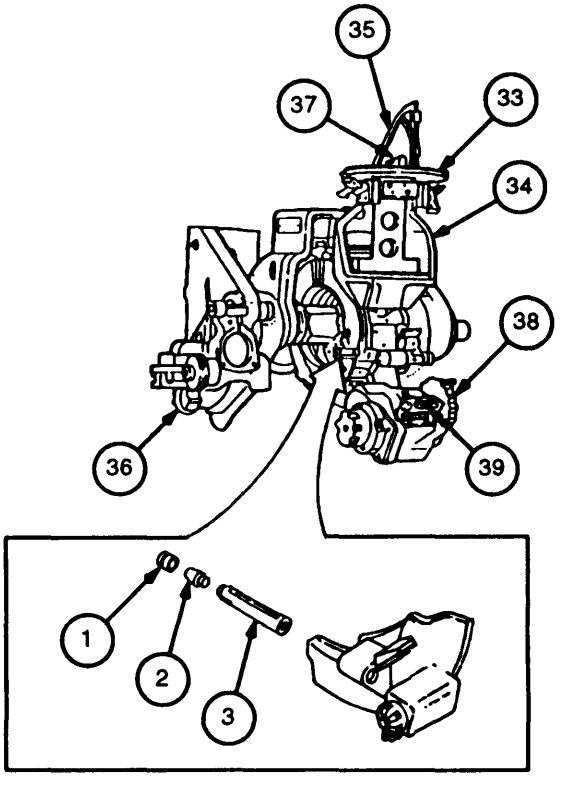
5 Adjust elevation handwheel (36) until elevation counter (39) reads zero.

6 Engage fabricated eccentric tool to the threaded ring (1).

7 Insert a common straight blade screwdriver through the center hole in fabricated eccentric tool and engage cell (2).

8 Adjust cell (2) until the level (3) bubble is centered within the graduations on level (3).

9 Hold cell (2) firmly in place while turning fabricated eccentric tool to tighten threaded ring (1). Be careful not to disturb the setting of level (3).



4-15. LEVEL ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Removal b. Disassembly c. Repair d. Assembly e. Installation f. Adjustment

INITIAL SETUP

Tools and Special Tools

Eccentric tool, fabricated (fig. C-2, appx C)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Tubular spanner wrench, 11/1 6 and 45/64 inch (Item 26, appx F)

Materials/Parts

Lockwashers (2) (Item 63, appx E)
Sealing compound (Item 13, appx B)
Sealing compound (Item 15, appx B)

References

TM 9-2350-311-10
TM 9-2350-314-10
TM 9-254

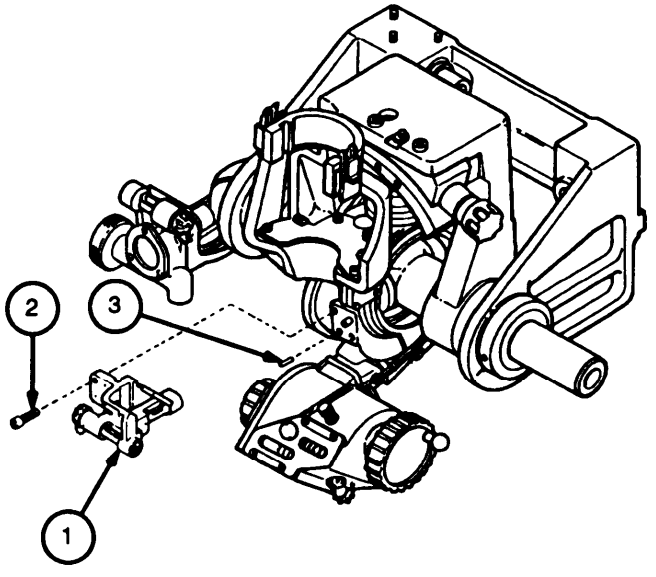
Equipment Condition

M145/M145A1 telescope mount installed on howitzer

a. Removal

1 Remove level assembly(1) by removing two cap screws (2).

2 Remove two headless straight pins (3), only if damaged.



4-15. LEVEL ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

b. Disassembly

1 Remove threaded ring (4), using fabricated eccentric tool.

2 Remove cell (5); slide cross-level (6) from bracket (7) and remove cover (8).

3 Remove headless straight pin (9), only if damaged.

4 Remove machine screw (10), Iockwasher(11), electrical connector cover (12), and LED (13). Discard Iockwasher.

5 Using 11/1 6 and 45/64 inch tubular spanner wrench, remove threaded ring (14).

6 Remove electrical lead (15) and lens (16).

7 Remove threaded ring (17) using fabricated eccentric tool.

8 Remove cell (18); slide pitch level (19) from bracket (7) and remove cover (20).

9 Remove headless straight pin (21), only if damaged.

10 Remove window (22), only if necessary for replacement.

11 Remove machine screw (23), Iockwasher (24), electrical connector cover (25), LED (26), and ring spacer (27). Discard Iockwasher.

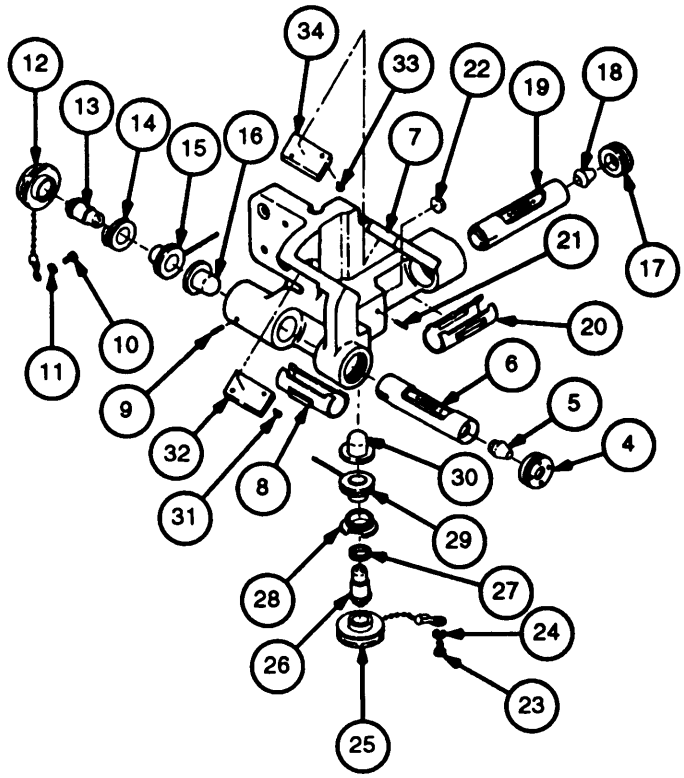
12 Remove ring spacer (27) from LED (26).

13 Using 11/1 6 and 45/64 inch tubular spanner wrench, remove threaded ring (28).

14 Remove electrical lead (29) and lens (30).

15 Remove two rivets (31) and mirror (32), only if necessary for replacement.

16 Remove two rivets (33) and mirror (34), only if necessary for replacement.



c. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

d. Assembly

1 If removed, install mirror (34) and secure using two rivets (33).

2 If removed, install mirror (32) and secure using two rivets (31).

3 Install lens (30) and electrical lead (29) with the raised brass portion of electrical lead (29) facing threaded ring (28).

4 Using 11/16 and 45/64 inch tubular spanner wrench, install threaded ring (28). Stake threaded ring (28) in three places.

5 Install ring spacer (27) onto LED (26).

6 Install LED (26) with ring spacer (27), electrical connector cover (25), new lockwasher (24), and machine screw (23).

7 If removed, install window (22), using sealing compound (item 13, appx B).

8 if removed, press headless straight pin (21) into bracket (7) so that the headless straight pin protrudes far enough into the pitch level (19) hole to engage pitch level (19).

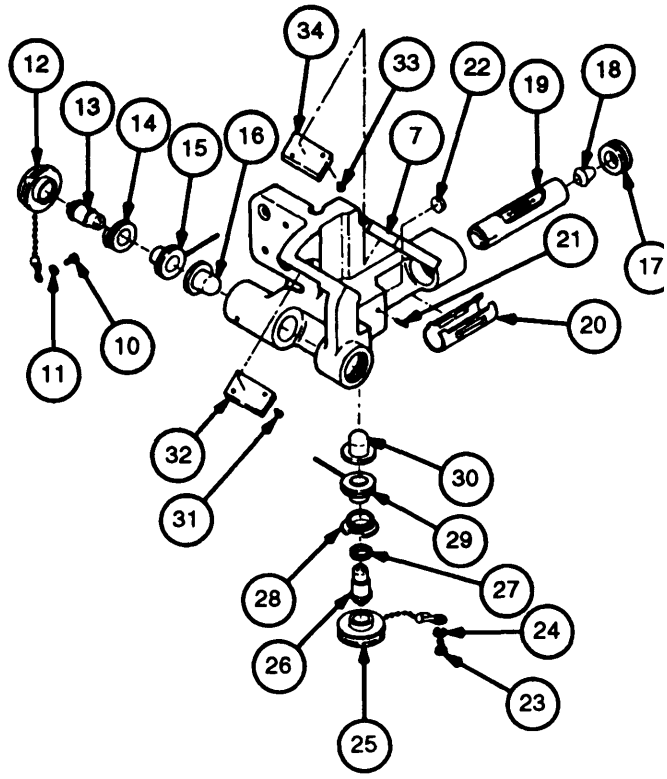
9 Position cover (20) in bracket (7) and pitch level (19) into the bracket (7) so the slot in the end of the pitch level (19) engages headless straight pin (21).

10 Install cell (18) and secure with threaded ring (17), using fabricated eccentric tool. Do not tighten threaded ring (17) at this time.

11 Install lens (16) and electrical lead (15) with the raised brass portion of electrical lead (15) facing threaded ring (14).

12 Using 11/16 and 45/64 inch tubular spanner wrench, install threaded ring (14). Stake threaded ring (14) in three places.

13 Install LED (13), electrical connector cover (12), new lockwasher(11), and machine screw (10).



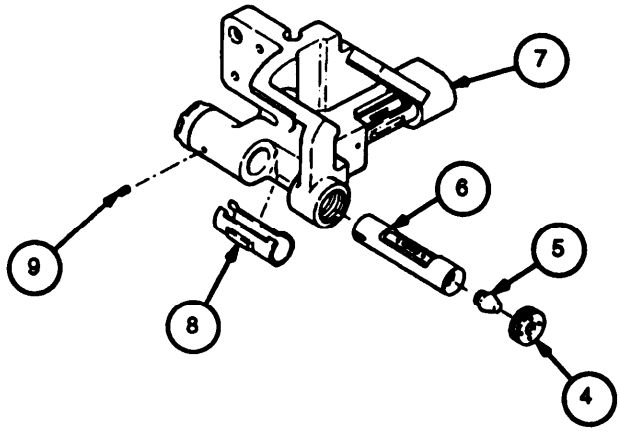
4-15. LEVEL ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

d. Assembly - continued

14 If removed, press headless straight pin (9) into bracket (7) so that the headless straight pin protrudes far enough into the cross-level (6) hole to engage cross-level (6).

15 Position cover (8) into bracket (7) and slide cross-level (6) into position so the slot in the end of the cross-level (6) engages headless straight pin (9).

16 Install cell (5) and secure with threaded ring (4), using fabricated eccentric tool. Do not tighten threaded ring (4) at this time.



e. Installation

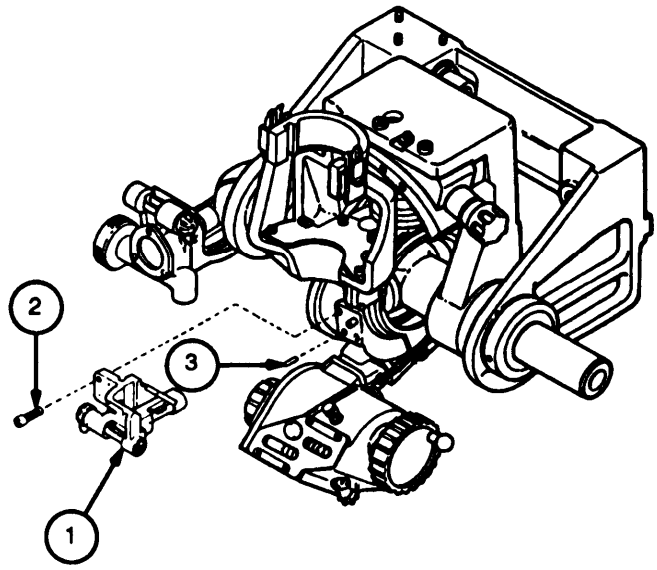
NOTE

Position contact wires in the grooves of the level assembly. Check to ensure wires are not pinched between the M145/M145A1 telescope mount and level assembly during installation.

1 If removed, install two headless straight pins (3).

2 Mount level assembly(1) and secure with two cap screws (2).

3 Level gun tube (TM 9-2350-311–10 or TM 9-2350-314-10).



f. Adjustment

1 Loosen threaded rings (4 and 17) using fabricated eccentric tool.

2 Place 1/2- by 3/4-by 6-inch parallel baron bearing plate in telescope socket (35) so that it is at right angle to main shaft (36).

3 Place zeroed M1A1 gunner's quadrant (37) on parallel bar.

4 Adjust pitch knob until gunner's quadrant (37) level (38) bubble is centered.

5 Apply sealing compound (item 15, appx B) to threaded ring (17) and install threaded ring into bracket (7).

6 Adjust cell (18) until bubble of pitch level(19) is centered. Hold cell (18) and tighten threaded ring (17).

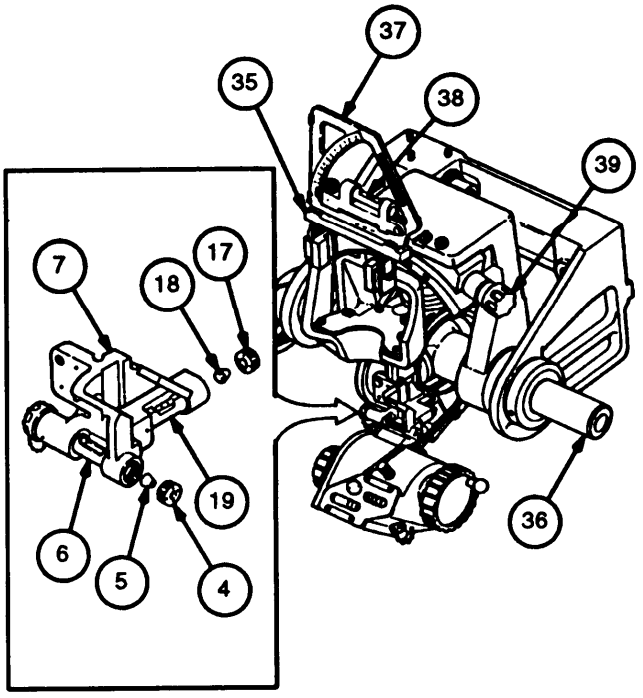
7 With M145/M145A1 telescope mount setup as directed, place 1/2- by 3/4- by 6-inch parallel baron bearing plate in telescope socket (35) so that it is parallel to main shaft (36).

8 Place zeroed M1A1 gunner's quadrant (37) on parallel bar.

9 Adjust cross-level mechanism knob (39) until M1A1 gunner's quadrant (37) level (38) bubble is centered.

10 Apply sealing compound (item 15, appx B) to threaded ring (4) and install into bracket (7).

11 Adjust cell (5) until bubble of cross-level (6) is centered. Hold cell (5) and tighten threaded ring (4).



4-16. QUADRANT SUPPORT ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly d. Adjustment

INITIAL SET-UP

Tools and Special Tools

C-clamp (Item 10, appx F)

Eccentric tool, fabricated (fig C-3, appx C)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Tubular spanner wrench 11/1 6 and 45/64 inch (Item 26, appx F)

Materials/Parts

Lockwasher (Item 63, appx E)
Lockwashers (4) (Item 64, appx E)
Lockwashers (2) (Item 66, appx E)
Sealing compound (Item 13, appx B)

Equipment Condition

M145/M145A1 telescope mount installed on howitzer

4-16. QUADRANT SUPPORT ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

a. Disassembly

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

2 Remove two machine screws (5), two lug terminals (6), and plate (7).

3 Remove retainer (8), spring (9), and V-bearing (10) on Ml 45A1 telescope mount.

4 Remove two machine screws (11), two lockwashers (12), and two retaining straps (13). Discard lockwashers.

5 Remove machine screw (14), lockwasher (15), machine screw (16), lockwasher (17), and clamp (18). Discard lockwashers.

6 Remove machine screw (19), lockwasher (20), electrical connector cover (21), and LED (22). Discard lockwasher.

7 Using 11/16 and 45/64 inch tubular spanner wrench, remove threaded ring (23).

8 Remove electrical lead (24) and lens (25).

9 Remove threaded ring (26), using fabricated eccentric tool.

10 Remove holder (27) and control cam (28). Slide out level (29) and remove cover (30).

11 Remove tapered pin (31) and knob (32) on M145 telescope mount.

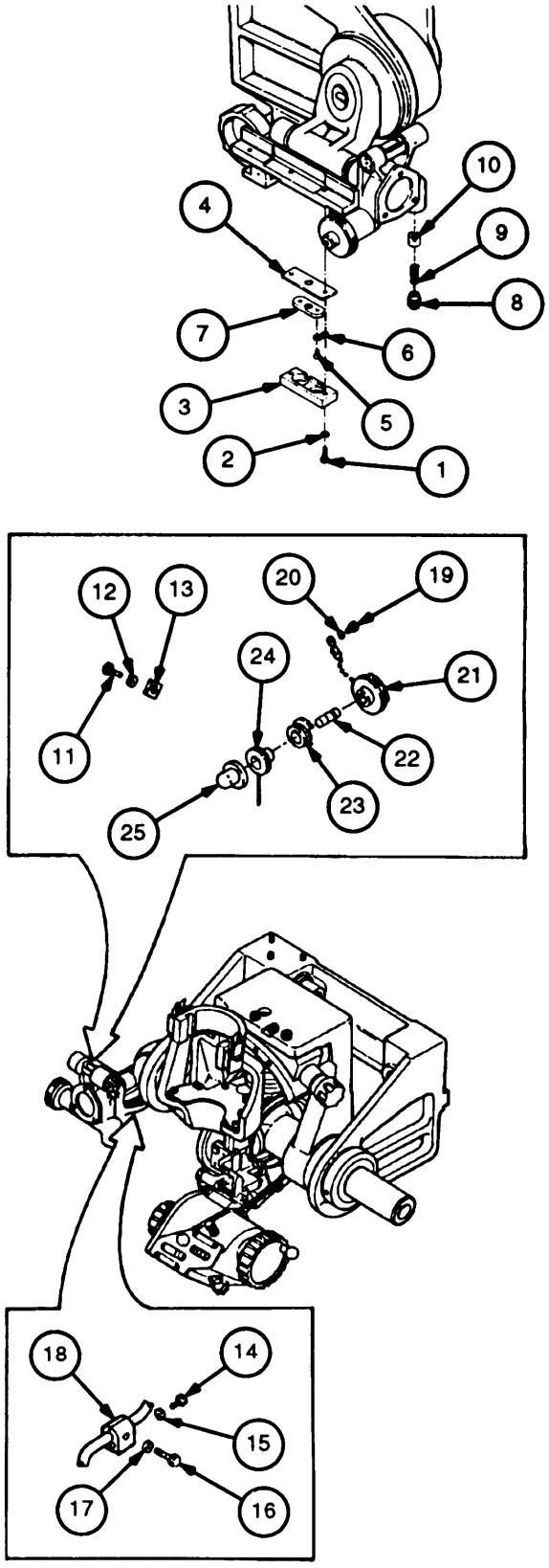
12 Remove spring pin (33) and knob (34) on M145A1 telescope mount.

b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.



c. Assembly

1 Install knob (32) and tapered pin (31) on M145 telescope mount.

2 Install knob (34) and spring pin (33) on M145A1 telescope mount.

3 Install cover (30) between bosses of rocker assembly and slide level (29) into position

4 Install control cam (28), holder (27), and threaded ring (26), using fabricated eccentric tool. Do not tighten, pending final adjustment.

5 Install lens (25) and electrical lead (24) with raised brass portion facing outward.

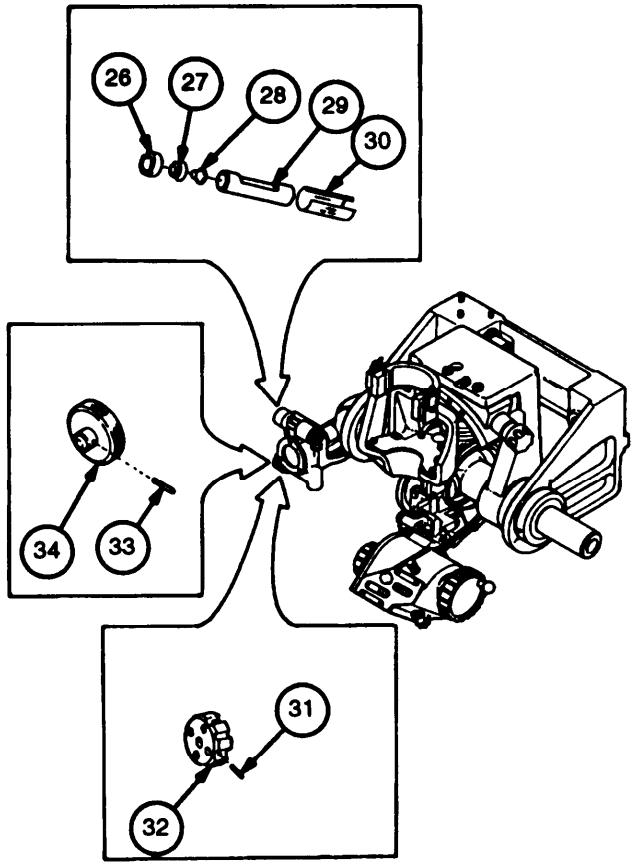
6 Apply sealing compound to threads of threaded ring (23).

7 Using 11/16 and 45/64 inch tubular spanner wrench, install threaded ring (23). Stake threaded ring (23) in three places.

8 Install LED (22), electrical connector cover (21), new Iockwasher (20), and machine screw (1 9).

9 Install clamp (18), new Iockwasher (17), machine screw (16), new Iockwasher (1 5), and machine screw (14).

10 Install two retaining straps (13), two new lockwashers (12), and two machine screws (11).



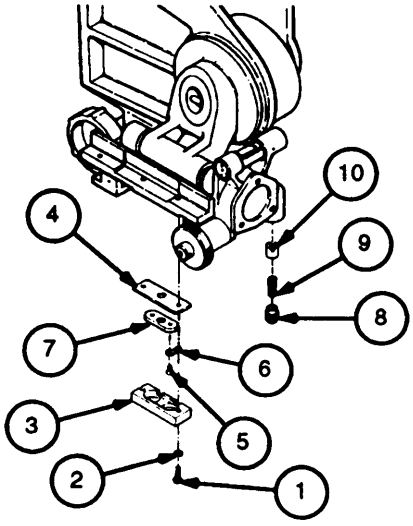
4-16. QUADRANT SUPPORT ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

Assembly - continued

11 Install plate (7), two lug terminals (6), and two machine screws (5).

12 Install plate insulator (4), plate insulator (3), two new lockwashers (2), and two machine screws(1).

13 Install V-bearing (10), spring (9), and retainer (8) on M145A1 telescope mount.



d. Adjustment

1 Clamp a 3/8-x 3/4-x 6-inch parallel bar to quadrant seat of bracket parallel to the quadrant supporl assembly level (29).

2 Position a zeroed M1A1 gunner's quadrant (35) on parallel bar, parallel to level (29).

3 Adjust quadrant support assembly level knob (34) until M1A1 gunner's quadrant (35) level (36) bubble is centered.

4 Loosen threaded ring (26) using fabricated eccentric tool.

5 Apply sealing compound to threaded ring (26) and install threaded ring (26) in bracket.

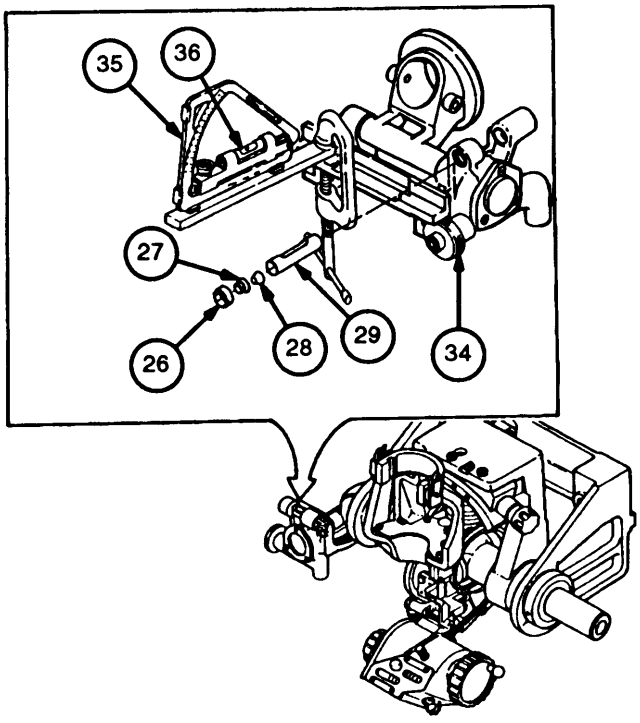
6 Engage fabricated eccentric tool into holder (27) and threaded ring (26).

7 Insert a common straight blade screwdriver through the center hole in the fabricated eccentric tool and engage control cam (28).

8 Adjust control cam (28) and holder (27) until the level (29) bubble is centered within the graduations on the level (29).

9 Rotate level assembly from 0 to 1330 mils and adjust control cam (28) and holder (27) until the level (29) bubble is centered within the graduations on the level (29).

10 Rotate level assembly from 1330 roils to 0 and adjust control cam (28) and holder (27) until the level (29) bubble is centered within the graduations on the level (29).



11 Repeat steps 9 and 10 as necessary to level the vial at 0 and 1330 roils.

12 Hold the inner portion of the fabricated eccentric tool firmly in place while turning the outer portion of the fabricated eccentric tool to tighten threaded ring (26). Be careful not to disturb the setting of level (29).

4-17. COUNTER BOX ASSEMBLY (KNOB) MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance(SC5180-95-CL-B29)
5180-01-168-0487

Materials/Parts

Oil, lubricating (Item 9, appx B)

References

TM 9-254

Equipment Conditions

M145/M145A1 telescope mount installed on howitzer

a. Disassembly

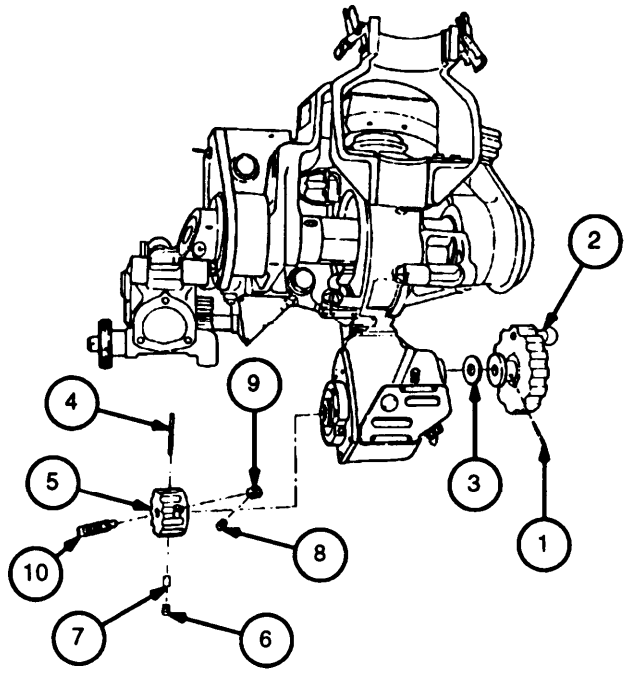
1 Remove tapered pin(1), elevation handwheel (2), and flat washer (3).

2 Drive out headless straight pin (4) and remove correction knob (5).

3 Remove setscrew (6) and plug (7).

4 Drive out headless straight pin (8).

5 Remove collar (9) and shouldered shaft (10).



4-17. COUNTER BOX ASSEMBLY (KNOB) MAINTENANCE INSTRUCTIONS - continued

b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly

1 Install shouldered shaft (10) in correction knob (5).

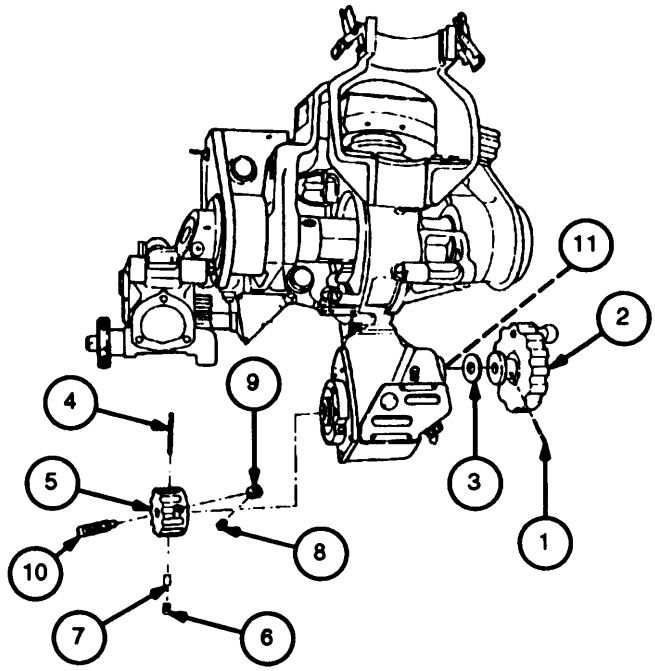
2 Install collar (9) on shouldered shaft (10) and secure with headless straight pin (8).

3 Install correction knob (5) and secure with headless straight pin (4).

4 Install plug (7) and setscrew (6).

5 Apply oil to flat washer (3) and install in elevation handwheel (2).

6 Aline hole in elevation handwheel (2) with hole in shaft (11) and install tapered pin (1).



Section V. General Support Maintenance Procedures

4-18. GENERAL

LIST OF TASKS

Task No.	Task	Task Ref (Page)	Troubleshooting Ref No. (Page)
1	Maintain M145/M145A1 telescope mount		—
	a. Disassemble	4-32	
	b. Repair	4-33	
	c. Assemble	4–34	
2	Maintain counter box assembly		4–8
	a. Remove	4-36	
	b. Disassemble	4-37	
	c. Repair	4-37	
	d. Assemble	4-37	
	e. Install	4-38	
3	Maintain counter box assembly (counters)		—
	a. Disassemble	4-40	
	b. Repair	4-41	
	c. Assemble	4-41	
4	Maintain segment assembly		—
	a. Remove	4-45	
	b. Disassemble	4-46	
	c. Repair	4-46	
	d. Assemble	4-46	
	e. Install	4-47	

4-19. M145/M145A1 TELESCOPE MOUNT MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance(SC5180-95-CL-B29)
5180-01-168-0487

Materials/Parts

Grease (Item 6, appx B)
Lockwashers (10) (Item 68, appx E)
Oil, lubricating (Item 9, appx B)
Sealing compound (Item 13, appx B)
Self-locking nut (Item 12, appx E)
Self-locking nut (Item 16, appx E)

References

TM 9-254

Equipment Condition

M145/M145A1 telescope mount removed from howitzer (TM 9-2350-311-20-2/ TM 9-2350-314-20-2)

Counter box assembly removed (ref. para 4-20)

a. Disassembly

1 Drive out tapered pin (1); remove pitch knob (2) and flat washer (3) from shouldered shaft (4).

2 Remove six machine screws (5), six lockwashers (6), six flat washers (7), and cover (8). Discard lockwashers.

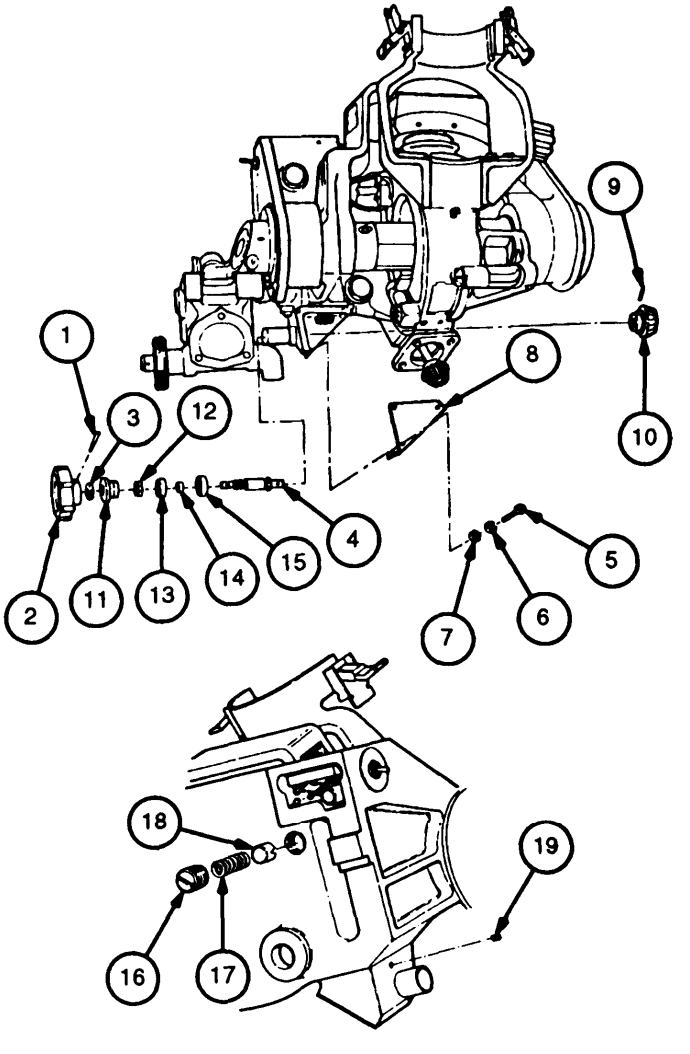
3 Drive out tapered pin (9) from bevel gear (10) and shouldered shaft (4).

4 Remove threaded ring (11) and slide out shouldered shaft (4) and related parts. Remove bevel gear (10) from shouldered shaft (4).

5 Remove self-locking nut (12), bearing (13), sleeve spacer (14), and bearing (15) from shouldered shaft (4). Discard self-locking nut.

6 Remove plug (16), spring (17), and V-bearing (18).

7 Remove setscrew (19).



8 Drive out tapered pin (20) and remove bevel gear (21).

9 Using adjustable spanner wrench, remove externally threaded nut (22).

10 Remove spring (23) and two flat washers (24),

11 Remove wormshaft (25) and related parts.

12 Remove self-locking nut (26), flat washer (27), and bearing (28) from wormshaft (25). Discard self-locking nut.

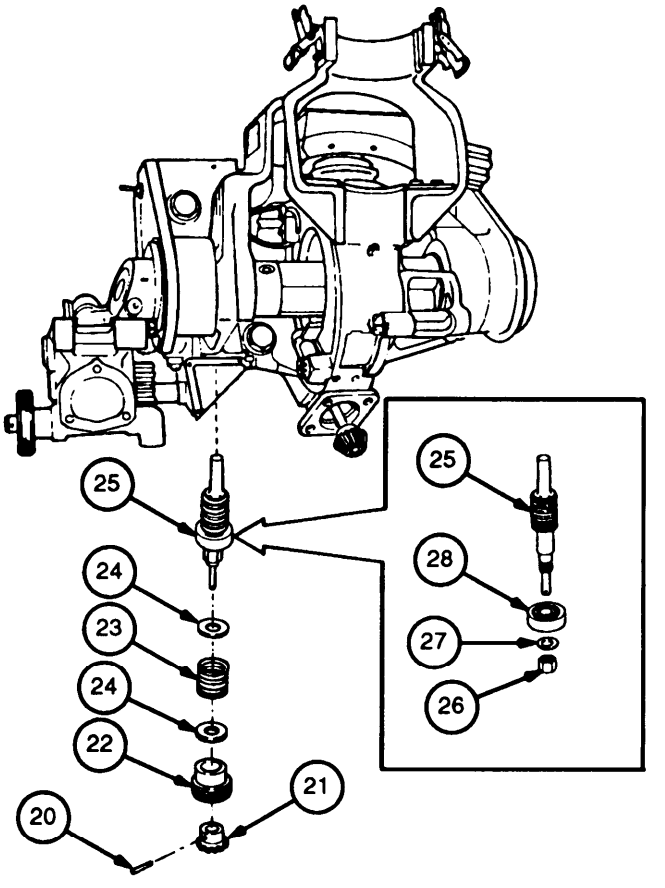
13 Drive out tapered pin (29) from bevel gear (30).

14 Remove bevel gear (30) from shaft of housing (31).

15 Remove two channels (32) from housing (31) by removing two machine screws (33) and two lockwashers (34) from each channel. Discard lockwashers.

16 Remove two stops (35).

17 Remove plug (36), only if necessary for replacement.

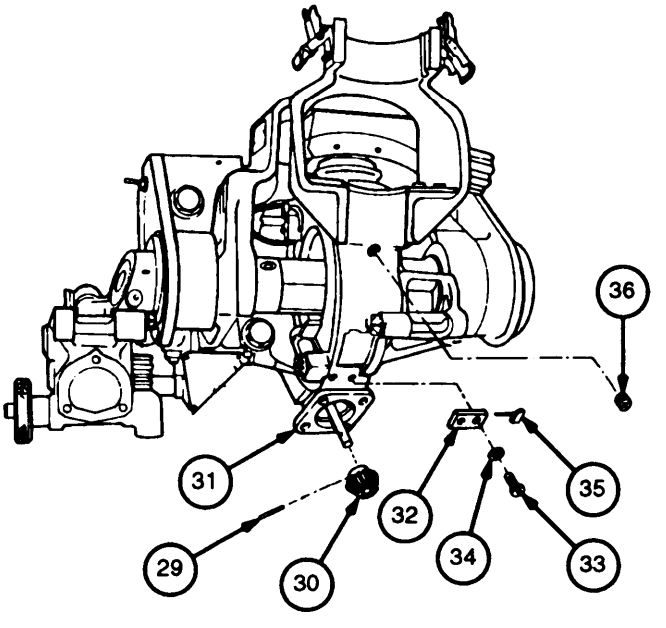


b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

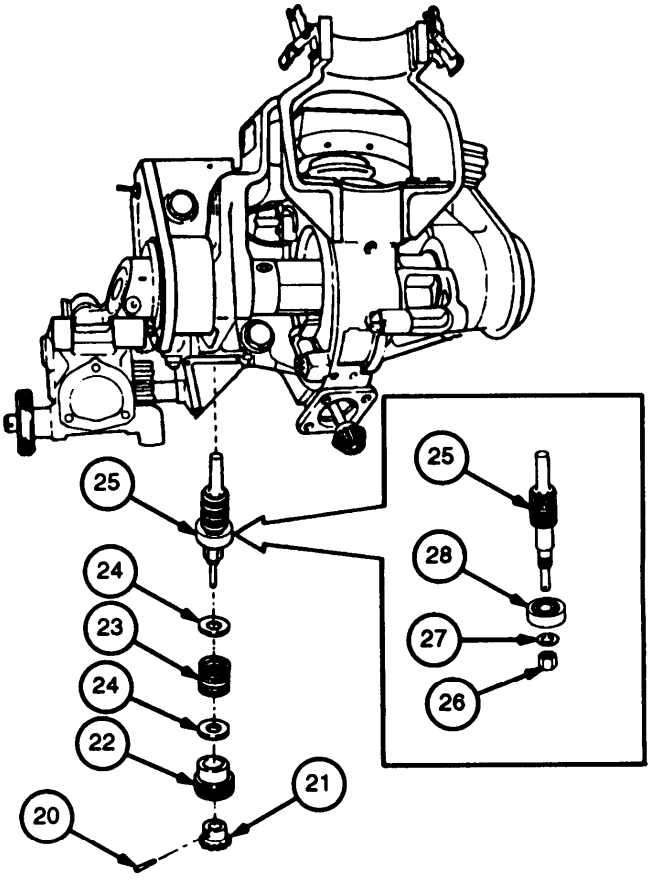
2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.



4-19. M145/M145A1 TELESCOPE MOUNT MAINTENANCE INSTRUCTIONS - continued

c. Assembly



1 Apply grease to bearing (28).

2 Mount bearing (28), flat washer (27), and new self-locking nut (26) on wormshaft (25).

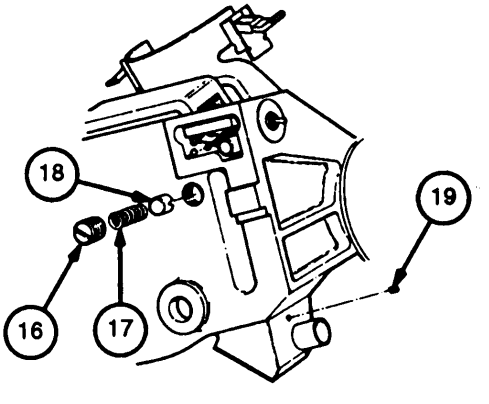
3 Install wormshaft (25) and related parts in the mount.

4 Install one flat washer (24) and spring (23).

5 Install second flat washer (24) into externally threaded nut (22).

6 Apply grease to externally threaded nut (22) and install using adjustable spanner wrench.

7 Install bevel gear (21) using tapered pin (20).



8 Apply sealing compound to the threads of setscrew (19) and install.

9 Apply grease to V-bearing (18).

10 Apply sealing compound to threads of plug (16). Install V-bearing (18), spring (17), and plug (16) in mount.

c. Assembly - continued

11 Install bearing (15), sleeve spacer (14), bearing (13), and new self-locking nut (12) on shouldered shaft (4).

12 Install shouldered shaft (4) with related parts in the telescope mount bracket and secure with threaded ring (11). Tighten threaded ring (11) to allow shouldered shaft (4) to rotate without binding. Stake threaded ring (11).

13 Install bevel gear (10) on shouldered shaft (4) and secure with tapered pin (9).

14 Apply oil to flat washer (3) and install in pitch knob (2).

15 Install pitch knob (2) on shouldered shaft (4) and secure with tapered pin (1).

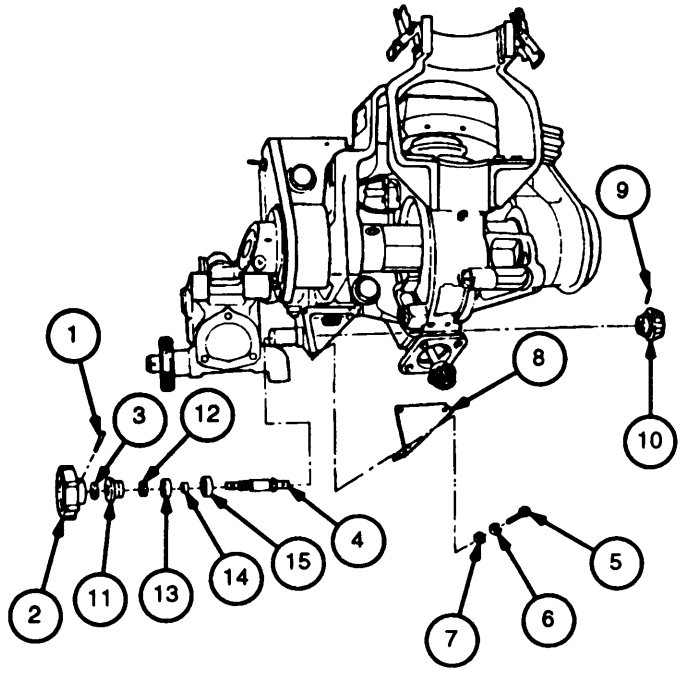
16 Install cover (8) and secure with six flat washers (7), six new lockwashers (6), and six machine screws (5).

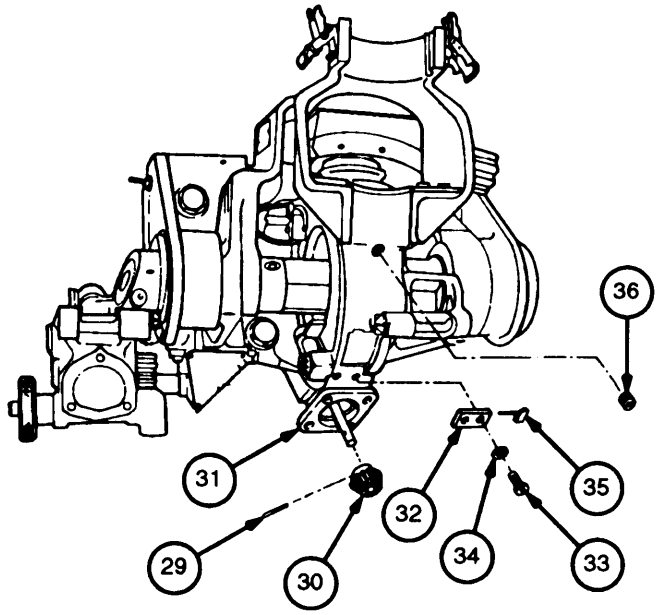
17 If removed, install plug (36).

18 Install two stops (35).

19 Install two channels (32) using two new lockwashers (34) and two machine screws (33) for each channel.

20 Install bevel gear (30) onto shaft of housing (31) and secure with tapered pin (29).





4-20. COUNTER BOX ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Removal b. Disassembly c. Repair d. Assembly e. Installation

INITIAL SET-UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Tubular spanner wrench, 11/16 and 45/64 inch (Item 26, appx F)

Materials/Parts

Adhesive (Item 2, appx B)
Lockwashers (8) (Item 63, appx E)
Lockwashers (4) (Item 64, appx E)
Lockwashers (3) (Item 68, appx E)
Lockwashers (4) (Item 71, appx E)
Sealing compound (Item 13, appx B)

References

TM 9-254
TM 750-116

Equipment Condition

M145/M145A1 telescope mount removed from howitzer (TM 9–2350-311-20-2/ TM 9–2350-314-20-2)

a. Removal

1 Remove three machine screws (1), three lockwashers (2), and plate insulator (3). Discard lockwashers.

2 Remove three machine screws (4), three lockwashers (5), and three wires (6) with three lug terminals (7) attached. Discard lockwashers.

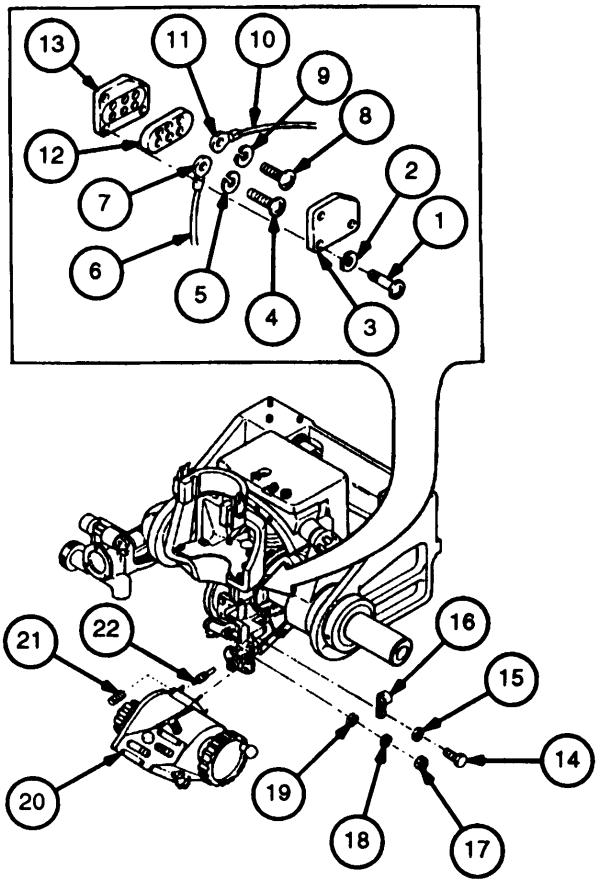
3 Remove two machine screws (8), two lockwashers (9), two wires (10) with two lug terminals (11) attached, plate (12), and plate insulator (13). Discard lockwashers.

4 Remove two machine screws (14), two lockwashers (15), and two retaining straps (16). Discard lockwashers.

5 Remove four nuts (17), four lockwashers (18), and four flat washers (19). Discard lockwashers.

6 Remove counter box assembly (20) from M145/M145A1 telescope mount.

7 Remove setscrew (21) and eccentric stud (22).



b. Disassembly

1 Remove four machine screws (23), four lockwashers (24) and identification plates (25 and 26) from counter box assembly (20). Discard lockwashers.

2 Remove two machine screws (27) and protective cap (28) from overlay assembly (29).

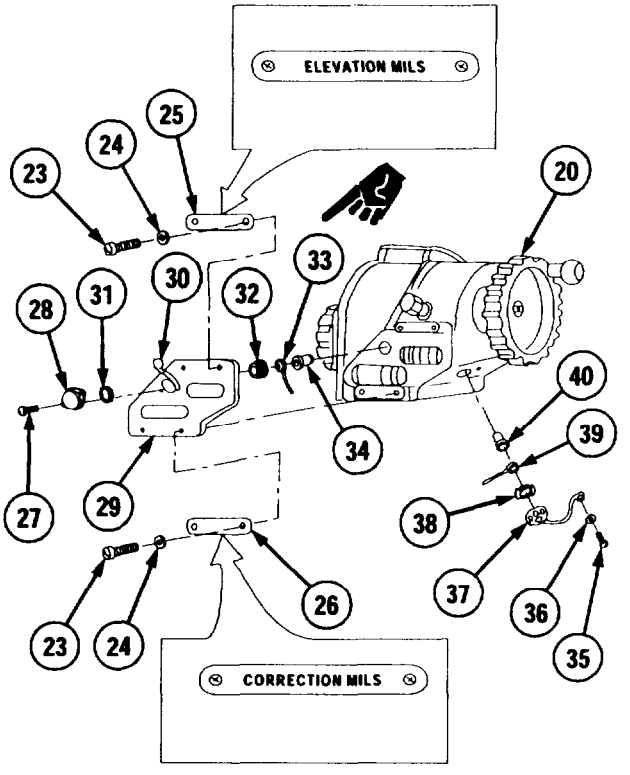
3 Pull wire (30) with lamp base through to the front of the overlay assembly (29).

4 Using 11/16 and 45/64 inch tubular spanner wrench, remove optical retaining ring (31) and overlay assembly (29) from counter box assembly (20).

5 Using 1/2 and 33/64 inch tubular spanner wrench, remove externally threaded ring (32), electrical lead (33), and lens (34) from counter box assembly (20).

6 Remove machine screw (35), lockwasher (36), and electrical connector cover (37). Discard lockwasher.

7 Using 11/16 and 45/64 inch tubular spanner wrench, remove externally threaded ring (38), electrical lead (39), and lens (40).



c. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

d. Assembly

1 Install lens (40) and electrical lead (39) with brass portion facing outward.

2 Apply adhesive to threads of externally threaded ring (38) and install in counter box assembly (20), using 11/16 and 45/64 inch tubular spanner wrench.

3 Install electrical connector cover (37), new lockwasher (36), and screw (35) to counter box assembly (20).

4 Install lens (34) and electrical lead (33) to counter box assembly (20).

5 Using 1/2 and 33/64 inch tubular spanner wrench, install externally threaded ring (32) to overlay assembly (29) and stake with adhesive.

6 Pull wire (30) with lamp base through to the front of overlay assembly (29) and position onto counterbox assembly (20). Install retaining ring (31) to overlay assembly (29).

7 Install identification plates (25 and 26), using four new lockwashers (24), and four machine screws (23) with adhesive applied to screw threads.

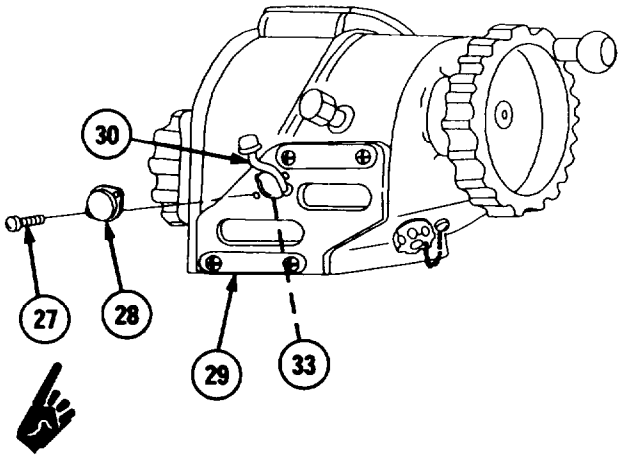
4-20. COUNTER BOX ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

d. Assembly - continued

8 Insert lamp base potion of overlay assembly (29) into electrical lead (33). Position wire (30) in recessed area to accommodate protective cap (28).

9 Apply adhesive to inside edge of protective cap (28).

10 Install protective cap (28) and secure with two machine screws (27). Remove excess adhesive from outer edge of protective cap (28).



e. Installation

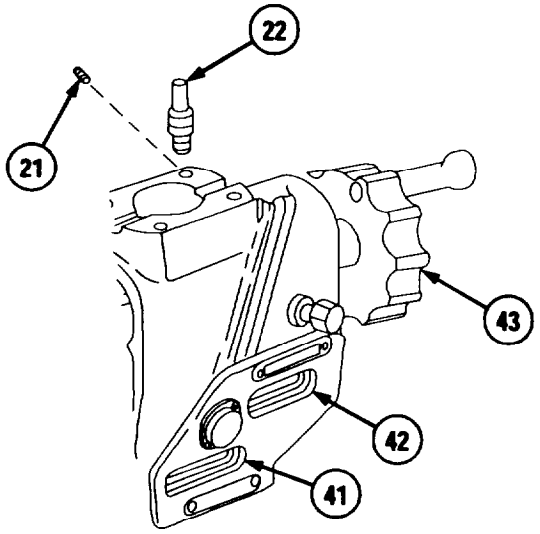
1 Install eccentric stud (22) and setscrew (21).

2 Set the correction counter (41) and elevation counter (42) to 0.

3 Apply sealing compound around keyways and slot around eccentric stud (22), and install counter box assembly (20) on M145/M145A1 telescope mount using four flat washers (19), four new lockwashers (18), and four nuts (17). Hand tighten four nuts (17).

4 Loosen setscrew (21) and rotate eccentric stud (22) to obtain minimum backlash in the elevation handwheel (43). Tighten setscrew (21).

5 Tighten four nuts (17).



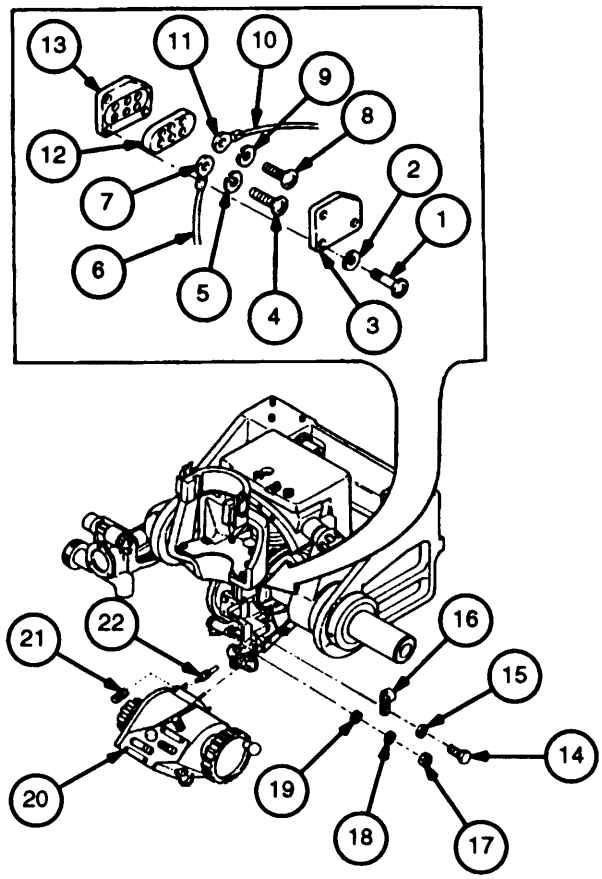
e. Installation - continued

6 Install two lug terminals(11) with two wires (10) attached to plate (12) using two new lockwashers (9) and two machine screws (8).

7 Install three lug terminals (7) with three wires (6) to plate (12) attached, using three new lockwashers (5) and three machine screws (4).

8 Install plate(12) between plate insulator(13) and plate insulator (3) and install on mount using three new lockwashers (2) and three machine screws (1).

9 Install two retaining straps(16) on cable and secure to mount using two new lock washers(15) and two machine screws (14).



4-21. COUNTER BOX ASSEMBLY (COUNTERS) MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29 51 80-01-168-0487

References

TM 9-254
TM 750-1 16

Materials/Parts

Lockwashers (8) (Item 64, appx E)
Lockwashers (4) (Item 65, appx E)
Lockwashers (4) (Item 66, appx E)
Sealing compound (Item 13, appx B)

Equipment Conditions

M145/M145A1 telescope mount removed from howitzer (TM 9-2350-311-20-2/ TM 9-2350-314-20-2)

Correction knob and elevation handwheel removed (ref. para 4-17)

4-21. COUNTER BOX ASSEMBLY (COUNTERS) MAINTENANCE INSTRUCTIONS - continued

a. Disassembly

1 Remove four machine screws (1) and four lockwashers (2). Discard Iockwashers.

2 Remove cover (3) with related parts from counter box assembly (4).

3 Remove two headless straight pins (5) only if necessary.

4 Remove plug (6) only if necessary for replacement.

NOTE

New counter box assemblies are tapped and do not require nut (7).

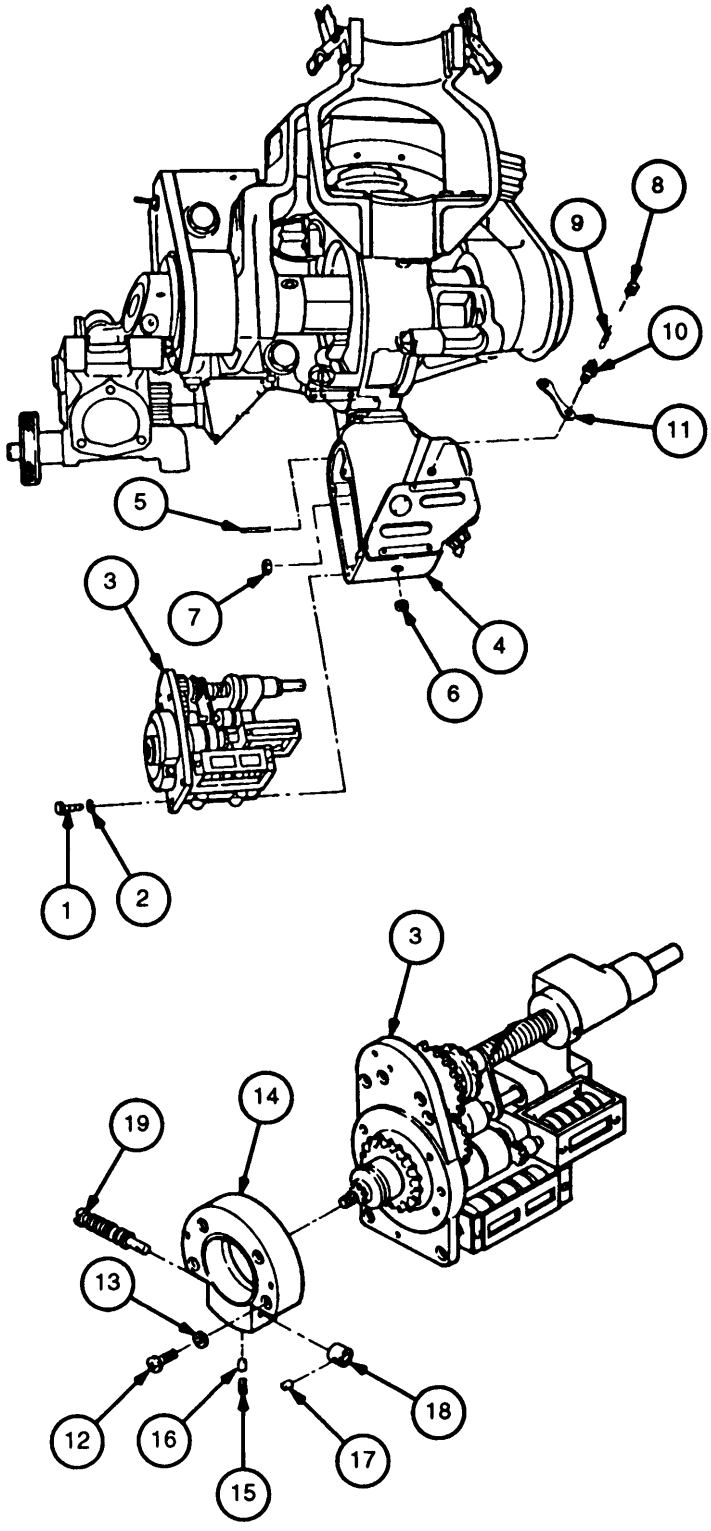
5 Remove air valve cap (8), valve core (9), nut (7), purging valve stem (10), and retaining strap(11).

6 Remove four machine screws(12) and four lockwashers (13). Discard Iockwashers.

7 Remove base(14) and related parts from cover (3).

8 Remove setscrew(15) and plug (16).

9 Drive out headless straight pin (17) and remove collar (18) and worm setscrew (19).



10 Remove four machine screws (20), four lockwashers (21), and correction rotating counter (22). Discard lockwashers.

11 Remove two machine screws (23) and mask (24) from correction rotating counter (22).

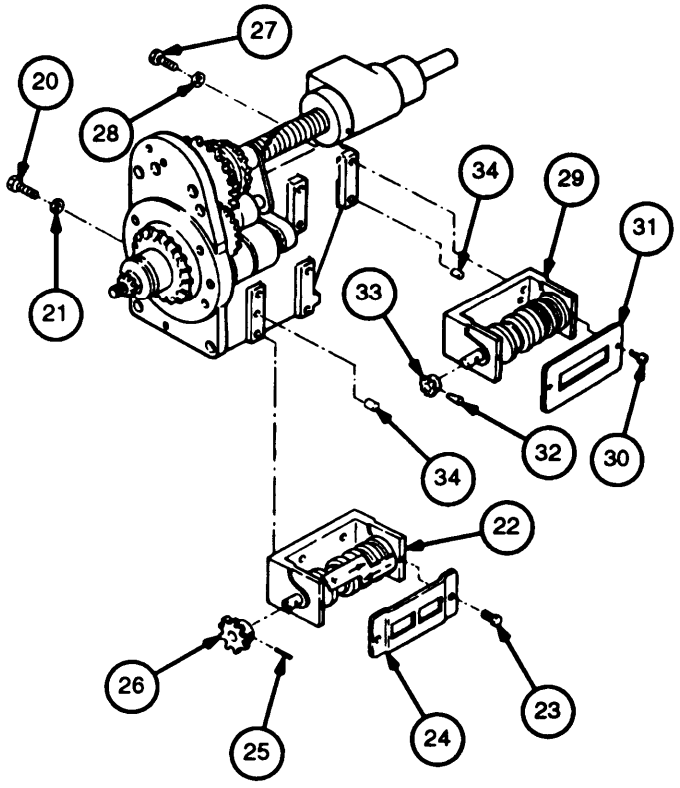
12 Remove tapered pin (25) and gear (26).

13 Remove four machine screws (27), four lockwashers (28), and elevation rotating counter (29). Discard lockwashers.

14 Remove two machine screws (30) and mask (31) from elevation rotating counter (29).

15 Remove tapered pin (32) and gear (33).

16 Remove four headless straight pins (34) only if new correction and elevation rotating counters are to be installed.



b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly

1 Install worm setscrew (19) in base (14).

2 Install collar (18) on worm setscrew (19) and secure with headless straight pin (17).

3 Install base (14) on cover (3) and secure with four new lockwashers (13) and four machine screws (12).

4 Install plug (16) and setscrew (15).

4-21. COUNTER BOX ASSEMBLY (COUNTERS) MAINTENANCE INSTRUCTIONS - continued

c. Assembly - continued

5 Install correction knob (35) (ref. para 4-17).

NOTE

Perform steps 6 thru 12 if new elevation rotating counter is installed. If reinstalling existing elevation rotating counter (29), go to step 13.

6 Temporarily install a setscrew in gear (33) and slide gear (33) onto shaft of elevation rotating counter (29).

7 Secure elevation rotating counter (29) to base (36) using four new lockwashers (28) and four machine screws (27).

8 Drill two pilot holes approximately 1/16 inch (0.16 mm) deep into base of elevation rotating counter (29), ensuring that drill bit does not damage numerals or elevation rotating counter (29) shaft.

9 Remove elevation rotating counter (29) from base (36) and finish drilling holes in elevation rotating counter (29).

10 Drill, ream, and pin gear (33) to shaft of elevation rotating counter (29) using tapered pin (32).

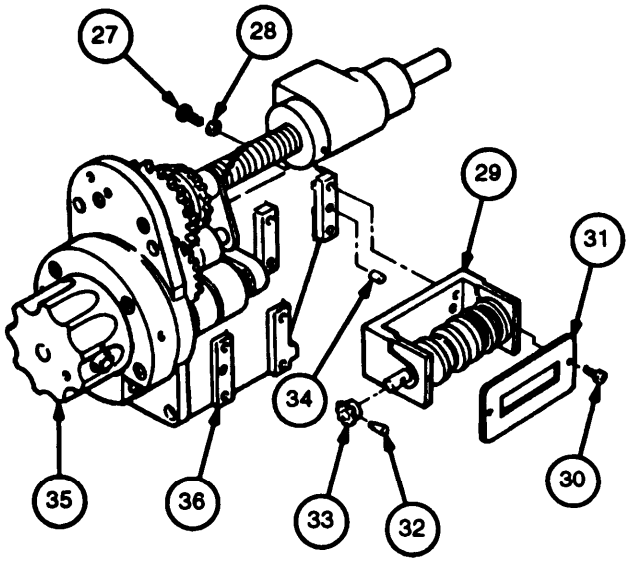
11 Install mask (31) on elevation rotating counter (29) and secure with two machine screws (30).

12 Install two headless straight pins (34), into base (36).

13 Rotate correction knob (35) counterclockwise to stop.

14 Set elevation rotating counter (29) to an indication of -50.

15 Install elevation rotating counter (29) on base (36) and secure with four new lockwashers (28) and four machine screws (27).



NOTE

Perform steps 16 thru 24 if new correction rotating counter is installed. If reinstalling existing correction rotating counter, go to step 23.

16 Temporarily install a setscrew in gear (26) and slide gear onto shaft of correction rotating counter (22).

17 Secure correction rotating counter (22) on base (36) using four new Iockwashers (21) and four machine screws (20).

18 Drill two pilot holes approximately 1/16 inch (0.16 mm) deep into base of correction rotating counter (22) ensuring that drill bit does not damage numerals or correction rotating counter (22) shaft.

19 Remove correction rotating counter (22) from base (36) and finish drilling holes in correction rotating counter (22).

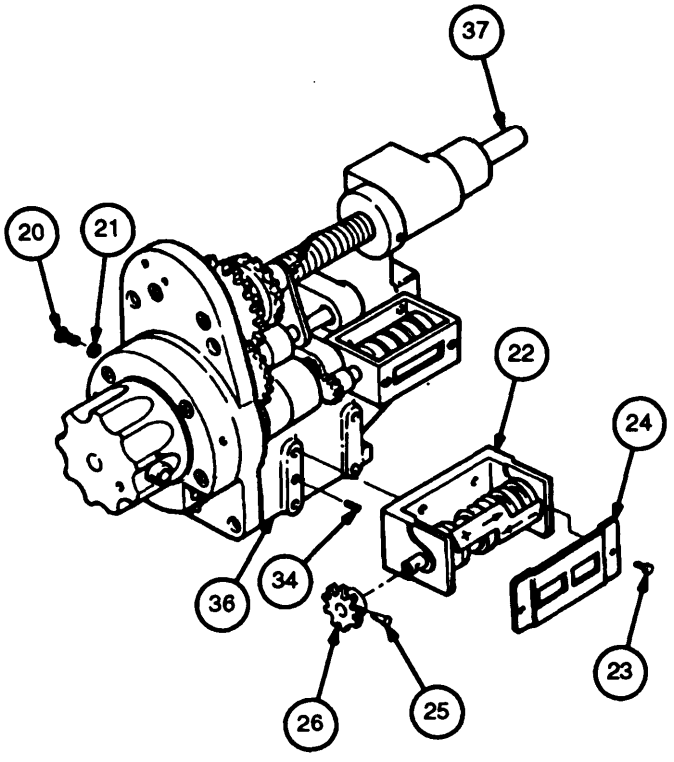
20 Drill, ream, and pin gear (26) to shaft of correction rotating counter (22) using tapered pin (25).

21 Install mask (24) on correction rotating counter (22) and secure with two machine screws (23).

22 Install two headless straight pins (34), in base (36).

23 Rotate shaft (37) counterclockwise to stop. Set correction rotating counter (22) to a reading of 9948.

24 Install correction rotating counter (22) on base (36) and secure with four new Iockwashers (21) and four machine screws (20).



4-21. COUNTER BOX ASSEMBLY (COUNTERS) MAINTENANCE INSTRUCTIONS - continued

c. Assembly - continued

NOTE

If the counter box assembly has a tapped hole to screw purging valve stem into, nut (7) is not required.

25 Apply sealing compound to threads of nut (7) and purging valve stem (10).

26 Install retaining strap (11), purging valve stem (10), nut (7), valve core (9), and air valve cap (8).

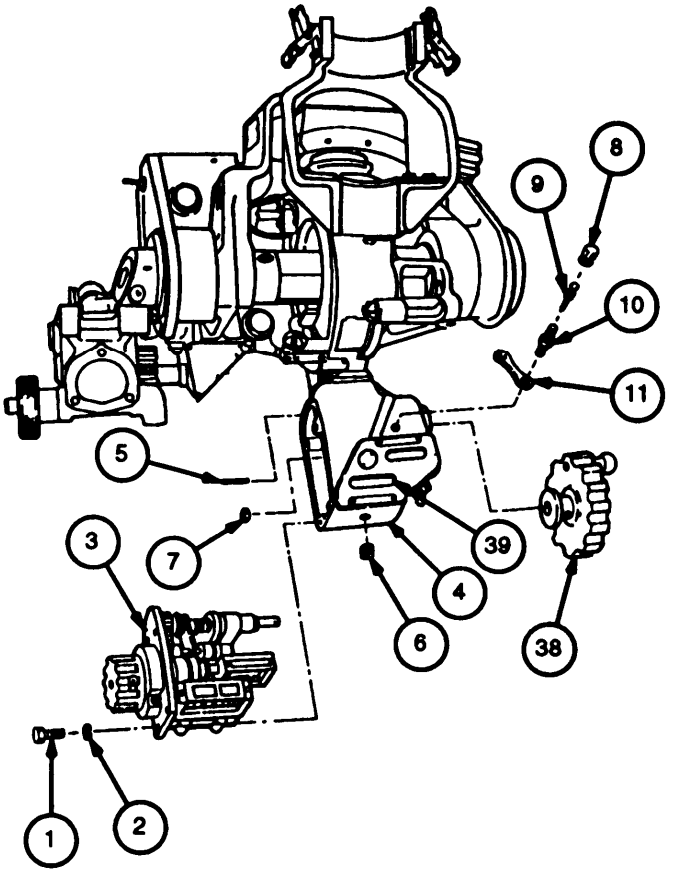
27 If removed, install plug (6).

28 If removed, install two headless straight pins (5).

29 Install cover (3) with related parts on counter box assembly (4) and secure with four new lockwashers (2) and four machine screws (1).

30 Install elevation handwheel (38) (ref. para 4-17).

31 Using elevation handwheel (38), set correction counter (39) to 0000. Rotate elevation handwheel (38) counterclockwise and ensure correction counter (39) attains a minimum reading of 1335 roils.



4-22 SEGMENT ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Removal b. Disassembly c. Repair d. Assembly e. Installation

INITIAL SET-UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Tubular spanner wrench, 1-1/8 and 1-9/64 inch (Item 29, appx F)

Materials/Parts

Lockwasher (Item 69, appx E)
Mechanical felt (Item 1, appx E)
Oil, lubricating (Item 9, appx B)
Sealing compound (Item 14, appx B)
Shims (V) (Item 57, appx E)
Shims (V) (Item 58, appx E)
Shims (V) (Item 59, appx E)
Shims (V) (Item 60, appx E)

References

TM 9-254

Equipment Condition

M145/M145A1 telescope mount removed from howitzer (TM 9-2350-311-20-2/ TM 9-2350-314-20-2)

Cross-level mechanism removed (ref. para 4-13)

a. Removal

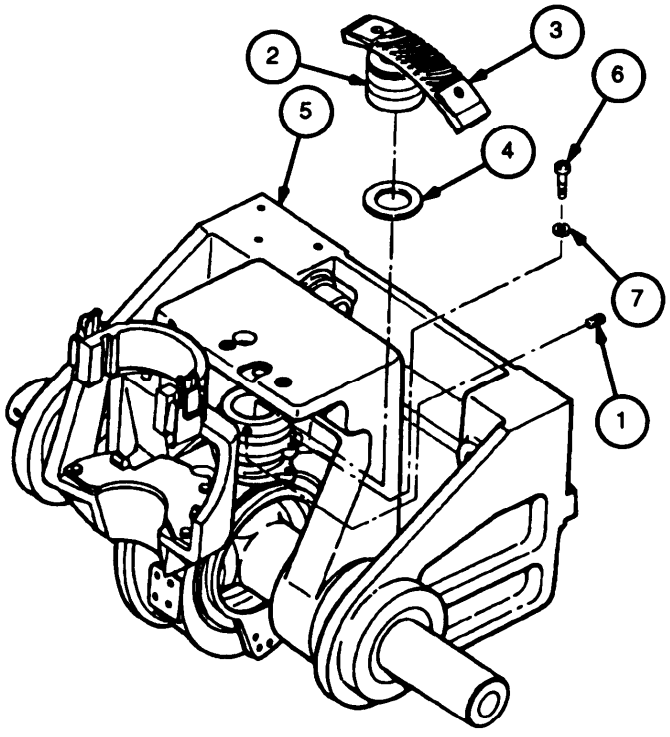
NOTE

Setscrew (1) locks retaining plate (2) in place.

1 Remove setscrew (1).

2 Using adjustable spanner wrench, remove segment assembly (3) and shims (4) from M145/M145A1 telescope mount body (5) by unscrewing retaining plate (2). Discard shims.

3 Remove machine screw (6) and lockwasher (7). lockwasher.



4-22. SEGMENT ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

b. Disassembly

1 Using 1-1/8 and 1-9/64 inch tubular spanner wrench, remove nut (8).

2 Remove bearing (9), separator (10), and bearing (11).

3 Remove retaining plate (2) and mechanical felt (12), then separate them. Discard mechanical felt.

4 Remove two machine screws (13) and two stops (14) from segment (15).

b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

d. Assembly

1 Install two stops (14) and two machine screws (13).

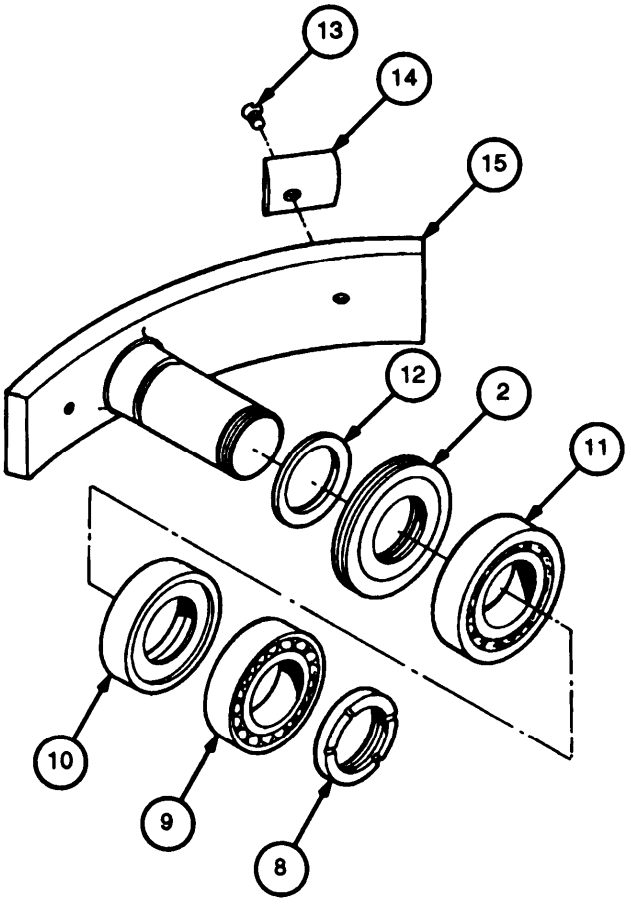
2 Lubricate new mechanical felt (12) with oil and insert into retaining plate (2).

3 Install retaining plate (2) on segment (15).

4 Install bearing (11), separator (10), bearing (9), and nut (8).

5 Using 1-1/8 and 1-9/64 inch tubular spanner wrench, tighten nut (8) to preload bearing (9) and bearing (11) to obtain free rotation without end play.

6 Stake nut (8) after preloading.



e. Installation

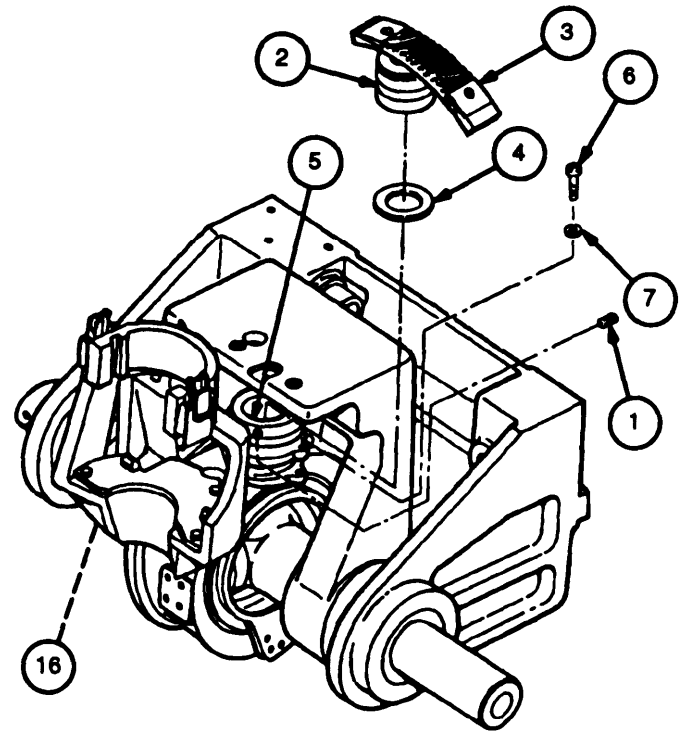
1 Install machine screw (6) and new lockwasher (7) in M145/M145A1 telescope mount body (5).

2 Refer to measurement taken between the rocker assembly and the cross-level mechanism in para 4-13. This will determine the number of shims (4) required in body assembly prior to installing segment assembly (3).

3 Place the amount of new shims (4) required into the mounting hole for segment assembly (3). Using adjustable spanner wrench, install segment assembly (3) into M145/M145A1 telescope mount body (5).

4 Secure segment assembly (3) by tightening retaining plate (2). Apply sealing compound to setscrew (1) and install.

5 Rotate pitch knob (16) to move rocker assembly as far as it will go toward foward end of M145/ M145A1 telescope mount body (5).



Section VI. General Support Final Inspection Procedures

4-23. GENERAL

a. This section describes and illustrates the final inspection of the M145/M145A1 telescope mount. A final inspection will be performed prior to returning the M145/M145A1 telescope mount to the using unit or to the supply system.

b. If the M145/M145A1 telescope mount being inspected fails to meet the required standards, ensure all maintenance authorized at the applicable level has been performed correctly. Then send the M145/M145A1 telescope mount to the next higher level of maintenance.

4-24. M145/M145A1 TELESCOPE MOUNT FINAL INSPECTION AND ADJUSTMENT

This task covers:

a. Setting up and adjusting the cross-leveling fixture
b. Visual inspection
c. Mounting M145/M145A1 telescope mount on cross-leveling fixture
d. Quadrant support assembly adjustment
e. Cross-level adjustment
f. Pitch adjustment
g. Cant adjustment
h. Pitch level vial adjustment
i. Checking elevation handwheel running torque
j. Checking cross-level mechanism knob running torque
k. Checking elevation correction knob running torque
i. Checking quadrant level knob running torque
m. Checking pitch knob running torque
n. Correction counter inspection

INITIAL SET-UP

Test Equipment

Adapter, fixture, with carrying case 5800953
Collimating telescope (Item 23, appx F)
Cross-leveling fixture (Item 11, appx F)
Eccentric tool, fabricated (fig. C-2, appx C)
Eccentric tool, fabricated (fig. C-3, appx C)
Linkage assembly 11728173
Perpendicularity gage 10559200
Precision level (Item 20, appx F)
Rigidity test target (Fig. C-11, appx C)

Tools

C-clamp (Item 10, appx F)

Purging kit (Item 22, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29) 5180-01-168-0487

Torque adapter (Item 3, appx F)
Torque adapter (Item 4, appx F)
Torque adapter (Item 5, appx F)
Torque adapter (Item 6, appx F)
Torque adapter (Item 8, appx F)
Torque wrench (in-oz) (item 35, appx F)
Torque wrench (in-lb) (item 36, appx F)

Material/Parts

Shim stock (Item 19, appx B)
Tape (Item 20, appx B)

References

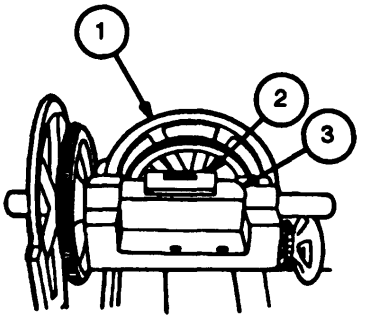
TM 750-116
TM 9-2350-311-10
TM 9-2350-314-10

Equipment Condition

M145/M145A1 telescope mount removed from howitzer (TM 9-2350-311-20-2/ TM 9-2350-314-20-2)

a. SETTING UP AND ADJUSTING THE CROSS-LEVELING FIXTURE

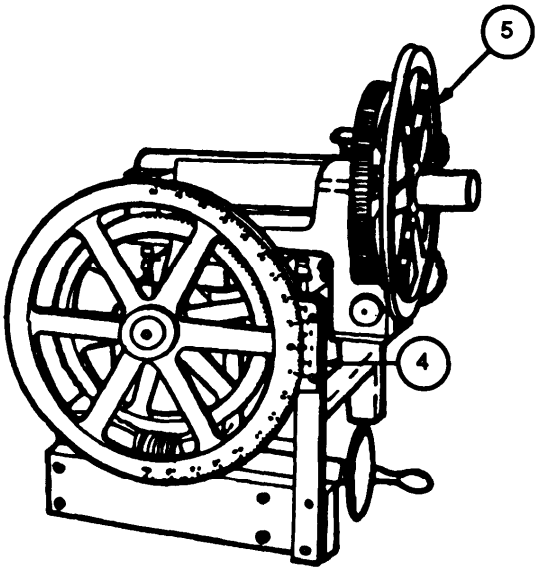
1 Secure cross-leveling fixture (1) on a solid stand bolted to the floor.



2 Place precision level (2) on square shaft (3), perpendicular to axis of rotation, and center bubble.

3 Place precision level (2) on square shaft (3), parallel to axis of rotation, and center bubble.

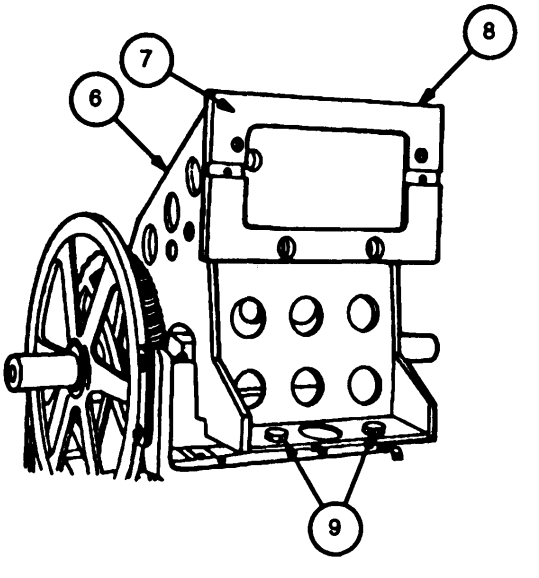
4 Set cant vernier scale (4) and elevation vernier scale (5) to "0".



5 Mount fixture adapter (6) on cross-leveling fixture (1); center fixture adapter (6) by means of four setscrews.

6 Hold M1A1 gunner's quadrant against mounting surface (7) of fixture adapter (6), and establish a level position by shimming the fixture adapter (6).

7 Place precision level (2) on surface (8), which is parallel to fixture adapter (6) keyway, and check that keyway is level. If necessary, shim fixture adapter (6) to obtain a level position.



8 Repeat steps 6 and 7 until both surfaces are level.

9 Secure fixture adapter (6) with six mounting screws (9).

4-24. M145/M145A1 TELESCOPE MOUNT FINAL INSPECTION AND ADJUSTMENT - continued

a. SETTING UP AND ADJUSTING THE CROSS-LEVELING FIXTURE - continued

10 Mount setup gage (10) on fixture adapter (6), and secure with four mounting bolts (11).

11 Install collimating telescope (12) in setup gage (10). Snug up thumbscrews (13) securing collimating telescope (12); do not tighten at this time.

12 Suspend a plumb line approximately 25 feet (7.62m) directly in front of collimating telescope (12).

13 Revolve collimating telescope (12) until its vertical line is superimposed on plumb line. Tighten thumbscrews (13) holding collimating telescope (12).

14 Fabricate rigidity test target (14). Use the following formula for target fabrication of test target:

$$\text{1 MIL GRADUATION} = \frac{\text{TARGET DISTANCE (IN INCHES)}}{1000}$$

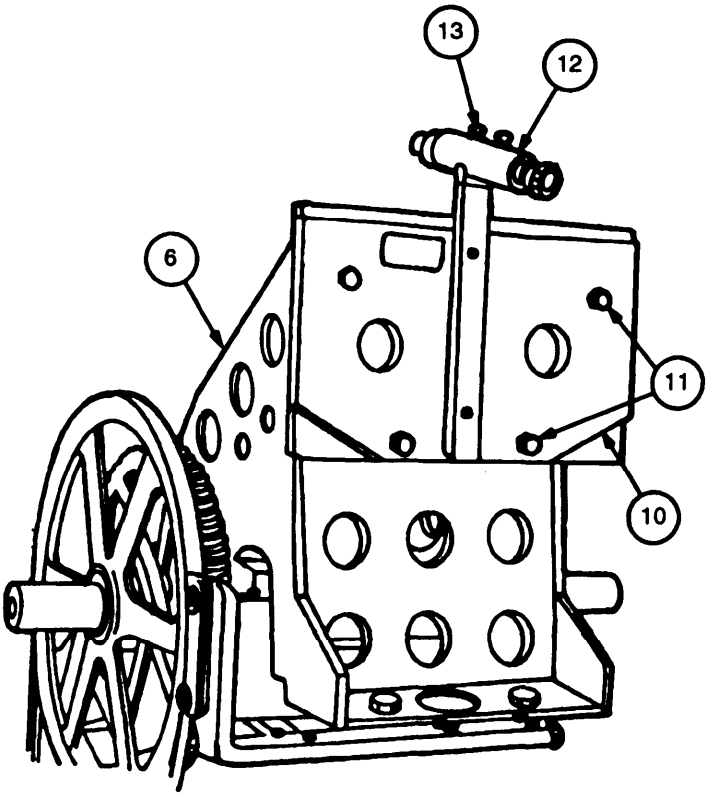
GIVEN:

TARGET DISTANCE = DISTANCE FROM SIGHTING DEVICE TO PLACEMENT OF TARGET.

EXAMPLE:

$$\text{1 MIL GRADUATION} = \frac{50\ \text{FT} \times 12\ \text{IN/FT}}{1000} = 0.6\ \text{IN}$$

0.25 MIL = 0.6 IN X 0.25 = 0.15 IN
1.50 MIL = 0.6 IN X 1.50 = 0.9 IN

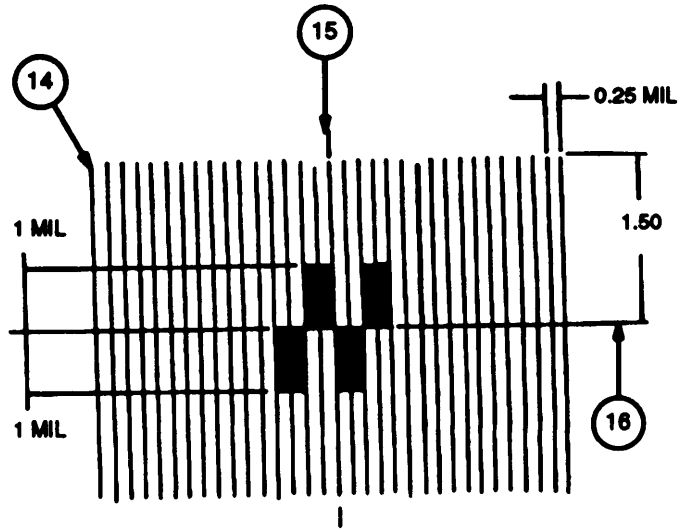


15 Position rigidity test target (14) 50 feet (15.24m) from objective end of collimating telescope (12).

16 Adjust position of rigidity test target (14) until its vertical lines (15) and horizontal crosslines (16) coincide with reticle lines of collimating telescope (12); secure target in this position.

17 Remove collimating telescope (12) from setup gage (10).

18 Remove setup gage (10) from fixture adapter (6).



b. VISUAL INSPECTION

1 Check that all screws and lockwashers are present and tight.

2 Check that all mounting surfaces are clean and free of burrs.

3 Check that M145/M145A1 telescope mount is free of dirt, corrosion, and foreign matter.

4 Check that M145/M45A1 telescope mount paint is not chipped.

5 Check that all M145/M145A1 telescope mount parts are present.

4-24. M145/M145A1 TELESCOPE MOUNT FINAL INSPECTION AND ADJUSTMENT - continued

c. MOUNTING M145/M145A1 TELESCOPE MOUNT ON CROSS-LEVELING FIXTURE

1 Install M145/M145A1 telescope mount (1) on fixture adapter (2) and with keyway properly positioned, secure with four mounting bolts.

2 Apply a 24 VDC power source to M145/M145A1 telescope mount (1) and illuminate vials and counters by turning toggle switch (3) to ON position.

3 Using M1A1 gunner's quadrant on mounting surface (4), level the fixture adapter (2).

4 Set fixture adapter (2) elevation indicator ring to "0".

5 Set elevation counter (5) and correction counter (6) to "0".

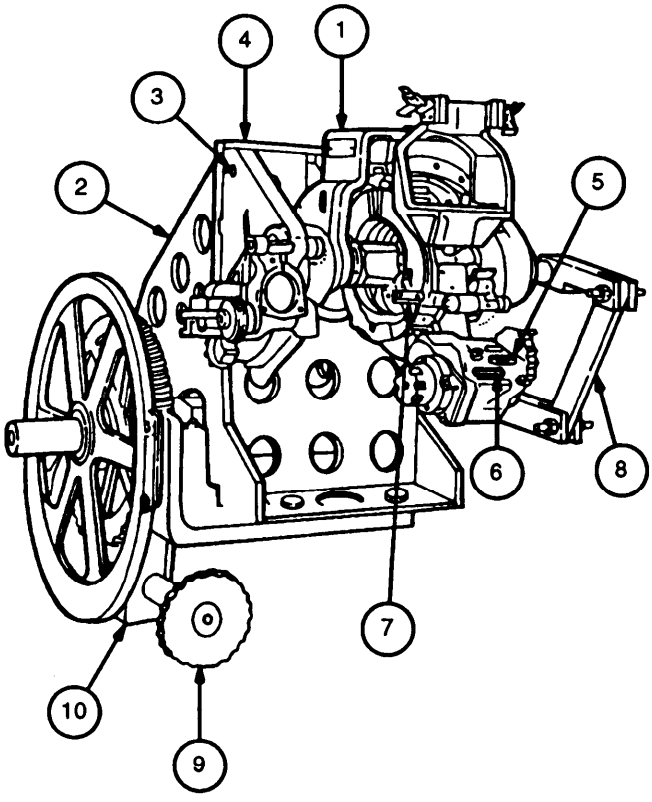
6 Install linkage assembly (8) on shaft of M145/M145A1 mount and fixture adapter (2). Manually center the disk assembly level (7) bubble. Secure in a level position.

7 Set elevation counter (5) to 50 roils depression.

8 Operate elevation handwheel (9) on the cross-leveling fixture (10) to center the disk assembly level (7) bubble.

9 Set elevation counter (5) to 1333 mils.

10 Repeat step 8.



d. QUADRANT SUPPORT ASSEMBLY ADJUSTMENT

1 Clamp a 3/8- by 3/4- by 6-inch parallel bar (1) to quadrant seat of bracket parallel to the quadrant support assembly level (2).

2 Position a zeroed M1A1 gunner's quadrant (3) on parallel bar (1), parallel to quadrant support level (2).

3 Adjust quadrant support assembly level knob (4) until gunner's quadrant level (5) bubble is centered.

4 Remove threaded ring (6) using fabricated eccentric tool (fig. C-3, appx C).

5 Apply sealing compound to threaded ring (6) and install in bracket.

6 Engage fabricated eccentric tool in holder (7) and threaded ring (6).

7 Insert a common straight blade screwdriver through the center hole in the fabricated eccentric tool (fig. C-3, appx C) and engage control cam (8).

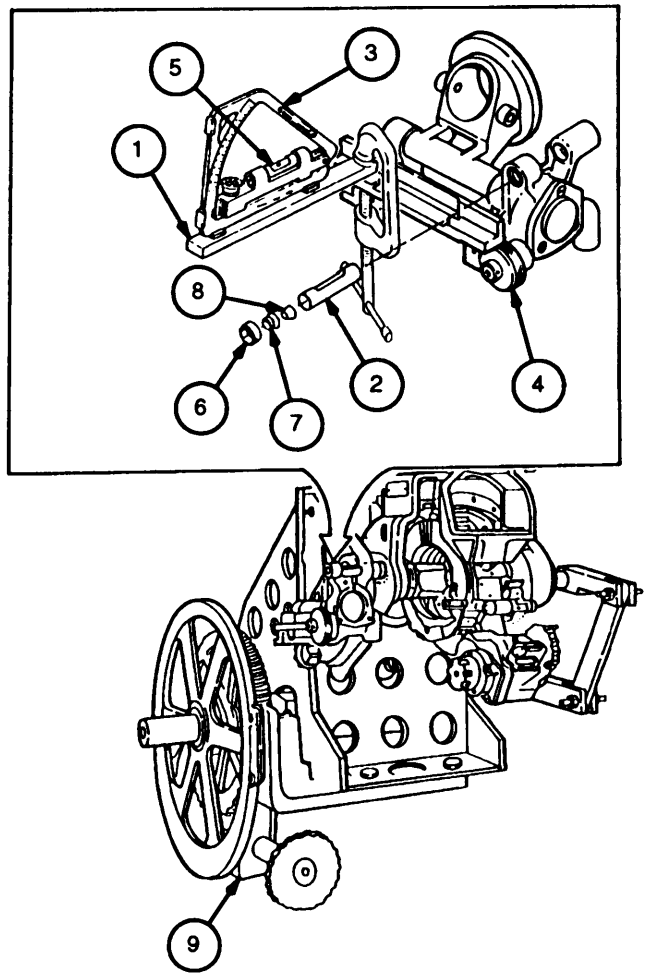
8 Adjust control cam (8) and threaded ring (6) until the level (2) bubble is centered within the graduations on the level (2).

9 Rotate cross-leveling fixture (9) from 0 to 1330 mils and adjust control cam (8) and threaded ring (6) until the level (2) bubble is centered within the graduations on the level (2).

10 Rotate cross-level fixture (9) from 1330 mils to 0 and adjust control cam (8) and threaded ring (6) until the level (2) bubble is centered within the graduations on the level (2).

11 Repeat steps 9 and 10 as necessary to center level (2) bubble at 0 and 1330 mils.

12 Hold the inner portion of the fabricated eccentric tool (fig. C-3, appx C) firmly in place while turning the outer portion of the tool to tighten threaded ring (6). Be careful not to disturb the setting of level (2).



4-24. M145/M145A1 TELESCOPE MOUNT FINAL INSPECTION AND ADJUSTMENT - continued

e. CROSS-LEVEL ADJUSTMENT

1 Install M117/M117A2 panoramic telescope (1) in M145/M145A1 telescope mount (ref. TM 9-2350-11-10 or TM 9-2350-314-10).

2 With cross-leveling fixture (3) leveled in elevation and cross-level, aline reticle of M117/M117A2 panoramic telescope (1) with plumbline.

3 Elevate and depress cross-leveling fixture (3), as required, between -50 mils and 1333 mils while tracking plumb line.

4 Adjust cross-level knob (4) and repeat steps 2 and 3 until M117/M117A2 panoramic telescope (1) tracks plumb line throughout complete excursion within 0.5 mil.

5 Engage fabricated eccentric tool (fig. C-2, appx C) to threaded ring (5).

6 Insert a common straight blade screwdriver through center hole in fabricated eccentric tool and engage cell (6).

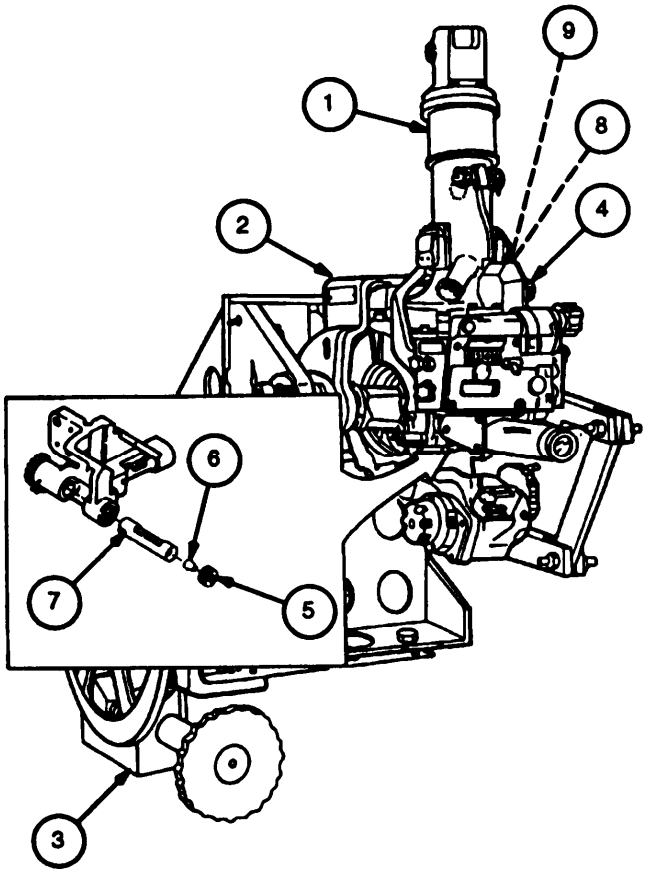
7 Adjust cell (6) until cross-level (7) bubble is centered within graduations on the cross-level (7).

8 Hold cell (6) firmly in place while turning fabricated eccentric tool (fig. C-2, appx C) to tighten threaded ring (5). Be careful not to disturb setting of cross-level (7).

9 Loosen two screws (8).

10 Rotate indicator (9) to aline scribe marks.

11 Tighten two screws (8).



f. PITCH ADJUSTMENT

1 Install perpendicularity gage (1) or use two parallel bars on M145/M145A1 telescope mount (2).

2 Level cross-leveling fixture (3) in elevation and cross-level (ref. para 4-24a).

3 Set M1A1 gunner's quadrant (4) on perpendicularity gage (1).

4 Adjust the pitch knob (5) to center the M1A1 gunner's quadrant level (6).

5 Engage fabricated eccentric tool (fig. C-3, appx C) to the threaded ring (7).

6 Insert a common straight blade screwdriver through center hole in fabricated eccentric tool (fig. C-3, appx C) and engage cell (8).

7 Adjust cell (8) until level (9) bubble is centered within the graduations on pitch level (9).

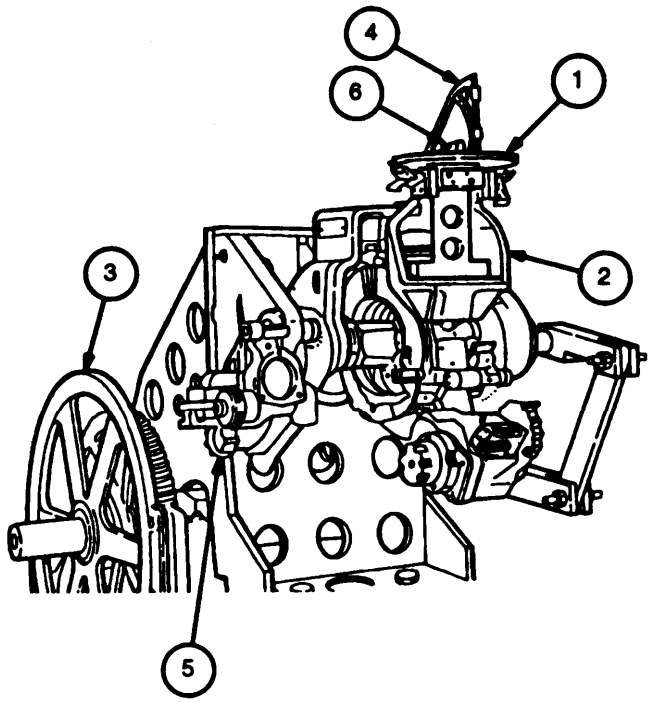
8 Hold cell (8) firmly in place while turning fabricated eccentric tool (fig. C-3, appx C) to tighten threaded ring (7). Be careful not to disturb the setting of pitch level (9).

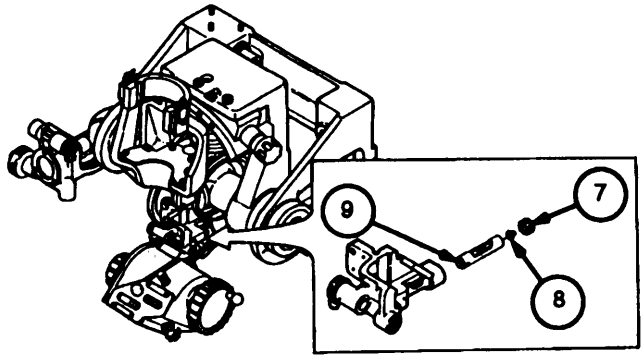
9 Mark the pitch knob (5) and bracket using tape as an open end point for checking backlash.

10 Rotate pitch knob (5) one revolution clockwise and return.

11 Read backlash using M1A1 gunner's quadrant (4) by centering bubble and reading the error on the M1A1 gunner's quadrant (4). Backlash shall not exceed 1 mil total. If backlash exceeds 1 mil, perform step 4 again.

12 Purge counter box assembly (ref. TM 750-116).





4-24. M145/M145A1 TELESCOPE MOUNT FINAL INSPECTION AND ADJUSTMENT - continued

g. CANT ADJUSTMENT

1 Install M117/M117A2 panoramic telescope (1) on M15/M145A1 telescope mount (2) (ref. TM 9-2350-311-10 or TM 9-2350-314-10).

2 Rotate M117/M117A2 panoramic telescope, using azimuth knob (3), until azimuth counter (4) indicates 4800 mile.

3 Reset M117/M117A2 panoramic telescope (1) reset counter (5) to 3200 mils.

4 Using M1A1 gunner's quadrant mounted on fixture adapter mounting surface (6), adjust fixture adapter for 88.9 roils cant.

5 Level M117/M117A2 panoramic telescope (1) using pitch knob (7), cress-level knob (8), and elevation handwheel (9) on cross-leveling fixture (10).

6 Set elevation counter (11) to 300 roils.

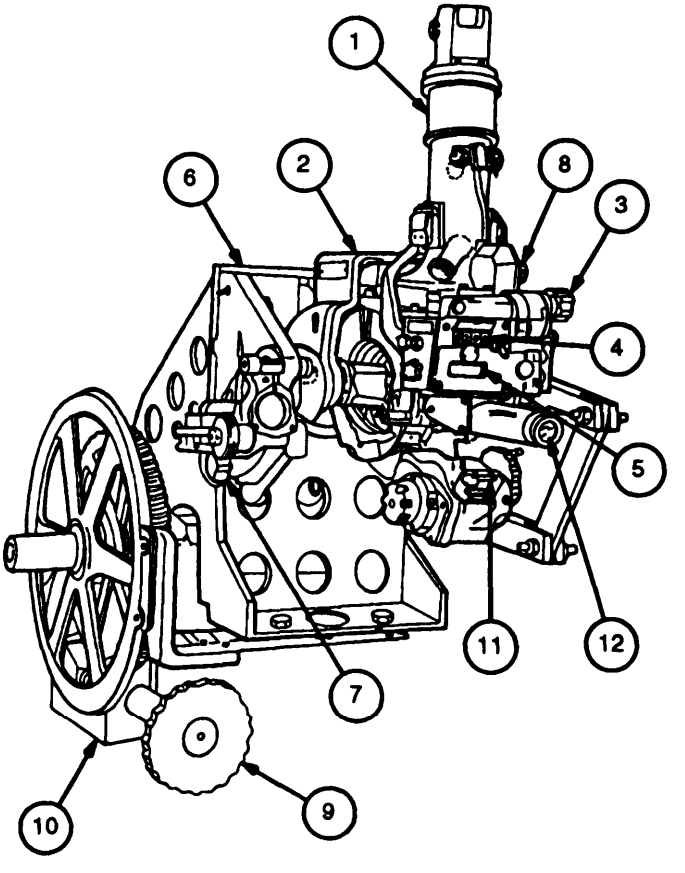
7 Level the M117/M117A2 panoramic telescope (1) using pitch knob (7), cross-level knob (8), and elevation handwheel (9) on cross-leveling fixture (10).

8 While looking through M117/M117A2 panoramic telescope (1) eyepiece (12), rotate M117/M117A2 panoramic telescope (1) using azimuth knob (3).

9 Aline reticle of M117/M117A2 panoramic telescope (1) with a plumbline at 90° to the fixture assembly.

10 Repeat steps 2 through 9 with fixture cant in the opposite direction 88.9 mils.

11 Return cross-leveling fixture (10), M145/M145A1 telescope mount (2), and M117/M117A2 panoramic telescope (1) to zero and level. Reset all counters.



NOTE

The reading on the azimuth counter of the M117/M117A2 panoramic telescope must agree with the tolerances given below.

CANT ADJUSTMENT			
Quadrant seat elevation (mils)	Cant angle (mils)	Azimuth corrections (mils)	Tolerance (mils)
300	88.9	27.0	±1.3
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

h. PITCH LEVEL VIAL ADJUSTMENT

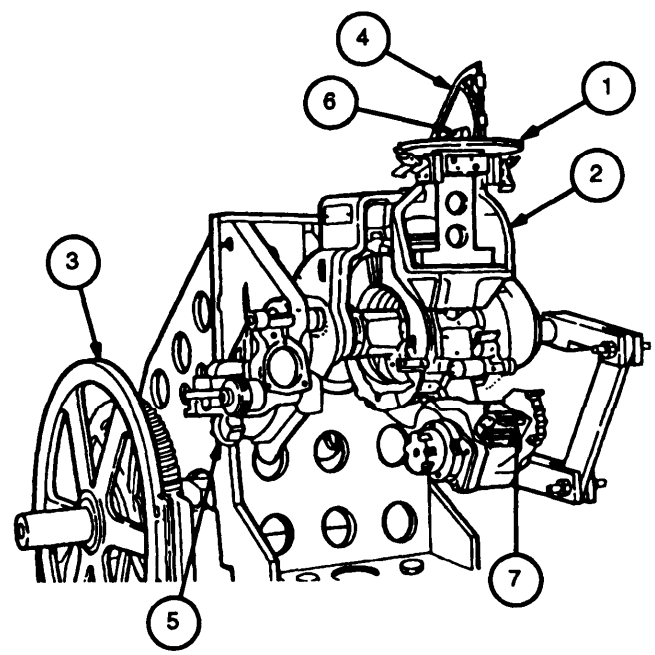
1 Install perpendicularity gage (1) or two parallel bars on M145/M145A1 telescope mount (2).

2 Level the cross-leveling fixture (3) in elevation and cross-level.

3 Set the zeroed M1A1 gunner's quadrant (4) on the perpendicularity gage (1) or two parallel bars.

4 Adjust pitch knob (5) until M1A1 gunner's quadrant (4) level (6) is centered.

5 Adjust elevation handwheel until elevation counter (7) reads zero.



4-24. M145/M145A1 TELESCOPE MOUNT FINAL INSPECTION AND ADJUSTMENT - continued

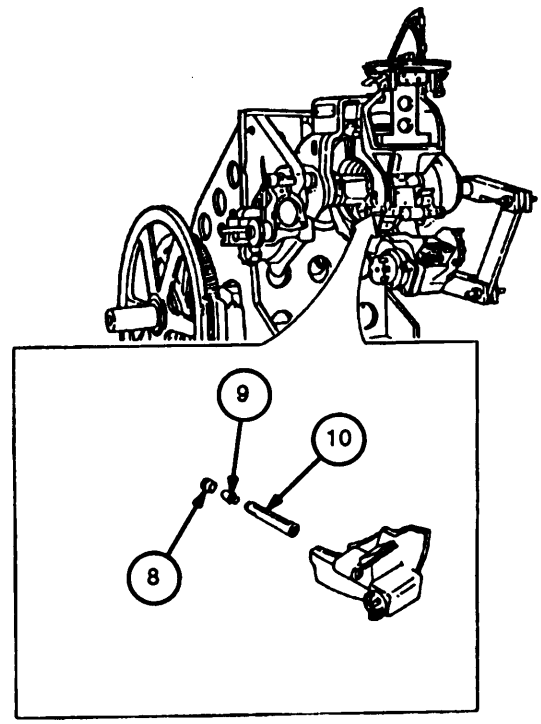
h. PITCH LEVEL VIAL ADJUSTMENT-continued

6 Engage fabricated eccentric tool (fig. C-3, appx C) to the threaded ring (8).

7 Insert a common straight blade screwdriver through the center hole in fabricated eccentric tool (fig. C-3, appx C) and engage cell (9).

8 Adjust cell (9) until the pitch level (10) bubble is centered within the graduations on the pitch level (10).

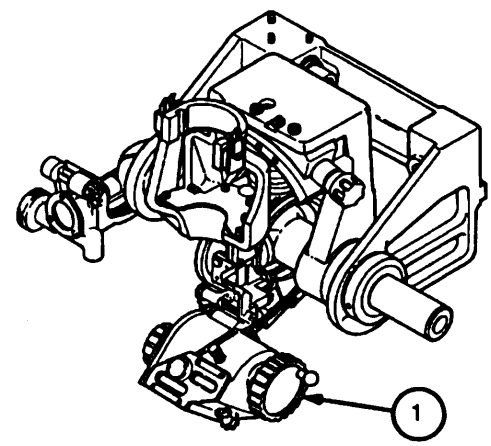
9 Hold cell (9) firmly in place while turning fabricated eccentric tool (fig. C-3, appx C) to tighten threaded ring (8). Be careful not to disturb the setting of pitch level (10).



i. CHECKING ELEVATION HANDWHEEL RUNNING TORQUE

1 With torque wrench (Item 36, appx F) and adapter (8599922) (Item 8, appx F), rotate elevation handwheel (1) one turn clockwise and one turn counterclockwise.

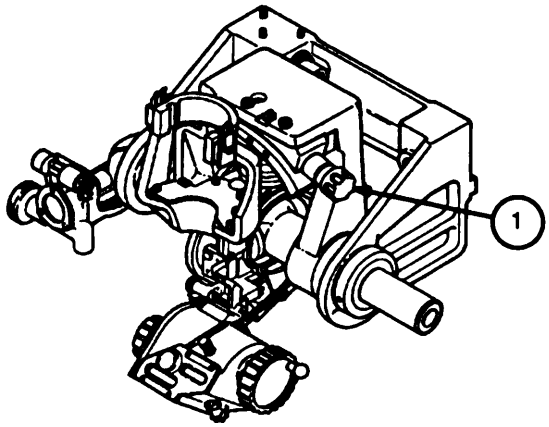
2 Measure the torque required to turn elevation handwheel (1). The torque must be between 8 and 12 pound-inches (0.904 and 1.356 N-m). If not, repair according to repair procedure (ref. para 4-16).



j. CHECKING CROSS-LEVEL MECHANISM KNOB RUNNING TORQUE

1 With torque wrench (Item 36, appx F) and adapter (8599917) (Item 6, appx F), rotate cross-level mechanism knob (1) one turn clockwise and one turn counteclockwise

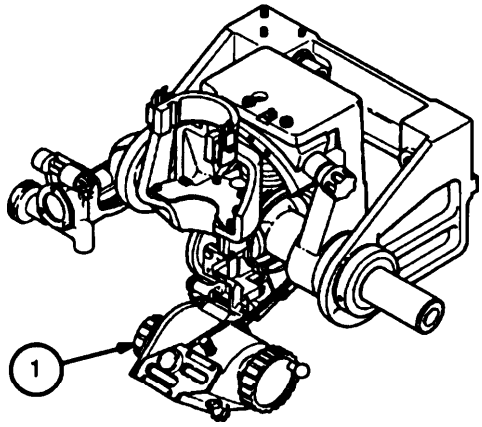
2 Measure the torque required to turn cross-level mechanism knob (1). The torque must be between 3 and 6 pound-inches (0.33 and 0.67 N-m). If not, repair according to repair procedure (ref. para 4-13).



k. CHECKING ELEVATION CORRECTION KNOB RUNNING TORQUE

1 With torque wrench (Item 36, appx F) and adapter (8599910) (Item 3, appx F), rotate elevation correction knob (1) one turn clockwise and one turn counterclockwise.

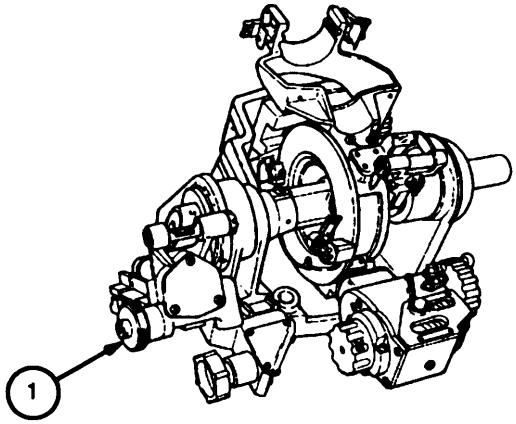
2 Measure the torque required to turn elevation correction knob (1). The torque must be between 2 and 4 pound-inches (0.23 and 0.45 N-m). If not, notify depot maintenance.



l. CHECKING QUADRANT LEVEL KNOB RUNNING TORQUE

1 With torque wrench (Item 35, appx F) and adapter (8599910 for M145A1) (Item3, appxF) (8599911 for M145) (Item 4, appx F), rotate quadrant level knob (1) one turn clockwise and one turn counterclockwise.

2 Measure the torque required to turn quadrant level knob (1). The torque must be between 4 and 10 ounce-inches (0.028 and 0.071 N-m). If not, repair according to repair procedure (ref. para 4-13).

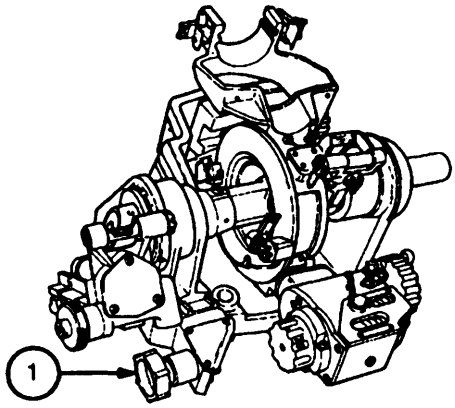


4-24. M145/M145A1 TELESCOPE MOUNT FINAL INSPECTION AND ADJUSTMENT - continued

m. CHECKING PITCH KNOB RUNNING TORQUE

1 With torque wrench (Item 36, appx F) and adapter (8599912) (Item 5, appx F), rotate pitch knob (1) one turn clockwise and one turn counterclockwise.

2 Measure the torque required to turn pitch knob (1). The torque must be between 5 and 16 pound-inches (0.56 and 1.80 N-m). If not, repair according to repair procedure (ref. para 4-19).



n. CORRECTION COUNTER INSPECTION

1 Place M1A1 gunner's quadrant (1) in position on quadrant support assembly (2).

2 Set correction counter (3) to +1 mil.

3 Set elevation counter (4) to 0.

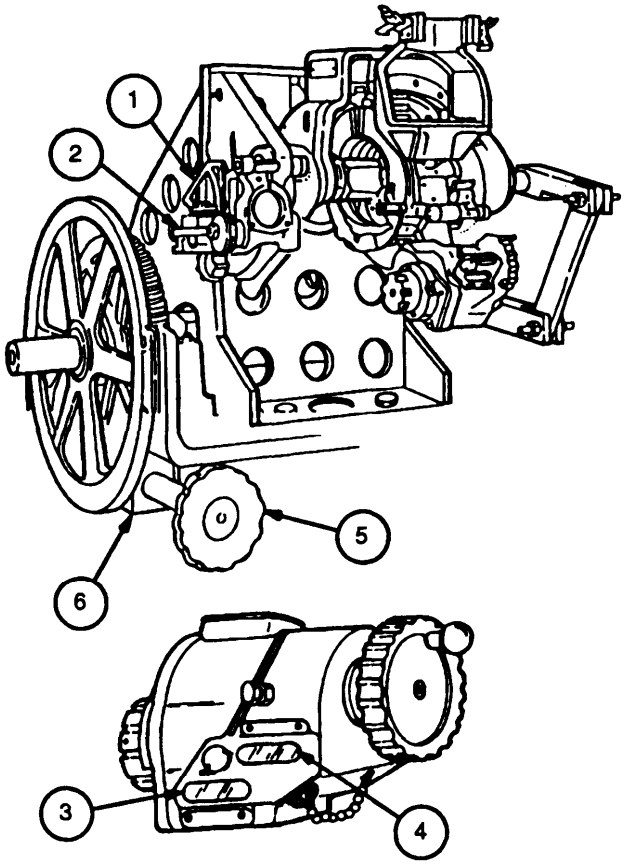
4 Rotate fixture elevation handwheel (5) on the cross-leveling fixture (6) until elevation level bubble is centered.

5 Note reading on gunner's quadrant (1).

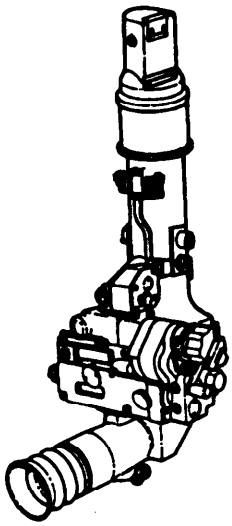
6 The quadrant support assembly must elevate or depress within 0.5 mil of the +1 mil entered into the correction counter (3).

7 Repeat steps 2 thru 6 above for correction counter (3) indications of -1 mil, ±12 mils, ±27 mils, and ±50 mils.

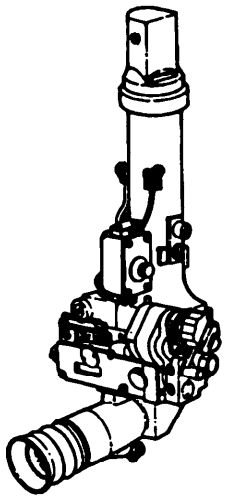
8 Check alinement of digits in correction counter (3) and elevation counter (4) by placing the lowest digit of each counter in coincidence with its respective line. The alinement of the other counter digits must not vary more than 1/16 inch (0.16mm). If the digit alinement varies more than 1/16 inch (0.16mm), repair according to repair procedure (ref. para 4-17).



CHAPTER 5
M117/M117A2 PANORAMIC TELESCOPE MAINTENANCE INSTRUCTIONS



M117 PANORAMIC TELESCOPE



M117A2 PANORAMIC TELESCOPE

CHAPTER OVERVIEW

This chapter contains maintenance procedures for the M117/M117A2 panoramic telescope. Information on repair parts and special tools and detailed procedures for troubleshooting and maintenance of the M117/M117A2 panoramic telescope are included.

CHAPTER INDEX

CHAPTER INDEX - continued

Section I. Repair Parts; Special Tools; Test, Measurement, and Diagnostic Equipment (TMDE); and Support Equipment

5-1. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organizational and Equipment (MTOE), CTA 50-970, applicable to your unit.

5-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special tools, TMDE, and support equipment required and authorized for repair of the M117/M117A2 panoramic telescope are listed in the repair parts and special tools list, appendix D. Fabricated tools are listed in appendix C.

5-3. REPAIR PARTS

Repair parts are listed and illustrated in the repair parts and special tools list, appendix D.

Section II. Inspections

5-4 GENERAL

a. Inspection is performed primarily to determine the following:

(1) Completeness.

(2) The nature of serviceability.

(3) The work repair parts, and supplies required to return the materiel to serviceability.

(4) That the work in process is being performed properly.

(5) That completed work complies fully with serviceability standards.

b. The M117/M117A2 panoramic telescope is considered serviceable when:

(1) It is complete and properly performs its intended function.

(2) All applicable modification work orders (MWO'S) have been applied.

(3) All defects disclosed by the inspection have been corrected.

c. DA Form 2408-5 and DA Form 2409 list applicable MWO'S.

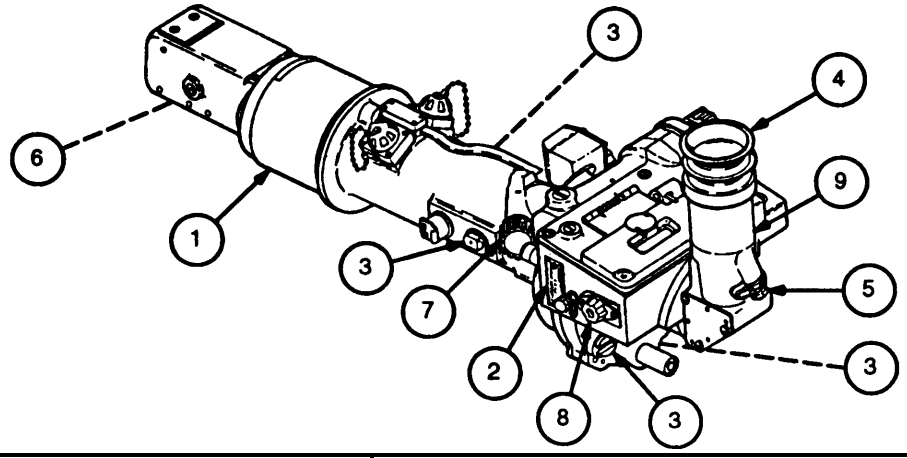
5-5. CATEGORIES OF INSPECTION

Categories of inspection define responsibilities

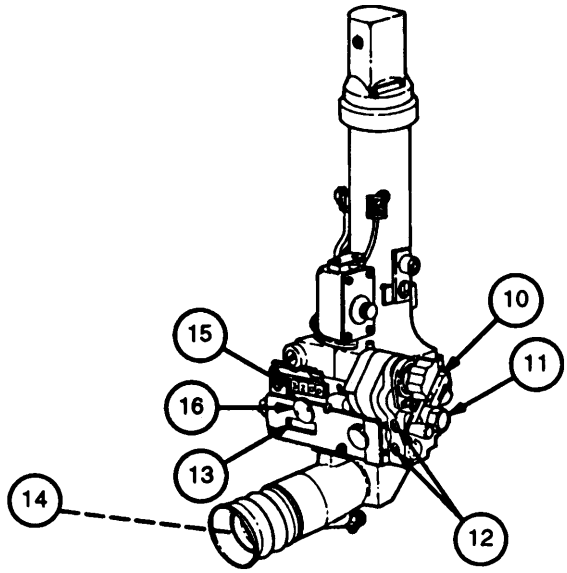
a. An initial inspection is performed immediately on receipt of the M117/M117A2 panoramic telescope for maintenance. This inspection will determine the amount and type of work to be performed or whether the M117/M117A2 panoramic telescope should be sent to depot maintenance.

b. Final inspection and adjustment (ref. para 5-26) are performed after repairs have been completed at general support maintenance to ensure the item meets serviceability standards.

5-6. INITIAL INSPECTION

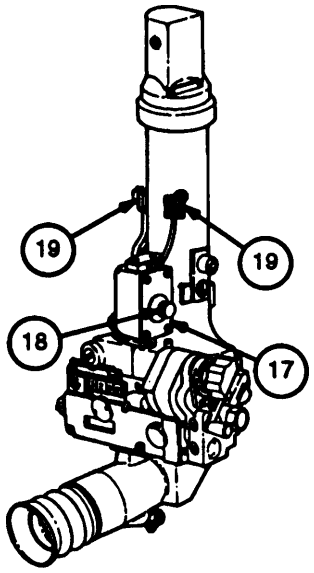


Item No.	Item To Be Inspected	Procedures
1	M117/M117A2 PANORAMIC TELESCOPE	Inspect M117/M117A2 panoramic telescope (1) for completeness and secureness of parts; must be complete and secure.
2	IDENTIFICATION PLATE	Inspect identification plate (2) for legibility; must be legible and clearly defined.
3	MOUNTING SURFACES	Inspect mounting surfaces (3) for burrs and corrosion; must be free of burrs and corrosion.
4	EYESHIELD	Inspect eyeshield (4) for security of attachment and damage such as deterioration, cuts, or tears; must be secure, without tears or deterioration.
5	PURGING VALVE STEM AND AIR VALVE CAP	Inspect purging valve stem and air valve cap (3) for damage such as bends or breaks and ability to hold pressure; must not be bent or broken, and must hold pressure.
6	WINDOW	Inspect window (6) for dirt, fungus, or condensation which may obstruct view; must be clean and free of moisture.
7	ELEVATION KNOB	Inspect elevation knob (7) for smooth operation without binding or jerky movement. Operates smoothly without binding.
8	RESET COUNTER KNOB	Inspect reset counter knob (8) for smooth operation without binding or jerky movement. Operates smoothly without binding.
9	ELBOW ASSEMBLY	Inspect elbow assembly (9) for smooth travel through full range of movement. Operates smoothly without binding.
		Inspect optical quality by looking through eyepiece. View should be clear with no objectionable signs of dirt, lint, cracked lenses, or condensed moisture.
10	AZIMUTH KNOB	Inspect azimuth knob (10) for smooth operation through full range in either direction with no binding or jerky motion.
11	GUNNER'S AID KNOB	Inspect gunner's aid knob (11) to be sure that it does not bind.



Item No.	Item To Be Inspected	Procedures
12	GUNNER'S AID COUNTER	Rotate gunner's aid knob (11) to stop in both directions. Gunner's aid counters (12) must have an excursion of 50 roils in each direction before contacting stops at extremes.
13	RESET COUNTER	Rotate reset counter knob (8) while observing reset counter (13). Reset counter (13) must be able to reset to 3200 roils from any counter position. Rotate azimuth knob (10) while observing reset counter (13). Reset counter (13) shall follow azimuth counter (15) within 0.25 mil when azimuth knob (10) is rotated. Set -50 roils on gunner's aid counter (12) (right) and check that reset counter (13) reading increases by 50 ± 0.5 roils. Set +50 roils on gunner's aid counter (12) (left) and check that reset counter reading decreases by 50 ± 0.5 roils and that azimuth counter (15) reading does not change.
14	LENS	Inspect lens (14) for dirt, fungus, or condensation which may obstruct view through eyepiece; must be clean and moisture free.
15	AZIMUTH COUNTER	Rotate azimuth knob (10) clockwise, then counterclockwise while observing azimuth counter (15). Azimuth counter (15) indication must increase when azimuth knob (10) is rotated clockwise and decrease when azimuth knob (10) is rotated counterclockwise. Rotate azimuth knob (10), gunner's aid knob (11), and reset counter knob (8) to lowest digit, with the lowest digit coinciding with its respective index line. Check that remaining numbers are in alinement within 1/16 inch (0.16 mm).
16	COUNTER LEDS	Inspect counter LEDs (16) by observing counter numerals; numerals shall be clearly distinguishable in darkened area with 24 volts DC applied.

5-6. INITIAL INSPECTION - continued



Item No.	Item To Be Inspected	Procedures
17	VARIABLE RESISTOR	Inspect variable resistor (17) by observing variation in reticle illumination as variable resistor knob (18) is turned. Variable resistor must control intensity of reticle illumination from off to bright with 24 volts DC applied.
18	RETICLE LEDS	Inspect reticle LEDs (19) by observing reticle illumination. illumination must be adequate in darkened area, with intensity required for clarity, with 24 volts DC applied.

Section III. Troubleshooting

5-7. GENERAL

a. The symptom index can be used as a quick guide to troubleshooting. Common malfunctions are listed in alphabetical order with a page number reference to the troubleshooting table, where a test or inspection and corrective action are provided.

b. The direct support troubleshooting table (ref. para 5-9) lists the common malfunctions which maybe found during maintenance of the M117/M117A2 panoramic telescope. Perform the tests/inspections and corrective actions in the order listed.

c. The general support troubleshooting table (ref. para 5-11) lists the common malfunctions which maybe found during maintenance of the M117/M117A2 panoramic telescope. Perform the tests/inspections and corrective actions in the order listed.

d. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective action, notify depot maintenance.

5-8 DIRECT SUPPORT SYMPTOM INDEX

5-9. DIRECT SUPPORT TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION

LAMP ASSEMBLY

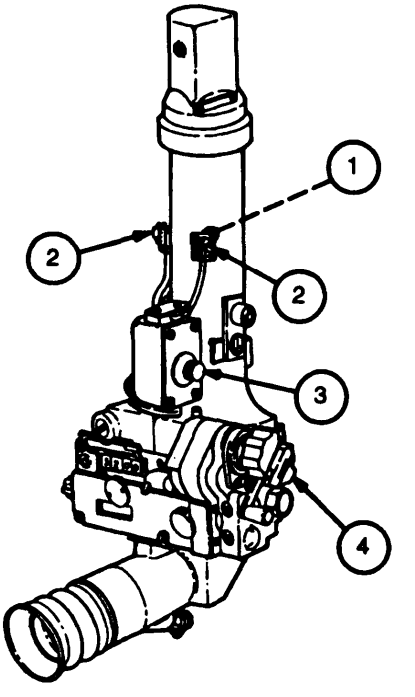
1. RETICLE IS NOT ILLUMINATED.

   Observe visually.

   a. Replace LED (1) (ref. para 5-14 or 5-15).

   b. Replace lamp assembly (2) (ref. para 5-14 or 5-15).

   c. Replace variable resistor (ref. para 5-14 or 5-15).



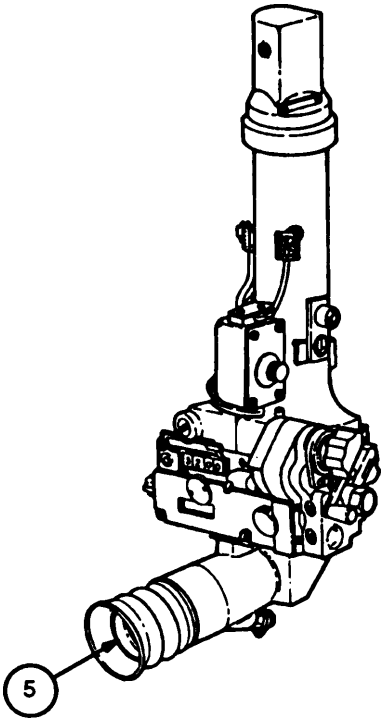
AZIMUTH KNOB

2. AZIMUTH KNOB (4) DOES NOT FUNCTION CORRECTLY.

   Rotate azimuth knob.

   Replace azimuth knob (4) (ref. para 5-13).

5-9. DIRECT SUPPORT TROUBLESHOOTING - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION
ELBOW ASSEMBLY 3. LENS (5) IS FOGGED OR CONDENSATION IS PRESENT. Observe visually. Purge and charge telescope (TM 750-116).	

5-10. GENERAL SUPPORT SYMPTOM INDEX

5-11. GENERAL SUPPORT TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION

CAP ASSEMBLY

1. CAP (1) BINDS OR JUMPS.

   Observe visually.

   Replace damaged balls in cap (ref. para 5-17).

COUNTER ASSEMBLY

2. AZIMUTH COUNTER (2) AND RESET COUNTER (3) DO NOT OPERATE.

   Adjust azimuth and reset counter knobs.

   Repair body (ref. para 5-17).

3. AZIMUTH COUNTER (2) AND RESET COUNTER (3) ARE NOT LEGIBLE.

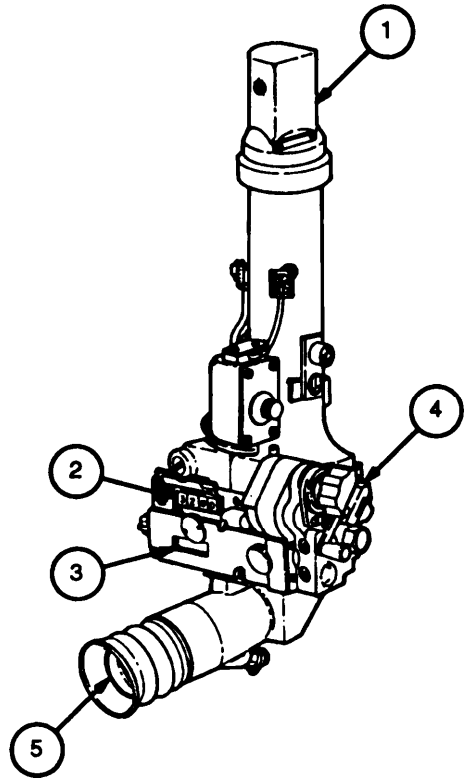
   Observe visually.

   Repair adapter assembly (ref. para 5-23).

4. DIFFERENTIAL GEAR ASSEMBLY NOISY WHEN AZIMUTH KNOB (4) IS OPERATED.

   Rotate knobs.

   Repair differential gear assembly (ref. para 5-23).



ELBOW ASSEMBLY

5. LENS (5) WILL NOT FOCUS.

   Observe visually.

   Repair elbow assembly (ref. para 5-19).

6. LENS (5) IS DAMAGED.

   Observe visually.

   Replace lens (ref. para 5-20).

