TO: ALL HOLDERS OF OUTBOARD LEADING EDGE SLAT DRIVE ROTARY ACTUATOR ASSEMBLY
COMPONENT MAINTENANCE MANUAL 27-81-54

REVISION NO. 5 DATED MAR 01/02

HIGHLIGHTS

Pages which have been added or revised are outlined below together with the highlights of the revision. Remove and insert the affected pages as listed and enter Revision No. and date on the Record of Revision Sheet.

NOTE: Highlights page for previous Revision 4 should have read NOV 01/01.

| CHAPTER/SECTION AND PAGE NO. | DESCRIPTION OF CHANGE |
|---|---|
| TITLE PAGE | Added 256T5120-2, -3 top assemblies as specified by PRR |
| 1 | B13063-16. |
| TR & SB RECORD | |
| 1 | |
| DESCRIPTION & OPERATION | |
| 1-3 | |
| 101-102 | |
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| REPAIR-GEN | |
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| REPAIR 6-1 | |
| 601-602 | |
| 701,703 | |
| 803-804 | |
| 1003,1005,1010-1013 | |

| CHAPTER/SECTION AND PAGE NO. | DESCRIPTION OF CHANGE |
|---|---|
| 302<br>REPAIR 5-1<br>601<br>702<br>1008 | Deleted replacement of the cork plug in the planet gear assembly to decrease the risk of corrosion. |
| REPAIR 2-1<br>603 | Added cadmium plate as an optional finish on the CRES repair bushing. |
| REPAIR 4-1<br>602<br>REPAIR 4-2<br>602-603 | Moved gear arm bushing hole repair from Repair 4-1 to Repair 4-2. |
| REPAIR 4-1<br>605 | Edited without technical change. |
| REPAIR 4-2<br>607 | Added a dimension to define a chamfer. |
| REPAIR 5-1<br>601-602,604 | Added procedures to repair corrosion in the planet gear bore. |
| 705<br>801<br>1008 | Changed item number callout. |
| 1008-1009 | Deleted markers from illustration of the gear arm assembly. |

BOEING

COMPONENT
MAINTENANCE MANUAL

# OUTBOARD LEADING EDGE SLAT DRIVE ROTARY ACTUATOR ASSEMBLY

# PART NUMBER 256T5120-1 THRU -3

COMPONENT MAINTENANCE MANUAL
WITH
ILLUSTRATED PARTS LIST



K07061

REVISION RECORD

- Retain this record in front of manual. On receipt of revision, insert revised pages in the manual, and enter revision number, date inserted and initial.

| REVISION NUMBER | REVISION DATE | DATE FILED | BY | REVISION NUMBER | REVISION DATE | DATE FILED | BY |
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TEMPORARY REVISION AND SERVICE BULLETIN RECORD

| BOEING SERVICE BULLETIN | BOEING TEMPORARY REVISION | OTHER DIRECTIVE | DATE OF INCORPORATION INTO MANUAL |
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| | | PRR B13063-16 | MAR 01/02 |

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| 602 | JUL 01/99 | 01 |
| REPAIR 2-1 | | |
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| 602 | JUL 01/99 | 01 |
| *603 | MAR 01/02 | 01.1 |
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| 603 | JUL 01/99 | 01 |
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| *601 | MAR 01/02 | 01.1 |
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TABLE OF CONTENTS

# INTRODUCTION

The instructions in this manual provide the information necessary to perform maintenance functions ranging from simple checks and replacement to complete shop-type repair.

This manual is divided into separate sections:

1. Title Page
2. Record of Revisions
3. Temporary Revision & Service Bulletin Record
4. List of Effective Pages
5. Table of Contents
6. Introduction
7. Procedures & IPL Sections

Refer to the Table of Contents for the page location of applicable sections.

The beginning of the REPAIR section includes a list of the separate repairs, a list of applicable standard Boeing practices, and an explanation of the True Position Dimensioning symbols used.

An explanation of the use of the Illustrated Parts List is provided in the Introduction to that section.

All weights and measurements used in the manual are in English units, unless otherwise stated. When metric equivalents are given they will be in parentheses following the English units.

Design changes, optional parts, configuration differences and Service Bulletin modifications create alternate part numbers. These are identified in the Illustrated Parts List (IPL) by adding an alphabetical character to the basic item number. The resulting item number is called an alpha-variant. Throughout the manual, IPL basic item number references also apply to alpha-variants unless otherwise indicated.

Verification:

# OUTBOARD LEADING EDGE SLAT DRIVE ROTARY ACTUATOR ASSEMBLY

## DESCRIPTION AND OPERATION

1. Description

   A. The Outboard-Leading-Edge-Slat-Drive Rotary Actuator Assembly is made of a sun gear, five planet gears, a pair of end ring gears, and a gear arm. The actuator assembly is used to extend and retract the outboard leading edge slats. Two actuators are used on each of the ten slats.

   B. The rotary actuator assembly is also used to deploy the ram air turbine (RAT).

   C. One rotary actuator configuration has a short gear arm. This actuator is used to extend and retract the Krueger flap seals at the outboard end of the inboard slats.

   D. Maintenance procedures for the similar 256T2120-( ) actuator assemblies are included in CMM 27-81-51.

2. Operation

   A. Input power to the sun gear is transmitted through the planet gears to the ring gears and gear arm. The ring gears are attached to airplane structure, while the arm turns to extend the slats, RAT, or Krueger flap seals.

3. Leading Particulars (Approximate)

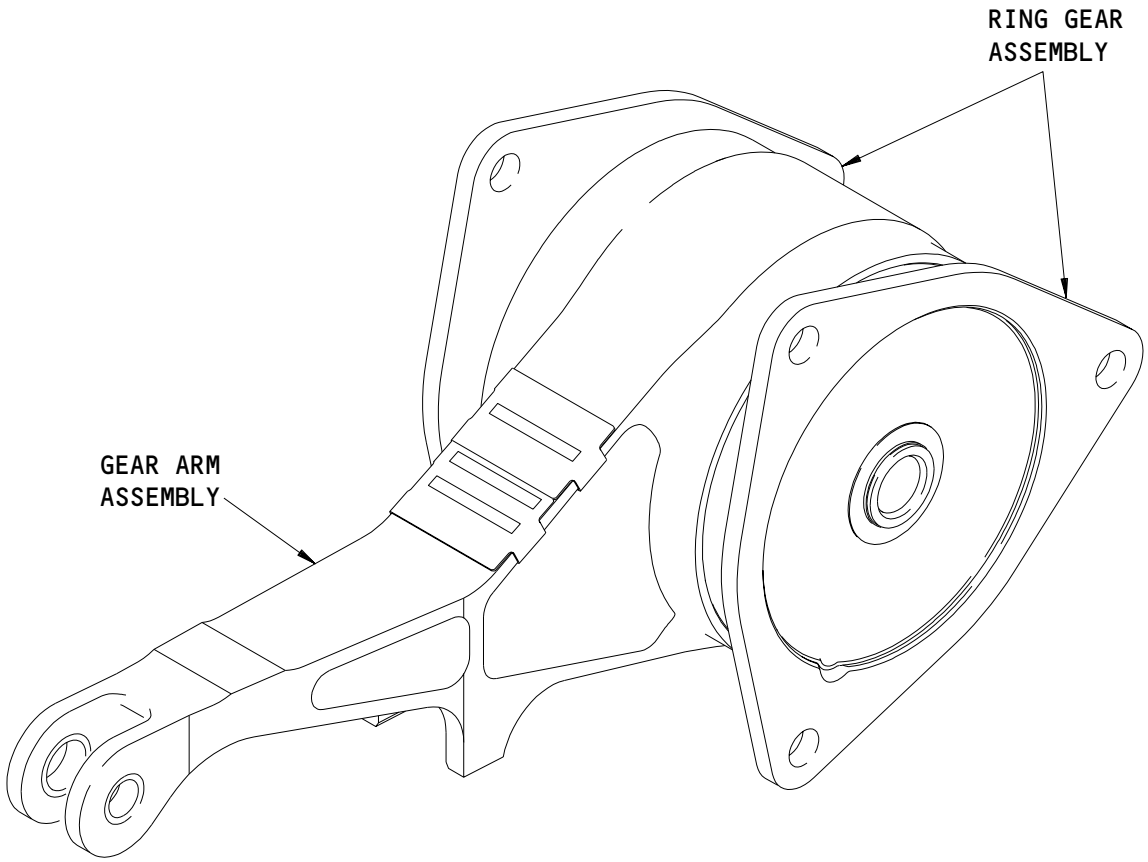
   A. Length -- 13 inches (256T5120-1, -3)
                8 inches (256T5120-2)

   B. Width -- 4 inches

   C. Depth -- 6 inches

   D. Weight -- 10.5 pounds

   E. Total gear ratio -- (-) 42.7:1

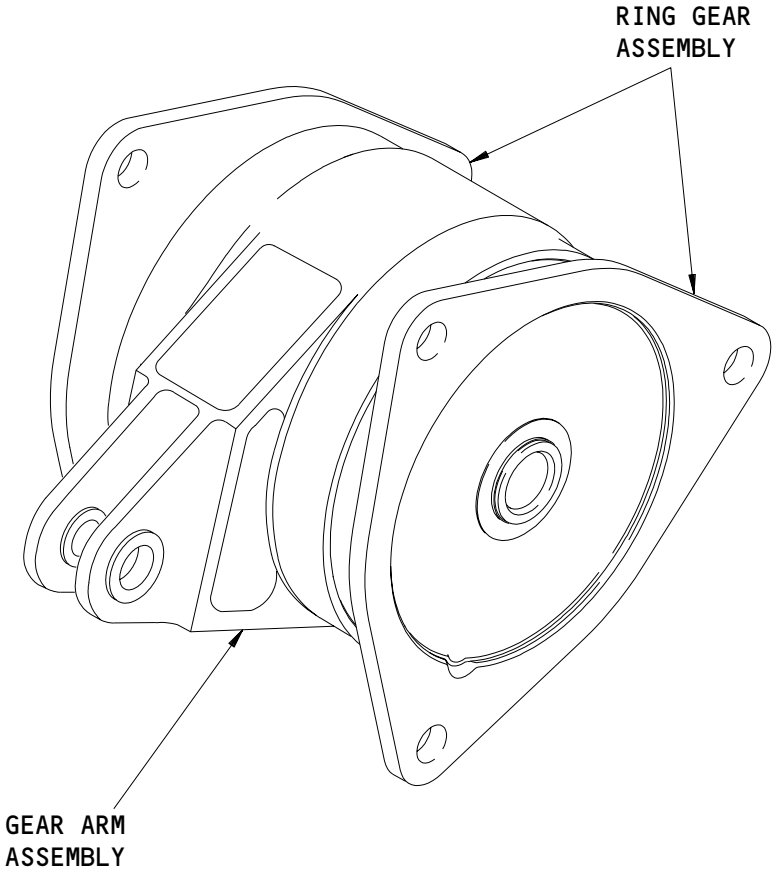



256T5120-1,-3

Outboard Leading Edge Slat Drive Rotary Actuator Assembly
Figure 1 (Sheet 1)



KD7162




256T5120-2

Outboard Leading Edge Slat Drive Rotary Actuator Assembly
Figure 1 (Sheet 2)



M31835

## TESTING AND FAULT ISOLATION

1. General

   A. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

   B. Refer to IPL Fig. 1 for item numbers.

2. Testing and Fault Isolation

   A. Special Tools and Equipment

      NOTE: Equivalent tools or equipment can be used.

      (1) A27070-65 -- Assembly Equipment (Includes -62 assembly tool, -24 backlash test fixture, -56 input crank, -46 and -68 bushings, and a force gauge)

   B. Do a backlash check.

      (1) Install the rotary actuator assembly in the A27070-24 backlash test fixture. Attach the force gauge to the gear arm assembly (65, 67) with the A27070-46 or -68 bushing.

      (2) Hold the sun gear (60) with the A27070-56 input crank so that it does not turn.

      (3) On assemblies 256T5120-1, -3, apply a 120-pound force perpendicular to the gear arm assembly (65) at the clevis holes.

      (4) On assembly 256T5120-2, apply a 290-pound force perpendicular to the gear arm assembly (67) at the clevis holes.

      (5) Align the dial indicator with the applied load, and set the indicator to zero.

      (6) Reduce the load to zero and apply the 120- or 290-pound force in the opposite direction.

      (7) On assemblies 256T5120-1, -3, measure the movement of the gear arm assembly (65) with the dial indicator. If the gear arm moves more than 0.140 inch (0.117 inch for a new or overhauled unit), disassemble the unit and repair or replace parts, as necessary.

(8) On assembly 256T5120-2, measure the movement of the gear arm assembly (67) with the dial indicator. If the gear arm moves more than 0.058 inch (0.048 inch for a new or overhauled unit), disassemble the unit and repair or replace parts, as necessary.

C. Do a check of the no-load input torque.

(1) Disconnect the force gauge from the gear arm clevis so that the rotary actuator assembly is free to turn.

(2) Use the A27070-56 input crank to turn the sun gear (60) through a minimum of 2 full turns in each direction. Make sure that the input torque necessary to turn the sun gear is not more that 8.0 pound-inches.

(3) If the unit does not turn smoothly, or if the input torque is too much, disassemble the unit and repair or replace parts, as necessary.

# DISASSEMBLY

1. General

   A. This procedure has the data necessary to disassemble the rotary actuator assembly.

   B. Disassemble this component sufficiently to isolate the defects, do the necessary repairs, and put the component back to a serviceable condition.

   C. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

   D. Refer to IPL Fig. 1 for item numbers.

2. Disassembly

   A. Parts Replacement (Ref IPL Fig. 1)

      NOTE: The parts which follow are recommended for replacement. Unless a procedure tells you to replace a part, replacement is optional.

      (1) Retaining ring (5)

      (2) Omniseal (30)

   B. Procedure

      (1) Remove the retaining rings (5) and washers (10).

      (2) Remove the ring gear assemblies (15) and the Omniseals (30).

         NOTE: Do not remove the end covers (25) from the ring gears unless it is necessary for repair or replacement.

      (3) Remove the flanged bearings (50).

(4) Remove the planet gear assemblies (35) or planet gears (47), and the sun gear (60), from the gear arm assembly (65, 67).

NOTE: Do not remove the markers (90, 95, 100, 105), DU bearings (70), or bushings (75, 77, 80, 82) from the gear arm unless it is necessary for repair or replacement.

(5) Remove the cork plugs (40) from the planet gear assemblies (35).

NOTE: Corrosion can occur in the planet gear bores. To decrease the risk of corrosion, we recommend that the cork plugs be removed and not be replaced.

(6) Remove the planet rings (55) from the sun gear (60).

# CLEANING

1. General

   A. This procedure has the data necessary to clean the rotary actuator assembly.

   B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

   C. Refer to IPL Fig. 1 for item numbers.

2. Cleaning

   A. References

      (1) SOPM 20-30-03, General Cleaning Procedures

   B. Procedure

      (1) Use standard industry procedures and refer to SOPM 20-30-03 to clean all parts.

CHECK

1. General

   A. This procedure has the data necessary to find defects in the material of the specified parts.

   B. Refer to FITS AND CLEARANCES for the design dimension and wear limits.

   C. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

   D. Refer to IPL Fig. 1 for item numbers.

2. Check

   A. References

      (1) SOPM 20-20-01, Magnetic Particle Inspection

      (2) SOPM 20-20-02, Penetrant Methods of Inspection

   B. Procedure

      (1) Use standard industry procedures to do a visual check of all the parts for defects. Do the penetrant or magnetic particle check if the visual check shows possible damage or if you suspect possible damage on the parts listed below:

      (2) Do a magnetic particle check (SOPM 20-20-01) of these parts:

         (a) Ring gear (20)

         (b) Planet gear (45, 47)

         (c) Planet ring (55)

         (d) Sun gear (60)

         (e) Gear arm (85, 87)

      (3) Do a penetrant check (SOPM 20-20-02) of these parts:

         (a) End cover (25)

(4) Do a visual check of the gear teeth and the splines for signs of too much wear, pitting, or other damage. Make sure that the center of the contact pattern is approximately at the center of the gear tooth faces. Replace the part if the visual check is not satisfactory.

(5) Do a check of the wear on the gear teeth. Refer to FITS AND CLEARANCES for the diameters of the pins in the procedures that follow, and for the wear limits.

(a) Sun gear (60), planet gear (45, 47) -- Put pins between the teeth on opposite sides of the gear and measure the distance over the pins.

(b) Ring gear (15), gear arm (65, 67) -- Put pins between the teeth on opposite sides of the gear and measure the distance between the pins.

(6) Do a check of the DU bearings (70). Make sure that the teflon surface is not scratched or damaged.

REPAIR - GENERAL

1. General

A. Instructions for repair, refinish, and replacement of the specified subassembly parts are included in each REPAIR when applicable:

| PART NUMBER | NAME | REPAIR |
|---|---|---|
| --- | REFINISH OF OTHER PARTS | 1-1 |
| 256T2151 | GEAR, RING | 2-1, 2-2 |
| 256T2153 | GEAR, SUN | 3-1 |
| 256T2150<br>256T2161<br>256T5121 | ARM, GEAR | 4-1, 4-2 |
| 256T5122 | GEAR, PLANET | 5-1 |
| 256T5124 | MARKER | 6-1 |

2. Dimensioning Symbols

A. Standard True Position Dimensioning Symbols used in the applicable repair procedures are shown in Fig. 601.

| | |
|---|---|
| — | STRAIGHTNESS |
| ▱ | FLATNESS |
| ⊥ | PERPENDICULARITY (OR SQUARENESS) |
| // | PARALLELISM |
| ○ | ROUNDNESS |
| ⌭ | CYLINDRICITY |
| ⌒ | PROFILE OF A LINE |
| ⌓ | PROFILE OF A SURFACE |
| ◎ | CONCENTRICITY |
| ⌯ | SYMMETRY |
| ∠ | ANGULARITY |
| ↗ | RUNOUT |
| ⌰ | TOTAL RUNOUT |
| ⌴ | COUNTERBORE OR SPOTFACE |
| ⌵ | COUNTERSINK |
| ⌖ | THEORETICAL EXACT POSITION OF A FEATURE (TRUE POSITION) |
| ∅ | DIAMETER |
| S ∅ | SPHERICAL DIAMETER |
| R | RADIUS |
| SR | SPHERICAL RADIUS |
| () | REFERENCE |
| BASIC (BSC) OR [DIM] | A THEORETICALLY EXACT DIMENSION USED TO DESCRIBE SIZE, SHAPE OR LOCATION OF A FEATURE. FROM THIS FEATURE PERMISSIBLE VARIATIONS ARE ESTABLISHED BY TOLERANCES ON OTHER DIMENSIONS OR NOTES. |
| [-A-] | DATUM |
| Ⓜ | MAXIMUM MATERIAL CONDITION (MMC) |
| Ⓛ | LEAST MATERIAL CONDITION (LMC) |
| Ⓢ | REGARDLESS OF FEATURE SIZE (RFS) |
| Ⓟ | PROJECTED TOLERANCE ZONE |
| FIM | FULL INDICATOR MOVEMENT |

## EXAMPLES

| | |
|---|---|
| — 0.002 | STRAIGHT WITHIN 0.002 |
| ⊥ 0.002 B | PERPENDICULAR TO DATUM B WITHIN 0.002 |
| // 0.002 A | PARALLEL TO DATUM A WITHIN 0.002 |
| ○ 0.002 | ROUND WITHIN 0.002 |
| ⌭ 0.010 | CYLINDRICAL SURFACE MUST LIE BETWEEN TWO CONCENTRIC CYLINDERS, ONE OF WHICH HAS A RADIUS 0.010 INCH GREATER THAN THE OTHER |
| ⌒ 0.006 A | EACH LINE ELEMENT OF THE SURFACE AT ANY CROSS SECTION MUST LIE BETWEEN TWO PROFILE BOUNDARIES 0.006 INCH APART RELATIVE TO DATUM A |
| ⌓ 0.020 A | SURFACES MUST LIE WITHIN PARALLEL BOUNDARIES 0.020 INCH APART AND EQUALLY DISPOSED ABOUT TRUE PROFILE |
| ◎ ∅ 0.0005 C | CONCENTRIC TO DATUM C WITHIN 0.0005 DIAMETER |
| ⌯ 0.010 A | SYMMETRICAL WITH DATUM A WITHIN 0.010 |
| ∠ 0.005 A | ANGULAR TOLERANCE 0.005 WITH DATUM A |
| ⌖ ∅ 0.002 Ⓢ B | LOCATED AT TRUE POSITION WITHIN 0.002 DIA RELATIVE TO DATUM B, REGARDLESS OF FEATURE SIZE |
| ⊥ ∅ 0.010 Ⓜ A<br>0.510 Ⓟ | AXIS IS TOTALLY WITHIN A CYLINDER OF 0.010 INCH DIAMETER, PERPENDICULAR TO DATUM A, AND EXTENDING 0.510 INCH ABOVE DATUM A, MAXIMUM MATERIAL CONDITION |
| [2.000]<br>OR<br>2.000<br>BSC | THEORETICALLY EXACT DIMENSION IS 2.000 |

True Position Dimensioning Symbols
Figure 601



KD7064

## REFINISH OF OTHER PARTS - REPAIR 1-1

1. General

   A. This procedure has the data necessary to refinish the parts which are not given in the specified repairs.

   B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

   C. Refer to IPL Fig. 601 for item numbers.

2. Refinish of Other Parts

   A. General

      (1) Instructions for the repair of the parts listed in Table 601 are for repair of the initial finish.

