ORDNANCE PAMPHLET NO. 909

MOUNTS

ASSEMBLIES

20 M M. MOUNTS MARK 2, MARK 2 MOD. 1, MARK 2 MOD. 2; MARK 4, MARK 4 MOD. 1 MARK 4 MOD. 2, MARK 4 MOD. 3; MARK 5, MARK 5 MOD. 1, MARK 5 MOD. 3, MARK 5 MOD. 4; MARK 6; MARK 10 AND MARK 10 MOD. 1

DESCRIPTION

MARCH 1943

NAVY DEPARTMENT, BUREAU OF ORDNANCE, WASHINGTON, D.C.

To all holders of Ordnance Pamphlet 909
Insert change; write on cover "Change 1 entered"
Approved by The Chief of The Bureau of Ordnance

OP 909 CHANGE 1

7 July 1944

1 Page ——— Page 1

ORDNANCE PAMPHLET 909
is changed as follows:

MOUNTS — ASSEMBLIES — 20 MM.
Mounts Mk 2, Mk 2 Mod 1, Mk 2 Mod 2;
Mk 4, Mk 4 Mod 1, Mk 4 Mod 2, Mk 4 Mod 3;
Mk 5, Mk 5 Mod 1, Mk 5 Mod 3, Mk 5 Mod 4;
Mk 6; Mk 10 and Mk 10 Mod 1 — Description

1. Wherever extra light mineral oil NS 1042, 2075, or 2110, or medium mineral oil NS 1065, or 3065 is now specified light preservative oil Ordnance Specification 1362 should be used.

2. Wherever oil mixture OE 3533 is now specified, transformer oil NDS 14-0-12 or a mixture of 85% extra light oil NS 1042, 2110, or 2075, and 15% Diesel fuel oil NDS 7-0-2 should be used.

3. Where anti-seize compound NS 52-C-19 (INT) is specified, bearing grease Ordnance Specification 1350 should be used.

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NOTICE

Please make the following corrections on the pages listed and Plate 1:

PAGE NO.	CORRECTION
21	Eighth line up from bottom of page—*delete sentence*—**See Section C-C, Plate 1.**
22	Sixteenth line from top of page—*delete sentence*—**See Plan View, Plate 1.**
28	Second line from top of page—*change* **(12-Z-313-5)** *to read* **(OE-2283).**
28	Fifth line from top of page—*change* **(OE-2157)** *to read* **(OE-2257).**
29	Operation No. 8, fourth line—*change* **(OW-2137)** *to read* **(OE-2137).**
31	Operation No. 18, first and third lines—*change* **(12-Z-313-5)** *to read* **(OE-2283).**
36	Operation No. 32, sixth line—*change* **(OE-2086)** *to read* **(OE-2045).**
44	Operation No. 24, second line—*change* **oiler (OE-2138)** *to read* **plug (299759-5).**
45	Operation No. 29, first line—*after word* **screws** *add* **(367557-8).**
45	Operation No. 33, first line—*change* **(OE-2158)** *to read* **(299948-1).**
51	Operation No. 1, between lines (c) and (e)—*add* **(d) Place spacing ring (OE-2067) on spring (OE-2062).**
Plate 1 at p. 56	Left end of plate, Section A-A—*change top* **(OE-2168)** *(leading to the spiral spring housing busking, printed in blue) to read* **(OE-2166).**
	Center of plate, list of part numbers starting with 299948-1—*change* **(OE-2093)** *to read* **(OE-2036)**; *change* **(OE-2030)** *to read* **(OE-2093).**
	Right center of plate, below handwheel, list of parts starting with (OE-2108)—*change* **(OE-2142)** *to read* **(OE-2123)** *and* **(OE-2123)** *to read* **(OE-2142).**

ORDNANCE PAMPHLET NO. 909

MOUNTS

ASSEMBLIES

20 MM MOUNTS MARK 2, MARK 2 MOD. 1, MARK 2 MOD. 2; MARK 4, MARK 4 MOD. 1 MARK 4 MOD. 2, MARK 4 MOD. 3; MARK 5, MARK 5 MOD. 1, MARK 5 MOD. 3, MARK 5 MOD. 4; MARK 6; MARK 10 AND MARK 10 MOD. 1

DESCRIPTION

MARCH 1943

PREFACE

20 mm. A.A. Gun Mounts Mark 2, Mark 2 Mod. 1, Mark 2 Mod. 2; Mark 4, Mark 4 Mod. 1, Mark 4 Mod. 2, Mark 4 Mod. 3; Mark 5, Mark 5 Mod. 1, Mark 5 Mod. 3, Mark 5 Mod. 4; Mark 6; Mark 10 and Mark 10 Mod. 1.

This Ordnance Pamphlet, No. 909, describes the construction, operation, and maintenance of the various 20 mm. A.A. Gun Mounts now in service.

Additional Ordnance publications relating to the use of the 20 mm. A.A. Guns and Mounts are:

O.P. 911—20 mm. Machine Gun Mechanisms Marks 2 and 4;
20 mm. Guns Marks 2, 3, 4, and 4 Mod. 1;
20 mm. Sights Marks 2, 4, 4 Mod. 1, and 5;
20 mm. Hand Grips and Shoulder Rests Marks 2, 4, and 5.

O.D. 4429—Gun Sight Mark 14 Mod. 2—Installation and Operation.

Sk. No. 103308—20 mm. Machine Gun and Mount Index.

The Mark 2 Mount is built to British standards and specifications in this country, but it has been issued by the U. S. Navy as well as the British Admiralty. In this mount the trunnion height is varied by means of a handwheel operating, through a train of gears, a screw inside the stand.

The Mark 4 Mount is identical in operation and almost identical in appearance to the Mark 2 Mount. The Mark 4 Mount has the cocking cable wound around the stand and secured to a hook at one end and a snap at the other. The Mark 2 Mount Cocking Cable is secured to a spring loaded reel which is housed within the stand. The Mark 4 Mount is built to U. S. standards and specifications and is issued by both the U. S. Navy and British Admiralty.

Mark 5 Mount is a Fixed Trunnion Height type. The use of Mounts Mark 5 is a temporary expedient and these mounts will be replaced on Naval Vessels by Mounts Marks 2, 4, 6, or 10, when available. A limited number of Mark 5 Mounts have been issued for installation in Merchant Vessels and these mounts are considered to be practical for this purpose.

Mark 5 Mod. 4 Mount is for use on submarines. It is of the Fixed Trunnion Height type with a shorter pedestal than used on the Mark 5 Mount. Also it has a number of holes drilled in the pedestal to permit sea water to drain out when the submarine is surfaced.

The Mark 6 Mount is an Adjustable Trunnion Height hydraulically operated type. The height of the trunnion is varied by a hydraulic system operated by foot pedals located in the pedestal.

Mark 10 Mount is a Fixed Trunnion Height type. The stand is a weldment of steel stampings, instead of a casting such as used on other types of 20 mm. A.A. Gun Mounts.

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NOTE—Plate 1 is the folded insert of Marks 2 and 4 Gun Mount at page 56.
Plate 2 is the folded insert of Mark 5 Mod. 3 Gun Mount at page 72.
Plate 3 is the folded insert of Mark 6 Gun Mount at page 120.

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MARK 5 MOD. 3 MOUNT

Chapter 4
MARK 5 MOD. 4 MOUNT

Chapter 5
MARK 6 MOUNT

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Chapter 5 (Cont'd)
MARK 6 MOUNT

Chapter 1

Mark 2 Mod. 2, Mark 4 Mod. 2, and Mark 4 Mod. 3 Mounts

Type.....Adjustable trunnion height, handwheel operated through mechanical gearing to jack screw lift.
Working Circle—Diameter.....10 Feet
Distance from mount centerline to face of shoulder pad (with Mark 4 shoulder rest)—Gun horizontal.....35½ Inches
Elevation Limits—Above horizontal.....87 Degrees
—Below horizontal.....5 Degrees
Training Limits.....Unlimited*
Height of Trunnion—Column extended.....62¼ Inches
Height of Trunnion—Column retracted.....46½ Inches
Holding Down Bolts
Number of Holes—Equally spaced.....5
Diameter of Holes.....1 5/32 Inches
Diameter of Bolts.....1⅛ Inches
Diameter of Bolt Circle.....26⅜ Inches
Stand Bearing Diameter—Outside.....29½ Inches
—Inside.....24 Inches
Weights
Stand—Mark 4.....1103 Pounds
Stand—Mark 4 Mod. 1..... Pounds
Carriage—Mark 4.....88 Pounds
Carriage—Mark 4 Mod. 1..... Pounds
Cradle—Mark 4 Mod. 2.....83 Pounds
Cradle—Mark 5.....84 Pounds
Mount—Mark 4 Mod. 2.....1274 Pounds
Mount—Mark 4 Mod. 3..... Pounds
Shield—Mark 4.....238 Pounds
Shield—Mark 4 Mod. 1.....241 Pounds
Shoulder Rest—Mark 4.....20 Pounds
Sight—Mark 4 Mod. 1.....13 Pounds
Gun Mechanism (without magazine)—Mark 4
Ribbed Barrel.....141 Pounds
Solid Barrel.....150 Pounds
Total weight, gun mechanism (solid barrel) and mount assembly Mark 4 Mod. 2 of above components.....1695 Pounds

For other characteristics see Working Circle Drawing, No. 209907.

Mark 5 Mod. 3 Mount

Type.....Fixed Trunnion Height
Working Circle—Diameter.....10 Feet
Distance from mount centerline to face of shoulder pad (with Mark 4 shoulder rest)—Gun horizontal.....35½ Inches
Elevation Limits—Above horizontal.....87 Degrees
—Below horizontal.....5 Degrees
Training Limits.....Unlimited*
Trunnion Height.....62¼ Inches

*Train limited by the length of power cable when mounts are equipped with Mark 14 Mod. 2 gun sight.

MARK 5 MOD. 3 MOUNT (Cont'd)

Oil Capacity ..... 1.65 or 1.95 Pounds. (See Operation No. 1 page 69).

Holding Down Bolts
- Number of Holes—Equally spaced 5
- Diameter of Holes ..... 1 5/32 Inches
- Diameter of Bolts ..... 1 1/8 Inches
- Diameter of Bolt Circle ..... 26 3/8 Inches

Stand Bearing Diameter—Outside ..... 29 1/2 Inches
—Inside ..... 23 1/2 Inches

Weights
- Stand—Mark 5 ..... 963 Pounds
- Carriage—Mark 5 ..... 63 Pounds
- Cradle—Mark 4 Mod. 2 ..... 83 Pounds
- Mount—Mark 5 Mod. 3 ..... 1109 Pounds
- Shield—Mark 4 ..... 238 Pounds
- Shoulder Rest—Mark 5 ..... 28 Pounds
- Sight—Mark 4 Mod. 1 ..... 13 Pounds
- Gun Mechanism (without magazine)—Mark 4
  - Ribbed Barrel ..... 141 Pounds
  - Solid Barrel ..... 150 Pounds

Total weight, gun mechanism (solid barrel) and mount assembly of above components ..... 1538 Pounds

For other characteristics see Working Circle Drawing, No. 299908.

Mark 5 Mod. 4 Mount

Type ..... Fixed Trunnion Height

Working Circle—Diameter ..... 10 Feet

Distance from mount centerline to face of shoulder pad (with Mark 5 shoulder rest)—Gun horizontal ..... 38 1/2 Inches

Elevation Limits—Above horizontal ..... 87 Degrees
—Below horizontal ..... 5 Degrees

Training Limits ..... Unlimited*

Trunnion Height ..... 50 3/4 Inches

Holding Down Bolts
- Number of Holes—Equally spaced 5
- Diameter of Holes ..... 1 5/32 Inches
- Diameter of Bolts ..... 1 1/8 Inches
- Diameter of Bolt Circle ..... 26 3/8 Inches

Stand Bearing Diameter—Outside ..... 29 1/2 Inches
—Inside ..... 23 1/2 Inches

Weights
- Stand—Mark 5 Mod. 2 (no lap at weld) ..... 827 Pounds

*Train limited by the length of power cable when mounts are equipped with Mark 14 Mod. 2 gun sight.

MARK 5 MOD. 4 MOUNT (Cont'd)

Carriage—Mark 5 ..... 63 Pounds
Cradle—Mark 4 Mod. 2 ..... 83 Pounds
Mount—Mark 5 Mod. 4 (no lap at weld) ..... 973 Pounds
Shield—Mark 4 ..... 238 Pounds
Shoulder Rest—Mark 5 ..... 20 Pounds
Sight—Mark 4 Mod. 1 ..... 13 Pounds
Gun Mechanism (without magazine)—Mark 4
Ribbed Barrel ..... 141 Pounds
Solid Barrel ..... 150 Pounds

Total weight, gun mechanism (solid barrel) and mount assembly (no laps at weld) of bove components ..... 1394 Pounds

For other characteristics see Working Circle drawing, No. 299908.

Mark 6 Mount

Type ..... Adjustable tannion height, foot pedal operaed hydraulic lift.

Working Circle ..... 10 Feet

Distance from mount centerline to face of shoulder pad (with Mark 5 shoulder rest)—Gun horizontal ..... 40½ Inches

Elevation Limits—Above horizontal ..... 90 Degrees
—Below horizontal ..... 15 Degrees

Training Limits ..... Unlimited*

Height of Trunnion
Column Extended ..... 68⅜ Inches
Column retracted ..... 44¾ Inches

Holding Down Bolts
Number of Holes—Equally spaced 5
Diameter of Holes ..... 1 5/32 Inches
Diameter of Bolts ..... 1⅛ Inches
Diameter of Bolt Circle ..... 26⅜ Inches

Stand Bearing Diameter—Outside ..... 30¼ Inches
—Inside ..... 19½ Inches
—Clearance Circle over heel lugs ..... 38 Inches

Weights
Stand—Mark 6 (with oil) ..... 1110 Pounds
Carriage—Mark 6 ..... 79 Pounds
Cradle—Mark 5 ..... 84 Pounds
Mount—Mark 6 (with oil) ..... 1273 Pounds
Shield—Mark 4 Mod. 1 ..... 241 Pounds
Shoulder Rest—Mark 5 ..... 20 Pounds
Sight—Mark 5 ..... 7 Pounds
Gun Mechanism (without magazine)—Mark 4
Ribbed Barrel ..... 141 Pounds
Solid Barrel ..... 150 Pounds

*Train limited by the length of power cables when mounts are equipped with Mark 14 Mod. 2 gun sight.

MARK 6 MOUNT (Cont'd)

Total weight, gun mechanism (solid barrel) and mount assembly of above components.....1691 Pounds
For other characteristics see Working Circle Drawing, No. 300047.

Mark 10 and Mark 10 Mod. 1 Mounts

Type.....Fixed Trunnion Height

Working Circle—Diameter.....10 Feet

Distance from mount centerline to face of shoulder pad (with Mark 5 shoulder rest)—Gun horizontal.....41⅞ Inches

Elevation Limits—Above horizontal.....90 Degrees
—Below horizontal.....15 Degrees

Training Limits.....Unlimited*

Trunnion Height.....52½ Inches

Holding Down Bolts
- Number of Holes—Equally spaced.....5
- Diameter of Holes.....1 15/32 Inches
- Diameter of Bolts.....1⅛ Inches
- Diameter of Bolt Circle.....26⅜ Inches

Stand Bearing Diameter—Outside.....29½ Inches
—Inside.....23¼ Inches

Weights
- Stand—Mark 7.....Pounds
- Stand—Mark 7 Mod. 1.....Pounds
- Carriage—Mark 7.....Pounds
- Cradle—Mark 5.....84 Pounds
- Mount—Mark 10.....Pounds
- Mount—Mark 10 Mod. 1.....Pounds
- Shield—Mark 4 Mod. 1.....241 Pounds
- Shoulder Rest—Mark 5.....28 Pounds
- Sight—Mark 5.....7 Pounds
- Gun Mechanism (without magazine)
  - Ribbed Barrel.....141 Pounds
  - Solid Barrel.....150 Pounds

Total weight, gun mechanism (solid barrel) and mount assembly of above components.....Pounds

For other characteristics see Working Circle Drawing, No. 329826.

*Train limited by the length of power cables when mounts are equipped with Mark 14 Mod. 2 gun sight.

MARKS AND MODIFICATIONS

MOUNT MARK	STAND MARK	CARRIAGE MARK	CRADLE MARK	SHIELD MARK	TYPE MARK
2	2	2	2	2	MECHANICAL
2 MOD. 1	2	2	2 MOD. 1	2	MECHANICAL
2 MOD. 2	2	2	2 MOD. 2	2	MECHANICAL
4	4	4	4	4	MECHANICAL
4 MOD. 1	4	4	4 MOD. 1	4	MECHANICAL
4 MOD. 2	4	4	4 MOD. 2	4	MECHANICAL
4 MOD. 3	4 MOD. 1	4 MOD. 1	5	4 MOD. 1	MECHANICAL
5	5	5	4	4	FIXED
5 MOD. 1	5	5	4 MOD. 1	4	FIXED
5 MOD. 3	5	5	4 MOD. 2	4	FIXED
5 MOD. 4	5 MOD. 2	5	4 MOD. 2	4	FIXED (Sub.)
6	6	6	5	4 MOD. 1	HYDRAULIC
10	7	7	5	4 MOD. 1	FIXED (Tripod)
10 MOD. 1	7 MOD. 1	7	5	4 MOD. 1	FIXED (Tripod)

NOTES

NOTES

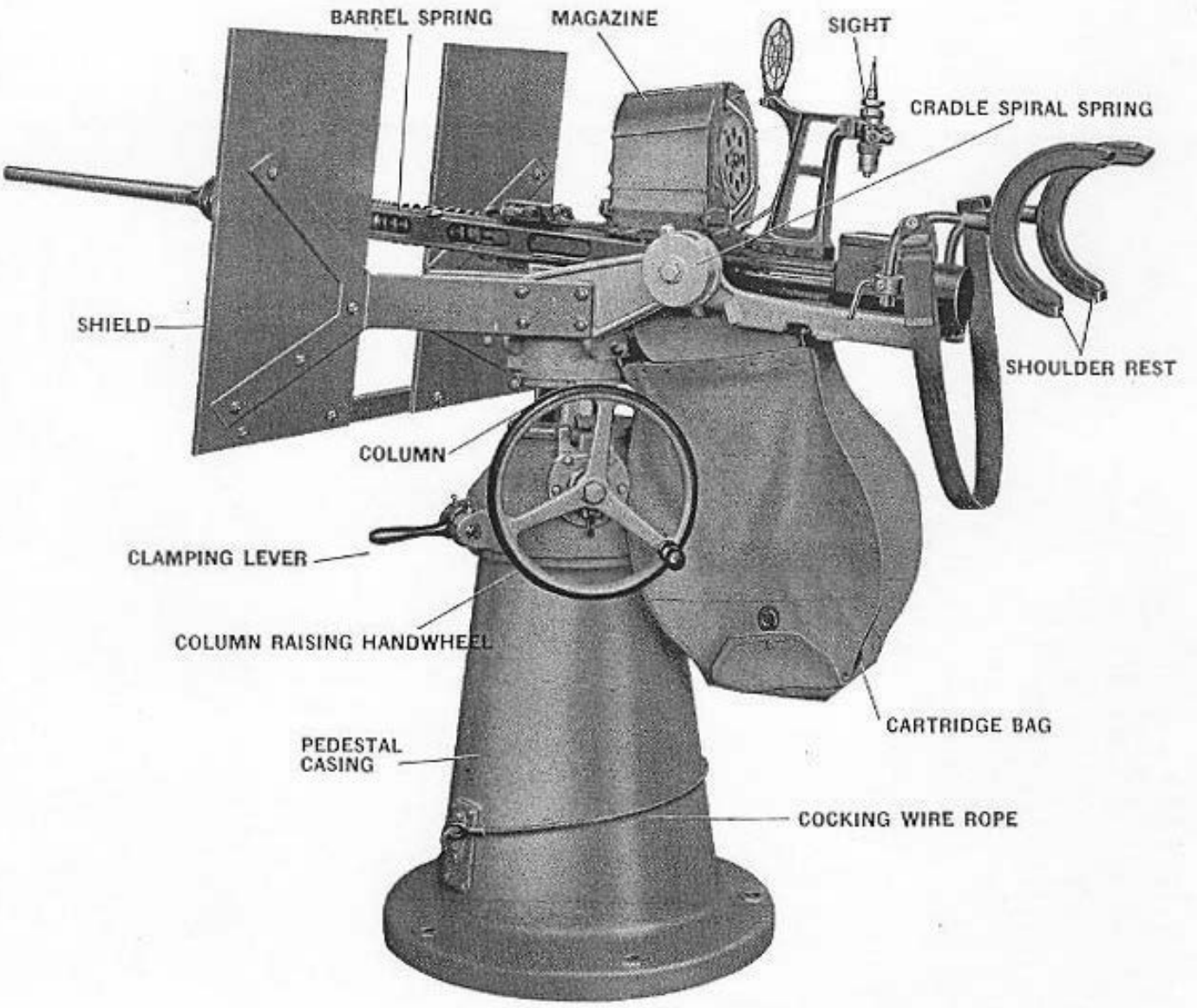

Figure 1—Exterior view showing general arrangement of the Mark 2 and Mark 4, 20 mm. AA Gun and Mount

Chapter 2

MARK 2 MOD. 2 AND MARK 4 MOD. 2 GUN MOUNTS

DESCRIPTION

The mount, Figure 1, permits the height of the gun trunnion above the deck to be easily and rapidly altered for any sight angle, thus enabling the gunlayer to assume the easiest position. This is done by the column raising handwheel mounted on the pedestal head. A tubular column supports the trunnion bracket and carries an internal thread that mates with a screw, driven by the handwheel. The rotatable pedestal head may be locked in any position by the clamping lever. On the base of the pedestal is also located the bracket for the cocking wire rope.

The gun can be trained through 360 degrees and continued around by means of the rotatable combined trunnion bracket and pivot. There is no stop; therefore, the training can be continued on any target without stopping. Train is limited by the length of power cable when mounts are equipped with Mark 14 Mod. 2 gun sight.

The gun can be elevated from minus 5 degrees to plus 87 by means of the rotatable cradle.

The pedestal of the Mark 4 mount has two brackets for the cocking wire rope. The wire rope is hooked in the lower bracket for use when cocking the gun. When the gun has been cocked, the upper end of the cocking wire rope is unhooked from the breech bar, wrapped around the pedestal and hooked over the upper bracket. The lower bracket for the cocking wire rope is shown in Figure 1.

The Mark 2 Mod. 2 mount has the cocking wire rope attached to a spring controlled reel that winds up the cocking rope inside the pedestal when it is not in use.

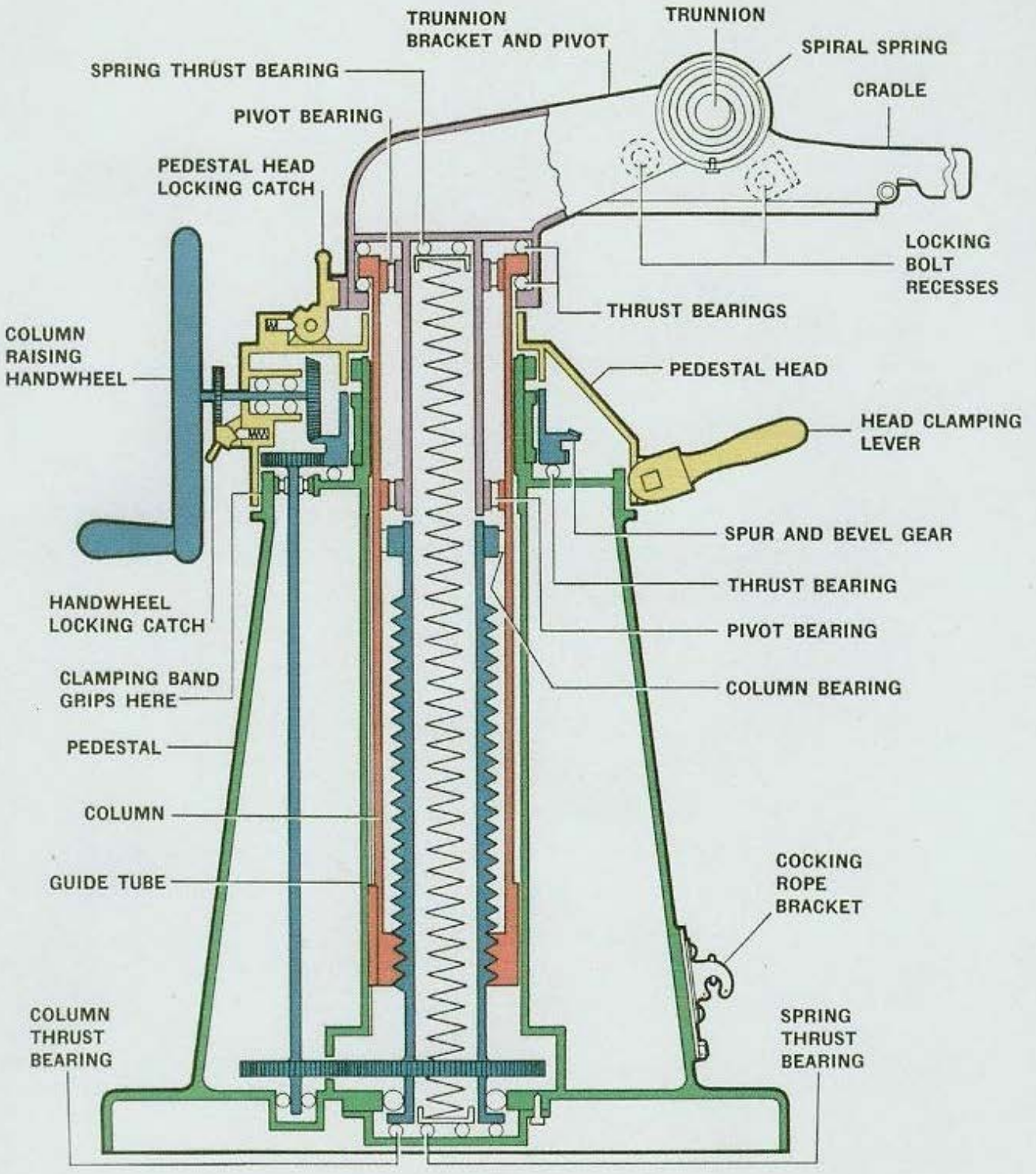

Figure 2—Diagrammatic Arrangement of Mount

Green—Fixed Pedestal
Red—Tubular column
Yellow—Pedestal head
Purple—Combined trunnion bracket and pivot
Blue—Column raising spindle and drive from handwheel

MOUNT CONSTRUCTION

NOTE—Figure 2 is diagrammatic and colored for the purpose of showing operation and is not accurate in construction details.

Plate 1 is a detailed section showing construction and OE and part numbers.

There are five principal parts in the mount as follows:

Fixed Pedestal in **green,** Figure 2 and Plate 1, supports the mount and is bolted to the deck. A cocking wire rope bracket is bolted to the outside and is used to hook the wire rope on when cocking the gun. A bottom cover plate is bolted underneath the pedestal and is the main support for the equalizing springs, the column raising spindle, and the vertical shaft of the gear train. This bottom cover plate has a shim pack which provides the means of adjustment for free movement of the column. A guide tube is fixed within the pedestal and is provided with a vertical keyway in which slides the key on the tubular column.

Tubular Column in **red,** Figure 2 and Plate 1, is constructed with internal threads at its lower end. These internal threads engage external threads on the column raising spindle in **blue** on Figure 2. The handwheel operates the column raising spindle. The drive from the handwheel is shown in **blue** on Figure 2 and Plate 1. The helical springs are inside the column raising spindle and the pivot and they are placed in series in compression, being separated by a spacing ring. Guide tubes hold these springs, the lower external guide tube being supported by a thrust bearing in a bushing on the bottom cover plate.

CAUTION—These compressed helical springs must not be disassembled unless a special fixture is used. The heavy compression these springs are under will cause serious injury unless the compression is eased off.

Pedestal Head in **yellow,** Figure 2 and Plate 1, through which the column rises, is able to rotate around the top of the fixed pedestal but can be held in any desired position by a spring steel clamping band that is operated by a lever. The pedestal head contains the handwheel drive, a double gear consisting of a bevel and spur for the purpose of transmitting the drive, and the clamping band with its lever.

Combined Trunnion Bracket and Pivot in **purple,** Figure 2 and Plate 1, is free to rotate around the top of the column on thrust bearings, which take upward and downward thrust, and in roller bearings located between the column and the trunnion bracket and pivot. It carries the trunnion arms that have plain bearings for the trunnion pins of the cradle.

NOTE—Two holes, each being one and one-half inches in diameter, are provided in the trunnion arms. These holes are directly above the center of gravity of the mount and a cable through these holes will support the mount in a vertical position.

CRADLE MARK 4 MOD. 2

The cradle supports the gun and is carried on two trunnion pins located in the arms which extend rearward on the carriage. The cradle rotates freely on the right trunnion pin. The left trunnion pin is keyed to the cradle in order to form an abutment for the cradle spiral spring.

In some earlier cradles, two cavities or pockets were cast in the rear end and these were filled with lead. See Section C-C, Plate 1. Later cradles were cast solid. The cradle is provided with machined grooves at the front and rear end in which the shoes of the gun breech casing engage. See Figure 3. The gun is held in position in these grooves by a securing bolt assembled to the underside of the cradle. See Figure 3, and Plate 1.

The torsion spring which is assembled to the left trunnion pin and anchored in the housing, Figure 2 and Section A-A, Plate 1, is used to compensate for the unbalance of the oscillating parts about the trunnion. This spring is placed under tension when the cradle is locked in the 87 degree elevation by turning its housing two or three notches when assembling the housing to its cover.

The cradle may be locked in either 5 degree or 87 degree elevation by a locking bolt built in the right side of the carriage.

A sheave, mounted on a pin in a slot in the left rear corner of the cradle, is used to facilitate cocking the gun with wire rope assembly (OE-2029).

The cartridge bag which accumulates the fired cartridge cases is attached to the cradle at its rear end.

NOTE—Earlier cradles Marks 2 and 4 used on Marks 2 and 4 Mounts did not have provisions for mounting Mark 14 Mod. 2 sight, interfered with installation or removal of the integral type shoulder rest Mark 5, and lacked provision for the cocking rope sheave. Ordalts Nos. 1186, 1269, and 1366 were issued to all ships and stations equipped with 20 mm. Antiaircraft guns. Performance of these Ordalts corrects these conditions and converts the Mark 2 cradle to Mark 2 Mod. 1 and Mark 4 cradle to Mark 4 Mod. 1 cradle.

TRUNNION BRACKET AND PIVOT LOCKING BOLT

This lock is built into the right side of the carriage to lock the cradle in the plus 5 degree or plus 87 degree positions. It consists of: Locking bolt (OE-2070), bolt knob (OE-2072), bolt knob pin (OE-2140), bolt spring (OE-2074), bolt bushing (OE-2071), two spring retaining pins (OE-2141), and bushing retaining pin (OE-2260). See Plan View, Plate 1.

The large end of the bolt operates in a horizontally drilled hole in the carriage. Locking the cradle in position is accomplished by releasing the bolt knob so that it rests flush with the bushing. When it is desired to train the gun without restriction, or change the elevation position, the knob should be pulled out and turned one-quarter turn.

GUN SECURING BOLT

This bolt is assembled in the floor of the cradle. It is of the spring loaded type and should always be engaged in the breech casing when the gun is in place. This assembly consists of: Bolt (OE-2188), bolt locating pin (OE-2262), bolt spring (OE-2189), bolt withdrawing head (OE-2190), and withdrawing head securing pin (OE-2261). See Main Section View, Plate 1, also Figure 3.

To operate the bolt pull it downward by the withdrawing head located on the bottom of the cradle and turn one-quarter turn to hold it out of engagement.

CARTRIDGE BAG

This bag which collects the fired cartridges is suspended at its front end from the carriage and at its rear end from the cradle. A flap with a snap fastener is provided at the bottom of the bag to permit the bag to be emptied easily.

A weight suspended from the pivot bolt, which passes through extensions on the front end of the cheek plates, serves as a deflector for the cartridges when entering the bag. See Plate 1.

ROTATING THE PEDESTAL HEAD

The pedestal head can be turned by hand to any position desired when the clamping lever (Figure 1 and Plate 1) is raised. The pedestal head can be locked in any position by depressing the clamping lever.

NOTE—The column raising handwheel tends to turn idly during the rotation of the pedestal head, and the rotation of the head can be assisted by turning the handwheel.

RAISING OR LOWERING THE COLUMN

When the pedestal head is locked so that it cannot rotate the action of turning the handwheel, Figure 2 and Plate 1, drives the gear train (shown in **blue**). The column (shown in **red**) has threads that are engaged in the threads of the column raising spindle and is prevented from turning by a key that is in a vertical keyway in the guide tube. The column, therefore, rises with the gun and the weight of the rising parts is taken by the compressed internal helical springs which aid in raising the gun. The rise of the gun is limited by the upper stop ring secured to the top of the spindle. A lug on the spindle spur gear acts as the lower stop.

NOTE—A locking catch is provided to lock the handwheel and thus fix the column at any height. A housing catch is also fitted to lock the combined trunnion bracket and pivot, when it is in its lowest position, to the pedestal.

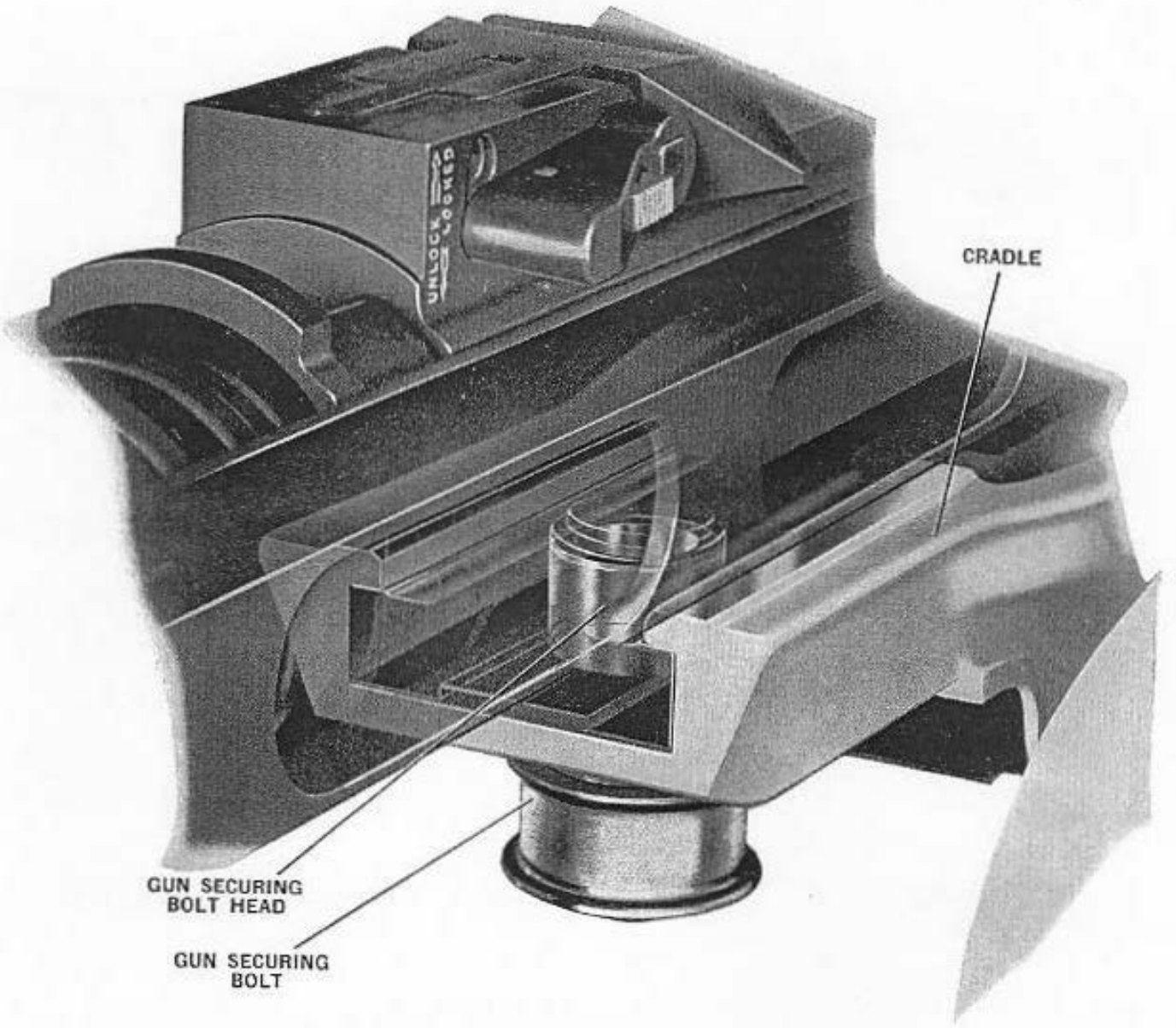

Figure 3—Gun Mounting showing securing shoes and securing bolt

MOUNT MARK 4 MOD. 3

GENERAL DESCRIPTION

This is a modification of the Mark 4 Mod. 2 mount to provide improved lubrication and exclude water from the interior of the mount.

In addition to the new lubrication provisions, this new mount uses Mark 4 Mod. 1 trunnion bracket and pivot, Mark 5 cradle, the cradle lock used on Mark 6 mounts, a modified pedestal casing, and a new pedestal head cover.

Due to the importance of incorporating additional lubrication provisions in Mark 2 and Mark 4 mounts now in service, Ordalt No. 1398, has been issued to cover such modifications as can be made on shipboard and at shore bases.

Detailed information regarding new lubrication provisions and parts used is given in the following paragraphs.

DETAILED DESCRIPTION

Lubrication: See lubrication chart, Figure 4.

(a) Direct lubrication is provided to the equalizing spring upper thrust bearing through a diagonally drilled hole leading from the top surface of the trunnion bracket and pivot to the bearing seat. A slotted pipe plug is used to close the hole. See Plate 1.

(b) Lubrication to the trunnion bracket and pivot upper and lower needle bearings is provided through an oil hole drilled in the top surface of the trunnion bracket and pivot. This hole is also closed by a slotted pipe plug. See Plate 1.

(c) Lubrication is provided to the bevel and spur wheel gear bushing through a hole in the pedestal head and drilled holes in the bevel and spur wheel gear. Lubrication to the pedestal head lower bearing is provided by squirting oil into the recess at the top of the pedestal through this plug hole. The hole in the pedestal head is fitted with a slotted pipe plug. See Plate 1.

(d) The upper part of the pedestal head lower bearing is lubricated by squirting oil into the trough located inside the head below the pipe plug hole referred to in (c). See Plate 1.

(e) Two oil holes are provided in the pedestal cover to lubricate the pedestal head bushing and column guide bushing. The holes are closed by slotted pipe plugs. See Plate 1.

(f) Lubrication is provided to the handwheel bevel pinion bearings through an oil hole drilled in the handwheel drive housing. This hole is closed by a slotted pipe plug. See Plate 1.

(g) Two pressure oilers are fitted 180 degrees apart in the wall of the trunnion bracket and pivot to provide lubrication to the two column thrust ball bearings.

(h) Pressure oilers are also screwed in the clamping lever spindle bearings to provide lubrication to the spindle. See Plate 1.

(i) A pressure fitting is also used in one end of the locking catch pivot pin to lubricate the pin. See Plate 1.

(j) A pipe plug in the pedestal casing permits access to a 45 degree street ell in the column guide bushing to provide lubrication to the column guide lower bearing bushing. See Plate 1.

(k) To permit access to the vertical shaft lower spur wheel and column raising spindle spur wheel for cleaning and lubrication, the rectangular hole near the lower part of the pedestal casing has been increased in size and relocated approximately 195 degrees clockwise. See Plate 1.

(l) To more effectively seal the column against the entrance of water, a new seal is employed in place of the felt ring formerly used. See Plate 1.

(m) A drain pipe extending from the bottom cover to the pedestal base flange permits drainage of water which may accumulate in the sections of the cover housing, the vertical shaft lower bearing and column lower bearing. At its outer end this pipe is fitted into a bushing which screws into the

base flange. The opening in the bushing through which the pipe extends is fitted with a pipe plug which should be reinstalled after draining is completed. The bearings in the cover may be lubricated if necessary through this pipe. See Plate 1.

(n) A pipe plug screwed in the base flange opposite the drain tube pipe plug can be removed to drain any water which may accumulate inside the pedestal casing. See Plate 1.

TRUNNION BRACKET AND PIVOT MARK 4 MOD. 1

The new part is a modification of Mark 4 trunnion bracket and pivot. The arms that extend rearward are longer to permit moving the cradle further back and provide more efficient ejection of cartridge cases when firing at high angles. The oil reservoir in the top of the trunnion bracket has been removed. Two oil holes with slotted pipe plugs are provided in the top surface to provide lubrication to the equalizing spring upper thrust bearing and the trunnion bracket and pivot needle bearings.

CRADLE MARK 5

The cradle is the same as used on Mark 6 Mounts and permits the gun to be elevated 90 degrees instead of 87 degrees as was the limit with the former cradle.

The depression of the gun is limited to 5 degrees. In this position the forward end of the cradle rests on two bosses cast in the top surface of the carriage.

CRADLE LOCK

The cradle lock is the same as used on Mark 6 Mounts.

PEDESTAL CASING

The pedestal casing is modified to provide access to the vertical shaft lower spur gear and column raising spindle spur wheel as described in paragraph (q) under "Lubrication". This change involves the use of a larger cocking rope bracket base.

PEDESTAL HEAD COVER

In place of the separate pedestal oil reservoir and lid fitted with a felt ring formerly used, a new cover is now employed. Two oil passages which provide lubricant to the column upper bushings are drilled in the top surface. These holes are closed by slotted plugs. A large recess is provided in the center of the cover into which the new seal is pressed.

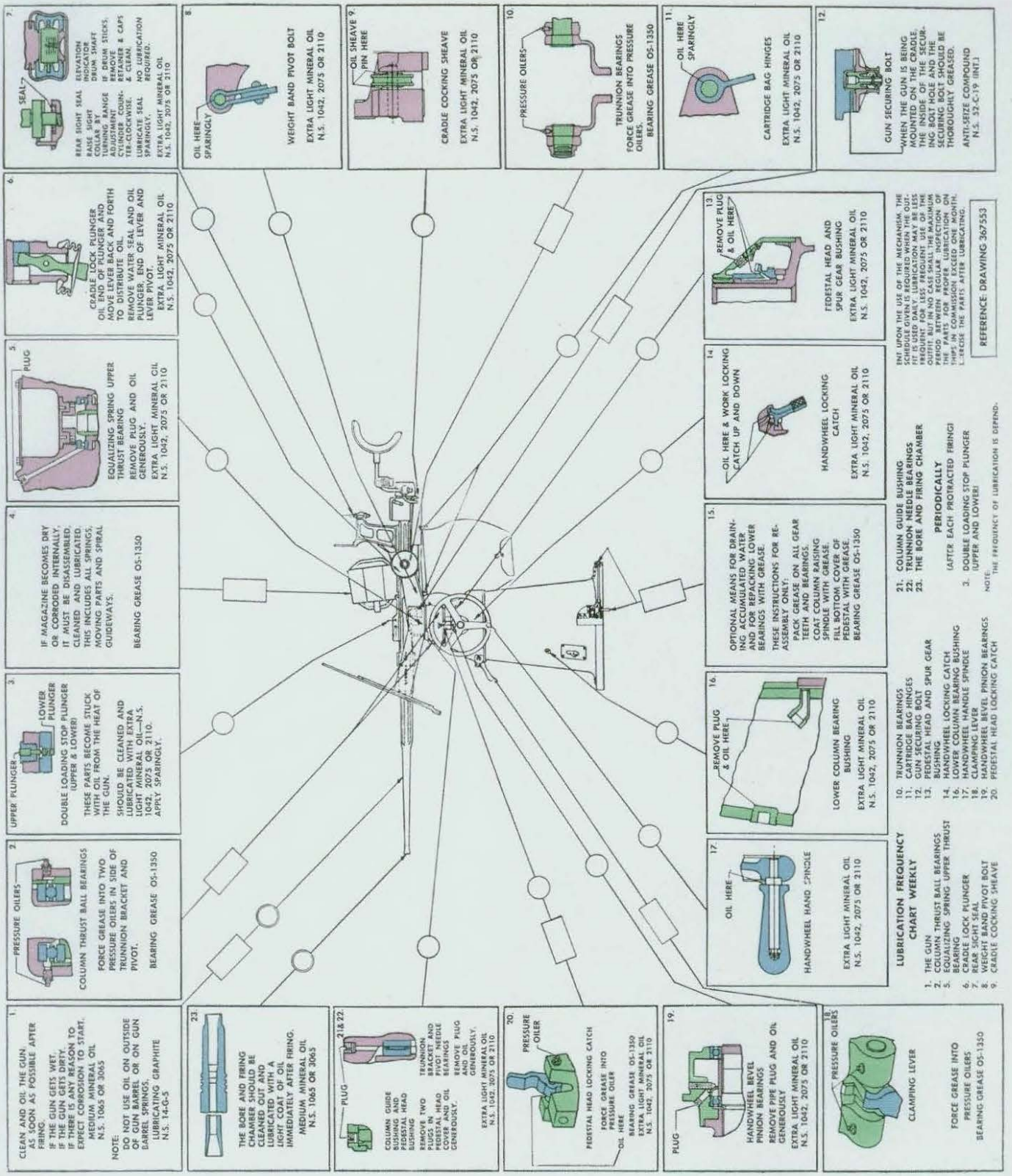

Figure 4—Lubrication Chart Mark 4 Mod. 3 Mount

LUBRICATION—See lubrication chart, Figure 4. (Also applies to all Mark 2 and Mark 4 mounts modified in accordance with Ordalt No. 1398.)

(a) When the gun is being mounted in the cradle, the inside of the securing bolt hole in the breech casing, and the securing bolt itself should be thoroughly coated with Anti-seize compound, Navy Specification 52-C-19 (Int.).

(b) Equalizing spring upper thrust bearing (OE-2097)—Remove slotted pipe plug (OE-3525) from top surface of trunnion bracket and pivot and oil the bearing generously with extra light mineral oil, Navy Symbol 1042, 2075 or 2110, using an oil can. (On some older mounts, remove the ⅛" pipe plug in screw plug (OE-2081) to lubricate the bearing.)

(c) Trunnion bracket and pivot needle bearings—upper (OE-2096) and lower (OE-2095)—Remove second slotted pipe plug (OE-3525) from top surface of trunnion bracket and pivot and oil the bearing generously with extra light mineral oil, Navy Symbol 1042, 2075 or 2110, using an oil can.

(d) Pedestal head bushing (OE-2055)—Remove slotted pipe plug (OE-3525) located near outer edge of pedestal cover and oil generously with extra light mineral oil, Navy Symbol 1042, 2075 or 2110, using an oil can. (On older mounts inject the oil into the oil reservoir after removing the plug and its gasket or slotted pipe plug (OE-3525) from oil reservoir lid (OE-2014).

(e) Column guide bushing (OE-2016)—Remove slotted pipe plug (OE-3525) located near center of pedestal cover and oil generously with extra light mineral oil, Navy Symbol 1042, 2075 or 2110, using an oil can. (On older mounts this bushing is lubricated through the same hole mentioned in (d).

(f) Handwheel bevel pinion bearings (OE-2142)—Remove pipe plug (299759-5) in handwheel drive housing and oil generously with extra light mineral oil, Navy Symbol 1042, 2075 or 2110, using an oil can.

(g) Pedestal head locking catch spring bolt (OE-2048)—Oil tip of bolt with a few drops of extra light mineral oil, Navy Symbol 1042, 2075 or 2110.

(h) Handwheel locking catch spring bolt (OE-2051)—Oil tip of bolt with a few drops of extra light mineral oil, Navy Symbol 1042, 2075 or 2110.

(i) Handwheel spindle (OE-2128)—Apply a few drops of extra light mineral oil, Navy Symbol 1042, 2075 or 2110, to spindle adjacent to handwheel.

(j) Bevel and spur wheel gear ball thrust bearing (OE-2054) and pedestal head (299744-2)—Remove headless pipe plug (12-Z-307-7) in pedestal head, adjacent to handwheel and with an oil can inject extra light mineral oil, Navy Symbol 1042, 2075 or 2110 into trough in gear. Rotate column slowly when doing this to fill the trough. Also inject oil into the trough on the inside of the pedestal head to lubricate the upper part of the pedestal head bearing.

(k) Column lower bearing bushing (OE-2033)—Remove headless pipe plug (12-Z-307-7) in pedestal casing just above cocking rope bracket and fill 45° street ell (12-Z-326-56), screwed into the side of column guide bushing (OE-2016), with extra light mineral oil, Navy Symbol 1042, 2075 or 2110, using an oil can. Rotate column when oiling this point. Reinstall the pipe plug.

(l) Cradle trunnion pins (OE-2160 and OE-2161)—Force grease (OS-1350) into the two pressure oilers (OE-2259) above the pins, using grease gun (OE-1637).

(m) Column thrust bearings (two) OE-2093—Force grease (OS-1350) into the two pressure oilers (OE-2259), located 180° apart, in the side of the trunnion and pivot bracket (367558-1), using grease gun (OE-1637).

(n) Pedestal head locking catch pivot pin (OE-2049) force grease (OS-1350) into pressure oiler in the end of the pivot pin, using grease gun (OE-1637).

(o) Clamping lever spindle (OE-2037)—Force grease (OS-1350) into the two pressure oilers (OE-2259) in the pedestal head adjacent to clamping lever (OE-2045), using grease gun (OE-1637).

(p) Draining water from bottom cover and lubricating bottom cover ball thrust bearing (OE-2077) and lower column raising spindle ball bearing (OE-2134)—Remove pipe plug (12-Z-313-5) in bushing in base flange and inject grease (OS-1350) into tube. Reinstall pipe plug.

(q) When necessary vertical shaft spur wheel—lower (OE-2111) and column raising spindle spur wheel (OE-2112) can be cleaned and lubricated by removing the four screws (OE-2157) and lock washers (OE-2270) attaching cocking rope bracket assembly (300016) to the pedestal. Clean the gears by swabbing with a brush dipped in kerosene. Lubricate with bearing grease (OS-1350) applied by brush (OE-1607).

(1) On older mounts this operation is not practical without stripping the mount due to the cocking rope bracket base being smaller and located on the opposite side.

Operation Number

1. Remove the gun assembly by pulling outward on the gun securing bolt (OE-2190) and sliding the gun out of the cradle.

2. Remove the cocking rope (OE-2029) if it is on the pedestal.

3. Remove the cartridge bag (OE-2198), the cartridge check plates (OE-2175-Right and OE-2174-Left) and weight and strap assembly (OE-2207).

4. Remove the shield from the trunnion bracket pivot, as follows: Remove shield strap (OE-2226) from the shield by removing bolts (OE-2227) and nuts (OE-2229). Remove shield plate (OE-2219) by taking out bolts (OE-2228) and nuts (OE-2229). Remove shield brackets (OE-2220 and OE-2221) from the trunnion bracket pivot by taking out bolts (OE-2218), nuts (OE-2217) and lock washers (OE-2275).

5. Remove the elevation counterbalance spring on the cradle, as follows: Lock the cradle at 90 degrees elevation. (Mounts with Mark 4 Mod. 1 and Mod. 2 cradles are limited to 87 degrees elevation.) Remove pin (OE-2268) that secures spring housing retaining nut (OE-2163). Remove this nut (OE-2163), using open end wrench (OE-2904) Figure 5. Remove (OE-2164) spring housing together with spring (OE-2169) and spring securing bolt (OE-2168). Remove housing cover (OE-2165) by taking out the securing screws (OE-2256).

   NOTE—The cover and housing have serrated edges and the housing was turned clockwise two or three serrations before the serrated edges were joined. This was done to give the spring an initial tensioning. Keep hands clear of the serrated edges to avoid injury. The spring housing (OE-2164) has its bushing (OE-2166) pressed in. The spring bolt (OE-2168) is screwed in and can be removed with its washer (OE-2278) using adjustable wrench (OE-1606). The outer end of the spring is hooked over (OE-2168) with the end of the spring projecting to the left when looking into the case. See Figure 23.

   Drive out pin (OE-2269) securing cradle trunnion pin nut. Remove nut (OE-2162) using open end wrench (OE-2904) and trunnion pin spanner (OE-3157), see Figure 52. Drive trunnion pin (OE-2160) inward, off its key (OE-2191). Remove both pins (OE-2160 and OE-2161).

6. **Remove the cradle sub-assembly and strip as follows:** Drive pin (OE-2261) out of gun securing bolt head (OE-2190) and remove head. Remove spring (OE-2189) and bolt assembly from the cradle. Remove pin (OE-2262) from gun securing bolt (OE-2188).

7. Remove the two cap screws and lockwashers securing cover plate (299946-5) and remove cover and gasket (299946-6). Secure the helical equalizing springs (OE-2001) by removing the pivot closing cap screw (299923-7), and the cap, using wrench (OE-2901) Figure 5, from the recess in the center of the pivot. Remove screw plug (OE-2081), using wrench (OE-2901), from pivot closing cap (OE-2078). Insert this plug in the top of the tension tube and tighten until the flange touches the bearing race.

   NOTE—This plug (OE-2081) when screwed into the tension tube (OE-2082) holds the 650-pound load of the equalizing springs; therefore, this plug must NEVER be removed unless special fixture (367539) is used. See page 47 for instructions on the use of this special fixture.

8. Raise the pivot head approximately 4 inches and remove the column raising handwheel assembly complete in its housing by taking out its securing bolts and washers (OE-2253 and OE-2270). To remove handwheel (OE-2104), remove nut (OE-2125) and washer (OE-2274). Remove key (OE-2258). Remove two set screws (OW-2137) from drive housing (OE-2110) and withdraw the pinion (OE-2108), bearings (OE-2142), spacer (OE-2123) and retainer (OE-2136). Remove pin (OE-2140), plunger (OE-2051) and spring (OE-2053). Place the mount on its side on a suitable support.

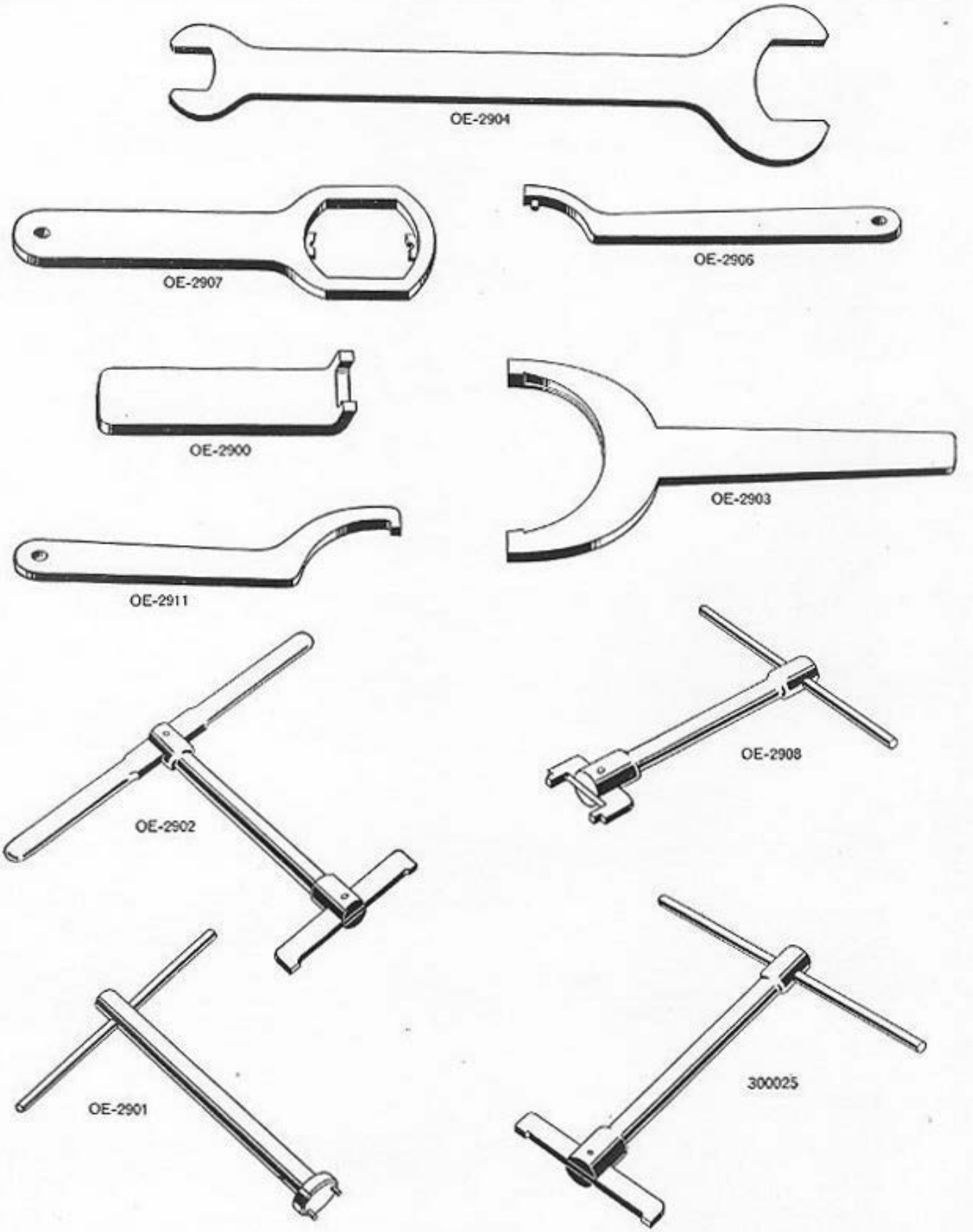

Figure 5—Mount Tools

Operation Number

9. Remove the trunnion bracket and pivot coupling nut securing bolt (OE-2069), washer (OE-2277) and coupling nut (OE-2032), using spanner wrench (OE-2903), Figure 5. Remove the trunnion bracket and pivot through the roller bearings at the top of the pedestal.

10. Remove cradle locking bolt locking screw (OE-3517), spring (OE-3516), ball (OE-3511), water seal (OE-3519), pin (OE-3513), lever (OE-3512), spacers (OE-3518), and plunger (299943-5). See Plate 1.

    (a) On older mounts, remove the cradle locking bolt bushing retaining pin (OE-2260) and locking bolt assembly (OE-2009).

11. On older mounts remove the four trunnion bracket cover screws (OE-2249) and cover (OE-2061).

12. Remove retainer ring set screw (299923-7) and bearing lower retaining ring (OE-2034) from the lower end of the trunnion bracket and pivot, using spanner (OE-2906), Figure 5. Remove inner race of lower needle bearing (OE-2095).

13. Remove from the trunnion bracket and pivot, retaining ring lockwire (OE-2073), set screw (OE-2092), retaining ring (OE-2036), and inner race of column upper needle bearing (OE-2096).

14. Remove the three round head screws (367557-8) from trunnion bracket and pivot (367558-1). Insert a small punch through the screw holes and drive out upper race of thrust bearing (OE-2093).

    (a) On older mounts remove three countersunk screws (OE-2248) instead of round head screws.

15. Remove slotted pipe plugs (OE-3525) from trunnion bracket and pivot (367558-1). Also remove two pressure oilers (OE-2259) from side of trunnion bracket and pivot.

    (a) On older mounts, remove plug and gasket from trunnion bracket cover (OE-2061).

16. Remove the column thrust ball bearing race (OE-2093) and the ball cage assembly (OE-2093) from the upper side of the flange at the top of the column.

17. Remove the equalizing springs and tube assembly complete with ball bearings at each end. This assembly is removed from the top.

    NOTE—Do not unscrew the plug at the top of this assembly or attempt to disassemble the equalizing springs unless a special fixture is used. The heavy compression these springs are under will cause serious injury unless the compression is eased off.

    See Instructions and Illustrations on Pages 47 to 52 for stripping and reassembling the equalizing springs.

18. Remove pipe plug (12-Z-313-5) and drain tube bushing (367564-2) from the base flange of pedestal (299742-2).

    Also remove pipe plug (12-Z-313-5) from the opposite side of the base flange.