Section IV. Direct Support Maintenance Procedures

5-12. GENERAL

LIST OF TASKS

Task No.	Task	Task Ref (Page)	Troubleshooting Ref No. (Page)
1	Maintain M117/M117A2 panoramic telescope		
	a. Disassemble	5-11	
	b. Repair	5-12	
	c. Assemble	5-13	
2	Maintain lamp assembly and related parts (Ml 17)		5-7
	a. Remove/Disassemble	5-16	
	b. Repair	5-17	
	c. Assemble/Install	5-17	
3	Maintain lamp assembly and related parts (Ml 17A2)		5-7
	a. Remove/Disassemble	5-20	
	b. Repair	5-22	
	c. Assemble/Install	5-22	

5-13. Ml17/Ml17A2 PANORAMIC TELESCOPE MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Purging kit (Item 22, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

V-block (Item 25, appx F)

Materials/Parts

Adhesive (Item 2, appx B)
Grease (Item 6, appx B)
Grease (Item 7, appx B)
Gasket (Item 3, appx E)
Gasket (Item 5, appx E)
Lockwasher (Item 69, appx E)
Lockwashers (4) (Item 62, appx E)
Lockwashers (6) (Item 68, appx E)
Preformed packing (Item 32, appx E)
Preformed packings (2) (Item 30, appx E)
Preformed packings (2) (Item 34, appx E)
Shim (Item 50, appx E)
Shim (Item 51, appx E)
Shim (Item 52, appx E)
Shims (2) (Item 46, appx E)
Shims (4) (Item 47, appx E)

References

TM 9-254
TM 750-116

Equipment Condition

M117/M117A2 panoramic telescope removed from howitzer (TM 9-2350-311-10/ TM 9-2350-314-10)

a. Disassembly

1 Support azimuth knob (1) with a V-block.

2 Remove headless straight pin (2).

3 Remove azimuth knob (1).

4 Remove cap screw (3), lockwasher (4), flat washer (5), and plate (6). Discard lockwasher.

5 On M117A2 panoramic telescope only, remove three machine screws (7), cap (8), and gasket (9). Discard gasket.

NOTE

Preformed packing (10) is located in cap (8) of M117A2 panoramic telescope or in plate (6) of M117 panoramic telescope.

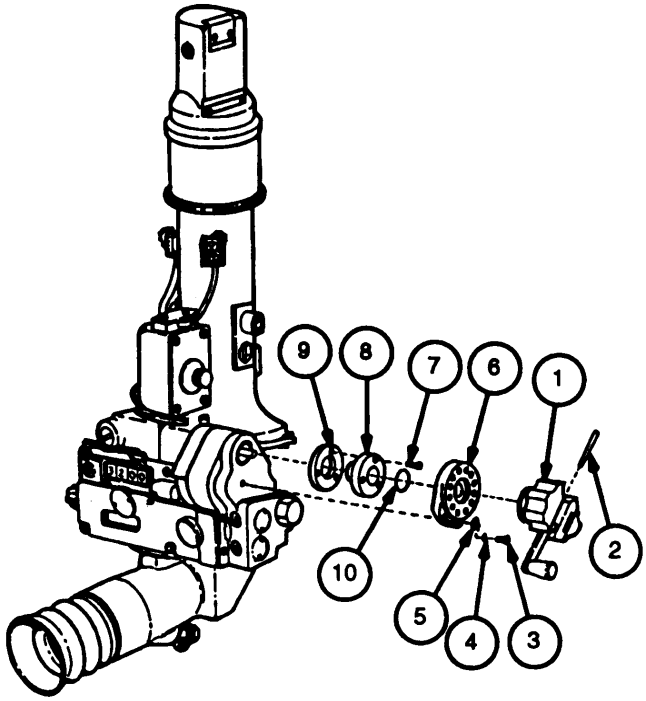
6 Remove and discard preformed packing (10).

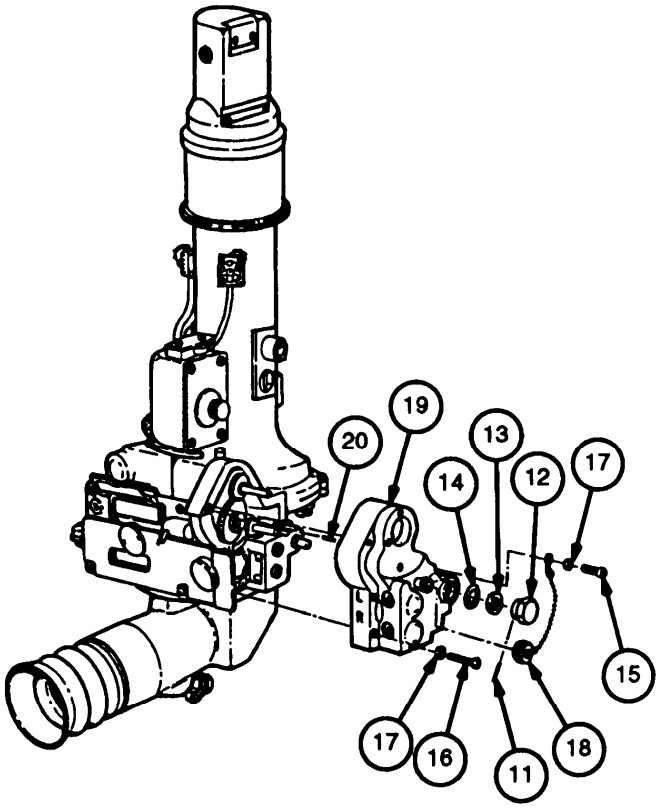
7 Remove headless straight pin (11), gunner's aid knob (12), three shims (13), and seal (14). Discard shims.

8 Remove three machine screws (15), three machine screws (16), and six lockwashers (17). Discard lockwashers.

9 Remove cap assembly (18).

10 Remove cover (19). Remove two headless straight pins (20), only if damaged.





5-13. M117/M117A2 PANORAMIC TELESCOPE MAINTENANCE INSTRUCTIONS - continued

a. Disassembly - continued

11 Remove four shims (21) and two shims (22). Discard shims.

12 Remove two windows (23), only if damaged.

13 Remove setscrew (24).

14 Loosen setscrew (25) and push elevation knob (26) into the housing as far as possible. Tighten setscrew (25).

15 Unscrew elevation knob (26) as far as possible from shouldered shaft (27) and repeat step 14 as necessary to remove elevation knob (26).

16 Remove setscrew (25) and shouldered shaft (27).

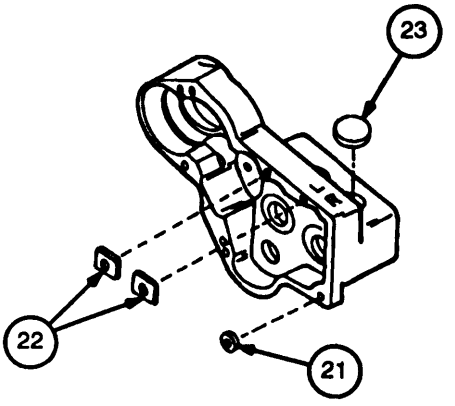
17 Remove and discard preformed packing (28).

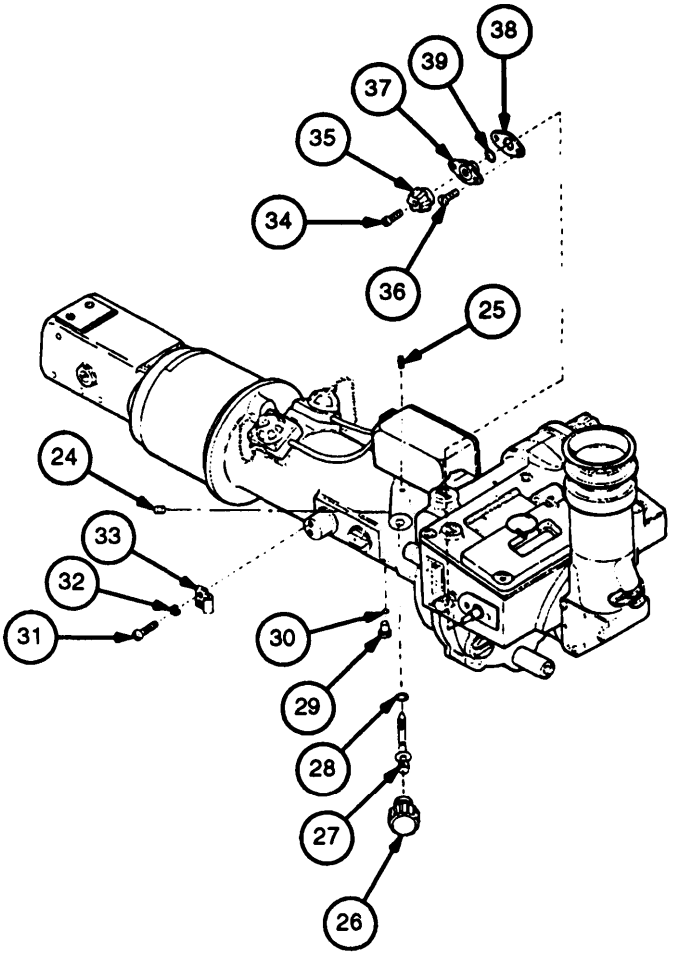
18 Remove two plugs (29) and two preformed packings (30). Discard preformed packings.

19 Remove four machine screws (31), four lockwashers (32), and two strikes (33). Discard lockwashers.

20 Remove machine screw (34) and reset counter knob (35).

21 Remove two machine screws (36), access cover (37), and gasket (38). Remove preformed packing (39) from access cover (37). Discard preformed packing and gasket.





b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly

1 Install two strikes (33) and secure with four new lockwashers (32) and four machine screws (31).

2 Apply grease (item 7, appx B) to new preformed packing (28) and install on shouldered shaft (27).

3 Apply grease (item 6, appx B) to shouldered shaft (27).

4 Turn telescope upside down to clear elevation shaft hole. Install shouldered shaft (27) and rotate until seated.

5 Install setscrew (25), but do not tighten.

6 Depress shouldered shaft (27) and tighten setscrew (25).

7 Screw elevation knob (26) onto shouldered shaft (27). Back off setscrew (25) until flush with housing and seal with adhesive.

8 Push elevation knob (26) into housing and install setscrew (24). Tighten setscrew (24) until it bottoms against elevation knob (26) and then back off as required for smooth operation.

9 Apply grease (item 7, appx B) to two new preformed packings (30) and install on two plugs (29).

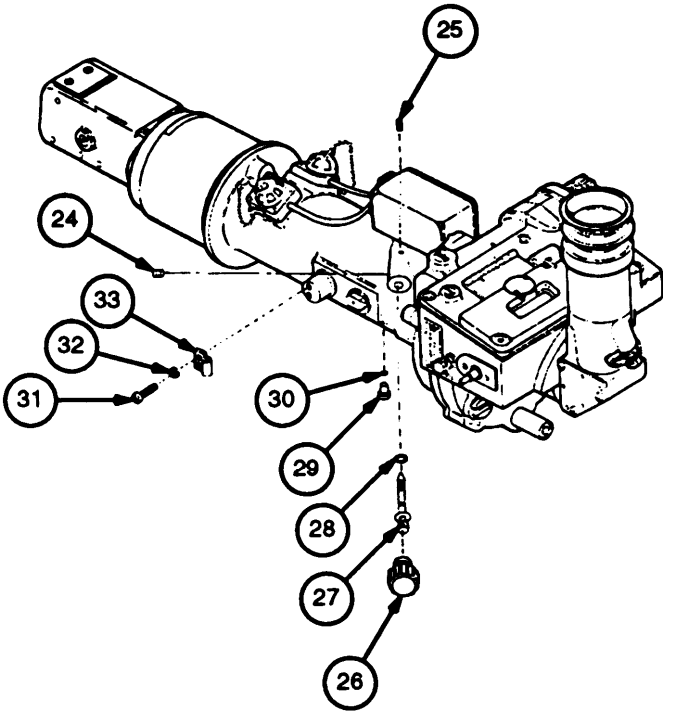
10 Install two plugs (29) into housing.

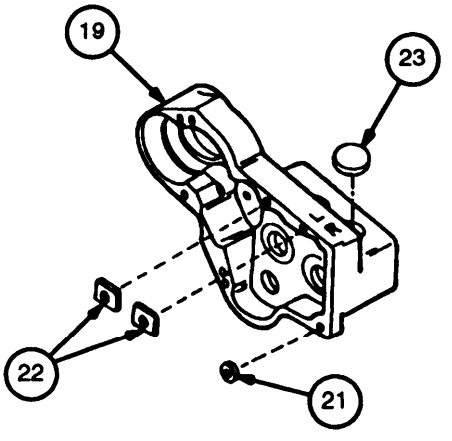
11 Apply adhesive to the groove and ledge of cover (19).

12 If removed, install two windows (23).

13 Apply adhesive to two new shims (22) and four new shims (21) and install on cover (19).

14 Apply adhesive to the mating surface of cover (19).





5-13. M117/M117A2 PANORAMIC TELESCOPE MAINTENANCE INSTRUCTIONS - continued

c. Assembly - continued

15 If removed, install two headless straight pins (20). Install cover (19) and secure with six new lockwashers (17), three machine screws (15), and three machine screws (16). Install chain of cap assembly (18) under one machine screw (15). Install cap assembly (18).

16 Apply grease (item 7, appx B) to seal (14) and install on cover (19).

17 Install three new shims (13) and gunner's aid knob (12) and secure with headless straight pin (11).

18 Apply grease (item 7, appx B) to new gasket (9) and install on cover (19) (M117A2 only).

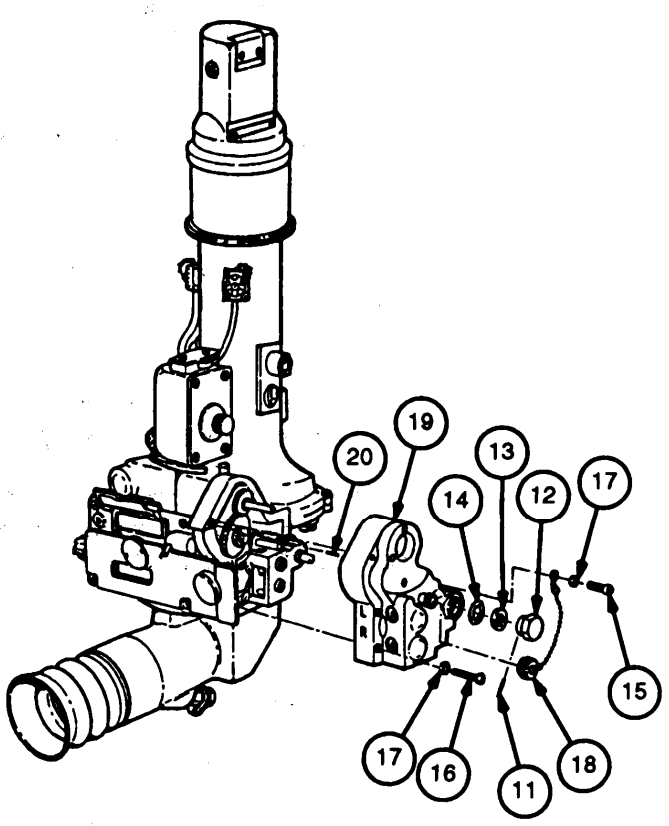
19 Apply grease (item 7, appx B) to new preformed packing (10) and install in cap (8) of M117A2 panoramic telescope or plate (6) of M117 panoramic telescope.

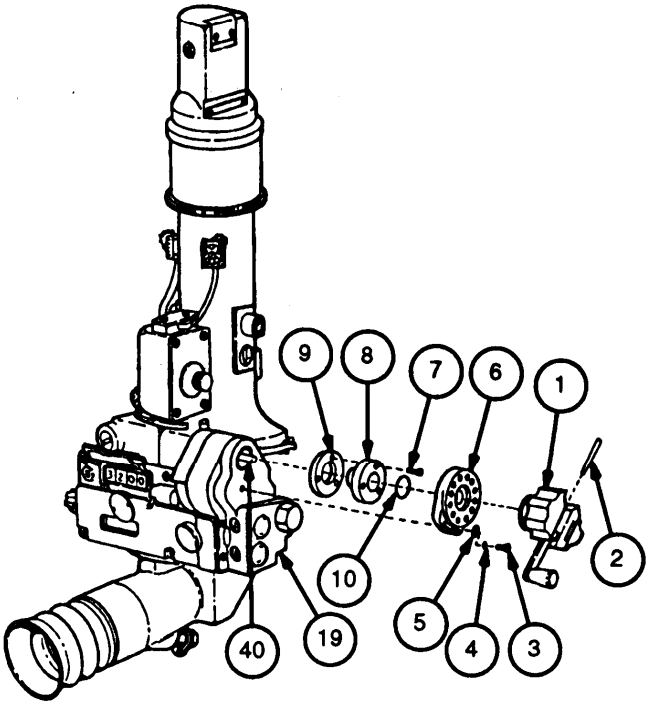
20 Apply adhesive to threads of three machine screws (7). Install cap (8) and secure with three machine screws (7) (M117A2 only).

21 Apply adhesive to cap screw (3). Install plate (6) and secure with flat washer (5), new lockwasher (4), and cap screw (3).

22 Install azimuth knob (1) on shaft (40).

23 Support azimuth knob (1) with a V-block and secure with headless straight pin (2).



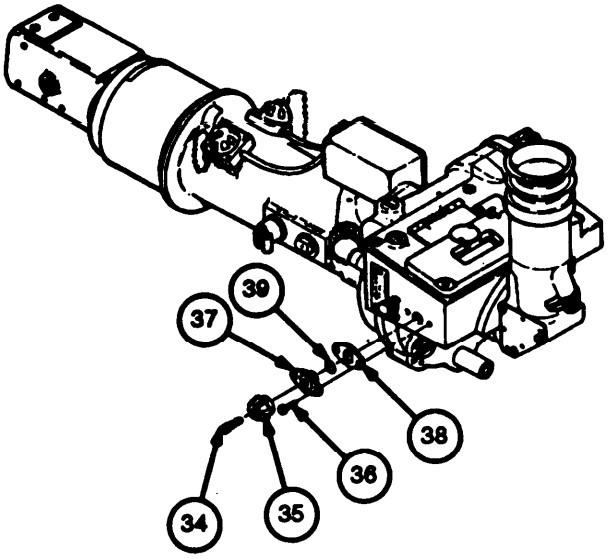


24 Apply grease (item 7, appx B)to new preformed packing (39). Apply adhesive to two machine screws (36) and new gasket (38).

25 Install gasket (38), preformed (39), access cover (37), and two machine screws (38).

26 Install reset counter knob (35) and machine screw (34).

27 Purge counter box assembly (ref. TM 750-116).



5-14. LAMP ASSEMBLY AND RELATED PARTS (M117) MAINTENANCE INSTRUCTIONS

This task covers: a. Removal/Disassembly b. Repair c. Assembly/Installation

INITIAL SET-UP

Tools:

Purging kit (Item 22, appx F)

Soldering iron (Item 24, appx F)

Tool Kit, Electronic System, Required, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Tubular spanner wrench, 11/16 and 45/64 inch (Item 26, appx F)

Materials/Parts

Flux (Item 5, appx B)
Gasket (Item 4, appx E)
Grease (Item 7, appx B)
Lockwasher (Item 61, appx E)
Lockwashers (2) Item 63. appx E)
Lockwashers (12) (Item 64, appx E)
Lockwashers (3) (Item 65, appx E)
Preformed packing (Item 29, appx E)
Sealing compound (Item 13, appx B)
Solder (Item 18, appx B)

References

TM 9-254
TM750-116

Equipment Condition

M117 panoramic telescope removed from howitzer (TM 9-2350-311-10/TM 9-2350-314-10)

5-14. LAMP ASSEMBLY AND RELATED PARTS (M117) MAINTENANCE INSTRUCTIONS - continued

a. Removal/Disassembly

1 Remove machine screw (1), lockwasher (2), and electrical connector cover (3). Discard lockwasher.

2 Remove LED (4).

3 Remove four machine screws (5) and access cover (6).

4 Remove machine screw (7), lockwasher (8), machine screw (9), and three lug terminals (10) with wires (11) attached. Discard lockwasher.

5 Unsolder wires (11) from three lug terminals (10).

6 Remove machine screw (12) and housing (13).

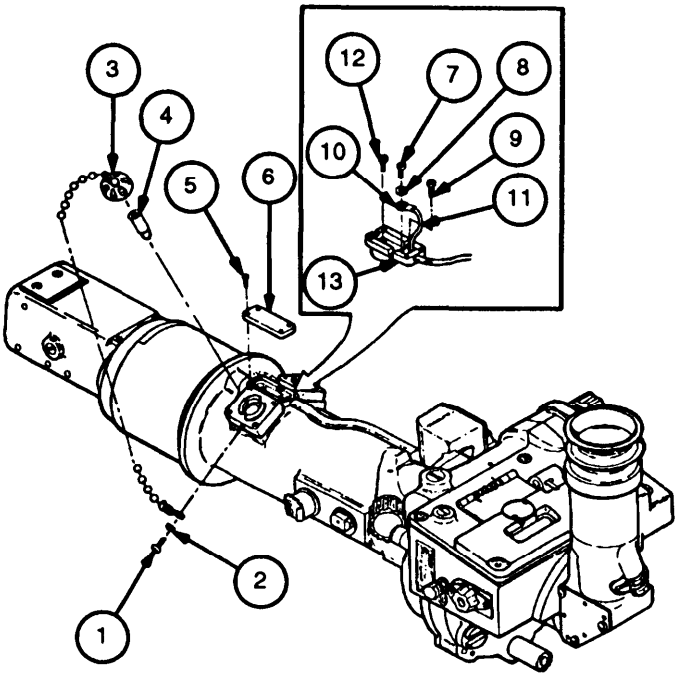
7 Using 11/16 and 45/64 inch tubular spanner wrench, remove threaded ring (14).

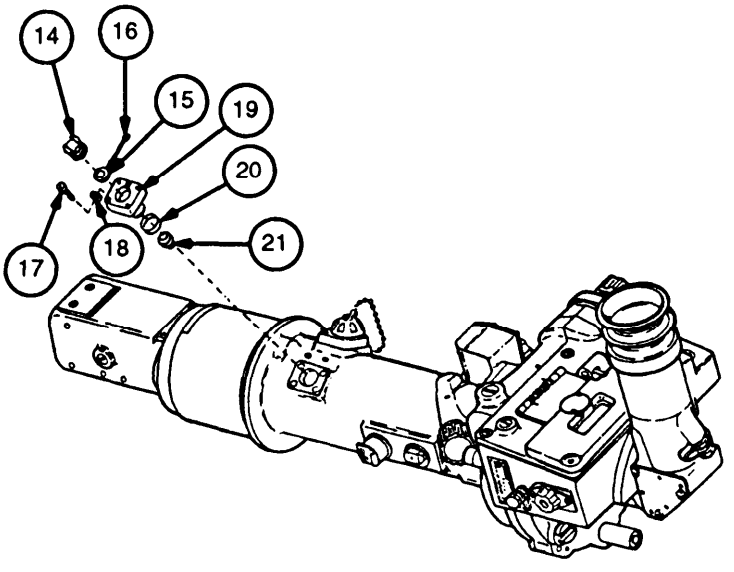
8 Remove electrical lead (15) with wire and lug terminal (16) attached.

9 Remove four machine screws (17), four lockwashers (18), and holder (19). Discard lockwashers.

10 Remove and discard preformed packing (20).

11 Remove lens (21) only if damaged.





NOTE

Remove second lamp assembly by repeating steps 1 and 2, then 7 thru 11.

12 Remove setscrew (22) and variable resistor knob (23).

13 Remove four machine screws (24), four lockwashers (25), access cover (26), and gasket (27). Discard lockwashers and gasket.

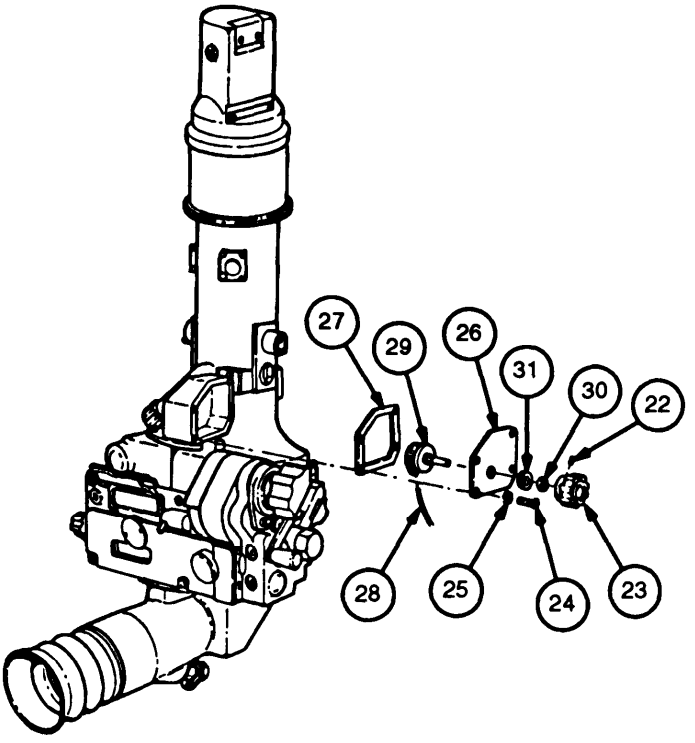
14 Unsolder wires (28) from variable resistor (29).

15 Remove nut (30) and boot (31) from variable resistor (29).

16 Remove variable resistor (29) from access cover (26).

17 Remove tube (32).

18 Remove three machine screws (33), three lockwashers (34), and housing (35). Discard lockwashers.



b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly/installation

1 Install housing (35) and secure with three new lockwashers (34) and three machine screws (33).

2 Install wire (28) in tube (32) and install tube into opening of housing (35).

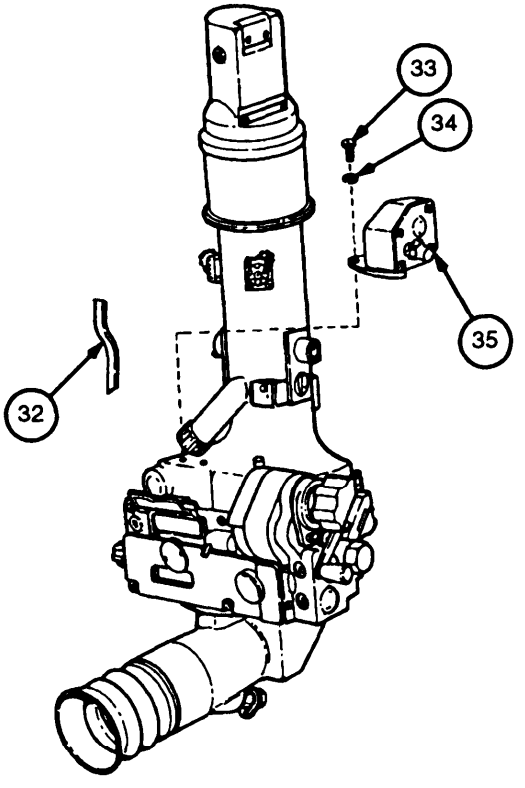
3 Mount variable resistor (29) on access cover (26) and secure with boot (31) and nut (30).

4 Solder wires (28) to lug terminals of variable resistor (29) using solder and flux.

5 Apply grease to new gasket (27).

6 Install access cover (26) and gasket (27) on housing (35) and secure with four new lockwashers (25) and four machine screws (24).

7 Install variable resistor knob (23) on shaft of variable resistor (29) and secure with setscrew (22).

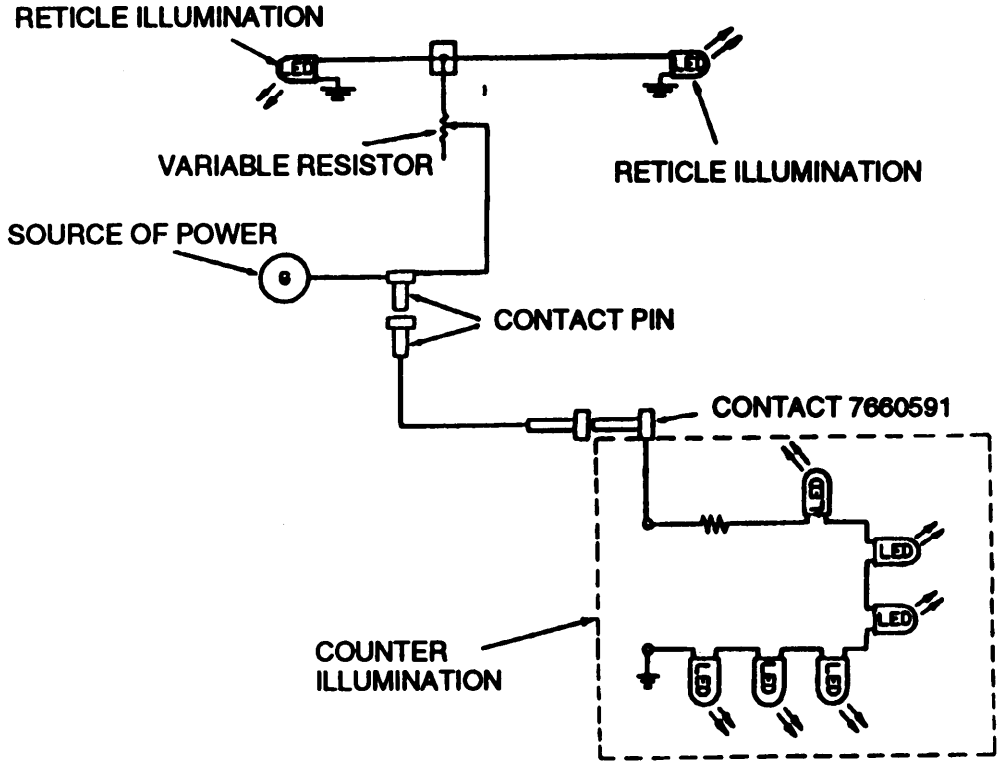


5-14. LAMP ASSEMBLY AND RELATED PARTS (M117) MAINTENANCE INSTRUCTIONS - continued

c. Assembly/Installation - continued

NOTE

Use schematic as a guide when wiring and soldering the M117 panoramic telescope.



8 If removed, install lens (21) in holder (19) using sealing compound.

9 Apply grease and install new preformed packing (20) on holder (19).

10 Install holder (19) on M117 panoramic telescope and secure with four new lockwashers (18) and four machine screws (17).

11 Install electrical lead (15) with wire and lug terminal (16) attached.

12 Using 11/1 6 and 45/64 inch tubular spanner wrench, install threaded ring (14).

13 Install housing (13) on M117 panoramic telescope and secure with machine screw (12).

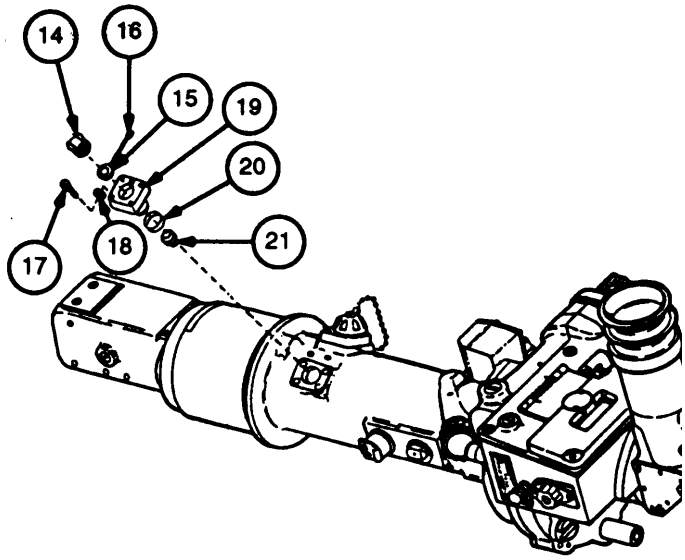
14 Solder three lug terminals (10) on wires (11) using solder and flux.

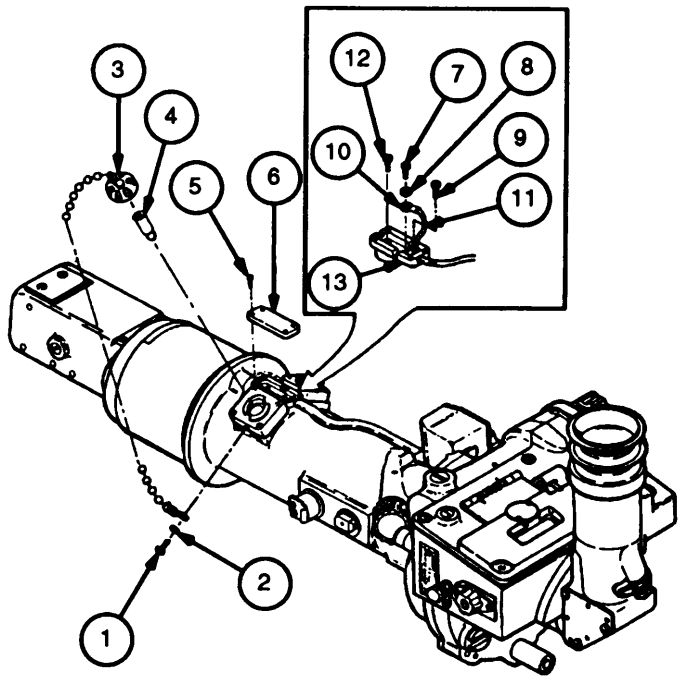
15 Install three lug terminals (10) with wires (11) attached on housing (13) and secure with machine screw (9), new Iockwasher (8) and machine screw (7).

16 Install access cover (6) and secure with four machine screws (5).

17 Install LED (4).

18 Install electrical connector cover (3) and secure chain with new Iockwasher (2) and machine screw (1).





NOTE

Repeat steps 8 through 12, then 17 and 18 for second lamp assembly.

19 Purge and charge optics (ref. TM 750-116).

5-15. LAMP ASSEMBLY AND RELATED PARTS (M117A2) MAINTENANCE INSTRUCTIONS

This task covers: a. Removal/Disassembly b. Repair c. Assembly/installation

INITIAL SET-UP

Tools

Hot air mini gun (Item 18, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Tubular spanner wrench, 11/16 and 45/64 inch (Item 26, appx F)

Materials/Parts

Adhesive (Item 2, appx B)
Flux (Item 5, appx B)
Lockwashers (2) (Item 63, appx E)
Lockwashers (8) (Item 68, appx E)
Lockwashers (19) (Item 69, appx E)
Lockwashers (2) (Item 70, appx E)
Preformed packing (Item 25, appx E)
Preformed packing (Item 26, appx E)
Preformed packings (Item 21, appx E)
Sealing compound (Item 13, appx B)
Sleeving, insulation (Fig. C-10, appx C)
Sleeving, insulation, non-shrinkable (Fig. C-9, appx C)
Solder (Item 18, appx B)

References

TM 9-254
TM 750-116

Equipment Condition

M117A2 panoramic telescope removed from howitzer (TM 9-2350-311–10/
TM 9-2350-314-10)

a. Removal/Disassembly

1 Remove setscrew (1) and variable resistor knob (2).

2 Remove four machine screws (3), four lockwashers (4), and access cover (5). Discard lockwashers.

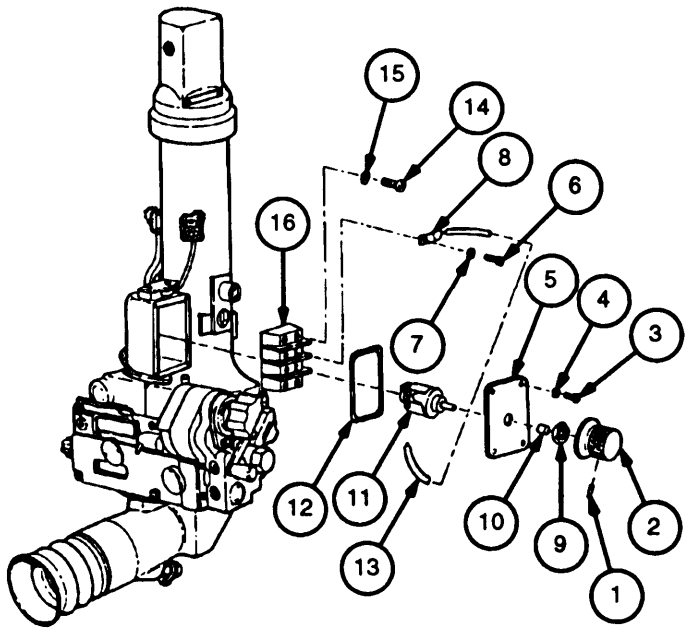
3 Remove four machine screws (6), four lockwashers (7), and six terminal strips (8) with wires attached. Discard lockwashers.

4 Remove nut (9) and boot (10), from variable resistor (11), then remove variable resistor (11) from access rover (5).

5 Remove and discard preformed packing (12).

6 Unsolder six terminal strips (8) from six wires (13) only if necessary to replace damaged parts.

7 Remove four machine screws (14), four lockwashers (15), and terminal board (16). Discard lockwashers.



8 Remove two machine screws (17), two lockwashers (18), and lamp retainer (19). Discard lockwashers.

9 Remove eight machine screws (20), eight lockwashers (21), and two lamp assemblies (22). Discard lockwashers.

10 Remove machine screw (23), lockwasher (24), and electrical connector cover (25). Discard lockwasher.

11 Remove LED (26).

12 Using 11/16 and 45/64 inch tubular spanner wrench, remove threaded ring (27).

13 Remove electrical lead (28) with wire attached.

14 Remove lens (29), only if necessary for replacement.

15 Remove and discard preformed packing (30).

16 Repeat steps 10 through 15 for second lamp assembly.

NOTE

Perform steps 17 through 21 only if either lamp assembly needs repair.

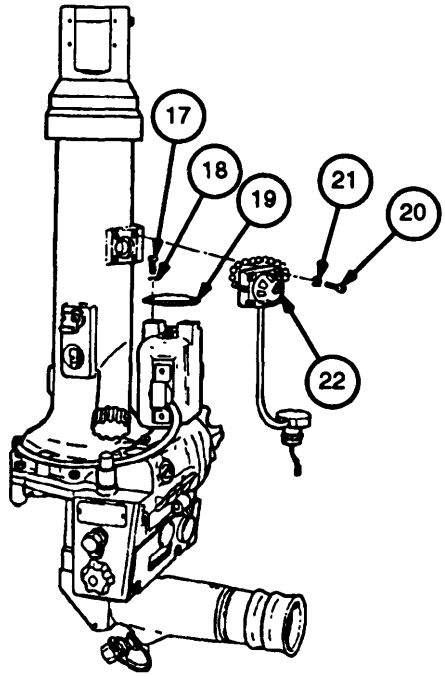
17 Unsolder wire (31) from terminal strip (32).

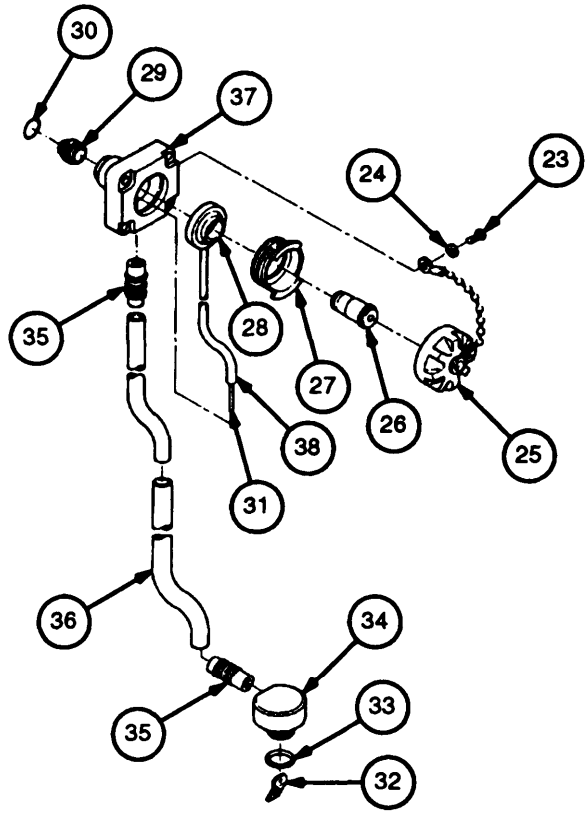
18 Remove preformed packing (33) from plug (34) and discard.

19 Remove two tubes (35) and insulation sleeving (36) from plug (34) and holder (37). Discard insulation sleeving.

20 Remove non-shrinkable insulation sleeving (38) from wire (31). Discard insulation sleeving.

21 Remove electrical lead (28) with wire (31) attached from holder (37).





5-15. LAMP ASSEMBLY AND RELATED PARTS (M117A2) MAINTENANCE INSTRUCTIONS - continued

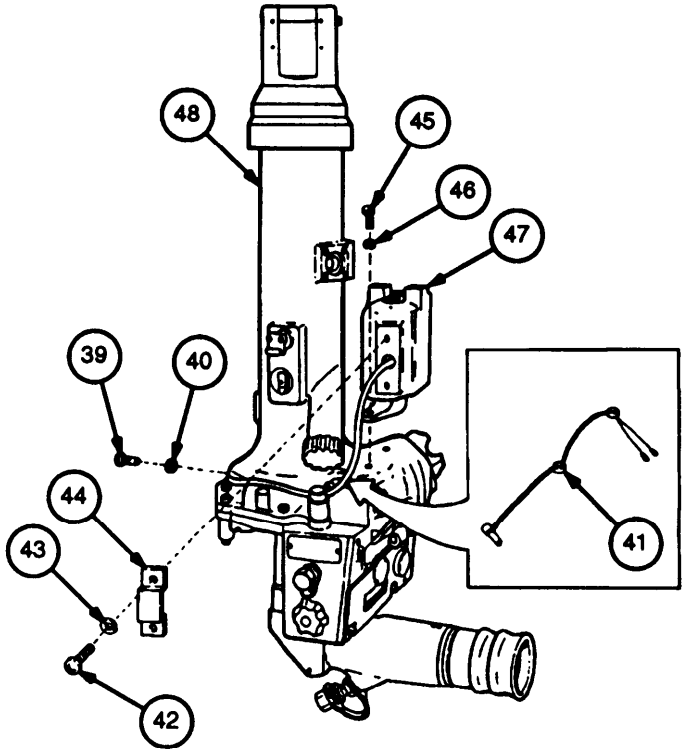
a. Removal/Disassembly - continued

22 Remove two machine screws (39) and two lockwashers (40) from contact assembly (41). Discard lockwashers.

23 Remove two machine screws (42), two lockwashers (43), and retaining strap (44). Discard lockwashers.

24 Remove contact assembly (41).

25 Remove three machine screws (45), three lockwashers (46), and housing (47). Discard lockwashers.



b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly/installation

1 Install housing (47) on upper housing (48) and secure with three new lockwashers (46) and three machine screws (45).

2 Install contact assembly (41) on upper housing (48) and secure with two new lockwashers (40) and two machine screws (39).

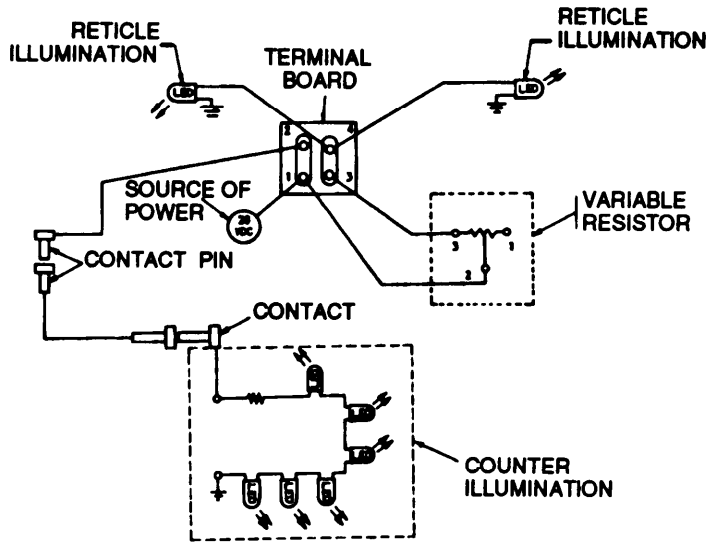
3 Install contact assembly (41) in housing (47) and secure with retaining strap (44), two new lockwashers (43), and two machine screws (42).

4 Install two tubes (35) into holder (37) and plug (34).

5 Install electrical lead (28) and wire (31) in holder (37) with raised brass portion facing outward.

NOTE

Use schematic as a guide when wiring and soldering the M117A2 panoramic telescope.



WIRING DIAGRAM FOR M117A2 PANORAMIC TELESCOPE

6 **Install non-shrinkable insulation sleeving (38) over wire (31).**

7 **Install insulation sleeving (36) over wire (31) and onto tube (35) of holder (37).**

8 Thread wire (31) through tube (35) attached to plug (34) and slide insulation sleeving (36) onto tube (35) of plug (34). Shrink sleeving with hot air mini gun.

9 Install new preformed packing (33) on plug (34).

10 Solder wire (31) onto terminal strip (32) using solder and flux.

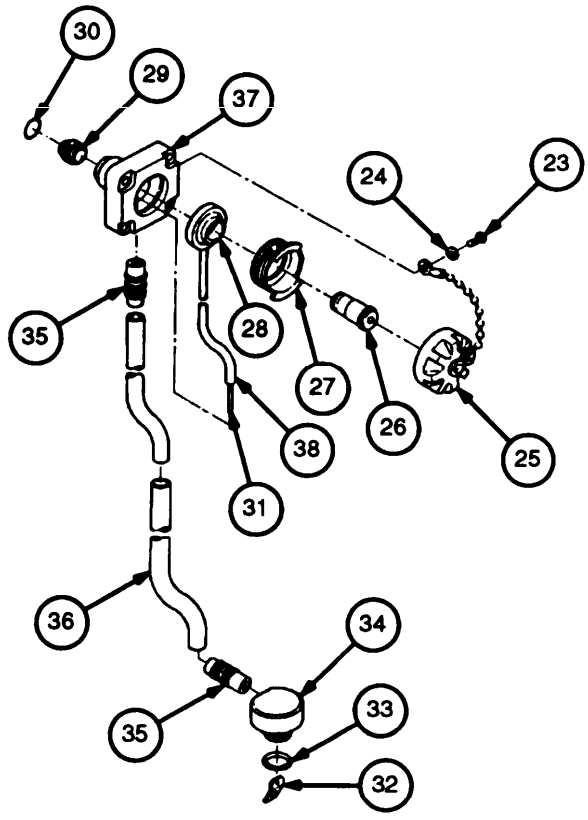
11 If removed, install lens (29) in holder (37), using sealing compound.

12 Using 11/16 and 45/64 inch tubular spanner wrench, secure electrical lead (28) in holder (37) with raised brass portion facing outward with threaded ring (27).

13 Install new preformed packing (30) on holder (37).

14 Install LED (26).

15 Install electrical connector cover (25) and secure with new lockwasher (24) and machine screw (23).



5-15. LAMP ASSEMBLY AND RELATED PARTS (M117A2) MAINTENANCE INSTRUCTIONS - continued

c. Assembly/Installation - continued

16 Repeat steps 4 through 15 for second lamp assembly.

17 Install two lamp assemblies (22) on upper housing (48) and secure with eight new lockwashers (21) and eight machine screws (20).

18 Install plugs (34) in housing (47) and secure with retainer (19), two new lockwashers (18), and two machine screws (17).

19 Mount variable resistor (11) on access cover (5) and secure with boot (10) and nut (9).

20 If removed, solder two wires to terminals of variable resistor (11) using solder and flux.

21 Apply a coat of adhesive over each terminal lug of variable resistor (11) to provide proper insulation.

22 Mount variable resistor knob (2) on shaft of variable resistor (11) and secure with setscrew (1).

23 Install terminal board (16) and secure with four new lockwashers (15) and four machine screws (14).

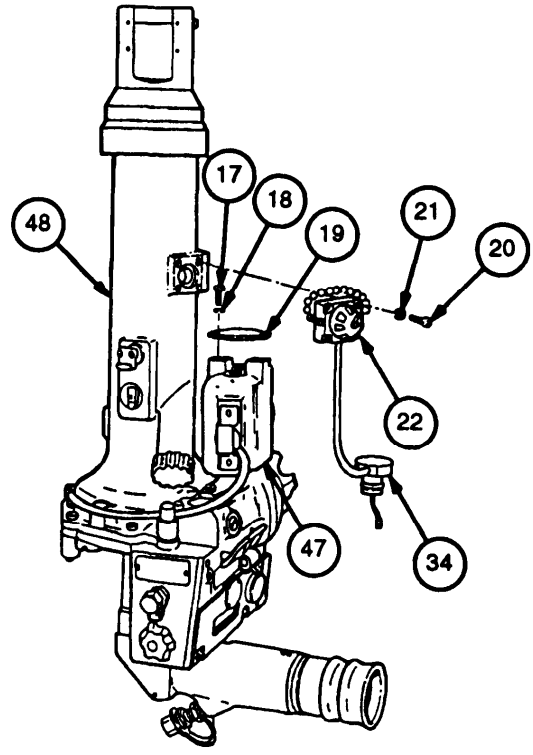
24 Solder six terminal strips (8) to six wires (13) using solder and flux.

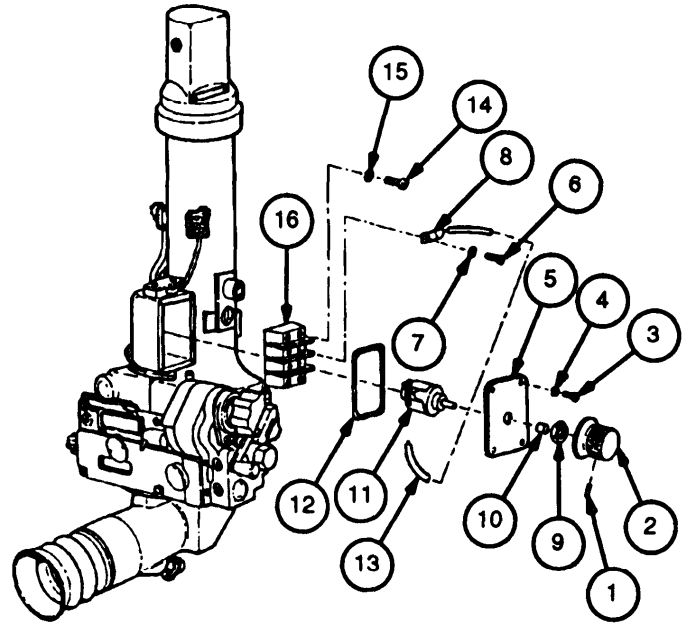
25 Install six terminal strips (8) on terminal board (16) and secure with four new lockwashers (7) and four machine screws (6). (Ref. wiring diagram p. 5-23.)

26 Install new preformed packing (12).

27 Install access cover (5) and secure with four new lockwashers (4) and four machine screws (3).

28 Purge and charge optics (ref. TM 750-116).





Section V. General Support Maintenance Procedures

5–16. GENERAL

LIST OF TASKS

Task No.	Task	Tack Ref (Page)	Troubleshooting Ref No. (Page)
1	Maintain M117/M117A2 panoramic telescope		5–9
	a. Disassemble	5-26	
	b. Repair	5-28	
	c. Assemble	5-28	
2	Maintain cap assembly		5–9
	a. Disassemble	5-31	
	b. Repair	5-31	
	c. Assemble	5-32	
3	Maintain elbow assembly		5–9
	a. Disassemble	5–33	
	b. Repair	5-33	
	c. Assemble	5-33	
4	Maintain cell assembly		5–9
	a. Disassemble	5–34	
	b. Repair	5–34	
	c. Assemble	5–35	
5	Maintain dove prism assembly		
	a. Remove	5–36	
	b. Repair	5–36	
	c. Install	5–36	
6	Maintain counter assembly 7660610		
	a. Remove	5-37	
	b. Repair	5-38	
	c. Install	5-38	
7	Maintain adapter assembly		5-9
	a. Remove/disassemble	5-39	
	b. Repair	5-42	
	c. Assemble/install	5-42	
8	Maintain reset counter assembly 7660419		
	a. Disassemble	5-46	
	b. Repair	5–46	
	c. Assemble	5–46	

5-17. M117/M117A2 PANORAMIC TELESCOPE MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INTIAL SET-UP

Tools

Soldering iron (Item 24, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

V-block (Item 25, appx F)

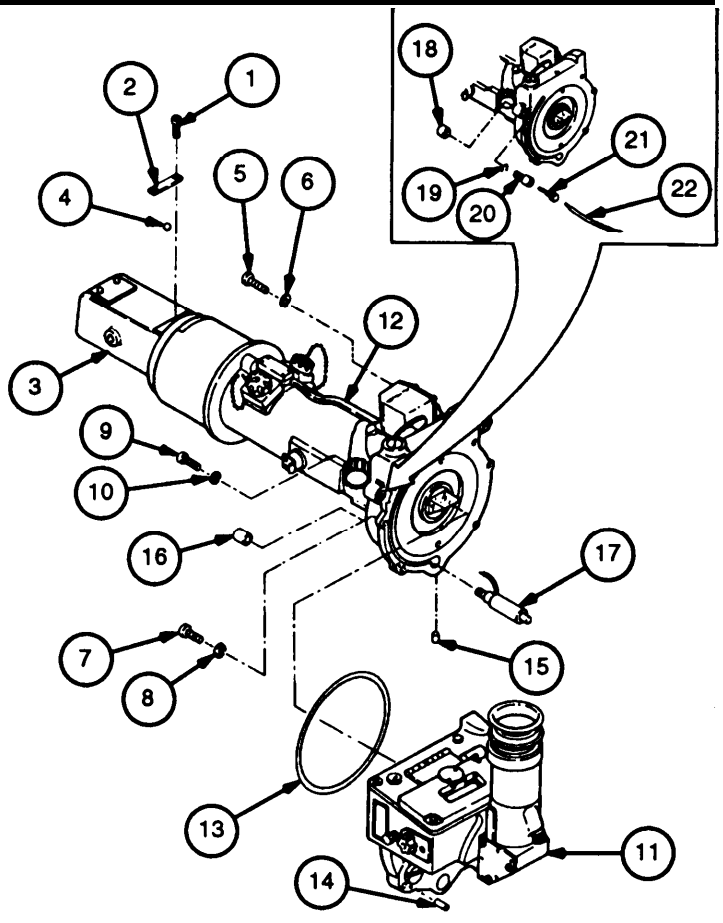
Materials/Parts

Adhesive (Item 2, appx B)
Felt mechanical washer (Item 2, appx E)
Flux (Item 5, appx B)
Grease (Item 6, appx B)
Grease (Item 7, appx B)
Lockwashers (6) (Item 70, appx E)
Preformed packing (Item 31, appx E)
Preformed packing (Item 34, appx E)
Preformed packing (Item 33, appx E)
Sealing compound (Item 13, appx B)
Self-locking nut (Item 17, appx E)
Solder (Item 18, appx B)

Equipment Condition

M117/M117A2 panoramic telescope removed from howitzer (TM 9-2350-311-10/ TM 9-2350-314-10)

a. Disassembly



1 Remove two machine screws (1) and plate (2).

2 Using azimuth knob, slowly rotate cap (3) and remove 50 balls (4).

3 Pull cap (3) from M117/M117A2 panoramic telescope.

4 Remove azimuth knob (ref. para 5-13).

5 Remove plate and gunner's aid knob (ref. para 5-13).

6 Remove correction counter cover (ref. para 5-13).

7 Remove elevation knob (ref. para 5-13).

8 Remove cap screw (5) and lockwasher (6). Discard lockwasher.

9 Remove cap screw (7) and lockwasher (8). Discard lockwasher.

10 Remove four cap screws (9) and four lockwashers (10). Discard lockwashers.

11 Separate lower housing (11) from upper housing (12).

12 Remove and discard preformed packing (13).

13 Remove headless straight pin (14), only if damaged.

14 Remove headless straight pin (15), only if alarm aged.

NOTE

Steps 15 through 19 refer to M117 panoramic telescope only.

15 Remove cap (16).

16 Remove contact assembly (17).

17 Remove cap (18).

18 Remove retaining ring (19).

19 Remove bushing insulator (20), grooved pin (21). and wire (22).

20 Remove plug (23) and spring (24).

21 Using adjustable spanner wrench, remove threaded ring (25) with worm shaft (26) and related parts attached.

22 Remove plunger (27).

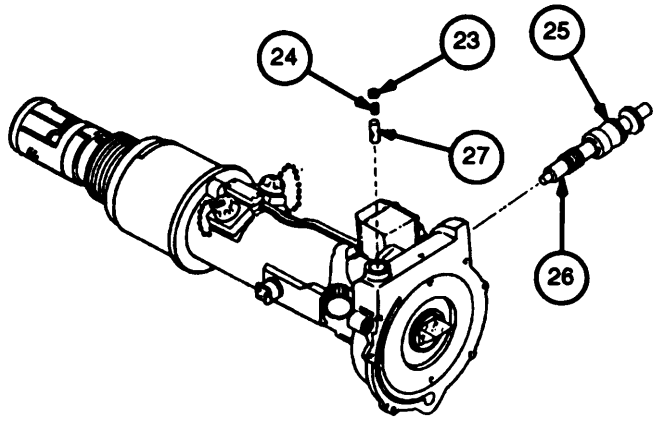
23 Position worm shaft (26) on V-block and remove tapered pin (28) and gear (29).

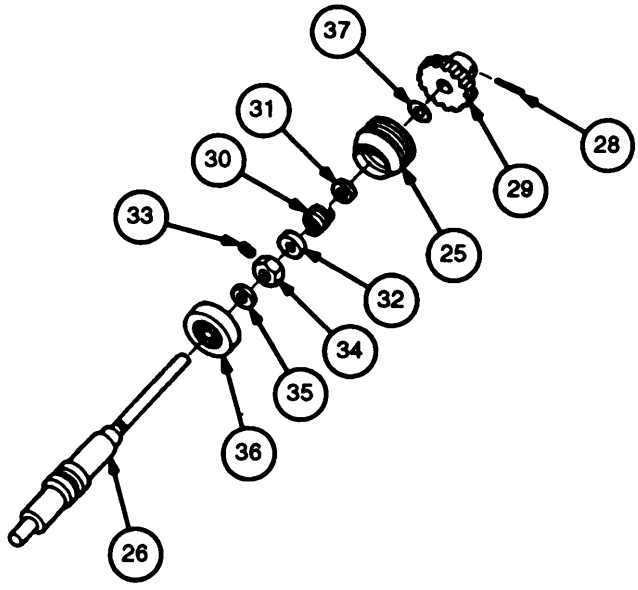
24 Remove threaded ring (25), spring (30), and two flat washers (31 and 32) from worm shaft (26).

25 Remove setscrew (33), self-locking nut (34), and ring spacer (35). Discard self-locking nut.

26 Remove self-alining bearing (36).

27 Remove preformed packing (37) from threaded ring (25) and discard.





5-17. M117/M117A2 PANORAMIC TELESCOPE MAINTENANCE INSTRUCTIONS - continued

a. Disassembly - continued

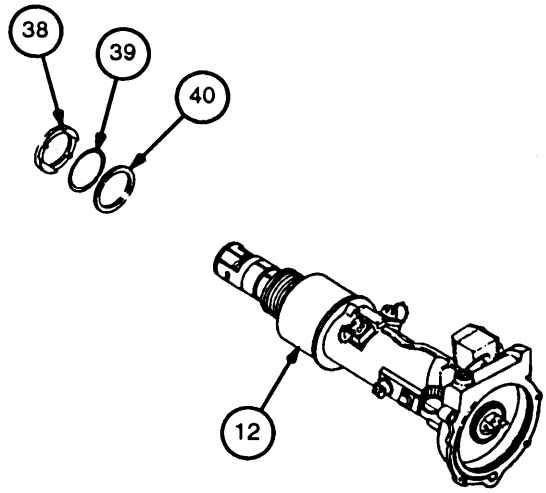
28 Remove coupling (38), preformed packing (39), and felt mechanical washer (40) from upper housing (12). Discard preformed packing and felt mechanical washer.

29 Remove counter assembly (ref. para 5-22).

30 Unsolder wire (41) from headed straight pin (42). Remove retaining ring (43), headed straight pin (42), spring (44), and insulator bushing (45).

31 Unsolder wire (41) from headed straight pin (46).

32 Remove insert (47), retaining ring (48), headed straight pin (46), spring (49), and insulator bushing (50).

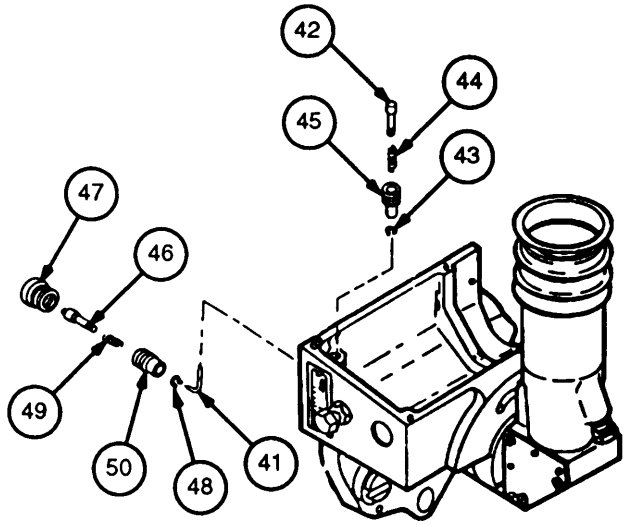


b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.



c. Assembly

1 Install insulator bushing (50), spring (49), headed straight pin (46), and retaining ring (48). Install insert (47).

2 Solder wire (41) to headed straight pin (46) using solder and flux.

3 Install insulator bushing (45), spring (44), headed straight pin (42), and retaining ring (43). Solder wire (41) to headed straight pin (42) using solder and flux.

4 Install counter assembly (ref. para 5-22).

NOTE

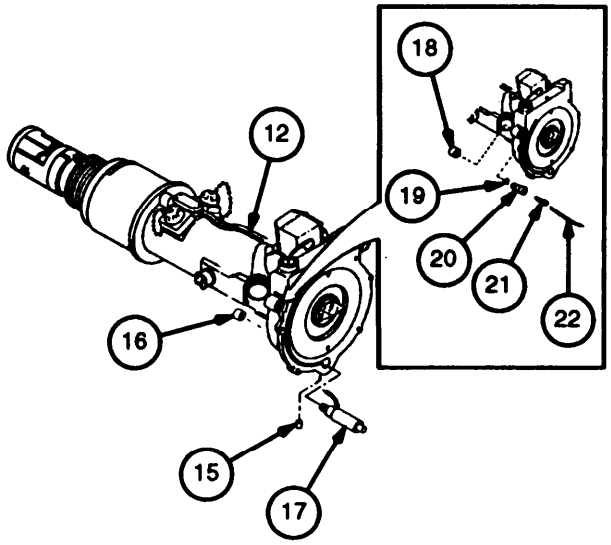
Steps 5 thru 8 refer to the Ml 17 panoramic telescope only.

5 Install contact assembly (17), cap (16), and headless straight pin (15), only if removed.

6 Solder wire (22) to grooved pin (21) using solder and flux.

7 Install bushing insulator (20) and grooved pin (21) with wire (22) attached. Secure with retaining ring (19).

8 Install cap (1 8). Apply adhesive to seal wire (22) into groove in upper housing (12).



9 Mount self-alining bearing (36) and spacer ring (35) on worm shaft (26). Secure with new self-locking nut (34).

10 Install setscrew (33) in self-locking nut (34). Apply sealing compound to setscrew (33).

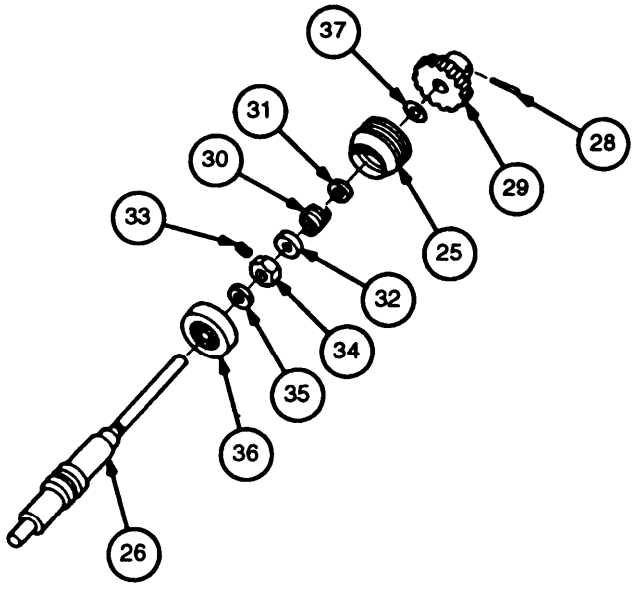
11 Apply grease (item 6, appx B) to flat washers (31 and 32).

12 Install fiat washer (32), spring (30), and flat washer (31) on worm shaft (26).

13 Apply grease (item 7, appx B) to new preformed packing (37) and install in threaded ring (25).

14 Install threaded ring (25) on worm shaft (26).

15 Install gear (29) on worm shaft (26) and secure with tapered pin (28).



5-17. M117/M117A2 PANORAMIC TELESCOPE MAINTENANCE INSTRUCTIONS - continued

c. Assembly - continued

16 Apply grease (item 6, appx B) to plunger (27).

17 Install plunger (27) with hole alined for installation of worm shaft (26).

18 Apply grease (item 6, appx B) to worm gear and bearing surface of worm shaft (26).

19 Using adjustable spanner wrench, install worm shaft (26) and related parts into upper housing (12) and rotate wormshaft assembly to engage with worm gear in M117/M117A2 panoramic telescope.

20 Apply grease (item 6, appx B) to spring (24).

21 Install spring (24) and plug (23).

22 Apply grease (item 7, appx B) to new preformed packing (13) and install on lower housing (11).

23 Install lower housing (11) on upper housing (12) and secure with six new Iockwashers (6, 8, and 10) and six cap screws (5,7, and 9).

24 If removed, install headless straight pin (14).

25 Install correction counter cover (ref. para 5-13).

26 Install gunner's aid knob and plate (ref. para 5-13).

27 Install azimuth knob (ref. para 5-13).

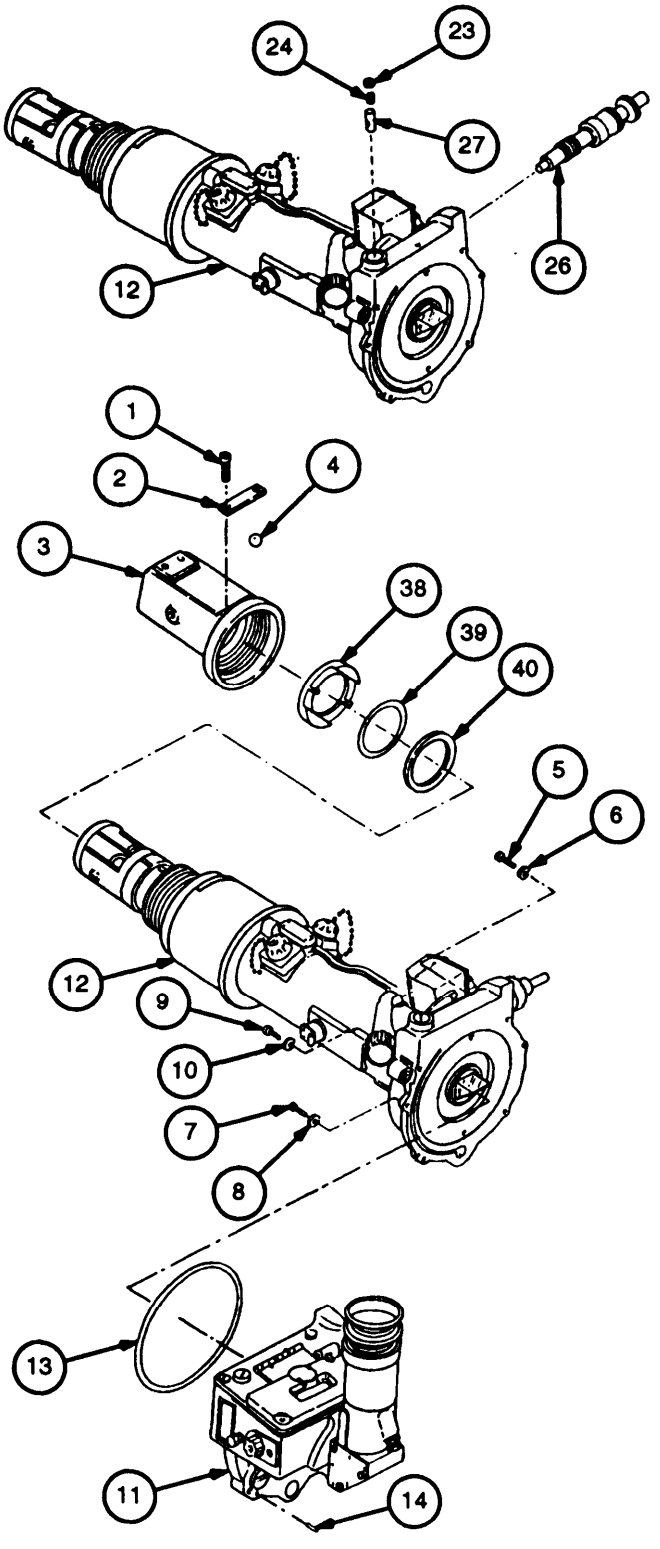
28 Apply grease (item 7, appx B) to new preformed packing (39).

29 Install new felt mechanical washer (40), preformed packing (39), and coupling (38) on upper housing (12).

30 Push to seat cap (3) on upper housing (12).

31 Rotate cap (3) by turning azimuth knob and install 50 balls (4).

32 Install plate (2) and two machine screws (1).



5-18. CAP ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Materials/Parts

Sealing compound (Item 13, appx B)

References

TM 9-254

Equipment Condition

M117/M117A2 panoramic telescope removed from howitzer (TM 9-2350-311-10/ TM 9-2350-314-10)

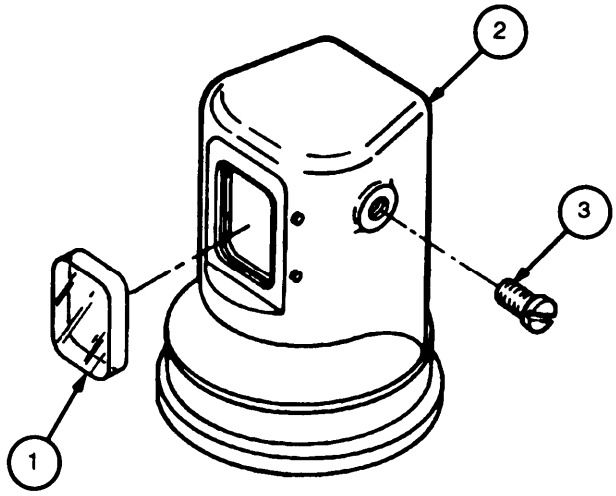
Cap assembly removed (ref. para 5-17)

a. Disassembly

1 Remove window (1) by tapping side facing interior of cap (2).

2 Remove all fragments of glass and scrape off all adhesive material. Avoid enlarging opening.

3 Remove purging machine screw (3).



b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

5-18. CAP ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

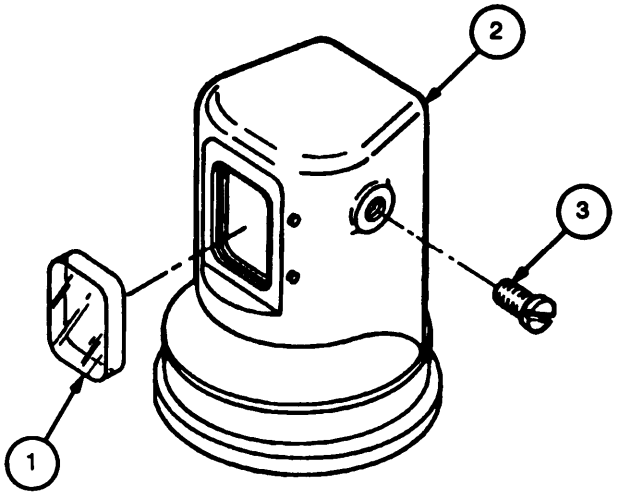
c. Assembly

1 Apply sealing compound to the groove and ledge of cap (2).

2 Install window (1) in cap (2).

3 Apply sealing compound to the four holes adjacent to window (1). Remove excess sealing compound.

4 Install purging machine screw (3).



5-19. ELBOW ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

References

TM 9-254

Equipment Condition

M117/M117A2 panoramic telescope removed from howitzer (TM 9-2350-311-10/ TM 9-2350-314-10)

a. Disassembly

1 Remove four setscrews (1 and 2).

2 Unscrew and remove cell assembly (3).

b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

4 Further repair is authorized for cell assembly. Refer to para 5-20.

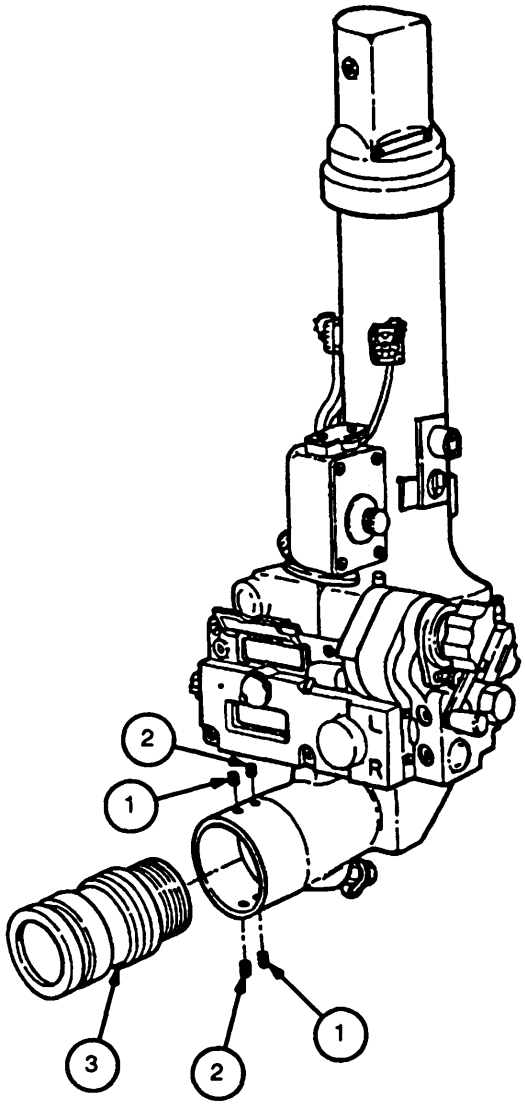
c. Assembly

1 Install cell assembly (3) by screwing it into elbow assembly.

2 Install four setscrews (1 and 2). Do not tighten at this time.

NOTE

Refer to para 5–26 for adjustment of cell assembly.



5-20. CELL ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SETUP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Tubular spanner wrench, 1 and 1-1/64 inch (Item 27, appx F)

Tubular spanner wrench, 1-3/32 and 1-7/64 inch (Item 28, appx F)

Materials/Parts

Sealing compound (Item 13, appx B)

References

TM 9-254

Equipment Condition

M117/M117A2 panoramic telescope removed from howitzer (TM 9-2350-311-10/ TM 9-2350-314-10)

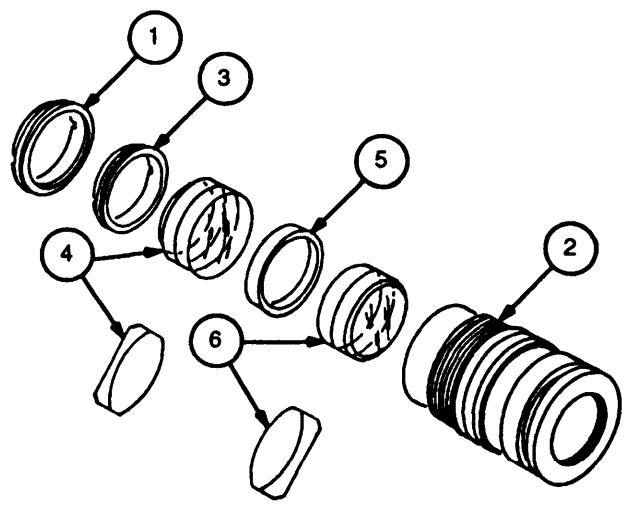
Cell assembly removed from elbow assembly (ref. para 5-19)

a. Disassembly

1 Using 1-3/32 and 1-7/64 inch tubular spanner wrench (item 28, appx F), remove threaded ring (1) from cell (2).

2 Using 1 and 1-1/64 inch tubular spanner wrench (item 27, appx F), remove threaded ring (3) from cell (2).

3 Remove lens (4), spacer (5), and lens (6) from cell (2). Mark lenses (4 and 6) for reference during assembly (ref. TM 9-254).



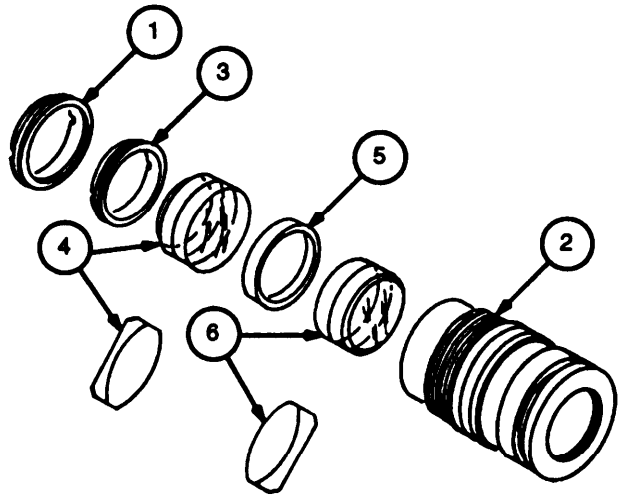
b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly



1 Apply sealing compound to the internal lip of cell (2).

2 While observing the reference marks on the lenses, install lens (6), spacer (5), and lens (4) in cell (2).

3 Using 1 and 1-1/64 inch tubular spanner wrench (item 27, appx F), install threaded ring (3) in cell (2).

4 Using 1-3/32 and 1-7/64 inch tubular spanner wrench (item 28, appx F), install threaded ring (1) in cell (2).

5 Stake threaded ring (3) and threaded ring (1) in place using sealing compound.

5-21. DOVE PRISM ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Removal b. Repair c. Installation

INITIAL SET-UP

Tools and Special Tools

Spanner wrench, fabricated (fig. C-7, appx C)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Materials/Parts

Grease (Item 6, appx B)

Equipment Condition

M117/M117A2 panoramic telescope removed from howitzer (TM 9-2350-311-10/ TM 9-2350-314-10)

Lower housing removed from telescope (ref. para 5-17)

5-21. DOVE PRISM ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

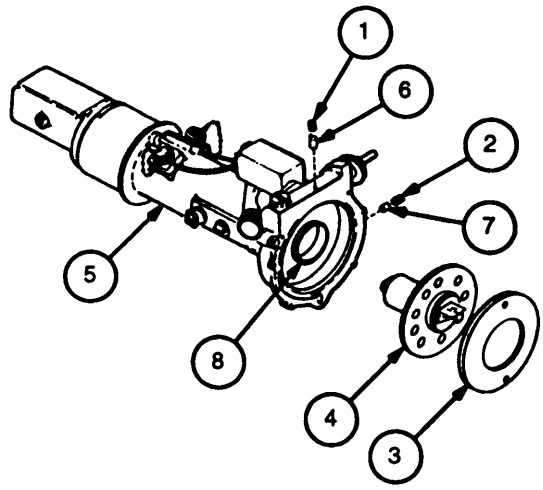
a. Removal

1 Remove setscrew (1) and setscrew (2).

2 Using fabricated spanner wrench, remove retainer (3).

3 Remove dove prism assembly (4) from M117/M117A2 panoramic telescope (5).

4 Remove inserts (6 and 7) by pushing out with scribe.



b. Repair

Repair is by replacement of authorized parts (appendix D).

c. Installation

1 Slide dove prism assembly (4) into M117/M117A2 panoramic telescope (5).

2 Apply grease to retainer (3). Using fabricated spanner wrench, install retainer (3). Retainer (3) applies tension to tube assembly (8). Tighten retainer (3) only enough to eliminate end play in tube assembly (8).

3 Install insert (7) and setscrew (2).

4 Install insert (6) and setscrew (1).

5-22. COUNTER ASSEMBLY 7660610 MAINTENANCE INSTRUCTIONS

This task covers: a. Removal b. Repair c. Installation

INITIAL SET-UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Materials/Parts

Adhesive (Item 2, appx B)
Gasket (Item 5, appx E)
Grease (Item 7, appx B)
Lockwashers (4) (Item 65, appx E)
Preformed packing (Item 34, appx E)
Shims (4) (Item 48, appx E)

References

TM 9-254

Equipment Condition

M117/M117A2 panoramic telescope removed from howitzer (TM 9-2350-311-10/ TM 9-2350-314-10)

Azimuth knob removed (ref. para 5-13)

Plate for azimuth knob removed (ref. para 5-13)

Gunner's aid knob removed (ref. para 5-13)

Correction counter cover removed (ref. para 5-13)

a. Removal

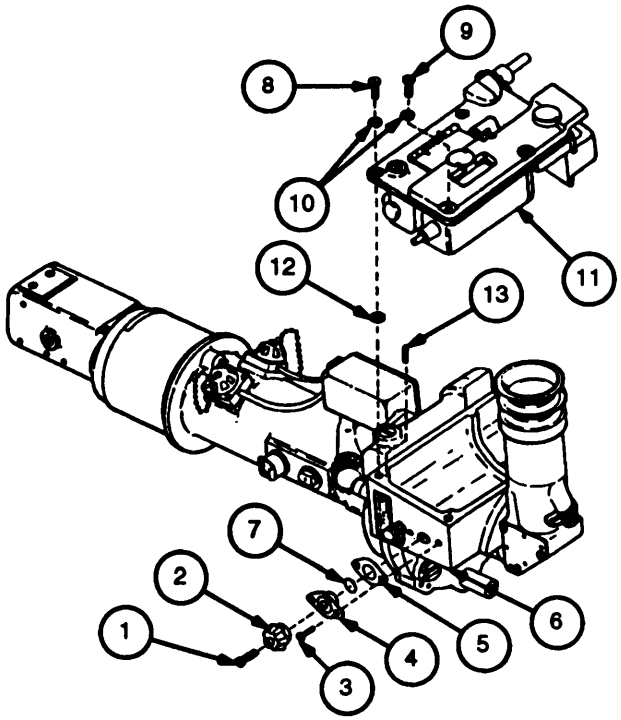
1 Remove machine screw (1) and reset counter knob (2).

2 Remove two machine screws (3), access cover (4), and gasket (5) from lower housing (6). Remove preformed packing (7) from access cover (4). Discard preformed packing and gasket.

3 Remove two machine screws (8), two machine screws (9), four lockwashers (10), and counter assembly (11) from lower housing (6). Discard lockwashers.

4 Remove four shims (12) from lower housing (6) or the mating surface of counter assembty (11). Discard shims.

5 Remove two headless straight pins (13) from lower housing (6), only if damaged.

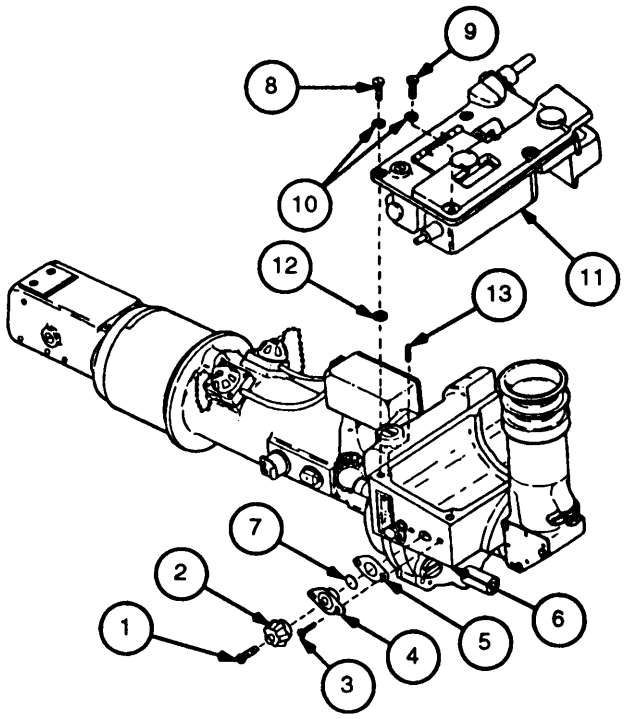


5-22. COUNTER ASSEMBLY 7660610 MAINTENANCE INSTRUCTIONS - continued

b. Repair

Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Installation



1 Apply adhesive to four shims (12) then install four new shims on lower housing (6).

2 Apply adhesive around the edge of counter assembly (11) and to threads of two machine screws (8), and two machine screws (9). Install counter assembly (11) using two machine screws (8), two machine screws (9), and four new lockwashers (10).

3 Apply adhesive to pin holes and install two headless straight pins (13), if removed.

4 Apply grease to new preformed packing (7). Apply adhesive to two machine screws (3) and new gasket (5).

5 Install gasket (5), preformed packing (7), access cover (4), and two machine screws (3).

6 Install reset counter knob (2) and machine screw (1).

5-23. ADAPTER ASSEMBLY MAINTENANCE INSTRUCTIONS

his task covers: a. Removal/Disassembly b. Repair c. Assembly/Installation

INITIAL SET-UP

Tools

Soldering iron (item 24, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Tubular spanner wrench, 11/16 and 45/64 inch (Item 26, appx F)

Materials/Parts

Adhesive (Item 2, appx B)
Flux (Item 5, appx B)
Lockwasher (Item 63, appx E)
Lo&washers (5) (Item 64, appx E)
Lockwashers (2) (Item 65, appx E)
Sealing compound (Item 13, appx B)
Solder (Item 18, appx B)

References

TM 9-254

Equipment Condition

M117/M117A2 panoramic telescope removed from howitzer (TM 9-2350-311-101
TM 9-2350-314-10)

Counter assembly removed from M117/M117A2 panoramic telescope (ref. para 5-22)

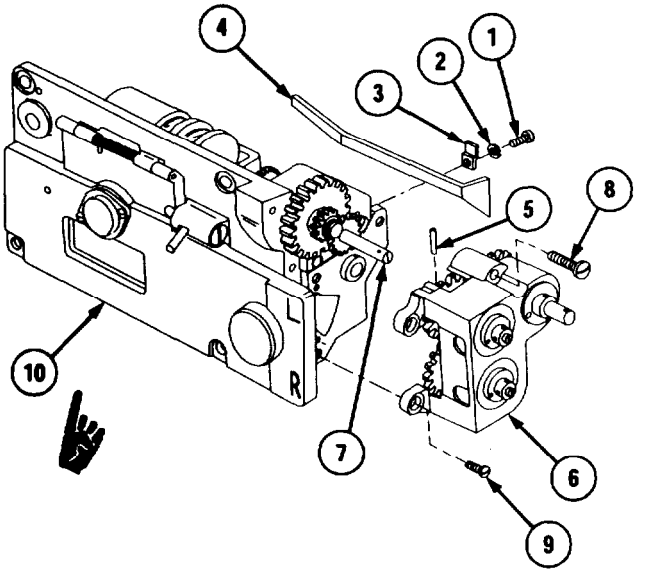
a. Removal/Disassembly

1 Remove machine screw (1), lockwasher (2), retaining strap (3), and light conductor (4). Discard lockwasher.

2 Remove headless straight pin (5) securing gear in mechanical housing (6) to gear shaft (7).

3 Remove machine screw (8) and two machine screws (9) from adapter assembly (10).

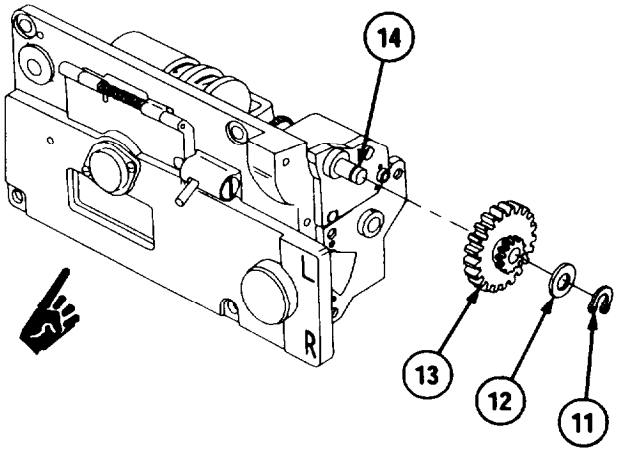
4 Carefully slide mechanical housing (6) from gear shaft (7).



5-23. ADAPTER ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

a. Removal/Disassembly - continued

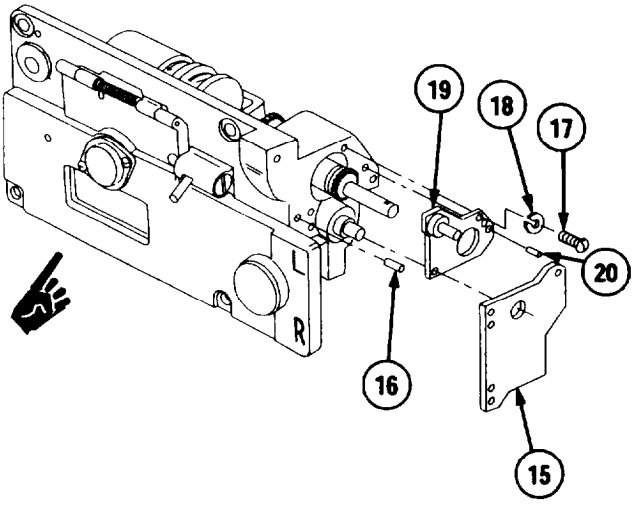
5 Remove retaining ring (11), washer (12), and gear cluster (13) from shaft (14).



6 Remove gear assembly plate (15) and two headless straight pins (16). Remove two headless straight pins only if damaged.

7 Remove three machine screws (17) and three lockwashers (18). Discard lockwashers.

8 Remove plate (19). Remove two headless straight pins (20), only if damaged.



9 Remove two machine screws (21), two lockwashers (22), and reset counter assembly (23) from adapter assembly (10). Discard lockwashers.

NOTE

See para 5-24 for disassembly of reset counter assembly (23).

10 Remove differential gear assembly (24).

11 Remove two headless straight pins (25) only if damaged.

12 Remove plug (26) and spring (27).

13 Remove setscrew (28) and post (29).

14 Remove detent plunger (30).

15 Remove headless straight pin (31), door (32), and spring (33).

16 Remove two machine screws (34) and protective cap (35) from overlay assembly (36).

17 Pull wire (37) with lamp base through to the front of the overlay assembly (36).

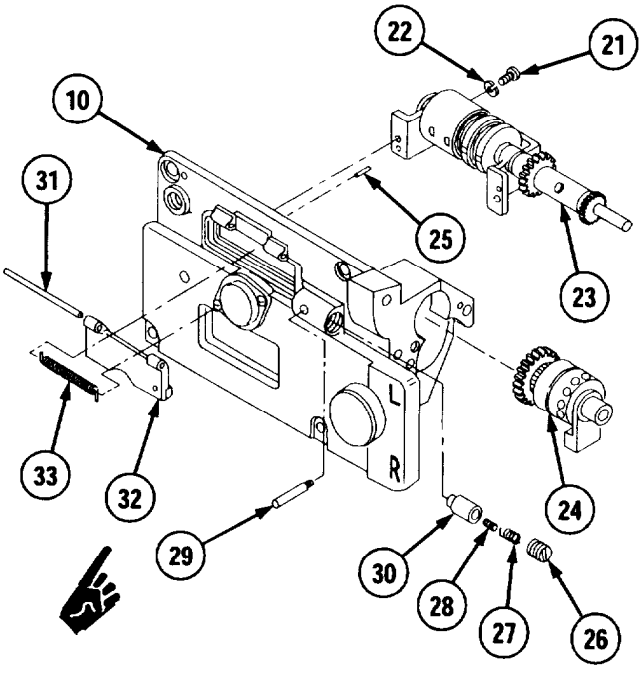
18 Using 11/16 and 45/64 inch tubular spanner wrench, remove retaining ring (38) and remove overlay assembly (36) from adapter assembly (10).

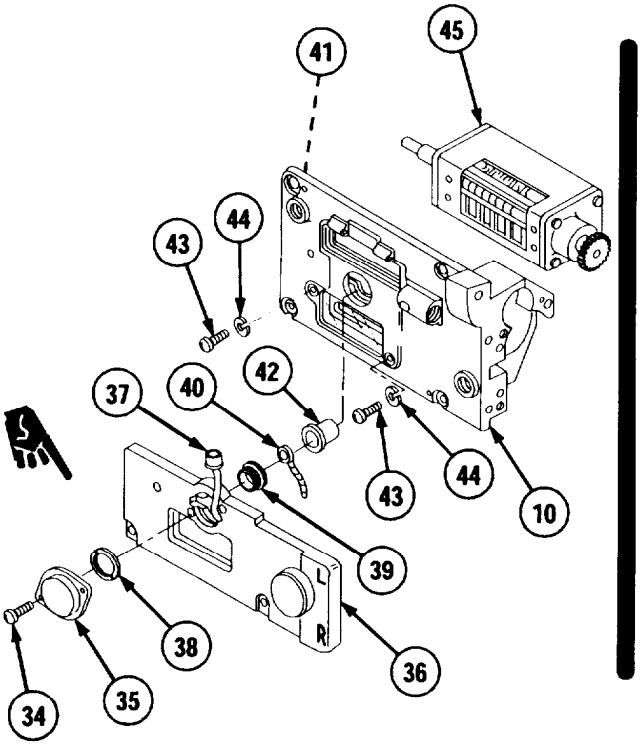
19 Using 1/2 and 33/64 inch tubular spanner wrench, remove externally threaded ring (39).

20 Unsolder electrical lead (40) from headless shoulder pin (41).

21 Remove electrical lead (40) and lens (42).

22 Remove two machine screws (43), two lockwashers (44), and azimuth rotating counter (45) from adapter assembly (10). Discard lockwashers.





5-23. ADAPTER ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

a. Removal/Disassembly - continued

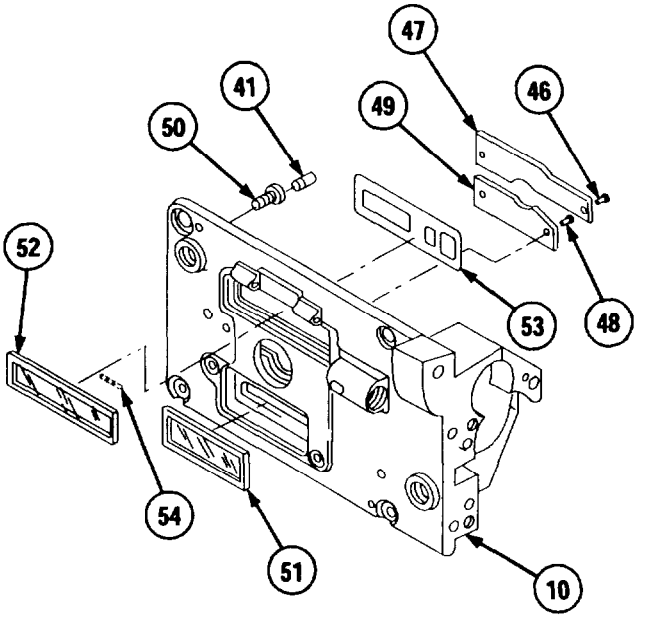
23 Remove two machine screws (46) and plate (47).

24 Remove two machine screws (48) and plate (49).

25 Remove headless shoulder pin (41) and plug (50).

26 Remove window (51) by pressing gently from backside of adapter assembly (10).

27 Remove window (52) and mask (53). Remove index (54) by pressing gently from backside of adapter assembly (10).



b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly/Installation

1 If removed, stake index (54) to adapter assembly (10).

2 Install mask (53) on adapter assembly (10) and stake in six places.

3 Apply sealing compound to edge of windows (52 and 51).

4 Install windows (52 and 51). Remove excess sealing compound.

5 Install plate (47) on adapter assembly (10) and secure with two machine screws (46).

6 Install plate (49) on adapter assembly (10) and secure with two machine screws (48).

7 Install plug (50) and headless shoulder pin (41).

8 Apply adhesive to lip of adapter assembly (10) where lens (42) seats.

9 Install lens (42) and electrical lead (40) in adapter assembly (10) with raised brass portion of contact facing outward.

10 Apply adhesive to two machine screws (43).

11 Install azimuth rotating counter (45) on adapter assembly (10) and secure with two new lockwashers (44) and two machine screws (43).

12 Seal heads of two machine screws (43) with adhesive.

13 Using solder and flux, solder electrical lead (40) to headless shoulder pin (41).

14 Using 1/2 and 33/64 inch tubular spanner wrench, install externally threaded ring (39) and stake in place using adhesive.

15 Pull wire (37) with lamp base through to the front of the overlay assembly (36) and position overlay assembly (36) onto adapter assembly (10).

16 Using 11/16 and 45/64 inch tubular spanner wrench, install retaining ring (38).

17 Insert lamp base portion of overlay assembly (36) into electrical lead (40). Position wire in recessed area to accommodate protective cap (35).

18 Apply adhesive to inside edge of protective cap (35).

19 Install protective cap (35) and secure with two machine screws (34). Remove any excess adhesive from outside edge of protective cap.

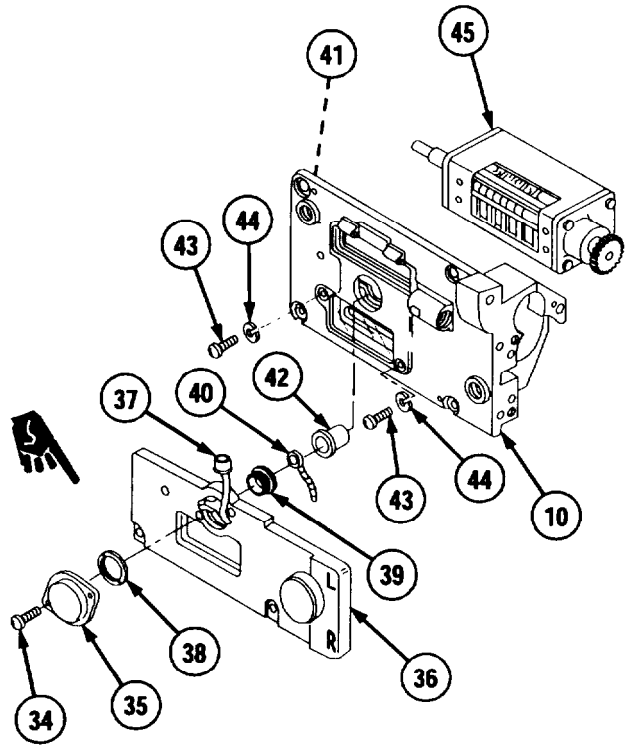
20 Apply sealing compound to post (29).

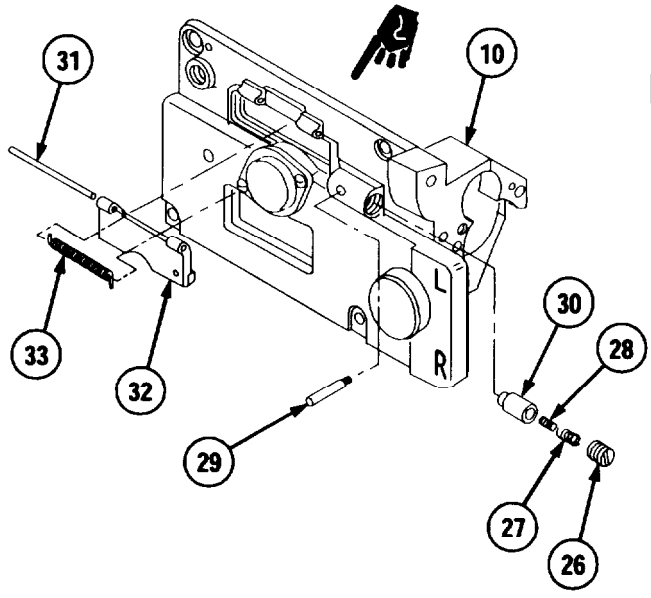
21 Install detent plunger (30) in adapter assembly (10).

22 Install post (29) in detent plunger (30) and secure with setscrew (28).

23 Install spring (27) and plug (26).

24 Install access door (32), spring (33), and headless straight pin (31).





5-23. ADAPTER ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

c. Assembly/Installation - continued

25 If removed, install two headless straight pins (25).

26 Install differential gear assembly (24) into adapter assembly (10).

27 Install reset counter assembly (23) and mesh gears on differential gear assembly (24).

28 Secure reset counter assembly (23) with two machine screws (21) and two new lo&washers (22).

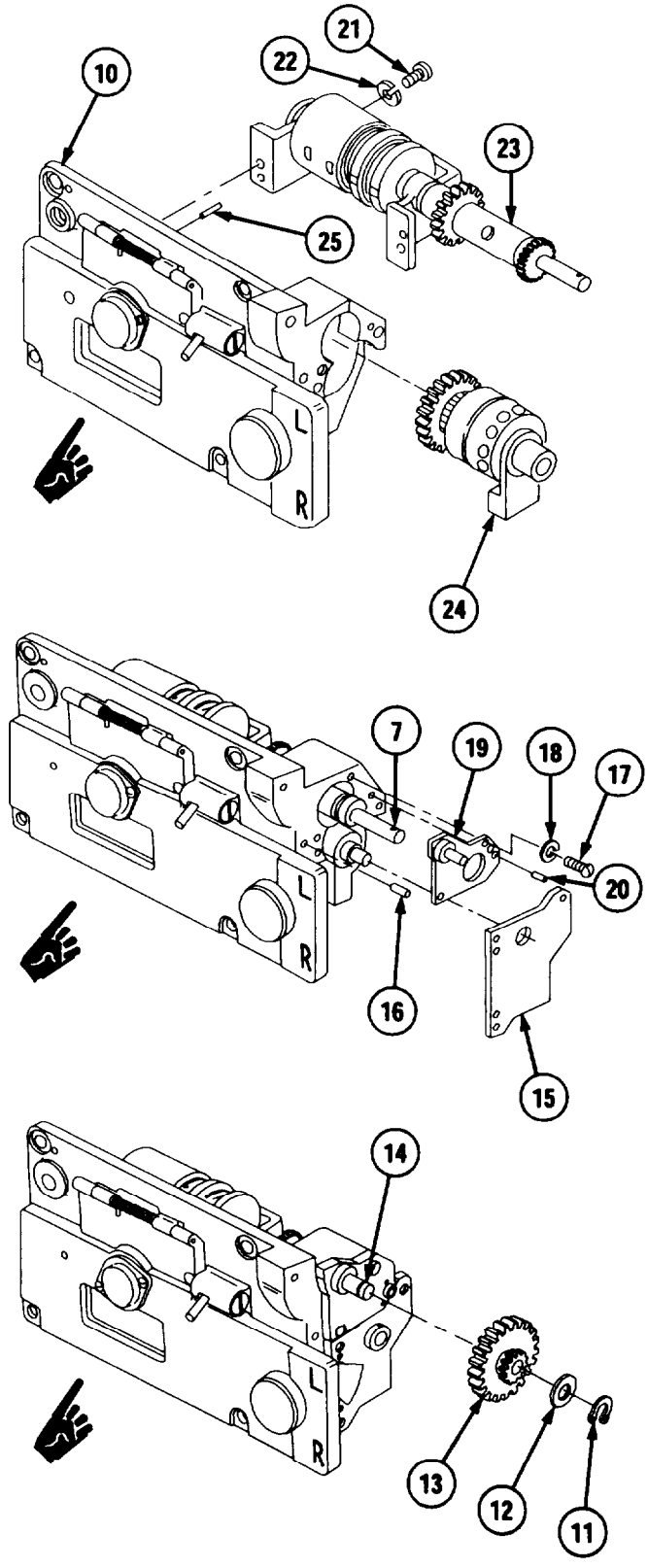
29 If removed, install two headless straight pins (20).

30 Install plate (19) over gear shaft (7) and secure with three machine screws (17) and three new lockwashers (18).

31 If removed, install two headless straight pins (16).

32 Install gear assembly plate (15) on two headless straight pins (16).

33 Install gear cluster (13) and washer (12) on shaft (14) and secure with retaining ring (11).

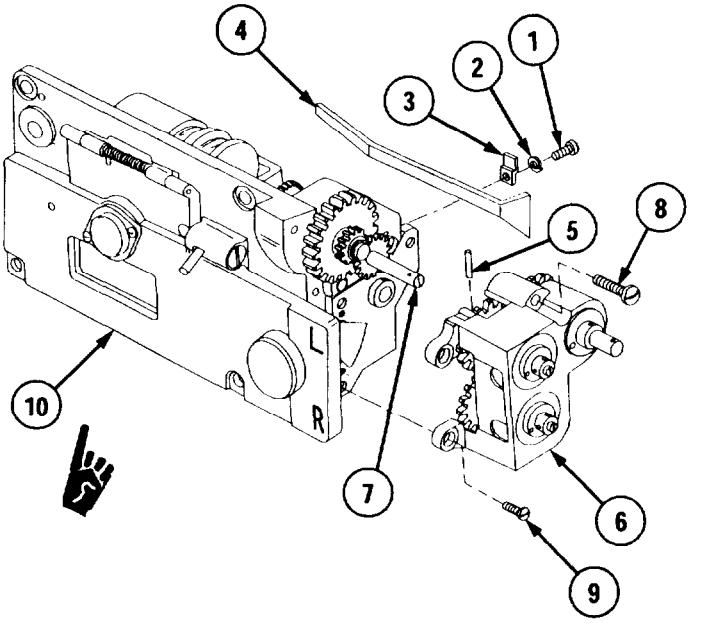


34 Install mechanical housing (6) on adapter assembly (10).

35 Rotate gear shaft (7) until pinhole alines with gear on mechanical housing (6) and install headless straight pin (5).

36 Install machine screw (8) and two machine screws (9). Tighten machine screws evenly to prevent binding.

37 Install light conductor (4) on adapter assembly (10) and secure with retaining strap (3), machine screw (1), and new lockwasher (2).



5-24. RESET COUNTER ASSEMBLY 7660419 MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29) 5180-01-168-0487

References

TM 9-254

Equipment Condition

M117/M117A2 panoramic telescope removed from howitzer (TM 9-2350-311-10/TM 9-2350-314-10)

Counter assembly removed from M117/M117A2 panoramic telescope (ref. para 5-22)

Reset counter assembly removed from adapter assembly (ref. para 5-23)

5-24. RESET COUNTER ASSEMBLY 7660419 MAINTENANCE INSTRUCTIONS - continued

a. Disassembly

NOTE

Depress and hold shaft (1) to permit removal of headless straight pin (2).

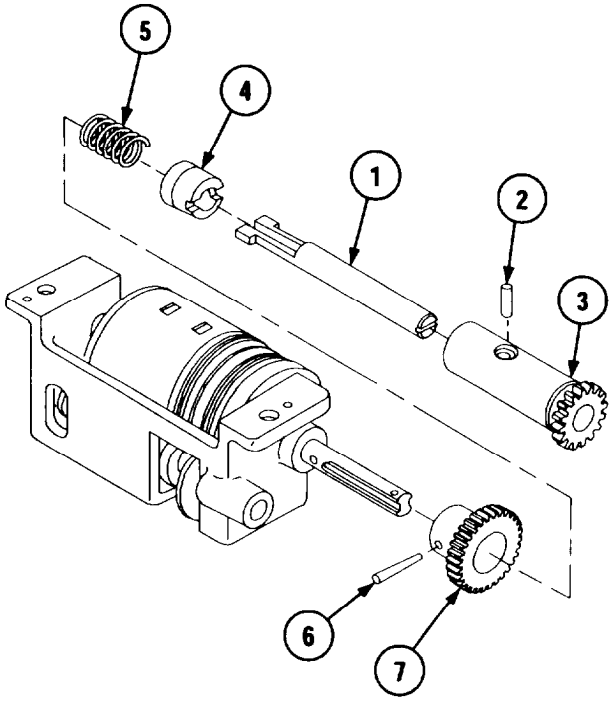
1 Remove headless straight pin (2) and gear shaft (3).

2 Remove shaft (1).

3 Remove positive clutch half (4).

4 Remove spring (5).

5 Remove tapered pin (6) and spur gear (7).



b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly

1 Install spur gear (7) and tapered pin (6).

2 Install spring (5), positive clutch half (4), and shaft (1).

3 Install gear shaft (3) and secure with headless straight pin (2).

Section VI. General Support Final Inspection Procedures

5-25. GENERAL

a. This section describes and illustrates the final inspection procedures for the M117/M117A2 panoramic telescope. A final inspection will be performed prior to returning the M117/M117A2 panoramic telescope to the using unit or to the supply system.

b. If the M117/M117A2 panoramic telescope to be inspected fails to meet the required standards, ensure that the maintenance authorized at the applicable level has been performed correctly. If necessary, send the M117/M117A2 panoramic telescope to depot maintenance.

c. Any time the seal of the M117/M117A2 panoramic telescope is broken, the M117/M117A2 panoramic telescope must be purged and charged.

5-26. M117/M117A2 PANORAMIC TELESCOPE FINAL INSPECTION AND ADJUSTMENT

This task covers:

a. Setting up azimuth testing fixture

b. Visual inspection

c. Collimation

d. Eyepiece focus

e. Parallax adjustment

f. Image tilt adjustment

g. Parallelism of reticle and image

h. Plumb travel and line of sight travel

i. Azimuth errors (800-mil steps) and backlash (azimuth mechanism)

j. Level travel and lift

k. Reset counter operation and adjustment

l. Gunner's aid counter operation and adjustment

m. Elevation knob torque inspection

n. Reset counter knob torque inspection

o. Gunner's aid knob torque inspection

p. Azimuth knob torque inspection

q. Purging and charging

5-26. M117/M117A2 PANORAMIC TELESCOPE FINAL INSPECTION AND ADJUSTMENT - continued

INITIAL SET-UP

Test Equipment

Collimator, telescope 5800955
Dioptometer holder (Item 19, appx F)
Fixture, testing, azimuth (Item 17, appx F)
Precision level (Item 20, appx F)
Projector, collimating (Item 21, appx F)

Tools

Purging kit (Item 22, appx F)
Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487
Torque adapter (Item 1, appx F)
Torque adapter (Item 2, appx F)
Torque adapter (Item 6, appx F)
Torque adapter (Item 7, appx F)
Torque wrench (in-lb) (Item 36, appx F)

Materials/Parts

Grease (Item 7, appx B)
Nitrogen, technical (Item 8, appx B)
Sealing compound (Item 13, appx B)
Shim stock (Item 19, appx B)
Tape (Item 20, appx B)

a. SETTING UP AZIMUTH TESTING FIXTURE

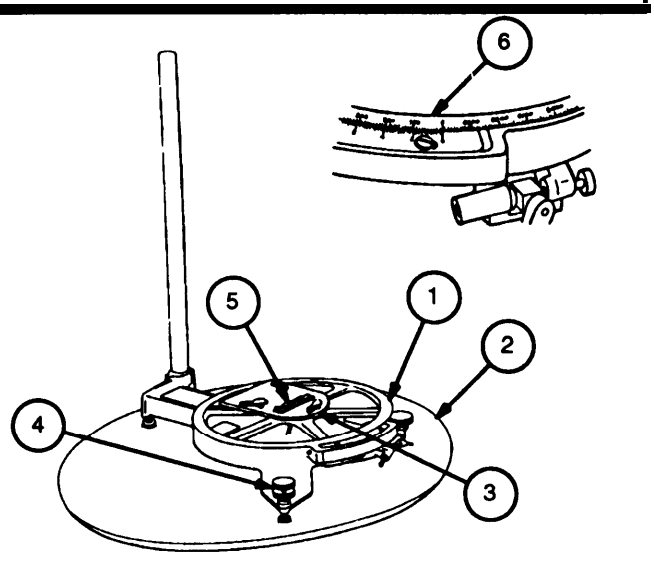
1 Install azimuth testing fixture (1) on test stand (2) at a height suitable for operation.

2 Position precision level (3) on azimuth testing fixture (1).

3 Adjust three leveling screws (4) until level (5) bubble remains centered through one full rotation of azimuth testing fixture (1).

4 Remove precision level (3).

5 Set azimuth fixture ring (6) so “0” graduation marks coincide and lock azimuth fixture ring (6).



6 Set fixture adapter (7) on adapter support plate (8). Do not clamp fixture adapter (7) to adapter support plate (8) at this time.

7 Suspend a plumb line (9) to one side of the azimuth testing fixture (1).

8 Install collimator adapter (10) and collimating projector (11) on tube (12).

9 Install alinement gage assembly (13) on fixture adapter (7).

10 Remove reflecting mimer assembly (14) from alinement gage assembly (13).

11 Install collimating telescope (15) in alinement gage assembly (13) and loosely claw in place by partially tightening thumbscrew (16).

12 Adjust height of collimating projector (11) so that line of sight from collimating projector (11) is in same plane as line of sight from collimating telescope (15).

13 Clamp collimator adapter (10) to tube (12).

14 Rotate fixture adapter (7) until collimating telescope (15) reticle cross line intersection point is in coincidence with plumb line (9).

15 Revolve collimating telescope (15) until vertical reticle is in coincidence with plumb line (9).

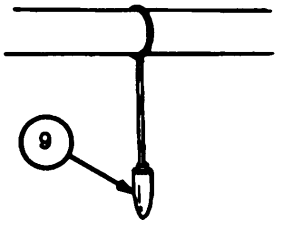
16 Secure collimating telescope (15) by tightening thumbscrew (16).

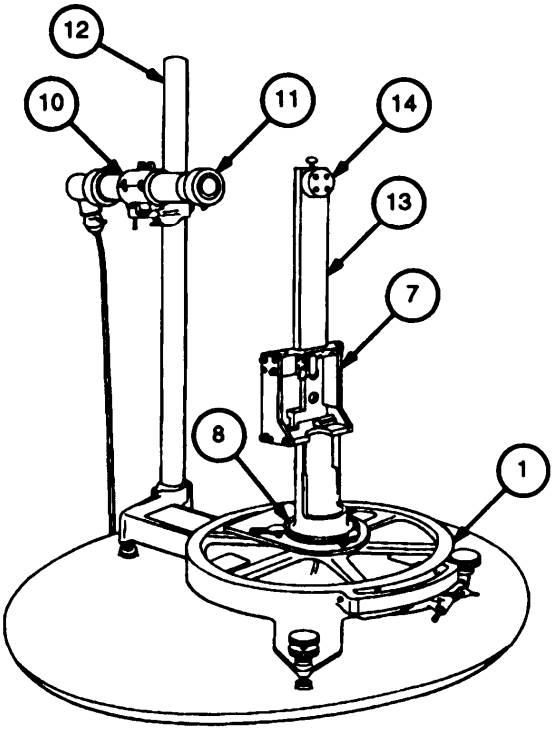
17 Rotate fixture adapter (7) until line of sight from collimating telescope (15) is in same plane of line of sight from collimating projector (11).

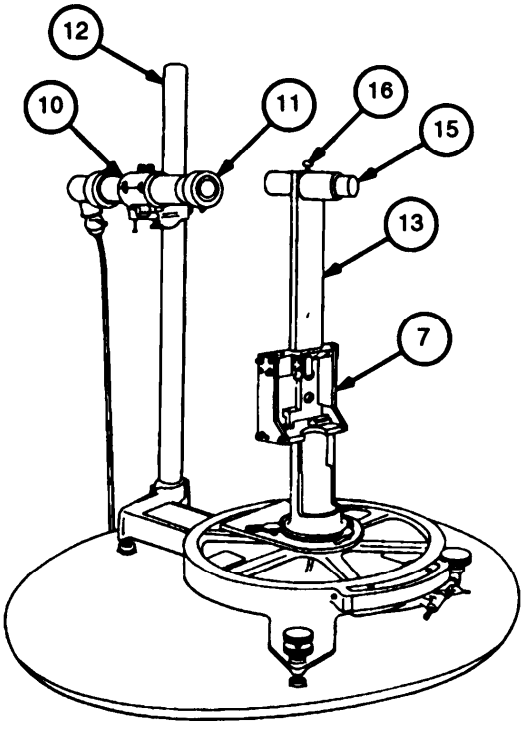
18 Sight through collimating telescope (15) and revolve collimating projector (11) until vertical reticle line is in coincidence with collimating projector (11) vertical reticle line.

19 Secure collimating projector (11) by tightening screws of collimator adapter (10).

20 Remove collimating telescope (15) from alinement gage assembly (13).







5-26. M117/M117A2 PANORAMIC TELESCOPE FINAL INSPECTION AND ADJUSTMENT - continued

a. SETTING UP AZIMUTH TESTING FIXTURE - continued

21 Install reflecting mirror assembly (14) on alinement gage assembly (13).

22 Remove lamp assembly (17) and diffusion disk from collimating projector (11).

23 Replace lamp assembly (17) with partial reflector at approximately a 45° angle.

24 Sight through collimating projector (11) and adjust collimating projector (11) and fixture adapter (7) until image of test reticle, as reflected by reflecting mirror assembly (14), is superimposed on test reticle. Adjust collimating projector (11) in elevation and fixture adapter (7) in defelction.

25 Clamp fixture adapter (7) in place with three cam-lock screws (18).

26 Remove alinement gage assembly (13) from fixture adapter (7).

27 Set collimating projector (11) to 88 yards (80 meters).

28 Install diffusion disk on collimating projector (11).

29 Install lamp assembly (17) on collimating projector (11).

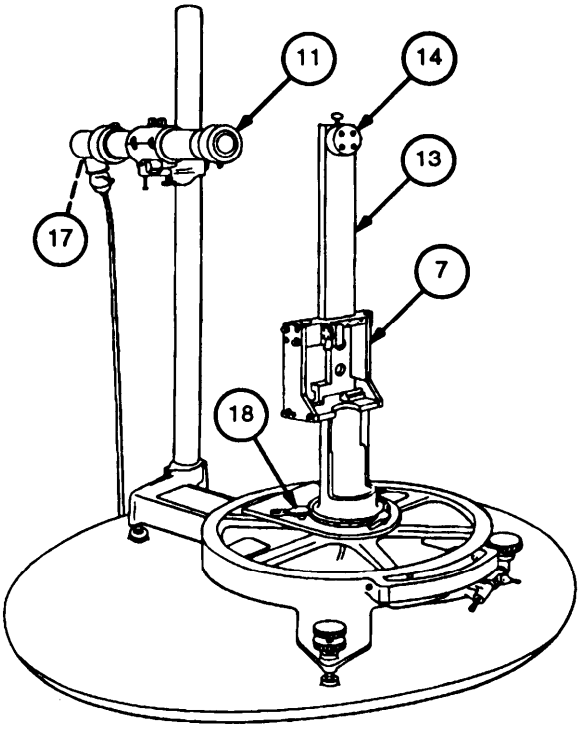
30 Install M117/M117A2 panoramic telescope (19) on fixture adapter (7) and secure with two latches (20).

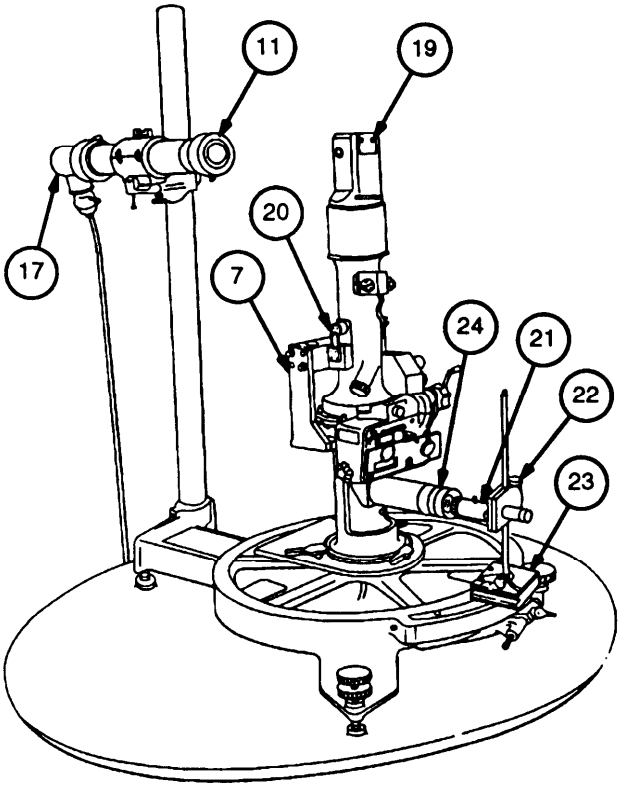
NOTE

Ensure that dioptometer (21) is adjusted to present a sharp, clear image of the dioptometer reticle.

31 Install dioptometer (21) in dioptometer holder (22) on surface gage (23).

32 Adjust height of dioptometer (21) to height of telescope eyepiece (24).





b. VISUAL INSPECTION

1 Check that all screws and lockwashers are present and tight.

2 Check that mounting surfaces are clean and free of burrs.

3 Check that M117/M117A2 panoramic telescope is free of dirt, corrosion, and foreign matter.

4 Check that paint is not chipped.

5 Check that all parts are present and free of damage.

c. COLLIMATION

1 Set azimuth fixture ring (1) to zero.

2 Set gunner's aid counter (2) to 00-00 detent.

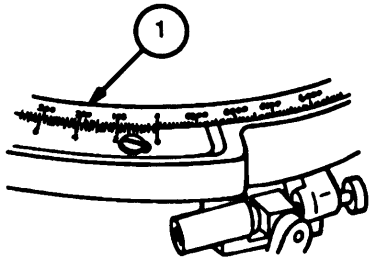
3 Rotate reset counter knob (3) until reset counter (4) registers 3200.

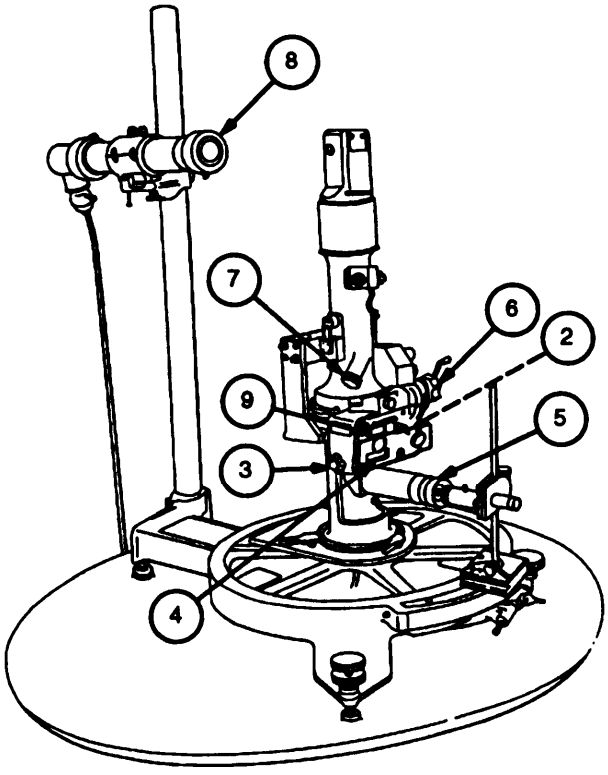
4 Sight through M117/M117A2 panoramic telescope eyepiece (5) and turn azimuth knob (6) and elevation knob (7) until M117/M117A2 panoramic telescope reticle is in coincidence with reticle of collimating projector (8).

5 Check that azimuth counter (9) registers 3200. If not, proceed as follows:

a. Remove cap and insert screwdriver into slotted shaft located below azimuth knob (6).

b. Push in and rotate screwdriver until azimuth counter (9) registers 3200.





5-26. M117/M117A2 PANORAMIC TELESCOPE FINAL INSPECTION AND ADJUSTMENT - continued

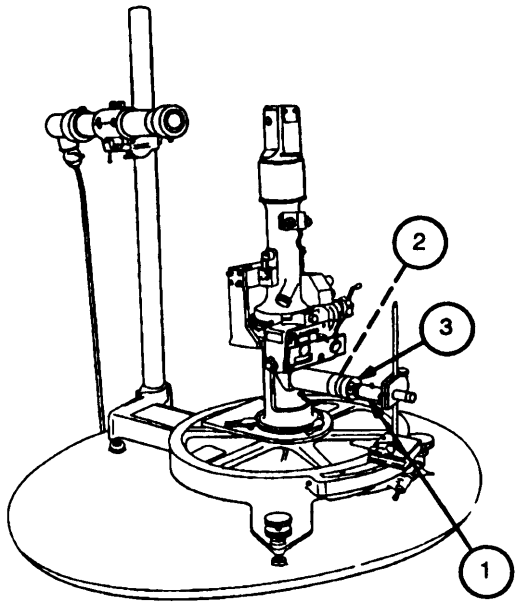
d. EYEPIECE FOCUS

1 Using dioptometer (1), check reticle focus for the optimum focus of minus 0.5 to minus 1.0 diopter.

2 If adjustment is required, remove four setscrews (2) and rotate M117/M117A2 panoramic telescope eyepiece (3) until optimum focus is achieved.

3 Using hand sealing gun, inject sealing compound into holes of two setscrews (2) nearest to counter assembly.

4 Apply sealing compound to threads of four setscrews (2) and install.

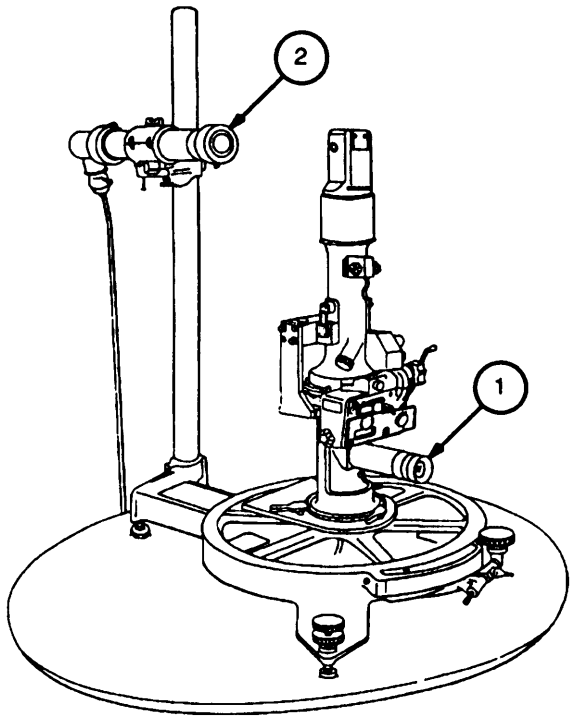


e. PARALLAX ADJUSTMENT

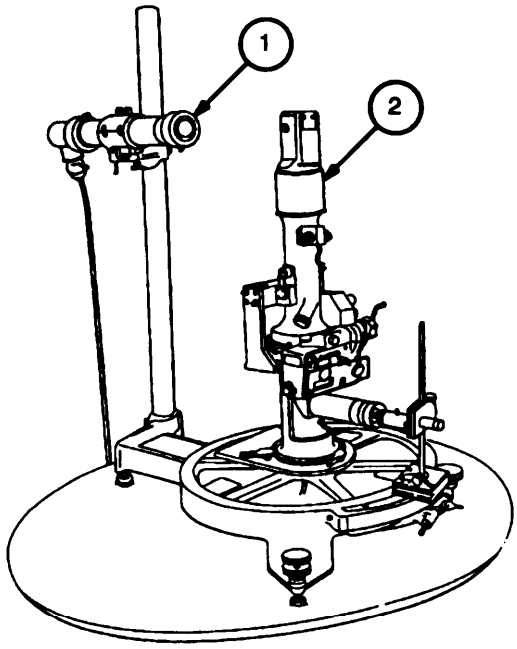
1 Sighting through M117/M117A2 panoramic telescope eyepiece (1), adjust M117/M117A2 panoramic telescope until reticle geometric center (intersection of cross lines) is on the vertical line of test reticle of the collimating projector (2).

2 Move head from side to side while viewing through M117/M117A2 panoramic telescope eyepiece (1). Parallax (movement between collimating projector (2) reticle and the M117/M117A2 panoramic telescope reticle) must not exceed thickness of vertical reticle line (0.1 mil).

3 If parallax is not within specified limits, return M117/M117A2 panoramic telescope to depot maintenance.



f. IMAGE TILT ADJUSTMENT



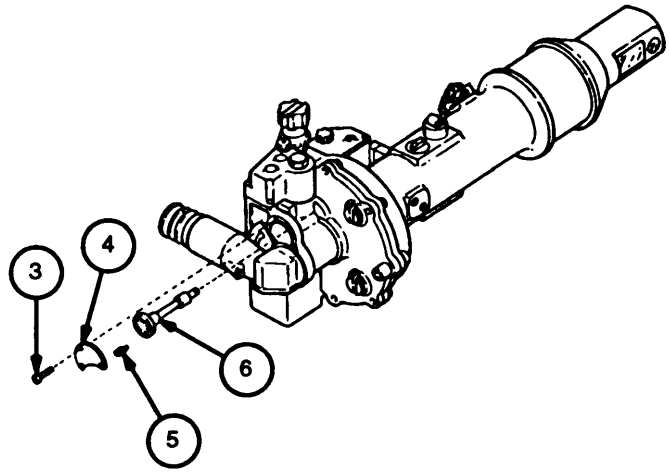
1 Position pre-plumbed collimating projector (1) at level of window in cap (2) of M117/M117A2 panoramic telescope so that the two optical axes lie in parallel planes.

2 Check image tilt through one full revolution of the cap (2) in each direction. The image of the vertical reticle line shall be vertical within 2° (0.62 mils) of arc. This requirement shall also be met with the elbow assembly positioned against each of the swing stops at each azimuth setting.

3 If image tilt is not within specified limits, remove three machine screws (3) and access cover (4).

4 Remove setscrew (5) from shaft (6).

5 Insert hexagon key into center of shaft (6) and turn until image of the vertical reticle line is within 2° (0.62 mils) of arc. (Ref. TM 9-254 for conversion to roils.)



6 Remove hexagon key and replace setscrew (5). Be careful not to disturb established position.

7 Recheck image tilt as directed in steps 1 and 2.

8 If necessary, repeat steps 4,5, and 6.

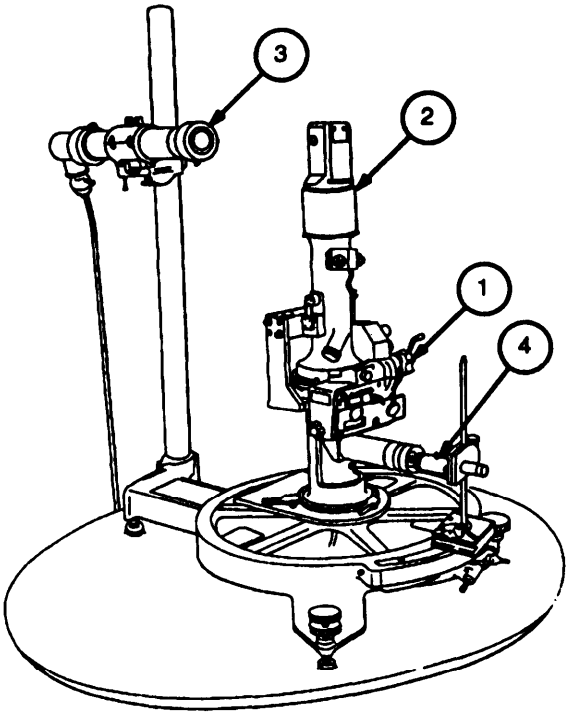
9 Install access cover (4) and secure with three machine screws (3).

5-26. M117/M117A2 PANORAMIC TELESCOPE FINAL INSPECTION AND ADJUSTMENT - continued

g. PARALLELISM OF RETICLE AND IMAGE

1 Rotate azimuth knob (1) until reticle line of M117/M117A2 panoramic telescope (2) coincides with reticle line of collimating projector (3).

2 Check image tilt through two full revolutions of the cap assembly. The image of a vertical target line shall be vertical within 0.62 mils or 2° of arc over the full field of view of the dioptometer (4).



h. PLUMB TRAVEL AND LINE OF SIGHT TRAVEL

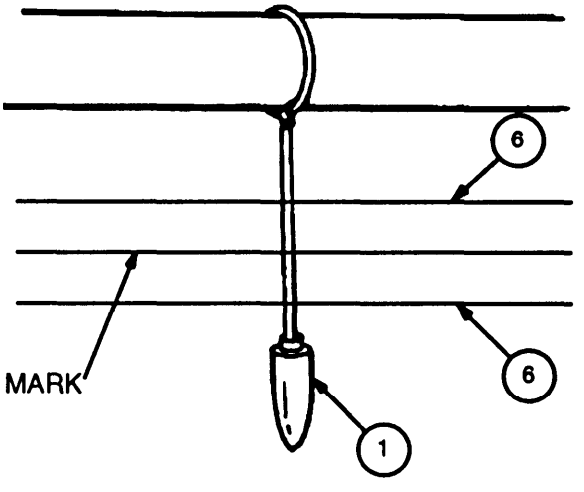
1 Collimate M117/M117A2 panoramic telescope (ref. para 5-26c).

2 Suspend plumb line (1) to one side of azimuth testing fixture (2).

3 Rotate azimuth knob (3) to sight onto plumb line (1).

4 Install a parallax shield on M117/M117A2 panoramic telescope eyepiece (4).

5 Place a mark on wall behind plumb line (1), intersecting reticle line.



6 Measure distance from cap (5) to mark on wall in inches (centimeter).

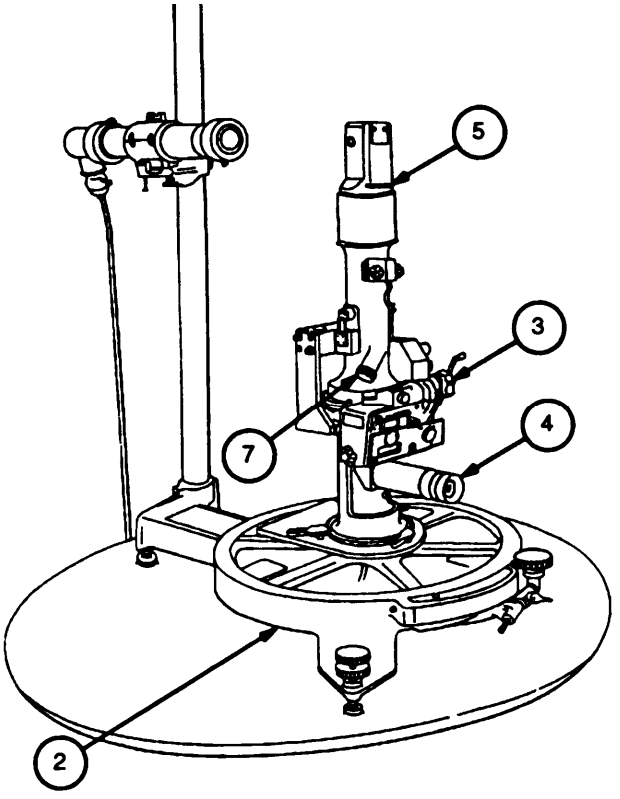
7 Multiply the distance found in step 6 by 0.30350 (tangent of 300 roils).

8 Place tape (6) above and below mark, at a distance determined in step 7.

9 Rotate elevation knob (7) from stop to stop. The reticle must follow plumb line (1) within 0.5 mil. The line of sight must elevate, or depress, no less than 300 roils in each direction from center.

10 If line of sight travel is not within the 300-mil limits in each direction, adjust elevation knob (7) (ref. para 5-13).

11 If the reticle does not track the plumb line (1) within 0.5 roil, send M117/M117A2 panoramic telescope to depot for maintenance on dove prism assembly.



i. AZIMUTH ERRORS (800-MIL STEPS) AND BACKLASH (AZIMUTH MECHANISM)

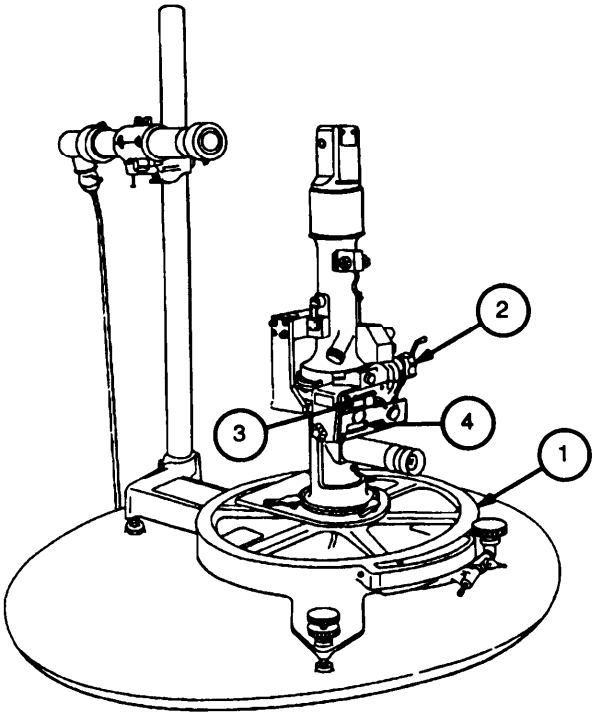
NOTE

Azimuth reading shall be made at 800-mil increments through one full revolution of the azimuth fixture ring (1) in each direction.