   B. Consumable Materials

      NOTE: Equivalent material can be used.

      (1) C00259 Primer -- BMS 10-11, type 1 (SOPM 20-60-02)

   C. References

      (1) SOPM 20-30-02, Stripping of Protective Finishes

      (2) SOPM 20-41-01, Decoding Table for Boeing Finish Codes

      (3) SOPM 20-41-02, Application of Chemical and Solvent Resistant Finishes

      (4) SOPM 20-42-02, Low Hydrogen Embrittlement Cadmium-Titanium Alloy Plating

      (5) SOPM 20-42-05, Bright Cadmium Plating

      (6) SOPM 20-43-01, Chromic Acid Anodizing

      (7) SOPM 20-60-02, Finishing Materials

D. Procedure

| IPL FIG. & ITEM | MATERIAL | FINISH |
|---|---|---|
| IPL Fig. 1 | | |
| Washer (10) | Aluminum alloy | Chromic acid anodize (F-17.04) and apply BMS 10-11, type 1 primer (F-20.02) all over. |
| End cover (25) | 17-7PH CRES, TH1100 | Cadmium plate (F-15.06) and apply BMS 10-11, type 1 primer (F-20.02) all over, but do not apply primer on the 0.938-0.941 inch ID surface. |
| Planet ring (55) | 4340M steel, 275-300 ksi | Cadmium-titanium plate (F-15.32). |
| DU bearing (70) | Steel (OD) | Tin flash plate OD, to a thickness of not more than 0.0002 inch. |

Refinish Details
Table 601

RING GEAR ASSEMBLY - REPAIR 2-1

256T2151-10

1. General

A. This procedure has the data necessary to repair the ring gear assembly (15).

B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

C. Refer to the REPAIR - GENERAL (27-81-54/601, REPAIR - GENERAL) for the Standard True Position Dimensioning Symbols shown in the repair.

D. Refer to IPL Fig. 1 for item numbers.

E. General repair details:

(1) Material: 4340M steel, 275-300 ksi

(2) Shot peen: All repaired surfaces, except in bore
Shot size -- 170 (Hard shot, Rc 55-65)
Intensity -- 0.006A
Coverage -- 2.0

2. End Cover Replacement (IPL Fig. 1) (Fig. 601)

A. Consumable Materials

NOTE: Equivalent material can be used.

(1) A00247 Sealant -- BMS 5-95 (SOPM 20-60-04)

B. References

(1) SOPM 20-41-01, Decoding Table for Boeing Finish Codes

(2) SOPM 20-50-03, Bearing and Bushing Replacement

(3) SOPM 20-50-10, Application of Stencils, Silk Screen, Part Numbering and Identification Markings

(4) SOPM 20-60-04, Miscellaneous Materials

C. Procedure

(1) Remove the end cover (25) from the ring gear (20).

(2) Install the replacement end cover (25) with wet sealant.

(3) Stamp arrow and OFFSET HOLE as shown (Fig. 601). Refer to SOPM 20-50-10. Make sure the arrow points to the offset hole, located at a 2.620 inch radius from the center of the gear.

(4) Fill the gap between the end cover (25) and the ring gear (20) at the index notch with sealant.

(5) Remove sealant from the gear teeth.

3. Mounting Hole Repair (IPL Fig. 1) (Fig. 602)

A. Consumable Materials

NOTE: Equivalent material can be used.

(1) A00247 Sealant -- BMS 5-95 (SOPM 20-60-04)

B. References

(1) SOPM 20-10-02, Machining of Alloy Steel

(2) SOPM 20-20-01, Magnetic Particle Inspection

(3) SOPM 20-41-01, Decoding Table for Boeing Finish Codes

(4) SOPM 20-42-10, Low Hydrogen Embrittlement Stylus Cadmium Plating

(5) SOPM 20-42-05, Bright Cadmium Plating

(6) SOPM 20-42-10, Low Hydrogen Embrittlement Stylus Cadmium Plating

(7) SOPM 20-50-03, Bearing and Bushing Replacement

(8) SOPM 20-60-04, Miscellaneous Materials

C. Procedure

(1) Machine the ring gear (20) mounting holes as necessary, within the repair limit shown, to remove defects. Refer to SOPM 20-10-02.

(2) Chamfer the edges of the holes 0.05 inch x 45 degrees.

(3) Do a magnetic particle check of the machined surface. Refer to SOPM 20-20-01.

(4) Stylus cadmium plate the holes. Refer to SOPM 20-42-10.

(5) Make a repair bushing from 4340M steel or 17-4PH CRES, as shown in Fig. 602. Refer to SOPM 20-10-02.

(6) Cadmium-titanium plate the bushing. Refer to SOPM 20-42-02. Optional: cadmium plate the bushing (17-4PH CRES only). Refer to SOPM 20-42-05.

(7) Install the repair bushing with sealant. Use the shrink-fit procedure. Refer to SOPM 20-50-03.

(8) If there is too much sealant after installation of the bushing, remove that quantity of sealant. Remove sealant from adjacent surfaces.

(9) Machine the ID of the bushing to the design dimension, if necessary. Refer to SOPM 20-10-02.

(10) If you machine the bushing after installation, stylus cadmium plate the bushing ID. Refer to SOPM 20-42-10.

4. DU Bearing and Omniseal Journal Repair (IPL Fig. 1) (Fig. 602)

A. References

(1) SOPM 20-10-02, Machining of Alloy Steel

(2) SOPM 20-10-03, Shot Peening

(3) SOPM 20-10-04, Grinding of Chrome Plated Parts

(4) SOPM 20-20-01, Magnetic Particle Inspection

(5) SOPM 20-42-03, Hard Chrome Plating

B. Procedure

(1) Machine the DU bearing and Omniseal journal on the ring gear (20) as necessary, within the repair limits shown, to remove defects. Refer to SOPM 20-10-02.

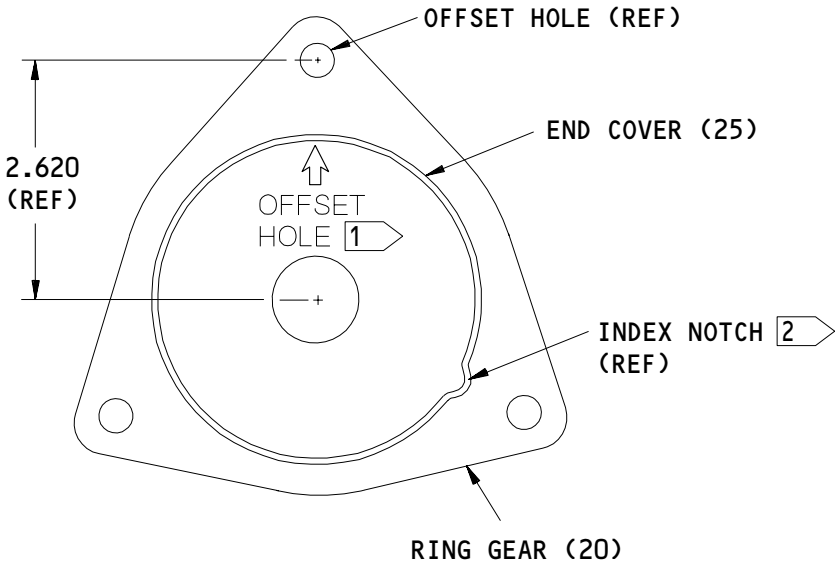
(2) Do a magnetic particle check of the machined surface. Refer to SOPM 20-20-01.

(3) Shot peen the machined surface. Refer to SOPM 20-10-03.

(4) Chrome plate the machined surface, but do not chrome plate the fillet radii or the edges of the part. Refer to SOPM 20-42-03.

(5) Grind to the design dimensions and finish shown. Make sure that the thickness of the chrome plate is not more than 0.015 inch after you grind the part. The chrome plate runout must be 0.015-0.030 inch long, and stop at the edges of the machined surface. Refer to SOPM 20-10-04.

(6) Do a magnetic particle check of the repaired surface. Refer to SOPM 20-20-01.




1 STAMP ARROW AND "OFFSET HOLE" AS SHOWN

2 FILL IN GAP AT INDEX NOTCH WITH SEALANT

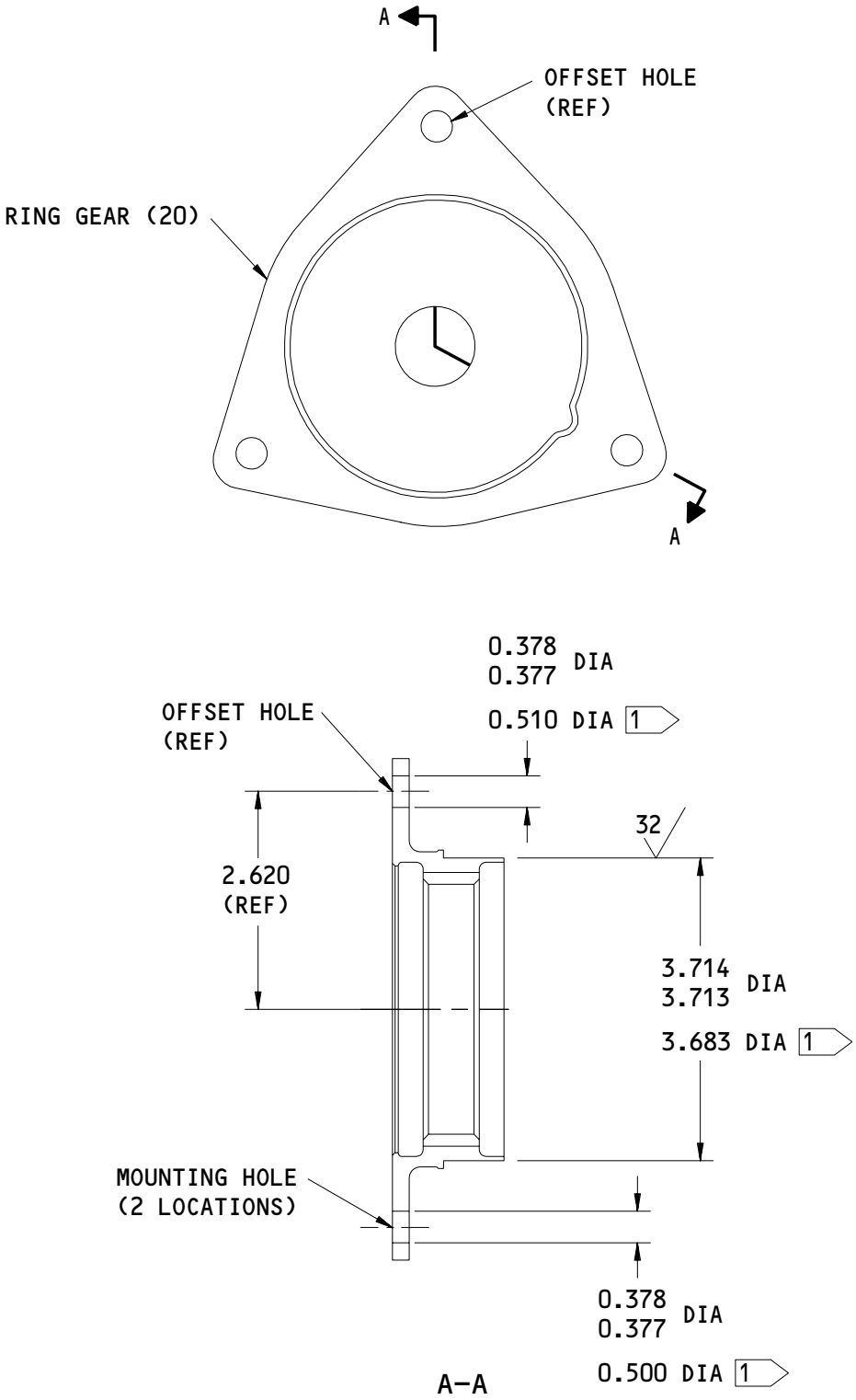
ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

256T2151-10
Ring Gear Assembly - End Cover Replacement
Figure 601



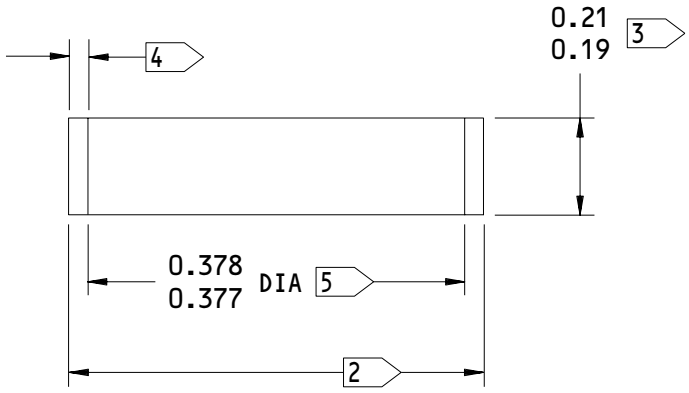
K19305




256T2151-10
Ring Gear Assembly Repair
Figure 602 (Sheet 1)



K19322




REPAIR BUSHING

1 > REPAIR LIMIT

2 > THE OUTSIDE DIAMETER OF THE BUSHING AFTER THE CADMIUM-TITANIUM PLATE IS EQUAL TO THE INSIDE DIAMETER OF THE HOLE IN THE RING GEAR PLUS THE INTERFERENCE OF 0.0005 TO 0.0010

3 > THE BUSHING HEIGHT IS EQUAL TO THE FLANGE THICKNESS MINUS 0.000 TO 0.010

4 > 0.03 MINIMUM WALL THICKNESS

5 > MACHINE TO DESIGN DIMENSION AFTER INSTALLATION, IF NECESSARY

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL (REPAIR BUSHING):
4340M STEEL OR 17-4PH CRES,
180-200 KSI

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

256T2151-10
Ring Gear Assembly Repair
Figure 602 (Sheet 2)



K19333

# RING GEAR - REPAIR 2-2

256T2151-11

## 1. General

A. This procedure has the data necessary to refinish the ring gear (20).

B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

C. Refer to the REPAIR - GENERAL (27-81-54/601, REPAIR - GENERAL) for the Standard True Position Dimensioning Symbols shown in the repair.

D. Refer to IPL Fig. 1 for item numbers.

E. General repair details:

(1) Material: 4340M steel, 275-300 ksi

## 2. Refinish

A. Consumable Materials

NOTE: Equivalent material can be used.

(1) C00259 Primer -- BMS 10-11, Type 1 (SOPM 20-60-02)

B. References

(1) SOPM 20-30-02, Stripping of Protective Finishes

(2) SOPM 20-41-01, Decoding Table For Boeing Finish Codes

(3) SOPM 20-41-02, Application of Chemical and Solvent Resistant Finishes

(4) SOPM 20-42-02, Low Hydrogen Embrittlement Cadmium-Titanium Alloy Plating

(5) SOPM 20-42-03, Hard Chrome Plating

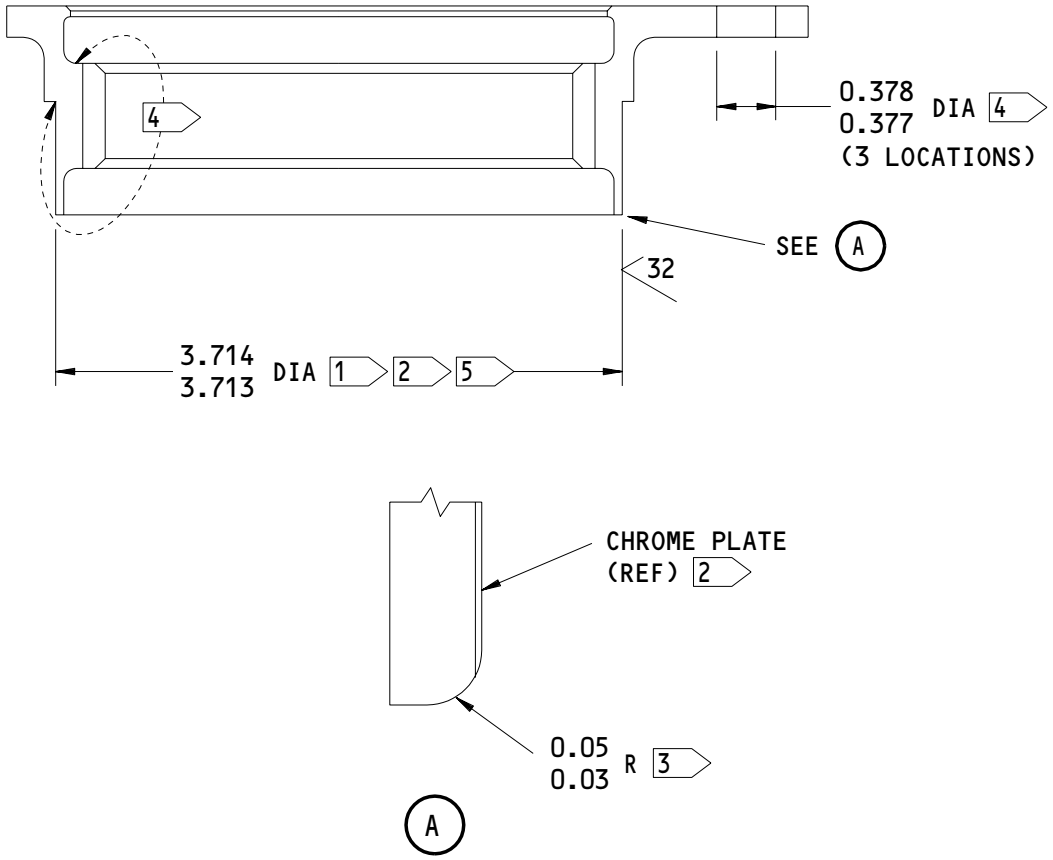
(6) SOPM 20-60-02, Finishing Materials

C. Procedure (Fig. 601)

(1) Cadmium-titanium plate (F-15.32), but not on the 3.713-3.714 inch diameter surface shown in Fig. 601.

(2) Apply thin dense chrome plate (minimum Rc 67), 0.0003-0.0005 inch thick, on the surfaces shown in Fig. 601. Refer to SOPM 20-42-03, class 4. Wipe the plating with primer (F-19.45).

(3) Apply BMS 10-11, type 1 primer (F20.03), but not on the surfaces shown in Fig. 601.




1 NO CADMIUM-TITANIUM PLATE ON THIS DIAMETER

2 APPLY THIN DENSE CHROME PLATE AND WIPE THE PLATING WITH PRIMER (F-19.45) ON THIS AREA

3 RADIUS MUST HAVE NO SHARP EDGES AND MUST BLEND SMOOTHLY WITH ADJACENT SURFACES

4 NO PRIMER (F-20.03) ON THESE SURFACES

5 DIMENSIONS APPLY BEFORE THE CHROME PLATE IS APPLIED

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

256T2151-11
Ring Gear Refinish
Figure 601



K19353

SUN GEAR - REPAIR 3-1

256T2153-4

1. General

A. This procedure has the data necessary to repair and refinish the sun gear (60).

B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

C. Refer to the REPAIR - GENERAL (27-81-54/601, REPAIR - GENERAL) for the Standard True Position Dimensioning Symbols shown in the repair.

D. Refer to IPL Fig. 1 for item numbers.

E. General repair details:

(1) Material: 4340M steel, 275-300 ksi

(2) Shot peen: All repaired surfaces, except in bore
Shot size -- 170 (Hard shot, Rc 55-65)
Intensity -- 0.006A
Coverage -- 2.0

2. Rulon Flanged Bearing Journal Repair (IPL Fig. 1) (Fig. 601)

A. References

(1) SOPM 20-10-02, Machining of Alloy Steel

(2) SOPM 20-10-03, Shot Peening

(3) SOPM 20-10-04, Grinding of Chrome Plated Parts

(4) SOPM 20-20-01, Magnetic Particle Inspection

(5) SOPM 20-42-03, Hard Chrome Plating

B. Procedure

(1) Machine the journal on the sun gear (60) for the Rulon flanged bearing (50) as necessary, within the repair limits shown, to remove defects. Refer to SOPM 20-10-02.

(2) Do a magnetic particle check of the machined surface. Refer to SOPM 20-20-01.

(3) Shot peen the machined surface. Refer to SOPM 20-10-03.

(4) Chrome plate the machined surface, but do not chrome plate the fillet radii or the edges of the part. Refer to SOPM 20-42-03.