Mount Tools

OE-2900—Spanner for OE-2038 and OE-2039
OE-2901—Spanner for OE-2078 and OE-2081
OE-2902—Spanner for OE-2035
OE-2903—Spanner for OE-2032
OE-2904—Open end wrench for OE-2162 and OE-2163
OE-2906—Spanner for OE-2034
OE-2907—Spanner for OE-2129
OE-2908—Spanner for OE-2118
OE-2909—Tool for removing OE-2095
OE-2910—Tool for removing OE-2096
OE-2911—Spanner for OE-2126
OE-2912—Tool for assembling OE-2016, OE-2057 and OE-2055
OE-2913—Tool for assembling OE-2057 and OE-2055
OE-2914—Tool for assembling OE-2012, OE-2033 and removing OE-2016
OE-2915—Tool for removing OE-2016
OE-2916—Tool for removing OE-2114
OE-2917—Spindle for assembling OE-2112, OE-2134, OE-2057, OE-2055, OE-2016 and OE-2033
OE-2918—Aligning tool for OE-2016
OE-2919—Tool for removing OE-2033
OE-2920—Handwheel for assembling OE-2134, OE-2112, OE-2057, OE-2055, OE-2016 and OE-2033
OE-2921—Disc for assembling OE-2033, OE-2016, OE-2112, and OE-2134
OE-2922—Puller for OE-2112 and OE-2134
OE-2923—Disc for removing OE-2112
OE-2924—Tool for assembling OE-2112 and OE-2134
OE-2925—Puller for OE-2057 and OE-2055
OE-2926—Disc for removing OE-2057 and OE-2055
OE-2927—Puller for OE-2114
OE-2928—Puller for OE-2033
OE-3157—Spanner for OE-2161
300025—Spanner for OE-2116
367539—Helical equalizing spring compression tool
OE-1637—Grease gun, or
299832-5—Grease Gun

Operation Number

Remove the eight bottom cover screws (OE-2255) and lockwashers (OE-2273). To force cover (OE-2011) out of the pedestal, screw three of the cover screws into the tapped holes in the cover. Remove cover (OE-2011) with lower race and balls of thrust bearing (OE-2077), shims (OE-2294), (OE-2295), and (OE-2296). Remove the upper race of thrust bearing (OE-2077) from the lower end of column raising spindle (OE-2080). Remove the bearing race from cover (OE-2011).

19. Remove the upper needle bearing retaining spring ring (OE-2075) from column. Remove the outer race and rollers of the trunnion bracket and pivot **upper** needle bearing (OE-2096) from the column (OE-2079), using tool (OE-2910), Figure 6. Tilt and insert tool (OE-2910) through the race and hold it against the lower side of the race by a pull on the loop handle of the tool. If sufficient force cannot be exerted to remove the race by pulling on the loop, it must be driven out by using a steel bar inserted from the lower side. Remove the lower bearing retaining spring ring.

To remove the trunnion bracket and pivot **lower** needle bearing outer race (OE-2095) from the

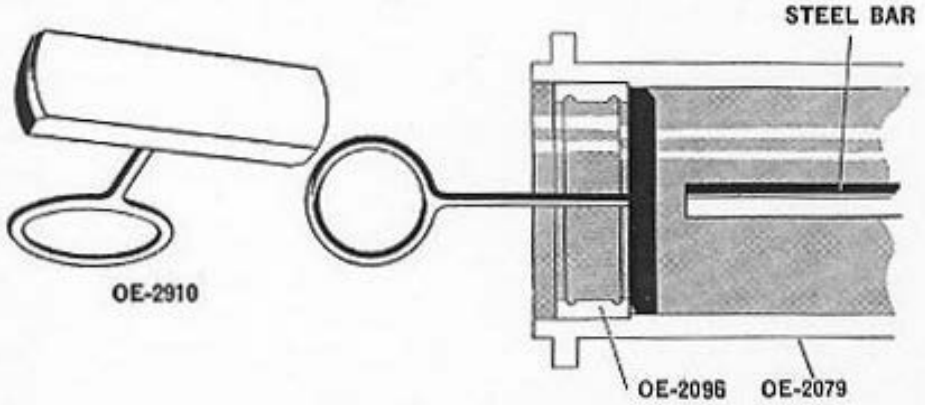

Figure 6—Removing outer race (OE-2096) from the column (OE-2079)

column (OE-2079) requires the use of tool (OE-2909), Figure 7. Insert tool (OE-2909) through the race and hold it against the lower side of race by a pull on the loop handle of the tool. If sufficient

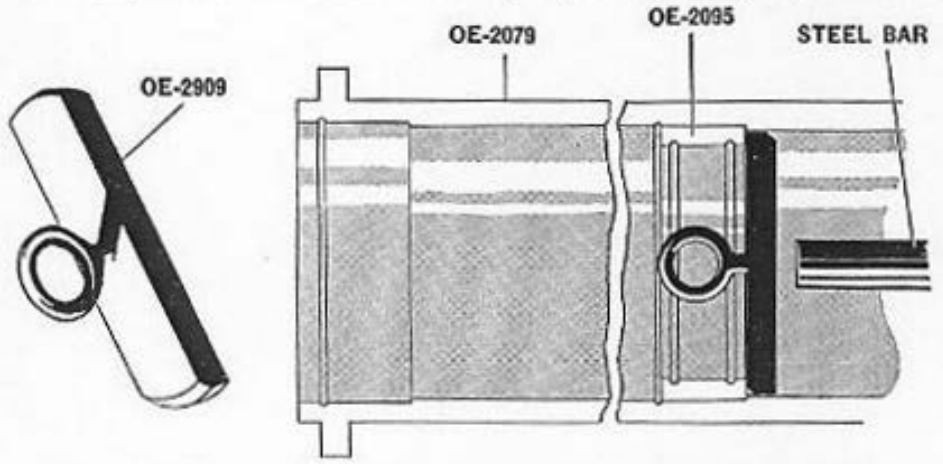

Figure 7—Removing trunnion bracket and pivot lower needle bearing outer race (OE-2095) from column (OE-2079)

force cannot be exerted to remove the race by pulling on the loop, the race must be driven out by using a steel bar inserted from the lower side.

Operation Number

20. Turn the column raising spindle assembly downward so that the lower end projects about six inches beyond the base of the pedestal so that the parts will be accessible.

21. Remove the lower spring housing bushing lock screw (OE-2251), lower spring housing bushing (OE-2129) using spanner wrench (OE-2907) and retaining ring (OE-2126) using spanner wrench (OE-2911). Remove the bearing (OE-2134) and the spur gear (OE-2112) from the spindle (OE-2080), as follows: Place hooks of puller tool (OE-2922) back of the gear teeth. Place the tool disc (OE-2923) over the end of the column raising spindle (OE-2080) Figure 8. Turn the center screw of puller tool (OE-2922) inward so that it presses against the disc (OE-2923) as shown in Figure 8. Turning the tool handle will press the ball bearing (OE-2134) and spur wheel (OE-2112) off the column raising spindle (OE-2080). Remove column raising spindle keys (OE-2239).

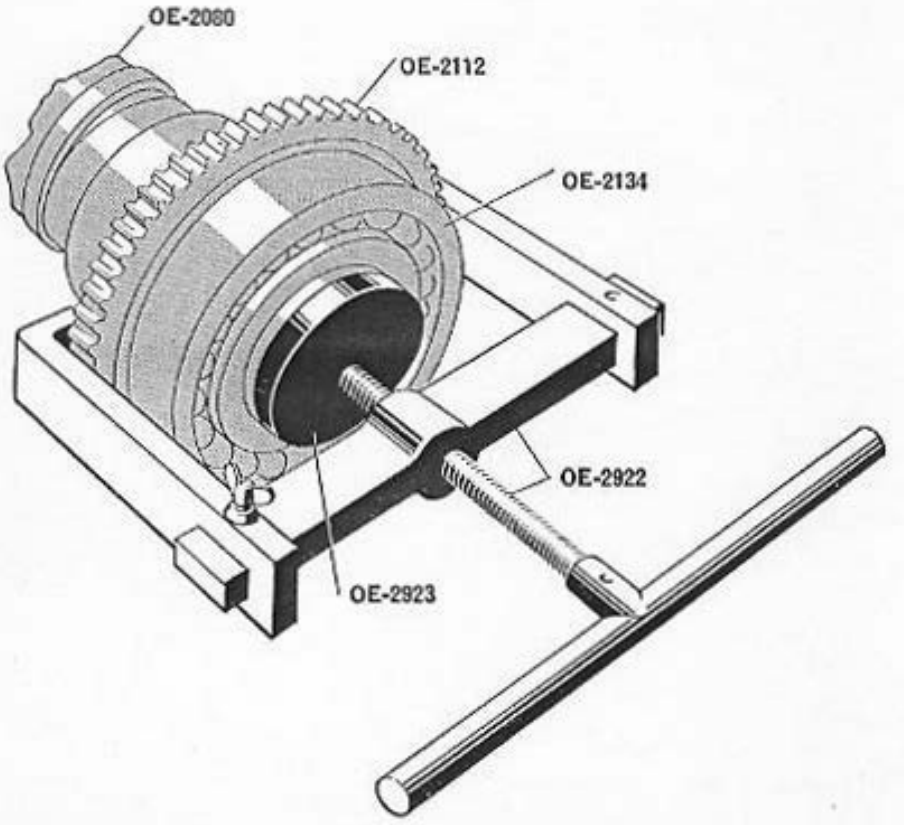

Figure 8—Using puller (OE-2922) and disc (OE-2923) to strip ball bearing and spur wheel from column raising spindle

22. Withdraw the column raising spindle (OE-2080) complete with the upper roller bearing (OE-2056), the stop ring (OE-2114), keys (OE-2238), retainer ring (OE-2116) and lock screw (299923-7), through the top of the mount by rotating the spindle in the threads in the column (OE-2079).

23. Strip the column raising spindle assembly, as follows: Remove the column raising spindle needle bearing ring set screw (299923-7). Remove the column raising spindle needle bearing retaining ring (OE-2116) using tool (300025), Figure 5. Remove upper stop ring needle bearing (OE-2056). To remove column raising spindle upper stop ring (OE-2114) from upper end of column raising spindle (OE-2080) requires the insertion of the column raising spindle back into the column as shown in Figure 9, and the use of special tools as follows:

OE-2927—Puller OE-2916—Bar

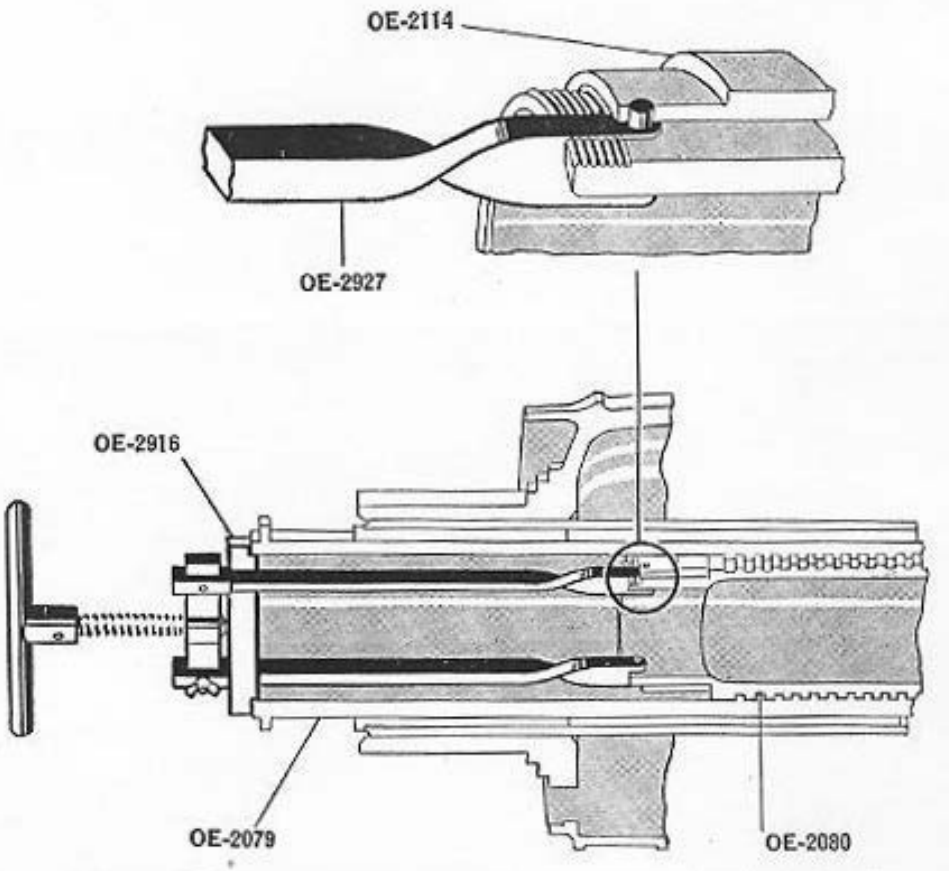

Figure 9—Removing column raising spindle upper stop ring (OE-2114) from column raising spindle (OE-2080)

Operation Number

Insert the pins that are on the lower ends of the puller (OE-2927) into the holes in the column raising spindle upper stop ring (OE-2114). Place the bar (OE-2916) on the upper end of column (OE-2079) and exert pressure by turning the center screw.

Column raising spindle (OE-2080) is stripped and can be unscrewed from pedestal.

24. Remove column lower bearing bushing retaining ring set screw (299923-7) and ring (OE-2035) using spanner wrench (OE-2902), Figure 5.

25. Remove the column lower bushing (OE-2033) and the bronze key (OE-2085) and screws (OE-2247) from the lower end of (OE-2079). Use puller (OE-2928) and tool (OE-2919) as shown in Figure 10. Hook the lugs that are on the lower ends of puller (OE-2928) into the holes in the column lower bearing bushing (OE-2033). Place special tool (OE-2919) on the lower end of the fixed pedestal casing (299742-2) and exert pressure with the center screw.

26. Remove the key (OE-2085) and screws (OE-2247) from the bushing (OE-2033).

27. Remove the six pedestal cover screws (12-Z-51-323) and lockwashers (12-Z-22-288) and loosen pedestal cover (367556-1) from the pedestal (299742-2).

    (a) On older mounts remove the six oil reservoir lid screws (OE-2250) before loosening the lid (OE-2014) from oil reservoir (OE-2013).

28. Withdraw column (OE-2079) together with thrust bearing (OE-2093), coupling nut (OE-2032), bushing (OE-2031), pedestal head cover (367556-1), oil seal (367556-2), and key (OE-2090) from the top of the mount. To strip column (OE-2079), remove key (OE-2090) and slide the rest of the parts off the end of the column.

Operation Number

29. Oil seal (367556-2) should not be removed from pedestal head cover (367556-1) unless it is to be replaced with a new one. It can be driven out with a drift applied from underneath.

(a) On older mounts remove lock wire (OE-2152), screw (OE-2015), and washers (OE-2017) from oil reservoir (OE-2013) and remove the reservoir.

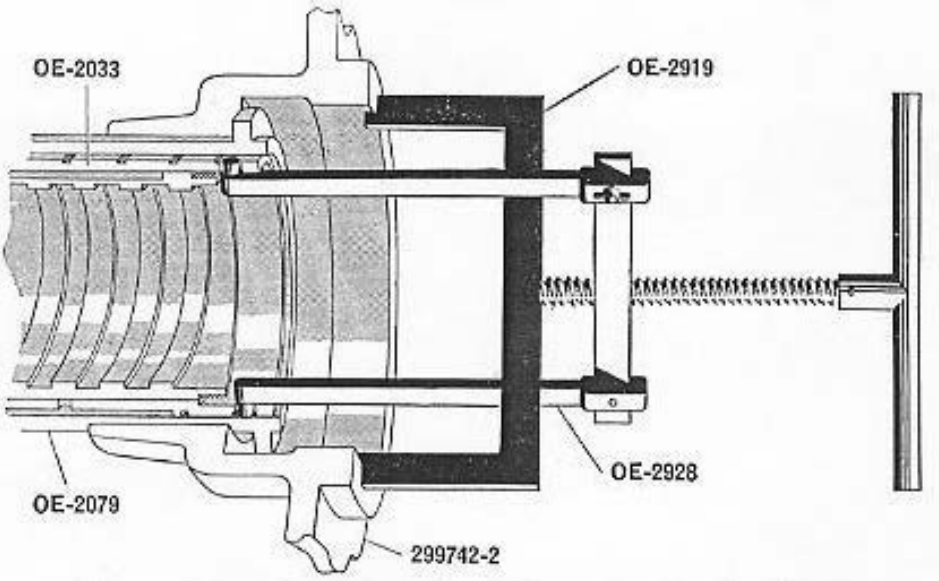

Figure 10—Removing column lower bearing bushing (OE-2033) from column (OE-2079)

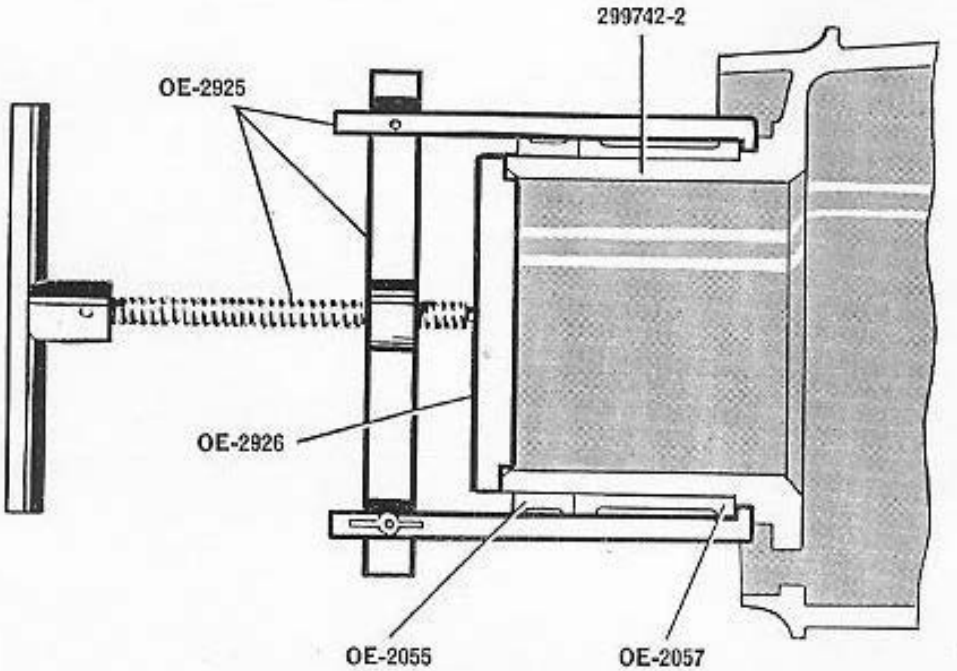

Figure 11—Removing bevel and spur wheel gear bushing (OE-2057) and pedestal head bushing (OE-2055) from fixed pedestal casing (299742-2)

30. Lift off the pedestal head assembly from the steel bushing at the upper end of the pedestal and strip as follows: Remove pedestal head locking catch pivot pin securing pin (OE-2241), pivot pin (OE-2049), pressure oiler (OE-2259), and catch (OE-2105).

Operation Number

31. Remove locking catch plunger plug pin (OE-2240), plug (OE-2047), spring (OE-2046), plunger securing pins (OE-2240), and plunger (OE-2048).

32. Mark the end of the clamping band lever screw on one edge with a prick punch, paint or crayon and place another mark on the pedestal head boss in line before removing the screw bushings. These parts can be reassembled in their original position and time will be saved in adjustment. Remove pins (OE-2242) from clamping band ends, unscrew bushings (OE-2038—Right Hand Thread, and OE-2039—Left Hand Thread) using angle wrench (OE-2900), Figure 5. Remove spindle (OE-2037), lever (OE-2086), clamping band assembly (OE-2040), and two pressure oilers (OE-2259).

33. Remove the bevel and spur wheel gear (OE-2107), then remove the bevel and spur wheel gear bushing (OE-2057) and pedestal head bushing (OE-2055) from the upper end of the fixed pedestal casing (299742-2) by using special tools as follows:

OE-2925—Puller OE-2926—Disc

Place puller (OE-2925) over the lower edge of bevel and spur wheel gear bushing (OE-2057). Place the disc (OE-2926) on the upper end of the fixed pedestal casing (299742-2). Apply pressure by turning the center screw as shown in Figure 11 and both bushings (OE-2057 and OE-2055) will be withdrawn.

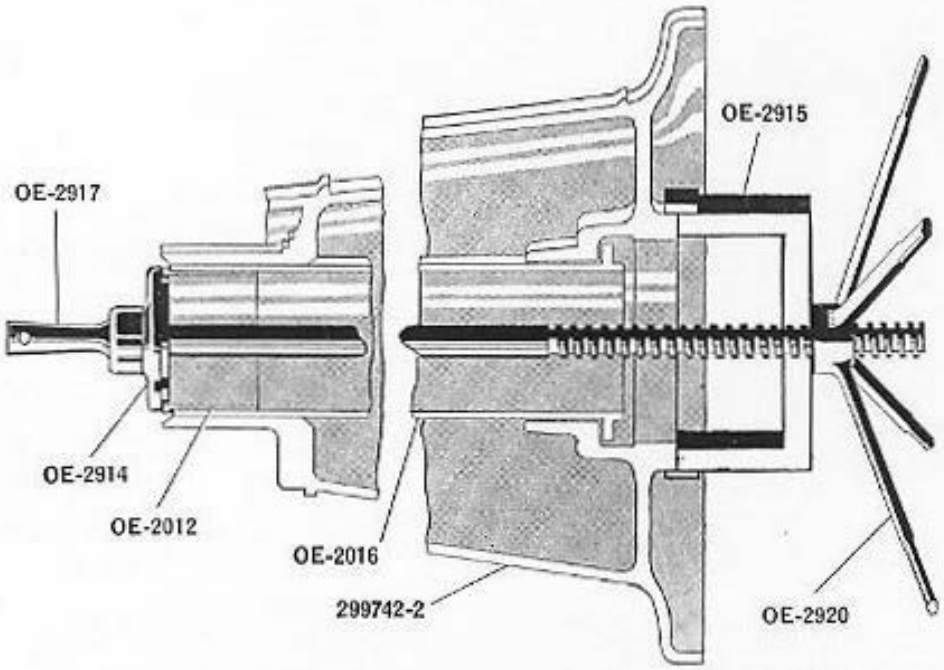

Figure 12—Removing column guide bushing (OE-2016) from fixed pedestal casing (299742-2)

34. To remove column guide bushing (OE-2016) from fixed pedestal casing (299742-2) requires the following special tools:

OE-2914—Disc OE-2920—Handwheel
OE-2915—Special Tool OE-2917—Spindle

Remove the four cocking rope bracket base screws (OE-2257) and lockwashers (OE-2270) and take off base and bracket (300016). Reach through the opening in the pedestal and remove 45° street ell (12-Z-326-56) screwed into column guide bushing (OE-2016).

Operation Number

Place disc (OE-2914) against flange of bushing (OE-2012) at upper end of column guide bushing (OE-2016). Insert threaded bar (OE-2917) through the hole in the center and place tool (OE-2915) on the lower face of the fixed pedestal casing (299742-2) and over the threaded bar (OE-2917). Screw the handwheel tool (OE-2920) on the threaded bar and continue turning the handwheel until the column guide bushing (OE-2016) is free. See Figure 12.

35. Remove spur wheel lower securing nut collar pin (OE-2232), nut (OE-2119), washer (OE-2235).
36. Remove vertical shaft (OE-2115) from vertical shaft spur wheel lower and pull out through the roller bearing at the top.
37. Remove spur wheel upper securing nut cotter (OE-2232), nut (OE-2120), spur wheel retainer nut washer, upper (OE-2234).
38. Remove vertical shaft upper bearing distance piece (OE-2121), vertical shaft upper spur wheel (OE-2109), inner race of vertical shaft needle bearing (OE-2099).
39. Remove bevel and spur gear ball thrust bearing (OE-2054) from fixed pedestal.
40. Remove vertical shaft needle bearing outer race and rollers of (OE-2099) from fixed pedestal at upper end of vertical shaft.
41. Remove vertical shaft ball bearing housing bushing bolt (OE-2257), lockwasher (OE-2270) and remove the housing bushing assembly from over the gear hub and out of the fixed pedestal.
42. Remove the vertical shaft spur wheel, lower (OE-2111) from inside the fixed pedestal.
43. Remove vertical shaft ball bearing retaining ring set screw (299923-7) and retaining ring (OE-2118) using wrench (OE-2908), Figure 5.
44. Remove ball bearing (OE-2098) from vertical shaft ball bearing housing bushing (OE-2117).
45. Remove pipe plug (12-Z-307-7) in pedestal casing just above cocking rope bracket base hole.

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The pedestal is to be lying on its side in a suitable support.

1. Assemble the vertical shaft ball bearing (OE-2098) into its housing bushing (OE-2117) with retainer ring (OE-2118) using wrench (OE-2908) Figure 5. Coat bearing with grease (OS-1350). Install headless set screw (299923-7).
2. Place vertical shaft spur wheel, lower (OE-2111), inside the fixed pedestal at the vertical shaft lower hole with the hub down. Coat the teeth with grease (OS-1350).
3. Assemble the sub-assembly made in Operation 1 over the gear hub and into the fixed pedestal and secure with screws (OE-2257) and lockwashers (OE-2270).
4. Insert outer race and rollers of vertical shaft needle bearing (OE-2099) at upper end of vertical shaft. Lubricate with extra light mineral oil, N. S. 1042, 2075 or 2110.
5. Assemble bevel and spur gear thrust bearing (299766-5) on fixed pedestal. This bearing is optional with ball thrust bearing (OE-2054).
6. Assemble vertical shaft as follows:
   (a) Assemble inner race of vertical shaft needle bearing (OE-2099) to vertical shaft upper spur wheel (OE-2109).
   (b) Assemble vertical shaft upper bearing distance piece (OE-2121), gear and bearing race assembled in (a), spur wheel retainer nut washer upper (OE-2234), securing nut (OE-2120) and cotter (OE-2232) to vertical shaft (OE-2115).

NOTE—The parts assembled in a, b, are then assembled through the roller bearing at the top and into the gear (OE-2111) at the bottom. Coat teeth of spur wheel (OE-2109) with grease (OS-1350).

(c) Assemble spur wheel lower securing nut washer (OE-2235), nut (OE-2119), and cotter pin (OE-2232) to the lower end of shaft.

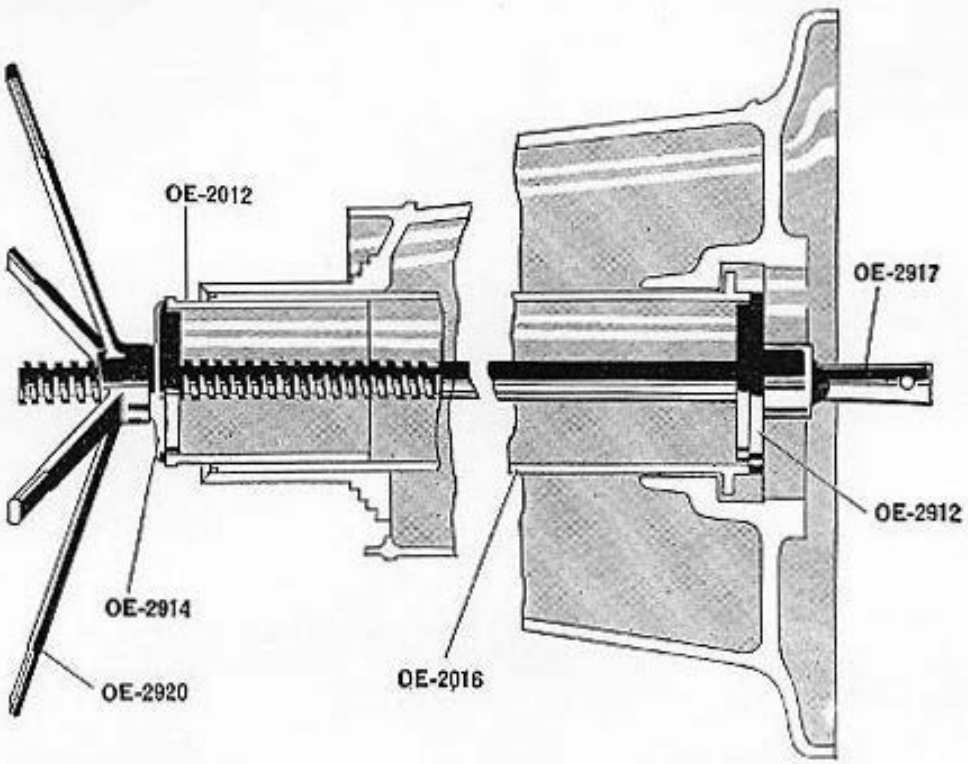

Figure 13—Assembling column upper bearing bushing (OE-2012) into column guide bushing (OE-2016)

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7. To assemble column upper bearing bronze bushing (OE-2012) into the column guide bushing (OE-2016) requires special tools as follows:

OE-2912—Disc (Figure 13)
OE-2914—Special Tool
OE-2917—Spindle
OE-2920—Handwheel

Place upper bearing bushing (OE-2012) into column guide bushing (OE-2016) so that the two internal vertical grooves (one on each side) are located 90 degrees from the $\frac{11}{16}$ inch deep notch in the top of guide bushing (OE-2016). Lubricate with extra light mineral oil, N.S. 1042, 2075 or 2110.

Then place disc (OE-2912) on the lower end of guide bushing (OE-2016) and insert threaded bar (OE-2917) through the center of the disc. Place disc (OE-2914) on the flanged end of bushing (OE-2016) and over the threaded bar. Install and turn handwheel (OE-2920) until the bushing is seated. See Figure 13.

8. Insert the assembly made in Operation 7 into the fixed pedestal casing (299742-2) from the bottom. Lubricate with extra light mineral oil, N.S. 1042, 2075 or 2110. **Some guide bushings (OE-2016) have two cutouts in the flange. On bushings with one cutout, insert the bushing as far as possible by hand, having the cutout toward the vertical shaft hole. On bushings with two cutouts, the cutout which is in line with the ¼ pipe tap in the wall of the bushing must be toward the vertical shaft hole.**

Proceed as follows, using special tools:

OE-2912—Disc
OE-2918—Aligning Tool
OE-2917—Spindle
OE-2921—Disc
OE-2920—Handwheel

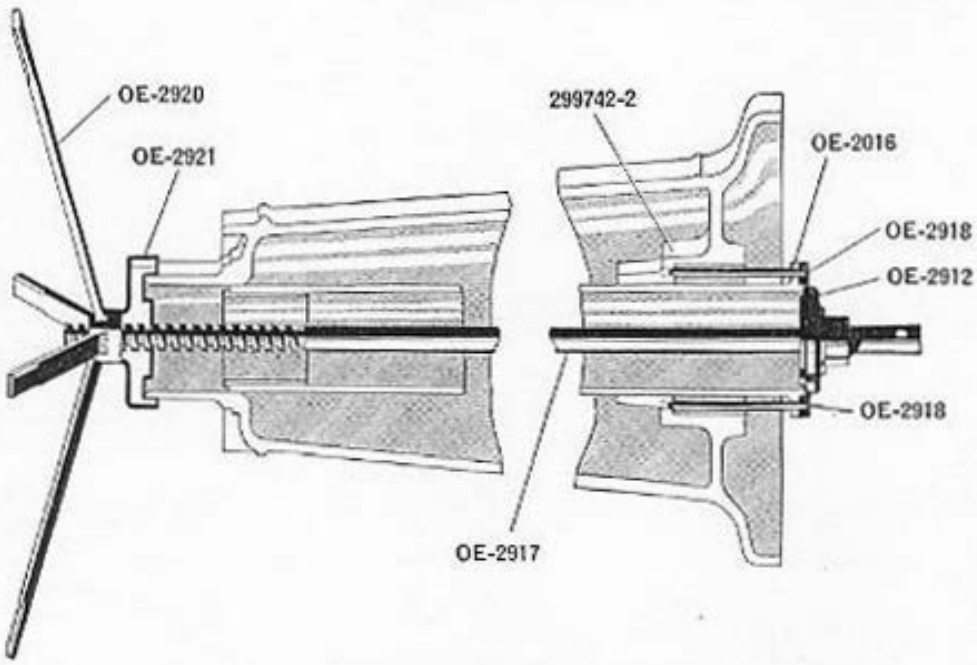

Figure 14—Assembling column guide bushing (OE-2016) into fixed pedestal casing (299742-2)

Place disc (OE-2912) on the flanged end of the column guide bushing (OE-2016). Insert the threaded bar of special tool (OE-2917) through the hole in the center of the disc (OE-2912). Insert the rods on special tool (OE-2918) through the holes in the flange of bushing (OE-2016) and into the tapped

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holes in the fixed pedestal casing (299742-2). This is done to maintain alignment of the holes in the bushing (OE-2016) and fixed pedestal casing (299742-2). See Figure 14.

Place disc (OE-2921) over the end of the threaded bar (OE-2917) and on the upper end of the fixed pedestal casing (299742-2).

Screw the handwheel (OE-2920) on the threaded bar and continue turning the handwheel until the flange of column guide bushing (OE-2016) is tight against the fixed pedestal casing (299742-2).

Insert a rod through the hole in the handle of the threaded bar (OE-2917) to prevent its turning.

Install the guide bushing securing bolts (OE-2254) and lockwashers (OE-2271).

9. Assemble the bevel and spur wheel gear bushing (OE-2057) and pedestal head bushing (OE-2055) on the upper end of the fixed pedestal casing (299742-2). This requires special tools as follows:

OE-2912—Disc	OE-2913—Special Tool
OE-2917—Spindle	OE-2920—Handwheel

Place disc (OE-2912) against the lower face of column guide bushing (OE-2016) or against the lower face of fixed pedestal casing (299742-2). Insert the threaded bar (OE-2917) through the hole in the center of this disc (OE-2912). Line up bevel and spur wheel gear bushing (OE-2057) with fixed pedestal casing (299742-2) and place tool (OE-2913) against this bushing and on the threaded bar (OE-2917). Screw handwheel (OE-2920) on the threaded bar (OE-2917) and turn the handwheel until the bushing is tight against the fixed pedestal casing (299742-2). Remove handwheel (OE-2920) and tool (OE-2913) and repeat this process with pedestal head bushing (OE-2055). Insert a rod through the hole in the handle of threaded bar (OE-2917) to prevent its turning.

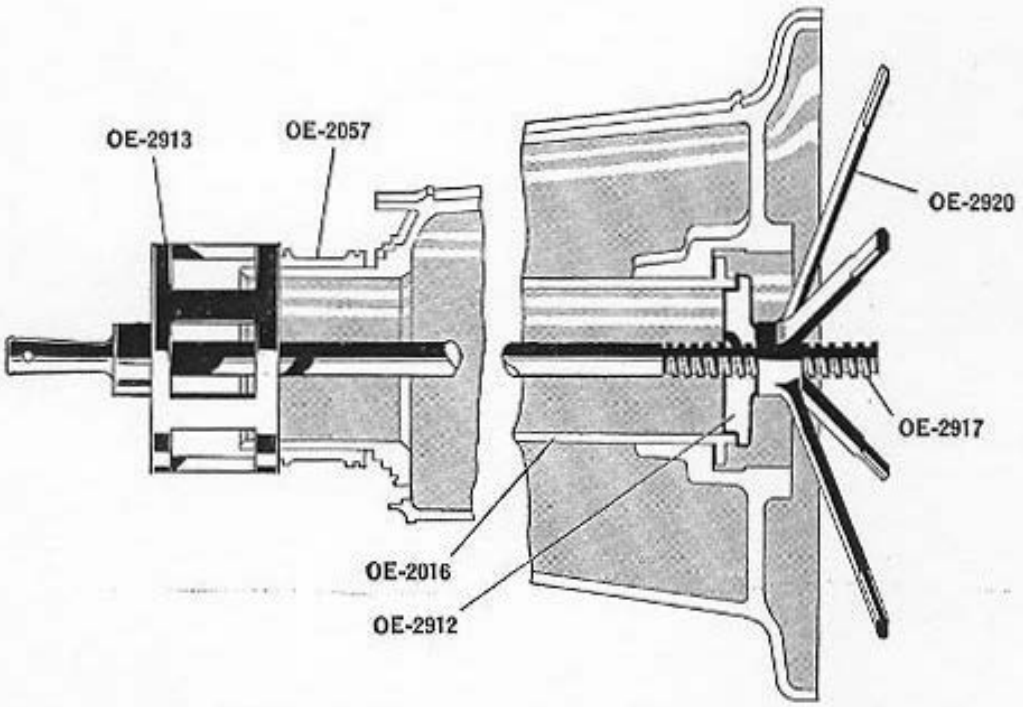

Figure 15—Installing bevel and spur wheel gear bushing (OE-2057) and pedestal head bushing (OE-2055) on fixed pedestal casing (299742-2)

10. Assemble the bevel and spur gear wheel (OE-2107) on bushing (OE-2057). Coat the teeth with grease (OS-1350).

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11. Assemble pedestal head as follows:

(a) Place clamping band assembly (OE-2040) in the pedestal head with ends projecting through the side between the clamping lever bosses. Assemble lever (OE-2045) and threaded spindle (OE-2037) with the mark on the end in line with the mark on the boss. These are the marks which were placed on these parts during the stripping operation. Assemble the threaded bushings (OE-2038 and OE-2039) on this spindle so that their inner ends enter the holes in the clamping band ends (OE-2041) and pin in place with (OE-2242). Use angle wrench (OE-2900).

NOTE—Threaded bushing (OE-2038) with the right-hand thread must be assembled on the right end of spindle (OE-2037) and bushing (OE-2039) with the left-hand thread must be placed on the left end of the spindle. As the lever is pressed down to tighten the band to hold the pedestal head in position, the bushings move inward on the threads. Moving the lever up to release the band causes the bushings to move outward.

(b) Screw the two oilers (OE-2259) into the clamping lever bearing bosses. Force grease (OS-1350) into the oilers, using grease gun (OE-1637).

(c) Assemble locking catch spring bolt (OE-2048), pedestal head lock plunger spring (OE-2046), plug (OE-2047), and two securing pins (OE-2240).

(d) Assemble locking catch (OE-2105), pivot pin (OE-2049) with tapped hole end facing counterclockwise (viewed from above) and secure with one (OE-2241) pin. Assemble pressure oiler (OE-2259) in end of pivot pin.

(e) Assemble the pedestal head assembly on the steel bushing at the upper end of the pedestal. Lubricate inner surface of head and bushing with extra light mineral oil, N.S. 1042, 2075 or 2110.

12. If oil seal (367556-2) has been removed from pedestal head cover (367556-1) install a new one. Tap the new seal into place, being careful not to damage its case. The lip should point upward. Place cover assembly (367556-3) in position on top of the pedestal head with inner oil hole 180 degrees from the vertical shaft and secure with six screws (12-Z-51-323) and lock washers (12-Z-22-288).

(a) On older mounts assemble oil reservoir (OE-2013) (without oil tubes or wicks) to top of pedestal (299742-2) with ½ inch drilled hole 180 degrees from vertical shaft and secure with screws (OE-2015), washers (OE-2017), and lockwire (OE-2152).

13. Assemble column lower bearing bushing (OE-2033) and guiding key (OE-2085) with screws (OE-2247). Insert this assembly into lower end of column guide bushing (OE-2016). Lubricate with extra light mineral oil, N.S. 1042, 2075 or 2110.

14. Assemble trunnion bracket and pivot coupling nut bushing (OE-2031) into coupling nut (OE-2032).

15. Assemble column thrust ball bearing (OE-2093) and parts assembled in 14, on the column (OE-2079). Pack bearings with grease (OS-1350).

NOTE—Inside diameters of thrust bearing rings are not alike. The smaller inside diameter ring should be placed adjacent to the column flange.

Assemble key (OE-2090) on column (OE-2079).

(a) On older mounts place oil reservoir cover (OE-2014) and packing (OE-2155) on column (OE-2079) before installing key (OE-2090).

NOTE—Insert this column assembly through the bronze bushing at the top of the pedestal and into the bronze bushing at the lower end of the pedestal, using the keyway in this bushing to line up the key in the column. Extreme care should be taken when moving the column through oil seal (367556-2) to prevent damaging the lip.

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Should this lower bushing be forced out of the pedestal due to the possible tight fit on the column it may be tapped in, using a wood block to prevent damage to the bronze bushing. Be sure that the resistance is not caused by misalignment of the key and keyway.

If the resistance due to the fit of the bushing on the column cannot be overcome by tapping then the following tools must be used to press the bushing (OE-2033) in place as shown in Figure 16.

OE-2914—Disc (Figure 16)
OE-2917—Spindle
OE-2921—Disc
OE-2920—Handwheel

Place disc (OE-2914) on the lower end of column lower bearing bushing (OE-2033). Insert the threaded bar (OE-2917) through this disc. Place disc (OE-2921) on the upper end of the column (OE-2079) and over the threaded bar. Install and turn the handwheel (OE-2920) until the column lower bearing bushing (OE-2033) is against its seat. A bushing that is fully seated extends approximately $1\frac{1}{16}$ inches beyond the lower end of the column (OE-2079).

16. Assemble column lower bearing bushing retaining ring (OE-2035) on the column using spanner wrench (OE-2902) and install set screw (299923-7).

(a) On older mounts slide packing (OE-2155) into its seat in oil reservoir (OE-2013). Coat underside of screws (OE-2250) with a plastic gasket paste such as (299998-3). If gasket paste is not available, white lead may be substituted. Assemble the screws in cover (OE-2014) but do not tighten.

17. Assemble column raising spindle as follows:

Assemble on upper end column raising spindle (OE-2080), two upper stop ring keys (OE-2238), stop ring (OE-2114), upper stop ring needle bearing (OE-2056) (hold rollers in place with an elastic band), retaining ring (OE-2116) using tool (300025) Figure 5, and set screw (299923-7).

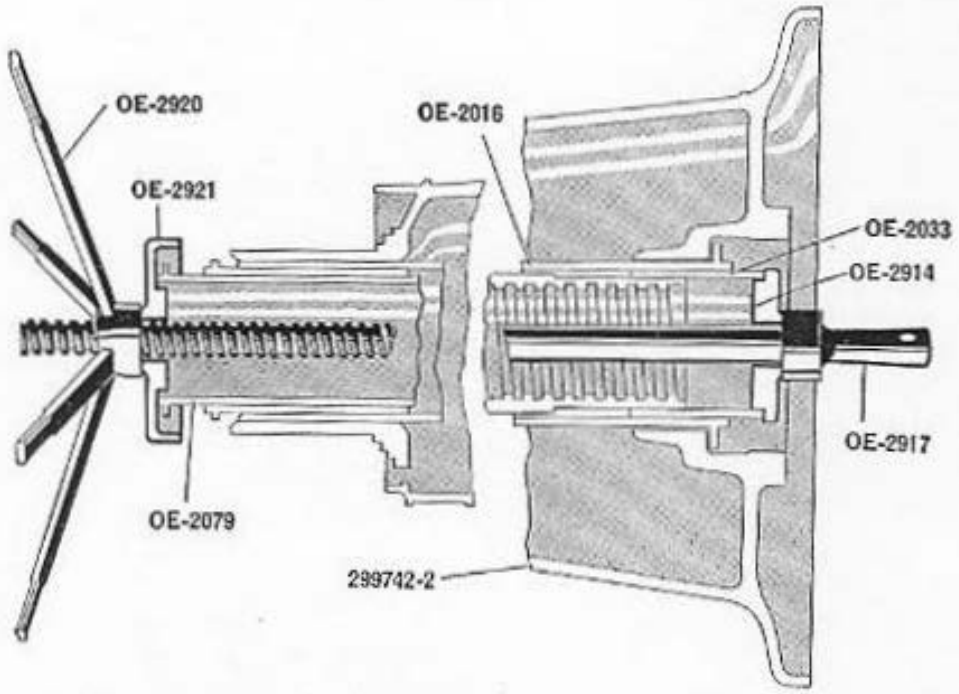

Figure 16—Assembling column lower bearing bushing (OE-2033) into column guide bushing (OE-2016)

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18. Coat spindle (OE-2080) with grease (OS-1350) and install the assembly made in step 17 into the pedestal from the top and turn it through the threads in the column so that the lower end projects approximately six inches beyond the base of the pedestal. Remove the elastic band that has by now been forced off from the needle rollers.

19. Assemble the column raising spindle spur wheel (OE-2112) and the column raising spindle ball bearing (OE-2134) onto the column raising spindle (OE-2080). This requires special tools as follows:

OE-2921—Disc	OE-2924—Special Tool
OE-2917—Spindle	OE-2920—Handwheel

Place disc (OE-2921) on the upper end of column (OE-2079). Insert threaded bar (OE-2917) through this disc. Assemble the two column raising spindle spur wheel keys (OE-2239) on the spindle (OE-2080). Assemble the spur wheel (OE-2112) on the spindle (OE-2080) as far as possible by hand pressure. Place ball bearing (OE-2134) on spindle (OE-2080) against the hub of spur wheel (OE-2112). Place special tool (OE-2924) against the bearing, with the three lugs of the tool over the outside and onto the threaded bar. Install the handwheel (OE-2920) on the threaded bar and

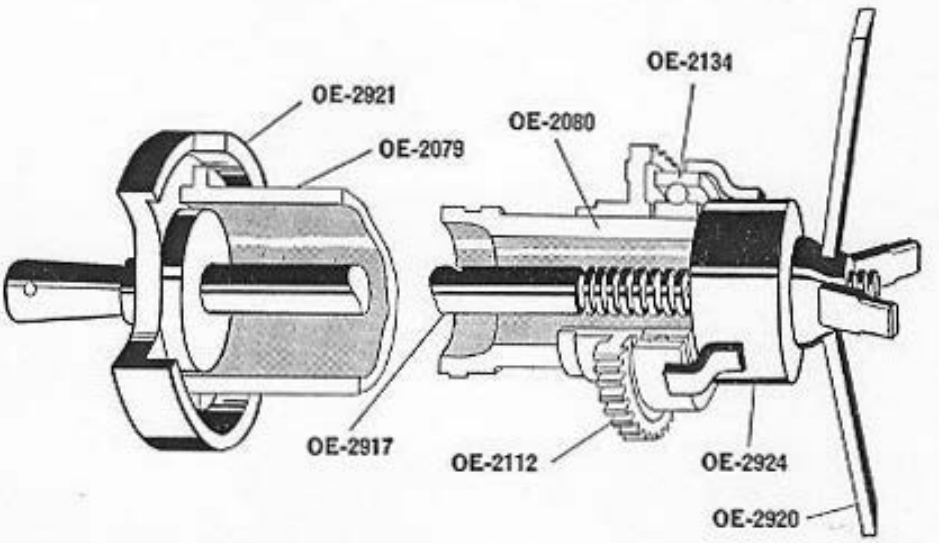

Figure 17—Assembling column raising spindle spur wheel (OE-2112) and ball bearing (OE-2134) onto the column raising spindle (OE-2080)

turn down to a light pressure. Make certain that the disc (OE-2921) is piloted into the upper end of column (OE-2079) and that the ball bearing (OE-2134) is lined up with spindle (OE-2080). See Figure 17. Pack the bearing and coat the spur wheel with grease (OS-1350).

Tighten handwheel (OE-2920) and continue turning it until the inner end of the hub of spur wheel (OE-2112) is tight against the lower thread of spindle (OE-2080).

Install column raising spindle retaining ring (OE-2126) using special wrench (OE-2911), Figure 5.

Install lower spring housing bushing (OE-2129) using special wrench (OE-2907), Figure 5.

Install lower spring housing bushing lock screw (OE-2251).

Install the smaller ring and ball race of bottom cover ball thrust bearing (OE-2077). Pack the bearing with grease (OS-1350).

NOTE—Screw the column raising spindle into the pedestal until the side of the gear bears against the column guide bushing. Make certain that the teeth on the gear mesh with the teeth on the vertical shaft lower pinion when screwing the column raising spindle in. Pack grease (OS-1350) on the teeth of the gear and pinion.

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20. Insert into column (OE-2079) the outer race and rollers of trunnion bracket and pivot lower needle bearing (OE-2095), snap ring (OE-2076), outer race and rollers of pivot upper needle bearing (OE-2096), and snap ring (OE-2075). Lubricate bearings with extra light mineral oil, N.S. 1042, 2075 or 2110.

21. Fill cover (OE-2011) with grease (OS-1350) and assemble it with the .0425 shim pack under the larger diameter ring of thrust ball bearing (OE-2077).

22. Install the bottom cover as assembled in step 21 to the pedestal, securing with lockwashers (OE-2273) and screws (OE-2255).

NOTE—Tighten up the screws gradually until the handwheel action is so tight that free movement is restricted. Measure the space between the bottom cover flange and the pedestal with a feeler gauge. Remove the cover and take out a pack of shims the thickness of which will be from .001 to .003 less than the thickness of the feeler gauge. Reassemble the cover assembly to the pedestal.

Insert drain tube (367564-1) into inner end of bushing (367564-2) and screw the bushing into the base flange of pedestal (299742-2). Install plug (OE-2283) in bushing. Install plug (OE-2283) in base flange on opposite side.

Complete filling the cover by removing headless pipe plug (OE-2283) from bottom of cover, installing a pressure oiler and forcing in grease (OS-1350), using grease gun (OE-1637). Remove oiler and reinstall plug flush with surface.

23. Assemble the Equalizing Spring and Tube Assembly, complete with bearing (OE-2094) and snap ring (OE-2084) into the mount from the top with the locking plug (OE-2081) at the top. Pack lower thrust bearing (OE-2094) with grease (OS-1350) before inserting assembly.

Place the mount in an upright position.

24. Assemble handwheel drive assembly (OE-2101) as follows:

To the handwheel drive housing (OE-2110) assemble oiler (OE-2138), locking catch plunger spring (OE-2053), plunger (OE-2051) and retaining pin (OE-2140). Assemble handwheel locking catch (OE-2050), locking catch pivot pin (OE-2245) and retaining screw (OE-2246). Assemble the outer ball bearing (OE-2142) and the bearing retainer (OE-2136) and the retainer adjusting screws (OE-2137) into the housing (OE-2110). Assemble the inner ball bearing (OE-2142) and bearing spacer (OE-2123) on pinion (OE-2108) and insert this group into the housing and through the outer bearing. On the outer end of this pinion shaft assemble the handwheel key (OE-2258), the handwheel assembly (OE-2102), the handwheel nut (OE-2125) and washer (OE-2274).

25. Install handwheel drive assembly (OE-2101) on the pedestal head. Use sufficient (OE-2135) shims to obtain free operation and secure with screws (OE-2253) and washers (OE-2270).

Oil handwheel pinion ball bearings (OE-2142) generously with extra light mineral oil, N.S. 1042, 2075, or 2110 through oil hole in housing using an oil can.

26. Place the smaller inside diameter ring of column thrust ball bearing race, and the ball cage assembly, of OE-2093 on the upper side of the flange at the top of the column. To assemble the trunnion bracket and pivot sub-assembly proceed as follows:

27. Screw two oilers (OE-2259) into the side wall of trunnion bracket and pivot (367558-1). Screw oiler (OE-2259) into trunnion pin boss. Assemble the larger inside diameter bearing race (OE-2093), inner race of bearing (OE-2096), retaining ring (OE-2036) with set screw (OE-2092) and lockwire (OE-2073).

28. Assemble inner race of bearing (OE-2095) with retainer ring (OE-2034) using spanner wrench (OE-2906) Figure 5, and set screw (299923-7).

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29. Coat threads and underside of screws with a plastic gasket paste such as (299998-3) to make them water tight. If gasket paste is not available, white lead may be substituted. Assemble the screws in holes of trunnion bracket (367558-1).
    (a) On older mounts coat the underside of screws (OE-2248) with gasket paste (299998-3) or white lead to make them watertight and assemble in the trunnion bracket and pivot. Coat edges of recess in trunnion bracket and pivot with plastic gasket paste (299998-3) or white lead and assemble trunnion bracket cover (OE-2061).

30. Install in the trunnion plunger (299943-5), lever (OE-3512), spacers (OE-3518), pin (OE-3513), seal (OE-3519), ball (OE-3511), spring (OE-3516), and screw (OE-3517). See Plate 1.
    (a) On older mounts, assemble the cradle locking bolt assembly (OE-2009) as follows: On the bolt (OE-2070) assemble spring (OE-2074), bushing (OE-2071), pins (OE-2141), knob (OE-2072) and knob pin (OE-2140). Insert this assembly into the trunnion bracket and pivot and secure with pin (OE-2260).

31. Insert combined trunnion and pivot bracket assembly through the roller bearings at the top of the pedestal. Screw up the coupling nut (OE-2032) using spanner wrench (OE-2903) Figure 5 and lock with screw (OE-2069) and washer (OE-2277).

32. Release equalizing springs by removing plug (OE-2078), using wrench (OE-2901), Figure 5. Coat threads of plug (OE-2081) with plastic gasket paste or white lead and screw it into closing cap (OE-2078), using wrench (OE-2901). Coat threads of closing cap with plastic gasket paste or white lead and screw the assembly into the recess in trunnion bracket and pivot (367558-1), using wrench (OE-2901). Coat threads of lock screw (299923-7) with plastic gasket paste or white lead and screw it into hole in edge of closing cap to lock it in place.
    Coat both sides of trunnion bracket cover gasket (299946-6) with plastic gasket paste or white lead, install cover (299946-5) and secure with lock washers (12-Z-22-252) and screws (299771-2).

33. Screw oiler (OE-2259) into trunnion pin boss on cradle (OE-2158). Assemble cheek plates (OE-2174-5) to the cradle, using screws (OE-2263). Assemble pin (OE-2262) in the gun securing bolt (OE-2188). Assemble the bolt and pin with the spring (OE-2189) in the cradle. Place withdrawing head (OE-2190) on the bolt, secure with pin (OE-2261).

34. Place cradle sub-assembly on pedestal with gun securing bolt, or front end, toward pedestal.

35. Fit key (OE-2191) in the long trunnion pin (OE-2160) and assemble in left hand trunnion boss with the head toward the center, assemble the short trunnion pin in right boss with pin head toward center. Assemble nut (OE-2162), using open end wrench (OE-2904) and spanner OE-3157. Insert pin (OE-2269).

36. Lock cradle in 90 degree elevation.
    (a) On older mounts cradle elevation is limited to 87 degrees.

37. Assemble spring housing cover (OE-2165) to trunnion bracket with screws (OE-2256). Assemble spring housing (OE-2164) and bearing (OE-2166). Screw on bolt (OE-2168) and washer (OE-2278), using adjustable wrench (OE-1606). Place spring (OE-2169) inside the spring housing with the outer end of the spring hooked over the screw stud, the spring winding clockwise from the stud looking into the cover. See Figure 23.

38. Place the assembly made in step 37 on the long trunnion pin with the inner end of the spring in the slot in the pin. Keep the serrated edges of the cover and case apart and turn the case to the right or clockwise two or three notches and engage the serrated edges. Assemble nut (OE-2163), using open end wrench (OE-2904) Figure 5, and pin (OE-2268). When turning the spring case keep hands away from the serrations to prevent injury.

NOTE—In order to improve the balance of the gun when installing the Mark 14 Mod. 2 sight on the rear end of the cradle, or when interchanging solid and ribbed gun barrels,

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the cradle spiral spring housing may be adjusted one or two notches from the standard setting. Cradle spiral spring spanner (367543-1), Figure 52, will be found helpful when making this adjustment.

39. Assemble the cartridge deflecting band assembly (OE-2207) to the front end of the cheek plates with bolt (OE-2177), nut (OE-2178), and cotter pin (OE-2230).

40. Assemble the cartridge bag assembly (OE-2198) with the inside leather reinforcement toward pedestal. Use bolts (OE-2172), nut (OE-2173), and cotter pins (OE-2231).

41. Lubricate mount thoroughly in accordance with lubrication instructions on Page 27.

42. Install all oil hole plugs and tighten securely.

43. Assemble the armor plate brackets (OE-2220 and OE-2221) to the trunnion bracket pivot with lockwashers (OE-2275), nuts (OE-2217), bolts (OE-2218). Assemble the plates (OE-2219) to the brackets with bolts (OE-2228), nuts (OE-2229), and assemble the cross strap (OE-2226) to the plates with bolts (OE-2227) and nuts (OE-2229).

The equalizing spring and tube assembly (OE-2001) must **NOT** be stripped unless the compressing tool assembly is used.

The following instructions cover the stripping and reassembly instructions using the modified tool assembly (367539) which will be available shortly. If only the original type tool (OE-2931) is available, then follow the same instructions, except omit Operation Number 1 which is not necessary.

Equalizing spring compressing tool assembly (367539), Figure 18, consists of the following:

367541—Equalizing spring compressing tool tube assembly—long
OE-3168—Equalizing spring compressing tool tube assembly—short—2 required
OE-3180—Equalizing spring tool wrench brace assembly
299861-5—Equalizing spring tool screw assembly
OE-3171—Equalizing spring compressing tool nut
OE-3176—Equalizing spring stop plate assembly
OE-3179—Equalizing spring tension tube plug
367540-4—Equalizing spring compressing tool nut
367540-3—Adapter—upper end—Mark 4 Mount
367540-2—Adapter—upper end—Mark 6 Mount
367541-1—Adapter—lower end
367541-2—Snap ring for adapter
367541-3—Thrust washer for adapter

NOTE—This tool is available on all tenders, repair ships, and at Navy Yards.

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1. Place adapter (367540-3) on upper end of long tube assembly (367541), being sure to engage lugs on adapter in slots in end of tube. Slide nut (367540-4) over adapter and screw onto threaded end of tube.
2. Place a piece of round bar, approximately ¾" in diameter, in a vise. Place the holes in the adapter on the end of the long tube over the bar to prevent tube from turning. Rest the threaded end of the tube on a suitable support.
3. Remove lower thrust bearing snap ring (OE-2084) and place the equalizing spring and tube assembly (OE-2001) in the long tube, with screw plug (OE-2081) entering first.
4. Install the tool screw assembly (299861-5) in the end of the long tube being careful to have keyways in nut (OE-3175), Figure 18, fitted over the lugs in the long tube. **This nut must seat firmly over the lugs.** Lubricate thrust bearing at the end of the screw with extra light mineral oil, Navy Symbol 1042, 2075 or 2110.
5. Slide compressing tool nut (OE-3171) over end of tool screw and thread it onto the long tube.

   NOTE—This nut has to hold the entire load of the equalizing springs and must be turned down all the way on the threads of the long tube.

6. Install tool wrench brace assembly (OE-3180) on the end of the tool screw and turn it until adapter (367541-1) on the end of the screw contacts lower thrust bearing (OE-2094) which is on the end of the spring and tube assembly. Turn the wrench brace clockwise a few more turns, just enough to compress the equalizing springs so that their load is taken off screw plug (OE-2081).
7. Lift the long tube off the bar. Hold the equalizing spring and tube assembly against turning by having a helper hold it while removing plug (OE-2081) with spanner (OE-2901) inserted through the end of the tube. Place the tube back on the round bar that is in the vise.
8. Turn the wrench brace counter-clockwise to release the spring until it is just short of the transverse slots, Figure 19, in the long tube. Insert stop plate assembly (OE-3176) in the transverse slots in long tube (367541).