1 Rotate azimuth fixture ring (1) counterclockwise to 800 mils.

2 Rotate azimuth knob (2) clockwise until retitles coincide (ref. para 5-26c). If coincidence point is overtraveled, rotate azimuth knob (2) counterclockwise one-half turn past coincidence point and repeat this step.

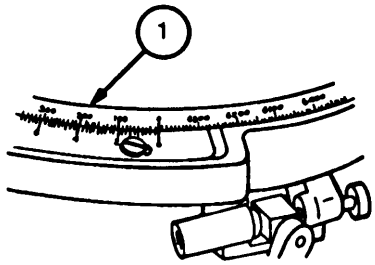
3 Azimuth counter (3) should increase by 800 mils ± 1.0 mil and reset counter (4) should increase by 800 roils ± 1.0 mil. Record readings.



5-26. M117/M117A2 PANORAMIC TELESCOPE FINAL INSPECTION AND ADJUSTMENT - continued

i. AZIMUTH ERRORS (800-MIL STEPS) AND BACKLASH (AZIMUTH MECHANISM) - continued

4 Again rotate azimuth knob (2) approximately one full revolution clockwise. Rotate azimuth knob (2) slowly counterclockwise until telescope reticle is in coincidence with collimating projector reticle. Record readings. Be careful not to overtravel coincidence point. If coincidence point is passed, repeat this step.

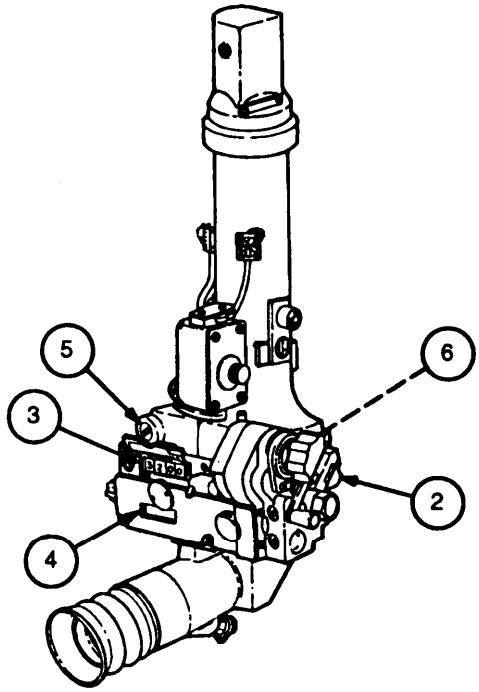


5 Difference between readings in steps 3 and 4 is amount of backlash and must not exceed 1.0 mil when read on azimuth counter (3) and 1.5 mil when read on reset counter (4).

6 Rotate azimuth fixture ring (1) counterclockwise to 1600 mils.

7 Repeat steps 2 thru 5. Azimuth counter (3) and reset counter (4) should indicate 4800 mils.

8 Repeat steps 6 and 7 above, every 800 mils, until azimuth fixture ring (1) completes two full revolutions.



9 Replace azimuth counter (3) (ref. para 5-23) if readings exceed tolerance in step 5.

10 Replace reset counter (4) (ref. para 5-23) if readings exceed tolerance in step 5.

11 If backlash in azimuth mechanism exceeds tolerance, adjust plug (5) or retainer (6). Check for binding or loose gear trains (ref. para 5-23).

j. LEVEL TRAVEL AND LIFT

1 Set azimuth fixture ring (1) to "0" coincidence on azimuth testing fixture (2).

2 While sighting through M117/M117/A2 panoramic telescope eyepiece (3), rotate azimuth knob (4) and elevation knob (5), until M117/M117A2 panoramic telescope reticle coincides with reticle of collimating projector (6).

3 Rotate azimuth fixture ring (1) 800 roils counterclockwise

4 Rotate azimuth knob (4) clockwise until retitles coincide.

5 Check that line of sight does not deviate from horizontal by more than 6.0 mil.

6 Rotate azimuth knob (4) clockwise approximately one-half revolution while observing reticle.

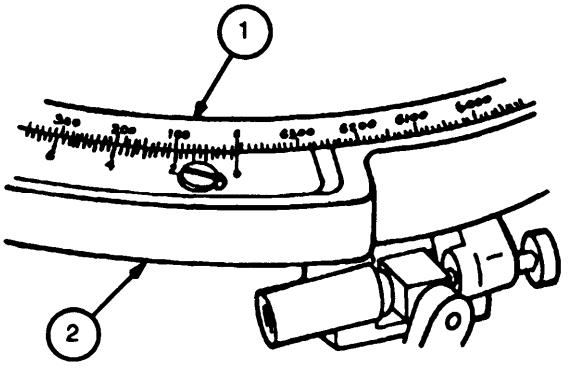
7 Rotate azimuth knob (4) slowly counterclockwise until retitles coincide.

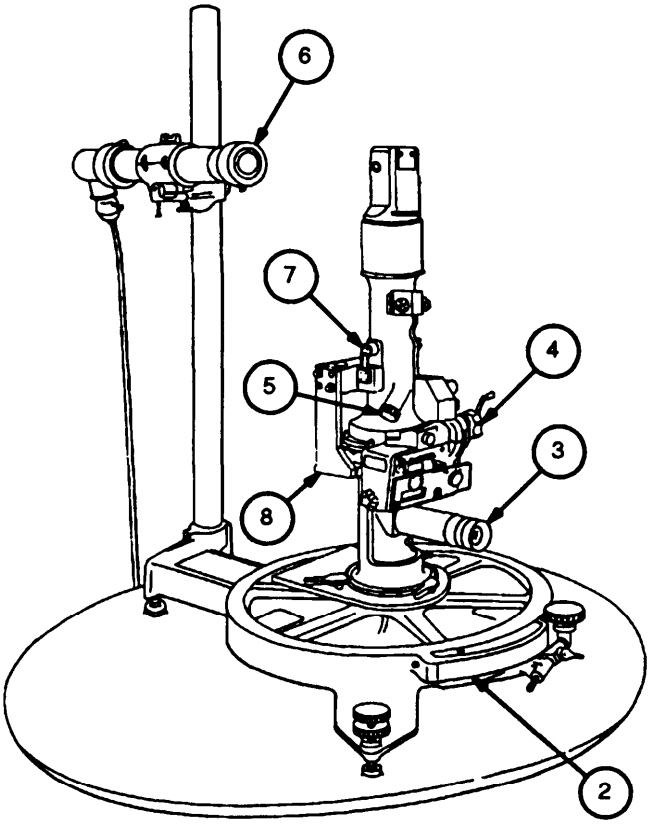
8 Check that line of sight changes no more than 0.5 mil from reading in step 5.

9 Repeat steps 3 thru 8 until azimuth fixture ring (1) has made two full revolutions.

10 During level travel test, direction of cap rotation shall be reversed. Any vertical displacement of line of sight with respect to horizontal target line resulting from this reversing of travel shall not exceed 2.0 mil. This test shall be performed at minimum of eight 800-mil azimuth settings.

11 If level travel exceeds tolerance specified, check mounting surfaces of M117/M117A2 panoramic telescope (7) and fixture adapter (8) for dirt and burrs. If none of above conditions exist, return M117/M117A2 panoramic telescope to depot maintenance.





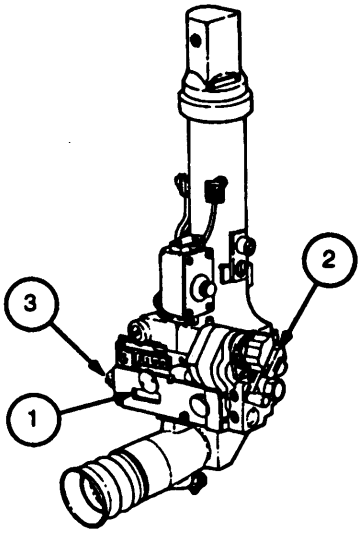
5-26. M117/M117A2 PANORAMIC TELESCOPE FINAL INSPECTION AND ADJUSTMENT - continued

k. RESET COUNTER OPERATION AND ADJUSTMENT

1 Reset counter (1) must follow when azimuth knob (2) is rotated.

2 Push in and rotate reset knob (3) to return reset counter (1) to 3200 mils.

3 Replace reset counter (1) (ref. para 5-23) if requirements in steps 1 and 2 cannot be met.

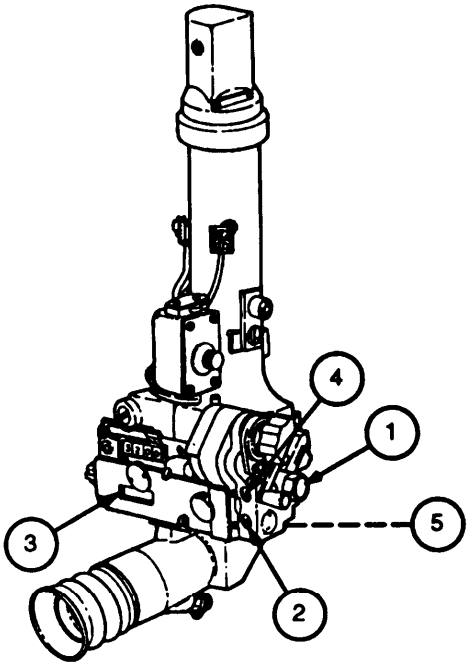


l. GUNNER'S AID COUNTER OPERATION AND ADJUSTMENT

1 Rotate gunner's aid knob (1) until a reading of 50 roils appears in gunner's aid counter (2). Check that reset counter (3) increases 50 mils.

2 Rotate gunner's aid knob (1) until a reading of 50 roils appears in gunner's aid counter (4). Check that reset counter (3) decreases 50 mils.

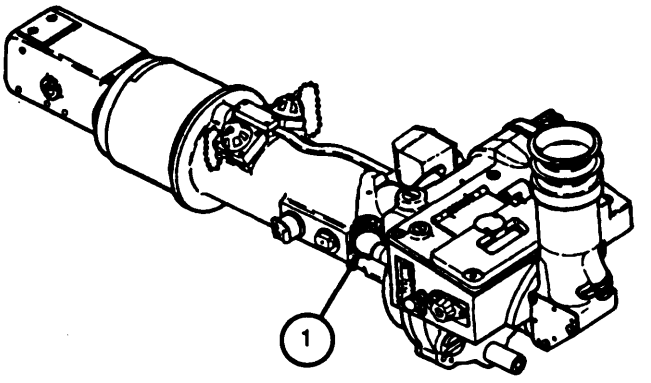
3 Replace gunner's aid counters by replacing housing assembly (5) (ref. para 5-23) if requirements of steps 1 and 2 cannot be met.



m. ELEVATION KNOB TORQUE INSPECTION

1 Using torque adapter (8213928) (Item 1, appx F) and torque wrench, check that elevation knob (1) running torque is 0.5 to 2.5 pound-inches (0.08 to 0.28 N-m).

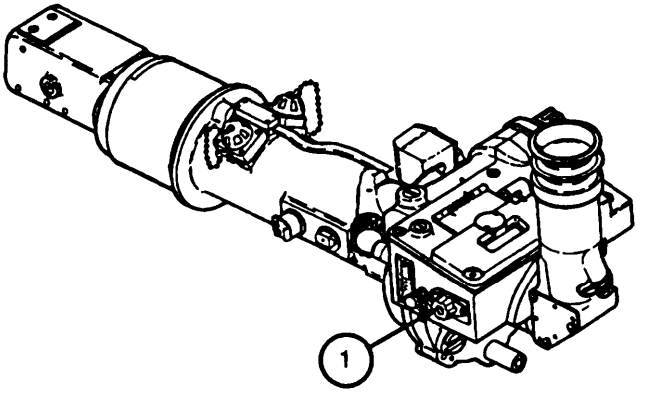
2 If torque requirement is not met in step 1, repair elevation mechanism (ref. para 5-17).



n. RESET COUNTER KNOB TORQUE INSPECTION

1 Using torque adapter (8599920) (Item 7, appx F) and torque wrench on reset counter knob (1), push in on reset knob and check that running torque is no more than 2.5 pound-inches (0.28 N-m).

2 If torque requirement is not met in step 1, check gearing and rotation for smooth movement.



5-26. M117/M117A2 PANORAMIC TELESCOPE FINAL INSPECTION AND ADJUSTMENT - continued

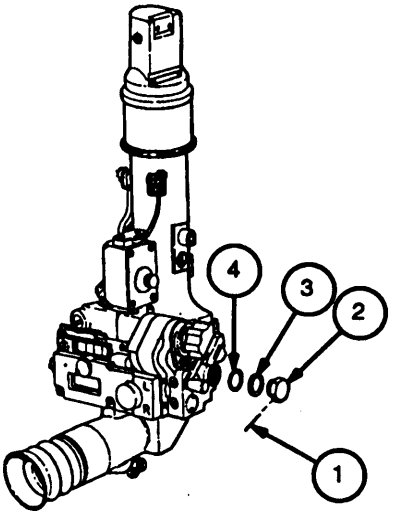
o. GUNNER'S AID KNOB TORQUE INSPECTION

1 Remove headless straight pin (1), gunner's aid knob (2), shim(s) (3), and seal (4).

2 Apply grease to inside diameter of seal (4). and sealing compound to outside diameter of seal (4). Install seal (4), shim(s) (3), gunner's aid knob (2), and headless straight pin (1).

3 Using torque adapter (8213929) (Item 2, appx F) and torque wrench, check that running torque of gunner's aid knob (2) is 1 to 4 pound-inches (0.11 to 0.45 N-m) in both directions.

4 Add or remove shim(s) (3) until required torque is achieved.



p. AZIMUTH KNOB TORQUE INSPECTION

1 Using torque adapter (8599917) (Item 6, appx F) and torque wrench, check that running torque of azimuth knob (1) is 4 to 8 pound-inches (0.45 to 0.90 N-m) in both directions.

2 If requirement in step 1 cannot be met, remove azimuth knob (1) (ref. para 5-13).

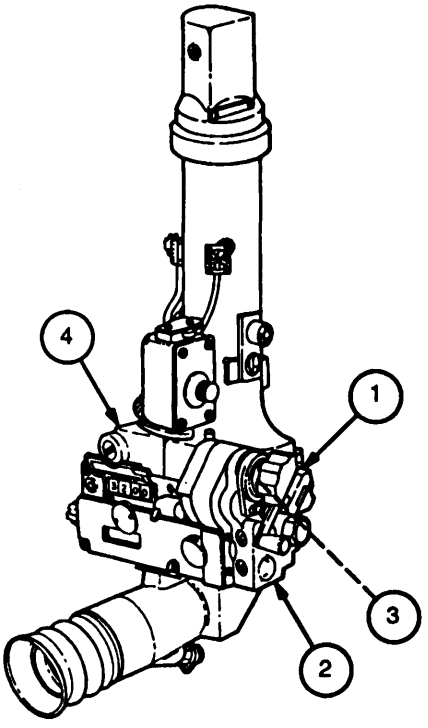
3 Remove cover (2) (ref. para 5–1 3).

4 Temporarily install azimuth knob (1), torque adapter, and torque wrench.

5 Using adjustable spanner wrench, adjust retainer (3) until required torque in step 1 is achieved.

6 Scribe a line on retainer (3) and housing (4). Back out retainer (3) and apply small amount of sealing compound and turn in retainer (3) to scribe marks.

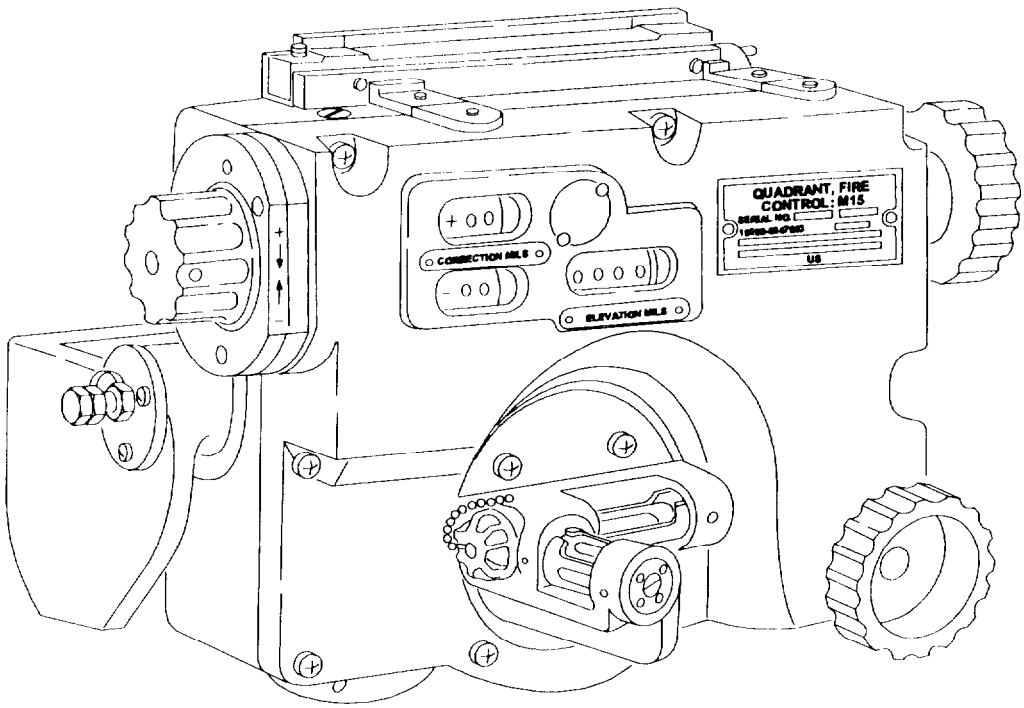
7 Install cover (2) (ref. para 5-17) and azimuth knob (1) (ref. para 5-13).



q. PURGING AND CHARGING

Refer to TM 750-116 for purging and charging procedures.

CHAPTER 5.1
M15 FIRE CONTROL QUADRANT MAINTENANCE INSTRUCTIONS



CHAPTER OVERVIEW

This chapter contains maintenance procedures for the M15 fire control quadrant. Information on repair parts and special tools, troubleshooting, and maintenance of the M15 fire control quadrant are included.

CHAPTER INDEX

CHAPTER INDEX - continued

Section I. Repair Parts; Special Tools; Test, Measurement, and Diagnostic Equipment (TMDE); and Support Equipment

5.1-1. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE) applicable to your unit.

5.1-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special tools, TMDE, and support equipment required and authorized for repair of the M15 Fire Control Quadrant are listed in the repair parts and special tools list, appendix D. Fabricated tools are listed in appendix C.

5.1-3. REPAIR PARTS

Repair parts are listed and illustrated in the repair parts and special tools list, appendix D.

Section II. Inspections

5.1-4. GENERAL

a. Inspection is performed primarily to determine the following:

(1) Completeness.

(2) The nature of unserviceability.

(3) The work, repair parts, and supplies required to return the materiel to serviceability.

(4) That the work in process is being performed properly.

(5) That completed work complies fully with serviceability standards.

b. The M15 fire control quadrant is considered serviceable when:

(1) It is complete and properly performs its intended function.

(2) All modification work orders (MWOs) have been applied.

(3) All defects disclosed by the inspection have been corrected.

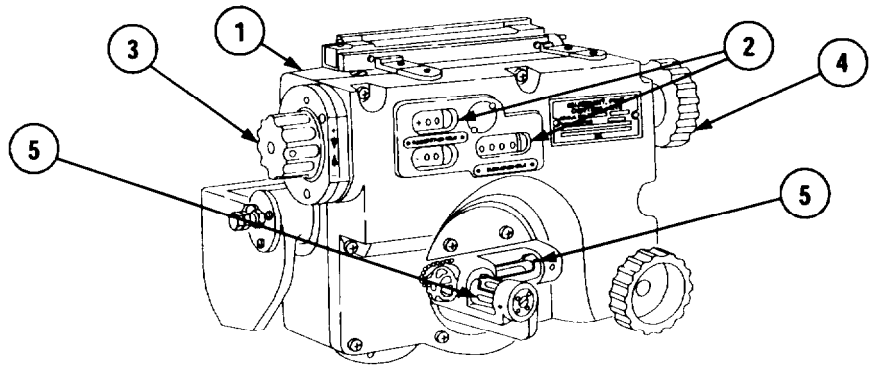
5.1-5. CATEGORIES OF INSPECTION

Categories of inspection define responsibilities.

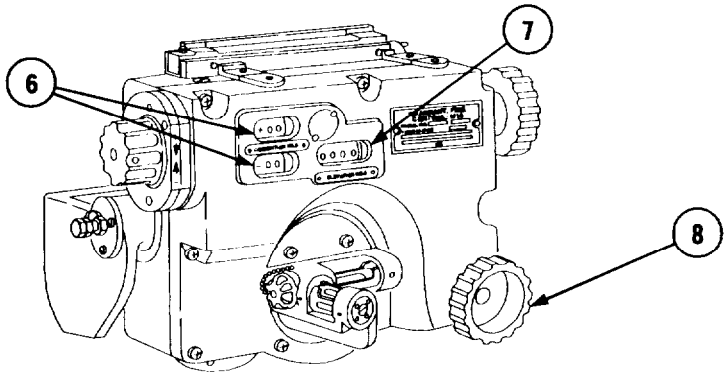
a. An initial inspection (ref. para 5.1-6 and 5.1-7) is performed immediately on receipt of the M15 quadrant for maintenance. This inspection will determine the amount and type of work to be performed.

b. A final inspection of the M15 quadrant (ref. para 5.1-24) is performed after repairs have been completed to ensure the item meets serviceability standards.

5.1-6. DIRECT SUPPORT INITIAL INSPECTION

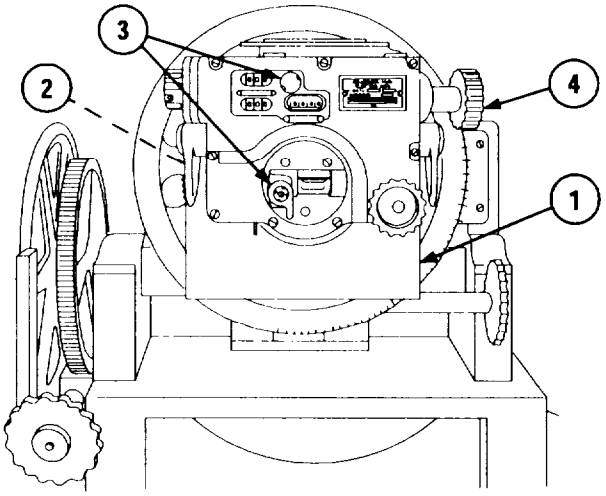


Item No.	Item To Be Inspected	Procedures
1	M15 QUADRANT	Look for signs of mistreatment, such as dents, scuff marks, bare spots, and missing parts. Inspect M15 quadrant for cleanness.
2	COUNTER WINDOWS	Check for moisture. Look for broken, cracked, or chipped glass.
3	CORRECTION KNOB	Operate correction knob. Check that operation is smooth without binding or rough motion and that not more than 3 pound-inches (0.339 N-m) of torque is required to turn it throughout its travel from stop to stop.
4	ELEVATION KNOB	Operate elevation knob. Check that operation is smooth without binding or rough motion and that not more than 8 pound-inches (0.904 N-m) of torque is required to turn it.
5	LEVEL VIALS	Check light sources. Check that light is present even throughout the level vial. Check that level vial graduations are present and legible. Check that level vials are not cracked or broken and that covers rotate smoothly.

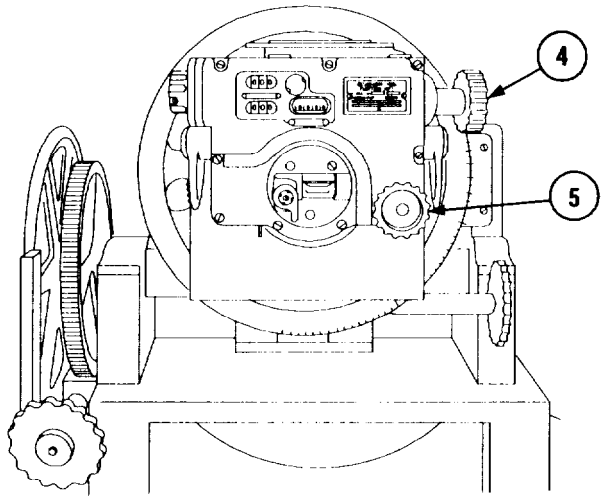


Item No.	Item To Be Inspected	Procedures
6	CORRECTION COUNTER	Check light sources. Check that light is present and even throughout the correction counter. Check that correction counter numbers are clear and legible and that total excursion registers a minimum of 50 mils at each stop.
7	ELEVATION COUNTER	Check light sources. Check that light is present and even throughout the elevation counter. Check that elevation counter numbers are clear and legible and register at least 1383 at maximum elevation and not more than 9772 at maximum depression.
8	CROSS LEVEL KNOB	Operate cross-level knob. Check that operation is smooth without binding or rough motion and that no more than 8 pound-inches (0.904 N-m) of torque is required to rotate it.

5.1-7. GENERAL SUPPORT INITIAL INSPECTION

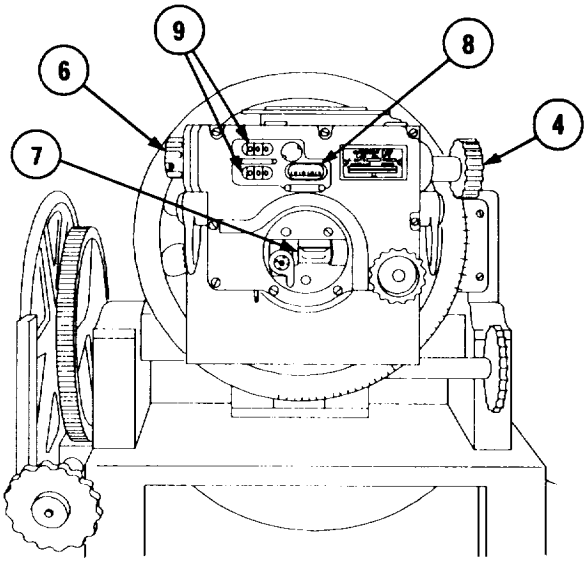


Item No.	Item To Be Inspected	Procedures
		NOTE The following inspections should be performed with the M15 quadrant mounted on cross-leveling fixture. Refer to final inspection (ref. para 5.1-24) for setup and mounting procedures.
1	M15 QUADRANT	Check that all parts are in proper positions and securely attached.
2	MOUNTING SURFACE	Check that mounting surface is properly alined and free of burrs and corrosion.
3	COUNTER AND LEVEL VIAL LEDS	Apply 24 volts DC to quadrant housing connector receptacle. Check that LEDs illuminate counters and level vials sufficiently to enable easy reading in a darkened area when toggle switch is moved to correct position.
4	ELEVATION KNOB AND ELEVATION MECHANISM	a. Check that torque required to turn elevation knob in either direction does not exceed 8 pound-inches (0.904 N-m) at any point between stops.

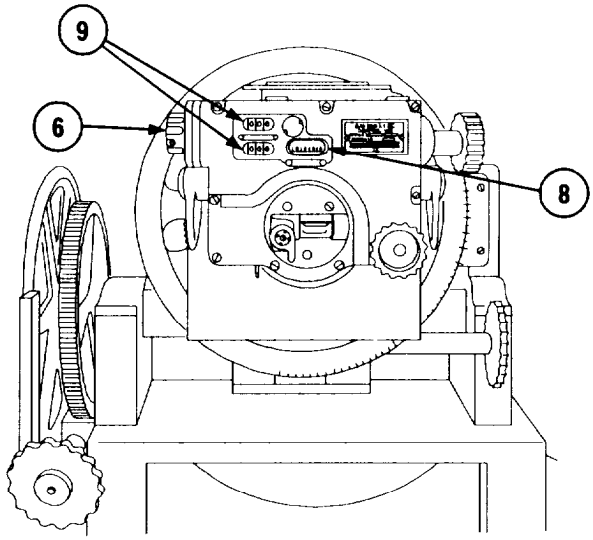


Item No.	Item To Be Inspected	Procedures
4	ELEVATION KNOB (4) AND ELEVATION MECHANISM - CONTINUED	b. Check elevation travel by turning elevation knob clockwise to stop. Center elevation level vial bubble by turning handwheel on upper section of cross-leveling fixture. Check that scale on upper section of cross-leveling fixture reads at least 77° 47' 37.5". Turn elevation knob counterclockwise to stop and center elevation level vial bubble. Check that upper scale reads at least 12° 49' 30". c. Check backlash by turning elevation knob clockwise to center elevation level vial bubble. Turn counterclockwise past center and then back to original position. Check that level vial bubble centers again within 1/2 space between level vial graduations.
5	CROSS-LEVEL KNOB (5) AND CROSS LEVEL MECHANISM	a. Check that torque required to turn elevation knob in either direction does not exceed 8 pound-inches (0.904 N-m) at any point between stops. b. Check cross-level travel by turning cross-level knob to either stop. Turn handwheel on lower section of cross-leveling fixture to center cross-level vial bubble. Check that scale on lower section of cross-leveling fixture reads at least 34°. c. With cross-level vial bubble centered, turn cross-level knob clockwise. Then turn back to original position to check backlash. Check that cross-level vial bubble centers within 1/2 space between level vial graduations.

5.1-7. GENERAL SUPPORT INITIAL INSPECTION - continued



Item No.	Item To Be Inspected	Procedures
6	CORRECTION KNOB	Check that torque required to turn correction knob in either direction between detent positions does not exceed 3 pound-inches (0.339 N-m).
7	CROSS-LEVEL VIAL	Check that cross-level vial bubble is centered within one graduation line when quadrant is in reference level position. (Refer to final inspection, para 5.1-24, to level the cross-leveling fixture.) Depress M15 quadrant to 200 mils by rotating upper section of fixture and check that level vial bubble remains centered. Elevate M15 quadrant to 1300 mils and check that level vial bubble remains centered.
8	ELEVATION COUNTER	a. Check that elevation counter registers at least 1383 mils when elevation knob (4) is turned clockwise to stop and not more than 9772 mils when turned counterclockwise to stop. b. With M15 quadrant in reference level position (ref. final inspection, para 5.1-24, for leveling procedures) and correction counters (9) set at 00, check that elevation counter registers 0000 $\pm$ 0.5 mil. c. Check that all numerals aline within 1/16 inch (1.588 mm).



Item No.	Item To Be Inspected	Procedures
9	CORRECTION COUNTERS	a. Turn correction knob (6) clockwise to stop and check that upper correction counter registers at least 55 mils. Turn correction knob counterclockwise to stop and check that lower correction counter registers at least 55 mils. b. Turn correction knob (6) clockwise to register 25 mils on upper correction counter. Check that reading on elevation counter (8) is reduced 25 ± 0.2 mils. Turn correction counter clockwise to register 50 mils on upper correction counter. Check that reading on elevation counter is reduced 50 ± 0.2 mils. Turn correction knob counterclockwise to register 25 and 50 mils, respectively, on lower correction counter. Check that reading on elevation counter increases 25 ± 0.2 and 50 ± 0.2 mils, respectively. c. Check that all numerals aline within 1/16 inch (1.588 mm).

Section III. Troubleshooting

5.1-8. GENERAL

a. The symptom index can be used as a quick guide to troubleshooting. Common malfunctions are listed in alphabetical order with a page number reference to the troubleshooting table where a test or inspection and corrective action are provided.

b. The direct support troubleshooting table (ref. para 5.1-10) lists the common malfunctions which may be found during maintenance of the M15 quadrant. Perform the tests/inspections and corrective actions in the order listed.

c. The general support troubleshooting table (ref. para 5.1-12) lists the common malfunctions which may be found during maintenance of the M15 quadrant. Perform the tests/inspections and corrective actions in the order listed.

d. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed or is not corrected by listed corrective action, notify next higher maintenance level.

5.1-9. DIRECT SUPPORT SYMPTOM INDEX

5.1-10. DIRECT SUPPORT TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION

LEVEL ASSEMBLY

1. LEVEL VIALS (1) HAVE UNEVEN OR NO ILLUMINATION WITH 24 VOLTS DC APPLIED.

   Observe visually in darkened area with 24 volts DC applied.

   a. Replace toggle switch (ref. para 5.1-14).

   b. Send to general support maintenance.

2. LEVEL VIAL (1) HAS NO BUBBLE OR IS CRACKED.

   Observe visually.

   Replace level vial (ref. para 5.1-17).

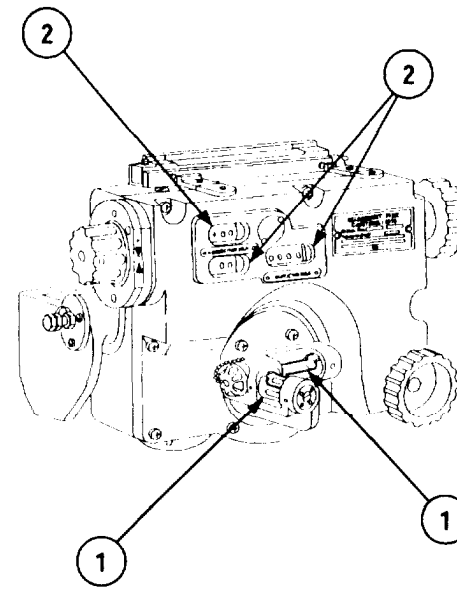
   COVER ASSEMBLY

3. COUNTER DIALS (2) HAVE UNEVEN OR NO ILLUMINATION WITH 24 VOLTS DC APPLIED.

   Observe visually in darkened area.

   a. Replace overlay assembly (ref. para 5.1-16).

   b. Replace electrical wiring or contacts (ref. para 5.1-16).



5.1-10. DIRECT SUPPORT TROUBLESHOOTING - continued

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION

COVER ASSEMBLY - continued

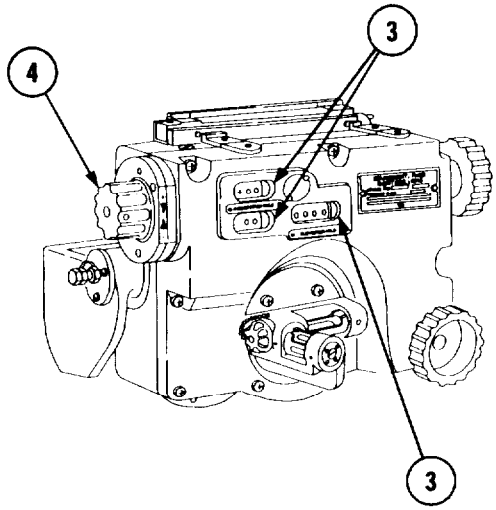
4. COUNTER WINDOWS (3) ARE FOGGED OR HAVE CONDENSATION.

Check for damaged glass and defective or missing parts.

a. Replace glass if required (ref. para 5.1-16).

b. Replace defective or missing parts as required and authorized (ref. para 5.1-16).

c. Remove cover assembly. Wipe dry, then purge and charge M15 quadrant with dry nitrogen after reinstalling cover (ref. TM 750-116).



CORRECTION KNOB ASSEMBLY

5. CORRECTION KNOB (4) BINDS.

Check for defective correction knob assembly.

a. Repair correction knob assembly (ref. para 5.1-15).

b. If correction knob still binds, notify general support maintenance.

COUNTER ASSEMBLY

6. CORRECTION COUNTER FAILS TO ALLOW +50 MILS MIN OR -50 MILS MIN.

Step 1. Check for incorrect assembly of key washers after repair.

Reinstall key washers correctly (ref. para 5.1-15).

Step 2. Check for worn or damaged correction knob assembly.

Replace worn or damaged parts as required (ref. para 5.1-15).

5.1-11. GENERAL SUPPORT SYMPTOM INDEX

5.1-12. GENERAL SUPPORT TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION

LEVEL ASSEMBLY

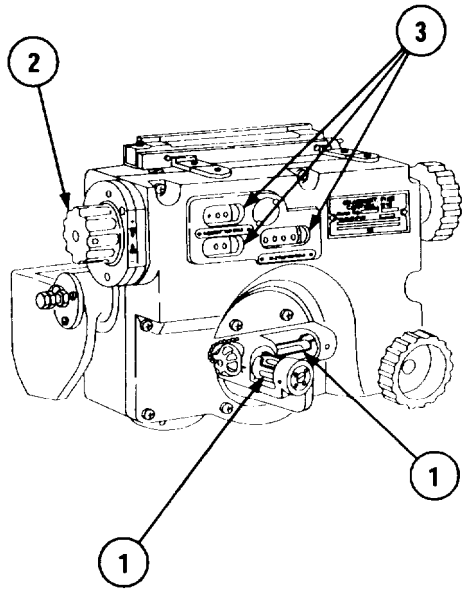
1. LEVEL VIALS (1) HAVE UNEVEN OR NO ILLUMINATION WITH 24 VOLTS DC APPLIED.

   Observe visually in darkened area with 24 volts DC applied.

   a. Replace LED (ref. para 5.1-22).

   b. Replace electrical wiring or contacts (ref. para 5.1-22).

   c. Replace components of electrical receptacle (ref. para 5.1-22).



CORRECTION KNOB ASSEMBLY

2. CORRECTION KNOB (2) BINDS.

   Check for defective correction counter.

   Replace correction counter assembly (ref. para 5.1-19).

COUNTER ASSEMBLY

3. COUNTER NUMBERS (3) ARE NOT IN HORIZONTAL ALINEMENT.

   Step 1. Observe visually for defective counters.

   Replace counter assembly (ref. para 5.1-19).

   Step 2. Check for incorrectly assembledcounter assembly.

   Reassemble counter assembly correctly (ref. para 5.1-20).

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION

4. ELEVATION COUNTER (4) FAILS TO ALLOW 1383 MILS ELEVATION AND 228 MILS DEPRESSION.

Step 1. Check for incorrectly installed counter.

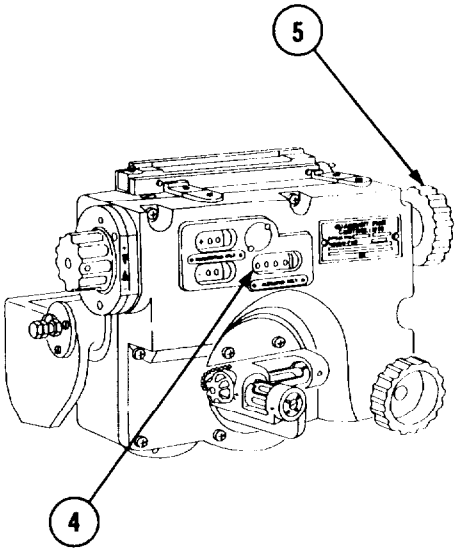
Reinstall counter correctly (ref. para 5.1-19).

Step 2. Check for incorrectly assembled counter.

Reassemble counter correctly (ref. para 5.1-20)

Step 3. Check for defective counter assembly.

Replace counterassembly (ref. para 5.1-19).



WORMSHAFT ASSEMBLY

5. ELEVATION KNOB (5) EXCEEDS 0.5-MIL BACKLASH TOTAL.

Step 1. Check for incorrectly adjusted retainers.

Adjust retainers (ref. para 5.1-19).

Step 2. Check for worn or damaged parts.

Remove wormshaft assembly (ref. para 5.1-19) and replace parts as required and authorized.

Section IV. Direct Support Maintenance Procedures

5.1-13. GENERAL

LIST OF TASKS

Task No.	Task	Task Ref (Page)	Troubleshooting Ref No. (Page)
1	Maintain M15 quadrant		
	a. Disassemble	5.1-18	
	b. Repair	5.1-19	
	c. Assemble	5.1-20	
2	Maintain knob assembly		5.1-12
	a. Disassemble	5.1-24	
	b. Repair	5.1-24	
	c. Assemble	5.1-25	
3	Maintain cover assembly		5.1-11,5.1-12
	a. Disassemble	5.1-27	
	b. Repair	5.1-28	
	c. Assemble	5.1-28	
4	Maintain level assembly		5.1-11
	a. Disassemble	5.1-31	
	b. Repair	5.1-31	
	c. Assemble	5.1-32	
	d. Adjust	5.1-32	

5.1-14. M15 QUADRANT MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Fire Control Maintenance and Repair Shop Specialized Equipment Wrench Set, Spanner, DS, GS Maintenance: Tubular, Double Ended, Concave, Inserted Blade Set, 76 Wrenches 4931-00-580-0012

Shop Equipment, Instrument and Fire Control: Field Maintenance, Basic (SC4931-95-CL-A07) 4931-00-754-0740

Tool Kit, Instrument, Fire Control System, Repair, Field Maintenance (SC5180-95-CL-B29) 5180-01-168-0487

Materials/Parts

Adhesive	Item 1.1, appx B
Flux	Item 5, appx B
Gasket	8215772
Gasket	8247723
Grease	Item 7, appx B
Grease	Item 6, appx B
Lockwasher (4)	MS35333-69
Lockwasher (3)	MS35338-136
Lockwasher (9)	MS35338-156
Preformed packing	MS9021-217
Preformed packing	MS9241-016
Sealing compound	Item 13, appx B
Solder	Item 18, appx B
Tape	Item 20, appx B

References

TM 9-254
TM 9-2350-311-20-2

Equipment Condition

M15 quadrant removed from howitzer (TM 9-2350-311-20-2)

5.1-14. M15 QUADRANT MAINTENANCE INSTRUCTIONS - continued

a. Disassembly

1 Loosen one of two setscrews in notches in detent plate of knob assembly (1).

2 Remove three screws (2) and three lockwashers (3). Pull base (4) carefully off two straight pins (5). Discard lockwashers.

3 Remove knob assembly (1) and preformed packing (6). Discard preformed packing.

4 Remove two straight pins (5), only if damaged.

5 Remove two screws (7) and identification plate (8), only if damaged.

6 Remove instrument light (9), two screws (10), plate spacer (11), and spring tension clip (12) from housing, only if damaged.

NOTE

Electrical cover of level assembly must be removed to permit removal of cover assembly.

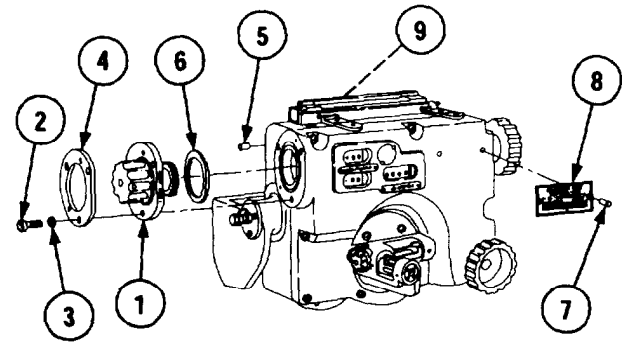
7 Remove tapered pin (13), knob (14), spring tension washer (15), recessed washer (16), and preformed packing (17). Discard preformed packing.

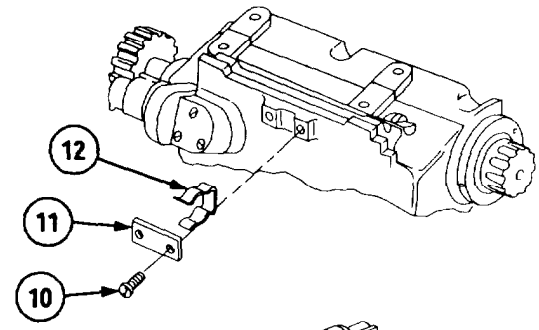
8 Remove nine screws (18) and nine lockwashers (19) and carefully work cover assembly (20) off two straight pins (21) in housing. Discard lockwashers.

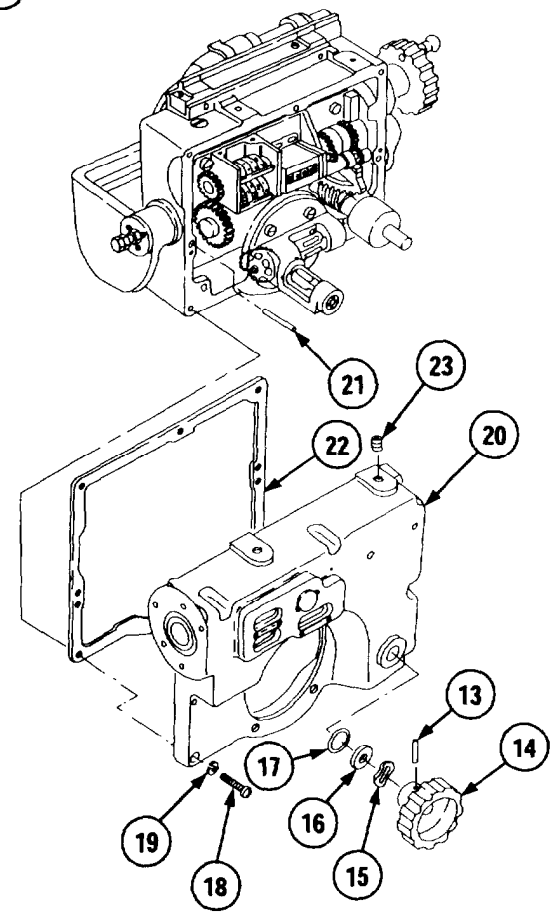
9 Remove and discard gasket (22).

10 Remove two setscrews (23), only if damaged.

11 Remove two straight pins (21), only if damaged.







NOTE

Perform the following steps only as necessary for replacement of damaged or defective parts.

12 Remove boot (24) from toggle switch (25).

13 Remove hexagon plain nut (26) from toggle switch (25).

NOTE

Rotate elevation handwheel to move sector gear away from toggle switch.

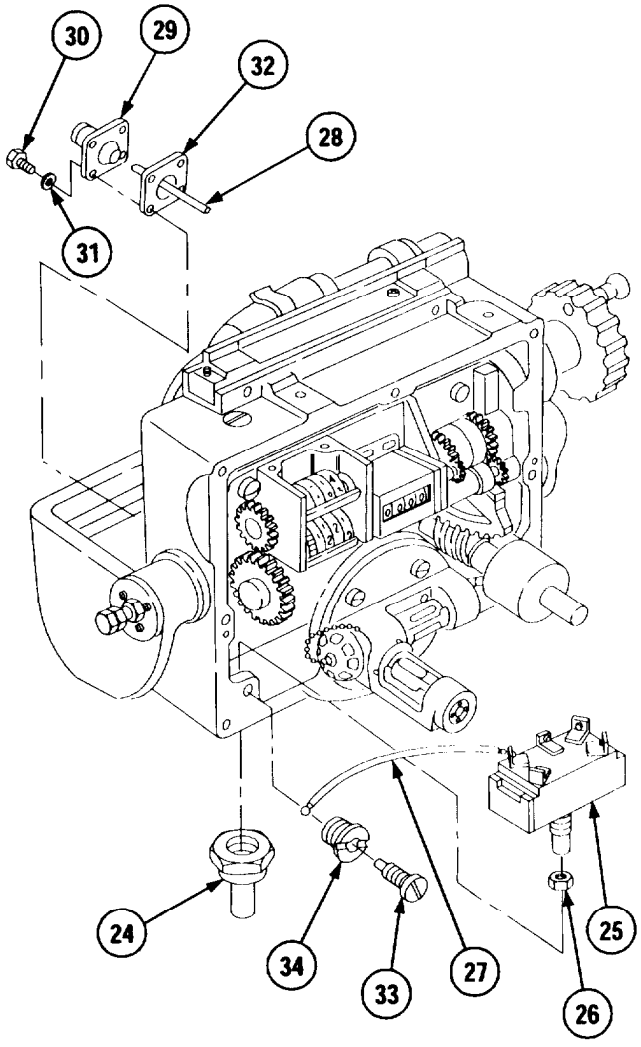
14 Using tape (item 20, appx B), tag and unsolder four wires (27) from toggle switch (25).

15 Remove toggle switch (25) from housing.

16 Unsolder wire (28) from contact of connector (29).

17 Remove four screws (30), four lockwashers (31), connector (29), and gasket (32) from housing. Discard lockwashers and gasket.

18 Unsolder wire (27) from contact (33). Unscrew contact (33) and screw thread insert (34) from mount.



b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

5.1-14. M15 QUADRANT MAINTENANCE INSTRUCTIONS - continued

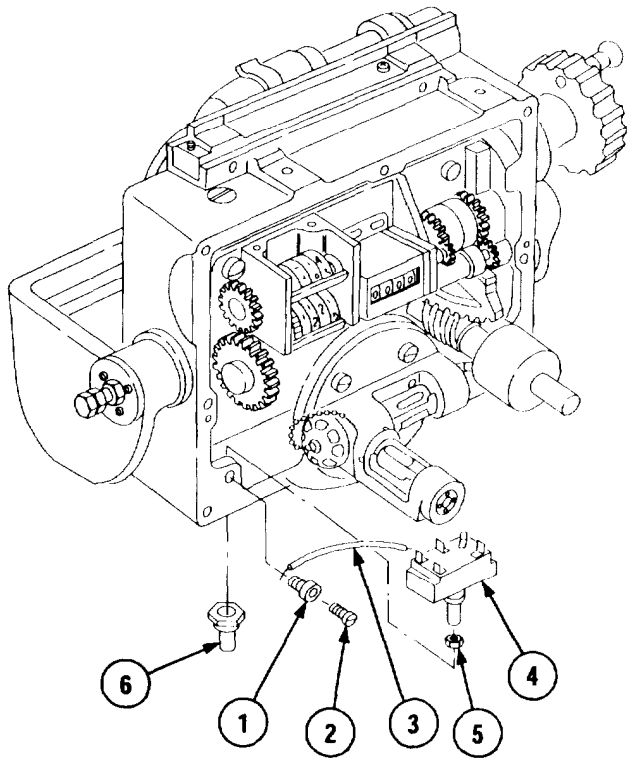
c. Assembly

1 Install screw thread insert (1) into housing.

2 Install contact (2) into screw thread insert (1).

3 Solder wire (3) to contact (2) using solder (item 18, appx B) and flux (item 5, appx B).

4 Position toggle switch (4) in housing and secure with hexagon plain nut (5) and boot (6).

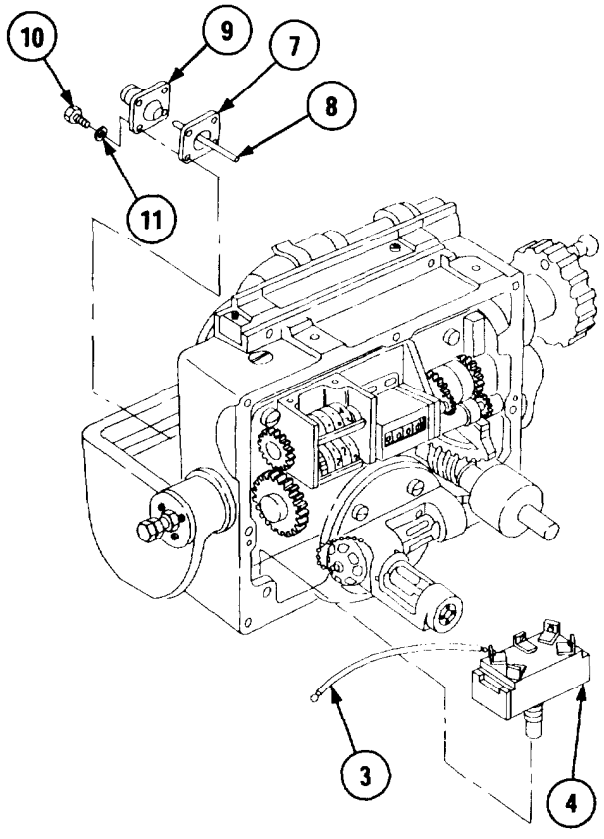


5 Install new gasket (7) over wire (8) and solder wire to contact of connector (9) using solder (item 18, appx B) and flux (item 5, appx B).

6 Secure connector (9) to housing using four screws (10) and four new lockwashers (11).

7 Solder four wires (3) to toggle switch (4) using solder (item 18, appx B) and flux (item 5, appx B).

8 Seal hole around wire (8) using sealing compound (item 13, appx B).



9 Install two straight pins (12), if removed.

10 Apply adhesive (item 1.1, appx B) to front machined surface of housing and install new gasket (13).

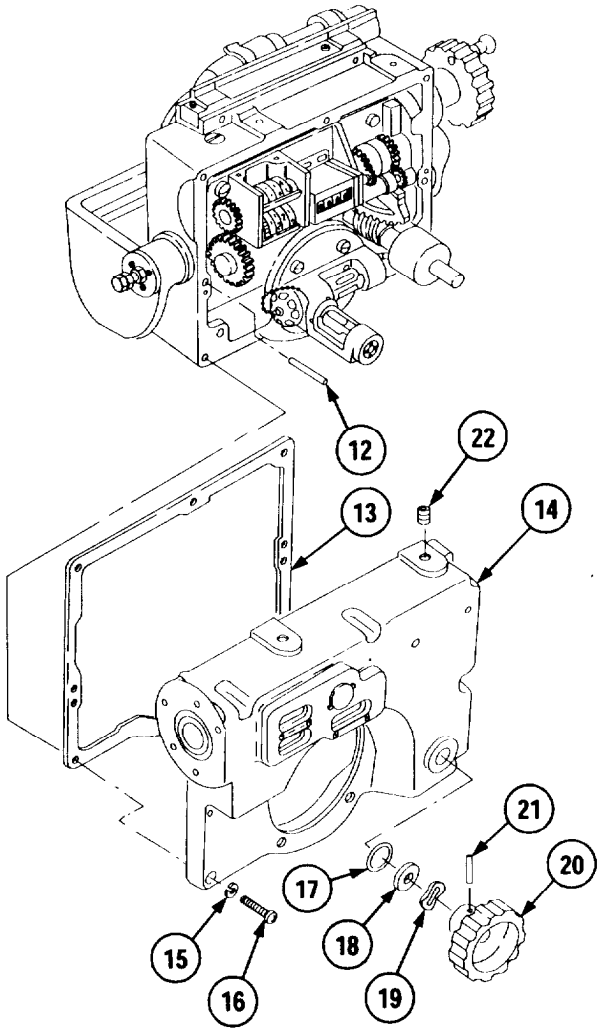
11 Install cover assembly (14) on two straight pins (12) and secure with nine new lockwashers (15) and nine screws (16).

12 Apply grease (item 7, appx B) to new preformed packing (17) and install.

13 Install recessed washer (18), spring tension washer (19), and knob (20).

14 Install tapered pin (21) to secure knob (20).

15 Install two setscrews (22), if removed.



5.1-14. M15 QUADRANT MAINTENANCE INSTRUCTIONS - continued

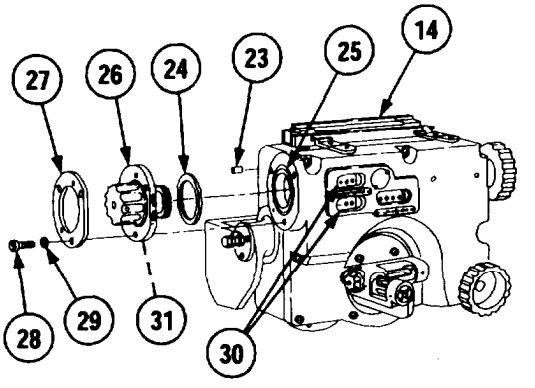
c. Assembly - continued

NOTE

Both correction counters and elevation counter must be zeroed prior to installing knob assembly.

16 If removed, install two straight pins (23).

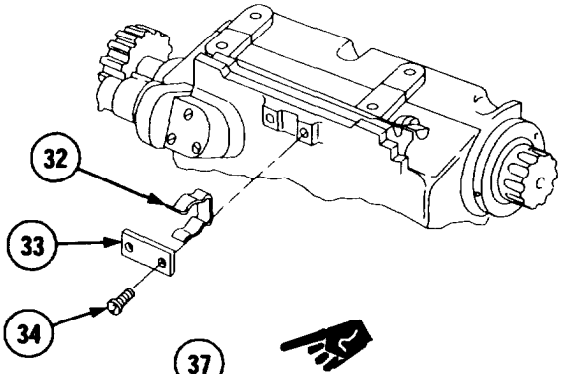
17 Apply grease (item 6, appx B) to new preformed packing (24) and install into groove (25) of cover assembly (14).



18 Position knob assembly (26) at the midway point between stops (approximately 5-1/2 turns from one stop).

19 Install base (27) on knob assembly (26).

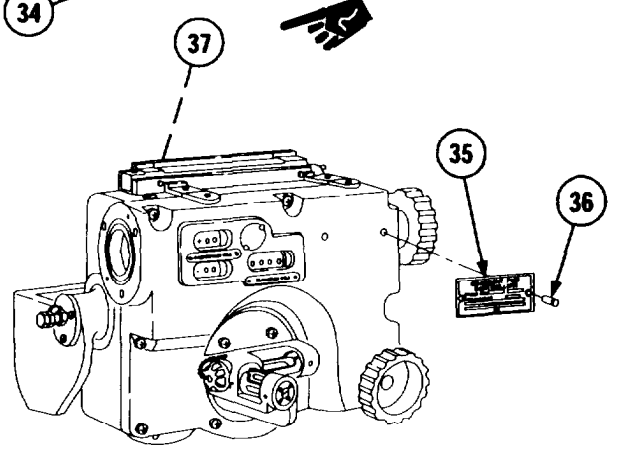
20 Install knob assembly (26) with base (27) on cover assembly (14) and secure with three screws (28) and three new lockwashers (29).



21 If numbers of correction counter (30) do not aline within 1/16 inch (1.588 mm), adjust two setscrews (31) to aline numbers.

22 Check that upper correction counter (30) registers at least +50 mils when knob assembly is turned clockwise to stop. Check that lower correction counter (30) registers at least -50 mils when knob assembly is turned counterclockwise to stop.

23 If removed, install spring tension clip (32) and plate spacer (33) on housing and secure with two screws (34).



24 If removed, install identification plate (35) and two screws (36) on housing.

25 If removed, install instrument light (37).

5.1-15. KNOB ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Fire Control Maintenance and Repair Shop Specialized Equipment Wrench Set, Spanner, DS, GS Maintenance: Tubular, Double Ended, Concave, Inserted Blade Set, 76 Wrenches 4931-00-580-0012

Shop Equipment, Instrument and Fire Control: Field Maintenance, Basic (SC4931-95-CL-A07) 4931-00-754-0740

Tool Kit, Instrument and Fire Control System, Repair, Field Maintenance (SC5180-95-CL-B29) 5180-01-168-0487

Materials/Parts

Grease	Item 7, appx B
Grease	Item 6, appx B
Lubricating oil	Item 9, appx B
Preformed mechanical felt	8247744
Preformed packing	MS9241-016

References

TM 9-254
TM 9-2350-311-20-2

Equipment Condition

M15 quadrant removed from howitzer (TM 9-2350-311-20-2)
Knob assembly removed from M15 quadrant (ref. para 5.1-14)

5.1-15 KNOB ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

a. Disassembly

1 Support knob (1) with V-block and drive out headless grooved pin (2).

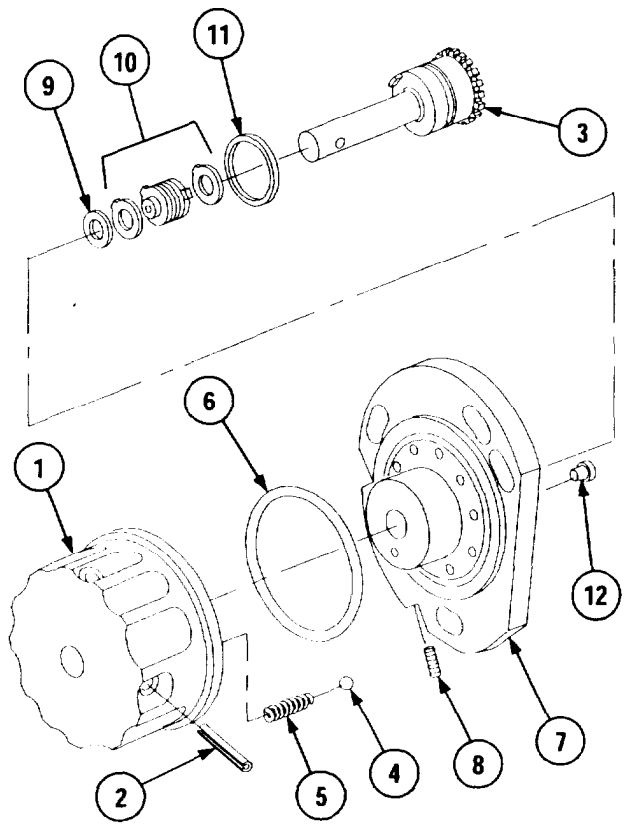
2 Remove knob (1) from gear shaft (3). Remove ball (4) and spring (5) from knob (1).

3 Remove preformed mechanical felt (6) from detent plate (7). Discard preformed mechanical felt.

4 Remove two setscrews (8) from detent plate (7).

5 Withdraw gear shaft (3) and remove flat washer (9), 12 key washers (10), and preformed packing (11). Discard preformed packing.

6 Remove headed straight pin (12) only if damaged.



b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly

1 Apply grease (item 6, appx B) to large diameter of gear shaft (1).

2 Apply grease (item 7, appx B) to new preformed packing (2) and install into groove on gear shaft (1).

3 Apply grease (item 6, appx B) to shaft of gear shaft (1) and to 12 key washers (3).

4 With keys facing away from gear, install 12 key washers (3) and flat washer (4) on gear shaft (1).

5 If removed, install headed straight pin (5) into detent plate (6).

6 Apply grease (item 6, appx B) to surface of detent plate (6) where ball (7) rides.

7 Install gear shaft (1) and related parts into detent plate (6).

8 Install new preformed mechanical felt (8) into groove of detent plate (6).

9 Apply lubricating oil (item 9, appx B) to preformed mechanical felt (8).

10 Apply grease (item 6, appx B) to spring (9) and install in knob (10).

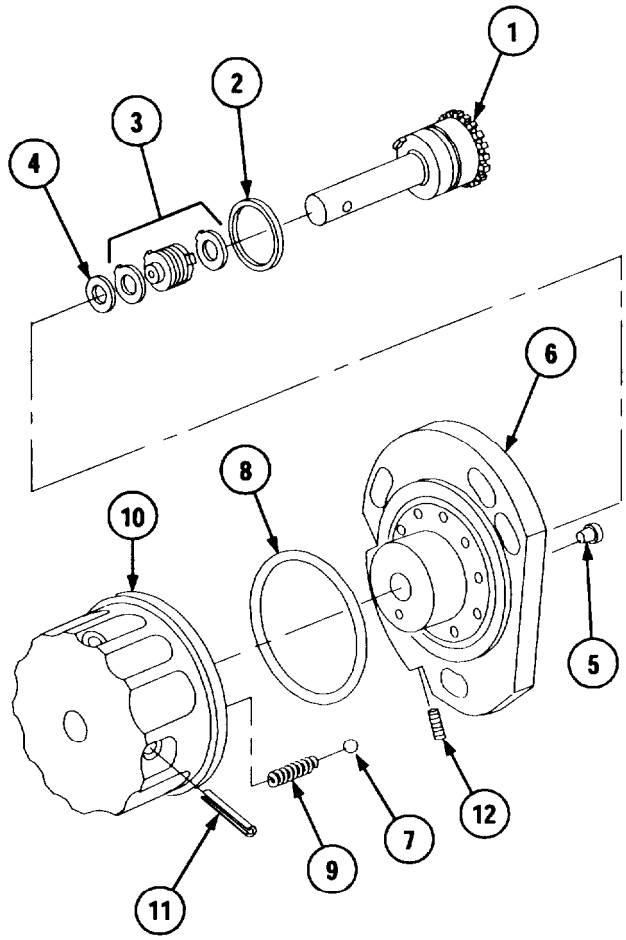
11 Apply grease (item 6, appx B) to detents of detent plate (6) and install ball (7) in one of the detents.

12 Aline spring (9) with ball (7) placed in detent of detent plate (6).

13 Aline hole in gear shaft (2) with hole in knob (10) and install headless grooved pin (11).

14 Rotate knob (10) clockwise, then counterclockwise from stop to stop to ensure that stops are engaging.

15 Install two setscrews into detent plate (6). Do not tighten.



5.1-16. COVER ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Fire Control Maintenance and Repair Shop Specialized Equipment Wrench Set, Spanner, DS, GS Maintenance: Tubular, Double Ended, Concave, Inserted Blade Set, 76 Wrenches 4931-00-580-0012

Shop Equipment, Instrument and Fire Control: Field Maintenance, Basic (SC4931-95-CL-A07) 4931-00-754-0740

Tool Kit, Instrument and Fire Control System, Repair, Field Maintenance (SC5180-95-CL-B29) 5180-01-168-0487

Materials/Parts

Adhesive	Item 1.1, appx B
Adhesive	Item 2, appx B
Flux	Item 5, appx B
Grease	item 7, appx B
Lockwasher (2)	MS35333-70
Sealing compound	Item 13, appx B
Solder	Item 18, appx B

References

TM 9-254
TM 9-2350-311-20-2

Equipment Conditions

M15 quadrant removed from howitzer (TM 9-2350-311-20-2)
Knob assembly removed (ref. para 5.1-14)
Cover assembly removed (ref. para 5.1-14)

a. Disassembly

1 Remove two screws (1) and cap (2) from cover (3).

2 Remove four screws (4) and identification plates (5 and 6) from cover (3).

3 Pull wire (7) with lamp base through to front of overlay assembly (8).

4 Using tubular spanner wrench 11/16 inch and 45/64 inch, remove retaining ring (9).

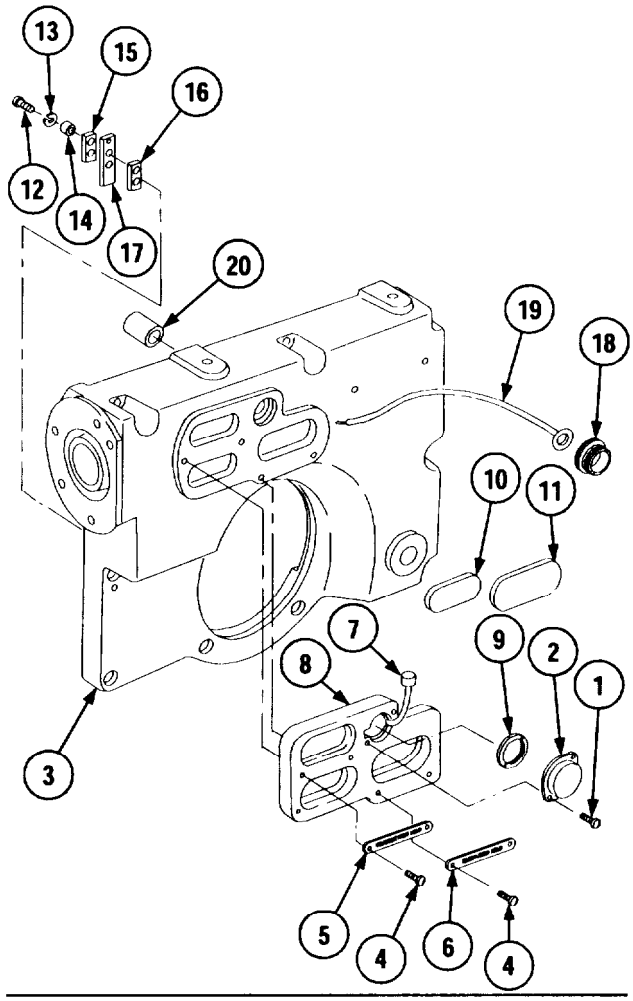
5 Remove overlay assembly (8) from cover (3).

6 If necessary for replacement, remove two dial windows (10) and observation window (11) by tapping side facing interior of cover (3). Remove all fragments of glass. Scrape off all adhesive material. Avoid enlarging opening.

7 Remove two screws (12), two lockwashers (13), two insulator bushings (14), insulator plates (15 and 16), and contact (17). Discard lockwashers.

8 Using 1/2 and 33/64 inch tubular spanner wrench, remove externally threaded ring (18).

9 If necessary for replacement, remove electrical plug connector (19) and lens (20) by unsoldering wire from contact (17).



5.1-16. COVER ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly

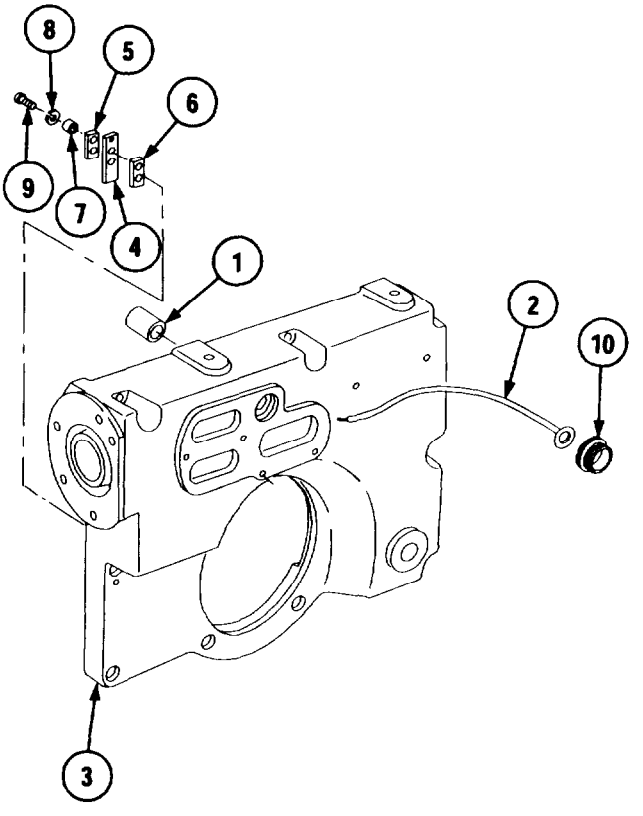
1 If removed, install lens (1) using adhesive (item 1.1, appx B).

2 If removed, insert electrical plug connector (2) through front of cover (3) with raised brass portion of contact toward front of cover. Using solder (item 18, appx B) and flux (item 5, appx B), solder contact (4) to end of electrical plug connector (2).

3 Assemble insulator plates (5 and 6) on each side of contact (4) and install with two insulator bushings (7), two new lockwashers (8), and two screws (9).

4 Seal electrical plug connector (2) to cover (3) in three places by applying sealing compound (item 13, appx B).

5 Using 1/2 and 33/64 inch tubular spanner wrench, secure contact of electrical plug connector (2) with externally threaded ring (10) and stake with adhesive (item 2, appx B).



6 Apply sealing compound (item 13, appx B) to the flange on cover (3) where windows (11 and 12) were removed. Position each window and press into place. Remove excess sealing compound.

7 Pull wire (13) with lamp base through to the front of overlay assembly (14).

8 Position overlay assembly (14) on cover (3).

9 Apply adhesive (item 2, appx B) to four screws (15). Position identification plate (16) and identification plate (17) and loosely secure with four screws (15).

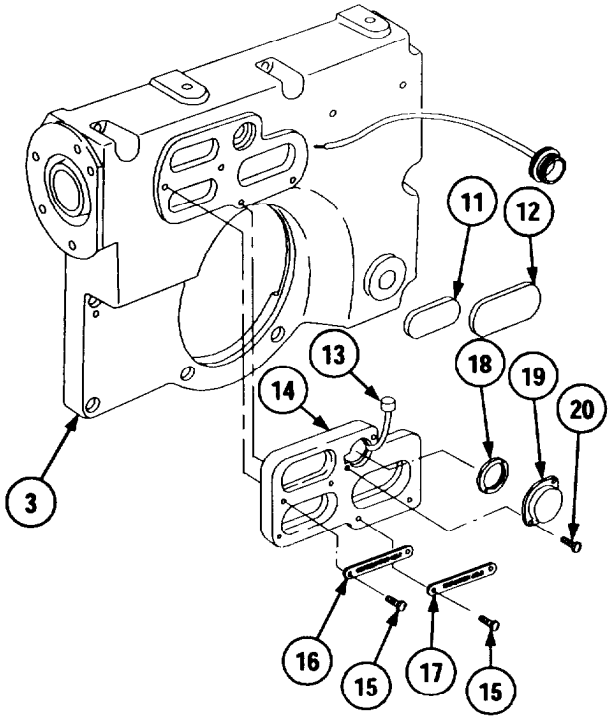
10 Using tubular spanner wrench, 11/16 inch and 45/64 inch, install retaining ring (18) and stake using adhesive (item 2, appx B).

11 Insert lamp base portion of overlay assembly (14) into contact of electrical plug connector (2).

12 Apply adhesive (item 2, appx B) to inside edge of cap (19).

13 Install cap (19) and secure with two screws (20). Remove any excess adhesive from outer edge of cap (19).

14 Tighten four screws (15).



5.1-17. LEVEL ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly d. Adjustment

INITIAL SET-UP

Tools

Eccentric tool, fabricated (fig. C-2, appx C)

Fire Control Maintenance and Repair Shop Specialized Equipment Wrench Set, Spanner, DS, GS Maintenance: Tubular, Double Ended, Concave, Inserted Blade Set, 76 Wrenches 4931-00-580-0012

Shop Equipment, Instrument and Fire Control: Field Maintenance, Basic (SC4931-95-CL-A07) 4931-00-754-0740

Tool Kit, Instrument and Fire Control System, Repair, Field Maintenance (SC5180-95-CL-B29) 5180-01-168-0487

Materials/Parts

Adhesive Item 1.1, appx B

References

TM 9-254
TM 9-2350-311-10
TM 9-2350-311-20-2

Equipment Conditions

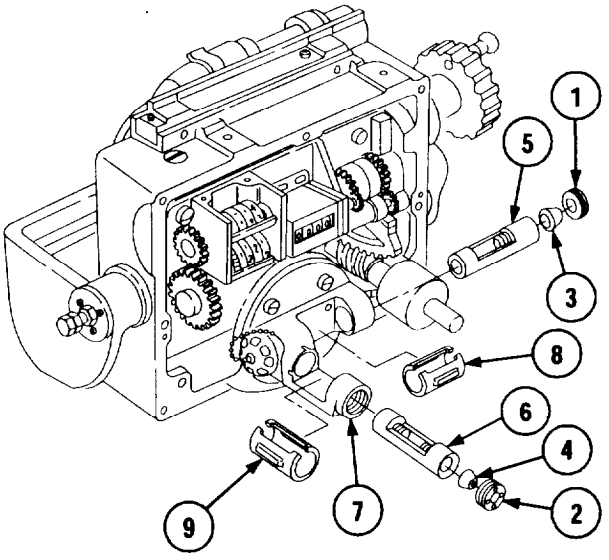
M15 quadrant removed from howitzer (TM 9-2350-311-20-2)
Cover assembly removed (ref. para 5.1-14)
Knob assembly removed (ref. para 5.1-14)

a. Disassembly

1 Using fabricated eccentric tool (fig. C-2, appx C) remove rings (1 and 2) and eccentric bushings (3 and 4).

2 Slide fire control levels (5 and 6) from bracket (7) and from level vial covers (8 and 9).

3 Remove level vial covers (8 and 9) from between bosses of bracket (7).



b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

5.1-17 LEVEL ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

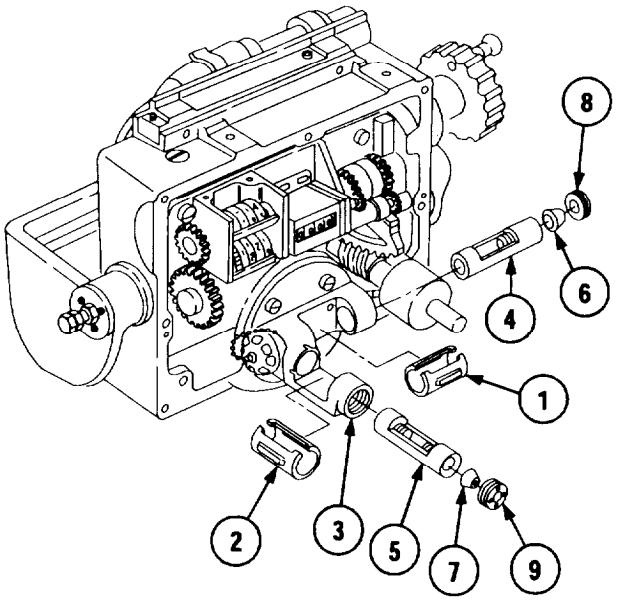
c. Assembly

1 Using suitable pliers, bend detent tabs on level vial covers (1 and 2) closer together or farther apart, as required to obtain desired fit. Position level vial covers (1 and 2) between bosses of bracket (3).

2 Install fire control levels (4 and 5) by sliding into bracket (3) and into level vial covers (1 and 2).

3 Install eccentric bushings (6 and 7).

4 Install rings (8 and 9) into bracket (3) and tighten rings snug against eccentric bushings (6 and 7) using fabricated eccentric tool (fig. C-2, appx C).



d. Adjustment

NOTE

Install cross-level knob on M15 quadrant. Install M15 quadrant on howitzer by procedures described in TM 9-2350-311-20-2.

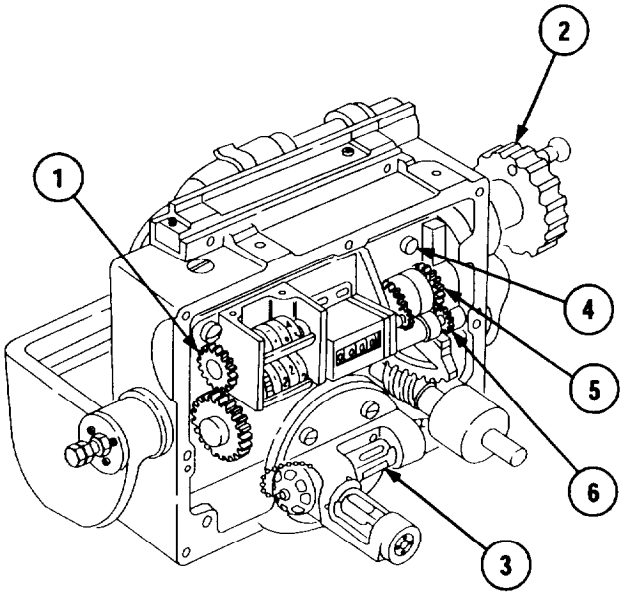
1 Level trunnions and gun tube as described in TM 9 2350-311-10.

2 Turn spur gear assembly (1) until correction counters register 00 mils. Turn elevation handwheel (2) until elevation counter registers 0000 mils.

3 Adjust elevation handwheel (2) to center bubble of fire control level (3).

4 Loosen three screws (4) to disengage differential spur gear (5) from spur gear shaft (6).

5 Rotate differential spur gear (5) to zero counter, then tighten three screws (4).



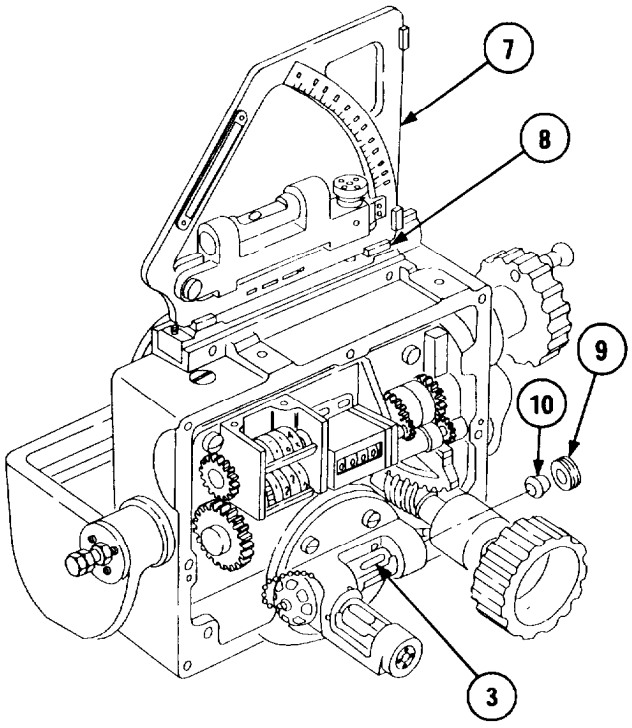
6 Place zeroed gunner's quadrant (7), with end-for-end correction applied, on quadrant seats (8) of M15 quadrant.

7 Center bubble on gunner's quadrant.

8 Recheck to be sure that bubble of fire control level (3) is in agreement with bubble in gunner's quadrant (7).

9 If fire control level (3) does not agree with gunners quadrant (7), loosen ring (9) and readjust eccentric bushing (10) until fire control level (3) and gunner's quadrant (7) agree.

10 Tighten ring (9) and seal with adhesive (item 1.1, appx B).



11 Using suitable clamp, secure 6-inch parallel bar on surface A perpendicular to bar (gunner's quadrant seat).

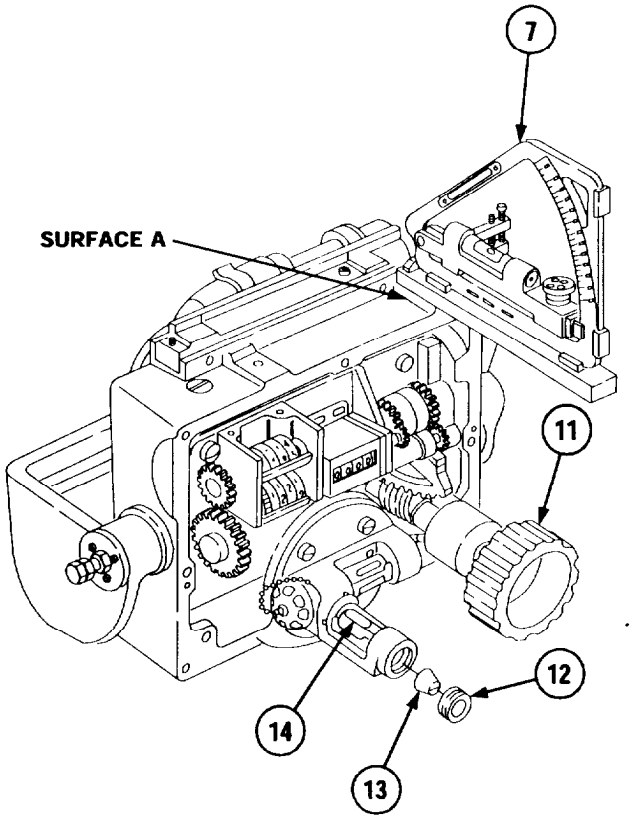
12 Place zeroed gunner's quadrant (7), with end-for-end correction applied, on parallel bar.

13 Turn cross-level knob (11) until bubble of gunner's quadrant (7) is centered.

14 Using fabricated eccentric tool (fig. C-2, appx C), loosen ring (12) and adjust eccentric bushing (13) until bubble in fire control level (14) centers.

15 Tighten ring (12) and seal with adhesive (item 1.1, appx B).

16 Remove 6-inch parallel bar and cross-level knob (11).



Section V. General Support Maintenance Procedures

5.1-18. GENERAL

LIST OF TASKS

Task No.	Task	Task Ref. (Page)	Troubleshooting Ref. No. (Page)
1	Maintain M15 Quadrant		---
	a. Disassemble	5.1-36	
	b. Repair	5.1-39	
	c. Assemble	5.1-40	
2	Maintain Counter Assembly		5.1-14
	a. Disassemble	5.1-49	
	b. Repair	5.1-50	
	c. Assemble	5.1-50	
3	Maintain Base		---
	a. Disassemble	5.1-55	
	b. Repair	5.1-55	
	c. Assemble	5.1-56	
4	Maintain Level Assembly		5.1-14
	a. Disassemble	5.1-58	
	b. Repair	5.1-58	
	c. Assemble	5.1-59	

5.1-19. M15 QUADRANT MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Fire Control Maintenance and Repair Shop Specialized Equipment Wrench Set, Spanner, DS, GS Maintenance: Tubular, Double Ended, Concave, Inserted Blade Set, 76 Wrenches 4931-00-580-0012

Shop Equipment, Instrument and Fire Control: Field Maintenance, Basic (SC4931-95-CL-A07) 4931-00-754-0740

Tool Kit, Instrument and Fire Control System, Repair, Field Maintenance (SC5180-95-CL-B29) 5180-01-168-0487

Materials/Parts

Flux	Item 5, appx B
Gasket	8262051
Gasket	8587541
Grease	Item 7, appx B
Grease	Item 6, appx B
Lockwasher (3)	MS35333-72
Lockwasher (3)	MS35338-134
Lockwasher (3)	MS35338-135
Lockwasher (3)	MS35338-139
Lockwasher	MS35338-140
Preformed packing	MS9021-016
Preformed packing	MS9021-026
Preformed packing	MS9021-235
Preformed packing	MS9241-013
Preformed packing (2)	MS9241-111
Sealing compound	Item 13, appx B
Solder	Item 18, appx B

References

TM 9-254
TM 9-2350-311-20-2

Equipment Conditions

M15 quadrant removed from howitzer (TM 9-2350-311-20-2)
Cover assembly removed (ref. para 5.1-14)
Cross-level knob removed (ref. para 5.1-14)
Knob assembly removed (ref. para 5.1-14)

5.1-19. M15 QUADRANT MAINTENANCE INSTRUCTIONS - continued

a. Disassembly

1 Remove ring spacer (1) and preformed packing (2). Discard preformed packing.

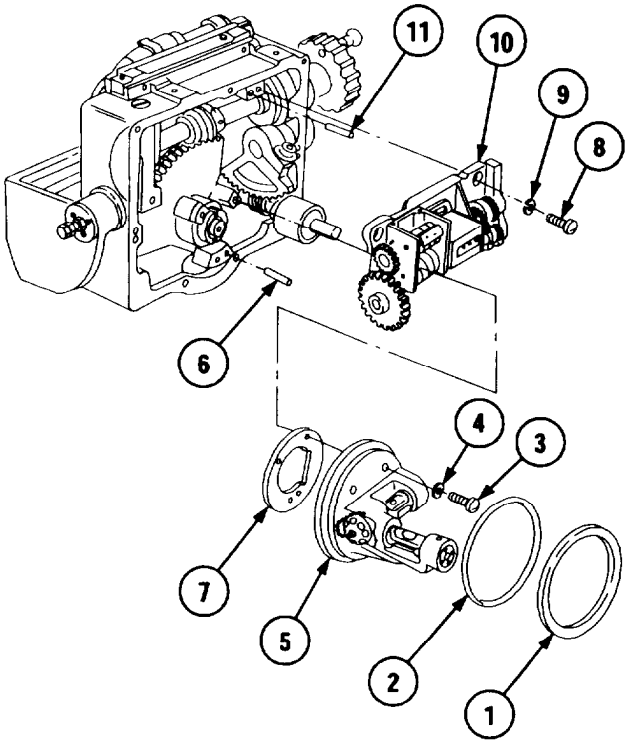
2 Remove three screws (3) and three packings (4). Carefully work level assembly (5) from straight pin (6).

3 Remove gasket (7). Discard gasket.

4 Remove straight pin (6), only if damaged.

5 Remove three screws (8), three lockwashers (9), and counter assembly (10). Discard lockwashers.

6 Remove two straight pins (11), only if damaged.

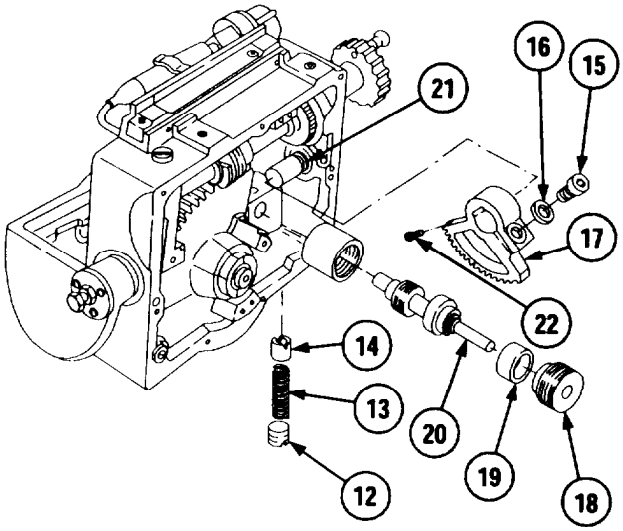


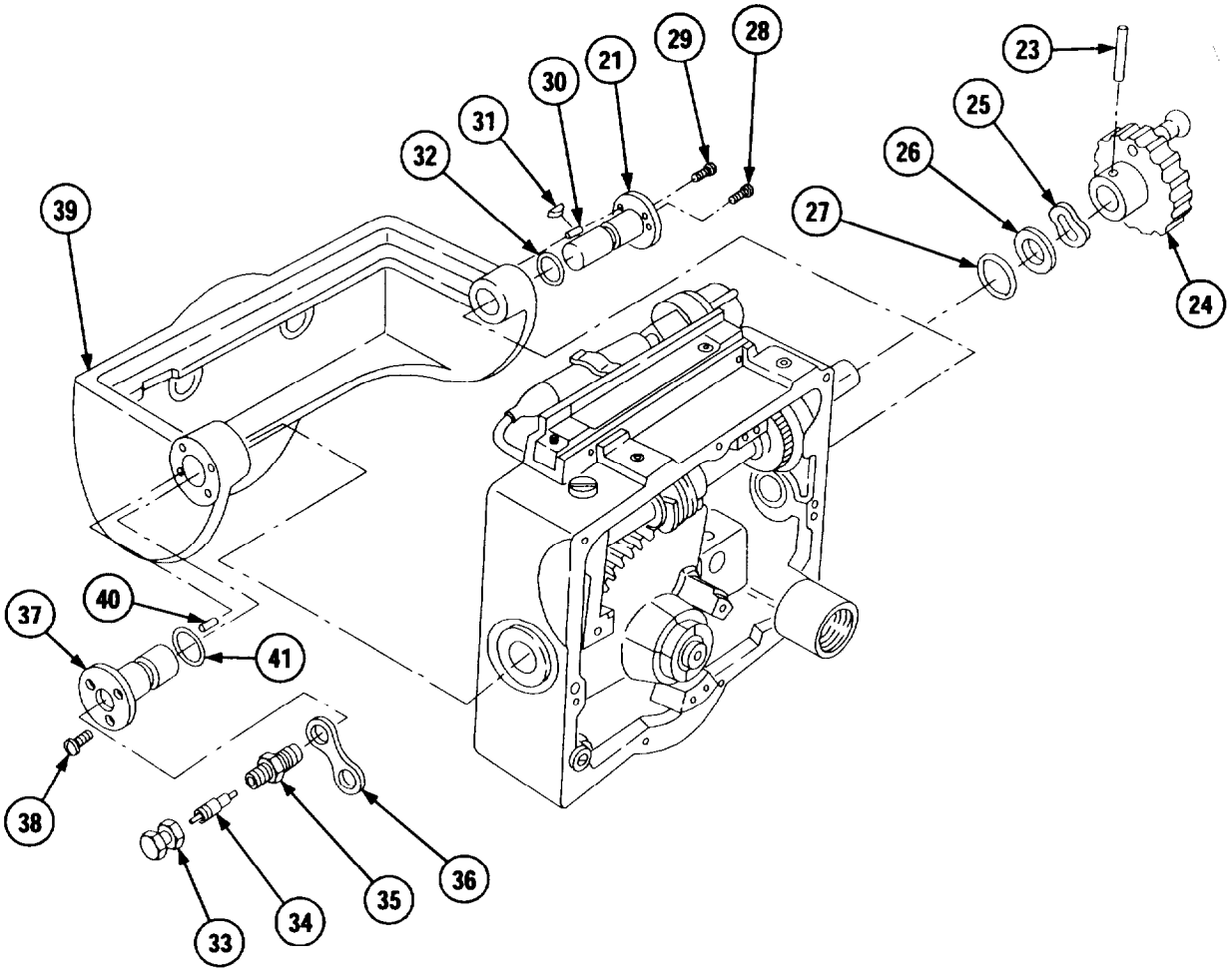
7 Remove plug (12), spring (13), and plunger (14).

8 Remove capscrew (15) and lockwasher (16) from gear sector (17). Discard lockwasher.

9 Using adjustable spanner wrench, remove ring (18), ball socket seat (19), and wormshaft (20) from M15 quadrant.

10 Remove gear sector (17) from quadrant spacer (21) and remove two screws (22) from gear sector (17).





11 Remove tapered pin (23), handwheel assembly (24), spring tension washer (25), recessed washer (26), and preformed packing (27). Discard preformed packing.

12 Remove three screws (28) and screw (29) from quadrant spacer (21).

13 Using brass drift and hammer, tap quadrant spacer (21) away from two straight pins (30). Rotate quadrant spacer (21) and remove woodruff key (31).

14 Remove quadrant spacer (21) and preformed packing (32). Discard preformed packing.

15 Remove cap (33), valve core (34), valve stem (35), and retaining strap (36) from shaft (37).

16 Remove three screws (38) securing shaft (37) to bracket (39).

17 Tap shaft (37) away from two straight pins (40). Remove shaft (37) and preformed packing (41) from bracket (39). Discard preformed packing.

18 Remove bracket (39) from M15 quadrant.

5.1-19. M15 QUADRANT MAINTENANCE INSTRUCTIONS - continued

a. Disassembly - continued

19 Remove plug (42), spring (43), and plunger (44).

20 Loosen two setscrews (45) in nut (46).

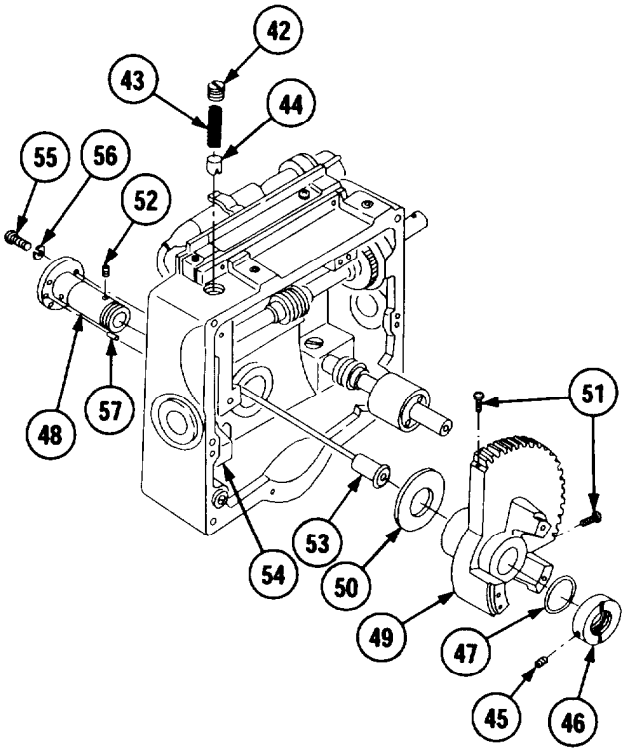
21 Using tubular spanner wrench 1-1/16 inch and 1-5/64 inch, remove nut (46) and flat washer (47) from shouldered shaft (48).

22 Remove gear sector (49) and flat washer (50) from shouldered shaft (48).

23 Remove two machine screws (51) from gear sector (49).

24 Loosen setscrew (52) in shouldered shaft (48); unsolder wire of electrical lead (53) from toggle switch (54) and remove electrical lead (53).

25 Remove three screws (55), three lockwashers (56), and shouldered shaft (48), only if necessary for replacement. If removed, discard lockwashers. Remove pin (57), only if necessary for replacement,



26 Using adjustable spanner wrench, remove ring (58) from M15 quadrant.

27 Remove preformed packing (59) from ring (58). Discard preformed packing.

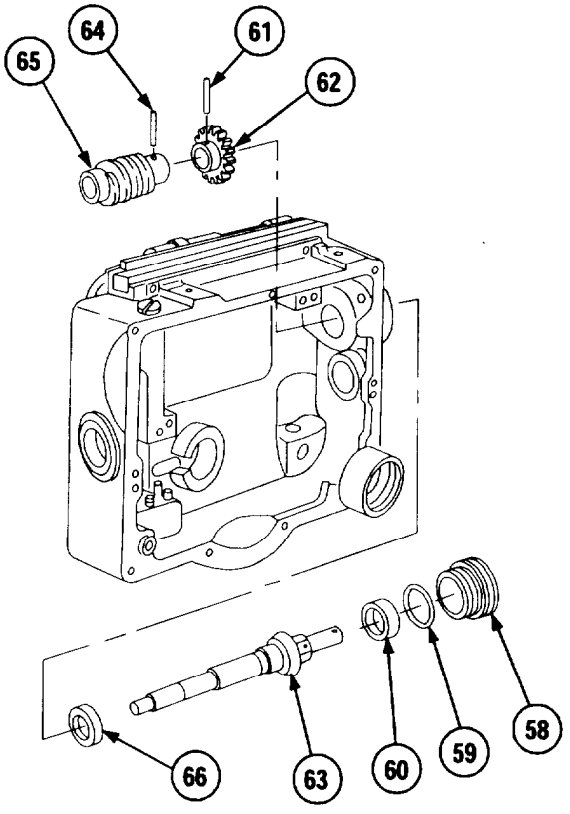
28 Remove ball socket seat (60) from M15 quadrant.

29 Remove tapered pin (61) securing spur gear (62) to shouldered shaft assembly (63).

30 Remove tapered pin (64) from worm gear (65).

31 Remove worm gear (65) and spur gear (62) from shouldered shaft assembly (63).

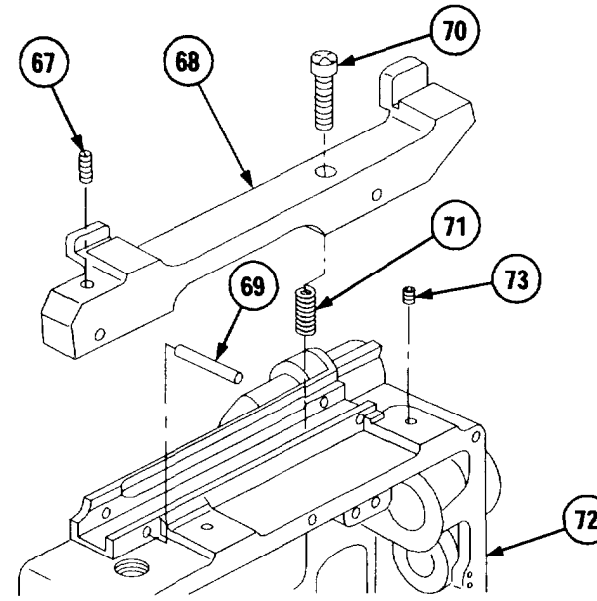
32 Remove shouldered shaft assembly (63) and ball socket seat (66) from M15 quadrant.



33 Remove setscrew (67) from bar (68).

34 Drive out two straight pins (69) and remove screw (70), bar (68), and spring (71) from housing (72).

35 Remove two setscrews (73), only if necessary for replacement.



36 Remove screw (74), shouldered pin (75), plate (76), and receptacle shell (77).

37 Remove three screws (78), three lockwashers (79), insulator (80), and gasket (81). Discard lockwashers and gasket.

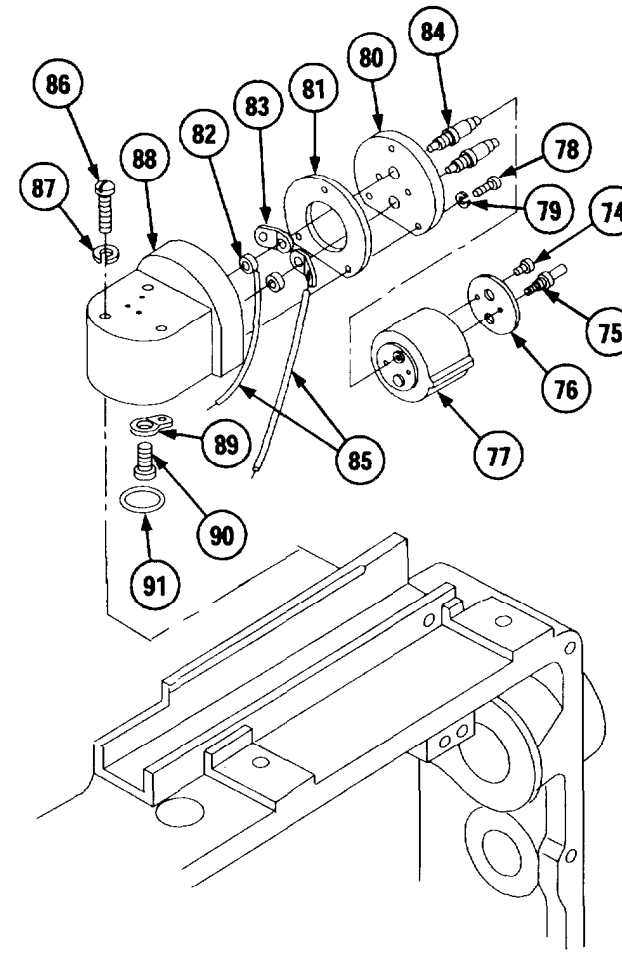
38 Remove two nuts (82) and two terminals (83) from two contacts (84). Remove two contacts (84).

39 Unsolder two electrical wires (85) from two terminals (83).

40 Remove three screws (86), three lockwashers (87), and electrical bracket (88) from M15 quadrant. Discard lockwashers.

41 Unsolder electrical wire (85) from terminal (89) and remove screw (90) and terminal (89) from electrical bracket (88).

42 Remove preformed packing (91) from groove of electrical bracket (88). Discard preformed packing.



b. Repair

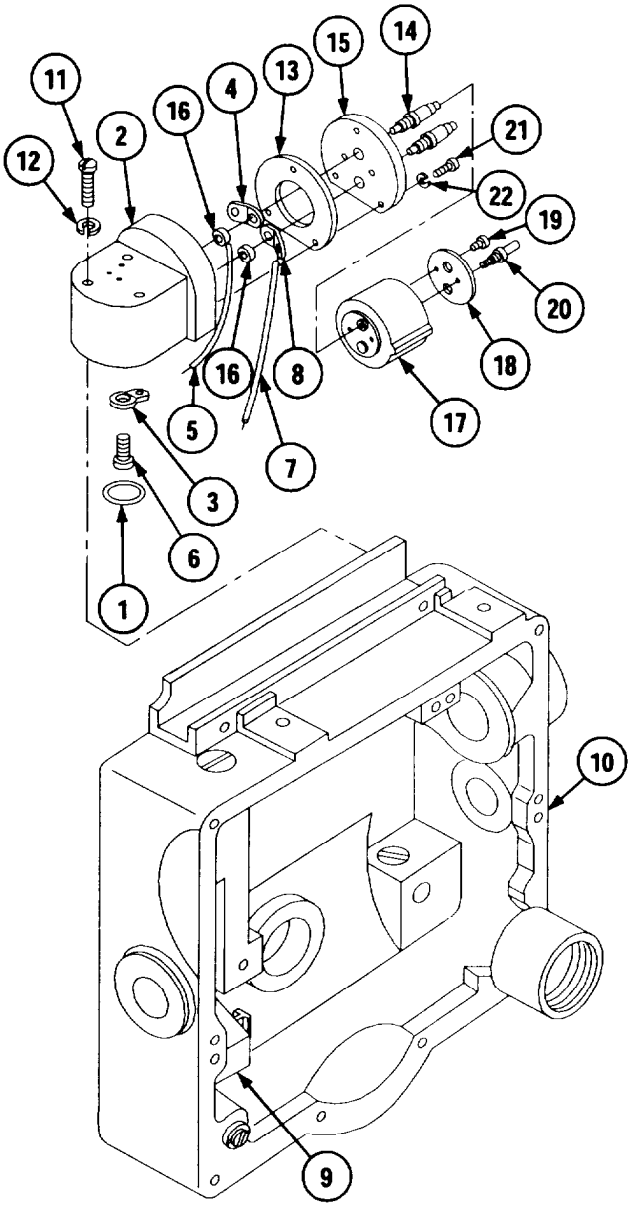
1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

5.1-19 M15 QUADRANT MAINTENANCE INSTRUCTIONS - continued

c. Assembly



1 Apply grease (item 7, appx B) to new preformed packing (1) and install in electrical bracket (2).

2 Solder terminals (3 and 4) to short electrical wire (5), using solder (item 18, appx B) and flux (item 5, appx B).

3 Secure terminal (3) to electrical bracket (2) with screw (6).

4 Solder electrical wire (7) to terminal (8) and to center post of toggle switch (9).

5 Assure that terminals (4 and 8) project from electrical bracket (2). Position electrical bracket (2) with preformed packing (1) on housing (10). Secure with three screws (11) and three new lockwashers (12).

6 Position new gasket (13) on electrical bracket (2) and install two contacts (14) into insulator (15). Attach two terminals (4 and 8) extending through the hole in center of gasket (13) to two contacts (14) with two nuts (16).

7 Position receptacle shell (17) with plate (18) inside shell over two contacts (14). Seat receptacle shell (17) against insulator (15) and install screw (19) and shouldered pin (20).

8 Secure insulator (15) to electrical bracket (2) with three screws (21) and three new lockwashers (22).

9 Apply sealing compound (item 13, appx B) to seal the hole in center of electrical bracket (2).

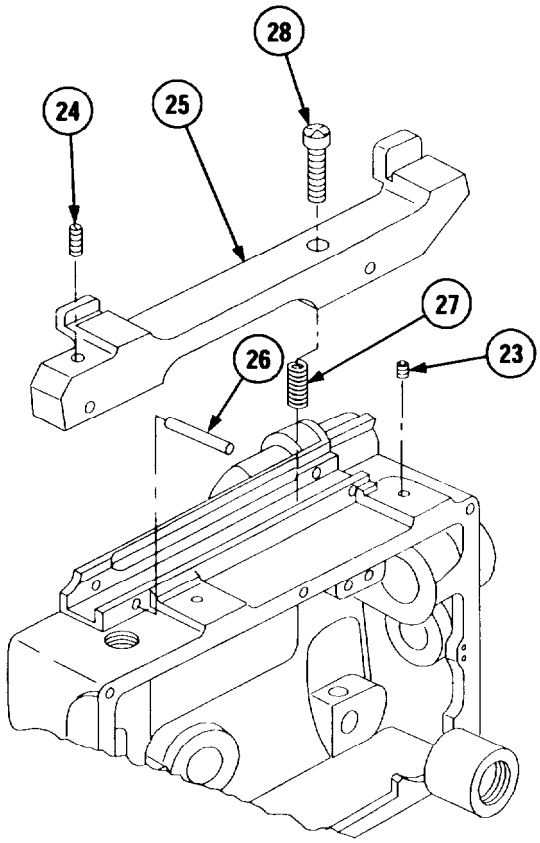
10 If removed, install two setscrews (23). Install setscrew (24).

NOTE

Final assembly and adjustment of bar will be done on cross-leveling test fixture (ref. para 5.1-24).

11 Install bar (25) and one straight pin (26) on end away from where spring (27) and screw (28) are to be installed.

12 Install spring (27) and screw (28).

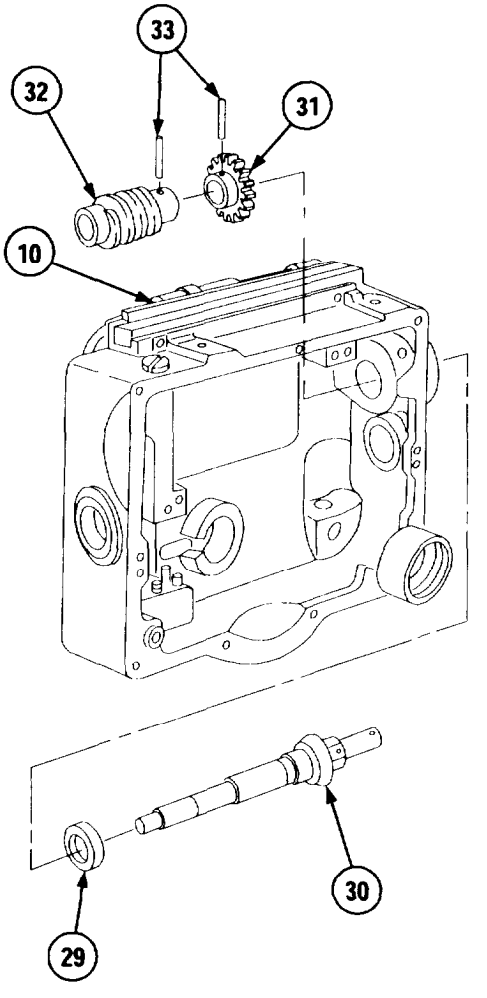


5.1-19. M15 QUADRANT MAINTENANCE INSTRUCTIONS - continued

c. Assembly - continued

NOTE

Steps 13 through 24 apply to replacement of shouldered shaft assembly. Steps 25 through 31 apply to reinstallation of existing shouldered shaft assembly.



13 Slide ball socket seat (29) onto long end of new shouldered shaft assembly (30) with internal beveled portion of ball socket seat (29) positioned against bearing of shouldered shaft assembly (30).

14 Slide spur gear (31) onto shouldered shaft assembly (30) with raised portion of gear away from bearing.

15 Slide worm gear (32) onto shouldered shaft assembly (30) with setscrew hole of worm gear (32) facing spur gear (31).

16 Temporarily install two setscrews to secure worm gear (32) and spur gear (31) tightly against shoulder of shouldered shaft assembly (30) until holes for tapered pins (33) are drilled and reamed.

17 Drill and ream two holes in shouldered shaft assembly (30) for tapered pins (33). Remove setscrews and apply grease (item 6, appx B) to gears.

18 Remove gears (31 and 32) from shouldered shaft assembly (30).

19 Install shouldered shaft assembly (30) and ball socket seat (29) through boss on housing (10) and install gears (32 and 31) on shouldered shaft assembly (30).

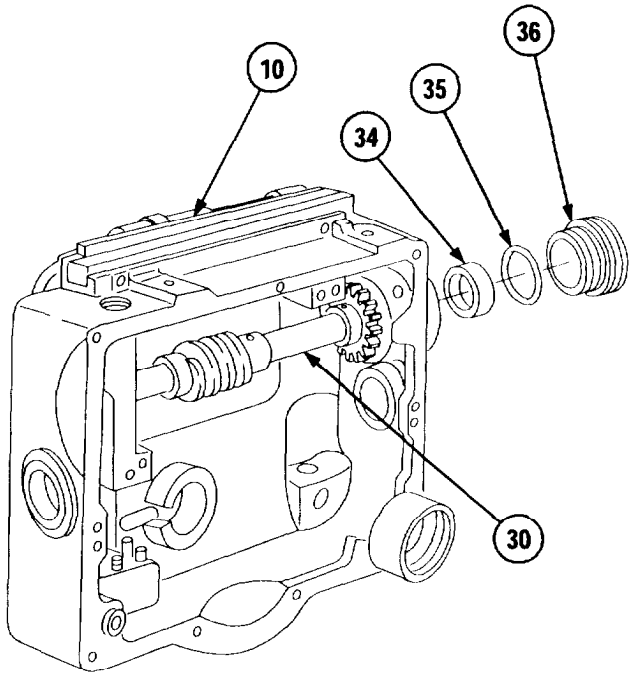
20 Aline holes in worm gear (32) and spur gear (31) with holes in shouldered shaft assembly (30) and install two tapered pins (33).

21 Apply grease (item 6, appx B) and install ball socket seat (34) through boss in housing (10) with tapered portion of ball socket seat positioned against bearing of shouldered shaft assembly (30).

22 Apply grease (item 7, appx B) and install new preformed packing (35) into ring (36).

23 Using adjustable spanner wrench, install ring (36) to secure shouldered shaft assembly (30) and related parts in housing (10).

24 Tighten ring (36) to eliminate any end play in shouldered shaft assembly (30).

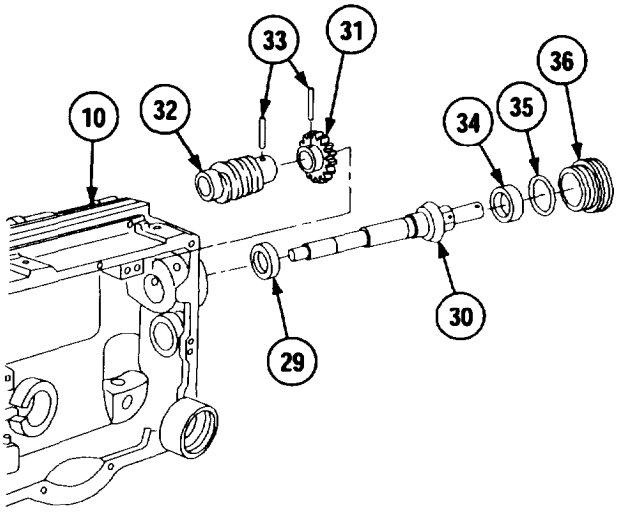


5.1-19. M15 QUADRANT MAINTENANCE INSTRUCTIONS - continued

c. Assembly - continued

NOTE

Steps 25 through 31 apply to reinstallation of existing shouldered shaft assembly.



25 Position ball socket seat (29) with beveled portion against bearing of shouldered shaft assembly (30) and install long end of shouldered shaft assembly (30) through boss in housing (10).

26 Slide spur gear (31) onto shouldered shaft assembly (30) with raised portion of gear facing away from bearing of shouldered shaft assembly (30). Slide worm gear (32) onto shouldered shaft assembly (30) with end containing setscrew hole facing spur gear (31).

27 Aline holes in gears (31 and 32) with holes in shouldered shaft assembly (30) and install two tapered pins (33).

28 Install ball socket seat (34) through boss in housing (10) with tapered portion facing bearing of shouldered shaft assembly (30).

29 Apply grease (item 7, appx B) and install new preformed packing (35) into groove on ring (36).

30 Using adjustable spanner wrench, install ring (36) into boss of housing (10) to secure shouldered shaft assembly (30).

31 Tighten ring (36) to prevent end play in shouldered shaft assembly (30) and related parts.

NOTE

If shouldered shaft was removed from housing, perform steps 32 thru 34. If shouldered shaft was not removed, go to step 35.

32 Insert shouldered shaft (37) into housing (10) from rear of housing. Aline hole in shouldered shaft with cutout in base of housing.

33 Install and tighten three screws (38) and three new lockwashers (39).

34 Install pin (40) in shouldered shaft (37), if removed.

35 Install electrical lead (41) into shaft by threading wire of electrical lead into externally threaded opening of shaft and out small hole that is alined with cutout in housing (10).

36 Secure electrical lead (41) into shaft with setscrew (42). Setscrew must not protrude from surface of shaft.

37 Solder wire of electrical lead (41) to center post of toggle switch (43) using solder (item 18, appx B) and flux (item 5, appx B).

38 Install two machine screws (44) in gear sector (45).

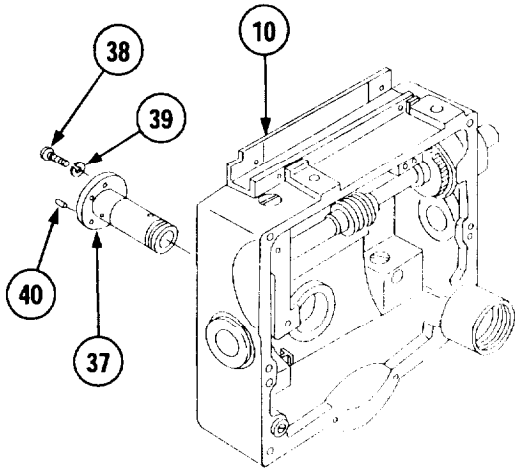
39 Apply grease (item 6, appx B) to shaft and install flat washer (46), gear sector (45), flat washer (47), and nut (48).

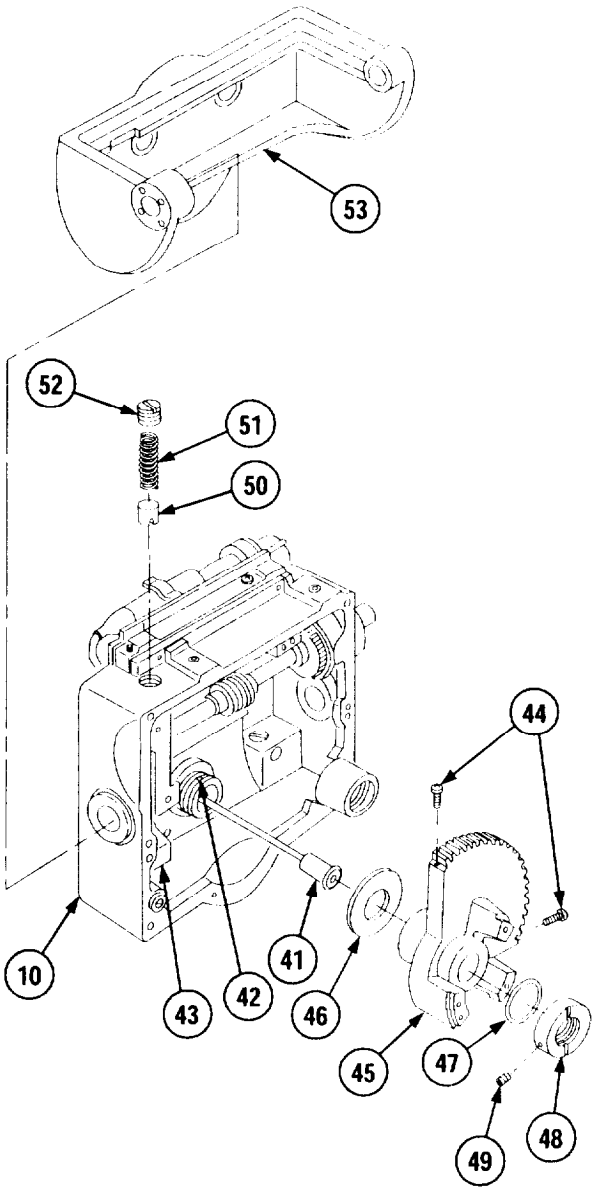
40 Using tubular spanner wrench 1-1/16 and 1-5/64 inch, tighten nut (48) and secure with two setscrews (49).

41 Apply grease (item 6, appx B) to plunger (50) and spring (51).

42 Install plunger (50) and spring (51) into housing (10) and secure with plug (52).

43 Position bracket (53) on housing (10).





5.1-19 M15 QUADRANT MAINTENANCE INSTRUCTIONS - continued

c. Assembly - continued

44 Apply grease (item 6, appx B) to two new preformed packings (54 and 55) and to shaft (56) and quadrant spacer (57).

45 Install shaft (56) and quadrant spacer (57) through bosses of bracket (53) and into bushing of quadrant housing.

46 Install woodruff key (58) into quadrant spacer (57) and aline hole in spacer with straight pin (59).

47 Install two screws (60) into gear sector (61).

48 Apply grease (item 6, appx B) to teeth of gear sector (61).

49 Aline keyway of gear sector (61) with woodruff key on quadrant spacer (57).

50 Secure gear sector (61) to quadrant spacer (57) with new lockwasher (62) and capscrew (63).

51 Apply grease (item 6, appx B) to worm gear and bearing of wormshaft (64).

52 Install wormshaft (64) into housing.

53 Install ball socket seat (65) on wormshaft (64) with beveled portion toward bearing.

54 Using adjustable spanner wrench, install ring (66).

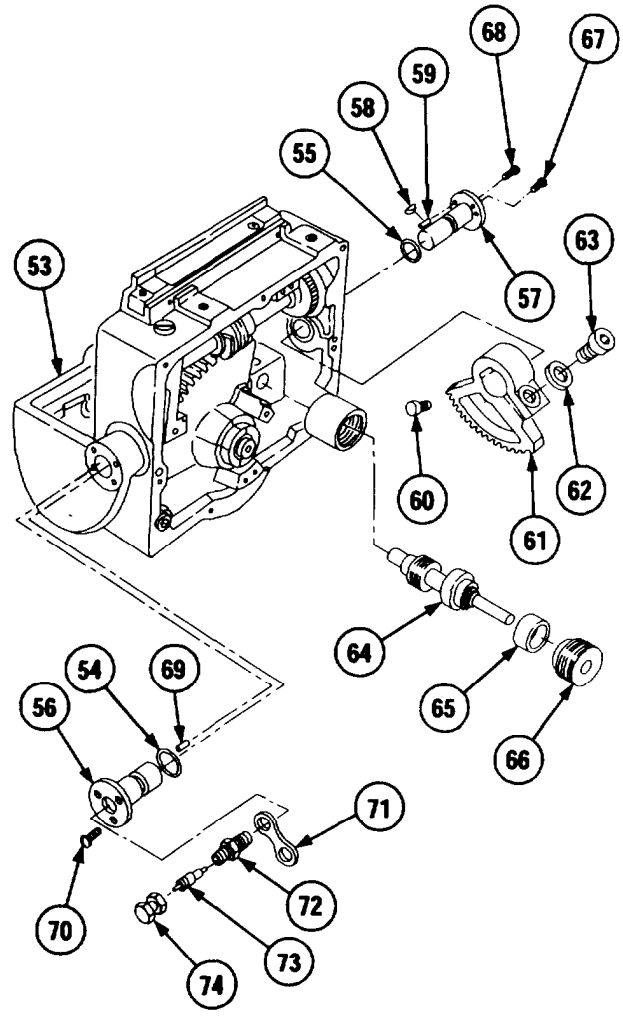
55 Tighten ring (66) to eliminate end play of wormshaft (64) and related parts.

56 Secure quadrant spacer (57) to bracket (53) with three screws (67) and install screw (68).

57 Aline hole in shaft (56) with straight pin (69).

58 Secure shaft (56) to bracket (53) with three screws (70).

59 Install retaining strap (71), valve stem (72), valve core (73), and cap (74).

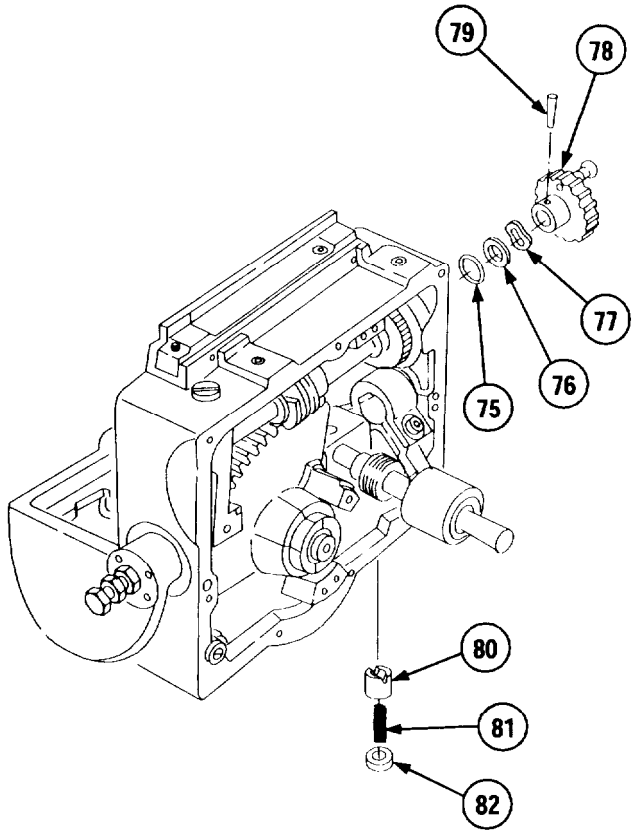


60 Install new preformed packing (75), recessed washer (76), and spring tension washer (77).

61 Install handwheel assembly (78) and secure with tapered pin (79).

62 Apply grease (item 6, appx B) to plunger (80) and spring (81).

63 Install plunger (80) and spring (81) into housing and secure with plug (82).



NOTE

Both elevation and correction counters must be set to 0 prior to installation.

64 Install two straight pins (83), if removed.

65 Aline counter assembly (84) on two straight pins (83).

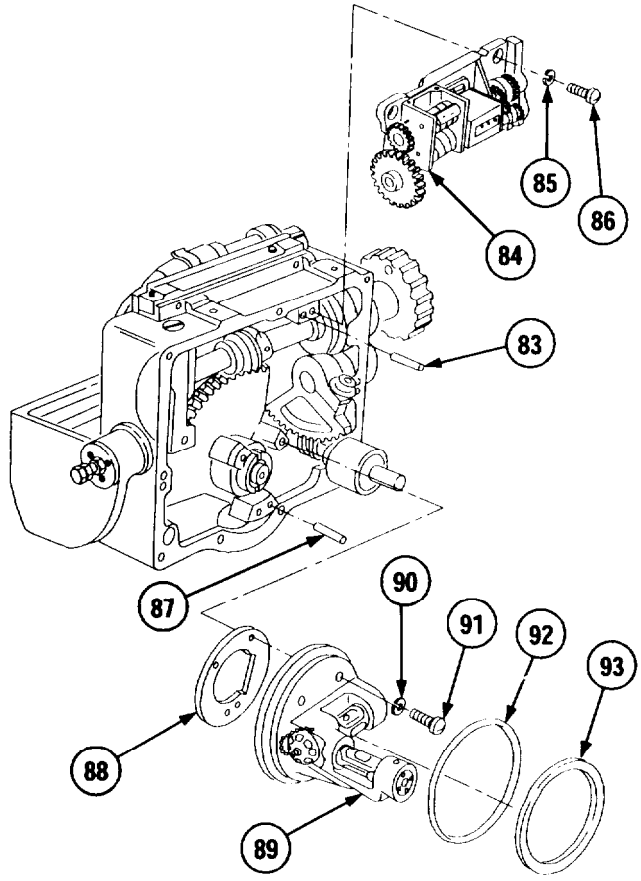
66 Secure counter assembly (84) with three new lockwashers (85) and three screws (86).

67 Install straight pin (87), if removed.

68 Install new gasket (88).

69 Install level assembly (89) and secure with three packings (90) and three screws (91).

70 Install new preformed packing (92) and ring spacer (93).



5.1-20. COUNTER ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SETUP

Tools

Fire Control Maintenance and Repair Shop Specialized Equipment Wrench Set, Spanner, DS, GS Maintenance: Tubular, Double Ended, Concave, Inserted Blade Set, 76 Wrenches 4931-00-580-0012

Shop Equipment, Instrument and Fire Control: Field Maintenance, Basic (SC4931-95-CL-A07) 4931-00-754-0740

Tool Kit, Instrument and Fire Control System, Repair, Field Maintenance (SC5180-95-CL-B29) 5180-01-168-0487

References

TM 9-254
TM 9-2350-311-20-2

Equipment Conditions

M15 quadrant removed from howitzer (TM 9-2350-311-20-2)
Cover assembly removed (ref. para 5.1-14)
Cross-level knob removed (ref. para 5.1-14)
Counter assembly removed (ref. para 5.1-19)
Knob assembly removed (ref. para 5.1-14)

Materials/Parts

Grease	Item 6, appx B
Lockwasher (4)	MS35338-134
Lockwasher (4)	MS35338-136

a. Disassembly

1 Remove four screws (1) and four lockwashers (2). Carefully separate rotating counter (3) from two straight pins (4) in base (5). Discard lockwashers.

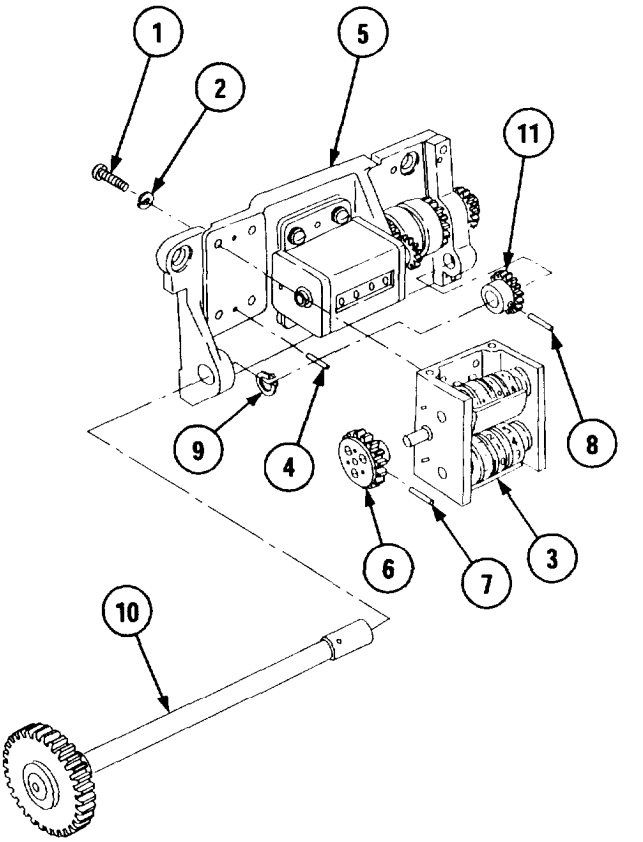
2 Remove two straight pins (4) only if damaged or if a new rotating counter (3) is to be installed.

3 Support hub of spur gear (6) and drive out straight pin (7). Remove spur gear (6) from shaft of rotating counter (3).

4 Drive out tapered pin (8).

5 Slide retaining ring (9) down spur gearshaft (10).

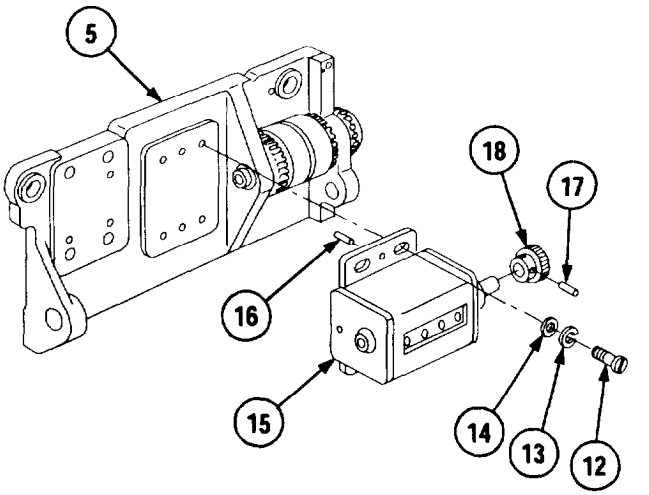
6 Remove spur gear (11) and retaining ring (9), and slide spur gearshaft (10) from base (5).



7 Remove four screws (12), four lockwashers (13), four flat washers (14), and rotating counter (15), with spur gear attached, from two straight pins (16) in base (5). Discard lockwashers.

8 Remove straight pin (17) and slide spur gear (18) from shaft of rotating counter (15).

9 Remove two straight pins (16) only if damaged or if a new rotating counter (15) is to be installed.



5.1-20. COUNTER ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

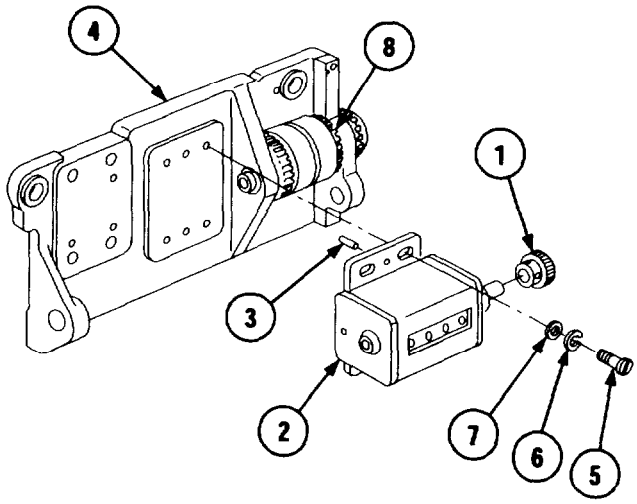
2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly

NOTE

If elevation counter is to be replaced, perform steps 1 thru 11. If existing counter is to be reinstalled, go to step 12.



1 Install spur gear (1) on shaft of rotating counter (2) and temporarily install, but do not tighten a number 4-48 UNF setscrew in spur gear (1).

2 Remove two straight pins (3) from base (4).

3 Position rotating counter (2) on base (4) and install, but do not tighten four screws (5), four new lockwashers (6), and four flat washers (7).

4 Position rotating counter (2) and spur gear (1) until spur gear (1) meshes properly with gear of differential assembly (8).

5 Tighten setscrew to secure spur gear (1) to shaft of rotating counter (2) and tighten four screws (5).

6 Drill and ream rotating counter (2) for two straight pins (3).

7 Remove four screws (5), four lockwashers (6), four flat washers (7), and rotating counter (2) from base (4).

8 Drill spur gear (1) and shaft of rotating counter (2) and install straight pin (9).

9 Position rotating counter (2) on base (4). Install but do not tighten four screws (5), four lockwashers (6), and four washers (7).

10 Aline holes of rotating counter (2) with holes in bass (4). Install two straight pins (3) and tighten four screws (5).

11 Remove setscrew temporarily installed in spur gear (1) and apply grease (item 6, appx B) to spur gear (1).

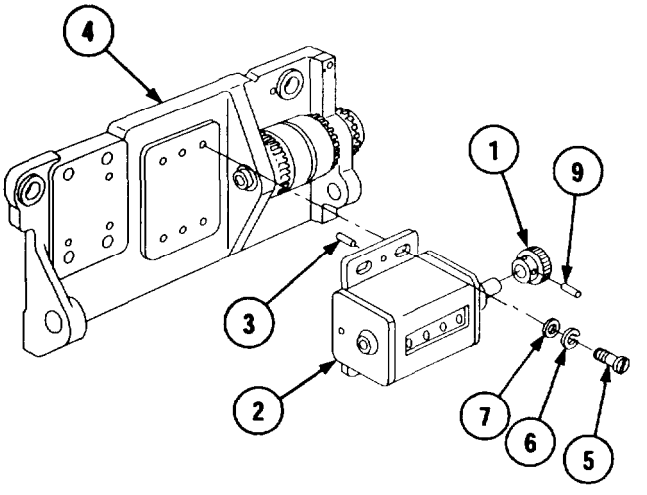
NOTE

If elevation counter is to be reinstalled, perform steps 12 thru 14.

12 Aline holes of spur gear (1) to holes in shaft of rotating counter (2) and install straight pin (9).

13 Apply grease (item 6, appx B) to spur gear (1) and position rotating counter (2) over two straight pins (3) on base (4).

14 Install four screws (5), four new lockwashers (6), and four washers (7).



5.1-20. COUNTER ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

c. Assembly - continued

15 Apply grease (item 6, appx B) in hole of boss on base (A) and hole of bracket(B).

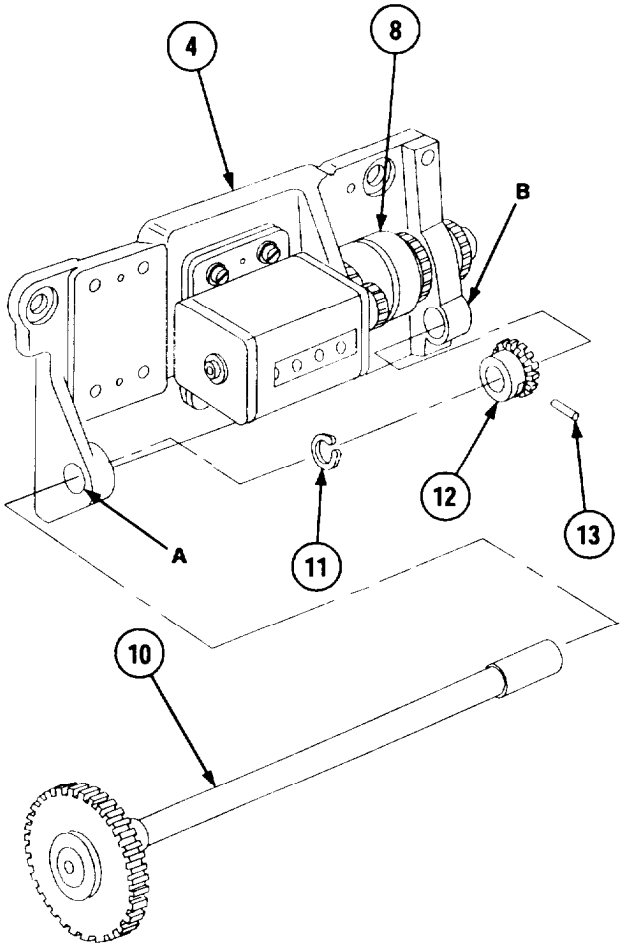
16 Slide spur gearshaft (10) through boss of base (A) and slide retaining ring (11) on shaft of spur gear-shaft (10), being careful to spread retaining ring (11) only as far as necessary.