(5) Grind to the design dimensions and finish shown. Make sure that the thickness of the chrome plate is not more than 0.015 inch after you grind the part. The chrome plate runout must be 0.015-0.030 inch long, and stop at the edges of the machined surface. Refer to SOPM 20-10-04.

(6) Do a magnetic particle check of the repaired surface. Refer to SOPM 20-20-01.

3. Refinish

A. Consumable Materials

NOTE: Equivalent material can be used.

(1) C00259 Primer -- BMS 10-11, type 1 (SOPM 20-60-02)

(2) G00508 Compound -- Corrosion Preventive, MIL-C-11796, Class 1 (SOPM 20-60-02)

B. References

(1) SOPM 20-30-02, Stripping of Protective Finishes

(2) SOPM 20-41-01, Decoding Table For Boeing Finish Codes

(3) SOPM 20-42-02, Low Hydrogen Embrittlement Cadmium-Titanium Alloy Plating

(4) SOPM 20-41-03, Application of Corrosion Preventives to Interior of Closed End Tubes

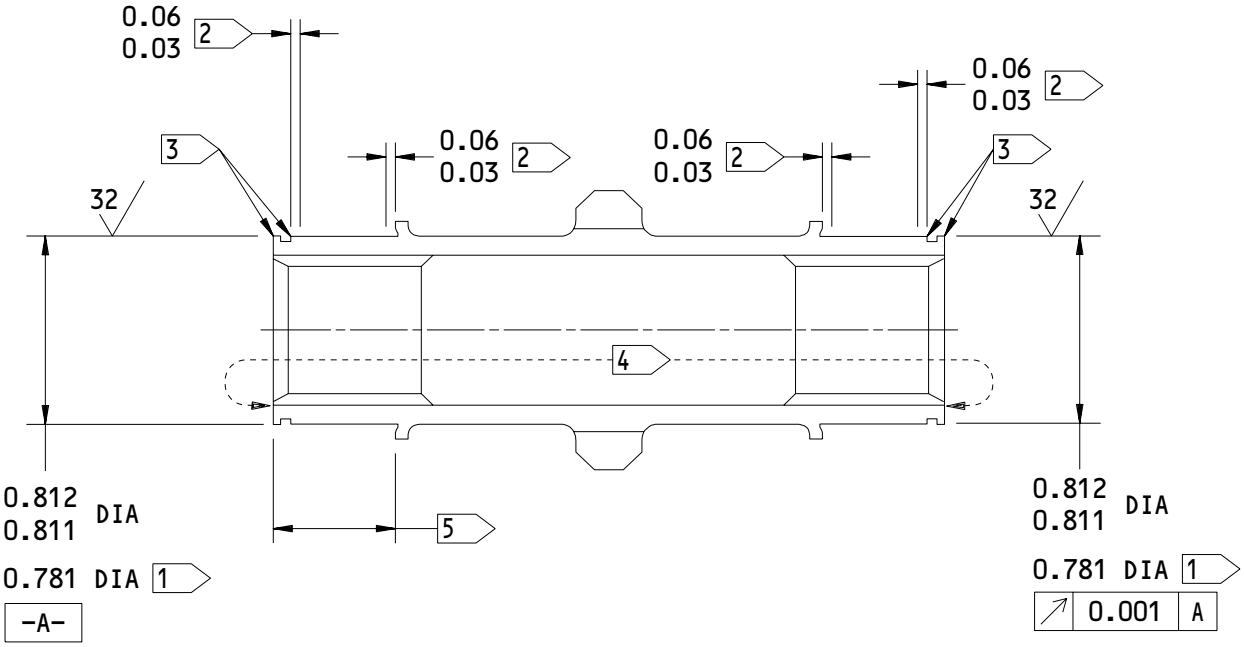
(5) SOPM 20-60-02, Finishing Materials

(6) BAC 5810, Phosphating (Boeing Process Specification)

C. Procedure

(1) Cadmium-titanium plate, 0.0005-0.0007 inch thick, all over, but not on the surfaces shown in Fig. 601. Refer to 20-40-02. Apply phosphate treatment, type III. Refer to BAC 5810.

(2) Apply MIL-C-11796 class 1 corrosion preventive compound (F-19.03) on the surface of the bore as shown in Fig. 601.




1 REPAIR LIMIT

2 CHROME PLATE RUNOUT AREA

3 DO NOT MACHINE OR CHROME PLATE THIS AREA DURING REPAIR

4 APPLY CORROSION PREVENTIVE COMPOUND ON THIS AREA

5 NO CADMIUM-TITANIUM PLATE THIS AREA. APPLY THIN DENSE CHROME PLATE AND WIPE THE PLATING WITH PRIMER (F-19.45). DIMENSIONS APPLY BEFORE THE CHROME PLATE IS APPLIED

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

256T2153-4
Sun Gear Repair
Figure 601

K19398

# GEAR ARM ASSEMBLY - REPAIR 4-1

256T2150-7
256T2161-3
256T5121-1

1. General

   A. This procedure has the data necessary to repair the gear arm assembly (65).

   B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

   C. Refer to the REPAIR - GENERAL (27-81-54/601, REPAIR - GENERAL) for the Standard True Position Dimensioning Symbols shown in the repair.

   D. Refer to IPL Fig. 1 for item numbers.

   E. General repair details:

      (1) Material: 4340M steel, 270-300 ksi

2. DU Bearing Replacement

   A. Special Tools and Equipment

      NOTE: Equivalent tools or equipment can be used.

      (1) A27070-80 -- Bearing Installation Equipment (replaces A27070-48)

   B. Procedure

      (1) Remove the DU bearing (70).

      (2) Use the bearing installation equipment A27070-80 to install the replacement DU bearing. Make sure that the bearing split line is located as shown in Fig. 601.

      (3) Make sure that the difference between the inner diameters of the installed DU bearings is not more than 0.002 inch.

3. Bushing Replacement

A. Consumable Materials

NOTE: Equivalent material can be used.

(1) A00247 Sealant -- BMS 5-95 (SOPM 20-60-04)

B. References

(1) SOPM 20-10-02, Machining of Alloy Steel

(2) SOPM 20-41-01, Decoding Table for Boeing Finish Codes

(3) SOPM 20-50-03, Bearing and Bushing Replacement

C. Procedure

(1) Remove the bushing (75, 77, 80, 82) from the gear arm (85, 87).

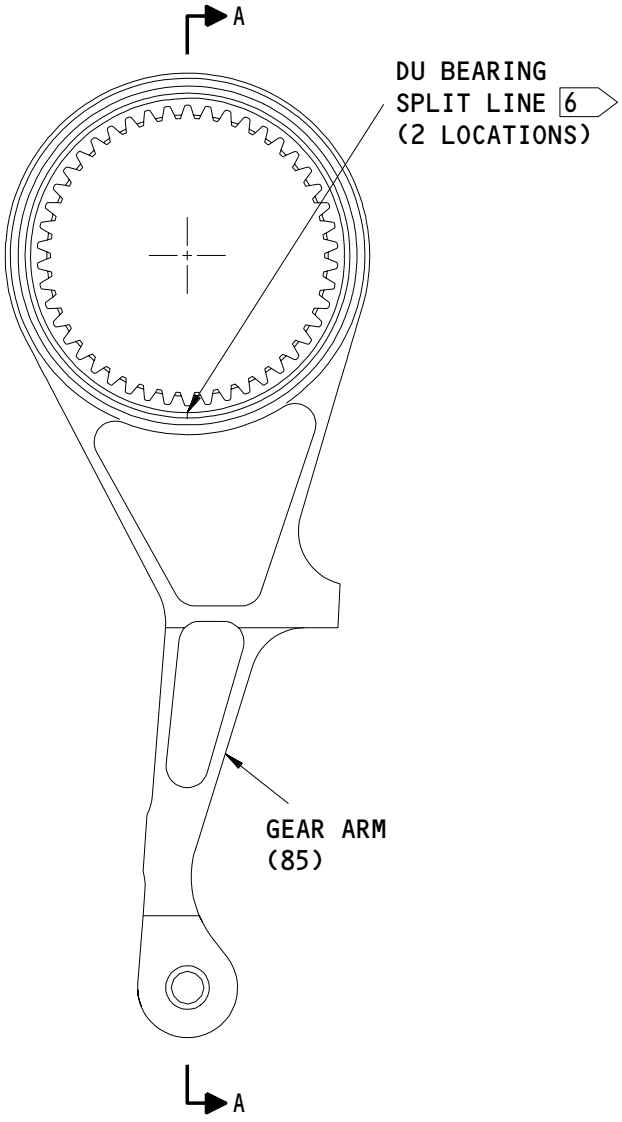
CAUTION: AN OVERSIZE BUSHING CAN BE INSTALLED IN THE GEAR ARM. DO NOT INSTALL A STANDARD REPLACEMENT BUSHING (75, 77, 80, 82) IN AN OVERSIZE HOLE, OR THE INTERFERENCE FIT WILL BE INCORRECT.

(2) Measure the hole diameter for the bushing (75, 77, 80, 82). If the diameter is more than the design diameter as shown in Fig. 601 or 602, get an oversize bushing as shown in Table A or B.

(3) Install the replacement bushing (75, 77, 80, 82) with wet sealant. Refer to SOPM 20-50-03.

(4) Machine the bushing ID to the design dimensions and finish shown in Fig. 601 or 602.

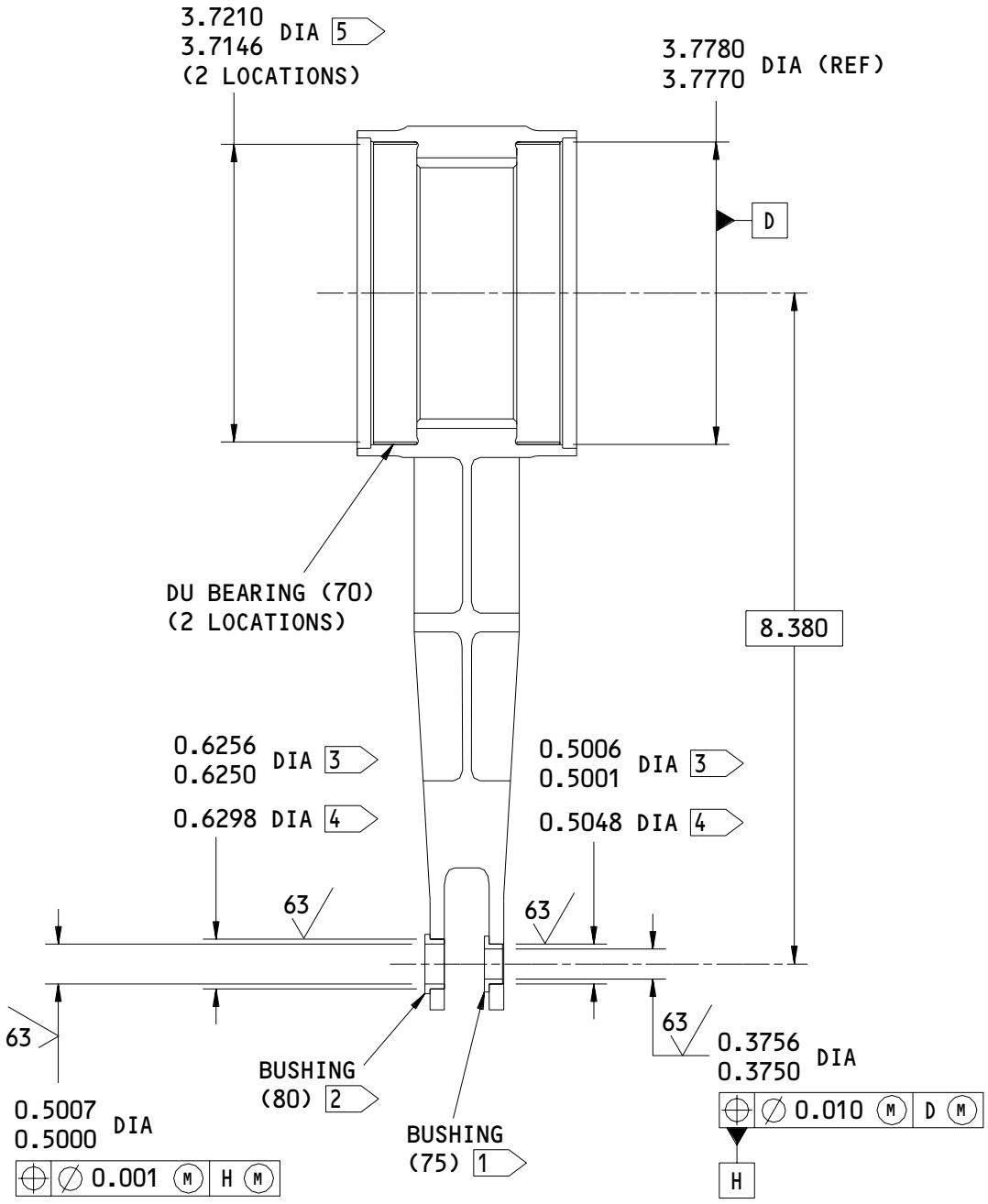
(5) Fillet seal the bushing with sealant.




256T5121-1
Gear Arm Assembly - Parts Replacement and Repair
Figure 601 (Sheet 1)



K19434




A–A

256T5121-1
Gear Arm Assembly – Parts Replacement and Repair
Figure 601 (Sheet 2)



K19437

| OVERSIZE HOLE DIAMETER IN GEAR ARM (85) | BUSHING PART NUMBER |
|---|---|
| 0.5013<br>0.5007 | 256T5125-1 |
| 0.5020<br>0.5014 | 256T5125-2 |
| 0.5027<br>0.5021 | 256T5125-3 |
| 0.5034<br>0.5028 | 256T5125-4 |
| 0.5041<br>0.5035 | 256T5125-5 |
| 0.5048<br>0.5042 | 256T5125-6 |

BUSHING (75) REPLACEMENT
TABLE A

| OVERSIZE HOLE DIAMETER IN GEAR ARM (85) | BUSHING PART NUMBER |
|---|---|
| 0.6263<br>0.6257 | 256T5126-1 |
| 0.6270<br>0.6264 | 256T5126-2 |
| 0.6277<br>0.6271 | 256T5126-3 |
| 0.6284<br>0.6278 | 256T5126-4 |
| 0.6291<br>0.6285 | 256T5126-5 |
| 0.6298<br>0.6292 | 256T5126-6 |

BUSHING (80) REPLACEMENT
TABLE B

1 INSTALL BUSHING FROM TABLE A, IF HOLE IS OVERSIZE

2 INSTALL BUSHING FROM TABLE B, IF HOLE IS OVERSIZE

3 DESIGN DIAMETER. HOLE CAN BE OVERSIZE

4 LIMIT FOR OVERSIZE BUSHING

5 DIFFERENCE BETWEEN INNER DIAMETERS OF DU BEARINGS TO BE 0.002 OR LESS

6 LOCATE SPLIT LINE AS SHOWN ±10 DEGREES

63 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

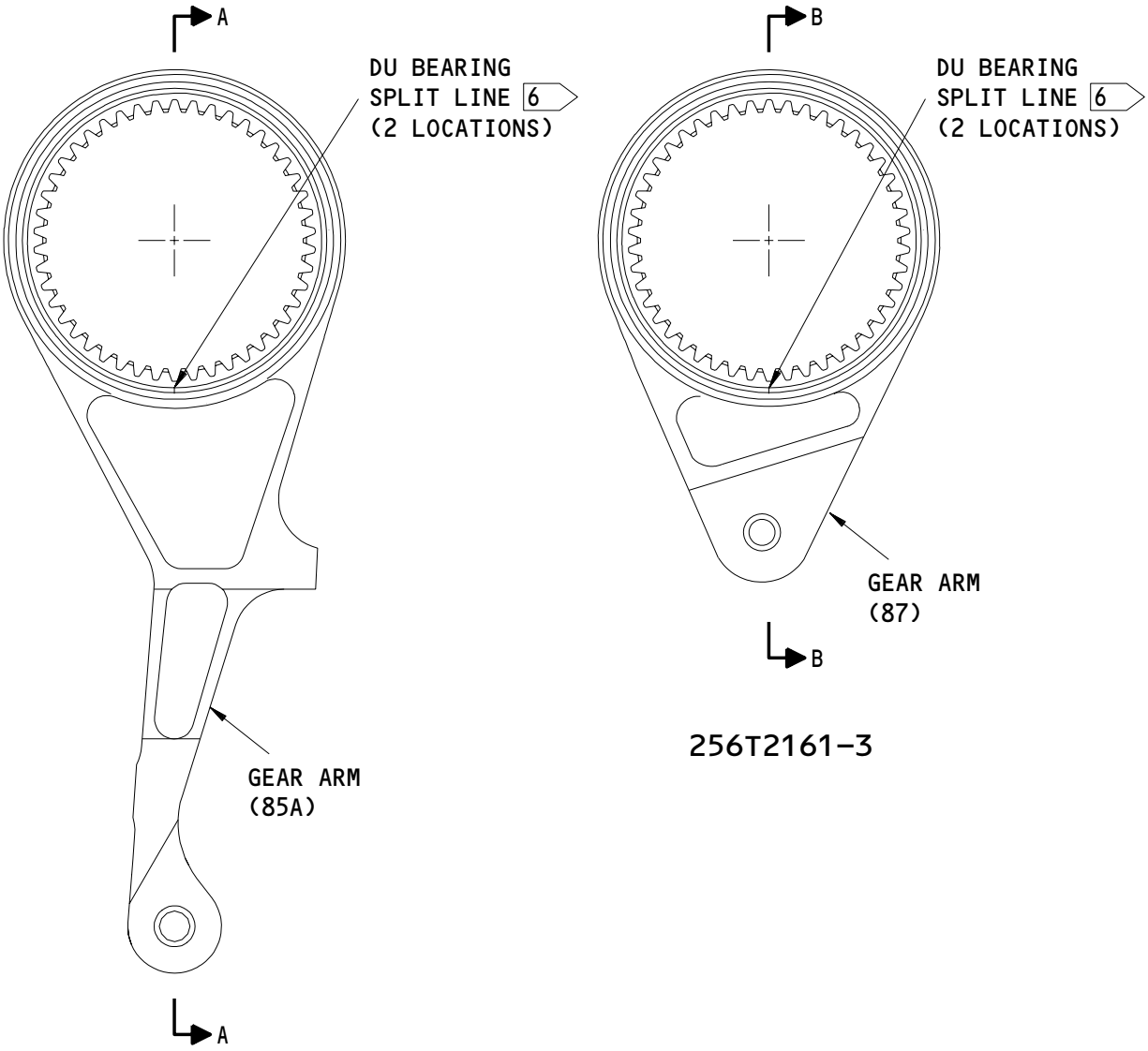
ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

256T5121-1
Gear Arm Assembly - Parts Replacement and Repair
Figure 601 (Sheet 3)



K19471



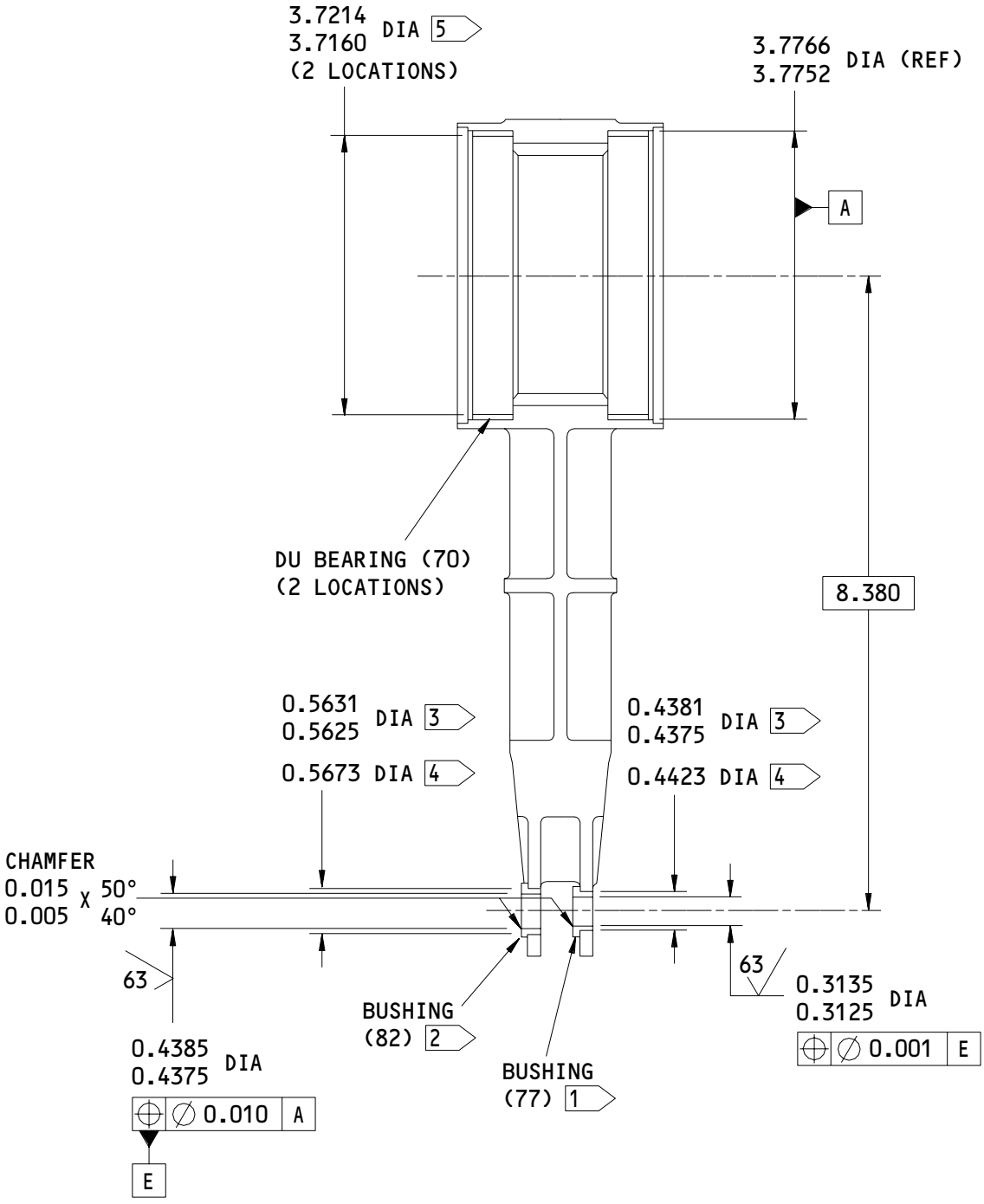

256T2161-3

256T2150-7

256T2150-7
256T2161-3
Gear Arm Assembly - Parts Replacement and Repair
Figure 602 (Sheet 1)