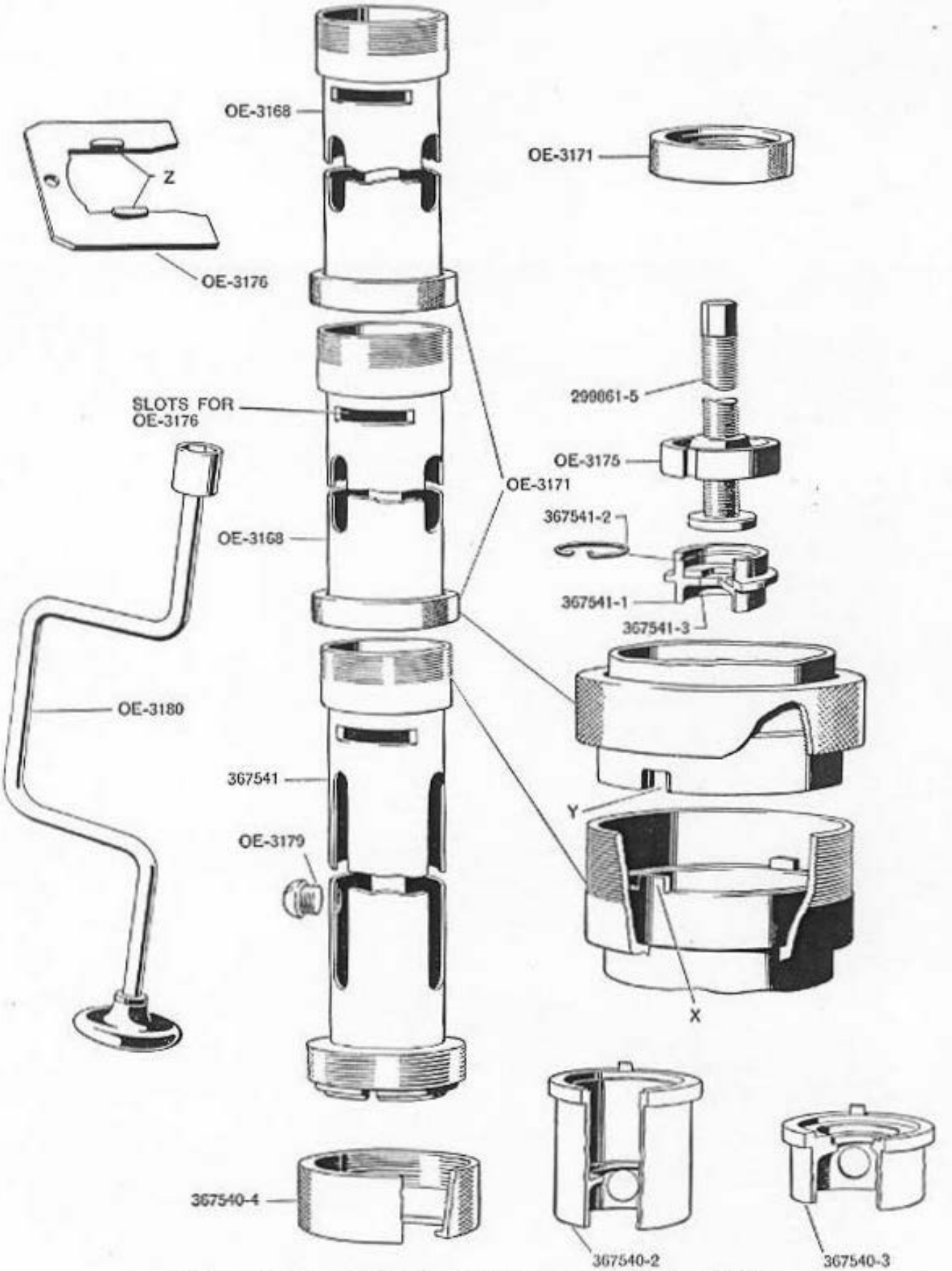

Figure 18—Equalizing Spring Compressing Tool—367539

Operation Number

NOTE—Lugs (Z), Figure 18, on the stop plate must be toward wrench end of tube. This is necessary to provide a positive lock.

9. Turn wrench brace counter-clockwise again until the spring pressure is resting on the stop plate just installed.

NOTE—It is necessary that the coils of the springs be free from binding or cocking during the stripping operation. Use a soft hammer and tap on the springs through the slots in the tube. Do this whenever there is any indication of binding.

10. Unscrew compressing tool nut (OE-3171) from the end of the long tube installed in Operation 5. Remove wrench brace (OE-3180) and tool screw assembly from the long tube.

11. Install one short tube assembly (OE-3168) on the long tube assembly being certain that the lugs (X) in the short tube engage in the slots (Y) in the long tube, see Figure 18. Complete seating of the lugs in their slots is necessary to prevent the tubes twisting during stripping of the springs.

12. Screw tube nut (OE-3171) onto the threaded end of the long tube to join the two tubes, making sure that the lugs remain engaged in their slots.

13. Install the tool screw assembly, as instructed in Operation 4. Install wrench brace (OE-3180) on the end of the tool screw.

14. Turn wrench brace clockwise enough to release the spring load on stop plate (OE-3176) and remove the plate.

15. Turn the wrench brace counter-clockwise to release the spring until the thrust bearing is just short of the transverse slots in the short tube installed in Operation 11. Insert stop plate (OE-3176) in transverse slots with lugs toward wrench brace. Turn brace counter-clockwise until spring load rests on stop plate.

16. Remove wrench brace (OE-3180), tool nut (OE-3171), and the tool screw.

17. Install the second short tube assembly (OE-3168), as instructed in Operation 11 and repeat Operations 12 through 16 inclusive.

NOTE—If there is any indication of the springs binding, tap them through the long slots in the tube, using a soft hammer.

18. The lower thrust bearing (OE-2094), outer tube assembly (OE-2002), equalizing spring outer guide tube assembly (OE-2006), equalizing spring inner guide tube assembly (OE-2007), the two equalizing springs (OE-2062), spacing ring (OE-2067), and upper thrust bearing (OE-2097) can now be withdrawn from the tool.

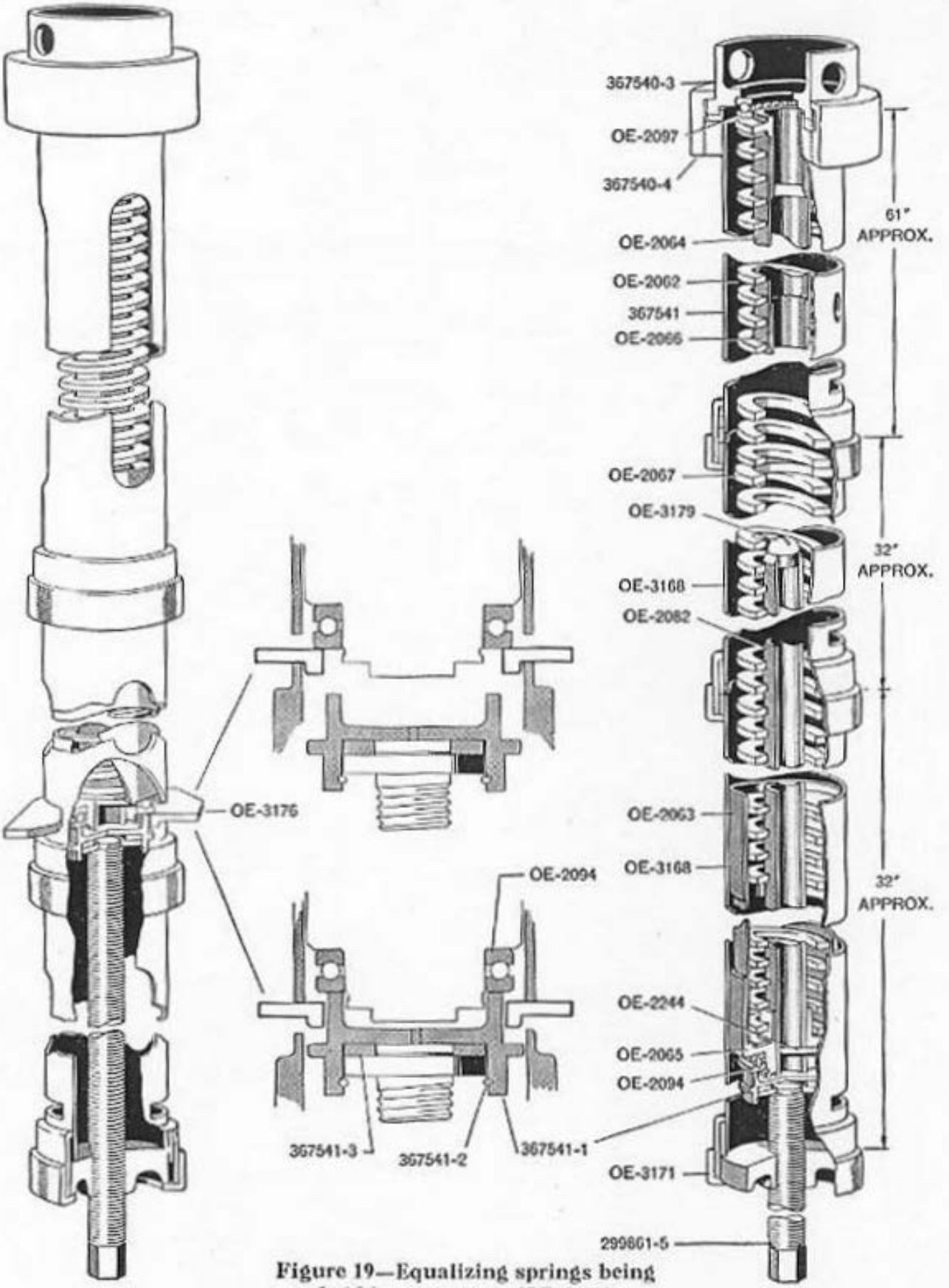

Figure 19—Equalizing springs being held by stop plate (OE-3176)

Operation Number

To reassemble equalizing spring and tube assembly (OE-2001) proceed as follows:

1. With the one long and two short tube assemblies and the adapter assembled as instructed in the "Stripping Operation", place the parts in the tool in the following manner:
   (a) Insert inner guide tube assembly (OE-2007) into the tool.
   (b) Insert spring upper thrust bearing assembly (OE-2094) through the slots in long tube (367541) and place it on the inner guide tube housing bushing (OE-2068) and against the inner face of adapter (367540-3).
   (c) Insert one of the equalizing springs (OE-2062).
   (e) Insert the remaining equalizing spring.
   (f) Remove the spherical head guide plug (OE-3179) which is stowed in the side of long tube (367541) and screw the plug into the end of tension tube (OE-2082), which is a part of outer and inner tube assembly (OE-2002), to guide the tension tube into inner guide tube assembly (OE-2007).
   (g) If outer and inner tube assembly (OE-2002) was stripped after being removed from the tool, reassemble it by placing tension tube (OE-2082) through bushing (OE-2065) in equalizing spring outer guide tube assembly (OE-2006). Install retaining pin (OE-2244) in bushing and tube. Install this assembly in the tool.
   (h) Assemble spring lower thrust bearing (OE-2094) on the lower end of guide tube assembly (OE-2006) with race having the smaller inside diameter adjacent to the flange.

   NOTE—Do not assemble snap ring (OE-2084) in the tube bushing until the compression of the springs is completed and the assembly is removed from the compressing tool.

2. Install tool screw assembly (299861-5) in the end of the tool. Be careful to have the keyways on screw nut (OE-3175) fitted over the lugs in the tube. **This nut must fit firmly over the lugs.**

3. Slide tool nut (OE-3171) over the end of the screw and thread it onto the tube.

   NOTE—This nut has to hold the entire pressure of the equalizing springs and therefore, must be turned down all the way on the threads of the tube.

4. Install and turn wrench brace (OE-3180) clockwise so as to put a slight tension on the equalizing springs.

   CAUTION—See that the spacing ring (OE-2067) is in place between the equalizing springs. Make certain that the springs are in alignment, see Figure 19. Keep watch of the end of the inner guide tube (OE-2064) when it gets into a position where it will contact the spacing ring (OE-2067); also see that when the second section of the equalizing spring contacts the end of the inner guide tube (OE-2064) all parts (spacing ring and springs) are properly aligned.

5. Turn the wrench brace clockwise to compress the springs until the thrust bearing is just beyond the transverse slots, see Figure 19, in the second short tube. Insert stop plate (OE-3176) in these transverse slots as shown.

   NOTE—The lugs on the stop plate must be toward the wrench brace end of the tube. This is necessary to provide a positive lock.

6. Turn the wrench brace counter-clockwise until the spring pressure is resting on stop plate (OE-3176) in the second short tube thereby leaving the first short tube free of the springs so it can be removed.

Operation Number

NOTE—It is necessary that the coils of the springs be free of binding or cocking during the entire reassembly operation. Use a soft hammer and tap on the springs through the slots in the tubes. Do this whenever there is any indication of binding. When the end of tension tube (OE-2082) meets the end of the inner guide tube (OE-2064) (during the compressing of the springs), the end of tension tube (OE-2082) will be guided into the end of inner tube (OE-2064) by the spherical head plug (OE-3179). Be careful the ends of these tubes do not meet and cause damage.

7. Remove wrench brace (OE-3180), tool tube nut (OE-3171), and tool screw. Remove the short tube that was freed of the springs in Operation 6.

8. Reinstall tool screw tool nut (OE-3171), and wrench brace (OE-3180) on the short tube and turn the wrench brace clockwise to relieve the pressure of the springs on stop plate (OE-3176). Remove the plate. Turn the wrench brace clockwise until the springs have been compressed so that the thrust bearing is just beyond the transverse slots in the long tube. Insert stop plate in the transverse slots.

9. Repeat procedure described in Operation 6.

10. Repeat procedure described in Operation 7, which will place the entire equalizing spring and tube assembly in the long tube resting against stop plate (OE-3176). Reinstall the tool screw, tool nut, and wrench brace. Turn the brace clockwise to relieve the pressure of the springs on the stop plate. Remove the plate.

11. Continue turning the brace clockwise until the inner guide tube (OE-2064)projects through the upper thrust bearing at the vise end of the tool tube.

12. Lift the tool off the bar in the vise, remove spherical head plug (OE-3179), and assemble screw plug (OE-2081) in guide tube (OE-2082), using wrench (OE-2901).

NOTE—Hold the equalizing spring assembly when screwing the plug into the tube so as to be sure the plug is turned all the way in the tube. This plug takes all the thrust of the springs and it must be firmly seated or serious injury will result if it is only holding by a few threads.

Operation Number

1. Remove the gun assembly by pulling outward on the gun securing bolt GM-188 and sliding the gun out of the cradle.
2. Remove the cocking wire rope GM-37 and its reel by removing the filler piece and cover. If other type of cocking device is used, remove it.
3. Remove the cartridge bag, GM-187 assembly, the cartridge cheek plates GM-175-Right and GM-174-Left and weight GM-170 assembly.
4. Remove the shield assembly from the trunnion bracket pivot. Stripping can be done as follows:
   (a) Remove oil reservoir cover screws and empty reservoir and oil well at top of trunnion pivot.
   (b) Remove shield SH-4 by taking out bolts SH-9, SH-10, and nuts SH-11.
   (c) Remove shield brackets SH-2-R.H. and SH-2-L.H. from the trunnion bracket pivot by taking out bolts SH-6, nuts SH-7, and lockwashers SH-8.
5. Remove the elevation counterbalance spring on the cradle as follows:
   (a) Lock the cradle at 85 degrees elevation.
   (b) Remove pin GM-197 that secures spring housing retaining nut GM-163. Remove this nut GM-163, using box wrench (OE-2905).
   (c) Remove the spring housing complete with spring GM-196 assembly. Remove housing cover GM-165 by taking out the securing screws GM-139.

   NOTE—The cover and case have serrated edges and the case was turned clockwise two or three serrations before the serrated edges were joined. This was done to give the spring an intitial tensioning. The spring housing GM-164 has its bushing GM-166 pressed in. The spring bolt GM-168 is screwed in and can be removed with its washer using box wrench (OE-2930) to remove the bolt. The outer end of the spring is hooked over GM-168 with the spring winding clockwise from the bolt, looking into the cover.

   (d) Drive out pin GM-195 securing cradle trunnion pin nut. Remove nut GM-162 using box wrench (OE-2904).
   (e) Drive trunnion pin GM-160 inward off its key GM-192. Remove both pins.
6. Remove the column raising handwheel assembly complete in its housing GM-221 by taking out the securing bolts GM-90 and washers GM-91 below the handwheel.
7. Place the mounting on its side on suitable chocks.
8. Remove trunnion bracket and pivot assembly as follows:
   (a) Place column GM-109 in lowest position.
   (b) Secure the helical springs (OE-2062) by removing the pivot closing cap GM-132, which is in the recess in the center of the pivot, taking out the screw plug GM-133 stowed therein, and inserting this plug in the top of the tension tube GM-134 (just below).
   (c) Remove horizontal bolt GM-123 (in recess for housing catch on pivot) securing coupling nut.
   (d) Raise the column sufficiently to remove the coupling nut GM-110 complete with bushing GM-131 below the upward thrust bearing, GM-154, and this bearing GM-154.
   (e) Withdraw trunnion bracket and pivot assembly, the upward ring of the downward thrust bearing GM-154 coming with it, but leaving behind the outer rings GM-157-OR and rollers of the needle bearings GM-157.
   (f) Remove outer ring with rollers GM-157-OR of the needle bearing GM-157.
9. Withdraw the thrust bearing GM-74 of the double gear GM-42.
10. Take out the vertical bolts GM-23 securing the column guide bushing GM-3 and withdraw the column guide bushing.
11. The stripping of the various sub-assemblies presents no particular difficulty except that should it be necessary to take the tension off the helical equalizing spring, special apparatus will be required. See Pages 47 through 52 for instructions and illustrations.

Operation Number

1. Set the pedestal on its side on suitable chocks.
2. Assemble the vertical shaft drive gear as follows:
   (a) Insert lower ball bearing housing sub-assembly GM-51 and secure with bolts GM-24 and washers GM-28.
   (b) Insert outer ring and rollers GM-85-OR of the needle bearing at upper end of shaft.
   (c) Install the thrust bearing GM-74 of the double gear GM-42.
   (d) Insert vertical shaft sub-assembly GM-50, threading the shaft through the roller bearing at the upper end and through the spur wheel and ball bearing at the lower end.
   (e) Put on washer and nut at lower end and secure with split pin.
3. Insert column guide bushing complete with bushing at upper end. Secure with vertical bolts GM-23 and washers at the lower end.
4. Install the double gear GM-42.
5. Install the pedestal head sub-assembly GM-41, including the handwheel locking catch GM-60, clamping band assembly G-66-AB and catch locking trunnion bracket.
6. Fix water excluding packing ring GM-30 for the oil reservoir at top of pedestal head, place reservoir GM-5 and secure with bolts GM-7, packing GM-31, and washers GM-8. Secure bolt heads with wire GM-29. Put on lid GM-6 and secure with screws GM-25 temporarily.
7. Insert column GM-109 first threading on the upward thrust ball bearing GM-154 at the top, and the coupling nut GM-110 complete with bushing GM-131. Insert lower bearing bushing GM-111 at lower end, entering the key GM-142 in the keyway in the column guide bushing GM-3. Put on the retaining ring GM-113 (at the lower end) and secure with vertical set screw GM-145. Take care that the upward thrust ball bearing GM-154 is placed the right way uppermost as the diameters of the upper and the lower rings differ.
8. Insert the column raising spindle sub-assembly GM-47 including the spur gear GM-42 secured by a set screw, ball bearing journal bearing GM-74, and retaining ring GM-63. Insert the upper stop ring GM-48 and needle bearing GM-76 at the upper end of the column raising spindle; put on the retaining ring GM-49 and secure by set screw GM-93.

   NOTE—Assembly operations can be performed by turning the column raising spindle downward so that the lower end projects about six inches beyond the base of the pedestal.
9. Insert the helical equalizing springs sub-assembly (OE-2001) under compression, through the bottom of the spindle. Screw the housing for the lower thrust bearing GM-119 for this sub-assembly into the spindle, and secure with set screws.
10. Insert outer rings, complete with rollers of needle bearings GM-157 of the pivot, inside the column and place the securing rings GM-114.
11. Put on the bottom cover sub-assembly GM-2 including ball thrust bearing GM-83 for the column and secure with vertical bolts GM-22 and washers GM-26.
12. Place the pedestal in the vertical position. Place handwheel gear housing sub-assembly GM-221 and secure with bolts GM-90 and washers GM-91. Place lower ring and balls of downward thrust bearing GM-154 (on upper side of flange at top of column).
13. Insert combined trunnion bracket and pivot sub-assembly, including inner ring of upper needle bearing GM-157 secured by retaining ring GM-114 and set screw GM-144, and inner ring of lower needle bearing GM-156 secured by retaining ring GM-112 and set screw GM-145, and upper ring of upward thrust bearing GM-154, also cradle locking bolt GM-124. Screw up coupling nut GM-110 and secure with bolt GM-123.

Operation Number

14. Release equalizing helical springs by removing plug GM-133, and then stow the latter in the pivot closing cap GM-132. Insert pivot closing cap GM-132 and secure with set screw GM-145, making a water-tight joint.

15. Install cradle sub-assembly GM-159, including trunnion pins GM-161, GM-160, and trunnion pin nut GM-162, secured with pin GM-195. Lock the cradle in the 82 degree elevation position.

16. Install the elevation counter-balance spring assembly GM-169, the spring in housing GM-164, secured with bolt GM-168 and washer, entering the free end of the spring in the slot, on the trunnion pinion nut GM-162 and secure with pin GM-195.

17. Fit cartridge deflecting band GM-170 complete with weight GM-179 and secure with pivot bolt GM-177, nut GM-178, and split pin GM-200. Hang the cartridge bag by bolts GM-172 and nuts GM-173 and secure with split pins. Attach wire rope bracket for cocking gun.

18. Lubricate mount according to instructions on Page 27 and reinstall filler plugs and gaskets.

NOTES

NOTES

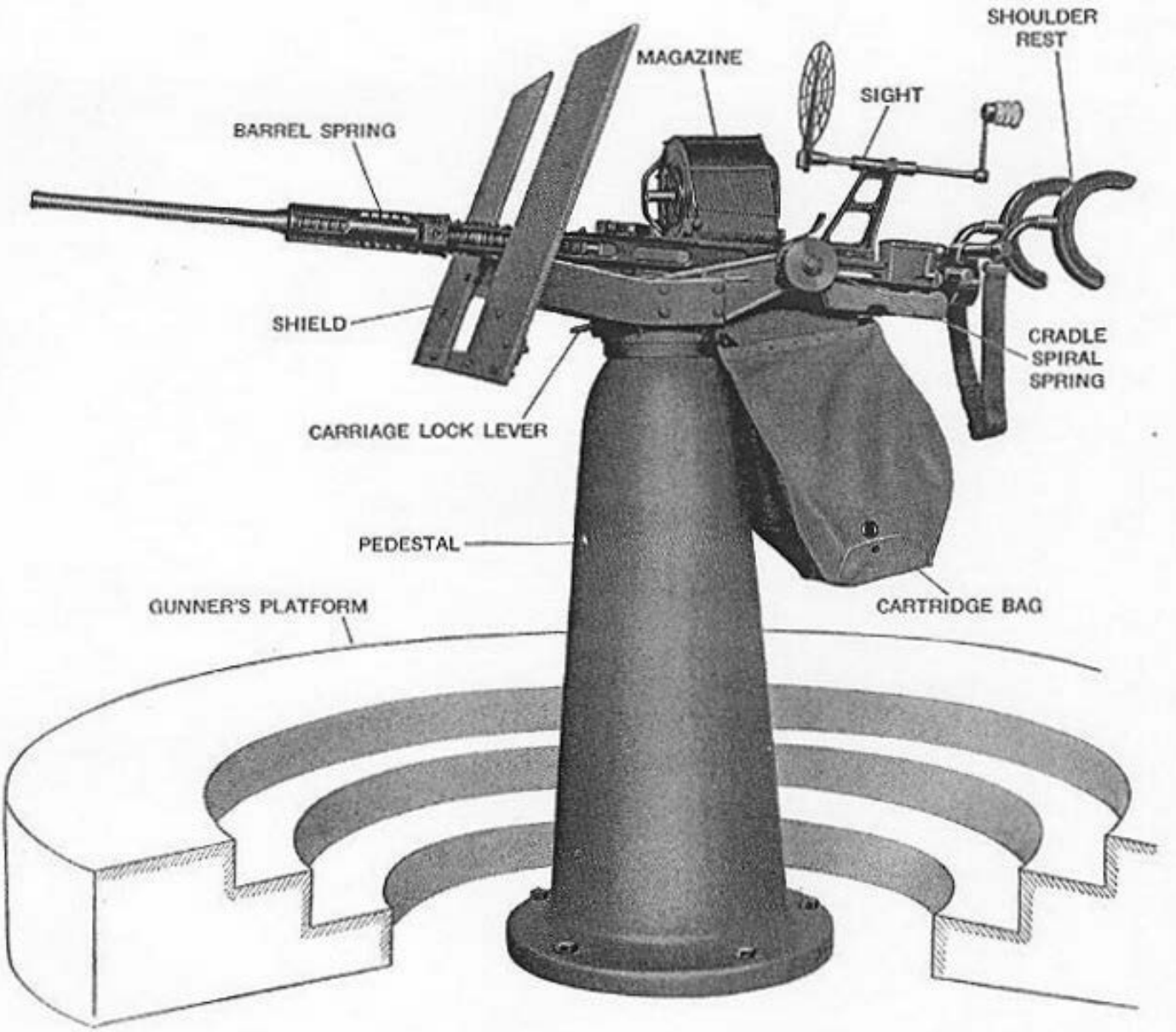

Figure 20—Exterior view showing general arrangement of the 20 mm. A.A. Gun and Mount Mark 5 Mod. 3.

Chapter 3

MARK 5 MOD. 3 GUN MOUNT

GENERAL DESCRIPTION

This gun mount, see Figure 20, is of the Fixed Trunnion Height Type, that is the trunnion cannot be raised or lowered as is possible with the Mark 2, Mark 4, and Mark 6 type mounts. It is, however, possible to train the gun through an unlimited angle when not locked in position by the carriage lock, see Page 61.

The gun can also be elevated between minus 5 degrees and plus 87 degrees. It can be locked in either the plus 5 degree or 87 degree positions with the trunnion bracket and pivot locking bolt, see Page 61.

DETAILED DESCRIPTION

The main view of Plate 2 folded at page 72, is a vertical cross section view of the mount.

Section A-A is a cross section view of the cradle and the counterbalance spring.

Section B-B is a cross section view of the cartridge bag weight attachment to the cradle.

Section C-C is a cross section view of the trunnion bracket and pivot locking bolt arrangement.

Section D-D is a cross section view of the cartridge bag attached to the cradle.

Section E-E is a cross section view of the carriage locking plunger arrangement.

Figure 21 is an exploded view of the gun mount parts.

PEDESTAL AND PIVOT (STAND MARK 5)

The pedestal and base on this type mount are integral. It consists of a hollow casting bored out in the center, near the top to serve as a bearing for the pivot on which the gun carriage rotates. See Figure 21. The cylinder in which the pivot operates is filled with extra light mineral oil, Navy Symbol 1042, 2110 or 2075 to permit easy training of the gun under all temperature conditions.

A shoulder is provided near the top of the cylinder to support the bearing flange of the pivot. Two two-piece large diameter, babbit faced steel thrust bearings are used above and below the pivot flange to provide easy movement of the pivot. The bearings are provided with locating lugs which ride in corresponding grooves in the pedestal.

As a relatively close adjustment is required on the thrust bearings, a threaded retainer is used at the top of the pedestal to provide proper clearance. This retainer has sixteen holes through one of which a lock screw is threaded into the pedestal after ajustment has been obtained.

A machined relief is provided between the upper and lower bearings on the pivot. An oil filler hole is drilled in the top of the pivot to provide a means of checking the oil level and adding additional oil if required. A headless pipe plug is screwed into the opening at the top.

NOTE—Ordalt No. 1269 provided for installation of a gun cocking rope hook on the stands of all Mark 5 mounts built without them. This addition, plus the installation of the sheave in the left rear corner of the cradle, greatly facilitates cocking the gun.

CARRIAGE MARK 5

The carriage used on Mark 5 mounts serves a purpose similar to that of the trunnion bracket and pivot Mark 4 on Mark 4 mounts, except that it does not operate on roller bearings. See Page 21. It is bolted to the top of pivot (OE-3503), which operates on two babbit faced steel thrust bearings. See Figure 21. The length of the two arms extending rearward on the carriage are the same on Mark 4 and Mark 5 carriages.

A different type carriage lock is used to prevent rotation of the carriage when the gun is not in action. It is described in detail on Page 61.

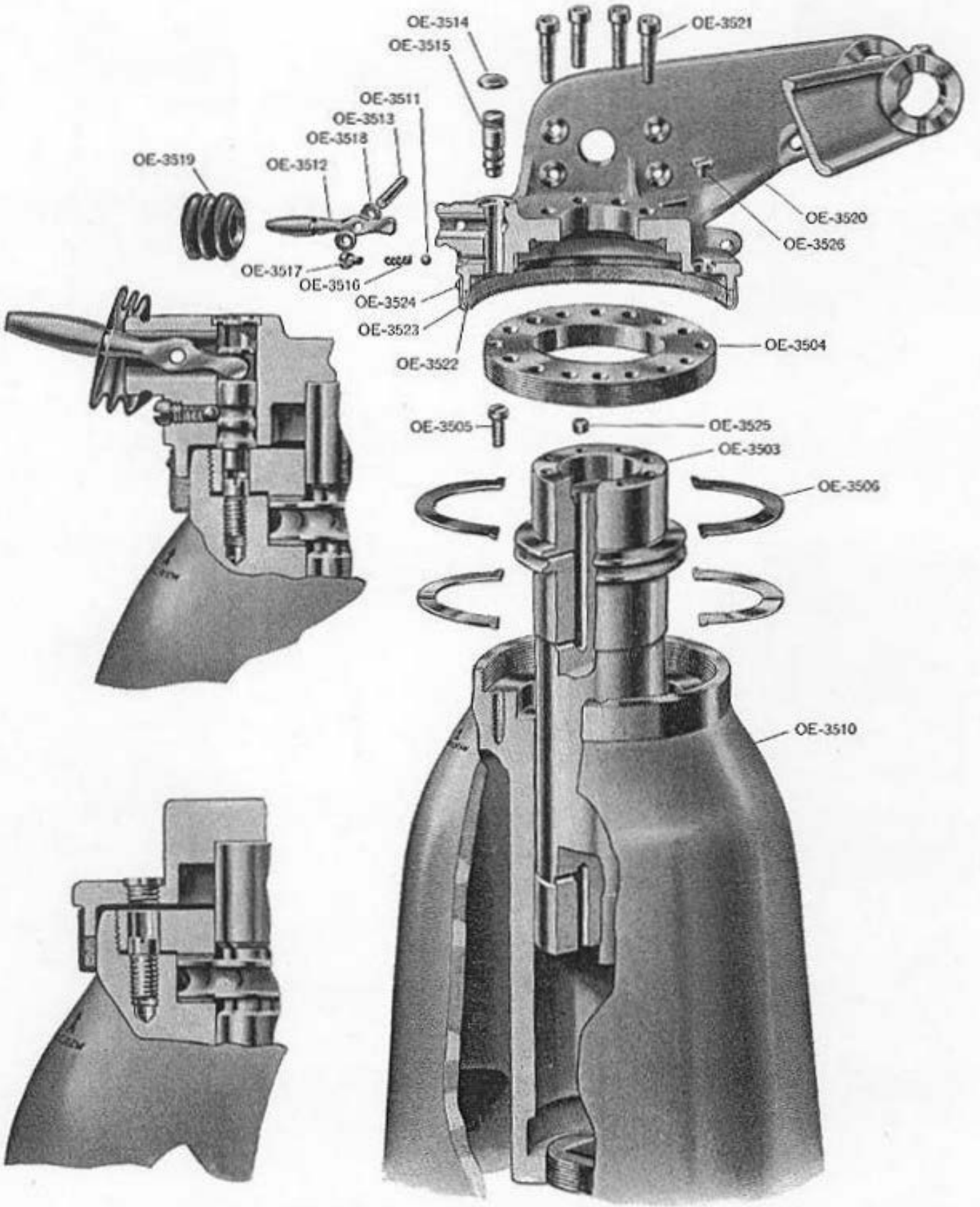

Figure 21—Exploded cut-away view of Mark 5 Mod. 3 Mount.

CRADLE MARK 4 MOD. 2

The original Mark 4 cradles used on Mark 5 mounts were the same as described on page 22 as they applied to Mark 2 and Mark 4 mounts.

The Mark 4 Mod. 2 cradle used on Mark 5 Mod. 3 mount is the same as used on Mark 4 Mod. 2 mounts. See Page 21 for complete information.

GUNNER'S PLATFORM

A circular raised platform having three step levels surrounds the gun. See Figure 20. Because of the fixed height of the gun, this platform is necessary to enable the gunner to fire at various elevations. For example: When operating the gun at high levels, the gunner will stand on the deck; whereas, when firing at lower elevations it will be necessary for the gunner to move up to one of the higher steps on the platform. This platform is not furnished with the mount, but is a part of the ship's structure.

CARRIAGE LOCK

To prevent rotation, the carriage can be locked in place by lock plunger (OE-3515) which engages in holes in the pivot retainer (OE-3504). This plunger slides in a vertically drilled hole located at the front end of the carriage and is operated by lock lever (OE-3512). See Section E-E, Plate 2. The lever is mounted on a pin (OE-3513) in its boss in the carriage. Two spacers (OE-3518), one located on each side of the lever, prevent the lever from shifting sideways. A rubber bellows type water seal (OE-3519) is stretched over the lever and its boss on the carriage to exclude dirt and moisture from the plunger.

A spring loaded locking ball arrangement consisting of ball (OE-3511), spring (OE-3516), and screw (OE-3517) holds the plunger in either the lower (locked) or upper (unlocked) position.

TRUNNION BRACKET AND PIVOT LOCKING BOLT

This lock is the same as used on the right side of the Mark 4 Mod. 2 mount and locks the cradle in either the 5 degree or 87 degree positions. For complete description see page 22. Also see Section C-C, Plate 2.

GUN SECURING BOLT

This bolt is the same as used on Mark 4 Mod. 2 mount to lock the gun in the cradle. For complete description see page 22. Also see Main Section View, Plate 2.

CARTRIDGE BAG

The cartridge bag and weight used on Mark 5 mounts are the same as used on Mark 4 mounts. See Page 22.

1. UPPER PLUNGER — LOWER PLUNGER

DOUBLE LOADING STOP PLUNGER (UPPER AND LOWER)

THESE PARTS BECOME STUCK WITH OIL FROM THE HEAT OF THE GUN. SHOULD BE CLEANED AND LUBRICATED WITH EXTRA LIGHT MINERAL OIL—N. S. 1042, 2075 OR 2110.

APPLY SPARINGLY.

2.

IF MAGAZINE BECOMES DRY OR CORRODED INTERNALLY, IT MUST BE DISASSEMBLED, CLEANED AND LUBRICATED.

THIS INCLUDES ALL SPRINGS, MOVING PARTS AND SPIRAL GUIDEWAYS.

BEARING GREASE OS-1350

3.

TRUNNION BRACKET AND PIVOT LOCKING BOLT

OIL END OF LOCKING BOLT THAT ENGAGES THE CRADLE AND FORCE OIL INTO THE CARRIAGE BEARING BY MOVING THE LOCKING BOLT IN AND OUT.

EXTRA LIGHT MINERAL OIL N. S. 1042, 2075 OR 2110

4. OIL HERE SPARINGLY

WEIGHT BAND PIVOT BOLT

EXTRA LIGHT MINERAL OIL N. S. 1042, 2075 OR 2110

5. OIL HERE SPARINGLY

CARTRIDGE BAG HINGES

EXTRA LIGHT MINERAL OIL N. S. 1042, 2075 OR 2110

6.

CRADLE COCKING SHEAVE

OIL SHEAVE PIN

EXTRA LIGHT MINERAL OIL N. S. 1042, 2075 OR 2110

7. PRESSURE OILERS

TRUNNION BEARINGS

FORCE GREASE INTO PRESSURE OILERS.

BEARING GREASE OS-1350

8.

GUN SECURING BOLT

WHEN INSTALLING THE GUN ON THE CRADLE, COAT THE SECURING BOLT AND THE INSIDE OF THE SECURING BOLT HOLE IN THE BREECH CASING WITH GREASE.

ANTI-SEIZE COMPOUND N. S. 52-C-19 (INT.)

9.

FILLER HOLE IN TOP OF PIVOT

FILL WITH OIL TO BOTTOM OF PLUG.

EXTRA LIGHT MINERAL OIL N. S. 1042, 2075 OR 2110

10.

GUN MOUNT CARRIAGE LOCK

REMOVE SEAL TO OIL.

EXTRA LIGHT MINERAL OIL N. S. 1042, 2075 OR 2110

11.

THE BORE AND FIRING CHAMBER SHOULD BE CLEANED OUT AND LUBRICATED WITH A *LIGHT* COAT OF OIL IMMEDIATELY AFTER FIRING.

MEDIUM MINERAL OIL N. S. 1065 OR 3065

12.

CLEAN AND OIL THE GUN:—

AS SOON AS POSSIBLE AFTER FIRING.

IF THE GUN GETS WET.
IF THE GUN GETS DIRTY.
IF THERE IS ANY REASON TO EXPECT CORROSION TO START.

MEDIUM MINERAL OIL N. S. 1065 OR 3065.

NOTE:
DO NOT USE OIL ON OUTSIDE OF GUN BARREL OR ON GUN BARREL SPRINGS.
LUBRICATING GRAPHITE N. S. 14-G-5

LUBRICATION FREQUENCY CHART WEEKLY

3. TRUNNION BRACKET AND PIVOT LOCKING BOLT
4. WEIGHT BAND PIVOT BOLT
5. CARTRIDGE BAG HINGES
6. CRADLE COCKING SHEAVE
7. TRUNNION BEARINGS
8. GUN SECURING BOLT
9. FILLER HOLE IN TOP OF PIVOT
10. GUN MOUNT CARRIAGE LOCK

PERIODICALLY
(AFTER EACH PROTRACTED FIRING)

1. DOUBLE LOADING STOP PLUNGER (UPPER AND LOWER)

(Continued in right hand column)

(Continued from left hand column)

NOTE:
THE FREQUENCY OF LUBRICATION IS DEPENDENT UPON THE USE OF THE MECHANISM. THE SCHEDULE GIVEN IS REQUIRED WHEN THE OUTFIT IS USED DAILY. LUBRICATION MAY BE LESS FREQUENT FOR LESS FREQUENT USE OF THE OUTFIT. BUT IN NO CASE SHALL THE MAXIMUM PERIOD BETWEEN REGULAR INSPECTIONS OF THE PARTS FOR PROPER LUBRICATION ON SHIPS IN COMMISSION EXCEED ONE MONTH. EXERCISE THE PARTS AFTER LUBRICATING.

REFERENCE: DRAWING NO. 299982

Figure 22—Lubrication Chart Mark 5 Mod. 3 Mount

THE PIVOT CAVITY IN THE PEDESTAL, THE CARRIAGE LOCK, TRUNNION BRACKET AND PIVOT BOLT, AND CRADLE COCKING SHEAVE SHOULD BE WELL LUBRICATED WITH "EXTRA LIGHT MINERAL OIL, NAVY SPECIFICATION 1042, 2110 OR 2075." See lubrication chart, Figure 22.

PIVOT (OE-3503)

Before reinstalling the pivot in its cylinder in the pedestal pour 1.65 lbs. (or 1.95 lbs. if cylinder has a machined relief) of the specified oil into the cylinder. After installation is completed check the oil level which should be up to the bottom of filler plug (OE-3525). Additional oil should be added if necessary.

CARRIAGE LOCK PLUNGER (OE-3515)

Remove lock lever water seal (OE-3519) and with an oil can inserted into the lock lever boss in the carriage, inject a small quantity of the specified oil into the plunger hole. At the same time move the lever up and down several times to thoroughly distribute the oil. Wipe off excess and reinstall the water seal on the lock lever.

TRUNNION BRACKET AND PIVOT LOCKING BOLT (OE-2070)

With cradle rotated to vertical position, oil end of locking bolt that engages the cradle with the specified oil, using an oil can. Distribute the oil into the carriage bearing by moving the locking bolt knob in and out a few times.

CRADLE COCKING SHEAVE

Spin the sheave by hand and with an oil can force the specified oil to the sheave pin.

GUN SECURING BOLT (OE-2188)

Just before the gun is installed in the cradle, thoroughly coat gun securing bolt and the inside of the securing bolt hole in the breech casing with "Anti-seize compound, Navy Specification 52-C-19 (Int.)".

USE OS-1350 GREASE IN PRESSURE OILERS AS INDICATED BELOW.

CRADLE TRUNNION PINS (OE-2161 AND OE-2160)

Force grease into pressure oilers (OE-2259) using grease gun (OE-1637) or (299832-5).

As the height of the mount is fixed only two steps are involved in its operation. The first step is to press down on carriage lock lever (OE-3512) to disengage plunger (OE-3515) from the retainer. This will then permit the gun to be trained without restriction.

The second step is to pull out trunnion bracket and pivot locking bolt knob (OE-2072) to disengage bolt (OE-2070) from the cradle and turn it one-quarter turn to permit the gun to be elevated without restriction.

If, after extensive service, excessive clearance develops between pivot (OE-3503) and its two thrust bearings (OE-3506) correct clearance can again be restored by tightening retainer (OE-3504). This can be done without removing carriage (OE-3520), in the following manner:

Operation Number

1. Pull out pivot locking bolt knob (OE-2072), see Plate 1, and raise gun to 87 degree position and lock in place.
2. Remove lock screw cover plug (OE-3526) from the carriage. Disengage lock plunger (OE-3515) from retainer (OE-3504) by pushing down lock lever (OE-3512). Rotate carriage (OE-3520) until the head of retainer screw (OE-3505) is visible through the plug hole in the carriage (location of screw indicated by arrow on pedestal just below top edge). Remove the lock screw. See Figure 21.
3. Engage the carriage lock plunger in the retainer and rotate the carriage (OE-3520) and retainer (OE-3504) clockwise (viewed from the top) as far as possible to tighten retainer down on thrust bearings.
4. Release plunger from retainer and rotate carriage clockwise until the plug hole lines up with the locating arrow on the front of the pedestal. Rotate the carriage clockwise until the plunger has passed the first hole in the retainer from the locating arrow. Drop the plunger into the second hole and rotate the carriage and retainer locked together counter-clockwise until the plug hole is in line with the arrow on the front of the pedestal.

   Install retainer screw (OE-3505) in retainer. Install hole plug (OE-3526) in carriage.

The following instructions for stripping the Mark 5 gun mount should be performed in the order given to facilitate the procedure and prevent injury to the personnel.

Precautions should be taken when removing the shield assemblies to be assured of adequate support when loosening and removing the shield bracket to carriage bolts to prevent the shields from dropping.

As instructions call for removing the gun before stripping the cradle and since the cradle spiral spring is under heavy load, note carefully the following precaution. **Without the gun in the cradle, the cradle spring and cradle weight will cause the cradle to spring down violently when unlocked from the 5 degree position. It is best for one man to hold the rear end of the cradle while another is unlocking it.**

In some instances, the carriage may stick to the top of the pivot. In this case it will be necessary to tap the underside of the carriage lightly with a soft face hammer. To prevent the carriage from dropping off, reinstall two of the carriage to pivot bolts a few turns or use headless guide screws if available. Screws (299989-4) will serve the purpose.

Due to a slight vacuum in the bottom of the pivot cavity in the pedestal it may be difficult to lift out the pivot. Removing the oil hole filler plug in the top of the pivot will facilitate this operation.

For location of the parts by part number, refer to Plate 2—Sectional Details of Gun Mount—which is folded at page 72.

Operation Number

1. MAGAZINE—Unship the magazine by pushing forward on the magazine catch lever. Uncock the gun.
2. SIGHT—Unship the sight by loosening the three clamping screws (OE-1192), using sight universal spanner (OE-1189). The center screw must be backed out five or six turns and then pushed toward the left side until the stop piece is disengaged from notch in the breech casing. Then slide the sight assembly back toward the trigger cover and lift it off the gun.
3. SHOULDER REST—Press the catch that retains the handgrips and remove the shoulder rest and handgrips by unscrewing counter-clockwise.
4. GUN—Pull down on gun securing bolt withdrawing head (OE-2190) to disengage bolt (OE-2188) from the breech casing and slide the gun out of the cradle to the rear.
5. CARTRIDGE BAG ASSEMBLY (OE-2198)—Remove the two cartridge bag anchor bolts (OE-2172), nuts (OE-2173), and cotter pins (OE-2231) from the carriage and cradle and remove the bag. See Section D-D, Plate 2.
6. WEIGHT AND BAND ASSEMBLY (OE-2207)—Raise the cradle to the 87 degree position and lock in place with trunnion bracket and pivot locking bolt (OE-2070). **Cradle spring and cradle weight will cause cradle to spring down violently. Handle with care.** Remove weight band pivot bolt (OE-2177), nut (OE-2178), and cotter pin (OE-2230) and remove the weight. See Section B-B, Plate 2.
7. SHIELDS—Remove shield strap (OE-2226) by taking out four bolts (OE-2227) and nuts (OE-2229). Remove the right and left shield assemblies by taking out four bolts (OE-3535), nuts (OE-2217), and lock washers (OE-2275) attaching each bracket (OE-2220) right and (OE-2221) left to the carriage. One man should hold the shield while the other is removing the bolts.

STRIPPING SHIELD ASSEMBLIES—

Stripping the shield assemblies, if necessary, is accomplished as follows: Remove four bolts (OE-2228) and nuts (OE-2229) attaching brackets to the shield plates.

Operation Number

8. CRADLE ASSEMBLY (OE-2327)—With the cradle locked in the 87 degree position remove cradle spring housing retaining nut pin (OE-2268) by driving it out with a punch. See Section A-A, Plate 2. Unscrew and remove retaining nut (OE-2163), using wrench (OE-2904).

NOTE—When the spiral spring and housing assembly was assembled to its cover (OE-2165), it was turned clockwise two or three notches before its serrations were engaged with those of the cover to keep spring (OE-2169) under tension. Keep hands clear when stripping to prevent injury.

Pull off the housing and spring assembly.

Remove the housing cover by taking out four screws (OE-2256). Drive out cradle trunnion pin securing nut pin (OE-2269) with a punch. Remove retaining nut (OE-2162), using wrench (OE-2904) and spanner (OE-3157). See Figure 52. Drive both cradle trunnion pins (OE-2161) right and (OE-2160) left inwards, and remove from their holes. Lift off the cradle. Key (OE-2191) in trunnion pin (OE-2160) is a press fit in the pin and should not be removed. Any attempt to remove it will result in damaging the pin.

STRIPPING CRADLE ASSEMBLY—

Stripping the cradle, if necessary, is accomplished as follows: Remove cheek plates (OE-2175) right and (OE-2174) left by taking out four screws (OE-2263) from each plate. See Section A-A, Plate 2. Unscrew and remove oiler (OE-2259). Drive out gun securing bolt withdrawing head pin (OE-2261), using a punch and take off head (OE-2190). The bolt (OE-2188) and spring (OE-2189) can then be removed. Drive pin (OE-2262) out of bolt (OE-2188), using a punch. Drive out cocking sheave pin taper pin (12-Z-49-63) from the bottom, cocking sheave pin (299950-3), and remove sheave (299950-2).

STRIPPING CRADLE SPRING AND HOUSING ASSEMBLY—

To strip cradle spring and housing assembly (OE-2312), if necessary, proceed as follows: Remove spring anchor bolt (OE-2168) and its lock washer (OE-2278). Spiral spring (OE-2169) can then be removed. Bushing (OE-2166) is pressed in the housing and should not be removed unless it is desired to replace the bushing.

9. CARRIAGE ASSEMBLY (OE-3508)—Unscrew and remove pivot retainer lock screw cover plug (OE-3526). See Main Section View, Plate 2. Push down on carriage lock lever (OE-3512) to disengage plunger (OE-3515) from retainer (OE-3504) and rotate the carriage until the pivot retainer lock screw cover plug hole is directly over the head of pivot retainer lock screw (OE-3505). The position of this screw is indicated by an arrow on the front of the pedestal, near the top. Remove the screw with a screw driver. Engage carriage lock plunger (OE-3515) with retainer (OE-3504) by raising lock lever (OE-3512) and rotate carriage counter-clockwise until the retainer is unscrewed from its mating threads in the pedestal.

Remove the eight carriage to pivot screws (OE-3521) with a $\frac{3}{8}$" special male socket and $\frac{1}{2}$" drive swivel end wrench handle. Lift off carriage. If it is necessary to tap the bottom of the carriage to break it loose from the pivot, it is advisable to leave at least two of the carriage to pivot screws turned in a few threads to prevent the carriage from dropping off.

STRIPPING CARRIAGE ASSEMBLY—

To strip the carriage assembly, if necessary, proceed as follows: Unscrew and remove carriage lock spring and ball retainer screw (OE-3517), spring (OE-3516), and ball (OE-3511). Remove lock lever water seal (OE-3519). Drive out lock lever pivot pin (OE-3513), using a punch, and remove lever (OE-3512) and two spacers (OE-3518). See Section E-E, Plate 2. Pull out lock plunger (OE-3515. It is not necessary to remove lock lever plug (OE-3514) unless it is desired to replace it.

Operation Number

Drive out carriage lock pin and bushing assembly retaining pin (OE-2260) and remove carriage cradle locking pin bushing (OE-2071). Drive knob pin (OE-2140) out of bolt (OE-2070) and remove knob (OE-2072). Remove bolt (OE-2070) and spring (OE-2074) from bushing (OE-2071). Drive the two bushing pins (OE-2141) out of the bushing. See Section C-C, Plate 2.

Unscrew and remove oiler (OE-2259).

If carriage packing (OE-3522) is damaged, remove it with retainer (OE-3523) by driving out the four sheet metal screws (OE-3524) with a small punch inserted from inside. Otherwise the packing and retainer should remain in place on the carriage.

10. PIVOT RETAINER (OE-3504)—Lift the retainer out of the pedestal. Some of the early mounts were equipped with a retainer fitted with an oil seal. If the seal is damaged or otherwise unusuable, it may be discarded as it has been found to be unnecessary.

11. PIVOT (OE-3503)—Unscrew and remove pivot oil passage filler plug (OE-3525). With two lifting eyes screwed into the carriage to pivot screw holes in the top of the pivot, lift out the pivot. This should be done slowly to give the oil an opportunity to drain through the oil passage hole into the sump at the bottom of the pedestal and break the vacuum. Upper pivot thrust bearing (OE-3506) will come out with the pivot. The lower pivot thrust bearing can be lifted off the shoulder in the pedestal.

The following instructions for reassembling the Mark 5 gun mount cover the complete reassembling of the mount starting with all serviceable units completely stripped. These instructions should be followed in the order given to facilitate the operations. **Adjustment procedure of the pivot retainer is important to assure easy, smooth pivot rotation.**

Extreme care should be taken to see that all parts, particularly machined surfaces are wiped clean of dirt, moisture, etc.

For location of parts by part number, refer to Plate 2 Sectional Details of Gun Mount—which is folded at page 72.

Operation Number

1. PIVOT (OE-3503)—If the pedestal bore has a continuous straight wall, install 850 CC. (1.65 lbs.) of extra light mineral oil, Navy Symbol 1042, 2110 or 2075, in the bottom of the bore. If there is a machined relief in the bore between the upper and lower pivot bearings, install 1000 CC. (1.95 lbs.) of oil. This will provide proper lubrication for all bearing surfaces.

   Install two pivot bearing halves (OE-3506)—lower bearing—in bottom of pedestal pivot shoulder. See Figure 21. Assemble this bearing with the babbitted side toward TOP of pedestal, engaging the lugs on the bearings in the notches in the pedestal. Lubricate the bearing with the same oil specified above.

   Wipe pivot (OE-3503) clean, lubricate with the same oil specified above and lower it **slowly** into the pedestal to prevent loss of oil.

   Install the second set of thrust bearing halves (OE-3506) on the flange of the pivot with the babbitted side toward the BOTTOM, engaging the lugs on the bearings in the notches in the pedestal. Lubricate the bearing with oil the same oil specified above.

2. PIVOT RETAINER (OE-3504)—Place the retainer with the flat 6½ inch diameter bearing surface down into the pedestal and screw it in as far as it will go by hand. With a ½ inch dowel draw the retainer down tightly on the thrust bearings. Then back off the retainer about two holes until the nearest hole is in line with the arrow on the front of the pedestal indicating the lock screw position. Install lock screw (OE-3505) and tighten securely.

3. CARRIAGE ASSEMBLY (OE-3508)—REASSEMBLING—Reassemble the trunnion bracket and pivot locking bolt assembly (OE-2009) as follows: Drive the two retaining bushing pins (OE-2141) into bushing (OE-2071) until the outer ends are flush. Place spring (OE-2074) on the small end of bolt (OE-2070), dip it into extra light mineral oil, Navy Symbol 1042, 2110 or 2075 and insert in bushing (OE-2071). Place knob (OE-2072) on end of bolt (OE-2070) and secure it with pin (OE-2140). Place the assembly in the hole in the right side of the carriage, lining up the pin hole in the bushing with the one in the carriage, and drive retaining pin (OE-2260) into the carriage boss to lock the assembly in place. See Section C-C, Plate 2. Check operation and place in unlocked position by pulling out knob and turning it one-quarter turn.

   Install pivot retainer lock screw cover plug (OE-3526).

   If carriage lock plunger hole plug (OE-3514) was removed, install a new one by setting it in the hole in the carriage with the hollow side toward the bottom and striking the center of the plug with drift (OE-1616) until a dimple is formed in the center of the plug. Assemble carriage lock plunger (OE-3515) after dipping it into extra light mineral oil, Navy Symbol 1042, 2110 or 2075. The grooved end of the plunger should be entered in the hole first.

   Install lock lever (OE-3512) and two lock lever spacers (OE-3518) in their hole in the carriage and drive lock lever pivot pin (OE-3513) through the holes in the lever and spacers. See Section E-E, Plate 2. Stake the pin securely at both ends to prevent it from coming out.

Operation Number

Slide lock lever water seal (OE-3519) over lock lever and seat it in the grooves in the boss on the carriage and lock lever.

Place lock plunger ball (OE-3511) and spring (OE-3516) in their hole in the carriage and screw in retainer screw (OE-3517).

Screw oiler (OE-2259) into its hole in the carriage.

In the event that a new carriage packing (OE-3522) is to be installed, do not assemble it to the carriage at this time. It may curl over and restrict movement of the carriage. However, place the packing in retainer (OE-3523) and place it in position on the pedestal.

4. CARRIAGE ASSEMBLY (OE-3508)—INSTALLATION—Install the carriage on pivot (OE-3503) and secure in place with eight carriage screws (OE-3521). These screws should be tightened to 75 foot pounds torque. This torque may be applied by a load of 75 pounds on a wrench handle one foot long, or by the use of a torque tension wrench, if available.

Line up the four holes in packing retainer (OE-3523) with those in carriage (OE-3520) and drive in the four sheet metal screws (OE-3524). Check operation of carriage for binding.

5. PIVOT OIL LEVEL—Check the oil level in filler hole in pivot (OE-3503). If necessary, add extra light mineral oil, Navy Symbol 1042, 2110 or 2075 to bring it up to level of bottom of plug (OE-3525). Then install plug and tighten securely.

6. CRADLE ASSEMBLY (OE-2327)—REASSEMBLING—Place cocking sheave (299950-2) in position in slot in rear end of cradle (OE-2325). Drive cocking sheave pin (299950-3) through cradle and sheave and lock in place with taper pin (12-Z-49-63) driven in from the top face of the cradle.

Screw oiler (OE-2259) into hole in trunnion pin boss.

Assemble cheek plates (OE-2175) right and (OE-2174) left, using four attaching screws (OE-2263) in each plate. Assemble the plates with the extensions on the plates forward.

Drive securing bolt locating pin (OE-2262) into hole near center of bolt (OE-2188). Place spring (OE-2189) on small end of bolt and insert bolt into hole in the cradle from the top. Press down on top of bolt, install withdrawing head (OE-2190) and secure it in place on the bolt with securing pin (OE-2261).

7. CRADLE ASSEMBLY (OE-2327)—INSTALLATION—Hold the cradle on the carriage with the gun securing bolt forward and the trunnion pin holes in the cradle and carriage in line. Drive trunnion pins (OE-2161) right and (OE-2160) left outwards so that they pass through the cradle and carriage. See Section A-A, Plate 2. Key (OE-2191) should be in place in trunnion pin (OE-2160) before driving the pin into place. Screw retaining nut (OE-2162) onto trunnion pin (OE-2161), using wrench (OE-2904) and spanner (OE-3157), Figure 52. Lock the nut in place with securing pin (OE-2269). If the holes in the nut and pin do not line up when the nut is tight, back nut off until the holes do line up.

Slide spring housing cover (OE-2165) over carriage pin (OE-2160) and secure it to the carriage with four screws (OE-2256).

Build up cradle spiral spring and housing assembly (OE-2312) as follows: If bushing (OE-2166) was removed from housing (OE-2164) press in a new one. Place spiral spring (OE-2169) in housing so that the spring winds **clockwise** toward the center when looking into the housing. See Figure 23. Install spring securing bolt (OE-2168) and lockwasher (OE-2278) in housing so that the stud end of the screw passes through the anchor hole in the outer end of the spring.

Raise the cradle to the 87 degree elevation and lock it in place by releasing trunnion bracket and pivot locking bolt knob (OE-2072). Slide the cradle spring and housing assembly onto the left trunnion pin with the radial portion of the spring sliding into the spring slot in the trunnion pin, until the notches in the housing are just clear of those on the housing cover.

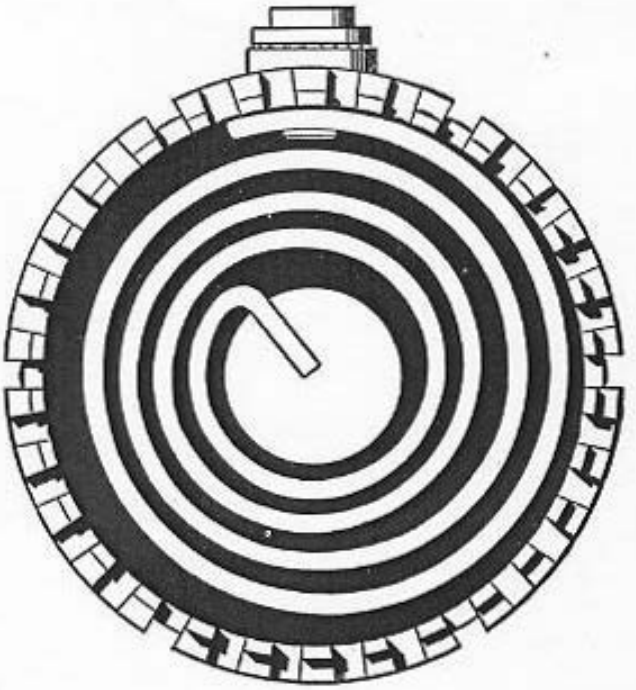

Figure 23—Correct position of spiral spring in housing.

Operation Number

NOTE—Keep hands clear of the serrations to prevent injury.

Turn the spring housing clockwise until spring tension is felt, then turn further in the same direction to the second place where the notches in the housing and cover will engage. Force the housing into engagement with the cover. Install spring housing trunnion pin nut (OE-2163) and tighten, using wrench (OE-2904). Lock the nut on the pin by driving securing pin (OE-2268) through nut and pin. If holes in the nut do not line up when the nut is tight, back nut off until the holes do line up.

NOTE—In order to improve the balance of the gun when installing the Mark 14 Mod. 2 sight on the rear end of the cradle, or when interchanging solid and ribbed gun barrels, the cradle spiral spring housing may be adjusted one or two notches from the standard setting. Cradle spiral spring spanner (367543-1), Figure 52, will be found helpful when making this adjustment.

8. WEIGHT AND BAND ASSEMBLY (OE-2207)—With the cradle in the 87 degree position install the weight and band assembly to the cradle cheeks, using pivot bolt (OE-2177), nut (OE-2178), and cotter pin (OE-2230). See Section B-B, Plate 2.

9. CARTRIDGE BAG ASSEMBLY (OE-2198)—Lower the cradle to the 5 degree position and lock in place. Place weight and band in bag. Fasten bag to cradle and carriage, using two bolts (OE-2172), nuts (OE-2173), and cotter pins (OE-2231). The nuts should be left sufficiently loose so that the cartridge bag ends can rotate on the bolts. See Section D-D, Plate 2.

10. SHIELD ASSEMBLIES (OE-2316) RIGHT AND (OE-2317) LEFT—Assemble shield plates (OE-2219) or (OE-2289 right and OE-2290 left) to shield brackets (OE-2220) right and (OE-2221) left, using four bolts (OE-2228) and nuts (OE-2229) in each plate.

Bolt the right and left shield assemblies to the carriage, using four bolts (OE-3535), lock washers (OE-2275), and nuts (OE-2217) on each bracket.

Bolt shield strap (OE-2226) to the shield plates, using four bolts (OE-2227) and nuts (OE-2229).