17 Position spur gear (12) so that teeth of spur gear mesh with gear of differential assembly (8) and slide shaft of spur gearshaft (10) through spur gear (12) and into hole of bracket (B).

18 Secure spur gearshaft (10) in base (4) with retaining ring (11).

19 Aline holes of spur gear (12) with hole in spur gearshaft (10) and secure with tapered pin (13).

20 Apply grease (item 6, appx B) to spur gear (12) and to teeth of spur gearshaft (10).



NOTE

If correction counter is to be replaced, perform steps 21 thru 30. If existing counter is to be reinstalled, go to step 31.

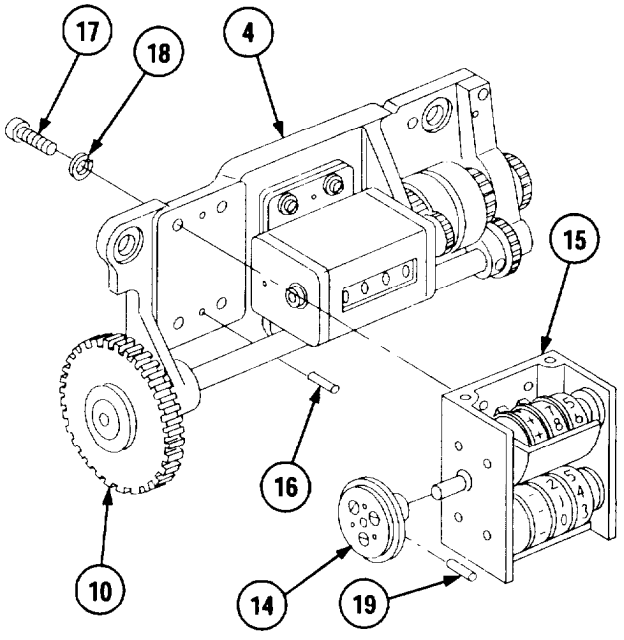
21 Slide spur gear (14) on shaft of rotating counter (15) and temporarily install, but do not tighten a setscrew in spur gear (14).

22 Remove two straight pins (16) from base (4).

23 Position rotating counter (15) on base (4) and install, but do not tighten four screws (17) and four new lockwashers (18).

24 Aline spur gear (14) with teeth of spur gearshaft (10) and temporarily secure spur gear (14) to shaft of rotating counter (15) with setscrew. Tighten four screws (17).

25 Mark holes for two straight pins (16) by partially drilling through existing holes in base (4).



26 Remove four screws (17), four lockwashers (18), and rotating counter (15) from base (4).

CAUTION

When drilling correction counter, extreme care must be exercised to prevent damage to rotating counters.

27 Finish drilling two holes in rotating counter (15) for two straight pins (16) and drill shaft of rotating counter (15) for straight pin (19). Install straight pin (19) to secure spur gear (14) to shaft of rotating counter (15).

28 Position rotating counter (15) on base (4) and install, but do not tighten four screws (17) and four lockwashers (18).

29 Aline holes in rotating counter (15) with holes in base (4). Install two straight pins (16) and tighten four screws (17).

30 Remove setscrew temporarily installed in spur gear (14).

NOTE

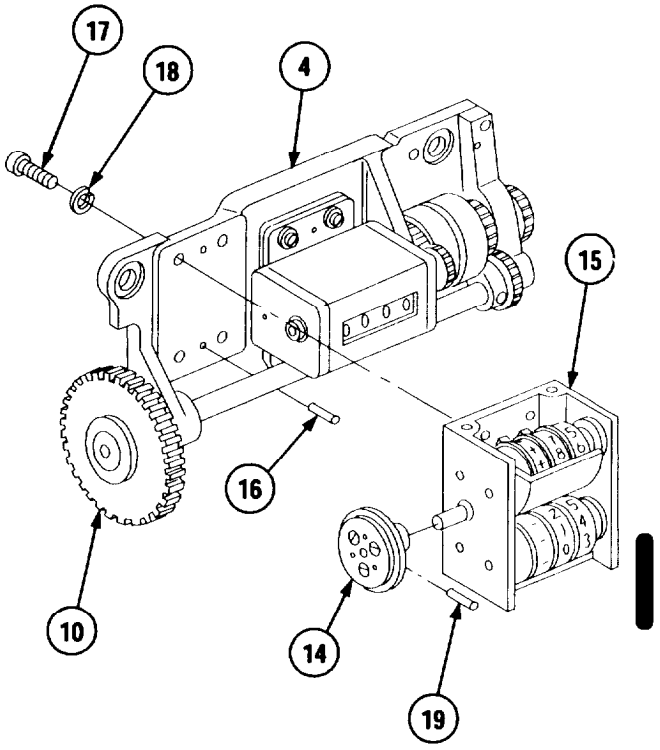
If correction counter is to be reinstalled, perform steps 31 thru 33.

31 Aline holes of spur gear (14) to holes in shaft of rotating counter (15) and install straight pin (19).

32 Install rotating counter (15) over two straight pins (16) and install four screws (17) and four new lockwashers (18).

33 Apply grease (item 6, appx B) to spur gear (14).

34 Rotate spur gearshaft (10) and check that counters operate smoothly without binding.



5.1-21. BASE MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Fire Control Maintenance and Repair Shop Specialized Equipment Wrench Set, Spanner, DS, GS Maintenance: Tubular, Double Ended, Concave, Inserted Blade Set, 76 Wrenches 4931-00-580-0012

Shop Equipment, Instrument and Fire Control: Field Maintenance, Basic (SC4931-95-CL-A07) 4931-00-754-0740

Tool Kit, Instrument and Fire Control System, Repair, Field Maintenance (SC5180-95-CL-B29) 5180-01-168-0487

Materials/Parts

Grease	Item 6, appx B
Lockwasher (2)	MS35333-72

References

TM 9-254
TM 9-2350-311-20-2

Equipment Conditions

M15 quadrant removed from howitzer (TM 9-2350-311-20-2)
Cover assembly removed (ref. para 5.1-14)
Cross level knob removed (ref. para 5.1-14)
Counter assembly removed (ref. para 5.1-19)
Counters removed from counter assembly (ref. para 5.1-20)
Knob assembly removed (ref. para 5.1-14)

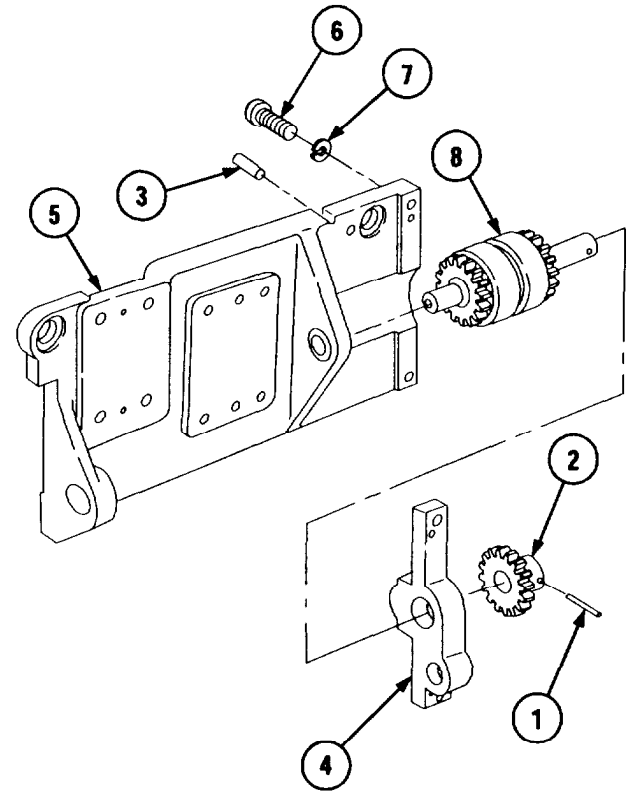
a. Disassembly

1 Drive out tapered pin (1) and remove spur gear (2).

2 Drive out two straight pins (3) from holes of bracket (4), but not from base (5).

3 Remove two screws (6), two lockwashers (7), and bracket (4) from base (5). Discard lockwashers.

4 Remove differential assembly (8) from base (5).



b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

5.1-21. BASE MAINTENANCE INSTRUCTIONS - continued

c. Assembly

NOTE

There are no repair parts for the differential assembly. Illustration is for assembly only.

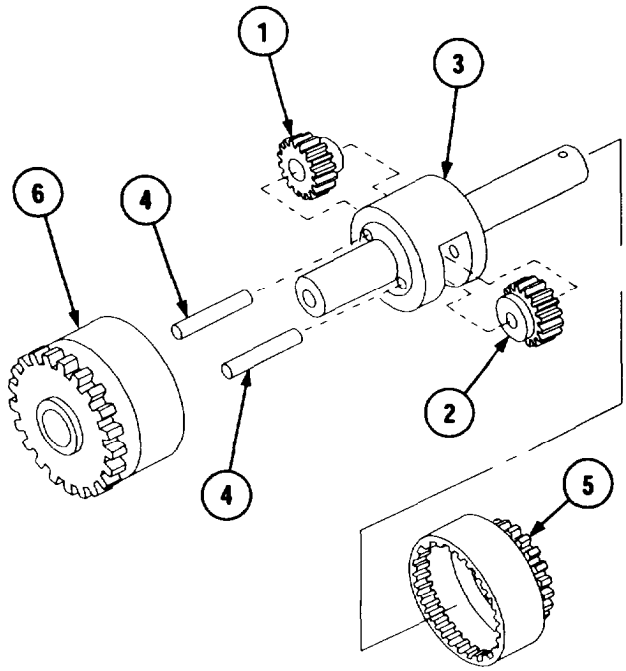
1 Apply grease (item 6, appx B) to teeth of spur gears (1 and 2).

2 Install spur gears (1 and 2) in slot of shouldered shaft (3) with hub extensions in opposite directions.

3 Apply grease (item 6, appx B) to two shafts (4) and install to secure spur gears (1 and 2) in shouldered shaft (3).

4 Apply grease (item 6, appx B) to teeth and inner wall of cluster gears (5 and 6) and install over spur gears (1 and 2).

5 Check differential assembly by rotating either cluster gear while holding shouldered shaft still. The other cluster gear should turn in the opposite direction, and there should be no binding or noticeable backlash. Test for backlash by grasping either cluster gear and the shaft end and attempting to turn the other cluster gear.

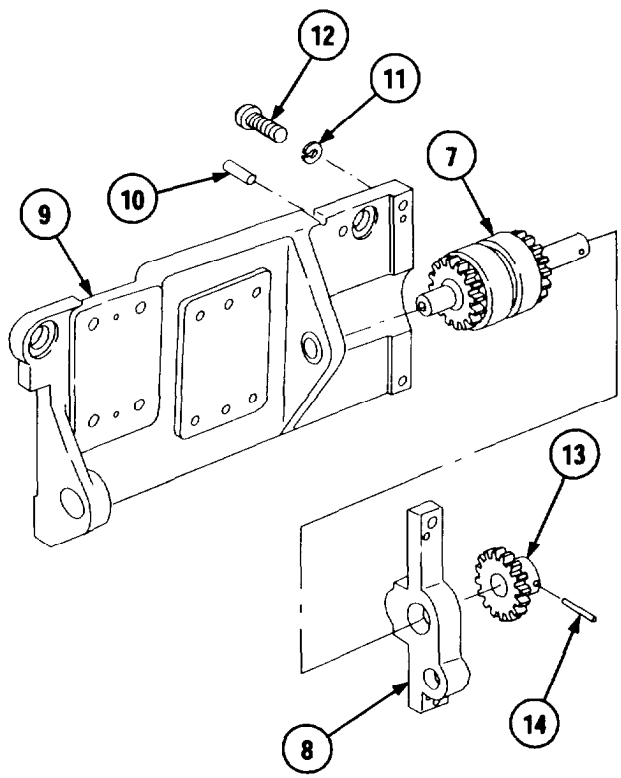


6 Apply grease (item 6, appx B) to both ends of differential assembly (7). Install long end of shaft through bracket (8). Install short end of shaft into base bushing, and slide bracket (8) into position on base (9).

7 Aline bracket holes with two straight pins (10), and tap straight pins through base until flush with rear surface.

8 Install two new lockwashers (11) and two screws (12).

9 Install spur gear (13) on shaft of differential assembly (7) and secure with tapered pin (14).



5.1-22. LEVEL ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Eccentric tool, fabricated (fig. C-2, appx C)

Fire Control Maintenance and Repair Shop Specialized Equipment Wrench Set, Spanner, DS, GS Maintenance: Tubular, Double Ended, Concave, Inserted Blade Set, 76 Wrenches 4931-00-580-0012

Shop Equipment, Instrument and Fire Control: Field Maintenance, Basic (SC4931-95-CL-A07) 4931-00-754-0740

Tool Kit, Instrument and Fire Control System, Repair, Field Maintenance (SC5180-95-CL-B29) 5180-01-168-0487

Materials/Parts

Flux	Item 5, appx B
Lockwasher	MS35333-69
Lockwasher (2)	MS35338-135
Solder	Item 18, appx B

References

TM 9-254
TM 9-2350-311-20-2

Equipment Conditions

M15 quadrant removed from howitzer (TM 9-2350-311-20-2)
Cover assembly removed (ref. para 5.1-14)
Cross-level knob removed (ref. para 5.1-14)
Knob assembly removed (ref. para 5.1-14)
Level assembly removed (ref. para 5.1-19)

5.1-22. LEVEL ASSEMBLY MAINTENANCE INSTRUCTIONS

a. Disassembly

1 Using fabricated eccentric tool (fig. C-2, appx C), remove rings (1 and 2) and eccentric bushings (3 and 4).

2 Slide fire control levels (5 and 6) from bracket (7) and level vial covers (8 and 9).

3 Remove level vial covers (8 and 9) from bracket (7).

4 Remove screw (10), lockwasher (11), electrical cover (12), spacer (13), and LED (14) from bracket (7). Discard lockwasher.

5 Using tubular spanner wrench 11/16 inch and 45/64 inch, remove ring (15) from bracket (7).

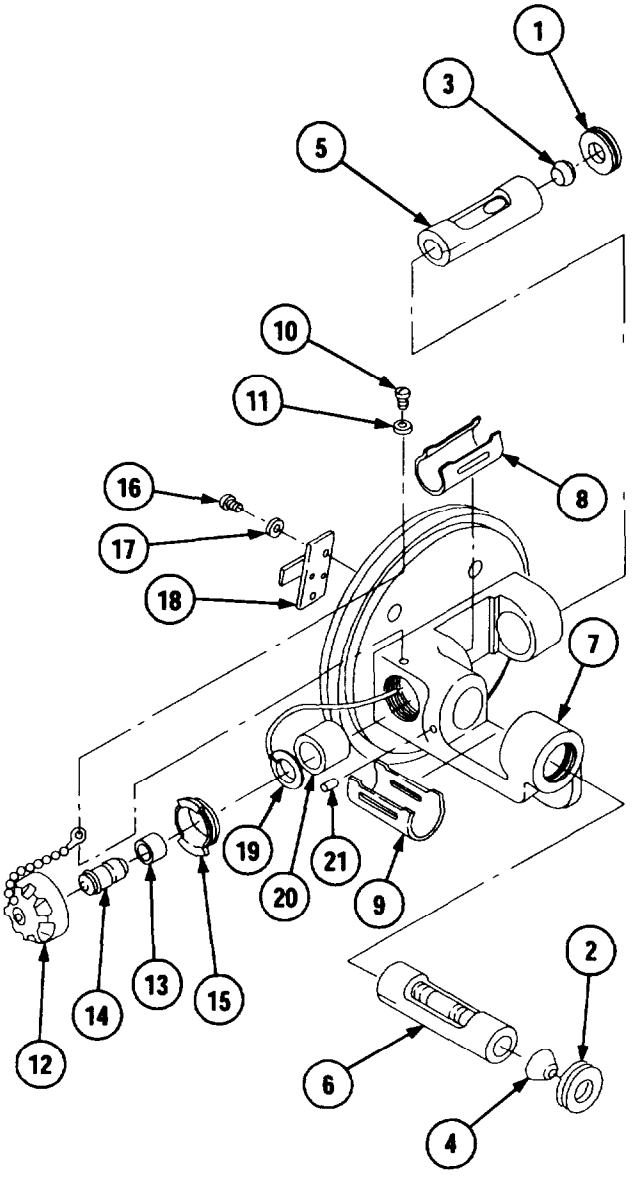
6 Remove two screws (16) and two lockwashers (17). Discard lockwashers.

7 Unsolder contact (18) from wire lead with electrical connector (19) attached.

8 Withdraw electrical connector (19) with wire lead attached from lamp recess.

9 Remove light lens (20).

10 Remove two pins (21) only if necessary for replacement.



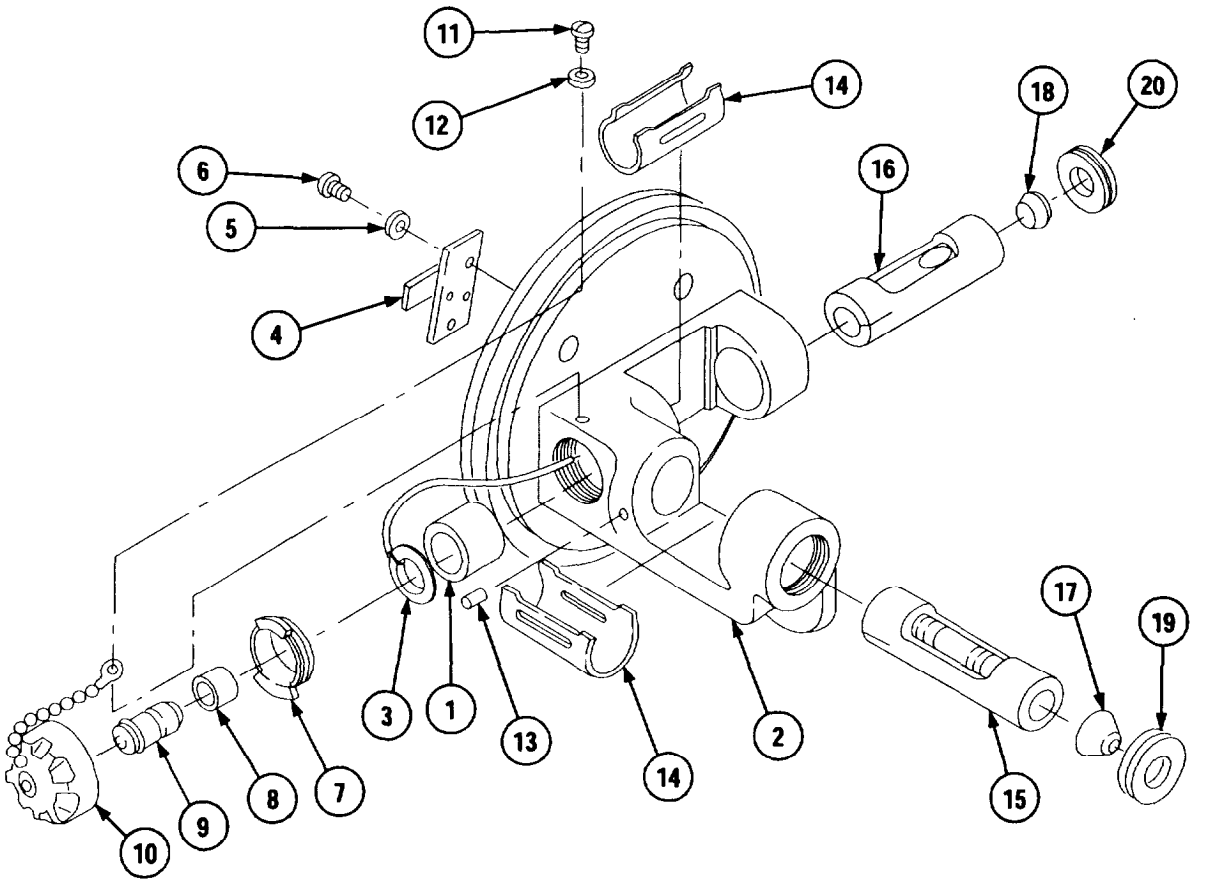
b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly



1 Install light lens (1), flat end first, into bracket (2).

2 Feed wire lead through small hole in bracket (2) and pull snug, drawing electrical connector (3) into lamp recess with raised portion facing outward.

3 Install contact (4) with two new lockwashers (5) and two screws (6).

4 Using solder (item 18, appx B) and flux (item 5, appx B), solder lead of electrical connector (3) to contact (4).

5 Using tubular spanner wrench 11/16 inch and 45/64 inch, install ring (7) into bracket (2).

6 Perform continuity check from electrical connector (3) to contact (4).

7 Install spacer (8) onto LED (9). Install LED (9) with spacer (8) and electrical cover (10). Secure with screw (11) and new lockwasher (12).

8 If removed, install two pins (13).

NOTE

It may be necessary to bend detent tabs on level vial covers with suitable pliers prior to installation of covers in level assembly.

9 Install two level vial covers (14) between bosses of bracket (2).

10 Install fire control levels (15 and 16) by sliding into bracket (2).

11 Install eccentric bushings (17 and 18).

12 Install rings (19 and 20) into bracket (2) and tighten rings snug against eccentric bushings (17 and 18), using fabricated eccentric tool (fig. C-2, appx C).

Section VI. General Support Final Inspection Procedures

5.1-23. GENERAL

a. This section describes and illustrates the final inspection of the M15 quadrant. A final inspection will be performed prior to returning the M15 quadrant to the using unit or to the supply system.

b. If the M15 quadrant being inspected fails to meet the required standards, ensure all maintenance authorized at the applicable level has been performed correctly.

5.1-24. M15 QUADRANT FINAL INSPECTION AND ADJUSTMENT

This task covers:

a. Setting up and adjusting cross-leveling fixture
b. Visual inspection
c. Bar (gunner's quadrant seat) final adjustment
d. Counter assembly final adjustment
e. Level assembly final adjustment
f. Backlash final adjustment
g. Checking maximum cant angle
h. Checking cross-level knob running torque
i. Checking elevation handwheel running torque
j. Checking knob assembly running torque

INITIAL SET-UP

Test Equipment

Cross-leveling fixture 4931-00-652-3553
Precision level 5120-00-546-6362
Test fixture adapter 4931-00-884-7752

Tools and Special Tools

Eccentric tool, fabricated (fig. C-2, appx C)
Quadrant mounting fixture (fig. C-12, appx C)
Shop Equipment, Instrument and Fire Control System Repair: Field Maintenance, Specialized (SC4931-95 CL-A07) 4931-00-754-0740

Materials/Parts

Adhesive	Item 1.1, appx B
Sealing compound	Item 13, appx B
Shim stock	Item 19, appx B
Tape, pressure sensitive	Item 20, appx B

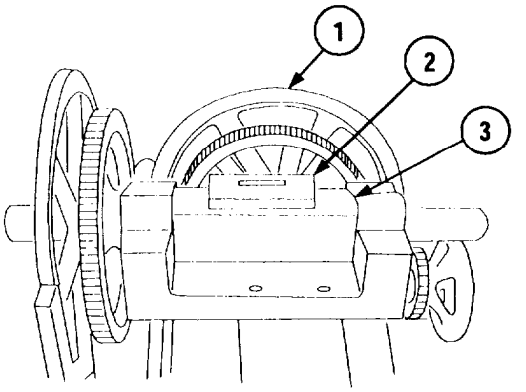
a. SETTING UP AND ADJUSTING CROSS-LEVELING FIXTURE

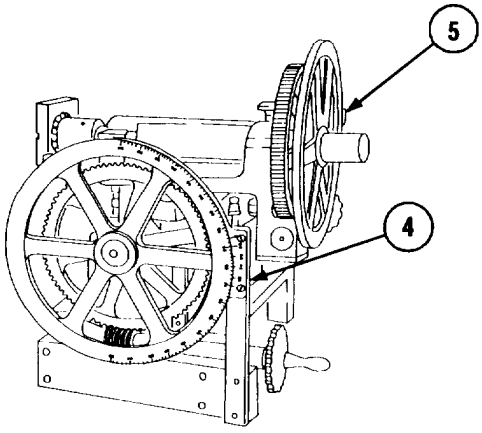
1 Secure cross-leveling fixture (1) on a solid stand bolted to the floor.

2 Place precision level (2) on square portion of elevation shaft (3), perpendicular to axis of rotation, and center the bubble.

3 Place precision level (2) on square portion of elevation shaft (3), parallel to axis of rotation, and center the bubble.

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





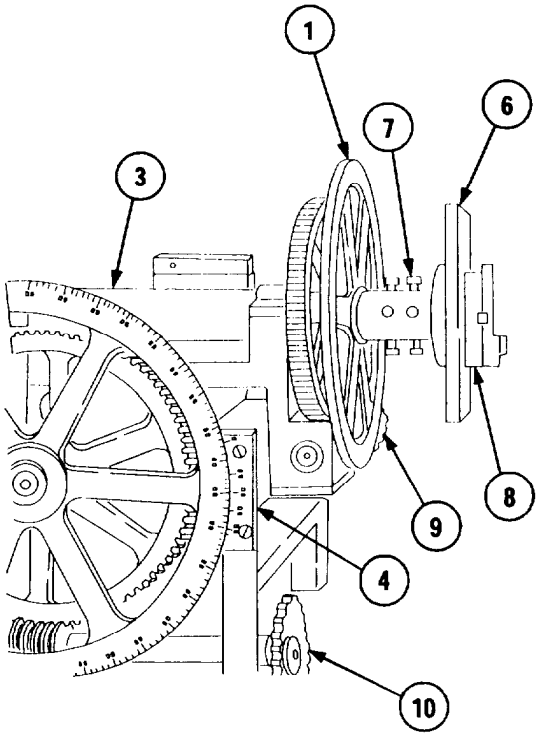
5 Install test fixture adapter (6) on shaft of cross-leveling fixture (1).

6 Tighten eight cap screws (7) only enough to keep test fixture adapter (6) from moving while checking test fixture adapter (6) for level.

7 Using a 5-second level or known good gunners quadrant and 6-inch parallel bar positioned on flat surface of round block (8), loosen eight cap screws (7) only enough to gently tap test fixture adapter (6) until bubble in level vial or gunner's quadrant is centered.

8 Using a 5-second level or known good gunners quadrant and a 6-inch parallel bar on square portion of elevation shaft (3), turn upper section handwheel (elevation) (9) and lower handwheel (cross-level) (10) until square portion of elevation shaft (3) is leveled in both elevation and cross-level positions.

9 With gunners quadrant still positioned as in step 7, ensure that surface is still level.



5.1-24. M15 QUADRANT FINAL INSPECTION AND ADJUSTMENT - continued

a. SETTING UP AND ADJUSTING CROSS-LEVELING FIXTURE - continued

10 Remove centering plug (11) from round block (8). Using known good gunner's quadrant and 6-inch parallel bar positioned across the top of two straight keys (12), ensure that keys are parallel with flat surface of round block (8).

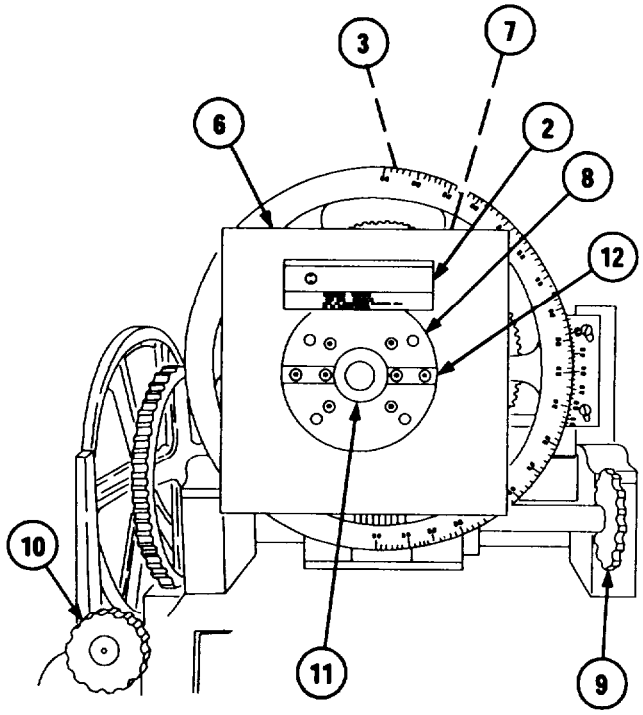
11 Recheck square portion of elevation shaft (3) to ensure that shaft is still level in elevation and cross-level positions. If not, repeat step 8.

12 Using known good gunner's quadrant and 6-inch parallel bar, position parallel bar and gunner's quadrant on the face of round block (8) perpendicular to flat surface of round block (8), and adjust two cap screws (7) at 12 o'clock position and two cap screws (7) at 6 o'clock position until bubble on gunner's quadrant is centered.

13 Rotate upper section handwheel (elevation) (9) to position flat surface of round block (8) from horizontal to perpendicular position as measured with a known good gunner's quadrant and a 6-inch parallel bar on flat surface of round block (8).

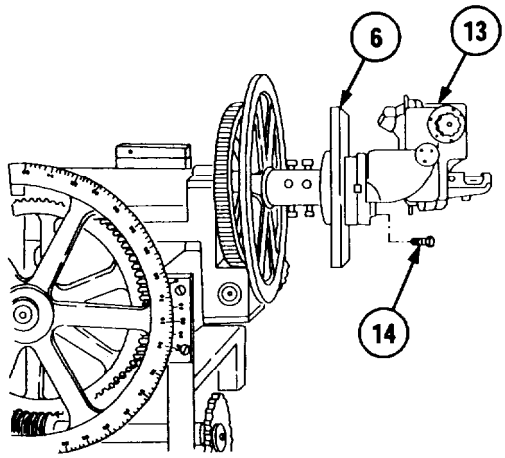
14 Position 6-inch parallel bar against two keys (12). Using known good gunner's quadrant placed on parallel bar, adjust two cap screws (7) at the 6 o'clock position until bubble in gunner's quadrant is centered.

15 Repeat steps 7 thru 12 until test fixture adapter (6) and square portion of elevation shaft (3) are in agreement.



16 Position M15 quadrant (13) on test fixture adapter (6), and secure with four cap screws (14).

17 Install knob on shaft of M15 quadrant cross-level worm gear.



b. VISUAL INSPECTION

1 Check that all screws and lockwashers are present and tight.

2 Check that all mounting surfaces are clean and free of burrs.

3 Check that M15 quadrant is free of dirt, corrosion, and foreign matter.

4 Check that M15 quadrant paint is not chipped.

5 Check that all M15 quadrant parts are present.

6 Check for broken, frayed, or deteriorated insulation on extension light.

5.1-24. M15 QUADRANT FINAL INSPECTION AND ADJUSTMENT - continued

c . BAR (GUNNER'S QUADRANT SEAT) FINAL ADJUSTMENT

1 Ensure that bar (1) is installed on M15 quadrant with one straight pin (2).

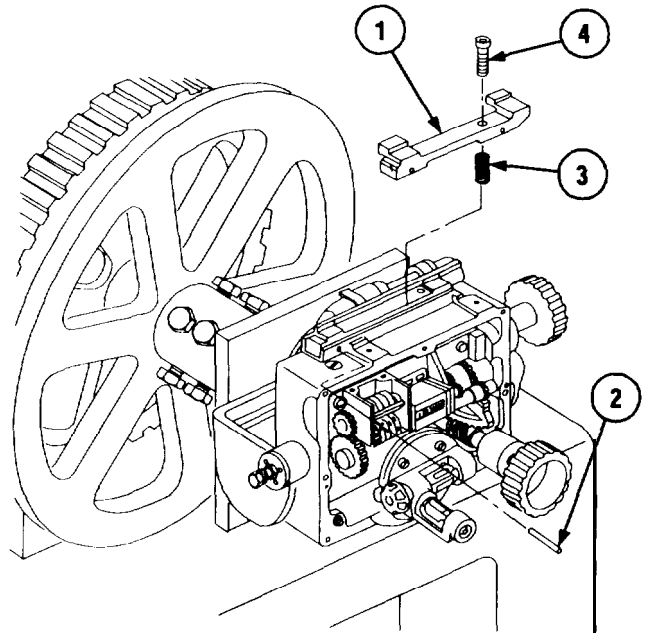
2 Ensure that spring (3) and screw (4) have been installed.

3 Place known good gunner's quadrant on machined quadrant seats of bar (1) and adjust screw (4) until bubble of gunner's quadrant is centered.

4 Using feeler gage between housing and bar (1), determine the number of shims (item 19, appx B) necessary to hold bar in place for drilling and reaming for straight pin (2).

5 Install shims as necessary between bar (1) and housing and tighten screw (4) to secure bar (1) for drilling.

6 Remove M15 quadrant from cross-leveling fixture.



7 Install M15 quadrant on quadrant mounting fixture (5) (fig. C-12, appx C) with four bolts.

8 Position quadrant mounting fixture (5) on drill press table with M15 quadrant placed in upright position.

9 Using cross-level knob (6), adjust cross-level bubble in fire control level (7) until bubble centers.

10 Reposition quadrant mounting fixture (5) with elevation quadrant facing upward.

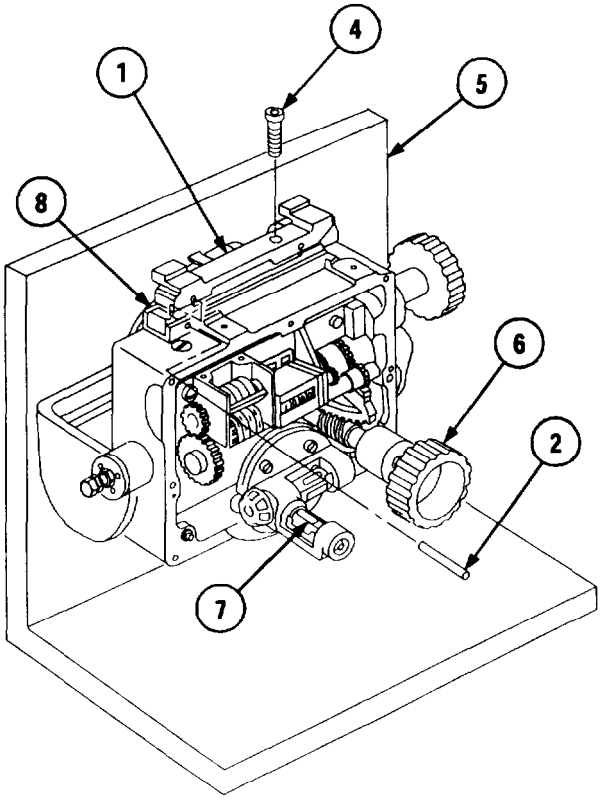
11 Drill with a number 13 drill bit and ream for a 3/16-inch straight pin (2).

12 Loosen screw (4) and remove shims previously installed between bar (1) and housing (8). Seal over screw (4) using sealing compound; (item 13, appx B).

13 Aline holes drilled and reamed in bar (1) and housing (6) and install straight pin (2).

14 Install screw (4) into recess of bar (1) but do not tighten.

15 Remove M15 quadrant from quadrant mounting fixture (5) and reinstall on test fixture adapter.

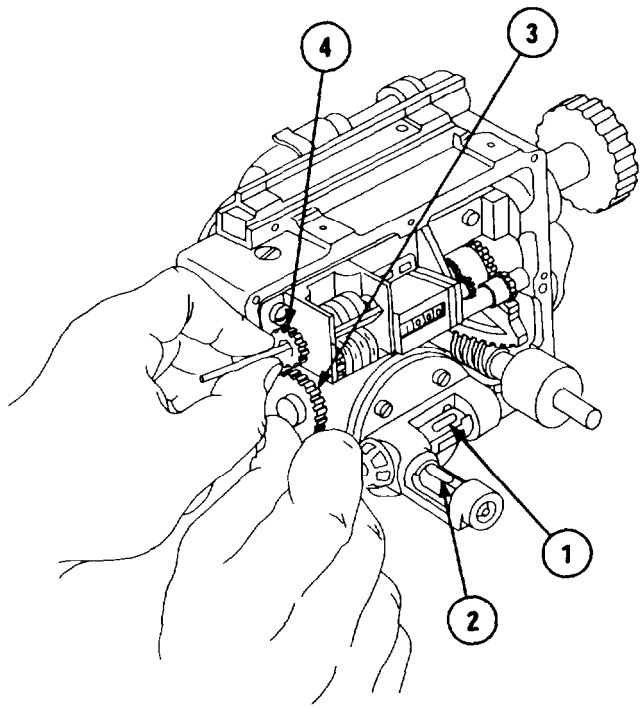


5.1-24. M15 QUADRANT FINAL INSPECTION AND ADJUSTMENT - continued

d. COUNTER ASSEMBLY FINAL ADJUSTMENT

NOTE

M15 quadrant must be mounted on cross-leveling fixture and test fixture adapter and cross-leveling fixture must be at zero elevation and cross-level.



1 Turn elevation knob until bubble in elevation fire control level (1) is centered.

2 Turn cross-level knob until bubble in cross-level fire control level (2) is centered.

3 Read elevation and correction counters. If numbers other than zero appear, block teeth of spur gearshaft (3).

4 Loosen three clamp screws on hub of correction counter spur gear (4).

5 Hold hub with a small drill shank inserted in one of three holes between screws, and turn spur gearshaft (3) until elevation counter registers 0000 mils.

6 Hold spur gearshaft (3) stationary and turn hub of correction counter spur gear (4) until correction counter registers 00 mils.

7 Tighten hub screws.

e. LEVEL ASSEMBLY FINAL ADJUSTMENT

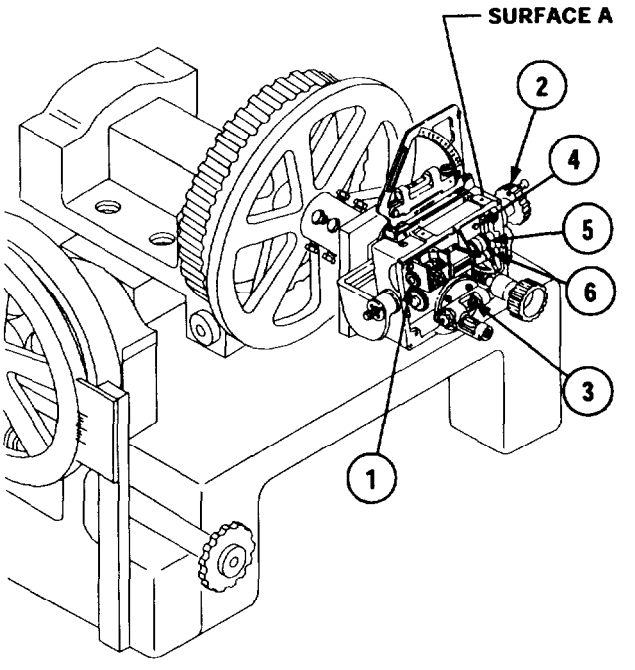
1 Install M15 quadrant on cross-leveling fixture (ref. Section a, para 5.1-24). Perform steps 7 thru 9 of fixture setup procedure (ref. Section a, para 5.1-24).

2 Turn spur gear (1) until correction counters register 00 mils. Turn elevation handwheel (2) until elevation counter registers 0000 mils.

3 Adjust elevation handwheel (2) to center bubble of fire control level (3).

4 Loosen three screws (4) to disengage differential spur gear (5) from spur gear (6).

5 Rotate differential spur gear (5) to zero counter, then tighten three screws (4).



5.1-24. M15 QUADRANT FINAL INSPECTION AND ADJUSTMENT - continued

e. LEVEL ASSEMBLY FINAL ADJUSTMENT - continued

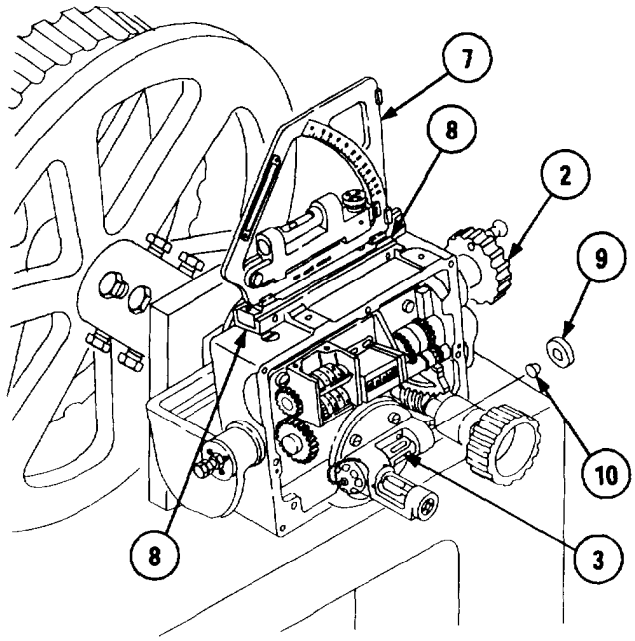
6 Place zeroed M1A1 gunner's quadrant (7) on quadrant seats (8) of M15 quadrant.

7 Center bubble on gunner's quadrant (7) by turning elevation handwheel (2).

8 Recheck to ensure that bubble of fire control level (3) is in agreement with bubble in gunner's quadrant (7).

9 If fire control level (3) does not agree with gunner's quadrant (7), loosen ring (9) and readjust eccentric bushing (10) until fire control level (3) and gunner's quadrant (7) agree.

10 Tighten ring (9). Seal ring (9) using adhesive (item 1.1, appx B).



11 Using suitable clamp, secure 6-inch parallel bar on surface A perpendicular to bar (gunner's quadrant seat).

12 Place zeroed M1A1 gunner's quadrant (7) on parallel bar.

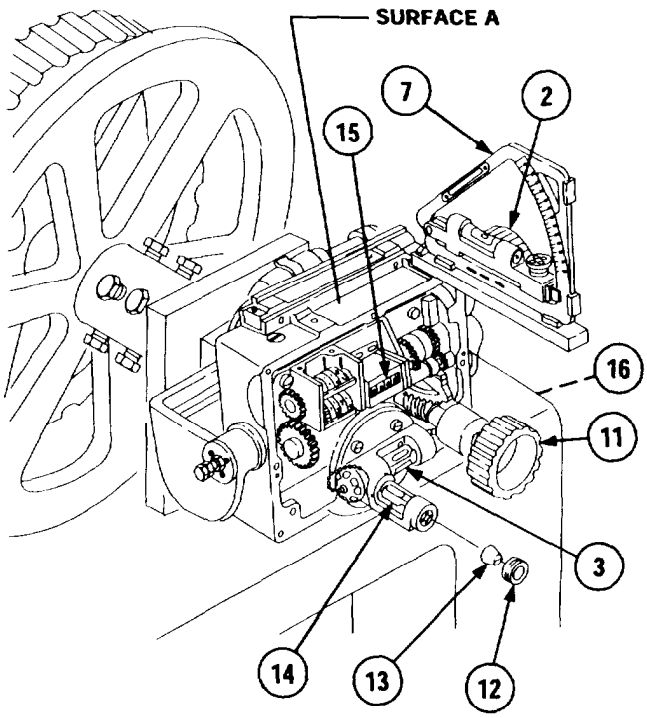
13 Turn cross-level knob (11) until bubble of gunner's quadrant (7) is centered.

14 Using fabricated eccentric tool (fig. C-2, appx C) loosen ring (12) and adjust eccentric bushing (13) until bubble in fire control level (14) centers.

15 Tighten ring (12).

16 Turn elevation handwheel (2) of M15 quadrant until reading of 1383 is set into elevation counter (15).

17 Rotate upper handwheel (16) of cross-leveling fixture clockwise until bubble of fire control level (3) centers.



18 Check bubble of fire control level (14); if not centered, loosen ring (12) and readjust eccentric bushing (13) to center bubble of fire control level (14)

19 Rotate elevation handwheel (2) of M15 quadrant to turn elevation counter (15) to 0.

20 Rotate upper handwheel (16) of cross-leveling fixture counterclockwise until bubble of fire control level (3) centers.

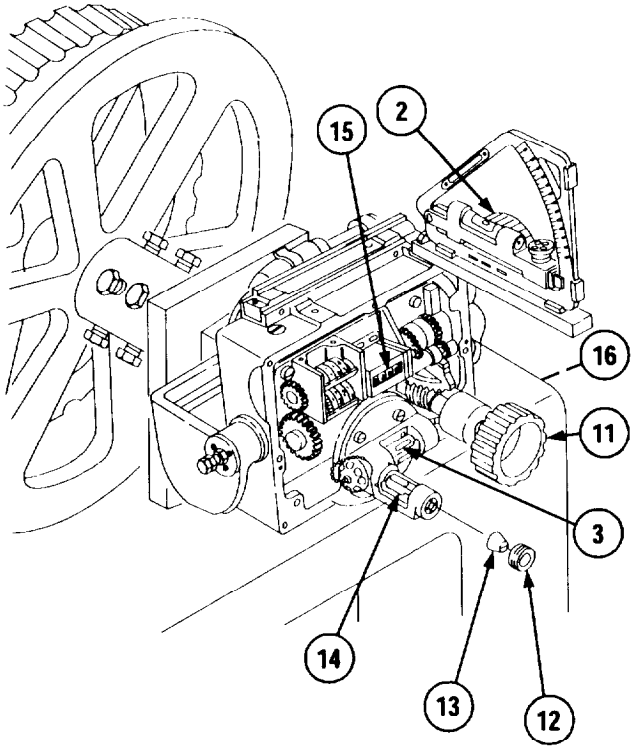
21 If bubble of fire control level (14) does not center, turn cross-level knob (11) until bubble centers in fire control level (14).

22 Repeat steps 16 thru 19 until bubble in fire control level (14) is approximately centered. Seal ring (12) using adhesive (item 1.1, appx B).

23 Return cross-leveling fixture to level position.

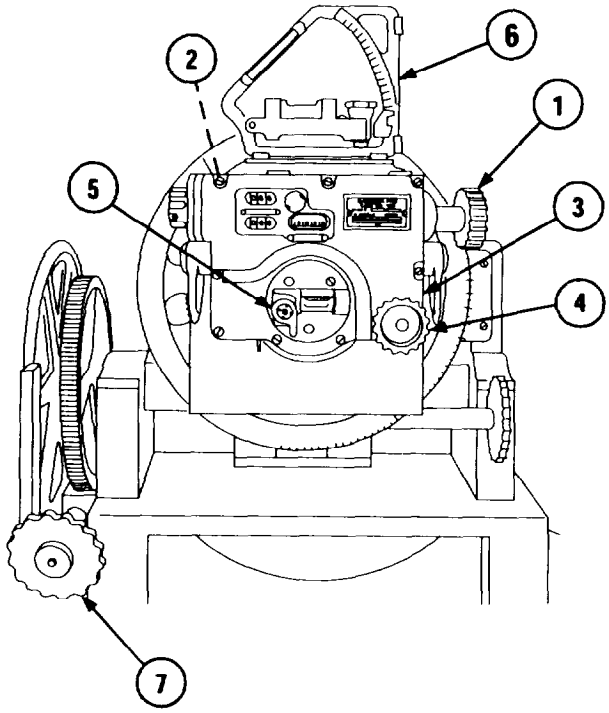
24 Remove cross-level knob (11) from M15 quadrant.

25 Install cover assembly, knob assembly, cross-level knob, and associated parts (ref. para 5.1-14).



5.1-24. M15 QUADRANT FINAL ADJUSTMENT - continued

f. BACKLASH FINAL ADJUSTMENT



1 Rotate handwheel assembly (1) at least 100 mils in each direction and check that backlash is not more than 0.5 mil.

2 If backlash exceeds 0.5 mil, adjust plug (2).

3 Using tape (item 20, appx B), tape a pointer to right side of housing (3) in line with cross-level knob (4).

4 With bubble of cross-level fire control level (5) centered, place a piece of tape on side of cross-level knob (4) and scribe a mark on the tape in line with pointer for a reference point.

5 Rotate cross-level knob one complete revolution in each direction and back to point where pointer and scribe mark on tape were originally alined. Bubble of fire control level (5) must recenter within 1/2 graduation (0.5 mil).

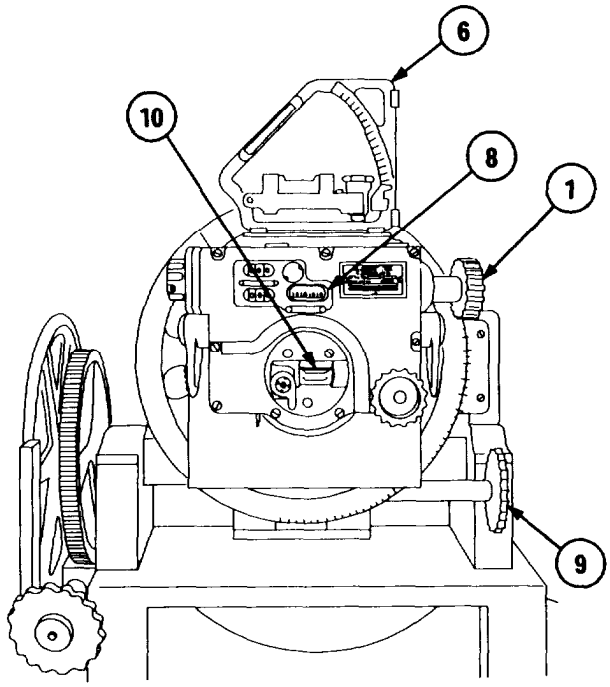
6 Using known good gunner's quadrant (6), place 300 mils on gunner's quadrant.

7 Place gunner's quadrant on square shaft of cross-leveling fixture and turn lower handwheel (7) counterclockwise until quadrant bubble centers. Turn cross-level knob (4) to center bubble of fire control level (5).

8 Repeat step 5. Fire control level must center within 1/2 graduation (0.5 mil).

9 Repeat step 7 in a clockwise direction.

10 Repeat step 8. Fire control level must center within 1/2 graduation (0.5 mil).



11 Turn handwheel assembly (1) counterclockwise to stop; reading on elevation counter (8) must indicate at least 9772 (228 mils depression).

12 Rotate handwheel assembly (1) clockwise to obtain a reading of 9800 on elevation counter (8).

13 Rotate upper section handwheel (elevation) (9) on cross-leveling fixture counterclockwise until bubble of fire control level (10) centers.

14 Using known good gunners quadrant (6) check elevation accuracy by placing a reading of 200 mils on M15 quadrant.

15 Place gunner's quadrant (6) on quadrant seats of bar. Bubble should center within plus or minus 0.5 mil.

16 Rotate handwheel assembly (1) one complete revolution in each direction. Bubble of fire control level (10) must center in each direction within 1/2 graduation (0.5 mil).

17 Repeat steps 14 thru 16 for 400,600,800,1000, and 1200 mils elevation,

18 Perform elevation excursion by rotating handwheel assembly (1) clockwise to stop. A minimum of 1383 mils must be obtained on elevation counter (8).

5.1-24. M15 QUADRANT FINAL INSPECTION AND ADJUSTMENT - continued

g. CHECKING MAXIMUM CANT ANGLE

1 Turn cross-level knob (1) counterclockwise to stop.

2 Turn lower section handwheel (2) on cross-leveling fixture until bubble in cross-level fire control level (3) is centered.

3 Read lower section scale wheel (4) at vernier zero line. The angle must be no less than 300 mils.

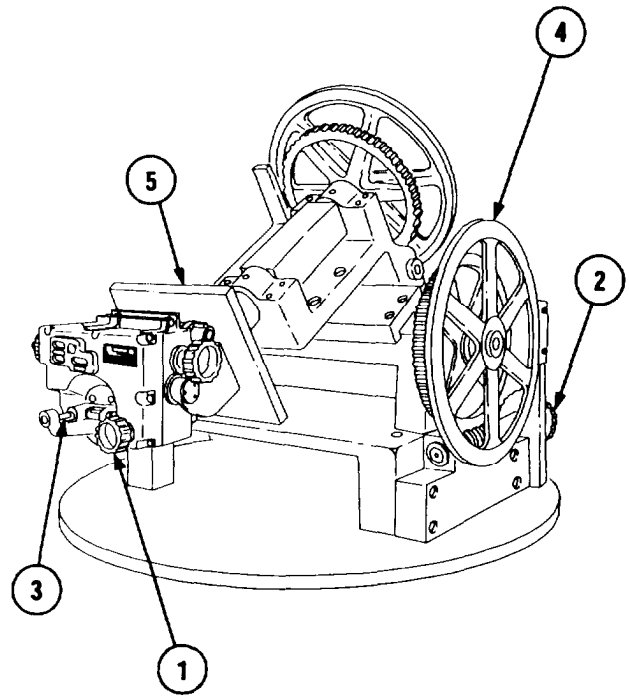
4 Return test fixture adapter (5) to approximately level position.

5 Turn cross-level knob (1) clockwise to stop.

6 Turn lower section handwheel (2) until bubble in cross-level tire control level (3) is centered.

7 Read scale wheel angle at vernier zero graduation. The indicated cant angle must be no less than 300 mils.

8 Return cross-leveling fixture to approximately zero in cant and elevation.



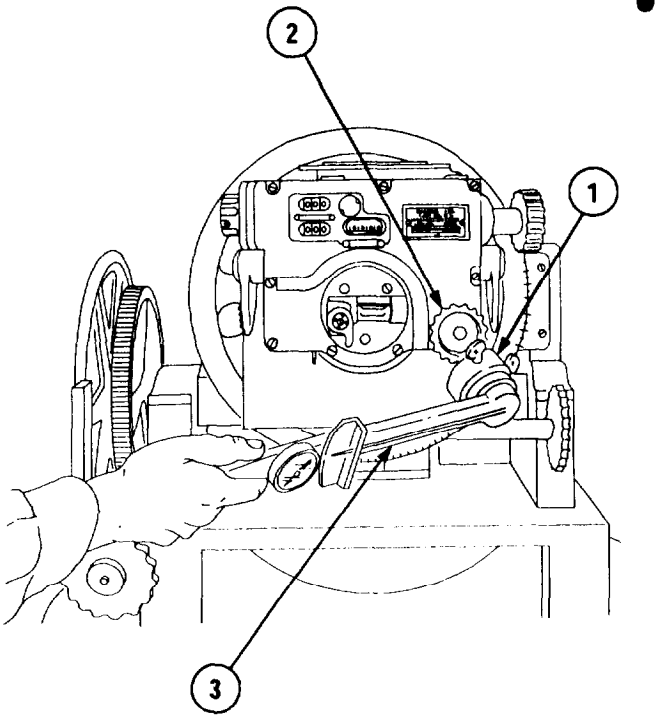
h. CHECKING CROSS-LEVEL KNOB RUNNING TORQUE

1 Place torque adapter 8213474 (1) on cross-level knob (2) and tighten securely.

2 Place torque wrench (3) of not more than 30 pound-inches (3.39-N-m) maximum capacity on torque adapter (1).

3 With torque wrench (3), rotate cross-level knob (2) one turn clockwise and one turn counterclockwise.

4 Measure the torque required to turn cross-level knob (2). The torque shall be between 3 and 9 pound-inches (0.339 and 1.017 N-m). If not, repair according to repair procedures (ref. para 5.1-19).



5.1-24. M15 QUADRANT FINAL INSPECTION AND ADJUSTMENT - continued

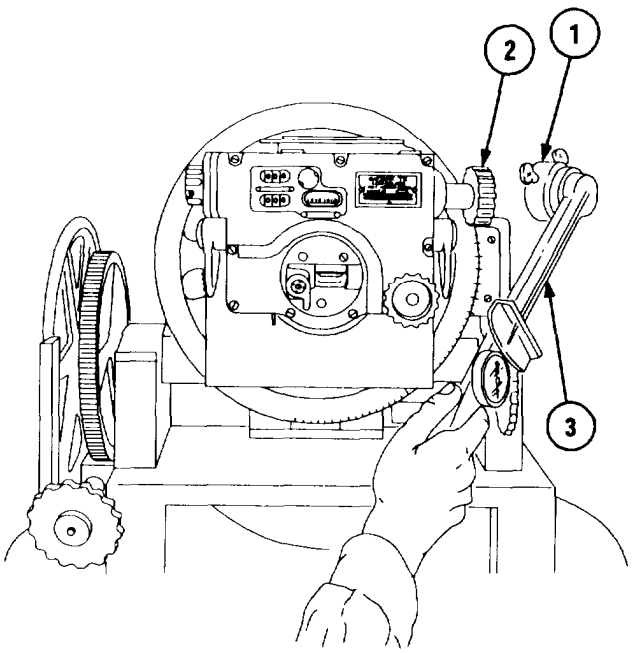
i. CHECKING ELEVATION HANDWHEEL RUNNING TORQUE

1 Place torque adapter 8213474 (1) on elevation handwheel (2) and tighten securely.

2 Place torque wrench (3) of not more than 30 pound-inches (3.39-N-m) maximum capacity on torque adapter (1).

3 Using torque wrench (3) rotate elevation handwheel (2) one turn clockwise and one turn counter-clockwise.

4 Measure the torque required to turn elevation handwheel (2). The torque shall be between 5 and 10 pound-inches (0.565 and 1.130 N-m). If not, repair according to repair procedures (ref. para 5.1-19).



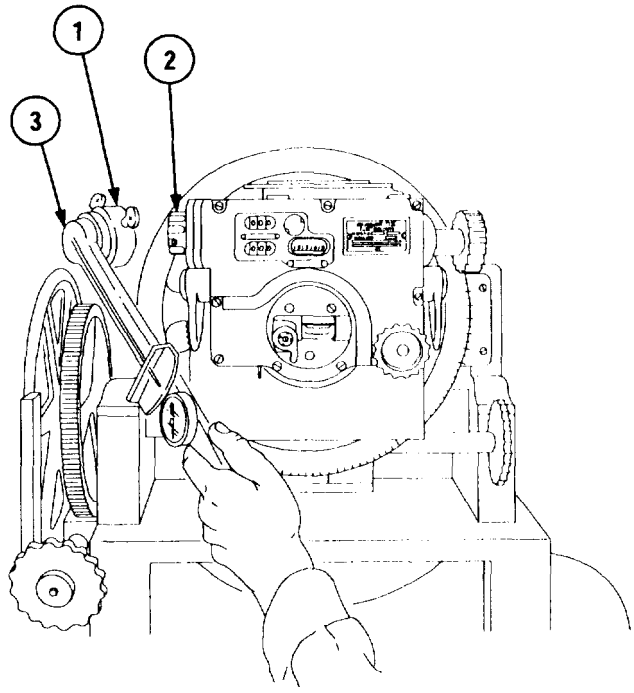
j. CHECKING KNOB ASSEMBLY RUNNING TORQUE

1 Place torque adapter 8213473 (1) on knob assembly (2) and tighten securely.

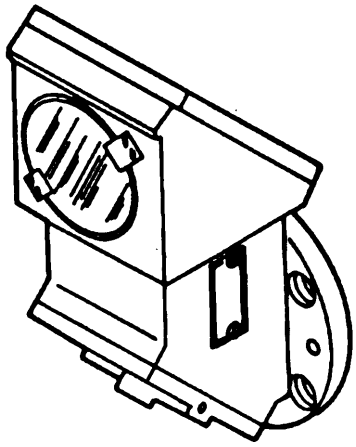
2 Place torque wrench (3) of not more than 30 pound-inches (3.39-N-m) maximum capacity on torque adapter (1).

3 With torque wrench (3) rotate knob assembly (2) one turn clockwise and one turn counterclockwise.

4 Measure the torque required to turn knob assembly (2). The torque shall be between 3 and 5 pound-inches (0.339 and 0.565 N-m). If not, repair according to repair procedure (ref. para 5.1-15).



CHAPTER 6
M42 PERISCOPE MAINTENANCE INSTRUCTIONS



CHAPTER OVERVIEW

This chapter contains maintenance procedures for the M42 periscope. Information on repair parts, special tools, and detailed procedures for troubleshooting and maintenance of the M42 periscope are included.

CHAPTER INDEX

Section I. Repair Parts; Special Tools; Test, Measurement, and Diagnostic Equipment (TMDE); and Support Equipment

6-1. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE), CTA 50-970, applicable to your unit.

6-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special tools, TMDE, and support equipment required and authorized for repair of the M42 periscope are listed in the repair parts and special tools list, appendix D. Fabricated tools are located in appendix C.

6-3. REPAIR PARTS

Repair parts are listed and illustrated in the repair parts and special tools list, appendix D.

Section II. Inspections

6-4. GENERAL

a. Inspection is performed primarily to determine the following:

(1) Completeness.

(2) The nature of unserviceability.

(3) The work, repair parts, and supplies required to return the materiel to serviceability.

(4) That the work in process is being performed properly.

(5) That completed work complies fully with serviceability standards.

b. The M42 periscope is considered serviceable when:

(1) It is complete and properly performs its intended function.

(2) All modification work orders (MWO's) have been applied.

(3) All defects disclosed by the inspection have been corrected.

c. Applicable MWO's are listed in DA Form 2408-5 and DA Form 2409.

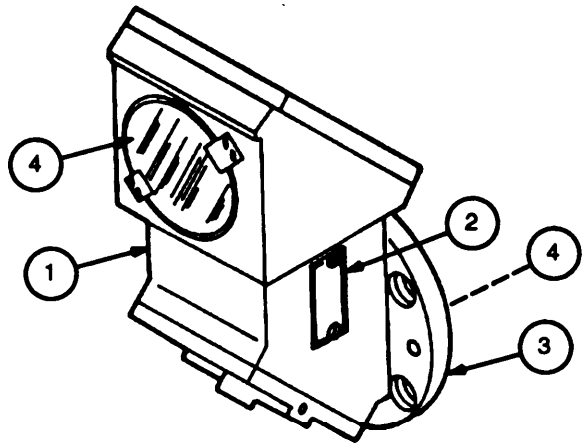
6-5. CATEGORIES OF INSPECTION

Categories of inspection define responsibilities:

a. An initial inspection (ref. para 6-6) is performed immediately on receipt of the M42 periscope for maintenance. This inspection will determine the amount and type of work to be performed.

b. A final inspection (ref. para 6-12) is performed after repairs have been completed to ensure the item meets serviceability standards.

6-6. INITIAL INSPECTION



Item No.	Item To Be Inspected	Procedures
1	M42 PERISCOPE	Inspect M42 periscope (1) for completeness and secureness of parts; must be complete and secure.
2	IDENTIFICATION PLATE	Check that identification plate (2) is legible and clearly defined.
3	MOUNTING SURFACE	Check that mounting surface (3) is free of burrs and corrosion.
4	WINDOWS	Inspect windows (4) for dirt, fungus, or condensation, which may obstruct view; must be clean and free of moisture. Check that windows and mirrors are free of fractures, scratches, and breaks.

Section III. Troubleshooting

6-7. GENERAL

a. The symptom index can be used as a quick guide to troubleshooting. Common malfunctions are listed in alphabetical order with page number reference to the troubleshooting table, where a test or inspection and corrective action are provided.

b. The general support troubleshooting table (ref. para 6-9) lists the common malfunctions which maybe found during maintenance of the M42 periscope. Perform the tests/inspections and corrective actions in the order listed.

c. There is no direct support maintenance on the M42 periscope.

6-8. GENERAL SUPPORT SYMPTOM INDEX

6-9. GENERAL SUPPORT TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION

1. MOUNTING SURFACE (1) DOES NOT SEAT M42 PERISCOPE CORRECTLY.

   Observe visually.

   a. Clean mounting surface with cleaning compound (item 3, appx B).

   b. Remove burrs with abrasive cloth (item 4, appx B) dipped in cleaning compound (item 3, appx B).

2. WINDOWS (2) ARE FOGGED OR CONDENSATION IS PRESENT.

   Observe visually.

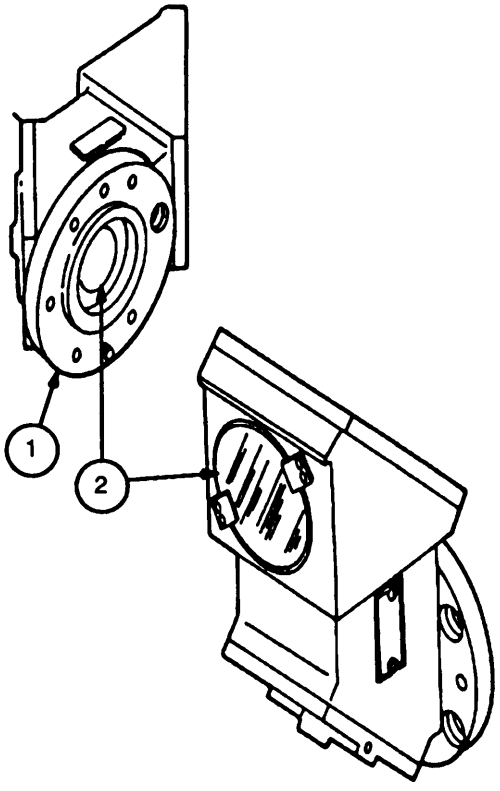
   a. Purge and charge M42 periscope (TM 750-116).

   b. Repair M42 periscope (ref. para 6-10).

3. WINDOWS (2) ARE BROKEN OR CRACKED.

   Observe visually.

   Repair M42 periscope (ref. para 6-10).



Section IV. General Support Maintenance Procedures

6-10. M42 PERISCOPE MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29)
5180-01-168-0487

Materials/Parts

Adhesive (Item 2, appx B)
Lockwashers (3) (Item 64, appx E)
Lockwashers (24) (Item 65, appx E)
Lockwashers (4) (Item 69, appx E)
Sealing compound (Item 13, appx B)

References

TM 9-254
TM 750-116

Equipment Condition

M42 periscope removed from howitzer (TM 9-2350-311-20-2)

a. Disassembly

1 Remove two machine screws (1) and identification plate (2).

2 Remove air valve cap (3), valve core (4), purging valve stem (5), and retaining strap (6) from M42 periscope.

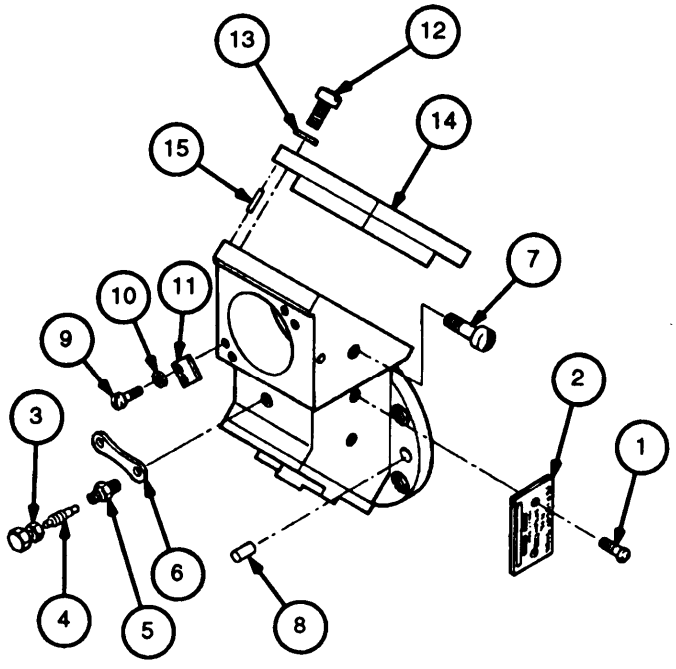
3 Remove purging machine screw (7).

4 Remove two headless straight pins (8) only if necessary for replacement.

5 Remove four machine screws (9), four lockwashers (10), and two retaining plates (11). Discard lockwashers.

6 Remove 12 machine screws (12), 12 lockwashers (13), and plate and mirror (14). Discard lockwashers.

7 Remove two headless straight pins (15) only if damaged.



6-10. M42 PERISCOPE MAINTENANCE INSTRUCTIONS - continued

a. Disassembly - continued

NOTE

Remove windows (16 and 25) only if necessary for replacement.

8 Remove window (16) by tapping on side facing interior of M42 periscope.

9 Remove all fragments of glass and scrape off all adhesive material. Avoid enlarging opening.

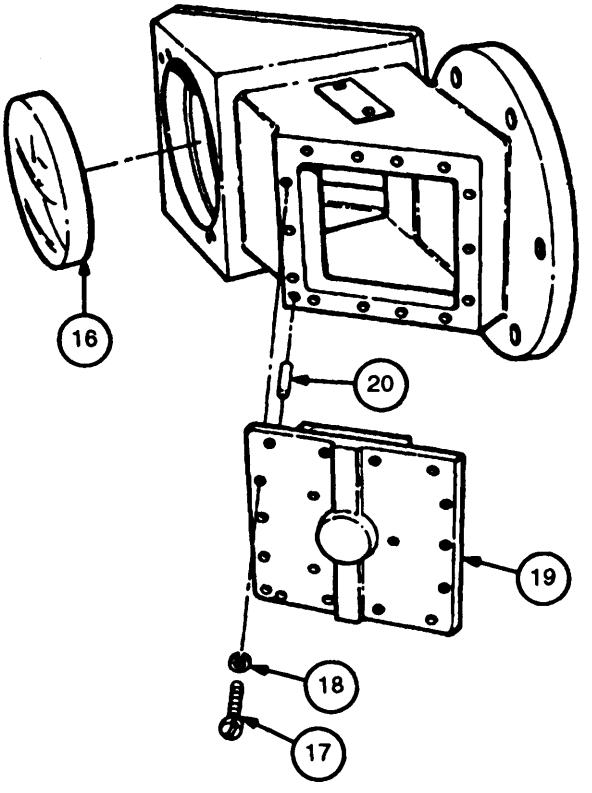
10 Remove 12 machine screws (1 7), 12 Iockwashers (18), and cover assembly (19). Discard lockwashers.

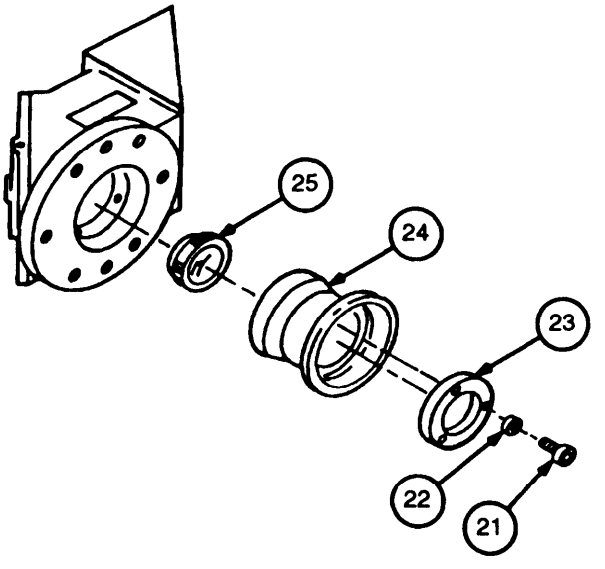
11 Remove two headless straight pins (20) only if damaged.

12 Remove three machine screws (21), three lockwashers (22), retaining ring (23), and seal (24). Discard lockwashers.

13 Remove window (25) by tapping side facing interior of M42 periscope.

14 Remove all fragments of glass and scrape off all adhesive material. Avoid enlarging opening.





b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly

1 Apply sealing compound to opening of M42 periscope and install window (25).

2 Install seal (24) and retaining ring (23); secure with thru new lockwashers (22) and three machine screws (21).

3 If removed, install two headless straight pins (20).

4 Apply adhesive to cover assembly (19) and install on M42 periscope. Secure with 12 new lockwashers (18) and 12 machine screws (17).

5 Apply sealing compound to opening of M42 periscope and install window (16).

6 If removed, install two headless straight pins (15).

7 Apply adhesive to plate and mirror (14) and install on M42 periscope. Secure with 12 new lockwashers (13) and 12 machine screws (12).

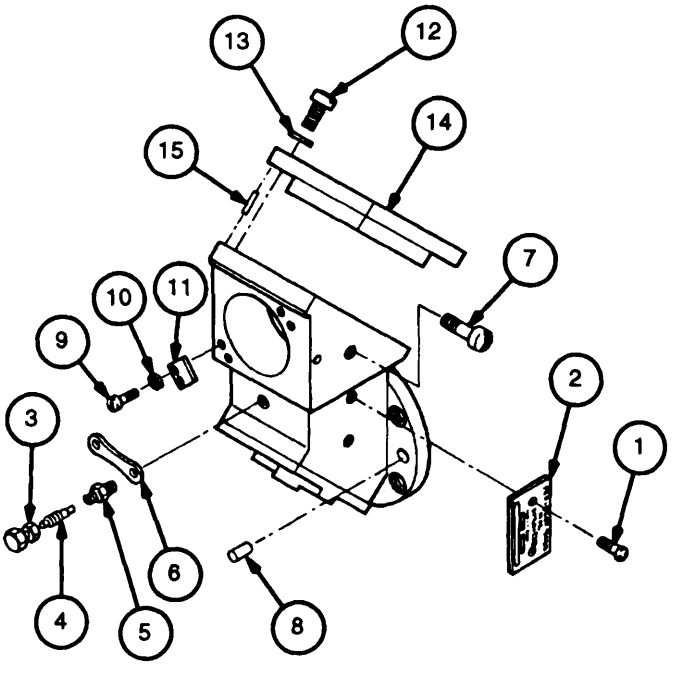
8 Install two retaining plates (11) and secure with four new lockwashers (10) and four machine screws (9).

9 If removed, install two headless straight pins (8).

10 Install purging machine screw (7).

11 Install retaining strap (6) on purging valve stem (5). Apply adhesive to threaded portion of purging valve stem (5) that screws into periscope housing. Install purging valve stem (5), valve core (4), and air valve cap (3).

12 Install identification plate (2) and secure with two machine screws (1).



Section V. General Support Final Inspection Procedures

6-11. GENERAL

a. This section describes and illustrates the final inspection of the M42 periscope. A final inspection will be performed prior to returning the M42 periscope to the using unit or to the supply system.

b. If the M42 periscope being inspected fails to meet the required standards, ensure all maintenance authorized at the applicable level has been performed correctly. Then send the M42 periscope to the next higher level of maintenance.

c. The M42 periscope must be purged and charged whenever the seal is broken (ref. TM 750-116).

6-12. M42 PERISCOPE FINAL INSPECTION AND ADJUSTMENT

This task covers:

a. Setting up inspection fixture

b. Installing M42 periscope on inspection fixture

c. Image tilt adjustment

d. Sealing inspection

INITIAL SET-UP

Test Equipment

Collimator holding fixture, fabricated (fig. C-4, appx c)

Fixture, inspection, with accessories carrying case 5800949

Projector, collimating (Item 21, appx F)

Telescope, collimating (Item 23, appx F)

Tools

Purging kit (Item 22, appx F)

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29) 5180-01-168-0487

Materials/Parts

Adhesive (Item 2, appx B)
Cleaning compound (Item 3, appx B)
Nitrogen, technical (Item 8, appx B)
Screws (3) (Item 45, appx E)

References

TM 9-254
TM 750-116

a. SETTING UP INSPECTION FIXTURE

1 Place inspection fixture (1) on a clean level surface at a height suitable for comfortable viewing through collimating projector and collimating telescope.

2 Mount reflecting mirrors (2) on inspection fixture (l), making sure that all mating surfaces are free of dirt, burrs, and other defects which would interfere with proper seating.

3 Insert special test reticle 8599932-15 into collimating projector (3).

4 Install collimating projector (3) in collimator holding fixture (4) with vertical reticle line approximately vertical.

5 Insert special test reticle 8599932-14 into auxiliary telescope (5).

6 Install auxiliary telescope (5) in support (6) with vertical reticle line approximately vertical.

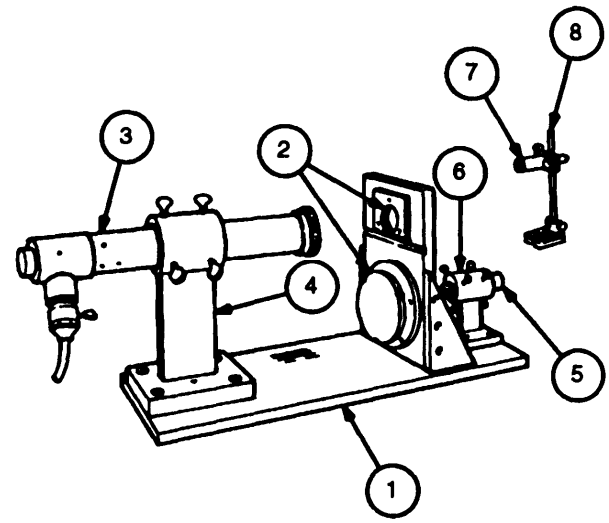
7 Mount collimating telescope (7) in collimating telescope holder (8) on surface gage.

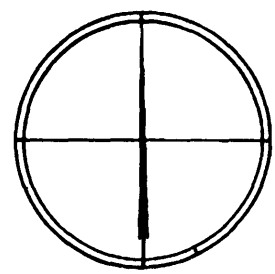
8 Adjust height of collimating telescope (7) to height of auxiliary telescope (5) on inspection fixture (1).

9 Suspend a plumbline approximately 10 feet (3.05m) from collimating telescope (7) viewing point.

10 View plumbline through collimating telescope (7) and revolve collimating telescope (7) until vertical reticle line is in coincidence with plumbline image. Secure collimating telescope (7) in collimating telescope holder (8) to maintain the trueness of the vertical reticle line.

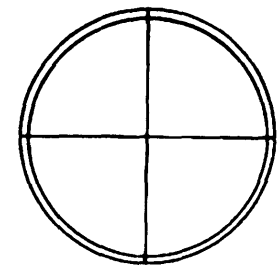
11 Place collimating telescope (7) in line with auxiliary telescope (5).





test reticle

8599932-14



test reticle

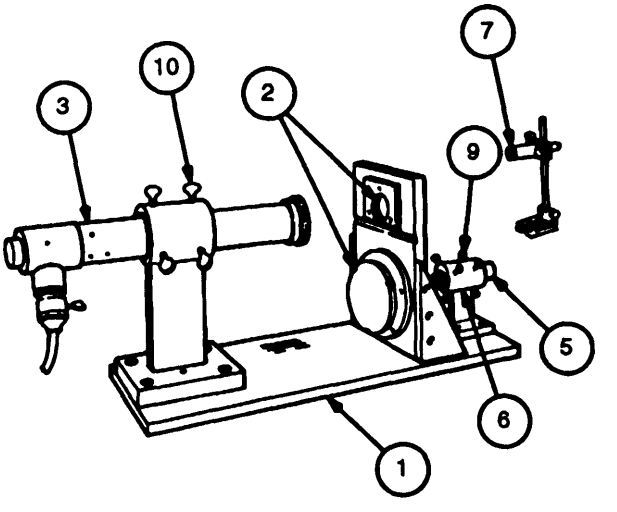
8599932-15

6-12. M42 PERISCOPE FINAL INSPECTION AND ADJUSTMENT-continued

a. SETTING UP INSPECTION FIXTURE - continued

12 View auxiliary telescope (5) vertical reticle line through collimating telescope (7) and revolve auxiliary telescope (5) until image of vertical reticle line is in coincidence with preplumbed vertical reticle line of collimating telescope (7).

13 Using parallel bars, adjust height of collimating telescope (7) to height of collimating projector (3) on inspection fixture (1).



14 Place collimating telescope (7) in line with collimating projector (3).

15 View collimating projector (3) vertical reticle line through collimating telescope (7) and revolve collimating projector (3) until image of vertical reticle line is in coincidence with preplumbed vertical reticle line of collimating telescope (7).

16 Using collimating projector (3) light source, autocollimate auxiliary telescope (5), using support (6) adjusting screws (9), until reticle image is superimposed on image reflected by the reflecting mirror (2).

17 Look through collimating projector (3) and autocollimate collimating projector using collimating projector (3) support screws (10), until reticle image is superimposed on image reflected by reflecting mirror (2).

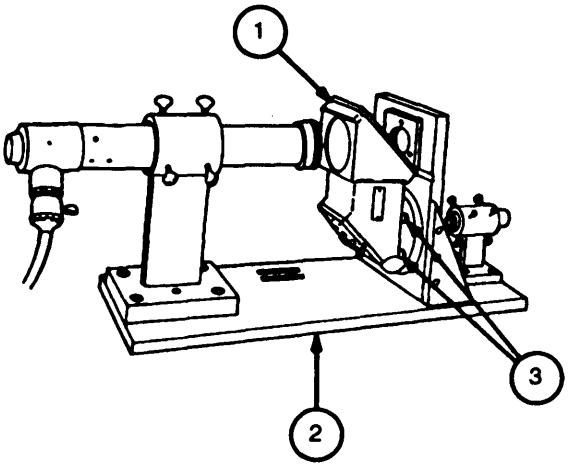
18 Repeat steps 11 thru 15 to check that trueness of retitles has not been disturbed.

19 Remove reflecting mirrors (2) from inspection fixture (1).

b. INSTALLING M42 PERISCOPE ON INSPECTION FIXTURE

1 Mount M42 periscope (1) on inspection fixture (2), making sure that all mating surfaces are free of dirt, burrs, and other defects which would interfere with proper seating.

2 Secure M42 periscope (1) to inspection fixture (2) using three screws (3).



C. IMAGE TILT ADJUSTMENT

1 Check collimation by viewing reticle images through auxiliary telescope (1). Image of auxiliary telescope (1) reticle intersection point should coincide with reticle image of collimating projector (2).

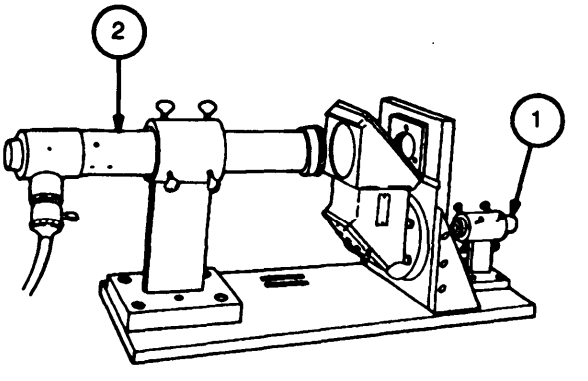
2 If auxiliary telescope (1) reticle does not coincide with image of collimating projector (2) reticle, adjust cover assembly (3) by turning three setscrews (4).

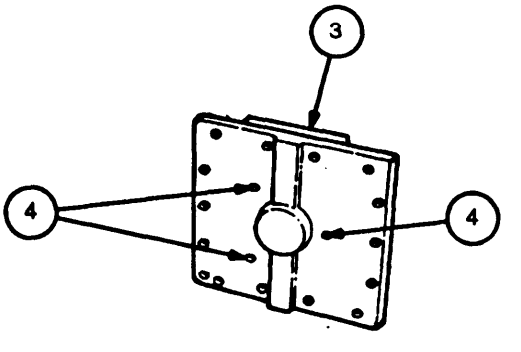
3 Check image tilt by viewing image of collimating projector vertical reticle line through auxiliary telescope (1). Vertical reticle line image should be vertical within 1 degree as measured on auxiliary telescope reticle (ref. TM 9-254).

4 If image tilt is not within specified limits, adjust the cover assembly (3) by turning three setscrews (4).

5 Recheck collimation (step 1) and adjust as necessary (step 2).

6 Apply adhesive to three setscrews (4) after final adjustment.





6-12. M42 PERISCOPE FINAL INSPECTION AND ADJUSTMENT- continued

d. SEALING INSPECTION

NOTE

There are currently 2 production models of the M42 periscope in use. The earlier model requires use of adapter 10552433 to attach purging hose assembly. The later model does not require the adapter.

1 Remove machine screw (1) or air valve cap (2) and purging machine screw (3).

2 For early model M42 periscope only, attach adapter (4) to inlet port (5).

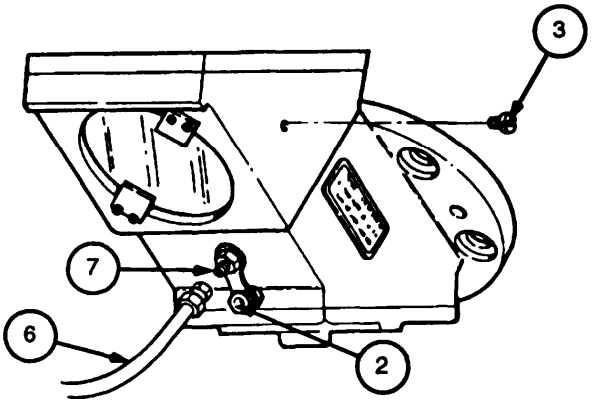
3 Attach hose assembly (6) to adapter (4) or to purging valve stem (7).

4 Make sure pressure regulator valve (8) is closed (fully counterclockwise). Open pressure regulator valve (8) until low pressure gage (9) indicates 5 psi (0.35 Kg/cm^2).

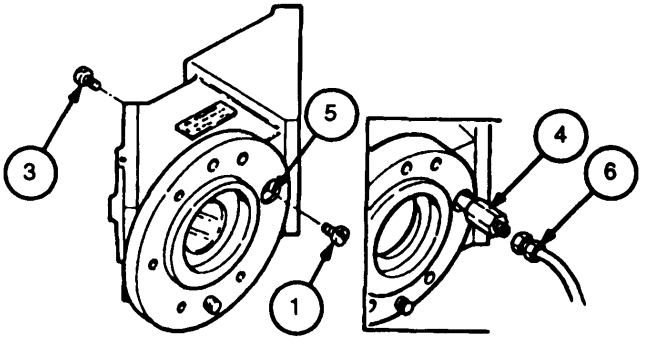
a. Maintain pressure for 5 minutes.

b. Close pressure regulator valve (8).

5 Apply adhesive to purging machine screw (3). Install and tighten purging machine screw (3).



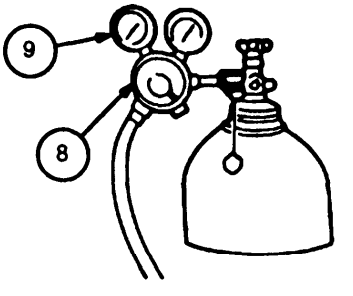
LATER PRODUCTION



EARLY PRODUCTION

NOTE

Early production models go to step 6. Late production models, go to steps 7,8, and 9.



6 Disconnect hose assembly (6) from inlet port (5).

a. Remove adapter (4).

b. Apply adhesive to machine screw (1). Install machine screw (1) in inlet port (5) and tighten.

7 Make sure pressure regulator valve (8) is closed (fully counterclockwise). Then slowly open pressure regulator valve (8) until 1 psi (0.07 Kg/cm^2) registers on low pressure gage (9).

a. Charge M42 periscope for 10 seconds.

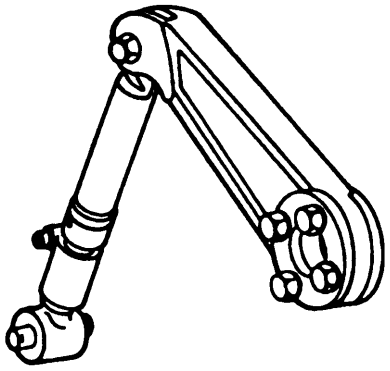
b. Turn pressure regulator valve (8) to off.

8 Apply a soap solution to all sealed joints and screws. Observe low pressure gage and M42 periscope for 5 minutes. If pressure drops or if bubbles appear, repair as necessary (ref. para 6-10).

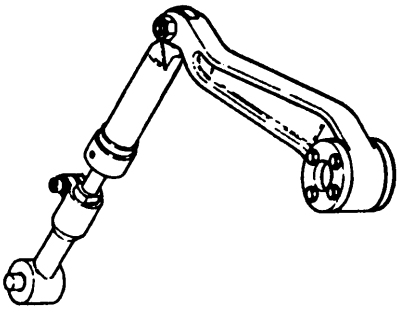
9 Remove hose assembly (6).

10 Install air valve cap (2).

CHAPTER 7
LINKAGE ASSEMBLY MAINTENANCE INSTRUCTIONS



8267877 (Used on M109A2/M109A3/M109A4/M109A5 Howitzers)



12563124 (Used on M109A6 Howitzers)

CHAPTER OVERVIEW

This chapter contains maintenance procedures for the linkage assembly. Information on repair parts and special tools and detailed procedures for troubleshooting and maintenance of the linkage assembly are included.

CHAPTER INDEX

Section I. Repair Parts; Special Tools; Test, Measurement, and Diagnostic Equipment (TMDE): and Support Equipment

7-1. COMMON TOOLS AND EQUIPMENT

For authorized common tools and equipment, refer to the Modified Table of Organization and Equipment (MTOE), CTA 50-970, applicable to your unit.

7-2. SPECIAL TOOLS, TMDE, AND SUPPORT EQUIPMENT

Special tools, TMDE, and support equipment required and authorized for repair of the linkage assembly are listed in the repair parts and special tools list, appendix D. Fabricated tools are listed in appendix C.

7-3. REPAIR PARTS

Repair parts are listed and illustrated in the repair parts and special tools list, appendix D.

Section II. Inspections

7-4. GENERAL

a. Inspection is performed primarily to determine the following:

(1) Completeness.

(2) The nature of serviceability.

(3) The work, repair parts, and supplies required to return the **materiel** to serviceability.

(4) That the work in process is being performed properly.

(5) That completed work complies fully with serviceability standards.

b. The linkage assembly is considered serviceable when:

(1) It is complete and properly performs its intended function.

(2) All modification work orders (MWO's) have been applied.

(3) All defects disclosed by the inspection have been corrected.

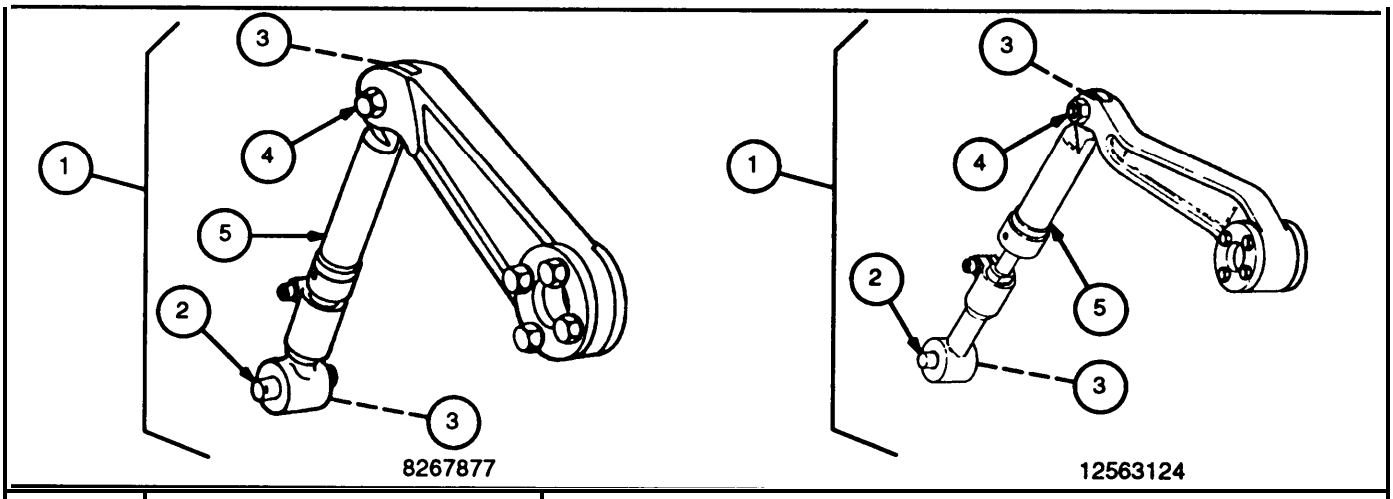
c. DA Form 2408-5 and DA Form 2409 list applicable MWO's.

7-5. CATEGORIES OF INSPECTION

Categories of inspection define responsibilities:

An initial inspection (ref. para 7-6) is performed immediately on receipt of the linkage assembly for maintenance. This inspection will determine the amount and type of work to be performed.

7-6. INITIAL INSPECTION



Item No.	Item To Be Inspected	Procedures
1	LINKAGE ASSEMBLY	Check that all components are properly positioned and securely attached. Check that linkage assembly (1) operates smoothly without binding or sticking.
2	CONNECTOR SHAFT	Check that both sides of connector shaft (2) are free of rust, corrosion, and burrs.
3,4	BEARINGS AND SHAFTS	Check that bearings (3) and shafts (2 and 4) are not worn, as indicated by lateral movement of link (5).

Section III. Troubleshooting

7-7. GENERAL

a. The symptom index can be used as a quick guide to troubleshooting. Common malfunctions are listed in alphabetical order with a page number reference to the troubleshooting table, where a test or inspection and corrective action are provided.

b. The direct support troubleshooting table (ref. para 7– 9) lists the common malfunctions which maybe found during maintenance of the linkage assembly. Perform the tests/inspections and corrective actions in the order listed.

c. This manual cannot list all malfunctions that may occur, nor all tests or inspections and corrective actions. If a malfunction is not listed, or is not corrected by listed corrective action, notify depot maintenance.

7-8. DIRECT SUPPORT SYMPTOM INDEX

7-9. DIRECT SUPPORT TROUBLESHOOTING

MALFUNCTION TEST OR INSPECTION CORRECTIVE ACTION	LOCATION

1. LINKAGE ASSEMBLY (1) BINDS.

   observe visually.

   Repair linkage assembly (ref. para 7-10).

2. CONNECTOR SHAFT (2) DOES NOT SEAT CORRECTLY.

   Observe visually.

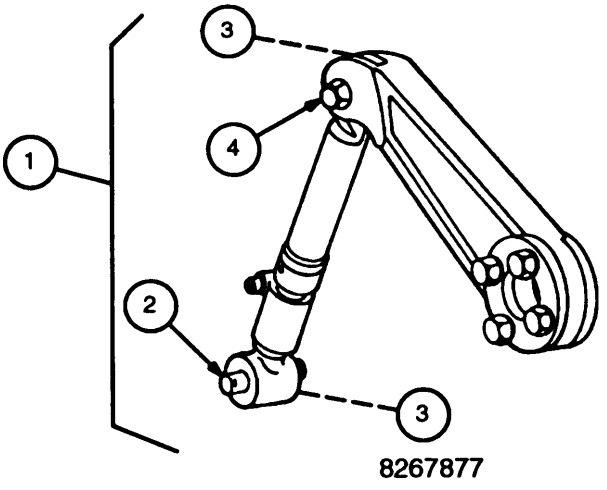
   a. Clean mounting surfaces with cleaning compound (item 3, appx B).

   b. Remove burrs with abrasive cloth (item 4, appx B) dipped in cleaning compound (item 3, appx B).

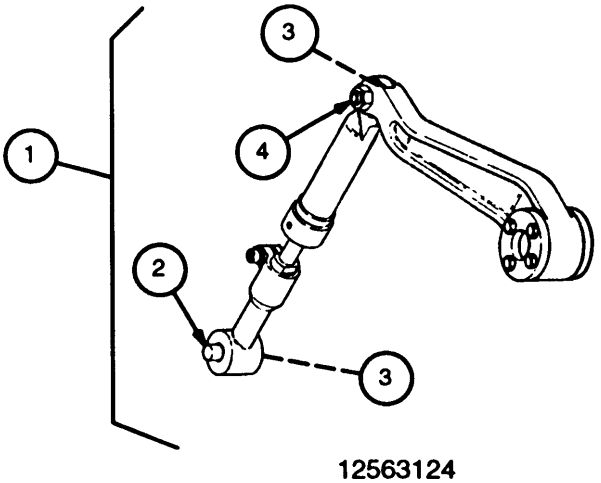
3. BEARINGS (3) ARE WORN AND OBJECTIONABLE MOVEMENT IS APPARENT.

   Check by feel for movement laterally and vertically.

   Repair by replacement of worn bearings (3) or shafts (2 and 4) (ref. para 7-10).



8267877



12563124

Section IV. Direct Support Maintenance Procedures

7-10. LINKAGE ASSEMBLY MAINTENANCE INSTRUCTIONS

This task covers: a. Disassembly b. Repair c. Assembly

INITIAL SET-UP

Tools

Tool Kit, Electronic System, Repair, Field Maintenance (SC5180-95-CL-B29) 51 80–01-1 68-0487

Materials/Parts

Grease (Item 6, appx B)
Lockwasher (Item 78, appx E) for 8267877
Lockwasher (Item 74, appx E) for 12563124
Lockwashers (4) (Item 79, appx E)
Self-locking nuts (2) (Item 18, appx E)

References

TM 9-254

Equipment Condition

Linkage assembly removed from howitzer (TM 9-2350-311-20-2 /TM 9-2350-314-20-2)

a. Disassembly

1 Remove four cap screws (1) and four lockwashers (2). Discard lockwashers.

2 Remove plate (3), plate (4), and two gripspring sets (5).

3 Remove two self-locking nuts (6) from shouldered shaft (7). Tap shouldered shaft (7) from arm (8) with brass drift punch. Discard self-locking nuts.

4 Separate arm (8) from link (9) and remove two gripspring sets (10).

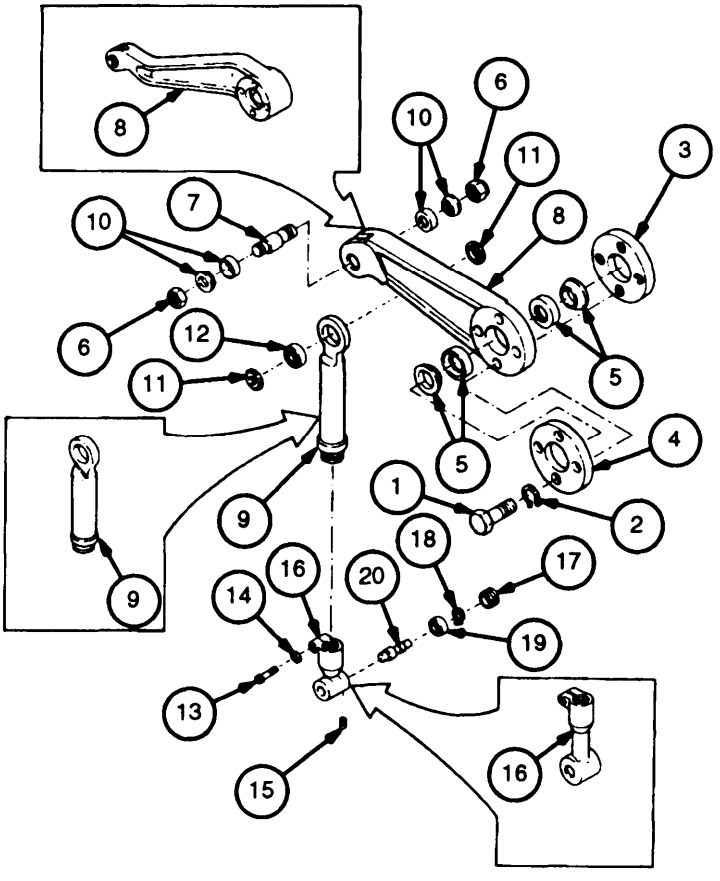
5 Remove two washer bearings (11) and bearing (12) from link (9).

6 Remove cap screw (13), lockwasher (14), and setscrew (15) from connector (16). Discard lockwasher.

7 Using adjustable spanner wrench, remove threaded ring (17).

8 Remove retaining ring (18), bearing (19), and shaft (20) as a unit.

9 Remove retaining ring (18) and bearing (19) from shaft (20).



7-10. LINKAGE ASSEMBLY MAINTENANCE INSTRUCTIONS - continued

b. Repair

1 Remove corrosion, grease, and dirt from all parts. Refer to TM 9-254 for cleaning instructions.

2 Visually inspect for missing or damaged parts.

3 Repair or replace parts in accordance with authorized parts listed in appendix D.

c. Assembly

1 Apply grease to bearing seat of connector (16).

2 Install bearing (19) and retaining ring (18) on shaft (20).

3 Install bearing (19), retaining ring (18), and shaft (20) as a unit in connector (16).

4 Install threaded ring (17) using adjustable spanner wrench.

5 Install setscrew (15), new lockwasher (14), and cap screw (13) on connector (16).

6 Install bearing (12) in link (9), then install two washer bearings (11) with raised portion positioned against bearing (12).

7 Install link (9) in arm (8) with the bevel of the link parallel to the bevel of the arm.

8 Apply grease to shouldered shaft (7).

9 Install shouldered shaft (7) in arm (8) and tap into position.

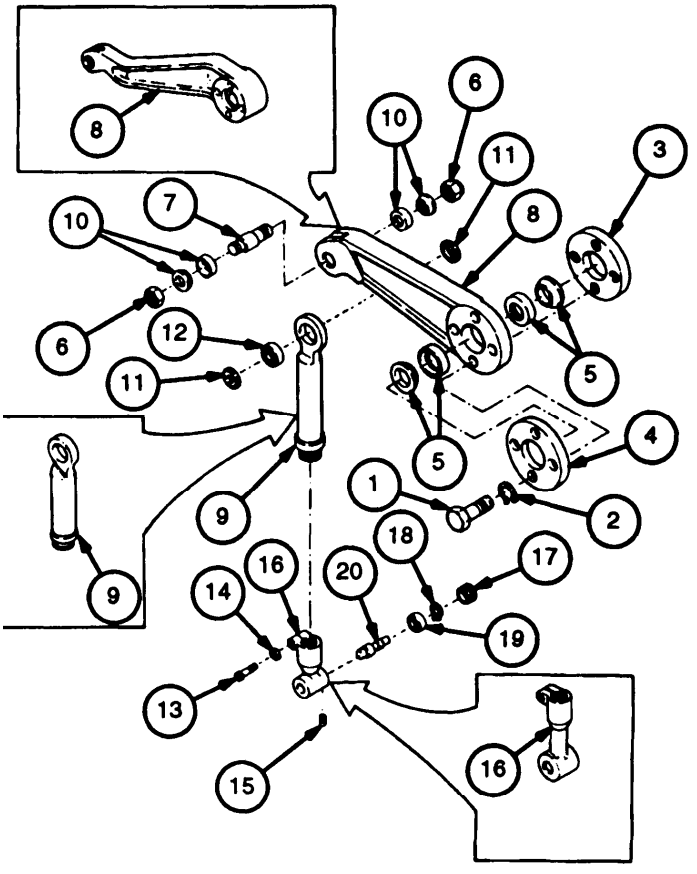
10 Install two gripspring sets (10) with the flat sides of the external springs positioned against washer bearings (11).

11 Install two new self-locking nuts (6) on shouldered shaft (7).

12 Install two gripspring sets (5) in arm (8) with the flat sides of the external halves together.

13 Place plate (4) on arm (8) and plate (3) on the opposite side of arm (8) as shown.

14 Install four new lockwashers (2) and four cap screws (1).



APPENDIX A
REFERENCES

A-1. SCOPE

This appendix lists all forms and pamphlets, technical manuals, supply catalogs and other references found in this manual.

A-2. TECHNICAL MANUALS

General Procedures for Purging and Charging of Fire Control Instruments	TM 750-116
General Maintenance Procedures for Fire Control Materiel	TM 9-254
Operators Manual for Howitzer, Medium, Self-Propelled, 155 MM, M109A2 (2350-01-031-0586), M109A3 (2350-01-031-8851) M109A4 (2350-01-277-5770) and M109A5 (2350-01-281-1 719)	TM 9-2350-311-10
Organizational Maintenance Manual for Howitzer, Medium, Self-Propelled, 155 MM, M109A2 (2350-01-031-0586) M109A3 (2350-01-031-8851) M109A4 (2350-01-277-5770), and M109A5 (2350-01-281-1 719)	TM 9-2350-311-20-2
Operator's Manual for Howitzer, Medium, Self-Propelled, 155 MM, M109A6(2350-01-305-0028)	TM 9-2350-314-10
Organizational Maintenance Manual for Howitzer, Medium, Self-Propelled, M109A6 (2350-01-305-0028)	TM 9-2350-314-20-2

A-3. FORMS AND PAMPHLETS

Recommended Changes to Publications andBlank Forms	DA FORM 2028
Recommended Changes to Equipment Technical Publications	DA FORM 2028-2
Equipment Modification Record	DA FORM 2408-5
Equipment Maintenance Log	DA FORM 2409
The Army Maintenance Management System (TAMMS)	DA PAM 738-750
First Aid for Soldiers	FM 21-11 (TEST)
Quality Deficiency Report	SF 368

A-4. SUPPLY CATALOGS

Shop Equipment, Instrument and Fire Control: Field Maintenance, Basic
4931-04-754-0740 ..... SC 4931-95-CL-A07

Tool Equipment, Instrument and Fire Control System, Repair, Field Maintenance
4931-00-947-8243. ..... SC 4931-95-CL-A09

Purging Kit, Fire Control: Organizational, Direct and General
Support Maintenance 4931-00-0851110....., ... SC 4931-95-CL-J54

Tool Kit, Electronic System, Repair Field Maintenance
5180-01-188-0487.. ..... SC 5180-95-CL-B29

A-5. OTHER

Expendable/Durable Items (Except Medical, Class V, Repair Parts,
and Heraldic Items) . . . . . CTA 50-970

Army Medical Department Expendable/Durable Items . . . . . CTA 8-100

APPENDIX B
EXPENDABLE AND DURABLE ITEMS LIST

Section I. Introduction

B-1. SCOPE

This appendix lists expendable and durable items you will need to operate and maintain the M109 fire control equipment. This listing i 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.

B-2. EXPLANATION OF COLUMNS

a. Column (1) - Item Number. This number is assigned to the entry in the listing for referencing when required.

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

C - Operator/Crew
0 - Unit Maintenance
F - Direct Support Maintenance
H - General Support Maintenance

c. Column (3) - National Stock Number. This is the national stock number assigned to the item; use it to request or requisition the item.

d. Column (4) - Description. Indicates the federal item name and, if required, a description to identify the item. The last line for each item indicates the Commercial and Government Entity Code (CAGEC) in parentheses followed by the part number.

e. Column (5) - Unit of Measure (U/M)/Unit of Issue (U/I). This measure is expressed by a two-character alphabetical abbreviation (e.g., EA, IN, PR). If the unit of measure differs from the unit of issue as shown in the Army Master Data File (AMDF) requisition the lowest unit of issue that will satisfy your requirements.

Section II. Expendable and Durable Items List

(1) Item Number	(2) Level	(3) National Stock Number	(4) Description	(5) U/M
1	F	8040-00-221-3811	ADHESIVE (81349) MMM-A-1617, TYPE I	OZ
1.1	F	8040-00-221-3811	ADHESIVE, RUBBER (81348) MMM-A-1617, TYPE II	OZ
2	F	8040-04-117-8510	ADHESIVE-SEALANT, SILICONE 3145 RTV CLEAR (71984) MIL-A-46146	TU
3	F	6850-00-224-6665	CLEANING COMPOUND, SOLVENT DEGREASING (82925) CCE-10	GL
4	F	5350-00-221-0872	CLOTH, ABRASIVE (58536) A-A-1206	SH
5	F	3439-00-008-8808	FLUX, SOLDERING (81438) MIL-F-14256	PT
6	F	9150-00-985-7243	GREASE, AIRCRAFT: GREASE, AIRCRAFT INSTRUMENT, CORROSION AND WATER-RESISTANT, 1-02 (28.3-G) TUBE (81349) MIL-G4343	TU
7	F	6850-00-880-7616	GREASE, SILICONE (81349) MIL-S-8660	TU
8	F	6830-00-656-1596	NITROGEN, TECHNICAL (81348) BB-N-411	CY
9	F	9150-00-257-5449	OIL, LUBRICATING, INSTRUMENT AIRCRAFT (81349) MIL-L-6085	CN
10	F	8010-01-154-2334	PAINT, EPOXY-POLYAMIDE (CARC) (WHITE) (81349) MIL-C-22750	QT
11	F	6640-00-597-6745	PAPER, LENS (80244) 840528	
12	F	7920-00-2053570	RAG, WIPING (58536) AA-531	BE
13	F	8030-00-537-7925	SEALING COMPOUND, ADHESIVE, CURING, POLYSULFIDE BASE (81349) MIL-S-11031	PT
14	F	8030-00-081-2333	SEALING COMPOUND, GRADE C (81349) MIL-S-22473	BT

(1)	(2)	(3)	(4)	(5)
ITEM NUMBER	LEVEL	NATIONAL STOCK NUMBER	DESCRIPTION	U/M
15	F	8030-00-275-8114	SEALING COMPOUND, NON-CURING (81349) MIL-S-11030	PT
16	F	5970-00-063-1500	INSULATION SLEEVING (81349) M23053/1-101-0	FT
17	F	5970-01-161-1434	INSULATION SLEEVING (81349) M3190/02-15-N	FT
18	F	3439-00-453-5473	SOLDER, TIN ALLOY, LEAD-TIN ALLOY AND LEAD ALLOY (81348) QQ-S-571	LB
19	F	9515-00-243-1872	STEEL, SHIM STOCK (81349) MIL-S-22499	SH
20	F	7510-00-266-6712	TAPE,PRESSURE SENSITIVE (19203) 8783476	RO
21	F	8010-01-200-2637	THINNER (FOR CARC EPOXY-POLYAMIDE) (80244) MIL-T-81772, TYPE 2	GL
22	F	6145-00-702-8604	WIRE,ELECTRICAL (BLACK) LW-C22 (7) J0	RO
23	F	6145-00-174-1119	WIRE,ELECTRICAL (RED) LW-C22 (7) J2	RO
24	F	6145-00-669-6235	WIRE,ELECTRICAL (WHITE) LW-C22 (7) J9	RO
25	F	6145-00-548-2994	WIRE,ELECTRICAL (WHITE WITH RED TRACER) LW-C22 (7) J92	RO

APPENDIX C
ILLUSTRATED LIST OF MANUFACTURED ITEMS

Section I. Introduction

C-1. SCOPE

This appendix includes complete instructions for making items authorized to be manufactured or fabricated at unit maintenance level. Al bulk materials needed for manufacture of an item are listed by specification number in the notes included with the illustration.

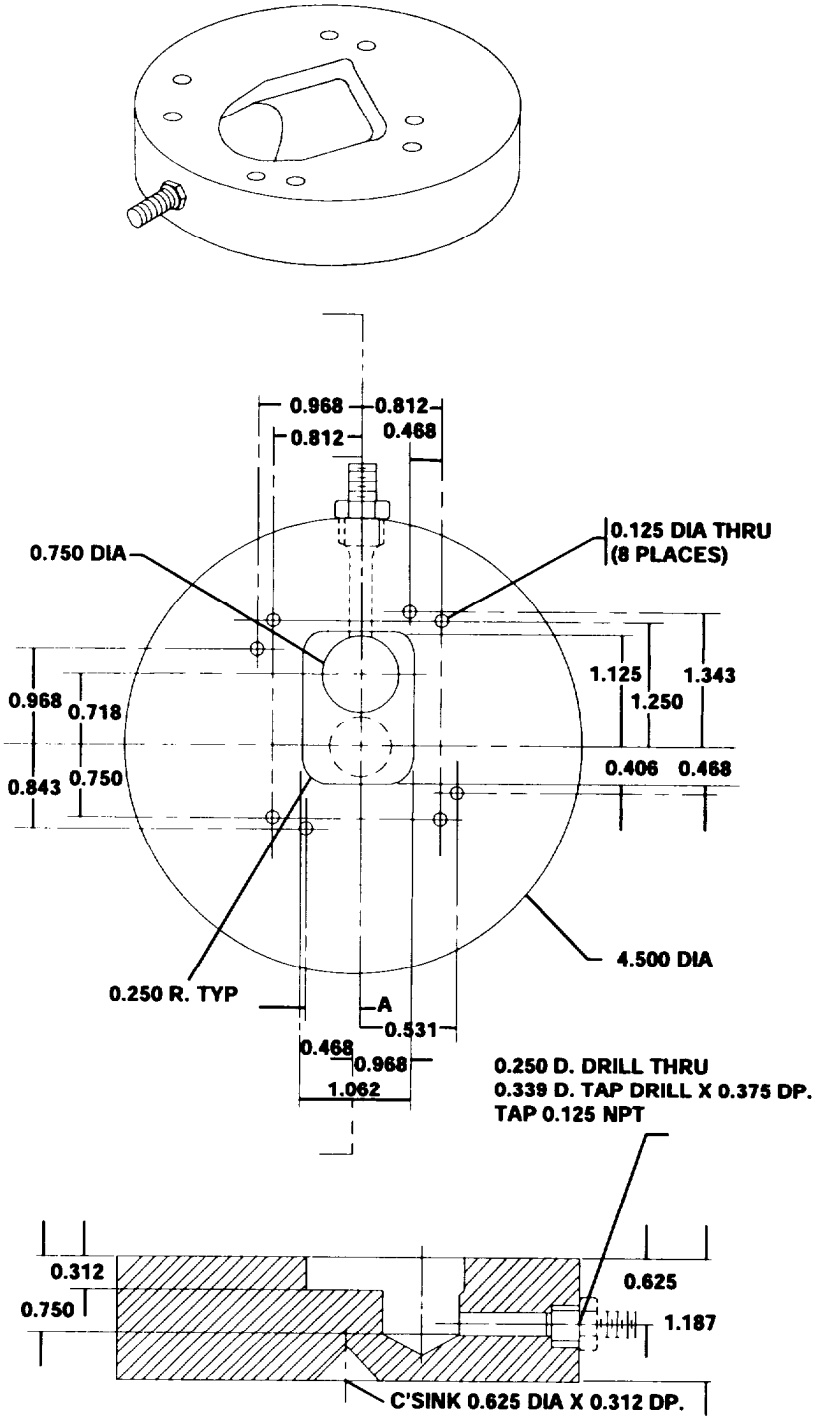
Section II. Manufactured Items List

C-2. MANUFACTURED ITEMS INDEX

Nomenclature	Figure Number
Adapter, leak test	C-1
Eccentric tool, one piece	C-2
Eccentric tool, two piece	C-3
Collimator holding fixture	C-4
Wrench, spanner	C-5
Wrench, spanner	C-6
Wrench, spanner	C-7
Wire, electrical	C-8
Sleeving, insulation (non-shrinkable)	C-9
Sleeving, insulation (shrinkable)	C-10
Rigidity test target	C-11
Quadrant mounting fixture	C-12

C-3. MANUFACTURED ITEMS ILLUSTRATIONS

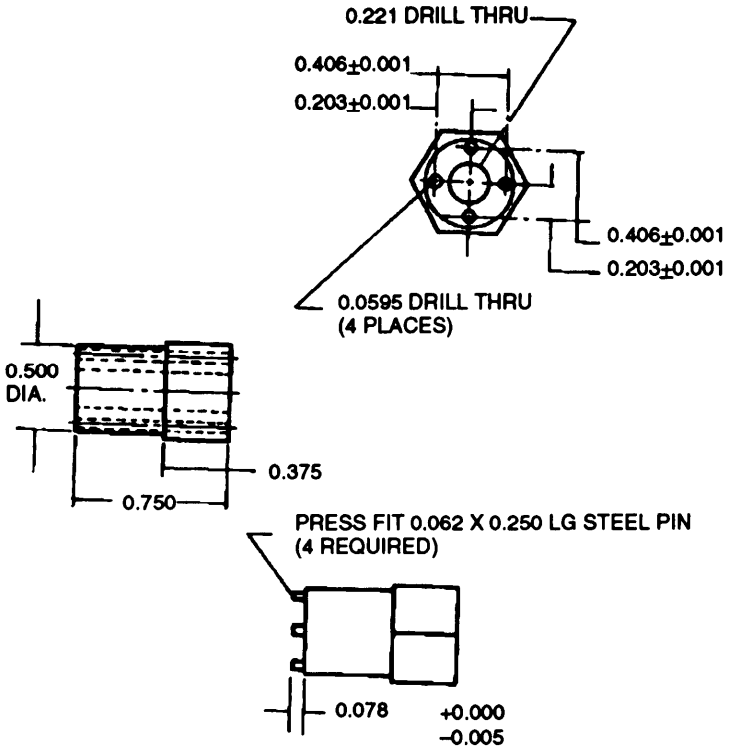
CONVERSION TABLE	
IN.	CM
0.125	0.318
0.250	0.635
0.312	0.792
0.339	0.861
0.375	0.953
0.406	1.031
0.468	1.189
0.531	1.349
0.625	1.588
0.718	1.824
0.750	1.905
0.812	2.062
0.843	2.141
0.968	2.459
1.062	2.697
1.125	2.858
1.250	3.175
1.343	3.411
1.187	3.015
4.500	11.430



NOTES:
1. All dimensions are in inches.
2. Fabricate from aluminum QQ-A-200.

Figure C-1. Leak Test Adapter

CONVERSION TABLE	
IN.	CM
0.001	0.003
0.005	0.013
0.0592	0.151
0.062	0.157
0.078	0.198
0.203	0.516
0.221	0.561
0.250	0.635
0.375	0.953
0.406	1.031
0.500	1.270
0.750	1.905



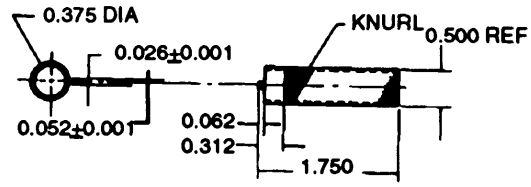
NOTES:

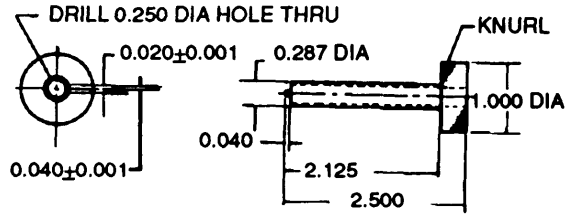
1. All dimensions are in inches.
2. Dimensions ±0.010 unless otherwise stated.
3. Fabricate from 9/16 hex stock C.R.S. QQ-T-580.
4. Remove burrs and break all sharp edges.

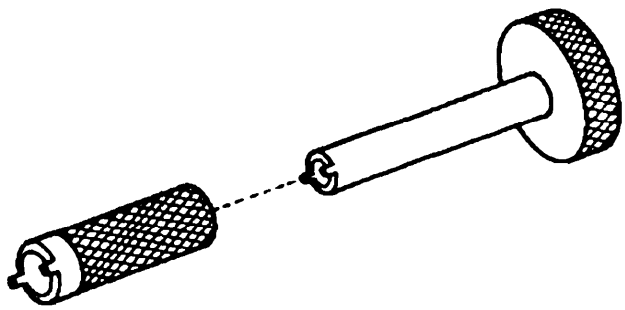
Figure C-2. One Piece Eccentric Tool

C-3. MANUFACTURED ITEMS ILLUSTRATIONS - continued

CONVERSION TABLE	
IN.	CM
0.001	0.003
0.020	0.051
0.026	0.066
0.040	0.102
0.052	0.132
0.062	0.157
0.250	0.635
0.287	0.729
0.312	0.792
0.375	0.953
0.500	1.270
1.000	2.540
1.750	4.445
2.125	5.398
2.500	6.350





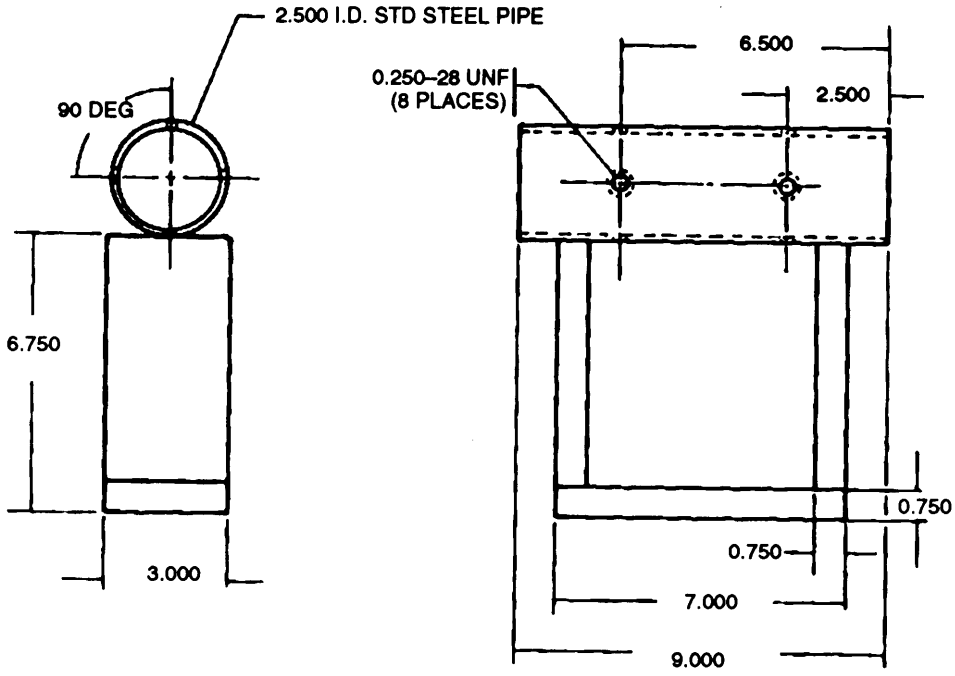


NOTES:

1. All dimensions are in inches.
2. Fabricate from steel QQ-T-580.
3. Remove burrs and break all sharp edges.

Figure C-3. Two Piece Eccentric Tool

CONVERSION TABLE	
IN.	CM
0.250	0.635
0.750	1.905
2.500	6.350
3.000	7.620
6.500	16.510
6.750	17.145
7.000	17.780
9.000	22.860



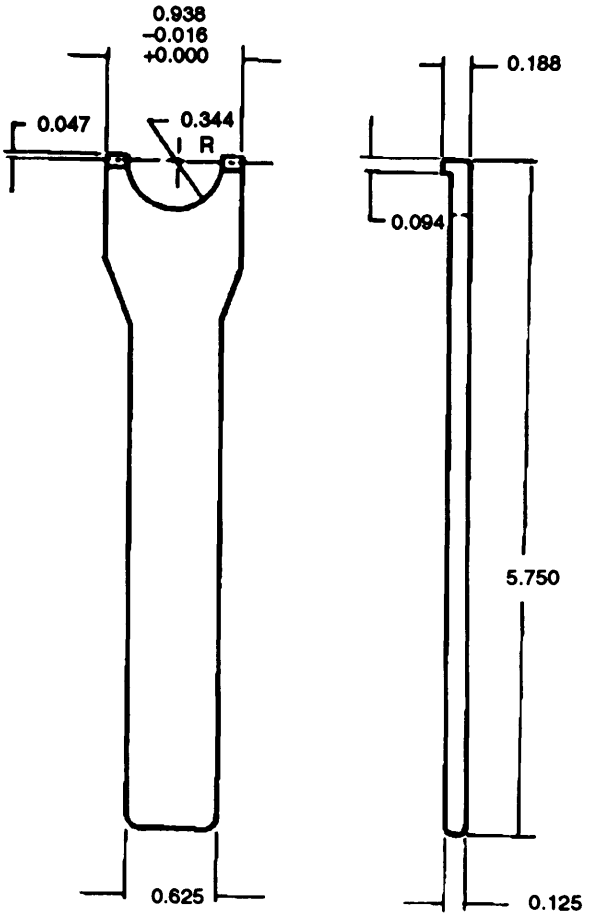
NOTES:

1. All dimensions are in inches unless otherwise specified.
2. All welded construction.
3. Fabricate from steel QQ-T-580

Figure C-4. Collimator Holding Fixture

C-3. MANUFACTURED ITEMS ILLUSTRATIONS - continued

CONVERSION TABLE	
IN.	CM
0.016	0.041
0.047	0.119
0.094	0.239
0.125	0.318
0.188	0.478
0.344	0.874
0.625	1.588
0.938	2.383
5.750	14.605

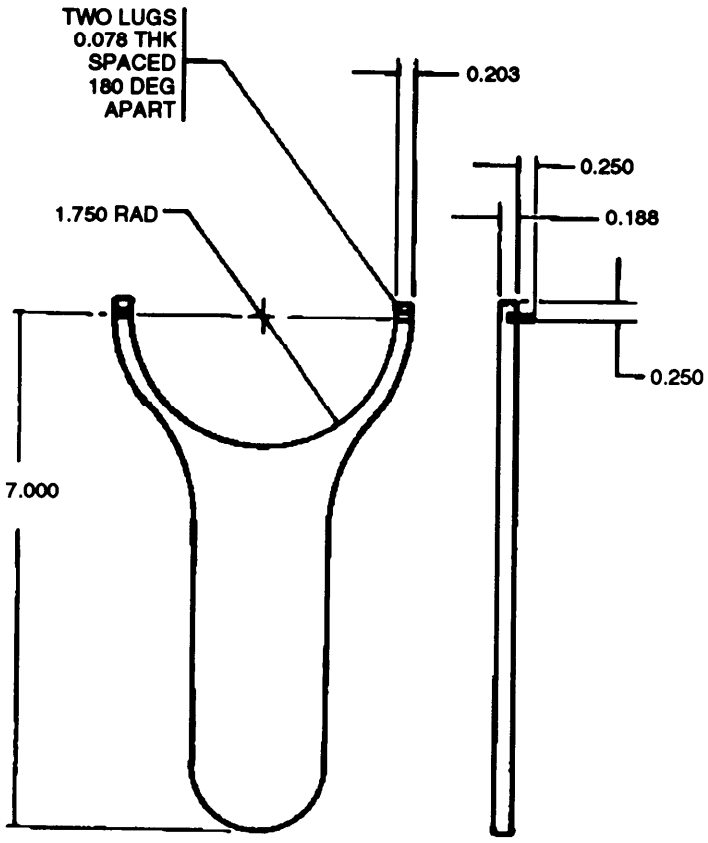


NOTES:

1. All dimensions are in inches.
2. Fabricate from steel QQ-T-580.

Figure C-5. Spanner Wrench

CONVERSION TABLE	
IN.	**CM**
0.078	0.198
0.188	0.478
0.203	0.516
0.250	0.635
1.750	4.445
7.000	17.780



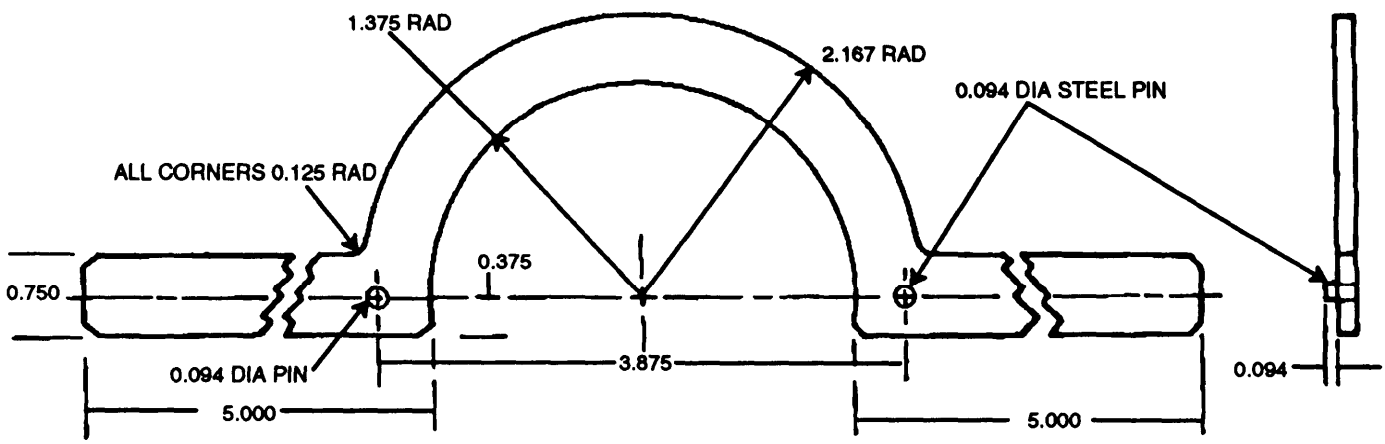
NOTES:

1. All dimensions are in inches.
2. Fabricate from steel QQ-T-580.

Figure C-6. Spanner Wrench

C-3. MANUFACTURED ITEMS ILLUSTRATIONS - continued

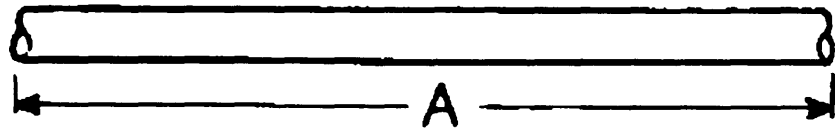
CONVERSION TABLE	
IN.	CM
0.094	0.239
0.125	0.318
0.375	0.953
0.750	1.905
1.375	3.493
2.167	5.504
3.875	9.843
5.000	12.700



NOTES:

1. All dimensions are in inches.
2. Fabricate from 0.188 thk steel QQ-T-580.

Figure C-7. Spanner Wrench



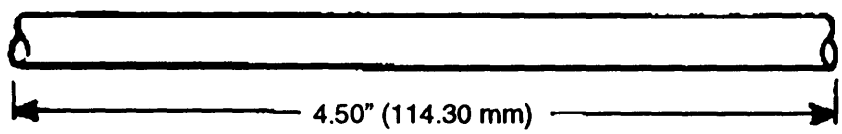
NOTE:

Fabricate from materials according to table below.

Application	Pt No.	Material	Length A
M118A2/M118A3 elbow telescope: wiring harness 8215873	8215873-1	Wire, electrical, LW-C22 (7) J0 6145-00-702-8604 (Item 22, appx B)	10.5 in. (266.7mm)
	8215873-2	Wire, electrical, LW-C22 (7) J0 6145-00-702-8604 (Item 22, appx B)	6.5 in. (165.1mm)
	8215873-3	Wire, electrical, LW-C22 (7) J92 6145-00-548-2994 (Item 25, appx B)	6.5 in. (165.1 mm)
		or	
		Wire, electrical, LW-C-22 (7) J9 6145-00-669-6235 (Item 24, appx B)	
	8215873-4	Wire, electrical, LW-C22 (7) J2 6145-00-174-1119 (Item 23, appx B)	14.5 in. (368.3mm)

Figure C-8. Electrical Wire

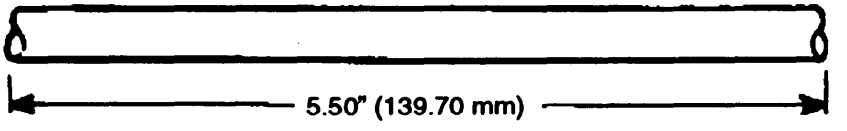
C-3. MANUFACTURED ITEMS ILLUSTRATIONS - continued



NOTE:

Fabricate from insulation sleeving (Item 17, appx B).

Figure C-9. Insulation Sleeving (Non-shrinkable)



NOTE:

Fabricate from insulation sleeving (Item 16, appx B).

Figure C-10. Insulation Sleeving (Shrinkable)

C-3. MANUFACTURED ITEMS ILLUSTRATIONS - continued

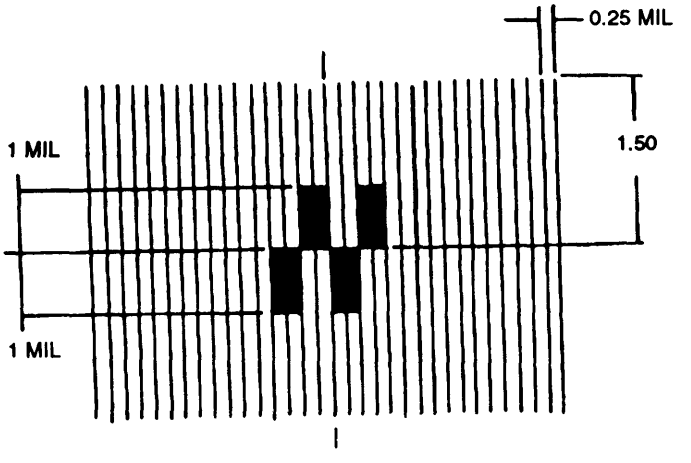
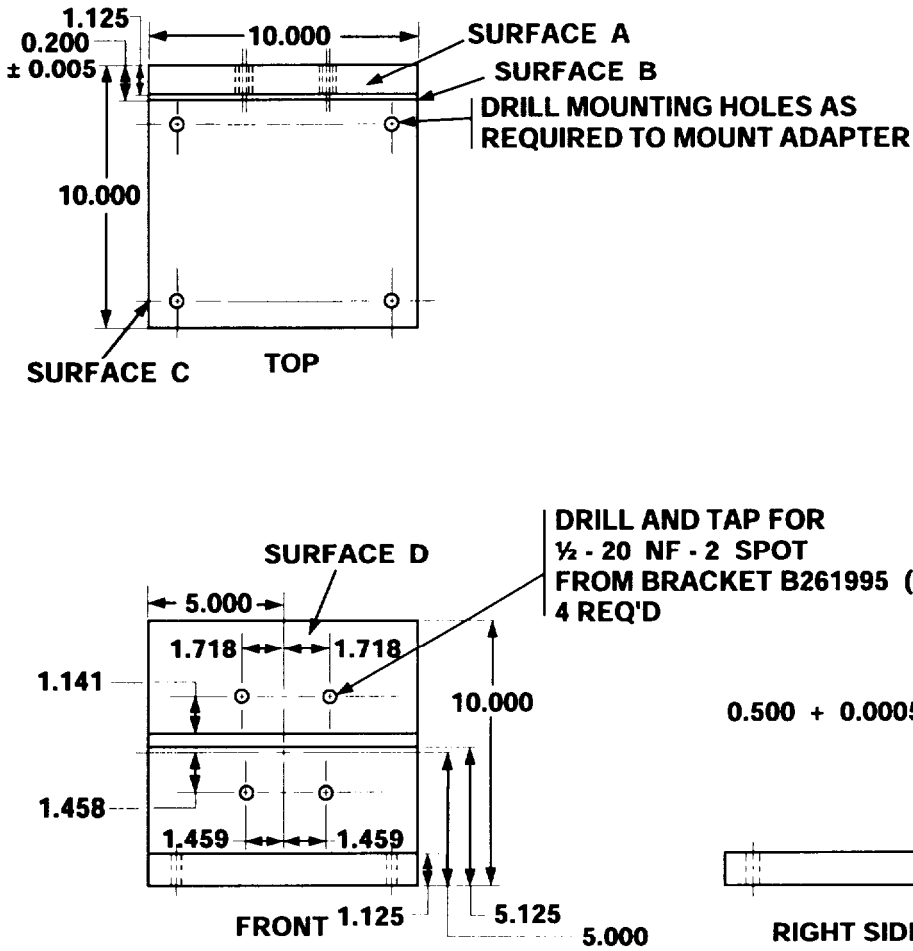


Figure C-11. Rigidity Test Target

CONVERSION TABLE	
IN.	CM
0.0005	0.0013
0.0050	0.0127
0.2000	0.5080
0.5000	1.2700
1.1250	2.8575
1.1410	2.8981
1.4580	3.7033
1.4590	3.7059
1.7180	4.3637
5.0000	12.7000
5.1250	13.0175
10.0000	25.4000



NOTES:
1. All dimensions are in inches.
2. Fabricate from steel, QQ-T-580.
3. Surfaces A, B, and C to be parallel to each other within 0.0002 TIR. Surface D to be perpendicular to surface C within 0.001 for its entire length.