M31880

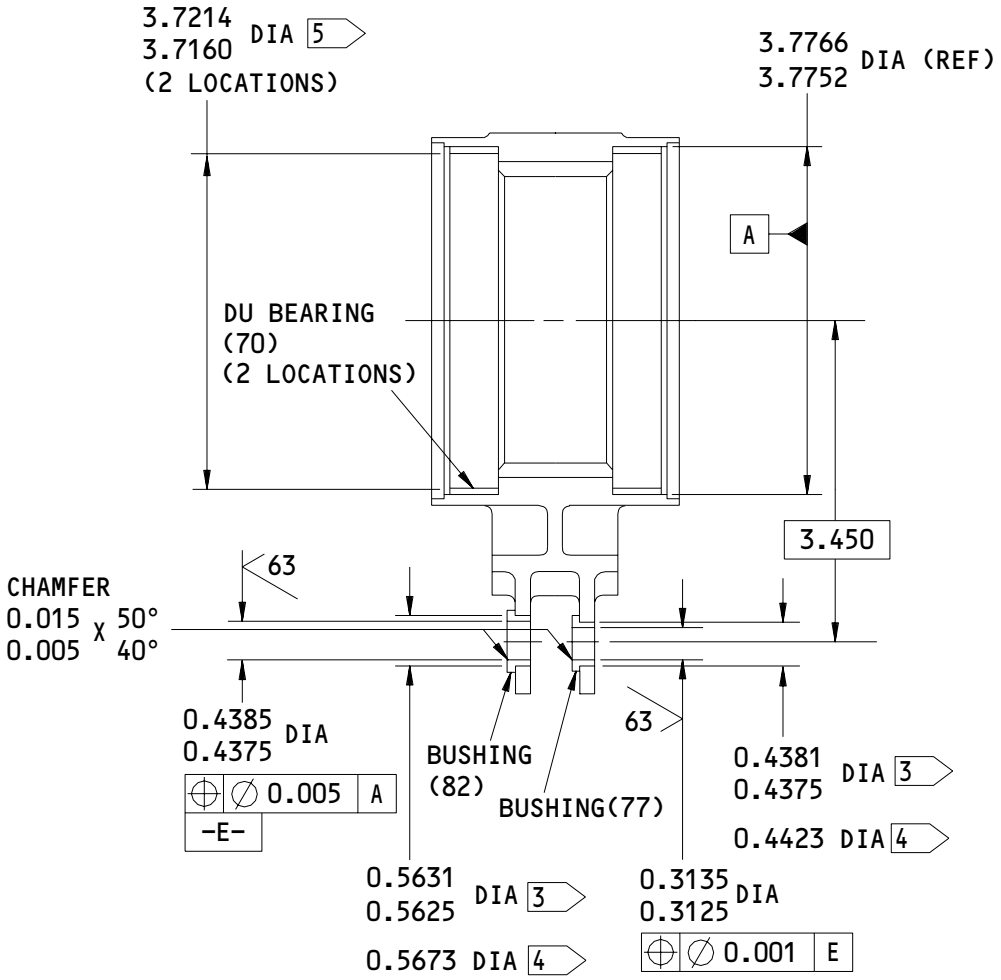



A–A

256T2150-7
256T2161-3
Gear Arm Assembly – Parts Replacement and Repair
Figure 602 (Sheet 2)



M31892




B–B

256T2150-7
256T2161-3
Gear Arm Assembly – Parts Replacement and Repair
Figure 602 (Sheet 3)

M31929

| OVERSIZE HOLE DIAMETER IN GEAR ARM (85A,87) | BUSHING PART NUMBER |
|---|---|
| 0.4388<br>0.4382 | 256T2166-1 |
| 0.4395<br>0.4389 | 256T2166-2 |
| 0.4402<br>0.4396 | 256T2166-3 |
| 0.4409<br>0.4403 | 256T2166-4 |
| 0.4416<br>0.4410 | 256T2166-4 |
| 0.4423<br>0.4417 | 256T2166-6 |

BUSHING (77) REPLACEMENT
TABLE A

| OVERSIZE HOLE DIAMETER IN GEAR ARM (85A,87) | BUSHING PART NUMBER |
|---|---|
| 0.5638<br>0.5632 | 256T2167-1 |
| 0.5645<br>0.5639 | 256T2167-2 |
| 0.5652<br>0.5646 | 256T2167-3 |
| 0.5659<br>0.5653 | 256T2167-4 |
| 0.5666<br>0.5660 | 256T2167-5 |
| 0.5673<br>0.5667 | 256T2167-6 |

BUSHING (82) REPLACEMENT
TABLE B

1 INSTALL BUSHING FROM TABLE A, IF HOLE IS OVERSIZE

2 INSTALL BUSHING FROM TABLE B, IF HOLE IS OVERSIZE

3 DESIGN DIAMETER. HOLE CAN BE OVERSIZE

4 LIMIT FOR OVERSIZE BUSHING

5 DIFFERENCE BETWEEN INNER DIAMETERS OF DU BEARINGS TO BE 0.002 OR LESS

6 LOCATE SPLIT LINE AS SHOWN ±10 DEGREES

63 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

256T2150-7
256T2161-3
Gear Arm Assembly - Parts Replacement and Repair
Figure 602 (Sheet 4)



M31955

GEAR ARM - REPAIR 4-2

256T2150-8
256T2161-4
256T5121-2

1. General

A. This procedure has the data necessary to repair and refinish the gear arm (85, 87).

B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

C. Refer to the REPAIR - GENERAL (27-81-54/601, REPAIR - GENERAL) for the Standard True Position Dimensioning Symbols shown in the repair.

D. Refer to IPL Fig. 1 for item numbers.

E. General repair details:

(1) Material: 4340M steel, 270-300 ksi

(2) Shot peen: All repaired surfaces, except in holes
Shot size -- 170 (Hard shot, Rc 55-65)
Intensity -- 0.006A
Coverage -- 2.0

2. DU Bearing Journal Repair (IPL Fig. 1) (Fig. 601, 602)

A. References

(1) SOPM 20-10-02, Machining of Alloy Steel

(2) SOPM 20-10-03, Shot Peening

(3) SOPM 20-10-04, Grinding of Chrome Plated Parts

(4) SOPM 20-20-01, Magnetic Particle Inspection

(5) SOPM 20-42-03, Hard Chrome Plating

B. Procedure

(1) Machine the DU bearing journal on the gear arm (85, 87) as necessary, within the repair limits shown, to remove defects. Refer to SOPM 20-10-02.

(2) Do a magnetic particle check of the machined surface. Refer to SOPM 20-20-01.

(3) Shot peen the machined surface. Refer to SOPM 20-10-03.

(4) Chrome plate the machined surface, but do not chrome plate the fillet radii or the edges of the part. Refer to SOPM 20-42-03.

(5) Grind to the design dimensions and finish shown. Make sure that the thickness of the chrome plate is not more than 0.010 inch after you grind the part. The chrome plate runout must be 0.015-0.030 inch long, and stop at the edges of the machined surface. Refer to SOPM 20-10-04.

(6) Do a magnetic particle check of the repaired surface. Refer to SOPM 20-20-01.

3. Bushing Hole Repair

A. Consumable Materials

NOTE: Equivalent material can be used.

(1) A00247 Sealant -- BMS 5-95 (SOPM 20-60-04)

B. References

(1) SOPM 20-10-02, Machining of Alloy Steel

(2) SOPM 20-20-01, Magnetic Particle Inspection

(3) SOPM 20-50-03, Bearing and Bushing Replacement

C. Procedure

(1) Machine the bushing hole on the gear arm (85, 87) as necessary, within the repair limits shown, to remove defects. Refer to SOPM 20-10-02.

(2) Do a magnetic particle check of the machined surface. Refer to SOPM 20-20-01.

(3) Use Table A or B (Fig. 601 or 602) to make the selection of the correct bushing, or make a bushing as shown in Fig. 603.

(4) Install the replacement bushing (75, 77, 80, 82). Refer to the procedure in Repair 4-1, par. 3.

4. Refinish

A. Consumable Materials

NOTE: Equivalent material can be used.

(1) COO259 Primer -- BMS 10-11, Type 1 (SOPM 20-60-02)

B. References

(1) SOPM 20-30-02, Stripping of Protective Finishes

(2) SOPM 20-41-01, Decoding Table For Boeing Finish Codes

(3) SOPM 20-41-02, Application of Chemical and Solvent Resistant Finishes

(4) SOPM 20-42-02, Low Hydrogen Embrittlement Cadmium-Titanium Alloy Plating

(5) SOPM 20-60-02, Finishing Materials

C. Procedure

(1) Gear arm (256T5121-2) (Fig. 601)

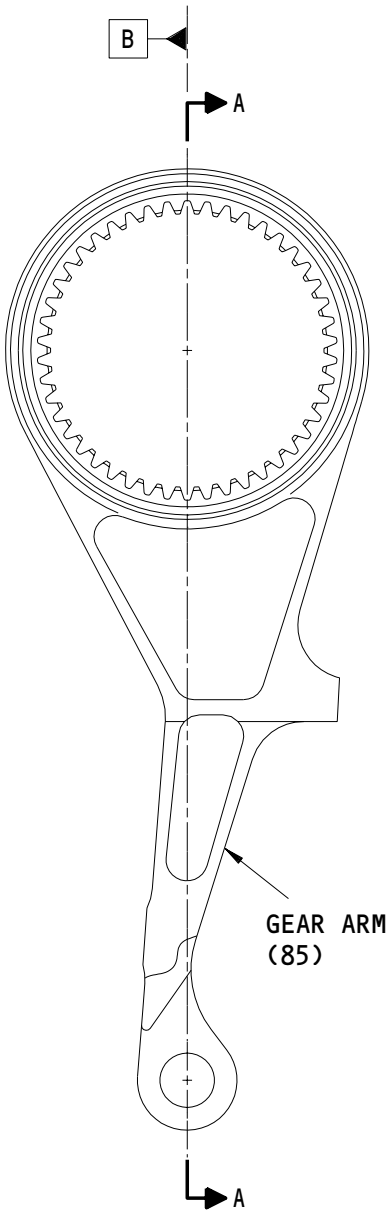
(a) Cadmium-titanium plate (F-15.32) on the surfaces shown in Fig. 601. Cadmium-titanium plate (F-15.01) on all other surfaces.

(b) Apply BMS 10-11, type 1 primer (F-20.02) all over, but not on the bushing (75, 80) holes or the (F-15.32) plated surfaces. On the (F-15.32) plated surfaces, wipe the plating with primer (F-19.45), as shown.

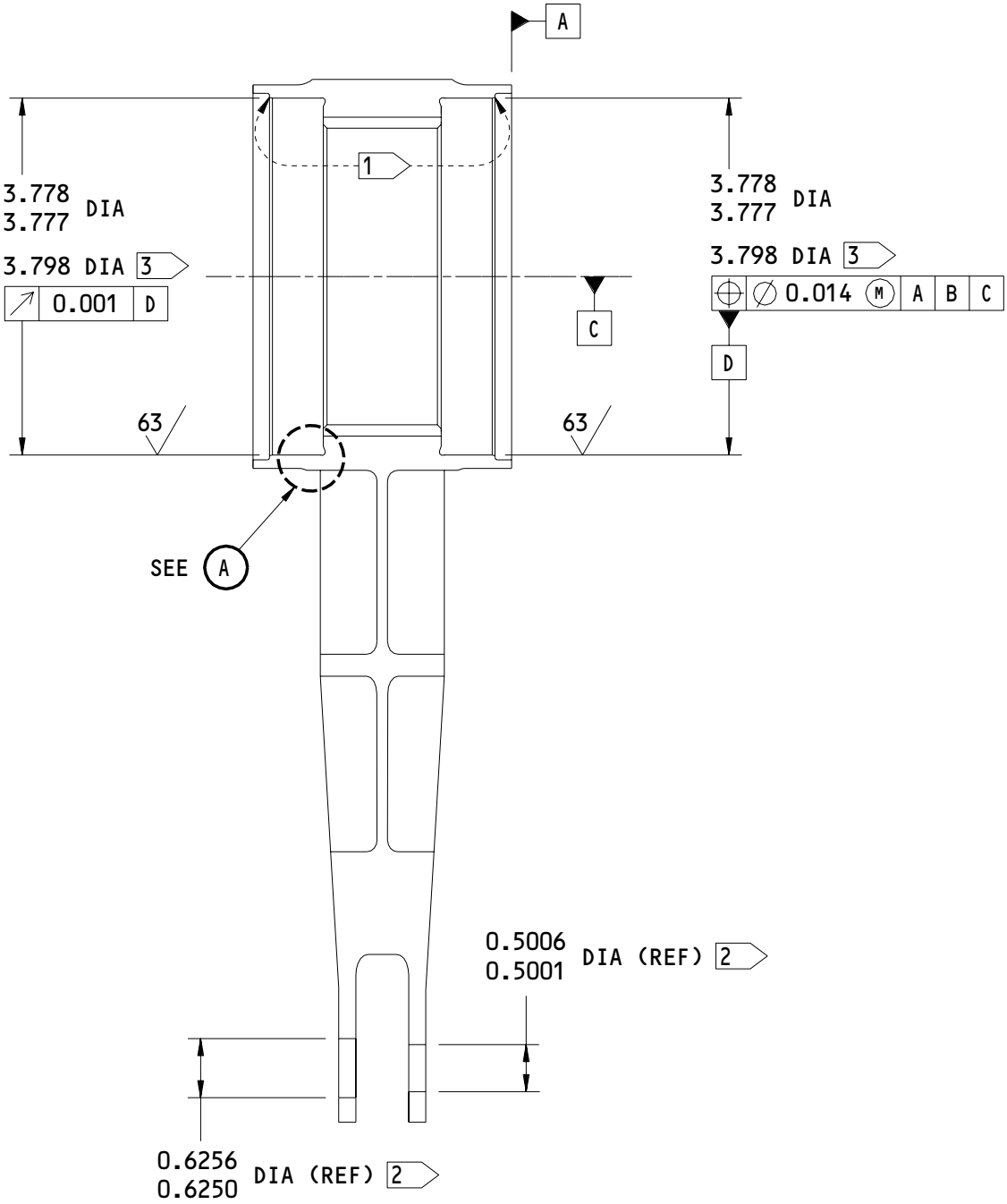
(2) Gear arm (256T2150-8 or 256T2161-4) (Fig. 602)

(a) Cadmium-titanium plate (F-15.32) all over, unless shown differently in Fig. 602.

(b) Apply BMS 10-11, type 1 primer (F-20.02) all over, but not on the bushing (77, 82) holes or on the internal surfaces shown in Fig. 602.




256T5121-2
Gear Arm Repair
Figure 601 (Sheet 1)

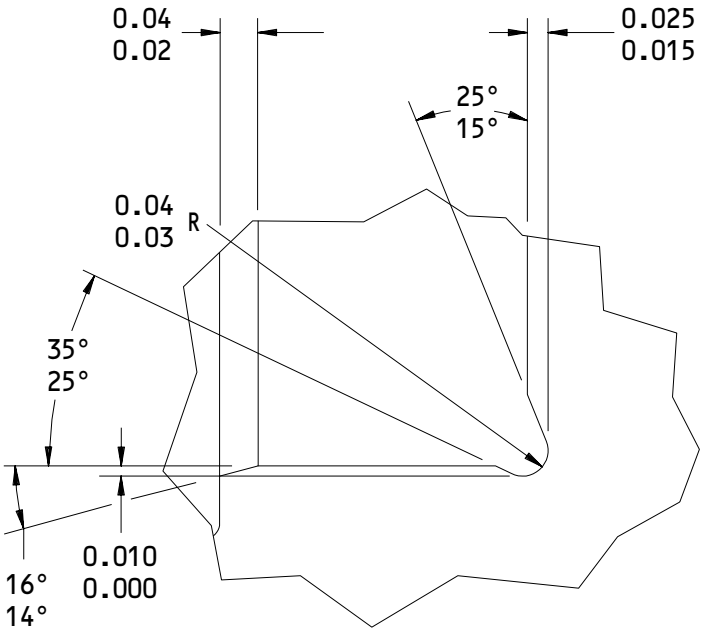



A–A

256T5121-2
Gear Arm Repair
Figure 601 (Sheet 2)



K19571




(2 LOCATIONS)

A

1 CADMIUM-TITANIUM PLATE (F-15.32) AND WIPE THE PLATING WITH PRIMER (F-19.45) ON THESE SURFACES

2 NO PRIMER ON THESE SURFACES

3 REPAIR LIMIT

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

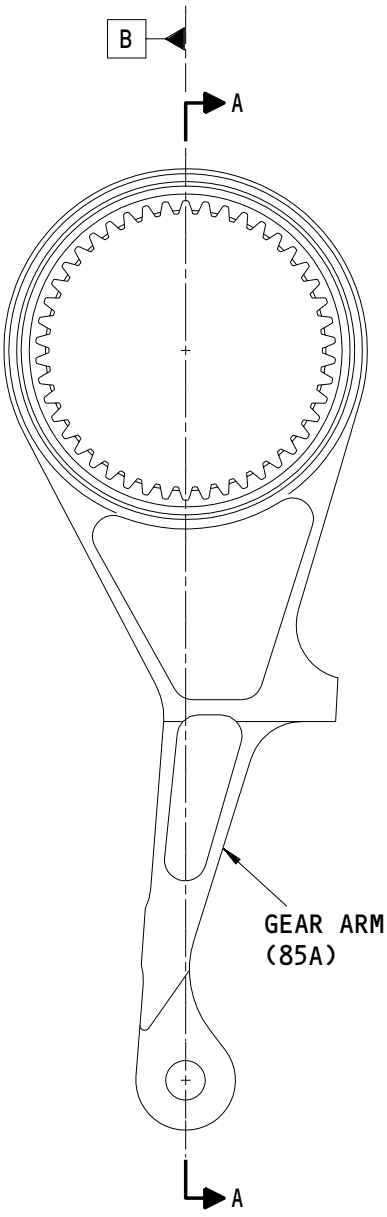
ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

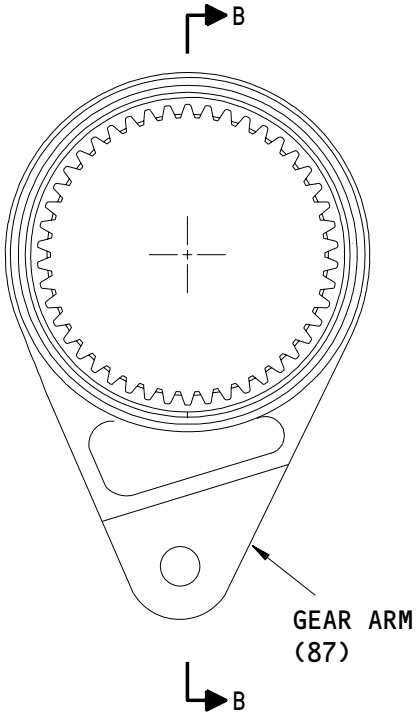
256T5121-2
Gear Arm Repair
Figure 601 (Sheet 3)