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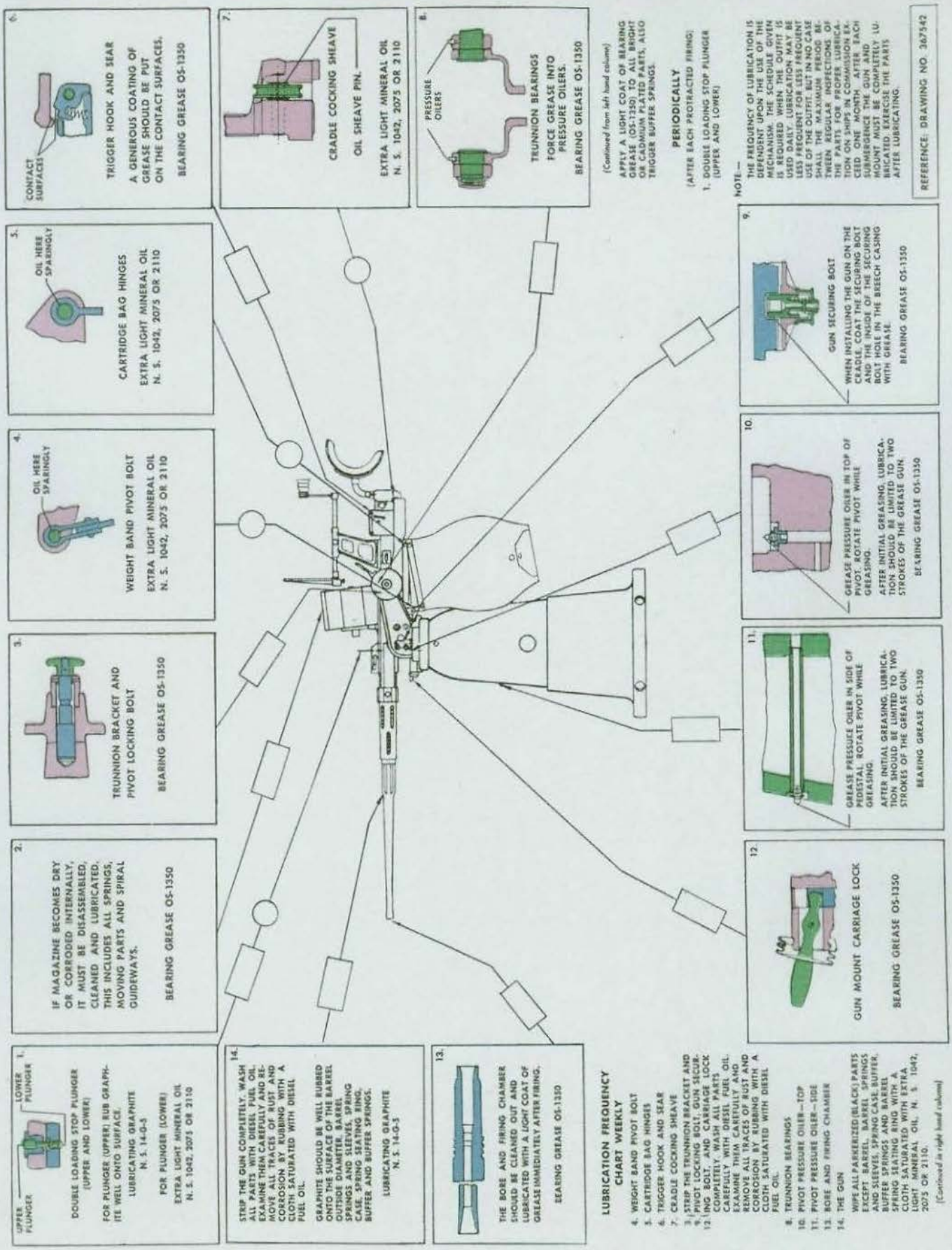

Figure 24—Lubrication Chart Mark 5 Mod. 4 Mount

Chapter 4

MARK 5—MOD. 4 GUN MOUNT

MOUNTED ON SUBMARINE

GENERAL DESCRIPTION

This mount is a modification of the Mark 5 Mount for use on submarines. Except for the pedestal, which is designated Mark 5 Mod. 2, all assembled units are the same as used on the Mark 5 Mount. The following changes were made to the Mark 5 pedestal:

(a) The pedestal is cut in two approximately 19" above the base and the upper portion telescoped into the lower part and welded in place. The overall height is reduced approximately 11" ½ which reduces the mount trunnion height to 50" ¾.

(b) Flooding and draining of the pedestal is accomplished by drilling a number of holes in the pedestal. Near the top are four 1" vent holes. Midway between the top and bottom are three 3" holes, and in the edge of the base flange are five 1" ¾ holes.

(c) The large pipe plug in the lower end of the pedestal pivot cylinder has a ½" hole drilled in the center to provide free drainage.

(d) The pivot (299964-1) is modified to provide pressure fittings for the lubrication of the upper and lower radial bearing surfaces. One grease fitting is fitted in the oil passage at the top of the pivot and an additional fitting is located in the side of the pedestal casing approximately 15".4 below the top.

SERVICE DATA

The maintenance, stripping, and reassembly data are the same as applies to the Mark 5 Mount. See Pages 65 to 71. Figures 20 and 21 will suffice for illustrative purposes.

Because of the conditions under which the gun and mount are used there are new problems involved in the maintenance and lubrication of this unit. Additional care is necessary to assure efficient operation upon surfacing and to provide adequate protection to the parts while submerged.

The carriage lock, trunnion bracket and pivot locking bolt and gun securing bolt in particular require frequent servicing to prevent their freezing tight due to accumulation of rust and corrosion. A hole is provided in the pedestal pivot cylinder plug to permit water to drain out. All parts must be frequently cleaned and adequately lubricated with special water resistant grease. See lubrication chart, Figure 24.

CLEANING

Strip the carriage lock, trunnion bracket and pivot locking bolt, and gun securing bolt completely (see Stripping Cradle Assembly and Carriage Assembly, Pages 66 to 71). Wash all parts carefully with Diesel fuel oil. Examine them carefully and remove all traces of rust and corrosion by rubbing with a cloth saturated with Diesel fuel oil.

LUBRICATION—(See lubrication chart, Figure 24)

Apply a light coat of (OS-1350) grease to all bright and cadmium-plated parts. This applies particularly to the carriage lock plunger, trunnion pivot locking bolt, and the gun securing bolt all of which must operate freely in their respective bores.

Apply a generous coat of (OS-1350) grease to the cradle trunnion pin grease fittings, using grease gun (OE-1637).

After initial greasing, lubrication of the pivot should be limited to two strokes of grease gun (OE-1637), with (OS-1350) grease, for each of the two fittings. This is necessary to insure that the pivot reliefs are **not** filled with grease. An excessive amount of grease would require excessive force to train the gun in cold weather. Rotate the pivot when greasing it.

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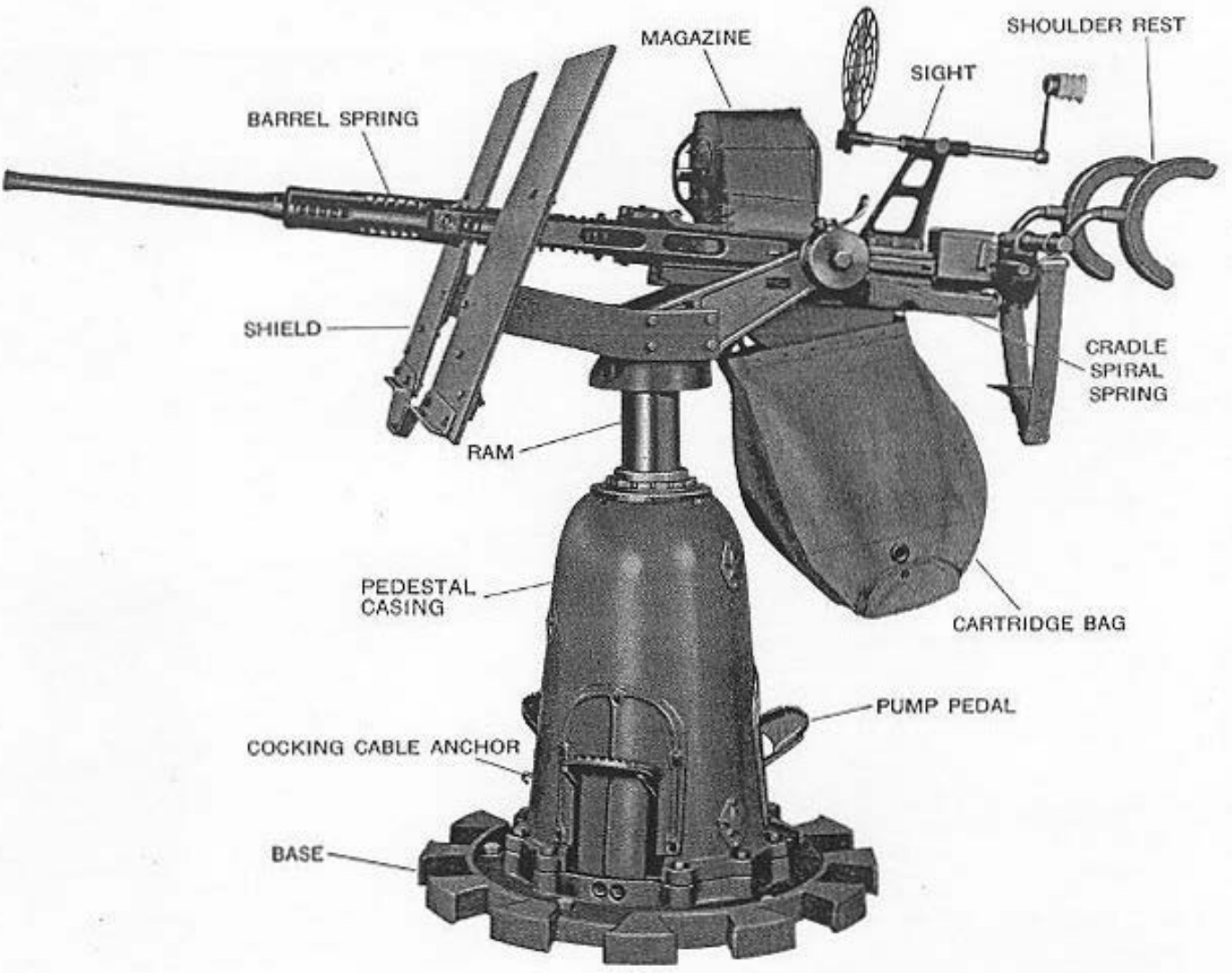


Figure 25—Exterior view showing general arrangement of the 20 mm. A.A. Gun and Mount Mark 6

Chapter 5

MARK 6 GUN MOUNT

GENERAL DESCRIPTION

This gun mount, see Figure 25, is hydraulically operated by three pedals, equally spaced around the pedestal. Operating any one of the pedals will permit raising and lowering the trunnion to enable the gunlayer to assume the easiest position to fire at any elevation.

The gun carriage is locked against rotation when lowered. After being raised approximately one half inch, the gun can be trained through an unlimited angle.

The gun can be elevated on its trunnions between minus 15 degrees and plus 90 degrees.

The Gun Mount comprises the following general units:

1. The base, ram cylinder, and pedestal casing which support and enclose the mechanism.
2. The ram, carriage, and cradle which raise and lower the gun and rotate with it.
3. The hydraulic operating and control mechanism which provides means of raising and lowering the ram.

DETAILED DESCRIPTION

The main view of Plate 3 folded at page 12 is a vertical cross section view of the mount.

Section A-A is a cross section view of the cradle and the counterbalance spring.

Section B-B is a cross section view of the cartridge bag weight attachment to the cradle.

Section C-C is a cross section view of the cradle locking plunger arrangement.

Section D-D is a cross section view of the oil pump and valve arrangement.

Section E-E is a detailed view showing the cylinder base air vent.

Section H-H is a detailed view showing the anchor on the pedestal for attaching the cocking rope.

Reference to Plate 3 folded at page 120 will be helpful in identifying the various parts mentioned.

BASE

The base which acts as a support for the pedestal casing, oil tank, ram cylinder, hydraulic pumps, and pump pedal brackets, also houses the intake and outlet valve groups. Cut-outs are provided on the outer edge of the base to give the gun layer solid foot holds when firing the gun at high elevation.

RAM CYLINDER

Centered in the pedestal casing and bolted to the base, the ram cylinder serves two purposes. Its upper third acts as a guide or bearing for the ram with its attaching carriage and cradle, while its lower two-thirds forms the ram cylinder proper. A shoulder formed at the junction of the guide and cylinder acts as a stop for the ram piston and limits the upward travel of the ram.

A leather oil seal pressed into the recess machined in the upper end of the ram cylinder serves to wipe off the ram as it is lowered. A close fitting ice breaker lip is provided on the top of the seal to remove ice which may form on the ram when it is raised.

A tapered sleeve screws onto the upper end of the ram cylinder and centers it by engaging in a tapered bore in the casing. Four Allen type set screws threaded into the side of the casing, near the top, prevent the sleeve from turning out.

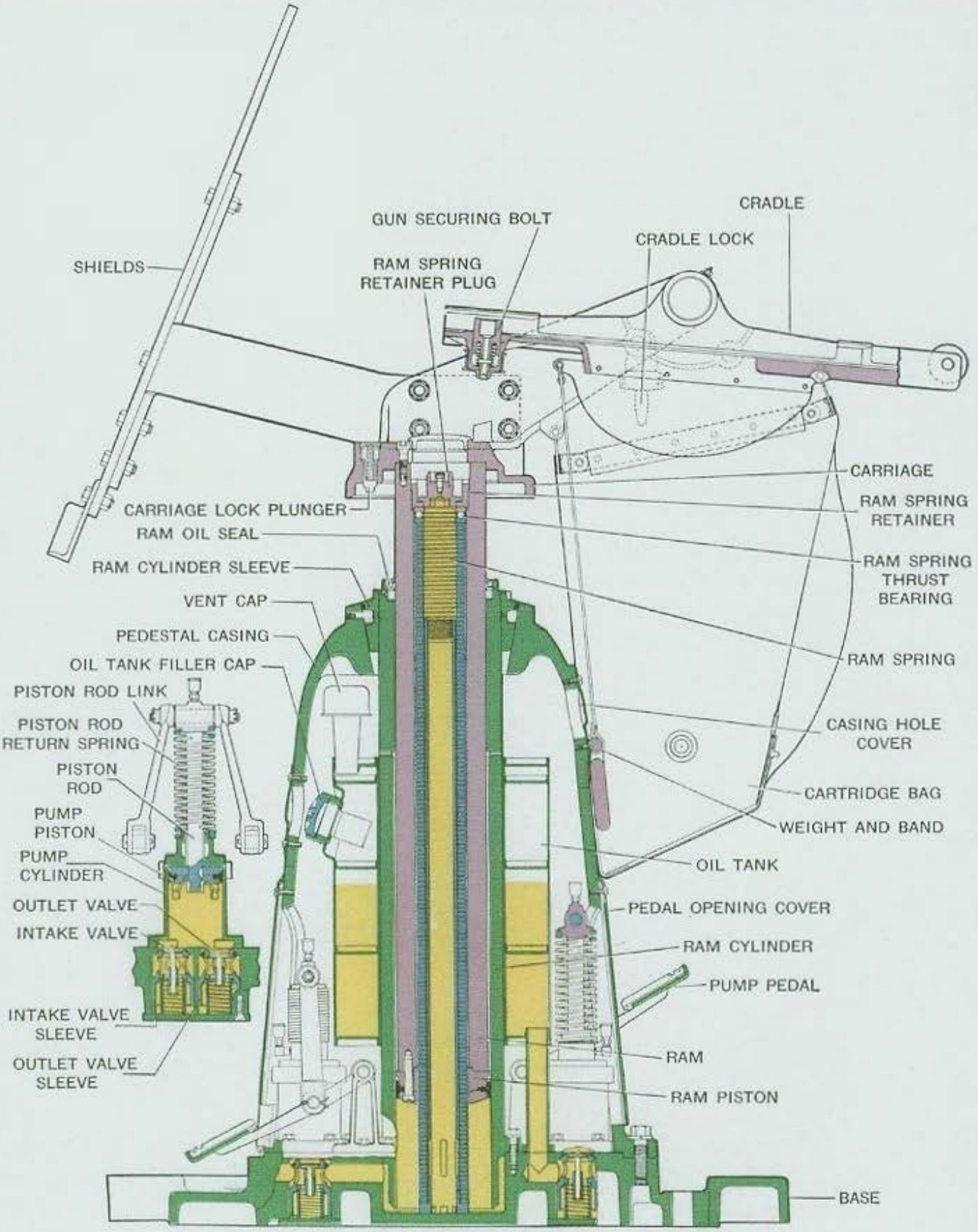


Figure 26—Sectional view of Mark 6 Mount (ram partially raised)

PEDESTAL CASING (STAND MARK 6)

The pedestal casing which completely surrounds the operating mechanism is bolted to the base. It is provided with three large removable pedal opening covers, held in place by five machine screws, which permit access to the pumps for lubrication and servicing. There are also four smaller hole covers, each held in place by two machine screws—two to cover the holes near the top provided for the lifting hook used when raising the casing off the base or when lifting the entire unit, one near the center for access to the oil tank filler cap, and one near the base for access to the base air vent valve.

RAM

The ram, which supports the carriage, raises and lowers in the ram cylinder. Power for raising the ram is furnished by three hydraulic pumps. Bolted to the lower end of the ram are the steel piston of slightly larger diameter than the ram, a synthetic rubber piston cup, and a steel piston cup retainer.

Contained within the ram is a ram spring and tube assembly, the purpose of which is to aid the hydraulic mechanism in raising the ram and gun and cushioning its downward travel. This assembly consists of five rectangular wire coil springs, separated from one another by steel spacer washers. At the lower end of the tube the springs are retained by a flange welded to the tube. These springs act against the upper end of the ram through a ball thrust bearing and a cup shaped retainer which screws into the internal threads in the ram. A retainer plug fitted with a bleeder valve is screwed into the retainer. This plug serves two purposes. When in its normal position the short, large diameter end is threaded into the retainer and it acts as a plug to prevent loss of oil. Its other purpose is to confine the ram springs when removing the ram spring and tube assembly from the ram to service the unit. For this purpose the plug is removed and inverted so that its long, small diameter end is threaded into the internal threads at the upper end of the tube. **Very definite instructions must be followed when servicing this assembly to prevent injury to the personnel. Carefully read the instructions under "Ram Spring and Tube Assembly—Removal", page 96, and "Ram Spring and Tube Assembly—Stripping", page 100.**

CARRIAGE MARK 6

This carriage is similar to Mark 5 carriage used on Mark 5 mounts except that the arms extend 2" farther backward and 2⅞" farther upward. Also there is no boss on the front end for the carriage lock lever. There is, however, a hole in which a spring loaded carriage lock bolt operates to lock the carriage against rotation when the ram is lowered. The operation of this carriage lock is explained in detail on page 83.

CRADLE MARK 5

The cradle used on Mark 6 mounts is similar to that used on Mark 5 mounts. Although the overall length is approximately the same length as cradle Mark 4 Mod. 2, it is one inch longer from the center of the cradle trunnion pin hole to the rear end. The two holes provided in the right side for the cradle lock plunger are relocated to permit the cradle to be locked in the 5 degree or 90 degree elevation positions. The operation of the cradle lock is described on page 83.

HYDRAULIC OPERATING AND CONTROL MECHANISM

The hydraulic operating and control mechanism consists of the oil tank, oil pumps, pump pedals, and the intake and outlet valves located in the base. See Figure 27.

Oil Tank

The oil tank is of approximately five gallons capacity and surrounds the ram cylinder. It is mounted on the base through three equally spaced hollow supports which act as outlets for the oil drawn from the tank through drilled passages in the base to the intake valve chambers. Three vent caps are pressed into place on three equally spaced vent tubes projecting from the top of the tank. An oil tank filler, fitted with

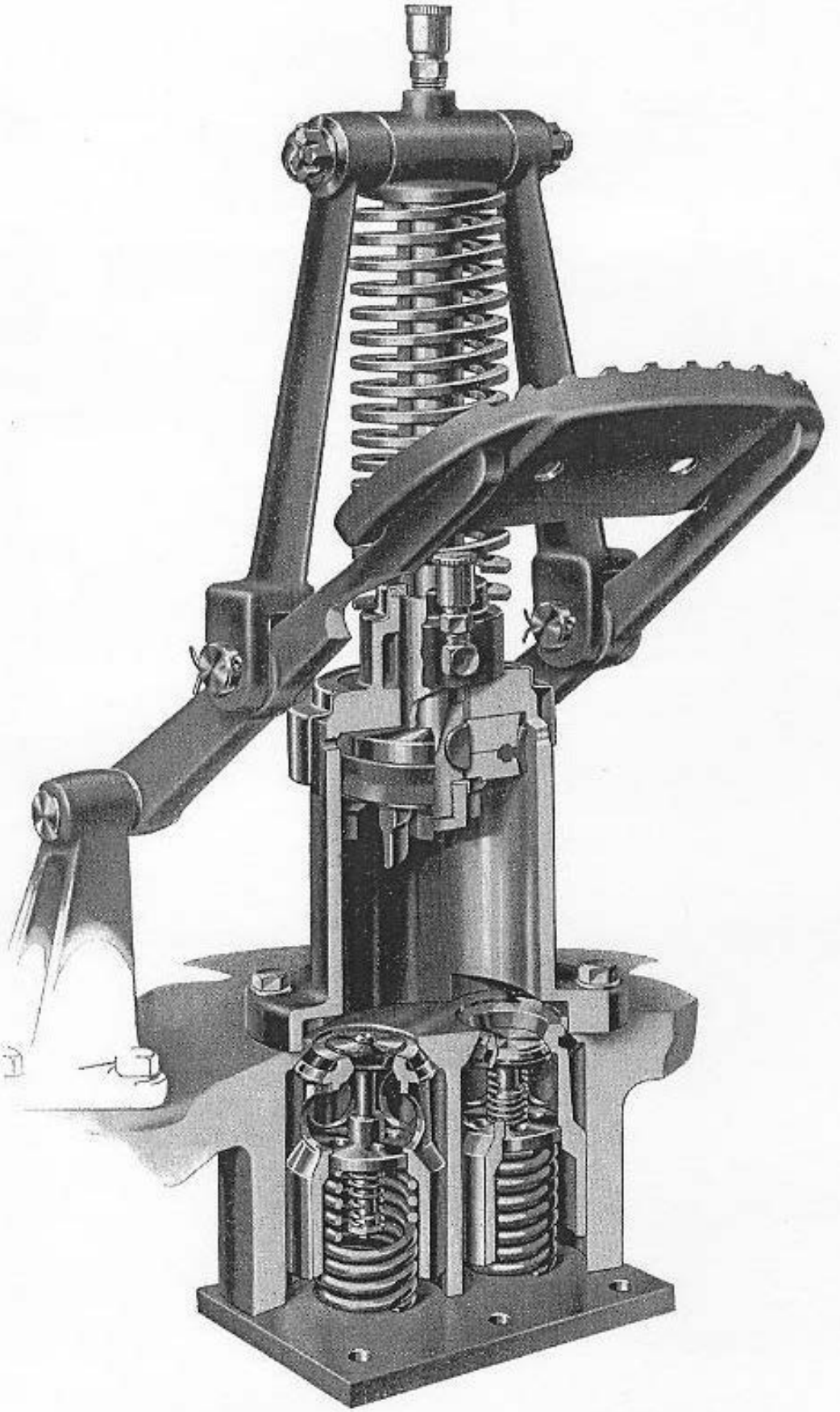


Figure 27—Cut-away view of oil pump and valves

a strainer is located near the top of the tank and is accessible through a hole near the center of the pedestal casing. A filler cap with gasket is screwed into the filler neck.

Oil Pumps and Pump Pedals

Three oil pumps, one opposite each of the pedals, are located on the base inside of the casing. Each pump includes a cylinder bolted to the base casting, a piston, piston cup, piston cup retainer, and a piston rod. A heavy coil wire spring holds the piston normally at the top of its travel while suitable linkage connects the piston rod and pedals. Four fingers are provided on the bottom of the piston for the purpose of opening the valve sleeves when the pedal is operated in the lower range of travel.

The piston cup, which is clamped between the piston and piston cup retainer, fits the pump walls snugly and prevents leakage between the piston and cylinder.

A porous bronze bushing in the top of the pump centers and guides the piston rod as it travels up and down. At the upper end of this bushing is a felt packing and retainer which acts as a wiper.

Pump Valves and Valve Sleeves

One pair of intake and outlet valves, each operating in a sleeve, is located in the base directly below each oil pump. Relatively heavy coil springs press the valve sleeves upward against seats in the base with enough force so that the oil pressure in the cylinder will not cause them to move downward and permit oil to escape.

Both intake and outlet valves have stems that are a sliding fit in guides which center them in the sleeves and each valve is equipped with a relatively light spring which tends to hold it in the closed position. Each valve as well as each sleeve has a rubber seal moulded into the seat to insure positive sealing. These seals are made of synthetic rubber which is not affected by oil.

The important thing to bear in mind at this point is that the intake and outlet VALVES function in the operation of RAISING the ram, whereas the intake and outlet valve SLEEVES function in the operation of LOWERING the ram. All details of these operations are covered in "Description of Hydraulic Operation," page 89, and are, therefore, not repeated here.

CARRIAGE LOCK

This lock is of the spring loaded plunger type and is built into the front end of the carriage. It consists of lock plunger (299943-1), plunger spring (299943-2), lock cover (299943-3), and cover retainer (299943-4). See Main Section View, Plate 3.

The plunger slides in a bored hole in the carriage and is held in the downward position by the spring which sets in the bore machined in the plunger. The cupped shaped cover placed over the spring to hold it under tension, is secured by the retainer which sets in a groove in the plunger hole. This lock operates automatically when the carriage is lowered.

CRADLE LOCK

The cradle lock, which permits locking the gun in the plus 5 degree and plus 90 degree positions is built into the right side of the carriage. The plunger (299943-5), slides in a vertically bored hole in the carriage and engages in one of the corresponding holes in the cradle. This plunger is operated by lock lever (OE-3512), see Section C-C, Plate 3, which is mounted on pin (OE-3513) in its boss in the carriage. Two spacers (OE-3518), one located on each side of the lever, prevent the lever from shifting sideways. A rubber bellows type water seal (OE-3519) is stretched over the lever and its boss on the carriage to exclude dirt and moisture from the plunger.

A spring loaded locking ball arrangement consisting of ball (OE-3511), spring (OE-3516), and screw (OE-3517) holds plunger (299943-5) in either the locked or unlocked position.

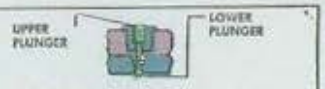
GUN SECURING BOLT

This bolt is the same as used on Mark 4 Mod. 2 Mount to lock the gun in the cradle. For complete description see page 22. Also see Main Section View, Plate 3.

CARTRIDGE BAG

The cartridge bag and weight are the same as used on Mark 4 Mod. 2 Mount. See page 22 for complete description.

1.



DOUBLE LOADING STOP PLUNGER (UPPER & LOWER)

THESE PARTS BECOME STUCK WITH OIL FROM THE HEAT OF THE GUN.

SHOULD BE CLEANED AND LUBRICATED WITH EXTRA LIGHT MINERAL OIL, N.S. 1042, 2075, OR 2110

APPLY SPARINGLY

2.

IF MAGAZINE BECOMES DRY OR CORRODED INTERNALLY, IT MUST BE DISASSEMBLED, CLEANED AND LUBRICATED. THIS INCLUDES ALL SPRINGS, MOVING PARTS AND SPIRAL GUIDEWAYS.

BEARING GREASE OS-1350

3.

REAR SIGHT SEAL

RAISE SIGHT COLLAR BY TURNING RANGE ADJUSTMENT CYLINDER COUNTER-CLOCKWISE.

LUBRICATE SEAL SPARINGLY.

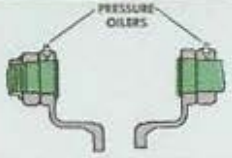
ELEVATION INDICATOR DRUM SHAFT

IF DRUM STICKS, REMOVE RETAINER & CAPS & CLEAN.

NO LUBRICATION REQUIRED.

EXTRA LIGHT MINERAL OIL N.S. 1042, 2075 OR 2110

4.

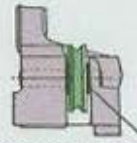


TRUNNION BEARINGS

FORCE GREASE INTO PRESSURE OILERS

BEARING GREASE OS-1350

5.



CRADLE COCKING SHEAVE

OIL SHEAVE PIN

EXTRA LIGHT MINERAL OIL N.S. 1042, 2075 OR 2110

6.

CARTRIDGE BAG HINGES

EXTRA LIGHT MINERAL OIL N.S. 1042, 2075 OR 2110

7.

CRADLE LOCK PLUNGER

OIL END OF PLUNGER AND MOVE LEVER BACK AND FORTH TO DISTRIBUTE OIL. REMOVE WATER SEAL AND OIL PLUNGER, END OF LEVER AND LEVER PIVOT.

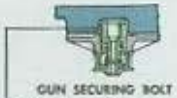
EXTRA LIGHT MINERAL OIL N.S. 1042, 2075 OR 2110

8.

WEIGHT BAND PIVOT BOLT

EXTRA LIGHT MINERAL OIL N.S. 1042, 2075 OR 2110

9.

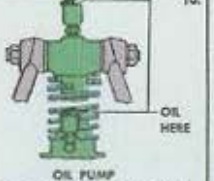


GUN SECURING BOLT

WHEN THE GUN IS BEING MOUNTED ON THE CRADLE, THE INSIDE OF THE SECURING BOLT HOLE AND THE SECURING BOLT SHOULD BE THOROUGHLY GREASED.

ANTI-SEIZE COMPOUND N.S. 52-C-19 (INT.)

10.



OIL PUMP

SIX OILERS—TWO ON EACH PUMP

OIL PUMP LINKAGE

TWELVE BEARINGS—FOUR ON EACH PUMP

APPLY OIL WITH OIL CAN

EXTRA LIGHT MINERAL OIL N.S. 1042, 2075 OR 2110

11.

OIL TANK

REMOVE CAP, CHECK LEVEL AND ADD FLUID IF REQUIRED.

OE-3533 OIL MIXTURE

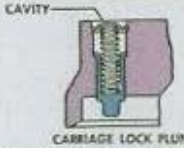
12.

RAM BEARING

REMOVE PLUG AND FILL RESERVOIR WITH OIL. RAISE CARRIAGE ABOUT TWELVE INCHES.

EXTRA LIGHT MINERAL OIL N.S. 1042, 2075 OR 2110

13.



CARRIAGE LOCK PLUNGER

FILL CAVITY WITH OIL AND PUSH END OF PLUNGER UP AND DOWN UNTIL OIL APPEARS AT LOWER END OF PLUNGER.

ON LOWER END MOVE EXTRA LIGHT MINERAL OIL N.S. 1042, 2075 OR 2110

14.

THE BORE AND FIRING CHAMBER SHOULD BE CLEANED OUT AND LUBRICATED WITH A LIGHT COAT OF OIL IMMEDIATELY AFTER FIRING.

MEDIUM MINERAL OIL N.S. 1065 OR 3065

15.

CLEAN AND OIL THE GUN:

AS SOON AS POSSIBLE AFTER FIRING.

IF THE GUN GETS WET.

IF THE GUN GETS DIRTY.

IF THERE IS ANY REASON TO EXPECT CORROSION TO START.

MEDIUM MINERAL OIL N.S. 1065 OR 3065

NOTE:

DO NOT USE OIL ON OUTSIDE OF GUN BARREL OR ON GUN BARREL SPRINGS.

LUBRICATING GRAPHITE N.S. 14-G-5

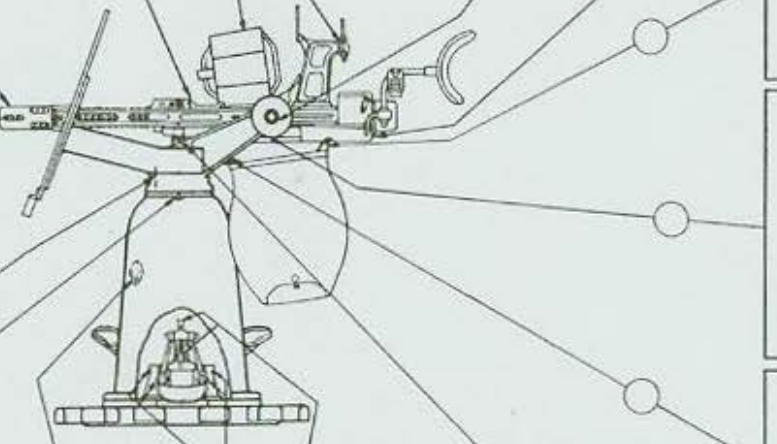


Figure 28—Lubrication chart Mark 6 Mount

LUBRICATION FREQUENCY CHART WEEKLY

3. REAR SIGHT SEAL
4. TRUNNION BEARINGS
5. CRADLE COCKING SHEAVE
6. CARTRIDGE BAG HINGES
7. CRADLE LOCK PLUNGER
8. WEIGHT BAND PIVOT BOLT
9. GUN SECURING BOLT
10. OIL PUMP OILERS AND LINKAGE
11. OIL TANK
12. RAM BEARING
13. CARRIAGE LOCK PLUNGER
14. BORE AND FIRING CHAMBER
15. THE GUN

(Continued in right hand column)

(Continued from left hand column)

PERIODICALLY

(AFTER EACH PROTRACTED FIRING)

DOUBLE LOADING STOP PLUNGER (UPPER AND LOWER)

NOTE:

THE FREQUENCY OF LUBRICATION IS DEPENDENT UPON THE USE OF THE MECHANISM. THE SCHEDULE GIVEN IS REQUIRED WHEN THE OUTFIT IS USED DAILY. LUBRICATION MAY BE LESS FREQUENT FOR LESS FREQUENT USE OF THE OUTFIT, BUT IN NO CASE SHALL THE MAXIMUM PERIOD BETWEEN REGULAR INSPECTION OF THE PARTS FOR PROPER LUBRICATION ON SHIPS IN COMMISSION EXCEED ONE MONTH. EXERCISE THE PARTS AFTER LUBRICATING.

REFERENCE: DRAWING 367537

ALL OILERS, PEDAL LEVER PIVOT BEARINGS, AND LOCK PLUNGERS SHOULD BE WELL LUBRICATED ACCORDING TO DETAIL INSTRUCTIONS THAT FOLLOW, USING EITHER EXTRA LIGHT MINERAL OIL, NAVY SYMBOL 1042, 2110 OR 2075, OR OIL MIXTURE (OE-3533) AS SPECIFIED FOR THE HYDRAULIC SYSTEM. SEE FIGURE 28.

CRADLE LOCK PLUNGER (299943-5)

With cradle rotated to vertical position, oil end of plunger that engages the cradle, using an oil can, and force oil into carriage bearing by operating lock lever back and forth a few times. Also remove the water seal from the lever and supply a few drops of oil to the plunger, end of lever, and lever pivot. Wipe off any excess oil that runs down before reinstalling the seal.

CARRIAGE LOCK PLUNGER (299943-1)

Raise carriage about 12 inches, reach under carriage, and using one hand, push up on the lower end of the carriage lock plunger until it reaches its upper limit of travel. Hold the plunger in this position and fill the plunger cavity on top of the carriage with oil. Then allow the lower end of the plunger to drop down slowly. This action will draw the oil from the cavity into the plunger hole. Repeat until oil appears on bottom end of plunger. It is not necessary to remove the plunger spring cover and retainer unless oil fails to appear on lower end of plunger by the method described.

HYDRAULIC SYSTEM—OIL TANK

At least once a week, remove filler cap, check oil level, and add Oil Mixture OE-3533, if necessary.

PISTON ROD BEARINGS

Loosen five cover screws in each cover and lift off covers.

Six oil cups—two on each pump, one on the upper end of the piston rod to lubricate the upper end of the rod to pivot pin bearing and the other in the pump cylinder to fill the oil well around the slightly porous cylinder bushing—unscrew covers and fill cups with specified oil.

PEDAL LEVER PIVOT BEARINGS

Twelve bearings—no oilers—oil pedal to link and pedal to lever bracket pin bearings using an oil can. Reinstall covers and tighten screws.

RAM BEARING

A circular oil well is provided at the top of the ram cylinder. Raise the carriage about 12 inches, remove the ¼ inch oil well plug from the top of the ram cylinder, fill oil well with specified oil, using an oil can and reinstall plug. Raise and lower carriage a few times to permit oil to spread completely over ram bearing.

GUN SECURING BOLT

Just before the gun is installed in the cradle thoroughly coat gun securing bolt and the inside of the securing bolt hole in the breech casing with Anti-seize compound, Navy Specification 52-C-19 (Int.).

CRADLE COCKING SHEAVE

Spin the sheave by hand and with an oil can force oil to sheave pin.

USE (OS-1350) GREASE IN PRESSURE OILERS AS INDICATED BELOW. SEE FIGURE 28.

CRADLE TRUNNION PINS (OE-2161 and OE-2160)

Force grease into pressure oilers (OE-2259) using grease gun (OE-1637).

TO RAISE THE CARRIAGE

Pump one or more of the three pedals up and down through the lifting stroke (upper four-fifths of the total travel). Rapidity of raising depends on the number of pedals operated and the speed at which they are pumped.

The first stroke of the pedal will raise the ram and carriage sufficiently for the carriage lock plunger to clear the notch in the ram cylinder sleeve and permit the gun to be trained to any position.

TO LOWER THE CARRIAGE

Depress one or more of the pedals beyond the resistance point felt at the end of the lifting stroke. Release the pedal when the carriage reaches the desired position. The speed of lowering is controlled by the number and position of the pedals operated.

When the ram is at its extreme upper limit of travel, extra pressure is required on the pedals for releasing. Explanation of this condition is given under "Lowering the Ram", page 91.

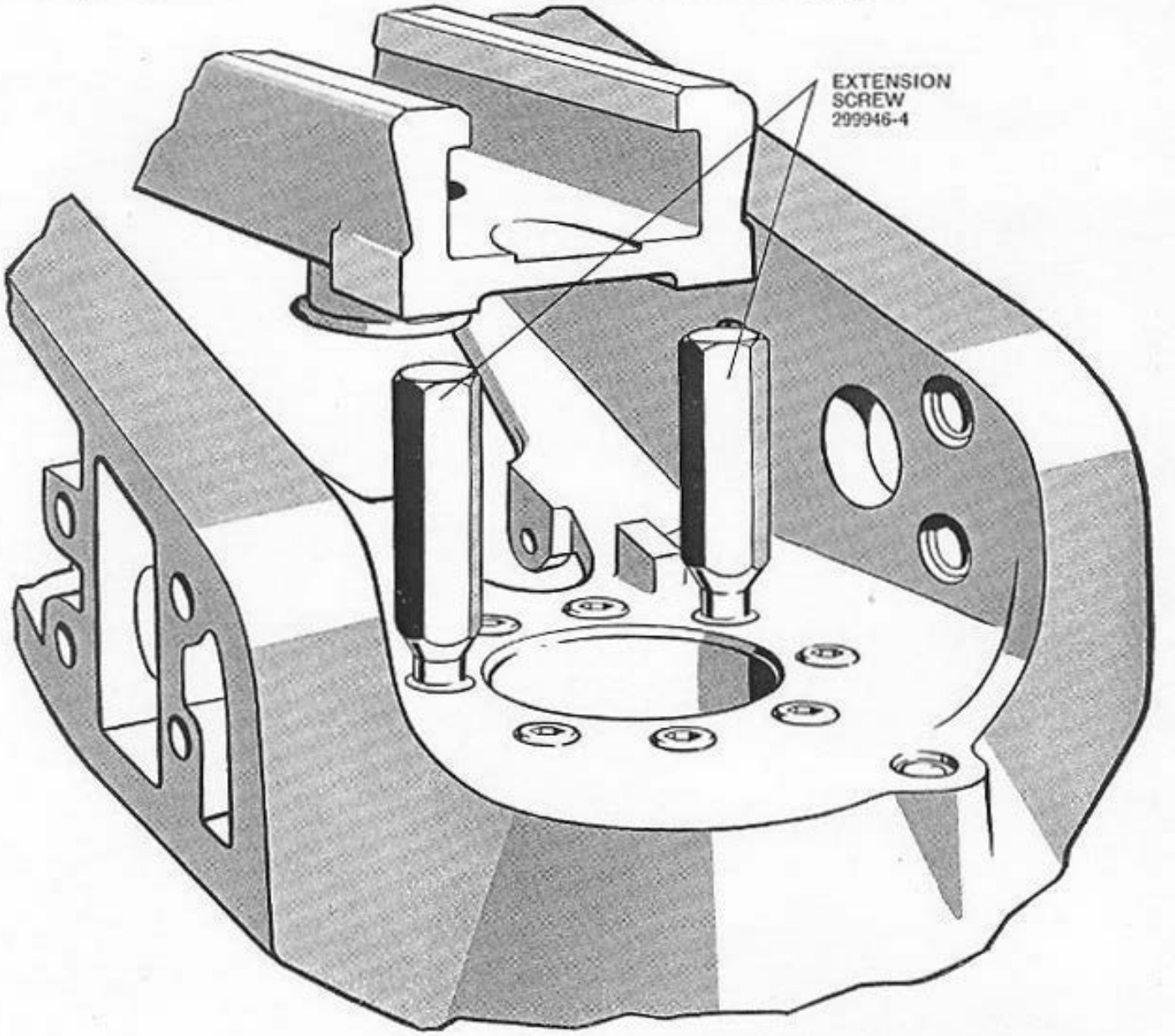


Figure 29—Carriage extension screws (299946-4) in place

The carriage is locked against rotation by completely lowering the ram and rotating it slightly until the tip of the carriage lock plunger drops into one of the notches provided in the ram cylinder sleeve.

SPLINTER BULWARKS

In some ships where 38 inch bulwarks are provided around the circumference of the mount working circle, it is necessary to use a stop to reduce the depression of the gun to approximately 3½ degrees (normal depression is 15 degrees). For this purpose two special extension screws (299946-4) are provided with each mount. When these are required, remove two center rear carriage to ram screws (299946-1) and replace them with the extension screws shown in Figure 29. This provides a stop for the front end of the cradle.

To obtain a complete understanding of the manner in which the hydraulic system operates note carefully the detailed information and illustrations that follow:

Assume first that the hydraulic system is full of oil, that it has been bled of entrapped air for satisfactory operation, and that the ram is at the lower end of its travel.

RAISING THE RAM

Pressing any one of the three pump pedals down through the upper four-fifths of its stroke forces the piston rod and its piston downward against the tension of the piston rod return spring. See Figure 30.

The oil pressure created in the pump cylinder forces the outlet valve downward from its seat in the sleeve. The oil displaced from the cylinder passes between the valve and its seat, through the sleeve and the passage in the base, into the bottom of the ram cylinder. The ram is forced upward a distance proportional to the amount of oil displaced from the pump.

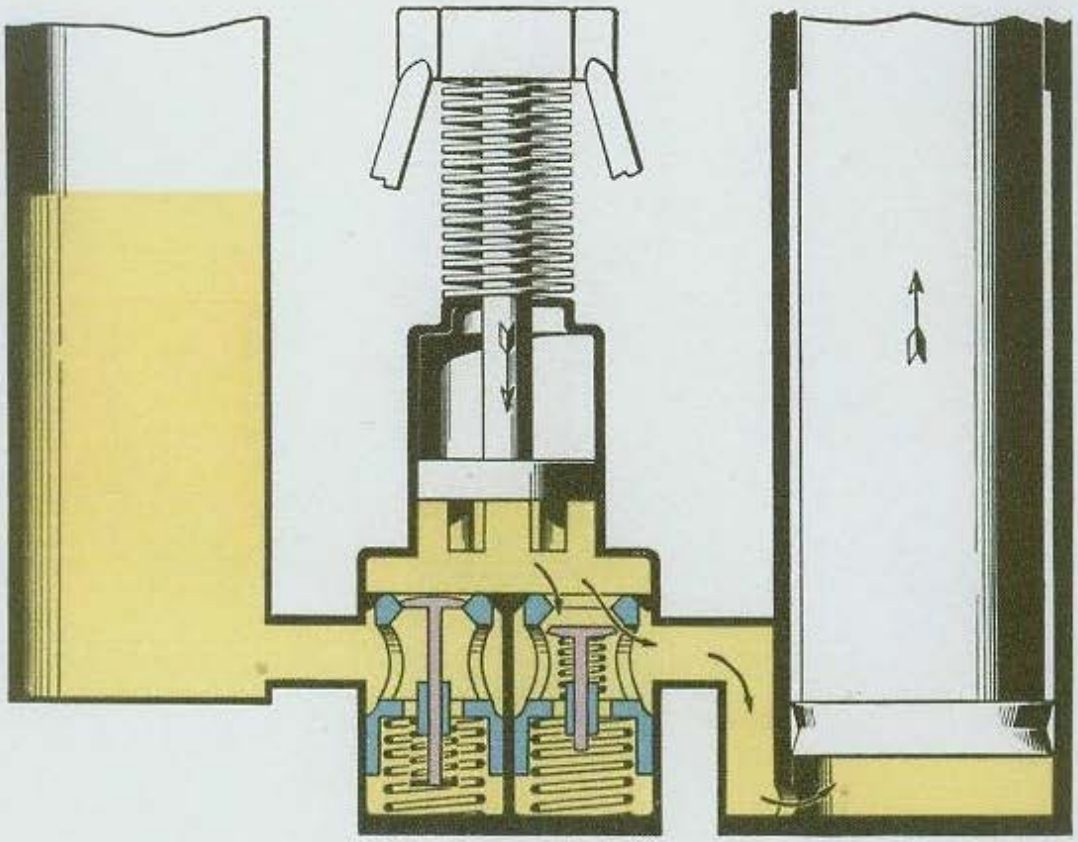


Figure 30—Lifting stroke—pump discharging oil into ram cylinder

As foot pressure is released from the pump pedal for the upward stroke, the tension on the piston rod return spring moves the piston rod and its piston upward. See Figure 31.

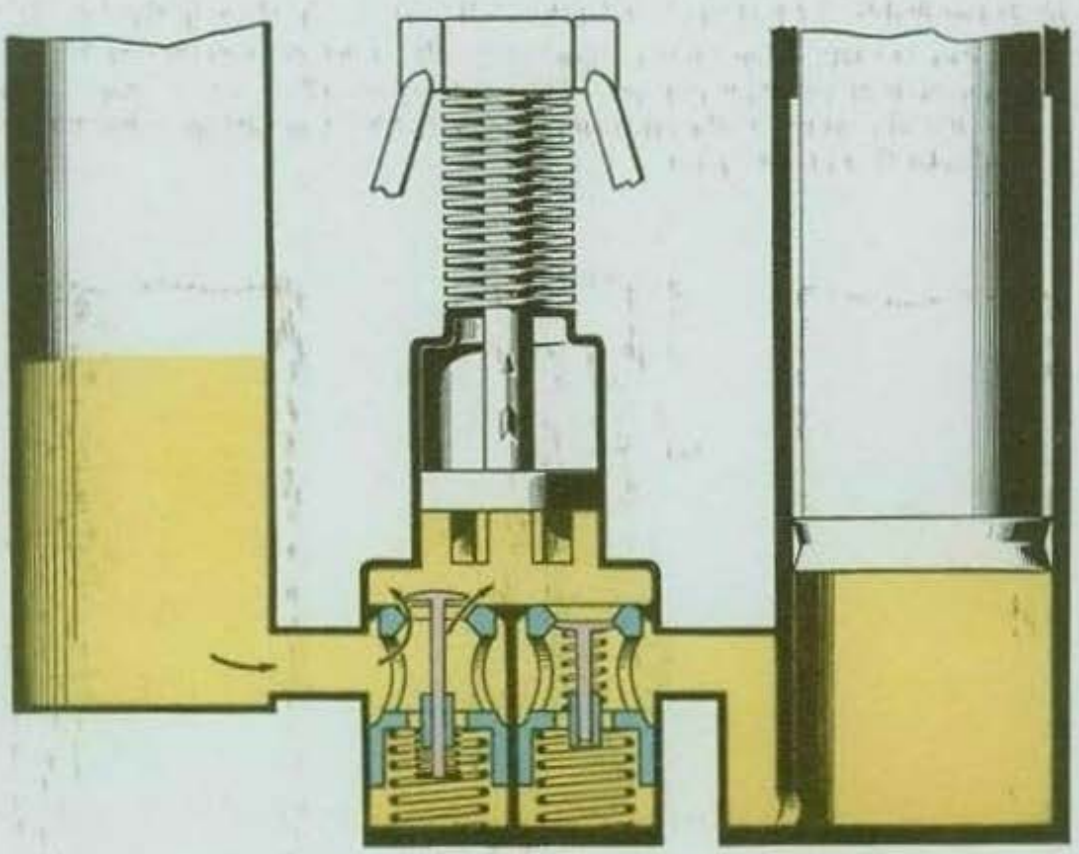


Figure 31—Intake stroke—drawing oil into pump cylinder

This releases the pressure on the outlet valve and it is returned to its seat in the sleeve by the tension of the light valve spring, trapping the oil in the ram cylinder and holding the ram suspended. At the same time the vacuum created in the pump cylinder lifts the intake valve off its seat in the sleeve, against the tension of the light spring. Oil is then drawn from the tank, between the intake valve and its seat in the sleeve and into the pump cylinder. When the cylinder becomes full of oil, the intake valve is returned to its seat by the drop in vacuum and the tension of the light valve spring. The pump is now ready for the next downward stroke.

LOWERING THE RAM

When the pump pedal starts through the lower range of pedal travel fingers on the bottom of the piston contact the upper edges of both intake and outlet valve sleeves. As the pedal is pressed downward the valve sleeves are forced off their seats in the base. See Figure 32.

This leaves a clear passage for oil, under pressure of the weight of the ram, to flow from the ram cylinder to the oil tank. Bottoming of the piston rod nut on the base determines the lower extremity of pedal travel.

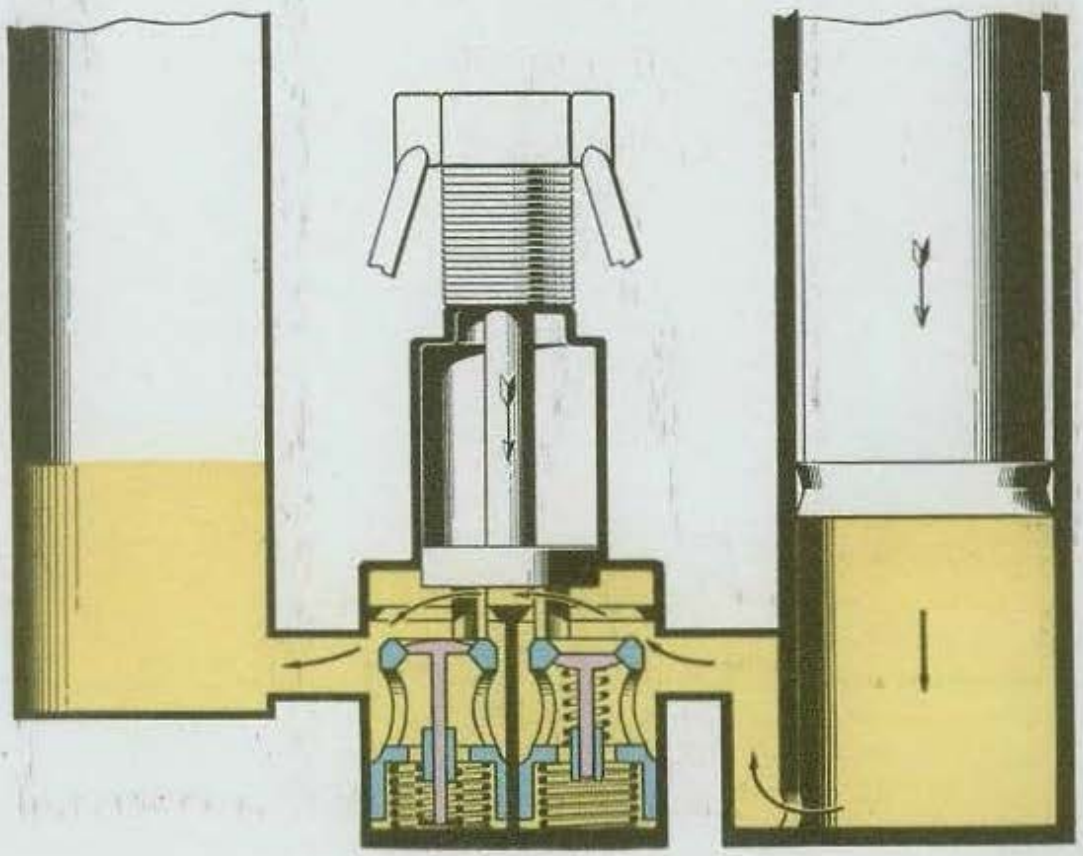


Figure 32—Valve sleeves forced off seats in base—ram discharging oil back into tank

While the foregoing conditions are true when lowering the ram from any partially raised position, a slightly different set of conditions are encountered when attempting to lower it after having forced it to its extreme upper position. In this case, the pump has a full charge of oil but it cannot be discharged through the outlet valve since the ram is already against its stop. See Figure 33. By applying extra force to the pedal, however, sufficient hydraulic pressure will be built up in the pump cylinder to force the intake valve sleeve down compressing the heavy sleeve spring, allowing the oil in the pump to return to the tank. Following this the piston fingers can function in opening the valve sleeves as described previously. See Figure 32.

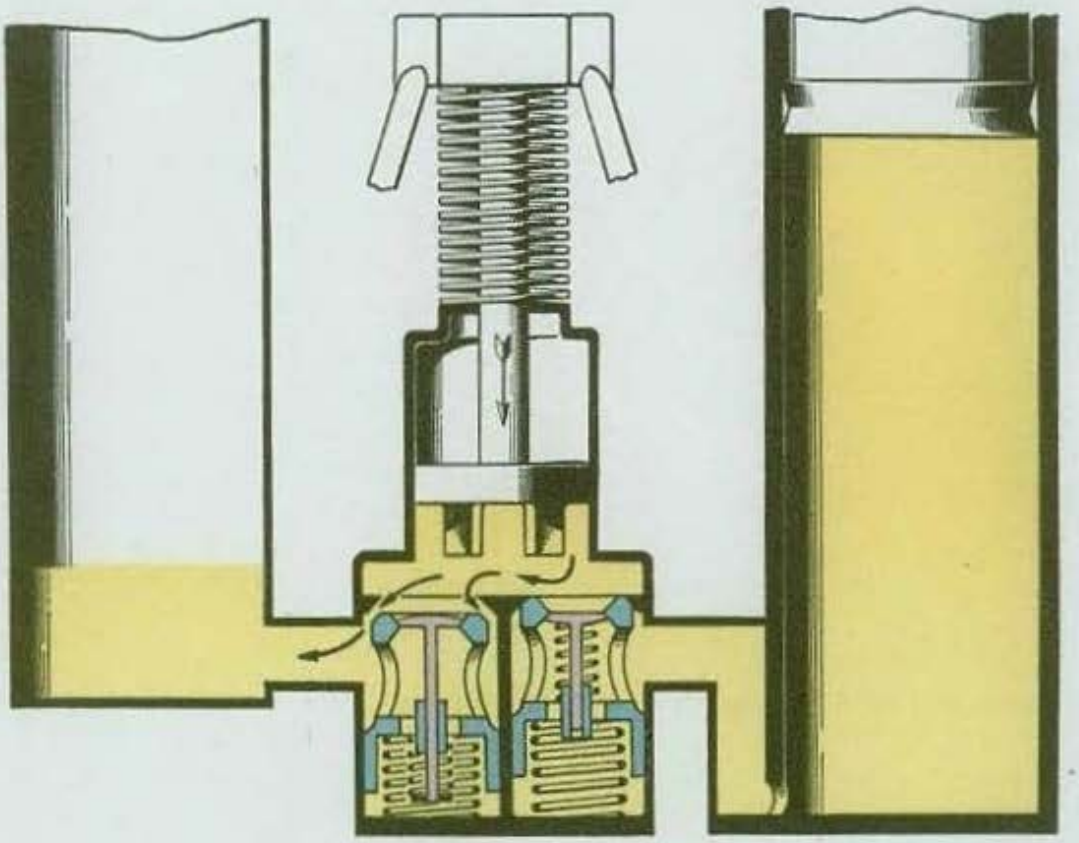


Figure 33—Ram at top of stroke—pump discharging oil back into tank

The following instructions for stripping the Mark 6 gun mount should be followed in the order given to prevent damage to the parts and injury to the personnel doing the work. Before beginning any operation read the entire procedure for that operation.

Operations which require particular care to prevent accidents include those in which the ram spring and tube assembly (299928) is removed from the gun mount and subsequent stripping of this unit. **No sizeable item mounted on the ram, including the carriage, cradle, and shields should be removed unless the ram springs (299929-1) have been confined by removing the ram spring retainer plug (299930-1) and reinstalling it in an inverted position as covered by Operations 6 and 7.** Minor items of small weight may be safely removed. **If a large piece is removed the ram springs will cause the ram to fly up with possible damage to the gun mount or personnel.** It is allowable to remove the gun, magazine, shoulder rest or the sight without confining the springs. If the ram spring retainer plug is removed at any time to confine the springs, then it will be necessary to bleed the hydraulic system as covered in operation 35 in "Reassembly."

When the gun has been removed from the cradle extreme care should be taken when moving the cradle back and forth from the 5 degree to 90 degree elevations. Without the gun in the cradle, the cradle spring and cradle weight will cause the cradle to spring down violently. It is best for one man to hold the rear end of the cradle securely while the other disengages the cradle lock.

For location of parts by part number refer to Plate 3—Sectional Detail of Gun Mount—which is folded at Page 120. The various tools required for stripping are listed and illustrated on pages 119 and 120 of this pamphlet.

The gun mount should **always** be lifted with shipping hook (300003-1), supplied with the mount, by engaging the hook in the two upper pedestal casing holes. **Never** lift the mount by attaching to the carriage or cradle as this places an excessive load on the edge of the ram piston and may damage the piston.

Operation Number

1. MAGAZINE—Unship the magazine by pushing forward on the magazine catch lever. Uncock the gun.

2. SIGHT—Unship the sight by loosening the three clamping screws (OE-1192), using sight universal spanner (OE-1189). The center screw must be backed out five or six turns and then pushed toward the left side until the stop piece is disengaged from the notch in the breech casing. Then slide the sight assembly back toward the trigger cover and lift it off the gun.

3. CARTRIDGE BAG ASSEMBLY (OE-2198)—Remove the two cartridge bag anchor bolts (OE-2172), nuts (OE-2173), and cotter pins (OE-2231) from the carriage and cradle and remove the bag. This operation can best be done with the gun in the 5 degree position.

4. WEIGHT AND BAND ASSEMBLY (OE-2207)—Raise the gun to the 90 degree position and lock in place with the cradle lock plunger. Remove weight band pivot bolt (OE-2177), nut (OE-2178), and cotter pin (OE-2230) and remove the weight. See Section B-B, Plate 3.

5. DRAINING OIL—Loosen the two lowest pedestal casing hole cover screws (12-Z-41-253) and swing cover (299915-2) to one side. Place a clean container of at least five gallons capacity near the mount. Unscrew the wing nut on base air vent valve (299942-2) a few turns and hold one end of bleeding pipes (299993-7 and 299992-4) over end of the valve and the other end in the container. **The hose must be held on the valve as oil pressure will force it off.** Pump each pedal **slowly** until the oil stops flowing.

   Pry ram cover (299946-2) from the top of the carriage. Remove ram air vent valve screw (12-Z-8-270) and lock washer (OE-1293) from air vent valve (299930-4). Unscrew air vent valve (299930-4) three turns with wrench (299995-2) and leave open for at least one minute. Close the

Operation Number

valve and pump one of the pedals **rapidly** until the oil stops flowing from the bleeding pipe. This breaks an air-lock and allows the oil to flow out of the center of the ram.

Remove pipes (299993-7 and 299992-4) after the oil had been drained.

6. RAM SPRING RETAINER PLUG (299930-1) REMOVAL—Place retainer wrench (299989-5) and wrench handle (299990-1) in position on retainer (299929-5) to keep it from turning when removing the plug. See Figure 34. Unscrew and remove retainer plug (299930-1), using retainer plug wrench (299990-3), 7/8 inch socket (299993-4), and swivel end wrench handle (299997-1). Drilled end of plug wrench (299990-3) is placed over plug valve (299930). Remove plug gasket (299930-2).