Figure C-12. Quadrant Mounting Fixture

APPENDIX D
DIRECT SUPPORT AND GENERAL SUPPORT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS LIST (INCLUDING DEPOT MAINTENANCE REPAIR PARTS AND SPECIAL TOOLS)

SECTION I. INTRODUCTION

1. 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 on the M109 Howitzer fire control equipment. It authorizes the requisitioning, issue, and disposition of spares, repair parts, and special tools as indicated by the source, maintenance, and recoverability (SMR) codes.

2. General. In addition to Section I, Introduction, this Repair Parts and Special Tools List is divided into the following sections:

a. Section II - Repair Parts List. A list of spares and repair parts authorized by this RPSTL for use in the performance of maintenance. The list also includes parts which must be removed for replacement of the authorized parts. Parts lists are composed of functional groups in ascending alphanumeric sequence, with the parts in each group listed in ascending figure and item number sequence. Bulk materials are listed by item name in FIG BULK at the end of the section. Kit repair parts are listed at the end of their applicable figure and appear in item number sequence.

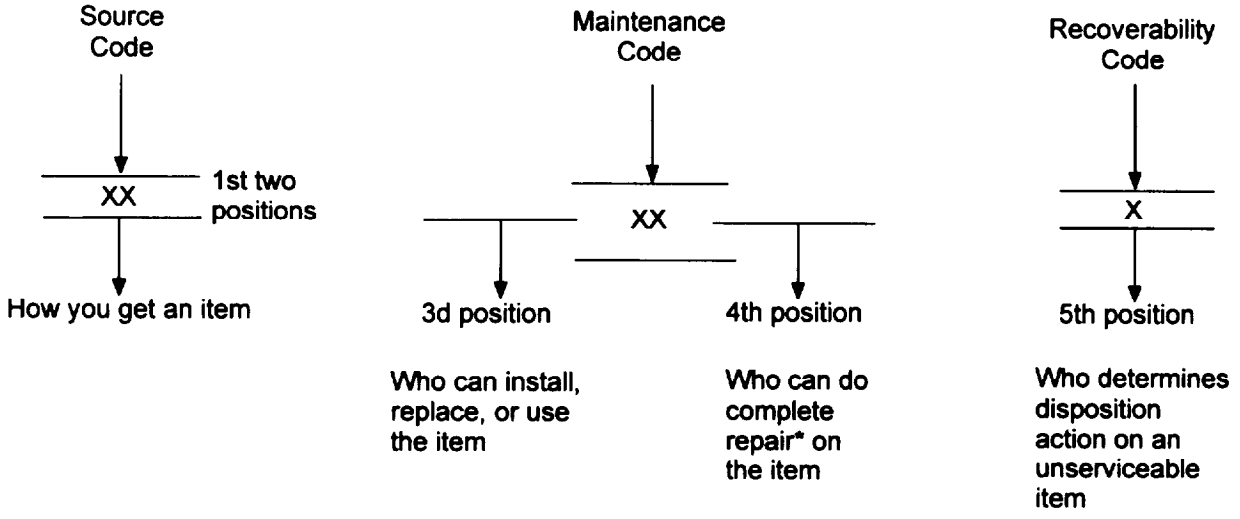
b. Section III - Special Tools List. A list of special tools, special TMDE, and other special support equipment authorized by this RPSTL (as indicated by Basis of Issue (BOI) information in DESCRIPTION AND USABLE ON CODE (UOC) column) for the performance of maintenance.

c. Section IV - Cross-reference Indexes. There are two cross-reference indexes in this RPSTL. The National Stock Number Index and the Part Number Index. The National Stock Number Index refers you to the figure and item number. The Part Number Index refers you to the National Stock Number and to the figure and item number.

3. Explanation of Columns (Sections II and III).

a. ITEM NO. (Column (1)) Indicates the number used to identify items called out in the illustration.

b. SMR CODE (Column (2)). The Source, Maintenance, and Recoverability (SMR) code is a 5-position cede containing supply/requisitioning information, maintenance category authorization criteria, and disposition instruction, as shown in the following breakout:



*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.

(1) 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:

Code	Explanation
PA PB PC** PD PE PF PG	Stocked items; use the applicable NSN to reques/requisition items with these source codes. They are authorized to the category indicated by the code entered in the 3d position of the SMR codes. "Items coded PC are subject to deterioration.
KD KF KB	Items with these codes are not to be request&/requisitioned individually. They are part of a kit which is authorized to the maintenance category indicated in the 3d position of the SMR code. The complete kit must be requisitioned and applied.

Code	Explanation
MO- (Made at unit/ AVUM Level) MF- (Made at DS/ AVUM Level) MH- (Made at GS Level) ML- (Made at Specialized Repair Activity (SRA)) MD- (Made at Depot).	Items with these codes are not to be requested/ requisitioned individually. They must be made from bulk material which is identified by the part number in the DESCRIPTION AND USABLE ON CODE (UOC) column and listed in the bulk material group of the repair parts list in this RPSTL. If the item is authorized to you by the 3d position code of the SMR code, but the source code indicates it is made at a higher level, order the item from the higher level of maintenance.
AO-(Assembled by unit/AVUM Level) AF- (Assembled by DS/AVIM Level) AH-(Assembled by GS Category) AL- (Assembled by SRA) AD- (Assembled by Depot)	Items with these codes are not to be requested requisitioned individuality. 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 3d 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.

NOTE

Cannibalization or controlled exchange, when authorized, maybe used as a source of supply for items with the source codes, listed below, except for those source-coded "XA" or those aircraft support items restricted by requirements of AR 700-42.

XA – Do not requisition an "XA"-coded item. Order its next higher assembly.
XB – If an "XB" item is not available from salvage, order it using the CAGEC and part number given.
XC – Installation drawing, diagram, instruction sheet, field service drawing that is identified by manufacturer's part number.
XD - Item is not stocked. Order an "XD"-coded item through normal supply channels using the CAGEC and part number given, if no NSN is available.

(2) 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:

(a) 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 one of the following levels of maintenance.

3. Explanation of Columns (Section II and III).—Continued

Code	Application/Explanation
C	-Crew or operator maintenance done within unit or aviation unit maintenance.
O	-Unit or aviation unit category can remove, replace, and use the item.
F	-Direct support or aviation intermediate level can remove, replace, and use the item.
H	-General support level can remove, replace, and use the item.
L	-Specialized repair activity can remove, replace, and use the item.
D	-Depot level can remove, replace, and use the item.

(b) The maintenance code entered in the fourth position tells whether or not the item is to be repaired and identifies the lowest maintenance level with the capability to do complete repair (i.e., perform all authorized repair functions). 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. This position will contain one of the following maintenance codes.

Code	Application/Explanation
O	–Unit or aviation unit is the lowest level that can do complete repair of the item.
F	-Direct support or aviation intermediate is the lowest level that can do corn-plete 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 the “B"-coded item.) However, the item maybe reconditioned by adjusting, lubricating, etc., at the user level.

(3) 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 Codes	Application/Explanation
Z	-Nonreparable item. When unserviceable, condemn and dispose of the item at the level of maintenance shown in 3d position of SMR Code.
O	-Reparable item. When uneconomically reparable, condemn and dispose of the item at unit or aviation unit level.
F	-Reparable item. When uneconomically reparable, condemn and dispose of the item at the direct support or aviation intermediate 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 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 (e.g., precious metal content, high dollar value, critical material, or hazardous material). Refer to appropriate manuals/directives for specific instructions.

c. NSN (Column (3)). The national stock number for the item is listed in this column.

d. CAGEC (Column (4)). The Contractor and Government Entity Code (CAGEC) is a 5-digit numeric code which is used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

e. 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 part number from the part ordered.

f. 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) Items that are included in kits and sets are listed below the name of the kit or set.

(3) Spare/repair parts that make up an assembled item are listed immediately following the assembled item line entry.

3. Explanation of Columns (Sections II and III). - Continued

(4) Part numbers for bulk materials are referenced in this column in the line item entry for the item to be manufactured/fabricated.

(5) The usable on code, when applicable (see paragraph 5, Special Information).

(6) In the special tools list section, the basis of issue (BOl) appears as the last line(s) in the entry for each special tool, special TMDE, and other special support equipment. When density of equipment supported exceeds density spread indicated in the BOI, the total authorization is increased proportionately.

(7) The statement “END OF FIGURE” appears just below the last item description in column (6) for a given figure in both Section II and Section III.

g. 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 in lieu o a quantity indicates that the quantity may vary from application to application.

4. Explanation of Index Format and Columns (Section IV).

a. NATIONAL STOCK NUMBER (NSN) INDEX.

(1) STOCK NUMBER Column. This column lists the NSN by National Item Identification Number (NIIN) sequence. The NIIN consists of the last nine digits of the NSN (i.e., 5305-01-674-1467). When using this column to locate an item, ignore the first 4 digits of the NSN. However, the complete NSN should be used when ordering items by stock number.

(2) FIG. Column. This column lists the number of the figure where the item is identified/located. The figures are in numerical order in Section II and Section Ill.

(3) 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.

b. Part Number index. Part numbers in this index are listed by part number in ascending alphanumeric sequence (i.e., vertical arrangement of letter and number combination which places the first letter or digit of each group in order A thru Z, followed by the numbers 0 thru 9 and each following letter or digit in like order).

(1) CAGEC Column. The Contractor and Government Entity Code (CAGEC) is a 5-digit numeric code used to identify the manufacturer, distributor, or Government agency, etc., that supplies the item.

(2) PART NUMBER Column. Indicates the primary number used by the manufacturer (individual, 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.

(3) STOCK NUMBER Column. This column lists the NSN for the associated part number and manufacturer identified in the PART NUMBER and CAGEC columns to the left.

(4) FIG. Column. The column lists the number of the figure where the item is identified/located in Sections II and III.

(5) ITEM Column. The item number is that number assigned to the item as it appears in the figure referenced in the adjacent figure number column.

5. Special Information.

a. Usable on Code. The usable on code appears in the lower left comer of the Description column heading. Usable on codes are shown as "UOC:...' in the Description Column (justified left) on the first line applicable item description/nomenclature. Uncoded items are applicable to all models. Identification of the usable on codes used in the RPSTL are:

Code	Used On
L96	M146 telescope mount
L95	M118A2 elbow telescope
V46	M116A3 elbow telescope
L98	M145 telescope mount
V36	M145A1 telescope mount
U38	M117 panoramic telescope
L97	M117A2 panoramic telescope
762	M42 periscope
L99	M15 fire control quadrant

b. 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 appendix C.

c. Assembly Instructions. Detailed assembly instructions for items source-coded to be assembled from component spare/repair parts are found in TM 9-2350-311-20-2 and TM 9-2350-311-34-2. Items that make up the assembly are listed immediately following the assembly item entry or reference is made to an applicable figure.

d. Kits Line item entries for repair parts kits appear in their applicable figure in item number sequence. The statement 'Part of Kit P/N' with the applicable part number will follow the item name.

e. Index Numbers. Items which have the work 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 National Stock Number/Part Number index and the bulk material list in Section II.

f. Associated Publications. The publications listed below pertain to the M109 Howitzer fire control equipment and components:

Publication	Short Title
TM 9-2350-311-10	Operator's Manual, M109A2/M109A3/M109A4/M109A5 Howitzer
TM 9-2350-311-20-2	Organizational Maintenance Manual: Cab and Fire Control Components, M109A2/M109A31M109A4/M109A5 Howitzer
TM 92350-311-24P-2	Organizational, Direct and General Support RPSTL with Depot Parts: Cab and Fire Control Components, M109A2/M109A3/M109A4/M109A5 Howitzer
TM 9-2350-311-34-1	Organizational, Direct and General Support Maintenance Manual: Hull and Components, M109A2/M109A3/M109A4/M109A5 Howitzer
TM 9-2350-311-34-2	Direct and General Support Maintenance Manual: Cab and Fire Control Components, M109A2/M109A3/M109A4/M109A5 Howitzer
TM 9-2350-314-10	Operator's Manual, M109A6 Howitzer
TM 9-2350-314-20-2	Unit Maintenance Manual: Cab and Fire Control Components, M109A6 Howitzer
TM 92350-314-24P-2	Unit, Direct and General Support RPSTL with Depot Parts: Cab and Fire Control Components, M109A6 Howitzer
TM 9-2350-314-34-1	Unit, Direct and General Support Maintenance Manual: Hull and Components, M109A6 Howitzer
TM 9-2350-314-34-2	Direct and General Support Maintenance Manual: Cab and Fire Control Components, M109A6 Howitzer

6. How to Locate Repair Parts.

a. When National Stock Number or Part Number is Not Known.

(1) First. Using the table of contents, determine the assembly group or subassembly group to which the item belongs. This is necessary since figures are prepared for assembly groups and subassembly groups, and listings are divided into the same groups.

(2) Second. Find the figure covering the assembly group or subassembly group to which the item belongs.

(3) Third. Identify the item on the figure. The NSNs and part numbers are on the same line as the associated item numbers.

(4) Fourth. Look in the repair parts list for the figure and item numbers. The NSNs and part numbers are on the same line as the associated item numbers.

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

(1) First. Using the index of National Stock Number or the Part Number Index, find the pertinent National Stock Number or Part Number. The NSN index is in National Item Identification Number (NIIN) sequence (see 4.a(1)). The part numbers in the Part Number index are listed in ascending alphanumeric sequence (see 4.b). Both indexes cross-reference you to the illustration/figure and item number of the item you are looking for.

(2) Second. Turn to the figure and item number. Verify that the item is the one you are looking for and then locate the item number in the repair parts list for the figure.

7. Abbreviations.

Abbreviations	Explanation
FIG.	Figure
LED	Light-Emitting Diode
RPSTL	Repair Parts and Special Tools List

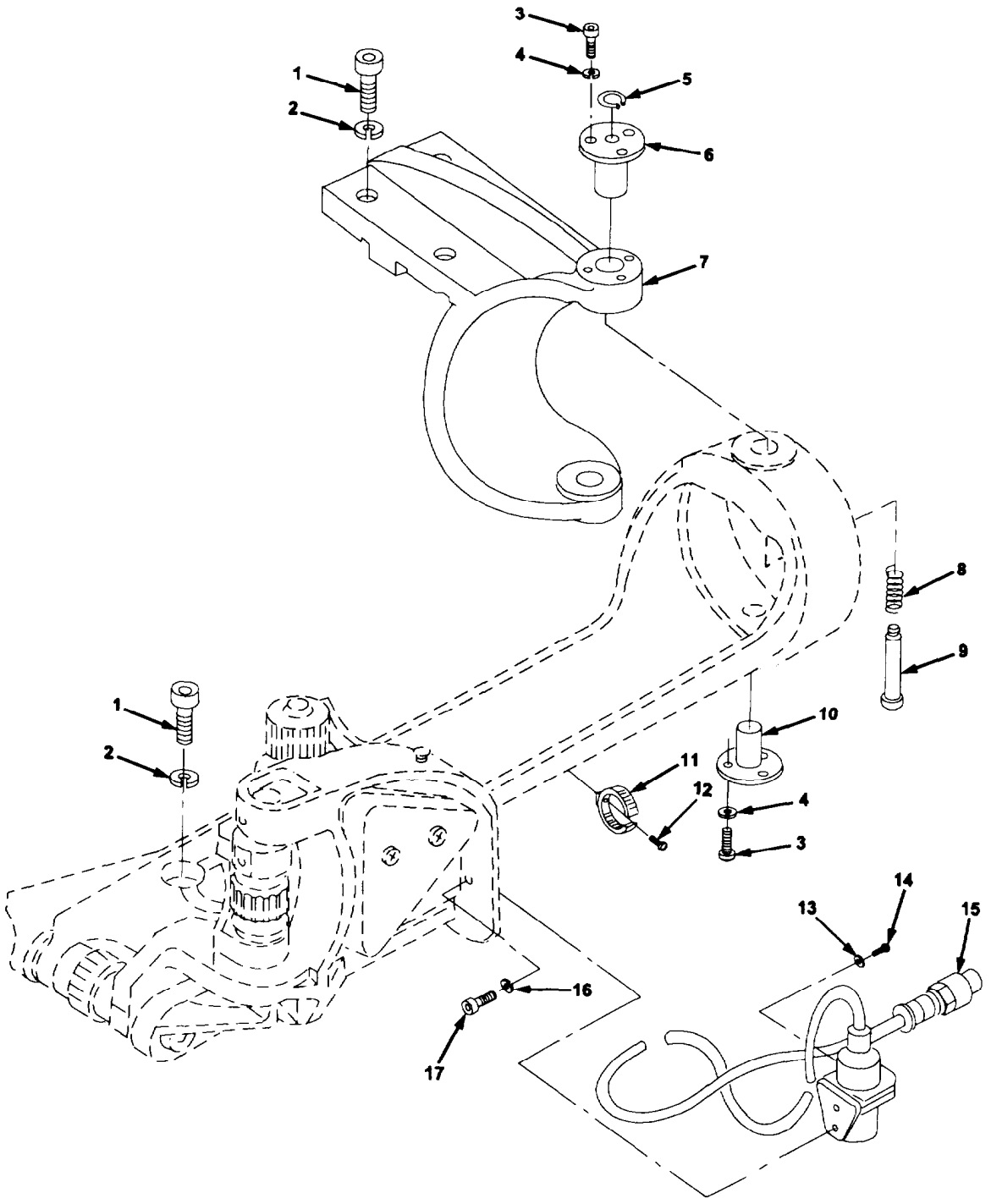


Figure D-1. Mount, Telescope M1468616011

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1806 MOUNT, TELESCOPE, M146 8616011	
					FIGURE D-1 MOUNT, TELESCOPE, M146 8616011	
1	PAOZZ	5305009837457	96906	MS16998-98	SCREW,CAP,SOCKET HE AD	8
2	PAOZZ	5310009338778	96906	MS35338-143	WASHER,LOCK	8
3	PAFZZ	5305009591909	96906	MS16996-11	SCREW,CAP,SOCKET HE AD	6
4	PAFZZ	5310009338120	96906	MS35338-138	WASHER,LOCK	6
5	PAFZZ	5325002986564	96906	MS16624-4025	RING,RETAINING	1
6	PAFZZ	1240003571472	19200	8616041	PIN YOKE	1
7	XAFZZ		19200	8616019	YOKE	1
8	PAFZZ	5360008511955	19200	8616077	SPRINC,HELICAL,COHP RESSION	1
9	PAFZZ	5315008522731	19200	8616078	PIN,GROOVED,HEADED	1
10	PAFZZ	5315003512937	19200	8616059	PIN,YOKE	1
11	PAFZZ	5340008805129	19200	11726323	CLIP,SPRING TENSION	1
12	PAFZZ	5305000570510	96906	MS51958-13	SCREW,MACHINE	1
13	PAOZZ	5310009338119	96906	MS35338-137	WASHER,LOCK	3
14	PAOZZ	5305007015058	96906	MS51958-42	SCREW,MACHINE	3
15	PAOFF	6150008640363	19200	8616025	CABLE,ASSEf'IBLY,SPEC IAL (FOR PARTS SEE GROUP 180602)	1
16	PAOZZ	5310009296395	96906	MS35338-136	WASHER,LOCK	2
17	PAOZZ	5305009591082	96906	MS16995-18	SCREW,CAP,SOCKET HE AD	2

END OF FIGURE

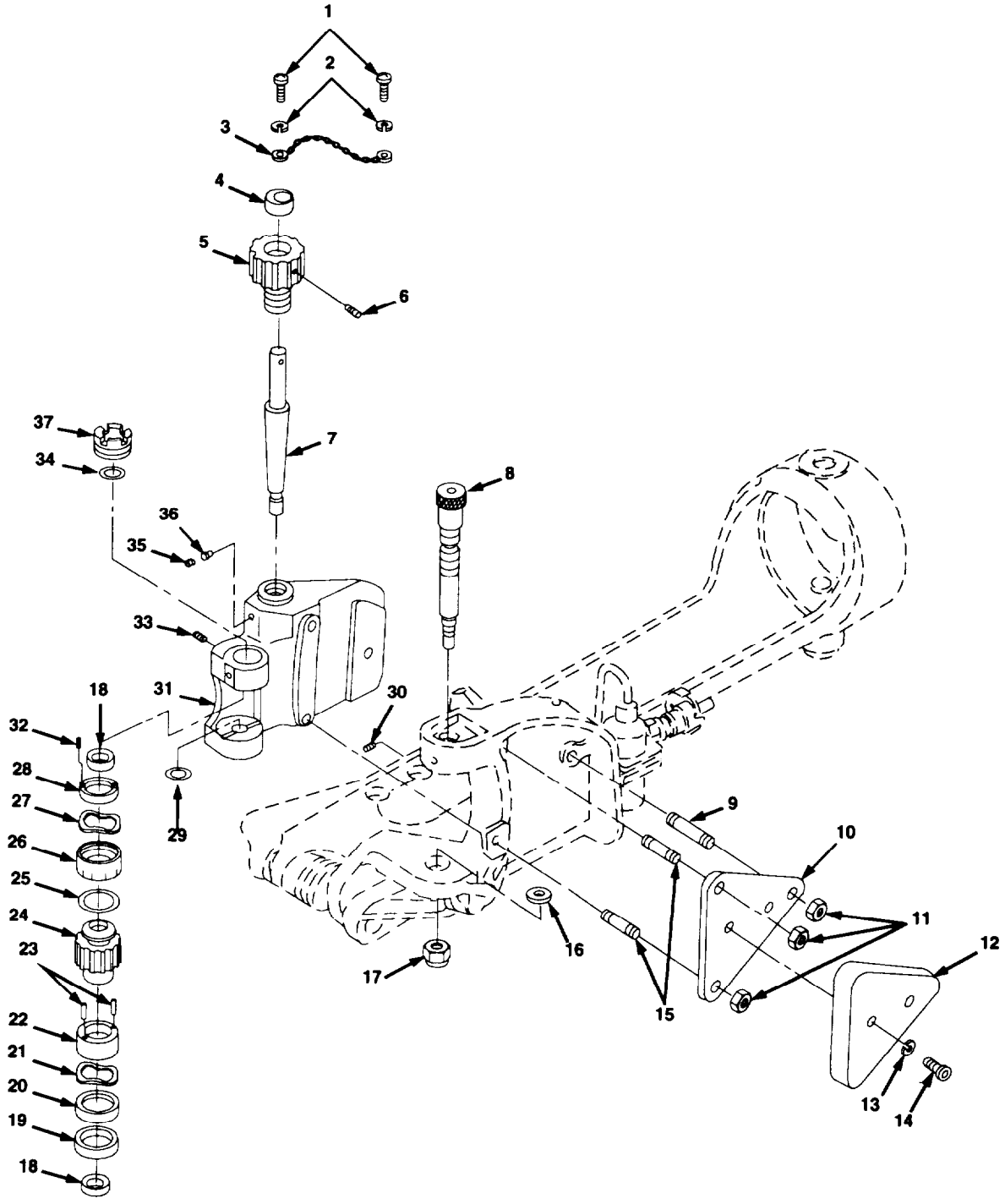


Figure D-2. Mount, Telescope M145 8616011 - Continued

GROUP 1806 MOUNT, TELESCOPE, M146
8616011

FIGURE D-2 MOUNT, TELESCOPE, M146
8616011 - CONTINUED

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
1	PAOZZ	5305007015057	96906	MS51958-41	SCREW,MACHINE	2
2	PAOZZ	5310005432739	96906	MS35333-72	WASHER,LOCK	2
3	PAOZZ	4010004883970	80205	NAS1201B10A16A	CHAIN ASSEMBLY, SING	1
4	PAFZZ	3040007028656	19204	7028656	COLLAR,SHAFT	1
5	PAFZZ	5355008509273	19200	8215887	KNOB	1
6	PAFZZ	5315001873271	96906	MS24692-102	PIN,TAPERED,PLAIN	1
7	PAFZZ	5315008640353	19200	8616049	PIN,TAPERED,PLAIN	1
8	PAFZZ	5305008642944	19200	8616056	SCREW,SHOULDER	1
9	PAFZZ	5307008518032	19200	8215913-1	STUD, PLAIN	1
10	PAFZZ	1240012016014	19200	8616051	PLATE,RETAINER	1
11	PAFZZ	5310009843806	96906	MS51922-9	NUT,SELF-LDCKING,HE XAGON	3
12	PAFZZ	5340003007908	19200	8616028	COVER ASSEMBLY RIGHT HAND SOLDERED	1
13	PAFZZ	5310009338119	96906	MS35338-137	WASHER,LOCK	2
14	PAFZZ	5305009887602	96906	HS16995-26	SCREW,CAP,SOCKET HE AD	2
15	PAFZZ	5307008847745	19200	8215913	STUD,PLAIN	2
16	PAFZZ	5310008513911	19200	8616075	WASHER,FLAT	1
17	PAFZZ	5310009146028	96906	MS51922-18	NUT,SELF-LOCKING,HE XAGON	1
18	PAFZZ	5310008511568	19200	8616073	WASHER,CONCAVE	2
19	PAFZZ	1240003512936	19200	8616058	RATCHET,KEYED	1
20	PAFZZ	5355001154457	19200	8616057	RATCHET DIAL	1
21	PAFZZ	5310004115816	19200	11729632	WASHER,SPRING	1
22	PBFZZ	5365012060880	19200	8616037	SHIELD,RATCHET	1
23	PAFZZ	5315008892610	96906	MS16555-619	PIN,STRAIGHT,HEADLE SS	2
24	PAFZZ	5355008640355	19200	8616047	KNOB	1
25	PAFZZ	1240008642929	19200	8616076	DISK	1
26	PAFZZ	1240001141095	19200	8616038	DIAL ELEVATION	1
27	PAFZZ	5310008519995	19200	8616042	WASHER,SPRING TENSI ON	1
28	PAFZZ	5310008529802	19200	8616050	NUT,PLAIN,ROUND	1
29	PAFZZ	5330002483839	96906	MS29513-111	O-RING	1
30	PAFZZ	5305007247274	96906	MS51966-27	SETSCREW	1
31	XAFZZ		19200	8616016	ELEVATION SLIDE RIGHT HAND	1
32	PAFZZ	5305007176955	96906	MS51963-1	SETSCREW	1
33	PAFZZ	5305004090854	96906	MS51974-10	SETSCREW	1
34	PAFZZ	5330002483846	96906	MS29513-114	O-RING	1
35	PAFZZ	5305010239675	96906	MS51031-150	SETSCREW	1
36	PAFZZ	1240008640362	19200	8616080	INSERT	1
37	PAFZZ	5365008511567	19200	8616083	RING,EXTERNALLY THR EADED	1

END OF FIGURE

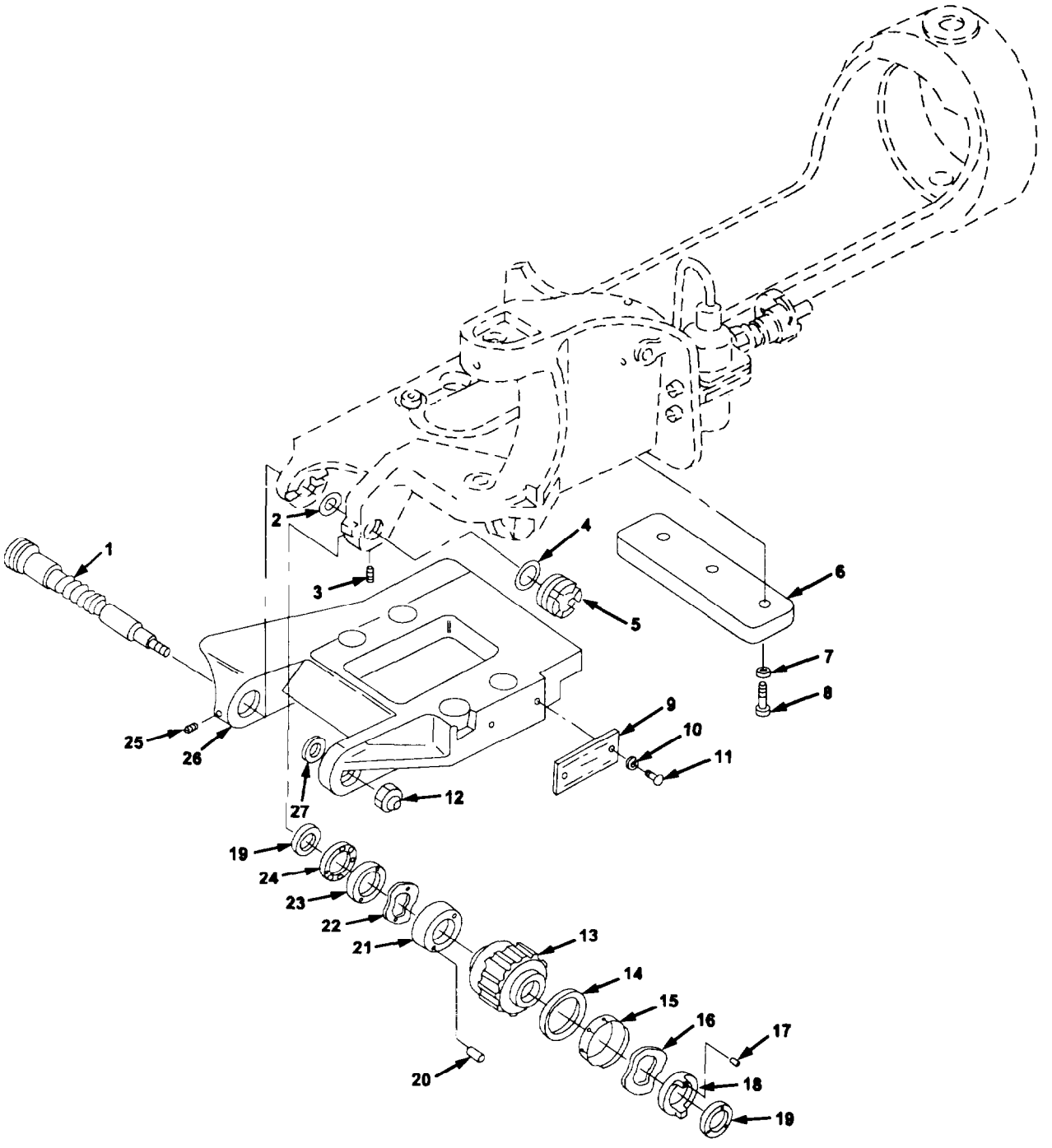


Figure D-3. Mount, Telescope M1468616011 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1806 MOUNT, TELESCOPE, M146 8616011	
					FIGURE D-3 MOUNT, TELESCOPE, M146 8616011 - CONTINUED	
1	PAFZZ	5305008702119	19200	8616060	SCREW,SHOULDER	1
2	PAFZZ	5330002483846	96906	MS29513-114	O-RING	1
3	PAFZZ	5305004090854	96906	MS51974-10	SETSCREW	1
4	PAFZZ	5330002483839	96906	MS29513-111	O-RING	1
5	PAFZZ	5365008511567	19200	8616083	RING,EXTERNALLY THR EADED	1
6	PBFZZ	5365011516439	19200	8616036	SPACER,PLATE	1
7	PAFZZ	5310009338121	96906	MS35338-139	WASHER,LOCK	3
8	PAFZZ	5305000529329	96906	MS16996-21	SCREW,CAP,SOCKET HE AD	3
9	PAFZZ	9905003100720	19200	8216024	PLATE,IDENTIFICATION	1
10	PAFZZ	5310009338118	96906	MS35338-135	WASHER,LOCK	2
11	PAFZZ	5305000570510	96906	MS51958-13	SCREW,MACHINE	2
12	PAFZZ	5310009146028	96906	MS51922-18	NUT,SELF-LOCKING,HE XAGON	1
13	PAFZZ	5355008640356	19200	8616061	KNOB	1
14	PAFZZ	1240008642929	19200	8616076	DISK	1
15	PAFZZ	5355003509435	19200	8616031	DIAL,SCALE	1
16	PAFZZ	5310008519995	19200	8616042	WASHER,SPRING TENSI ON	1
17	PAFZZ	5305007176955	96906	MS51963-1	SETSCREW	1
18	PAFZZ	5310008529802	19200	8616050	NUT,PLAIN,ROUND	1
19	PAFZZ	5310008511568	19200	8616073	WASHER,CONCAVE	2
20	PAFZZ	5315008892610	96906	MS16555-619	PIN,STRAIGHT,HEADLE SS	2
21	PAFZZ	5365012060880	19200	8616037	SHIELD,RATCHET	1
22	PAFZZ	5310004115816	19200	11729632	WASHER,SPRING	1
23	PAFZZ	5355001154457	19200	8616057	RATCHET DIAL	1
24	PAFZZ	1240003512936	19200	8616058	RATCHET,KEYED	1
25	PAFZZ	5305008509131	96906	MS51023-29	SETSCREW	1
26	XAFZZ		19200	8616017	BASE PLATE,RIGHT HAND	1
27	PAFZZ	5310008513911	19200	8616075	WASHER,FLAT	1

END OF FIGURE

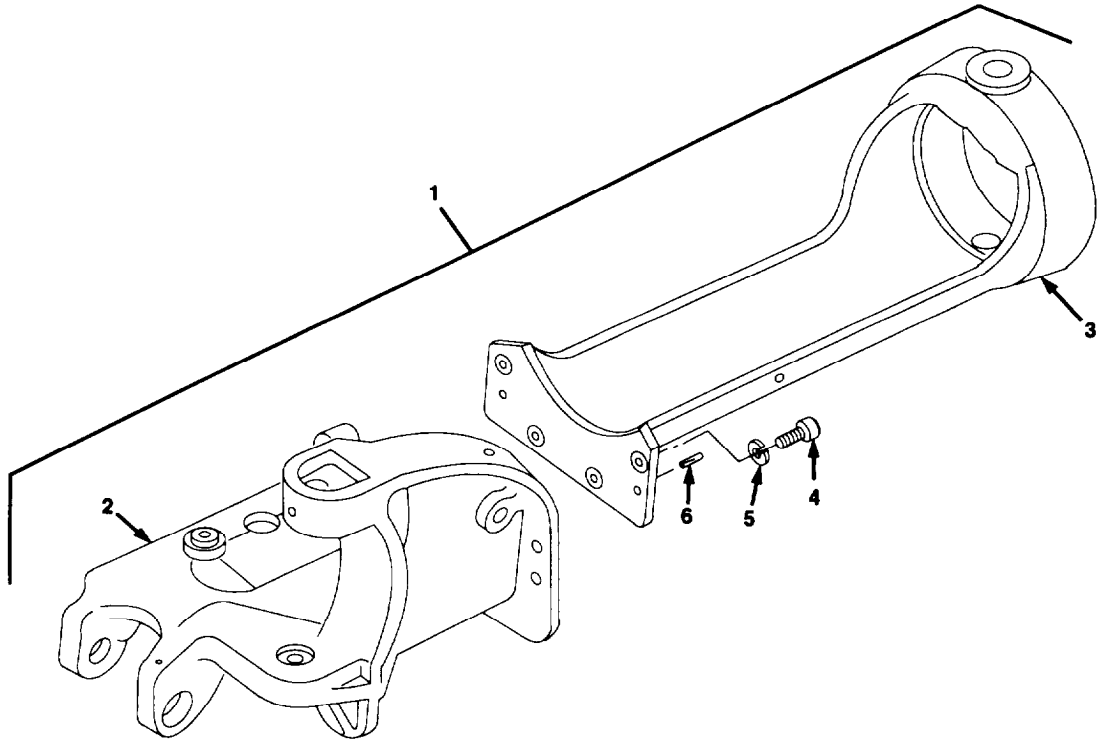


Figure D-4. Mount, Telescope M146 8616011 Including Bracket 10549240 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UDC)	(7) QTY
					GROUP 1806 MOUNT, TELESCOPE, M146 180611 AND	
					GROUP 180601 BRACKET 19549240	
					FIGURE D-4 MOUNT, TELESCOPE, M146 8616011 INCLUDING BRACKET 10549240	
1	XAFFF		19200	10549240	BRACKET,MACHINED	1
2	XAFZZ		19200	8616018	.ELEVATION BRACKET RIGHT HAND	1
3	XAFZZ		19200	8616020	.ARM	1
4	PAFZZ	5305009587667	96906	MS16996-23	.SCREW,CAP,SOCKET HE AD	4
5	PAFZZ	5310009338121	96906	MS35338-139	.WASHER,LOCK	4
6	PAFZZ	5315006821733	96906	MS16555-646	.PIN,STRAIGHT,HEADLE SS	2
					END OF FIGURE	

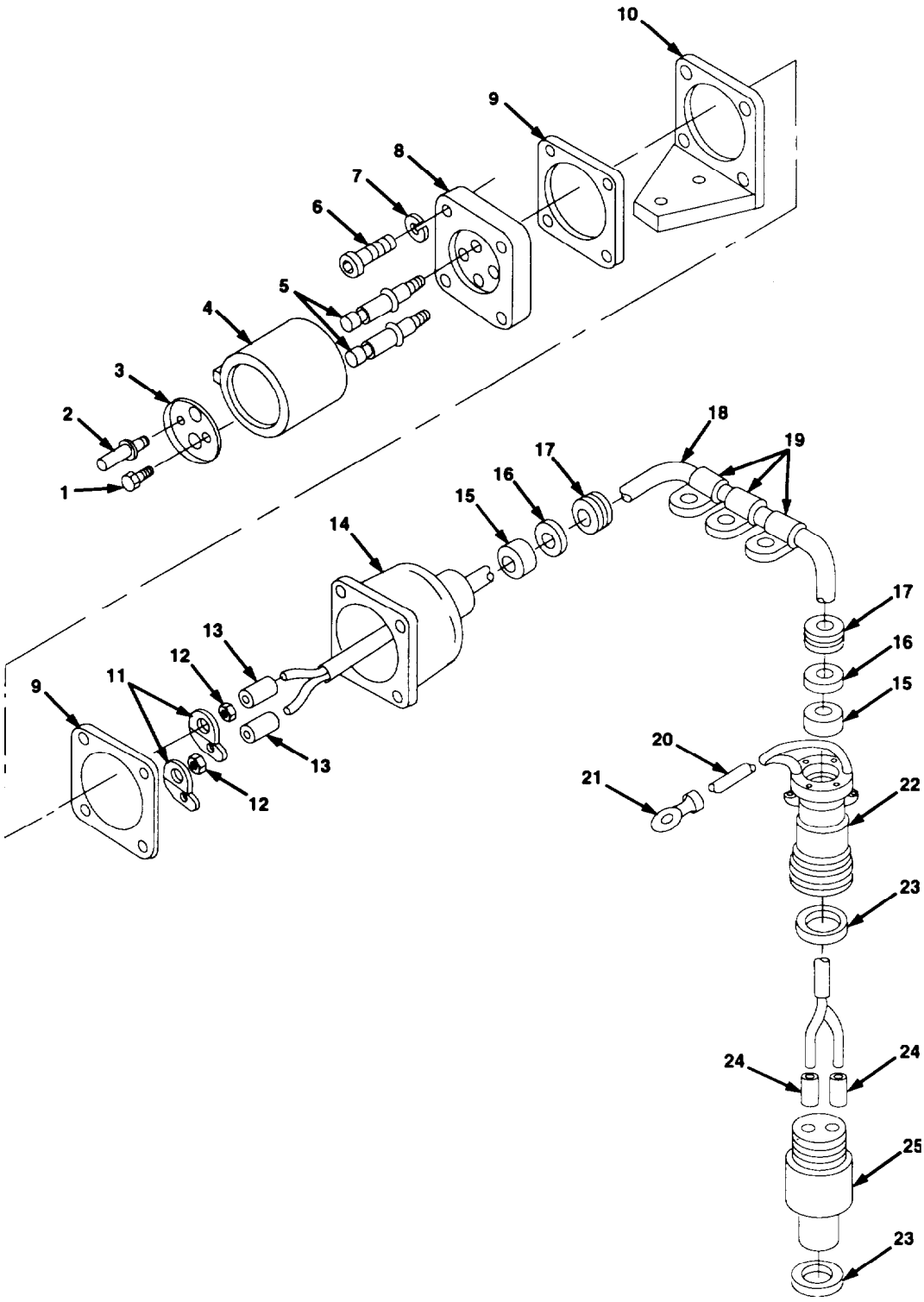


Figure D-5. Cable Assembly 8616025

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 180602 CABLE ASSEMBLY 8616025	
					FIGURE D-5 CABLE ASSEMBLY 8616025	
1	PAFZZ	5305002077468	96906	MS35214-16	SCREW,MACHINE	1
2	PAFZZ	5315007530514	19200	8624898	PIN,SHOULDER,HEADLE SS	1
3	PAFZZ	5999000425355	19200	7660438	PLATE MOUNT ELEVATI ON	1
4	PAFZZ	1290001913302	19200	11729776	SHELL RECEPTACLE	1
5	PAFZZ	5999008956493	19200	8267787	CONTACT,ELECTRICAL	2
6	PAFZZ	5305000545652	96906	MS51957-18	SCREW,MACHINE SOCKET HEAD	4
7	PAFZZ	5310009338118	96906	MS35338-135	WASHER,LOCK	4
8	PAFZZ	5970007530516	19200	8624900	INSULATOR,BUSHING	1
9	PAFZZ	5330008936696	19200	8616084	GASKET.	2
10	XAFZZ		19200	8616044	BRACKET,ANGLE	1
11	PAFZZ	5940006822477	96906	MS77068-1	TERHINAL,LUG	2
12	PAFZZ	5310009349746	96906	MS35649-245B	NUT,PLAIN,HEXAGON	2
13	MFFZZ		81349	MIL-I-631	INSULATION SLEEVING (MAKE FROM NSN 5970-00-811-3310)	2
14	XAFZZ		19200	8616045	SHELL,ELECTRICAL CONNECTOR	1
15	PAFZZ	5330012108122	19200	8616085	PACKING,PREFORMED	2
16	PAFZZ	5310006419236	11599	46A8702	WASHER,FLAT	2
17	PAFZZ	5365012010830	19200	8616069	BUSHING,MACHINE THR EAD	2
18	MFFZZ		81349	MILC27072	CABLE,SPECIAL PURPO SE (MAKE FROM NSN 6145-00-853-3355)	1
19	PAFZZ	5340006197754	19200	8215891	CLAMP,LOOP	3
20	MFFZZ		96906	MS20995C20	WIRE,NONELECTRICAL (MAKE FROM NSN 9505-00-221-2650)	1
21	PAFZZ	5940005571629	96906	MS25036-149	TERMINAL,LUG	1
22	XAFZZ		19200	8616032	SHELL,CONNECTOR	1
23	PAFZZ	5330004681065	19200	8616065	GASKET	2
24	RFFZZ		18876	8034668-10	INSULATION SLEEVING (MAKE FROH NSN 5970-00-245-38431	2
25	PAFZA	5935005566799	96906	MS3107A10SL-3S	CONNECTOR,PLUG,ELEC TRICAL	1

END OF FIGURE

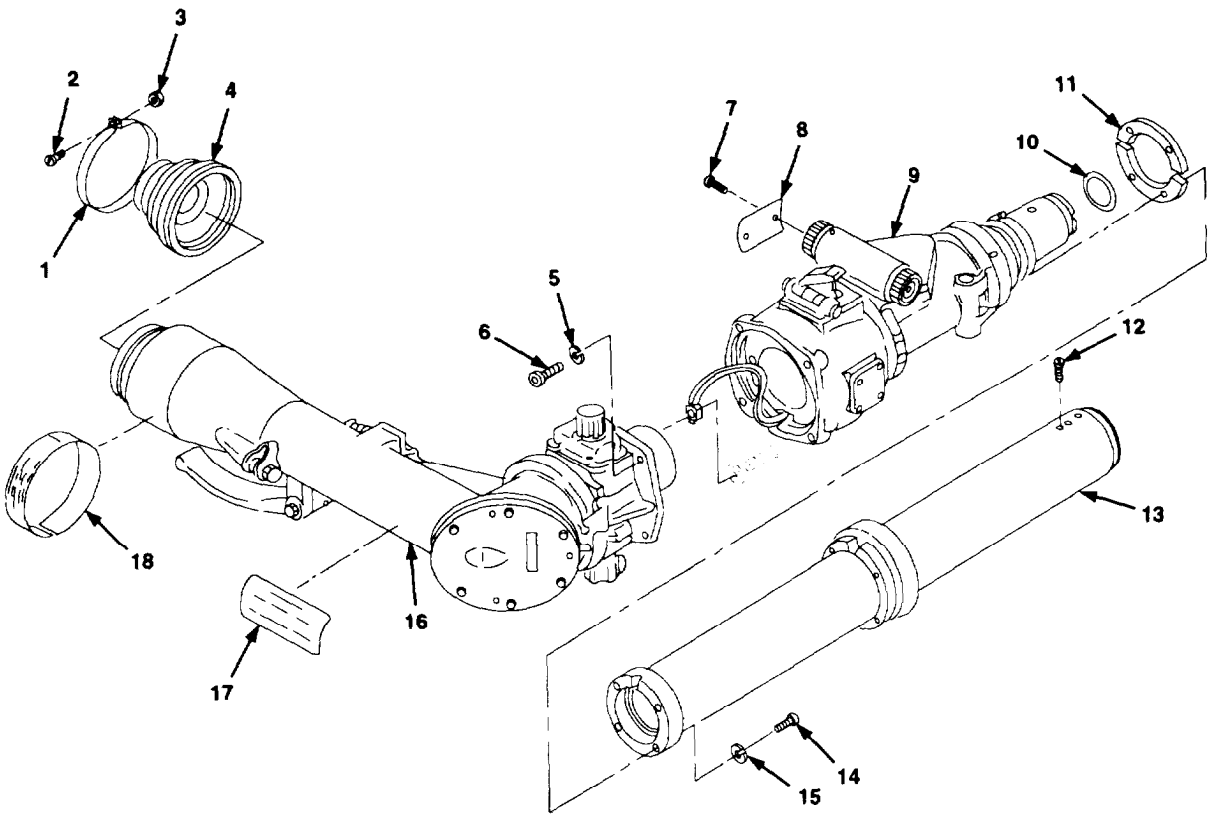


Figure D-6. Telescope, Elbow M118A2/M118A3 11829207 and 9356014

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1807 TELESCOPE, ELBOW, M118A2/ M118A3 11829107 AND 9356014	
					FIGURE D-6 TELESCOPE, ELBOW, M118A2/ M118A3 11829207 AND 9356014	
1	PA022	5340002869411	19200	5321572	CLAMP,LOOP	1
2	PA022	5305000570511	96906	MS51958-14	SCREW,MACHINE	1
3	PAOZZ	5310004973888	88044	AN365-448A	NUT,SELF-LOCKING,HE XAGON	1
4	PA022	1240006271332	19200	6271332	EYESHIELD,OPTICAL I NSTRUMENT	1
5	PAHZZ	5310005825965	96906	MS35338-44	WASHER,LOCK	4
6	PAHZZ	5305009836659	96906	MS16998-42	SCREW,CAP,SOCKET HE AD	4
7	PAHZZ	5305000545646	96906	MS51957-12	SCREW,MACHINE	2
8	PBHZZ	9905011887751	19200	11834881	PLATE,IDENTIFICATIO N UOC:L95	1
8	PAHZZ	9905013220159	19200	9356015	PLATE,IDENTIFICATIO N UOC : V48	1
9	XAHDD		19200	11834882	ELBOW TELESCOPE SUBASSEMBLY(RETICLE CAGE AND CANT CORRECTOR) (FOR PARTS SEE GROUP 180702) UGC:L95	1
9	XAHDD		19200	9356016	ELBOW TELESCOPE SUB ASSEMBLY (CAGE AND CANT CORRECTOR) (FOR PARTS SEE GROUP 180702) UOC : V48	1
10	PAHZZ	5330008511018	19200	8615992	O-RING	1
11	XAHZZ		19200	8615906	RING,CLAMP	2
12	PAOZZ	5305009640310	96906	MS51958-24	SCREW,MACHINE	1
13	XAHDD		19200	8615791	ELBOW TELESCOPE SUBASSEBLY(OBJECTIVE AND DIAPHRAGM) (FOR PARTS SEE GROUP 180703)	1
14	PAHZZ	5305000685405	96906	MS16996-14	SCREW,CAP,SOCKET HE AD	4
15	PAHZZ	5310009338120	96906	MS35338-138	WASHER,LOCK	4
16	XAHDD		19200	10512983	ELBOW TELESCOPE SUBASSEMBLY(EYEPIECE AND ERECTOR LENS) (FOR PARTS SEE GROUP 1807011	1
17	PADZZ	7690013566240	19200	11785497	MARKER,IDENTIFICATI ON	1
18	PADZZ	7690013566239	19200	11785498	MARKER,IDENTIFICATI ON	1
					END OF FIGURE	

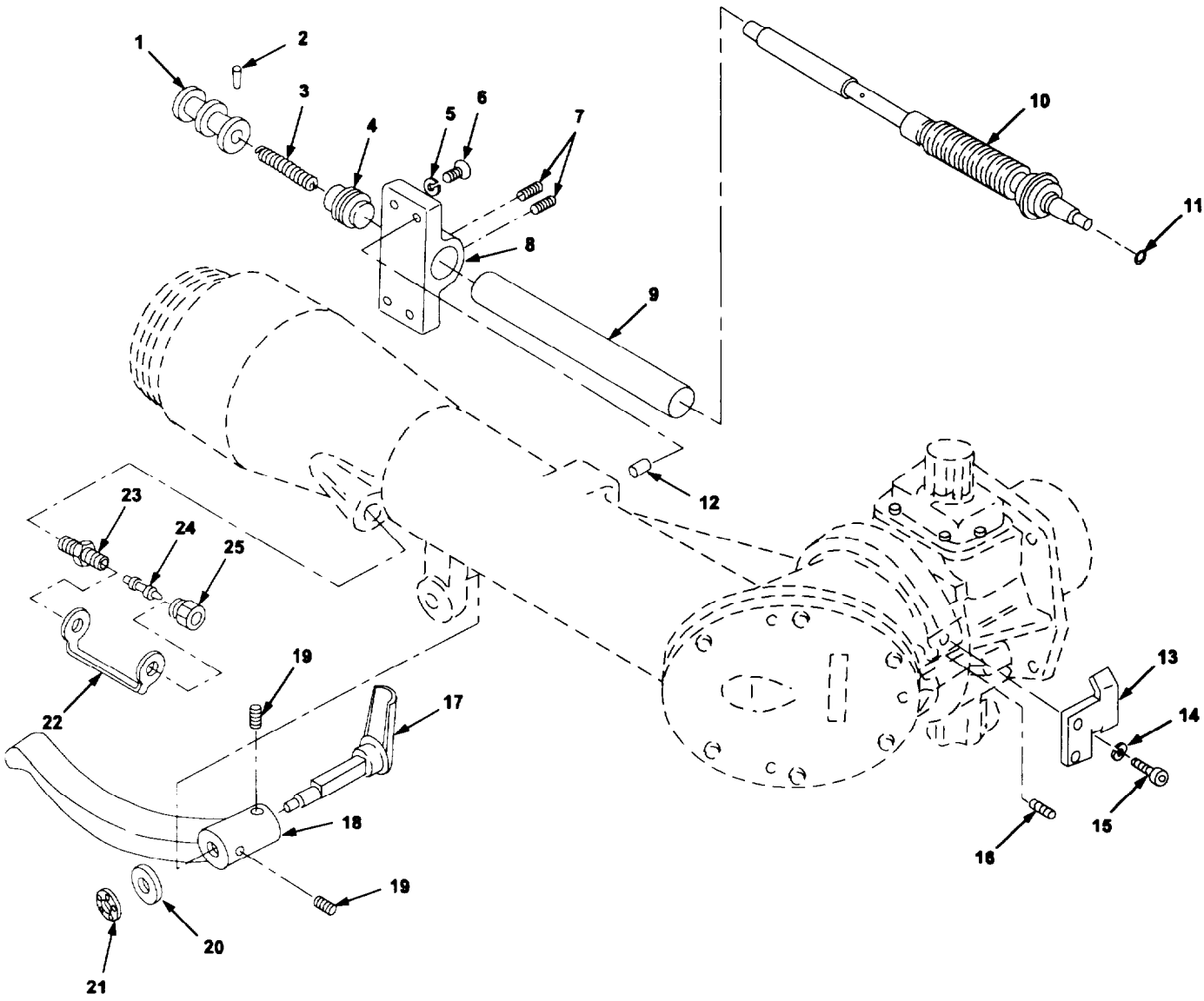


Figure D-7. Elbow Telescope Subassembly (Eyepiece and Erector Lens) 10512983

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 180701 ELBOW TELESCOPE SUBASSEMBLY 10512983	
					FIGURE D-7 ELBOW TELESCOPE SUB-ASSEMBLY (EYEPIECE AND ERECTOR LENS) 10512983	
1	XAFZZ		19200	8615964	SPOOL,LEVER	1
2	PAFZZ	5315001873228	96906	MS24692-30	PIN,TAPERED,PLAIN	1
3	PAFZZ	5360000700997	19200	8565960	SPRING,HELICAL,COMP RESSION	1
4	PAFZZ	5365008509276	19200	8615966	RING,EXTERNALLY THR EADED	1
5	PAFZZ	5310006163555	96906	NS35333-71	WASHER,LOCK	2
6	PAFZZ	5305000546654	96906	MS51957-30	SCREW,MACHINE	2
7	PAFZZ	5305008512287	96906	MS51023-18	SETSCREW	2
8	XAFZZ		19200	10512981	BRACKET	1
9	XAFZZ		19200	10512972	TUBE	1
10	PAFZZ	1240001141089	19200	10512969	BELLOWS ASSEMBLY	1
11	PAFZZ	5330002483836	96906	MS29513-012	O-RING	1
12	PAFZZ	5315008224740	96906	MS16556-627	PIN,STRAIGHT,HEADLE SS	2
13	PAFZZ	5340000190020	19200	8215770	LIMIT PLATE	1
14	PAFZZ	5310009338120	96906	MS35338-138	WASHER,LOCK	2
15	PAFZZ	5305009887608	96906	MS16995-36	SCREW,CAP,SOCKET HE AD	2
16	PAFZZ	4730000189566	34623	MA241A21 020	PLUG,PIPE	1
17	PAFZZ	3040001190901	19200	10512970	LEVER,MANUAL CONTRO L	1
18	PAFZZ	5340008194561	19200	10512980	LEVER,LOCK-RELEASE	1
19	PAFZZ	5305002723533	96906	MS51023-49	SETSCREW	2
20	PAFZZ	5310005825677	96906	MS15795-810	WASHER,FLAT	1
21	PAFZZ	5325002986564	96906	MS16624-4025	RING,RETAINING	1
22	PAOZZ	5340004644792	19200	10516567	STRAP,RETAINING	1
23	PAOZZ	4820001141096	96906	MS51607-1	VALVE STEM,PURGING	1
24	PAOZZ	2640000603543	96906	MS51377-2	VALVE CORE	1
25	PAOZZ	4820012350223	19200	8200055	CAP,AIR VALVE	1
					END OF FIGURE	

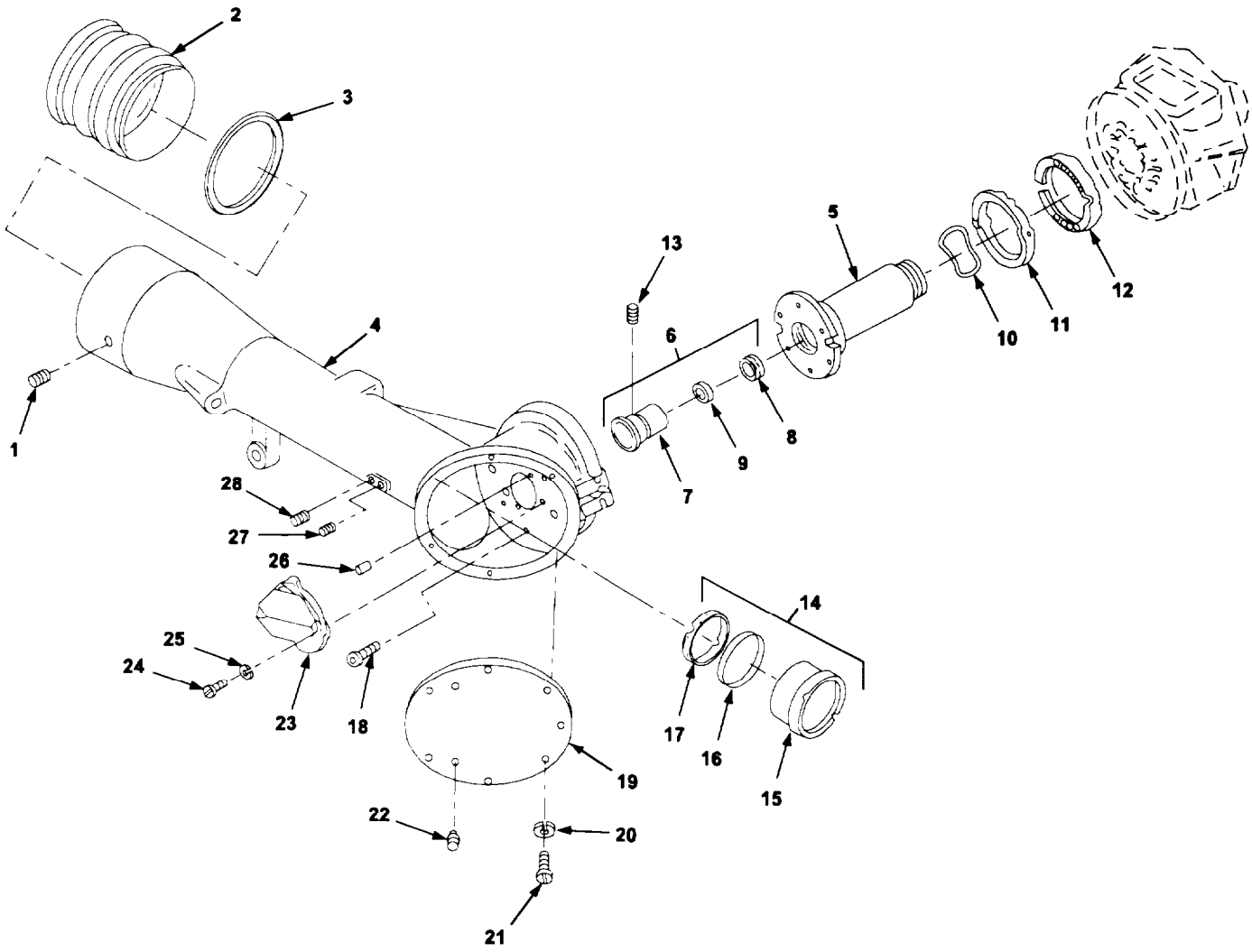


Figure D-8. Elbow Telescope Subassembly (Eyepiece and Erector Lens) 10512983 Including Cell Assembly 10512976 and Cell Assembly 8215796 - Continued

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 180701 ELBOW TELESCOPE SUB-ASSEMBLY 10512983;GROUP 18070101 CELL ASSEMBLY 10512976;AND GROUP 18070102 CELL ASSEMBLY 8215796	
					FIGURE D-8 ELBOW TELESCOPE SUB-ASSEMBLY(EYEPIECE AND ERECTOR LENS) 10512983 INCLUDING CELL ASSEMBLY 10512976 AND CELL ASSEMBLY 8215796 - CONTINUED	
1	PAHZZ	5305008776285	96906	MS51029-18	SETSCREW	2
2	XAHHH		19200	10512979	CELL ASSEMBLY OPTICAL INSTRUMENT (FOR PARTS SEE GROUP 180701031	1
3	PAHZZ	5330004358522	96906	MS29513-150	PACKING,PREFORMED	1
4	XADZZ		19200	10512982	ARM,EYEPIECE	1
5	XADZZ		19200	8615832	HOUSING,OPTICAL ELEMENT CELL	1
6	XADDD		19200	8215796	CELL ASSEMBLY, OPTICAL INSTRUMENT	1
7	XADZZ		19200	8615896	.CELL,OPTICAL ELEMENT	1
8	PADZZ	1240008514868	19200	8615902	.RETAINER,OPTICAL EL EMENT	1
9	PADZZ	6650008513919	19200	8615945	.LENS,OPTICAL INSTRU MENT	1
10	PAHZZ	5310008531928	19200	8615965	WASHER,SPRING TENS1 ON	1
11	PAHZZ	1240004696673	19200	8615835	SHUTTLE,TELESCOPE E	1
12	PAHZZ	3020008688360	19200	8615834	RATCHET,ARM	1
13	PADZZ	5305007176950	96906	MS51963-9	SETSCREW	1
14	XAHDD		19200	10512976	CELL ASSEMBLY OPTICAL INSTRUMENT	1
15	XADZZ		19200	10512975	.CELL,OPTICAL ELEMEN T	1
16	PADZZ	6650008286553	19200	10512965	.LENS,OPTICAL INSTRU MENT	1
17	XADZZ		19200	10512973	.RETAINER,OPTICAL ELEMENT	1
18	PADZZ	5305000574593	96906	MS16996-9	SCREW,CAP,SOCKET HE AD	6
19	XAHZZ		19200	10512968	COVER,PRISH	1
20	PAHZZ	5310005503715	96906	MS35333-70	WASHER,LOCK	6
21	PAHZZ	5305000545651	96906	MS51957-17	SCREW,MACHINE	6
22	PAHZZ	5305002827650	21450	503919	SETSCREW	3
23	PADZZ	6650008706281	19200	8615930	PRISM,OPTICAL INSTR UMENT	1
24	PADZZ	5305000546651	96906	MS51957-27	SCREW,MACHINE	3
25	PADZZ	5310009296395	96906	MS35338-136	WASHER,LOCK	3
26	PADZZ	5315006821726	96906	MS16555-617	PIN,STRAIGHT,HEADLE SS	2
27	PAHZZ	5305000514497	96906	MS51973-19	SETSCREW	1
28	PAHZZ	5305008286555	96906	MS51029-36	SETSCREW	1
					END OF FIGURE	

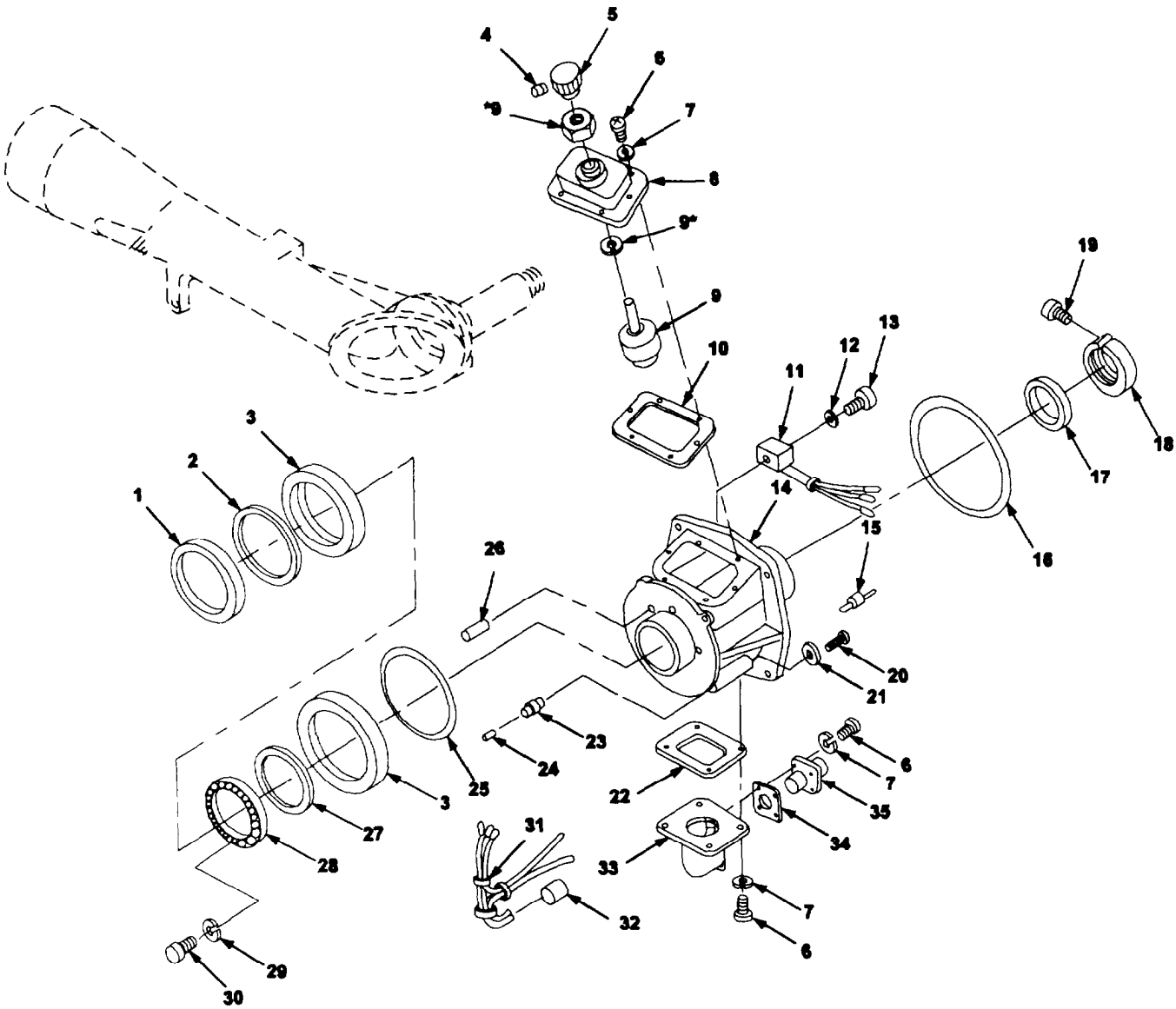


Figure D-9. Elbow Telescope Subassembly (Eyepiece and Erector Lens) 10512983 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 180701 ELBOW TELESCOPE SUBASSEMBLY 10512983	
					FIGURE D-9 ELBOW TELESCOPE SUB-ASSEMBLY (EYEPIECE AND ERECTOR LENS) 10512983 - CONTINUED	
1	PAHZZ	6650001154458	19200	8615839	CAP, LENS	1
2	PAHZZ	5365001074380	19200	8615932	SHIM	1
3	PAHZZ	5330008203242	19200	8615836	SEAL,PLAIN,ENCASED	1
4	PAOZZ	5305008512287	96906	MS51023-18	SETSCREW	1
5	PAOZZ	5355008476260	19200	8615879	KNOB	1
6	PAFZZ	5305000570512	96906	MS51958-15	SCREW,MACHINE	14
7	PAFZZ	5310009338118	96906	MS35338-135	WASHER,LOCK	14
8	XAFZZ		19200	8615825	HOUSING,VARIABLE RESISTOR	1
9	PAFZZ	5905008997645	12697	8615829	RESISTOR,VARIABLE,W	1
10	PAFZZ	5330008520798	19200	8615922	GASKET	1
11	PAHZZ	5995001150638	19200	8215939	WIRING HARNESS	1
12	PAHZZ	5310009282690	96906	MS35338-134	WASHER.LOCK	2
13	PAHZZ	5305000570502	96906	MS51958-5	SCREW,MACHINE	2
14	XAHZZ		19200	8615762	HOUSING,REAR	1
15	PAHZZ	5940011926691	19200	8615948	TERHINAL,FEEDTHRU INSULATED	3
16	PAHZZ	5330008511020	19200	8615998	O-RING	1
17	PBHZZ	5365011253159	19200	8215769	SPACER,RING	1
18	PAHZZ	5310009441094	19200	8215768	NUT,PLAIN,ROUND	1
19	PAHZZ	5305009591082	96906	MS16995-18	SCREW,CAP,SOCKET HE AD	1
20	PAHZZ	5315008556805	96906	MS24665-22	PIN,COTTER	2
21	PAHZZ	5310008805978	96906	MS15795-807	WASHER,FLAT	2
22	PAFZZ	5330008642946	19200	8615923	GASKET	1
23	PAHZZ	5360008642940	19200	8615985	SPRING,HELICAL,COMP RESSION	2
24	PAHZZ	5315011894622	19200	8615983	PIN,SHOULDER,HEAD	2
25	PAHZZ	5330008514878	19200	8615994	O-RING	1
26	PAHZZ	5315000569386	96906	MS16555-640	PIN,STRAIGHT,HEADLE SS	2
27	XAHZZ		19200	8615928	SPACER	1
28	PAHZZ	3020008688368	19200	8615910	RATCHET,FIXED	1
29	PAHZZ	5310009338118	96906	MS35338-135	WASHER,LOCK	6
30	PAHZZ	5305000821128	21450	591110	SCREW,CAP,SOCKET HE AD	6
31	PAHZZ	5995001150636	19200	8215893	WIRING HARNESS,BRAN CH	1
32	MHHZZ		18876	8034668-10	INSULATION SLEEVING (MAKE FROM NSN 5970-00-245-3843)	1
33	PAFZZ	6650001273009	19200	8615886	MOUNT,TELESCOPE COPE	1
34	PAFZZ	5330008517609	19200	8615925	GASKET	1
35	PAFZZ	5935006263122	96906	MS3450W10SL3P	CONNECTOR,RECEPTACL E	1

END OF FIGURE

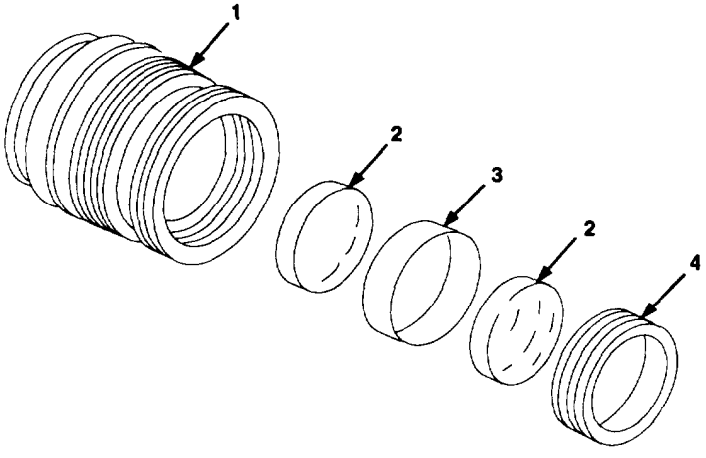


Figure D-10. Cell Assembly 10512979

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 18070103 CELL ASSEMBLY 10512979	
					FIGURE D-10 CELL ASSEMBLY 10512979	
1	PAHZZ	1240008145620	19200	10512978	CELL,OPTICAL ELEMEN T	1
2	PAHZZ	6650008286552	19200	10512966	LENS,OPTICAL INSTRU HENT	2
3	XAHZZ		19200	10512977	SPACER,OPTICAL ELEMENT	1
4	PAHZZ	5365008288797	19200	10512974	RING,EXTERNALLY THR EADED	1
					END OF FIGURE	

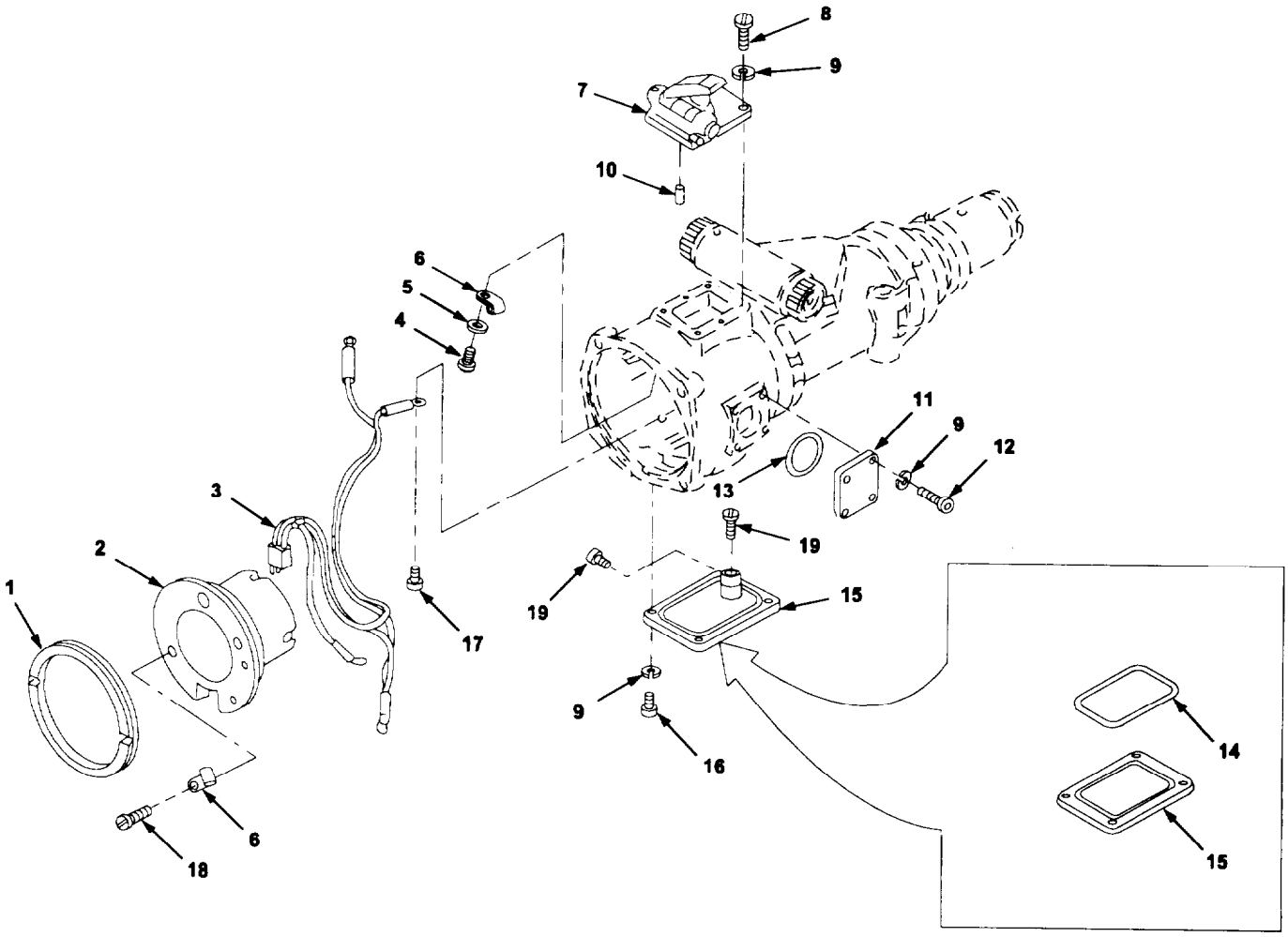


Figure D-11. Elbow Telescope and Reticle Cage Assembly 11834882 and 9356016

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180702 ELBOW TELESCOPE AND RETICLE CAGE ASSEMBLY 11834882 AND 9356016	
					FIGURE D-11 ELBOW TELESCOPE AND RETICLE CAGE ASSEMBLY 11834882 AND 9356016	
1	PAHZZ	5365011888025	19200	8615920	RING,EXTERNALLY TH READED	1
2	ADHDD		19200	11834878	RETICLE ASSEM0BLY,OP TICAL (FOR PARTS SEE GROUP 18070206) UOC:L95	1
2	ADHDD		19200	12599350	RETICLE CAGE ASSEMB LY (FOR PARTS SEE GROUP 18070206)	1
3	PAHHH	5995001150637	19200	8215873	WIRING HARNESS,BRAN CH (FOR PARTS SEE GROUP 18070204)	1
4	PAHZZ	5305000570511	96906	MS51958-14	SCREW,MACHINE	2
5	PAHZZ	5310005956211	96906	MS15795-803	WASHER,FLAT	2
6	PAHZZ	5340000366881	19200	8215854	CLAMP,LOOP	3
7	PAFFF	1240012919347	19200	12599348	LEVEL,ASSEMBLY (FOR PARTS SEE GROUP 180702051	1
8	PAFZZ	5305000570512	96906	MS51958-15	SCREW,MACHINE UOC:L95	4
9	PAFZZ	5310009338118	96906	MS35338-135	WASHER,LOCK	16
10	PAFZZ	5315006821726	96906	MS16555-617	PIN,STRAIGHT,HEADLE SS	2
11	XAFZZ		19200	8215801	COVER,ACCESS	2
12	PAFZZ	5305000582075	96906	MS16997-3	SCREW,CAP,SOCKET HE AD	8
13	PAFZZ	5330002651076	96906	MS29513-126	O-RING	2
14	PAFZZ	5330008514881	19200	8616002	O-RING	1
15	PGFZZ	5340012929871	19200	12599323	COVER,ACCESS UOC:V48	1
15	PAFFF	6240009594952	19200	10543756	COVER ASSEMBLY,TELE SCOPE (FOR PARTS SEE GROUP 18070203) UOC:L95	1
16	PAFZZ	5305000570511	96906	MS51958-14	SCREW,MACHINE	4
17	PAHZZ	5305011894560	19200	10555981	SCREW,MACHINE	2
18	PAHZZ	5305000570510	96906	MS51958-13	SCREW,MACHINE	1
19	PAFZZ	5305000570497	96906	MS51958-1	SCREW,MACHINE UOC:L95	4
					END OF FIGURE	

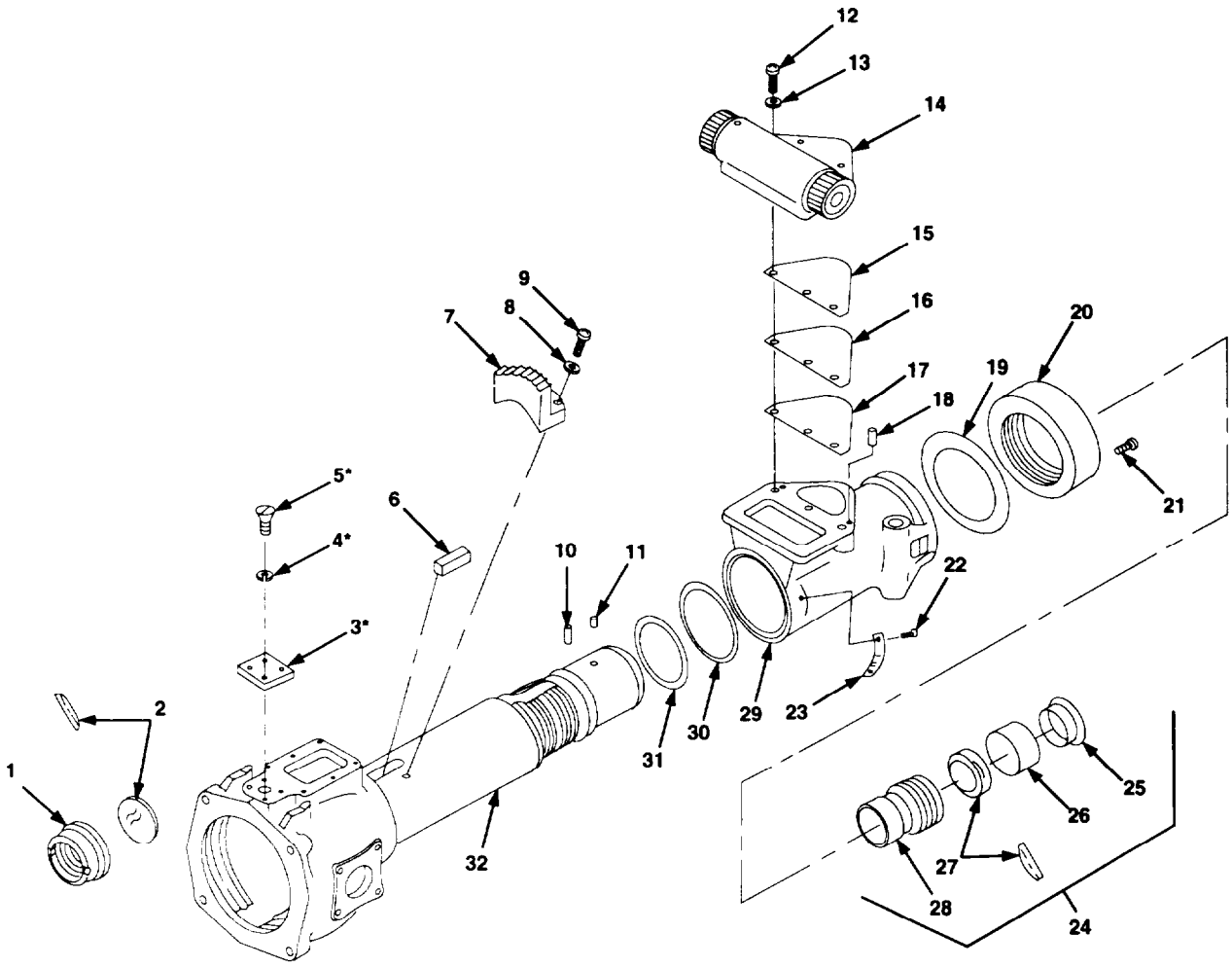


Figure D-12. Elbow Telescope and Reticle Cage Assembly 11834882 and 9356016 Including Cell Assembly 8215783

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 180702 ELBOW TELESCOPE AND RETICLE CAGE ASSEMBLY 11834882 AND 9356016 INCLUDING GROUP 18070201 CELL ASSEMBLY 8215783	
					FIGURE D-12 ELBOW TELESCOPE AND RETICLE CAGE ASSEMBLY 11834882 AND 9356016 INCLUDING CELL ASSEMBLY 8215783	
1	PADZZ	1240001154456	19200	8615895	RETAINER,OPTICAL EL EMENT	1
2	PADZZ	6650008712974	19200	8615944	LENS,OPTICAL INSTRU MENT	1
3	PBFZZ	5340011003275	19200	11829209	COVER,ACCESS UOC:L95	1
4	PAFZZ	5310009338118	96906	MS35338-135	WASHER,LOCK	4
5	PAFZZ	5305000570512	96906	MS51958-15	SCREW,MACHINE UOC:L95	4
6	XADZZ		19200	8615980	KEY,MACHINE	1
7	XADZZ		19200	8615888	GEAR SECTOR,WORM W EEL	1
8	PADZZ	5310005825965	96906	MS35338-44	WASHER,LOCK	2
9	PADZZ	5305000529329	96906	MS16996-21	SCREW,CAP,SOCKET HE AD	2
10	PADZZ	5315009408033	96906	MS9390-290	PIN,STRAIGHT,HEADLE SS	1
11	PADZZ	5305007245802	96906	MS51964-29	SETSCREW	1
12	PAFZZ	5305009887614	96906	MS16995-50	SCREW,CAP,SOCKET HE AD INSTRUMENT	3
13	PAFZZ	5310005825965	96906	MS35338-44	WASHER,LOCK	3
14	XAFFF		19200	8615844	WORM ASSEMBLY	1
15	PAFZZ	5365011910157	19200	8615975	SHIM	1
16	PAFZZ	5365011894786	19200	8615976	SHIM	1
17	PAFZZ	5365011894787	19200	8615977	SHIM	1
18	PAFZZ	5315008077957	96906	MS16555-608	PIN,STRAIGHT,HEADLE SS	2
19	PADZZ	5310011894590	19200	8270655	WASHER,NONMETALLIC UOC : L95	1
20	XADZZ		19200	8615913	NUT,PALIN,ROUND	1
21	PADZZ	5305000574593	96906	MS16996-9	SCREW,CAP,SOCKET HE AD	1
22	PAFZZ	5305000570509	96906	MS51958-12	SCREW,MACHINE	2
23	PAFZZ	1240002694983	19200	8615871	INDEX ELBOW	1
24	XADDD		19200	8215783	CELL ASSEMBLY	1
25	XADZZ		19200	8615909	.CELL,OPTICAL ELEMEN T	1
26	XADZZ		19200	8615981	.SPACER,OPTICAL ELEMENT	1
27	PADZZ	6650008513918	19200	8615943	.LENS,OPTICAL INSTRU MENT	1
28	XADZZ		19200	8615908	.CELL,OPTICAL ELEMEN T	1
29	XADZZ		19200	8615788	SLEEVE,OUTER	1
30	PADZZ	5330008514878	19200	8615994	O-RING	1
31	PADZZ	5330005278522	96906	MS29513-145	O-RING	1
32	XADZZ		19200	11834884	HOUSING,MAIN	1

END OF FIGURE

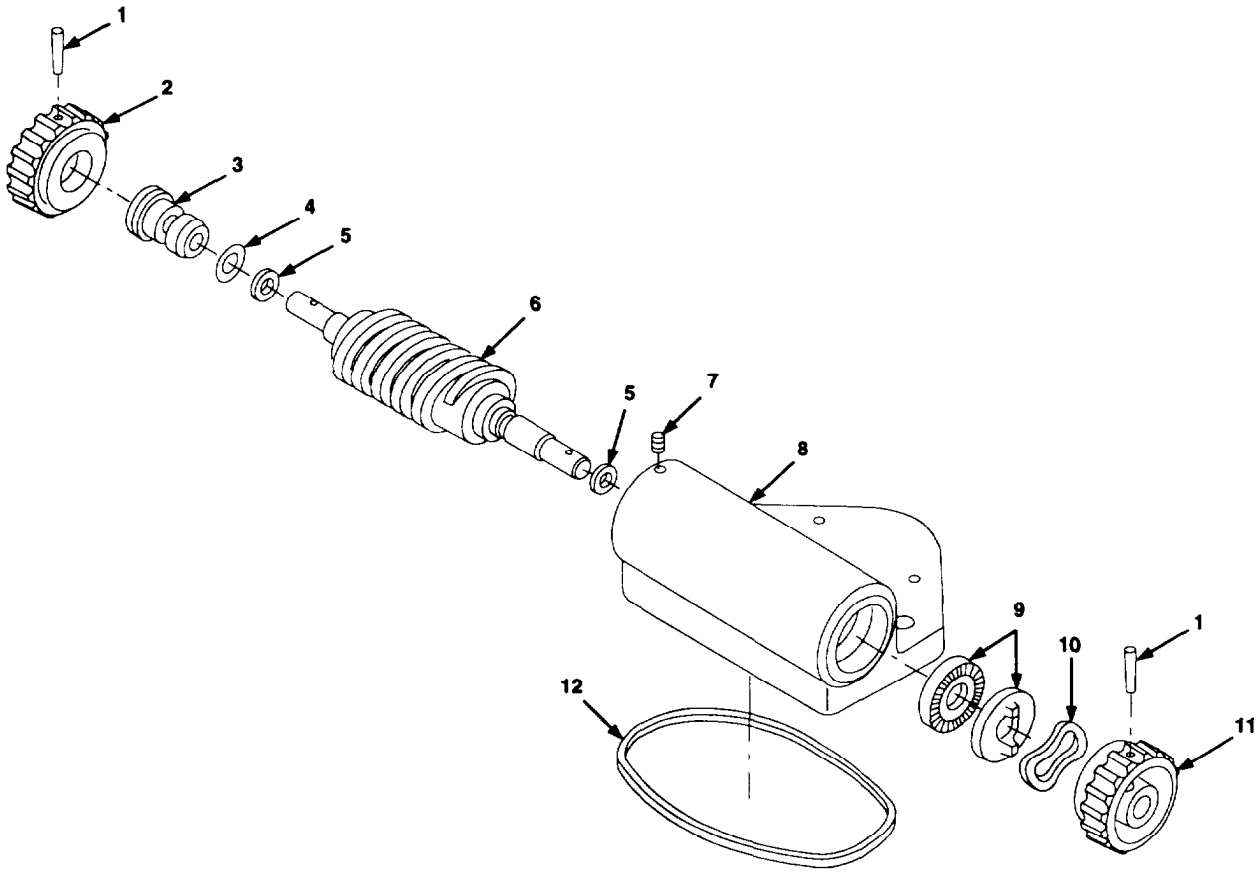


Figure D-13. Wormshaft Assembly 08615844

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 18070202 WORMSHAFT ASSEMBLY 8615844	
					FIGURE D-13 WORMSHAFT ASSEMBLY 8615844	
1	PAFZZ	5315001873243	96906	MS24692-57	PIN, TAPERED, PLAIN	2
2	PAFZZ	5355011560254	19200	8615877	KNOB	1
3	PAFZZ	5365011901141	19200	8615882	BUSHING, MACHINE TH READ	1
4	PAFZZ	5330008460501	96906	HS9241-118	O-RING	1
5	PAFZZ	5330008826874	96906	MS9241-011	O-RING	2
6	PAFZZ	3040009715975	19200	8615827	WORM SHAFT	1
7	PAFZZ	5305000572601	96906	MS51038-48	SETSCREW	1
8	XAFZZ		19200	8615824	HOUSING, WORM SHAFT	1
9	PAFZZ	3020009686135	19200	8615893	RATCHET	2
10	PAFZZ	5310005957319	78189	3564-28-00	WASHER, SPRING TENSI ON	1
11	PAFZZ	5355011903224	19200	8615830	KNOB	1
12	PAFZZ	5330008533361	19200	8615995	O-RING	1

END OF FIGURE

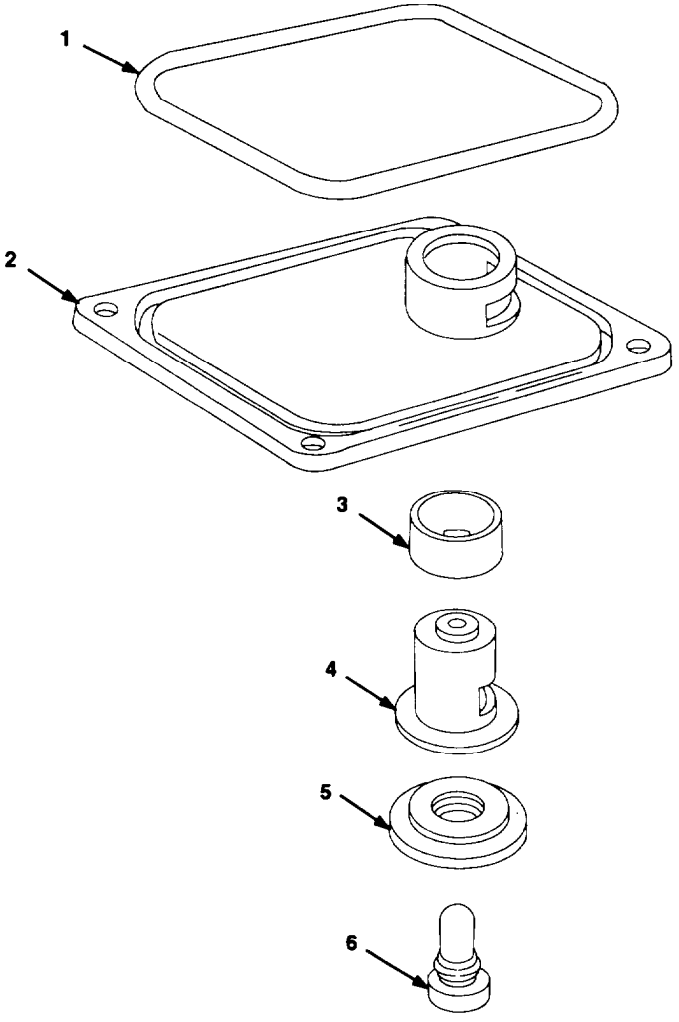


Figure D-14. Cover Assembly 10543756

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 18070203 COVER ASSEMBLY 10543756	
					FIGURE D-14 COVER ASSEMBLY 10543756	
1	PAFZZ	5330008514881	19200	8616002	O-RING uoc : L95	1
2	XAFZZ		19200	10543766	COVER,PLATE UOC:L95	1
3	PAFZZ	5365009165902	19200	10543761	SPACER, SLEEVE UDC:L95	1
4	PAFZZ	1240004915240	19200	10547199	TELESCOPE SUBASSEMB Y UDC:L95	1
5	PAFZZ	1240009165913	19200	10543763	HOLDER, OPTICAL ELEM ENT uoc : L95	1
6	PAOZZ	6240000514843	96906	HS25236-8623	LAMP, INCANDESCENT uoc : L95	1
					END OF FIGURE	

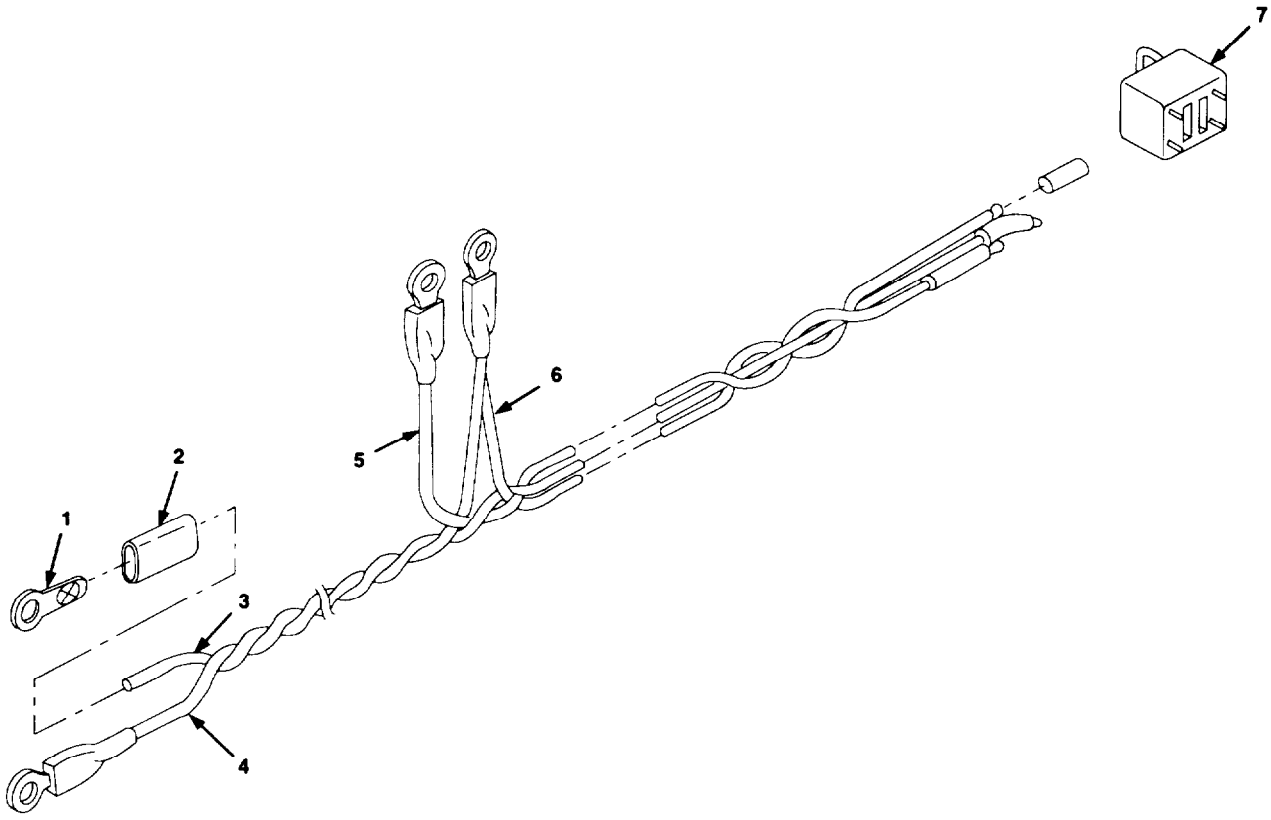


Figure D-15. Wiring Harness 8215873

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 18070204 WIRING HARNESS 8215873	
					FIGURE D-15 WIRING HARNESS 8215873	
1	PAHZZ	5940008555918	19200	8215934	TERMINAL, LUG	4
2	MHHZZ		18876	8034668-10	INSULATION SLEEVING AWG. NO. 14,1/2 LONG (MAKE FROM NSN 5970-00-245-3843)	8
3	MHHZZ		19200	8215873-2	WIRE, ELECTRICAL (MAKE FROM NSN 6145-00-702-8604)	1
4	MHHZZ		19200	8215873-4	WIRE, ELECTRICAL (MAKE FROM NSN 6145-00-174-1119).	1
5	MHHZZ		19200	8215873-1	WIRE, ELECTRICAL (MAKE FROM NSN 6145-00-548-2994)	1
6	MHHZZ		19200	8215873-3	WIRE, ELECTRICAL (MAKE FROM NSN 6145-00-702-8604)	1
7	PAHZA	5935009464348	81413	117528-000	CONNECTOR, RECEPTACL E	1
					END OF FIGURE	

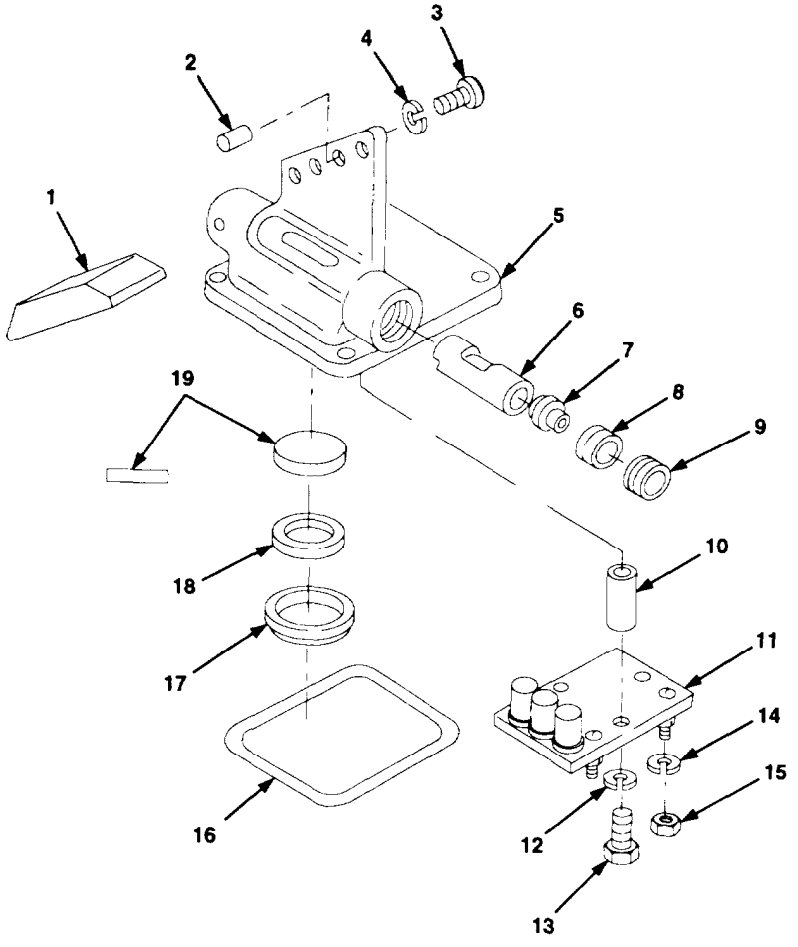


Figure D-16. Level Assembly 12599348

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 18070205 LEVEL ASSEMBLY 12599348	
					FIGURE D-16 LEVEL ASSEMBLY 12599348	
1	PAFZZ	6650004885285	19200	11731289	MIRROR, OPTICAL INST RUMENT	1
2	PAFZZ	5315008067039	96906	MS16555-604	PIN, STRAIGHT, HEADLE SS	2
3	PAFZZ	5305009590379	96906	MS16995-10	SCREW, CAP, SOCKET HE AD	2
4	PAFZZ	5310009265876	96906	MS35338-154	WASHER, LOCK	2
5	XAFZZ		19200	12599349	MOUNT, LEVEL, PINNED UOC : V48	1
6	PAFZZ	1240008514866	19200	8215794	LEVEL, FIRE CONTROL INSTRUMENT	1
7	PAFZZ	3040008956496	19200	8215789	CAM, CONTROL	1
8	PAFZZ	1240008956495	19200	8215790	HOLDER, OPTICAL ELEM ENT	1
9	PAFZZ	5365008488664	19200	8615973	RING, EXTERNALLY THR EADED UOC:L95	1
10	PAFZZ	5365006323103	80205	NAS43DDO-32	SPACER, SLEEVE UOC : V48	2
11	PAFZZ	5998012868785	19200	12599285	CIRCUIT BOARD ASSY BLY UOC : V48	1
12	PAFZZ	5310005432410	96906	MS35338-40	WASHER, LOCK UOC : V48	2
13	PAFZZ	5305009844976	96906	MS35206-219	SCREW, MACHINE UOC : V48	2
14	PAFZZ	5310000221117	96906	HS35333-103	WASHER, LOCK	2
15	PAFZZ	5310009349740	96906	MS35649-225B	NUT, PLAIN, HEXAGON UOC : V48	2
16	PAFZZ	5330008511019	19200	8615996	O-RING	1
17	PAFZZ	1240011888029	19200	8615982	RETAINER, OPTICAL ELEMENT	1
18	PAFZZ	5365011894788	19200	10548474	SHIM	1
19	PAFZZ	9340008513913	19200	8616003	WINDOW, OBSERVATION	1
					END OF FIGURE	

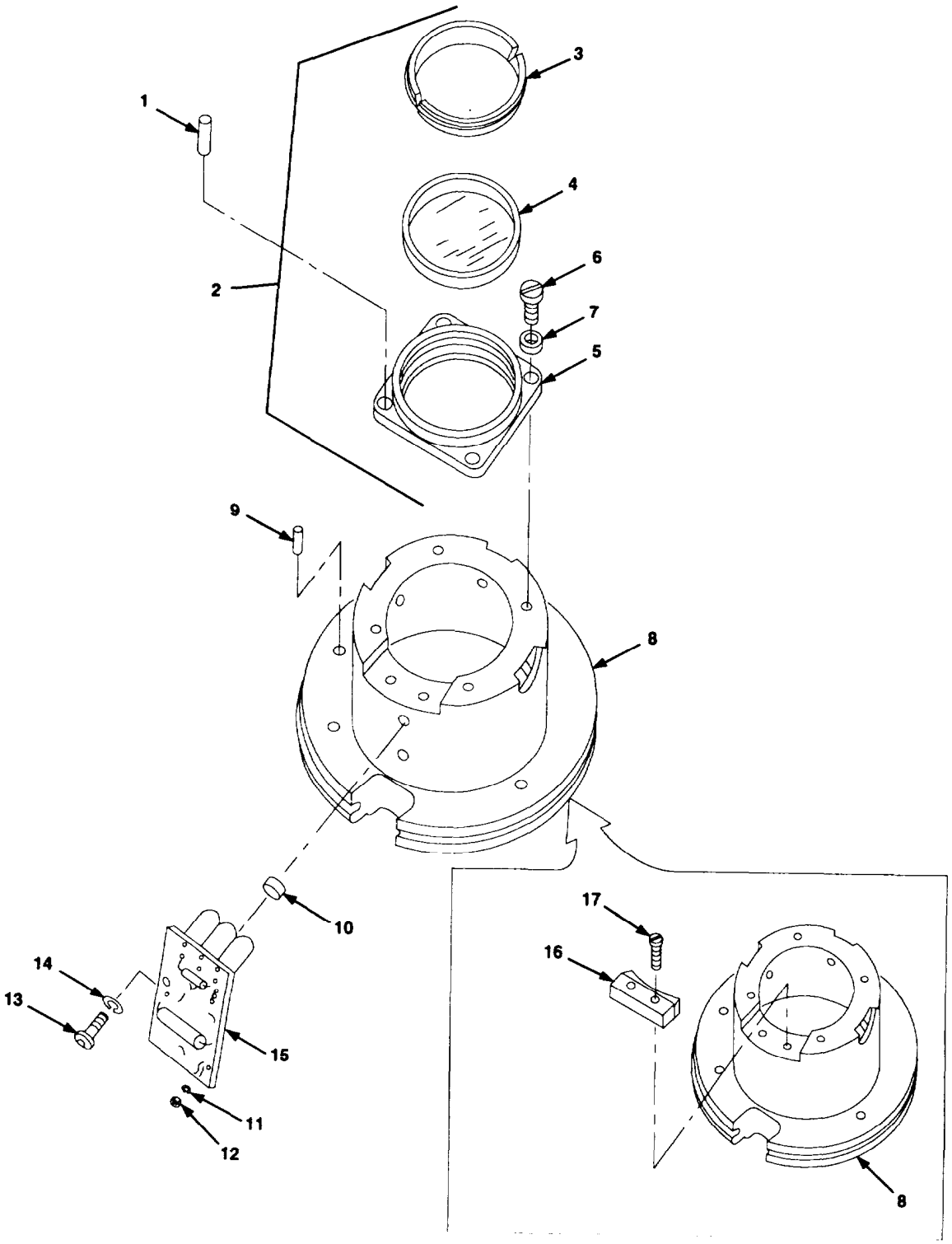


Figure D-17. Reticle Cage Assembly 12599350 and 11834878 Including Cell Assembly 11834879

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 18070206 RETICLE CAGE ASSEMBLY 12599350 AND 11834878 INCLUDING GROUP 1807020601 CELL ASSEMBLY	
					FIGURE D-17 RETICLE CAGE ASSEMBLY 12599350 AND 11834878 INCLUDING CELL ASSEMBLY 11834879	
1	PADZZ	5315007029650	96906	MS16555-602	PIN, STRAIGHT, HEADLE SS	2
2	ADDDD		19200	11834879	CELL ASSEMBLY, OPTIC AL INSTRUMENT	1
3	PBDZZ	1240008844879	19200	8615979	. RETAINER, OPTICAL ELEMENT	1
4	PADZZ	6650011055608	19200	11829210	. RETICLE, OPTICAL INS TRUMENT	1
5	PGDZZ	1240011924168	19200	11747068	CELL, OPTICAL ELEMENT UOC:L95	1
6	PADZZ	5305000570511	96906	MS51958-14	SCREW, MACHINE	4
7	PADZZ	5310009338118	96906	MS35338-135	WASHER, LOCK	4
8	PADZZ	1240013725069	19200	9356017	HOLDER, OPTICAL ELEM ENT	1
9	PADZZ	5315004915241	19200	10512989	PIN, STRAIGHT, HEADLE SS	1
10	PAHZZ	5365005805317	80205	NAS43DD0-8	SPACER, SLEEVE uoc : V48	2
11	PAHZZ	5310000221117	96906	MS35333-103	WASHER, LOCK UOC:V48	2
12	PAHZZ	5310009349740	96906	MS35649-225B	NUT, PLAIN, HEXAGON UOC: V48	2
13	PAHZZ	5305008892997	96906	MS35206-215	SCREW, MACHINE UOC:V48	2
14	PAHZZ	5310005432410	96906	MS35338-40	WASHER, LOCK uoc : V48	2
15	PAHZZ	5998012868785	19200	12599285	CIRCUIT CARD ASSEMBLY uoc : V48	1
16	PAHZZ	6695008847746	19200	8615924	LIGHT CONDUCTOR, INS UOC:L95	1
17	PAHZZ	5305000570512	96906	MS51958-15	SCREW, MACHINE UOC:L95	2
					END OF FIGURE	

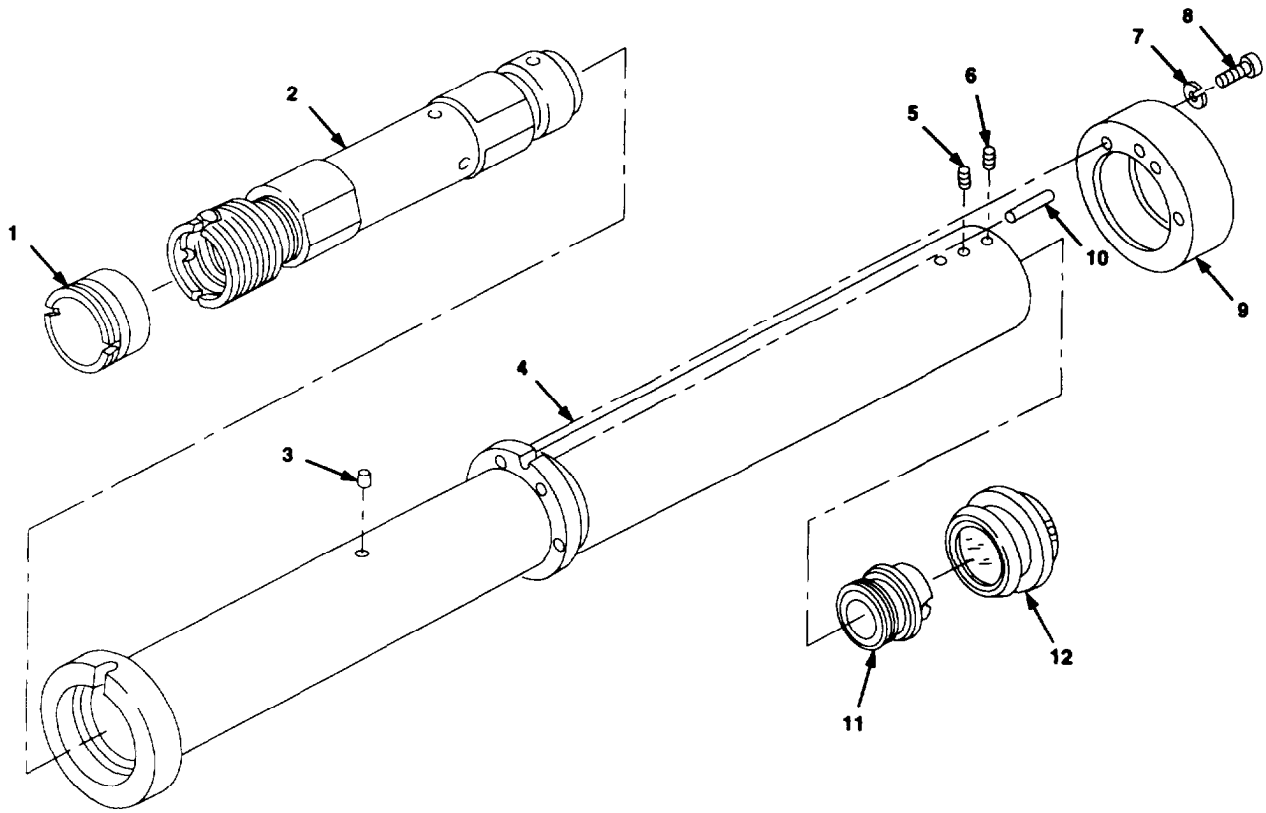


Figure D-18. Elbow Telescope Subassembly (Objective and Diaphragm) 8615791 and Cell Assembly 8215808

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180703 ELBOW TELESCOPE SUB-ASSEMBLY 8615791 AND GROUP 18070301 CELL ASSEMBLY 8215808	
					FIGURE D-18 ELBOW TELESCOPE SUB-ASSEMBLY (OBJECTIVE AND DIAPHRAGM) 8615791 AND CELL ASSEMBLY 8215808	
1	XADZZ		19200	8615907	DIAPHRAGM, OPTICAL INSTRUMENT	1
2	XADDD		19200	8215761	CELL AND HOUSING ASSEMBLY, OPTICAL INSTRUMENT	1
3	PADZZ	5305007245802	96906	MS51964-29	SETSCREW	1
4	XADZZ		19200	8615790	TUBE, CEMENTED AND PINNED	1
5	PADZZ	5305007245805	96906	MS51964-31	SETSCREW	2
6	PAFZZ	5305007245792	96906	MS51964-17	SETSCREW	1
7	PADZZ	5310009338120	96906	MS35338-138	WASHER, LOCK	4
8	PADZZ	5305009836654	96906	MS16998-31	SCREW, CAP, SOCKET HE AD	4
9	XADZZ		19200	8615828	MOUNTING RING	1
10	PADZZ	5315000637312	96906	MS16555-644	PIN, STRAIGHT, HEADLE SS	1
11	PADZZ	1240008640342	19200	8215807	CELL ASSEMBLY, OPTIC AL INSTRUMENT	1
12	PAFZZ	1240008640343	19200	8215808	CELL ASSEMBLY, OPTIC AL INSTRUMENT	1

END OF FIGURE

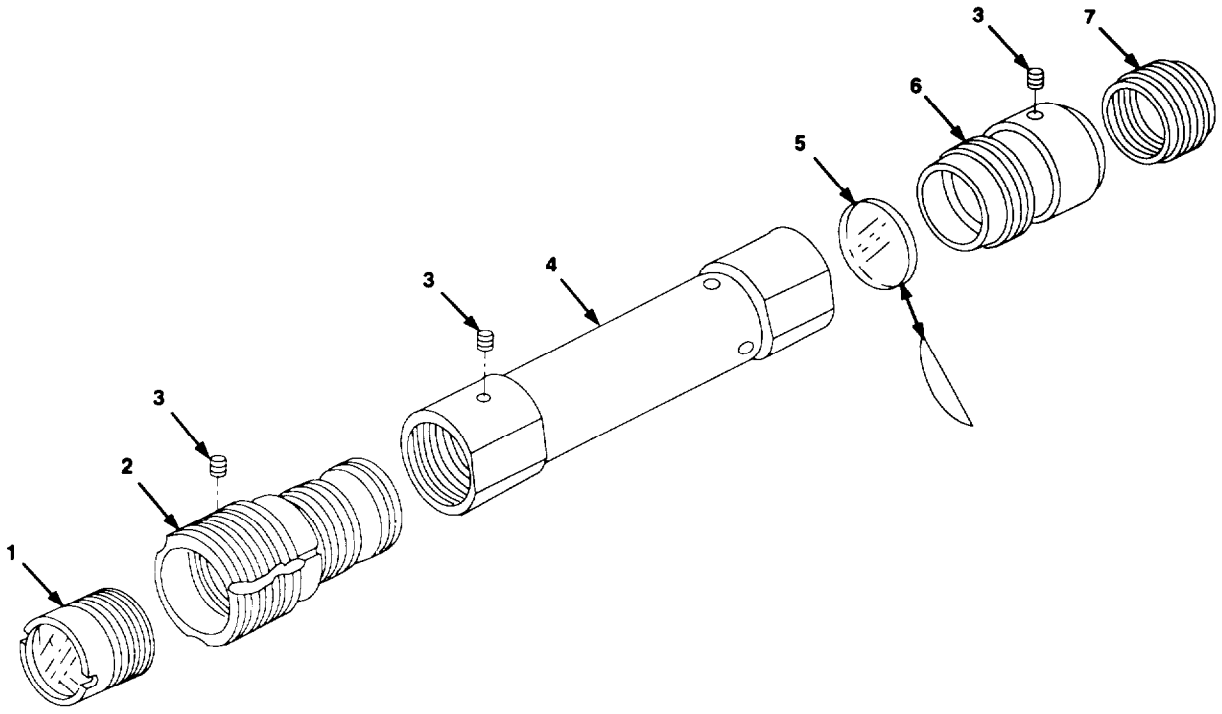


Figure D-19. Cell and Housing Assembly 8215761

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 18070302 CELL AND HOUSING ASSEMBLY 8215761	
					FIGURE D-19 CELL AND HOUSING ASSEMBLY 8215761	
1	XADZZ		19200	8215806	CELL ASSEMBLY OPTICAL INSTRUMENT	1
2	XADZZ		19200	8615897	HOUSING	1
3	PADZZ	5305008007261	96906	MS51021-9	SET SCREW	4
4	XADZZ		19200	8615831	HOUSING, OPTICAL ELEMENT CELL	1
5	PADZZ	6650008712974	19200	8615944	LENS, OPTICAL INSTRU MENT	1
6	XADZZ		19200	8615899	RETAINER, OPTICAL EL EMENT	1
7	XADZZ		19200	8615900	DIAPHRAGM, OPTICAL INSTRUMENT	1
					END OF FIGURE	

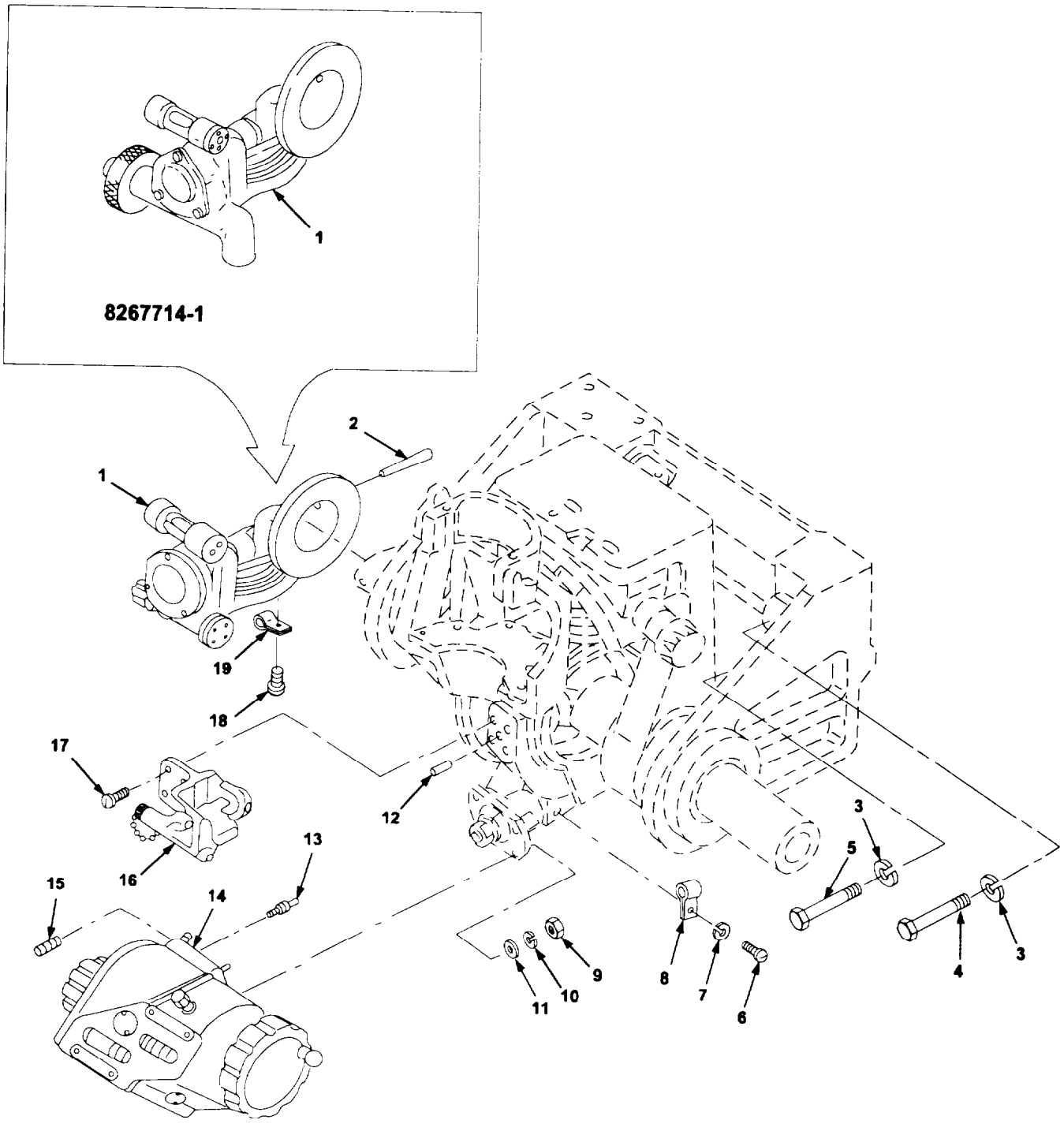


Figure D-20. Mount, Telescope, M14/M145A1 8267701-2 and 8267701-1

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1808 MOUNT, TELESCOPE, M145/M145A1 8267701-2 AND 8267701-1	
					FIGURE D-20 MOUNT, TELESCOPE, M145/ M145A1 8267701-2 AND 8267701-1	
1	PADDD	1240011495951	19200	8267714-2	QUADRANT SUPPORT AS SEMBLY (FOR PARTS SEE GROUP 1808041 UOC : L98	1
1	PADDD	1290013295033	19200	8267714-1	QUADRANT SUPPORTAS SEMBLY (NEW CONFIGURATION) (FOR PARTS SEE GROUP 180804) UOC:V36	1
2	PADZZ	5315000545543	96906	MS24692-321	PIN, TAPERED, PLAIN UOC : V36	1
3	PAOZZ	5310009370453	96906	MS35338-145	WASHER, LOCK	4
4	PAOZZ	5305009448299	96906	MS35308-474	SCREW, CAP, HEXAGON H EAD	2
5	PAOZZ	5305009477047	96906	MS35308-472	SCREW, CAP, HEXAGON H EAD	2
6	PAFZZ	5305000545644	96906	MS51957-11	SCREW, MACHINE	2
7	PAFZZ	5310005503715	96906	MS35333-70	WASHER, LOCK	2
8	PAFZZ	5340000665006	19200	8267812	STRAP, RETAINING	2
9	PAHZZ	5310009349760	96906	MS35649-204	NUT, PLAIN, HEXAGON	4
10	PAHZZ	5310009338120	96906	MS35338-138	WASHER. LOCK	4
11	PAHZZ	5310006191148	96906	MS15795-808	WASHER, FLAT	4
12	PAFZZ	5315000544122	21450	544122	PIN, STRAIGHT, HEADLE SS	2
13	PAHZZ	5315000863408	19200	8267760	STUD, SHOULDERED, ECC ENTRIC	1
14	PAHDD	1240011495952	19200	8267711	COUNTER BOX ASSEMBL Y (FOR PARTS SEE GROUP 180805)	1
15	PAHZZ	5305006381198	96906	MS51029-1	SETSCREW	1
16	AFFFF		19200	8215836	LEVEL ASSEMBLY (FOR PARTS SEE GROUP 180803)	1
17	PAFZZ	5305008844886	19200	8215846	SCREW, CAP, SOCKET HE AD	2
18	PAFZZ	5305000570522	96906	MS51958-26	SCREW, MACHINE	2
19	PAFZZ	5340000366881	19200	8215854	CLAMP, LOOP	2

END OF FIGURE

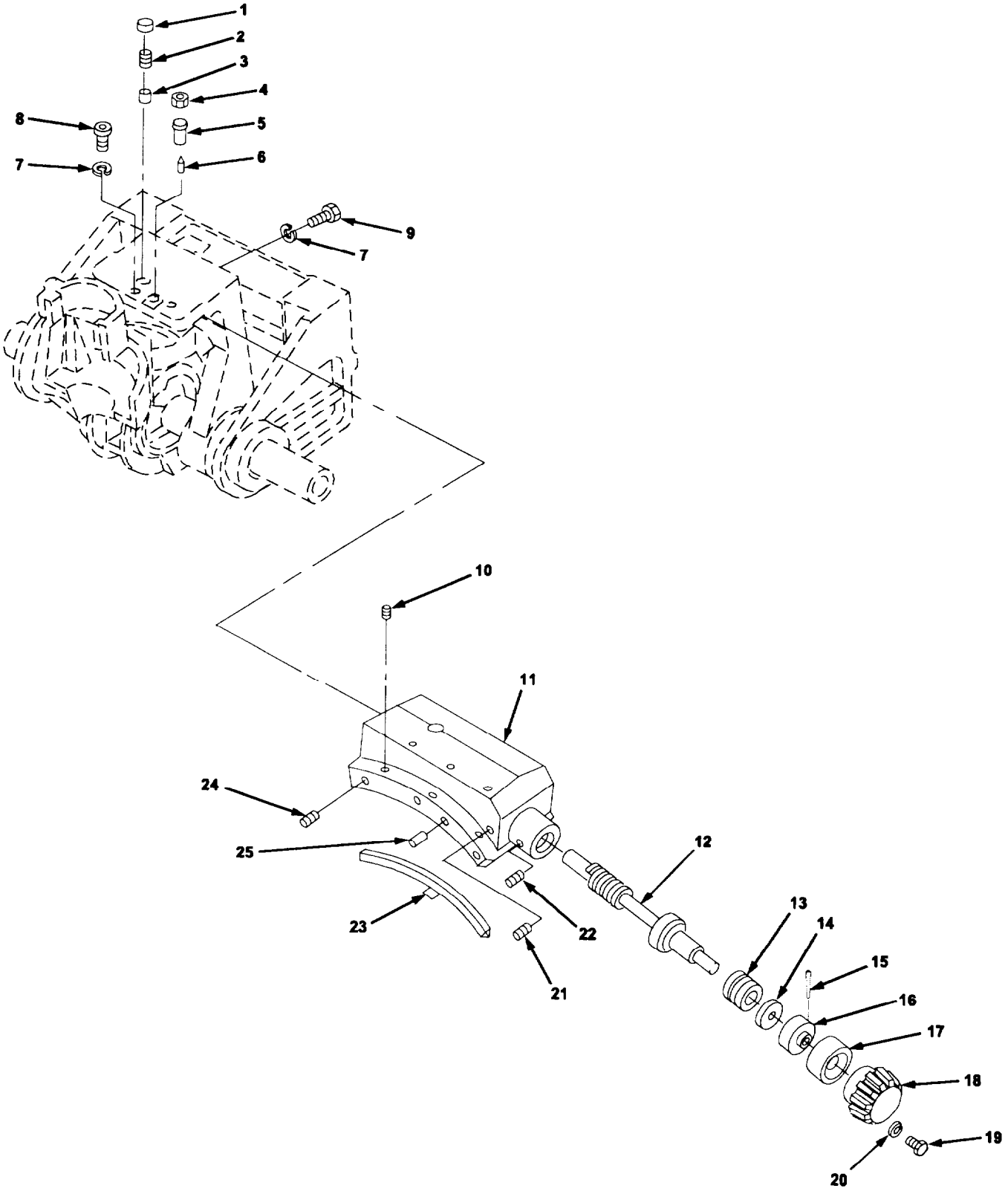


Figure D-21. Mount, Telescope, M145/M145A1 8267701-2 and 8267701-1 - Continued

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1808 MOUNT, TELESCOPE, M145/M145A1 8267701-2 AND 8267701-1	
					FIGURE D-21 MOUNT, TELESCOPE, M145/ M145A1 8267701-2 AND 8267701-1 - CONTINUED	
1	PAFZZ	5365000766002	19200	8587558	PLUG, MACHINE THREAD	1
2	PAFZZ	5360009789584	19200	8587557	SPRING, HELICAL, COMP RESSION	1
3	PAFZZ	3120009837313	19200	8215750	BEARING, V	1
4	PAFZZ	5310009349765	96906	MS35650-304	NUT, PLAIN, HEXAGON	1
5	PAFZZ	3120004556044	19200	8267733	BEARING, SLEEVE MOUNT, TELESCOPE	1
6	PAFZZ	5315008847763	19200	8267730	PIN, TAPERED, THREADE D	1
7	PAFZZ	5310009746623	96906	MS35338-140	WASHER, LOCK	4
8	PAFZZ	5305002257211	96906	MS16995-63	SCREW, CAP, SOCKET HE AD	2
9	PAFZZ	5305009887839	96906	MS16995-65	SCREW, CAP, SOCKET HE AD	2
10	PAFZZ	5305009933590	96906	MS51031-47	SETSCREW	3
11	PBHZZ	1240011656252	19200	8215757	HOUSING, WORM SHAFT	1
12	PAFZZ	3040009789583	19200	8587551	WORMSHAFT ASSEMBLY	1
13	PBFZZ	1240008324702	19200	8587556	SEAT, BALL SOCKET	1
14	PAFZZ	5310009516416	19207	8587560	WASHER, FLAT	1
15	PAFZZ	5315001873228	96906	MS24692-30	PIN, TAPERED, PLAIN	1
16	PBFZZ	3040012524291	19200	8215754	HUB, BODY	1
17	XAFZZ		19200	8215759	INDICATOR	1
18	PAFZZ	5355012045875	19200	8215749	KNOB	1
19	PAFZZ	5305000545652	96906	MS51957-18	SCREW, MACHINE	2
20	PAFZZ	5310009338118	96906	MS35338-135	WASHER, LOCK	2
21	PAFZZ	5305009516414	19200	8587559	SETSCREW	1
22	PAFZZ	5305000514484	96906	MS551973-9	SETSCREW	1
23	PBFZZ	5315012524279	19200	8267817	KEY, GIB	1
24	PAFZZ	5305007245869	96906	MS51031-62	SETSCREW	3
25	PAFZZ	5315000780112	96906	MS16556-608	PIN, STRAIGHT, HEADLE SS	1
					END OF FIGURE	

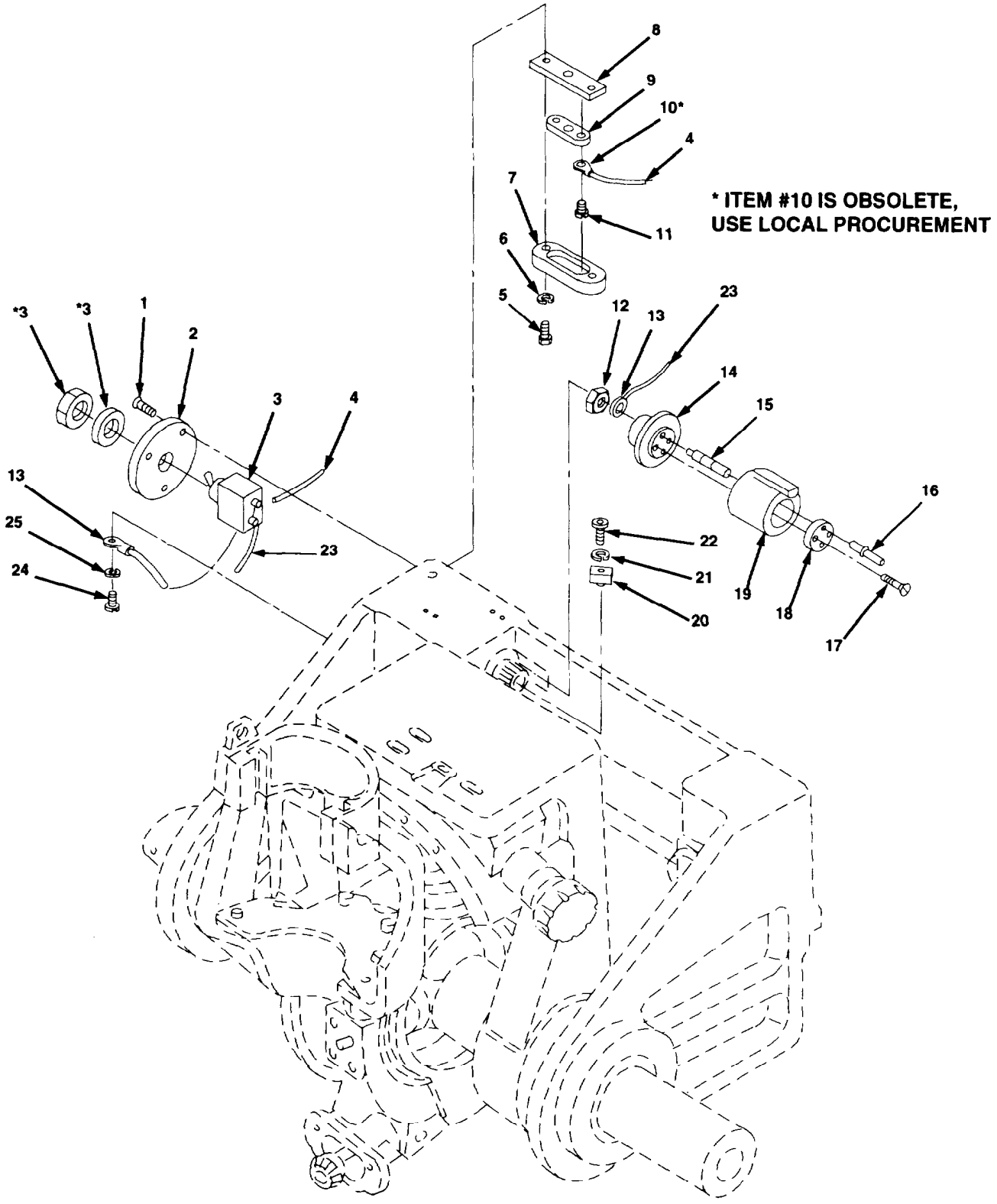


Figure D-22. Mount, Telescope, M145/M145A1 8267701-2 and 8267701-1 - Continued

GROUP 1808 MOUNT, TELESCOPE, M145/M145A1 8267701-2 AND 8267701-1

FIGURE D-22 MOUNT, TELESCOPE, M145/ M145A1 8267701-2 AND 8267701-1 - CONTINUED

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
1	PAFZZ	5305007702533	96906	MS51959-13	SCREW, MACHINE	3
2	XAFZZ		19200	8267786	PLATE	1
3	PAFZZ	5930010624903	19200	11739570	SWITCH, TOGGLE	1
4	MFFZZ		81349	M13486-1-2	WIRE, ELECTRICAL (MAKE FROM NSN 6145-00-570-0516)	2
5	PAFZZ	5305009887604	96906	MS16995-28	SCREW, CAP, SOCKET HE AD	2
6	PAFZZ	5310009338119	96906	MS3535338-137	WASHER, LOCK	2
7	PAFZZ	5970008847762	19200	8267765	INSULATOR, PLATE	1
8	PAFZZ	5970008847764	19200	8267763	INSULATOR, PLATE	1
9	XAFZZ		19200	8267764	PLATE	1
11	PAFZZ	5305009580660	96906	MS35207-224	SCREW, MACHINE	2
12	PAFZZ	5310004103017	96906	MS35649-245T	NUT, PLAIN, HEXAGON	2
13	PAHZZ	5940008555918	19200	8215934	TERMINAL, LUG	3
14	PAFZZ	5970007530515	19200	8624897	INSULATOR, BUSHING	1
15	PAFZZ	5999008956493	19200	8267787	CONTACT, ELECTRICAL	2
16	PAFZZ	5315007530514	19200	8624898	PIN, SHOULDER, HEADLE SS	1
17	PAFZZ	5305002077468	96906	MS35214-16	SCREW, MACHINE	1
18	PAFZZ	5999000425355	19200	7660438	PLATE MOUNT ELEVATI ON	1
19	PAFZZ	1290001913302	19200	11729776	SHELL RECEPTACLE	1
20	PAFZZ	5340003648192	19200	8267814	STRAP, RETAINING	1
21	PAFZZ	5310009338118	96906	MS35338-135	WASHER, LOCK	1
22	PAFZZ	5305000545652	96906	MS51957-18	SCREW, MACHINE	1
23	MFFZZ		81349	M16878/58DE9	WIRE, ELECTRICAL (MAKE FROM NSN 6145-01-182-1377)	3
24	PAFZZ	5305000685276	96906	MS16995-9	SCREW, CAP, SOCKET HE AD	1
25	PAFZZ	5310005503715	96906	MS35333-70	WASHER, LOCK	1

END OF FIGURE

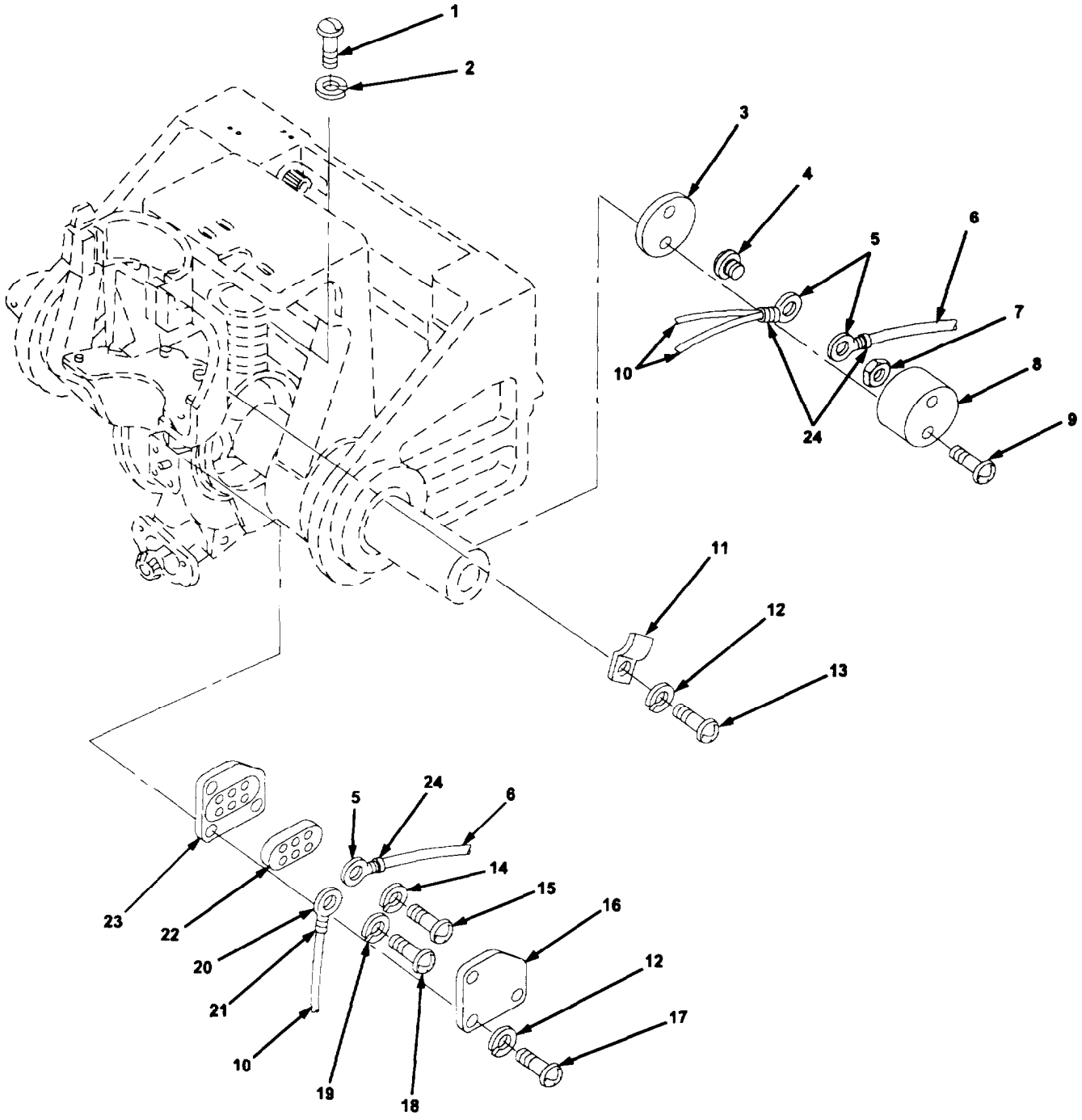
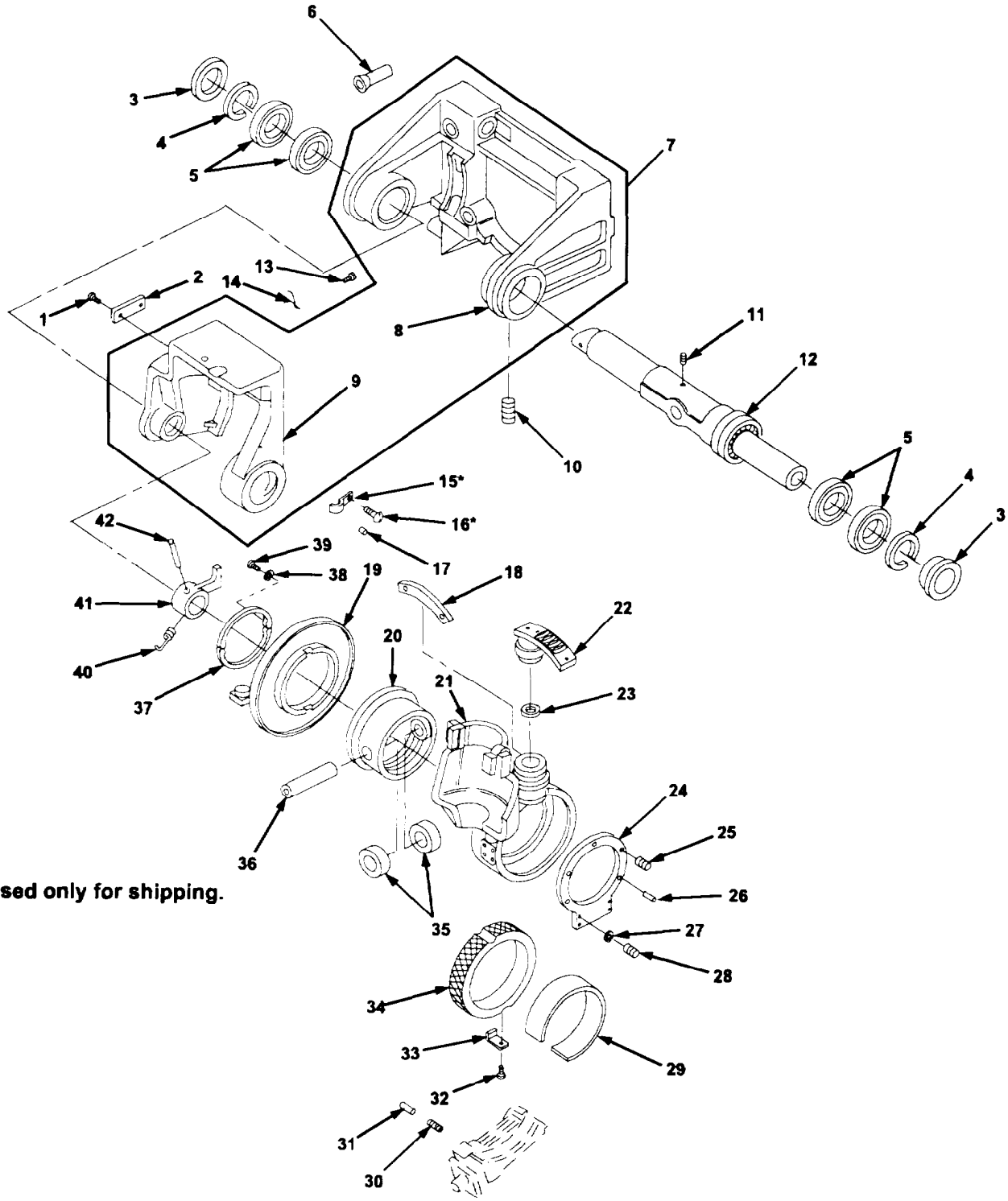


Figure D-23. Mount, Telescope, M145/M145A1 8267701-2 and 8267701-1 - Continued

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1808 MOUNT, TELESCOPE, M145/M145A1 8267701-2 AND 8267701-1	
					FIGURE D-23 MOUNT, TELESCOPE, M145/ M145A1 8267701-2 AND 8267701-1	
1	PAFZZ	5305000546658	96906	MS51957-34	SCREW, MACHINE	1
2	PAFZZ	5310009296395	96906	MS35338-136	WASHER, LOCK	1
3	PAFZZ	5970008528627	19200	8267850	INSULATOR, DISK	1
4	PAFZZ	5305000570509	96906	MS51958-12	SCREW, MACHINE	1
5	PAFZZ	5940009356453	18876	8215845	TERMINAL, LUG	5
6	MFFZZ		81349	M13486-1-3	WIRE, ELECTRICAL (MAKE FROM NSN 6145-00-161-1609)	2
7	PAFZZ	5310009349741	96906	MS35650-345	NUT, PLAIN, HEXAGON	1
8	PAFZZ	5970008523689	19200	8267849	INSULATOR, DISK	1
9	PAFZZ	5305007637827	96906	MS51959-18	SCREW, MACHINE	2
10	MFFZZ		81349	M16878/5BDE9	WIRE, ELECTRICAL (MAKE FROM NSN 6145-01-182-1377)	2
11	PAFZZ	5340003648192	19200	8267814	STRAP, RETAINING	1
12	PAFZZ	5310009338118	96906	MS35338-135	WASHER, LOCK	4
13	PAFZZ	5305000545650	96906	MS51957-16	SCREW, MACHINE	1
14	PAFZZ	5310005503715	96906	MS35333-70	WASHER, LOCK	2
15	PAFZZ	5305009548118	96906	MS35215-10	SCREW, MACHINE	2
16	PAFZZ	5970002355158	19200	8267719	INSULATOR, PLATE	1
17	PAFZZ	5305000545652	96906	MS51957-18	SCREW, MACHINE	3
18	PAFZZ	5305009548110	96906	MS35215-1	SCREW, MACHINE	3
19	PAFZZ	5310005434652	96906	MS35333-69	WASHER, LOCK	3
20	PAHZZ	5940008555918	19200	8215934	TERMINAL, LUG	3
21	MFFZZ		81349	MS3053/5-104-0	INSULATION SLEEVING (MAKE FROM NSN V 5970-00-812-2969)	
22	XAFZZ		19200	8267772	PLATE	1
23	PAFZZ	5970004361639	19200	8267720	INSULATOR, PLATE	1
24	MFFZZ		81349	M23053/5-105-0	INSULATION SLEEVING (MAKE FROM NSN V 5970-00-954-16221	

END OF FIGURE



*Parts used only for shipping.