K19579




256T2150-8

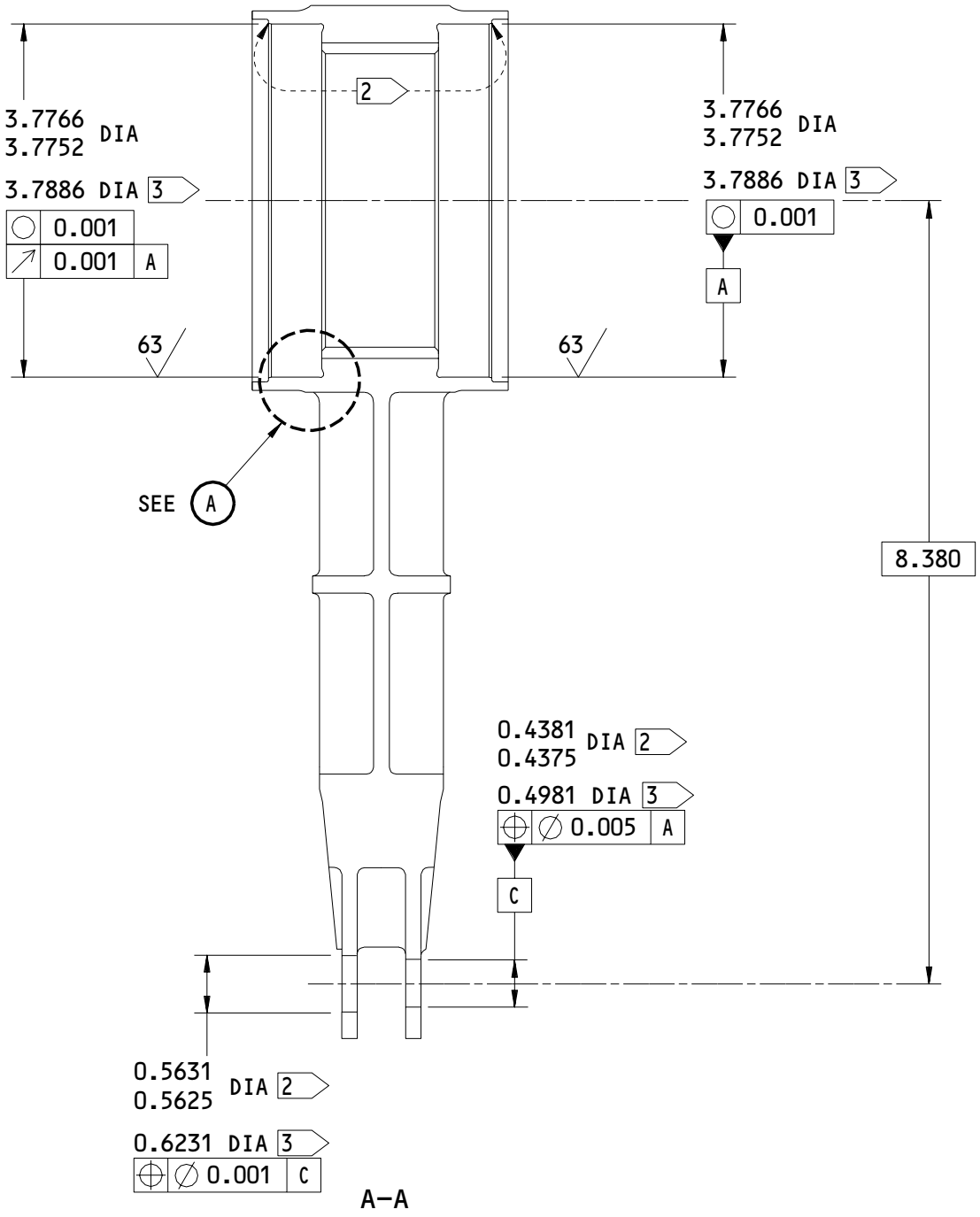



256T2161-4

256T2150-8
256T2161-4
Gear Arm Repair
Figure 602 (Sheet 1)



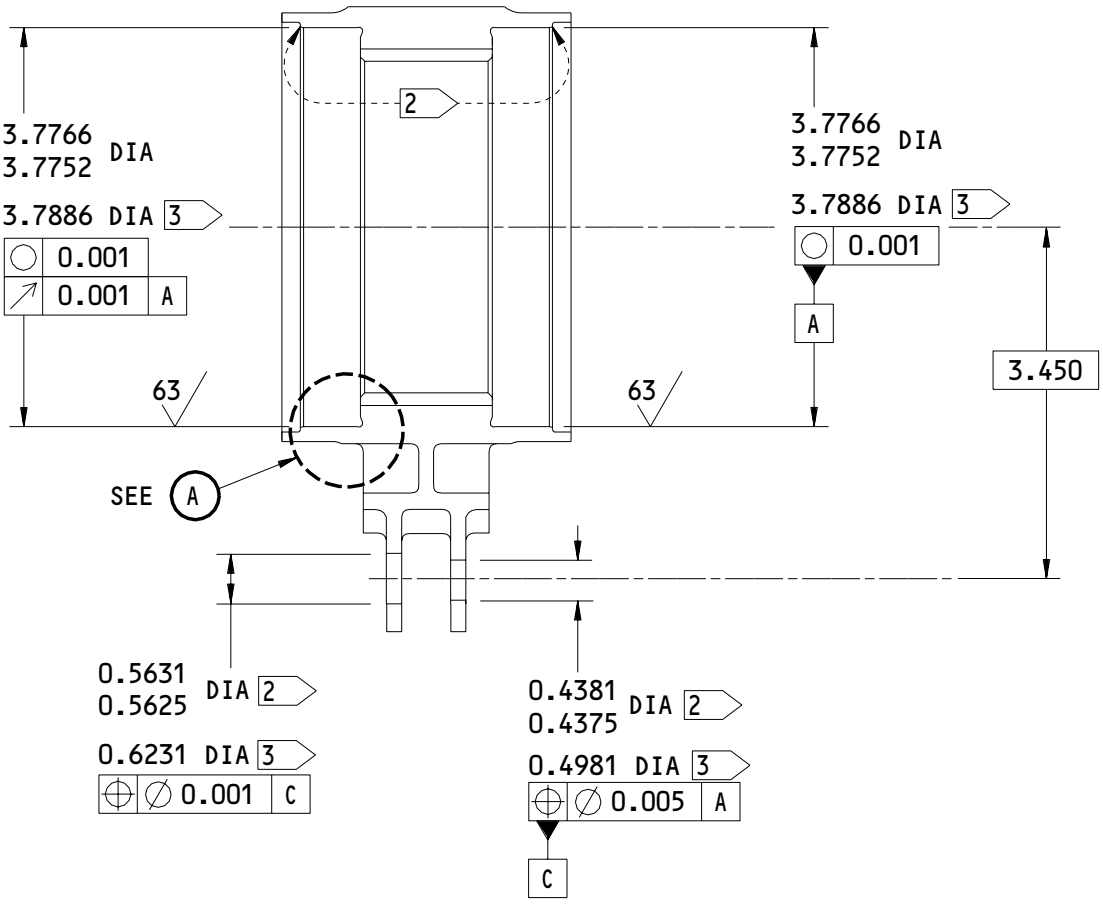
M31965




256T2150-8
256T2161-4
Gear Arm Repair
Figure 602 (Sheet 2)



M31988

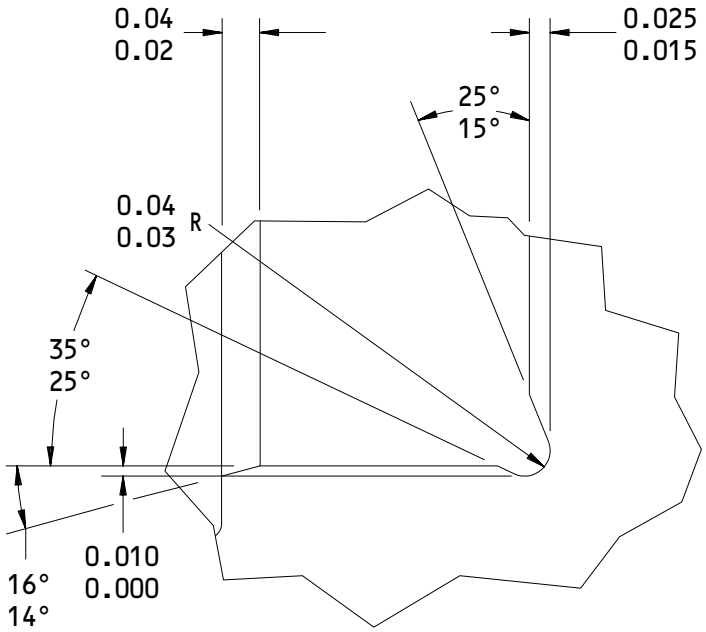



B–B

256T2150-8
256T2161-4
Gear Arm Repair
Figure 602 (Sheet 3)



M32024




(2 LOCATIONS)

A

1 DELETED

2 NO PRIMER ON THESE SURFACES

3 REPAIR LIMIT

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

ITEM NUMBERS REFER TO IPL FIG. 1

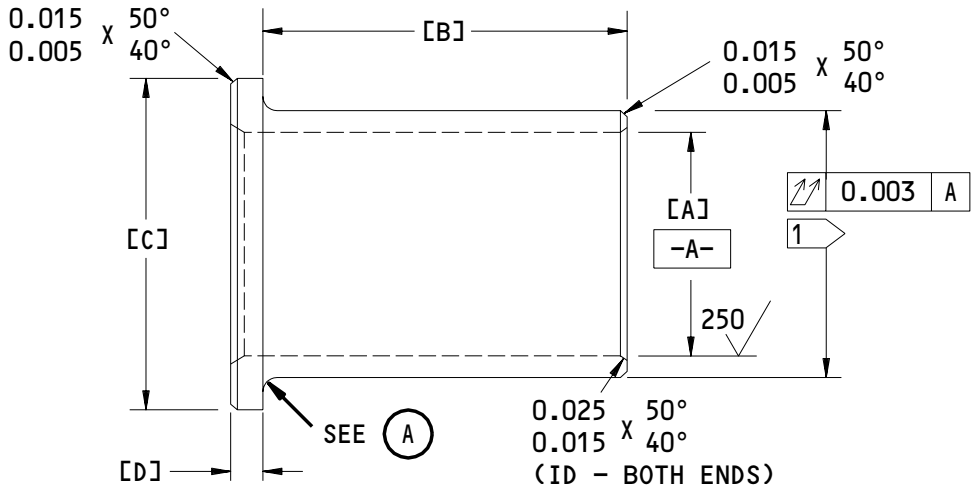
ALL DIMENSIONS ARE IN INCHES

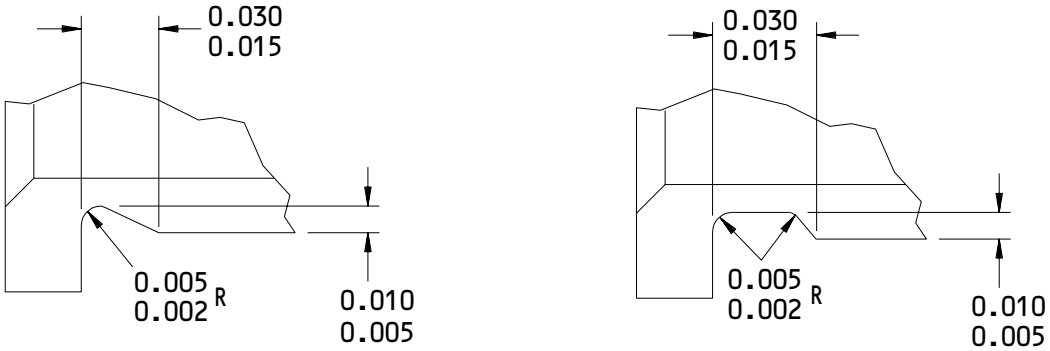
DIMENSIONS APPLY BEFORE PLATING

256T2150-8
256T2161-4
Gear Arm Repair
Figure 602 (Sheet 4)



M32064




UNDERCUT CONFIGURATIONS

A 2

Oversize Bushing Details
Figure 603 (Sheet 1)



M32765

| REPLACES BUSHING (IPL FIG. 1) | [A] | [B] | [C] | [D] | INTERFERENCE (AFTER PLATING) |
|---|---|---|---|---|---|
| 82 | 0.428<br>0.422 | 0.150<br>0.145 | 0.690<br>0.680 | 0.065<br>0.060 | 0.0017<br>0.0005 |
| 77 | 0.303<br>0.297 | 0.140<br>0.135 | 0.610<br>0.600 | 0.065<br>0.060 | 0.0015<br>0.0003 |

1 FINAL BUSHING OUTSIDE DIA EQUALS REPAIR DIA OF ARM PLUS INTERFERENCE (AFTER PLATING)

2 TYPE 1 OR TYPE 2 OPTIONAL

63 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: BUSHING (82) -- ALUMINUM-NICKEL BRONZE

BUSHING (77) -- 15-5PH OR 17-4PH CRES (180-200 KSI)

FINISH: CADMIUM PLATE (F-15.06). PLATING OPTIONAL IN BORE

ALL DIMENSIONS ARE IN INCHES

DIMENSIONS APPLY BEFORE PLATING

Oversize Bushing Details
Figure 603 (Sheet 2)



M33728

PLANET GEAR - REPAIR 5-1

256T5122-1, -2

1. General

A. This procedure has the data necessary to repair and refinish the planet gear assembly (35) and the planet gear (47).

B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

C. Refer to the REPAIR - GENERAL (27-81-54/601, REPAIR - GENERAL) for the Standard True Position Dimensioning Symbols shown in the repair.

D. Refer to IPL Fig. 1 for item numbers.

E. General repair details:

(1) Material: 4330M steel, 240 ksi (core)

2. Cork Plug Replacement

NOTE: Corrosion can occur in the planet gear (45, 47) bore. To decrease the risk of corrosion, we recommend that you do not replace the cork plug (40) in the planet gear assembly (35). If you remove the cork plug, add more grease to the actuator. Refer to ASSEMBLY/701, for the correct quantity of grease.

3. Corrosion Repair

A. References

(1) SOPM 20-10-02, Machining of Alloy Steel

(2) SOPM 20-20-01, Magnetic Particle Inspection

(3) SOPM 20-41-01, Decoding Table for Boeing Finish Codes

(4) SOPM 20-42-02, Low Hydrogen Embrittlement Cadmium-Titanium Alloy Plating

B. Procedure (Fig. 601)

(1) Machine the bore of the planet gear (47) as necessary to remove the corrosion damage. Machine the chamfer if necessary. Do not machine more than the limit shown. Refer to SOPM 20-10-02.

(2) Break all sharp edges.

(3) Do the necessary procedures after you machine the part. Refer to SOPM 20-10-02.

(4) Do a magnetic particle check of the machined area. Refer to SOPM 20-20-01.

(5) Cadmium-titanium plate (F-15.01) the machined surfaces. Refer to SOPM 20-42-02.

(6) Apply BMS 10-11, type 1 primer to the bore, as shown in the Refinish procedures and in Fig. 601.

4. Planet Gear Refinish

A. Consumable Materials

NOTE: Equivalent material can be used.

(1) C00259 Primer -- BMS 10-11, type 1 (SOPM 20-60-02)

B. References

(1) SOPM 20-30-02, Stripping of Protective Finishes

(2) SOPM 20-41-01, Decoding Table for Boeing Finish Codes

(3) SOPM 20-41-02, Application of Chemical and Solvent Resistant Finishes

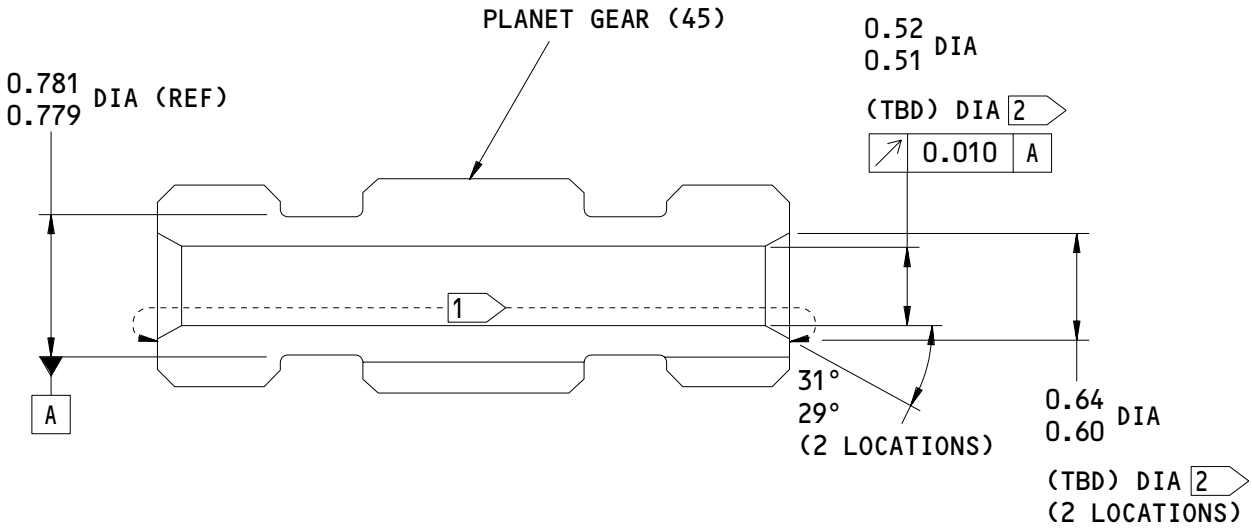
(4) SOPM 20-42-02, Low Hydrogen Embrittlement Cadmium-Titanium Alloy Plating

(5) SOPM 20-60-02, Finishing Materials

C. Procedure

(1) Cadmium-titanium plate (F-15.01) all over. Plate thickness must be 0.0005-0.0007 inch on the gear teeth. Bake for a minimum of 12 hours at 250-300 degrees F.

(2) Apply BMS 10-11, type 1 primer (F-20.03) in the bore, as shown in Fig. 601.




1 APPLY PRIMER ON THESE SURFACES

2 REPAIR LIMIT

ITEM NUMBERS REFER TO IPL FIG. 1

256T5122-2
Planet Gear Repair
Figure 601



K19480

MARKER - REPAIR 6-1

256T5124-1, -2, -21, -22, -23

1. General

A. This procedure has the data necessary to replace the markers (90, 95, 100, 105).

B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

C. Deleted.

D. Refer to IPL Fig. 1 for item numbers.

2. Marker Replacement

A. Consumable Materials

NOTE: Equivalent material can be used.

(1) A00292 Adhesive -- Type 89 (BMS 5-105) (SOPM 20-50-12)

(2) A00554 Adhesive -- Type 70 (BMS 5-92) (SOPM 20-60-04)

B. References

(1) SOPM 20-50-10, Application of Stencils, Insignia, Silk Screen, Part Numbering and Identification Markings

(2) SOPM 20-50-12, Application of Adhesives

(3) SOPM 20-60-04, Miscellaneous Materials

C. Procedure

(1) Record the serial number from the installed serialized marker (95, 100).

(2) Remove the marker (90, 95, 100, 105) from the gear arm assembly (65, 67).

(3) Steel stamp the serial number on the new marker (95, 100). Refer to SOPM 20-50-10.

(4) Bond the marker (90, 95, 100, 105) to the gear arm assembly (65, 67) with Type 89 or Type 70 adhesive, as shown in IPL Fig. 1. Refer to SOPM 20-50-12.

(5) Bend the tabs on the marker (90, 95) to agree with the shape of the gear arm (85, 87).

# ASSEMBLY

1. General

   A. This procedure has the data necessary to assemble the rotary actuator assembly.

   B. Refer to the Standard Overhaul Practices Manual (SOPM) for details of the SOPM chapters identified in this procedure.

   C. Refer to IPL Fig. 1 for item numbers.

2. Assembly

   A. Special Tools and Equipment

      NOTE: Equivalent tools or equipment can be used.

      (1) A27070-65 -- Assembly Equipment (Includes -62 assembly tool, -24 backlash test fixture, -56 input crank, -46 and -68 bushings, and a force gauge)

   B. Consumable Materials

      NOTE: Equivalent material can be used.

      (1) A00247 Sealant -- BMS 5-95 (SOPM 20-60-04; SOPM 20-50-12, Type 93)

      (2) D00633 Grease -- BMS 3-33 (SOPM 20-60-03)

   C. References

      (1) SOPM 20-50-03, Bearing and Bushing Replacement

      (2) SOPM 20-50-06, Installation of O-rings and Teflon Seals

      (3) SOPM 20-50-12, Application of Adhesives

      (4) SOPM 20-60-03, Lubricants

      (5) SOPM 20-60-04, Miscellaneous Materials

D. Procedure

(1) Apply a thin layer of grease to the seals, gear teeth, and all other faying surfaces.

(2) Install the planet rings (55) on the sun gear (60).