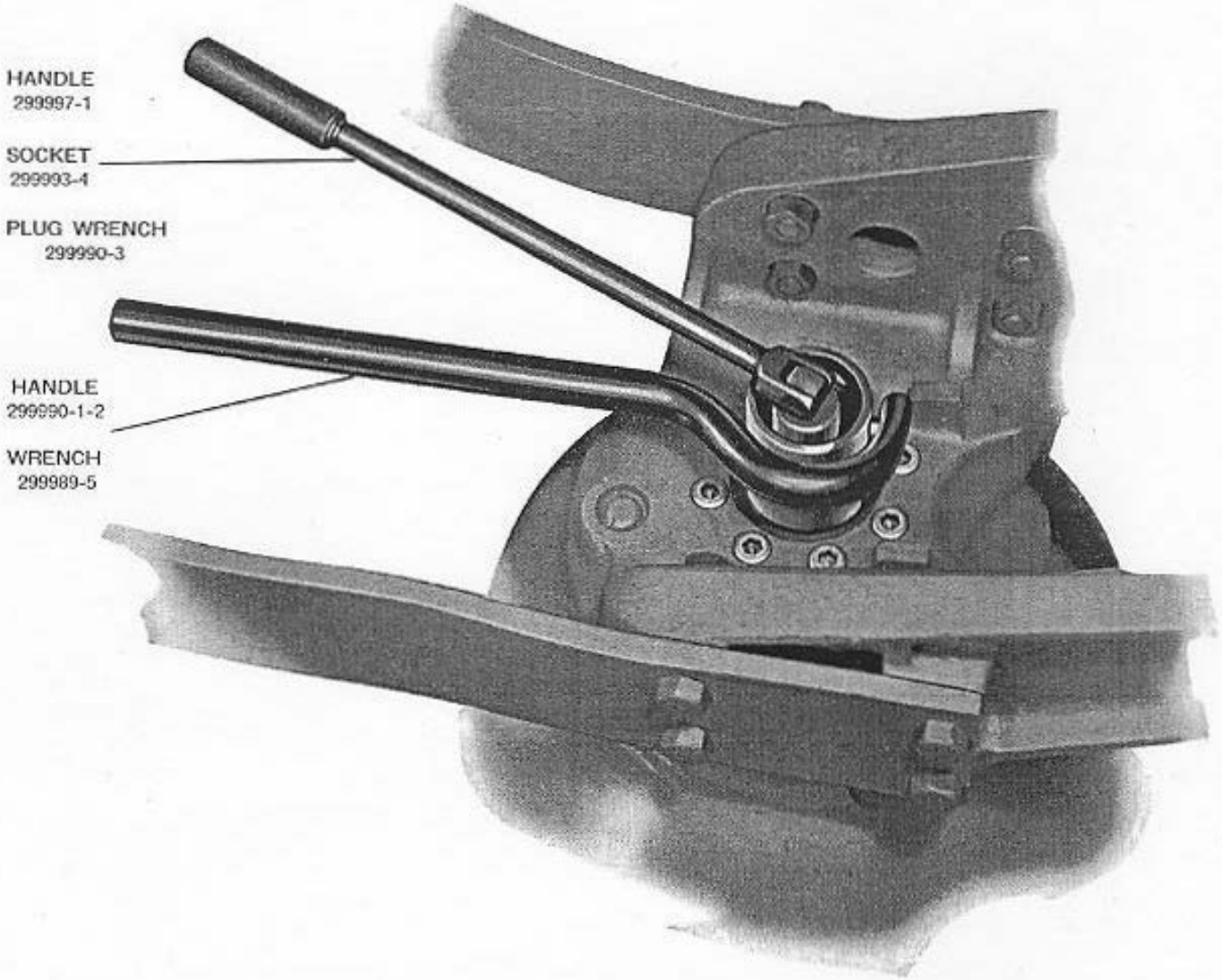


Figure 34—Removing ram spring retainer plug (299930-1)

7. RAM SPRING RETAINER PLUG (299930-1) SAFETY POSITION—Replace plug in **inverted** position (long end down) in retainer (299929-5), using wrench (299990-3). The engaging threads for this operation are **left hand.** See Figure 47. Screw the plug in **exactly nine turns.** This operation confines ram springs (299929-1) in the ram spring and tube assembly so that this unit

Operation Number

may be safely lifted from the ram in a later operation. **Do not** install retainer plug gasket (299930-2) at this time.

8. RAM SPRING RETAINER (299929-5)—Unscrew the retainer from the upper threads of ram (299926-1), using wrench (299989-5) and wrench handle (299990-1). **The retainer cannot be removed from the cavity at this time due to interference with the carriage.**

9. SHOULDER REST—Press the catch that retains the handgrips and remove the shoulder rest and handgrips by unscrewing counterclockwise.

10. GUN—Disengage cradle lock and lower the gun to the 5 degree position and lock it in place. Pull down on gun securing bolt withdrawing head (OE-2190) to disengage bolt (OE-2188) from the breech casing and slide the gun out of the cradle to the rear.

11. SHIELDS—Remove shield strap (299951-1) by taking out four bolts (OE-2227) and nuts (OE-2229). Remove the right and left shields as assemblies by taking out four bolts (OE-3535), nuts (OE-2217), and lock washers (OE-2275) attaching each bracket (OE-2220) right and (OE-2221) left to the carriage. One man should hold the shields while another is removing the bolts.

STRIPPING SHIELD ASSEMBLIES—

Stripping the shield assemblies, if necessary, is accomplished as follows: Remove four bolts (OE-2228) and nuts (OE-2229) attaching the brackets to the shield plates.

12. CRADLE ASSEMBLY (299947)—Raise the cradle to the 90 degree position and lock it in place with the cradle locking plunger. **Cradle spring and cradle weight will cause cradle to spring down violently. Handle with care.** Remove cradle spring housing retaining nut pin (OE-2268) by driving it out with a punch. See Section A-A, Plate 3. Unscrew and remove retaining nut (OE-2163), using wrench (OE-2904).

NOTE—When the spiral spring and housing assembly was assembled to its cover (OE-2165), it was turned clockwise one notch before its serrations were engaged with those of the cover to keep spring (OE-2169) under tension. Keep hands clear of serrations when stripping to prevent injury.

Pull off the housing and spring assembly.

Remove the housing cover by taking out four screws (OE-2256). Drive out cradle trunnion pin securing nut pin (OE-2269) with a punch. Remove retaining nut (OE-2162), using wrench (OE-2904 and spanner OE-3157). Drive both cradle trunnion pins (OE-2161) right and (OE-2160) left inwards, and remove from their holes. Lift off the cradle. Key (OE-2191) in trunnion pin (OE-2160) is a press fit in the pin and should not be removed. Any attempt to remove it will result in damaging the pin.

STRIPPING CRADLE ASSEMBLY—

Stripping the cradle assembly, if necessary, is accomplished as follows: Remove cheek plates (299947-1) right and (299947-2) left by taking out four screws (OE-2263) from each plate. See Section A-A, Plate 3. Unscrew and remove oiler (OE-2259). Drive out gun securing bolt withdrawing head pin (OE-2261), using a punch and take off head (OE-2190). The bolt (OE-2188) and spring (OE-2189) can then removed. Drive pin (OE-2262) out of bolt (OE-2188), using a punch. Drive out cocking sheave pin taper pin (12-Z-49-63) from underneath. Drive out cocking sheave pin (299950-3) and remove sheave (299950-2).

STRIPPING CRADLE SPRING AND HOUSING ASSEMBLY—

To strip cradle spring and housing (OE-2312), proceed as follows: Remove spring anchor bolt (OE-2168) and its lock washer (OE-2278). See Section A-A, Plate 3. Spiral spring (OE-2169)

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can then be removed. Bushing (OE-2166) is pressed in the housing and should **not** be removed unless it is desired to replace the bushing.

13. RAM CYLINDER SLEEVE (299925-1)—Using Allen wrench (299993-2), unscrew and remove the four cylinder sleeve set screws (299925-2) located near the top of the pedestal. With ram in lowest position so that carriage lock plunger (299943-1) is engaged in one of the notches provided in the cylinder sleeve, turn the carriage counterclockwise, as viewed from the top. Continue turning the carriage until the sleeve is disengaged from the cylinder as evidenced by the sleeve no longer raising when it is turned.

14. CARRIAGE ASSEMBLY (299943)—Remove two opposite carriage to ram screws (299946-1), using socket (299992-2) and swivel end wrench handle (299997-1). If it is necessary to tap the bottom of the carriage slightly to break it loose from the ram, install the two pilot screws (299989-4). These screws will prevent the carriage from falling off the ram when it breaks loose.

STRIPPING CARRIAGE ASSEMBLY—

Stripping the carriage assembly, if necessary, is accomplished as follows: Unscrew and remove oiler (OE-2259). Press down on lock cover (299943-3) and remove retainer (299943-4) with a pair of pliers. **Be sure to hold one hand over the cover when removing the retainer to prevent the spring popping the cover up into the air.** Remove spring (299943-2) and plunger (299943-1) from carriage. See Main Section View, Plate 3.

Remove lock spring and ball retainer screw (OE-3517), spring (OE-3516), and ball (OE-3511). Remove carriage lock lever water seal (OE-3519). Drive out lock lever pivot pin (OE-3513), using a punch and remove lever (OE-3512) and two spacers (OE-3518). See Section C-C, Plate 3. Pull out plunger (299943-5). Hole cover (OE-3514) should not be removed unless it is necessary. This is an expansion type plug and can be driven out with a drift inserted from underneath.

15. RAM CYLINDER SLEEVE (299925-1)—Lift sleeve off top of pedestal. Carefully examine sleeve packing (299925-3). If damaged, it can be removed by prying it out of groove in sleeve.

16. RAM SPRING AND TUBE ASSEMBLY (299928) REMOVAL—Engage the two round lugs on outside of hoisting hook (299989-6) in the two holes provided in ram spring retainer (299929-5). **Be sure that the horizontal cross bar on the hook rests on the top edge of the retainer.** See Figure 35. With both hands, carefully raise the spring and tube assembly out of the ram. If the ram is raised with the springs, tap it lightly on top with a soft face hammer. Remove retainer gasket (299930-3).

17. PEDAL OPENING COVER (299916-1)—Loosen five screws (12-Z-41-253) attaching each pedal opening cover to the pedestal and lift off the covers.

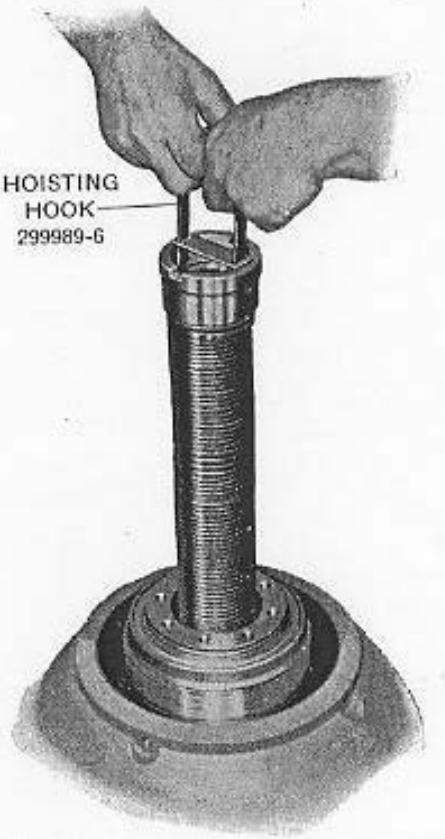

Figure 35—Lifting ram spring and tube assembly from ram

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18. PEDESTAL CASING (299913-1)—Loosen the two casing hole cover screws (12-Z-41-253) in each cover (299915-2) at the top of the pedestal and swing the covers to one side. Remove the nine pedestal to base screws (299915-4) and lock washers (12-Z-22-257), using 1 inch socket (299993-6) and swivel end wrench handle (299997-1). Engage hook (300003-1), shipped with the mount, into the two lifting holes near the top of the pedestal. With a chain fall or hoist, carefully raise the casing off the base.

19. PUMP PISTON ROD LINK (299940-6)—Remove cotter pins (12-Z-48-639) from link pins (299940-7) and push pins out of the links. See Section D-D, Plate 3. Remove cotter pins (12-Z-48-623) from each end of piston rod link pivot pins (299940-1) and remove nuts (299940-2) and washers (12-Z-22-274), using box wrench (299996-2), $\frac{5}{8}$ inch socket (299995-5), and swivel end wrench handle (299997-1). Remove piston rod links and push pivot pins out of piston rods.

20. PUMP LEVER BRACKET ASSEMBLY (299919)—Remove three bracket to base screws (12-Z-46-244) and lock washers (OE-2271), using $\frac{9}{16}$" socket (299995-4) and crank type wrench handle (299996-1), from each of the six brackets and remove the brackets from the base. See Main Section View, Plate 3. The three pedal assemblies can now be slipped off the bracket pivot pins.

21. PUMP ASSEMBLIES—With $\frac{9}{16}$" socket (299995-4) and swivel end wrench handle (299997-1) remove the eighteen pump cylinder to base screws (12-Z-46-244) and lock washers (OE-2271) and remove the pump assemblies from the base. Remove the cylinder gaskets (299941-1). See Main Section View, Plate 3.

STRIPPING PUMP ASSEMBLIES—

Strip pump assemblies, if necessary, as follows: Remove oiler (299938-5) from end of piston rod. Invert the pump and clamp the upper end of the piston rod in a vise. Insert piston rod pivot pin (299940-1) in rod. Turn cylinder assembly 90 degrees on the piston rod, to align the side holes of the cylinder base with the pivot pin. Compress the piston return spring (299939-5) by having two assistants pull the cylinder down with a bar placed over the base. Align this bar so that ends of pump piston do not strike bar and restrict its downward travel. Place one piston rod assembling hook (299989-1) over each end of the piston rod pivot pin and engage the hooks in the center holes of the cylinder base. Install nuts (299940-2) on each end of pivot pin (299940-1). See Figure 36.

Bend down the tab on piston rod nut washer (299939-4) from nut (299939-2). With $\frac{13}{16}$" socket (299993-5) and swivel end wrench handle (299997-1) remove piston rod nut and washer. Again compress piston rod return spring with bar and remove hooks. Remove piston (299939-3), cup (299939-1), cup retainer (299938-3), cylinder assembly (299937), and return spring (299939-5) from piston rod. See Section D-D, Plate 3. It is not necessary to remove woodruff key (299938-4) from the piston rod. Remove cylinder packing retainer (299937-5), packing (299937-6), oiler (299938-5) and oiler elbow (12-Z-322-8) from cylinder. Cylinder bushing (299937-2) should not be removed from the cylinder unless it is desired to replace it. Cylinder vent cover (299937-1) also should not be removed. Remove the pivot pin from the rod and the rod from the vise.

22. BASE AIR VENT—Remove air vent valve (299942-2), elbow (299942-4) and pipe (299942-3) from the cylinder base. See Section E-E, Plate 3.

23. OIL TANK ASSEMBLY (299931)—Remove the six screws (12-Z-46-221) and lock washers (OE-2270) attaching the oil tank to the base, using $\frac{1}{2}$" socket (299995-3) and crank type wrench handle (299996-1). Lift tank off base over ram cylinder. Remove the three oil tank outlet pipe gaskets (299933-4). See Main Section View, Plate 3.

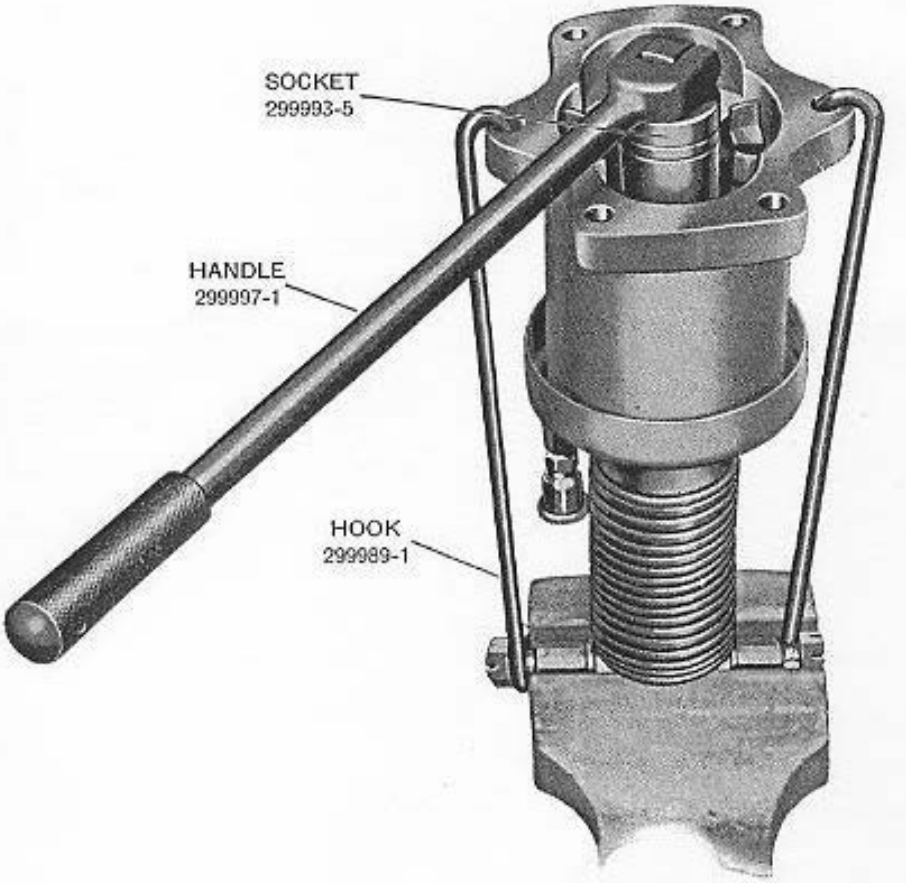

Figure 36—Stripping oil pump assembly

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STRIPPING OIL TANK ASSEMBLY—

Strip the oil tank, if necessary, as follows: Unscrew filler cap (299936-4) and remove gasket (299936-5), using socket (299992-2) and swivel end wrench handle (299997-1). Using a sharp tool or a knife pry out strainer retainer (299936-3) and remove strainer (299936-6). Remove the three vent cap assemblies (299935) by pulling them off the vent tubes.

24. RAM (299926-1) AND RAM CYLINDER (299924-1)—Remove the six cylinder to base screws (12-Z-46-263) and lock washers (12-Z-22-254), using 5/8" socket (299995-5) and crank type wrench handle (299996-1). Fasten ram hoisting bar (299991-1) to top of ram (299926-1) with two screws (299946-1). Lift the ram, and the cylinder off the base with a hoist or chain fall. When lifting the ram, the ram piston will pick up the ram cylinder by striking the internal shoulder located just above the row of vent holes. Remove cylinder gasket (299923-5).

25. RAM (299926-1)—Lay the ram cylinder on its side, remove hoisting bar from the ram, and push the ram out through the bottom of the cylinder.

STRIPPING RAM—

Strip the ram, if necessary as follows: Again fasten hoisting bar (299991-1) to top of ram with two screws (299946-1) to serve as a handle. With a screw driver remove the four ram piston screws (299927-4) from the ram. Lift off ram cup retainer (299927-1), cup (299927-2), piston (299926-2), and gasket (299927-3). See Figure 43. Remove the hoisting bar and screws from the ram.

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26. RAM CYLINDER (299924-1)—Ram oil seal (299923-6) should **not** be removed from the cylinder unless it is to be replaced. If necessary to remove it, pry it out with hoisting bar (299991-1).

Remove oil well plug (299923-7) with a screw driver.

27. BASE ASSEMBLY (299912) STRIPPING—The base has now been stripped of all parts except the valves. If necessary to remove them, proceed as follows: Turn the base upside down and remove two valve chamber cover screws (12-Z-42-276) from opposite corners of the cover. See Figure 37.

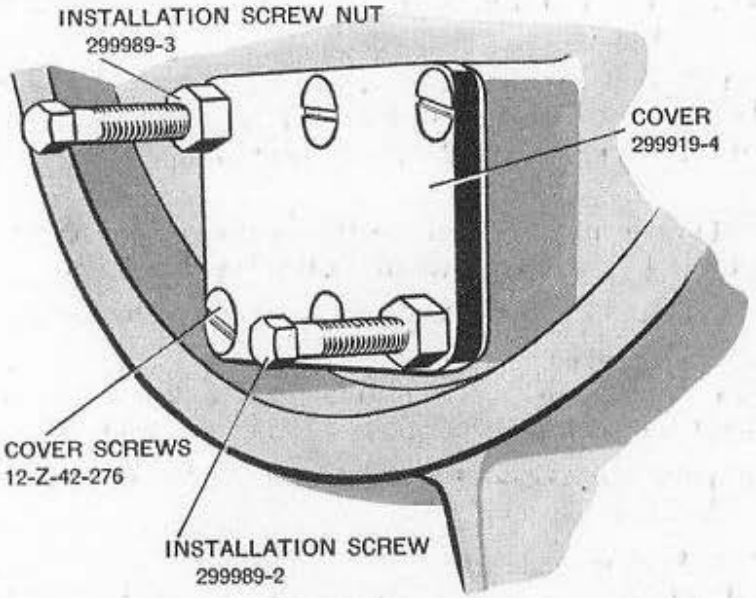

Figure 37—Installation screws and nuts in place

Install in their place the two valve chamber cover installation screws (299989-2) with nuts (299989-3) threaded on them until they bottom in holes and draw the nuts down tight against the

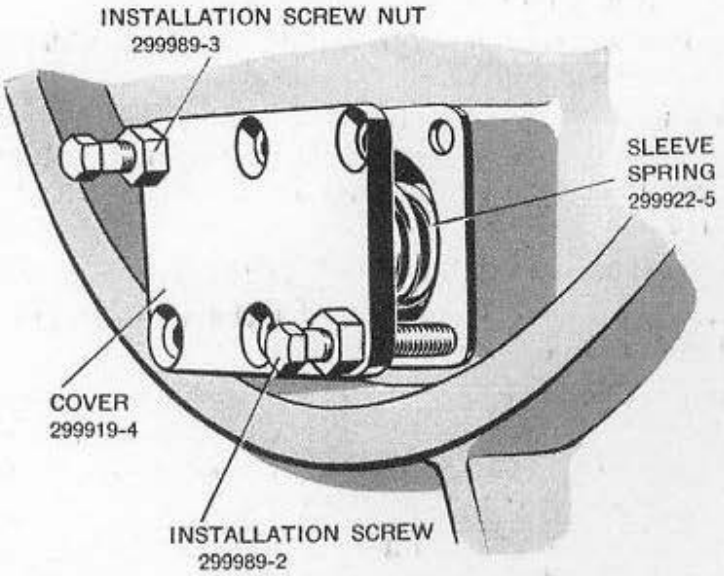

Figure 38—Removing valve chamber cover

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cover. Remove the balance of the cover screws and then back off nuts (299989-3) alternately with ¾" deep socket (299993-3) until the spring pressure is released. See Figure 38. If the sealer used on the cover gasket holds the cover to the base, tap the cover lightly on the edge with a soft face hammer before backing off the nuts too far. Remove the installation screws and nuts, cover (299919-4), and gasket (299919-6). Withdraw the two valve sleeve springs (299922-5), valve sleeves and valves from their cavities.

Repeat this operation at each of the remaining two valve chamber covers.

Turn the base over and remove the six base headless pipe plugs (12-Z-329-94) using swivel end wrench handle (299997-1).

28. INTAKE VALVES—Strip the intake valve and sleeve assemblies by compressing valve spring seat (299923-1) and spring (299923-2) with the fingers and removing retainer (299922-6). Remove the seat, spring, valve guide (299922-2), and valve (299921) from sleeve assembly (299920-1). See Figure 40.

NOTE—The rubber on the valves and valve sleeves is moulded on at the time of manufacture and cannot be removed without destroying the pieces.

Repeat this operation on each of the remaining two intake valve and sleeve assemblies.

29. OUTLET VALVES—Stripping of outlet valve and sleeve assemblies requires no mechanical operations. Push outlet valve (299922-1) downward in sleeve assembly (299920-3) and guide (299922-2), spring (299923-2), and outlet valve (299922-1) will come out of the sleeve. See Figure 40.

The ram spring and tube assembly (299928) must **not** be stripped unless compressing tool assembly (367539), Figure 18, is used.

The procedure for this operation is as follows:

30. Place adapter (367540-2) on upper end of long tube assembly (367541) being sure to engage lugs on adapter in slots in end of tube. Slide nut (367540-4) over adapter and screw onto threaded end of tube. See Figure 39.

31. Place a piece of round bar—approximately ¾" in diameter in a vise. Place the holes in the adapter on the end of the long tube over the bar to prevent the tube from turning. Rest the threaded end of the tube on a suitable support.

32. Place the ram spring and tube assembly into the long tube, with the retainer plug (299930-1) entering first.

33. Install tool screw assembly (299861-5) in end of the long tube, being careful to have keyways in nut (OE-3175), Figure 18, fitted over the lugs in the long tube. **This nut must seat firmly over the lugs.** Lubricate the adapter thrust washer with a few drops of light mineral oil, Navy Symbol 1042, 2075 or 2110.

34. Slide compressing tool nut (OE-3171) over end of tool screw and thread it onto the long tube.

NOTE—This nut has to hold the entire load of the ram springs and must be turned down all the way on the threads of the long tube.

35. Install tool wrench brace assembly (OE-3180) on the end of tool screw (299861-5) and turn it until adapter (367541-1) on the end of the screw contacts the flange of ram spring tube assembly (299927). Turn the wrench brace clockwise a few more turns, just enough to compress the ram springs to take their load off retainer plug (299930-1). See Figure 39.

36. Lift the long tube off the bar. Have a helper hold the long tube and remove plug (299930-1), using retainer plug wrench (299930-3), ⅞" socket (299993-4), and wrench handle (299997-1), inserted through the end of the tube. Place the tube back on the round bar that is in the vise.

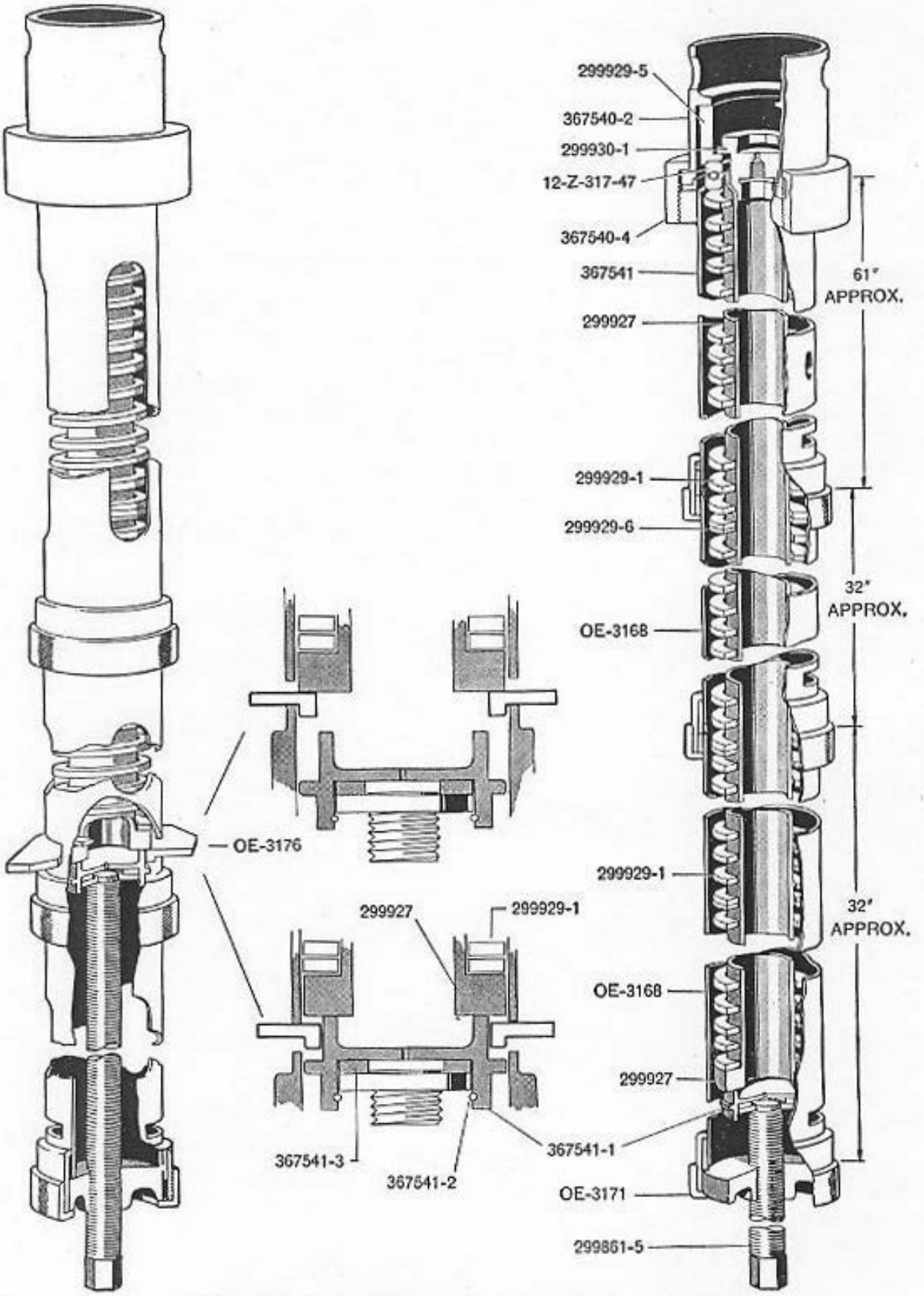

Figure 39—Stripping ram spring and tube assembly

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37. Turn the wrench brace counter-clockwise until the flange of the tube is just short of the transverse slots, Figure 39, in the long tube. Insert stop plate (OE-3176) in the transverse slots in long tube (367541).

NOTE—Lugs (Z), Figure 18, on the stop plate must be toward wrench end of tube. This is necessary to provide a positive lock.

38. Turn wrench brace counter-clockwise again until the spring pressure is resting on the stop plate just installed. See Figure 39.

NOTE—It is necessary that the coils of the springs be free from binding or cocking during the stripping operation. Use a soft hammer and tap on the springs through the slots in the tubes. Do this whenever there is any indication of binding.

39. Unscrew compressing tool nut (OE-3171) from the end of the long tube installed in Operation 34. Remove wrench brace (OE-3180) and the screw assembly (299861-5) from the long tube.

40. Install one short tube assembly (OE-3168) on the long tube assembly being certain that the lugs (X) in the long tube engage in the slots (Y) in the short tube, see Figure 18. Complete seating the lugs in their slots to prevent the tubes twisting during stripping of the springs.

41. Screw tube nut (OE-3171) onto the threaded end of the long tube to join the two tubes, making sure that the lugs remain engaged in their slots.

42. Install the tool screw assembly as instructed in Operation 33. Install wrench brace (OE-3180) on the end of the tool screw.

43. Turn wrench brace clockwise enough to release the spring load on stop plate (OE-3176) and remove the plate.

44. Turn the wrench brace counter-clockwise until the flange of the tube is just short of the transverse slots in the short tube installed in Operation 40. Insert stop plate (OE-3176) in transverse slots with lugs toward wrench brace. Turn brace counter-clockwise until spring load rests on stop plate (OE-3176).

45. Remove wrench brace (OE-3180), tool nut (OE-3171), and tool screw (299861-5).

46. Install the second short tube assembly (OE-3168) as instructed in Operation 40 and repeat Operations 41 through 45.

NOTE—If there is any indication of the springs binding, tap them through the long slots in the tube, using a soft hammer.

47. The following parts can now be withdrawn from the tool assembly: Ram spring tube assembly (299927), the five ram springs (299929-1), four ram spring spacers (299929-6), upper thrust bearing (12-Z-317-47), and retainer (299929-5).

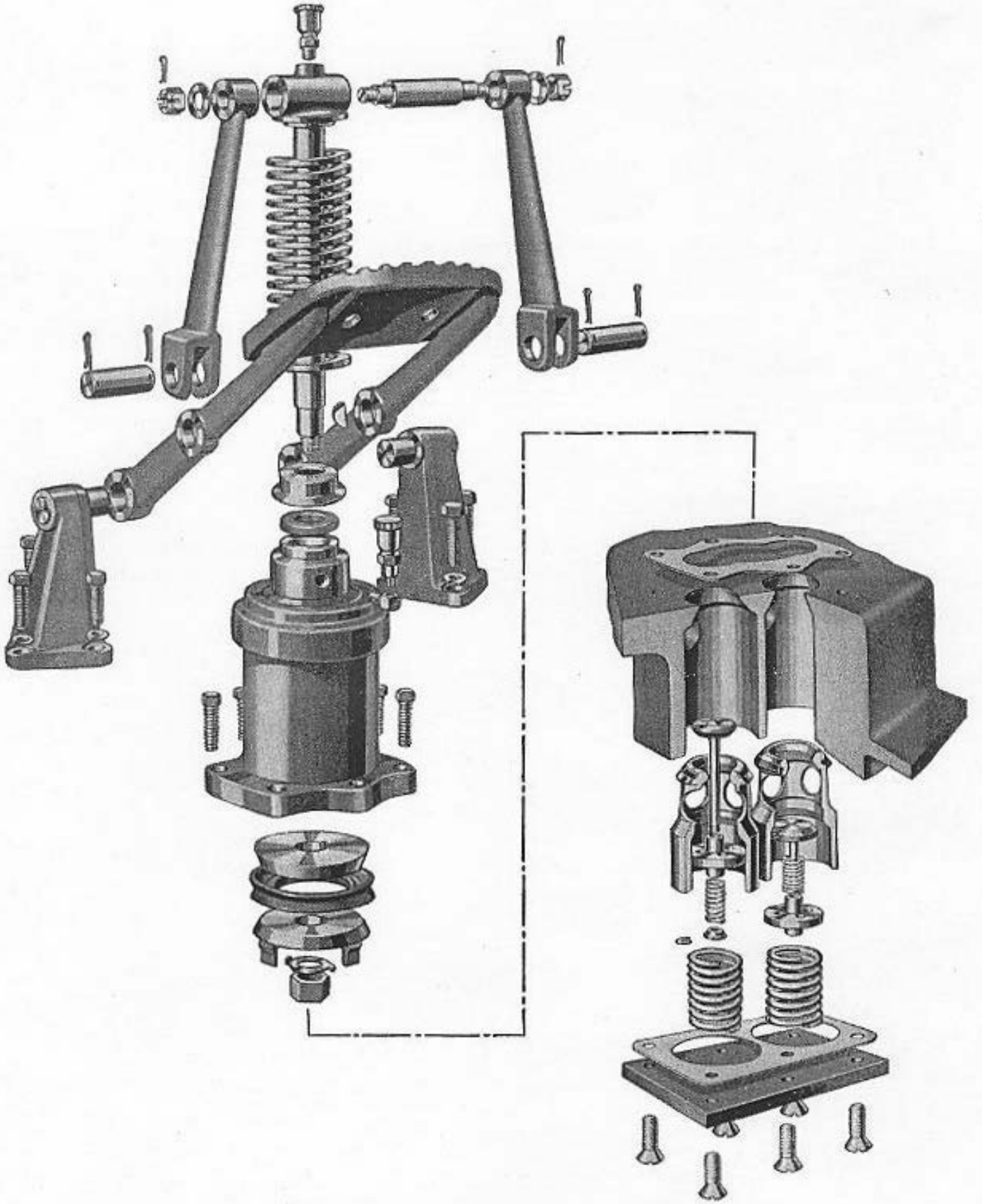

Figure 40—Exploded view of oil pump, pump pedal, and valves

The following instructions for reassembling the Mark 6 gun mount cover the complete reassembling of the mount starting with all serviceable units completely stripped. (For repairs on ships some units will be supplied as assemblies ready for installation.) **The following operations should be performed in the order given to prevent accidents and injury to either the gun mount or the service personnel.** Before beginning any operation read the entire procedure for that operation.

Extreme care must be taken during the reassembling and installation of ram spring and tube assembly (299928). The springs (299929-1) are compressed with a force of over five hundred pounds and if allowed to fly apart can do serious damage to adjacent objects. After installation in the gun mount ram spring retainer plug (299930-1) should not be removed from this assembly until the carriage, cradle, and shields have been installed on the ram. The weight of these items is necessary to keep the ram from flying up under the force of the unconfined springs. It is not necessary to have the gun, the shoulder rest, the magazine or the sight in place before uncapping the ram springs.

New lock washers, cotter pins, and composition gaskets should be used at every build-up, or at the installation of any part. All composition gaskets should be coated on both sides with sealer (299998-4) before they are installed. All old gasket material must be scraped off clean before new gaskets are installed, and extreme care should be taken to keep all parts clean and free of dirt or grit. The oil mixture (OE-3533) for use in the hydraulic system must be kept free of water and dirt and should be handled in a clean container only.

For location of parts by part numbers refer to Plate 3—Sectional Details of Gun Mount—which is folded at Page 120. The various tools required for reassembling are listed and illustrated on Pages 119 and 120.

Before reassembling, dip all parts such as pump valves, sleeves, guides and piston cups in oil mixture (OE-3533). Also coat all bearings and pivot pins with the same oil at the time of reassembling to assure adequate initial lubrication. Figure 40 is an exploded view of the oil pump, pedal, and valve parts.

The gun mount should always be lifted with shipping hook (300003-1) supplied with the mount. It should never be lifted by attaching to the carriage or cradle as this places an excessive load on the edge of the ram piston and may damage the piston.

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1. BASE ASSEMBLY (299912)—Clean base (299917-1) carefully, including interior oil holes, and make certain there are no burrs in the valve sleeve holes. All old gasket material must be scraped off. Coat the threads of the six base headless pipe plugs (12-Z-329-94) with sealer (299998-4). Install the plugs in the base, using swivel end wrench handle (299997-1).

2. PUMP VALVES—OUTLET—Turn the base upside down, dip outlet valve sleeve assemblies (299920-3) in oil mixture (OE-3533) and place them in clockwise holes (as viewed from bottom of base) of each pair of holes. See Figures 40 and 41. Dip outlet valve assemblies (299922-1), springs (299923-2), guides (299922-2), and sleeve springs (299922-5) in oil mixture (OE-3533) and place them in the three outlet sleeve assemblies in the order given.

   INTAKE—Make three assemblies of the intake valves. Place intake valve assembly (299921) in intake valve sleeve assembly (299920-1) and install guide (299922-2) in sleeve. Place spring (299923-2) and spring seat (299923-1) on valve stem. Depress the spring and seat with the fingers and slide seat retainer (299922-6) fully into the groove in the stem. Dip the three assemblies in oil mixture (OE-3533) and place them in the counter-clockwise holes of each pair of valve holes. Place the three intake valve sleeve springs (299922-5) in the sleeves.

   Coat both sides of valve chamber cover gaskets (299919-6) with sealer (299998-4) and place them on covers (299919-4). Install the two installation screws (299989-2) with nuts (299989-3) threaded on each one through opposite corner holes in the cover and gasket and thread them into the base for at least ten turns. Pull nuts down uniformly with ¾" deep socket (299993-3). When

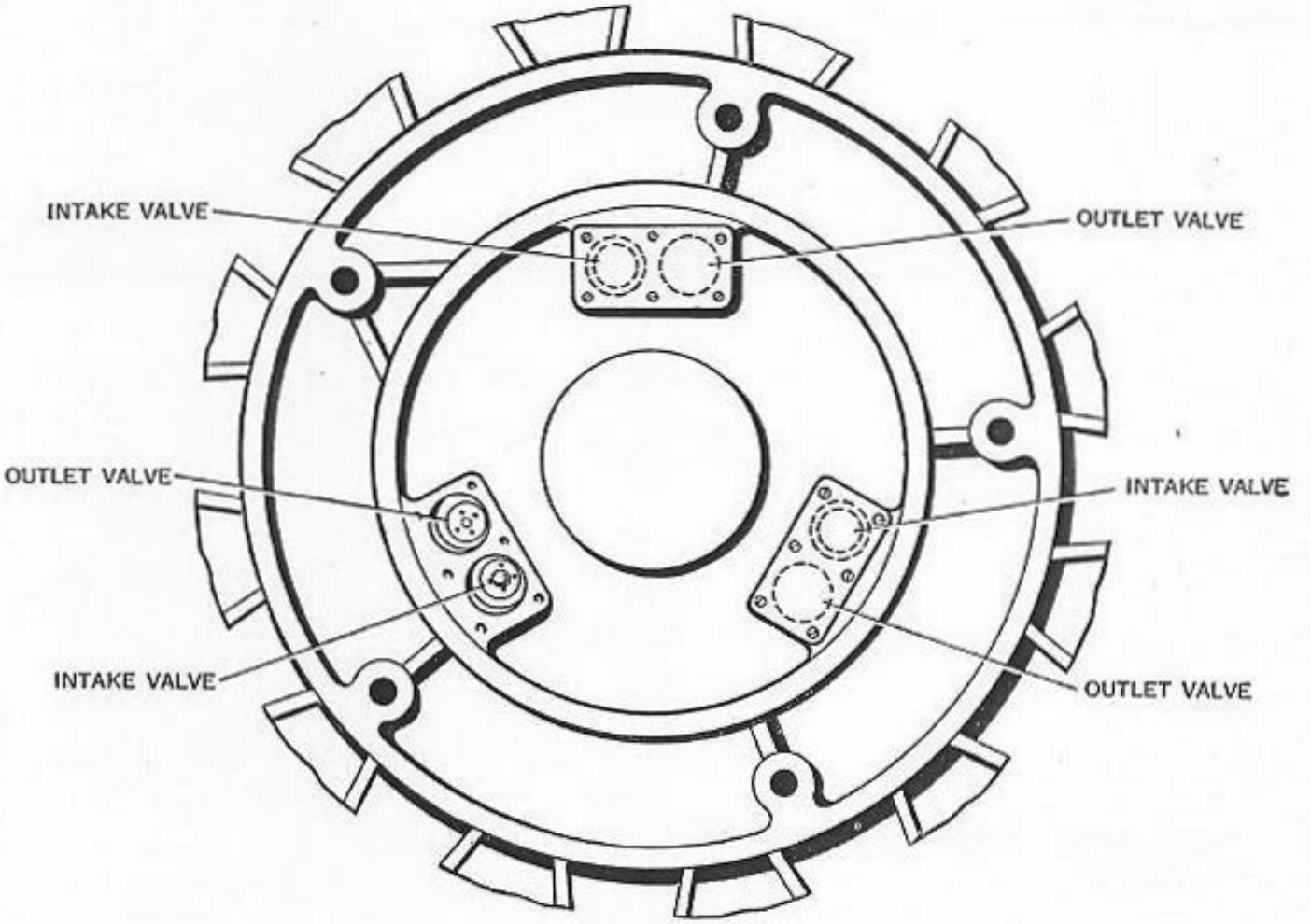

Figure 41—Valve locations in base

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the cover is about one inch from the base, feel under cover with fingers and centralize the sleeve valve springs. See Figure 42. Continue to pull nuts down until the cover is against the base and then install four cover screws (12-Z-42-276). Remove the two special screws and nuts and install in their places two more screws (12-Z-42-276). Tighten screws securely with a screw driver and adjustable wrench (OE-1606). Turn the base right side up. With the handle end of a blunt instrument, such as a hammer, press down on the valve heads once or twice to check their movement.

Repeat above operation at each of the two remaining valve groups.

3. RAM CYLINDER (299924-1)—If oil seal (299923-6) was removed from the ram cylinder replace it with a new one. Place it in the cylinder with the ice breaker lip to the top. Place pilot (299993-1) on the seal and tap lightly in place with a soft face hammer, tapping progressively around the pilot until the seal is all the way in and seated. Do not strike too hard, and do not continue to tap after the seal is seated. Screw oil seal well plug (299923-7) into its hole near the top of the cylinder.

Place ram cylinder sleeve (299925-1) on the cylinder and screw it down until the lip on the oil seal is about $\frac{1}{8}$" inside the top edge of the sleeve. Clean the cylinder and seal and stand the cylinder upside down on the floor. Clean off all old gasket material and wipe interior of the cylinder with a clean cloth dipped in oil mixture (OE-3533).

4. RAM (299926-1)—Fasten ram hoisting bar (299991-1) to **bottom** of ram with two carriage to ram screws (299946-1). Lubricate the exterior of the ram with oil and lower the ram into the cylinder.

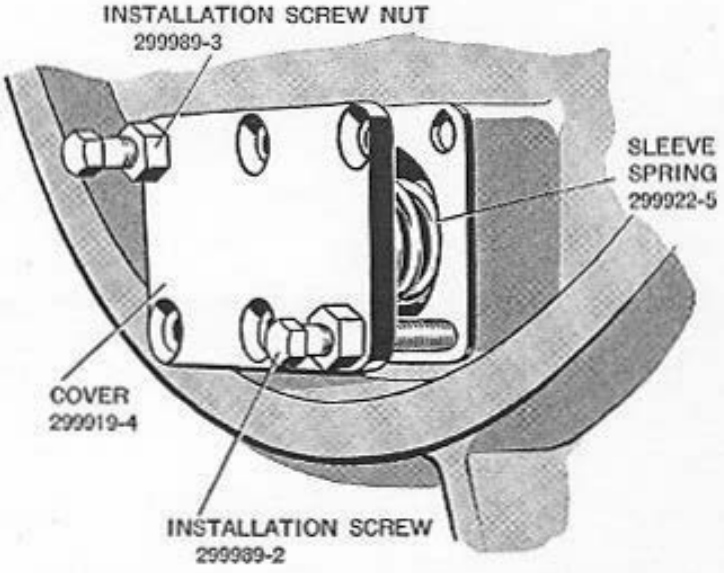

Figure 42—Centralize springs at this point

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Care must be taken to start the ram through the step in the cylinder just below the row of vent holes.

Lay the ram cylinder on its side on a bench, being careful not to damage the cylinder sleeve flange and remove the hoisting bar and screws from the ram.

Slide the ram up into the cylinder about two inches, and fasten hoisting bar (299991-1) to the **top** of the ram with two carriage to ram screws (299946-1). Coat both sides of ram piston gasket (299927-3) with sealer (299998-4). Place the two pilot screws (299989-4) in opposite screw holes in the bottom of the ram and place the gasket on the end of the ram. Install ram piston (299926-2) against the gasket. Dip piston cup (299927-2) in oil mixture (OE-3533) and place it in the ram cylinder over the pilot screws. Fit the cup against the ram piston, making certain that the ring on

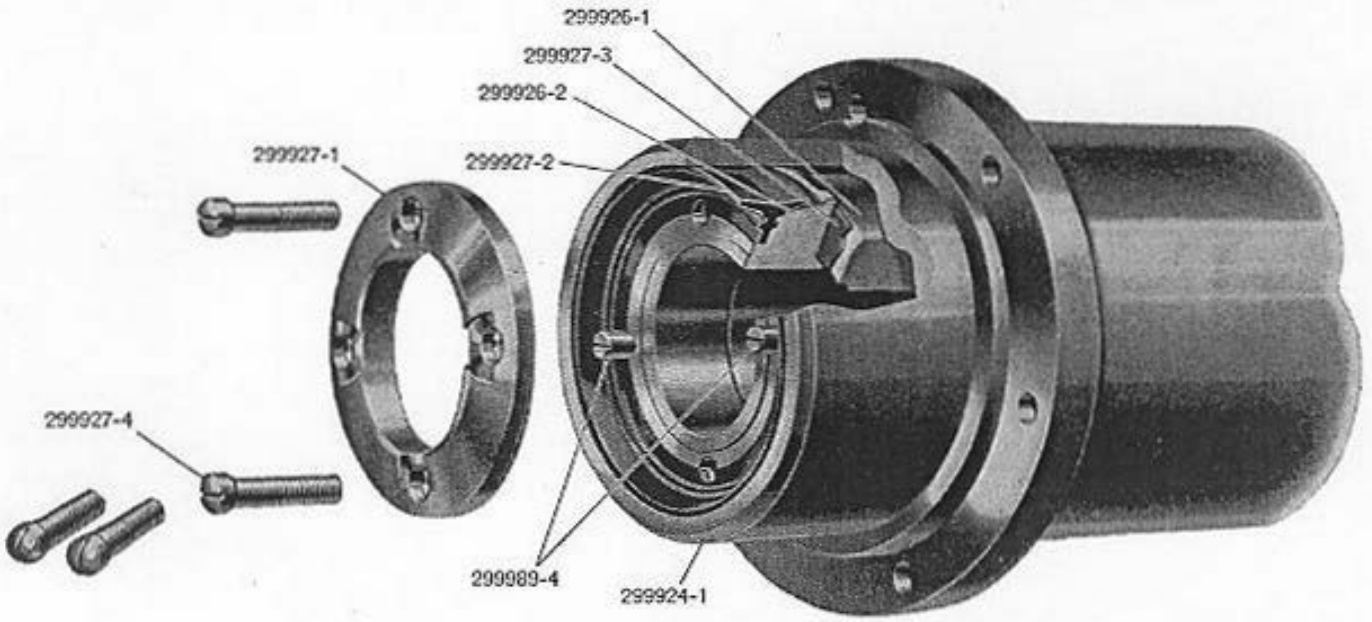

Figure 43—Installing ram piston parts on lower end of ram

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the cup enters into the groove in the ram piston. See Figure 43. Use a screw driver if necessary to press it into place. Place ram piston cup retainer (299927-1) in the ram cylinder against ram cup (299927-2) and install two ram piston screws (299927-4) in their holes and draw up snugly. Remove pilot screws and install the remaining two screws (299927-4). Tighten the screws securely with a screw driver and adjustable wrench (OE-1606). If the ram is rotated slightly and pushed back and forth several inches while the screws are still a little loose, the piston cup will be better fitted in the ram cylinder.

5. RAM CYLINDER (299924-1)—Turn the base right side up and clean the top side and central bore of the base carefully. Coat both sides of cylinder gasket (299923-5) with sealer (299998-4). Screw the two pilot screws (299989-4) in opposite cylinder flange screw holes in the base and install the gasket on the base. The base air vent notch in the gasket must be placed on a radial line between any two groups of three pedal lever bracket holes. See Figure 44.

Raise the ram cylinder with hoisting bar (299991-1) which is fastened to the upper end of the ram (the ram will slide part way out of the cylinder) and set the ram cylinder on the base. The tapped hole in the cylinder flange must be over the notch in the gasket. See Figure 44. Install four ram cylinder to base screws (12-Z-46-263) and four new lock washers (12-Z-22-254). Remove the two pilot screws and install the remaining two screws (12-Z-46-263) and lock washers (12-Z-22-254). Tighten the screws securely, using box wrench (299996-2). Remove ram cylinder sleeve (299925-1) from the cylinder.

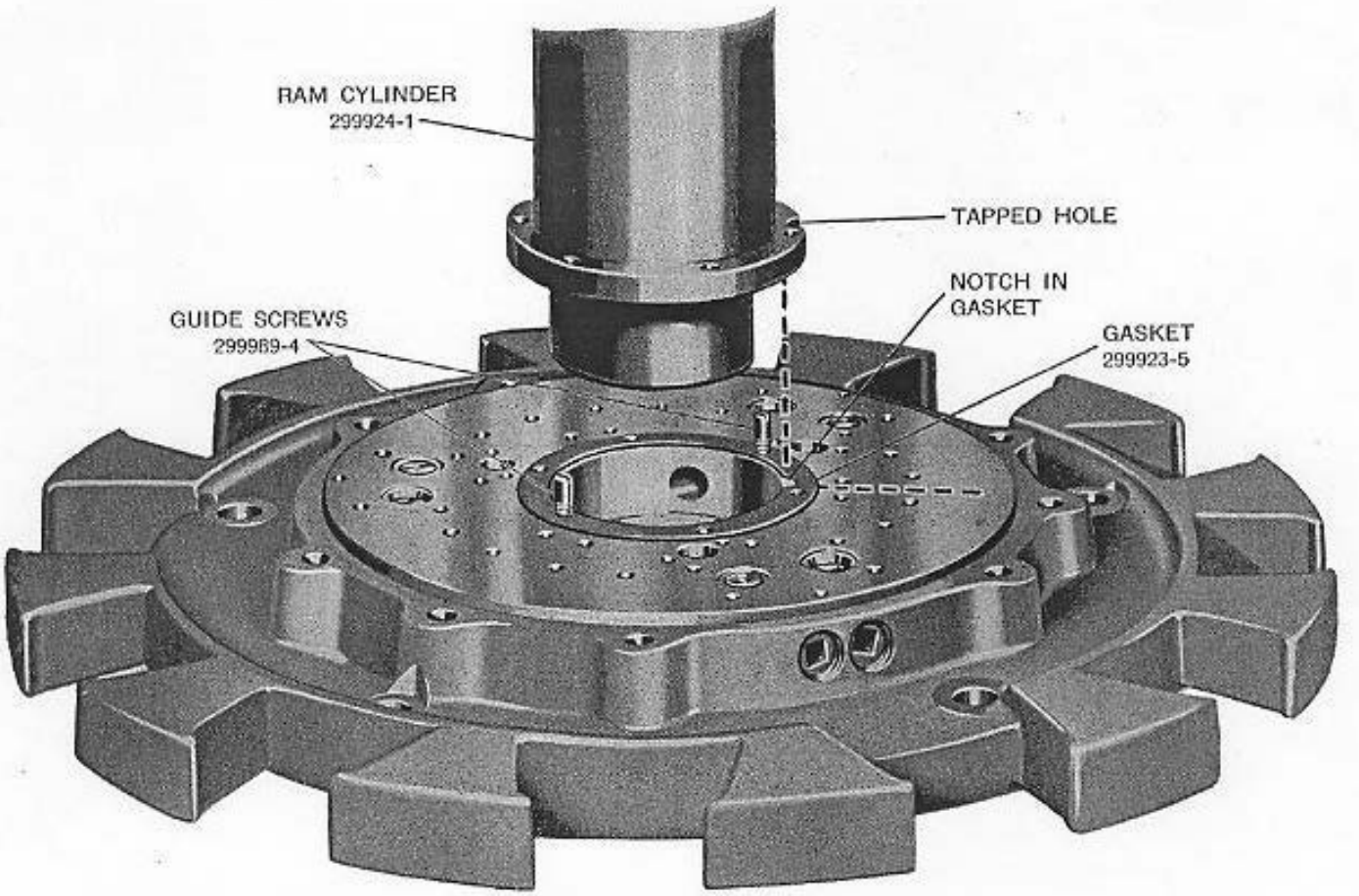

Figure 44—Position of ram cylinder and gasket on base

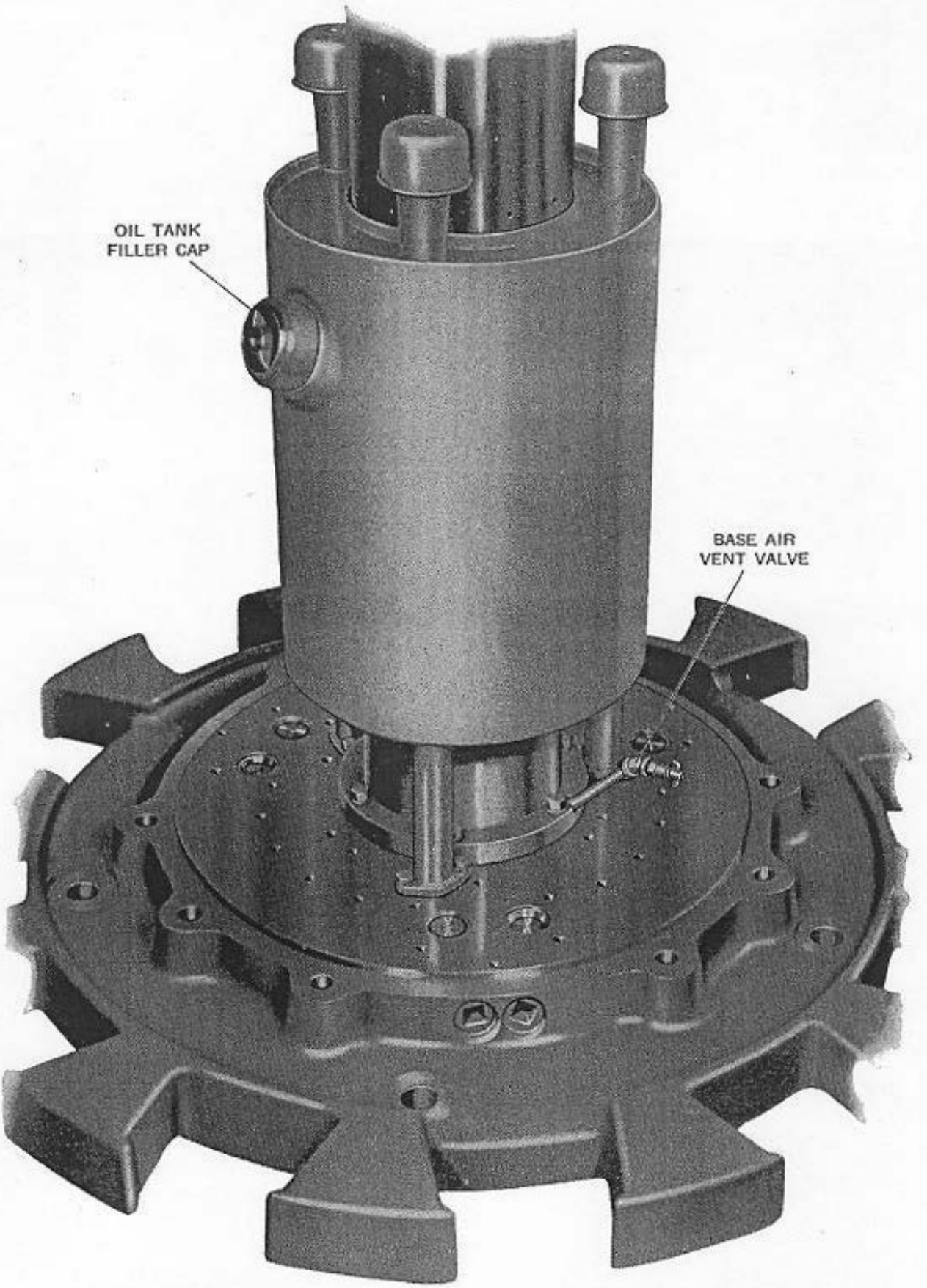

Figure 45—Position of oil tank filler cap in relation to base air vent valve

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6. BASE AIR VENT—Coat the threads of air vent pipe (299942-3), elbow (299942-4), and valve (299942-2) with sealer (299998-4) and install pipe in the tapped hole in ram cylinder base flange. Install elbow and valve on pipe. Close the vent valve if it is open. See Section E-E, Plate 3.

7. OIL TANK ASSEMBLY (299931)—Coat both sides of the three oil tank outlet pipe gaskets (299933-4) with sealer (299998-4) and place them on the base. Carefully clean the outlet pipe flanges of all old gasket material and lower the tank over the ram cylinder onto the base. Locate the tank on the base so that the filler hole in the side of the tank is 120 degrees (one third turn) clockwise (as viewed from the top) from the base air vent valve. See Figure 45. Fasten the tank to the base with six screws (12-Z-46-221) and new lock washers (OE-2270). Tighten screws securely with ½" socket (299995-3) and crank type wrench handle (299996-1).

Install the three oil tank vent caps (299935) by pushing them down onto the oil tank vent tubes.

Clean oil tank strainer assembly (299936-6) carefully, install it in the oil tank filler hole and secure it by seating oil tank strainer retainer (299936-3) in its groove in the filler hole.

8. OIL PUMPS—REASSEMBLING—Insert a piston rod link pivot pin (299940-1) in the upper end of a piston rod (299938-1). Clamp the rod and pivot pin upside down in a vise. Place return spring (299939-5), piston rod packing retainer (299937-5), and packing (299937-6), which previously had been soaked in oil mixture (OE-3533) on the piston rod. Care must be taken to start the piston rod packing over the two steps on the piston rod so that the packing is not damaged.