Figure D-24. Mount, Telescope, M145/M145A1 8267701-2 and 8267701-1 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1808 MOUNT, TELESCOPE, M145/M145A1 8267701-2 AND 8267701-1	
					FIGURE D-24 MOUNT, TELESCOPE, M145/ M145A1 8267701-2 AND 8267701-1	
1	PAHZZ	5305000545644	96906	MS51957-11	SCREW, MACHINE	2
2	PFHZZ	9905000044340	19200	10555190-2	PLATE, IDENTIFICATIO N UOC:L98	1
2	PFHZZ	9905013213720	19200	10555190-1	PLATE, IDENTIFICATIO N UOC : V36	1
3	PADZZ	5365012045900	19200	8267859	RING, EXTERNALLY THR EADEO	2
4	PADZZ	5365012050452	19200	8267779	SPACER, RING	2
5	PADZZ	3110008849862	19200	8215885	BEARING, BALL, ANNULA R	4
6	XADZZ		19200	8215815	BUSHING, SLEEVE	1
7	XADZZ		19200	9356157	ROCKER/BRACKET (MATCHED SET)	1
8	XADZZ		19200	8267702	. BRACKET	1
9	XAOZZ		19200	8267703	. ROCKER	1
10	PADZZ	5305000546869	96906	MS51031-48	SETSCREW	2
11	PADZZ	5305008528623	19200	8215881	SETSCREW	1
12	PAOZZ	3040013874026	19200	8267729-1	SHAFT, SHOULDERED	1
13	PAOZZ	5305000711322	96906	MS51960-65	SCREW, MACHINE	2
14	XADZZ		19200	8267768	STOP	2
15	PADZZ	5340006649175	96906	MS35140-10	STRAP, RETAINING	1
16	PADZZ	5305002078253	96906	MS35307-308	SCREW, CAP, HEXAGON H EAO	1
17	PAHZZ	5315000604776	96906	MS16556-604	PIN, STRAIGHT, HEADLE SS	2
18	PADZZ	5340001172779	19200	8267806	SEGMENT, TELESCOPE	1
19	XDDDD		19200	11728942	PLATE, MOUNTING (FOR PARTS SEE GROUP 1808021	1
20	PADZZ	5365011321389	19200	8267706	RING, MOUNT TELESCOP E	1
21	XADZZ		19200	8267704	BODY	1
22	PAHHH	1240011656247	19200	8267742	SEGMENT ASSEMBLY, GE AR ASSEMBLY (FOR PARTS SEE GROUP 1080806)	1
23	PAHZZ	5365013495621	19200	9356161-4	SHIM	V
23	PAHZZ	5365013490875	19200	9356161-3	SHIM	V
23	PAHZZ	5365013490876	19200	9356161-2	SHIM	V
23	PAHZZ	5365013490877	19200	9356161-1	SHIM	V
24	PADZZ	1240004061582	19200	8267736	MOUNT, TELESCOPE	1
25	PADZZ	5305009887608	96906	MS16995-36	SCREW, CAP, SOCKET HE AD	4
26	PADZZ	5315008224740	96906	MS16556-627	PIN, STRAIGHT, HEADLE SS	2
27	PADZZ	5310009338120	96906	MS35338-138	WASHER, LOCK	4
28	PADZZ	5305009887607	96906	MS16995-35	SCREW, CAP, SOCKET HE AD	4
29	PADZZ	5340011247396	19200	8267801	COVER	1
30	PADZZ	5360008791005	19200	8267808	SPRING, HELICAL, COMP RESSION	1
31	PADZZ	5340008849863	20200	8267807	PLUG, RECTANGULAR	1
32	PADZZ	5305007278833	96906	MS51959-3	SCREW, MACHINE	4
33	PADZZ	5315011749260	19200	8267797	KEY, SPLIT, FLAT	2
34	PADZZ	3020002235144	19200	8267738	GEAR, WORM WHEEL	1
35	PADZZ	3110008849861	19200	8215882	BEARING, BALL, THRUST	2
36	PADZZ	3040011310291	19200	8267800	SHAFT, PIVOT	1

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
37	XADZZ		19200	8267739	RING, RETAINING	1
38	PAHZZ	5310009296395	96906	MS35338-136	WASHER, LOCK	4
39	PAHZZ	5305000546651	96906	MS51957-27	SCREW, MACHINE	4
40	PADZZ	5305007239398	96906	MS51963-47	SETSCREW	1
41	PADZZ	5340004061576	19200	8267818	STOP, MECHANICAL TELESCOPE	1
42	PADZZ	5315001880233	96906	MS24692-315	PIN, TAPERED, PLAIN	1

END OF FIGURE

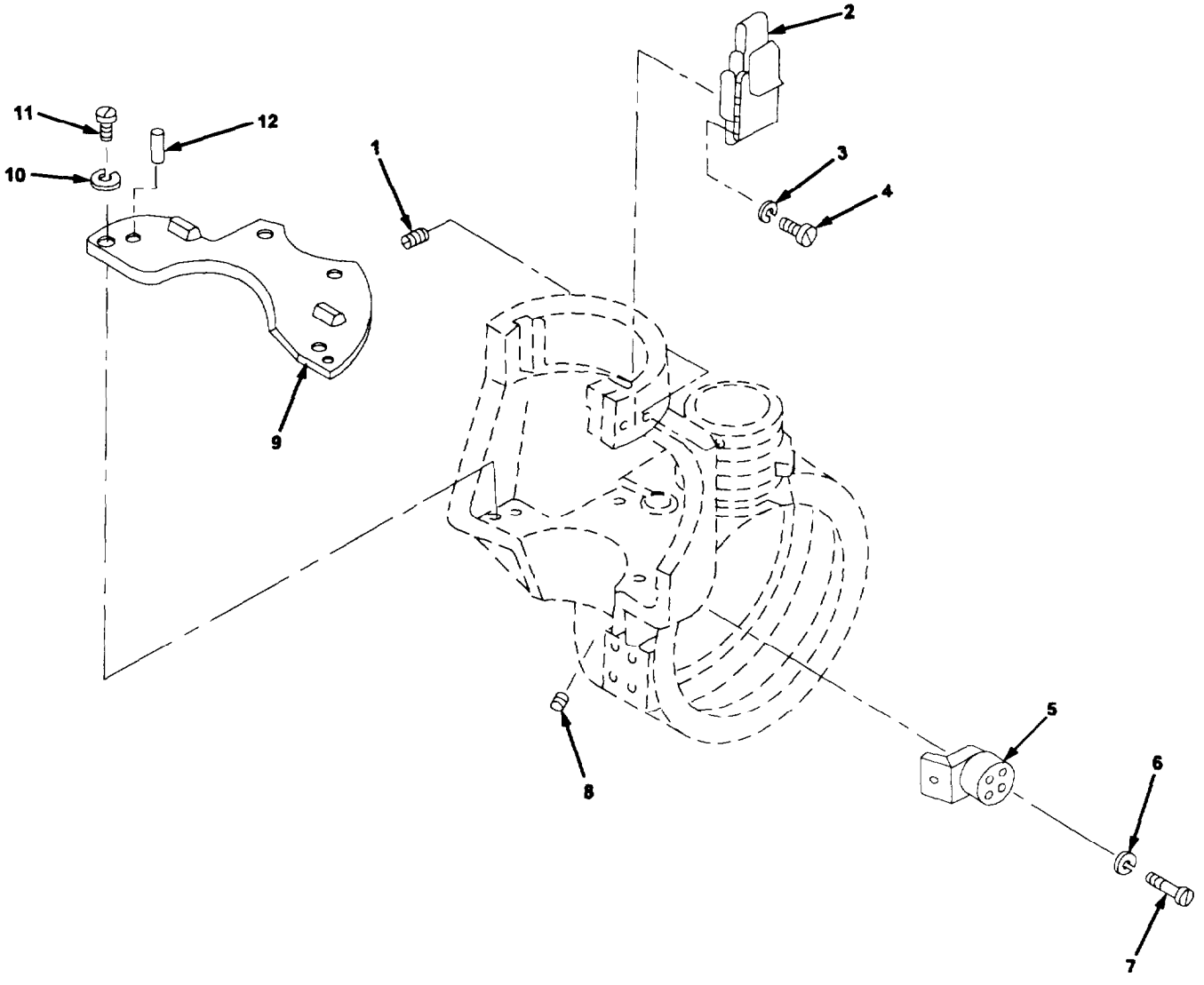


Figure D-25. Mount, Telescope, M145/M145A1 8267701-2 and 8267701-1 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1808 MOUNT, TELESCOPE, M145/M145A1 8267701-2 AND 8267701-1	
					FIGURE D-25 MOUNT, TELESCOPE, M145/ M145A1 8267701-2 AND 8267701-1 - CONTINUED	
1	PAHZZ	5305005275737	96906	MS51031-16	SETSCREW	1
2	PAFZZ	5340009845206	19200	10531763-4	CATCH, CLAMPING	2
3	PAFZZ	5310006163555	96906	MS35333-71	WASHER, LOCK	4
4	PAFZZ	5305000546650	96906	MS51957-26	SCREW, MACHINE	4
5	PAHZZ	5999008712976	19200	8267774	CONTACT, ELECTRICAL	1
6	PAHZZ	5310005434652	96906	MS35333-69	WASHER, LOCK	2
7	PAHZZ	5305000570499	96906	MS51958-3	SCREW, MACHINE	2
8	PAHZZ	5365008522737	19200	8267851	PLUG, MACHINE THREAD	1
9	XADZZ		19200	7660425	PLATE	1
10	PADZZ	5310009338120	96906	MS35338-138	WASHER, LOCK	4
11	PADZZ	5305000509229	96906	MS51957-63	SCREW, MACHINE	4
12	PADZZ	5315009645114	96906	MS16555-340	PIN, STRAIGHT, HEADLE SS	2

END OF FIGURE

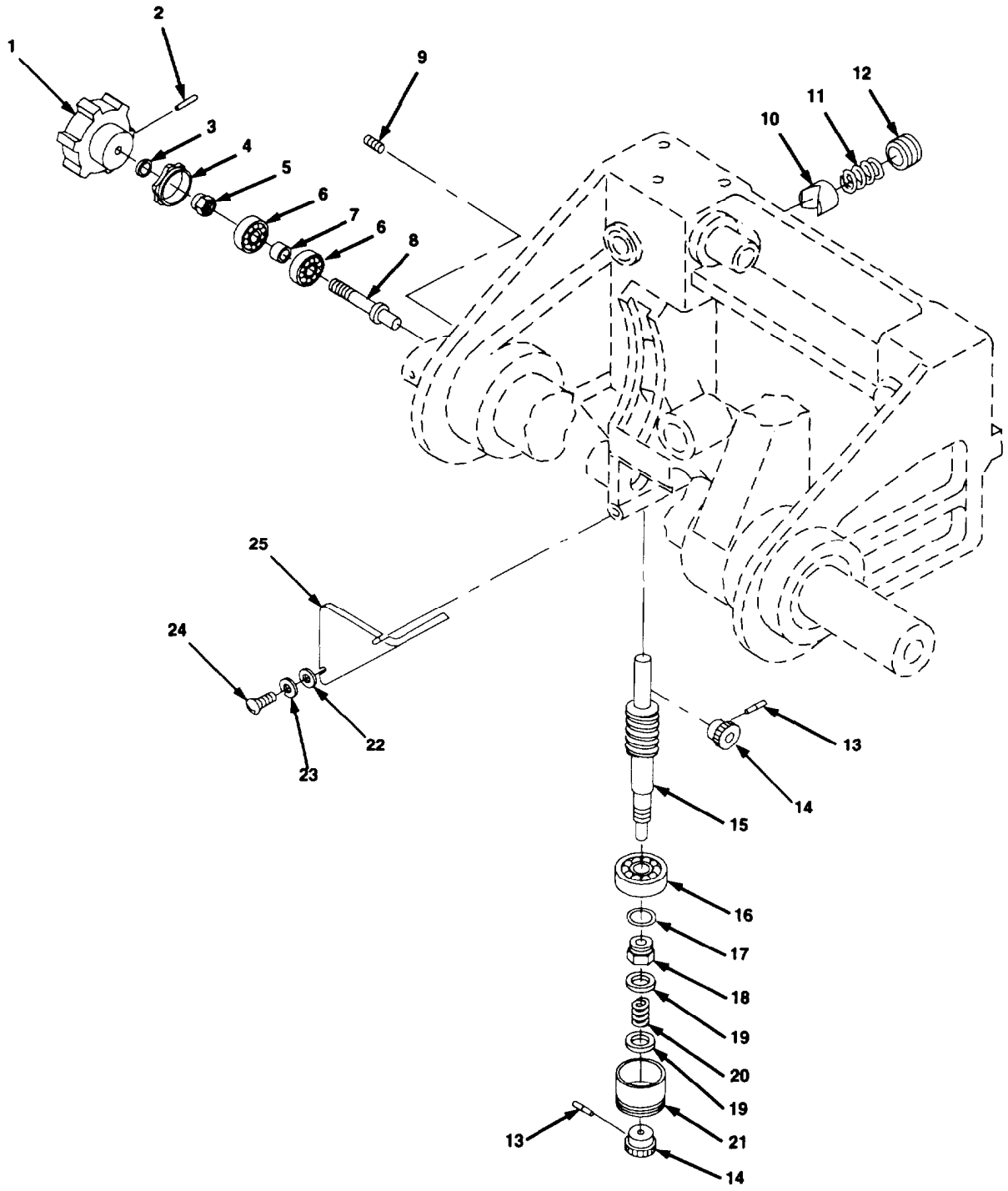


Figure D-26. Mount, Telescope, M145/M145A1 8267701-2 and 8267701-1 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1808 MOUNT, TELESCOPE, M4145/M145A1 8267701-2 AND 8267701-1	
					FIGURE D-26 MOUNT, TELESCOPE, M145/ M145A1 8267701-2 AND 8267701-1 - CONTINUED	
1	PAHZZ	5355012090611	19200	8267766	KNOB	1
2	PAHZZ	5315001873235	96906	MS24692-42	PIN, TAPERED, PLAIN	1
3	PAHZZ	5310008464635	19200	8215823	WASHER, FLAT	1
4	PAHZZ	5365011727863	19200	8215821	RING, EXTERNALLY THR EADED	1
5	PAHZZ	5310009826816	96906	MS21044C5	NUT, SELF-LOCKING, HE XAGON	1
6	PAHZZ	3110002938120	19200	10543685-2	BEARING, BALL, ANNULA R	2
7	PAHZZ	5365011590112	19200	8215824	SPACER, SLEEVE	1
8	PAHZZ	3040002482023	19200	8267770	SHAFT, SHOULDERED	1
9	PAHZZ	5305007168036	96906	MS51974-19	SETSCREW	1
10	PAHZZ	3120008336794	96906	MS35689-7	BEARING, V	1
11	PAHZZ	5360002006918	19200	7653347	SPRING, HELICAL, COMP RESSION	1
12	PAHZZ	5365002785309	19200	5036245	PLUG, MACHINE THREAD	1
13	PAHZZ	5315001873256	96906	MS24692-81	PIN, TAPERED, PLAIN	2
14	PAHZZ	3020004592792	19200	8267745	GEAR, BEVEL	2
15	XAHZZ		21450	8267726	WORM	1
16	PAHZZ	3110005546084	19200	8215827	BEARING, BALL, ANNULA R, SELF-ALIGNING	1
17	PAHZZ	5310004089564	19200	8215817	WASHER, FLAT	1
18	PAHZZ	5310008528621	19200	8215820	NUT, SELF-LOCKING, HE XAGON	1
19	PAHZZ	5310004089563	19200	8215818	WASHER, FLAT	2
20	PAHZZ	5360008528622	19200	8215816	SPRING, HELICAL, COMP RESSION	1
21	XAHZZ		19200	8215814	RING, EXTERNALLY THREADED	1
22	PAHZZ	5310009514679	96906	MS27183-3	WASHER, FLAT	6
23	PAHZZ	5310009338118	96906	MS35338-135	WASHER, LOCK	6
24	PAHZZ	5305000545649	96906	MS51957-15	SCREW, MACHINE	6
25	XAHZZ		19200	8215826	COVER	1
					END OF FIGURE	

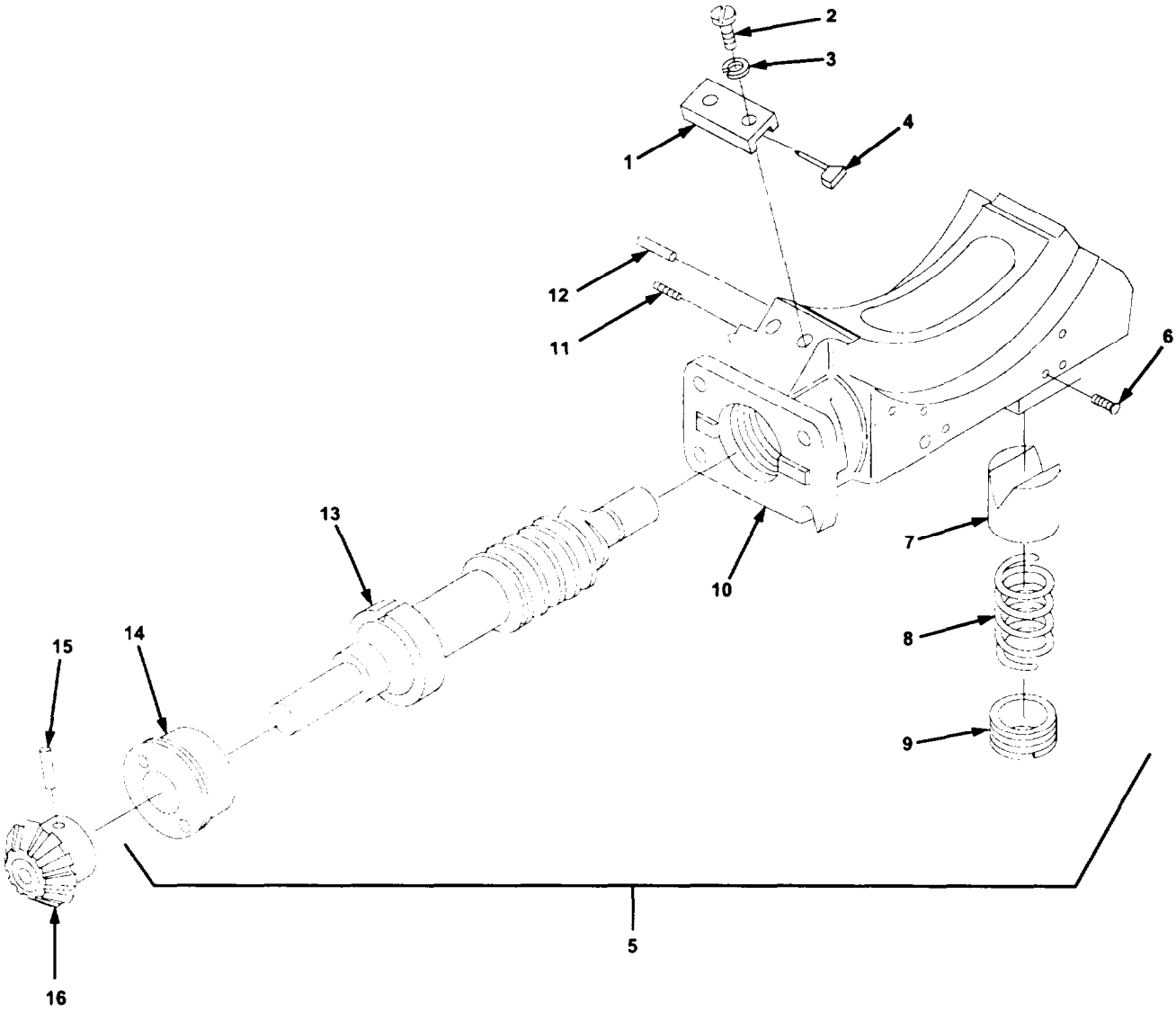


Figure D-27. Mount, Telescope, M145/M145A1 8267701-2 and 8267701-1 Including Housing Assembly 8587561 - Continued

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1808 MOUNT, TELESCOPE, M145/M145A1 8267701-2 AND 8267701-1 INCLUDING	
					GROUP 180801 HOUSING ASSEMBLY 8587561	
					FIGURE D-27 MOUNT, TELESCOPE, H145/ M145A1 8267701-2 AND 8267701-1 INCLUDING HOUSING ASSEMBLY 8587561	
1	PAHZZ	9540012046007	19200	8267810	CHANNEL, STRUCTURAL	2
2	PAHZZ	5305000545650	96906	MS51957-16	SCREW, MACHINE	4
3	PAHZZ	5310009338118	96906	MS35338-135	WASHER, LOCK	4
4	PAHZZ	5340004556045	19200	8267809	STOP, MECHANICAL	2
5	XADDD		19200	8587561	HOUSING ASSEMBLY	1
6	PADZZ	5305007167921	96906	MS51974-8	. SETSCREW	1
7	PADZZ	3120008336794	96906	MS35689-7	. BEARING, V	1
8	PADZZ	5360004823014	19200	8215842	. SPRING, HELICAL, COMP RESSION	1
9	PADZZ	5365001502759	19200	5036245-1	. PLUG, MACHINE THREAD	1
10	XADZZ		19200	8587563	. HOUSING	1
11	PADZZ	5305007168036	96906	MS51974-19	. SETSCREW	1
12	PADZZ	5315007029651	96906	MS16555-618	. PIN, STRAIGHT, HEADLE SS	1
13	PADZZ	3040011495950	19200	8587562	. WORM SHAFT	1
14	PBDZZ	3110012045823	19200	8267805	. SEAT, BEARING	1
15	PAHZZ	5315001873256	96906	MS24692-81	PIN, TAPERED, PLAIN	1
16	PAHZZ	3020000122944	19200	8587550	GEAR, BEVEL	1

END OF FIGURE

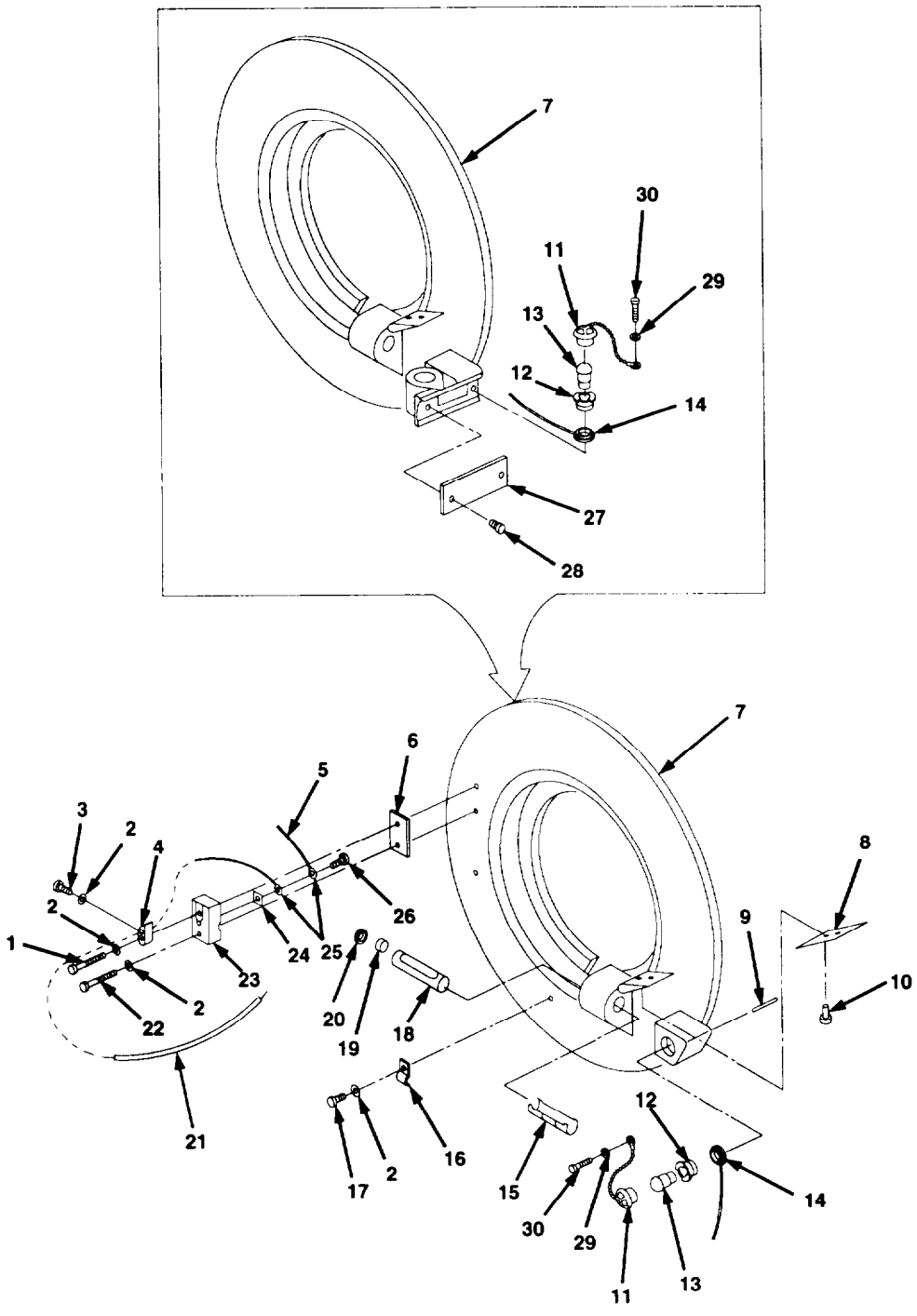


Figure D-28. Disk Assembly 11728942 and 8267707

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180802 DISK ASSEMBLY 11728942 AND 8267707	
					FIGURE D-28 DISK ASSEMBLY 11728942 AND 8267707	
1	PAFZZ	5305000570517	96906	MS51958-20	SCREW, MACHINE	1
2	PAFZZ	5310005503715	96906	MS35333-70	WASHER, LOCK	6
3	PAFZZ	5305000570510	96906	MS51958-13	SCREW, MACHINE	1
4	PAFZZ	3040008712977	19200	8267811	CLAMP, HUB	1
5	MFFZZ		81349	M16878/5BDE9	WIRE, ELECTRICAL (MAKE FROM NSN 6145-01-182-1377)	1
6	PAFZZ	5970008861223	19200	8267771	INSULATOR, PLATE	1
7	PADZZ	1240013818557	19200	11728943	DISK, MOUNT, TELESCOP E	1
7	XADZZ		19200	8267707	DISK ASSEMBLY	1
8	PAFZZ	6650008522735	19200	8267783	MIRROR, OPTICAL INST RUMENT	1
9	PAFZZ	5315007029650	96906	MS16555-602	PIN, STRAIGHT, HEADLE SS	1
10	PAFZZ	5320002438375	96906	MS20470A2-5	RIVET, SOLID	2
11	PAOZZ	5935001755966	19200	10559863	COVER, ELECTRICAL CO NNECTOR	1
12	PAFZZ	5365008984222	19200	8247732	RING, EXTERNALLY THR EADED	1
13	PAOZZ	5980012895274	19207	12360905-2	LIGHT EMITTING DIOD E	1
13	PAOZZ	6240001557836	96906	MS25237-327	LAMP, INCANDESCENT UOC:V36	1
14	PAFZZ	5995000505969	19200	10543306-6	LEAD, ELECTRICAL	1
15	PAFZZ	6680008962239	19200	8215835	COVER, LEVEL VIAL	1
16	PAFZZ	5340008523686	19200	8267813	STRAP, RETAINING	3
17	PAFZZ	5305000570509	96906	MS51958-12	SCREW, MACHINE	3
18	PAFZZ	1290006921493	19200	8202183	LEVEL, FIRE CONTROL INSTRUMENT	1
19	PAFZZ	5365008962251	19207	8202177	BUSHING, ECCENTRIC	1
20	PAFZZ	5365006921492	19200	8202181	RING, EXTERNALLY THR EADED	1
21	MFFZZ		81349	M13486-1-2	WIRE, ELECTRICAL (MAKE FROM NSN 6145-00-570-0516)	1
22	PAFZZ	5305000570515	96906	MS51958-18	SCREW, MACHINE	1
23	PAFZZ	5340011674593	19200	8267773	COVER, ACCESS	1
24	XAFZZ		19200	8267821	PLATE	1
25	PAFZZ	5940009356453	18876	8215845	TERMINAL, LUG	2
26	PAFZZ	5305006375884	96906	MS35214-12	SCREW, MACHINE	1
27	PAFZZ	6220008709967	19200	8267735	REFLECTOR, LIGHT	1
28	PAFZZ	5305007749704	96906	MS51960-7	SCREW, MACHINE	2
29	PAOZZ	5310005434652	96906	MS35333-69	WASHER, LOCK	1
30	PAOZZ	5305000570498	96906	MS51958-2	SCREW, MACHINE	1

END OF FIGURE

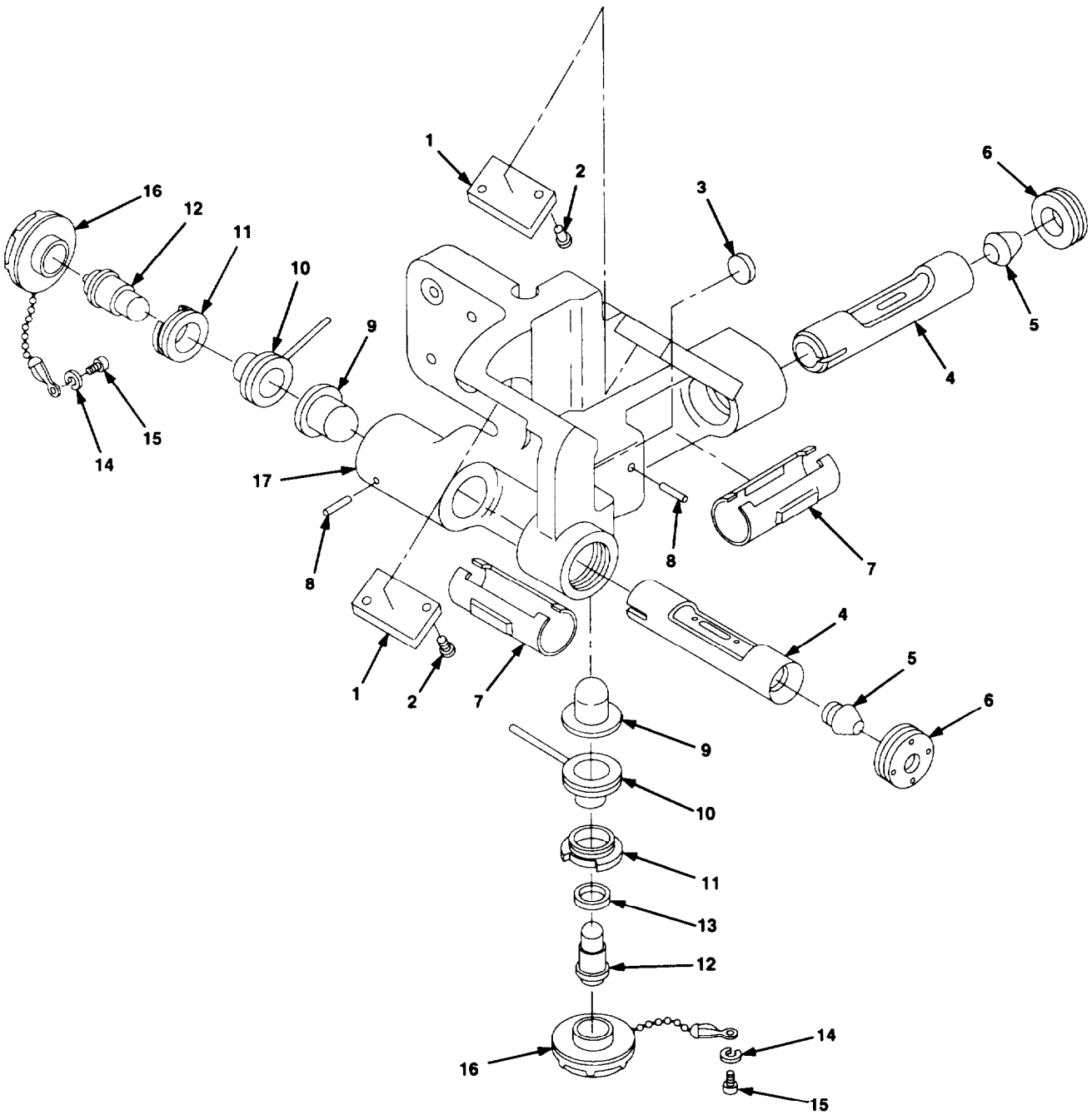


Figure D-29. Level Assembly 8215836

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180803 LEVEL ASSEMBLY 8215836	
					FIGURE D-29 LEVEL ASSEMBLY 8215836	
1	PAFZZ	6650008522736	19200	8267784	MIRROR, OPTICAL INST RUMENT	2
2	PAFZZ	5320002438375	96906	MS20470A2-5	RIVET, SOLID	4
3	PAFZZ	1240008847761	19200	8215840	WINDOW, OPTICAL INST RUMENT	1
4	PAFZZ	1290006921493	19200	8202183	LEVEL, FIRE CONTROL INSTRUMENT	2
5	PAFZZ	5365008962251	19200	8202177	BUSHING, ECCENTRIC	2
6	PAFZZ	5365006921492	19200	8202181	RING, EXTERNALLY THR EADED	2
7	PAFZZ	6680008962239	19200	8215835	COVER, LEVEL VIAL	2
8	PAFZZ	5315000544103	21450	544103	PIN, STRAIGHT, HEADLE SS	2
9	PAFZZ	6210008962246	19200	8215819	LENS, LIGHT	2
10	PAFZZ	5995000505969	19200	10543306-6	LEAD, ELECTRICAL	2
11	PAFZZ	5365008984222	19200	8247732	RING, EXTERNALLY THR EADED	2
12	PAOZZ	5980012895274	19207	12360905-2	LIGHT EMITTING DIOD E	2
13	PAOZZ	5365012876452	19200	12599295	SPACER, RING	1
14	PAOZZ	5310005434652	96906	MS35333-69	WASHER, LOCK	2
15	PAOZZ	5305000545636	96906	MS51957-2	SCREW, MACHINE	2
16	PAOZZ	5935001755966	19200	10559863	COVER, ELECTRICAL CO NNECTOR	2
17	PAFZZ	5340004061577	19200	8215828	BRACKET, MOUNTING TELESCOPE	1

END OF FIGURE

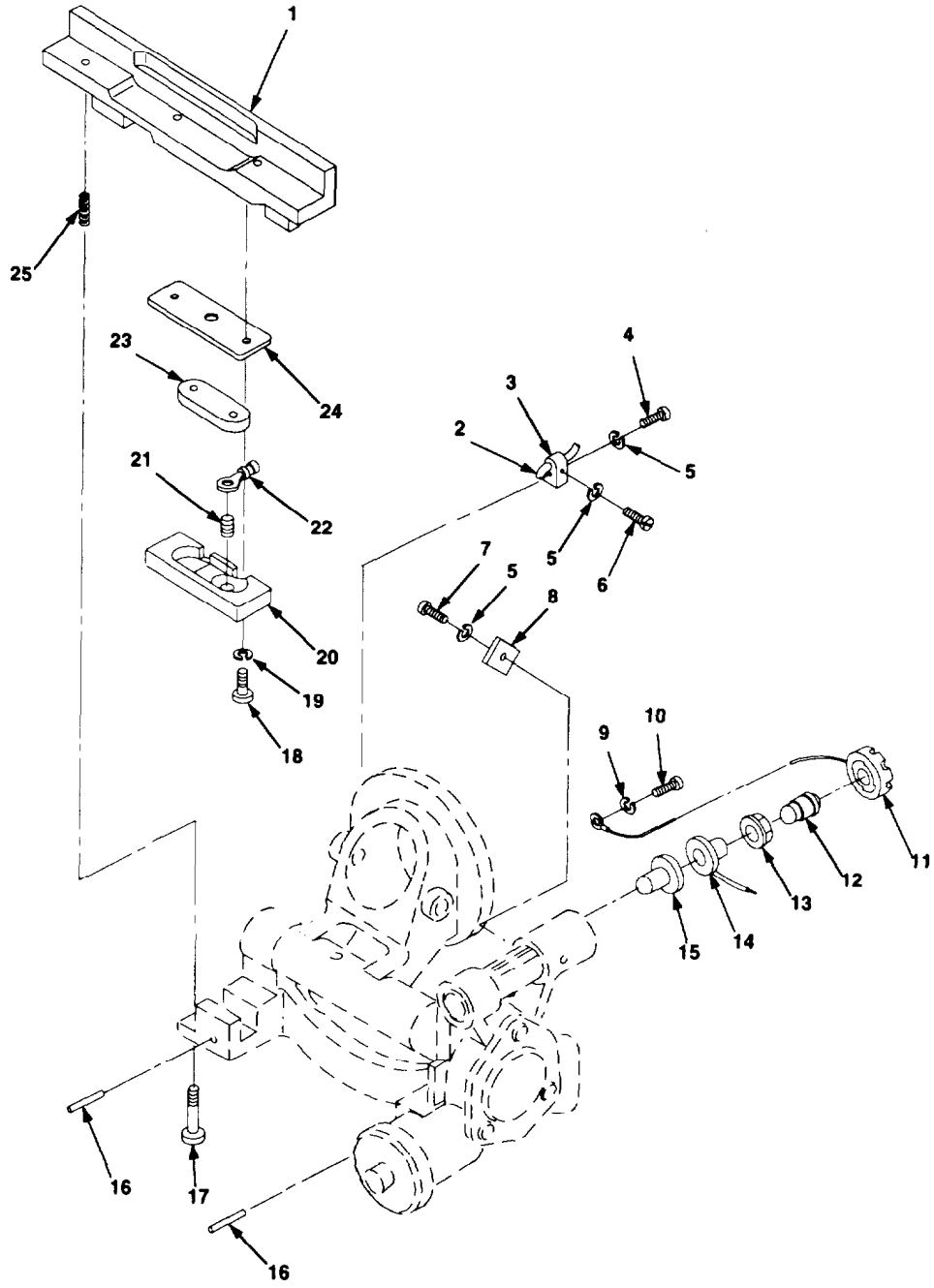


Figure D-30. Quadrant Support Assembly 8267714-1 and 8267714-2

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180804 QUADRANT SUPPORT ASSEMBLY 8267714-1 AND 8267714-2	
					FIGURE D-30 QUADRANT SUPPORT ASSEMBLY 8267714-1 8267714-2	
1	PADZZ	5340012045947	19200	8267756	BRACKET, ANGLE	1
2	MFFZZ		81349	M13486-1-2	WIRE, ELECTRICAL (MAKE FROM NSN 6145-00-570-0516)	1
3	PAFZZ	3040008712977	19200	8267811	CLAMP, HUB	1
4	PADZZ	5305000509234	96906	MS51957-68	SCREW, MACHINE	1
5	PAFZZ	5310005503715	96906	MS35333-70	WASHER, LOCK	4
6	PAFZZ	5305000570510	96906	MS51958-13	SCREW, MACHINE	1
7	PAFZZ	5305000545646	96906	MS51957-12	SCREW, MACHINE	2
8	PAFZZ	5340008523686	19200	8267813	STRAP, RETAINING	2
9	PAOZZ	5310005434652	96906	MS35333-69	WASHER, LOCK	1
10	PAOZZ	5305000545636	96906	MS51957-2	SCREW, MACHINE	1
11	PAOZZ	5935001755966	19200	10559863	COVER, ELECTRICAL CO NNECTOR	1
12	PAOZZ	5980012895274	19207	12360905-2	LIGHT EMITTING DIOD E	1
13	PAFZZ	5365008984222	19200	8247732	RING, EXTERNALLY THR EADED	1
14	PAFZZ	5995000505969	19200	10543306-6	LEAD, ELECTRICAL	1
15	PAFZZ	6210008962246	19200	8215819	LENS, LIGHT	1
16	PADZZ	5315000583108	21450	583108	PIN, STRAIGHT, HEADLE SS	2
17	PAFZZ	5305000545651	96906	MS51957-17	SCREW, MACHINE	1
18	PAFZZ	5305000546672	96906	MS51957-47	SCREW, MACHINE	2
19	PAFZZ	5310005432739	96906	MS35333-72	WASHER, LOCK	2
20	PAFZZ	5970008847762	19200	8267765	INSULATOR, PLATE	1
21	PAFZZ	5305009548128	96906	MS35215-21	SCREW, MACHINE	2
22	PAFZZ	5940008847759	19200	8215746	TERMINAL LUG UOC:L98,V36	2
23	XAFZZ		19200	8267764	PLATE	1
24	PAFZZ	5970008847764	19200	8267763	INSULATOR, PLATE	1
25	XADZZ		19200	8261760	SPRING, HELICAL, COMP RESSION	1
					END OF FIGURE	

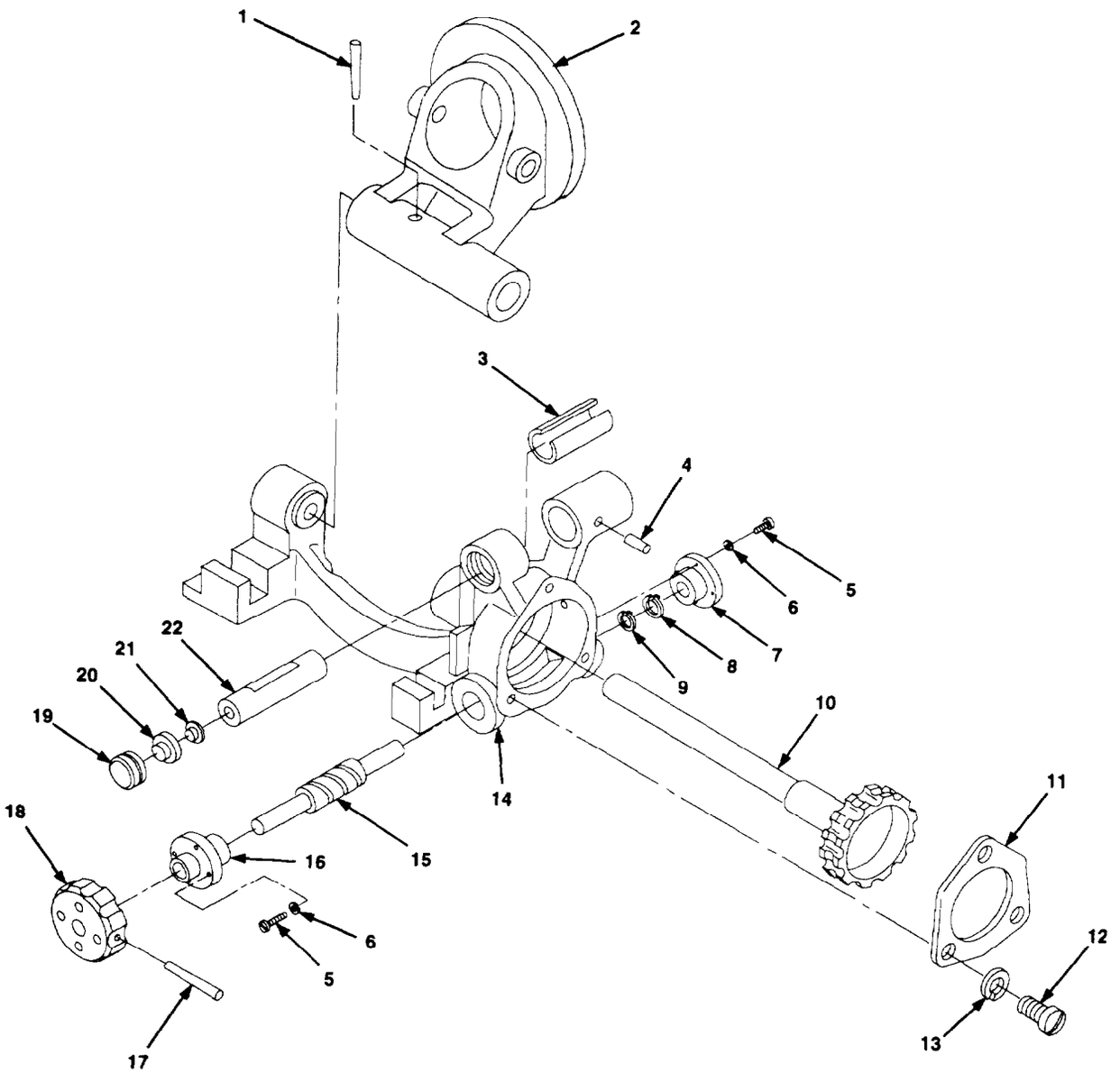


Figure D-31. Quadrant Support Assembly 8267714-1 and 8267714-2 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180804 QUADRANT SUPPORT ASSEMBLY 8267714-1 AND 8267714-2	
					FIGURE D-31 QUADRANT SUPPORT ASSEMBLY 8267714-1 AND 8267714-2 - CONTINUED	
1	PAHZZ	5315001873274	96906	MS24692-108	PIN, TAPERED, PLAIN	1
2	XADZZ		19200	8267731	BRACKET	1
3	PAFZZ	6680008962239	19200	8215835	COVER, LEVEL VIAL	1
4	PADZZ	5315007029650	96906	MS16555-602	PIN, STRAIGHT, HEADLE SS	1
5	PADZZ	5305000545637	96906	MS51957-3	SCREW, MACHINE UOC : L98	8
6	PAHZZ	5310005434652	96906	MS35333-69	WASHER, LOCK UOC:L98	8
7	XADZZ		19200	8267845	PLATE, RETAINING SHAFT UOC : L98	1
8	PADZZ	5310001777559	19200	8267843	WASHER, KEY UOC:L98	1
9	PADZZ	5310008533359	19200	8267844	WASHER, KEY UOC:L98	18
10	XADZZ		19200	8267757	GEARSHAFT, WORM WHEEL UOC : L98	1
11	XADZZ		19200	8267840	COVER	1
12	PAFZZ	5305000546650	96906	MS51957-26	SCREW, MACHINE	3
13	PAFZZ	5310006163555	96906	MS35333-71	WASHER, LOCK	3
14	XADZZ		19200	8267732-2	ROCKER, BONDED AND MACHINED UOC:L98	1
15	PADZZ	3040004661957	19200	8267758	WORM SHAFT UOC : L98	1
16	XADZZ		19200	8267841	BEARING, SLEEVE UOC:L98	1
17	PAFZZ	5315001873230	96906	MS24692-33	PIN, TAPERED, PLAIN UOC:L98	1
18	PAFZZ	5355011585587	19200	8267842	KNOB UOC : L98	1
19	PAFZZ	5365008488664	19200	8615973	RING, EXTERNALLY THR EADED	1
20	PAFZZ	1240008956495	19200	8215790	HOLDER, OPTICAL ELEM	1
21	PAFZZ	3040008956496	19200	8215789	CAM, CONTROL	1
22	PAFZZ	1290006921493	19200	8202183	LEVEL, FIRE CONTROL INSTRUMENT	1

END OF FIGURE

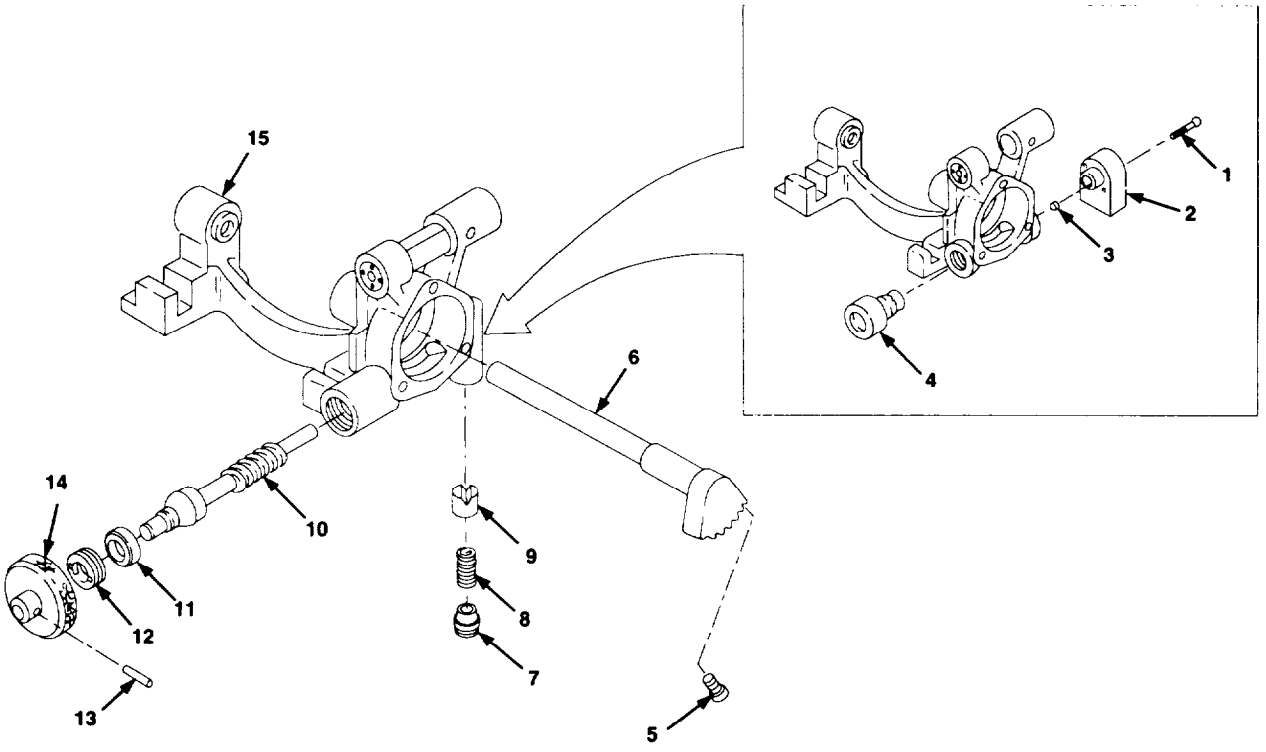


Figure D-32. Quadrant Support Assembly 8267714-1

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180804 QUADRANT SUPPORT ASSEMBLY 8267714-1	
					FIGURE D-32 QUADRANT SUPPORT ASSEMBLY 8267714-1 - CONTINUED	
1	PADZZ	5305001448425	96906	MS21090-0628	SCREW, SELF-LOCKING UOC : V36	4
2	PADZZ	5340012848517	19200	9360301	RETAINER, HELICAL COMPRESSION SPRING UOC : V36	1
3	PADZZ	5325008254826	96906	MS122158	INSERT, SCREW THREAD UOC : V36	4
4	PADZZ	3130012958131	19200	9360300	HOUSING, BEARING UNI UOC : V36	1
5	PAHZZ	5305009409487	96906	MS35275-225	SCREW, MACHINE UOC : V36	2
6	PADZZ	3020012850144	19200	9360575	GEARSHAFT, WORM WHEE L UOC:V36	1
7	PAFZZ	5340012969585	19200	9360308	RETIANER, HELICAL CO HPRESSION SPRING UOC : V36	1
8	PAFZZ	5360009221895	96906	MS24585C111	SPRING, HELICAL, COMP RESSION UOC : V36	1
9	PAFZZ	3120013002969	19200	9360307	BEARING, V UOC : V36	1
10	PADZZ	3040012582003	19200	9360310	WORM SHAFT ASSEMBLY UOC :V36	1
11	PADZZ	3110012935383	19200	9360304	SEAT, BEARING UOC :V36	1
12	PADZZ	5365012935551	19200	9360305	RING, EXTERNALLY THR EADED UOC :V36	1
13	PAFZZ	5315008445644	96906	MS16562-194	PIN, SPRING UOC : V36	1
14	PAFZZ	5355012966074	19200	9360302	KNOB..... UOC : V36	1
15	XADZZ		19200	8267732-1	ROCKER, BONDED AND UOC : V36	1

END OF FIGURE

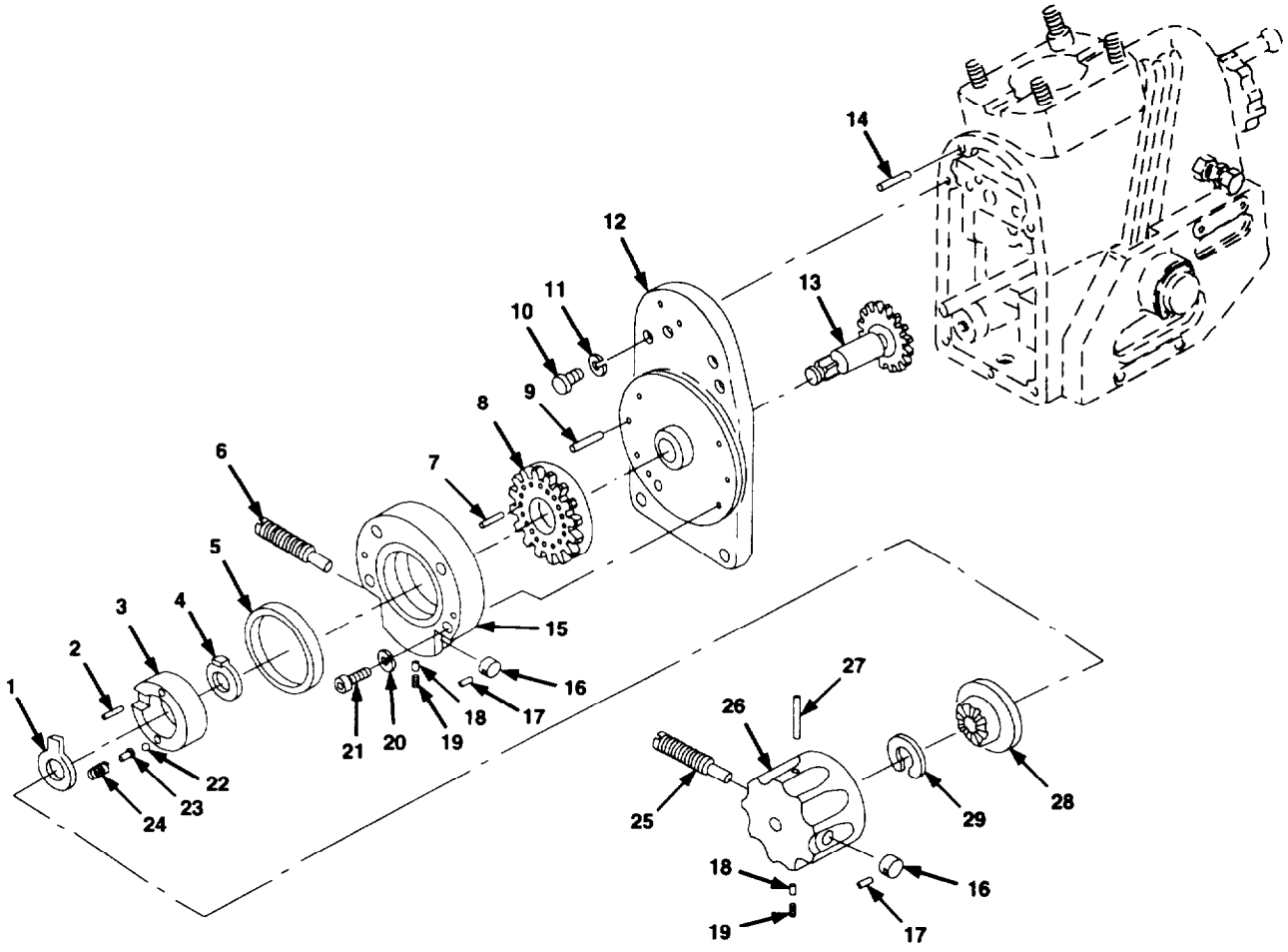


Figure D-33. Counter Box Assembly 8267711

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180805 COUNTER BOX ASSEMBLY 8267711	
					FIGURE D-33 COUNTER BOX ASSEMBLY 8267711	
1	PADZZ	5310008533358	19200	8267827	WASHER, KEY	1
2	PADZZ	5315009391146	96906	MS16555-605	PIN, STRAIGHT, HEADLE SS	1
3	XADZZ		19200	8267833	ADAPTER	1
4	PADZZ	5310008533360	19200	8267826	WASHER, KEY	5
5	PADZZ	5330008746791	19200	8267828	FELT, MECHANICAL, PRE FORMED	1
6	PADZZ	5305008528164	19200	8267830	SETSCREW WORM	1
7	PADZZ	5315007029650	96906	MS16555-602	PIN, STRAIGHT, HEADLE SS	1
8	PADZZ	3020004028246	19200	8267829	GEAR, WORM WHEEL	1
9	PADZZ	5315000544173	21450	544173	PIN, STRAIGHT, HEADLE SS	2
10	PAHZZ	5305000546669	96906	MS51957-44	SCREW, MACHINE	7
11	PAHZZ	5310005432739	96906	MS35333-72	WASHER, LOCK	7
12	XADZZ		19200	8267725	COVER	1
13	XADZZ		19200	8267752	GEARSHAFT, SPUR	1
14	PAFZZ	5315000544103	21450	544103	PIN, STRAIGHT, HEADLE SS	2
15	XDDZZ		19200	8267753	BASE, COUNTER BOX AS SEMBLY	1
16	PAFZZ	3040008657716	19200	8267831	COLLAR, SHAFT	2
17	PAFZZ	5315009639753	96906	MS16555-3	PIN, STRAIGHT, HEADLE SS	2
18	XAFZZ		19200	8267832	PLUG	2
19	PAFZZ	5305005829064	96906	MS51031-24	SETSCREW	2
20	PADZZ	5310006163555	96906	MS35333-71	WASHER, LOCK	4
21	PADZZ	5305000570527	96906	MS51958-31	SCREW, MACHINE	4
22	PADZZ	3110001839175	96906	MS19060-4808	BALL, BEARING CRES	1
23	PADZZ	5340001962748	19200	8267834	PLUNGER, DETENT	1
24	PADZZ	5360008743323	19200	8267835	SPRING, HELICAL, COMP RESSION	1
25	XDFZZ		19200	8267836	SHAFT, SHOULDERED	1
26	PAFZZ	5355011010064	19200	8267755	KNOB	1
27	XDFZZ		21450	583104	PIN, STRAIGHT, HEADLE SS	1
28	PADZZ	3020004028247	19200	8267754	GEAR, WORM WHEEL	1
29	PADZZ	5325008037311	96906	MS16624-1039	RING, RETAINING	1

END OF FIGURE

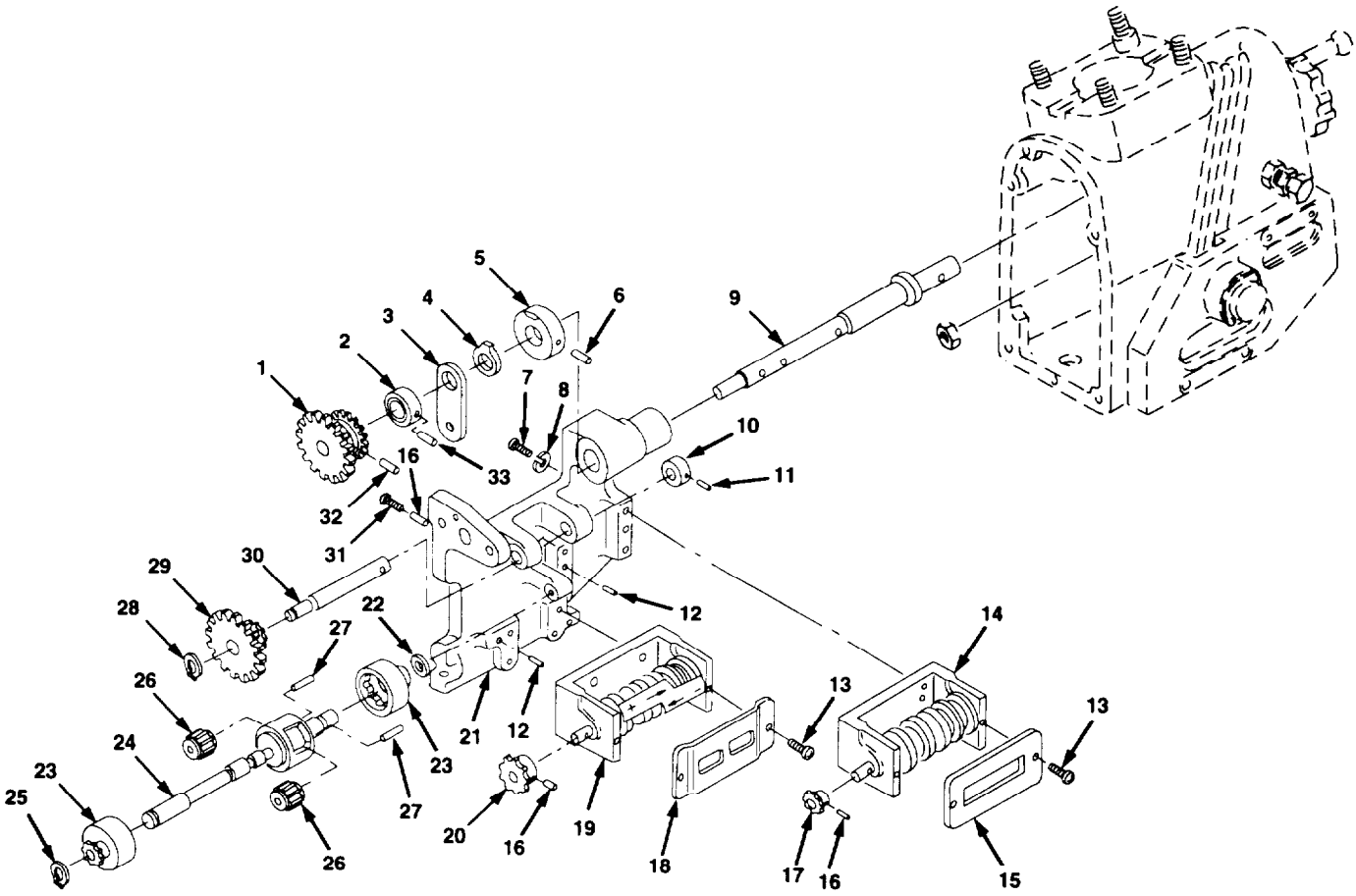


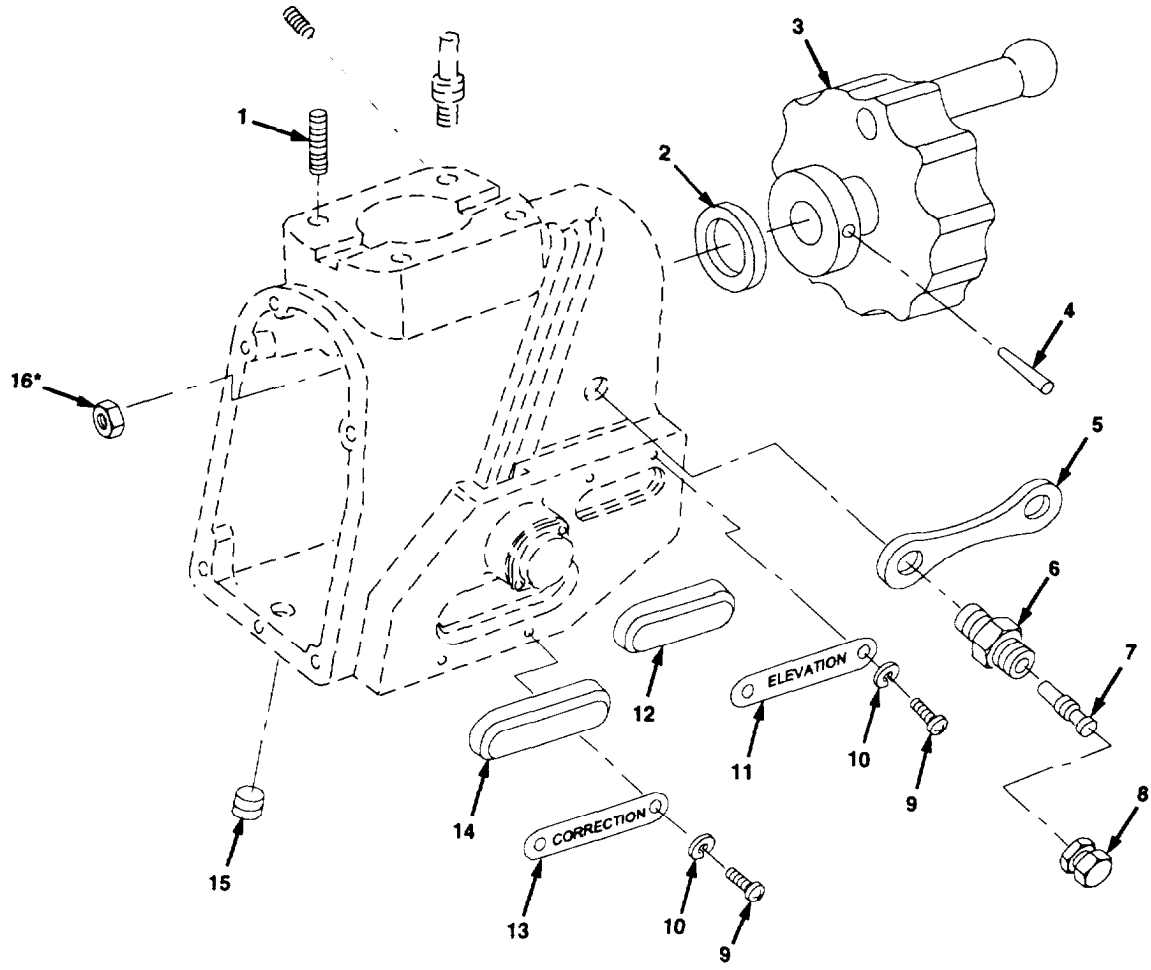
Figure D-34. Counter Box Assembly 8267711 - Continued

GROUP 180805 COUNTER BOX ASSEMBLY
8267711

FIGURE D-34 COUNTER BOX ASSEMBLY
8267711 - CONTINUED

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
1	PADZZ	3020000122943	19200	8267734	GEAR CLUSTER, BEVEL- SPUR	1
2	XADZZ		19200	8589488	COLLAR	1
3	XADZZ		19200	8267822	RETAINER	1
4	PADZZ	5310004134382	19200	8261858	RING, MT TELESCOPE	16
5	PADZZ	5340004310329	19200	8267820	STOP, MECHANICAL	1
6	PADZZ	5315001873232	96906	MS24692-36	PIN, TAPERED, PLAIN	1
7	PAHZZ	5305000545651	96906	MS51957-17	SCREW, MACHINE	8
8	PAHZZ	5310005503715	96906	MS35333-70	WASHER, LOCK	8
9	PADZZ	3040001258782	19200	8267819	SHAFT, SHOULDERED	1
10	PBDZZ	3040012524286	19200	8589486	COLLAR, SHAFT	1
11	PAHZZ	5315009639753	96906	MS16555-3	PIN, STRAIGHT, HEADLE SS	1
12	PAHZZ	5315000583098	21450	583098	PIN, STRAIGHT, HEADLE SS	4
13	PAHZZ	5305000570497	96906	MS51958-1	SCREW, MACHINE	4
14	PAHZZ	6680008522733	19200	8267727	COUNTER, ROTATING FIXED MOUNTING	1
15	XAHZZ		19200	8215929	MASK	1
16	PAHZZ	5315001873216	96906	MS24692-3	PIN, TAPERED, PLAIN	2
17	PAHZZ	3020004029532	19200	8267750	GEAR, SPUR	1
18	XAHZZ		19200	8215928	MASK	1
19	PAHZZ	6680008522734	19200	8267728	COUNTER, ROTATING FIXED MOUNTING	1
20	PAHZZ	3020002228581	19200	8267751	GEAR, SPUR	1
21	XADZZ		19200	8267713	BASE	1
22	PADZZ	5325006804619	96906	MS16628-1025	RING, RETAINING	2
23	PADZZ	3020004061578	19200	8261829	GEAR CLUSTER TELESCOPE MOUNT	2
24	XADZZ		19200	8267746	SHAFT, SHOULDERED	1
25	PADZZ	5325007208064	96906	MS16624-1025	RING, RETAINING	2
26	PADZZ	3020001961409	19200	8261831	GEAR, SPUR	2
27	PBDZZ	5315011334958	19200	8261861	PIN, STRAIGHT, HEADLE SS	2
28	PADZZ	5325002635877	96906	MS16624-15	RING, RETAINING	1
29	PADZZ	3020004345320	19200	8267749	GEAR CLUSTER	1
30	PBDZZ	3040012524289	19200	8267825	SHAFT, SHOULDERED	1
31	PAFZZ	5305000545644	96906	MS51957-11	SCREW, MACHINE	4
32	PADZZ	5315001873271	96906	MS24692-102	PIN, TAPERED, PLAIN	1
33	XDDZZ		96906	MS16555-5	PIN, STRAIGHT, HEADLE SS	1

END OF FIGURE



*** Used on early models to secure purging valve stem.**

Figure D-35. Counter Box Assembly 8267711 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180805 COUNTER BOX ASSEMBLY 8267711	
					FIGURE D-35 COUNTER BOX ASSEMBLY 8267711 - CONTINUED	
1	PADZZ	5305007239392	96906	MS51963-53	SETSCREW	3
2	PAFZZ	5310008532224	19200	8267824	WASHER, FLAT	1
3	PAFZZ	5340001138108	19200	8267747	HANDWHEEL	1
4	PAFZZ	5315001873245	96906	MS24692-60	PIN, TAPERED, PLAIN	1
5	PAHZZ	5340004644792	19200	10516567	STRAP, RETAINING	1
6	PAHZZ	4820001141096	96906	MS51607-1	VALVE STEM, PURGING	1
7	PAOZZ	2640000603543	96906	MS51377-2	VALVE CORE	1
8	PAOZZ	4820012350223	19200	8200055	CAP, AIR VALVE	1
9	PAOZZ	5305000545640	96906	MS51957-6	SCREW, MACHINE	4
10	PAOZZ	5310005434652	96906	MS35333-69	WASHER, LOCK	4
11	PAFZZ	9905000122972	19200	8247758	PLATE, IDENTIFICATIO N	1
12	PADZZ	9340008528626	19200	8267761	WINDOW, OBSERVATION	1
13	PAFZZ	9905000122973	19200	8247759	PLATE, IDENTIFICATION	1
14	PADZZ	9340008528624	19200	8267762	WINDOW, OBSERVATION	1
15	PAFZZ	4730000189566	34623	MA241A21 020	PLUG, PIPE	1
16	PAHZZ	5310007829877	19200	8635803	NUT, PLAIN, HEXAGON	1

END OF FIGURE

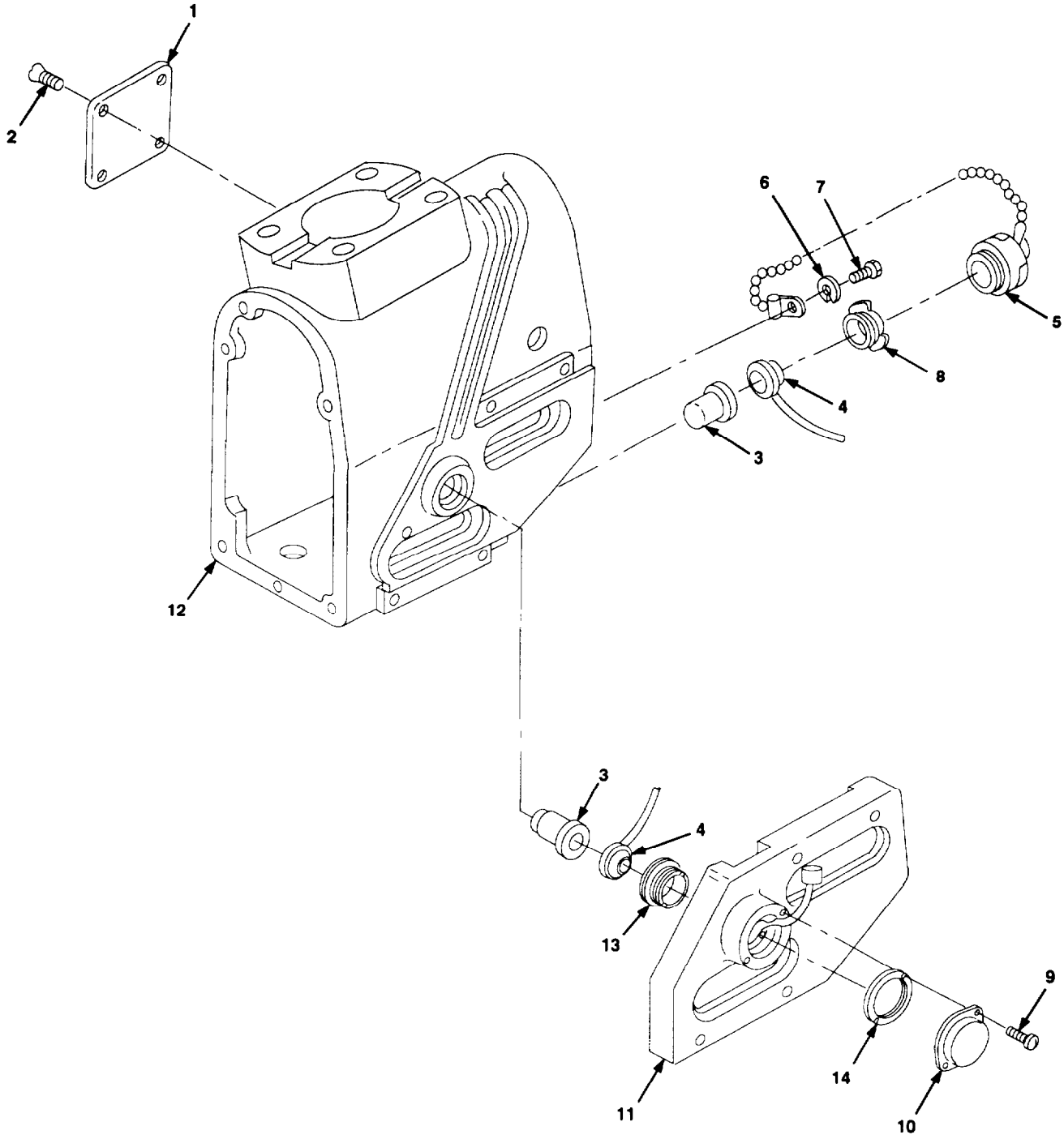


Figure D-36. Counter Box Assembly 8267711 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180805 COUNTER BOX ASSEMBLY 8267711	
					FIGURE D-36 COUNTER BOX ASSEMBLY 8267711 - CONTINUED	
1	XDOZZ		19200	8267823	COVER	1
2	PADZZ	5305007776039	96906	MS51959-12	SCREW, MACHINE	4
3	PAFZZ	6210008962246	19200	8215819	LENS, LIGHT	2
4	PAFZZ	5995000505969	19200	10543306-6	LEAD, ELECTRICAL	2
5	PAOZZ	5935001755966	19200	10559863	COVER, ELECTRICAL CO NNECTOR	1
6	PAOZZ	5310005434652	96906	MS35333-69	WASHER, LOCK	1
7	PAOZZ	5305000545636	96906	MS51957-2	SCREW, MACHINE	1
8	PAFZZ	5365008984222	19200	8247732	RING, EXTERNALLY THR EADED	2
9	PAFZZ	5305009413538	96906	MS35275-201	SCREW, MACHINE	2
10	PAFZZ	5340013672321	19200	9399168	CAP, PROTECTIVE, DUST	1
11	PAFZZ	5998012856425	19200	12599271	ELECTRONIC COMPONEN T OVERLAY	1
12	XADZZ		19200	8267712	BOX	1
13	PAFZZ	5365013667755	19200	9399170	RING, EXTERNALLY THR EADED	1
14	PAFZZ	1240013890868	19200	9399169	RING, RETAINING, OPTI CAL	1

END OF FIGURE

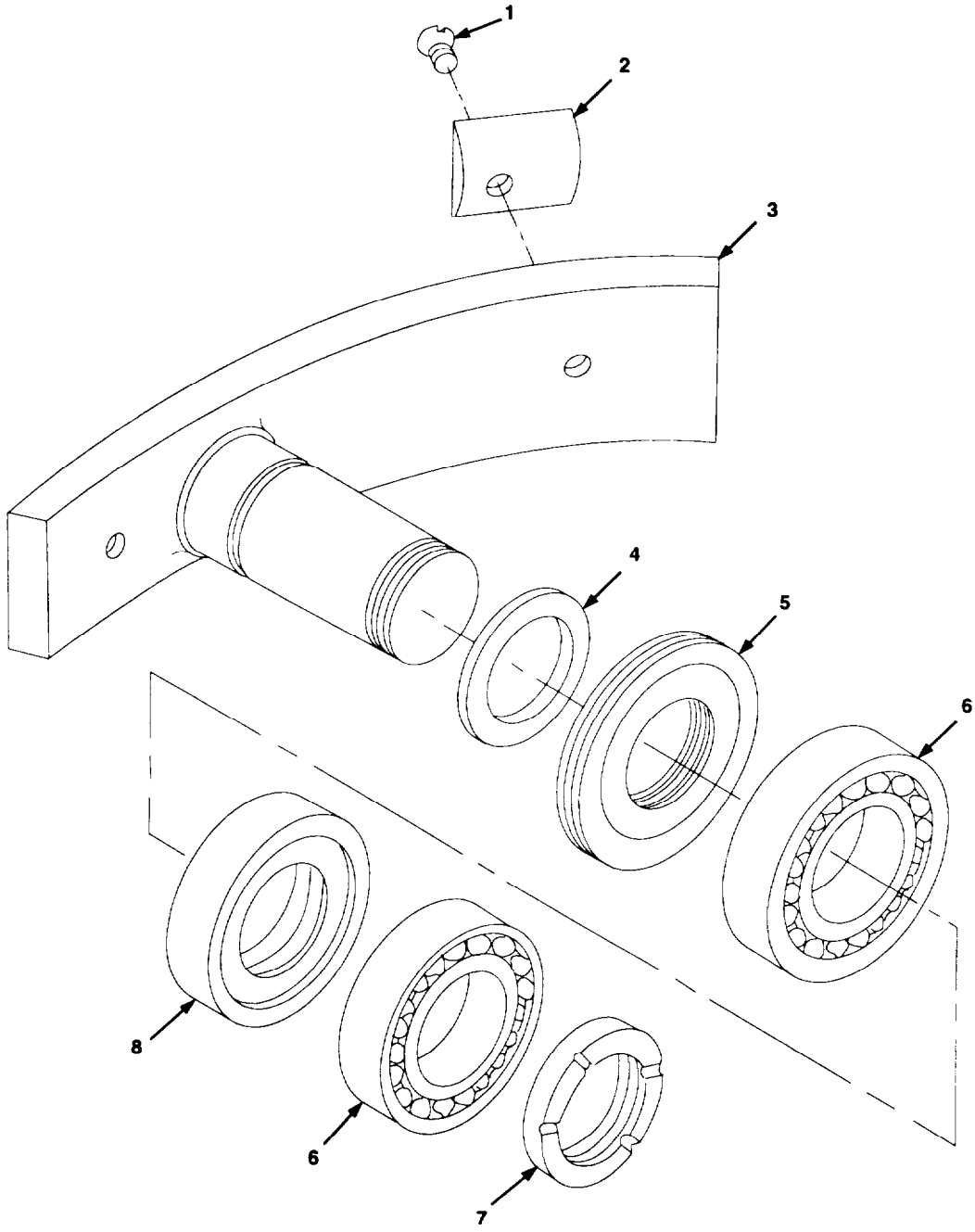


Figure D-37. Segment Assembly 8267742

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180806 SEGMENT ASSEMBLY 8267742	
					FIGURE D-37 SEGMENT ASSEMBLY 8267742	
1	PAHZZ	5305000595433	96906	HS51960-62	SCREW,MACHINE	2
2	PAHZZ	1240012104047	19200	8267788	STOP	2
3	XAHZZ		19200	8267743	SEGMENT	1
4	PAHZZ	5330013209912	19200	7586889	FELT,MECHANICAL,PRE FORMED	1
5	XAHZZ		19200	7586888	PLATE,RETAINING,SHA	1
6	PAHZZ	3110001599047	21450	702629	BEARING,BALL,ANNULA R	2
7	PAHZZ	5310007586885	19200	7586885	NUT,PLAIN,ROUND	1
8	XAHZZ		19200	7586890	SEPARATOR	1

END OF FIGURE

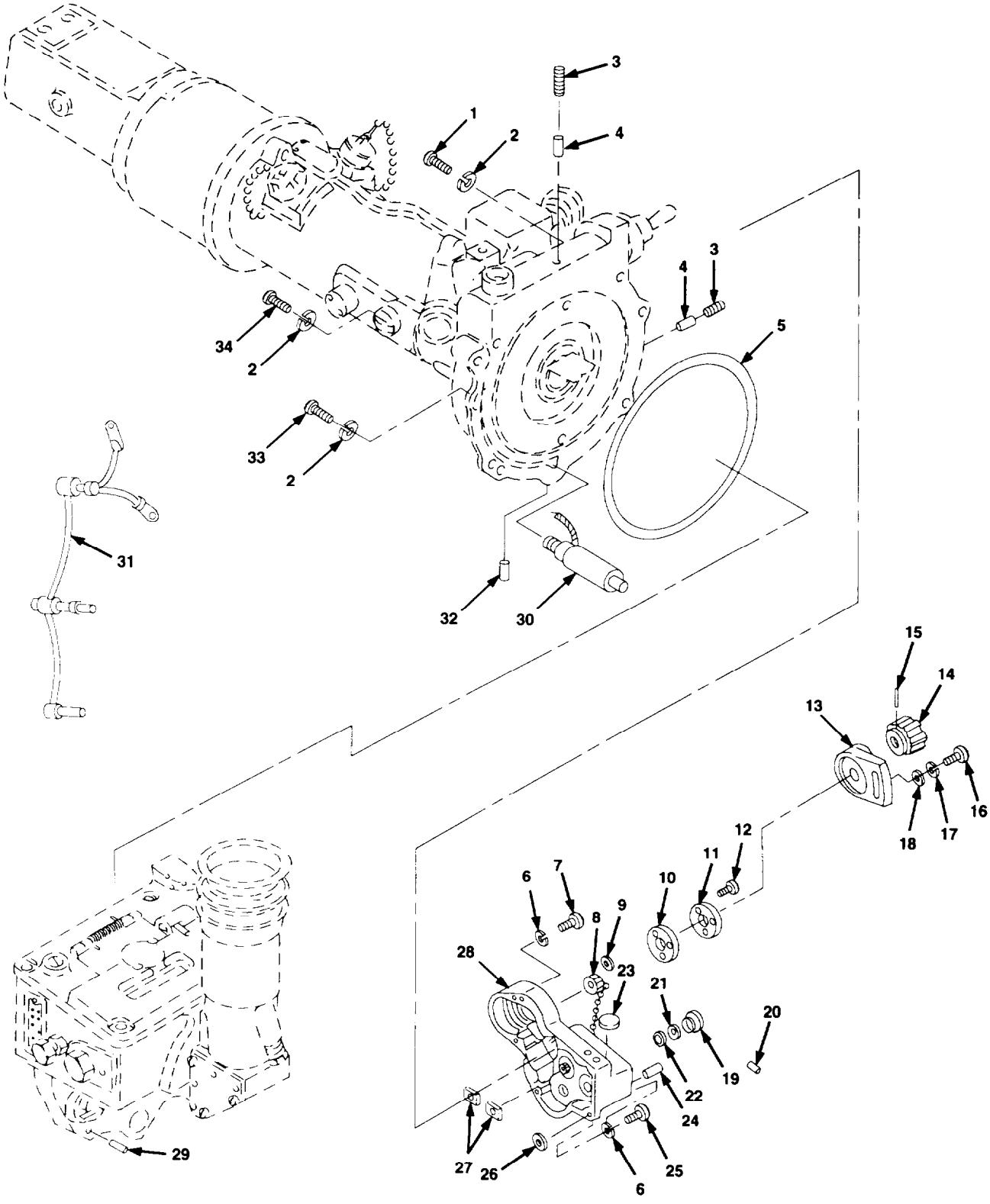


Figure D-38. Telescope, Panoramic, M117/M117A2 7660400 and 11739510

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1809 TELESCOPE, PANORAMIC, M117/M117A2 7660400 AND 11739510	
					FIGURE D-38 TELESCOPE, PANORAMIC, M117/M117A2 7660400 AND 11739510	
1	PAHZZ	5305009789375	96906	MS16997-37	SCREW,CAP,SOCKET HE AD	1
2	PAHZZ	5310009338119	96906	MS35338-137	WASHER,LOCK	6
3	PAHZZ	5305007246776	96906	MS51965-2	SETSCREW	2
4	PAHZZ	5340012050111	19200	8215855	INSERT,SELF-LOCK	2
5	PAHZZ	5330008526395	19200	8215868	O-RING	1
6	PAFZZ	5310009338118	96906	MS35338-135	WASHER,LOCK	6
7	PAFZZ	5305000545653	96906	MS51957-19	SCREW,MACHINE	3
8	PAOZZ	5340009448036	19200	10541481	CAP,ASSEMBLY	1
9	PAFZZ	5330008455643	19200	8587397-2	PACKING,PREFORMED	1
10	PAFZZ	5330009289452	19200	10540479	GASKET	1
11	PAFZZ	5340011811698	19200	10556685	CAP	1
12	PAFZZ	5305008893118	96906	MS35206-203	SCREW,MACHINE	3
13	PAFZZ	5340011830712	19200	10556687	PLATE,DETENT	1
14	PAFZZ	5355008986791	19200	8587348	KNOB ASSEMBLY	1
15	PAFZZ	5315000824858	96906	MS16556-621	PIN,STRAIGHT,HEADLE SS	1
16	PAFZZ	5305009789347	96906	MS16997-19	SCREW,CAP,SOCKET HE AD	1
17	PAFZZ	5310009296395	96906	MS35338-136	WASHER,LOCK UOC:L97	1
18	PAFZZ	5310007225998	96906	MS15795-805	WASHER,FLAT	1
19	PAFZZ	5355009273400	19200	10540481	KNOB	1
20	PAFZZ	5315008077957	96906	MS16555-608	PIN,STRAIGHT,HEADLE SS	1
21	PAFZZ	5365001774092	19200	10559199-1	SHIM	1
21	PAFZZ	5365001774093	19200	10559199-2	SHIM	1
21	PAFZZ	5365001774091	19200	10559199-3	SHIM	1
22	PAFZZ	5330009448040	19200	10540480	SEAL	1
23	PAHZZ	1240008989907	19200	7660556	WINDOW,OBSERVATION	2
24	PAFZZ	5315007029651	96906	MS16555-618	PIN,STRAIGHT,HEADLE SS	2
25	PAFZZ	5305000545649	96906	MS51957-15	SCREW,MACHINE	3
26	PAFZZ	5365001135645	19200	10543298	SHIM	4
27	PAFZZ	5365001132969	19200	10543297	SHIM	2
28	PAFZZ	1240012126583	19200	7660414	COVER,CEMENTED	1
29	PAHZZ	5315009058431	96906	MS16556-626	PIN,STRAIGHT,HEADLE SS	1
30	PAHZZ	5999009771221	19200	10527531	CONTACT ASSEMBLY UOC : U38	1
31	PAHZZ	5999011789916	19200	11739516	CONTACT ASSEMBLY,EL ECTRICAL UOC:L97	1
32	PAHZZ	5315007029650	96906	MS16555-602	PIN,STRAIGHT,HEADLE SS UOC:U38	1
33	PAHZZ	5305009789373	96906	HS16997-35	SCREW,CAP,SOCKET HE AD	1
34	PAHZZ	5305009789370	96906	MS16997-32	SCREW,CAP,SOCKET HE AD	4

END OF FIGURE

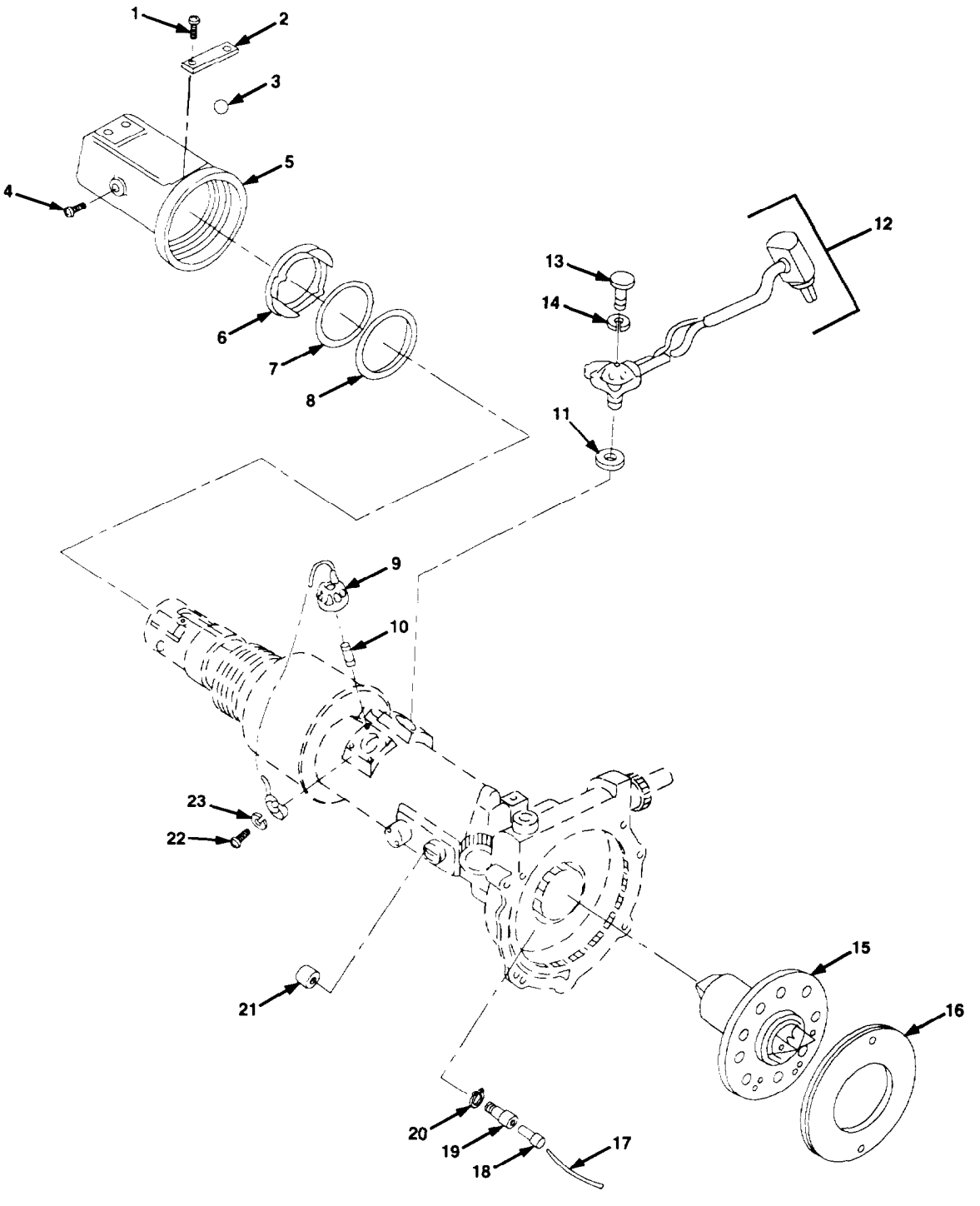
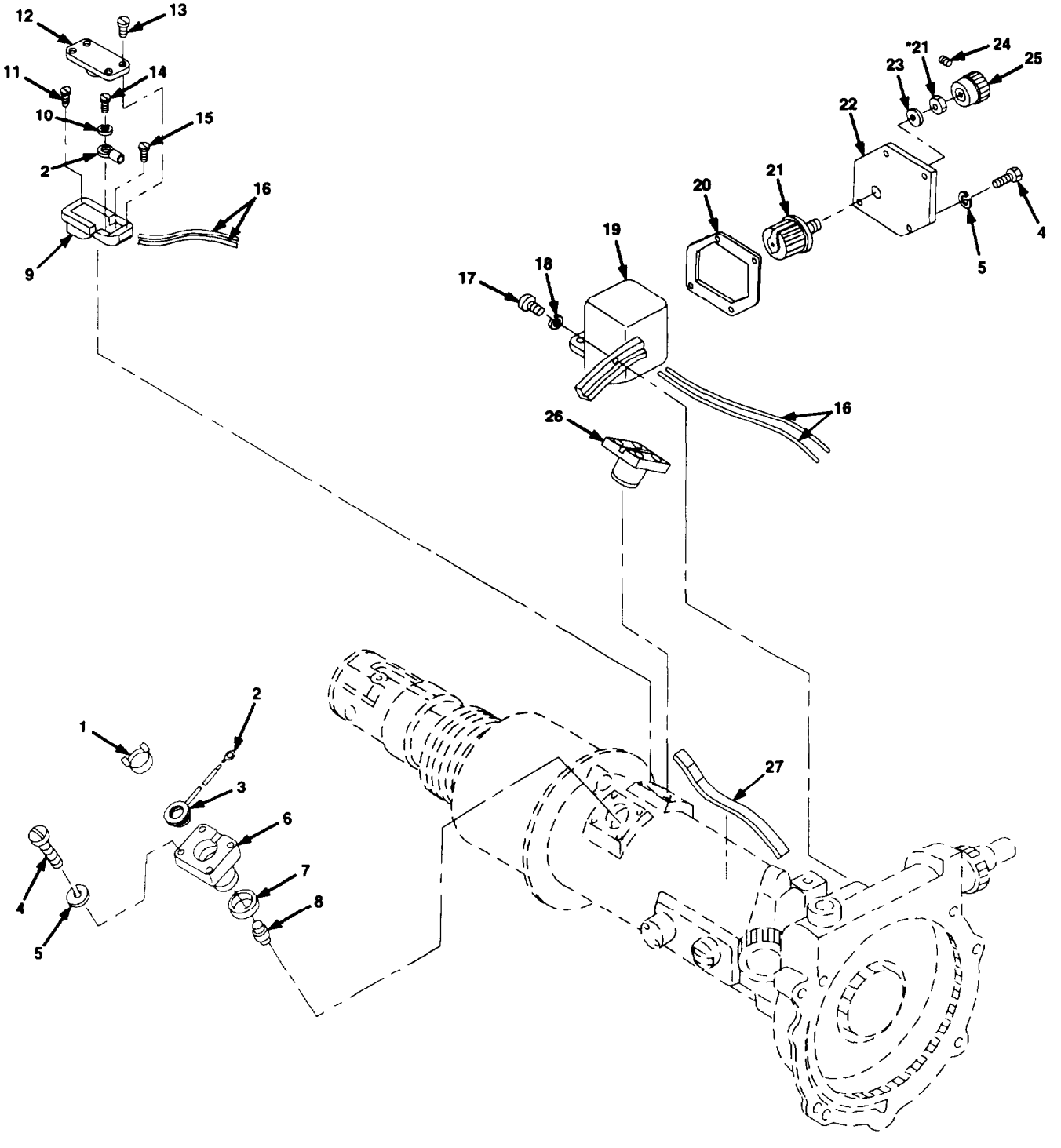


Figure D-39. Telescope, Panoramic, M117/M117A2 7660400 and 11739510 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1809 TELESCOPE, PANORAMIC, M117/M117A2 7660400 AND 11739510	
					FIGURE D-39 TELESCOPE, PANORAMIC, M117/M117A2 7660400 AND 11739510 - CONTINUED	
1	PAHZZ	5305007662422	96906	MS51959-1	SCREW,MACHINE	2
2	PAHZZ	3110000638145	19200	8215912	PLATE,RETAINING,BEA RING	1
3	PAHZZ	3110000700181	19200	8215930	BALL,BEARING	50
4	PAOZZ	5305005240709	19200	10555157-14	SCREW,MACHINE UOC:L97	1
5	PAHHH	1240003285623	19200	11739514	CAP CEMENTED (FOR PARTS SEE GROUP 180901)	1
6	PAHZZ	3010012050057	19200	7660452	CLUTCH HALF,POSITIV E	1
7	PAHZZ	5330000814042	19200	8215931	O-RING	1
8	PAHZZ	5330008523665	19200	7660526	FELT,MECHANICAL,PRE FORMED	1
9	PAOZZ	5935001755966	19200	10559863	COVER,ELECTRICAL CO NNECTOR UOC:U38	2
10	PAOZZ	5980012856689	19207	12360905-1	LIGHT EMITTING DIOD E UOC:L97	2
11	PAFZZ	5330007332208	96906	MS29513-112	O-RING UOC:L97	2
12	PAFFF	1240011789752	19200	11739517	LAMP ASSEMBLY,TELES TELESCOPE (FOR PARTS SEE GROUP 180903) UOC:L97	2
13	PAFZZ	5305000545649	96906	MS51957-15	SCREW,MACHINE	8
14	PAFZZ	5310009338118	96906	MS35338-135	WASHER,LOCK	8
15	PAHDD	1240008688381	19200	7660457	PRISM,DOVE,ASSEMBLY (FOR PARTS SEE GROUP 180907)	1
16	PAHZZ	1240002281632	19200	7660466	RETAINER,OPTICAL EL EMENT	1
17	MHHZA		81349	M16878/5BDB9	WIRE,ELECTRICAL (MAKE FROM NSN 6145-01-295-2819) UOC:U38	1
18	PAHZZ	5315008522732	19200	7660548	PIN,GROOVED,HEADED UOC:U38	1
19	PAHZZ	5970008523691	19200	7660549	INSULATOR,BUSHING UOC:U38	1
20	PAHZZ	5325008037301	96906	MS16624-1050	RING,RETAINING UOC:U38	1
21	PAHZZ	5999008341270	19200	7660544	CAP,ELECTRICAL UOC:U38	1
22	PAOZZ	5305000545636	96906	MS51957-2	SCREW,MACHINE UOC:U38	2
23	PAOZZ	5310005434652	96906	MS35333-69	WASHER,LOCK UOC:U38	2

END OF FIGURE



*Part of identically numbered item.

Figure D-40. Telescope, Panoramic, M117 7660400 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1809 TELESCOPE, PANORAMIC, M17 7660400	
					FIGURE D-40 TELESCOPE, PANORAMIC, M117 7660400 - CONTINUED	
1	PAFZZ	5365008984222	19200	8247732	RING, EXTERNALLY THR EADED UOC : U38	2
2	PAHZZ	5940008555918	19200	8215934	TERMINAL, LUG UOC : U38	3
3	PAFZZ	5995000505969	19200	10543306-6	LEAD, ELECTRICAL UOC : U38	2
4	PAFZZ	5305000545649	96906	MS51957-15	SCREW, MACHINE UOC : U38	1 2
5	PAFZZ	5310005503715	96906	MS35333-70	WASHER, LOCK UOC : U38	1 2
6	XDFZZ		19200	8215883	HOLDER UOC : U38	1
7	PAFZZ	5330008522326	19200	8215865	O-RING UOC : U38	2
8	PAFZZ	6220008709966	19200	7660577	LENS, LIGHT INSTRUMENT 0150 IN UOC : U38	2
9	PAFZZ	1240003285625	19200	11729504	HOUSING, MOLDED PLASTIC UOC : U38	1
10	PAFZZ	5310000221117	96906	MS35333-103	WASHER, LOCK UOC : U38	1
11	PAFZZ	5305004078551	96906	MS35214-2	SCREW, MACHINE UOC : U38	1
12	XDFZZ		19200	10555245	COVER, ACCESS UOC : U38	1
13	PAFZZ	5305007278833	96906	MS51959-3	SCREW, MACHINE UOC : U38	4
14	PAFZZ	5305009576643	96906	MS35190-212	SCREW, MACHINE UOC : U38	1
15	PAFZZ	5305009956653	96906	MS35190-222	SCREW, MACHINE UOC : U38	1
16	HFFZZ		81349	M16878/5BGB9	WIRE, ELECTRICAL (MAKE FROM NSN 6145-00-295-28221 UOC : U38	4
17	PAFZZ	5305000546651	96906	MS51957-27	SCREW, MACHINE UOC : U38	3
18	PAFZZ	5310006163555	96906	MS35333-71	WASHER, LOCK UOC : U38	3
19	XAFZZ		19200	8215916	HOUSING UOC : U38	1
20	PAFZZ	5330008706280	19200	8215915	GASKET UOC : U38	1
21	PAFZZ	5905009514527	81349	RP061SB351KK	RESISTOR, VARIABLE, W IRE WOUND, NONPRECISION	1
22	PAFZZ	5340003285622	19200	11745033	COVER, ACCESS UOC : U38	1
23	PAFZZ	5975008929026	81349	M5423/09-03	BOOT, DUST AND MOIST URE	1

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
24	PAFZZ	5305009313144	96906	MS18063-5	SETSCREW	1
25	PAFZZ	5355010332742	96906	MS91528-1618	KNOB	1
26	XDFZZ		19200	82158G4	HOLDER UOC : U38	1
27	PAFZZ	4710009365399	19200	8215935	TUBE, BENT, METALLIC UOC : U38	1

END OF FIGURE

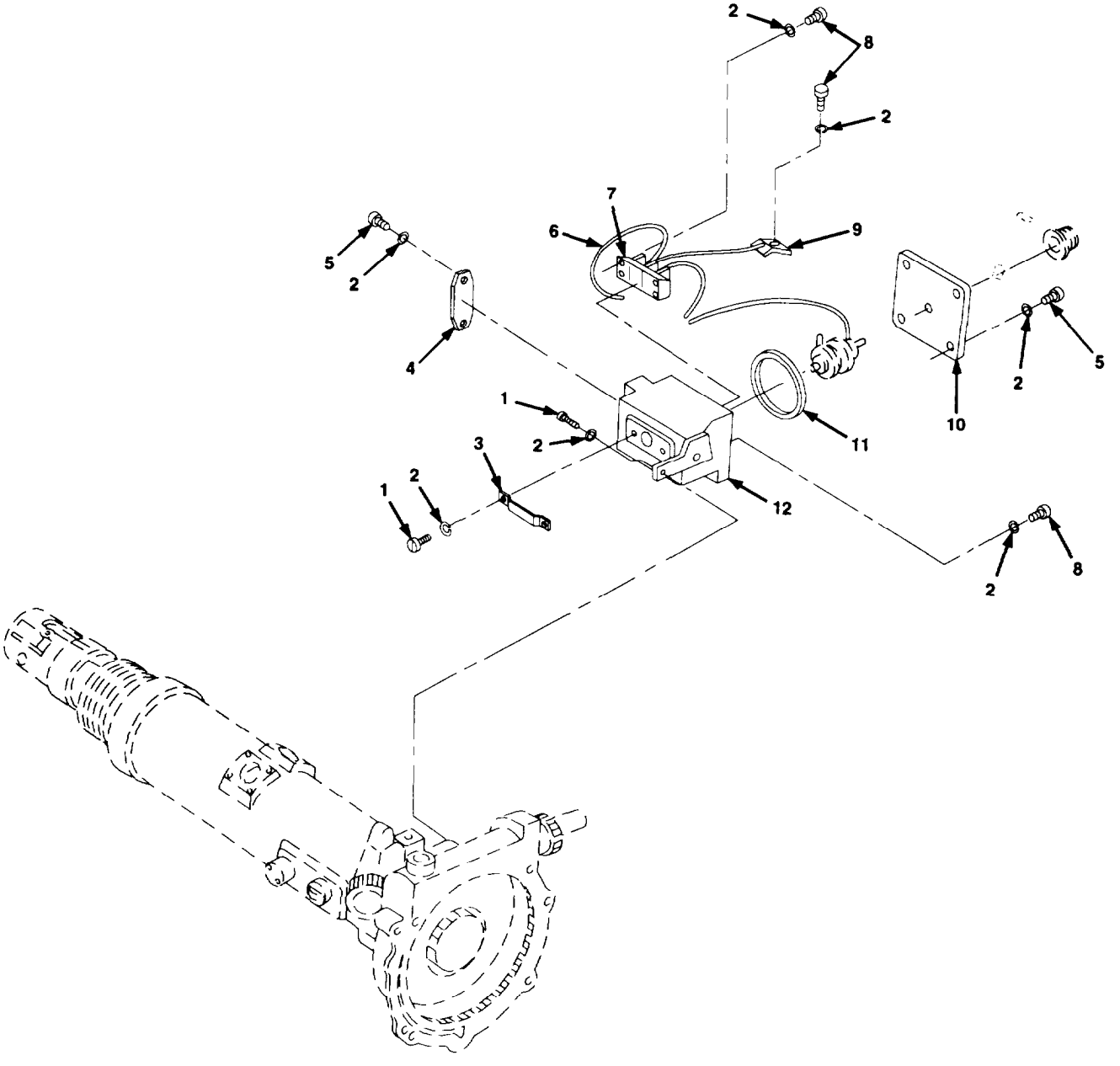


Figure D-41. Telescope, Panoramic, M117A2 11739510 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1809 TELESCOPE, PANORAMIC, M117A2 11739510	
					FIGURE D-41 TELESCOPE, PANORAMIC, M117A2 11739510 - CONTINUED	
1	PAFZZ	5305000546650	96906	MS51957-26	SCREW,MACHINE UOC:L97	3
2	PAFZZ	5310009296395	96906	MS35338-136	WASHER,LOCK UOC:L97	15
3	PAFZZ	5340011789958	19200	11739521	STRAP,RETAINING UOC:L97	1
4	PAFZZ	6250011789742	19200	11739522	RETAINER,LAMP UOC:L97	1
5	PAFZZ	5305000546652	96906	MS51957-26	SCREW,MACHINE UOC:L97	6
6	MHHZA		81349	M16878/5BDB9	WIRE,ELECTRICAL (HAKE FROM NSN 6145-01-295-2819) UOC:L97	1
7	PAFZZ	5940009836043	81349	37TB2	TERMINAL BOARD TYPE 37TB2, TB1 UOC:L97	1
8	PAFZZ	5305000546655	96906	MS51957-31	SCREW,MACHINE UOC:L97	6
9	PAFZZ	5940012075800	19200	11739519	TERMINAL STRIP,GROU NDING UOC:L97	6
10	PAFZZ	5340012050105	19200	11739520	COVER,ACCESS UOC:L97	1
11	PAFZZ	5330008377811	96906	MS9021-135	O-RING UOC:L97	1
12	PAFZZ	1240011789749	19200	11739515	HOUSING,TELESCOPE UOC:L97	1
					END OF FIGURE	

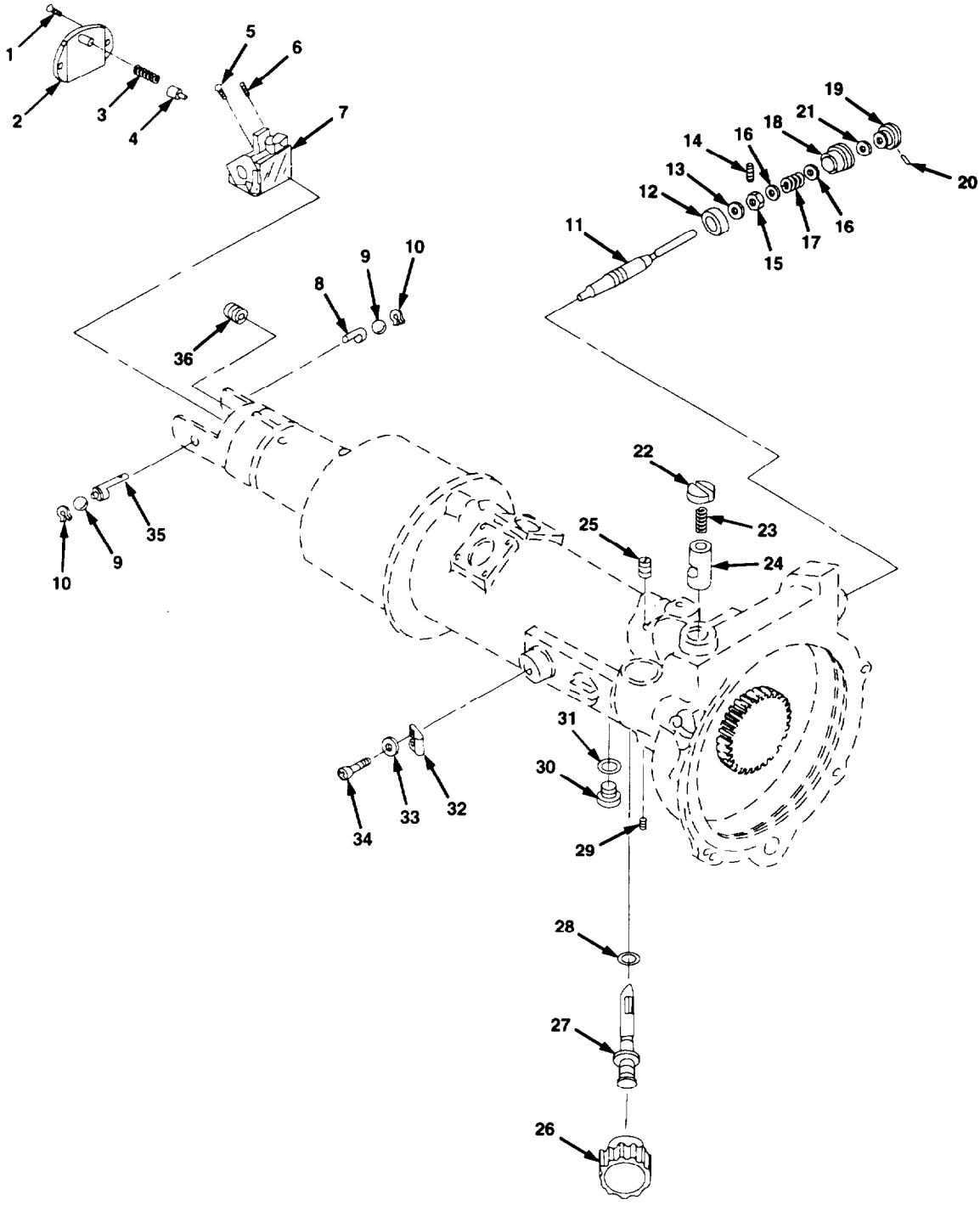


Figure D-42. Telescope, Panoramic, M117/M117A2 7660400 and 11739510 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1809 TELESCOPE, PANORAMIC, M117/H117A2 7660400 AND 11739510	
					FIGURE D-42 TELESCOPE, PANORAMIC, M117/M117A2 7660400 AND 11739510 - CONTINUED	
1	PADZZ	5305009228777	96906	MS35275-202	SCREW,MACHINE	2
2	PADZZ	5340008159677	19200	7660449	PLATE,SPRING RETAIN ING	1
3	PADZZ	5360008519605	19200	7660514	SPRING,HELICAL,COMP RESSION	1
4	PADZZ	5340000876538	19200	7660590	RETAINER,HELICAL CO MPRESSION SPRING	1
5	PADZZ	5305000570498	96906	MS51958-2	SCREW.MACHINE	1
6	PADZZ	5305001431673	19200	7660499	SETSCREW	1
7	PADZZ	6650008712983	19200	7660451	PRISM,OPTICAL INSTR UMENT-BONDED	1
8	PADZZ	3040009364278	19200	7660517	TRUNNION	1
9	PADZZ	3110000520305	19200	8215922	BEARING,BALL,ANNULA R	2
10	PADZZ	5325004323584	96906	MS16624-5018-1	RING,RETAINING	2
11	PAHZZ	3040000876533	19205	7660476	WORM SHAFT	1
12	PAHZZ	3110005546085	51228	HR10033	BEARING,BALL,ANNULA R, SELF-ALIGNING	1
13	PAHZZ	5365008464644	19200	8215822	SPACER,RING	1
14	PAHZZ	5305007168035	96906	MS51974-1	SETSCREW	1
15	PAHZZ	5310012050031	19200	8215932	NUT,SELF-LOCKING,HE XAGON	1
16	PAHZZ	5310008464632	19200	8215753	WASHER,FLAT	2
17	PAHZZ	5360008476246	19200	8215747	SPRING,HELICAL,COMP RESSION	1
18	PAHZZ	5365001364927	19200	8565655	RING,EXTERNALLY THR EADED	1
19	PAHZZ	3020004273725	19200	10556686	GEAR,SPUR	1
20	PAHZZ	5315001873228	96906	MS24692-30	PIN,TAPERED,PLAIN	1
21	PADZZ	5330008455643	19200	8587397-2	PACKING,PREFORMED	1
22	PAHZZ	5365001273007	19200	7660537	PLUG,MACHINE THREAD	1
23	PAHZZ	5360008521988	19200	8261760	SPRING,HELICAL,COMP RESSION	1
24	PAHZZ	5340009364279	19200	8262118	PLUNGER,DETENT	1
25	PAFZZ	5305008529800	19200	7660555	SETSCREW	1
26	PAFZZ	5355009952022	19200	7660552	KNOB	1
27	PAFZZ	3040009331202	19200	7660553	SHAFT,SHOULDERED	1
28	PAFZZ	5330008522329	19200	8215869	O-RING	1
29	PAFZZ	5305008523687	19200	7660554	SETSCREW	1
30	PAFZZ	5365008657715	19200	7660550	PLUG,MACHINE THREAD ED	2
31	PAFZZ	5330008522327	19200	8215866	O-RING	2
32	PAFZZ	5340004005510	19200	8215851	STRIKE,CATCH	2
33	PAFZZ	5310005790079	96906	MS35333-37	WASHER,LOCK	4
34	PAFZZ	5305000546650	96906	11551957-26	SCREW,MACHINE	4
35	PADZZ	3040000520304	19200	7660516	TRUNNION	1
36	PADZZ	5305008432841	96906	MS51021-1	SETSCREW	2

END OF FIGURE

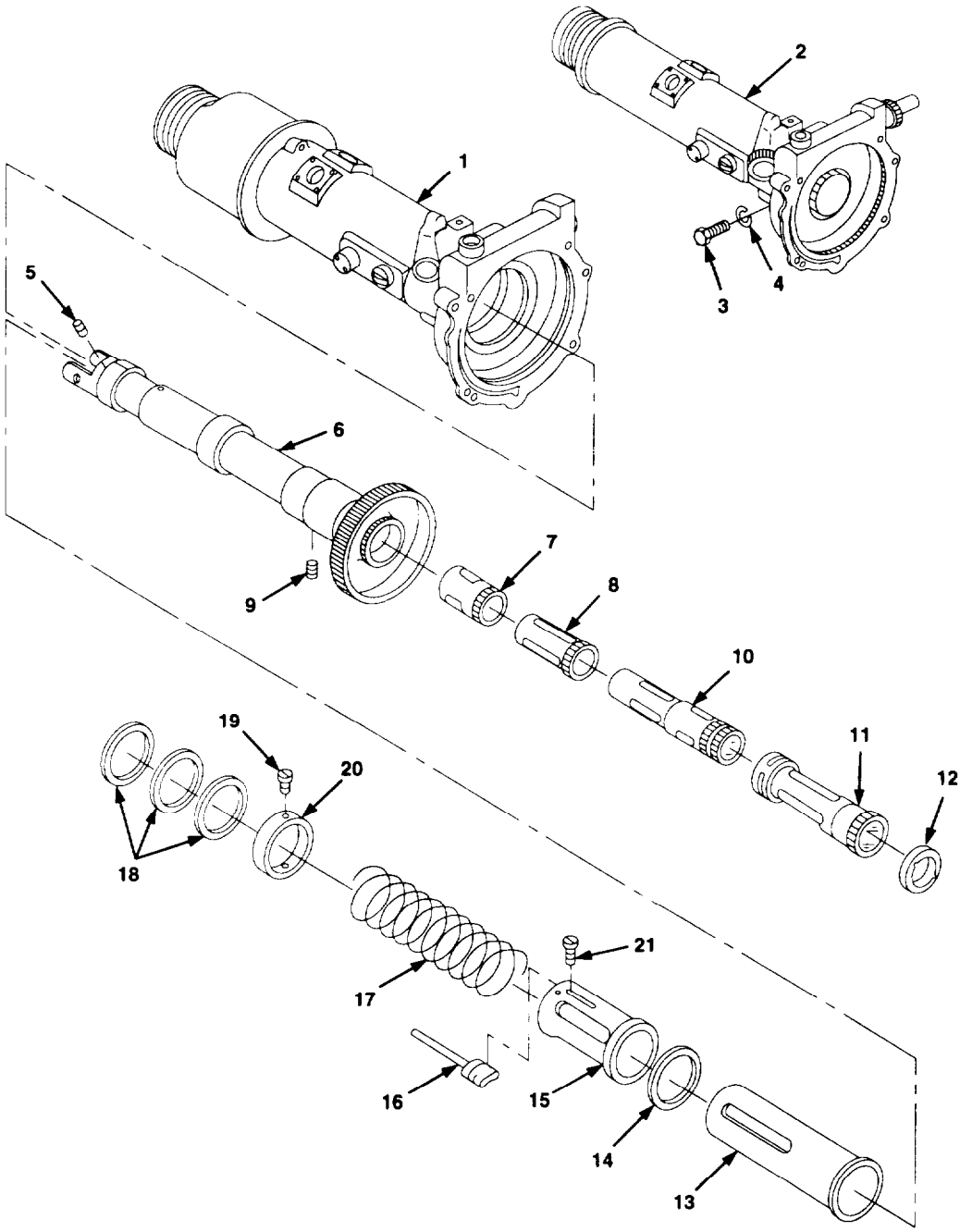


Figure D-43. Telescope, Panoramic, M117/M117A2 7660400 and 11739510 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1809 TELESCOPE, PANORAMIC, M117/M117A2 7660400 AND 11739510	
					FIGURE D-43 TELESCOPE, PANORAMIC, M117/M117A2 7660400 AND 11739510 - CONTINUED	
1	XADZZ		19200	7660588	TELESCOPE SUBASSEMB Y UOC:U38	1
2	PADZZ	1240011789750	19200	11739512	HOUSING,TELESCOPE UOC:L97	1
3	PADZZ	5305000546670	96906	MS51957-45	SCREW,MACHINE UOC:L97	2
4	PADZZ	5310009338119	96906	MS35338-137	WASHER,LOCK UOC:L97	2
5	PADZZ	5305007176948	96906	MS51055-23	SETSCREW	4
6	PADZZ	1240004696665	19200	7660408	TELESCOPE SUBASSEMB LY	1
7	PADZZ	4710004696667	19200	7660446	TUBE,ECCENTRIC	1
8	PADZZ	1240004696668	19200	7660447	CELL,OPTICAL ELEMEN T	1
9	PADZZ	5305012059674	19200	7660448	SETSCREW PRESSED	4
10	XADDD		19200	7660440	TUBE ASSY	1
11	XADDD		19200	7660443	TUBE ASSEMBLY	1
12	XADZZ		19200	7660510	RING,RETAINING	1
13	XADZZ		19200	7660468	SPACER,SLEEVE	1
14	PADZZ	5365001502654	19200	8215852	SHIM	1
15	PADZZ	5365000520287	19200	7660454	TUBE	1
16	PADZZ	1240008714896	19200	7660453	TELESCOPE SUBASSEMB LY	1
17	PADZZ	5360009480775	19200	8215859	SPRING,HELICAL,COMP RESSION	1
18	PADZZ	5365008523669	19200	7660521	SPACER,RING	3
19	PADZZ	5305000577159	19200	7660523	SCREW,MACHINE	2
20	PADZZ	5365008712979	19200	7660522	SPACER,RING	1
21	PADZZ	5305007776039	96906	MS51959-12	SCREW,MACHINE	2
					END OF FIGURE	

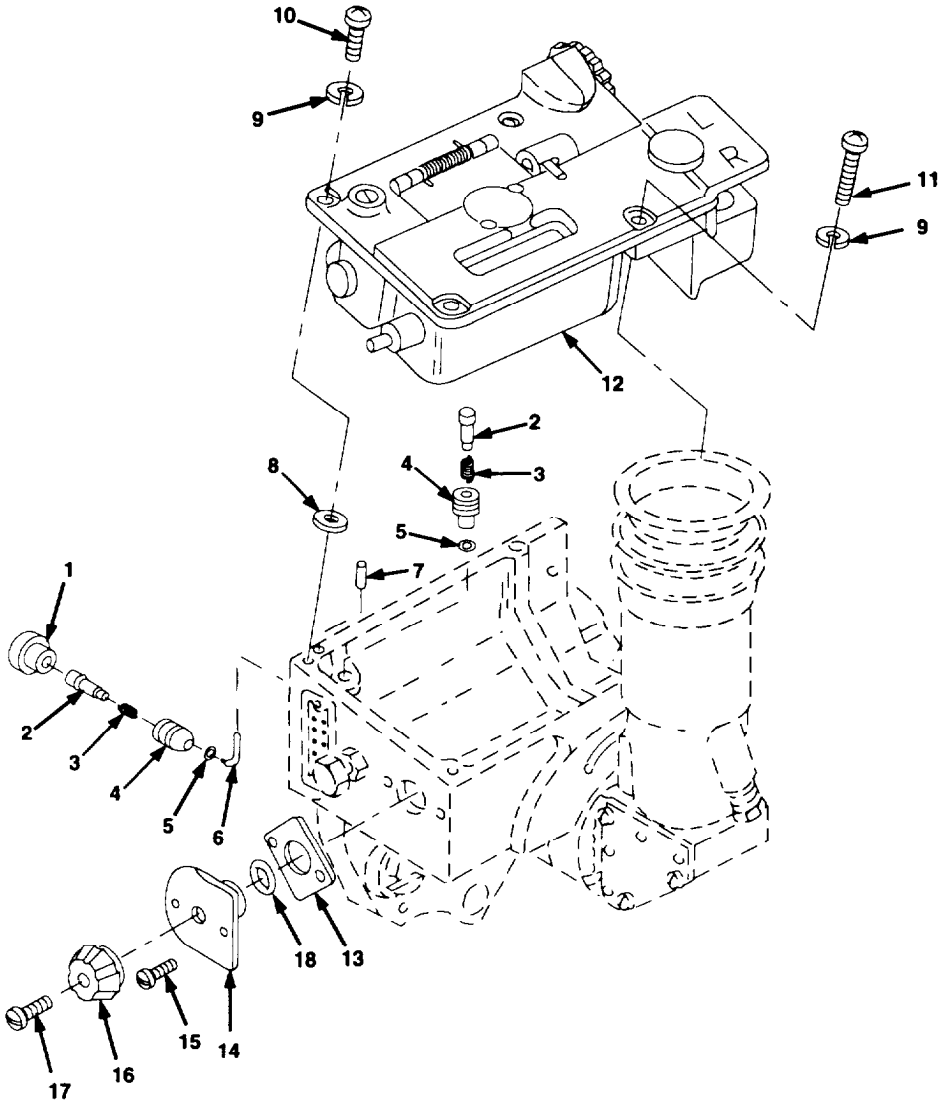


Figure D-44. Telescope, Panoramic, M117/M117A2 7660400 and 11739510 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1809 TELESCOPE, PANORAMIC, M117/H117A2 7660400 AND 11739510	
					FIGURE D-44 TELESCOPE, PANORAMIC, M117/N117A2 7660400 AND 11739510 - CONTINUED	
1	PAHZZ	5325012050051	19200	8215940	INSERT,SCREW THR EADED	1
2	PAHZZ	5315005841639	19200	8202567	PIN,STRAIGHT,HEADED UOC:L97	2
3	PAHZZ	5360005841250	19200	8202569	SPRING,HELICAL,COMP RESSIDN	2
4	PAHZZ	5970005831559	19200	8202568	INSULATOR,BUSHING	2
5	PAHZZ	5325002002637	96906	MS16624-5012	RING,RETAINING UOC:L97	2
6	MHHZA		81349	M16878/5BDB9	WIRE,ELECTRICAL TYPE EE-26(MAKE FROM NSN 6145-01-295-2819) UOC:L97	1
7	PAHZZ	5315008067040	96906	MS16555-620	PIN,STRAIGHT,HEADLE SS	2
8	PAHZZ	5365009952006	19200	10543299	SHIM	4
9	PAHZZ	5310006163555	96906	MS35333-71	WASHER,LOCK	4
10	PAHZZ	5305000546654	96906	MS51957-30	SCREW,MACHINE	2
11	PAHZZ	5305000546655	96906	MS51957-31	SCREW,HACHINE	2
12	XAHHH		19200	7660610	COUNTER ASSEMBLY PINNED	1
13	PAFZZ	5330009169589	19200	8614045	GASKET	1
14	PAFZZ	5340009169590	19200	8614043-1	COVER,ACCESS	1
15	PAFZZ	5305000545647	96906	MS51957-13	SCREW,MACHINE	2
16	PAFZZ	5355008989908	19200	8215762	KNOB	1
17	PAFZZ	5305009592710	96906	MS35190-203	SCREW,MACHINE	1
18	PAFZZ	5330008455643	19200	8587397-2	PACKING,PREFORMED	1
					END OF FIGURE	

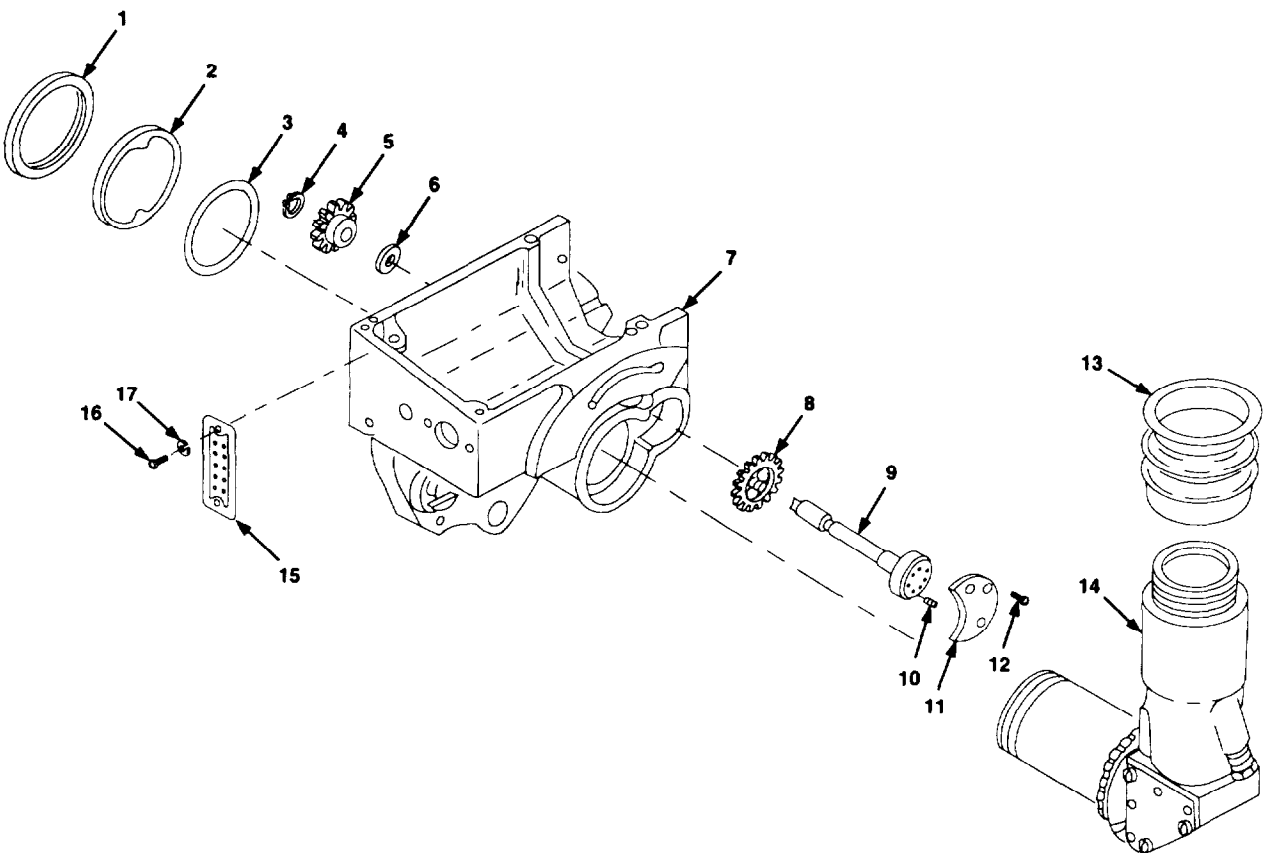


Figure D-45. Telescope, Panoramic, M117/M117A2 7660400 and 11739510 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1809 TELESCOPE, PANORAMIC, M117/H117A2 7660400 AND 11739510	
					FIGURE D-45 TELESCOPE, PANORAMIC, H117/H117A2 7660400 AND 11739510 - CONTINUED	
1	PADZZ	5310008783544	19200	7660533	NUT.PLAIN.ROUND	1
2	PADZZ	5310008533357	19200	7660534	WASHER,KEY	1
3	PADZZ	5330008522328	19200	8215867	O-RING	1
4	PADZZ	5325002986564	96906	MS16624-4025	RING,RETAINING	1
5	PADZZ	3020001253917	19200	7660474	GEAR,SPUR	1
6	PADZZ	5330008455643	19200	8587397-2	PACKING,PREFORMED	1
7	XADDD		19200	7660589	HOUSING,CEMENTED AND MACHINED (FOR PARTS SEE GROUP 180904)	1
8	PADZZ	3020000122953	19200	7660475	GEAR,SPUR	1
9	PADZZ	3040001193967	19200	7660611	SHAFT TELESCOPE	1
10	PADZZ	5305001154446	19200	7660612	SETSCREW	1
11	PADZZ	5340007648425	19200	7660535	COVER,ACCESS	1
12	PADZZ	5305007278833	96906	MS51959-3	SCREW,MACHINE	3
13	PAOZZ	1240008825940	19200	7660576	EYESHIELD,OPTICAL I NSTRUMENT	1
14	XADDD		19200	7660410	ELBOW ASSEMBLY (FOR PARTS SEE GROUP 180906)	1
15	PADZZ	9905012071929	19200	11739509	PLATE, IDENTIFICATION, M117A2 UOC:L97	1
15	PADZZ	9905012970614	19200	8216020	PLATE,IDENTIFICATIO N, M117 UOC:U38	1
16	PADZZ	5305000545635	96906	MS51957-1	SCREW,MACHINE	2
17	PADZZ	5310005434652	96906	MS35333-69	WASHER,LOCK	2
					END OF FIGURE	