(3) Assemble the planet gear assemblies (35), or planet gears (47), around the sun gear (60). Put the parts on the A27070-62 assembly tool to hold the planet gears at the correct distance from each other, as shown in Fig. 701.

NOTE: Corrosion can occur in the planet gear bores. To decrease the risk of corrosion, we recommend that the cork plugs be removed from the planet gear assemblies (35).

CAUTION: THE PLANET GEARS AND THE GEAR ARM MUST BE ALIGNED AS SHOWN IN FIG. 701, OR THE ASSEMBLY WILL NOT OPERATE CORRECTLY.

(4) Install the gear arm assembly (65, 67) over the gears (35 or 47, 60), then remove the assembly tool.

(5) Bond the flanged bearings (50) to the end covers (25) on the ring gear assemblies (15) with sealant. Refer to SOPM 20-50-12, Type 93.

(6) Apply grease to all surfaces of the Omniseal (30), then install the Omniseal in the gear arm assembly (65, 67), as shown in Fig. 701. Make sure that the open side of the Omniseal is to the inner side of the gear arm assembly.

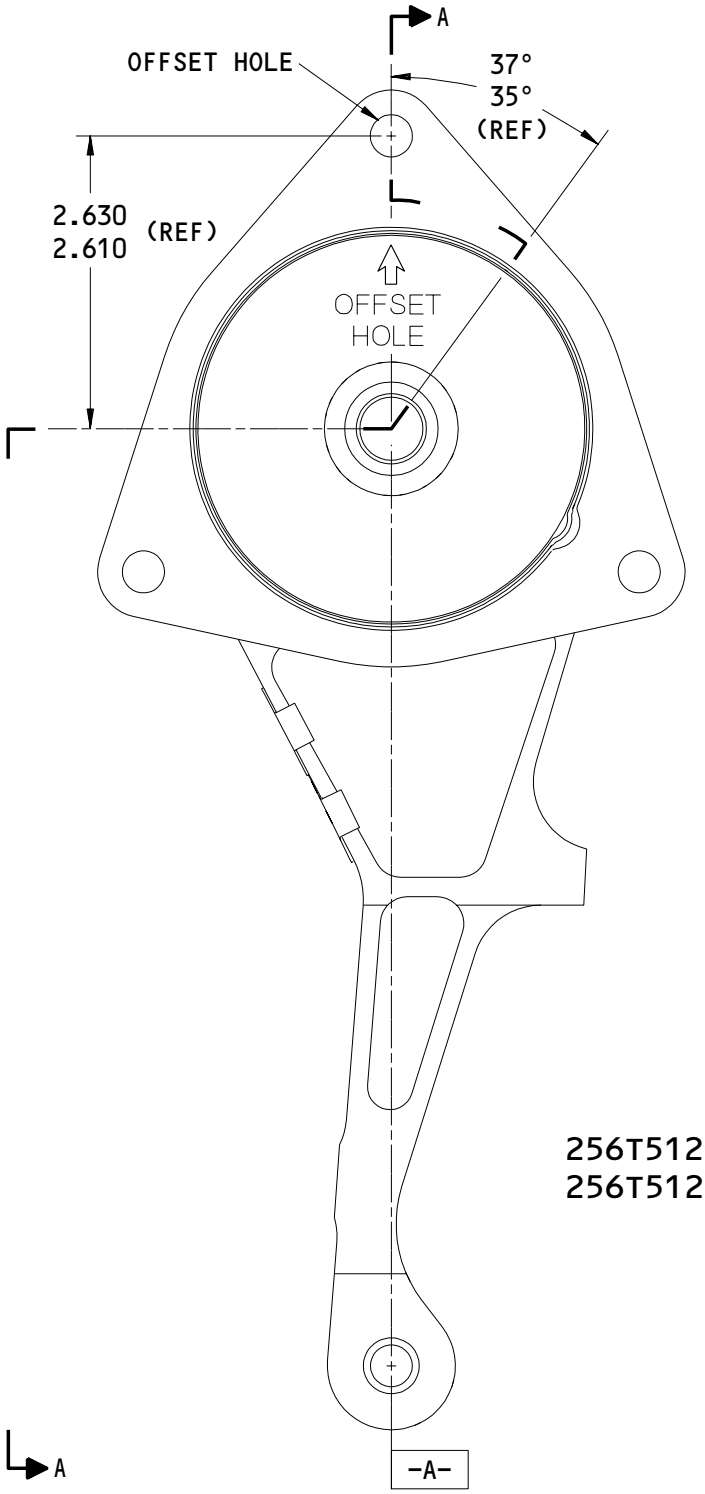
(7) If the actuator has the planet gears (47) installed, fill the unit with 214-234 cc (188-206 g or 0.41-0.45 lb) of grease.

(8) If the actuator has the planet gear assemblies (35) installed, fill the unit with 151-171 cc (133-151 g or 0.29-0.33 lb) of grease.

CAUTION: THE RING GEARS, PLANET GEARS, AND THE GEAR ARM MUST BE ALIGNED AS SHOWN IN FIG. 701, OR THE ASSEMBLY WILL NOT OPERATE CORRECTLY.

(9) Install the ring gear assemblies (15) with the flanged bearings (50) on the gear arm assembly (65, 67). Make sure that the offset mounting holes on the ring gears are aligned with each other, as shown in Fig. 701.

(10) Install one retaining washer (10) and one retaining ring (5) on each end of the sun gear (60).

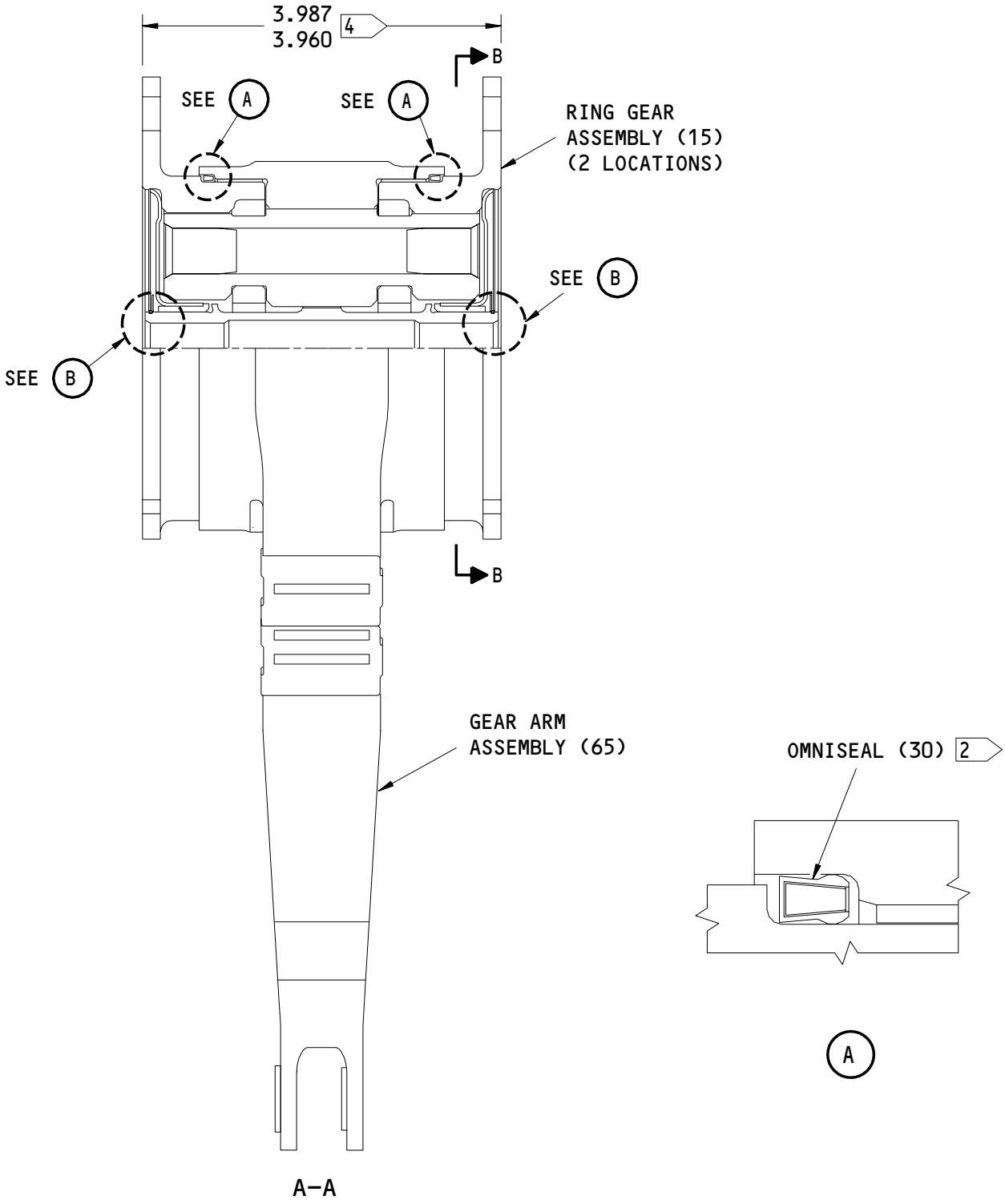



256T5120-1 SHOWN
256T5120-2,-3 SIMILAR

Assembly Details
Figure 701 (Sheet 1)



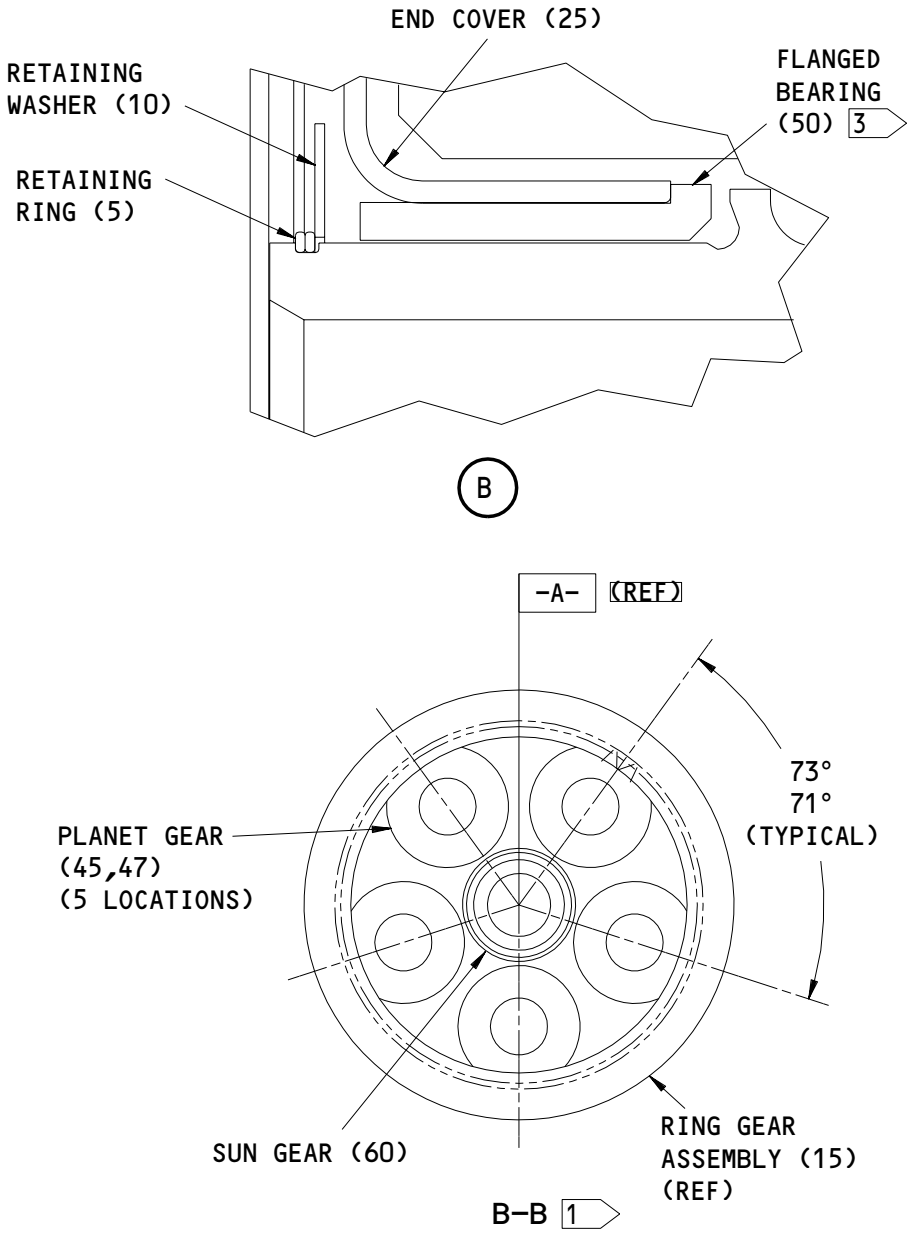
K19753




Assembly Details
Figure 701 (Sheet 2)



K19760




1 GEARS AND GEAR ARM MUST BE ALIGNED AS SHOWN TO GET THE CORRECT TIMING

2 OPEN END OF THE OMNISEAL MUST POINT IN

3 BOND THE FLANGED BEARING TO THE END COVER

4 DIMENSION WITH THE RING GEAR FLANGES PUSHED IN

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

Assembly Details
Figure 701 (Sheet 3)

3. Test

A. References

(1) 27/81-54/101, Testing and Fault Isolation

B. Procedure

(1) Do a backlash check of the rotary actuator assembly. Refer to Testing and Fault Isolation, page 101.

(2) Do a check of the no-load input torque of the rotary actuator assembly. Refer to Testing and Fault Isolation, page 101.

4. Storage

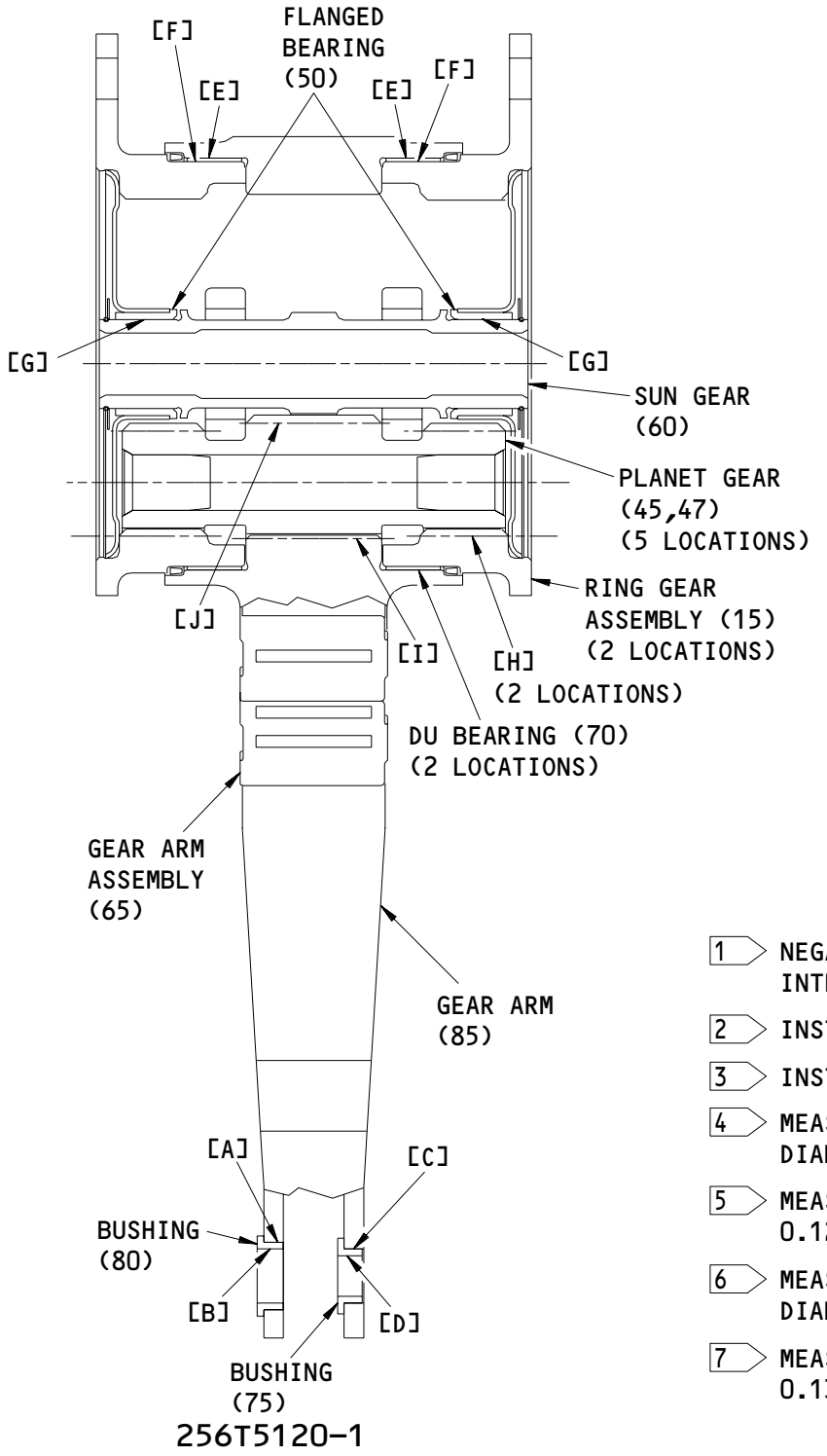
A. Reference

(1) SOPM 20-44-02, Temporary Protective Coatings

B. Procedure

(1) Use standard industry procedures and the information in SOPM 20-44-02 to store this component.

FITS AND CLEARANCES




1 NEGATIVE VALUE IS FOR AN INTERFERENCE FIT

2 INSTALLATION PART 114T0212-5

3 INSTALLATION PART BACB30LT6DU26

4 MEASURE DIMENSION OVER TWO 0.1200 DIAMETER PINS

5 MEASURE DIMENSION BETWEEN TWO 0.1200 DIAMETER PINS

6 MEASURE DIMENSION OVER TWO 0.1371 DIAMETER PINS

7 MEASURE DIMENSION BETWEEN TWO 0.1371 DIAMETER PINS

Fits and Clearances
Figure 801 (Sheet 1)