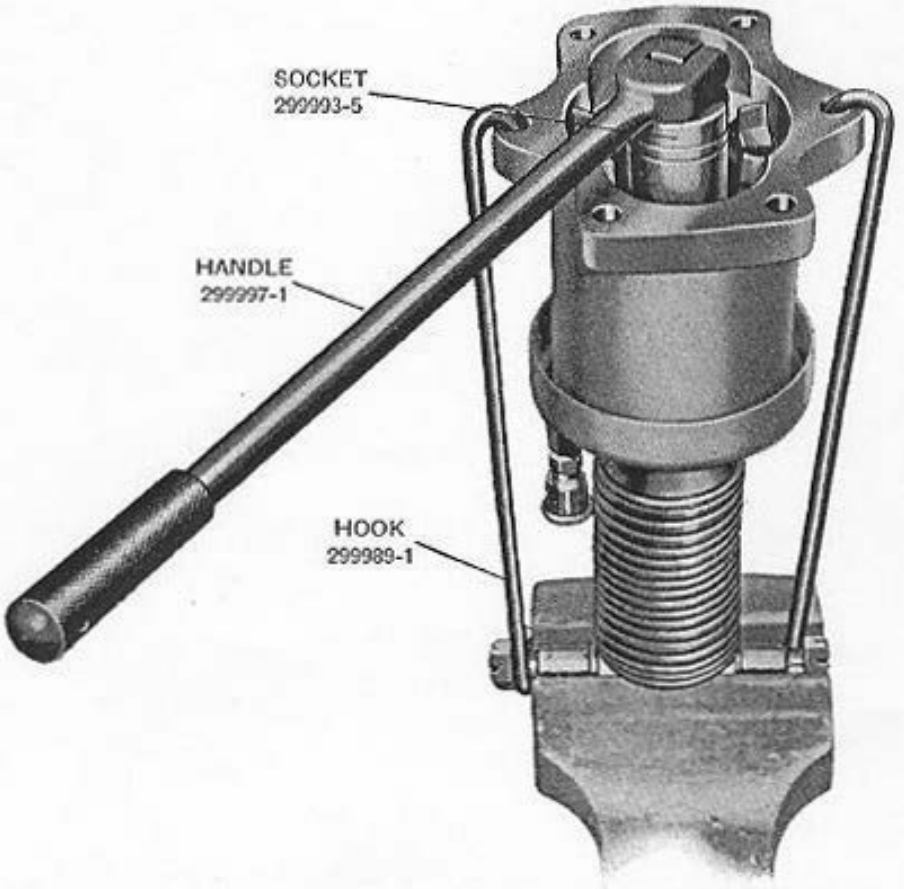

Figure 46—Reassembling oil pump

Operation Number

Clean all old gasket material off cylinder (299937-4) and clean the bushing and bore of the cylinder. Oil the interior of the cylinder with oil mixture (OE-3533) and place it on the piston rod. Turn the cylinder 90 degrees from its correct position so that the two individual hole bosses are over the ends of the pivot pin. See Figure 46. Place the two piston rod assembling hooks (299989-1) over the ends of the pivot pin and screw on the two pivot pin nuts (299940-2) a few turns. By body weight compress the piston return spring and place the ends of the two hooks over the holes in the cylinder flange. If piston rod key (299938-4) was removed, install a new one in the keyway in the piston rod. Place piston cup retainer (299938-3) on the piston rod over the aligning key. Dip piston cup (299939-1) in oil mixture (OE-3533) and place it in the cylinder, over the piston rod and against the retainer. Fit the cup carefully in the retainer, using a screw driver if necessary to press it into the groove in the retainer. Place pump piston (299939-3) on rod and over aligning key. Install piston nut washer (299939-4) on the piston rod with lug on the washer engaged in the hole in the piston. Install nut (299939-2) and tighten with $\frac{15}{16}$" socket (299993-5) and swivel end wrench handle 299997-1). Bend other lug on washer up against the side of the nut. Again compress piston rod return spring by body pressure and remove the hooks from the cylinder and pivot pin. Remove pump from the vise.

Install piston rod oiler elbow (12-Z-322-8) in hole at the upper end of the cylinder. Hole in elbow should point upward. Install oiler (299938-5) in elbow.

Repeat the above operations to reassemble the remaining two pumps.

9. OIL PUMP ASSEMBLIES—INSTALLATION—Clean top of base at the valves. Coat both sides of pump cylinder gasket (299941-1) with sealer (299998-4) and place gaskets on base at pump locations. Place pump assemblies on base with oilers facing towards outside. Install six cylinder to base screws (12-Z-46-244) and new lock washers (OE-2271). Tighten securely, using $\frac{3}{16}$" socket (299995-4), crank type wrench handle (299996-1), and box wrench (299996-2).

Install oilers (299938-5) at top of each piston rod.

10. PUMP PEDALS—Place a piston rod link pivot pin (299940-1) in the top of each piston rod (299938-1). Place two piston rod links (299940-6) on pivot pin, retaining each link with one flat washer (12-Z-22-274) and nut (299940-2). DO NOT tighten nuts at this time. See Figure 40.

Install pump pedal assemblies (299941) by placing each pedal over a pump, placing each piston rod link (299940-6) so that its lower hole lines up with the hole near the center of the pedal lever and install a piston rod link pin (299940-7) previously dipped in oil, through each link and pedal lever. See Section D-D, Plate 3. Secure the pins in place with new cotter pins (12-Z-48-639) installed at each end of the pin.

Dip the ends of the pivot pins of pump lever bracket assemblies (299919) in oil and place the end bearing holes of the pedal levers over the pins. Fasten each bracket assembly to the base with three screws (12-Z-46-244) and new lock washers (OE-2271). DO NOT tighten the screws at this time.

Pump each pedal several times to check alignment of the various parts and tap the brackets lightly if necessary to line them up. Tighten nuts (299940-2) at each end of pivot pin and install new cotter pins (12-Z-48-623). Tighten the pedal bracket screws (12-Z-46-244) after the brackets have been lined up so that each pedal moves freely, using box end wrench (299996-2). Fill all oilers with oil mixture (OE-3533).

11. PEDESTAL CASING (299913-1)—If gun cocking cable anchor hook (299915-6) was removed from the pedestal, screw it into place and lock with nut (12-Z-9-244). See Section H-H, Plate 3. Place casing on base, using hoisting hook (300003-1) shipped with the mount and chain fall or hoist. Use two casing to base bolts (299915-4) as pilots to line up casing and base bolt holes. The oil tank filler

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hole must line up with the filler hole on the oil tank and the base air vent valve hole in the casing must line up with the air vent valve. Fasten the casing in place with nine bolts (299915-4) and new lock washers (12-Z-22-257), using 1" socket (299993-6) and swivel end wrench handle (299997-1).

12. CYLINDER SLEEVE (299925-1)—Stretch ram cylinder sleeve packing (299925-3) over the sleeve and seat it in the packing groove. Lubricate the cylinder sleeve seat at the top of the casing and the sleeve packing with oil mixture (OE-3533). Place the sleeve on ram cylinder (299924-1) and screw down as far as it can be turned by hand.

TO REASSEMBLE RAM SPRING AND TUBE ASSEMBLY (299928) proceed as follows:

13. With the one long and two short tube assemblies and the adapter assembled as instructed in the "Stripping Operation", place the parts in the tool in the following manner:
    (a) Insert retainer (299929-5) into the tool.
    (b) Insert upper thrust bearing (12-Z-317-47) through the slots in long tube assembly (367541) and place it in the counterbore on the bottom face of retainer (299929-5). See Figure 39.
    (c) Insert one of the ram springs (299929-1).
    (d) Insert one of the spring spacers (299929-6).
    (e) Insert the remaining four springs and spacers, alternating them as described above.
    (f) Insert ram spring tube assembly (299927) into the ram springs.
14. Install tool screw assembly (299861-5) in the end of the tool. Be careful to have the keyways on screw nut (OE-3175) fitted over the lugs in the tube. **This nut must fit firmly over the lugs.**
15. Slide tool nut (OE-3171) over the end of the screw and thread it onto the tube.

    NOTE—This nut has to hold the entire pressure of the ram springs and must be turned down all the way on the threads of the tube.
16. Install and turn wrench brace (OE-3180) clockwise so as to put a slight tension on the ram springs.

    CAUTION—See that spring spacers (299929-6) are in place between the ram springs. Make certain that the springs are in alignment, see Figure 39.
17. Turn the wrench brace clockwise to compress the springs so that the flange of tube (299927) is just beyond the transverse slots, see Figure 39, in the second short tube. Insert stop plate (OE-3176) in these transverse slots as shown.

    NOTE—The lugs on the stop plate must be toward the wrench brace end of the tube. This is necessary to provide a positive lock.
18. Turn the wrench brace counter-clockwise until the spring pressure is resting on stop plate (OE-3176) in the second short tube thereby leaving the first short tube free of the springs so it can be removed.

    NOTE—It is necessary that the coils of the springs be free of binding or cocking during the entire reassembly operation. Use a soft hammer and tap on the springs through the slots in the tubes. Do this whenever there is any indication of binding.
19. Remove wrench brace (OE-3180), tool tube nut (OE-3171), and tool screw (299861-5). Remove the short tube that was freed of the springs in Operation 18.
20. Reinstall tool screw (299861-5), tool nut (OE-3171), and wrench brace (OE-3180) on the short tube and turn the wrench brace clockwise to relieve the pressure of the springs on stop plate (OE-3176). Remove the plate. Turn the wrench brace clockwise until flange of the tube is just beyond the transverse slots in the long tube. Insert stop plate in the transverse slots.
21. Repeat procedure described in Operation 18.

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22. Repeat procedure described in Operation 19, which will place the entire ram spring and tube assembly in the long tube (367541) resting against stop plate (OE-3176). Reinstall the tool screw, tool nut, and wrench brace. Turn the brace clockwise to relieve the pressure of the springs on the stop plate. Remove the plate.

23. Continue turning the brace clockwise until the upper end of ram spring tube (299927) projects through the thrust bearing.

24. Lift the tool off the bar in the vise and assemble plug (299930-1) in tube (299927), using wrench (299990-3), 7/8" socket (299993-4), and wrench handle (299997-1).

NOTE—Hold the ram spring and tube assembly when screwing in the plug so as to be sure the plug is turned all the way in the tube. This plug takes all the thrust of the springs and it must be firmly seated or serious injury will result if it is only holding by a few threads.

25. Upon removing the ram spring and tube assembly from the compressing tool, check its length against Figure 47. If it does not agree with the length shown, replace the unit in the compressing tool, lock it in place with the tool screw and nut and lengthen or decrease whichever is necessary by turning retainer plug (299930-1) in or out until the proper length is reached.

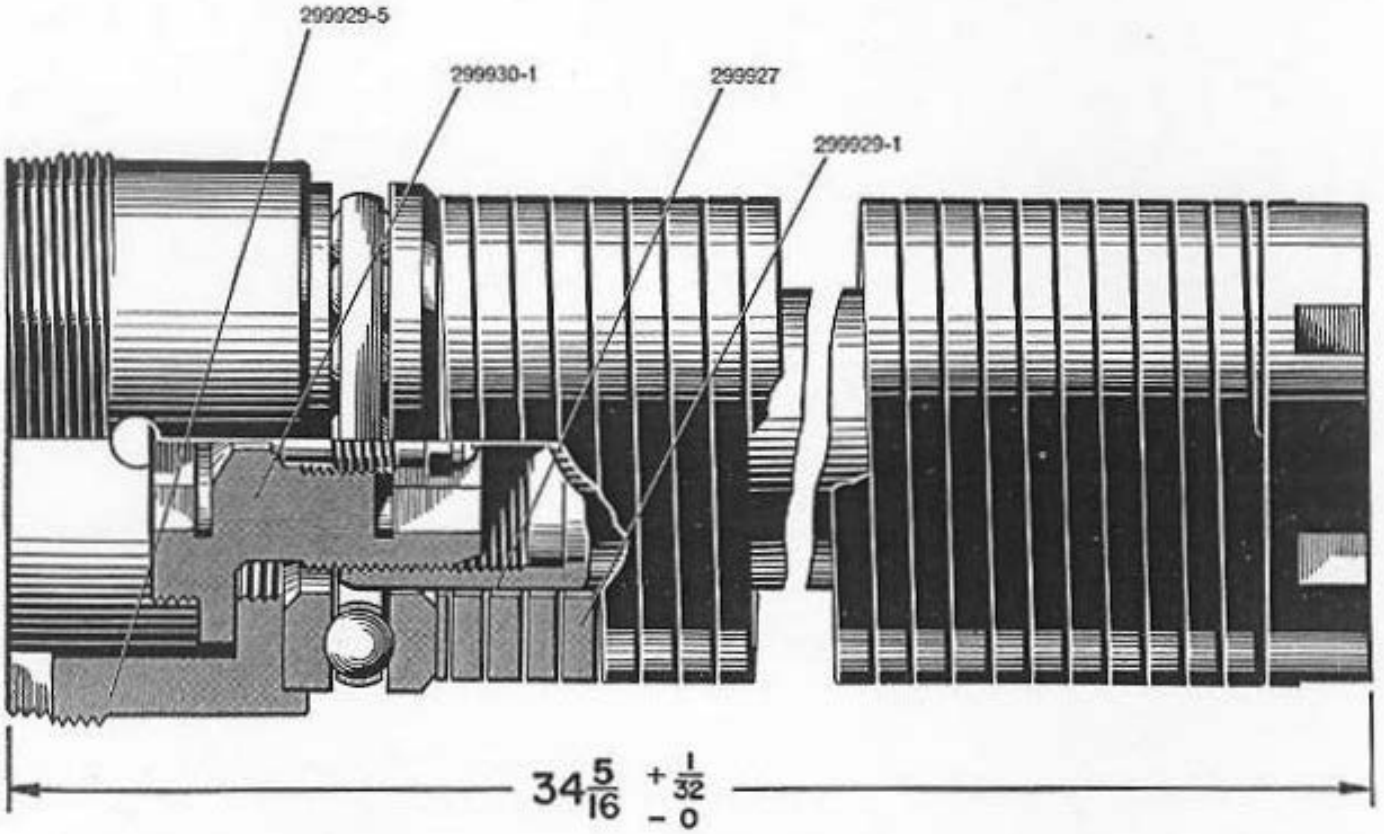

Figure 47—Correct length of ram spring and tube assembly (299928)—retainer plug inverted in safety position

26. RAM SPRING AND TUBE ASSEMBLY (299928) INSTALLATION—Pass retainer gasket (299930-3) over flange end of the assembly, the springs and thrust bearing, and against retainer

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(299929-5). Raise the assembly with hoisting hook (299989-6) locked in place and lower it into the center of ram (299926-1). See Figure 48. **Be sure retainer gasket (299930-3) is in place.** For safety reasons **do not** try to screw ram spring retainer (299929-5) into its mating threads at this time.

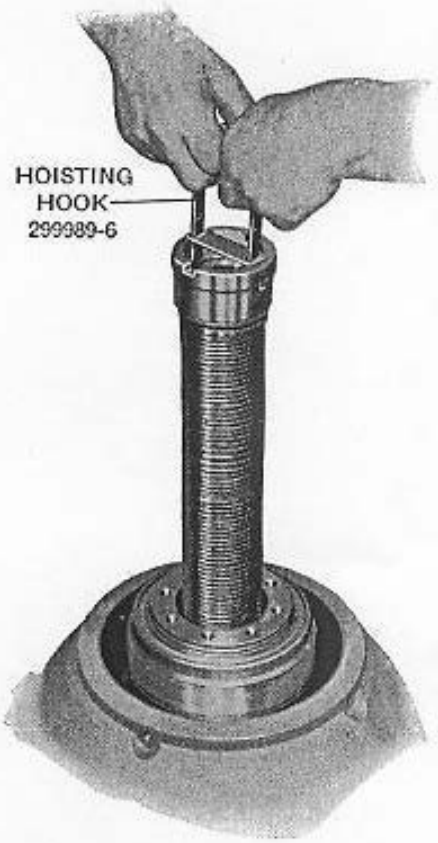

Figure 48—Lowering ram spring and tube assembly into ram

27. CARRIAGE ASSEMBLY (299943) REASSEMBLING—Oil carriage lock plunger (299943-1) with extra light mineral oil, Navy Symbol 1042, 2110 or 2075 and insert the plunger into its hole in carriage (299944-1) and place plunger spring (299943-2) into its hole in the plunger. Force the spring down with cover (299943-3) until the cover is far enough down to force cover retainer (299943-4) into the groove in the plunger hole. See Main Section View, Plate 3.

If cradle lock plunger hole plug (OE-3514) was removed, install a new one by setting it in the hole in the carriage with the hollow side toward the inside and striking the center of the plug with drift (OE-1616) until a dimple is formed in the center of the plug. Assemble cradle lock plunger (299943-5) in carriage after oiling it with extra light mineral oil, Navy Symbol 1042, 2110 or 2075. The grooved end of the plunger should be entered into the hole first.

Install cradle lock lever (OE-3512) and two lock lever spacers (OE-3518) into their hole in the carriage and drive lock lever pivot pin (OE-3513) through the holes in the lever and spacers. See Section C-C, Plate 3. Stake the pin securely at both ends to prevent it from coming out.

Slide lock lever water seal (OE-3519) over the cradle lock lever and seat it in the grooves in the boss on the carriage and lock lever.

Place lock plunger ball (OE-3511) and spring (OE-3516) in their hole in the carriage and screw in retainer screw (OE-3517).

Screw trunnion bracket and pivot bearing pressure oiler (OE-2259) into its hole in the carriage.

28. CARRIAGE ASSEMBLY (299943)—INSTALLATION—Screw the two pilot screws (299989-4) into opposite holes in the top of the ram. Carefully clean the bottom side of the carriage and place it on top of the ram. Fasten the carriage to the ram with six carriage to ram screws (299946-1). Remove the two pilot screws and install the remaining two screws (299946-1). Tighten all screws to 75 foot pounds torque, using torque tension wrench (299991-2) and socket (299992-2). If the tension wrench is not available, tighten with a pull of 75 pounds on a wrench handle one foot long or 38 pounds on a handle two feet long.

29. CRADLE ASSEMBLY (299947)—REASSEMBLING—Assemble cheek plates (299947-1) right and (299947-2) left to cradle, using four attaching screws (OE-2263) in each plate. The end of each plate having an extension on it goes to the front.

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Drive securing bolt locating pin (OE-2262) into securing pin (OE-2188) until it protrudes equally on both sides. Place securing bolt spring (OE-2189) on small end of bolt and insert the bolt and spring in the bolt hole in the cradle, after applying a coat of Anti-seize compound, Navy Specification 52-C-19 (Int.) on the bolt. Assemble withdrawing head (OE-2190) on the lower end of the bolt and secure it by driving in securing pin (OE-2261).

Place cocking sheave (299950-2) in slot in rear end of cradle and drive in sheave pin (299950-3). Secure pin in cradle by driving taper pin (12-Z-49-63) into the cradle from the top.

Screw cradle trunnion pin oiler (OE-2259) into its hole in the cradle.

30. CRADLE ASSEMBLY (299947)—INSTALLATION—Hold the cradle in the carriage with the gun securing bolt forward and the trunnion holes in the cradle and carriage in line. Drive trunnion pins (OE-2161) right and (OE-2160) left outwards so that they pass through the cradle and carriage. See Section A-A, Plate 3. Key (OE-2191) should be in place in trunnion pin (OE-2160) before driving the pin into place. Screw securing nut (OE-2162) onto pin (OE-2161), using wrench (OE-2904 and spanner (OE-3157). Lock the nut in place with securing pin (OE-2269). If the holes in the nut and pin do not line up when the nut is tight, back nut off until the holes do line up.

Slide spring housing cover (OE-2165) over carriage pin (OE-2160) and secure it to the carriage with four screws (OE-2256).

Build up cradle spiral spring and housing assembly (OE-2312) as follows: If bushing (OE-2166) was removed from housing (OE-2164) press in a new one. Place spiral spring (OE-2169) in housing so that the spring winds **clockwise** toward the center when looking into the housing. See Figure 49. Install spring securing bolt (OE-2168) and lock washer (OE-2278) in housing so that the stud end of the screw passes through the anchor hole in the outer end of the spring.

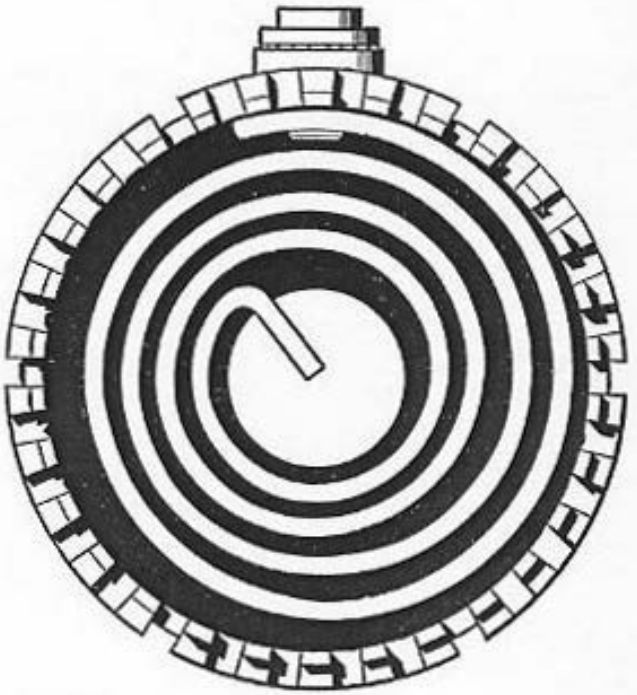

Figure 49—Correct position of spiral spring in housing

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Raise the cradle to the 90 degree position and lock it in place by pulling out cradle lock lever (OE-3512). Slide the cradle spring and housing assembly onto the left trunnion pin with the radial portion of the spring sliding in the spring slot in the trunnion pin, until the notches in the housing are just clear of those on the housing cover.

NOTE—Keep hands clear of the serrations to prevent injury.

Turn the spring housing clockwise until spring tension is felt, then turn further in the same direction to the first place where the notches in the housing and cover will engage. Force the housing into engagement with the cover. Install spring housing trunnion pin nut (OE-2163) and tighten, using wrench (OE-2904). Lock the nut on the pin by driving securing pin (OE-2268) through nut and pin. If holes in the nut do not line up when the nut is tight, back nut off until the holes do line up.

NOTE—In order to improve the balance of the gun when installing the Mark 14 Mod. 2 sight on the rear end of the cradle, or when interchanging solid and ribbed gun barrels, the cradle spiral spring housing may be adjusted one or two notches from the standard setting. Cradle spiral spring spanner (367543-1), Figure 52, will be found helpful when making this adjustment.

31. SHIELD ASSEMBLIES (OE-2316) RIGHT AND (OE-2317) LEFT—Assemble shield plates (OE-2219) or (OE-2289 right and OE-2290 left) to shield brackets (OE-2220) right and (OE-2221) left, using four bolts (OE-2228) and nuts (OE-2229) in each plate.

Bolt the right and left shield assemblies to the carriage, using four bolts (OE-3535), lock washers (OE-2275), and nuts (OE-2217) on each bracket.

Bolt shield strap (299951-1) to the shield plates, using four bolts (OE-2227) and nuts (OE-2229).

32. RAM SPRING RETAINER (299929-5)—Engage the threads on the retainer with those on the inside of ram (299926-1), by turning the retainer with retainer wrench (299989-5) and retainer wrench handle (299990-1). Pull the retainer down tight so as to seal it on its gasket (299930-3).

33. CYLINDER SLEEVE (299925-1)—Lock the cradle in the 5 degree position. Oil cylinder sleeve packing (299925-3) and be sure it is free of wrinkles around its outer edge.

With carriage lock plunger (299943-1) engaged in one of the notches in the sleeve, screw the sleeve down on ram cylinder (299924-1) until it is tight, by turning the carriage in clockwise direction when viewed from the top.

34. RAM SPRING RETAINER PLUG (299930-1)—Carefully elevate the cradle to the 90 degree position and lock in place with lock lever (OE-3512). Unscrew the plug from retainer (299929-5) using retainer plug wrench (299990-3), 7/8" socket (299993-4), and swivel end wrench handle (299997-1). The engaging threads for this operation are **left hand.** Place retainer plug gasket (299930-2) in the retainer and install the retainer plug again but this time turn it over so that its short, large diameter end is threaded into spring retainer (299929-5). See Figure 50. The engaging threads for this operation are **right hand.** Tighten the plug to 125 foot pounds torque, using 7/8" socket (299993-4) and torque tension wrench (299991-2). If the tension wrench is not available, tighten with a pull of 125 pounds on a wrench handle one foot long or 62 pounds on a handle two feet long.

35. RAM AIR VENT VALVE ASSEMBLY (299930)—Screw the air vent valve assembly into the hole in retainer plug (299930-1) and pull down tight with 3/8" socket (299995-2) and crank type wrench handle (299996-1).

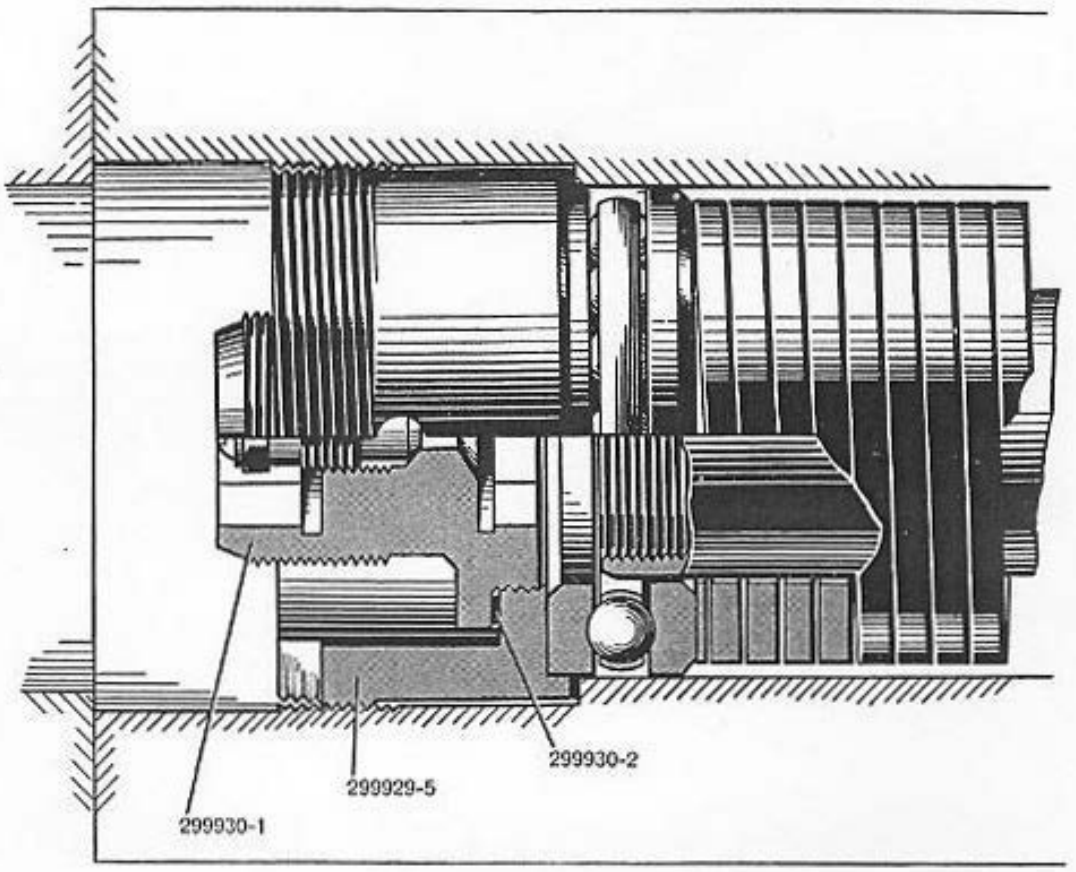

Figure 50—Retainer plug secured in retainer

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36. FILLING HYDRAULIC SYSTEM—Pour 4 gallons, 2 quarts (31.4 pounds) of oil mixture (OE-3533) into the oil tank through the oil filler hole in the pedestal casing. The oil must be poured slowly as it has to flow through the strainer. After about 3 gallons have been poured in, pump each pedal about 5 times. Pour the balance of the oil mixture into the oil tank.

NOTE—Specifications for oil mixture (OE-3533). If necessary to prepare the specified oil mixture in the field, mix 3 gallons, 3.9 quarts (27.8 pounds) of extra light mineral oil, Navy Symbol 1042 with 2.8 quarts (4.9 pounds) of No. 1 fuel oil. Mix in a clean container and keep free of dirt and water. If larger or smaller amounts are needed, mix in the proportion of 85% of oil, Navy Symbol 1042 and 15% fuel oil, either by volume or weight.

37. BLEEDING—Raise carriage to its maximum height three times by pumping up once as fast as possible with each of the three pumps. Place bleeding pipes (299993-7 and 299992-4) over the end of base air vent valve (299942-2) through the hole in the pedestal casing, and place the other end in a suitable, clean container. Open the valve slightly and watch the oil flowing out of the hose. When the oil flows free of air bubbles, close the valve and remove the bleeding pipes. Pour the bled oil back into the tank.

Remove ram air vent valve screw (12-Z-8-270) and lock washer (OE-1293), (A), Figure 51 and install in their place in air vent valve (299930-4) bleeder fitting (299992-3). Place bleeding pipes (299993-7 and 299992-4) on the fitting and slip $\frac{3}{8}$" socket (299995-2) over the hose so that it can turn valve (299930-4), (B), Figure 51. Hold the free end in a suitable clean container, raise the carriage several inches by pumping one of the pedals, and open the valve slightly. See (C), Figure 51. Operate one pump slowly at least five strokes. Then operate the other two pumps in the same manner. **Never bleed off more than one quart of oil at one time.** When a quart is bled off, close the air vent valve and pour the bled oil back into the tank.

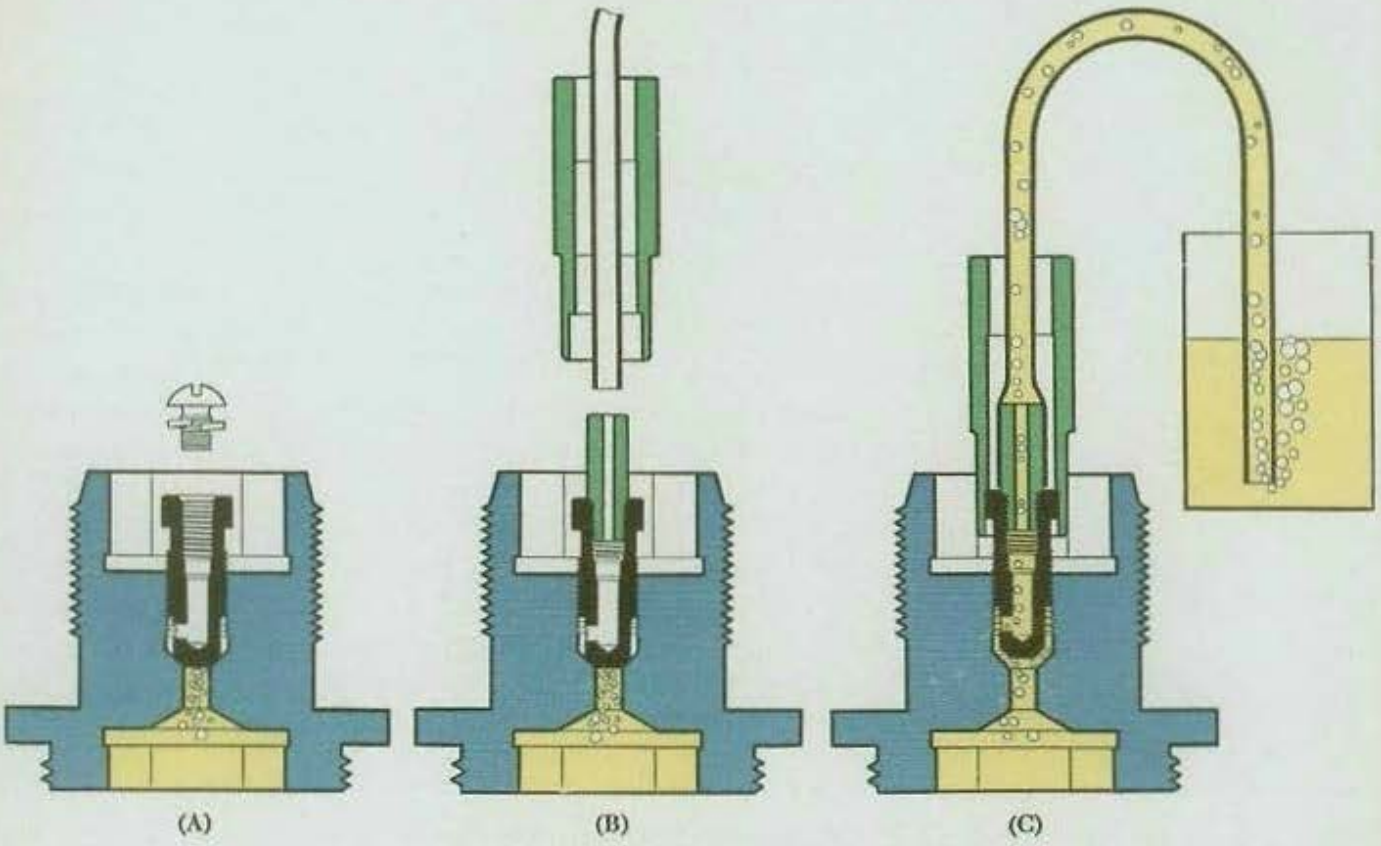

Figure 51—Bleeding ram air vent valve

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Bleed the base air vent in the same manner as described before, pouring the bled oil back into the tank.

Bleed the ram air vent valve again in the same manner as before. When all bubbles stop coming out with the oil, check by lowering the carriage and stopping it before it goes all the way down. If it stops **sharply,** the air is probably all out of the system. If it stops, then bounces slightly, there is still air in the system and further bleeding is required.

When bleeding is completed, close the base air vent valve and the ram air vent valve tightly. Remove bleeder fitting (299992-3) and install lock washer (OE-1293) and screw (12-Z-8-270) in the valve and tighten securely.

Lower the carriage all the way and refill the tank until the oil level can be seen in the strainer. Insert oil tank filler cap gasket (299936-5) in filler hole and screw in filler cap (299936-4), tightening it securely with socket (299992-2) and swivel end wrench handle (299997-1).

38. RAM COVER (299946-2)—Remove any oil drippings from top of carriage and ram spring retainer by soaking it up with rag waste and install ram cover in hole in carriage.

39. WEIGHT AND BAND ASSEMBLY (OE-2207)—Assemble the weight and band assembly to the cradle cheek plates, using pivot bolt (OE-2177), nut (OE-2178), and cotter pin (OE-2230). See Section B-B, Plate 3.

40. CARTRIDGE BAG ASSEMBLY (OE-2198)—Place the cradle in the 5 degree position and lock it in place. Place weight and band in bag. Fasten bag to cradle and carriage, using two bolts (OE-2172), nuts (OE-2173), and cotter pins (OE-2231). The nuts should be left sufficiently loose so that the cartridge bag ends can rotate on the bolts.

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41. CASING HOLE COVERS (299915-2)—Swing the hole covers into position and secure them with screws (12-Z-41-253). The three upper covers should have the elongated hole at the top, and the cover over the base air vent valve hole should have the elongated hole at the bottom.

42. CYLINDER SLEEVE SET SCREW (299925-2)—Install the four screws in the pedestal near the top, tightening them with Allen wrench (299993-2).

43. LUBRICATION—See lubrication chart, Figure 28. Raise the carriage about 6 inches and remove cylinder oil well plug (299923-7) from the top of the ram cylinder. Fill the well with oil mixture (OE-3533) and replace the plug.

Lubricate the six oilers on the pump assemblies with extra light mineral oil, Navy Symbol 1042, 2110 or 2075. Place a few drops of this oil on each of the bearing joints of the pump pedals and replace the covers.

Lubricate the two cradle trunnion pin oilers (OE-2259) with grease gun (OE-1637), using grease (OS-1350). Continue to pump gun until grease starts to come out of the joints on the side of the pins.

Apply a coat of Anti-seize compound, Navy Specification 52-C-19 (Int.) on gun securing bolt (OE-2188). Place several drops of extra light mineral oil, Navy Symbol 1042, 2110 or 2075 on cradle lock plunger (299943-5) and work the plunger in and out of the carriage several times. Place several drops of extra light mineral oil, Navy Symbol 1042, 2110 or 2075 in the cavity in the carriage on top of the carriage lock cover and allow it to seep down past the cover.

At all places where bearings are lubricated or oilers are filled, it is allowable to use extra light mineral oil, Navy Symbol 1042, 2110 or 2075 in place of oil mixture (OE-3533). IT IS NEVER ALLOWABLE TO PUT MINERAL OIL ALONE IN THE OIL TANK.

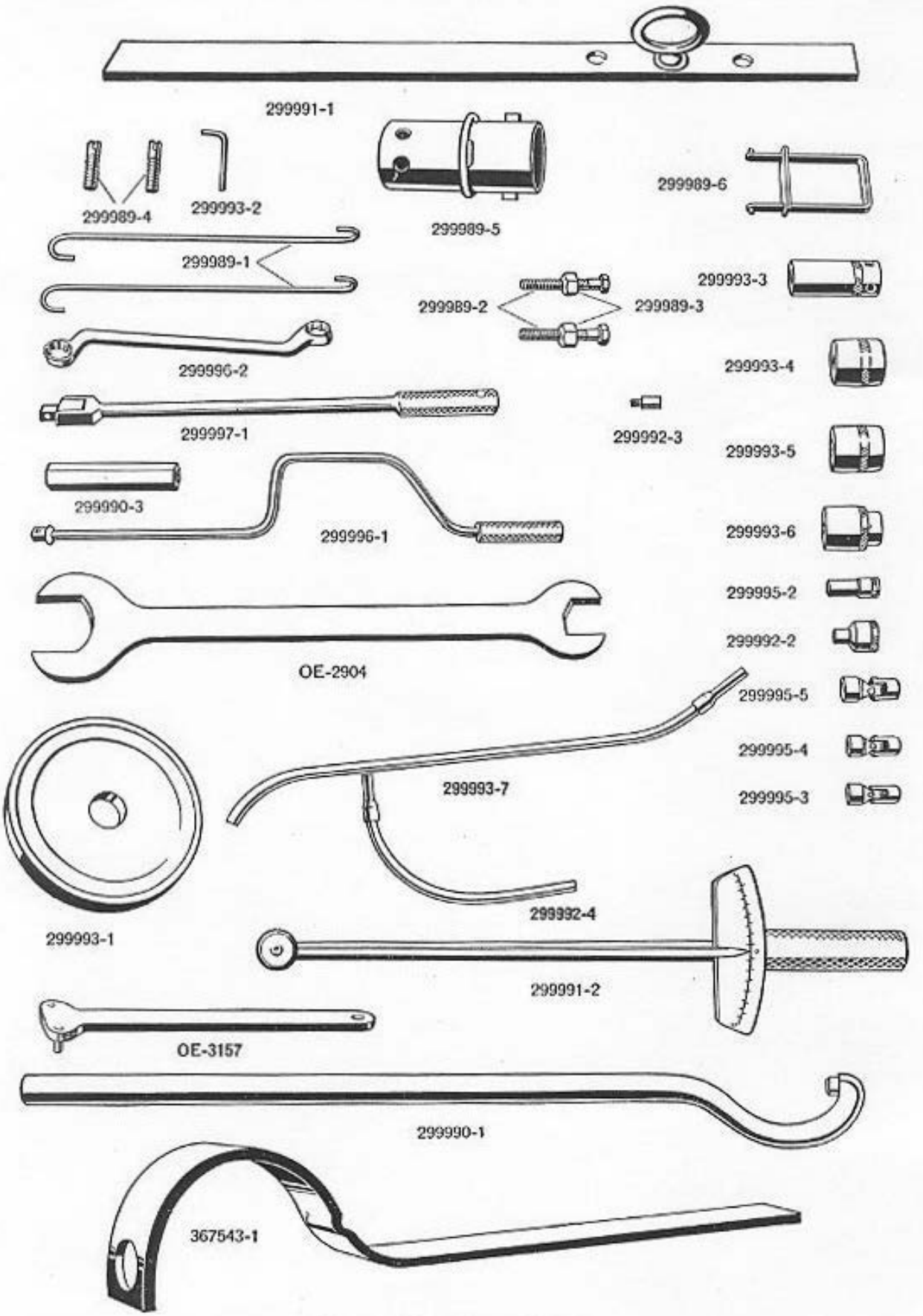

Figure 52—Mount Tools

TOOLS

Shipped with every Mark 6 Mount is a tool roll (299998) containing all the tools listed below and illustrated in Figure 52, except (299991-2) torque wrench—½" drive, (299991-1) ram hoisting bar, and (299993-1) ram oil seal installation pilot. These latter tools are included in the spare parts and tool box shipped to Shore Bases and Tender Ships.

These tools, used together with the tools shipped with every Gun as tool roll and contents (299817), are sufficiently complete to allow the complete stripping and reassembling of the gun mount, except the ram spring and tube assembly (299928). For this operation a special spring compressing tool (367539) is required. This tool is furnished only to Shore Bases. For this reason (299928) ram spring and tube assembly will be handled as a complete unit for Vessel and Tender service.

This same compressing tool can be used for stripping and reassembling equalizing spring and tube assembly (OE-2001) used on Mark 4 Mount. These tools are sufficient to completely strip and reassemble the Mark 6 Mount and no extra tools are needed except a bench vise and the gun mount hoisting hook (300003-1) which was shipped with the mount in its shipping box.

The use of all tools is covered in Stripping and Reassembling sections of this Pamphlet.

Tool Number	Tool Name
299991-1	Bar—Ram Hoisting
299992-3	Fitting—Ram Air Bleeder
299996-1	Wrench Handle—⅜" Drive Crank Type
299997-1	Wrench Handle—½" Drive Swivel End
299990-1	Handle—Ram Spring Retainer Wrench
299989-1	Hook—Pump Piston Rod Assembling
299989-6	Hoisting Hook—Ram Spring
299993-7	Pipe Assembly—Long—Bleeding
299992-4	Pipe Assembly—Short—Bleeding
299989-3	Nut—Pump Valve Chamber Cover Installation
299993-1	Pilot—Ram Oil Seal Installation
299995-2	Socket—⅜" Deep Type—⅜" Drive
299993-3	Socket—¾" Deep Type—½" Drive
299995-3	Socket—½" Universal—⅜" Drive
299995-4	Socket—$\frac{9}{16}$" Universal—⅜" Drive
299995-5	Socket—⅝" Universal—⅜" Drive
299993-4	Socket—⅞" Standard—½" Drive
299993-5	Socket—$1\frac{5}{16}$" Standard—½" Drive
299993-6	Socket—1" Standard—½" Drive
299992-2	Socket—⅜" Special Male—½" Drive
299989-2	Screw—Pump Valve Chamber Cover Installation
299993-2	Wrench— $\frac{3}{16}$" Allen Type
299996-2	Wrench— $\frac{9}{16}$" and ⅝" Box End
367543-1	Spanner—Cradle Spring Housing
OE-3157	Spanner—Trunnion Pin
OE-2904	Wrench—1", ¼" and 2"— $\frac{3}{16}$" Open End
299990-3	Wrench—Ram Spring Retainer Plug
299989-5	Wrench—Ram Spring Retainer
299991-2	Wrench—Torque—½" Drive
299989-4	Screw—Ram Cylinder Installation
367539	Compressing Tool—Ram Spring and Tube Assembly

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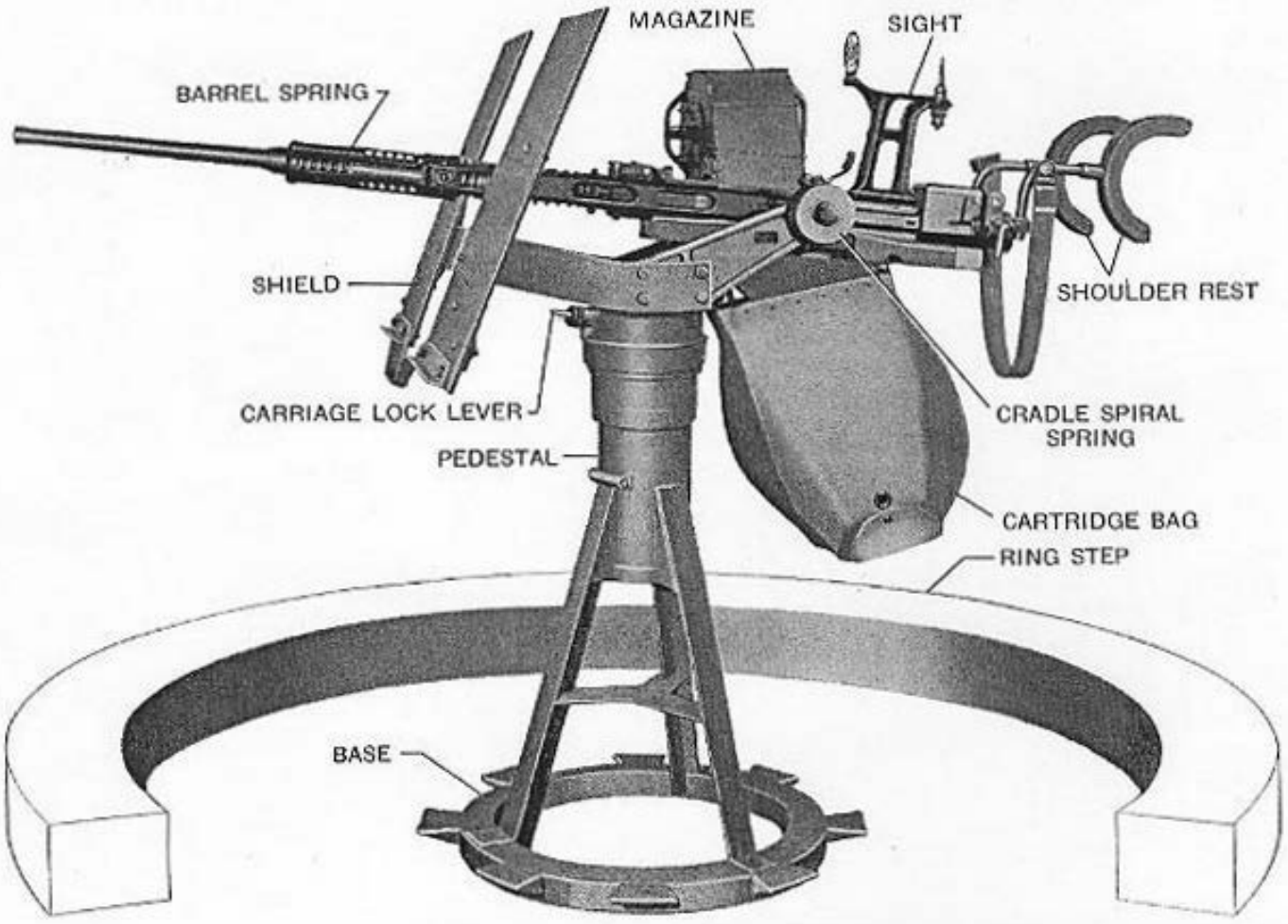


Figure 53—Exterior view showing general arrangement of the 20 mm. A.A. Gun and Mount Mark 10

Chapter 6

MARK 10 AND MARK 10 MOD. 1 GUN MOUNTS

GENERAL DESCRIPTION

These two mounts are of the Fixed Height Type similar to Mark 5 Mounts, except for the stands. The difference between Mark 10 and Mark 10 Mod. 1 Mounts is in the design of the stand and is explained in greater detail later. Mark 10 Mount is illustrated in Figure 53. Mark 7 or Mark 7 Mod. 1 stands, Mark 7 carriage and Mark 5 cradles are used on these mounts.

The gun can be elevated between 15 degrees below horizontal (depression) and 90 degrees above horizontal the same as Mark 6 Mount. The gun and its cradle can be locked in either the 5 degree or 90 degree above horizontal positions by the cradle lock built in the right side of the carriage. When the mount is installed within splinter bulwarks, carriage extension screws (299046-4) described on page 88 and illustrated in Figure 29 may be used to limit the gun's depression to 3½ degrees.

DETAILED DESCRIPTION

PEDESTAL MARK 7 AND MARK 7 MOD. 1 AND PIVOT

The two pedestals Mark 7 and Mark 7 Mod. 1 are of the tripod type but differ in manufacturing details. They are made up of a number of steel stampings or rolled shapes and plates welded together. The stand legs on Mark 7 stand are "T" shaped and are 2 inches shorter than the "U" shaped legs used on Mark 7 Mod. 1 stand. These legs are welded at one end to the stand sleeve and at the other end to the base. The base is provided with a number of foot holds for the gunner's convenience.

The pivot housing used on Mark 7 stand is 19⅛ inches long or 2 inches longer than the one used on Mark 7 Mod. 1 stand. The pivot housing is held stationary in the stand by a draw bolt fitted with a lock washer and nut. The upper end of the housing is threaded for a retainer, the same type as used on Mark 5 Mounts. The same retainer lock screw is also used. The steel cap and gasket secured to the lower end of the pivot housing have four bolt holes on the Mark 7 stand and six bolt holes on the Mark 7 Mod. 1 stand. These caps are fitted with a pipe plug. The plug should be removed when the mount is installed on a submarine.

The pivot is similar to that used on Mark 5 Mounts except that it is hollow and is lubricated with grease instead of oil. A grease fitting located in the top provides lubrication to the two babbitt faced thrust bearings used above and below the pivot flange. The thrust bearings are the same as used on Mark 5 Mounts. Circumferential grooves are provided in the upper and lower pivot radial bearings. These bearings are lubricated by two grease fittings in the stand. One is located near the upper end of the pivot housing and the other fitting is near the lower end of the stand sleeve.

CARRIAGE MARK 7

The arms extending rearward on the carriage are the same length as those on Mark 6 carriage. The base of the carriage is similar to that on Mark 5 carriage, except that the boss for the carriage lock is located slightly to the left of the centerline instead of being on the centerline as on the Mark 5 carriage.

CARRIAGE LOCK

This lock is the same as used on Mark 6 Mount and described on page 83.

CRADLE MARK 5

The cradle is the same type as used on Mark 6 Mounts. See Page 81 for description and operation.

CRADLE LOCK

The cradle lock is the same type as used on Mark 6 Mounts. See page 83 for description and operation.

GUN SECURING BOLT

This lock is the same as used on Mark 6 Mount and described on page 84.

SHIELD

When a shield is used on Mark 10 Mounts it is the Mark 4 Mod. 1 type which employs the offset type shield strap (299951-1) to allow the gun to be depressed 15 degrees.

RING STEP

A ring step 8" high and 8' 10" in outside diameter may be used with this Mount. The lowest angle of elevation attained by a gunner 5' 9" in height, using a shoulder rest and **without** the ring step, is 4½° **elevation.** With the 8" ring step, this angle is approximately 6½° **depression.** Limiting angle changes approximately 4° with 3" change in height of gunner. The ring step is part of the ship's structure and is not furnished by the Bureau of Ordnance. See Figure 53.

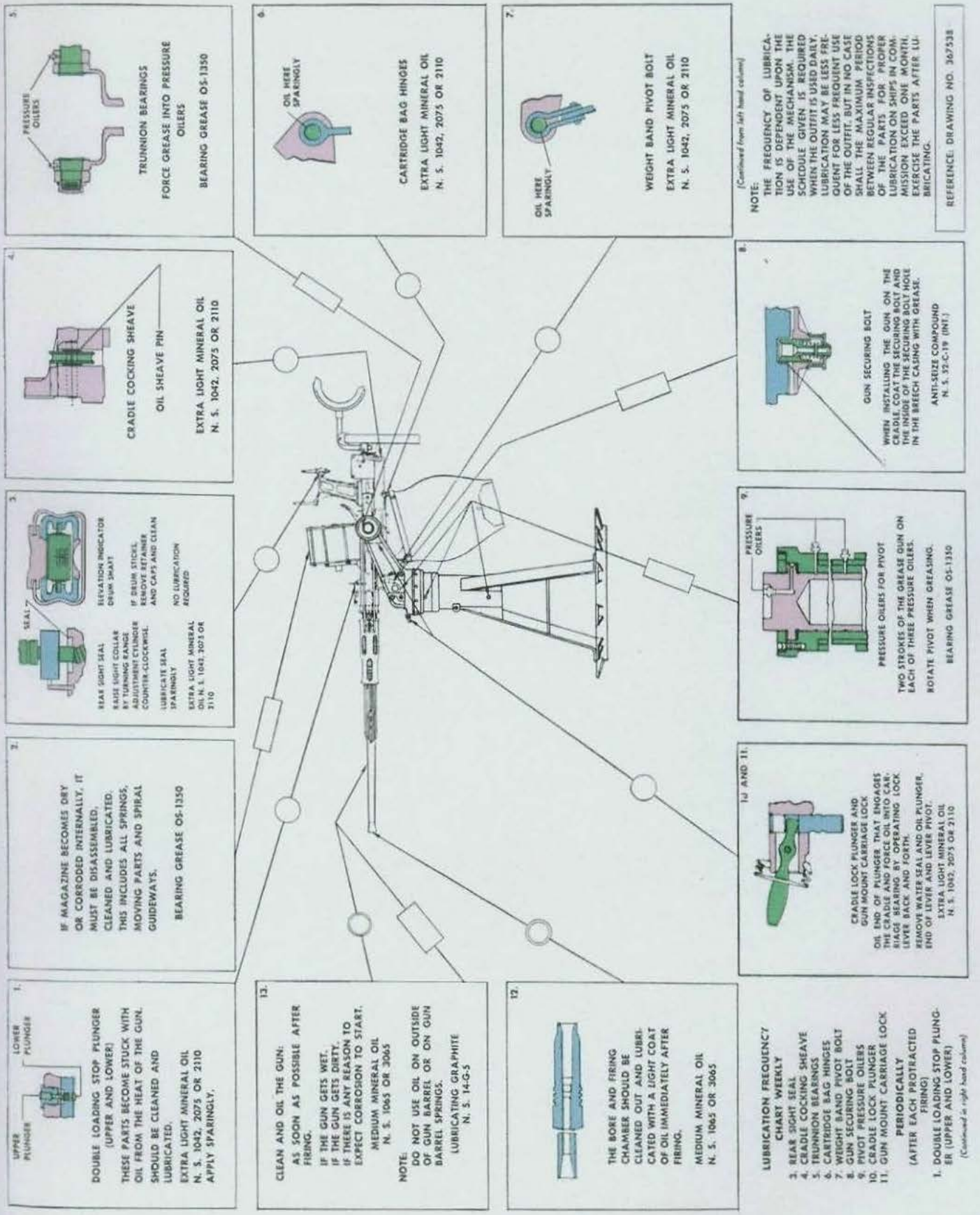


Figure 54—Lubrication Chart Mark 10 Mount—Surface Vessels

PIVOT THRUST BEARING ADJUSTMENT

The procedure of this operation is the same as that applying to the Mark 5 Mount. See page 65.

STRIPPING AND REASSEMBLY

In general the procedure outlined for the Mark 5 Mount applies. See pages 66 to 71. If necessary to remove pivot housing (365904-1) or (367544-1) from pedestal (365900-1) or (367528) remove nut (12-Z-9-245) and lock washer (12-Z-22-255) from the end of draw stud (365905-3) and withdraw the stud from the pedestal. The housing can then be lifted from the pedestal.

Before reinstalling the pivot, coat the inside of the pivot housing lightly with (OS-1350) grease.

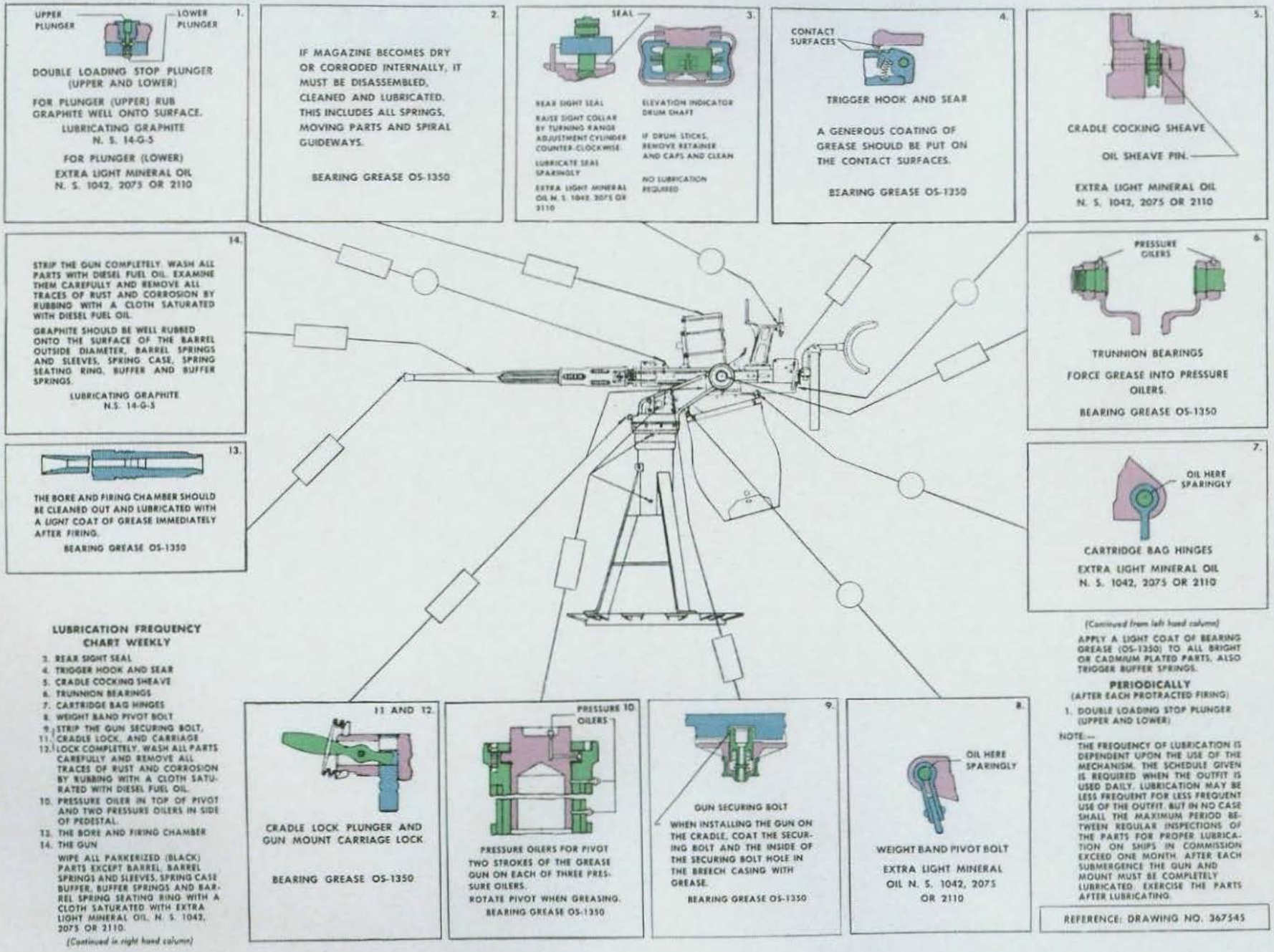
LUBRICATION

Three grease fittings are used on this type mount to lubricate the pivot. These are located as follows: One in the top of the pivot, another in the side of the pivot housing near the top and the third in the side of the stand sleeve, near the bottom.

After initial greasing, lubrication should be limited to two strokes of grease gun (OE-1637), using grease (OS-1350), for each of the three fittings. This is necessary to insure that the pivot reliefs are **not** filled with grease. An excessive amount of grease would require excessive force to train the gun in cold weather.

When mounted on surface vessels, lubricate all other parts as described on lubrication chart, Figure 54.

When mounted on a submarine, all other parts should be lubricated as described on lubrication chart, Figure 55.



LUBRICATION FREQUENCY CHART WEEKLY

3. REAR SIGHT SEAL
4. TRIGGER HOOK AND SEAR
5. CRADLE COCKING SHEAVE
6. TRUNNION BEARINGS
7. CARTRIDGE BAG HINGES
8. WEIGHT BAND PIVOT BOLT
9. STRIP THE GUN SECURING BOLT,
11. CRADLE LOCK, AND CARRIAGE
12. LOCK COMPLETELY. WASH ALL PARTS CAREFULLY AND REMOVE ALL TRACES OF RUST AND CORROSION BY RUBBING WITH A CLOTH SATURATED WITH DIESEL FUEL OIL.
10. PRESSURE OILER IN TOP OF PIVOT AND TWO PRESSURE OILERS IN SIDE OF PEDESTAL.
13. THE BORE AND FIRING CHAMBER
14. THE GUN

WIPE ALL PARKERIZED (BLACK) PARTS EXCEPT BARREL, BARREL SPRINGS AND SLEEVES, SPRING CASE BUFFER, BUFFER SPRINGS AND BARREL SPRING SEATING RING WITH A CLOTH SATURATED WITH EXTRA LIGHT MINERAL OIL, N. S. 1042, 2075 OR 2110.

(Continued in right hand column)

(Continued from left hand column)

APPLY A LIGHT COAT OF BEARING GREASE (OS-1350) TO ALL BRIGHT OR CADMIUM PLATED PARTS, ALSO TRIGGER BUFFER SPRINGS.