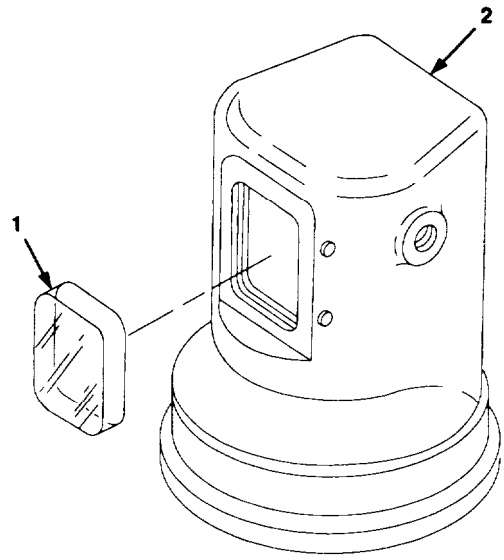


Figure D-46. Cap Assembly 11739514

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES(UOC)	(7) QTY
					GROUP 180901 CAP ASSEMBLY 11739514	
					FIGURE D-46 CAP ASSEMBLY 11739514	
1	PAHZZ	1240008642931	19200	7660439	WINDOW,OPTICAL INST RUMENT	1
2	XAHZZ		19200	11739513	CAP	1

END OF FIGURE

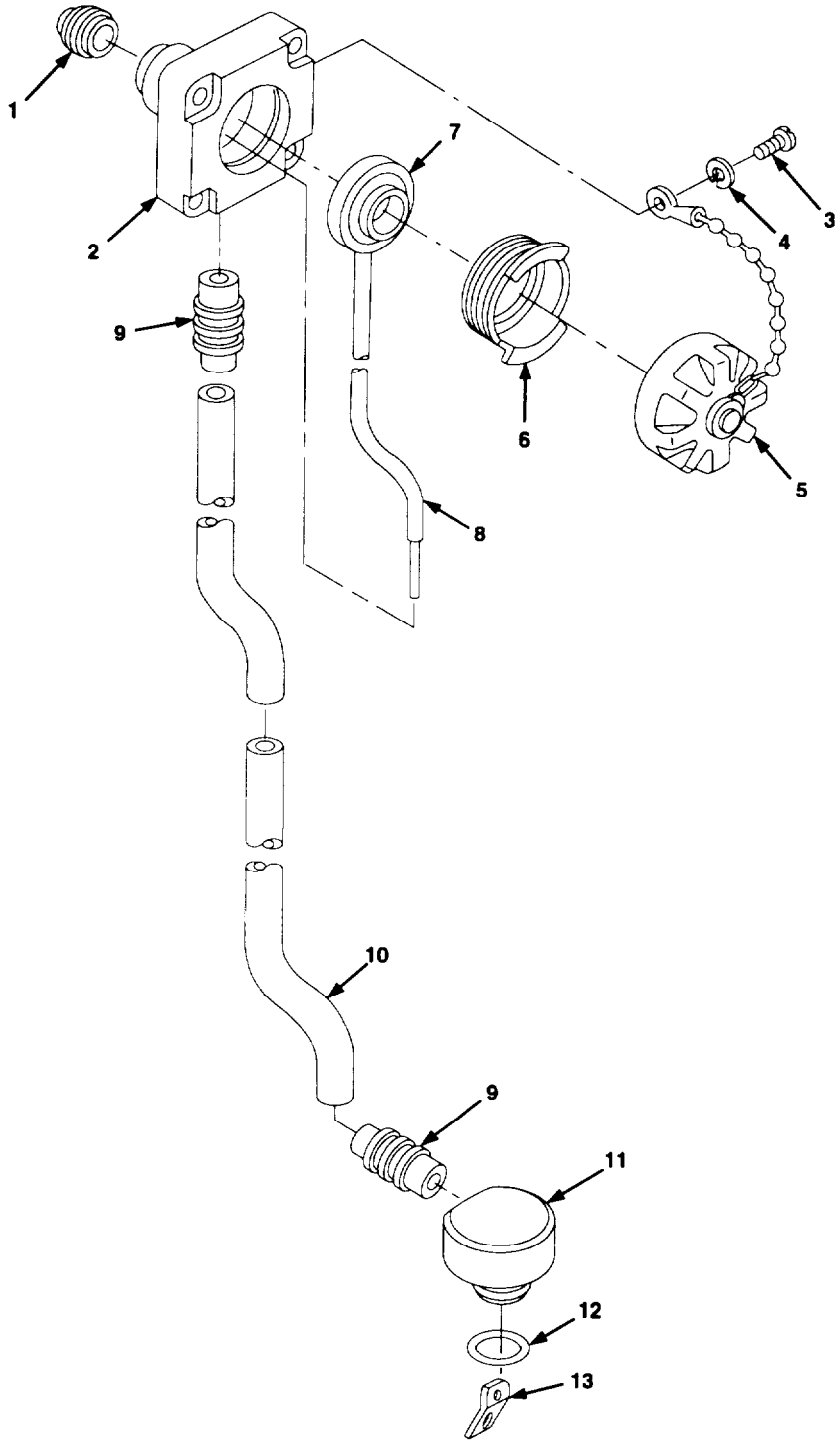


Figure D-47. Lamp Assembly 11739517

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180903 LAMP ASSEMBLY 11739517	
					FIGURE D-47 LAMP ASSEMBLY 11739517	
1	PAFZZ	6220008709966	19200	7660577	LENS,LIGHT INSTRUMENT UOC:L97	1
2	XAFZZ		19200	11739525	HOLDER UOC:L97	1
3	PAOZZ	5305000545636	96906	MS51957-2	SCREW,MACHINE UOC:L97	1
4	PAOZZ	5310005434652	96906	MS35333-69	WASHER,LOCK UOC:L97	1
5	PAOZZ	5935001755966	19200	10559863	COVER,ELECTRICAL CO NNECTOR UOC:L97	1
6	PAFZZ	5365008984222	19200	8247732	RING,EXTERNALLY THR EADED UOC:L97	1
7	PAFZZ	5995000505969	19200	10543306-6	LEAD,ELECTRICAL UOC:L97	1
8	MFFZZ		81349	M3190/02-15-N	INSULATION,SLEEVING (MAKE FROM NSN 5970-00-161-1434) UOC:L97	1
9	XAFZZ		19200	11739524	TUBE UOC:L97	2
10	MFFZZ		81349	M23053/1-101-O	INSULATION SLEEVING BLACK,.25 INCH (MAKE FROM NSN 5970-00-063-1500).... UOC:L97	1
11	XAFZZ		19200	11739523	PLUG UOC:L97	1
12	PAFZZ	5330005808918	96906	MS9021-011	O-RING UOC:L97	1
13	PAFZZ	5940012075800	19200	11739519	TERMINAL STRIP,GROU NDING UOC:L97	1

END OF FIGURE

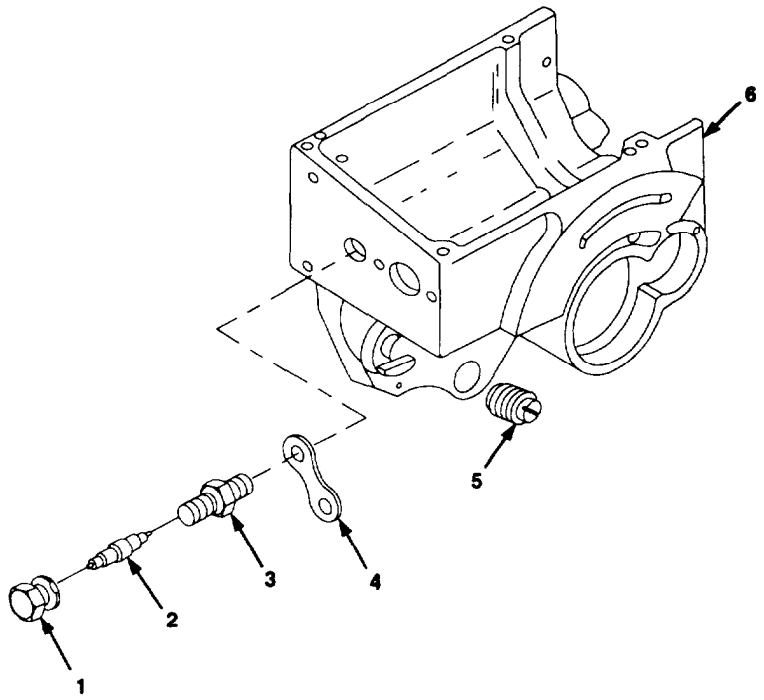


Figure D-48. Housing Assembly 7660589

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180904 HOUSING ASSEMBLY 7660589	
					FIGURE D-48 HOUSING ASSEMBLY 7660589	
1	PAOZZ	4820012350223	19200	8200055	CAP,AIR VALVE	1
2	PAOZZ	2640000603543	96906	MS51377-2	VALVE CORE	1
3	PAOZZ	4820001141096	96906	MS51607-1	VALVE STEM,PURGING	1
4	PAOZZ	5340004644792	19200	10516567	STRAP,RETAINING	1
5	XADZZ		19200	7660557	PLUG	2
6	XADZZ		19200	7660404	HOUSING	1
					END OF FIGURE	

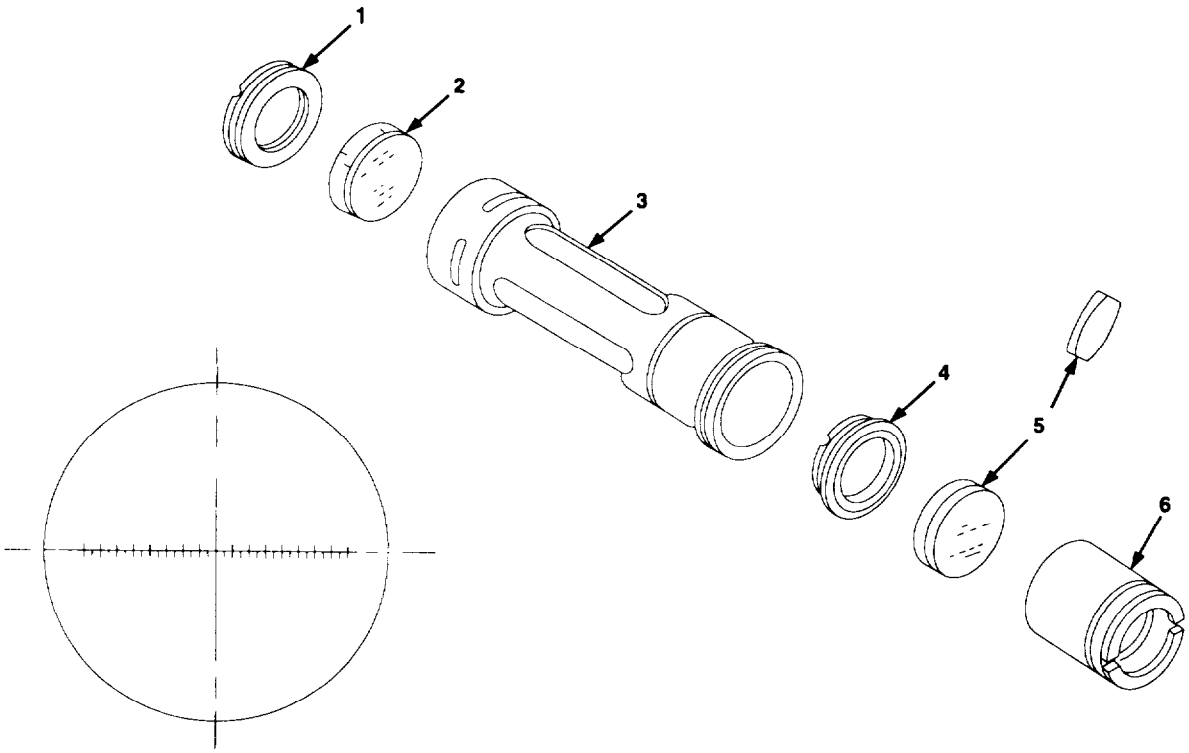


Figure D-49. Tube Assembly 7660433

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UDC)	(7) QTY
					GROUP 180905 TUBE ASSEMBLY 7660443	
					FIGURE D-49 TUBE ASSEMBLY 7660443	
1	PADZZ	1240008642932	19200	7660508	RETAINER,OPTICAL EL EMENT	1
2	PADZZ	6650000202364	19200	8565151	RETICLE,OPTICAL INS TRUMENT	1
3	XADZZ		19200	7660416	TUBE	1
4	PADZZ	1240008646543	19200	7660509	RETAINER,OPTICAL EL EMENT	1
5	PADZZ	6650008517615	19200	7660502	LENS,OPTICAL INSTRU MENT	1
6	XADZZ		19200	7660445	CELL	1
					END OF FIGURE	

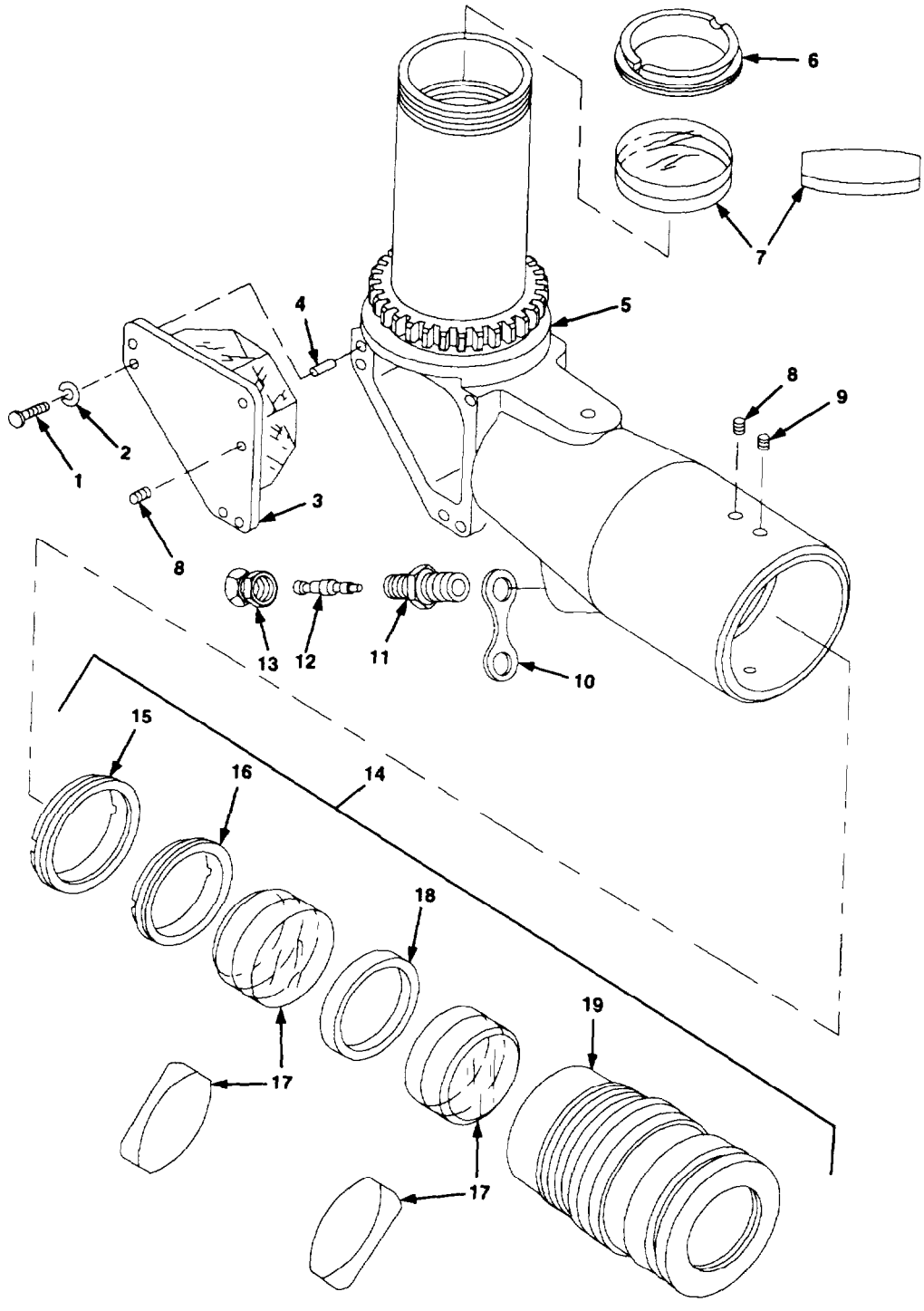


Figure D-50. Elbow Assembly 7660410 and Cell Assembly 7660469

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UDC)	(7) QTY
					GROUP 180906 ELBOW ASSEMBLY 7660410 AND GROUP 18090601 CELL ASSEMBLY 7660469	
					FIGURE D-50 ELBOW ASSEMBLY 7660410 AND CELL ASSEMBLY 7660469	
1	PADZZ	5305000545648	96906	MS51957-14	SCREW,MACHINE	3
2	PADZZ	5310005503715	96906	MS35333-70	WASHER,LOCK	3
3	PADZZ	6650008706278	19200	7660471	PRISM,OPTICAL INSTR UMENT-BONDED	1
4	PADZZ	5315009493909	96906	MS16556-603	PIN,STRAIGHT,HEADLE SS	2
5	XADDD		19200	7660418	ELBOW,CEMENTED (FOR PARTS SEE GROUP 18090602)	1
6	XADZZ		19200	7660532	RING,EXTERNALLY THR EADED	1
7	PADZZ	6650008517614	19200	7660501	LENS,OPTICAL INSTRU MENT	1
8	PAHZZ	5305008432841	96906	MS51021-1	SETSCREW	8
9	PAHZZ	5305007195329	96906	MS51963-20	SETSCREW	2
10	PAOZZ	5340004644792	19200	10516567	STRAP,RETAINING	1
11	PAOZZ	4820001141096	96906	MS51607-1	VALVE STEM,PURGING	1
12	PAOZZ	2640000603543	96906	MS51377-2	VALVE CORE	1
13	PAOZZ	4820012350223	19200	8200055	CAP,AIR VALVE	1
14	XAHHH		19200	7660469	CELL ASSEMBLY OPTICAL INSTRUMENT	
15	PAHZZ	5365008512569	19200	7660529	.RING,EXTERNALLY THR EADED	
16	PAHZZ	5365008512570	19200	7660530	.RING,EXTERNALLY THR EADED	
17	PAHZZ	6650008642942	19200	7660504	.LENS,OPTICAL INSTRU MENT	
18	XAHZZ		19200	7660531	.SPACER,OPTICAL ELEMENT	1
19	XAHZZ		19200	7660470	.CELL,OPTICAL ELEMENT	1
					END OF FIGURE	

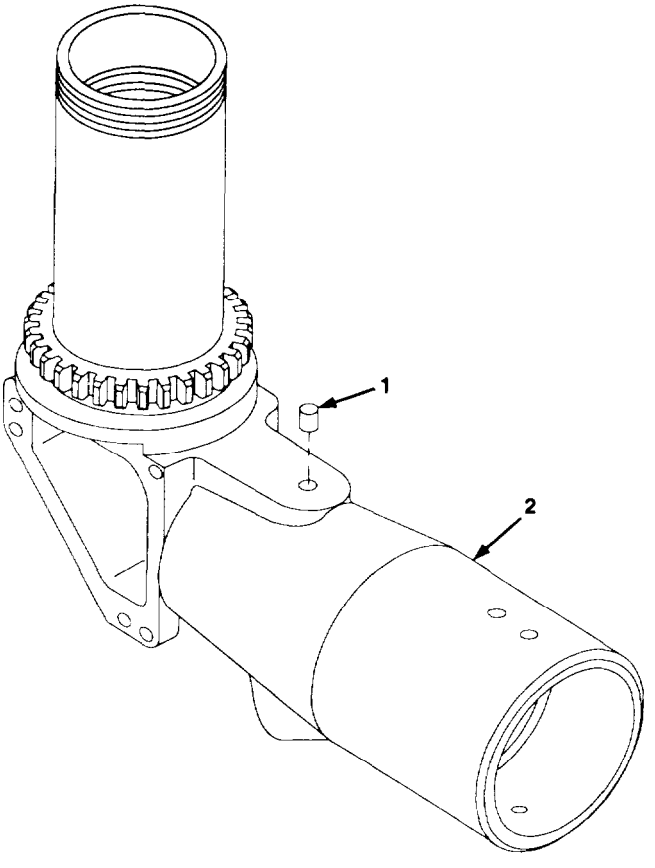


Figure D-51. Elbow Assembly 7660418

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 18090602 ELBOW ASSEMBLY 7660418	
					FIGURE D-51 ELBOW ASSEMBLY 7660418	
1	PADZZ	5315008224739	96906	MS16556-625	PIN,STRAIGHT,HEADLE SS	1
2	XADZZ		19200	NPN	ELBOW	1

END OF FIGURE

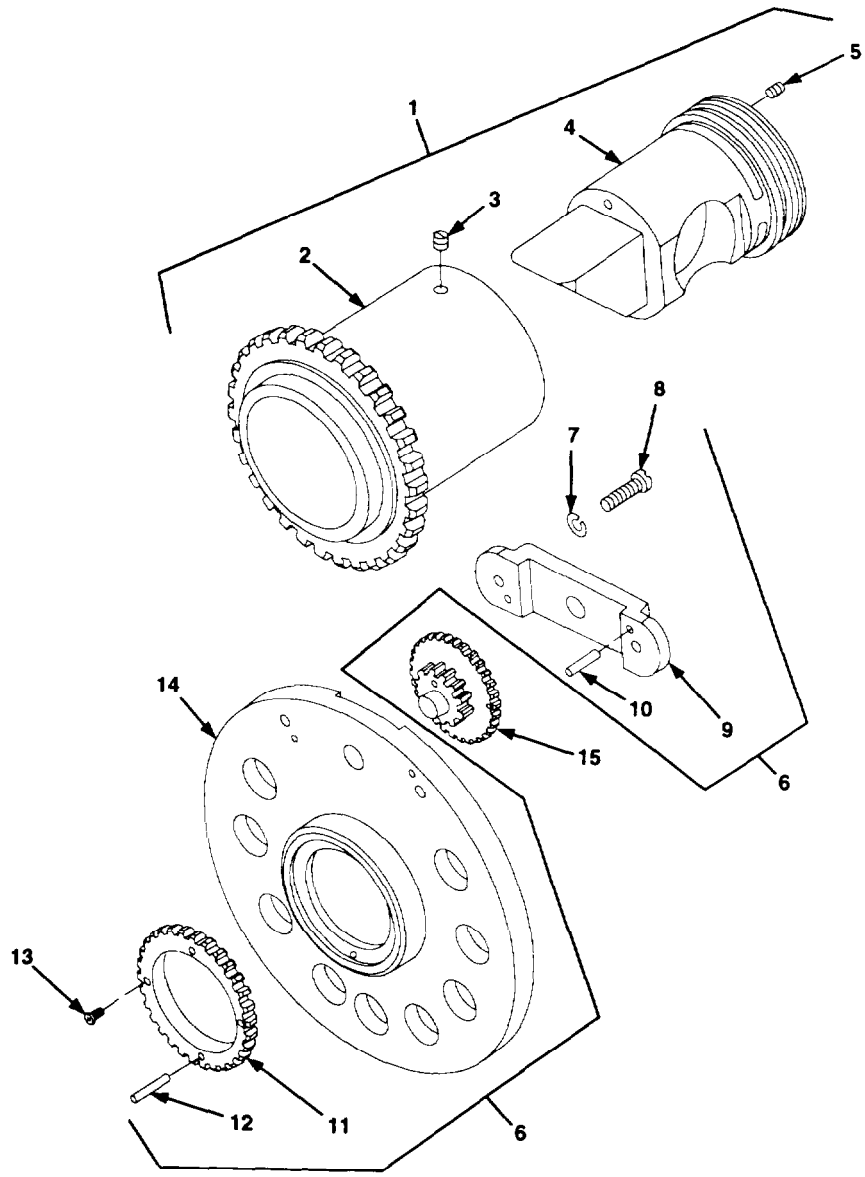


Figure D-52. Prism Assembly, Dove 7660457; Including Gear, Prism, Optical 7660458; and Support, Pinned 7660460

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180907 PRISM ASSEMBLY, DOVE 7660457; GROUP 18090701 GEAR, PRISM,OPTICAL INST 7660458; AND GROUP 18090702 SUPPORT, PINNED 7660460	
					FIGURE D-52 PRISM ASSEMBLY, DOVE 7660457; GEAR, PRISM, OPTICAL 7660458; AND SUPPORT, PINNED 7660460	
1	PADDD	5985008706277	19200	7660458	GEAR-PRISM OPTICAL INSTRUMENT	1
2	XADZZ		19200	7660459	.GEAR,SPUR	1
3	PADZZ	5305007245396	96906	MS51964-9	.SETSCREW	2
4	XADZZ		19200	8261711	.PRISM,OPTICAL INSTRUMENT-BONDED	1
5	PADZZ	5305007243478	96906	MS51031-37	.SETSCREW	2
6	XADDD		19200	7660460	SUPPORT,PINNED AND MACHINED	1
7	PADZZ	5310005503715	96906	MS35333-70	.WASHER,LOCK	2
8	PADZZ	5305000570512	96906	MS51958-15	.SCREW,MACHINE	2
9	XADZZ		19200	7660527	.SUPPDRT,UPPER	1
10	PADZZ	5315000604776	96906	MS16556-604	.PIN,STRAIGHT,HEADLE SS	2
11	XADZZ		19200	7660462	.GEAR,SPUR	1
12	PADZZ	5315009493909	96906	MS16556-603	.PIN,STRAIGHT,HEADLE SS	1
13	PADZZ	5305009289582	96906	MS35191-215	.SCREW.MACHINE	2
14	XADZZ		19200	7660461	.SUPPORT,LOWER	1
15	XADZZ		19200	7660463	GEAR CLUSTER,SPUR	61

END OF FIGURE

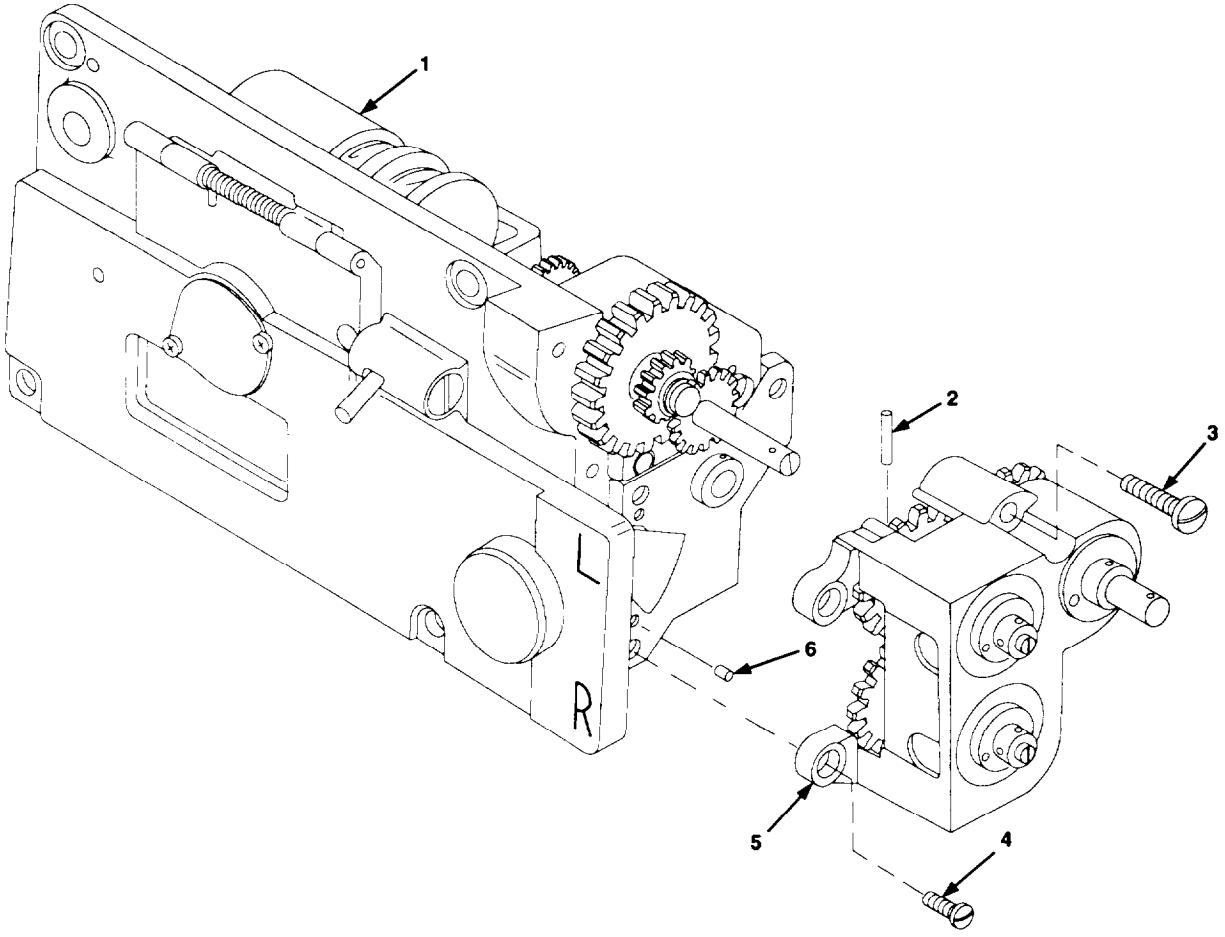


Figure D-53. Counter Assembly 7660610

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180908 COUNTER ASSEMBLY 7660610	
					FIGURE D-53 COUNTER ASSEMBLY 7660610	
1	XAHHH		19200	7660412	ADAPTER ASSEMBLY (FOR PARTS SEE GROUP 18090801)	1
2	PAHZZ	5315000604760	96906	MS16556-606	PIN,STRAIGHT,HEADLE SS	1
3	PAHZZ	5305000545654	96906	MS51957-20	SCREW,MACHINE	1
4	PAHZZ	5305000545651	96906	MS51957-17	SCREW,MACHINE	2
5	PAHZZ	3040013390478	19200	9360111	HOUSING,MECHANICAL	1
6	PAHZZ	5315007029650	96906	MS16555-602	PIN,STRAIGHT,HEADLE SS	2
					END OF FIGURE	

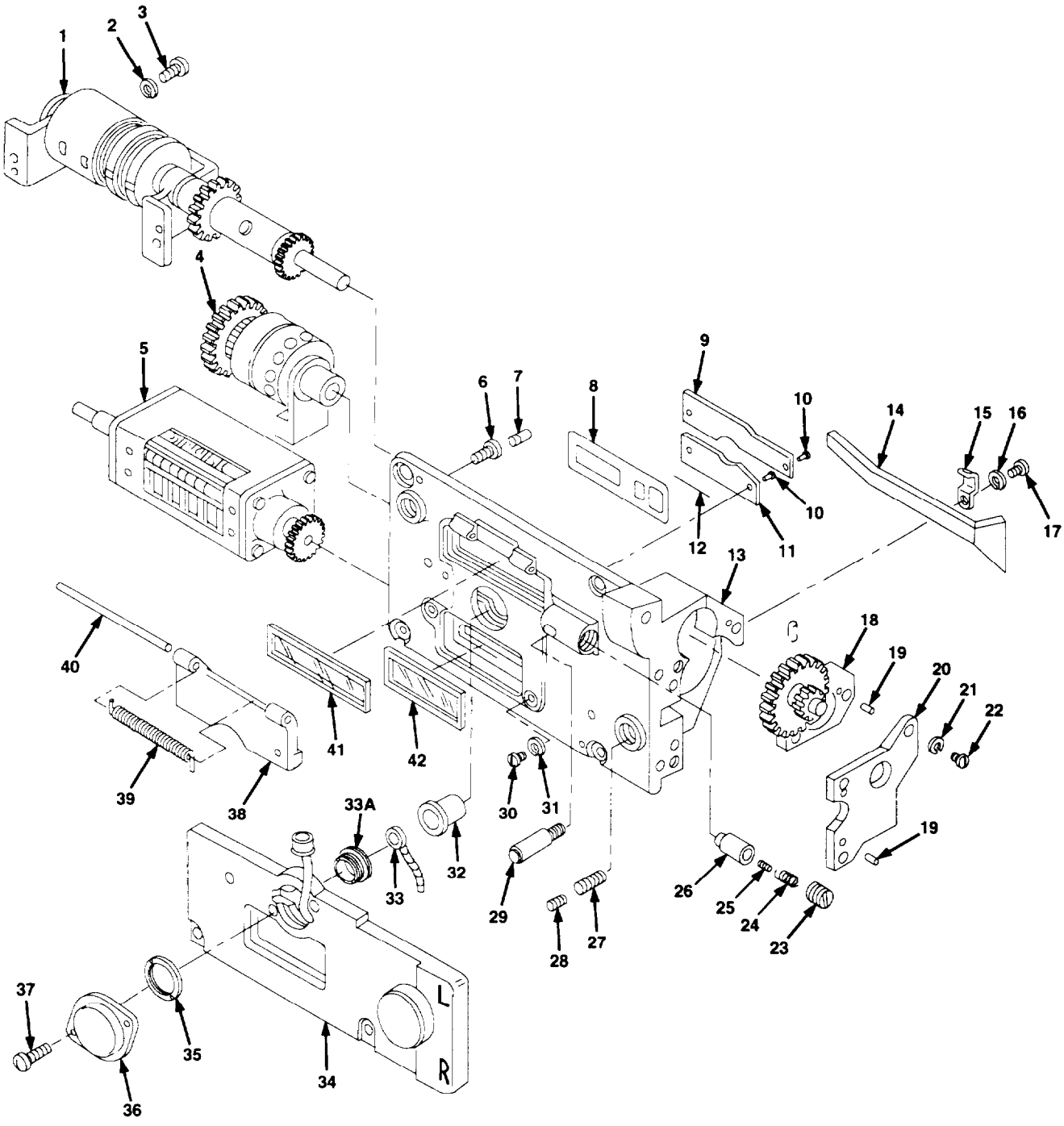


Figure D-54. Adapter Assembly 7660412

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 18090801 ADAPTER ASSEMBLY 7660412	
					FIGURE D-54 ADAPTER ASSEMBLY 7660412	
1	AHHHH		19205	7660419	COUNTER ASSEMBLY (FOR PARTS SEE GROUP 1809080101)	1
2	PAHZZ	5310006163555	96906	MS35333-71	WASHER,LOCK	2
3	PAHZZ	5305000546651	96906	MS51957-27	SCREW,MACHINE	2
4	PAHZZ	3040000272615	19200	8587531	DIFFERENTIAL GEAR UNIT ASSEMBLY	1
5	PAHZZ	6680009070737	19200	8587543	COUNTER,ROTATING MECHANICAL,DIRECT DRIVE-3200 NIL RESET	1
6	PAHZZ	5365008476253	19207	8262092	PLUG,MACHINE THREAD ED	1
7	PAHZZ	5315008504341	19200	7660591	PIN,SHOULDER,HEADLE SS	1
8	PAHZZ	1240001163421	19200	7660596	MASK	1
9	PAHZZ	6695001163419	19200	7660594	PLATE,TELESCOPE	1
10	PAHZZ	5305009526383	96906	MS35190-201	SCREW,MACHINE	4
11	PAHZZ	5970001163420	19200	7660595	PLATE,LIGHT SUPPORT	1
12	PAHZZ	9505001163429	19200	8262091	WIRE ,	1
13	XAHZZ		19200	7660413	ADAPTER	1
14	PAHZZ	6695009123538	19200	8591032	LIGHT CONDUCTOR,INS	1
15	PAHZZ	5340003285635	19200	7660575	STRAP,RETAINING	1
16	PAHZZ	5310005434652	96906	MS35333-69	WASHER,LOCK	2
17	PAHZZ	5305000545636	96906	MS51957-2	SCREW,MACHINE	2
18	AHHHH		19205	7660480	GEAR,ASSEMBLY (FOR PARTS SEE GROUP 1809080102)	1
19	PAFZZ	5315008067039	96906	MS16555-604	PIN,STRAIGHT,HEADLE SS	6
20	PAHZZ	5340011467722	19200	7660428	PLATE,GEAR ASSEMBLY	1
21	PAHZZ	5310005503715	96906	MS35333-70	WASHER,LOCK	6
22	PAHZZ	5305000545649	96906	MS51957-15	SCREW,MACHINE	6
23	PAHZZ	5365009154868	19200	8262097	PLUG,MACHINE THREAD ED	1
24	PAHZZ	5360008936095	19200	8262100	SPRING,HELICAL,COHP RESSION	1
25	PAHZZ	5305000812651	96906	MS51038-15	SETSCREW	1
26	PAHZZ	5340007589602	19200	8262090	PLUNGER,DETENT	1
27	PAHZZ	5305008992165	19200	7660571	SETSCREW	1
28	PAHZZ	5305008176139	96906	MS51021-56	SETSCREW	1
29	PAHZZ	5340007641669	19200	8262098	POST,ELECTRICAL-HEC HANICAL	1
30	PAHZZ	5305000570512	96906	MS51958-15	SCREW,MACHINE	2
31	PAHZZ	5310005503715	96906	MS35333-70	WASHER,LOCK	2
32	PAHZZ	6210008962246	19200	8215819	LENS,LIGHT	1
33	PAHZZ	5995000'35969	19200	10543306-6	LEAD,ELECTRICAL	1
33A	PAHZZ	5365013667755	19200	9399170	RING,EXTERNALLY THR EADED	1
34	PAHZZ	5998012874438	19200	12599272	ELECTRONIC COMPONEN T OVERLAY COHPONENTS ASSEMBLY UOC:L97	1
35	PAHZZ	1240013890868	19200	9399169	RING,RETAINING,OPTI	1
36	PAHZZ	5340013672321	19200	9399168	CAP,PROTECTIVE DUST	1
37	PAHZZ	5305009413538	96906	MS35275-201	SCREW,MACHINE UOC:L97	2
30	PAHZZ	5340012932136	19200	12599352	DOOR,ACCESS	1
39	PAHZZ	5360008492973	19200	8587478	SPRING,HELICAL,TORS ION	1

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
40	PAH22	5315009273399	19200	8215936	PIN,STRAIGHT,HEADLE SS	1
41	PAM2	5355008472698	19200	8262105	WINDOW,OBSERVATIDN	1
42	PAHZZ	5355008472697	19200	8262104	WINDOW,OBSERVATION	1

END OF FIGURE

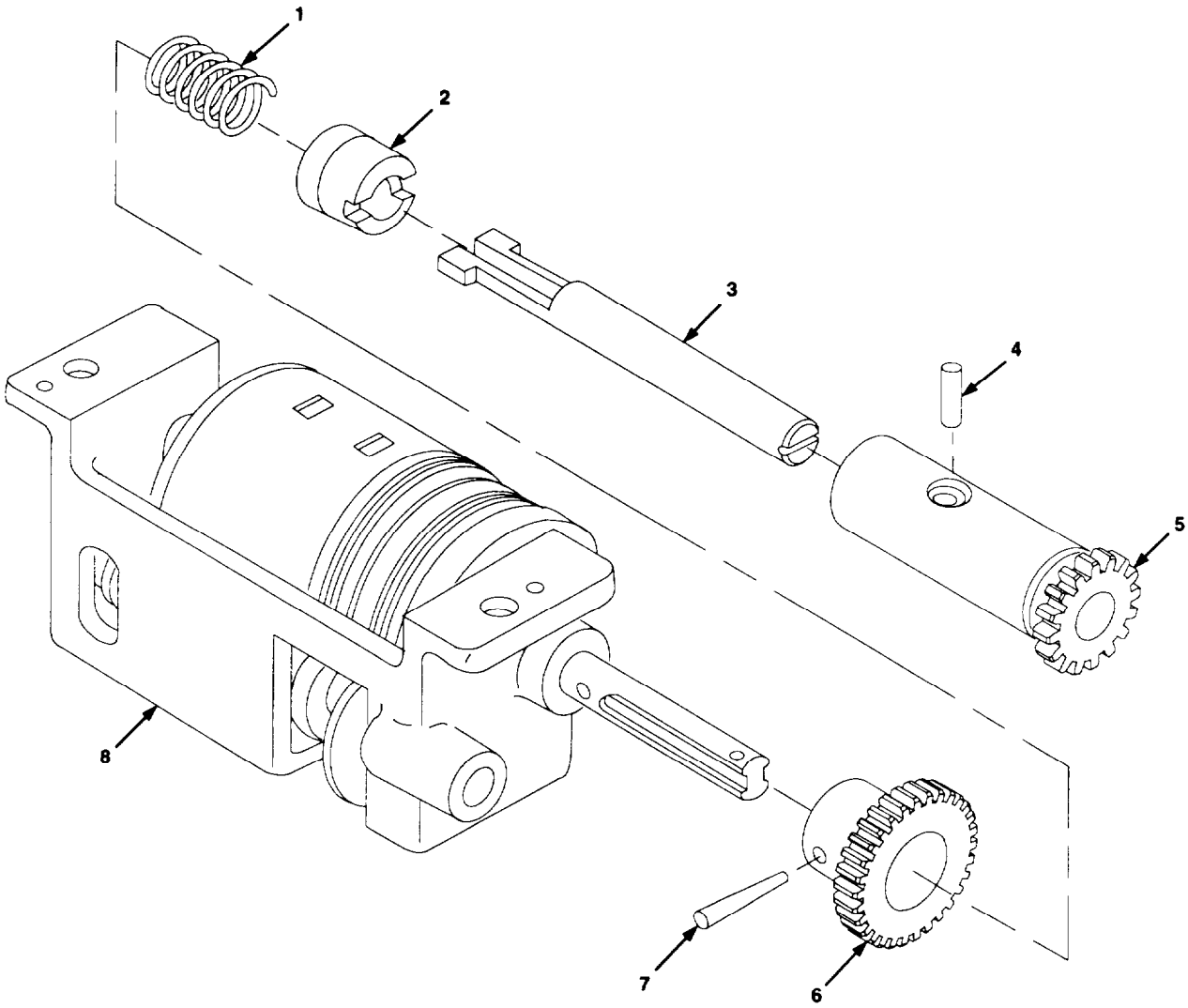


Figure D-55. Counter Assembly 7660419

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1809080101 COUNTER ASSEMBLY 7660419	
					FIGURE D-55 COUNTER ASSEMBLY 7660419	
1	PAHZZ	5360001791391	19200	10547435	SPRING,HELICAL,COMP RESSION	1
2	PAHZZ	3010008984216	19200	8587456	CLUTCH HALF,POSITIV E	1
3	PAHZZ	3040008986799	19200	8587475	SHAFT,STRAIGHT	1
4	PAHZZ	5315008077684	96906	MS16555-603	PIN,STRAIGHT,HEADLE SS	1
5	PAHZZ	3040012060079	19200	7660488	GEARSHAFT,SPUR	1
6	PAHZZ	3020008466882	19200	8587455	GEAR,SPUR	1
7	PAHZZ	5315001873226	96906	MS24692-27	PIN,TAPERED,PLAIN	1
8	PAHZZ	6680008969049	19200	8215837	COUNTER,ROTATING	1
					END OF FIGURE	

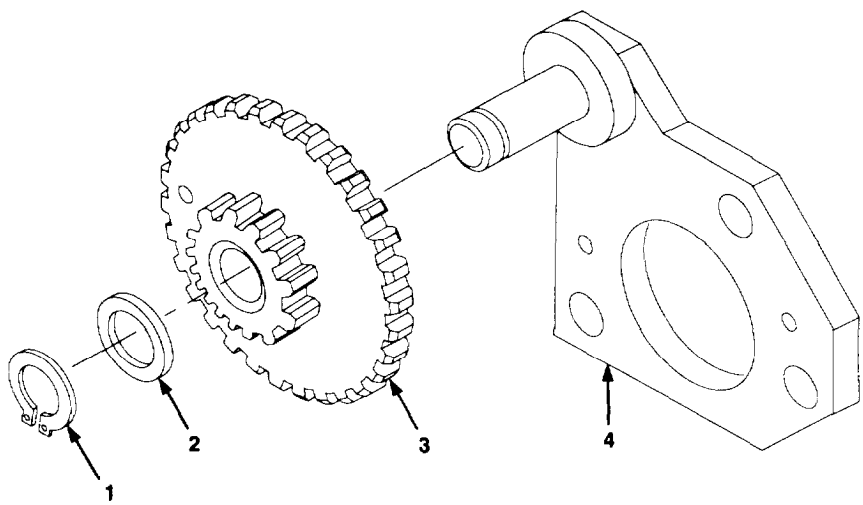


Figure D-56. Gear Assembly 7660480

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1809080102 GEAR ASSEMBLY 7660480	
					FIGURE D-56 GEAR ASSEMBLY 7660480	
1	PAHZZ	5325008108932	96906	MS16624-1068	RING,RETAINING	1
2	PAHZZ	5310008517611	19200	8215861	WASHER	1
3	PAHZZ	3020004273415	19200	10556693	GEAR CLUSTER	1
4	PAHZZ	5340004696666	19200	7660426	PLATE, MOUNTING ASSEMBLY	1
					END OF FIGURE	

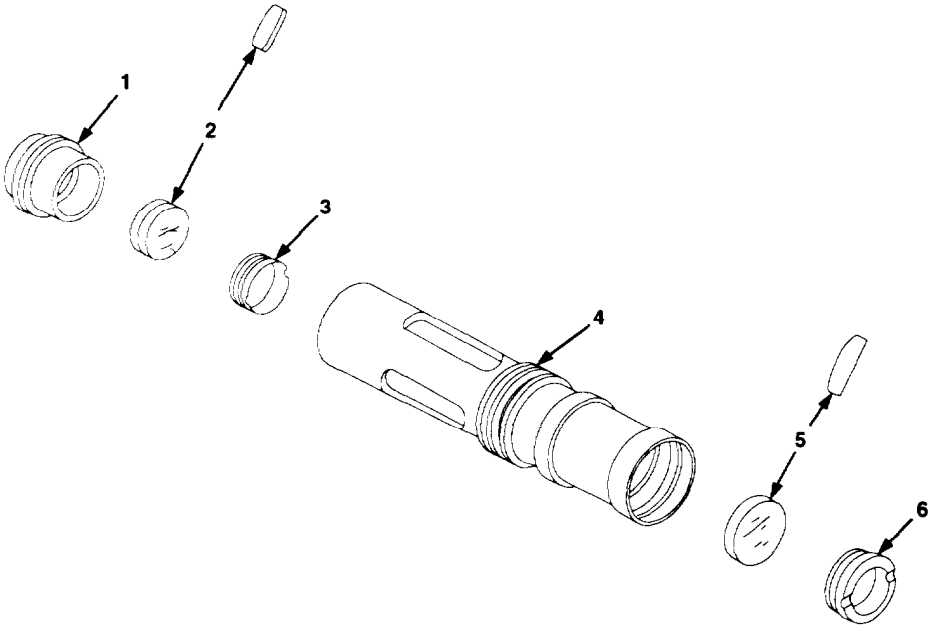


Figure D-57. Tube Assembly 7660440

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 180909 TUBE ASSEMBLY 7660440	
					FIGURE D-57 TUBE ASSEMBLY 7660440	
1	PADZZ	1240012159761	19200	7660442	RETAINER,OPTICAL EL EMENT	1
2	PADZZ	6650008517613	19200	7660500	LENS,OPTICAL INSTRU MENT	1
3	PADZZ	1240008646542	19200	7660507	RETAINER,OPTICAL EL EMENT	1
4	XADZZ		19200	7660415	TUBE	1
5	PADZZ	6650008642941	19200	7660503	LENS,OPTICAL INSTRU MENT	1
6	PADZZ	1240008646541	19200	7660506	RETAINER,OPTICAL EL EMENT	1
					END OF FIGURE	

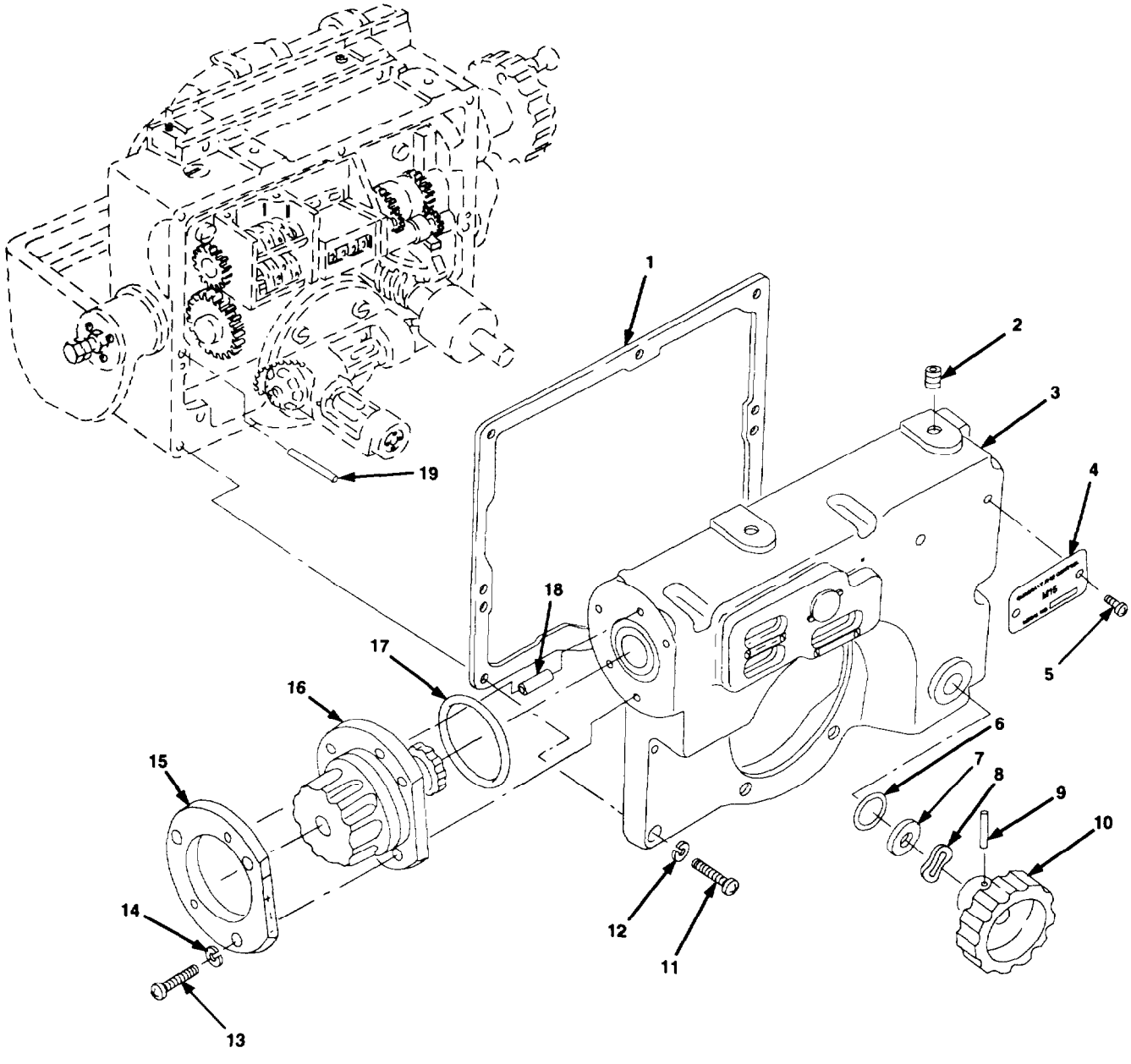


Figure D-58. Quadrant, Fire Control, M15 8247683

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1810 QUADRANT, FIRE CONTROL, M15 8247683	
					FIGURE D-58 QUADRANT, FIRE CONTROL, M15 8247683	
1	PAFZZ	5330008915653	19200	8247723	GASKET	1
2	PAFZZ	5305000610266	96906	MS51029-50	SETSCREW	1
3	XAFFF		19200	8247684	COVER ASSEMBLY	1
4	PAFZZ	9905000074867	19200	10559722	PLATE,IDENTIFICATIO N	1
5	PAFZZ	5305000545646	96906	MS51957-12	SCREW,MACHINE	2
6	PAFZZ	5330008503743	96906	MS9241-016	O-RING	1
7	PAFZZ	5310001503792	19200	10553927	WASHER,RECESSED	1
8	PAFZZ	5310001503708	19200	10553928	WASHER,SPRING TENSI ON	1
9	PAFZZ	5315001873243	96906	MS24692-57	PIN,TAPERED,PLAIN	1
10	PAFZZ	5355008936421	19200	8262020	KNOB	1
11	PAFZZ	5305000546674	96906	MS51957-49	SCREW,MACHINE	9
12	PAFZZ	5310008694199	96906	MS35338-156	WASHER,LOCK	9
13	PAFZZ	5305000546655	96906	MS51957-31	SCREW,MACHINE	3
14	PAFZZ	5310009296395	96906	MS35338-136	WASHER,LOCK	3
15	XAFZZ		19200	8247712	BASE	1
16	PAFFF	1290004707504	19200	10553929	KNOB ASSEMBLY	1
17	PAFZZ	5330005853350	96906	MS9021-217	O-RING	1
18	PAFZZ	5315009162410	96906	MS9105-60	PIN,STRAIGHT,HEADLE SS	2
19	PAFZZ	5315008340745	96906	MS16555-631	PIN,STRAIGHT,HEADLE SS	2
					END OF FIGURE	

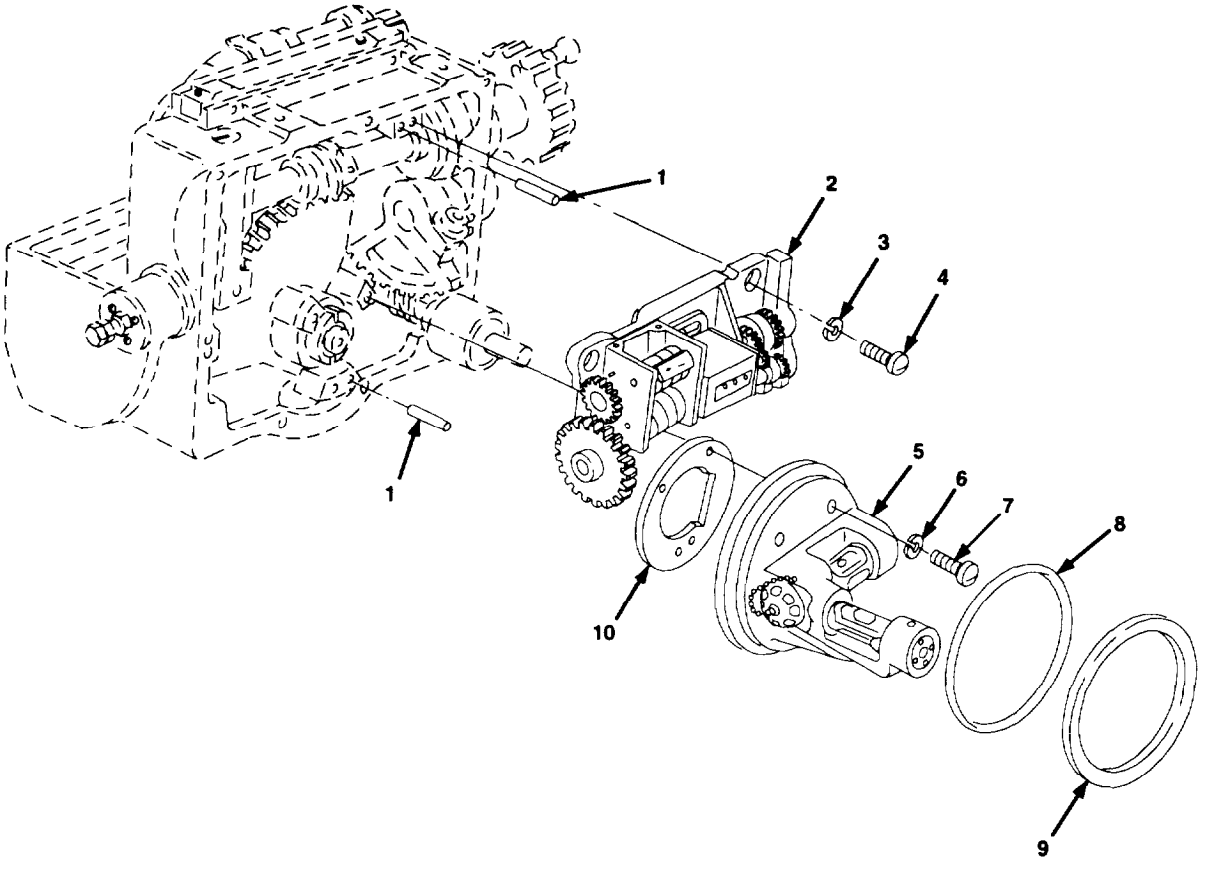


Figure D-59. Quadrant, Fire Control, M15 8247683 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1810 QUADRANT, FIRE CONTROL, M15 8247683	
					FIGURE D-59 QUADRANT, FIRE CONTROL M15 8247683 - CONTINUED	
1	PAHZZ	5315008251207	96906	MS16555-627	PIN,STRAIGHT,HEADLE SS	3
2	XAHHH		19200	8247690	COUNTER ASSEMBLY	1
3	PAHZZ	5310009338121	96906	MS35338-139	WASHER,LOCK	3
4	PAHZZ	5305000711316	96906	MS51957-80	SCREW.MACHINE	3
5	XAHHH		19200	8247688	LEVEL ASSEMBLY	1
6	PAHZZ	5330011411914	80205	NAS1523C3Y	PACKING WITH RETAIN ER	3
7	PAHZZ	5305000509230	96906	MS51957-64	SCREW,MACHINE	3
8	PAHZZ	5330005809761	96906	MS9021-235	O-RING	1
9	PAHZZ	5365001502667	19200	10553921	SPACER,RING	1
10	PAHZZ	5330008915654	19200	8262051	GASKET	1

END OF FIGURE

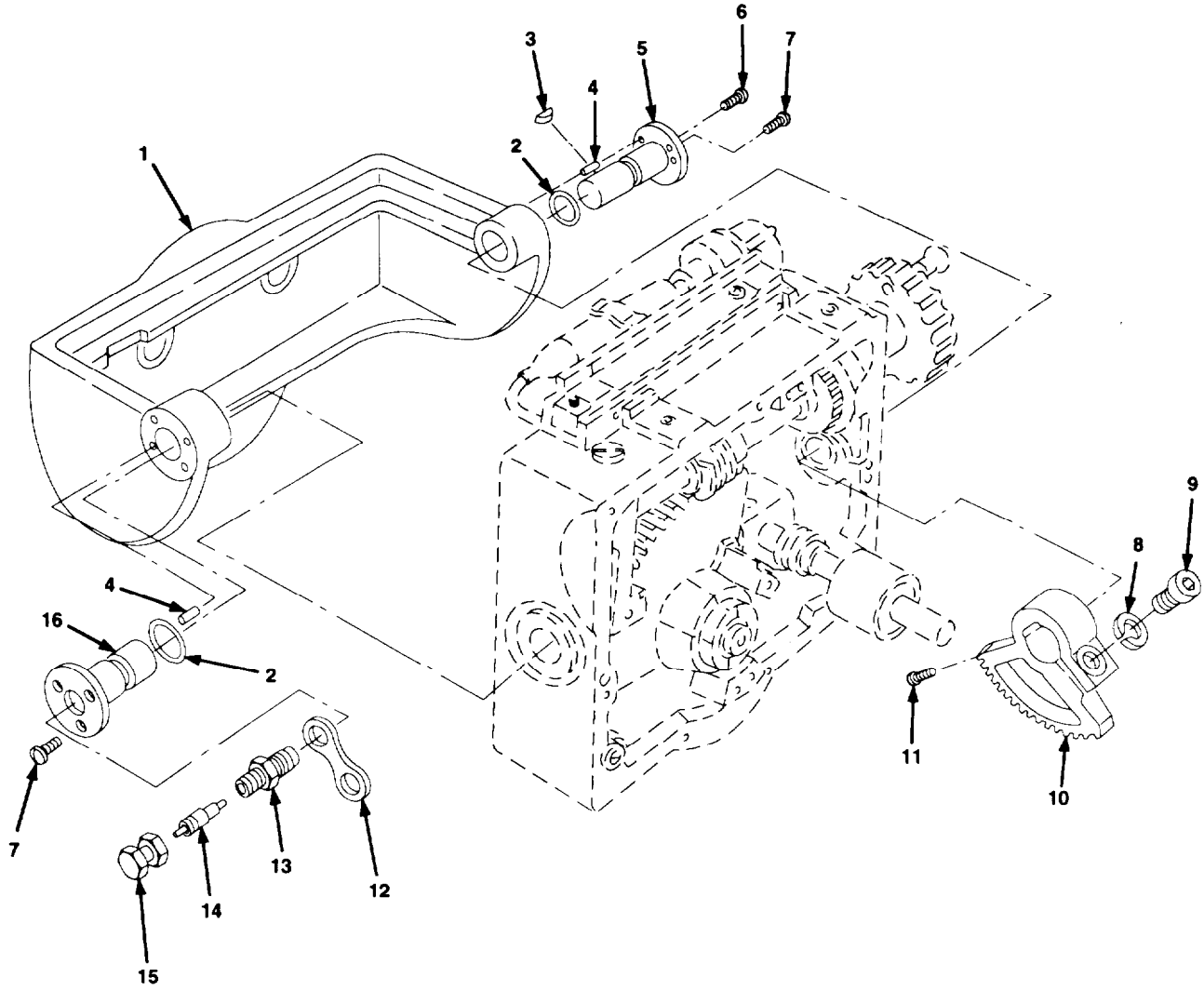


Figure D-60. Quadrant, Fire Control, M158247683 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1810 QUADRANT, FIRE CONTROL, M15 8247683	
					FIGURE D-60 QUADRANT, FIRE CONTROL, M15 8247683 - CONTINUED	
1	XAHZZ		19200	8261995	BRACKET	1
2	PAHZZ	5330000816910	96906	MS9241-111	O-RING	2
3	PAHZZ	5315006165515	96906	MS35756-5	KEY, WOODRUFF	1
4	PAHZZ	5315008251207	96906	MS16555-627	PIN, STRAIGHT, HEADLE SS	2
5	PAHZZ	5365012144312	19200	10553923	SPACER, QUADRANT	1
6	PAHZZ	5305004333707	96906	MS3212-21	SCREW, MACHINE	1
7	PAHZZ	5305000826768	96906	MS51960-32	SCREW, MACHINE	6
8	PAHZZ	5310009746623	96906	MS35338-140	WASHER, LOCK	1
9	PAHZZ	5305009887838	96906	MS16995-64	SCREW, CAP, SOCKET HE AD	1
10	PAHZZ	3020008609184	19200	8262001	GEAR SECTOR, WORM WH EEL	1
11	PAHZZ	5305008517605	21450	224511	SCREW, MACHINE	2
12	PAOZZ	5340004644792	19200	10516567	STRAP, RETAINING ELASTIC	1
13	PAOZZ	4820001141096	96906	MS51607-1	VALVE STEM, PURGING	1
14	PAOZZ	2640000501229	81348	TYV/CL2/TR C1	VALVE CORE	1
15	PAOZZ	4820012350223	19200	8200055	CAP, AIR VALVE	1
16	PAHZZ	3040012108179	19200	10553932	SHAFT STRAIGHT	1
					END OF FIGURE	

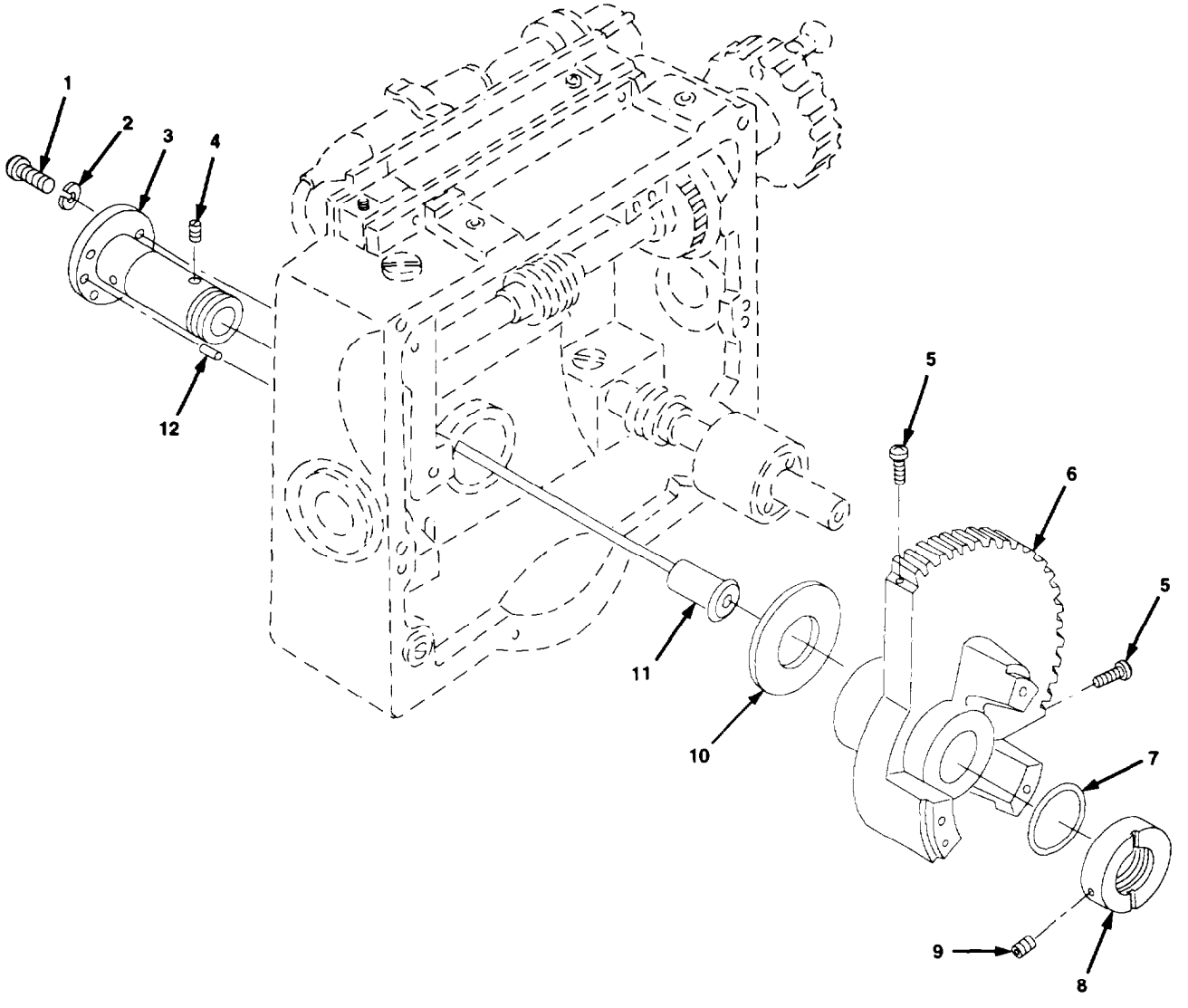


Figure D-61. Quadrant, Fire Control, M15 8247683 - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1810 QUADRANT, FIRE CONTROL, M15 8247683	
					FIGURE D-61 QUADRANT, FIRE CONTROL, M15 8247683-CONTINUED	
1	PAHZZ	5305000546671	96906	MS51957-46	SCREW, MACHINE	3
2	PAHZZ	5310005432739	96906	MS35333-72	WASHER, LOCK	3
3	PAHZZ	3040012060798	19200	8262019	SHAFT, SHOULDERED	1
4	PAHZZ	5305008995142	96906	MS51038-26	SETSCREW	1
5	PAHZZ	5305009399221	96906	MS35275-241	SCREW, MACHINE	2
6	PAHZZ	3020008962237	19200	8247698	GEAR SECTOR, WORM WH EEL	1
7	PAHZZ	5310009596771	19200	8635800	WASHER, FLAT	1
8	PAHZZ	5310008646114	19200	8262052	NUT, PLAIN, ROUND	1
9	PAHZZ	5305008944255	96906	MS51038-28	SETSCREW	2
10	PAHZZ	5310008935888	19200	8262054	WASHER, FLAT	1
11	PAHZZ	5995008986802	19200	8262018	LEAD, ELECTRICAL	1
12	PAHZZ	5315008251207	96906	MS16555-627	PIN, STRAIGHT, HEADLE SS	2

END OF FIGURE

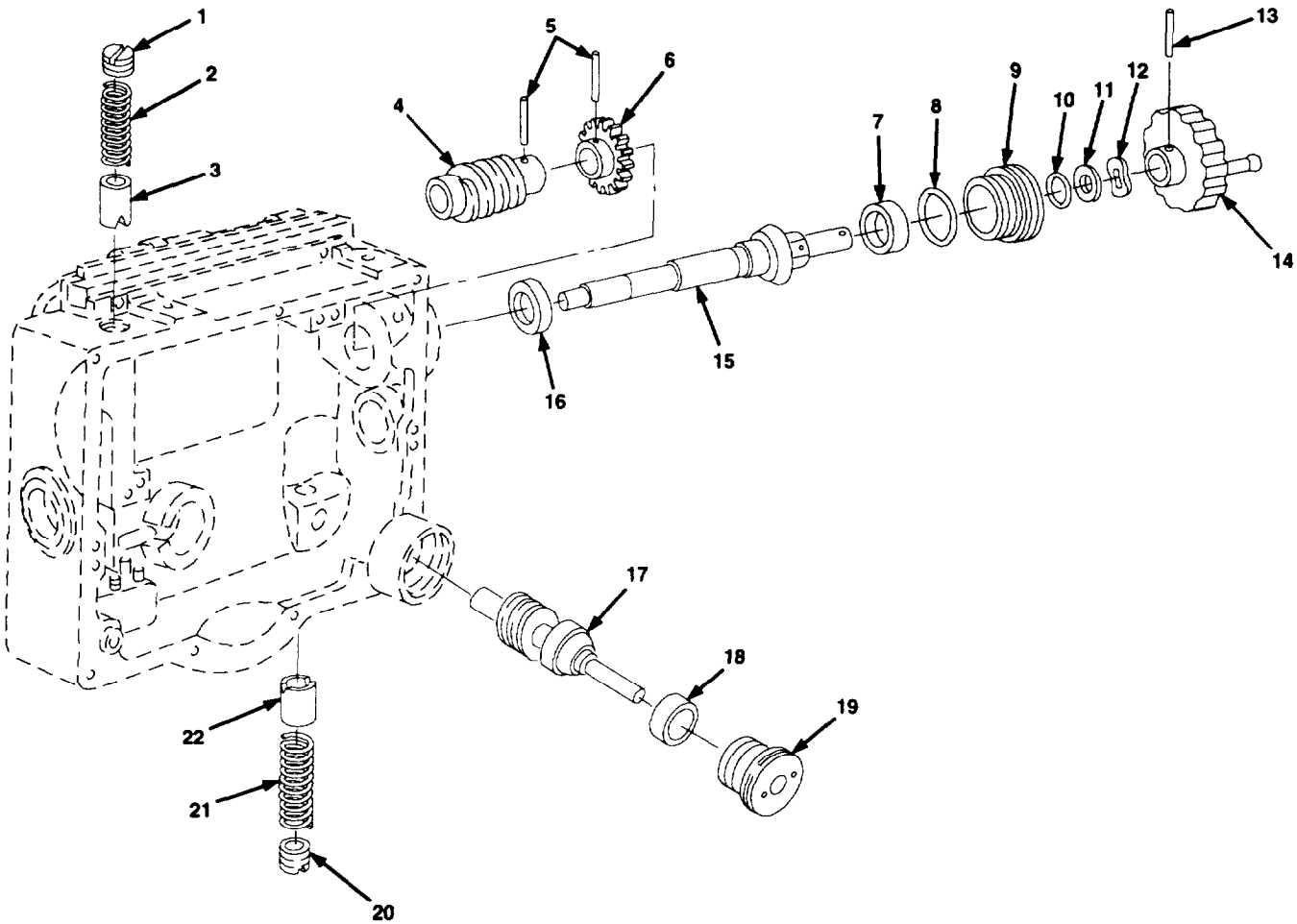


Figure D-62. Quadrant, Fire Control, M15 8247683 - Continued

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1810 QUADRANT, FIRE CONTROL, M15 8247683	
					FIGURE D-62 QUADRANT, FIRE CONTROL, M15 8247683 - CONTINUED	
1	PAHZZ	5365001502661	19200	10553919	PLUG, MACHINE THREAD	1
2	PAHZZ	5360008492966	19200	8247756	SPRING, HELICAL, COMP RESSION	1
3	PAHZZ	5340008984223	19200	8247754	PLUNGER, DETENT	1
4	PAHZZ	3040008996936	19200	8247720	GEAR, WORM	1
5	PAHZZ	5315001873301	96906	MS24692-156	PIN, TAPERED, PLAIN	2
6	PAHZZ	3020008492965	19200	8262015	GEAR, SPUR	1
7	PAHZZ	1290004707496	19200	10553937	SEAT, BALL SOCKET	1
8	PAHZZ	5330006005041	96906	MS9021-026	O-RING	1
9	PAHZZ	5365001686592	19200	10553934	RING, EXTERNALLY THR EADED	1
10	PAHZZ	5330007104367	96906	MS9241-013	O-RING	1
11	PAHZZ	5310001503791	19200	10553925	WASHER, RECESSED	1
12	PAHZZ	5310001503709	19200	10553926	WASHER, SPRING TENSI ON	1
13	PAHZZ	5315001873274	96906	MS24692-108	PIN, TAPERED, PLAIN	1
14	PAHZZ	5340004792997	19200	10553935	HANDWHEEL ASSEMBLY	1
15	PAHZZ	3040004696662	19200	10555579	SHAFT, SHOULDERED ASSEMBLY	1
16	PAHZZ	1290004696671	19200	10553938	SEAT, BALL SOCKET	1
17	PAHZZ	3040004696663	19200	10555580	WORM SHAFT	1
18	PAHZZ	5340012090662	19200	10555584	SEAT, BALL SOCKET	1
19	PAHZZ	5365001686591	19200	10555585	RING, EXTERNALLY THR EADED	1
20	PAHZZ	5365008504339	19200	10553920	PLUG, MACHINE THREAD ED	1
21	PAHZZ	5360008476249	19200	8262058	SPRING, HELICAL, COMP RESSION	1
22	PAHZZ	5340008986795	19200	8262059	PLUNGER, DETENT	1

END OF FIGURE

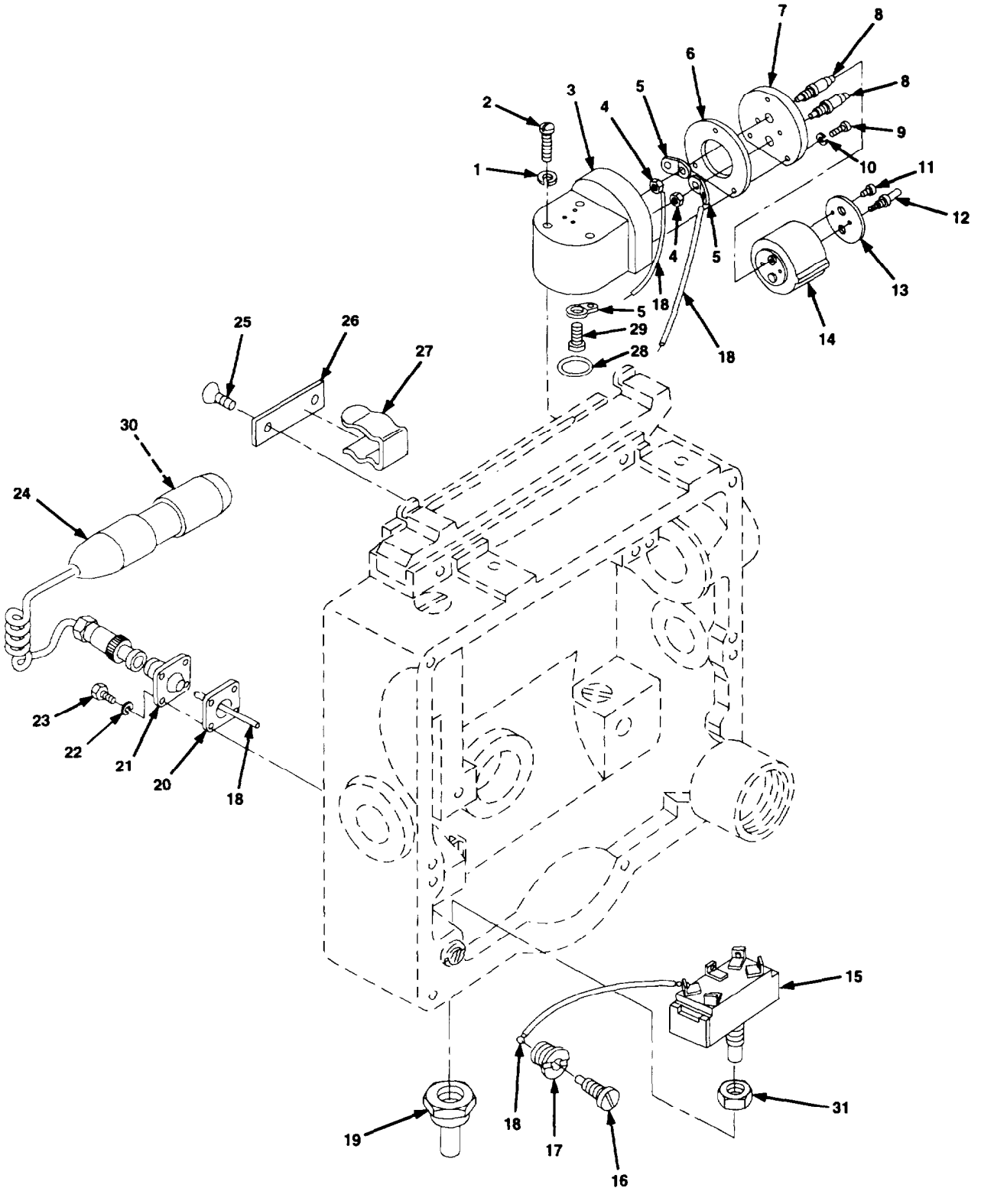


Figure D-63. Quadrant, Fire Control, M15 8247683 - Continued

GROUP 1810 QUADRANT, FIRE CONTROL, M15 8247683

FIGURE D-63 QUADRANT, FIRE CONTROL, M15 8247683 - CONTINUED

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
1	PAHZZ	5310009338118	96906	MS35338-135	WASHER, LOCK	3
2	PAHZZ	5305000545655	96906	MS51957-21	SCREW, MACHINE	3
3	PAHZZ	5935008969045	19200	7660401	BRACKET, ELECTRICAL	1
4	PAHZZ	5310009349746	96906	MS35649-245B	NUT, PLAIN, HEXAGON	2
5	PAHZZ	5940006822477	96906	MS77068-1	TERMINAL, LUG	3
6	PAHZZ	5330001810126	19200	8587541	GASKET	1
7	PAHZZ	5970007544117	19200	8635798	INSULATOR, DISK	1
8	PAHZZ	5999008600589	19200	7660498	CONTACT, ELECTRICAL	2
9	PAHZZ	5305000545638	96906	MS51957-4	SCREW, MACHINE	3
10	PAHZZ	5310009282690	96906	M535338-134	WASHER, LOCK	3
11	PAHZZ	5305006375884	96906	M535214-12	SCREW, MACHINE	1
12	PAHZZ	5315007530514	19200	8624898	PIN, SHOULDER, HEADLESS	1
13	PAHZZ	5999000425355	19200	7660438	PLATE MOUNT, ELECTRICAL	1
14	PAHZZ	1290001913302	19200	11729776	SHELL RECEPTACLE	1
15	PAFZZ	5930006159376	96906	MS35059-21	SWITCH, TOGGLE	1
16	PAFZZ	5999008600590	19204	8202570	CONTACT, ELECTRICAL	1
17	PAFZZ	5325008997639	19200	8261853	INSERT, SCREW THREAD ED	1
18	PAFZA	6145002952819	81349	M16878/5BDB9	WIRE, ELECTRICAL	V
19	PAFZZ	5930006896786	81349	M5423/01-01	BOOT, DUST AND MOIST URE	1
20	PAFZZ	5330008476262	19200	8215772	GASKET	1
21	PAFZA	5935002593880	19203	8215804	CONNECTOR, RECEPTACL E	1
22	PAFZZ	5310005434652	96906	MS35333-69	WASHER, LOCK	4
23	PAFZZ	5305000545637	96906	MS51957-3	SCREW, MACHINE	4
24	PAOZZ	6695008936094	19200	8247695	LIGHT, INSTRUMENT	1
25	PAFZZ	5305007654257	96906	MS51959-43	SCREW, MACHINE	2
26	PAFZZ	5365004917709	19200	8262037	SPACER, PLATE	1
27	PAFZZ	5340008464482	19200	8247753	CLIP, SPRING TENSION	1
28	PAHZZ	5330005841231	96906	MS9021-016	O-RING	1
29	PAHZZ	5305002061270	96906	MS35214-11	SCREW, MACHINE	1
30	PAOZZ	5980012895274	19207	12360905-2	LED, T 13/4, BASED	1
31	PAFZZ	5310001373068	96906	MS25082C21	NUT, PLAIN, HEXAGON	1

END OF FIGURE

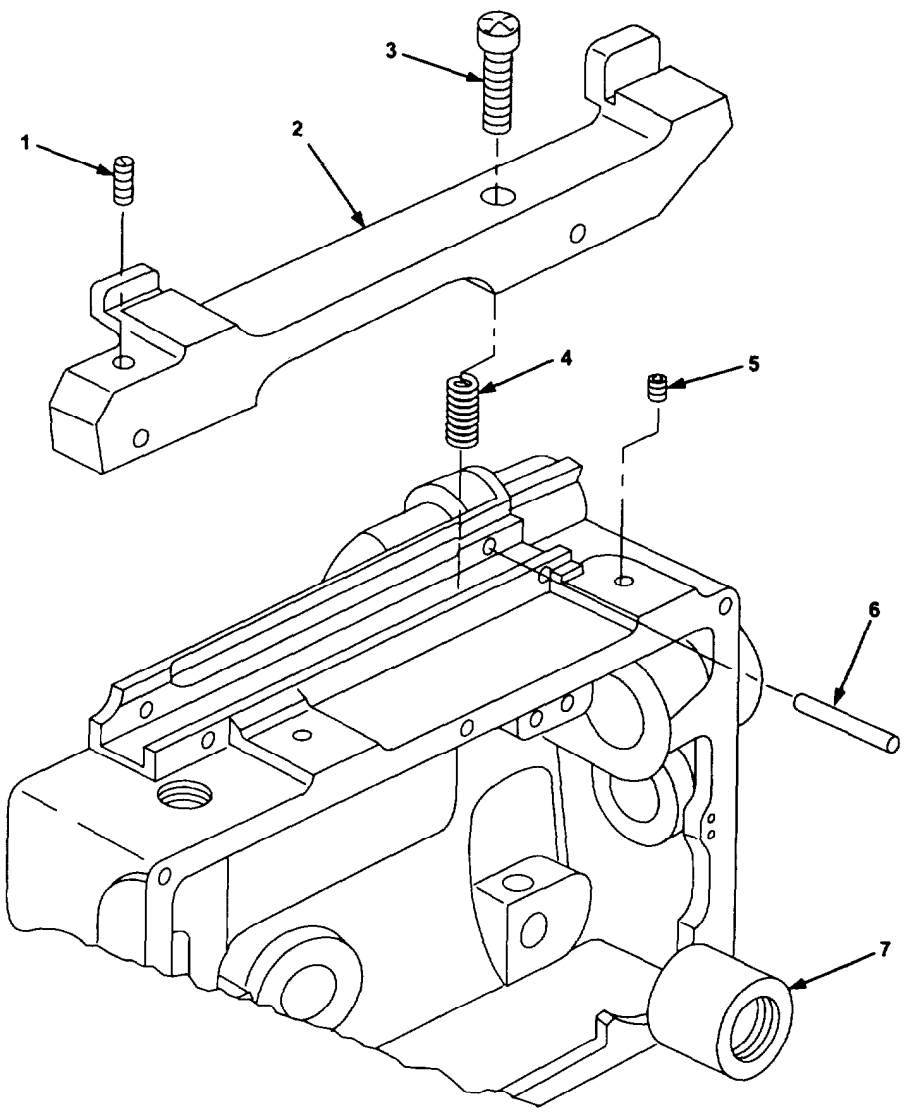


Figure D-64. Quadrant, Fire Control, M15 8247683 - Continued

(1) ITEM MO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1810 QUADRANT, FIRE CONTROL, M15 8247683	
					FIRURE D-64 QUADRANT, FIRE CONTROL, M15 8247683 - CONTINUED	
1	PAHZZ	5305003100800	19200	8587539	SETSCREW	1
2	XDHZZ		19200	8624899	BAR	1
3	PAHZZ	5305009887605	96906	MS16995-29	SCREW, MACHINE HEAD	1
4	PAHZZ	5360012060784	19200	8262063	SPRING, HELICAL, COMP RESSION	1
5	PAHZZ	5305000610266	96906	MS51029-50	SETSCREW	2
6	PAHZZ	5315009265864	96906	MS16555-643	PIN, STRAIGHT, HEADLE SS	2
7	XAHZZ		19200	8247692	HOUSING, CEMENTED AND MACHINED	1

END OF FIGURE

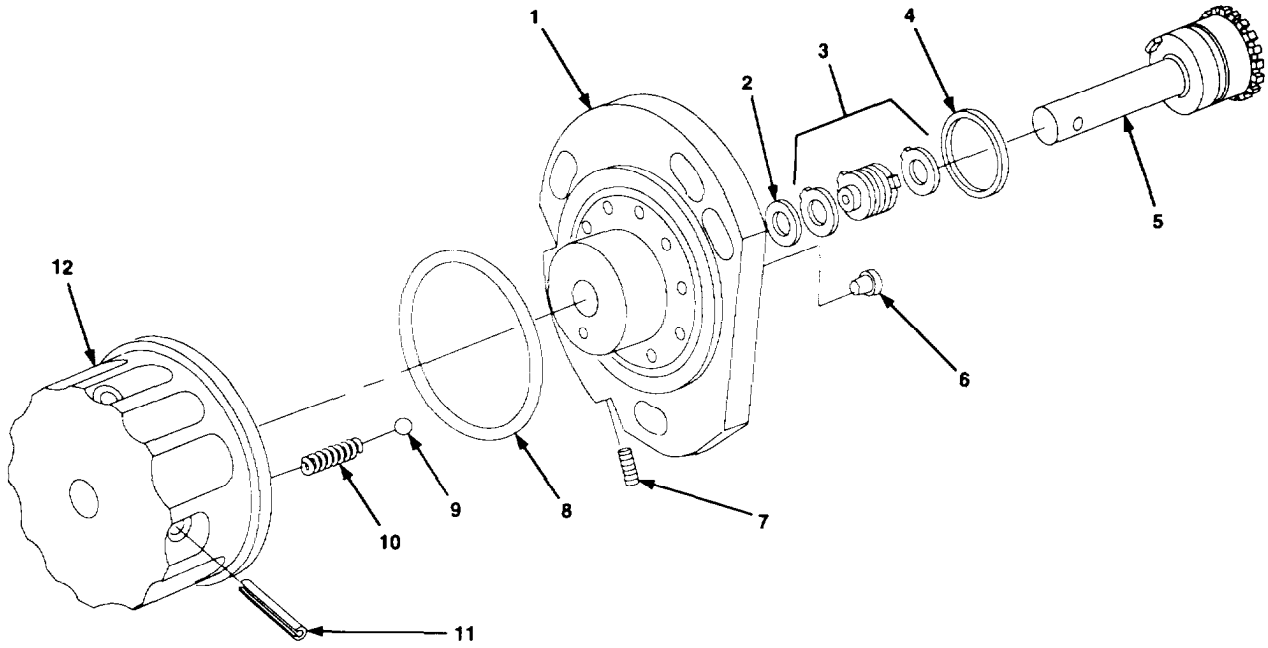


Figure D-65. Knob Assembly, Correction 10553929

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 181001 KNOB ASSEMBLY, CORRECTION 10553929	
					FIGURE D-65 KNOB ASSEMBLY, CORRECTION 10553929	
1	XAFZZ		19200	10553931	PLATE, DETENT	1
2	PAFZZ	5310012064323	19200	8247745	WASHER, FLAT	1
3	PAFZZ	5310012014317	19200	8247742	WASHER, KEY	12
4	PAFZZ	5330008503743	96906	MS9241-016	O-RING	1
5	XAFZZ		19200	10553930	GEAR SHAFT, SPUR	1
6	PAFZZ	5315012064449	19200	8247746	PIN, STRAIGHT, HEADED	1
7	PAFZZ	5305007245805	96906	MS51964-31	SETSCREW	2
8	PAFZZ	5330001810127	19200	8247744	FELT, MECHANICAL, PRE FORMED	1
9	PAFZZ	3110001839175	96906	MS19060-4808	BALL, BEARING	1
10	PAFZZ	5360009132796	19200	8247743	SPRING, HELICAL, COMP RESSION	1
11	PAFZZ	5315008253748	96906	MS35672-18	PIN, GROOVED, HEADLES SS	1
12	PAFZZ	5355001775352	19200	8247710	KNOB	1

END OF FIGURE

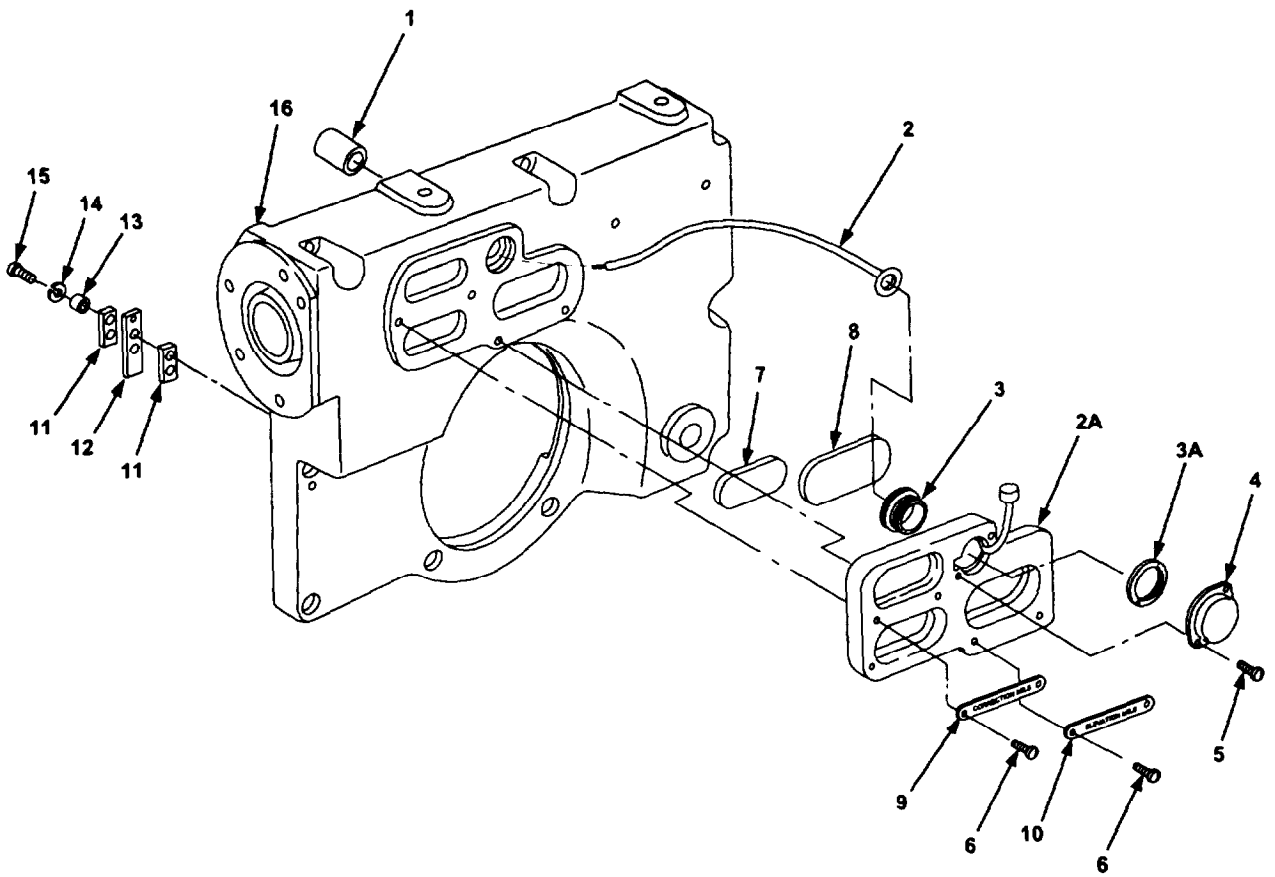


Figure D-66. Cover Assembly 8247684

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 181002 COVER ASSEMBLY 8247684	
					FIGURE D-66 COVER ASSEMBLY 8247684	
1	PAFZZ	6210008543126	19200	8247752	LENS, LIGHT	1
2	PAFZZ	5935012045865	19200	10543306-7	CONNECTOR, PLUG, ELEC TRICAL	1
2A	PAFZZ	5998012874439	19200	12599270-1	OVERLAY ASSEMBLY WHITE	1
2A	PAFZZ	5998013129045	19200	12599270-2	ELECTRONIC COMPONEN GREEN	1
3	PAFZZ	5365013667755	19200	9399170	RING, EXTERNALLY THR EADED	1
3A	PAFZZ	1240013890868	19200	9399169	RING, RETAINING, OPTI CAL	1
4	PAFZZ	5340013672321	19200	9399168	CAP, PROTECTIVE, DUST	1
5	PAFZZ	5305009413538	96906	MS35275-201	SCREW, MACHINE	2
6	PAFZZ	5305000545638	96906	MS51957-4	SCREW, MACHINE	4
7	PAFZZ	5355008935887	19200	8247750	WINDOW, DIAL	2
8	PAFZZ	5355008459518	19200	8261872	WINDOW, OBSERVATION	1
9	PAFZZ	9905000122973	19200	8247759	PLATE, IDENTIFICATIO N	1
10	PAFZZ	9905000122972	19200	8247758	PLATE, IDENTIFICATIO N	1
11	PAFZZ	5970008935884	19200	8262061	INSULATOR, PLATE	2
12	PAFZZ	5999012054017	19200	10553922	CONTACT, ELECTRICAL	1
13	PAFZZ	5970008039423	57057	8081100536	INSULATOR, BUSHING	2
14	PAFZZ	5310005503715	96906	MS35333-70	WASHER, LOCK	2
15	PAFZZ	5305000545649	96906	MS51957-15	SCREW, MACHINE	2
16	XAFZZ		19200	8247686	COVER	1

END OF FIGURE

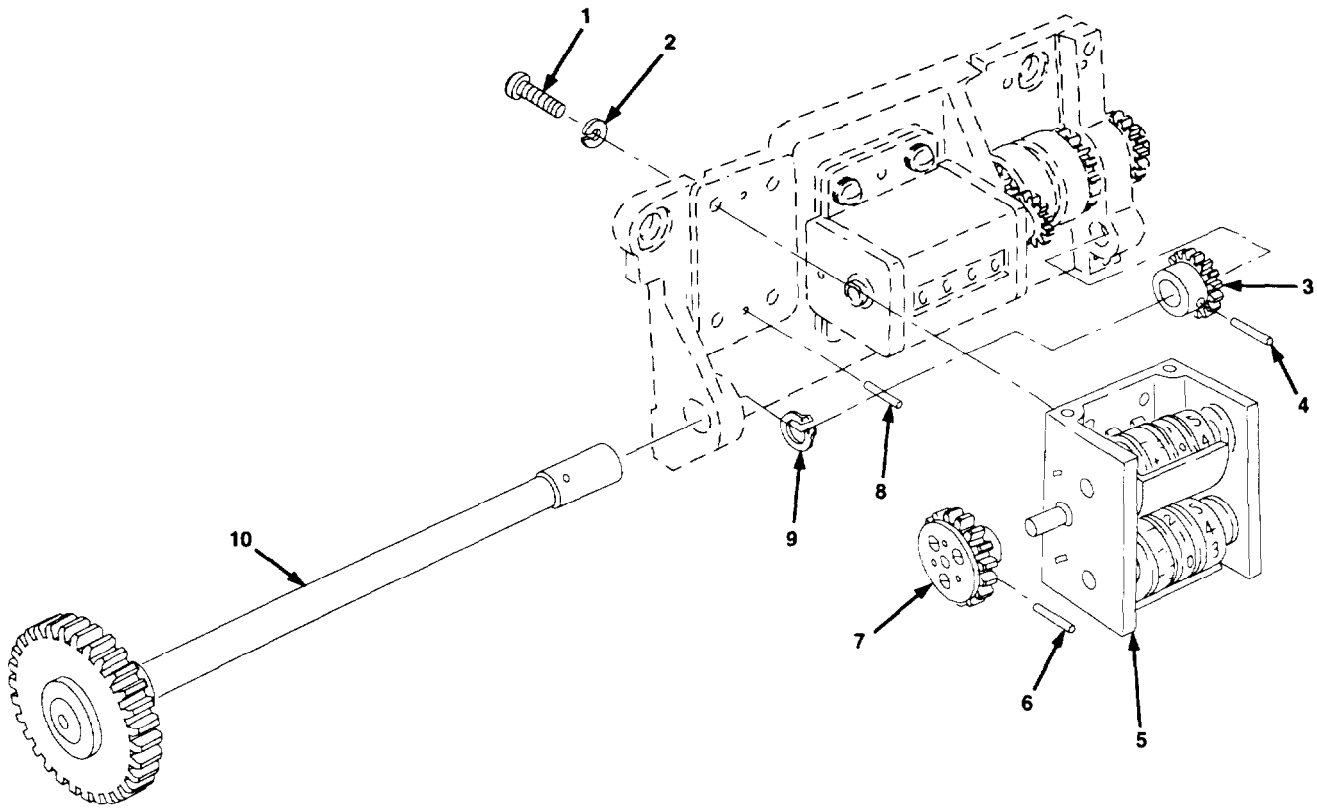


Figure D-67. Counter Assembly 8247690

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 181009 COUNTER ASSEMBLY 8247690	
					FIGURE D-67 COUNTER ASSEMBLY 8247690	
1	PAHZZ	5305000546652	96906	MS51957-28	SCREW, MACHINE	4
2	PAHZZ	5310009296395	96906	MS35338-136	WASHER, LOCK	4
3	PAHZZ	3020008997641	19200	8262028	GEAR, SPUR	1
4	PAHZZ	5315001873228	96906	MS24692-30	PIN, TAPERED, PLAIN	1
5	PAHZZ	6680008962238	19200	8247699	COUNTER, ROTATING FIXED MOUNTED	1
6	PAHZZ	5315007029650	96906	MS16555-602	PIN, STRAIGHT, HEADLE SS	1
7	PAHZZ	3020008586333	19200	8247705	GEAR, SPUR	1
8	PAHZZ	5315007029651	96906	MS16555-618	PIN, STRAIGHT, HEADLE SS	2
9	PAHZZ	5325008036227	96906	MS16624-1028	RING, RETAINING	1
10	PAHZZ	3040008633199	19200	8247707	GEARSHAFT, SPUR	1
					END OF FIGURE	

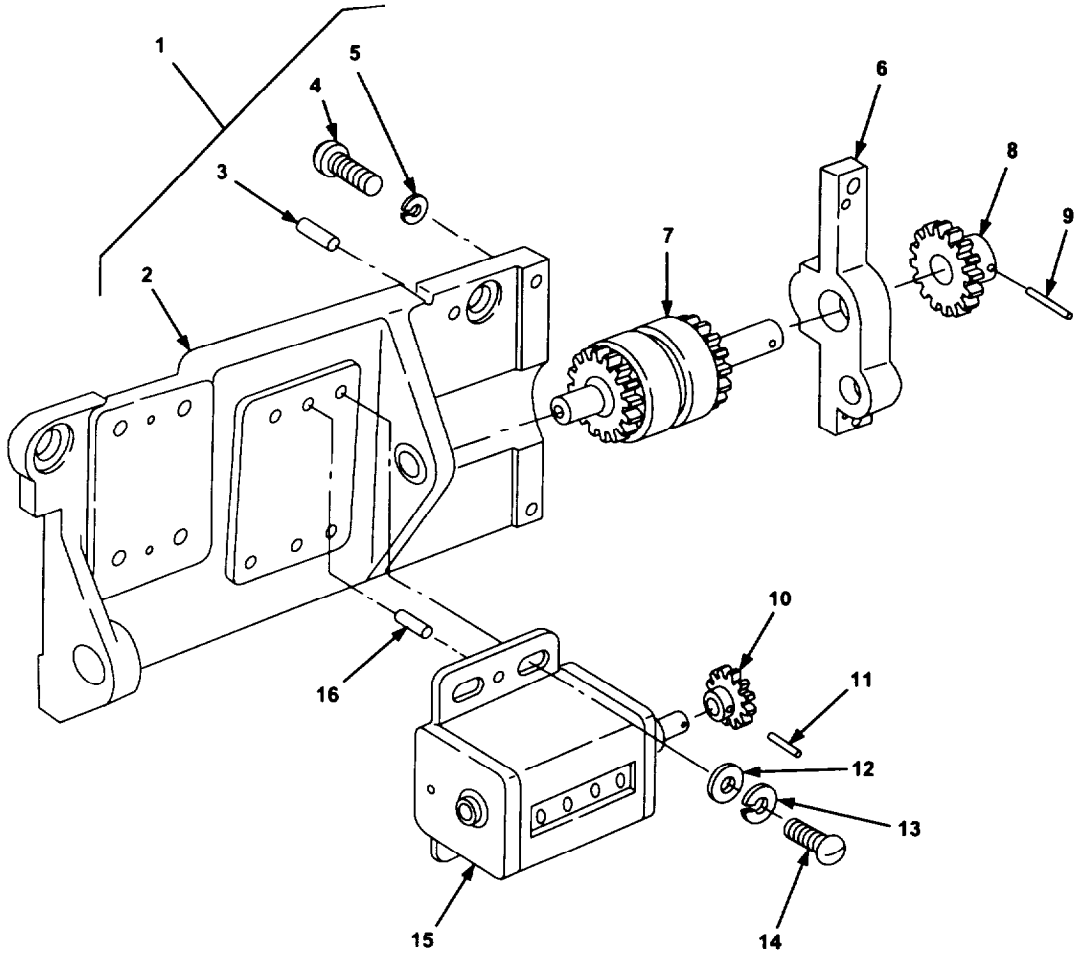


Figure D-68. Counter Assembly 8247690 including Base 8247693 - Continued

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 181003 COUNTER ASSEMBLY 8247690 AND GROUP 18100301 BASE 8247693	
					FIGURE D-68 COUNTER ASSEMBLY 8247690 INCLUDING BASE 8247693 CONTINUED	
1	XAHHH		19200	8247693	BASE, CEMENTED AND MACHINED	1
2	XAHZZ		19200	8247691	.. BASE	1
3	PAHZZ	5315008251207	96906	MS16555-627	.. PIN, STRAIGHT, HEADLE SS	2
4	PAHZZ	5305007015061	96906	MS51958-45	.. SCREW, MACHINE	2
5	PAHZZ	5310005432739	96906	MS35333-72	.. WASHER, LOCK	2
6	XAHZZ		19200	8247704	. . BRACKET	1
7	PAHZZ	1290008595988	19200	8262003	DIFFERENTIAL ASSEMBLY	1
8	PAHZZ	3020008486936	19200	8262035	GEAR, SPUR	1
9	PAHZZ	5315001873228	96906	MS24692-30	PIN, TAPERED, PLAIN	1
10	PAHZZ	3020008996937	19200	8262031	GEAR, SPUR	1
11	PAHZZ	5315008077684	96906	MS16555-603	PIN, STRAIGHT, HEADLE SS	1
12	PAHZZ	5310005956761	96906	MS15795-802	WASHER, FLAT	4
13	PAHZZ	5310009282690	96906	MS35338-134	WASHER, LOCK	4
14	PAHZZ	5305000545638	96906	MS51957-4	SCREW, MACHINE	4
15	PAHZZ	6680008969044	19200	8262030	COUNTER, ROTATING	1
16	PAHZZ	5315006821726	96906	MS16555-617	PIN, STRAIGHT, HEADLE SS	2
					END OF FIGURE	

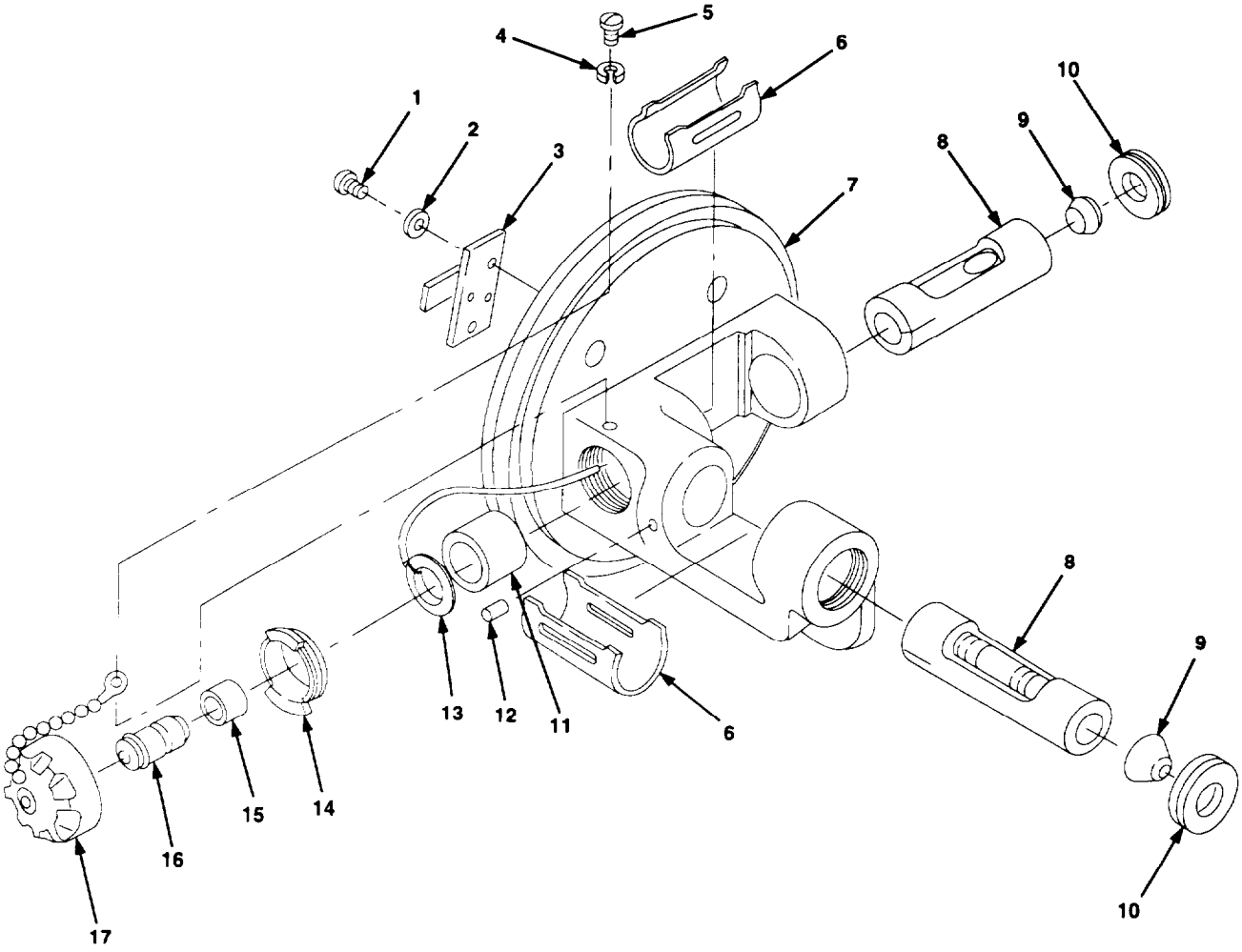


Figure D-69. Level Assembly 8247688

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 181004 LEVEL ASSEMBLY 8247688	
					FIGURE D-69 LEVEL ASSEMBLY 8247688	
1	PAHZZ	5305000545646	96906	MS51957-12	SCREW, MACHINE	2
2	PAHZZ	5310009338118	96906	MS35338-135	WASHER, LOCK	2
3	PAHZZ	5999004051395	19200	8262017	CONTACT, ELECTRICAL	1
4	PAOZZ	5310005434652	96906	MS35333-69	WASHER, LOCK	1
5	PAOZZ	5305000545636	96906	MS51957-2	SCREW, MACHINE	1
6	PAFZZ	6680008962239	19200	8215835	COVER, LEVEL VIAL	2
7	PAHZZ	3040012064620	19200	8247689	BRACKET, ANGLE	1
8	PAFZZ	1290006921493	19200	8202183	LEVEL, FIRE CONTROL INSTRUMENT	2
9	PAFZZ	5365008962251	19200	8202177	BUSHING, ECCENTRIC	2
10	PAFZZ	5365006921492	19200	8202181	RING, EXTERNALLY THR EADED	2
11	PAHZZ	6210008646113	19200	8215771	LENS, LIGHT	1
12	PAHZZ	5315008170889	96906	MS16555-601	PIN, STRAIGHT, HEADLE SS	1
13	PAHZZ	5935012045865	19200	10543306-7	CONNECTOR, PLUG, ELEC TRICAL	1
14	PAHZZ	5365008984222	19200	8247732	RING, EXTERNALLY THR EADED	1
15	PAOZZ	5365012876452	19200	12599295	SPACER, RING	1
16	PAOZZ	5980012895274	19207	12360905-2	LED, T 13/4,BASED	1
17	PAOZZ	5935001755966	19200	10559863	COVER, ELECTRICAL CO NNECTOR	1

END OF FIGURE

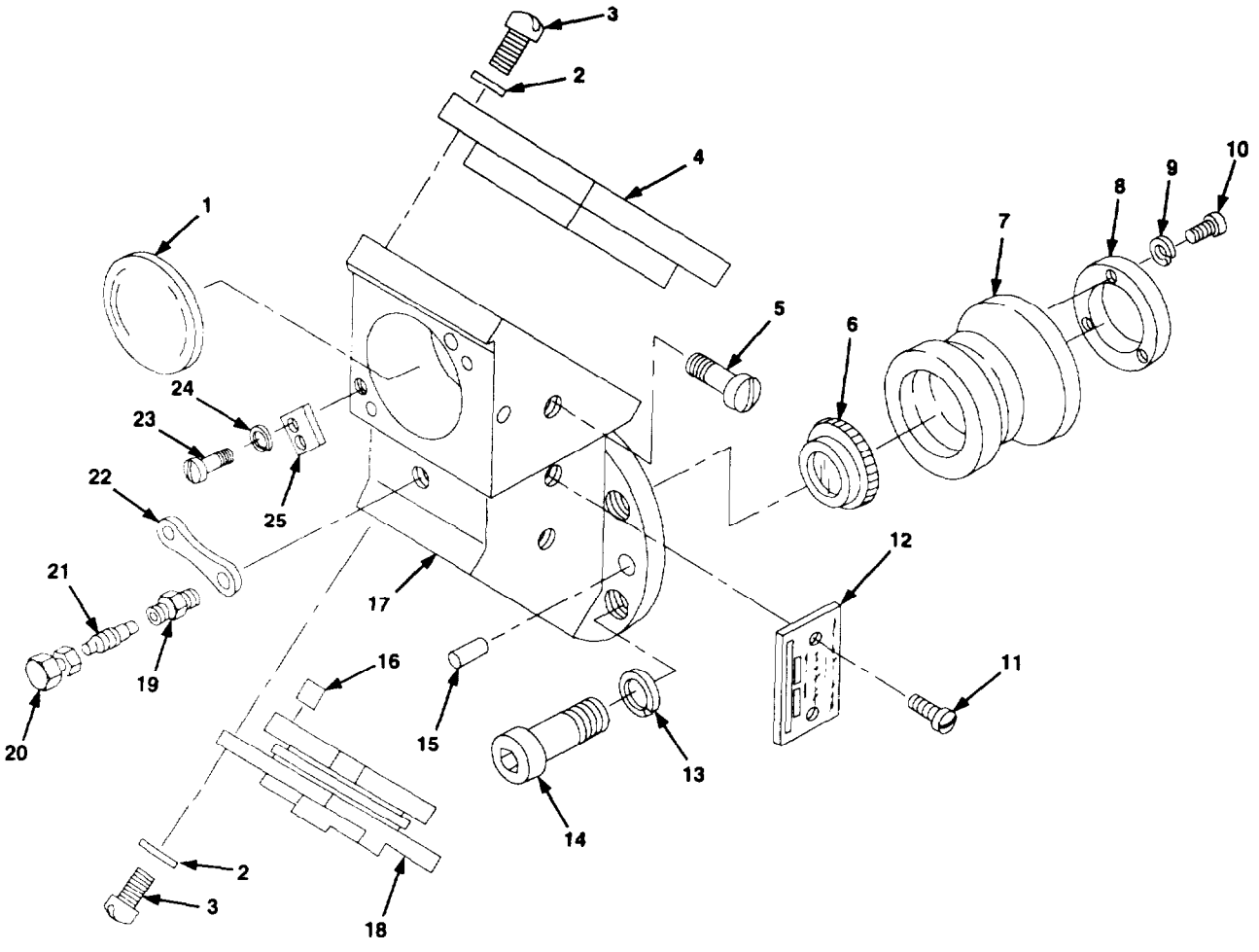


Figure D-70. Periscope, Tank, M42 7645543

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1811 PERISCOPE, TANK, M42 7645543	
					FIGURE D-70 PERISCOPE, TANK, M42 7645543	
1	PAHZZ	1240008703751	19200	7645551	WINDOW, OPTICAL INST RUMENT	1
2	PAHZZ	5310006163555	96906	MS35333-71	WASHER, LOCK	24
3	PAHZZ	5305000546654	96906	MS51957-30	SCREW, MACHINE	24
4	XAHZZ		19200	7645547	PLATE AND MIRROR	1
5	PAHZZ	5305010579300	19200	10555157-8	SCREW, MACHINE	1
6	PAHZZ	1240008642936	19200	7645552	WINDOW, OPTICAL INST RUMENT	1
7	PAOZZ	5340004484221	19200	11731297	SEALXBOOT	1
8	PAOZZ	1240004199558	19200	11731298	RING, RETAINING, OPTI CAL	3
9	PAOZZ	5310005503715	96906	MS335333-70	WASHER, LOCK	3
10	PAOZZ	5305000545649	96906	MS51957-15	SCREW, MACHINE	3
11	PAHZZ	5305000545646	96906	MS51957-12	SCREW, MACHINE	2
12	PAHZZ	9905012269301	19200	10548083	PLATE, IDENTIFICATIO N	1
13	PAOZZ	5310009847042	96906	MS35338-141	WASHER, LOCK	5
14	PAOZZ	5305000688202	96906	MS16996-40	SCREW, CAP, SOCKET HE AD	5
15	PAOZZ	5315004024651	96906	MS9390-680	PIN, STRAIGHT, HEADLE SS	2
16	PAHZZ	5315008892518	96906	MS16556-628	PIN, STRAIGHT, HEADLE SS	4
17	XADZZ		19200	7645544	HOUSING	1
18	XAHZZ		19200	8215877	COVER ASSEMBLY	1
19	PAOZZ	4820001141096	96906	MS51607-1	VALVE STEM, PURGING	1
20	PAOZZ	4820012350223	19200	8200055	CAP, AIR VALVE	1
21	PAOZZ	2640000603543	96906	MS51377-2	VALVE CORE	1
22	PAOZZ	5340004644792	19200	10516567	STRAP, RETAINING	1
23	PAHZZ	5305000546651	96906	MS51957-27	SCREW, MACHINE	4
24	PAHZZ	5310009296395	96906	MS35338-136	WASHER, LOCK	4
25	XAHZZ	1240004831166	19200	11731264	PLATE, RETAINING	2

END OF FIGURE

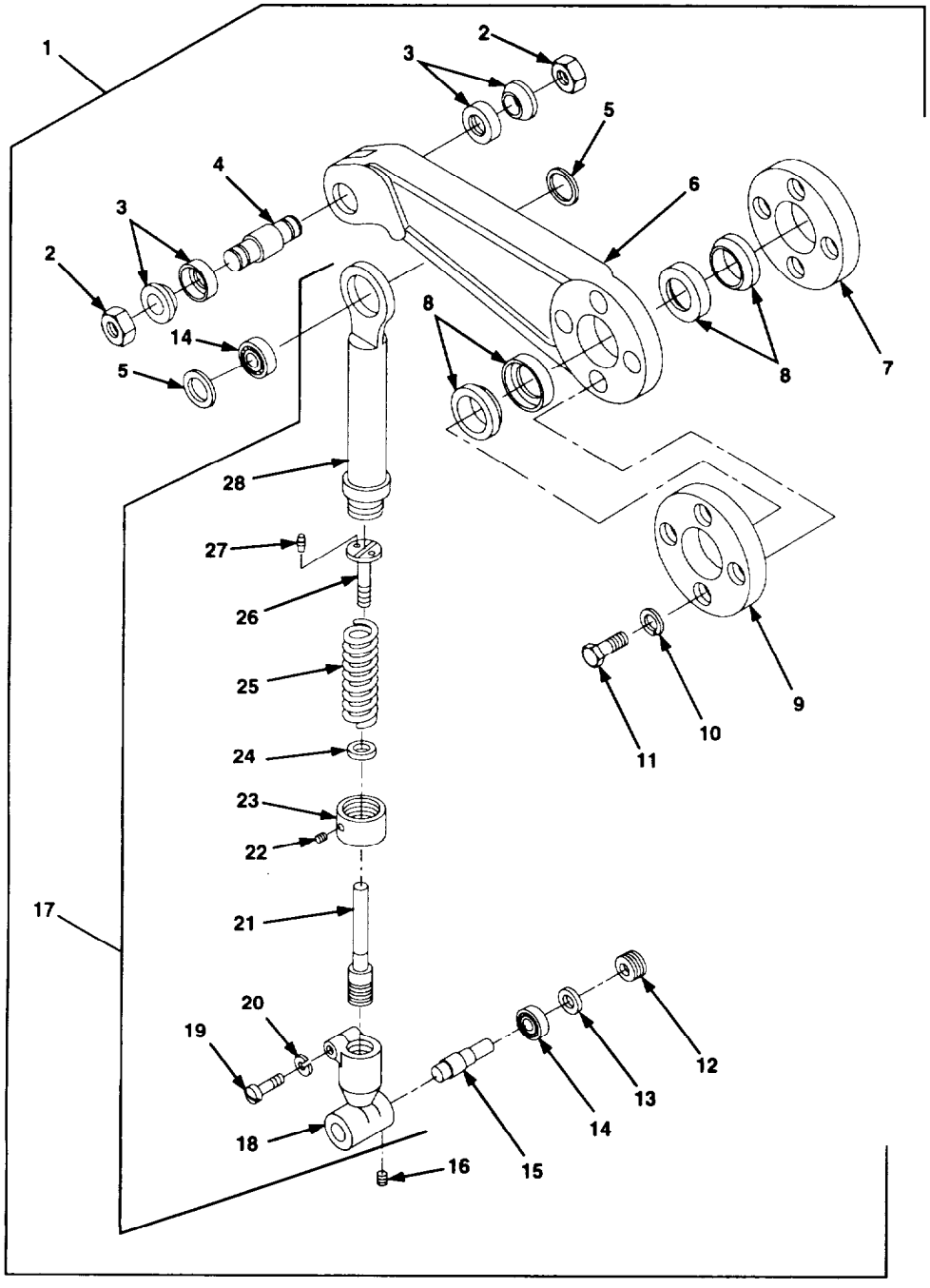


Figure D-71. Linkage Assembly 8267877 Including Link, Connector 8267878 and Linkage Assembly 12563124 Including Link, Connector 12948233 (Sheet 1 of 2)

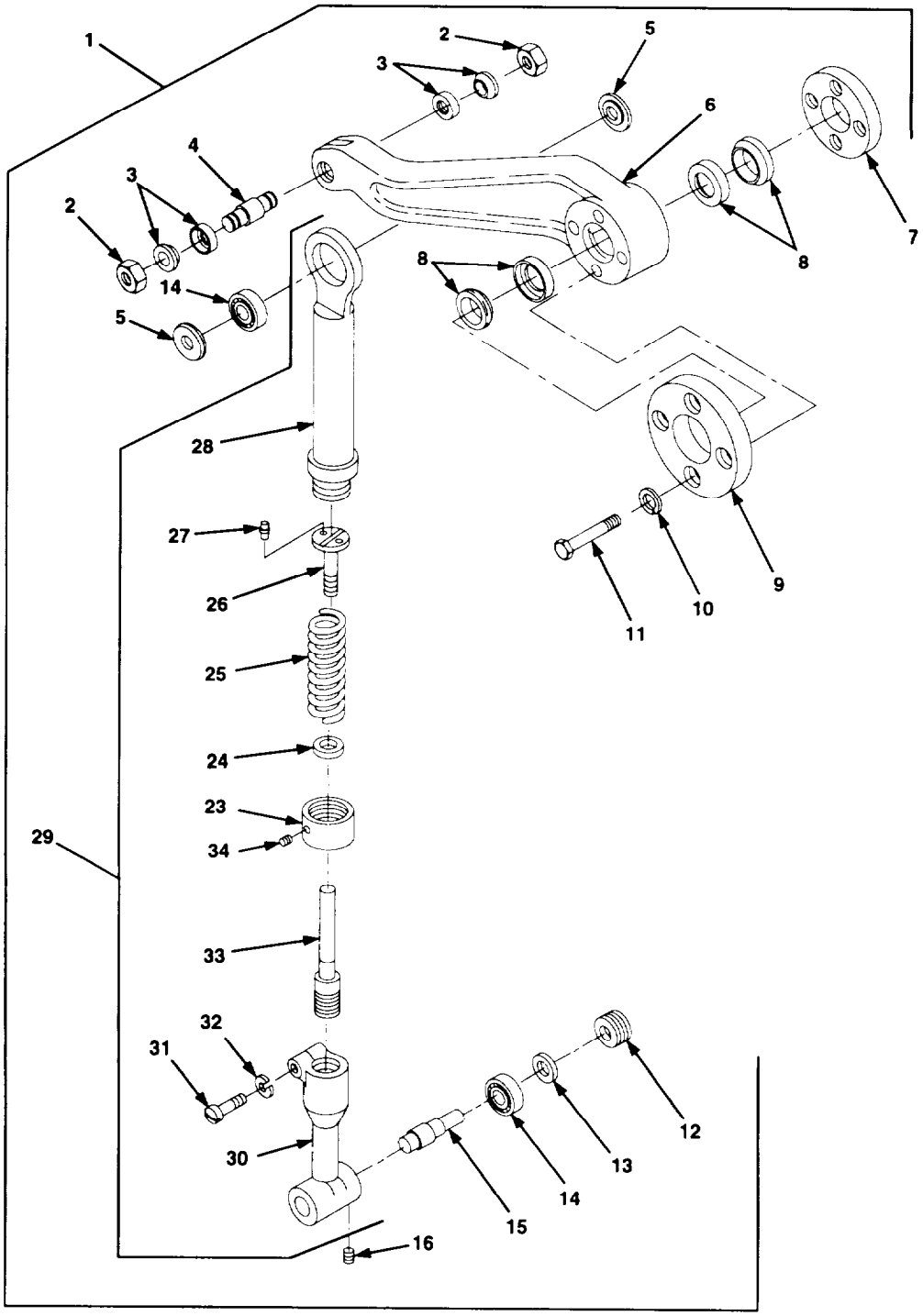


Figure D-71. Linkage Assembly 8267877 Including Link, Connector 8267878 and Linkage Assembly 12563124 Including Link, Connector 12948233 (Sheet 2 of 2)

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 1812 LINKAGE ASSEMBLY 8267877 AND LINKAGE ASSEMBLY 12563124 INCLUDING GROUP 181201 LINK, CONNECTOR 8267878 AND 12948233	
					FIGURE D-71 LINKAGE ASSEMBLY 8267877 AND 12563124 INCLUDING LINK, CONNECTOR 3267878 AND 12948233	
1	PAODD	1240008715475	19200	8267877	LINKAGE ASSEMBLY	1
1	PAODD	1030013179117	19200	12563124	LINKAGE ASSEMBLY UOC:V36	1
2	PAOZZ	5310012054010	19200	8267869	. NUT, SELF-LOCKING, CL INCH	2
3	PAOZZ	3120012042717	19200	8215850	. GRIPSPRING	2
4	PAOZZ	3040012027784	19200	8267868	. SHAFT, SHOULDERED ECCENTRIC	1
5	PAOZZ	3120012027730	19200	8267870	. BEARING, WASHER, THRU THRUST	2
6	XAFZZ		19200	8267897	. ARM	1
6	PAOZZ	3040013235211	19200	12553637	. CONNECTING LINK, RIG ID UOC:V36	1
7	PAOZZ	5365013095491	19200	8267863	. SPACER, PLATE	1
8	PAOZZ	5340011959853	19200	8215850-2	. GRIPSPRING	2
9	XAOZZ		19200	8267862	. PLATE	1
10	PAOZZ	5310005845272	96906	MS35338-48	. WASHER, LOCK	4
11	PAOZZ	5305007195239	96906	MS90727-116	SCREW, CAP, HEXAGON H EAD	4
11	PAOZZ	5305007195269	96906	MS90727-122	. SCREW, CAP, HEXAGON H EAD UOC:V36	4
12	PAFZZ	5365012129183	19200	8267899	. RING, EXTERNALLY THR EADED	1
13	PAFZZ	5325002821830	96906	MS16624-1066	. RING, RETAINING	1
14	PAFZZ	3110005540810	77260	X310	. BEARING, BALL, ANNULA R	2
15	XAFZZ		19200	8267898	. SHAFT	1
16	PAFZZ	5305008660449	96906	MS51031-25	. SETSCREW	1
17	XADDD		19200	8267878	. LINK	1
18	XADZZ		19200	8267879	.. CONNECTOR	1
19	PAOZZ	5305000518608	96906	MS16998-87	.. SCREW, CAP, SOCKET HE AD	1
20	PAOZZ	5310002090965	96906	MS35338-47	.. WASHER, LOCK	1
21	XADZZ		19200	8267866	.. ROD	1
22	PADZZ	5305000589378	96906	MS51977-50	... SETSCREW	1
23	XADZZ		19200	8267871	.. CAP	1
24	XADZZ		19200	8267872	.. COLLAR	1
25	PADZZ	5360012068567	19200	8267900	.. SPRING, HELICAL, COM PRESSION	1
26	PADZZ	5305012044184	19200	8267874	.. SCREW, EXTERNALLY	1
27	PADZZ	5305000140940	21450	140940	.. SETSCREW	1
28	XAFZZ		19200	8267860	.. LINK	1
29	PAFFZ	5340013660957	19200	12948233	. CONNECTOR, ROD END UOC:V36	1
30	PAFFZ	3040013677595	19200	12553419	.. CONNECTING LINK, RIG UOC:V36	1
31	PAOZZ	5305009838074	96906	MS16998-96	.. SCREW, CAP, SOCKET HE AD UOC:V36	1
32	PAOZZ	5310009338770	96906	MS35338-143	.. WASHER, LOCK UOC:V36	1

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
33	XADZZ		19200	8267866	.. ROD UOC:V36	1
34	PAFZZ	5305008660449	96906	MS51031-25	.. SETSCREW UOC:V36	1

END OF FIGURE

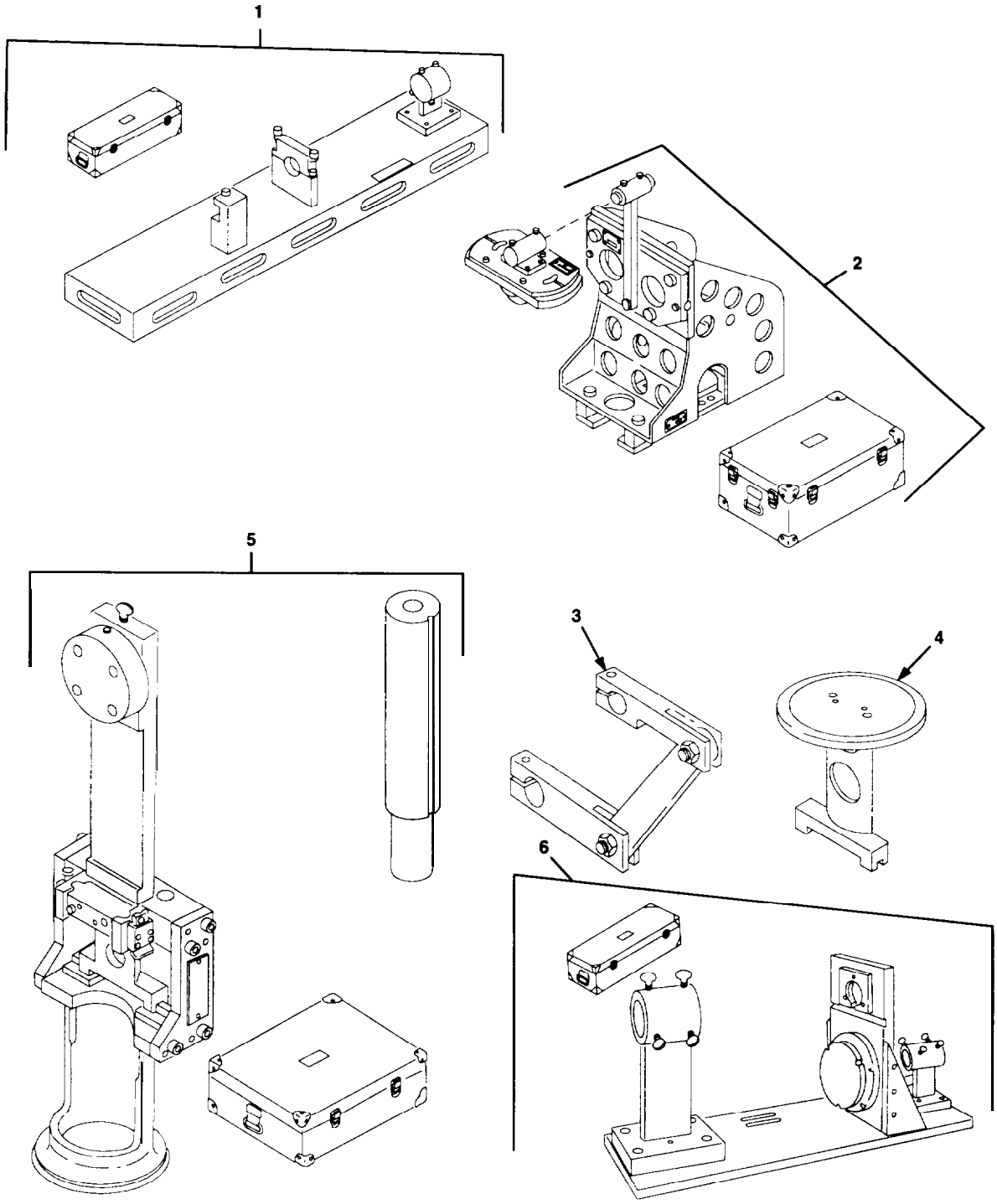


Figure D-72. Special Tools and Equipment

(1) ITEM No	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 9500 SPECIAL TOOLS AND EQUIPMENT	
					FIGURE D-72 SPECIAL TOOLS AND EQUIPMENT	
1	PEHZZ	4931000340898	19200	5800954	FIXTURE, TELESCOPE T TEST, WITH CARRYING CASE BOI:1 AUTH BY NUMBERED BTRY/CO AND SIMILAR HQ PERFG ORG/AVUH MAINT FOR OTHER UNITS BOI:1 AUTH BY NUMBERED BTRY/CO AND SIMILAR HQ PERFG ORG/AVUM MAINT FOR OTHER UNITS	
2	PEHZZ	4931000340897	19200	5800953	ADAPTER, FIXTURE BOI:1 AUTH BY NUMBERED BTRY/CO AND SIMILAR HQ PERFG ORG/AVUM MAINT FOR OTHER UNITS BOI:1 AUTH BY NUMBERED BTRY/CO AND SIMILAR HQ PERFG ORG/AVUM MAINT FOR OTHER UNITS	
3	PEHZZ	1240003637510	19200	11728173	LINKAGE ASSEMBLY BOI:1 AUTH BY NUMBERED BTRY/CO AND SIMILAR HQ PERFG ORG/AVUM MAINT FOR OTHER UNITS BOI:1 AUTH BY NUMBERED BTRY/CO AND SIMILAR HQ PERFG ORG/AVUM MAINT FOR OTHER UNITS	
4	XDHZZ		19200	10559200	ADAPTER/CROSS LEVEL BOI:1 AUTH BY NUMBERED BTRY/CO AND SIMILAR HQ PERFG ORG/AVUM MAINT FOR OTHER UNITS BOI:1 AUTH BY NUMBERED BTRY/CO AND SIMILAR HQ PERFG ORG/AVUM MAINT FOR OTHER UNITS	
5	PEHZZ	4931000202365	19200	5800955	COLLIMATOR, TELESCOP E, ACCESSORY CASE BOI:1 AUTH BY NUMBERED BTRY/CO AND SIMILAR HQ PERFG ORG/AVUM MAINT FOR OTHER UNITS BOI:1 AUTH BY NUMBERED BTRY/CO AND SIMILAR HQ PERFG ORG/AVUM MAINT FOR OTHER UNITS	
6	PEHZZ	4931000202367	19200	5800949	FIXTURE, TELESCOPE T BOI:1 AUTH BY NUMBERED BTRY/CO AND SIMILAR HQ PERFG ORG/AVUM MAINT FOR OTHER UNITS BOI:1 AUTH BY NUMBERED BTRY/CO AND SIMILAR HQ PERFG ORG/AVUM MAINT FOR OTHER UNITS	
					END OF FIGURE	