K19534

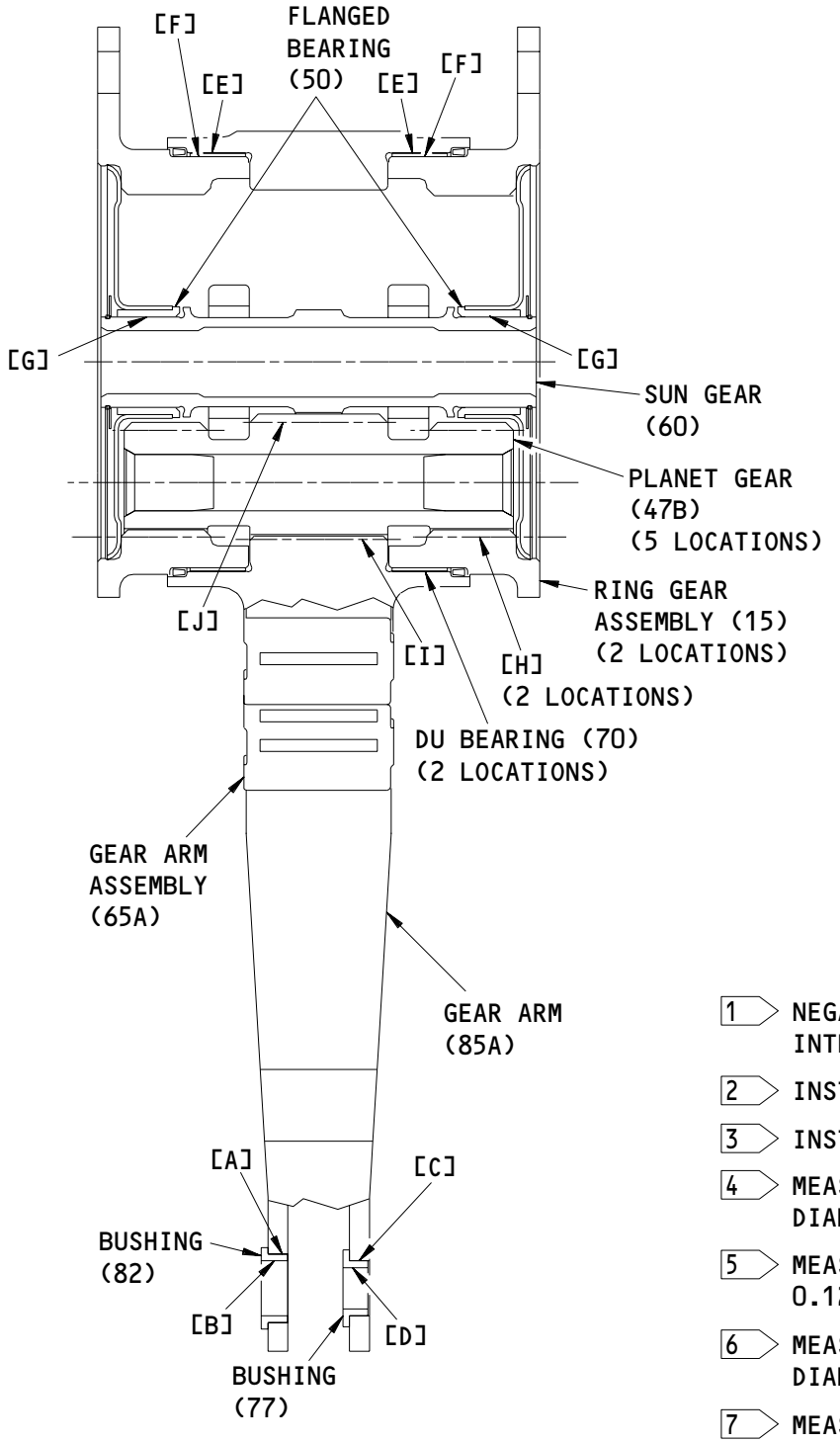
| REF LETTER | REF IPL FIG. 1, MATING ITEM NO. | | DESIGN DIMENSION* DIMENSION MIN | DESIGN DIMENSION* DIMENSION MAX | DESIGN DIMENSION* ASSEMBLY CLEARANCE [1] MIN | DESIGN DIMENSION* ASSEMBLY CLEARANCE [1] MAX | SERVICE WEAR LIMIT* DIMENSION MIN | SERVICE WEAR LIMIT* DIMENSION MAX | SERVICE WEAR LIMIT* MAXIMUM CLEARANCE |
|---|---|---|---|---|---|---|---|---|---|
| [A] | ID | 85 | 0.6250 | 0.6256 | -0.0016 | -0.0005 | | 0.6260 | --- |
| | OD | 80 | 0.6261 | 0.6266 | | | --- | | |
| [B] | ID | 80 | 0.5000 | 0.5007 | 0.0005 | 0.0017 | | 0.5042 | 0.0050 |
| | OD | [2] | 0.4990 | 0.4995 | | | 0.4960 | | |
| [C] | ID | 85 | 0.5001 | 0.5006 | -0.0014 | -0.0004 | | 0.5010 | --- |
| | OD | 75 | 0.5010 | 0.5015 | | | --- | | |
| [D] | ID | 75 | 0.3750 | 0.3756 | 0.0005 | 0.0016 | | 0.3791 | 0.0050 |
| | OD | [3] | 0.3740 | 0.3745 | | | 0.3700 | | |
| [E] | ID | 85 | 3.3770 | 3.7780 | -0.0033 | 0.0002 | | 3.7785 | --- |
| | OD | 70 | 3.3778 | 3.7803 | | | --- | | |
| [F] | ID | 70 | 3.7146 | 3.7210 | -0.0004 | 0.0074 | | 3.7240 | 0.0084 |
| | OD | 15 | 3.7136 | 3.7150 | | | 3.7130 | | |
| [G] | ID | 50 | 0.8190 | 0.8210 | 0.0056 | 0.0090 | | 0.8220 | 0.0120 |
| | OD | 60 | 0.8120 | 0.8134 | | | 0.8100 | | |
| [H] | 35 | [4] | 1.1361 | 1.1395 | --- | --- | 1.1345 | | --- |
| | 15 | [5] | 2.9461 | 2.9514 | | | | 2.9540 | |
| [I] | 35 | [6] | 1.2973 | 1.2999 | --- | --- | 1.2951 | | --- |
| | 65 | [7] | 3.0549 | 3.0604 | | | | 3.0639 | |
| [J] | 35 | [6] | 1.2973 | 1.2999 | --- | --- | 1.2951 | | --- |
| | 60 | [6] | 1.2614 | 1.2638 | | | | 1.2574 | |

* ALL DIMENSIONS ARE IN INCHES

Fits and Clearances
Figure 801 (Sheet 2)



K19876




256T5120-3 SHOWN
256T5120-2 SIMILAR

1. NEGATIVE VALUE IS FOR AN INTERFERENCE FIT
2. INSTALLATION PART BACB28AK05-051
3. INSTALLATION PART BACB30LT5U24
4. MEASURE DIMENSION OVER TWO 0.1200 DIAMETER PINS
5. MEASURE DIMENSION BETWEEN TWO 0.1200 DIAMETER PINS
6. MEASURE DIMENSION OVER TWO 0.1371 DIAMETER PINS
7. MEASURE DIMENSION BETWEEN TWO 0.1371 DIAMETER PINS

Fits and Clearances
Figure 802 (Sheet 1)

| REF LETTER | REF IPL FIG. 1, MATING ITEM NO. | | DESIGN DIMENSION* | | | | SERVICE WEAR LIMIT* | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | DIMENSION | | ASSEMBLY CLEARANCE 1 | | DIMENSION | | MAXIMUM CLEARANCE |
| | | | MIN | MAX | MIN | MAX | MIN | MAX | |
| [A] | ID | 85A,87 | 0.5625 | 0.5631 | −0.0017 | −0.0005 | | | |
| | OD | 82 | 0.5636 | 0.5642 | | | | | |
| [B] | ID | 82 | 0.4375 | 0.4385 | 0.0005 | 0.0020 | | 0.4420 | 0.0050 |
| | OD | 2 | 0.4365 | 0.4370 | | | 0.4335 | | |
| [C] | ID | 85A,87 | 0.4375 | 0.4381 | −0.0015 | −0.0003 | | | |
| | OD | 77 | 0.4384 | 0.4390 | | | | | |
| [D] | ID | 77 | 0.3125 | 0.3135 | 0.0005 | 0.0020 | | 0.3170 | 0.0050 |
| | OD | 3 | 0.3115 | 0.3120 | | | 0.3075 | | |
| [E] | ID | 85A,87 | 3.3752 | 3.7766 | −0.0051 | −0.0012 | | | |
| | OD | 70 | 3.3778 | 3.7803 | | | | | |
| [F] | ID | 70 | 3.7160 | 3.7214 | 0.0010 | 0.0078 | | 3.7240 | 0.0084 |
| | OD | 15 | 3.7136 | 3.7150 | | | 3.7130 | | |
| [G] | ID | 50 | 0.8190 | 0.8210 | 0.0056 | 0.0090 | | 0.8220 | 0.0120 |
| | OD | 60 | 0.8120 | 0.8134 | | | 0.8100 | | |
| [H] | 47 | 4 | 1.1361 | 1.1395 | --- | --- | 1.1345 | | --- |
| | 15 | 5 | 2.9461 | 2.9514 | | | | 2.9540 | |
| [I] | 47 | 6 | 1.2973 | 1.2999 | --- | --- | 1.2951 | | --- |
| | 65A,67 | 7 | 3.0550 | 3.0606 | | | | 3.0639 | |
| [J] | 47 | 6 | 1.2973 | 1.2999 | --- | --- | 1.2951 | | --- |
| | 60 | 6 | 1.2614 | 1.2638 | | | | 1.2574 | |

* ALL DIMENSIONS ARE IN INCHES

Fits and Clearances
Figure 802 (Sheet 2)



M33055

SPECIAL TOOLS AND EQUIPMENT

NOTE: Equivalent tools and equipment can be used.

1. A27070-65 -- Assembly Equipment

2. A27070-80 -- Bearing Installation Equipment (replaces A27079-48)

## ILLUSTRATED PARTS LIST

1. This section lists and illustrates replaceable or repairable component parts. The Illustrated Parts Catalog contains a complete explanation of the Boeing part numbering system.

2. Indentures show parts relationships as follows:

    Assembly
      Detail Parts for Assembly
      Subassembly
      Attaching Parts for Subassembly
        Detail Parts for Subassembly

    Detail Installation Parts (Included only if installation parts may be returned to shop as part of assembly)

3. One use code letter (A, B, C, etc.) is assigned in the EFF CODE column for each variation of top assembly. All listed parts are used on all top assemblies except when limitations are shown by use code letter opposite individual part entries.

4. Letter suffixes (alpha-variants) are added to item numbers for optional parts, Service Bulletin modification parts, configuration differences (Except left- and right-hand parts), product improvement parts, and parts added between two sequential item numbers. The alpha-variant is not shown on illustrations when appearance and location of all variants of the part is the same.

5. Service Bulletin modifications are shown by the notations PRE SB XXXX and POST SB XXXX.

    A. When a new top assembly part number is assigned by Service Bulletin, the notations appear at the top assembly level only. The configuration differences at detail part level are then shown by use code letter.

    B. When the top assembly part number is not changed by the Service Bulletin, the notations appear at the detail part level.

6. Parts Interchangeability

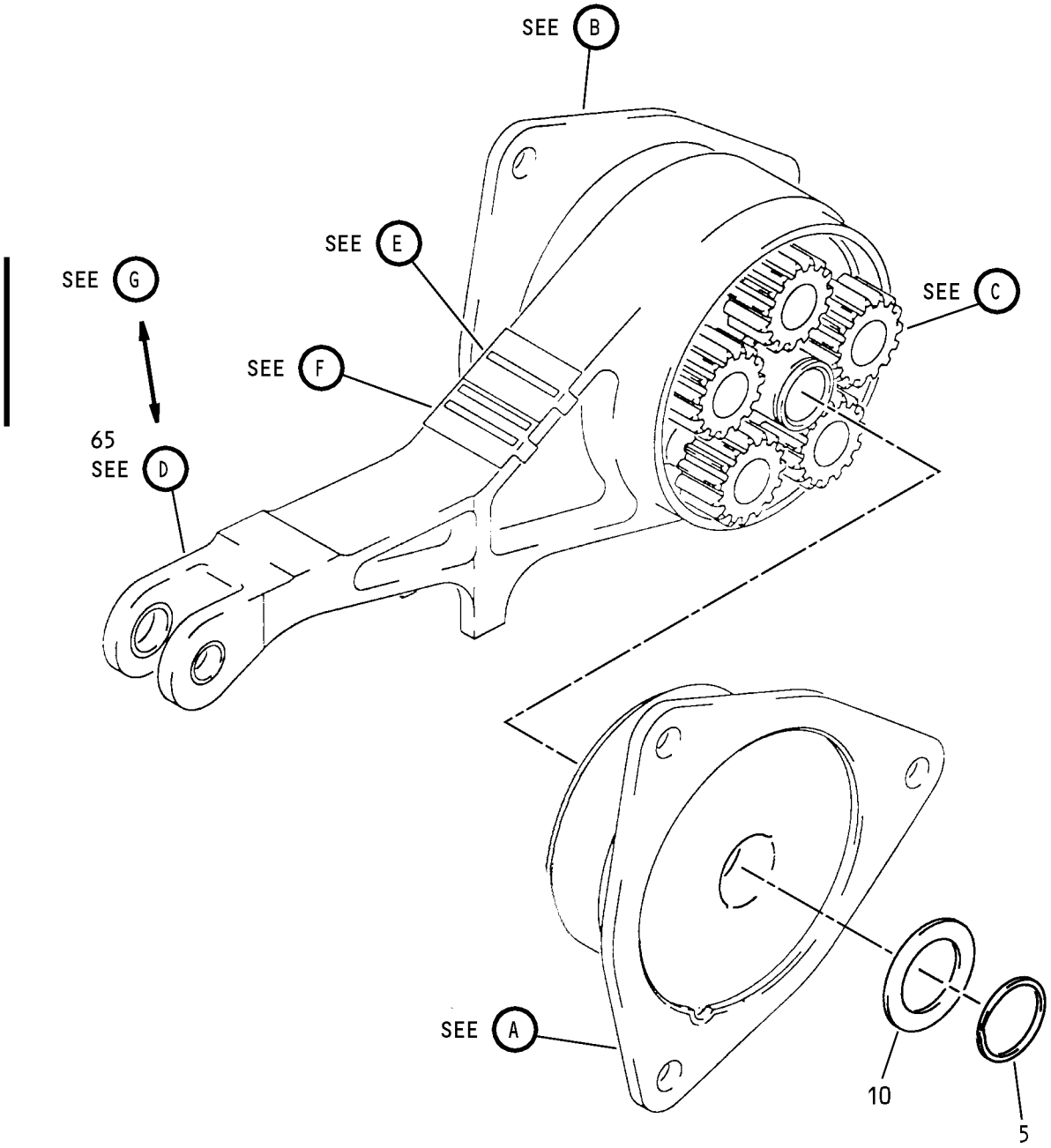
| | |
|---|---|
| Optional (OPT) | The parts are optional to and interchangeable with other parts having the same item number. |
| Supersedes, Superseded By (SUPSDS, SUPSD BY) | The part supersedes and is not interchangeable with the original part. |
| Replaces, Replaced By (REPLS, REPLD BY) | The part replaces and is interchangeable with, or is an alternate to, the original part. |

VENDORS

05939 FURON CO MECHANICAL SEAL DIV
4412 CORPORATE CENTER DRIVE PO BOX 520
LOS ALAMITOS, CALIFORNIA 90720-2410

80756 SPIROLUX DIV OF KAYDON CORP
29 CASSENS STREET
ST. LOUIS, MISSOURI 63026-2542

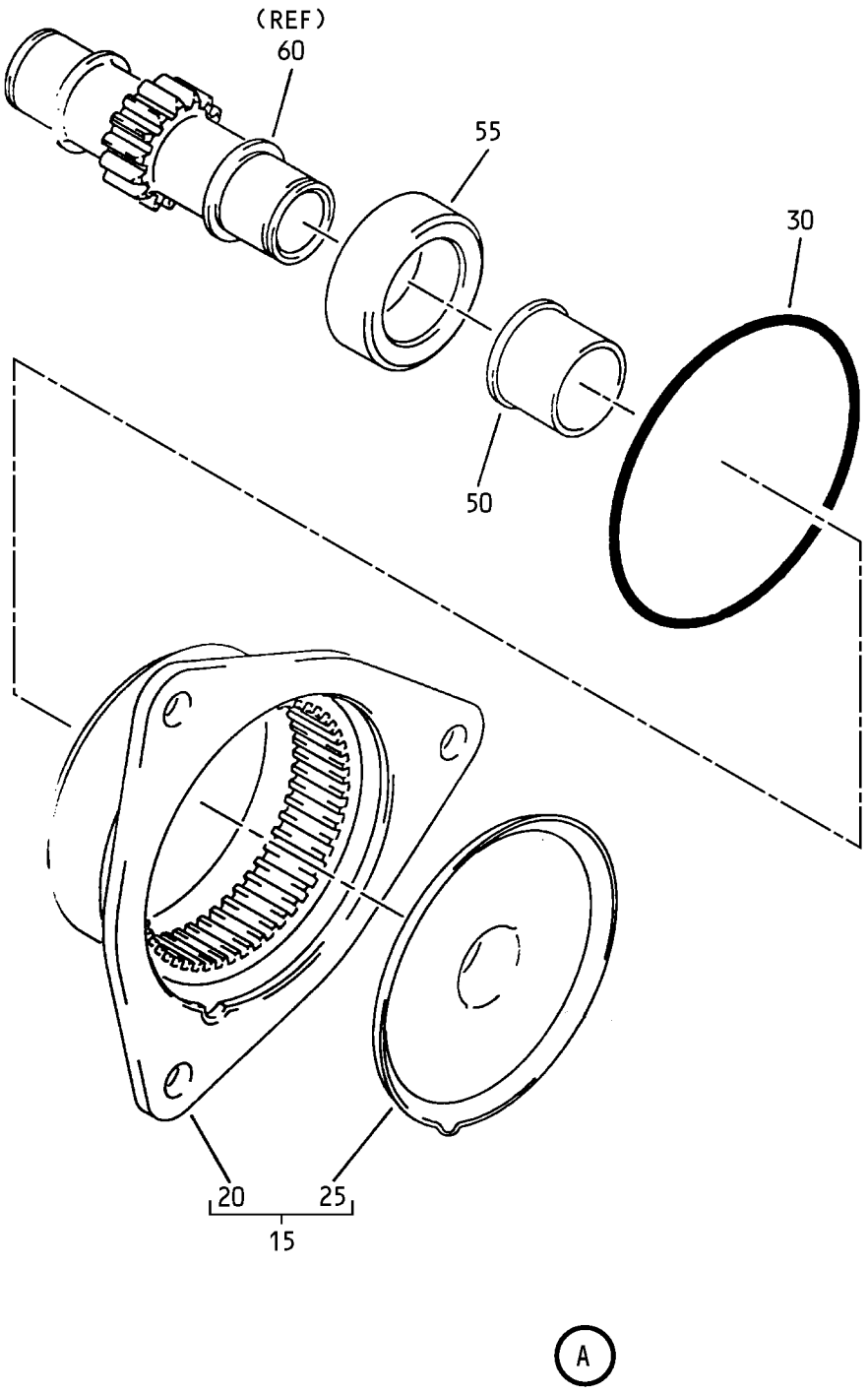
| PART NUMBER | AIRLINE PART NO. | FIG. | ITEM | TTL REQ |
|---|---|---|---|---|
| AR145321 | | 1 | 30 | 2 |
| BACB28AM07B015A | | 1 | 82 | 1 |
| BACB28AP05P014 | | 1 | 77 | 1 |
| BACB28AP06P017 | | 1 | 75 | 1 |
| BACB28AT08B018C | | 1 | 80 | 1 |
| RS81C | | 1 | 5 | 2 |
| 23420-151 | | 1 | 40 | 10 |
| 256T2150-7 | | 1 | 65A | 1 |
| 256T2150-8 | | 1 | 85A | 1 |
| 256T2151-10 | | 1 | 15 | 2 |
| 256T2151-11 | | 1 | 20 | 2 |
| 256T2153-4 | | 1 | 60 | 1 |
| 256T2154-1 | | 1 | 55 | 2 |
| 256T2161-3 | | 1 | 67 | 1 |
| 256T2161-4 | | 1 | 87 | 1 |
| 256T2163-1 | | 1 | 70 | 2 |
| 256T2164-1 | | 1 | 50 | 2 |
| 256T2165-1 | | 1 | 10 | 2 |
| 256T2166-1 | | 1 | 77A | 1 |
| 256T2166-2 | | 1 | 77B | 1 |
| 256T2166-3 | | 1 | 77C | 1 |
| 256T2166-4 | | 1 | 77D | 1 |
| 256T2166-5 | | 1 | 77E | 1 |
| 256T2166-6 | | 1 | 77F | 1 |
| 256T2167-1 | | 1 | 82A | 1 |
| 256T2167-2 | | 1 | 82B | 1 |
| 256T2167-3 | | 1 | 82C | 1 |
| 256T2167-4 | | 1 | 82D | 1 |
| 256T2167-5 | | 1 | 82E | 1 |
| 256T2167-6 | | 1 | 82F | 1 |
| 256T5120-1 | | 1 | 1A | RF |
| 256T5120-2 | | 1 | 1C | RF |
| 256T5120-3 | | 1 | 1B | RF |
| 256T5121-1 | | 1 | 65 | 1 |
| 256T5121-2 | | 1 | 85 | 1 |
| 256T5122-1 | | 1 | 35 | 5 |
| 256T5122-2 | | 1 | 45 | 5 |
| 256T5122-2 | | 1 | 47B | 5 |
| 256T5123-1 | | 1 | 25 | 2 |
| 256T5124-1 | | 1 | 90 | 1 |
| 256T5124-2 | | 1 | 95 | 1 |
| 256T5124-21 | | 1 | 100 | 1 |
| 256T5124-22 | | 1 | 105 | 1 |
| 256T5124-23 | | 1 | 90A | 1 |




Outboard Leading Edge Slat Drive Rotary Actuator Assembly
Figure 1 (Sheet 1)