PERIODICALLY
(AFTER EACH PROTRACTED FIRING)

1. DOUBLE LOADING STOP PLUNGER (UPPER AND LOWER)

NOTE.—
THE FREQUENCY OF LUBRICATION IS DEPENDENT UPON THE USE OF THE MECHANISM. THE SCHEDULE GIVEN IS REQUIRED WHEN THE OUTFIT IS USED DAILY. LUBRICATION MAY BE LESS FREQUENT FOR LESS FREQUENT USE OF THE OUTFIT, BUT IN NO CASE SHALL THE MAXIMUM PERIOD BETWEEN REGULAR INSPECTIONS OF THE PARTS FOR PROPER LUBRICATION ON SHIPS IN COMMISSION EXCEED ONE MONTH. AFTER EACH SUBMERGENCE THE GUN AND MOUNT MUST BE COMPLETELY LUBRICATED. EXERCISE THE PARTS AFTER LUBRICATING.

REFERENCE: DRAWING NO. 367545

Figure 55—Lubrication Chart Mark 10 Mount—Submarines

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INSTRUCTIONS FOR ORDERING REPLACEMENT PARTS

Plates 1, 2, and 3 are for reference purposes only and should not be used directly for ordering parts. When a part has been identified on the plate, reference should be made to the OE to Bureau of Ordnance Numbers Cross Index at the back of this pamphlet for the Parts List page on which this part may be found. If no page reference is indicated, then the part is not supplied individually and the sub assembly or assembly of which it is a component should be ordered.

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PARTS LIST

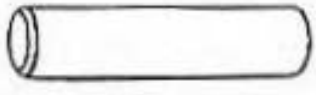
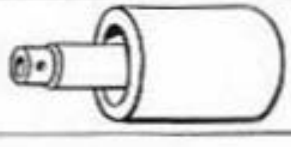
20-MM ANTIAIRCRAFT GUN MOUNT MARK 4 AND MARK 2

Part numbers of the Mark 4 parts are shown in the Mark 4 (OE.) column. Part numbers of the Mark 2 parts are shown in the Mark 2 (item) column.

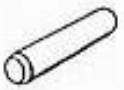
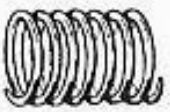
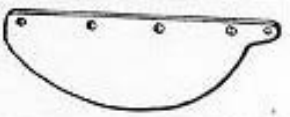
Parts that are interchangeable between Mark 4 and Mark 2 have their Mark 4 (OE.) number and Mark 2 (item) number in the same line.

Parts of an assembly have their names indented under the assembly name.

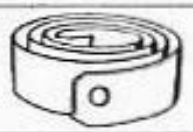
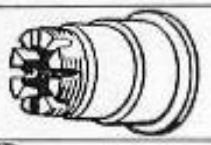
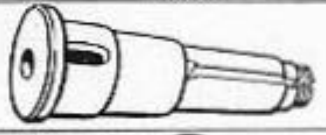
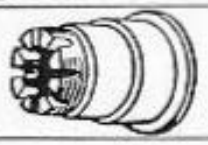
CRADLE

MK. 4 PART NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
OE-2327		1	Cradle Assembly (Mod. 2)—Consists of:	
OE-2325		1	Cradle (Mod. 2)	
299950-2		1	Cocking Sheave	
299950-3		1	Cocking Sheave Pin	
12-Z-49-63		1	Cocking Sheave Pin Taper Pin	
OE-2205	GM-188 Assy.	1	Gun Securing Bolt Assembly—Consists of:	
OE-2188		1	Gun Securing Bolt	
	GM-188	1	Gun Securing Bolt	

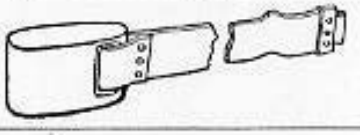
CRADLE

MK. 4 OE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2262		1	Gun Securing Bolt Locating Pin	
	GM-196	1	Gun Securing Bolt Locating Pin	
2189	GM-189	1	Gun Securing Bolt Spring	
2190	GM-190	1	Withdrawing Head	
2261	GM-198	1	Withdrawing Head Securing Pin	
2259	GM-191	1	Cradle Pressure Oiler	
2175	GM-175	1	Cheek Plate—Right	
2174	GM-174	1	Cheek Plate—Left	
2263	GM-193	8	Cheek Plate Securing Screw	
2312	GM-169 Assy.	1	Cradle Spiral Spring and Housing Assembly—Consists of:	
2157		1	Spring Housing Assembly	
2166		1	Spring Housing Bearing Bushing	

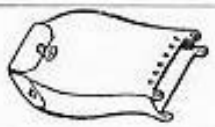
CRADLE

MK. 4 OE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2168		1	Spiral Spring Securing Bolt	
2278		1	Spring Securing Bolt Washer	
2169	GM-169	1	Cradle Spiral Spring	
2312	GM-169 Assy.	1	Cradle Spiral Spring and Housing Assembly—Consists of:	
	GM-164 Assy.	1	Spring Housing Assembly	
	GM-166	1	Spring Housing Bearing Bushing	
	GM-168	1	Spiral Spring Securing Bolt	
2169	GM-169	1	Cradle Spiral Spring	
2268		1	Spring Housing Retaining Nut Pin	
	GM-197	1	Spring Housing Retaining Nut Pin	
2161	GM-161	1	Cradle Trunnion Pin—Right	
2160		1	Cradle Trunnion Pin—Left	
	GM-160	1	Cradle Trunnion Pin—Left	

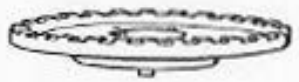
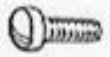
CRADLE

MK. 4 OE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2191		1	Cradle Trunnion Pin Key	
	GM-192	1	Cradle Trunnion Pin Key	
2162		1	Cradle Trunnion Pin Securing Nut	
	GM-162	1	Cradle Trunnion Pin Securing Nut	
2269		1	Cradle Trunnion Pin Securing Nut Pin	
	GM-195	1	Cradle Trunnion Pin Securing Nut Pin	
2163		1	Spring Housing Retaining Nut	
	GM-163	1	Spring Housing Retaining Nut	
2207		1	Weight and Band Assembly	
2177		1	Weight Pivot Bolt 12–28 Thread	
	GM-177	1	Weight Pivot Bolt ¼–28 Thread	
2178		1	Weight Pivot Bolt Nut 12–28 Thread	
	GM-178	1	Weight Pivot Bolt Nut ¼–28 Thread	

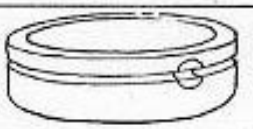
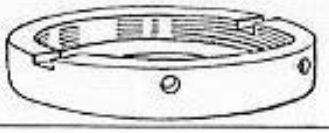
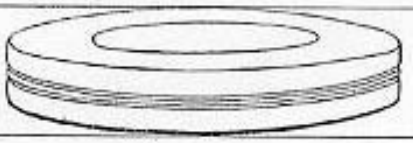
CRADLE

MK. 4 OE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2230	GM-200	1	Weight Pivot Bolt Nut Pin	
			Mark 4 and Mark 2 Complete Cartridge Bag and Frame Assemblies are Interchangeable	
2198		1	Cartridge Bag and Frame Assembly	
2172		2	Cartridge Bag Anchor Bolt ⅜–24 Thread	
2173		2	Cartridge Bag Anchor Bolt Nut ⅜–24 Thread	
2231	GM-199	2	Cartridge Bag Anchor Bolt Nut Pin	
	GM-187 Assy.	1	Cartridge Bag and Frame Assembly	
	GM-172	2	Cartridge Bag Pivot Bolt ⅜–16 Thread	
	GM-173	2	Nut for GM-172 ⅜–16 Thread	

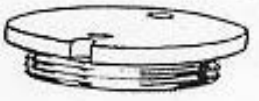
CARRIAGE

MK. 4 OE.NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2030		1	Trunnion Bracket and Pivot	
	GM-108	1	Trunnion Bracket and Pivot	
2165	GM-165	1	Spring Housing Cover	
2256	GM-139	4	Cradle Spring Housing Mounting Screw	
2095	GM-156	1	Trunnion Bracket and Pivot Needle Bearing – Lower – Consists of:	
2306		1	Needle Bearing Outer Race and Needles Assembly – Lower	
	GM-156OR	1	Needle Bearing Outer Race and Needles Assembly – Lower	
2307		1	Needle Bearing Inner Race – Lower	
	GM-156IR	1	Needle Bearing Inner Race – Lower	
2096	GM-157	1	Trunnion Bracket and Pivot Needle Bearing – Upper – Consists of:	
2308		1	Needle Bearing Outer Race and Needles Assembly – Upper	
	GM-157OR	1	Needle Bearing Outer Race and Needles Assembly – Upper	
2309		1	Needle Bearing Inner Race – Upper	

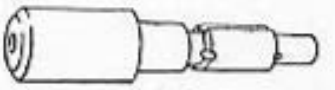
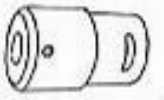
CARRIAGE

MK. 4 PART NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
	GM-1571R	1	Needle Bearing Inner Race—Upper	
OE-2036	GM114	1	Needle Bearing Upper Retaining Ring	
OE-2092	GM-144	1	Needle Bearing Upper Retaining Ring Grub Screw	
OE-2073	GM-127	1	Grub Screw Securing Spring Ring	
OE-2034	GM-112	1	Needle Bearing Lower Retaining Ring	
299923-7	GM-145	1	Needle Bearing Lower Retaining Ring Set Screw	
OE-2248	GM-150	3	Trunnion Bracket and Pivot Countersunk Screw	
OE-2259	GM-151	1	Trunnion Bracket and Pivot Bearing Pressure Oiler	
OE-2093	GM-154	1	Column Thrust Ball Bearing	

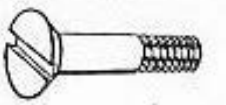
CARRIAGE

MK. 4 PART NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
OE-2032	GM-110	1	Trunnion Bracket and Pivot Coupling Nut	
OE-2069		1	Coupling Nut Securing Bolt	
	GM-123	1	Coupling Nut Securing Bolt	
OE-2277		1	Coupling Nut Securing Bolt Washer	
OE-2031	GM-131	1	Trunnion Bracket and Pivot Coupling Nut Bushing	
OE-2078	GM-132	1	Trunnion Bracket and Pivot Closing Cap	
299923-7	GM-145	1	Trunnion Bracket Closing Cap Set Screw	

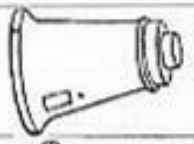
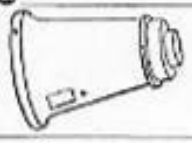
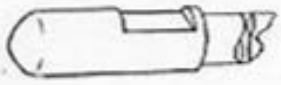
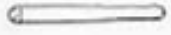
CARRIAGE

MK. 4 PART NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
OE-2009	GM-124 Assy.	1	Trunnion Bracket and Pivot Locking Bolt Assembly – Consists of:	
OE-2070	GM-124	1	Trunnion Bracket and Pivot Locking Bolt	
OE-2072	GM-126	1	Trunnion Bracket and Pivot Locking Bolt Knob	
OE-2074	GM-128	1	Trunnion Bracket and Pivot Locking Bolt Spring	
OE-2140	GM-147	1	Trunnion Bracket and Pivot Locking Bolt Knob Pin	
OE-2008	GM-125 Assy.	1	Trunnion Bracket and Pivot Locking Bolt Bushing Assembly – Consists of:	
OE-2071	GM-125	1	Spring Retaining Bushing	
OE-2141	GM-215	2	Spring Retaining Bushing Pin	
OE-2260	GM-146	1	Retaining Bushing Securing Pin	
OE-2061	GM-115	1	Trunnion Bracket and Pivot Cover	
299751-7		1	Cover Plug (1st type)	
299751-8		1	Cover Plug Gasket (1st type)	
OE-3525		1	Cover Pipe Plug (2nd type)	

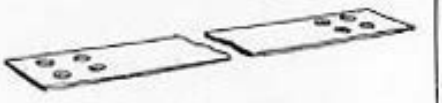
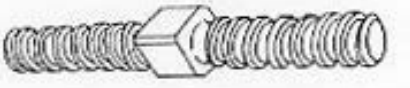
CARRIAGE

MK. 4 PART NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
OE-2249	GM-138	4	Trunnion Bracket and Pivot Cover Screws	

STAND

MK. 4 PART NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
299742-2		1	Fixed Pedestal Casing	
	GM-1	1	Fixed Pedestal Casing	
OE-2315	GM-41 Assy.	1	Pedestal Head Assembly – Consists of:	
OE-2060	GM-41	1	Pedestal Head	
OE-2055	GM-75	1	Pedestal Head Bushing	
OE-2105	GM-40	1	Locking Catch – Pedestal Head	
OE-2046	GM-62	1	Pedestal Head Lock Plunger Spring	
OE-2047	GM-71	1	Locking Catch Spring Retaining Nut	
OE-2048	GM-72	1	Locking Catch Spring Bolt	
OE-2240		2	Locking Catch Pivot Short Pin	
	GM-102	2	Locking Catch Pivot Short Pin	
OE-2049	GM-73	1	Locking Catch Pivot Pin	
OE-2241	GM-100	1	Pedestal Head Securing Pin	

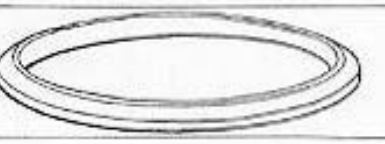
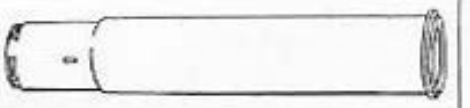
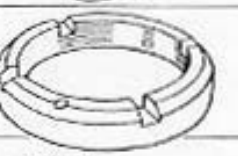
STAND

MK. 4 DE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2040		1	Clamping Band Assembly – Consists of:	
	GM-66AB	1	Clamping Band Assembly – Consists of:	
2041		2	Clamping Band End	
	GM-66A	2	Clamping Band End	
2042		1	Clamping Band	
	GM-66B	1	Clamping Band	
2043	GM-104	8	Clamping Band Lug Countersunk Rivet	
2242	GM-98	2	Clamping Band End Securing Pin	
2045	GM-68	1	Clamping Lever	
2038	GM-65	1	Screwed Bushing – R.H. Thread	
2039	GM-65A	1	Screwed Bushing – L.H. Thread	
2037	GM-64	1	Screwed Spindle	

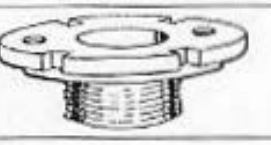
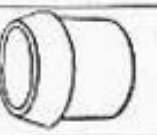
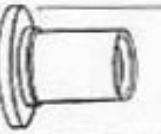
STAND

MK. 4 PART NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
OE-2013		1	Oil Reservoir	
	GM-5	1	Oil Reservoir	
OE-2014	GM-6	1	Oil Reservoir Lid	
299751-7		1	Oil Reservoir Lid Plug (1st type)	
299751-8		1	Oil Reservoir Lid Plug Gasket (1st type)	
OE-3525		1	Oil Reservoir Lid Pipe Plug (2nd type)	
OE-2250	GM-25	6	Oil Reservoir Lid Screw	
OE-2015	GM-7	6	Oil Reservoir Securing Bolt	
OE-2152	GM-29	1	Oil Reservoir Securing Bolt Locking Wire	
OE-2017	GM-8	6	Oil Reservoir Securing Bolt Washer	

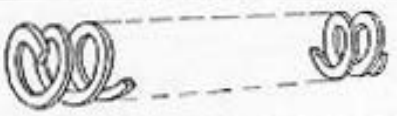
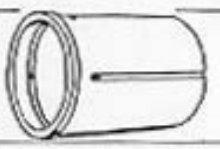
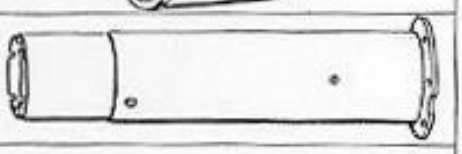
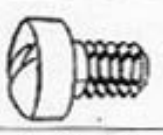
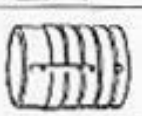
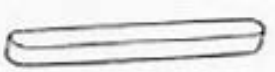
STAND

MK. 4 OE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2155	GM-30	1	Oil Reservoir Cover Packing Ring	
2079		1	Column	
	GM-109	1	Column	See OE-2079
2088	GM-47 Assy.	1	Column Raising Spindle Assembly – Consists of:	
2080		1	Column Raising Spindle	
	GM-47	1	Column Raising Spindle	See OE-2080
2114	GM-48	1	Column Raising Spindle Stop Ring – Upper	
2116	GM-49	1	Column Raising Spindle Needle Bearing Retaining Ring	
2236	GM-93	1	Column Raising Spindle Needle Bearing Ring Set Screw	
2238		2	Upper Bearing Bushing and Upper Stop Ring Key	
	GM-88	2	Upper Bearing Bushing and Upper Stop Ring Key	See OE-2238
2056	GM-76	1	Upper Stop Ring Needle Bearing	
2126	GM-63	1	Column Raising Spindle Retaining Ring	

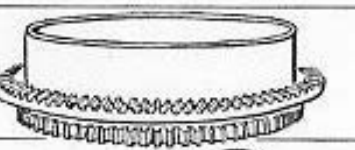
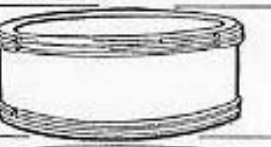
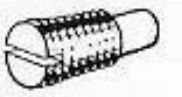
STAND

MK. 4 OE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2001	OE-2001	1	Equalizing Springs and Tube Assembly – Consists of:	
2002	OE-2002	1	Outer and Inner Tube Assembly – Consists of:	
2244	GM-143	1	Tension Tube Retaining Pin	
2082	GM-134	1	Tension Tube	
2081	GM-133	1	Screwed Plug	
2006	GM-117 Assy.	1	Equalizing Spring Outer Guide Tube Assembly – Consists of:	
2065	GM-119	1	Lower Spring Housing Bushing	
2063	GM-117	1	Equalizing Spring Outer Guide Tube	
2083	GM-135	1	Bearing Bushing	
2007	GM-118 Assy.	1	Equalizing Spring Inner Guide Tube Assembly – Consists of:	
2066	GM-120	1	Centering Ring	
2064	GM-118	1	Equalizing Spring Inner Guide Tube	
2068	GM-122	1	Upper Spring Housing Bushing	

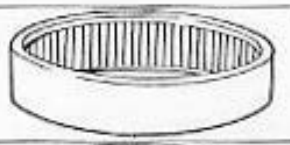
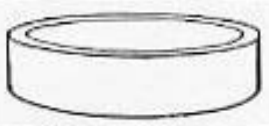
STAND

MK. 4 OE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2067	GM-121	1	Spacing Ring	
2062	OE-2062	2	Equalizing Spring	
2097	GM-158	1	Spring Thrust Ball Bearing – Upper	
2005	GM-3 Assy.	1	Column Bushing Assembly – Consists of:	
2012	GM-4	1	Bearing Bushing – Upper	
2016	GM-3	1	Column Guide Bushing	
2089	GM-137 Assy.	1	Lower Bearing Bushing and Guiding Key Assembly – Consists of:	
2085	GM-137	1	Guiding Key	
2247	GM-148	2	Guiding Key Securing Screw	
2033	GM-111	1	Column Lower Bearing Bushing	
2112	GM-46	1	Column Raising Spindle Spur Wheel	
2134	GM-82	1	Column Raising Spindle Ball Bearing	
2090	GM-142	1	Column Lower Bushing Securing Key	

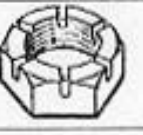
STAND

MK. 4 PART NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
OE-2107	GM-42	1	Bevel and Spur Wheel Gear	
OE-2239	GM-87	2	Spur Wheel and Column Raising Spindle Key	
OE-2057	GM-103	1	Bevel and Spur Wheel Gear Bushing	
OE-2054	GM-74	1	Bevel and Spur Gear Ball Thrust Bearing	
OE-2254	GM-23	4	Guide Bush Securing Bolt	
OE-2271	GM-27	4	Guide Bush Securing Bolt Washer	
OE-2129	GM-77	1	Lower Spring Housing Bushing	
OE-2251	GM-107	1	Lower Spring Housing Bushing Lock Screw	
OE-2106	GM-92	1	Lower Spring Housing Bushing Base	
OE-2094	GM-155	1	Spring Thrust Ball Bearing – Lower	
OE-2035	GM-113	1	Lower Bearing Bushing Retaining Ring	
299923-7	GM-145	1	Lower Bearing Bushing Retaining Ring Set Screw	
OE-2095	GM-156	1	Trunnion Bracket and Pivot Needle Bearing – Lower – Consists of:	

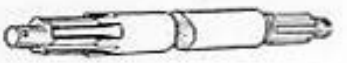
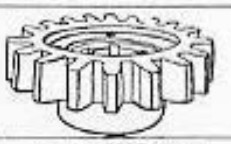
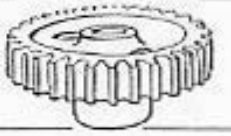
STAND

MK. 4 DE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2307		1	Needle Bearing Inner Race – Lower	
	GM-156IR	1	Needle Bearing Inner Race – Lower	
2306		1	Needle Bearing Outer Race and Needles Assembly – Lower	
	GM-156OR	1	Needle Bearing Outer Race and Needles Assembly – Lower	
2076	GM-130	1	Spring Ring Retaining Needle Bearing – Lower	
2096	GM-157	1	Trunnion Bracket and Pivot Needle Bearing – Upper – Consists of:	
2309		1	Needle Bearing Inner Race – Upper	
	GM-157IR	1	Needle Bearing Inner Race – Upper	
2308		1	Needle Bearing Outer Race and Needles Assembly – Upper	
	GM-157OR	1	Needle Bearing Outer Race and Needles Assembly – Upper	
2075	GM-129	1	Spring Ring Retaining Needle Bearing – Upper	
2084	GM-136	1	Spring Retaining Ring	
2099	GM-85	1	Vertical Shaft Needle Bearing Assembly – Consists of:	

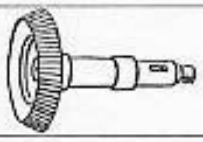
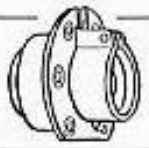
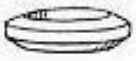
STAND

MK. 4 PART NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
OE-2304		1	Vertical Shaft Needle Bearing Outer Race and Needle Assembly	
*	GM-85OR	1	Vertical Shaft Needle Bearing Outer Race and Needle Assembly	
OE-2305		1	Vertical Shaft Needle Bearing Inner Race	
	GM-85IR	1	Vertical Shaft Needle Bearing Inner Race	
OE-2100	GM-51 Assy.	1	Vertical Shaft Ball Bearing Housing Assembly – Consists of:	
OE-2098	GM-84	1	Vertical Shaft Ball Bearing	
OE-2117	GM-51	1	Vertical Shaft Ball Bearing Housing Bushing	
OE-2118	GM-52	1	Vertical Shaft Ball Bearing Retaining Ring	
299923-7	GM-93	1	Vertical Shaft Ball Bearing Retainer Set Screw	
OE-2091	GM-50 Assy	1	Vertical Shaft Assembly – Consists of:	
OE-2232	GM-101	1	Vertical Shaft Upper Gear Nut Pin	
OE-2120	GM-54	1	Spur Wheel Upper Securing Nut	
OE-2234		1	Spur Wheel Retainer Nut Washer – Upper	

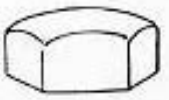
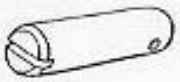
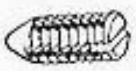
STAND

MK. 4 PART NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
OE-2115	GM-50	1	Vertical Shaft	
OE-2121	GM-55	1	Vertical Shaft Upper Bearing Distance Piece	
OE-2109	GM-44	1	Vertical Shaft Spur Wheel – Upper	
OE-2111	GM-45	1	Vertical Shaft Spur Wheel – Lower	
OE-2257	GM-24	4	Vertical Shaft Ball Bearing Housing Bushing Bolt	
OE-2270	GM-28	4	Bushing Bolt Lock Washer	
OE-2119	GM-53	1	Spur Wheel Lower Securing Nut	
OE-2235	GM-95	1	Spur Wheel Retainer Nut Washer – Lower	
OE-2232	GM-105	1	Vertical Shaft Lower Bearing Nut Pin	
OE-2101	GM-221 Assy.	1	Handwheel Drive Assembly – Consists of:	
OE-2102	GM-38	1	Handwheel Assembly – Consists of:	
OE-2104	GM-220	1	Handwheel	
299773	GM-69 Assy.	1	Handwheel Handle Grip and Spindle Assembly – Consists of:	

STAND

MK. 4 PART NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
OE-2127	GM-69	1	Hand Spindle Handle Grip	
OE-2243		1	Handwheel Handle Grip Pin	
	GM-232	1	Handwheel Handle Grip Pin	
OE-2128	GM-70	1	Hand Spindle	
OE-2108	GM-222	1	Handwheel Spindle and Bevel Pinion	
OE-2103	GM-221	1	Handwheel Drive Housing Assembly – Consists of:	
OE-2110		1	Handwheel Drive Housing	
OE-2139		1	Handwheel Housing Spring Seat or	
OE-2302		1	Handwheel Housing Spring Seat – Option	
	GM-106	1	Packing Ring for GM-221	
OE-2135	GM-240	1	Handwheel Drive Housing Shim	
299759-5		1	Handwheel Housing Pipe Plug	
OE-2258	GM-88	1	Handwheel Key	

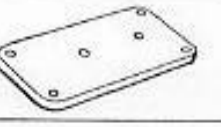
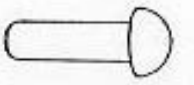
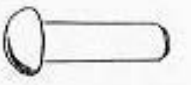
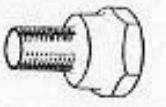
STAND

MK. 4 OE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2125	GM-224	1	Handwheel Securing Nut	
2274	GM-238	1	Handwheel Securing Nut Washer	
2123	GM-223	1	Distance Liner – Inner	
2050	GM-60	1	Locking Catch – Handwheel	
2051	GM-61	1	Locking Catch Spring Bolt – Handwheel	
2053	GM-79	1	Locking Catch Plunger Spring – Handwheel	
2140		1	Locking Catch Spring Bolt Pin – Handwheel	
	GM-102	1	Locking Catch Spring Bolt Pin – Handwheel	See OE-2140
2246	GM-96	1	Locking Catch Shaft Screw – Handwheel Housing	
2245	GM-229	1	Locking Catch Pivot Pin – Handwheel Housing	
2142	GM-86	2	Handwheel Bevel Pinion Ball Bearing	
2136	GM-234	1	Handwheel Bevel Pinion Ball Bearing Retainer	
2137	GM-235	2	Handwheel Bevel Pinion Ball Bearing Retainer Screw	

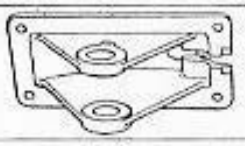
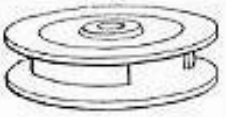
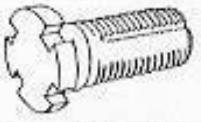
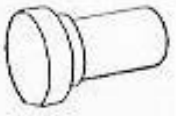
STAND

MK. 4 OE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2253	GM-90	6	Handwheel Bearing Housing Bolt	
2270	GM-91	6	Handwheel Bearing Housing Bolt Washer	
2011		1	Bottom Cover and Housing	
	GM-2	1	Bottom Cover and Housing	See OE-2011
2255	GM-22	8	Bottom Cover Securing Screw	
2273	GM-26	8	Bottom Cover Securing Screw Washer	
2294	GM-243	As Req'd	Bottom Cover Thrust Bearing Shim (.002)	
2295	GM-244	As Req'd	Bottom Cover Thrust Bearing Shim (.005)	
2296	GM-245	As Req'd	Bottom Cover Thrust Bearing Shim (.010)	
2283	GM-212	1	Bottom Cover and Housing Plug	
2077	GM-83	1	Bottom Cover Ball Thrust Bearing	
2029		1	Cocking Rope	
2149		1	Cocking Rope Bracket Assembly – Consists of:	

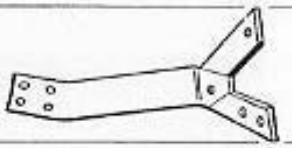
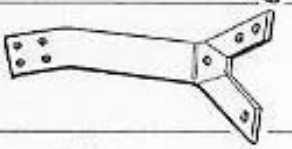
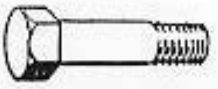
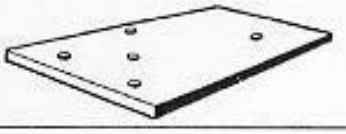
STAND

MK. 4 PART NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
OE-2146		1	Cocking Rope Bracket	
OE-2147		1	Cocking Rope Bracket Base (1st type)	
OE-2148		2	Cocking Rope Bracket Rivet	
300016		1	Cocking Rope Bracket Assembly—Consists of:	
OE-2146		1	Cocking Rope Bracket	
300016-1		1	Cocking Rope Bracket Base (2nd type)	
300016-2		1	Cocking Rope Bracket Rivet	
OE-2257		4	Cocking Rope Bracket Base Screw	
OE-2270		4	Cocking Rope Bracket Base Screw Lockwasher	
OE-2297		1	Cocking Rope Snap	
OE-2298		1	Cocking Rope Snap Anchor Stud	
OE-2284		1	Cocking Rope Anchor Stud Lockwasher	

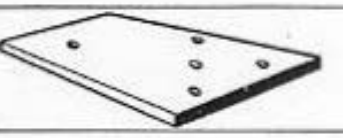
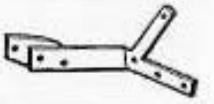
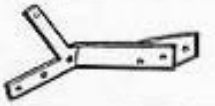
STAND

MK. 4 OE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
	GM-37	1	Cocking Cable Assembly	
	GM-11	1	Cocking Cable Reel Supporting Cover	
	GM-12	1	Cocking Cable Reel Pulley	
	GM-13	1	Cocking Cable Reel Pulley Cover	
	GM-14	1	Cocking Cable Reel Pulley Pivot Pin	
	GM-15	1	Cocking Cable Reel Spiral Spring	
	GM-20	1	Cocking Cable Reel Spiral Spring Rivet	
	GM-21	1	Washer	
2285		6	Pedestal Hold Down Bolt	
2286		12	Pedestal Hold Down Bolt Nut	
2287		6	Pedestal Hold Down Bolt Washer	

SHIELD

MK. 4 OE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
			The following parts are NOT usable in Mark 2:	
2220		1	Shield Bracket Assembly–Right	
2221		1	Shield Bracket Assembly–Left	
2218		8	Shield Bracket Bolt	
2217		8	Shield Bracket Bolt Nut	
2275		8	Shield Bracket Bolt Nut Lockwasher	
2226		1	Shield Strap	
2227		4	Shield Strap to Shield Bolt	
2229		4	Shield Strap to Shield Bolt Nut	
2228		8	Shield Bracket to Shield Bolt	
2229		8	Shield Bracket to Shield Bolt Nut	
2219		2	Shield Plate–or	
2289		1	Shield Plate–Right	

SHIELD

MK. 4 OE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2290		1	Shield Plate–Left	
			The following parts are usable ONLY in Mark 2:	
	SH-1-2 RH	1	Shield Bracket and Pad Assembly–Right	
	SH-1-2 LH	1	Shield Bracket and Pad Assembly–Left	
	SH-5	2	Bolt ⅝ x 1	
	SH-6	4	Bolt ⅝ x 2	
	SH-7	6	Nut ⅝	
	SH-8	6	Washer ⅝	
	SH-3	1	Shield Strap	
	SH-4	2	Shield	
	SH-9	8	Bolt ½ x 1⅝	
	SH-10	4	Bolt ½ x 1⅜	
	SH-11	12	Nut ½	

NOTES

PARTS LIST

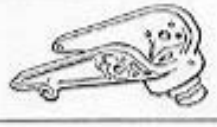
20-MM ANTIAIRCRAFT GUN MOUNT MARK 4 MOD. 3

All parts listed in this group with the exception of those marked by an asterisk (*) are new and are used only on Mark 4 Mod. 3 mounts.

All other parts used on this mount are listed in the Mark 4 Mod. 2 mount parts list on pages 135 to 161.

Parts of the Cradle group are listed in the Mark 6 mount parts list on pages 179 to 181.

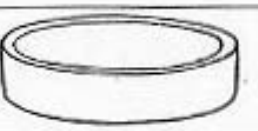
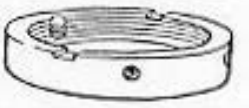
CARRIAGE

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
367566	1	Trunnion Bracket and Pivot Assembly—Consists of:	
367558-1	1	Trunnion Bracket and Pivot	
367557-8	3	Trunnion Bracket and Pivot Screws (Bearing race knockout holes)	
OE-2165*	1	Cradle Spring Housing Cover	
OE-2256*	4	Cover Mounting Screws	
OE-2259*	3	Pressure Oilers	
OE-3525*	2	Oil Hole Pipe Plug	

CARRIAGE

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
OE-3512*	1	Cradle Lock Lever	
OE-3513*	1	Cradle Lock Lever Pivot Pin	
OE-3518*	1	Cradle Lock Lever Spacer	
OE-3519*	1	Cradle Lock Lever (Water) Seal	
OE-3514*	1	Cradle Lock Plunger Hole Plug	
299943-5*	1	Cradle Lock Plunger	
OE-3511*	1	5/16" Dia. Ball	
OE-3516*	1	Cradle Lock Ball Spring	
OE-3517*	1	Cradle Lock Spring and Ball Retainer Screw	
OE-2309*	1	Needle Bearing Inner Race–Upper	
OE-2036*	1	Needle Bearing Upper Retaining Ring	
OE-2092*	1	Needle Bearing Retaining Ring Grub Screw	
OE-2073*	1	Grub Screw Securing Spring Ring	

CARRIAGE

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
OE-2307*	1	Needle Bearing Inner Race–Lower	
OE-2034*	1	Needle Bearing Lower Retaining Ring	
299923-7*	1	Retaining Ring Set Screw	
299946-5*	1	Trunnion Bracket and Pivot Hole Cover	
299946-6*	1	Cover Gasket	
299771-2*	2	Cover Screw	
12-Z-22-252*	2	Cover Screw Lockwasher	

STAND

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
299742-2	1	Pedestal Casing	
12-Z-307-7	1	Pedestal Casing Pipe Plug 1"	
OE-2283	1	Pedestal Casing Base Flange Pipe Plug ⅜"	
367564-1	1	Column Lower Bearing Drain Tube	
367564-2	1	Drain Tube Bushing	
367564-3	1	Drain Tube Bushing Gasket	
OE-2283	1	Drain Tube Bushing Pipe Plug	
300016	1	Cocking Rope Bracket Assembly–Consists of:	
300016-1	1	Bracket Base	
300016-2	1	Bracket Rivet	
OE-2146*	1	Bracket	
OE-2315	1	Pedestal Head Assembly–Consists of:	
299744-2	1	Pedestal Head	

STAND

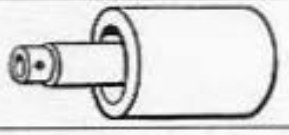
PART NUMBER	NO. PCS.	COMPONENT	SKETCH
299746-3	1	Oil Trough	
12-Z-36 73	2	Oil Trough Screws	
		(Balance of parts are same as included in Pedestal Head Assembly (OE-2315) listed on page 145).	
367556-3	1	Pedestal Head Cover Assembly—Consists of:	
367556-1	1	Pedestal Head Cover	
367556-2	1	Seal	
OE-3525	2	Oil Hole Plug	
12-Z-51-323	6	Pedestal Head Cover Screw	
12-Z-22-288	6	Cover Screw Lockwasher	
12-Z-326-56	1	Column Lower Bearing Bushing Street Ell	
299759-5	1	Handwheel Housing Pipe Plug	

NOTES

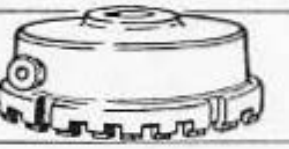
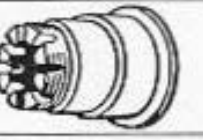
PARTS LIST

20-MM ANTIAIRCRAFT GUN MOUNT MARK 5

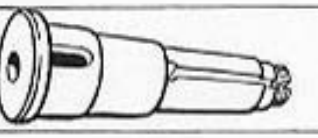
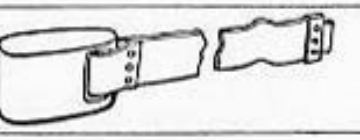
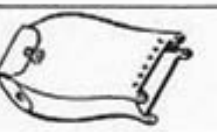
CRADLE

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
OE-2327	1	Cradle Assembly (Mod. 2)—Consists of:	
OE-2325	1	Cradle (Mod. 2)	
299950-2	1	Cocking Sheave	
299950-3	1	Cocking Sheave Pin	
12-Z-49-63	1	Cocking Sheave Pin Taper Pin	
OE-2205	1	Gun Securing Bolt Assembly—Consists of:	
OE-2188	1	Gun Securing Bolt	
OE-2262	1	Gun Securing Bolt Locating Pin	
OE-2189	1	Gun Securing Bolt Spring	
OE-2190	1	Withdrawing Head	

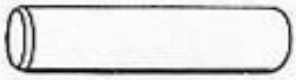
CRADLE

OE. NUMBER	NO. PCS.	COMPONENT	SKETCH
2261	1	Withdrawing Head Securing Pin	
2259	1	Cradle Pressure Oiler	
2175	1	Cheek Plate–Right	
2174	1	Cheek Plate–Left	
2263	8	Cheek Plate Securing Screw	
2312	1	Cradle Spiral Spring and Housing Assembly–Consists of:	
2157	1	Spring Housing Assembly	
2166	1	Spring Housing Bearing Bushing	
2168	1	Spiral Spring Securing Bolt	
2278	1	Spring Securing Bolt Washer	
2169	1	Cradle Spiral Spring	
2268	1	Spring Housing Retaining Nut Pin	
2161	1	Cradle Trunnion Pin–Right	

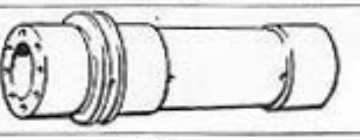
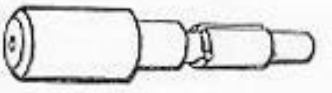
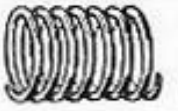
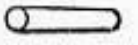
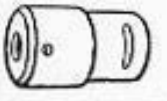
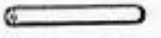
CRADLE

OE. NUMBER	NO. PCS.	COMPONENT	SKETCH
2160	1	Cradle Trunnion Pin–Left	
2191	1	Cradle Trunnion Pin Key	
2162	1	Cradle Trunnion Pin Securing Nut	
2269	1	Cradle Trunnion Pin Securing Nut Pin	
2163	1	Spring Housing Retaining Nut	
2207	1	Weight and Band Assembly	
2177	1	Weight Pivot Bolt	
2178	1	Weight Pivot Bolt Nut	
2230	1	Weight Pivot Bolt Nut Pin	
2198	1	Cartridge Bag and Frame Assembly	
2172	2	Cartridge Bag Anchor Bolt	
2173	2	Cartridge Bag Anchor Bolt Nut	
2231	2	Cartridge Bag Anchor Bolt Nut Pin	

CARRIAGE

OE. NUMBER	NO. PCS.	COMPONENT	SKETCH
3508	1	Carriage Assembly–Consists of:	
3520	1	Carriage	
3512	1	Carriage Lock Lever	
3513	1	Carriage Lock Lever Pivot Pin	
3518	2	Carriage Lock Lever Spacer	
3519	1	Carriage Lock Lever (Water) Seal	
3514	1	Carriage Lock Cover Plug	
3515	1	Carriage Lock Plunger	
3511	1	5/16 Dia. Ball	
3516	1	Carriage Lock Ball Spring	
3517	1	Carriage Lock Spring and Ball Retainer Screw	
3522	1	Carriage Packing	
3523	1	Carriage Packing Retainer	

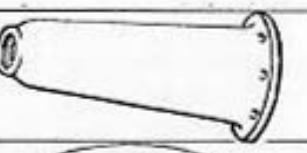
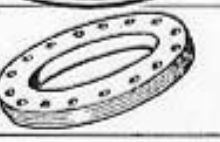
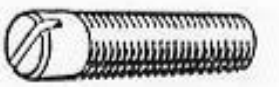
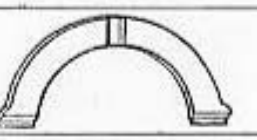
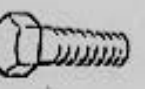
CARRIAGE

OE. NUMBER	NO. PCS.	COMPONENT	SKETCH
3524	4	Metal Drive Screw	
3521	8	Carriage to Pivot Screw	
3526	1	Pivot Retainer Lock Screw Cover Plug	
3503	1	Pivot	
3525	1	Headless Pipe Plug	
2009	1	Trunnion Bracket and Pivot Locking Bolt Assembly–Consists of:	
2070	1	Trunnion Bracket and Pivot Locking Bolt	
2072	1	Trunnion Bracket and Pivot Locking Bolt Knob	
2074	1	Trunnion Bracket and Pivot Locking Bolt Spring	
2140	1	Trunnion Bracket and Pivot Locking Bolt Knob Pin	
2008	1	Trunnion Bracket and Pivot Locking Bolt Bushing Assembly–Consists of:	
2071	1	Spring Retaining Bushing	
2141	2	Spring Retaining Bushing Pin	

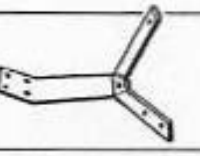
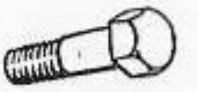
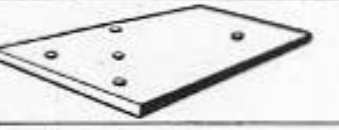
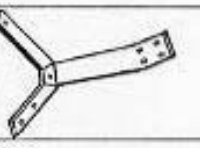
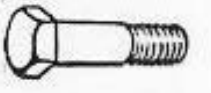
CARRIAGE

OE. NUMBER	NO. PCS.	COMPONENT	SKETCH
2165	1	Spring Housing Cover	
2256	4	Cradle Spring Housing Screw	
2259	1	Trunnion Bracket and Pivot Bearing Pressure Oiler	
2260	1	Retaining Bushing Securing Pin	

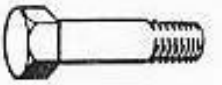
STAND

OE. NUMBER	NO. PCS.	COMPONENT	SKETCH
3510	1	Pedestal Assembly–Consists of:	
3501	1	Pedestal Casing	
3502	1	Four Inch Countersunk Headless Pipe Plug	
3504	1	Pivot Retainer	
3505	1	Pivot Retainer Lock Screw	
3506	4	Pivot Thrust-Bearing Half	
2146	1	Cocking Rope Bracket	
2257	2	Cocking Rope Bracket Base Screw	
2270	2	Cocking Rope Bracket Base Screw Lock Washer	
2297	1	Cocking Rope Snap	
2298	1	Cocking Rope Snap Anchor Stud	
2284	1	Cocking Rope Snap Anchor Stud Lock Washer	

SHIELD

OE. NUMBER	NO. PCS.	COMPONENT	SKETCH
2316	1	Shield Assembly–Right–Consists of:	
2220	1	Shield Bracket Assembly–Right	
2228	4	Shield Bracket to Shield Bolt	
2229	4	Shield Bracket to Shield Bolt Nut	
2219	1	Shield Plate–or	
2289	1	Shield Plate–Right	
2317	1	Shield Assembly–Left–Consists of:	
2221	1	Shield Bracket Assembly–Left	
2228	4	Shield Bracket to Shield Bolt	
2229	4	Shield Bracket to Shield Bolt Nut	
2219	1	Shield Plate–or	
2290	1	Shield Plate–Left	
3535	8	Shield Bracket Bolt	

SHIELD

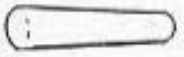
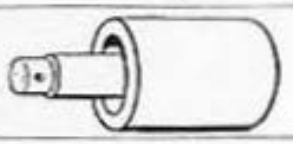
OE. NUMBER	NO. PCS.	COMPONENT	SKETCH
2217	8	Shield Bracket Bolt Nut	
2275	8	Shield Bracket Bolt Nut Lockwasher	
2227	4	Shield Strap to Shield Bolt	
2229	4	Shield Strap to Shield Bolt Nut	
2226	1	Shield Strap	

NOTES

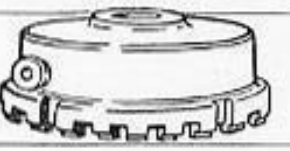
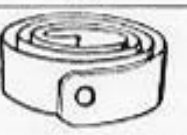
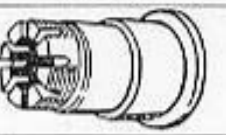
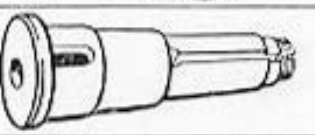
PARTS LIST

20-MM ANTIAIRCRAFT GUN MOUNT MARK 6

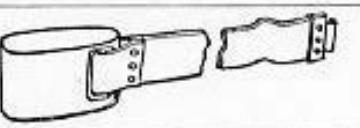
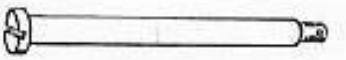
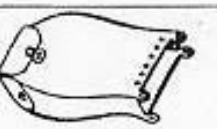
CRADLE

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
299947	1	Cradle Assembly–Consists of:	
299948-1	1	Cradle	
299950-2	1	Cocking Sheave	
299950-3	1	Cocking Sheave Pin	
12-Z-49-63	1	Cocking Sheave Pin Taper Pin	
OE-2205	1	Gun Securing Bolt Assembly–Consists of:	
OE-2188	1	Gun Securing Bolt	
OE-2262	1	Gun Securing Bolt Locating Pin	
OE-2189	1	Gun Securing Bolt Spring	
OE-2190	1	Withdrawing Head	

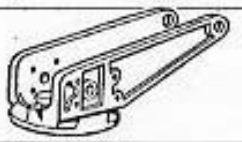
CRADLE

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
OE-2261	1	Withdrawing Head Securing Pin	
OE-2259	1	Cradle Pressure Oiler	
299947-1	1	Cheek Plate–Right	
299947-2	1	Cheek Plate–Left	
OE-2263	8	Cheek Plate Securing Screw	
OE-2312	1	Cradle Spiral Spring and Housing Assembly–Consists of:	
OE-2157	1	Spring Housing Assembly	
OE-2166	1	Spring Housing Bearing Bushing	
OE-2168	1	Spiral Spring Securing Bolt	
OE-2278	1	Spring Securing Bolt Washer	
OE-2169	1	Cradle Spiral Spring	
OE-2161	1	Cradle Trunnion Pin–Right	
OE-2160	1	Cradle Trunnion Pin–Left	

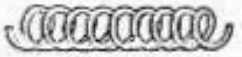
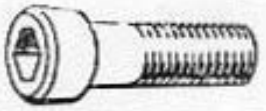
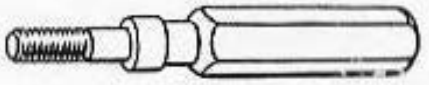
CRADLE

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
OE-2191	1	Cradle Trunnion Pin Key	
OE-2162	1	Cradle Trunnion Pin Securing Nut	
OE-2269	1	Cradle Trunnion Pin Securing Nut Pin	
OE-2163	1	Spring Housing Retaining Nut	
OE-2268	1	Spring Housing Retaining Nut Pin	
OE-2207	1	Weight and Band Assembly	
OE-2177	1	Weight Pivot Bolt	
OE-2178	1	Weight Pivot Bolt Nut	
OE-2230	1	Weight Pivot Bolt Nut Pin	
OE-2198	1	Cartridge Bag and Frame Assembly	
OE-2172	2	Cartridge Bag Anchor Bolt	
OE-2173	2	Cartridge Bag Anchor Bolt Nut	
OE-2231	2	Cartridge Bag Anchor Bolt Nut Pin	

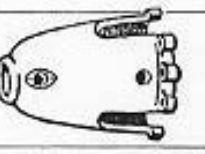
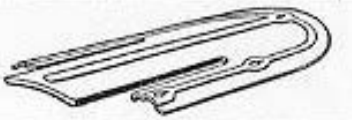
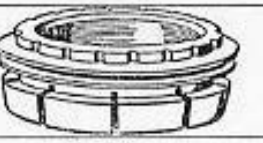
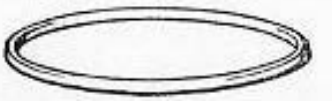
CARRIAGE

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
299943	1	Carriage Assembly–Consists of:	
299944-1	1	Carriage	
299943-1	1	Carriage Lock Plunger	
299943-2	1	Carriage Lock Plunger Spring	
299943-3	1	Carriage Lock Cover	
299943-4	1	Carriage Lock Cover Retainer	
OE-2165	1	Spring Housing Cover	
OE-2256	4	Cradle Spring Housing Screw	
OE-2259	1	Trunnion Bracket and Pivot Bearing Pressure Oiler	
OE-3512	1	Cradle Lock Lever	
OE-3513	1	Cradle Lock Lever Pivot Pin	
OE-3518	2	Cradle Lock Lever Spacer	
OE-3519	1	Cradle Lock Lever (Water) Seal	

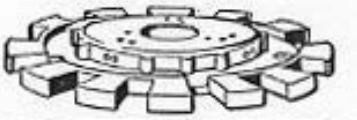
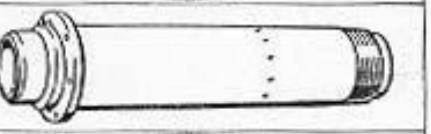
CARRIAGE

PART NUMBER	NO. PCS	COMPONENT	SKETCH
OE-3514	1	Cradle Lock Plunger Hole Plug	
299943-5	1	Cradle Lock Plunger	
OE-3511	1	5/16 Dia. Ball	
OE-3516	1	Carriage Lock Ball Spring	
OE-3517*	1	Cradle Lock Spring and Ball Retainer Screw	
299946-1	8	Carriage to Ram Screw	
299946-2	1	Ram Cover (1st Type)	
299946-4	2	Extension Screw	
299946-5	1	Ram Cover (2nd Type)	
299946-6	1	Ram Cover Gasket	
299771-2	2	Screw	
12-Z-22-252	2	Lock Washer	

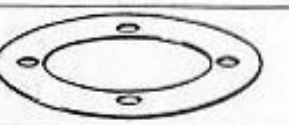
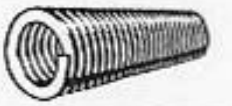
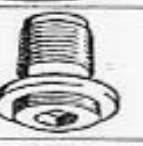
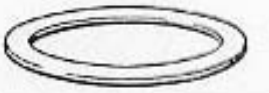
STAND

PART NUMBER	NO. PCS	COMPONENT	SKETCH
299914	1	Pedestal Assembly—Consists of:	
299913-1	1	Pedestal Casing	
299916-1	3	Pedal Opening Cover	
12-Z-41-253	15	Round Head Screw	
299915-2	4	Casing Hole Cover	
12-Z-41-253	8	Round Head Screw	
299915-6	1	Gun Cocking Cable Anchor (To Casing)	
12-Z-9-244	1	Nut	
299915-4	9	Pedestal Casing to Base Bolt	
12-Z-22-257	9	Lock Washer	
299925-1	1	Ram Cylinder Sleeve	
299925-2	4	Ram Cylinder Sleeve Set Screw	
299925-3	1	Ram Cylinder Packing	

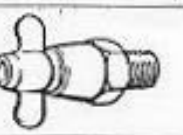
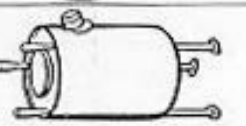
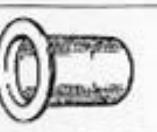
STAND

PART NUMBER	NO. PCS	COMPONENT	SKETCH
299912	1	Base Assembly—Consists of:	
299917-1	1	Base	
12-Z-329-94	6	Headless Pipe Plug 1" Countersunk	
299924-1	1	Ram Cylinder	
299923-5	1	Ram Cylinder Gasket	
299923-6	1	Ram Oil Seal	
299923-7	1	Ram Cylinder Oil Well Plug	
12-Z-46-263	6	Ram Cylinder to Base Screw	
12-Z-22-254	6	Lock Washer	
299926-1	1	Ram	
299926-2	1	Ram Piston	
299927-1	1	Ram Piston Cup Retainer	
299927-2	1	Ram Piston Cup	

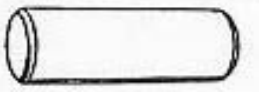
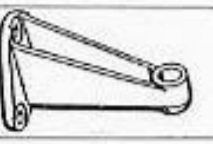
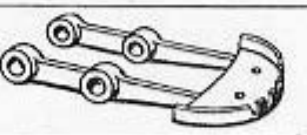
STAND

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
299927-3	1	Ram Piston Gasket	
299927-4	4	Ram Piston Screw	
299928	1	Ram Spring and Tube Assembly – Consists of:	
299927	1	Ram Spring Tube Assembly	
299929-1	5	Ram Spring	
299929-5	1	Ram Spring Retainer	
299929-6	4	Ram Spring Spacer Washer	
299930-1	1	Ram Spring Retainer Plug	
12-Z-317-47	1	Ram Spring Thrust Bearing	
299930-2	1	Ram Spring Retainer Plug Gasket	
299930-3	1	Ram Spring Retainer Gasket	
299930	1	Ram Air Vent Valve Assembly– Consists of:	
299930-4	1	Ram Air Vent Valve	

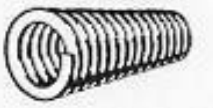
STAND

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
12-Z-8-270	1	Round Head Slotted Screw	
OE-1293	1	Lock Washer	
299942-2	1	Base Air Vent Valve	
299942-3	1	Base Air Vent Pipe	
299942-4	1	Base Air Vent Elbow	
299931	1	Oil Tank Assembly	
299933-4	3	Oil Tank Outlet Pipe Gasket	
299935	3	Oil Tank Vent Cap Assembly	
299936-3	1	Oil Tank Strainer Retainer	
299936-4	1	Oil Tank Filler Cap	
299936-5	1	Oil Tank Filler Cap Gasket	
299936-6	1	Oil Tank Strainer Assembly	
12-Z-46-221	6	Oil Tank to Base Screw	

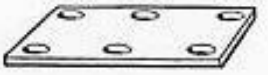
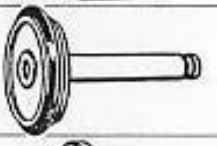
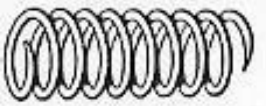
STAND

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
OE-2270	6	Lock Washer	
299919	6	Pump Lever Bracket Assembly– Consists of:	
299919-1	6	Pump Lever Pivot Pin	
299919-3	6	Pump Lever Bracket	
12-Z-46-244	18	Pump Lever Bracket to Base Screw	
OE-2271	18	Lock Washer	
299941	3	Pump Pedal Assembly	
299940-6	6	Pump Piston Rod Link	
299940-7	6	Pump Piston Rod Link Pin	
12-Z-48-639	12	Cotter Pin	
299938-1	3	Piston Rod	
299938-3	3	Pump Piston Cup Retainer	
299938-4	3	Pump Piston to Rod Woodruff Key	

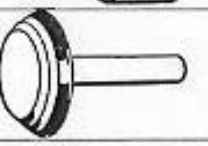
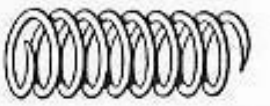
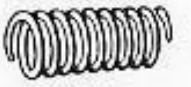
STAND

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
299938-5	3	Pump Piston Rod Oiler	
299939-1	3	Pump Piston Cup	
299939-2	3	Pump Piston to Rod Nut	
299939-3	3	Pump Piston	
299939-4	3	Lock Washer	
299939-5	3	Pump Piston Rod Return Spring	
299940-1	3	Pump Piston Rod Link Pivot Pin	
299940-2	6	Link Pivot Pin Nut	
12-Z-22-274	6	Flat Washer	
12-Z-48-623	6	Cotter Pin	
299937	3	Pump Cylinder Assembly	
299937-5	3	Pump Piston Rod Packing Retainer	
299937-6	3	Pump Piston Rod Packing	

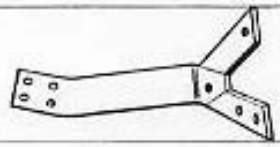
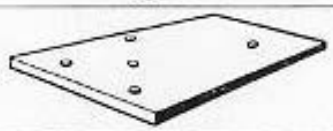
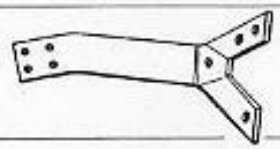
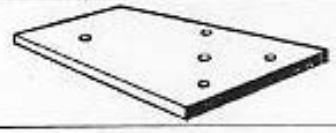
STAND

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
299938-5	3	Pump Piston Rod Oiler (On Cylinder)	
12-Z-322-8	3	Pump Piston Rod Oiler Elbow	
299941-1	3	Pump Cylinder Gasket	
12-Z-46-244	18	Pump Cylinder to Base Screw	
OE-2271	18	Lock Washer	
299919-4	3	Pump Valve Chamber Cover	
299919-6	3	Pump Valve Chamber Cover Gasket	
12-Z-42-276	18	Pump Valve Chamber Cover Screw	
299920-1	3	Pump Intake Valve Sleeve Assembly	
299921	3	Pump Intake Valve Assembly	
299922-2	3	Pump Valve Guide	
299922-5	3	Pump Valve Sleeve Spring	
299922-6	3	Pump Intake Valve Spring Seat Retainer	

STAND

PART NUMBER	NO. POS.	COMPONENT	SKETCH
299923-1	3	Pump Intake Valve Spring Seat	
299923-2	3	Pump Valve Spring	
299920-3	3	Pump Outlet Valve Sleeve Assembly	
299922-1	3	Pump Outlet Valve Assembly	
299922-2	3	Pump Valve Guide	
299922-5	3	Pump Valve Sleeve Spring	
299923-2	3	Pump Valve Spring	

SHIELD

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
OE-2316	1	Shield Assembly–Right–Consists of:	
OE-2220	1	Shield Bracket Assembly–Right	
OE-2228	4	Shield Bracket to Shield Bolt	
OE-2229	4	Shield Bracket to Shield Bolt Nut	
OE-2219	1	Shield Plate–or	
OE-2289	1	Shield Plate–Right	
OE-2317	1	Shield Assembly–Left–Consists of:	
OE-2221	1	Shield Bracket Assembly–Left	
OE-2228	4	Shield Bracket to Shield Bolt	
OE-2229	4	Shield Bracket to Shield Bolt Nut	
OE-2219	1	Shield Plate–or	
OE-2290	1	Shield Plate–Left	
299951-1	1	Shield Strap	

SHIELD

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
OE-2227	4	Shield Strap to Shield Bolt	
OE-2229	4	Shield Strap to Shield Bolt Nut	
OE-3535	8	Shield Bracket Bolt	
OE-2217	8	Shield Bracket Bolt Nut	
OE-2275	8	Shield Bracket Bolt Nut Lock Washer	

NOTES

PARTS LIST

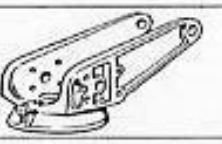
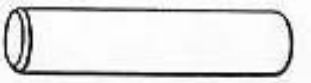
20-MM ANTIAIRCRAFT GUN MOUNT MARK 10

As stated previously many parts used in this mount are identical to those used on the Mark 5 Mount.

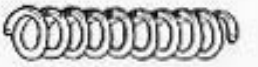
Parts which are not interchangeable are listed herewith.

Parts which are interchangeable and are not listed here are shown in the Mark 5 Parts List on pages 169 to 177.