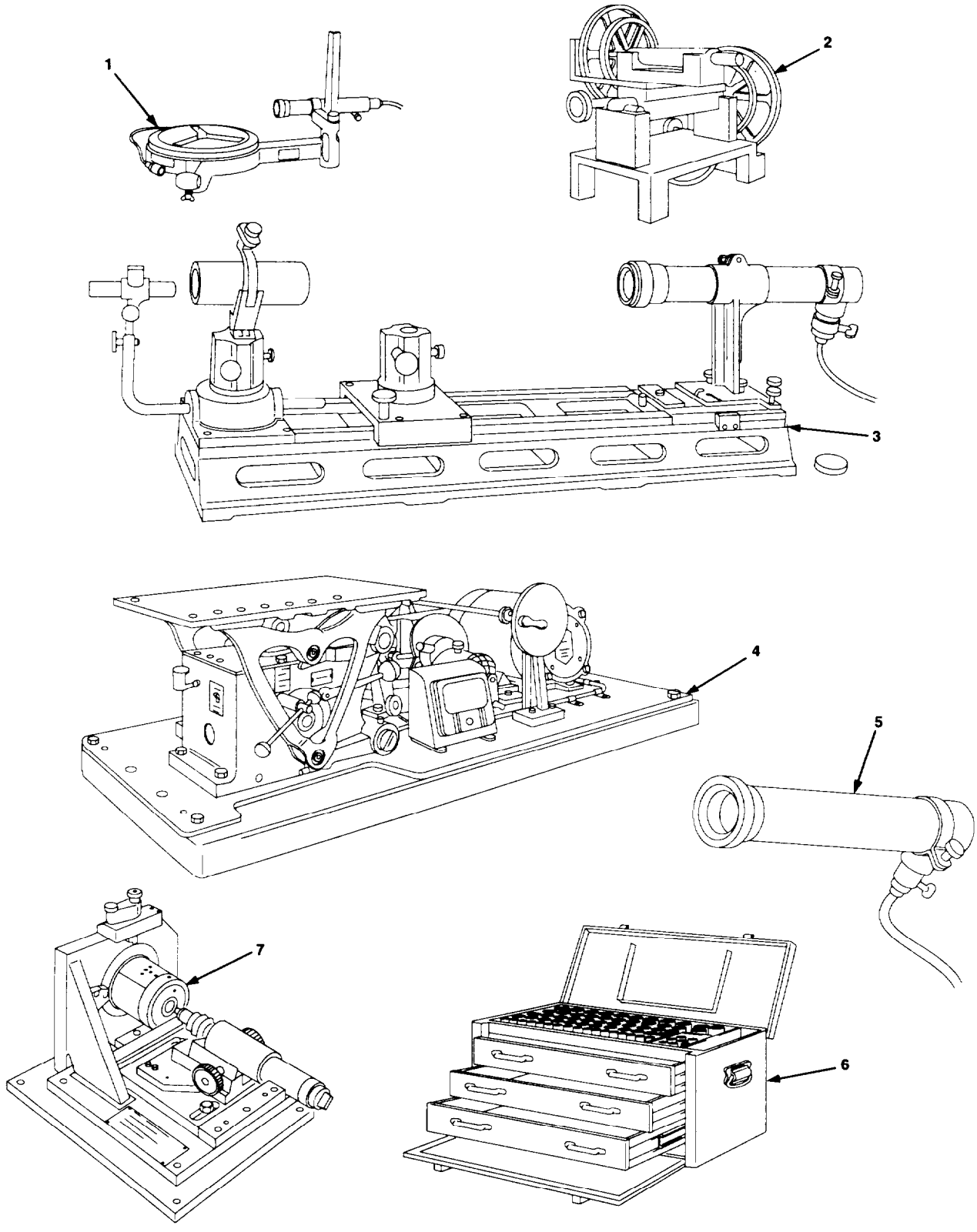


Figure D-73. Special Tools - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 9501 SPECIAL TOOLS AND EQUIPHENT	
					FIGURE D-73 SPECIAL TOOLS AND EQUIPMENT - CONTINUED	
1	PEHZA	4931007691596	19200	7691596	FIXTURE, TELESCOPE T TEST, F/C AZIHUTH	
2	PEHHH	4931005085484	19200	7681019	FIXTURE, CROSSLEVELI NG & ELEVATION.	
3	PEDZZ	4931005085434	19200	7197944	TEST FIXTURE, TELESC OPE, DOVE PRISM M117 SERIES PANTEL	
4	PEDZZ	6635005365555	19200	7560085	TESTING MACHINE, VIBRATION UNIVERSAL	
5	PEHZZ	1240007573291	19200	7573291	COLLIMATOR, INFINITY AIMING REFERENCE	
6	PEFZZ	5120005800012	19200	5800012	WRENCH SET, SPANNER TUBULAR W/CASE (76 WRENCHES)	
7	PEDZA	4931000202366	19200	5800952	FIXTURE, TELESCOPE T EST, ALINEMENT, MICROSCOPE W/CASE	
					END OF FIGURE	

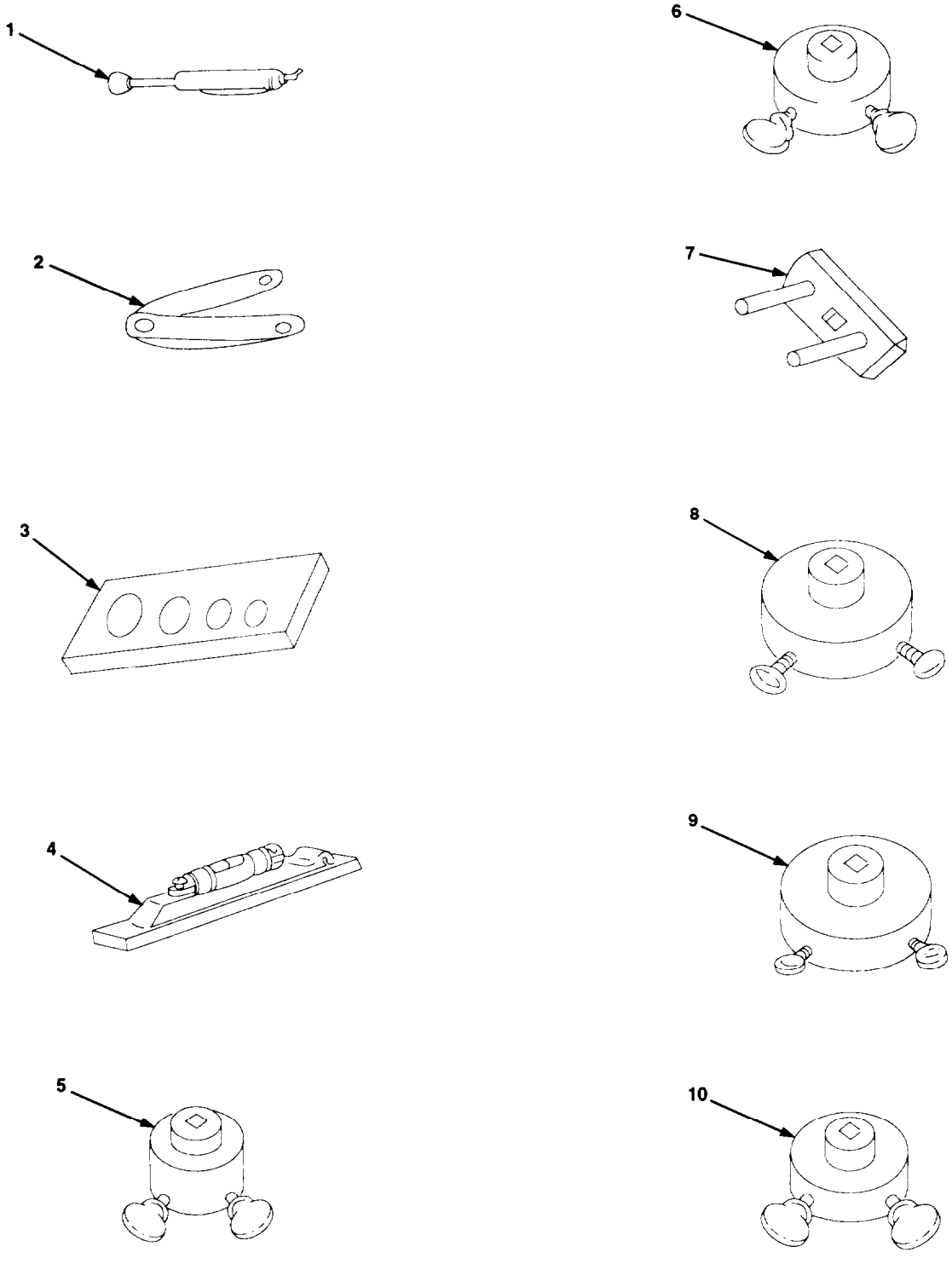


Figure D-74. Fixture, Telescope Test, F/C Azimuth

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 9502 SPECIAL TOOLS AND EQUIPMENT	
					FIGURE D-74 SPECIAL TOOLS AND EQUIPMENT - CONTINUED	
1	PAHZZ	6635007900733	81349	MILT43560	TESTER,SPRING RESIL (10 TO 20 LBS PUSH/PULL)	
2	PAFZZ	5120005958996	19200	7597708	WRENCH, SPANNER ADJUSTABLE (1/16 INCH PINS)	
3	PEHZA	5210005132206	19200	7641866	OPTICAL FLAT SET (SCRATCH & DIG COMPARISON STANDARD)	
4	PAFZZ	5210005466362	19200	7686087	LEVEL PRECISION	
5	PAFZZ	5120009775605	19200	8213928	ADAPTER, TORQUE WREN CH	
5	PAFZZ	5120009775606	19200	8213929	ADAPTER, TORQUE WREN CH	
5	PAFZZ	5120003127924	19200	8599910	ADAPTER, TORQUE WREN CH	
6	PAFZZ	5120003128401	19200	8599916	ADAPTER, TORQUE WREN CH	
6	PAFZZ	5120003129492	19200	8599918	ADAPTER, TORQUE WREN CH	
6	PAFZZ	5120003129513	19200	8599919	ADAPTER, TORQUE WREN CH	
6	PAFZZ	4931003129600	19200	8599920	ADAPTER, TEST	
6	PAFZZ	5340003128022	19200	8599911	ADAPTER, TORQUE	
6	PAFZZ	5120003128234	19200	8599912	ADAPTER, TORQUE WREN CH	
6	PAFZZ	5120003128776	19200	8599917	ADAPTER, TORQUE WREN CH, L97	
7	PAFZZ	5120005606593	19200	8599922	ADAPTER, TORQUE WREN CH	
8	PAFZZ	5120008579821	19200	8599927	ADAPTER, TORQUE WREN CH	
9	PAFZZ	5120009720205	19200	8213473	ADAPTER, TORQUE WREN	
10	PAFZZ	5120009720203	19200	8213474	ADAPTER, TORQUE WREN	
					END OF FIGURE	

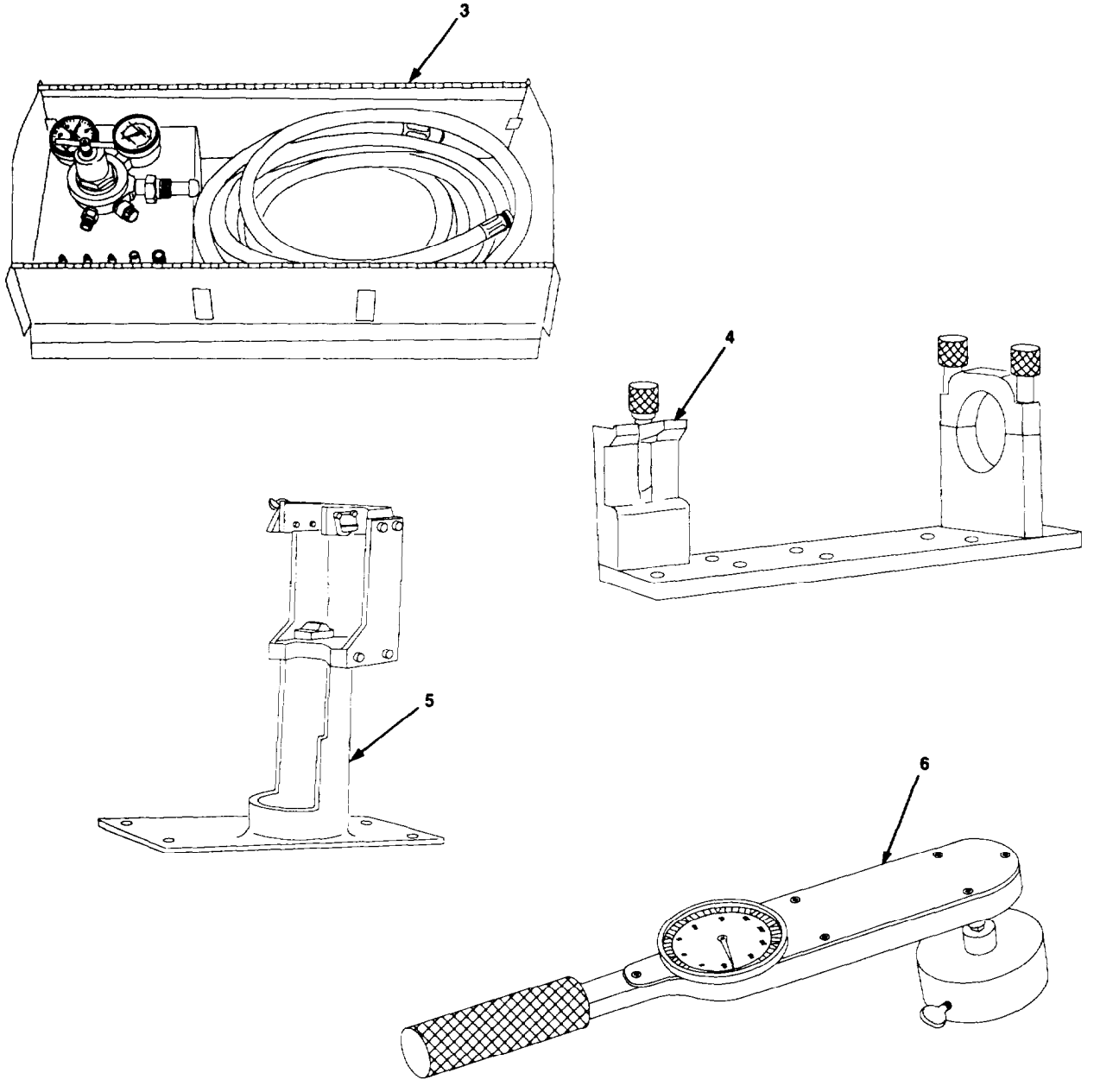


Figure D-75. Special Tools - Continued

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 9503 SPECIAL TOOLS AND EQUIPMENT	
					FIGURE D-75 SPECIAL TOOLS AND EQUIPMENT - CONTINUED	
1	PEFZZ	4931007540740	19204	SC4931-95CLA07	SHOP EQUIPMENT, FIRE CONTROL (NOT ILLUSTRATED)	
2	PEF-Z	5180011680487	19200	5911336	TOOL KIT, ELECTRONIC	
3	PEOZZ	4931000651110	19200	SC4931-95CLJ54	PURGING KIT, FIRE CONTROL INSTRUMENT	
4	PEDZZ	4940005092771	19200	8599915	ADAPTER, MECHANICAL VIBRATION TEST (M118)	
5	PEDZA	4931008016859	19200	8599926	ADAPTER, VIBRATION M17	
6	PAFZZ	5120005292552	58536	A-A-1274	WRENCH, TORQUE (0 TO 25 INCH-LBS)	

END OF FIGURE

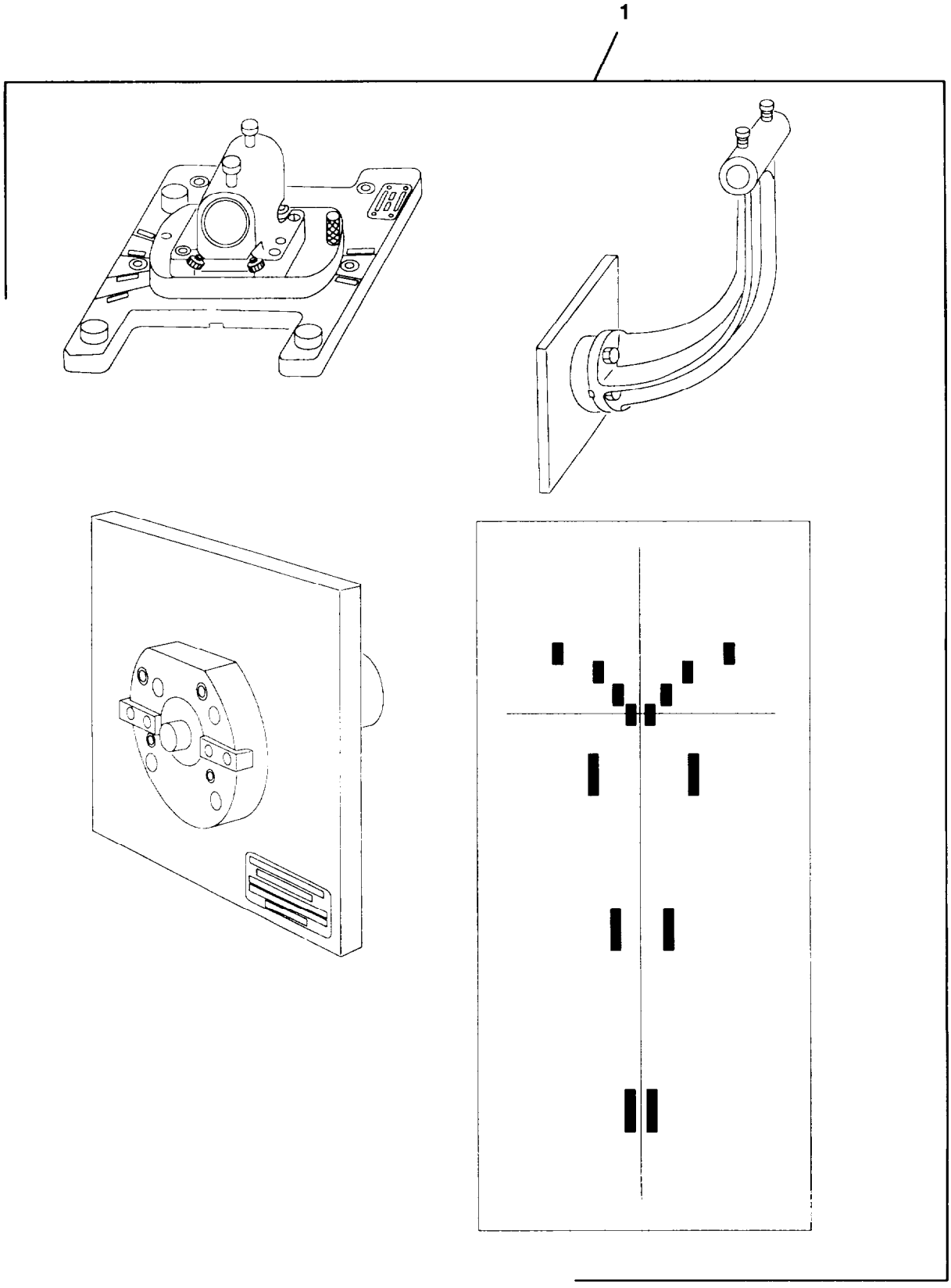


Figure D-76. Fixture, Telescope Test 8213745

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 9504 SPECIAL TOOLS AND EQUIPMENT	
					FIGURE D-76 FIXTURE, TELESCOPE TEST 8213745	
1	PEHZZ	4931008847752	19200	8213745	FIXTURE, TELESCOPE T TEST, CONSISTING 0F:FIXTURE ADAPTER, SIGHTING DEVICE, SET-UP GAGE, TARGET BOI:1 PER LETTERED CO BOI:1 PER LETTERED CO	
					END OF FIGURE	

(1) ITEM NO	(2) SMR CODE	(3) NSN	(4) CAGEC	(5) PART NUMBER	(6) DESCRIPTION AND USABLE ON CODES (UOC)	(7) QTY
					GROUP 9999 BULK MATERIALS	
					FIGURE BULK	
1	PAFZZ		81349	M27072/57	CABLE, SPECIAL PURPO	V
2	PAFZZ	6145008533355	81349	MILC27072	CABLE, SPECIAL PURPO NSN 6145-00-853-3355	V
3	XDFZA		81349	MIL-W-16878/5	CABLE, SPECIAL PURPO NSN 6145-00-688-5696	V
4	PAFZZ	5970002453843	18876	8034668-10	INSULATION SLEEVING	V
5	PAFZZ	5970009541622	81349	M23053/5-105-0	INSULATION SLEEVING NSN 5970-00-954-1622 (3/16 INCH BLACK)	V
6	PAFZZ	5970008122969	81349	M23053/5-104-0	INSULATION SLEEVING NSN 5970-00-812-2969 (1/8 INCH BLACK)	V
7	PAHZZ	5970008113310	81349	MIL-I-631	INSULATION SLEEVING NSN 5970-00-811-3310 UOC:L95	V
8	PAFZZ	5970002453843	18876	8034668-10	INSULATION SLEEVING	V
9	PAFZZ	5970011611434	81349	M3190/02-15-N	INSULATION SLEEVING NSN 5970-00-161-1434, SIZE AWG-22	V
10	PAFZZ	5970010853431	81349	M23053/1-201-0	INSULATION SLEEVING NSN 5970-00-063-1500, SIZE 0.25-INCH BLK	V
11	PAHZZ	6145007028604	81349	LW-C22(7)J0	WIRE, ELECTRICAL NSN 6145-00-702-8604 UOC:L95	V
12	PAHZZ	6145006696235	81349	M76LWPC227B9	WIRE, ELECTRICAL NSN 6145-00-669-6235 UOC:L95	V
13	PAHZZ	6145005482994	81349	M76LWPC227B92	WIRE, ELECTRICAL NSN 6145-00-548-2994 UOC:L95	V
14	PAHZA	6145001741119	81349	LW-C22(7)J2	WIRE, ELECTRICAL NSN 6145-00-174-1119 UOC:L95	V
15	PAFZZ	6145005700516	81349	M13486-1-2	WIRE, ELECTRICAL NSN 6145-00-570-0516	V
16	PAFZZ	6145011821377	81349	M16878/5BDE9	WIRE, ELECTRICAL NSN 6145-01-182-1377	V
17	PAFZZ	6145001611609	81349	M13486-1-3	WIRE, ELECTRICAL NSN 6145-00-161-1609	V
18	PAHZA	6145002952819	81549	M16878/5BDB9	WIRE, ELECTRICAL NSN 6145-01-295-2819	V
19	PAFZA	6145002952822	81349	M16878/5BGB9	WIRE, ELECTRICAL	V
20	PAFZZ		96906	MS209995C20	WIRE, NON-ELECTRICAL	V
21	PAFZZ	9505002212650	96906	MS20995C20	WIRE, NONELECTRICAL NSN 9505-00-221-2650	V
					END OF FIGURE	

CROSS-REFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM
9905-00-004-4340	D-24	2
9905-00-007-4867	D-58	4
3020-00-012-2943	D-34	1
3020-00-012-2944	D-27	16
3020-00-012-2953	D-45	8
9905-00-012-2972	D-35	11
	D-66	10
9905-00-012-2973	D-35	13
	D-66	9
5305-00-014-0940	D-71	27
4730-00-018-9566	D-7	16
	D-35	15
5340-00-019-0020	D-7	13
6650-00-020-2364	D-49	2
4931-00-020-2365	D-72	5
4931-00-020-2366	D-73	7
4931-00-020-2367	D-72	6
5310-00-022-1117	D-16	14
	D-17	11
	D-40	10
3040-00-027-2615	D-54	4
4931-00-034-0897	D-72	2
4931-00-034-0898	D-72	1
5340-00-036-6881	D-11	6
	D-20	19
5999-00-042-5355	D-5	3
	D-22	18
	D-63	13
2640-00-050-1229	D-60	14
5995-00-050-5969	D-28	14
	D-29	10
	D-30	14
	D-36	4
	D-40	3
	D-47	7
	D-54	33
5305-00-050-9229	D-25	11
5305-00-050-9230	D-59	7
5305-00-050-9234	D-30	4
5305-00-051-4484	D-21	22
5305-00-051-4497	D-8	27
6240-00-051-4843	D-14	6
5305-00-051-8608	D-71	19
5365-00-052-0287	D-43	15
3040-00-052-0304	D-42	35
3110-00-052-0305	D-42	9
5305-00-052-9329	D-3	8
	D-12	9
5315-00-054-4103	D-29	8
	D-33	14
5315-00-054-4122	D-20	12
5315-00-054-4173	D-33	9
5315-00-054-5543	D-20	2
5305-00-054-5635	D-45	16
5305-00-054-5636	D-29	15
	D-30	10
	D-36	7
	D-39	22
	D-47	3
	D-54	17
	D-69	5
5305-00-054-5637	D-31	5
	D-63	23
5305-00-054-5638	D-63	9
	D-66	6
	D-68	14
5305-00-054-5640	D-35	9
5305-00-054-5644	D-20	6
	D-24	1
	D-34	31
5305-00-054-5646	D-6	7
	D-30	7
	D-58	5
	D-69	1
	D-70	11
5305-00-054-5647	D-44	15
5305-00-054-5648	D-50	1
5305-00-054-5649	D-26	24
	D-38	25
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	D-54	22
	D-66	15
	D-70	10
5305-00-054-5650	D-23	13
	D-27	2
5305-00-054-5651	D-8	21
	D-30	17
	D-34	7
	D-53	4
5305-00-054-5652	D-5	6
	D-21	19
	D-22	22
	D-23	17
5305-00-054-5653	D-38	7
5305-00-054-5654	D-53	3
5305-00-054-5655	D-63	2
5305-00-054-6650	D-25	4
	D-31	12
	D-41	1

CROSS-REFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5305-00-054-6650	D-42	34	5305-00-057-2601	D-13	7
5305-00-054-6651	D-8	24	5305-00-057-4593	D-8	18
	D-24	39		D-12	21
	D-40	17	5305-00-057-7159	D-43	19
	D-54	3	5305-00-058-2075	D-11	12
	D-70	23	5315-00-058-3098	D-34	12
5305-00-054-6652	D-41	5	5315-00-058-3108	D-30	16
	D-67	1	5305-00-058-9378	D-71	22
5305-00-054-6654	D-7	6	5305-00-059-5433	D-37	1
	D-44	10	2640-00-060-3543	D-7	24
	D-70	3		D-35	7
5305-00-054-6655	D-41	8		D-48	2
	D-44	11		D-50	12
	D-58	13		D-70	21
5305-00-054-6658	D-23	1	5315-00-060-4760	D-53	2
5305-00-054-6669	D-33	10	5315-00-060-4776	D-24	17
5305-00-054-6670	D-43	3		D-52	10
5305-00-054-6671	D-61	1	5305-00-061-0266	D-58	2
5305-00-054-6672	D-30	18		D-64	5
5305-00-054-6674	D-58	11	5315-00-063-7312	D-18	10
5305-00-054-6869	D-24	10	3110-00-063-8145	D-39	2
5315-00-056-9386	D-9	26	4931-00-065-1110	D-75	3
5305-00-057-0497	D-11	19	5340-00-066-5006	D-20	8
	D-34	13	5305-00-068-5276	D-22	24
5305-00-057-0498	D-28	30	5305-00-068-5405	D-6	14
	D-42	5	5305-00-068-8202	D-70	14
5305-00-057-0499	D-25	7	3110-00-070-0181	D-39	3
5305-00-057-0502	D-9	13	5360-00-070-0997	D-7	3
5305-00-057-0509	D-12	22	5305-00-071-1316	D-59	4
	D-23	4	5305-00-071-1322	D-24	13
	D-28	17	5365-00-076-6002	D-21	1
5305-00-057-0510	D-1	12	5315-00-078-0112	D-21	25
	D-3	11	5305-00-081-2651	D-54	25
	D-11	18	5330-00-081-4042	D-39	7
	D-28	3	5330-00-081-6910	D-60	2
	D-30	6	5305-00-082-1128	D-9	30
5305-00-057-0511	D-6	2	5315-00-082-4858	D-38	15
	D-11	4	5305-00-082-6768	D-60	7
	D-11	16	5315-00-086-3408	D-20	13
	D-17	6	3040-00-087-6533	D-42	11
5305-00-057-0512	D-9	6	5340-00-087-6538	D-42	4
	D-11	8	5365-00-107-4380	D-9	2
	D-12	5	5365-00-113-2969	D-38	27
	D-17	17	5365-00-113-5645	D-38	26
	D-52	8	5340-00-113-8108	D-35	3
	D-54	30	1240-00-114-1089	D-7	10
5305-00-057-0515	D-28	22	1240-00-114-1095	D-2	26
5305-00-057-0517	D-28	1	4820-00-114-1096	D-7	23
5305-00-057-0522	D-20	18		D-35	6
5305-00-057-0527	D-33	21		D-48	3

CROSS-REFERENCE INDEXES

NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
4820-00-114-1096	D-50	11	5355-00-177-5352	D-65	12
	D-60	13	5310-00-177-7559	D-31	8
	D-70	19	5360-00-179-1391	D-55	1
5995-00-115-0636	D-9	31	5330-00-181-0126	D-63	6
5995-00-115-0637	D-11	3	5330-00-181-0127	D-65	8
5995-00-115-0638	D-9	11	3110-00-183-9175	D-33	22
5305-00-115-4446	D-45	10		O-65	9
1240-00-115-4456	D-12	1	5315-00-187-3216	D-34	16
5355-00-115-4457	D-2	20	5315-00-187-3226	D-55	7
	D-3	23	5315-00-187-3228	D-7	2
6650-00-115-4458	D-9	1		D-21	15
6695-00-116-3419	D-54	9		D-42	20
5970-00-116-3420	D-54	11		D-67	4
1240-00-116-3421	D-54	8		D-68	9
9505-00-116-3429	D-54	12	5315-00-187-3230	D-31	17
5340-00-117-2779	D-24	18	5315-00-187-3232	D-34	6
3040-00-119-0901	D-7	17	5315-00-187-3235	D-26	2
3040-00-119-3967	D-45	9	5315-00-187-3243	D-13	1
3020-00-125-3917	D-45	5		D-58	9
3040-00-125-8782	D-34	9	5315-00-187-3245	D-35	4
5365-00-127-3007	D-42	22	5315-00-187-3256	D-26	13
6650-00-127-3009	D-9	33		D-27	15
5365-00-136-4927	D-42	18	5315-00-187-3271	D-2	6
5310-00-137-3068	D-63	31		D-34	32
5305-00-143-1673	D-42	6	5315-00-187-3274	D-31	1
5305-00-144-8425	D-32	1		D-62	13
5365-00-150-2654	D-43	14	5315-00-187-3301	D-62	5
5365-00-150-2661	D-62	1	5315-00-188-0233	D-24	42
5365-00-150-2667	D-59	9	1290-00-191-3302	D-5	4
5365-00-150-2759	D-27	9		D-22	19
5310-00-150-3708	D-58	8		D-63	14
5310-00-150-3709	D-62	12	3020-00-196-1409	D-34	26
5310-00-150-3791	D-62	11	5340-00-196-2748	D-33	23
5310-00-150-3792	D-58	7	5325-00-200-2637	D-44	5
6240-00-155-7836	D-28	13	5360-00-200-6918	D-26	11
3110-00-159-9047	D-37	6	5305-00-206-1270	D-63	29
6145-00-161-1609	BULK	17	5305-00-207-7468	D-5	1
5365-00-168-6591	D-62	19		D-22	17
5365-00-168-6592	D-62	9	5305-00-207-8253	D-24	16
6145-00-174-1119	BULK	14	5310-00-209-0965	D-71	20
5935-00-175-5966	D-28	11	9505-00-221-2650	BULK	21
	D-29	16	3020-00-222-8581	D-34	20
	D-30	11	3020-00-223-5144	D-24	34
	D-36	5	5305-00-225-7211	D-21	8
	D-39	9	1240-00-228-1632	D-39	16
	D-47	5	5970-00-235-5158	D-23	16
	D-69	17	5320-00-243-8375	D-28	10
5365-00-177-4091	D-38	21		D-29	2
5365-00-177-4092	D-38	21	5970-00-245-3843	BULK	4
5365-00-177-4093	D-38	21		BULK	8

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STOCK NUMBER	FIG.	ITEM
3040-00-248-2023	D-26	8
5330-00-248-3836	D-7	11
5330-00-248-3839	D-2	29
	D-3	4
5330-00-248-3846	D-2	34
	D-3	2
5935-00-259-3880	D-63	21
5325-00-263-5877	D-34	28
5330-00-265-1076	D-11	13
1240-00-269-4983	D-12	23
5305-00-272-3533	D-7	19
5365-00-278-5309	D-26	12
5325-00-282-1830	D-71	13
5305-00-282-7650	D-8	22
5340-00-286-9411	D-6	1
3110-00-293-8120	D-26	6
6145-00-295-2819	BULK	18
	D-63	18
6145-00-295-2822	BULK	19
5325-00-298-6564	D-1	5
	D-7	21
	D-45	4
5340-00-300-7908	D-2	12
9905-00-310-0720	D-3	9
5305-00-310-0800	D-64	1
5120-00-312-7924	D-74	5
5340-00-312-8022	D-74	6
5120-00-312-8234	D-74	6
5120-00-312-8401	D-74	6
5120-00-312-8776	D-74	6
5120-00-312-9492	D-74	6
5120-00-312-9513	D-74	6
4931-00-312-9600	D-74	6
5340-00-328-5622	D-40	22
1240-00-328-5623	D-39	5
1240-00-328-5625	D-40	9
5340-00-328-5635	D-54	15
5355-00-350-9435	D-3	15
1240-00-351-2936	D-2	19
	D-3	24
5315-00-351-2937	D-1	10
1240-00-357-1472	D-1	6
1240-00-363-7510	D-72	3
5340-00-364-8192	D-22	20
	D-23	11
5340-00-400-5510	D-42	32
5315-00-402-4651	D-70	15
3020-00-402-8246	D-33	8
3020-00-402-8247	D-33	28
3020-00-402-9532	D-34	17
5999-00-405-1395	D-69	3
5340-00-406-1576	D-24	41
5340-00-406-1577	D-29	17
3020-00-406-1578	D-34	23
1240-00-406-1582	D-24	24
5305-00-407-8551	D-40	11
5310-00-408-9563	D-26	19
5310-00-408-9564	D-26	17
5305-00-409-0854	D-2	33
	D-3	3
5310-00-410-3017	D-22	12
5310-00-411-5816	D-2	21
	D-3	22
5310-00-413-4382	D-34	4
1240-00-419-9558	D-70	8
3020-00-427-3415	D-56	3
3020-00-427-3725	D-42	19
5340-00-431-0329	D-34	5
5325-00-432-3584	D-42	10
5305-00-433-3707	D-60	6
3020-00-434-5320	D-34	29
5330-00-435-8522	D-8	3
5970-00-436-1639	D-23	23
5340-00-448-4221	D-70	7
3120-00-455-6044	D-21	5
5340-00-455-6045	D-27	4
3020-00-459-2792	D-26	14
5340-00-464-4792	D-7	22
	D-35	5
	D-48	4
	D-50	10
	D-60	12
	D-70	22
3040-00-466-1957	D-31	15
5330-00-468-1065	D-5	23
3040-00-469-6662	D-62	15
3040-00-469-6663	D-62	17
1240-00-469-6665	D-43	6
5340-00-469-6666	D-56	4
4710-00-469-6667	D-43	7
1240-00-469-6668	D-43	8
1290-00-469-6671	D-62	16
1240-00-469-6673	D-8	11
1290-00-470-7496	D-62	7
1290-00-470-7504	D-58	16
5340-00-479-2997	D-62	14
5360-00-482-3014	D-27	8
4010-00-488-3970	D-2	3
6650-00-488-5285	D-16	1
1240-00-491-5240	D-14	4

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NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5315-00-491-5241	D-17	9	3110-00-554-6084	D-26	16
5365-00-491-7709	D-63	26	3110-00-554-6085	D-42	12
5310-00-497-3888	D-6	3	5935-00-556-6799	D-5	25
4931-00-508-5434	D-73	3	5940-00-557-1629	D-5	21
4931-00-508-5484	D-73	2	5120-00-560-6593	D-74	7
4940-00-509-2771	D-75	4	6145-00-570-0516	BULK	15
5210-00-513-2206	D-74	3	5310-00-579-0079	D-42	33
5305-00-524-0709	D-39	4	5120-00-580-0012	D-73	6
5305-00-527-5737	D-25	1	5365-00-580-5317	D-17	10
5330-00-527-8522	D-12	31	5330-00-580-8918	D-47	12
5120-00-529-2552	D-75	6	5330-00-580-9761	D-59	8
6635-00-536-5555	D-73	4	5310-00-582-5677	D-7	20
5310-00-543-2410	D-16	12	5310-00-582-5965	D-6	5
	D-17	14		D-12	8
5310-00-543-2739	D-2	2		D-12	13
	D-30	19	5305-00-582-9064	D-33	19
	D-33	11	5970-00-583-1559	D-44	4
	D-61	2	5330-00-584-1231	D-63	28
	D-68	5	5360-00-584-1250	D-44	3
5310-00-543-4652	D-23	19	5315-00-584-1639	D-44	2
	D-25	6	5310-00-584-5272	D-71	10
	D-28	29	5330-00-585-3350	D-58	17
	D-29	14	5310-00-595-6211	D-11	5
	D-30	9	5310-00-595-6761	D-68	12
	D-31	6	5310-00-595-7319	D-13	10
	D-35	10	5120-00-595-8996	D-74	2
	D-36	6	5330-00-600-5041	D-62	8
	D-39	23	5930-00-615-9376	D-63	15
	D-45	17	5310-00-616-3555	D-7	5
	D-47	4		D-25	3
	D-54	16		D-31	13
	D-63	22		D-33	20
	D-69	4		D-40	18
5210-00-546-6362	D-74	4		D-44	9
6145-00-548-2994	BULK	13		D-54	2
5310-00-550-3715	D-8	20		D-70	2
	D-20	7	5315-00-616-5515	D-60	3
	D-22	25	5310-00-619-1148	D-20	11
	D-23	14	5340-00-619-7754	D-5	19
	D-28	2	5935-00-626-3122	D-9	35
	D-30	5	1240-00-627-1332	D-6	4
	D-34	8	5365-00-632-3103	D-16	10
	D-40	5	5305-00-637-5884	D-28	26
	D-50	2		D-63	11
	D-52	7	5305-00-638-1198	D-20	15
	D-54	21	5310-00-641-9236	D-5	16
	D-54	31	5340-00-664-9175	D-24	15
	D-66	14	6145-00-669-6235	BULK	12
	D-70	9	5325-00-680-4619	D-34	22
3110-00-554-0810	D-71	14	5315-00-682-1726	D-8	26

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NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5315-00-682-1726	D-11	10	5305-00-724-5805	D-65	7
	D-68	16	5305-00-724-5869	D-21	24
5315-00-682-1733	D-4	6	5305-00-724-6776	D-38	3
5940-00-682-2477	D-5	11	5305-00-724-7274	D-2	30
	D-63	5	5305-00-727-8833	D-24	32
5930-00-689-6786	D-63	19		D-40	13
5365-00-692-1492	D-28	20		D-45	12
	D-29	6	5330-00-733-2208	D-39	11
	D-69	10	5315-00-753-0514	D-5	2
1290-00-692-1493	D-28	18		D-22	16
	D-29	4		D-63	12
	D-31	22	5970-00-753-0515	D-22	14
	D-69	8	5970-00-753-0516	D-5	8
5305-00-701-5057	D-2	1	4931-00-754-0740	D-75	1
5305-00-701-5058	D-1	14	5970-00-754-4117	D-63	7
5305-00-701-5061	D-68	4	1240-00-757-3291	D-73	5
6145-00-702-8604	BULK	11	5310-00-758-6885	D-37	7
3040-00-702-8656	D-2	4	5340-00-758-9602	D-54	26
5315-00-702-9650	D-17	1	5305-00-763-7827	D-23	9
	D-28	9	5340-00-764-1669	D-54	29
	D-31	4	5340-00-764-8425	D-45	11
	D-33	7	5305-00-765-4257	D-63	25
	D-38	32	5305-00-766-2422	D-39	1
	D-53	6	4931-00-769-1596	D-73	1
	D-67	6	5305-00-770-2533	D-22	1
5315-00-702-9651	D-27	12	5305-00-774-9704	D-28	28
	D-38	24	5305-00-777-6039	D-36	2
	D-67	8		D-43	21
5330-00-710-4367	D-62	10	5310-00-782-9877	D-35	16
5305-00-716-7921	D-27	6	6635-00-790-0733	D-74	1
5305-00-716-8035	D-42	14	5305-00-800-7261	D-19	3
5305-00-716-8036	D-26	9	4931-00-801-6859	D-75	5
	D-27	11	5325-00-803-6227	D-67	9
5305-00-717-6948	D-43	5	5325-00-803-7301	D-39	20
5305-00-717-6950	D-8	13	5325-00-803-7311	D-33	29
5305-00-717-6955	D-2	32	5970-00-803-9423	D-66	13
	D-3	17	5315-00-806-7039	D-16	2
5305-00-719-5239	D-71	11		D-54	19
5305-00-719-5269	D-71	11	5315-00-806-7040	D-44	7
5305-00-719-5329	D-50	9	5315-00-807-7684	D-55	4
5325-00-720-8064	D-34	25		D-68	11
5310-00-722-5998	D-38	18	5315-00-807-7957	D-12	18
5305-00-723-9392	D-35	1		D-38	20
5305-00-723-9398	D-24	40	5325-00-810-8932	D-56	1
5305-00-724-3478	D-52	5	5970-10-811-3310	BULK	7
5305-00-724-5396	D-52	3	5970-00-812-2969	BULK	6
5305-00-724-5792	D-18	6	1240-00-814-5620	D-10	1
5305-00-724-5802	D-12	11	5340-00-815-9677	D-42	2
	D-18	3	5315-00-817-0889	D-69	12
5305-00-724-5805	D-18	5	5305-00-817-6139	D-54	28

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STOCK NUMBER	FIG.	ITEM
5340-00-819-4561	D-7	18
5330-00-820-3242	D-9	3
5315-00-822-4739	D-51	1
5315-00-822-4740	D-7	12
	D-24	26
5315-00-825-1207	D-59	1
	D-60	4
	D-61	12
	D-68	3
5315-00-825-3748	D-65	11
5325-00-825-4826	D-32	3
6650-00-828-6552	D-10	2
6650-00-828-6553	D-8	16
5305-00-828-6555	D-8	28
5365-00-828-8797	D-10	4
1240-00-832-4702	D-21	13
3120-00-833-6794	D-26	10
	D-27	7
5315-00-834-0745	D-58	19
5999-00-834-1270	D-39	21
5330-00-837-7811	D-41	11
5305-00-843-2841	D-42	36
	D-50	8
5315-00-844-5644	D-32	13
5330-00-845-5643	D-38	9
	D-42	21
	D-44	18
	D-45	6
5355-00-845-9518	D-66	8
5330-00-846-0501	D-13	4
5340-00-846-4482	D-63	27
5310-00-846-4632	D-42	16
5310-00-846-4635	D-26	3
5365-00-846-4644	D-42	13
3020-00-846-6882	D-55	6
5355-00-847-2697	D-54	42
5355-00-847-2698	D-54	41
5360-00-847-6246	D-42	17
5360-00-847-6249	D-62	21
5365-00-847-6253	D-54	6
5355-00-847-6260	D-9	5
5330-00-847-6262	D-63	20
3020-00-848-6936	D-68	8
5365-00-848-8664	D-16	9
	D-31	19
3020-00-849-2965	D-62	6
5360-00-849-2966	D-62	2
5360-00-849-2973	D-54	39
5330-00-850-3743	D-58	6
	D-65	4
5365-00-850-4339	D-62	20
5315-00-850-4341	D-54	7
5305-00-850-9131	D-3	25
5355-00-850-9273	D-2	5
5365-00-850-9276	D-7	4
5330-00-851-1018	D-6	10
5330-00-851-1019	D-16	16
5330-00-851-1020	D-9	16
5365-00-851-1567	D-2	37
	D-3	5
5310-00-851-1568	D-2	18
	D-3	19
5360-00-851-1955	D-1	8
5305-00-851-2287	D-7	7
	D-9	4
5365-00-851-2569	D-50	15
5365-00-851-2570	D-50	16
5310-00-851-3911	D-2	16
	D-3	27
9340-00-851-3913	D-16	19
6650-00-851-3918	D-12	27
6650-00-851-3919	D-8	9
1240-00-851-4866	D-16	6
1240-00-851-4868	D-8	8
5330-00-851-4878	D-9	25
	D-12	30
5330-00-851-4881	D-11	14
	D-14	1
5305-00-851-7605	D-60	11
5330-00-851-7609	D-9	34
5310-00-851-7611	D-56	2
6650-00-851-7613	D-57	2
6650-00-851-7614	D-50	7
6650-00-851-7615	D-49	5
5307-00-851-8032	D-2	9
5360-00-851-9605	D-42	3
5310-00-851-9995	D-2	27
	D-3	16
5330-00-852-0798	D-9	10
5360-00-852-1988	D-42	23
5330-00-852-2326	D-40	7
5330-00-852-2327	D-42	31
5330-00-852-2328	D-45	3
5330-00-852-2329	D-42	28
5315-00-852-2731	D-1	9
5315-00-852-2732	D-39	18
6680-00-852-2733	D-34	14
6680-00-852-2734	D-34	19
6650-00-852-2735	D-28	8
6650-00-852-2736	D-29	1

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STOCK NUMBER	FIG.	ITEM
5365-00-852-2737	D-25	8
5330-00-852-3665	D-39	8
5365-00-852-3669	D-43	18
5340-00-852-3686	D-28	16
	D-30	8
5305-00-852-3687	D-42	29
5970-00-852-3689	D-23	8
5970-00-852-3691	D-39	19
5330-00-852-6395	D-38	5
5305-00-852-8164	D-33	6
5310-00-852-8621	D-26	18
5360-00-852-8622	D-26	20
5305-00-852-8623	D-24	11
9340-00-852-8624	D-35	14
9340-00-852-8626	D-35	12
5970-00-852-8627	D-23	3
5305-00-852-9800	D-42	25
5310-00-852-9802	D-2	28
	D-3	18
5310-00-853-1928	D-8	10
5310-00-853-2224	D-35	2
6145-00-853-3355	BULK	1
5310-00-853-3357	D-45	2
5310-00-853-3358	D-33	1
5310-00-853-3359	D-31	9
5310-00-853-3360	D-33	4
5330-00-853-3361	D-13	12
6210-00-854-3126	D-66	1
5940-00-855-5918	D-15	1
	D-22	13
	D-23	20
	D-40	2
5315-00-855-6805	D-9	20
5120-00-857-9821	D-74	8
3020-00-858-6333	D-67	7
1290-00-859-5988	D-68	7
5999-00-860-0589	D-63	8
5999-00-860-0590	D-63	16
3020-00-860-9184	D-60	10
3040-00-863-3199	D-67	10
1240-00-864-0342	D-18	11
1240-00-864-0343	D-18	12
5315-00-864-0353	D-2	7
5355-00-864-0355	D-2	24
5355-00-864-0356	D-3	13
1240-00-864-0362	D-2	36
6150-00-864-0363	D-1	15
1240-00-864-2929	D-2	25
	D-3	14
1240-00-864-2931	D-46	1
1240-00-864-2932	D-49	1
1240-00-864-2936	D-70	6
5360-00-864-2940	D-9	23
6650-00-864-2941	D-57	5
6650-00-864-2942	D-50	17
5305-00-864-2944	D-2	8
5330-00-864-2946	D-9	22
6210-00-864-6113	D-69	11
5310-00-864-6114	D-61	8
1240-00-864-6541	D-57	6
1240-00-864-6542	D-57	3
1240-00-864-6543	D-49	4
5365-00-865-7715	D-42	30
3040-00-865-7716	D-33	16
5305-00-866-0449	D-71	16
	D-71	34
3020-00-868-8360	D-8	12
3020-00-868-8368	D-9	28
1240-00-868-8381	D-39	15
5310-00-869-4199	D-58	12
5305-00-870-2119	D-3	1
1240-00-870-3751	D-70	1
5985-00-870-6277	D-52	1
6650-00-870-6278	D-50	3
5330-00-870-6280	D-40	20
6650-00-870-6281	D-8	23
6220-00-870-9966	D-40	8
	D-47	1
6220-00-870-9967	D-28	27
6650-00-871-2974	D-12	2
	D-19	5
5999-00-871-2976	D-25	5
3040-00-871-2977	D-28	4
	D-30	3
5365-00-871-2979	D-43	20
6650-00-871-2983	D-42	7
1240-00-871-4896	D-43	16
1240-00-871-5475	D-71	1
5360-00-874-3323	D-33	24
5330-00-874-6791	D-33	5
5305-00-877-6285	D-B	1
5310-00-878-3544	D-45	1
5360-00-879-1005	D-24	30
5340-00-880-5129	D-1	11
5310-00-880-5978	D-9	21
1240-00-882-5940	D-45	13
5330-00-882-6874	D-13	5
1240-00-884-4879	D-17	3
5305-00-884-4886	D-20	17
5307-00-884-7745	D-2	15

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NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
6695-00-884-7746	D-17	16	6680-00-896-9049	D-55	8
4931-00-884-7752	D-76	1	3010-00-898-4216	D-55	2
5940-00-884-7759	D-30	22	5365-00-898-4222	D-28	12
1240-00-884-7761	D-29	3		D-29	11
5970-00-884-7762	D-22	7		D-30	13
	D-30	20		D-36	8
5315-00-884-7763	D-21	6		D-40	1
5970-00-884-7764	D-22	8		D-47	6
	D-30	24		D-69	14
3110-00-884-9861	D-24	35	5340-00-898-4223	D-62	3
3110-00-884-9862	D-24	5	5355-00-898-6791	D-38	14
5340-00-884-9863	D-24	31	5340-00-898-6795	O-62	22
5970-00-886-1223	D-28	6	3040-00-898-6799	D-55	3
5315-00-889-2518	D-70	16	5995-00-898-6802	D-61	11
5315-00-889-2610	D-2	23	1240-00-898-9907	D-38	23
	D-3	20	5355-00-898-9908	D-44	16
5305-00-889-2997	D-17	13	5305-00-899-2165	D-54	27
5305-00-889-3118	D-38	12	5305-00-899-5142	D-61	4
5330-00-891-5653	D-58	1	3040-00-899-6936	D-62	4
5330-00-891-5654	D-59	10	3020-00-899-6937	D-68	10
5975-00-892-9026	D-40	23	5325-00-899-7639	D-63	17
5970-00-893-5884	D-66	11	3020-00-899-7641	D-67	3
5355-00-893-5887	D-66	7	5905-00-899-7645	D-9	9
5310-00-893-5888	D-61	10	5315-00-905-8431	D-38	29
6695-00-893-6094	D-63	24	6680-00-907-0737	D-54	5
5360-00-893-6095	D-54	24	6695-00-912-3538	D-54	14
5355-00-893-6421	D-58	10	5360-00-913-2796	D-65	10
5330-00-893-6696	D-5	9	5310-00-914-6028	D-2	17
5305-00-894-4255	D-61	9		D-3	12
5999-00-895-6493	D-5	5	5365-00-915-4868	D-54	23
	D-22	15	5315-00-916-2410	D-58	18
1240-00-895-6495	D-16	8	5365-00-916-5902	D-14	3
	D-31	20	1240-00-916-5913	D-14	5
3040-00-895-6496	D-16	7	5330-00-916-9589	D-44	13
	D-31	21	5340-00-916-9590	D-44	14
3020-00-896-2237	D-61	6	5360-00-922-1895	D-32	8
6680-00-896-2238	D-67	5	5305-00-922-8777	D-42	1
6680-00-896-2239	D-28	15	5315-00-926-5864	D-64	6
	D-29	7	5310-00-926-5876	D-16	4
	D-31	3	5315-00-927-3399	D-54	40
	D-69	6	5355-00-927-3400	D-38	19
6210-00-896-2246	D-29	9	5310-00-928-2690	D-9	12
	D-30	15		D-63	10
	D-36	3		D-68	13
	D-54	32	5330-00-928-9452	D-38	10
5365-00-896-2251	D-28	19	5305-00-928-9582	D-52	13
	D-29	5	5310-00-929-6395	D-1	16
	D-69	9		D-8	25
6680-00-896-9044	D-68	15		D-23	2
5935-00-896-9045	D-63	3		D-24	38

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STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5310-00-929-6395	D-38	17	5340-00-936-4279	D-42	24
	D-41	2	4710-00-936-5399	D-40	27
	D-58	14	5310-00-937-0453	D-20	3
	D-67	2	5315-00-939-1146	D-33	2
	D-70	24	5305-00-939-9221	D-61	5
5305-00-931-3144	D-40	24	5315-00-940-8033	D-12	10
3040-00-933-1202	D-42	27	5305-00-940-9487	D-32	5
5310-00-933-8118	D-3	10	5305-00-941-3538	D-36	9
	D-5	7		D-54	37
	D-9	7		D-66	5
	D-9	29	5310-00-944-1094	D-9	18
	D-11	9	5340-00-944-8036	D-38	8
	D-12	4	5330-00-944-8040	D-38	22
	D-17	7	5305-00-944-8299	D-20	4
	D-21	20	5935-00-946-4348	D-15	7
	D-22	21	5305-00-947-7047	D-20	5
	D-23	12	5360-00-948-0775	D-43	17
	D-26	23	5315-00-949-3909	D-50	4
	D-27	3		D-52	12
	D-38	6	5905-00-951-4527	D-40	21
	D-39	14	5310-00-951-4679	D-26	22
	D-63	1	5305-00-951-6414	D-21	21
	D-69	2	5310-00-951-6416	D-21	14
5310-00-933-8119	D-1	13	5305-00-952-6383	D-54	10
	D-2	13	5970-00-954-1622	BULK	5
	D-22	6	5305-00-954-8110	D-23	18
	D-38	2	5305-00-954-8118	D-23	15
	D-43	4	5305-00-954-8128	D-30	21
5310-00-933-8120	D-1	4	5305-00-957-6643	D-40	14
	D-6	15	5305-00-958-0660	D-22	11
	D-7	14	5305-00-958-7667	D-4	4
	D-18	7	5305-00-959-0379	D-16	3
	D-20	10	5305-00-959-1082	D-1	17
	D-24	27		D-9	19
	D-25	10	5305-00-959-1909	D-1	3
5310-00-933-8121	D-3	7	5305-00-959-2710	D-44	17
	D-4	5	6240-00-959-4952	D-11	15
	D-59	3	5310-00-959-6771	D-61	7
5310-00-933-8778	D-1	2	5315-00-963-9753	D-33	17
	D-71	32		D-34	11
5310-00-934-9740	D-16	15	5305-00-964-0310	D-6	12
	D-17	12	5315-00-964-5114	D-25	12
5310-00-934-9741	D-23	7	3020-00-968-6135	D-13	9
5310-00-934-9746	D-5	12	3040-00-971-5975	D-13	6
	D-63	4	5120-00-972-0203	D-74	10
5310-00-934-9760	D-20	9	5120-00-972-0205	D-74	9
5310-00-934-9765	D-21	4	5310-00-974-6623	D-21	7
5940-00-935-6453	D-23	5		D-60	8
	D-28	25	5999-00-977-1221	D-38	30
3040-00-936-4278	D-42	8	5120-00-977-5605	D-74	5

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NATIONAL STOCK NUMBER INDEX

STOCK NUMBER	FIG.	ITEM	STOCK NUMBER	FIG.	ITEM
5120-00-977-5606	D-74	5	5355-01-156-0254	D-13	2
5305-00-978-9347	D-38	16	5355-01-158-5587	D-31	18
5305-00-978-9370	D-38	34	5365-01-159-0112	D-26	7
5305-00-978-9373	D-38	33	5970-01-161-1434	BULK	9
5305-00-978-9375	D-38	1	1240-01-165-6247	D-24	22
3040-00-978-9583	D-21	12	1240-01-165-6252	D-21	11
5360-00-978-9584	D-21	2	5340-01-167-4593	D-28	23
5310-00-982-6816	D-26	5	5180-01-168-0487	D-75	2
5940-00-983-6043	D-41	7	5365-01-172-7863	D-26	4
5305-00-983-6654	D-18	8	5315-01-174-9260	D-24	33
5305-00-983-6659	D-6	6	6250-01-178-9742	D-41	4
3120-00-983-7313	D-21	3	1240-01-178-9749	D-41	12
5305-00-983-7457	D-1	1	1240-01-178-9750	D-43	2
5305-00-983-8074	D-71	31	1240-01-178-9752	D-39	12
5310-00-984-3806	D-2	11	5999-01-178-9916	D-38	31
5305-00-984-4976	D-16	13	5340-01-178-9958	D-41	3
5340-00-984-5206	D-25	2	5340-01-181-1698	D-38	11
5310-00-984-7042	D-70	13	6145-01-182-1377	BULK	16
5305-00-988-7602	D-2	14	5340-01-183-0712	D-38	13
5305-00-988-7604	D-22	5	9905-01-188-7751	D-6	8
5305-00-988-7605	D-64	3	5365-01-188-8025	D-11	1
5305-00-988-7607	D-24	28	1240-01-188-8029	D-16	17
5305-00-988-7608	D-7	15	5305-01-189-4560	D-11	17
	D-24	25	5310-01-189-4590	D-12	19
5305-00-988-7614	D-12	12	5315-01-189-4622	D-9	24
5305-00-988-7838	D-60	9	5365-01-189-4786	D-12	16
5305-00-988-7839	D-21	9	5365-01-189-4787	D-12	17
5305-00-993-3590	D-21	10	5365-01-189-4788	D-16	18
5365-00-995-2006	D-44	8	5365-01-190-1141	D-13	3
5355-00-995-2022	D-42	26	5355-01-190-3224	D-13	11
5305-00-995-6653	D-40	15	5365-01-191-0157	D-12	15
5305-01-023-9675	D-2	35	1240-01-192-4168	D-17	5
5355-01-033-2742	D-40	25	5940-01-192-6691	D-9	15
5305-01-057-9300	D-70	5	5340-01-195-9853	D-71	8
5930-01-062-4903	D-22	3	5365-01-201-0830	D-5	17
5970-01-085-3431	BULK	10	5310-01-201-4317	D-65	3
5340-01-100-3275	D-12	3	1240-01-201-6014	D-2	10
5355-01-101-0064	D-33	26	3120-01-202-7730	D-71	5
6650-01-105-5608	D-17	4	3040-01-202-7784	D-71	4
5340-01-124-7396	D-24	29	3120-01-204-2717	D-71	3
5365-01-125-3159	D-9	17	5305-01-204-4184	D-71	26
3040-01-131-0291	D-24	36	3110-01-204-5823	D-27	14
5365-01-132-1389	D-24	20	5935-01-204-5865	D-66	2
5315-01-133-4958	D-34	27		D-69	13
5330-01-141-1914	D-59	6	5355-01-204-5875	D-21	18
5340-01-146-7722	D-54	20	5365-01-204-5900	D-24	3
3040-01-149-5950	D-27	13	5340-01-204-5947	D-30	1
1240-01-149-5951	D-20	1	9540-01-204-6007	D-27	1
1240-01-149-5952	D-20	14	5310-01-205-0031	D-42	15
5365-01-151-6439	D-3	6	5325-01-205-0051	D-44	1

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STOCK NUMBER	FIG.	ITEM
3010-01-205-0057	D-39	6
5340-01-205-0105	D-41	10
5340-01-205-0111	D-38	4
5365-01-205-0452	D-24	4
5310-01-205-4010	D-71	2
5999-01-205-4017	D-66	12
5305-01-205-9674	D-43	9
3040-01-206-0079	D-55	5
5360-01-206-0784	D-64	4
3040-01-206-0798	D-61	3
5365-01-206-0880	D-2	22
	D-3	21
5310-01-206-4323	D-65	2
5315-01-206-4449	D-65	6
3040-01-206-4620	D-69	7
5360-01-206-8567	D-71	25
9905-01-207-1929	D-45	15
5940-01-207-5800	D-41	9
	D-47	13
5355-01-209-0611	D-26	1
5340-01-209-0662	D-62	18
1240-01-210-4047	D-37	2
5330-01-210-8122	D-5	15
3040-01-210-8179	D-60	16
1240-01-212-6583	D-38	28
5365-01-212-9183	D-71	12
5365-01-214-4312	D-60	5
1240-01-215-9761	D-57	1
9905-01-226-9301	D-70	12
4820-01-235-0223	D-7	25
	D-35	8
	D-48	1
	D-50	13
	D-60	15
	D-70	20
5315-01-252-4279	D-21	23
3040-01-252-4286	D-34	10
3040-01-252-4289	D-34	30
3040-01-252-4291	D-21	16
3040-01-258-2003	D-32	10
5340-01-284-8517	D-32	2
3020-01-285-0144	D-32	6
5998-01-285-6425	D-36	11
5980-01-285-6689	D-39	10
5998-01-286-8785	D-16	11
	D-17	15
5998-01-287-4438	D-54	34
5998-01-287-4439	D-66	2A
5365-01-287-6452	D-29	13
	D-69	15
5980-01-289-5274	D-28	13
	D-29	12
	D-30	12
	D-63	30
	D-69	16
1240-01-291-9347	D-11	7
5340-01-292-9871	D-11.	15
5340-01-293-2136	D-54	38
3110-01-293-5383	D-32	11
5365-01-293-5551	D-32	12
3130-01-295-8131	D-32	4
5355-01-296-6074	D-32	14
5340-01-296-9585	D-32	7
9905-01-297-0614	D-45	15
3120-01-300-2969	D-32	9
5365-01-309-5491	D-71	7
5998-01-312-9045	D-66	2A
1030-01-317-9117	D-71	1
5330-01-320-9912	D-37	4
9905-01-321-3720	D-24	2
9905-01-322-0159	D-6	8
3040-01-323-5211	D-71	6
1290-01-329-5033	D-20	1
3040-01-339-0478	D-53	5
5365-01-349-0875	D-24	23
5365-01-349-0876	D-24	23
5365-01-349-0877	D-24	23
5365-01-349-5621	D-24	23
7690-01-356-6239	D-6	18
7690-01-356-6240	D-6	17
5340-01-366-0957	D-71	29
5365-01-366-7755	D-36	13
	D-54	33A
	D-66	3
5340-01-367-2321	D-36	10
	D-54	36
	D-66	4
3040-01-367-7595	D-71	30
1240-01-372-5069	D-17	8
1240-01-381-8557	D-28	7
3040-01-387-4026	D-24	12
1240-01-389-0868	D-36	14
	D-54	35
	D-66	3A

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
58536	A-A-1274	5120-00-529-2552	D-75	6
88044	AN365-448A	5310-00-497-3888	D-6	3
51228	HR10033	3110-00-554-6085	D-42	12
81349	LW-C22(7)JO	6145-00-702-8604	BULK	11
81349	LW-C22(7)J2	6145-00-174-1119	BULK	14
34623	MA241A21 020	4730-00-018-9566	D-7	16
			D-35	15
81349	MIL-I-631		D-5	13
		5970-00-811-3310	BULK	7
81349	MIL-W-16878/5		BULK	3
81349	MILC27072		D-5	18
			BULK	2
81349	MILT43560	6635-00-790-0733	D-74	1
96906	MS122158	5325-00-825-4826	D-32	3
96906	MS15795-802	5310-00-595-6761	D-68	12
96906	MS15795-803	5310-00-595-6211	D-11	5
96906	MS15795-805	5310-00-722-5998	D-38	18
96906	MS15795-807	5310-00-880-5978	D-9	21
96906	MS15795-808	5310-00-619-1148	D-20	11
96906	MS15795-810	5310-00-582-5677	D-7	20
96906	MS16555-3	5315-00-963-9753	D-33	17
			D-34	11
96906	MS16555-340	5315-00-964-5114	D-25	12
96906	MS16555-5		D-34	33
96906	MS16555-601	5315-00-817-0889	D-69	12
96906	MS16555-602	5315-00-702-9650	D-17	1
			D-28	9
			D-31	4
			D-33	7
			D-38	32
			D-53	6
			D-67	6
96906	MS16555-603	5315-00-807-7684	D-55	4
			D-68	11
96906	MS16555-604	5315-00-806-7039	D-16	2
			D-54	19
96906	MS16555-605	5315-00-939-1146	D-33	2
96906	MS16555-608	5315-00-807-7957	D-12	18
			D-38	20
96906	MS16555-617	5315-00-682-1726	D-8	26
			D-11	10
			D-68	16
96906	MS16555-618	5315-00-702-9651	D-27	12
			D-38	24
			D-67	8
96906	MS16555-619	5315-00-889-2610	D-2	23
			D-3	20
96906	MS16555-620	5315-00-806-7040	D-44	7
96906	MS16555-627	5315-00-825-1207	D-59	1
			D-60	4
			D-61	12

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
96906	MS16555-627	5315-00-825-1207	D-68	3
96906	MS16555-631	5315-00-834-0745	D-58	19
96906	MS16555-640	5315-00-056-9386	D-9	26
96906	MS16555-643	5315-00-926-5864	D-64	6
96906	MS16555-644	5315-00-063-7312	D-18	10
96906	MS16555-646	5315-00-682-1733	D-4	6
96906	MS16556-603	5315-00-949-3909	D-50	4
			D-52	12
96906	MS16556-604	5315-00-060-4776	D-24	17
			D-52	10
96906	MS16556-606	5315-00-060-4760	D-53	2
96906	MS16556-608	5315-00-078-0112	D-21	25
96906	MS16556-621	5315-00-082-4858	D-38	15
96906	MS16556-625	5315-00-822-4739	D-51	1
96906	MS16556-626	5315-00-905-8431	D-38	29
96906	MS16556-627	5315-00-822-4740	D-7	12
			D-24	26
96906	MS16556-628	5315-00-889-2518	D-70	16
96906	MS16562-194	5315-00-844-5644	D-32	13
96906	MS16624-1025	5325-00-720-8064	D-34	25
96906	MS16624-1028	5325-00-803-6227	D-67	9
96906	MS16624-1039	5325-00-803-7311	D-33	29
96906	MS16624-1050	5325-00-803-7301	D-39	20
96906	MS16624-1066	5325-00-282-1830	D-71	13
96906	MS16624-1068	5325-00-810-8932	D-56	1
96906	MS16624-15	5325-00-263-5877	D-34	28
96906	MS16624-4025	5325-00-298-6564	D-1	5
			D-7	21
			D-45	4
96906	MS16624-5012	5325-00-200-2637	D-44	5
96906	MS16624-5018-1	5325-00-432-3584	D-42	10
96906	MS16628-1025	5325-00-680-4619	D-34	22
96906	MS16995-10	5305-00-959-0379	D-16	3
96906	MS16995-18	5305-00-959-1082	D-1	17
			D-9	19
96906	MS16995-26	5305-00-988-7602	D-2	14
96906	MS16995-28	5305-00-988-7604	D-22	5
96906	MS16995-29	5305-00-988-7605	D-64	3
96906	MS16995-35	5305-00-988-7607	D-24	28
96906	MS16995-36	5305-00-988-7608	D-7	15
			D-24	25
96906	MS16995-50	5305-00-988-7614	D-12	12
96906	MS16995-63	5305-00-225-7211	D-21	8
96906	MS16995-64	5305-00-988-7838	D-60	9
96906	MS16995-65	5305-00-988-7839	D-21	9
96906	MS16995-9	5305-00-068-5276	D-22	24
96906	MS16996-11	5305-00-959-1909	D-1	3
96906	MS16996-14	5305-00-068-5405	D-6	14
96906	MS16996-21	5305-00-052-9329	D-3	8
			D-12	9
96906	MS16996-23	5305-00-958-7667	D-4	4

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
96906	MS16996-40	5305-00-068-8202	D-70	14
96906	MS16996-9	5305-00-057-4593	D-8	18
			D-12	21
96906	MS16997-19	5305-00-978-9347	D-38	16
96906	MS16997-3	5305-00-058-2075	D-11	12
96906	MS16997-32	5305-00-978-9370	D-38	34
96906	MS16997-35	5305-00-978-9373	D-38	33
96906	MS16997-37	5305-00-978-9375	D-38	1
96906	MS16998-31	5305-00-983-6654	D-18	8
96906	MS16998-42	5305-00-983-6659	D-6	6
96906	MS16998-87	5305-00-051-8608	D-71	19
96906	MS16998-96	5305-00-983-8074	D-71	31
96906	MS16998-98	5305-00-983-7457	D-1	1
96906	MS18063-5	5305-00-931-3144	D-40	24
96906	MS19060-4808	3110-00-183-9175	D-33	22
			D-65	9
96906	MS20470A2-5	5320-00-243-8375	D-28	10
			D-29	2
96906	MS20995C20		D-5	20
		9505-00-221-2650	BULK	21
96906	MS209995C20		BULK	20
96906	MS21044C5	5310-00-982-6816	D-26	5
96906	MS21090-0628	5305-00-144-8425	D-32	1
96906	MS24585C111	5360-00-922-1895	D-32	8
96906	MS24665-22	5315-00-855-6805	D-9	20
96906	MS24692-102	5315-00-187-3271	D-2	6
			D-34	32
96906	MS24692-108	5315-00-187-3274	D-31	1
			D-62	13
96906	MS24692-156	5315-00-187-3301	D-62	5
96906	MS24692-27	5315-00-187-3226	D-55	7
96906	MS24692-3	5315-00-187-3216	D-34	16
96906	MS24692-30	5315-00-187-3228	D-7	2
			D-21	15
			D-42	20
			D-67	4
			D-68	9
96906	MS24692-315	5315-00-188-0233	D-24	42
96906	MS24692-321	5315-00-054-5543	D-20	2
96906	MS24692-33	5315-00-187-3230	D-31	17
96906	MS24692-36	5315-00-187-3232	D-34	6
96906	MS24692-42	5315-00-187-3235	D-26	2
96906	MS24692-57	5315-00-187-3243	D-13	1
			D-58	9
96906	MS24692-60	5315-00-187-3245	D-35	4
96906	MS24692-81	5315-00-187-3256	D-26	13
			D-27	15
96906	MS25036-149	5940-00-557-1629	D-5	21
96906	MS25082C21	5310-00-137-3068	D-63	31
96906	MS25236-8623	6240-00-051-4843	D-14	6
96906	MS25237-327	6240-00-155-7836	D-28	13

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
96906	MS27183-3	5310-00-951-4679	D-26	22
96906	MS29513-012	5330-00-248-3836	D-7	11
96906	MS29513-111	5330-00-248-3839	D-2	29
			D-3	4
96906	MS29513-112	5330-00-733-2208	D-39	11
96906	MS29513-114	5330-00-248-3846	D-2	34
			D-3	2
96906	MS29513-126	5330-00-265-1076	D-11	13
96906	MS29513-145	5330-00-527-8522	D-12	31
96906	MS29513-150	5330-00-435-8522	D-8	3
96906	MS3107A1OSL-3S	5935-00-556-6799	D-5	25
96906	MS3212-21	5305-00-433-3707	D-60	6
96906	MS3450W1OSL3P	5935-00-626-3122	D-9	35
96906	MS35059-21	5930-00-615-9376	D-63	15
96906	MS35140-10	5340-00-664-9175	D-24	15
96906	MS35190-201	5305-00-952-6383	D-54	10
96906	MS35190-203	5305-00-959-2710	D-44	17
96906	MS35190-212	5305-00-957-6643	D-40	14
96906	MS35190-222	5305-00-995-6653	D-40	15
96906	MS35191-215	5305-00-928-9582	D-52	13
96906	MS35206-203	5305-00-889-3118	D-38	12
96906	MS35206-215	5305-00-889-2997	D-17	13
96906	MS35206-219	5305-00-984-4976	D-16	13
96906	MS35207-224	5305-00-958-0660	D-22	11
96906	MS35214-11	5305-00-206-1270	D-63	29
96906	MS35214-12	5305-00-637-5884	D-28	26
			D-63	11
96906	MS35214-16	5305-00-207-7468	D-5	1
			D-22	17
96906	MS35214-2	5305-00-407-8551	D-40	11
96906	MS35215-1	5305-00-954-8110	D-23	18
96906	MS35215-10	5305-00-954-8118	D-23	15
96906	MS35215-21	5305-00-954-8128	D-30	21
96906	MS35275-201	5305-00-941-3538	D-36	9
			D-54	37
			D-66	5
96906	MS35275-202	5305-00-922-8777	D-42	1
96906	MS35275-225	5305-00-940-9487	D-32	5
96906	MS35275-241	5305-00-939-9221	D-61	5
96906	MS35307-308	5305-00-207-8253	D-24	16
96906	MS35308-472	5305-00-947-7047	D-20	5
96906	MS35308-474	5305-00-944-8299	D-20	4
96906	MS35333-103	5310-00-022-1117	D-16	14
			D-17	11
			D-40	10
96906	MS35333-37	5310-00-579-0079	D-42	33
96906	MS35333-69	5310-00-543-4652	D-23	19
			D-25	6
			D-28	29
			D-29	14
			D-30	9

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
96906	MS35333-69	5310-00-543-4652	D-31	6
			D-35	10
			D-36	6
			D-39	23
			D-45	17
			D-47	4
			D-54	16
			D-63	22
			D-69	4
96906	MS35333-70	5310-00-550-3715	D-8	20
			D-20	7
			D-22	25
			D-23	14
			D-28	2
			D-30	5
			D-34	8
			D-40	5
			D-50	2
			D-52	7
			D-54	21
			D-54	31
			D-66	14
			D-70	9
96906	MS35333-71	5310-00-616-3555	D-7	5
			D-25	3
			D-31	13
			D-33	20
			D-40	18
			D-44	9
			D-54	2
			D-70	2
96906	MS35333-72	5310-00-543-2739	D-2	2
			D-30	19
			D-33	11
			D-61	2
			D-68	5
96906	MS35338-134	5310-00-928-2690	D-9	12
			D-63	10
			D-68	13
96906	MS35338-135	5310-00-933-8118	D-3	10
			D-5	7
			D-9	7
			D-9	29
			D-11	9
			D-12	4
			D-17	7
			D-21	20
			D-22	21
			D-23	12
			D-26	23
			D-27	3

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
96906	MS35338-135	5310-00-933-8118	D-38	6
			D-39	14
			D-63	1
			D-69	2
96906	MS35338-136	5310-00-929-6395	D-1	16
			D-8	25
			D-23	2
			D-24	38
			D-38	17
			D-41	2
			D-58	14
			D-67	2
			D-70	24
96906	MS35338-137	5310-00-933-8119	D-1	13
			D-2	13
			D-22	6
			D-38	2
			D-43	4
96906	MS35338-138	5310-00-933-8120	D-1	4
			D-6	15
			D-7	14
			D-18	7
			D-20	10
			D-24	27
			D-25	10
96906	MS35338-139	5310-00-933-8121	D-3	7
			D-4	5
			D-59	3
96906	MS35338-140	5310-00-974-6623	D-21	7
			D-60	8
96906	MS35338-141	5310-00-984-7042	D-70	13
96906	MS35338-143	5310-00-933-8778	D-1	2
			D-71	32
96906	MS35338-145	5310-00-937-0453	D-20	3
96906	MS35338-154	5310-00-926-5876	D-16	4
96906	MS35338-156	5310-00-869-4199	D-58	12
96906	MS35338-40	5310-00-543-2410	D-16	12
			D-17	14
96906	MS35338-44	5310-00-582-5965	D-6	5
			D-12	8
			D-12	13
96906	MS35338-47	5310-00-209-0965	D-71	20
96906	MS35338-48	5310-00-584-5272	D-71	10
96906	MS35649-204	5310-00-934-9760	D-20	9
96906	MS35649-225B	5310-00-934-9740	D-16	15
			D-17	12
96906	MS35649-245B	5310-00-934-9746	D-5	12
			D-63	4
96906	MS35649-245T	5310-00-410-3017	D-22	12
96906	MS35650-304	5310-00-934-9765	D-21	4
96906	MS35650-345	5310-00-934-9741	D-23	7

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
96906	MS35672-18	5315-00-825-3748	D-65	11
96906	MS35689-7	3120-00-833-6794	D-26	10
			D-27	7
96906	MS35756-5	5315-00-616-5515	D-60	3
96906	MS51021-1	5305-00-843-2841	D-42	36
			D-50	8
96906	MS51021-56	5305-00-817-6139	D-54	28
96906	MS51021-9	5305-00-800-7261	D-19	3
96906	MS51023-18	5305-00-851-2287	D-7	7
			D-9	4
96906	MS51023-29	5305-00-850-9131	D-3	25
96906	MS51023-49	5305-00-272-3533	D-7	19
96906	MS51029-1	5305-00-638-1198	D-20	15
96906	MS51029-18	5305-00-877-6285	D-8	1
96906	MS51029-36	5305-00-828-6555	D-8	28
96906	MS51029-50	5305-00-061-0266	D-58	2
			D-64	5
96906	MS51031-150	5305-01-023-9675	D-2	35
96906	MS51031-16	5305-00-527-5737	D-25	1
96906	MS51031-24	5305-00-582-9064	D-33	19
96906	MS51031-25	5305-00-866-0449	D-71	16
			D-71	34
96906	MS51031-37	5305-00-724-3478	D-52	5
96906	MS51031-47	5305-00-993-3590	D-21	10
96906	MS51031-48	5305-00-054-6869	D-24	10
96906	MS51031-62	5305-00-724-5869	D-21	24
96906	MS51038-15	5305-00-081-2651	D-54	25
96906	MS51038-26	5305-00-899-5142	D-61	4
96906	MS51038-28	5305-00-894-4255	D-61	9
96906	MS51038-48	5305-00-057-2601	D-13	7
96906	MS51055-23	5305-00-717-6948	D-43	5
96906	MS51377-2	2640-00-060-3543	D-7	24
			D-35	7
			D-48	2
			D-50	12
			D-70	21
96906	MS51607-1	4820-00-114-1096	D-7	23
			D-35	6
			D-48	3
			D-50	11
			D-60	13
			D-70	19
96906	MS51922-18	5310-00-914-6028	D-2	17
			D-3	12
96906	MS51922-9	5310-00-984-3806	D-2	11
96906	MS51957-1	5305-00-054-5635	D-45	16
96906	MS51957-11	5305-00-054-5644	D-20	6
			D-24	1
			D-34	31
96906	MS51957-12	5305-00-054-5646	D-6	7
			D-30	7

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
96906	MS51957-12	5305-00-054-5646	D-58	5
			D-69	1
			D-70	11
96906	MS51957-13	5305-00-054-5647	D-44	15
96906	MS51957-14	5305-00-054-5648	D-50	1
96906	MS51957-15	5305-00-054-5649	D-26	24
			D-38	25
			D-39	13
			D-40	4
			D-54	22
			D-66	15
			D-70	10
96906	MS51957-16	5305-00-054-5650	D-23	13
			D-27	2
96906	MS51957-17	5305-00-054-5651	D-8	21
			D-30	17
			D-34	7
			D-53	4
96906	MS51957-18	5305-00-054-5652	D-5	6
			D-21	19
			D-22	22
			D-23	17
96906	MS51957-19	5305-00-054-5653	D-38	7
96906	MS51957-2	5305-00-054-5636	D-29	15
			D-30	10
			D-36	7
			D-39	22
			D-47	3
			D-54	17
			D-69	5
96906	MS51957-20	5305-00-054-5654	D-53	3
96906	MS51957-21	5305-00-054-5655	D-63	2
96906	MS51957-26	5305-00-054-6650	D-25	4
			D-31	12
			D-41	1
			D-42	34
96906	MS51957-27	5305-00-054-6651	D-8	24
			D-24	39
			D-40	17
			D-54	3
			D-70	23
96906	MS51957-28	5305-00-054-6652	D-41	5
			D-67	1
96906	MS51957-3	5305-00-054-5637	D-31	5
			D-63	23
96906	MS51957-30	5305-00-054-6654	D-7	6
			D-44	10
			D-70	3
96906	MS51957-31	5305-00-054-6655	D-41	8
			D-44	11
			D-58	13

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
96906	MS51957-34	5305-00-054-6658	D-23	1
96906	MS51957-4	5305-00-054-5638	D-63	9
			D-66	6
			D-68	14
96906	MS51957-44	5305-00-054-6669	D-33	10
96906	MS51957-45	5305-00-054-6670	D-43	3
96906	MS51957-46	5305-00-054-6671	D-61	1
96906	MS51957-47	5305-00-054-6672	D-30	18
96906	MS51957-49	5305-00-054-6674	D-58	11
96906	MS51957-6	5305-00-054-5640	D-35	9
96906	MS51957-63	5305-00-050-9229	D-25	11
96906	MS51957-64	5305-00-050-9230	D-59	7
96906	MS51957-68	5305-00-050-9234	D-30	4
96906	MS51957-80	5305-00-071-1316	D-59	4
96906	MS51958-1	5305-00-057-0497	D-11	19
			D-34	13
96906	MS51958-12	5305-00-057-0509	D-12	22
			D-23	4
			D-28	17
96906	MS51958-13	5305-00-057-0510	D-1	12
			D-3	11
			D-11	18
			D-28	3
			D-30	6
96906	MS51958-14	5305-00-057-0511	D-6	2
			D-11	4
			D-11	16
			D-17	6
96906	MS51958-15	5305-00-057-0512	D-9	6
			D-11	8
			D-12	5
			D-17	17
			D-52	8
			D-54	30
96906	MS51958-18	5305-00-057-0515	D-28	22
96906	MS51958-2	5305-00-057-0498	D-28	30
			D-42	5
96906	MS51958-20	5305-00-057-0517	D-28	1
96906	MS51958-24	5305-00-964-0310	D-6	12
96906	MS51958-26	5305-00-057-0522	D-20	18
96906	MS51958-3	5305-00-057-0499	D-25	7
96906	MS51958-31	5305-00-057-0527	D-33	21
96906	MS51958-41	5305-00-701-5057	D-2	1
96906	MS51958-42	5305-00-701-5058	D-1	14
96906	MS51958-45	5305-00-701-5061	D-68	4
96906	MS51958-5	5305-00-057-0502	D-9	13
96906	MS51959-1	5305-00-766-2422	D-39	1
96906	MS51959-12	5305-00-777-6039	D-36	2
			D-43	21
96906	MS51959-13	5305-00-770-2533	D-22	1
96906	MS51959-18	5305-00-763-7827	D-23	9

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
96906	MS51959-3	5305-00-727-8833	D-24	32
			D-40	13
			D-45	12
96906	MS51959-43	5305-00-765-4257	D-63	25
96906	MS51960-32	5305-00-082-6768	D-60	7
96906	MS51960-62	5305-00-059-5433	D-37	1
96906	MS51960-65	5305-00-071-1322	D-24	13
96906	MS51960-7	5305-00-774-9704	D-28	28
96906	MS51963-1	5305-00-717-6955	D-2	32
			D-3	17
96906	MS51963-20	5305-00-719-5329	D-50	9
96906	MS51963-47	5305-00-723-9398	D-24	40
96906	MS51963-53	5305-00-723-9392	D-35	1
96906	MS51963-9	5305-00-717-6950	D-8	13
96906	MS51964-17	5305-00-724-5792	D-18	6
96906	MS51964-29	5305-00-724-5802	D-12	11
			D-18	3
96906	MS51964-31	5305-00-724-5805	D-18	5
			D-65	7
96906	MS51964-9	5305-00-724-5396	D-52	3
96906	MS51965-2	5305-00-724-6776	D-38	3
96906	MS51966-27	5305-00-724-7274	D-2	30
96906	MS51973-19	5305-00-051-4497	D-8	27
96906	MS51973-9	5305-00-051-4484	D-21	22
96906	MS51974-1	5305-00-716-8035	D-42	14
96906	MS51974-10	5305-00-409-0854	D-2	33
			D-3	3
96906	MS51974-19	5305-00-716-8036	D-26	9
			D-27	11
96906	MS51974-8	5305-00-716-7921	D-27	6
96906	MS51977-50	5305-00-058-9378	D-71	22
96906	MS77068-1	5940-00-682-2477	D-5	11
			D-63	5
96906	MS9021-011	5330-00-580-8918	D-47	12
96906	MS9021-016	5330-00-584-1231	D-63	28
96906	MS9021-026	5330-00-600-5041	D-62	8
96906	MS9021-135	5330-00-837-7811	D-41	11
96906	MS9021-217	5330-00-585-3350	D-58	17
96906	MS9021-235	5330-00-580-9761	D-59	8
96906	MS90727-116	5305-00-719-5239	D-71	11
96906	MS90727-122	5325-00-719-5269	D-71	11
96906	MS9105-60	5315-00-916-2410	D-58	18
96906	MS91528-1G1B	5355-01-033-2742	D-40	25
96906	MS9241-011	5330-00-882-6874	D-13	5
96906	MS9241-013	5330-00-710-4367	D-62	10
96906	MS9241-016	5330-00-850-3743	D-58	6
			D-65	4
96906	MS9241-111	5330-00-081-6910	D-60	2
96906	MS9241-118	5330-00-846-0501	D-13	4
96906	MS9390-290	5315-00-940-8033	D-12	10
96906	MS9390-680	5315-00-402-4651	D-70	15

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
81349	M13486-1-2	6145-00-570-0516	BULK	15
			D-22	4
			D-28	21
			D-30	2
81349	M13486-1-3	6145-00-161-1609	BULK	17
			D-23	6
81349	M16878/5BDB9	6145-00-295-2819	BULK	18
			D-39	17
			D-41	6
			D-44	6
			D-63	18
81349	M16878/5BDE9	6145-01-182-1377	BULK	16
			D-22	23
			D-23	10
			D-28	5
81349	M16878/5BGB9	6145-00-295-2822	BULK	19
			D-40	16
81349	M23053/1-101-0		D-47	10
81349	M23053/1-201-0	5970-01-085-3431	BULK	10
81349	M23053/5-104-0	5970-00-812-2969	BULK	6
			D-23	21
81349	M23053/5-105-O	5970-00-954-1622	BULK	5
			D-23	24
81349	M27072/57	6145-00-853-3355	BULK	1
81349	M3190/02-15-N	5970-01-161-1434	BULK	9
			D-47	8
81349	M5423/01-01	5930-00-689-6786	D-63	19
81349	M5423/09-03	5975-00-892-9026	D-40	23
81349	M76LWPC227B9	6145-00-669-6235	BULK	12
81349	M76LWPC227B92	6145-00-548-2994	BULK	13
80205	NAS1201B1OA16A	4010-00-488-3970	D-2	3
80205	NAS1523C3Y	5330-01-141-1914	D-59	6
80205	NAS43DDO-32	5365-00-632-3103	D-16	10
80205	NAS43DDO-8	5365-00-580-5317	D-17	10
19200	NPN		D-51	2
81349	RP061SB351KK	5905-00-951-4527	D-40	21
19204	SC4931-95CLA07	4931-00-754-0740	D-75	1
19200	SC4931-95CLJ54	4931-00-065-1110	D-75	3
81348	TYV/CL2/TR C1	2640-00-050-1229	D-60	14
77260	X310	3110-00-554-0810	D-71	14
19200	10512965	6650-00-828-6553	D-8	16
19200	10512966	6650-00-828-6552	D-10	2
19200	10512968		D-8	19
19200	10512969	1240-00-114-1089	D-7	10
19200	10512970	3040-00-119-0901	D-7	17
19200	10512972		D-7	9
19200	10512973		D-8	17
19200	10512974	5365-00-828-8797	D-10	4
19200	10512975		D-8	15
19200	10512976		D-8	14
19200	10512977		D-10	3

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	10512978	1240-00-814-5620	D-10	1
19200	10512979		D-8	2
19200	10512980	5340-00-819-4561	D-7	18
19200	10512981		D-7	8
19200	10512982		D-8	4
19200	10512983		D-6	16
19200	10512989	5315-00-491-5241	D-17	9
19200	10516567	5340-00-464-4792	D-7	22
			D-35	5
			D-48	4
			D-50	10
			D-60	12
			D-70	22
19200	10527531	5999-00-977-1221	D-38	30
19200	10531763-4	5340-00-984-5206	D-25	2
19200	10540479	5330-00-928-9452	D-38	10
19200	10540480	5330-00-944-8040	D-38	22
19200	10540481	5355-00-927-3400	D-38	19
19200	10541481	5340-00-944-8036	D-38	8
19200	10543297	5365-00-113-2969	D-38	27
19200	10543298	5365-00-113-5645	D-38	26
19200	10543299	5365-00-995-2006	D-44	8
19200	10543306-6	5995-00-050-5969	D-28	14
			D-29	10
			D-30	14
			D-36	4
			D-40	3
			D-47	7
			D-54	33
19200	10543306-7	5935-01-204-5865	D-66	2
			D-69	13
19200	10543685-2	3110-00-293-8120	D-26	6
19200	10543756	6240-00-959-4952	D-11	15
19200	10543761	5365-00-916-5902	D-14	3
19200	10543763	1240-00-916-5913	D-14	5
19200	10543766		D-14	2
19200	10547199	1240-00-491-5240	D-14	4
19200	10547435	5360-00-179-1391	D-55	1
19200	10548083	9905-01-226-9301	D-70	12
19200	10548474	5365-01-189-4788	D-16	18
19200	10549240		D-4	1
19200	10553919	5365-00-150-2661	D-62	1
19200	10553920	5365-00-850-4339	D-62	20
19200	10553921	5365-00-150-2667	D-59	9
19200	10553922	5999-01-205-4017	D-66	12
19200	10553923	5365-01-214-4312	D-60	5
19200	10553925	5310-00-150-3791	D-62	11
19200	10553926	5310-00-150-3709	D-62	12
19200	10553927	5310-00-150-3792	D-58	7
19200	10553928	5310-00-150-3708	D-58	8
19200	10553929	1290-00-470-7504	D-58	16

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	10553930		D-65	5
19200	10553931		D-65	1
19200	10553932	3040-01-210-8179	D-60	16
19200	10553934	5365-00-168-6592	D-62	9
19200	10553935	5340-00-479-2997	D-62	14
19200	10553937	1290-00-470-7496	D-62	7
19200	10553938	1290-00-469-6671	D-62	16
19200	10555157-14	5305-00-524-0709	D-39	4
19200	10555157-8	5305-01-057-9300	D-70	5
19200	10555190-1	9905-01-321-3720	D-24	2
19200	10555190-2	9905-00-004-4340	D-24	2
19200	10555245		D-40	12
19200	10555579	3040-00-469-6662	D-62	15
19200	10555580	3040-00-469-6663	D-62	17
19200	10555584	5340-01-209-0662	D-62	18
19200	10555585	5365-00-168-6591	D-62	19
19200	10555981	5305-01-189-4560	D-11	17
19200	10556685	5340-01-181-1698	D-38	11
19200	10556686	3020-00-427-3725	D-42	19
19200	10556687	5340-01-183-0712	D-38	13
19200	10556693	3020-00-427-3415	D-56	3
19200	10559199-1	5365-00-177-4092	D-38	21
19200	10559199-2	5365-00-177-4093	D-38	21
19200	10559199-3	5365-00-177-4091	D-38	21
19200	10559200		D-72	4
19200	10559722	9905-00-007-4867	D-58	4
19200	10559863	5935-00-175-5966	D-28	11
			D-29	16
			D-30	11
			D-36	5
			D-39	9
			D-47	5
			D-69	17
19200	11726323	5340-00-880-5129	D-1	11
19200	11728173	1240-00-363-7510	D-72	3
19200	11728942		D-24	19
19200	11728943	1240-01-381-8557	D-28	7
19200	11729504	1240-00-328-5625	D-40	9
19200	11729632	5310-00-411-5816	D-2	21
			D-3	22
19200	11729776	1290-00-191-3302	D-5	4
			D-22	19
			D-63	14
19200	11731264		D-70	25
19200	11731289	6650-00-488-5285	D-16	1
19200	11731297	5340-00-448-4221	D-70	7
19200	11731298	1240-00-419-9558	D-70	8
19200	11739509	9905-01-207-1929	D-45	15
19200	11739512	1240-01-178-9750	D-43	2
19200	11739513		D-46	2
19200	11739514	1240-00-328-5623	D-39	5

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	11739515	1240-01-178-9749	D-41	12
19200	11739516	5999-01-178-9916	D-38	31
19200	11739517	1240-01-178-9752	D-39	12
19200	11739519	5940-01-207-5800	D-41	9
			D-47	13
19200	11739520	5340-01-205-0105	D-41	10
19200	11739521	5340-01-178-9958	D-41	3
19200	11739522	6250-01-178-9742	D-41	4
19200	11739523		D-47	11
19200	11739524		D-47	9
19200	11739525		D-47	2
19200	11739570	5930-01-062-4903	D-22	3
19200	11745033	5340-00-328-5622	D-40	22
19200	11747068	1240-01-192-4168	D-17	5
81413	117528-000	5935-00-946-4348	D-15	7
19200	11785497	7690-01-356-6240	D-6	17
19200	11785498	7690-01-356-6239	D-6	18
19200	11829209	5340-01-100-3275	D-12	3
19200	11829210	6650-01-105-5608	D-17	4
19200	11834878		D-11	2
19200	11834879		D-17	2
19200	11834881	9905-01-188-7751	D-6	8
19200	11834882		D-6	9
19200	11834884		D-12	32
19207	12360905-1	5980-01-285-6689	D-39	10
19207	12360905-2	5980-01-289-5274	D-28	13
			D-29	12
			D-30	12
			D-63	30
			D-69	16
19200	12553419	3040-01-367-7595	D-71	30
19200	12553637	3040-01-323-5211	D-71	6
19200	12563124	1030-01-317-9117	D-71	1
19200	12599270-1	5998-01-287-4439	D-66	2A
19200	12599270-2	5998-01-312-9045	D-66	2A
19200	12599271	5998-01-285-6425	D-36	11
19200	12599272	5998-01-287-4438	D-54	34
19200	12599285	5998-01-286-8785	D-16	11
			D-17	15
19200	12599295	5365-01-287-6452	D-29	13
			D-69	15
19200	12599323	5340-01-292-9871	D-11	15
19200	12599348	1240-01-291-9347	D-11	7
19200	12599349		D-16	5
19200	12599350		D-11	2
19200	12599352	5340-01-293-2136	D-54	38
19200	12948233	5340-01-366-0957	D-71	29
21450	140940	5305-00-014-0940	D-71	27
21450	224511	5305-00-851-7605	D-60	11
78189	3564-28-00	5310-00-595-7319	D-13	10
81349	37TB2	5940-00-983-6043	D-41	7

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
11599	46A8702	5310-00-641-9236	D-5	16
19200	5036245	5365-00-278-5309	D-26	12
19200	5036245-1	5365-00-150-2759	D-27	9
21450	503919	5305-00-282-7650	D-8	22
19200	5321572	5340-00-286-9411	D-6	1
21450	544103	5315-00-054-4103	D-29	8
			D-33	14
21450	544122	5315-00-054-4122	D-20	12
21450	544173	5315-00-054-4173	D-33	9
19200	5800012	5120-00-580-0012	D-73	6
19200	5800949	4931-00-020-2367	D-72	6
19200	5800952	4931-00-020-2366	D-73	7
19200	5800953	4931-00-034-0897	D-72	2
19200	5800954	4931-00-034-0898	D-72	1
19200	5800955	4931-00-020-2365	D-72	5
21450	583098	5315-00-058-3098	D-34	12
21450	583104		D-33	27
21450	583108	5315-00-058-3108	D-30	16
21450	591110	5305-00-082-1128	D-9	30
19200	5911336	5180-01-168-0487	D-75	2
19200	6271332	1240-00-627-1332	D-6	4
21450	702629	3110-00-159-9047	D-37	6
19204	7028656	3040-00-702-8656	D-2	4
19200	7197944	4931-00-508-5434	D-73	3
19200	7560085	6635-00-536-5555	D-73	4
19200	7573291	1240-00-757-3291	D-73	5
19200	7586885	5310-00-758-6885	D-37	7
19200	7586888		D-37	5
19200	7586889	5330-01-320-9912	D-37	4
19200	7586890		D-37	8
19200	7597708	5120-00-595-8996	D-74	2
19200	7641866	5210-00-513-2206	D-74	3
19200	7645544		D-70	17
19200	7645547		D-70	4
19200	7645551	1240-00-870-3751	D-70	1
19200	7645552	1240-00-864-2936	D-70	6
19200	7653347	5360-00-200-6918	D-26	11
19200	7660401	5935-00-896-9045	D-63	3
19200	7660404		D-48	6
19200	7660408	1240-00-469-6665	D-43	6
19200	7660410		D-45	14
19200	7660412		D-53	1
19200	7660413		D-54	13
19200	7660414	1240-01-212-6583	D-38	28
19200	7660415		D-57	4
19200	7660416		D-49	3
19200	7660418		D-50	5
19205	7660419		D-54	1
19200	7660425		D-25	9
19200	7660426	5340-00-469-6666	D-56	4
19200	7660428	5340-01-146-7722	D-54	20

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	7660438	5999-00-042-5355	D-5	3
			D-22	18
			D-63	13
19200	7660439	1240-00-864-2931	D-46	1
19200	7660440		D-43	10
19200	7660442	1240-01-215-9761	D-57	1
19200	7660443		D-43	11
19200	7660445		D-49	6
19200	7660446	4710-00-469-6667	D-43	7
19200	7660447	1240-00-469-6668	D-43	8
19200	7660448	5305-01-205-9674	D-43	9
19200	7660449	5340-00-815-9677	D-42	2
19200	7660451	6650-00-871-2983	D-42	7
19200	7660452	3010-01-205-0057	D-39	6
19200	7660453	1240-00-871-4896	D-43	16
19200	7660454	5365-00-052-0287	D-43	15
19200	7660457	1240-00-868-8381	D-39	15
19200	7660458	5985-00-870-6277	D-52	1
19200	7660459		D-52	2
19200	7660460		D-52	6
19200	7660461		D-52	14
19200	7660462		D-52	11
19200	7660463		D-52	15
19200	7660466	1240-00-228-1632	D-39	16
19200	7660468		D-43	13
19200	7660469		D-50	14
19200	7660470		D-50	19
19200	7660471	6650-00-870-6278	D-50	3
19200	7660474	3020-00-125-3917	D-45	5
19200	7660475	3020-00-012-2953	D-45	8
19205	7660476	3040-00-087-6533	D-42	11
19205	7660480		D-54	18
19200	7660488	3040-01-206-0079	D-55	5
19200	7660498	5999-00-860-0589	D-63	8
19200	7660499	5305-00-143-1673	D-42	6
19200	7660500	6650-00-851-7613	D-57	2
19200	7660501	6650-00-851-7614	D-50	7
19200	7660502	6650-00-851-7615	D-49	5
19200	7660503	6650-00-864-2941	D-57	5
19200	7660504	6650-00-864-2942	D-50	17
19200	7660506	1240-00-864-6541	D-57	6
19200	7660507	1240-00-864-6542	D-57	3
19200	7660508	1240-00-864-2932	D-49	1
19200	7660509	1240-00-864-6543	D-49	4
19200	7660510		D-43	12
19200	7660514	5360-00-851-9605	D-42	3
19200	7660516	3040-00-052-0304	D-42	35
19200	7660517	3040-00-936-4278	D-42	8
19200	7660521	5365-00-852-3669	D-43	18
19200	7660522	5365-00-871-2979	D-43	20
19200	7660523	5305-00-057-7159	D-43	19

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	7660526	5330-00-852-3665	D-39	8
19200	7660527		D-52	9
19200	7660529	5365-00-851-2569	D-50	15
19200	7660530	5365-00-851-2570	D-50	16
19200	7660531		D-50	18
19200	7660532		D-50	6
19200	7660533	5310-00-878-3544	D-45	1
19200	7660534	5310-00-853-3357	D-45	2
19200	7660535	5340-00-764-8425	D-45	11
19200	7660537	5365-00-127-3007	D-42	22
19200	7660544	5999-00-834-1270	D-39	21
19200	7660548	5315-00-852-2732	D-39	18
19200	7660549	5970-00-852-3691	D-39	19
19200	7660550	5365-00-865-7715	D-42	30
19200	7660552	5355-00-995-2022	D-42	26
19200	7660553	3040-00-933-1202	D-42	27
19200	7660554	5305-00-852-3687	D-42	29
19200	7660555	5305-00-852-9800	D-42	25
19200	7660556	1240-00-898-9907	D-38	23
19200	7660557		D-48	5
19200	7660571	5305-00-899-2165	D-54	27
19200	7660575	5340-00-328-5635	D-54	15
19200	7660576	1240-00-882-5940	D-45	13
19200	7660577	6220-00-870-9966	D-40	8
			D-47	1
19200	7660588		D-43	1
19200	7660589		D-45	7
19200	7660590	5340-00-087-6538	D-42	4
19200	7660591	5315-00-850-4341	D-54	7
19200	7660594	6695-00-116-3419	D-54	9
19200	7660595	5970-00-116-3420	D-54	11
19200	7660596	1240-00-116-3421	D-54	8
19200	7660610		D-44	12
19200	7660611	3040-00-119-3967	D-45	9
19200	7660612	5305-00-115-4446	D-45	10
19200	7681019	4931-00-508-5484	D-73	2
19200	7686087	5210-00-546-6362	D-74	4
19200	7691596	4931-00-769-1596	D-73	1
18876	8034668-10		D-5	24
			D-9	32
		5970-00-245-3843	BULK	4
			BULK	8
			D-15	2
57057	8081100536	5970-00-803-9423	D-66	13
19200	8200055	4820-01-235-0223	D-7	25
			D-35	8
			D-48	1
			D-50	13
			D-60	15
			D-70	20
19207	8202177	5365-00-896-2251	D-28	19

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	8202177	5365-00-896-2251	D-29	5
			D-69	9
19200	8202181	5365-00-692-1492	D-28	20
			D-29	6
			D-69	10
19200	8202183	1290-00-692-1493	D-28	18
			D-29	4
			D-31	22
			D-69	8
19200	8202567	5315-00-584-1639	D-44	2
19200	8202568	5970-00-583-1559	D-44	4
19200	8202569	5360-00-584-1250	D-44	3
19204	8202570	5999-00-860-0590	D-63	16
19200	8213473	5120-00-972-0205	D-74	9
19200	8213474	5120-00-972-0203	D-74	10
19200	8213745	4931-00-884-7752	D-76	1
19200	8213928	5120-00-977-5605	D-74	5
19200	8213929	5120-00-977-5606	D-74	5
19200	8215746	5940-00-884-7759	D-30	22
19200	8215747	5360-00-847-6246	D-42	17
19200	8215749	5355-01-204-5875	D-21	18
19200	8215750	3120-00-983-7313	D-21	3
19200	8215753	5310-00-846-4632	D-42	16
19200	8215754	3040-01-252-4291	D-21	16
19200	8215757	1240-01-165-6252	D-21	11
19200	8215759		D-21	17
19200	8215761		D-18	2
19200	8215762	5355-00-898-9908	D-44	16
19200	8215768	5310-00-944-1094	D-9	18
19200	8215769	5365-01-125-3159	D-9	17
19200	8215770	5340-00-019-0020	D-7	13
19200	8215771	6210-00-864-6113	D-69	11
19200	8215772	5330-00-847-6262	D-63	20
19200	8215783		D-12	24
19200	8215789	3040-00-895-6496	D-16	7
			D-31	21
19200	8215790	1240-00-895-6495	D-16	8
			D-31	20
19200	8215794	1240-00-851-4866	D-16	6
19200	8215796		D-8	6
19200	8215801		D-11	11
19203	8215804	5935-00-259-3880	D-63	21
19200	8215806		D-19	1
19200	8215807	1240-00-864-0342	D-18	11
19200	8215808	1240-00-864-0343	D-18	12
19200	8215814		D-26	21
19200	8215815		D-24	6
19200	8215816	5360-00-852-8622	D-26	20
19200	8215817	5310-00-408-9564	D-26	17
19200	8215818	5310-00-408-9563	D-26	19
19200	8215819	6210-00-896-2246	D-29	9

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	8215819	6210-00-896-2246	D-30	15
			D-36	3
			D-54	32
19200	8215820	5310-00-852-8621	D-26	18
19200	8215821	5365-01-172-7863	D-26	4
19200	8215822	5365-00-846-4644	D-42	13
19200	8215823	5310-00-846-4635	D-26	3
19200	8215824	5365-01-159-0112	D-26	7
19200	8215826		D-26	25
19200	8215827	3110-00-554-6084	D-26	16
19200	8215828	5340-00-406-1577	D-29	17
19200	8215835	6680-00-896-2239	D-28	15
			D-29	7
			D-31	3
			D-69	6
19200	8215836		D-20	16
19200	8215837	6680-00-896-9049	D-55	8
19200	8215840	1240-00-884-7761	D-29	3
19200	8215842	5360-00-482-3014	D-27	8
18876	8215845	5940-00-935-6453	D-23	5
			D-28	25
19200	8215846	5305-00-884-4886	D-20	17
19200	8215850	3120-01-204-2717	D-71	3
19200	8215850-2	5340-01-195-9853	D-71	8
19200	8215851	5340-00-400-5510	D-42	32
19200	8215852	5365-00-150-2654	D-43	14
19200	8215854	5340-00-036-6881	D-11	6
			D-20	19
19200	8215855	5340-01-205-0111	D-38	4
19200	8215859	5360-00-948-0775	D-43	17
19200	8215861	5310-00-851-7611	D-56	2
19200	8215865	5330-00-852-2326	D-40	7
19200	8215866	5330-00-852-2327	D-42	31
19200	8215867	5330-00-852-2328	D-45	3
19200	8215868	5330-00-852-6395	D-38	5
19200	8215869	5330-00-852-2329	D-42	28
19200	8215873	5995-00-115-0637	D-11	3
19200	8215873-1		D-15	5
19200	8215873-2		D-15	3
19200	8215873-3		D-15	6
19200	8215873-4		D-15	4
19200	8215877		D-70	18
19200	8215881	5305-00-852-8623	D-24	11
19200	8215882	3110-00-884-9861	D-24	35
19200	8215883		D-40	6
19200	8215884		D-40	26
19200	8215885	3110-00-884-9862	D-24	5
19200	8215887	5355-00-850-9273	D-2	5
19200	8215891	5340-00-619-7754	D-5	19
19200	8215893	5995-00-115-0636	D-9	31
19200	8215912	3110-00-063-8145	D-39	2

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	8215913	5307-00-884-7745	D-2	15
19200	8215913-1	5307-00-851-8032	D-2	9
19200	8215915	5330-00-870-6280	D-40	20
19200	8215916		D-40	19
19200	8215922	3110-00-052-0305	D-42	9
19200	8215928		D-34	18
19200	8215929		D-34	15
19200	8215930	3110-00-070-0181	D-39	3
19200	8215931	5330-00-081-4042	D-39	7
19200	8215932	5310-01-205-0031	D-42	15
19200	8215934	5940-00-855-5918	D-15	1
			D-22	13
			D-23	20
			D-40	2
19200	8215935	4710-00-936-5399	D-40	27
19200	8215936	5315-00-927-3399	D-54	40
19200	8215939	5995-00-115-0638	D-9	11
19200	8215940	5325-01-205-0051	D-44	1
19200	8216020	9905-01-297-0614	D-45	15
19200	8216024	9905-00-310-0720	D-3	9
19200	8247684		D-58	3
19200	8247686		D-66	16
19200	8247688		D-59	5
19200	8247689	3040-01-206-4620	D-69	7
19200	8247690		D-59	2
19200	8247691		D-68	2
19200	8247692		D-64	7
19200	8247693		D-68	1
19200	8247695	6695-00-893-6094	D-63	24
19200	8247698	3020-00-896-2237	D-61	6
19200	8247699	6680-00-896-2238	D-67	5
19200	8247704		D-68	6
19200	8247705	3020-00-858-6333	D-67	7
19200	8247707	3040-00-863-3199	D-67	10
19200	8247710	5355-00-177-5352	D-65	12
19200	8247712		D-58	15
19200	8247720	3040-00-899-6936	D-62	4
19200	8247723	5330-00-891-5653	D-58	1
19200	8247732	5365-00-898-4222	D-28	12
			D-29	11
			D-30	13
			D-36	8
			D-40	1
			D-47	6
			D-69	14
19200	8247742	5310-01-201-4317	D-65	3
19200	8247743	5360-00-913-2796	D-65	10
19200	8247744	5330-00-181-0127	D-65	8
19200	8247745	5310-01-206-4323	D-65	2
19200	8247746	5315-01-206-4449	D-65	6
19200	8247750	5355-00-893-5887	D-66	7

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	8247752	6210-00-854-3126	D-66	1
19200	8247753	5340-00-846-4482	D-63	27
19200	8247754	5340-00-898-4223	D-62	3
19200	8247756	5360-00-849-2966	D-62	2
19200	8247758	9905-00-012-2972	D-35	11
			D-66	10
19200	8247759	9905-00-012-2973	D-35	13
			D-66	9
19200	8261711		D-52	4
19200	8261760		D-30	25
		5360-00-852-1988	D-42	23
19200	8261829	3020-00-406-1578	D-34	23
19200	8261831	3020-00-196-1409	D-34	26
19200	8261853	5325-00-899-7639	D-63	17
19200	8261858	5310-00-413-4382	D-34	4
19200	8261861	5315-01-133-4958	D-34	27
19200	8261872	5355-00-845-9518	D-66	8
19200	8261995		D-60	1
19200	8262001	3020-00-860-9184	D-60	10
19200	8262003	1290-00-859-5988	D-68	7
19200	8262015	3020-00-849-2965	D-62	6
19200	8262017	5999-00-405-1395	D-69	3
19200	8262018	5995-00-898-6802	D-61	11
19200	8262019	3040-01-206-0798	D-61	3
19200	8262020	5355-00-893-6421	D-58	10
19200	8262028	3020-00-899-7641	D-67	3
19200	8262030	6680-00-896-9044	D-68	15
19200	8262031	3020-00-899-6937	D-68	10
19200	8262035	3020-00-848-6936	D-68	8
19200	8262037	5365-00-491-7709	D-63	26
19200	8262051	5330-00-891-5654	D-59	10
19200	8262052	5310-00-864-6114	D-61	8
19200	8262054	5310-00-893-5888	D-61	10
19200	8262058	5360-00-847-6249	D-62	21
19200	8262059	5340-00-898-6795	D-62	22
19200	8262061	5970-00-893-5884	D-66	11
19200	8262063	5360-01-206-0784	D-64	4
19200	8262090	5340-00-758-9602	D-54	26
19200	8262091	9505-00-116-3429	D-54	12
19207	8262092	5365-00-847-6253	D-54	6
19200	8262097	5365-00-915-4868	D-54	23
19200	8262098	5340-00-764-1669	D-54	29
19200	8262100	5360-00-893-6095	D-54	24
19200	8262104	5355-00-847-2697	D-54	42
19200	8262105	5355-00-847-2698	D-54	41
19200	8262118	5340-00-936-4279	D-42	24
19200	8267702		D-24	8
19200	8267703		D-24	9
19200	8267704		D-24	21
19200	8267706	5365-01-132-1389	D-24	20
19200	8267707		D-28	7

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	8267711	1240-01-149-5952	D-20	14
19200	8267712		D-36	12
19200	8267713		D-34	21
19200	8267714-1	1290-01-329-5033	D-20	1
19200	8267714-2	1240-01-149-5951	D-20	1
19200	8267719	5970-00-235-5158	D-23	16
19200	8267720	5970-00-436-1639	D-23	23
19200	8267725		D-33	12
21450	8267726		D-26	15
19200	8267727	6680-00-852-2733	D-34	14
19200	8267728	6680-00-852-2734	D-34	19
19200	8267729-1	3040-01-387-4026	D-24	12
19200	8267730	5315-00-884-7763	D-21	6
19200	8267731		D-31	2
19200	8267732-1		D-32	15
19200	8267732-2		D-31	14
19200	8267733	3120-00-455-6044	D-21	5
19200	8267734	3020-00-012-2943	D-34	1
19200	8267735	6220-00-870-9967	D-28	27
19200	8267736	1240-00-406-1582	D-24	24
19200	8267738	3020-00-223-5144	D-24	34
19200	8267739		D-24	37
19200	8267742	1240-01-165-6247	D-24	22
19200	8267743		D-37	3
19200	8267745	3020-00-459-2792	D-26	14
19200	8267746		D-34	24
19200	8267747	5340-00-113-8108	D-35	3
19200	8267749	3020-00-434-5320	D-34	29
19200	8267750	3020-00-402-9532	D-34	17
19200	8267751	3020-00-222-8581	D-34	20
19200	8267752		D-33	13
19200	8267753		D-33	15
19200	8267754	3020-00-402-8247	D-33	28
19200	8267755	5355-01-101-0064	D-33	26
19200	8267756	5340-01-204-5947	D-30	1
19200	8267757		D-31	10
19200	8267758	3040-00-466-1957	D-31	15
19200	8267760	5315-00-086-3408	D-20	13
19200	8267761	9340-00-852-8626	D-35	12
19200	8267762	9340-00-852-8624	D-35	14
19200	8267763	5970-00-884-7764	D-22	8
			D-30	24
19200	8267764		D-22	9
			D-30	23
19200	8267765	5970-00-884-7762	D-22	7
			D-30	20
19200	8267766	5355-01-209-0611	D-26	1
19200	8267768		D-24	14
19200	8267770	3040-00-248-2023	D-26	8
19200	8267771	5970-00-886-1223	D-28	6
19200	8267772		D-23	22

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	8267773	5340-01-167-4593	D-28	23
19200	8267774	5999-00-871-2976	D-25	5
19200	8267779	5365-01-205-0452	D-24	4
19200	8267783	6650-00-852-2735	D-28	8
19200	8267784	6650-00-852-2736	D-29	1
19200	8267786		D-22	2
19200	8267787	5999-00-895-6493	D-5	5
			D-22	15
19200	8267788	1240-01-210-4047	D-37	2
19200	8267797	5315-01-174-9260	D-24	33
19200	8267800	3040-01-131-0291	D-24	36
19200	8267801	5340-01-124-7396	D-24	29
19200	8267805	3110-01-204-5823	D-27	14
19200	8267806	5340-00-117-2779	D-24	18
20200	8267807	5340-00-884-9863	D-24	31
19200	8267808	5360-00-879-1005	D-24	30
19200	8267809	5340-00-455-6045	D-27	4
19200	8267810	9540-01-204-6007	D-27	1
19200	8267811	3040-00-871-2977	D-28	4
			D-30	3
19200	8267812	5340-00-066-5006	D-20	8
19200	8267813	5340-00-852-3686	D-28	16
			D-30	8
19200	8267814	5340-00-364-8192	D-22	20
			D-23	11
19200	8267817	5315-01-252-4279	D-21	23
19200	8267818	5340-00-406-1576	D-24	41
19200	8267819	3040-00-125-8782	D-34	9
19200	8267820	5340-00-431-0329	D-34	5
19200	8267821		D-28	24
19200	8267822		D-34	3
19200	8267823		D-36	1
19200	8267824	5310-00-853-2224	D-35	2
19200	8267825	3040-01-252-4289	D-34	30
19200	8267826	5310-00-853-3360	D-33	4
19200	8267827	5310-00-853-3358	D-33	1
19200	8267828	5330-00-874-6791	D-33	5
19200	8267829	3020-00-402-8246	D-33	8
19200	8267830	5305-00-852-8164	D-33	6
19200	8267831	3040-00-865-7716	D-33	16
19200	8267832		D-33	18
19200	8267833		D-33	3
19200	8267834	5340-00-196-2748	D-33	23
19200	8267835	5360-00-874-3323	D-33	24
19200	8267836		D-33	25
19200	8267840		D-31	11
19200	8267841		D-31	16
19200	8267842	5355-01-158-5587	D-31	18
19200	8267843	5310-00-177-7559	D-31	8
19200	8267844	5310-00-853-3359	D-31	9
19200	8267845		D-31	7

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	8267849	5970-00-852-3689	D-23	8
19200	8267850	5970-00-852-8627	D-23	3
19200	8267851	5365-00-852-2737	D-25	8
19200	8267859	5365-01-204-5900	D-24	3
19200	8267860		D-71	28
19200	8267862		D-71	9
19200	8267863	5365-01-309-5491	D-71	7
19200	8267866		D-71	21
			D-71	33
19200	8267868	3040-01-202-7784	D-71	4
19200	8267869	5310-01-205-4010	D-71	2
19200	8267870	3120-01-202-7730	D-71	5
19200	8267871		D-71	23
19200	8267872		D-71	24
19200	8267874	5305-01-204-4184	D-71	26
19200	8267877	1240-00-871-5475	D-71	1
19200	8267878		D-71	17
19200	8267879		D-71	18
19200	8267897		D-71	6
19200	8267898		D-71	15
19200	8267899	5365-01-212-9183	D-71	12
19200	8267900	5360-01-206-8567	D-71	25
19200	8270655	5310-01-189-4590	D-12	19
19200	8565151	6650-00-020-2364	D-49	2
19200	8565655	5365-00-136-4927	D-42	18
19200	8565960	5360-00-070-0997	D-7	3
19200	8587348	5355-00-898-6791	D-38	14
19200	8587397-2	5330-00-845-5643	D-38	9
			D-42	21
			D-44	18
			D-45	6
19200	8587455	3020-00-846-6882	D-55	6
19200	8587456	3010-00-898-4216	D-55	2
19200	8587475	3040-00-898-6799	D-55	3
19200	8587478	5360-00-849-2973	D-54	39
19200	8587531	3040-00-027-2615	D-54	4
19200	8587539	5305-00-310-0800	D-64	1
19200	8587541	5330-00-181-0126	D-63	6
19200	8587543	6680-00-907-0737	D-54	5
19200	8587550	3020-00-012-2944	D-27	16
19200	8587551	3040-00-978-9583	D-21	12
19200	8587556	1240-00-832-4702	D-21	13
19200	8587557	5360-00-978-9584	D-21	2
19200	8587558	5365-00-076-6002	D-21	1
19200	8587559	5305-00-951-6414	D-21	21
19207	8587560	5310-00-951-6416	D-21	14
19200	8587561		D-27	5
19200	8587562	3040-01-149-5950	D-27	13
19200	8587563		D-27	10
19200	8589486	3040-01-252-4286	D-34	10
19200	8589488		D-34	2

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CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	8591032	6695-00-912-3538	D-54	14
19200	8599910	5120-00-312-7924	D-74	5
19200	8599911	5340-00-312-8022	D-74	6
19200	8599912	5120-00-312-8234	D-74	6
19200	8599915	4940-00-509-2771	D-75	4
19200	8599916	5120-00-312-8401	D-74	6
19200	8599917	5120-00-312-8776	D-74	6
19200	8599918	5120-00-312-9492	D-74	6
19200	8599919	5120-00-312-9513	D-74	6
19200	8599920	4931-00-312-9600	D-74	6
19200	8599922	5120-00-560-6593	D-74	7
19200	8599926	4931-00-801-6859	D-75	5
19200	8599927	5120-00-857-9821	D-74	8
19200	8614043-1	5340-00-916-9590	D-44	14
19200	8614045	5330-00-916-9589	D-44	13
19200	8615762		D-9	14
19200	8615788		D-12	29
19200	8615790		D-18	4
19200	8615791		D-6	13
19200	8615824		D-13	8
19200	8615825		D-9	8
19200	8615827	3040-00-971-5975	D-13	6
19200	8615828		D-18	9
12697	8615829	5905-00-899-7645	D-9	9
19200	8615830	5355-01-190-3224	D-13	11
19200	8615831		D-19	4
19200	8615832		D-8	5
19200	8615834	3020-00-868-8360	D-8	12
19200	8615835	1240-00-469-6673	D-8	11
19200	8615836	5330-00-820-3242	D-9	3
19200	8615839	6650-00-115-4458	D-9	1
19200	8615844		D-12	14
19200	8615871	1240-00-269-4983	D-12	23
19200	8615877	5355-01-156-0254	D-13	2
19200	8615879	5355-00-847-6260	D-9	5
19200	8615882	5365-01-190-1141	D-13	3
19200	8615886	6650-00-127-3009	D-9	33
19200	8615888		D-12	7
19200	8615893	3020-00-968-6135	D-13	9
19200	8615895	1240-00-115-4456	D-12	1
19200	8615896		D-8	7
19200	8615897		D-19	2
19200	8615899		D-19	6
19200	8615900		D-19	7
19200	8615902	1240-00-851-4868	D-8	8
19200	8615906		D-6	11
19200	8615907		D-18	1
19200	8615908		D-12	28
19200	8615909		D-12	25
19200	8615910	3020-00-868-8368	D-9	28
19200	8615913		D-12	20

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	8615920	5365-01-188-8025	D-11	1
19200	8615922	5330-00-852-0798	D-9	10
19200	8615923	5330-00-864-2946	D-9	22
19200	8615924	6695-00-884-7746	D-17	16
19200	8615925	5330-00-851-7609	D-9	34
19200	8615928		D-9	27
19200	8615930	6650-00-870-6281	D-8	23
19200	8615932	5365-00-107-4380	D-9	2
19200	8615943	6650-00-851-3918	D-12	27
19200	8615944	6650-00-871-2974	D-12	2
			D-19	5
19200	8615945	6650-00-851-3919	D-8	9
19200	8615948	5940-01-192-6691	D-9	15
19200	8615964		D-7	1
19200	8615965	5310-00-853-1928	D-8	10
19200	8615966	5365-00-850-9276	D-7	4
19200	8615973	5365-00-848-8664	D-16	9
			D-31	19
19200	8615975	5365-01-191-0157	D-12	15
19200	8615976	5365-01-189-4786	D-12	16
19200	8615977	5365-01-189-4787	D-12	17
19200	8615979	1240-00-884-4879	D-17	3
19200	8615980		D-12	6
19200	8615981		D-12	26
19200	8615982	1240-01-188-8029	D-16	17
19200	8615983	5315-01-189-4622	D-9	24
19200	8615985	5360-00-864-2940	D-9	23
19200	8615992	5330-00-851-1018	D-6	10
19200	8615994	5330-00-851-4878	D-9	25
			D-12	30
19200	8615995	5330-00-853-3361	D-13	12
19200	8615996	5330-00-851-1019	D-16	16
19200	8615998	5330-00-851-1020	D-9	16
19200	8616002	5330-00-851-4881	D-11	14
			D-14	1
19200	8616003	9340-00-851-3913	D-16	19
19200	8616016		D-2	31
19200	8616017		D-3	26
19200	8616018		D-4	2
19200	8616019		D-1	7
19200	8616020		D-4	3
19200	8616025	6150-00-864-0363	D-1	15
19200	8616028	5340-00-300-7908	D-2	12
19200	8616031	5355-00-350-9435	D-3	15
19200	8616032		D-5	22
19200	8616036	5365-01-151-6439	D-3	6
19200	8616037	5365-01-206-0880	D-2	22
			D-3	21
19200	8616038	1240-00-114-1095	D-2	26
19200	8616041	1240-00-357-1472	D-1	6
19200	8616042	5310-00-851-9995	D-2	27

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	8616042	5310-00-851-9995	D-3	16
19200	8616044		D-5	10
19200	8616045		D-5	14
19200	8616047	5355-00-864-0355	D-2	24
19200	8616049	5315-00-864-0353	D-2	7
19200	8616050	5310-00-852-9802	D-2	28
			D-3	18
19200	8616051	1240-01-201-6014	D-2	10
19200	8616056	5305-00-864-2944	D-2	8
19200	8616057	5355-00-115-4457	D-2	20
			D-3	23
19200	8616058	1240-00-351-2936	D-2	19
			D-3	24
19200	8616059	5315-00-351-2937	D-1	10
19200	8616060	5305-00-870-2119	D-3	1
19200	8616061	5355-00-864-0356	D-3	13
19200	8616065	5330-00-468-1065	D-5	23
19200	8616069	5365-01-201-0830	D-5	17
19200	8616073	5310-00-851-1568	D-2	18
			D-3	19
19200	8616075	5310-00-851-3911	D-2	16
			D-3	27
19200	8616076	1240-00-864-2929	D-2	25
			D-3	14
19200	8616077	5360-00-851-1955	D-1	8
19200	8616078	5315-00-852-2731	D-1	9
19200	8616080	1240-00-864-0362	D-2	36
19200	8616083	5365-00-851-1567	D-2	37
			D-3	5
19200	8616084	5330-00-893-6696	D-5	9
19200	8616085	5330-01-210-8122	D-5	15
19200	8624897	5970-00-753-0515	D-22	14
19200	8624898	5315-00-753-0514	D-5	2
			D-22	16
			D-63	12
19200	8624899		D-64	2
19200	8624900	5970-00-753-0516	D-5	8
19200	8635798	5970-00-754-4117	D-63	7
19200	8635800	5310-00-959-6771	D-61	7
19200	8635803	5310-00-782-9877	D-35	16
19200	9356015	9905-01-322-0159	D-6	8
19200	9356016		D-6	9
19200	9356017	1240-01-372-5069	D-17	8
19200	9356157		D-24	7
19200	9356161-1	5365-01-349-0877	D-24	23
19200	9356161-2	5365-01-349-0876	D-24	23
19200	9356161-3	5365-01-349-0875	D-24	23
19200	9356161-4	5365-01-349-5621	D-24	23
19200	9360111	3040-01-339-0478	D-53	5
19200	9360300	3130-01-295-8131	D-32	4
19200	9360301	5340-01-284-8517	D-32	2

CROSS-REFERENCE INDEXES

PART NUMBER INDEX

CAGEC	PART NUMBER	STOCK NUMBER	FIG.	ITEM
19200	9360302	5355-01-296-6074	D-32	14
19200	9360304	3110-01-293-5383	D-32	11
19200	9360305	5365-01-293-5551	D-32	12
19200	9360307	3120-01-300-2969	D-32	9
19200	9360308	5340-01-296-9585	D-32	7
19200	9360310	3040-01-258-2003	D-32	10
19200	9360575	3020-01-285-0144	D-32	6
19200	9399168	5340-01-367-2321	D-36	10
			D-54	36
			D-66	4
19200	9399169	1240-01-389-0868	D-36	14
			D-54	35
			D-66	3A
19200	9399170	5365-01-366-7755	D-36	13
			D-54	33A
			D-66	3

APPENDIX E
MANDATORY REPLACEMENT PARTS

Section I. Introduction

E-1. SCOPE

This appendix lists all mandatory replacement parts referenced in the task setups and procedures.

E-2. EXPLANATION OF COLUMNS

a. Column (1) - Item number. This number is assigned to the entry in the listing for referencing when required.

b. Column (2) - Nomenclature. Name or identification of the part.

c. Column (3) - Part number. The manufacturer's part number.

Section II. Mandatory Replacement Parts

E-3. MANDATORY REPLACEMENT PARTS LIST

(1) Item Number	(2) Nomenclature	(3) Part Number
1	Felt, mechanical	7586889
1.1	Felt, mechanical, preformed	8247744
2	Felt, mechanical washer	7660526
3	Gasket	10540479
4	Gasket	8215915
4.1	Gasket	8215772
4.2	Gasket	8247723
4.3	Gasket	8262051
4.4	Gasket	8587541
5	Gasket	8614045
6	Gasket	8616065
7	Gasket	8616084
8	Gasket	8615922
9	Gasket	8615923
10	Gasket	8615925
11	Nut, self-locking	AN365-448A

E-3. MANDATORY REPLACEMENT PARTS LIST - continued

(1) Item Number	(2) Nomenclature	(3) Part Number
12	Nut, self-locking	MS21044C5
13	Nut, self-locking	MS51922-18
14	Nut, self-locking	MS351922-9
15	Nut, self-locking	7674694
16	Nut, self-locking	8215820
17	Nut, self-locking	8215932
18	Nut, self-locking	8267869
19	Packing, preformed	MS29513-012
20	Packing, preformed	MS29513-111
21	Packing, preformed	MS29513-112
22	Packing, preformed	MS29513-114
23	Packing, preformed	MS29513-126
24	Packing, preformed	MS29513-150
25	Packing, preformed	MS9021-011
25.1	Packing, preformed	MS9021-016
25.2	Packing, preformed	MS9021-026
26	Packing, preformed	MS9021-135
26.1	Packing, preformed	MS9021-217
26.2	Packing, preformed	MS9021-235
27	Packing, preformed	MS9241-011
27.1	Packing, preformed	MS9241-013
27.2	Packing, preformed	MS9241-016
27.3	Packing, preformed	MS9241-111
28	Packing, preformed	MS9241-118
29	Packing, preformed	8215865
30	Packing, preformed	8215866
31	Packing, preformed	8215868
32	Packing, preformed	8215869
33	Packing, preformed	8215931
34	Packing, preformed	8587397-2

(1) Item Number	(2) Nomenclature	(3) Part Number
35	Packing, preformed	8615990
36	Packing, preformed	8615992
37	Packing, preformed	8615994
38	Packing, preformed	8615995
39	Packing, preformed	8615996
40	Packing, preformed	8615998
41	Packing, preformed	8616000
42	Packing, preformed	8616002
43	Packing, preformed	8616085
44	Pin, cotter	MS24665-22
45	Screw	MS16996-40
46	Shim	10543297
47	Shim	10543298
48	Shim	10543299
49	Shim	10548474
50	Shim	10559199-1
51	Shim	10559199-2
52	Shim	10559199-3
53	Shim	8615932
54	Shim	8615975
55	Shim	8615976
56	Shim	8615977
57	Shim	9356161-1
58	Shim	9356161-2

E-3. MANDATORY REPLACEMENT PARTS LIST - continued

(1) Item Number	(2) Nomenclature	(3) Part Number
59	Shim	9356161-3
60	Shim	9356161-4
61	Washer, lock	MS35333-103
62	Washer, lock	MS35333-37
63	Washer, lock	MS35333-69
64	Washer, lock	MS35333-70
65	Washer, lock	MS35333-71
66	Washer, lock	MS35333-72
67	Washer, lock	MS35338-134
68	Washer, lock	MS35338-135
69	Washer, lock	MS35338-136
70	Washer, lock	MS35338-137
71	Washer, lock	MS35338-138
72	Washer, lock	MS35338-139
73	Washer, lock	MS35338-140
74	Washer, lock	MS35338-143
75	Washer, lock	MS35338-154
75.1	Washer, lock	MS35338-156
76	Washer, lock	MS35338-40
77	Washer, lock	MS35338-44
78	Washer, lock	MS35338-47
79	Washer, lock	MS35338-48

TOOL IDENTIFICATION LIST

TOOL IDENTIFICATION LIST

ITEM	LEVEL	NOMENCLATURE	NSN	REFERENCE
1	H	ADAPTER, TORQUE (8213928)	5120-00-977-5605	SC4931-95-CL-A11
2	H	ADAPTER, TORQUE (8213929)	5120-00-977-5606	SC4931-95-CL-A11
3	H	ADAPTER, TORQUE (8599910)	5120-00-312-7924	SC4931-95-CL-A11
4	H	ADAPTER, TORQUE (8599911)	5340-00-312-8022	SC4931-95-CL-A11
5	H	ADAPTER, TORQUE (8599912)	5120-00-312-8234	SC4931-95-CL-A11
6	H	ADAPTER, TORQUE (8599917)	5120-00-312-8776	SC4931-95-CL-A11
7	H	ADAPATER, TORQUE (8599920)	4931-00-312-9600	SC4931-95-CL-A11
8	O,F	ADAPTER, TORQUE (8599922)	4931-00-560-6593	SC4931-95-CL-A11
9	O,F	ADAPTER, TORQUE (8599927)	4931-00-857-9821	SC4931-95-CL-A11
10	F,H	C-CLAMP (GGG-C-406)	5120-00-180-0907	SC4931-95-CL-A07
11	H	CROSS-LEVELING FIXTURE	4931-00-652-3553	
12	O,F	DRILL, ELECTRIC 1/2" (WD661)	5130-00-204-2718	SC4931-95-CL-A07
13	O,F	DRILL, TWIST NO. 15(0.180)	5133-00-189-9260	SC4931-95-CL-A07
14	O,F	DRILL,TWIST NO. 32(0.116)	5133-00-189-9277	SC4931-95-CL-A07
15	O,F	DRILL, TWIST NO. 44 (0.086)	5133-00-189-9289	SC4931-95-CL-A07
16	O,F	DRILL, TWIST NO 54 (0.055)	5133-00-189-9299	SC4931-95-CL-A07
17	H	FIXTURE, TESTING, AZIMUTH (7691596)	4931-00-769-1596	
18	O,F	GUN, HOT AIR MINI		
19	H	HOLDER, DIOPTOMETER (1 1738294)	1240-00-191-1379	
20	H	LEVEL, PRECISION (768087)	5210-00-546-6362	
21	H	PROJECTOR, COLLIMATING (8599924-27)	4931-00-757-3291	
22	H	PURGING KIT	4931-00-065-1110	SC4931-95-CL-J54

ITEM	LEVEL	NOMENCLATURE	NSN	REFERENCE
23	H	TELESCOPE, COLLIMATING (55491 08)	4931-00-554-9108	SC4931-95-CL-A07
24	O,F	SOLDERING IRON, ELECTRIC (TC552K)	3439-00-853-8760	SC4931-95-CL-A07
25	O,F	V-BLOCK	3460-00-725-5076	SC4931-95-CL-A07
26	F,H	WRENCH, SPANNER TUBULAR (7597638) (11/16 AND 45/64 INCH)	5120-00-345-1387	SC4931-95-CL-J52
27	F,H	WRENCH, SPANNER TUBULAR (7597648) (1 AND 1-1/64 INCH)	5120-00-345-1396	SC4931-95-CL-J52
28	F,H	WRENCH, SPANNER TUBULAR (7597651) (1-3/32 AND 1-7/64 INCH)	5120-00-345-1399	SC4931-95-CL-J52
29	H	WRENCH, SPANNER TUBULAR (7597652) (1-1/8 AND 1-9/64 INCH)	5120-00-345-1400	SC4931-95-CL-J52
30	H	WRENCH, SPANNER TUBULAR (7597662) (1-7/16 AND 1-29/64 INCH)	5120-00-345-1409	SC4931-95-CL-J52
31	O,F	WRENCH, SPANNER TUBULAR (7597670) (1-11/16 AND 1-45/64 INCH)	5120-00-345-1417	SC4931-95-CL-J52
32	O,F	WRENCH, SPANNER, TUBULAR (7597673) (1-25/32 AND 1-51/64 INCH)	5120-00-345-1420	SC4931-95-CL-J52
33	O,F	WRENCH, SPANNER, TUBULAR (7597680) (2 AND 2-1/64 INCH)	5120-00-345-1427	SC4931-95-CL-J52
34	O,F	WRENCH, SPANNER, TUBULAR (7597698) (2-9/16 AND 2-37/64 INCH)	5120-00-345-1445	SC4931-95-CL-J52
35	H	WRENCH, TORQUE 0-80 IN-OZ CAPACITY	5120-00-729-6427	SC4931-95-CL-A11
36	O,F,H	WRENCH, TORQUE 0-60 IN-LB CAPACITY	5120-00-580-2949	SC4931-95-CL-A11

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V

W

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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 Centiimeters
= 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
Centimeters	Inches	0.394

TO CHANGE	TO	MULTIPLY BY
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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