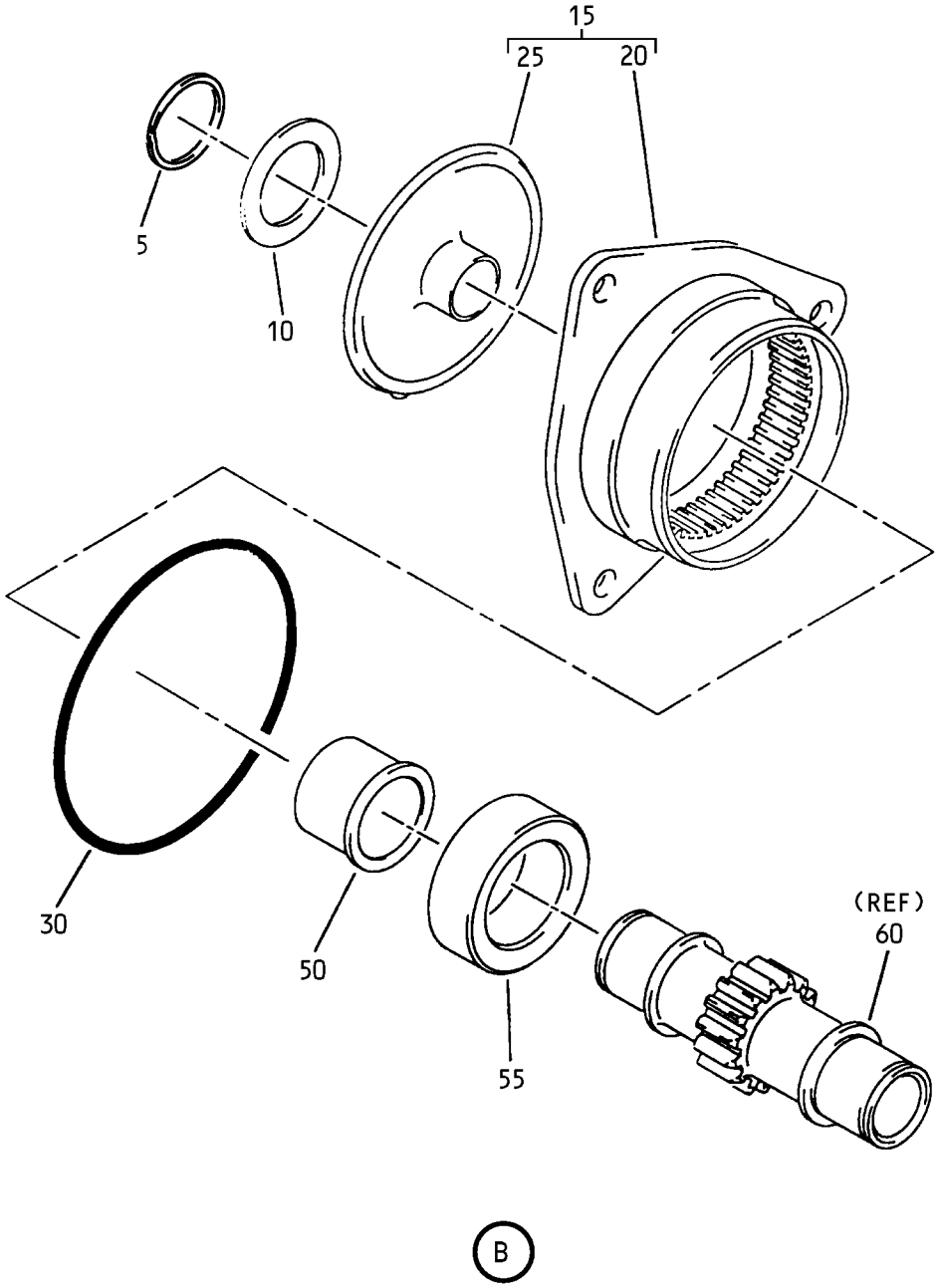
K19633




Outboard Leading Edge Slat Drive Rotary Actuator Assembly
Figure 1 (Sheet 2)



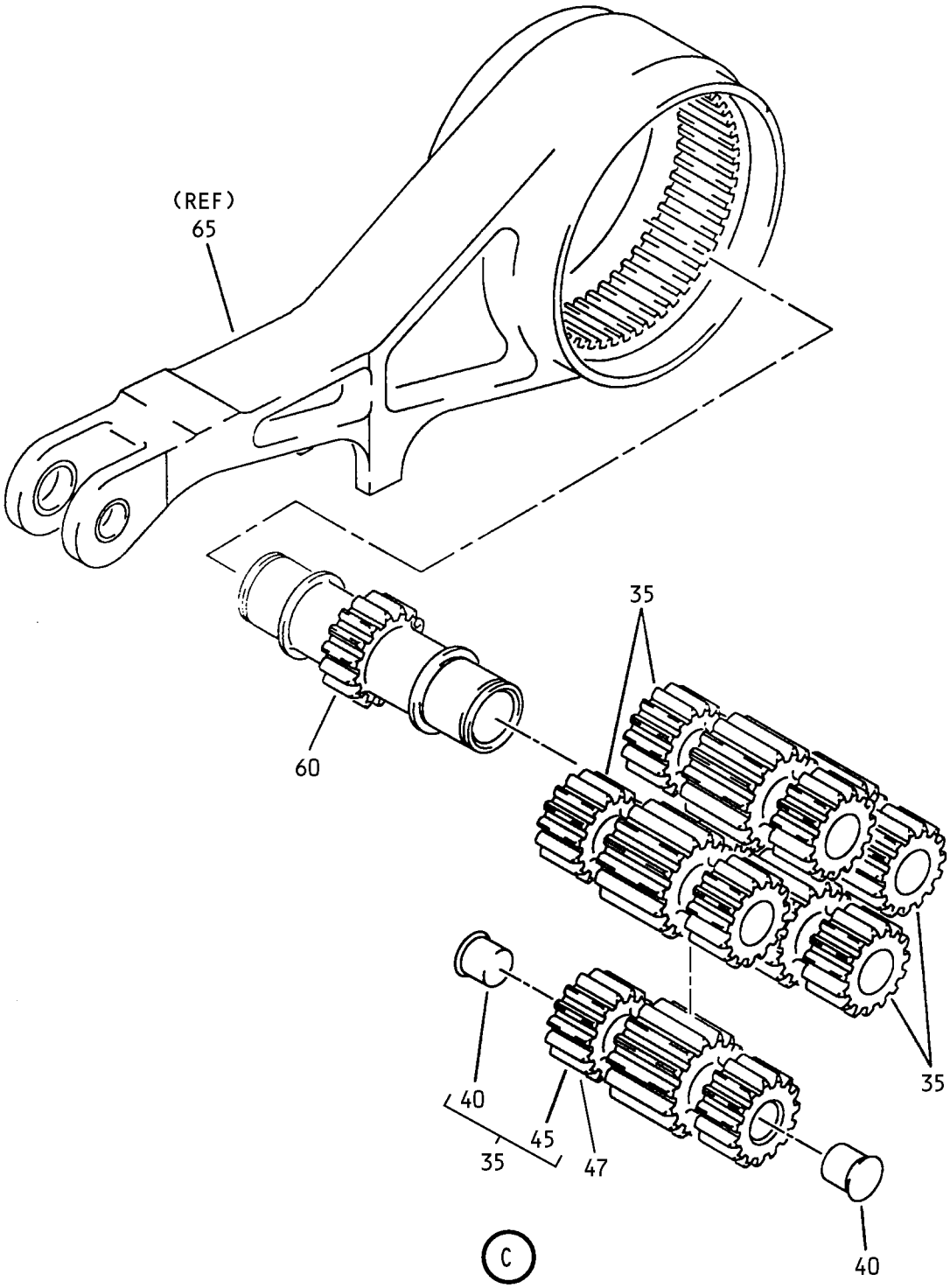
K19641




Outboard Leading Edge Slat Drive Rotary Actuator Assembly
Figure 1 (Sheet 3)



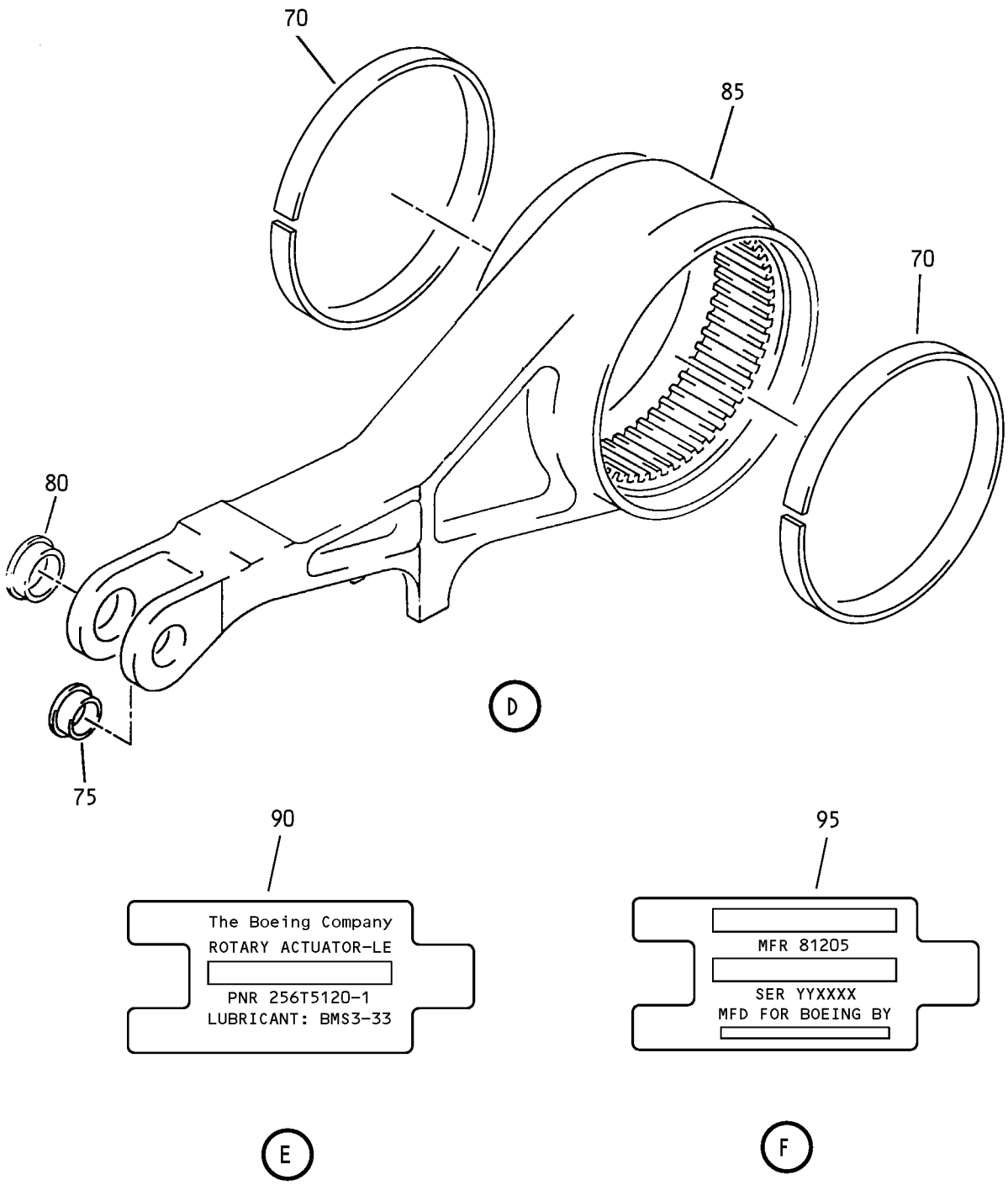
K19642




Outboard Leading Edge Slat Drive Rotary Actuator Assembly
Figure 1 (Sheet 4)

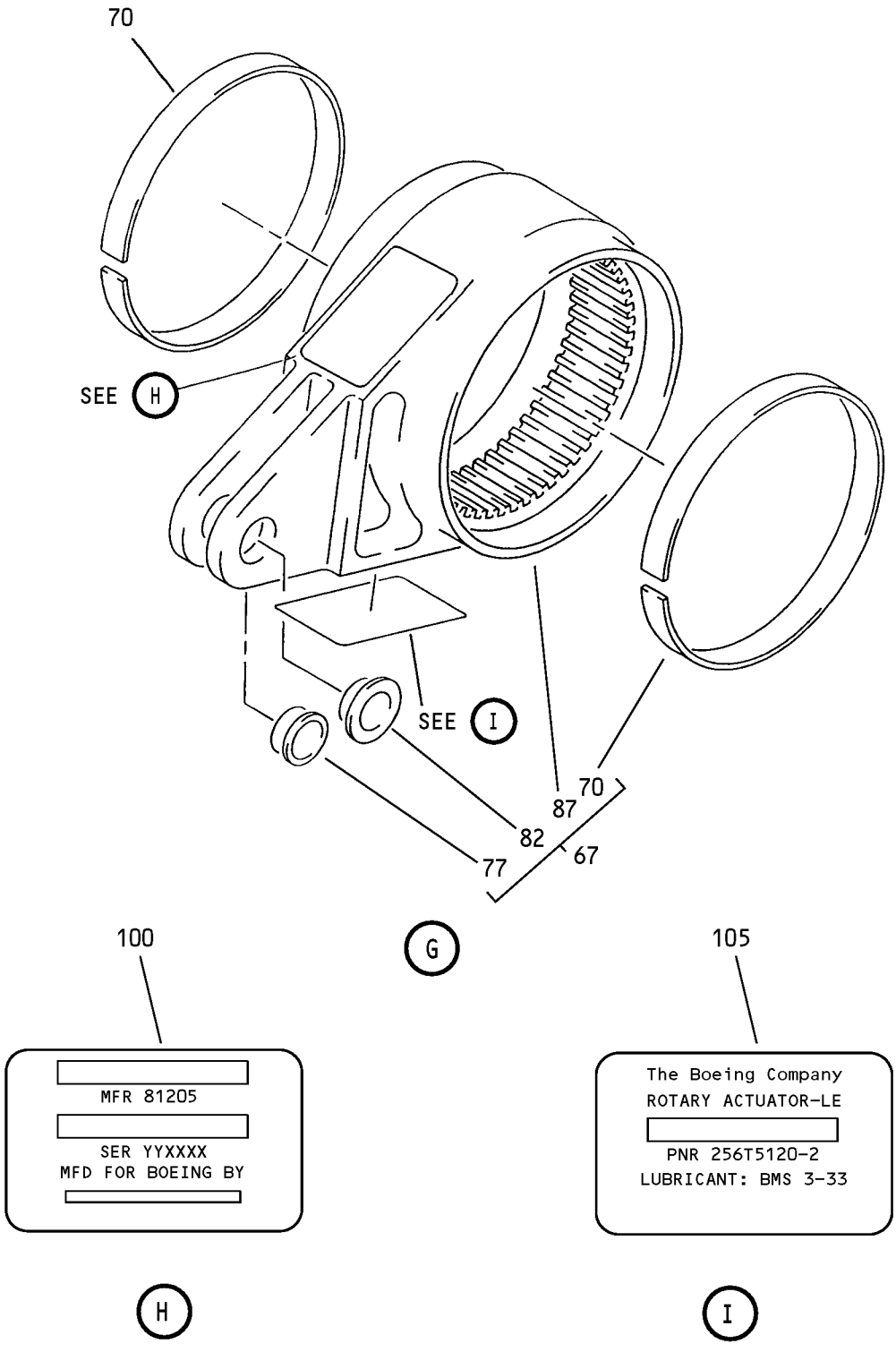


K19644




Outboard Leading Edge Slat Drive Rotary Actuator Assembly
Figure 1 (Sheet 5)

K19645




Outboard Leading Edge Slat Drive Rotary Actuator Assembly
Figure 1 (Sheet 6)



M33243

| FIG. & ITEM | PART NO. | AIRLINE PART NUMBER | NOMENCLATURE 1234567 | EFF CODE | QTY PER ASSY |
|---|---|---|---|---|---|
| 01- | | | | | |
| -1A | 256T5120-1 | | ACTUATOR ASSY-OUTBD LE SLAT DRIVE ROTARY | A | RF |
| -1B | 256T5120-2 | | ACTUATOR ASSY-OUTBD LE SLAT DRIVE ROTARY | B | RF |
| -1C | 256T5120-3 | | ACTUATOR ASSY-OUTBD LE SLAT DRIVE ROTARY | C | RF |
| 5 | RS81C | | .RING-RETAINING (V80756) | | 2 |
| 10 | 256T2165-1 | | .WASHER-RETAINING | | 2 |
| 15 | 256T2151-10 | | .GEAR ASSY-RING | | 2 |
| 20 | 256T2151-11 | | ..GEAR | | 1 |
| 25 | 256T5123-1 | | ..COVER-END | | 1 |
| 30 | AR145321 | | .OMNISEAL- (V05939) | | 2 |
| 35 | 256T5122-1 | | .GEAR ASSY-PLANET (OPT ITEM 47) | A | 5 |
| 40 | 23420-151 | | ..PLUG-CORK (V86912) | A | 2 |
| 45 | 256T5122-2 | | ..GEAR-PLANET | A | 1 |
| 47 | 256T5122-2 | | .GEAR-PLANET (OPT ITEM 35) | A | 5 |
| 47A | 256T5122-1 | | DELETED | | |
| -47B | 256T5122-2 | | .GEAR-PLANET | B,C | 5 |
| 50 | 256T2164-1 | | .BEARING-FLANGED | | 2 |
| 55 | 256T2154-1 | | .RING-PLANET | | 2 |
| 60 | 256T2153-4 | | .GEAR-SUN | | 1 |
| 65 | 256T5121-1 | | .ARM ASSY-GEAR | A | 1 |
| -65A | 256T2150-7 | | .ARM ASSY-GEAR | B | 1 |
| 67 | 256T2161-3 | | .ARM ASSY-GEAR | C | 1 |
| 70 | 256T2163-1 | | ..BEARING-DU | | 2 |
| 75 | BACB28AP06P017 | | ..BUSHING | A | 1 |
| -75A | 256T5125-1 | | ..BUSHING-SPARE (OVERSIZE) | A | 1 |
| -75B | 256T5125-2 | | ..BUSHING-SPARE (OVERSIZE) | A | 1 |
| -75C | 256T5125-3 | | ..BUSHING-SPARE (OVERSIZE) | A | 1 |
| -75D | 256T5125-4 | | ..BUSHING-SPARE (OVERSIZE) | A | 1 |
| -75E | 256T5125-5 | | ..BUSHING-SPARE (OVERSIZE) | A | 1 |
| -75F | 256T5125-6 | | ..BUSHING-SPARE (OVERSIZE) | A | 1 |
| 75G | BACB28AP05P014 | | DELETED | | |

| FIG. & ITEM | PART NO. | AIRLINE PART NUMBER | NOMENCLATURE 1234567 | EFF CODE | QTY PER ASSY |
|---|---|---|---|---|---|
| 01- | | | | | |
| 77 | BACB28AP05P014 | | ..BUSHING | B,C | 1 |
| -77A | 256T2166-1 | | ..BUSHING-FLANGED (OVERSIZE) | B,C | 1 |
| -77B | 256T2166-2 | | ..BUSHING-FLANGED (OVERSIZE) | B,C | 1 |
| -77C | 256T2166-3 | | ..BUSHING-FLANGED (OVERSIZE) | B,C | 1 |
| -77D | 256T2166-4 | | ..BUSHING-FLANGED (OVERSIZE) | B,C | 1 |
| -77E | 256T2166-5 | | ..BUSHING-FLANGED (OVERSIZE) | B,C | 1 |
| -77F | 256T2166-6 | | ..BUSHING-FLANGED (OVERSIZE) | B,C | 1 |
| 80 | BACB28AT08B018C | | ..BUSHING | A | 1 |
| -80A | 256T5126-1 | | ..BUSHING-SPARE (OVERSIZE) | A | 1 |
| -80B | 256T5126-2 | | ..BUSHING-SPARE (OVERSIZE) | A | 1 |
| -80C | 256T5126-3 | | ..BUSHING-SPARE (OVERSIZE) | A | 1 |
| -80D | 256T5126-4 | | ..BUSHING-SPARE (OVERSIZE) | A | 1 |
| -80E | 256T5126-5 | | ..BUSHING-SPARE (OVERSIZE) | A | 1 |
| -80F | 256T5126-6 | | ..BUSHING-SPARE (OVERSIZE) | A | 1 |
| 80G | BACB28AM07B015A | | DELETED | | |
| 82 | BACB28AM07B015A | | ..BUSHING | B,C | 1 |
| -82A | 256T2167-1 | | ..BUSHING-FLANGED (OVERSIZE) | B,C | 1 |
| -82B | 256T2167-2 | | ..BUSHING-FLANGED (OVERSIZE) | B,C | 1 |
| -82C | 256T2167-3 | | ..BUSHING-FLANGED (OVERSIZE) | B,C | 1 |
| -82D | 256T2167-4 | | ..BUSHING-FLANGED (OVERSIZE) | B,C | 1 |
| -82E | 256T2167-5 | | ..BUSHING-FLANGED (OVERSIZE) | B,C | 1 |
| -82F | 256T2167-6 | | ..BUSHING-FLANGED (OVERSIZE) | B,C | 1 |

| FIG. & ITEM | PART NO. | AIRLINE PART NUMBER | NOMENCLATURE 1234567 | EFF CODE | QTY PER ASSY |
|---|---|---|---|---|---|
| 01- | | | | | |
| 85 | 256T5121-2 | | ..ARM | A | 1 |
| -85A | 256T2150-8 | | ..ARM | B | 1 |
| 87 | 256T2161-4 | | ..ARM | C | 1 |
| 90 | 256T5124-1 | | .MARKER-NAMEPLATE | A | 1 |
| -90A | 256T5124-23 | | .MARKER-NAMEPLATE | B | 1 |
| 95 | 256T5124-2 | | .MARKER-SERIALIZED | A,B | 1 |
| 100 | 256T5124-21 | | .MARKER-ALUMINUM FOIL | C | 1 |
| 105 | 256T5124-22 | | .MARKER-ALUMINUM FOIL | C | 1 |

- Item Not Illustrated