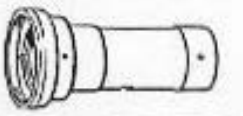
CARRIAGE

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
365906	1	Carriage	
OE-3512	1	Cradle Lock Lever	
OE-3513	1	Cradle Lock Lever Pivot Pin	
OE-3518	2	Cradle Lock Lever Spacers	
OE-3519	1	Cradle Lock Lever (Water) Seal	
OE-3514	1	Cradle Lock Plunger Hole Plug	
299943-5	1	Cradle Lock Plunger	

CARRIAGE

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
OE-3511	1	1/16 Dia. Ball	
OE-3516	1	Cradle Lock Ball Spring	
OE-3517	1	Cradle Lock Spring and Ball Retainer Screw	

STAND

PART NUMBER	NO. PCS.	COMPONENT	SKETCH
365900-1	1	Pedestal Assembly	
365904-1	1	Pivot Housing	
365905-3	1	Pivot Housing Draw Stud	
12-Z-9-245	1	Draw Stud Nut	
12-Z-22-255	1	Draw Stud Nut Lock Washer	
365905-1	1	Pivot	
365905-2	1	Pivot Cap	
365903-10	1	Pivot Cap Gasket	
12-Z-46-241	4	Pivot Cap Bolt	
12-Z-22-253	4	Pivot Cap Bolt Lock Washer	
12-Z-329-57	1	Pivot Cap Pipe Plug	
12-Z-339-2	3	Pressure Oiler	

MOUNT TOOLS

MK. 4 OE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2900			Spanner for OE-2038 and OE-2039	See Page 30
2901			Spanner for OE-2078 and OE-2081	See Page 30
2902			Spanner for OE-2035	See Page 30
2903			Spanner for OE-2032	See Page 30
2904			Open End Wrench for OE-2162 and OE-2163	See Page 30
2906			Spanner for OE-2034	See Page 30
2907			Spanner for OE-2129	See Page 30
2908			Spanner for OE-2118	See Page 30
2909			Tool for removing OE-2095	See Page 32
2910			Tool for removing OE-2096	See Page 32
2911			Spanner for OE-2126	See Page 30
2912			Tool for assembling OE-2016, OE-2057, OE-2055	See Page 38

MOUNT TOOLS

MK. 4 OE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2913			Tool for assembling OE-2057, OE-2055	See Page 40
2914			Tool for assembling OE-2012, OE-2033 and removing OE-2016	See Page 36
2915			Tool for removing OE-2016	See Page 36
2916			Tool for removing OE-2114	See Page 34
2917			Spindle for assembling OE-2112, OE-2134, OE-2057, OE-2055, OE-2016, OE-2033	See Page 36
2918			Aligning Tool for OE-2016	See Page 39
2919			Tool for removing OE-2033	See Page 35
2920			Handwheel for assembling OE-2134, OE-2112, OE-2057, OE-2055, OE-2016, OE-2033	See Page 36
2921			Disc for assembling OE-2033, OE-2016, OE-2112, OE-2134	See Page 39
2922			Puller for OE-2112, OE-2134	See Page 33
2923			Disc for removing OE-2112	See Page 33
2924			Tool for assembling OE-2112, OE-2134	See Page 43
2925			Puller for OE-2057, OE-2055	See Page 35

MOUNT TOOLS

MK. 4 OE. NO.	MK. 2 ITEM NO.	NO. PCS.	COMPONENT	SKETCH
2926			Disc for removing OE-2057, OE-2055	See Page 35
2927			Puller for OE-2114	See Page 34
2928			Puller for OE-2033	See Page 35
367539			Helical Equalizing Spring Compression Tool	See Page 48
1637			Grease Gun	
2965			Spare Parts Bag – Long	
2966			Spare Parts Bag – Short	

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OE-1003	299902	Ass'y	
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OE-1012	299827	-2	
OE-1013	299901	-1	
OE-1014	299902	-1	
OE-1015	299902	-2	
OE-1016	299902	-3	
OE-1029	299671	Ass'y	
OE-1030	299824	Ass'y	
OE-1031	299669	Ass'y	
OE-1032	299824	Ass'y	
OE-1033	299677	Ass'y	
OE-1034	299680	Ass'y	
OE-1035	299678	Ass'y	
OE-1036	299736	Ass'y	
OE-1037	299680	Ass'y	
OE-1038	299683	Ass'y	
OE-1039	299672	Ass'y	
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OE-1203	299690	-1	
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OE-1346	299665	–4	
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OE-1494	299736	–4	
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OE-1496	299737	Ass'y	
OE-1497	299730	Ass'y	
OE-1498	299733	Ass'y	
OE-1499	299731	Ass'y	
OE-1500	299729	Ass'y	
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OE-1527	299717	–1	
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OE-1529	299726	–8	
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OE-1532	299710	Ass'y	
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299738	Ass'y		OE-1491
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299782	Ass'y	157	OE-2149
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299783	–1	158	OE-2146
	–2	158	OE-2147
	–3	158	OE-2148
	–4	158	OE-2297
	–5	158	OE-2298
	–6	158	OE-2284
299784	–1		OE-2212
	–2		OE-2213
	–3		OE-2293
	–4		OE-2288
	–5		OE-2321
299785	Ass'y		OE-2310
299786	Ass'y	143	OE-2009
299786	Ass'y	143	OE-2008
	–1	143	OE-2070
	–2	143	OE-2072
	–3	143	OE-2074
	–4	143	OE-2140
	–5	143	OE-2071
	–6	143	OE-2141
299787	Ass'y		OE-2313

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DRAWING No.	PC. No.	PAGE No.	NUMBER
299787	–1	143	OE-2061
	–2	141	OE-2092
	–3	141	OE-2034
	–4	141	OE-2036
	–5	141	OE-2073
299788	–1		OE-2153
	–2	140	OE-2165
	–3	140	OE-2256
	–4	141	OE-2248
	–5	143	OE-2260
	–6	143	OE-2249
299789	–1	140	OE-2030
299790	–1	142	OE-2032
	–2	142	OE-2069
	–3	142	OE-2277
	–4	142	OE-2078
299791	–1	142	OE-2031
	–2	140	OE-2095
	–3	140	OE-2306
	–4	140	OE-2307
	–5	140	OE-2096
	–6	140	OE-2308
	–7	140	OE-2309
	–8		OE-2300
299792	Ass'y		OE-2311
299792	Ass'y		OE-2314
	–1		OE-2159
299793	–1		OE-2158
299794	Ass'y	135	OE-2205
	–1	135	OE-2188
	–2	136	OE-2190
	–3	136	OE-2189
	–4	136	OE-2262
	–5	136	OE-2261
12-Z-339-7		136	OE-2259
299795	–1	136	OE-2174
	–2	136	OE-2175
	–3	136	OE-2263

BUREAU OF ORDNANCE			OE
DRAWING No.	PC. No.	PAGE No.	NUMBER
299796	Ass'y	136	OE-2312
299796	Ass'y	136	OE-2157
	–1		OE-2164
	–2	136	OE-2166
299797	–1		OE-2167
	–2	137	OE-2168
	–3	137	OE-2278
	–4	137	OE-2169
	–5	138	OE-2163
	–6	137	OE-2268
299798	–1	137	OE-2160
	–2	137	OE-2161
	–3	138	OE-2162
	–4	138	OE-2191
	–5	138	OE-2269
299799	Ass'y	138	OE-2207
	–1		OE-2176
	–2		OE-2279
	–3		OE-2170
299800	–1		OE-2179
	–2	138	OE-2177
	–3	138	OE-2178
	–5		OE-2340
	–6		OE-2185
	–7		OE-2301
299801	Ass'y	139	OE-2198
	–1		OE-2206
	–2		OE-2265
299802	Ass'y	139	OE-2187
299803	–1		OE-2192
	–2		OE-2196
	–3		OE-2197
	–4		OE-2199
	–5		OE-2201
	–6		OE-2202
	–7		OE-2200
	–8		OE-2280
299804	–1		OE-2193

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BUREAU OF ORDNANCE DRAWING No.	PC. No.	PAGE No.	OE NUMBER
299804	–2		OE-2194
	–3		OE-2144
	–4		OE-2184
	–5		OE-2180
299805	–1		OE-2210
	–2		OE-2291
	–3		OE-2292
	–4		OE-2195
	–5		OE-2211
	–6		OE-2181
	–7		OE-2154
299806	Ass'y		OE-2203
	–1		OE-2183
	–2		OE-2267
299807	Ass'y		OE-2319
299807	Ass'y		OE-2204
	–1		OE-2182
	–2		OE-2145
	–3		OE-2186
299808	Ass'y		OE-2318
299808	Ass'y		OE-2320
299808	Ass'y		OE-2171
	–1		OE-2133
	–2		OE-2132
299809	–1		OE-2303
	–2	139	OE-2173
	–3	139	OE-2172
299810	Ass'y	176	OE-2316
299810	Ass'y	176	OE-2317
299811	Ass'y	160	OE-2220
299811	Ass'y	160	OE-2221
	–1		OE-2224
	–2		OE-2225
299812	–1		OE-2222
	–2		OE-2223
299813	–1	160	OE-2226
	–2	160	OE-2218
	–3	160	OE-2217

BUREAU OF ORDNANCE DRAWING No.	PC. No.	PAGE No.	OE NUMBER
299813	–4	160	OE-2227
	–5	160	OE-2229
	–6	160	OE-2228
299814	List		OE-1603
	–1		OE-1617
	–2		OE-1618
	–3		OE-1621
	–4		OE-1606
299815	Ass'y		OE-1622
	–1		OE-1619
	–2		OE-1623
	–3		OE-1624
	–4		OE-1625
	–5		OE-1626
299816	–1		OE-1630
	–2		OE-1631
	–3		OE-1633
	–4		OE-1634
299817	–1		OE-1632
	–2		OE-1620
	–3		OE-1607
	–4		OE-1616
299818	–1		OE-1627
	–2		OE-1628
	–3		OE-1612
	–4		OE-1611
	–5		OE-1608
	–6		OE-1609
	–7		OE-1613
	–8		OE-1615
299819	–1		OE-1635
	–2		OE-1614
	–3		OE-1610
	–4		OE-1629
	–5		OE-1605
	–6		OE-1636
299820	–1		OE-1604
299821	Ass'y		OE-1160

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299822	Ass'y		OE-1163
	–1		OE-1162
299823	–1		OE-1161
299824	Ass'y		OE-1030
299824	Ass'y		OE-1032
299825	Ass'y		OE-1000 SHEET 1
299826	Ass'y		OE-1000 SHEET 2
299827	Ass'y		OE-1001
	–1		OE-1011
	–2		OE-1012
	–3		OE-1011-SC
299828	–1		OE-1233
299829	–1		OE-1249
299830	Ass'y		OE-1638
	–1		OE-1639
	–2		OE-1640
	–3		OE-1643
	–4		OE-1641
	–5		OE-1642
299831	Ass'y		OE-3157
299831	–1	198	OE-2904
299831	–2		OE-3158
299831	–3		OE-3159
299832	Ass'y	198	OE-2903
	–1		OE-1637
	–2		OE-3136
	–3		OE-3137
	–4		OE-3138
299833	Ass'y	198	OE-2906
	–1		OE-3118
	–2		OE-3117
299834	Ass'y	198	OE-2909
299834	Ass'y	198	OE-2910
	–1		OE-3101
	–2		OE-3100
	–3		OE-3102

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299835	Ass'y	198	OE-2901
	-1		OE-3145
	-2		OE-3147
	-3		OE-3148
	-4		OE-3146
	-5		OE-3149
299836	Ass'y	198	OE-2902
	-1		OE-3105
	-2		OE-3125
	-3		OE-3126
	-4		OE-3127
299837	Ass'y	198	OE-2907
	-1		OE-3120
	-2		OE-3119
	-3	198	OE-2900
299838	Ass'y	198	OE-2908
	-1		OE-3123
	-2		OE-3122
	-3		OE-3121
	-4		OE-3124
299839	-1	198	OE-2912
	-2	199	OE-2923
	-3	199	OE-2914
299840	-1	199	OE-2924
	-2	198	OE-2911
299841	Ass'y	199	OE-2915
	-1	199	OE-2915
	-2		OE-3142
	-3		OE-3143
	-4		OE-3144
299842	Ass'y	199	OE-2917
	-1		OE-3139
	-2		OE-3140
	-3		OE-3141
299843	Ass'y	199	OE-2918
	-1		OE-3135
	-2		OE-3134
299844	Ass'y	199	OE-2919

BUREAU OF ORDNANCE DRAWING No.	PC. No.	PAGE No.	OE NUMBER
299844	-1		OE-3160
	-2		OE-3161
299845	Ass'y	199	OE-2920
	-1		OE-3150
	-2		OE-3151
299846	-1	199	OE-2921
	-2	199	OE-2913
299847	Ass'y	199	OE-2922
	-1		OE-3110
	-2		OE-3103
	-4		OE-3104
299848	-1		OE-3111
	-2		OE-3112
	-3		OE-3129
299849	Ass'y	199	OE-2925
	-1		OE-3114
	-2		OE-3128
	-3		OE-3113
299850	-1		OE-3115
	-2		OE-3116
299851	Ass'y	200	OE-2927
	-1		OE-3130
	-2		OE-3131
299852	-1		OE-3132
	-2		OE-3133
	-3	200	OE-2926
299853	Ass'y	200	OE-2928
	-1		OE-3107
	-2		OE-3108
	-3		OE-3106
299854	Ass'y	200	OE-2929
	-1		OE-3109
	-2		OE-3152
	-3		OE-3156
	-4		OE-3153
299855	-1		OE-3155
	-2		OE-3154
	-3	199	OE-2916

BUREAU OF ORDNANCE DRAWING No.	PC. No.	PAGE No.	OE NUMBER
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299857	Ass'y		OE-3162
	-1		OE-3166
	-2		OE-3167
	-3		OE-3165
299858	-1		OE-3163
	-2		OE-3179
	-3		OE-3171
	-4		OE-3170
299859	Ass'y		OE-3168
	-1		OE-3169
299860	Ass'y		OE-3176
	-1		OE-3164
	-2		OE-3178
	-3		OE-3177
299861	Ass'y		OE-3172
	-1		OE-3174
	-2		OE-3173
	-3		OE-3175
299862	Ass'y		OE-3180
	-1		OE-3184
	-2		OE-3182
	-3		OE-3185
	-4		OE-3181
	-5		OE-3183
299863	Ass'y		OE-2980
299864	-1		OE-2981
299865	-1		OE-2984
299866	-1		OE-2985
299867	-1		OE-2982
	-2		OE-2983
	-3		OE-2986
299868	Ass'y		OE-2979
	-1		OE-2988
	-2		OE-2987
299869	Ass'y		OE-2955
299870	-1		OE-2956
299871	-1		OE-2957

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BUREAU OF ORDNANCE DRAWING No.	PC. No.	PAGE No.	OE NUMBER
299871	-2		OE-2958
	-3		OE-2959
	-4		OE-2960
299872	List		OE-2967
299872	List		OE-2994
299872	List		OE-2968
299872	List		OE-2993
	-1		OE-2964
299873	-1		OE-2961
	-2	200	OE-2965
	-3		OE-2963
	-4	200	OE-2966
299874	-1		OE-2962
299875	Ass'y		OE-2970
299876	-1		OE-2971
299877	-1		OE-2974
299878	-1		OE-2975
299879	-1		OE-2972
	-2		OE-2973
	-3		OE-2976
299880	Ass'y		OE-2969
	-1		OE-2978
	-2		OE-2977
299881	-1		OE-3005
299882	Ass'y		OE-1106
	-1		OE-1107
	-2		OE-1108
299883	Ass'y		OE-1105
299884	Ass'y		OE-3542
299885	-1		OE-3544
	-2		OE-3549
	-3		OE-3550
	-4		OE-3551
299886	-1		OE-3545
	-2		OE-3552
	-3		OE-3553
	-4		OE-3554
299887	Ass'y		OE-3561

BUREAU OF ORDNANCE DRAWING No.	PC. No.	PAGE No.	OE NUMBER
	-1		OE-3565
	-2		OE-3563
	-3		OE-3555
299888	-1		OE-3556
	-2		OE-3548
	-3		OE-3560
	-4		OE-3557
	-5		OE-3558
	-6		OE-3559
299889	-1		OE-2947
299890	-1		OE-2946 SHEET 1
299891			OE-2946 SHEET 2
299892	List		OE-2942
299892	List		OE-2833
	-1		OE-2952
299893	Ass'y		OE-1700
299894	Ass'y		OE-1703
	-1		OE-1716
	-2		OE-1711
	-3		OE-1712
	-4		OE-1714
	-5		OE-1713
299895	Ass'y		OE-1708
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	-2		OE-1730
	-3		OE-1731
299896	-1		OE-1710
299897	Ass'y		OE-1701
299897	Ass'y		OE-1702
	-1		OE-1717
	-2		OE-1720
	-3		OE-1718
	-4		OE-1288
	-5		OE-1719
299898	Ass'y		OE-1705
299898	Ass'y		OE-1706

BUREAU OF ORDNANCE DRAWING No.	PC. No.	PAGE No.	OE NUMBER
299898	-1		OE-1724
	-2		OE-1725
	-3		OE-1723
	-4		OE-1722
299899	Ass'y		OE-1707
	-1		OE-1721
	-2		OE-1289
	-3		OE-1727
	-4		OE-1726
299900	Ass'y		OE-1704
	-1		OE-1715
299901	-1		OE-1013
299902	Ass'y		OE-1003
	-1		OE-1014
	-2		OE-1015
	-3		OE-1016
299903	List		OE-2941
	-1		OE-3006
	-2		OE-3017
299904	List		OE-2839
299906	-1		OE-1728
	List		OE-2840
299918	Ass'y		OE-1359
	-1		OE-1360
	-2		OE-1361
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12-Z-22-256		177	OE-2275
12-Z-48-12		139	OE-2230
12-Z-48-25		139	OE-2231
12-Z-48-40		153	OE-2232
299951	-2	176	OE-3535
299952	Ass'y		OE-2832
299953	List		OE-2837
	-1		OE-2817
	-2		OE-2800
	-3		OE-2818
	-4		OE-3030

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299953	-5		OE-2862
299954	-1		OE-2819
	-2		OE-2823
	-3		OE-2824
299955	-1		OE-2820
	-1		OE-2822
	-3		OE-2825
	-4		OE-2826
	-5		OE-2834
	-6		OE-2835
299956	Ass'y		OE-2827
	-1		OE-2821
	-2		OE-2829
	-3		OE-2828
	-4		OE-2830
299957	-1		OE-2804
	-2		OE-2807
	-3		OE-2810
	-4		OE-2803
	-5		OE-2808
	-6		OE-2805
299958	-1		OE-2836
299959	Ass'y		OE-3500
299960	Ass'y		OE-3500
	-1		OE-3019
299961	-1	175	OE-3501
299962	List	175	OE-3510
	-1	175	OE-3502
	-2	175	OE-3505
	-3	175	OE-3506
	-4	143	OE-3525
299963	-1	175	OE-3504
	-2		OE-3507
299964	-1	173	OE-3503

BUREAU OF ORDNANCE DRAWING No.	PC. No.	PAGE No.	OE NUMBER
299965	-1		OE-3527
	-2		OE-3528
	-3		OE-3534
299966	List	172	OE-3508
	-1	172	OE-3515
	-2	164	OE-3512
	-3	164	OE-3511
	-4	164	OE-3513
	-5	164	OE-3514
	-6	172	OE-3522
299967	-1	172	OE-3520
299968	-1	172	OE-3523
	-2	164	OE-3516
	-3	164	OE-3519
	-4	164	OE-3517
299969	-1	173	OE-3524
	-2	164	OE-3518
	-3	173	OE-3526
	-4	173	OE-3521
	-5		OE-3529
299970	Ass'y		OE-3530
	-1		OE-3531
	-2		OE-3532
299971	Ass'y		OE-2995
299972	List		OE-2933
	-1		OE-2841
	-2		OE-2844
299973	-1		OE-2943
	-2		OE-2849
	-3		OE-2850
	-4		OE-2845
	-5		OE-2848
299974	-1		OE-2842
	-2		OE-2846

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299974	-3		OE-2847
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299975	List		OE-2989
299976	-1		OE-2812
	-2		OE-2814
299977	-1		OE-2815
	-2		OE-2801
	-3		OE-2811
	-4		OE-2809
	-5		OE-2806
	-6		OE-2802
299978	List		OE-2936
	-1		OE-2813
	-2		OE-2816
299983	Ass'y		OE-1733
299984	Ass'y		OE-1732
300005	Ass'y		OE-2328
300006	-1		OE-2329
	-2		OE-2330
	-3		OE-2331
300007	-1		OE-2332
	-2		OE-2333
	-3		OE-2334
300008	-1		OE-2335
	-2		OE-2336
	-3		OE-2337
	-4		OE-2341
	-5		OE-2342
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300026	-1		OE-2322
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NOTES

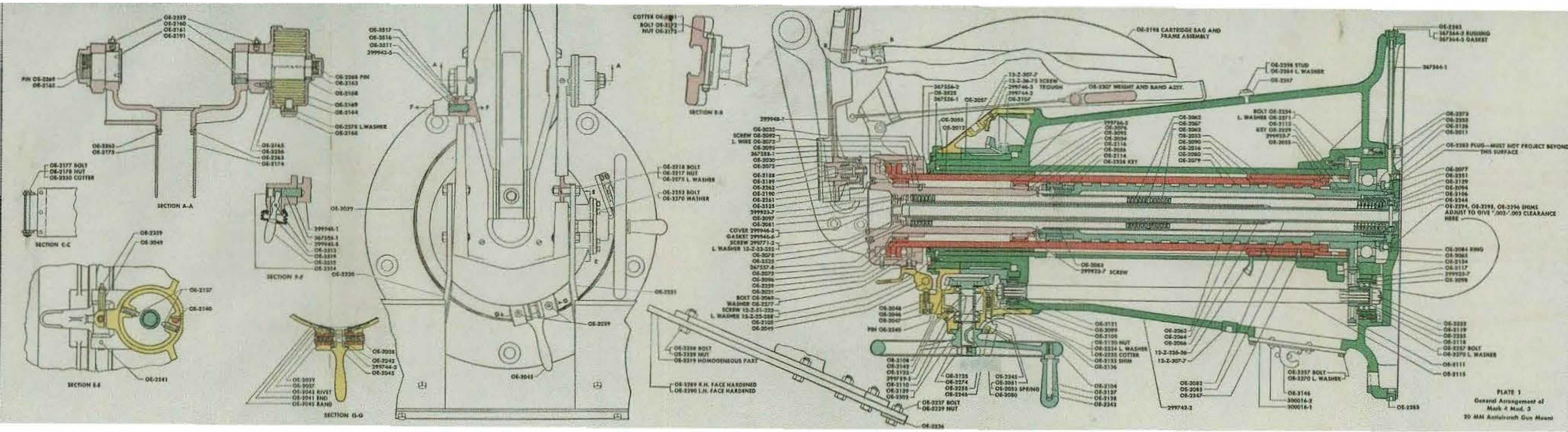


PLATE 1
General Arrangement of
Mark 4 Mod. 3
20 MM Antiaircraft Gun Mount

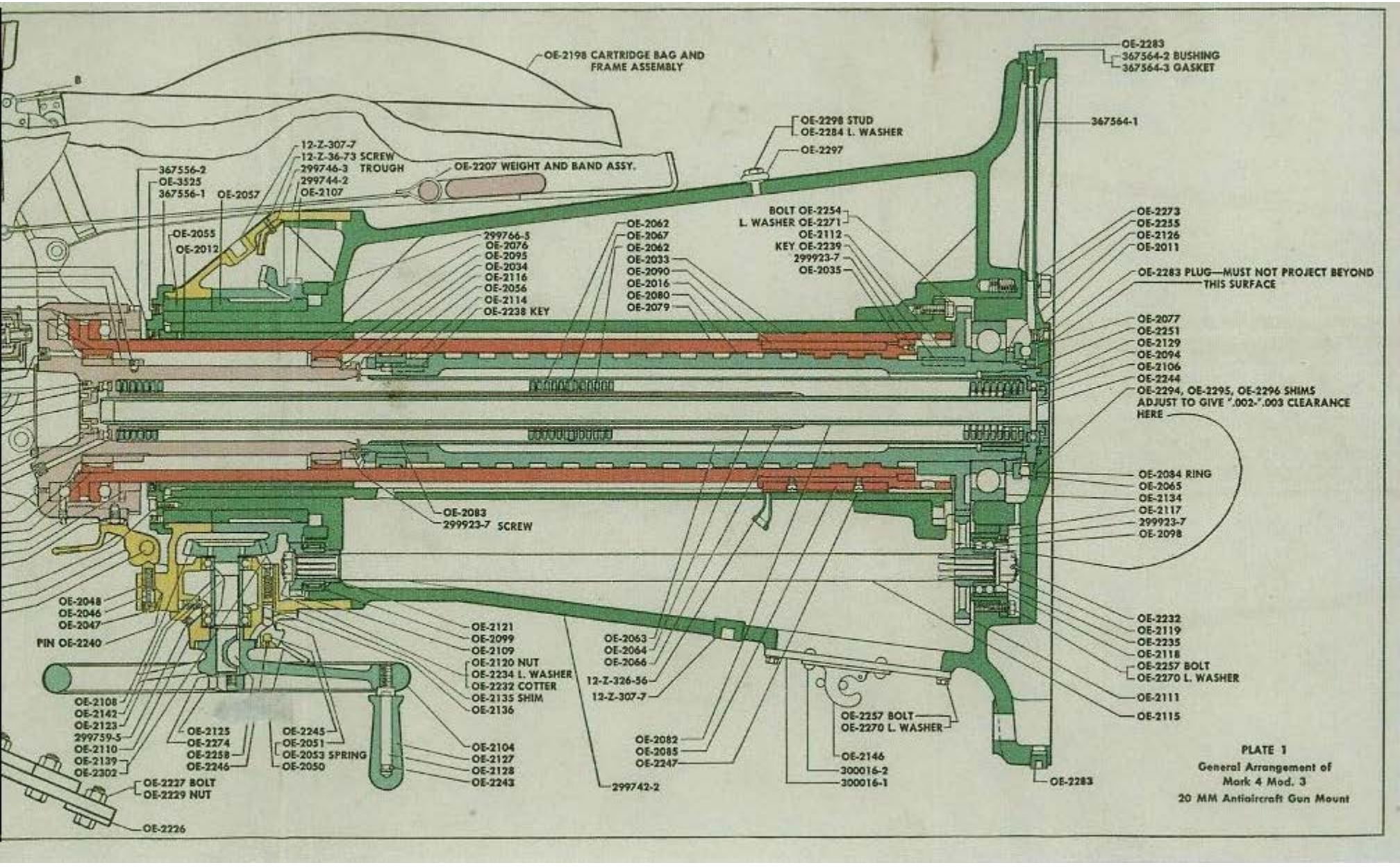
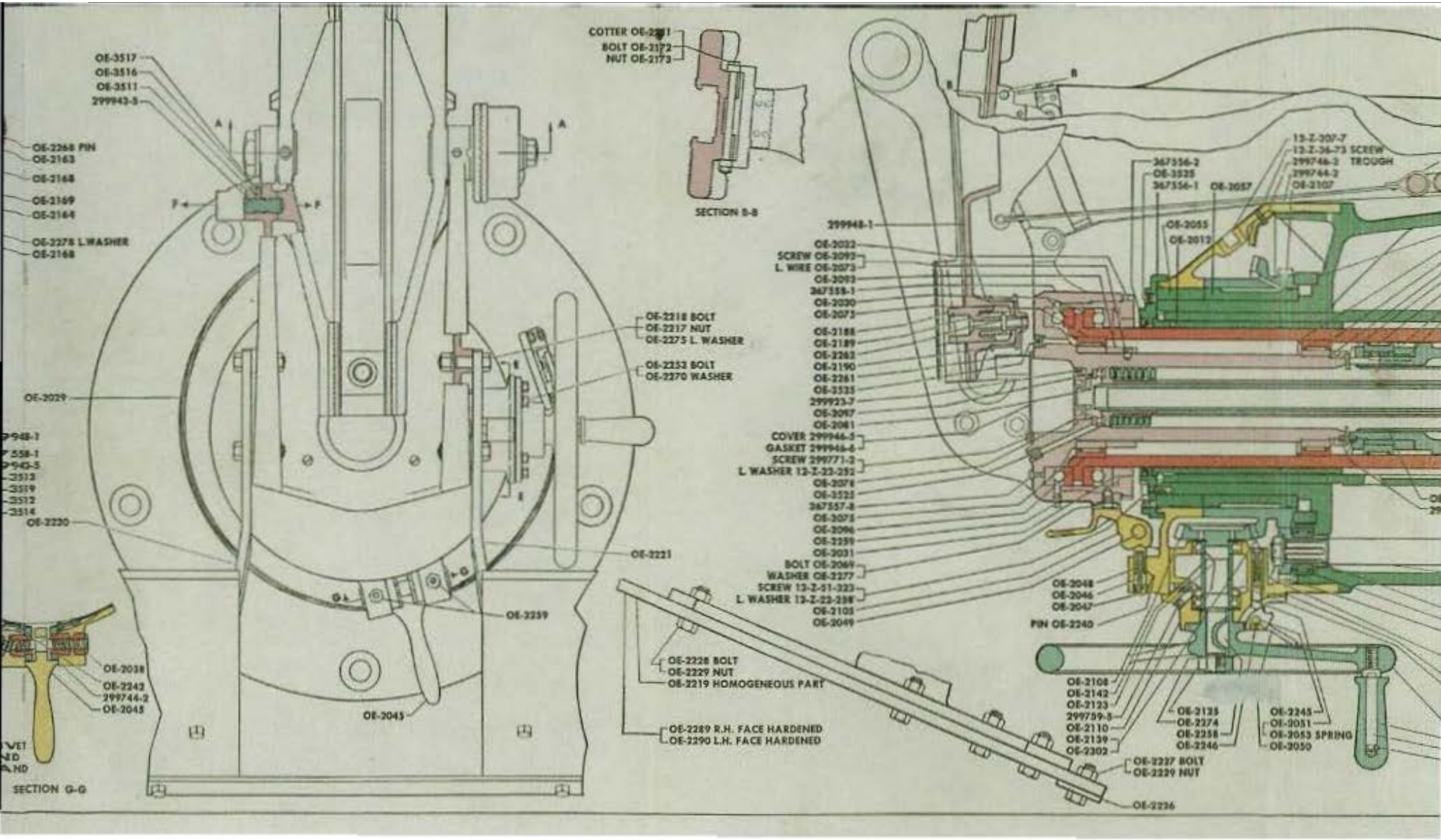


PLATE 1
General Arrangement of Mark 4 Mod. 3
20 MM Antiaircraft Gun Mount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OE-2278 L.WASHER
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OE-2125
OE-2274
OE-2258
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OE-2245
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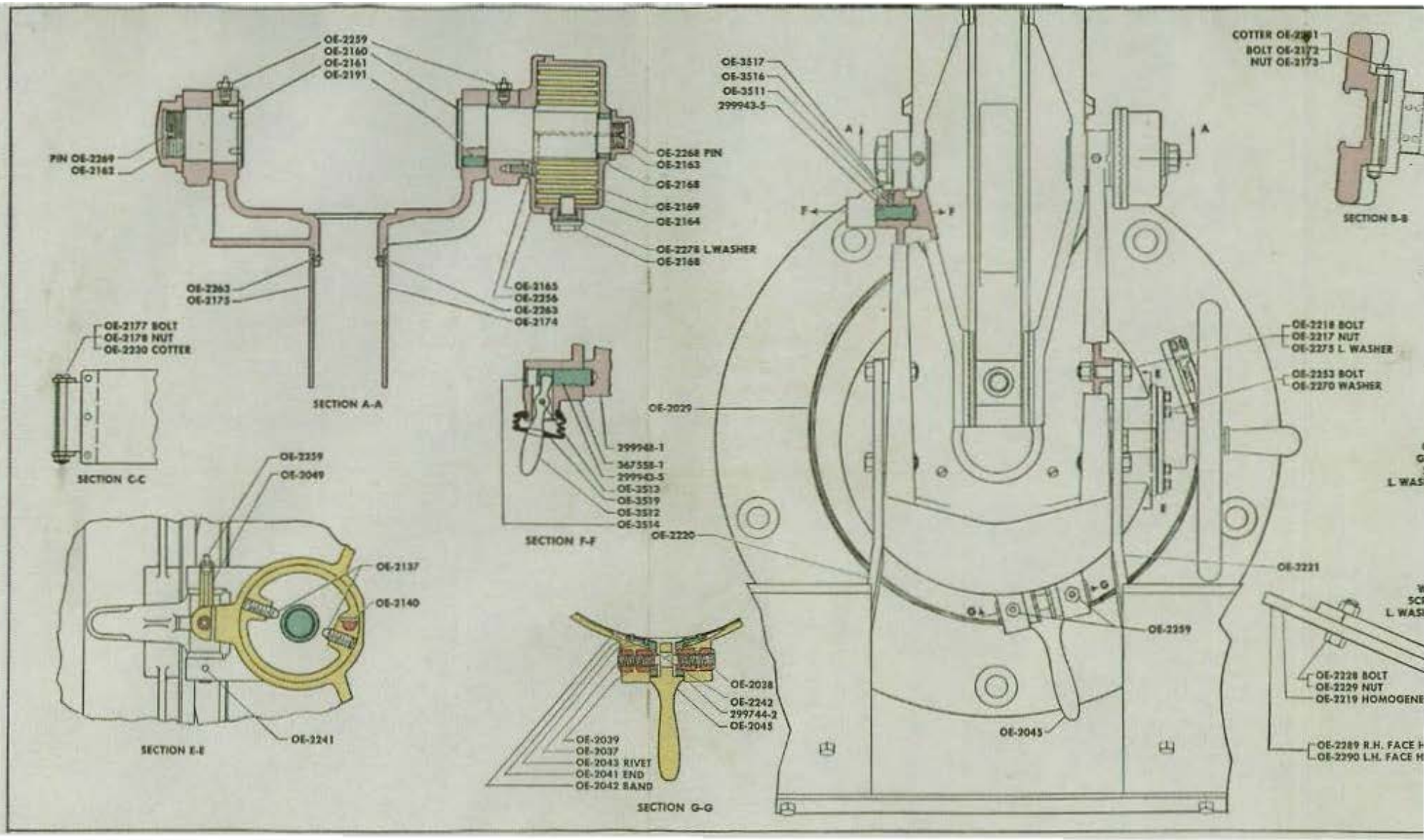
OE-2053 SPRING
OE-2050
OE-2227 BOLT
OE-2229 NUT
OE-2226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OE-2160
OE-2161
OE-2191
PIN OE-2269
OE-2162
OE-2268 PIN
OE-2163
OE-2168
OE-2169
OE-2164
OE-2278 L WASHER
OE-2168
OE-2263
OE-2175
OE-2165
OE-2256
OE-2263
OE-2174
SECTION A-A
OE-2177 BOLT
OE-2178 NUT
OE-2230 COTTER
SECTION C-C
OE-2359
OE-2049
OE-2137
OE-2140
OE-2241
SECTION E-E
299948-1
367558-1
299943-5
OE-3513
OE-3519
OE-3512
OE-3514
SECTION F-F
OE-2039
OE-2037
OE-2043 RIVET
OE-2041 END
OE-2042 BAND
SECTION G-G
OE-3517
OE-3516
OE-3511
299943-5
OE-2029
OE-2220
OE-2038
OE-2242
299744-2
OE-2045
OE-2259
OE-2221
OE-2045
COTTER OE-2171
BOLT OE-2172
NUT OE-2173
SECTION B-B
OE-2218 BOLT
OE-2217 NUT
OE-2275 L WASHER
OE-2253 BOLT
OE-2270 WASHER
OE-2228 BOLT
OE-2229 NUT
OE-2219 HOMOGENE
OE-2289 R.H. FACE H
OE-2290 L.H. FACE H

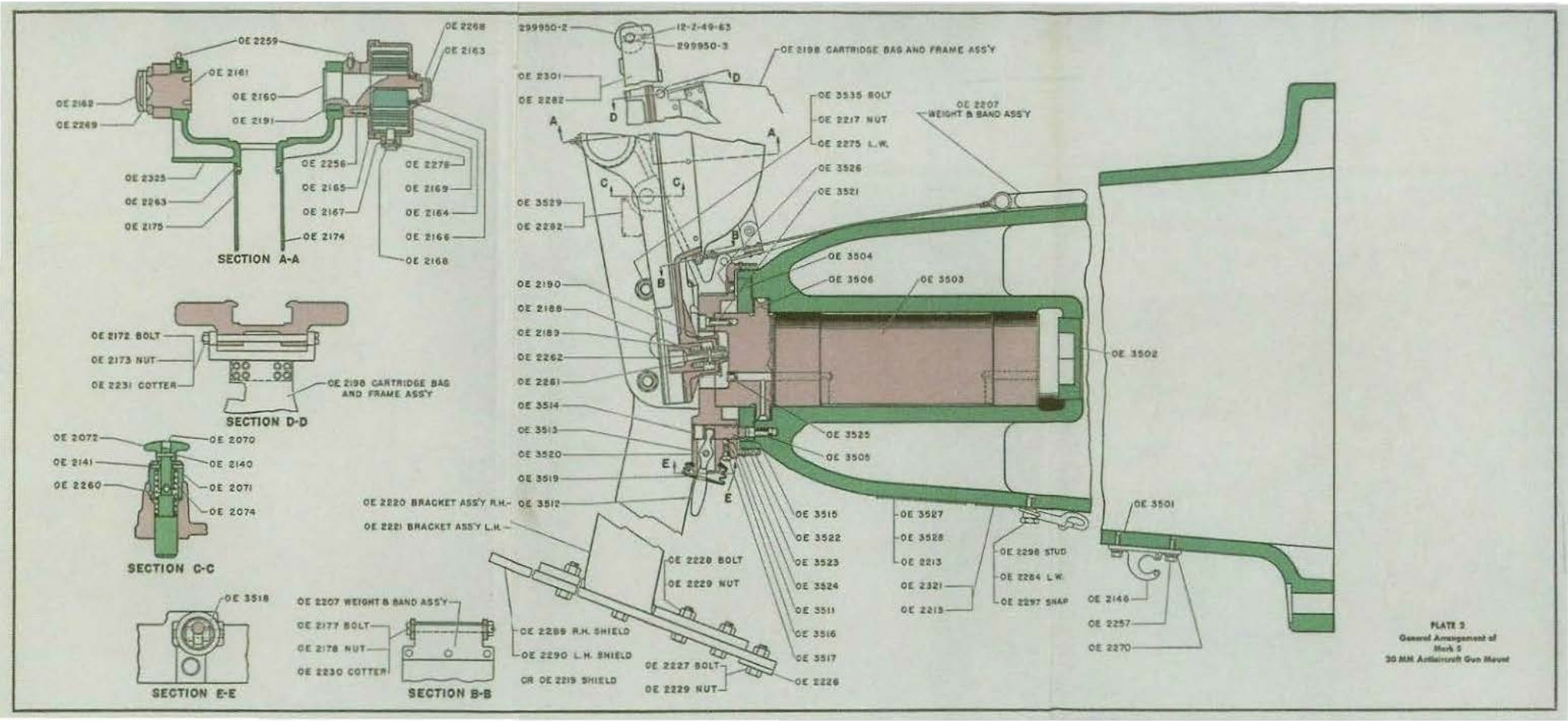


PLATE 2
General Arrangement of
Mark 5
20 MM Antiaircraft Gun Mount

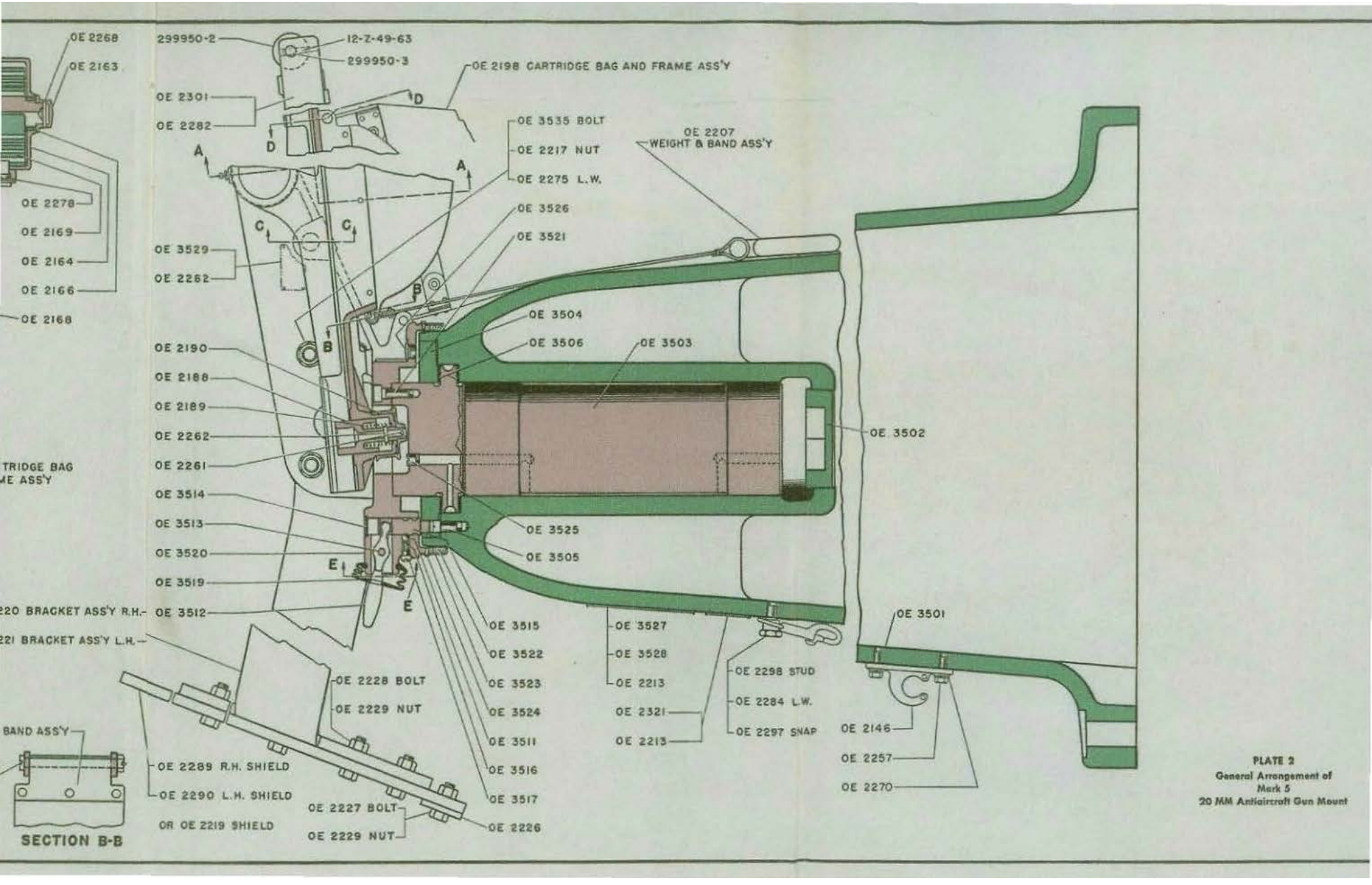
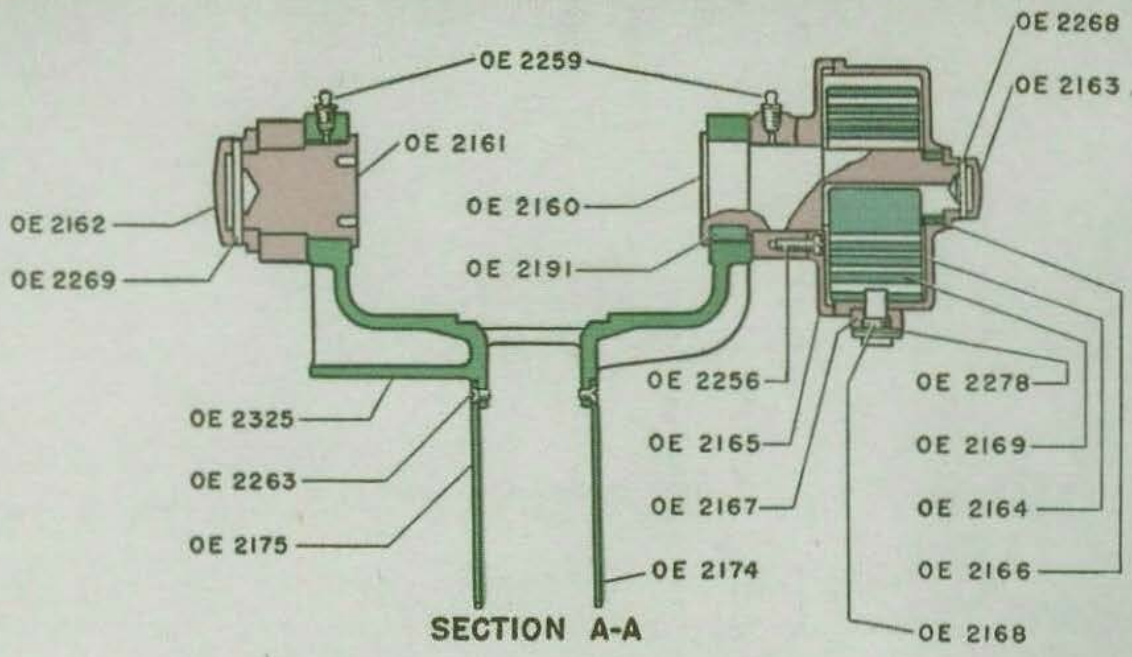
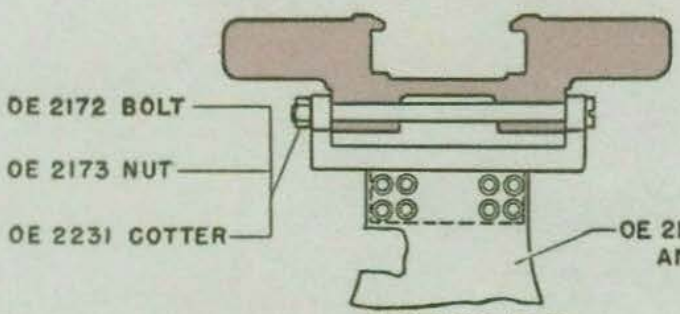


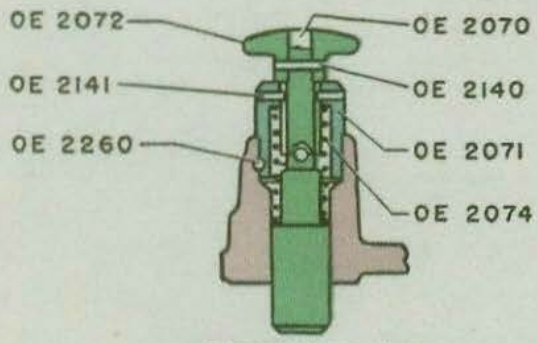
PLATE 2
General Arrangement of Mark 5 20 MM Antiaircraft Gun Mount



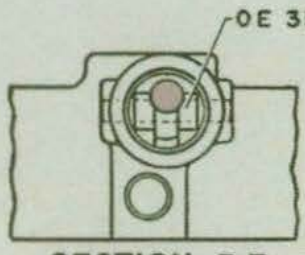
SECTION A-A



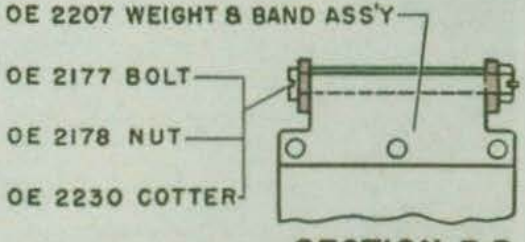
SECTION D-D



SECTION C-C



SECTION E-E



SECTION B-B

299950-2
OE 2301
OE 2282
A
OE 3529
OE 2282
OE 2190
OE 2188
OE 2189
OE 2262
OE 2261
OE 3514
OE 3513
OE 3520
OE 3519
OE 3512
OE 2220 BRACKET ASS'Y R.H.
OE 2221 BRACKET ASS'Y L.H.
OE 2289 R.
OE 2290 L.
OR OE 2219

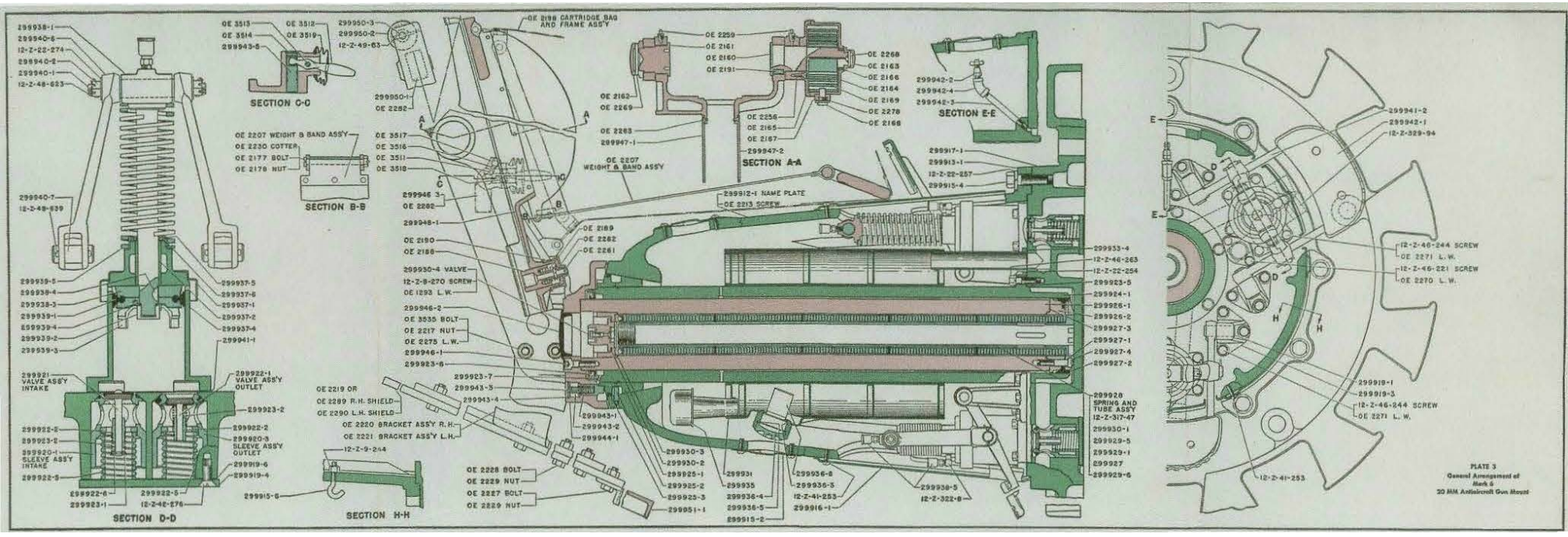


PLATE 3
General Arrangement of Mark 6
20 MM Antiaircraft Gun Mount

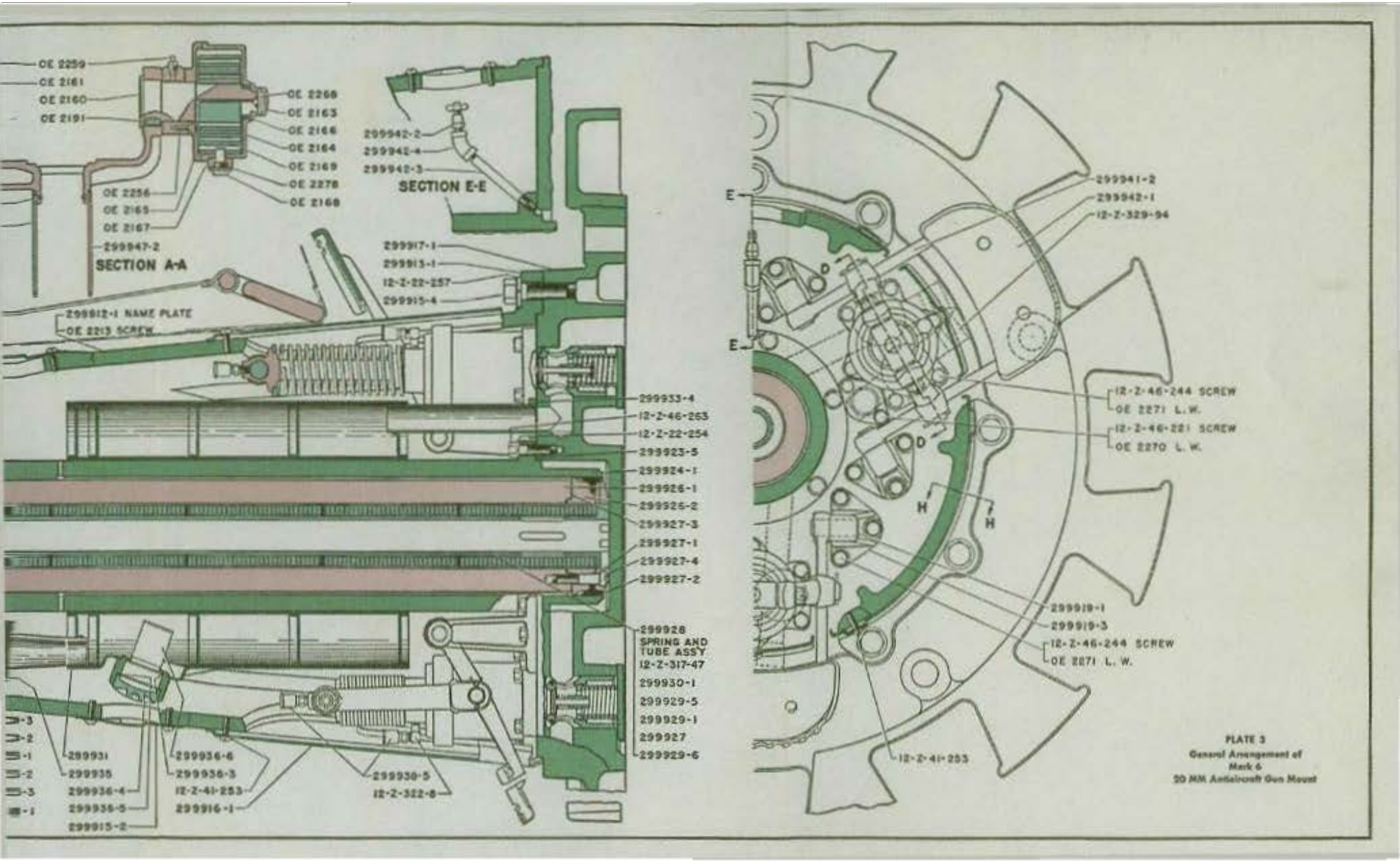
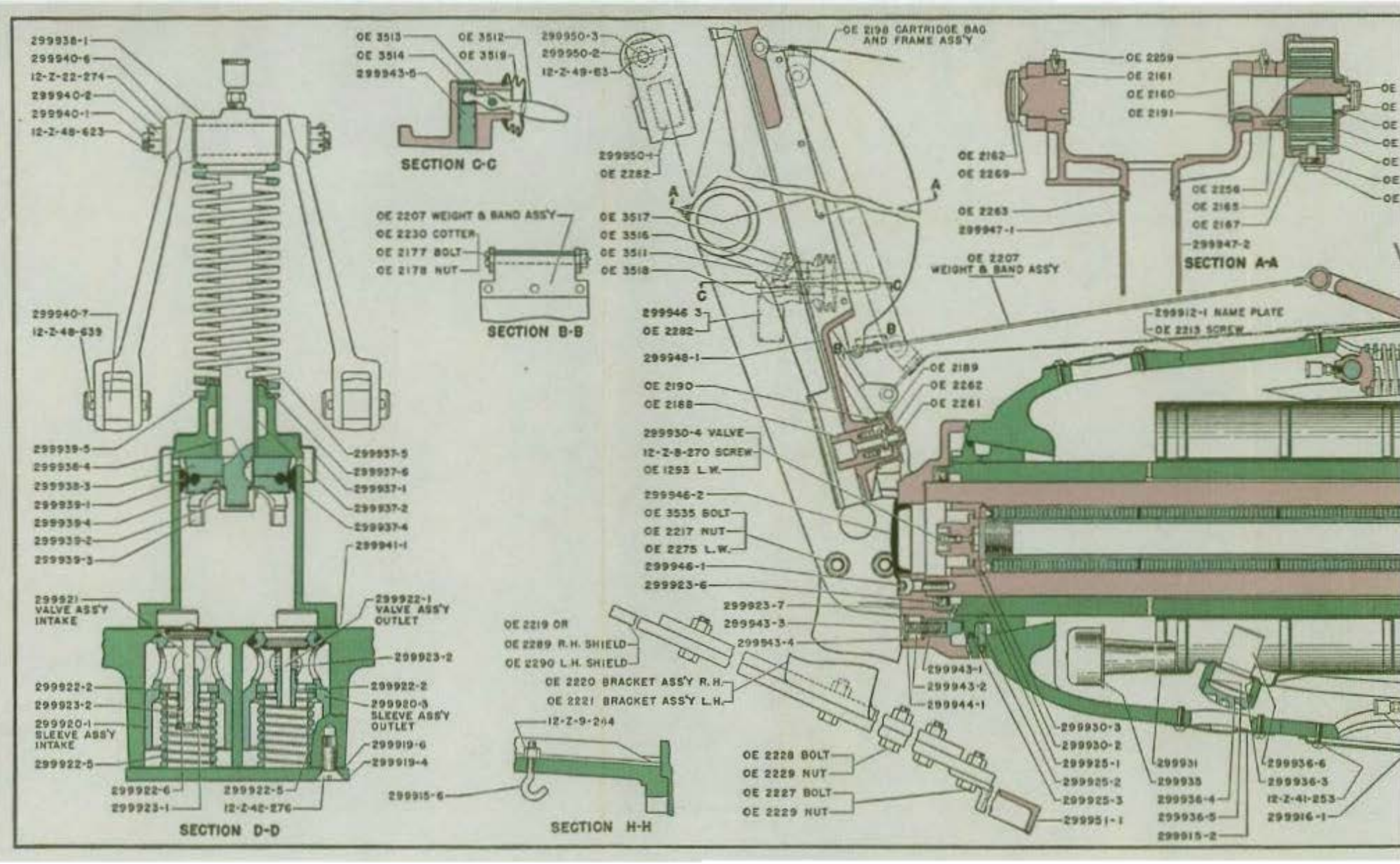


PLATE 3
General Arrangement of
Mark 6
20 MM Antiaircraft Gun Mount


299938-1
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12-Z-22-274
299940-2
299940-1
12-Z-48-623
299940-7
12-Z-48-639
299939-5
299939-4
299939-3
299939-1
299939-4
299939-2
299939-3
299937-5
299937-6
299937-1
299937-2
299937-4
299941-1
299921 VALVE ASS'Y INTAKE
299922-1 VALVE ASS'Y OUTLET
299923-2
299922-2
299923-2
299920-1 SLEEVE ASS'Y INTAKE
299922-5
299920-3 SLEEVE ASS'Y OUTLET
299919-6
299919-4
299922-6
299923-1
299922-5
12-Z-42-276
SECTION D-D
OE 3513
OE 3514
299943-5
OE 3512
OE 3519
SECTION C-C
299950-3
299950-2
12-Z-49-63
299950-1
OE 2282
OE 2207 WEIGHT & BAND ASS'Y
OE 2230 COTTER
OE 2177 BOLT
OE 2178 NUT
SECTION B-B
OE 3517
OE 3516
OE 3511
OE 3518
299946-3
OE 2282
299948-1
OE 2190
OE 2188
299930-4 VALVE
12-Z-8-270 SCREW
OE 1293 L.W.
299946-2
OE 3535 BOLT
OE 2217 NUT
OE 2275 L.W.
299946-1
299923-6
299923-7
299943-3
299943-4
OE 2219 OR
OE 2289 R.H. SHIELD
OE 2290 L.H. SHIELD
OE 2220 BRACKET ASS'Y R.H.
OE 2221 BRACKET ASS'Y L.H.
12-Z-9-264
299915-6
OE 2228 BOLT
OE 2229 NUT
OE 2227 BOLT
OE 2229 NUT
SECTION H-H
OE 2198 CARTRIDGE BAG AND FRAME ASS'Y
OE 2259
OE 2161
OE 2160
OE 2191
OE 2162
OE 2269
OE 2263
299947-1
OE 2256
OE 2165
OE 2167
299947-2
SECTION A-A
OE 2207 WEIGHT & BAND ASS'Y
299912-1 NAME PLATE
OE 2213 SCREW
OE 2189
OE 2262
OE 2261
299943-1
299943-2
299944-1
299930-3
299930-2
299925-1
299925-2
299925-3
299951-1
299931
299935
299936-4
299936-5
299915-2
299936-6
299936-3
12-Z-41-253
299916-1