COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST

THRUST REVERSER MANUAL DRIVE ASSEMBLY

PART NUMBER 315A1803–2

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COMPONENT MAINTENANCE MANUAL

Revision No. 10
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To: All holders of THRUST REVERSER MANUAL DRIVE ASSEMBLY 78-31-07.

Attached is the current revision to this COMPONENT MAINTENANCE MANUAL

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A = Added, R = Revised, D = Deleted, O = Overflow

TABLE OF CONTENTS

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COMPONENT MAINTENANCE MANUAL

TEMPORARY REVISION AND SERVICE BULLETIN RECORD

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL
		PRR 33667	JAN 10/85
		PRR 53267	JAN 10/85

All revisions to this manual will be accompanied by transmittal sheet bearing the revision number. Enter the revision number in numerical order, together with the revision date, the date filed and the initials of the person filing.

Revision		Filed	
Number	Date	Date	Initials

Revision		Filed	
Number	Date	Date	Initials

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Number	Date	Date	Initials	Number	Date	Date	Initials

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All temporary revisions to this manual will be accompanied by a cover sheet bearing the temporary revision number. Enter the temporary revision number in numerical order, together with the temporary revision date, the date the temporary revision is inserted and the initials of the person filing.
When the temporary revision is incorporated or cancelled, and the pages are removed, enter the date the pages are removed and the initials of the person who removed the temporary revision.

Temporary Revision		Inserted		Removed	
Number	Date	Date	Initials	Date	Initials

Temporary Revision		Inserted		Removed	
Date	Initials	Number	Date	Date	Initials

Temporary Revision		Inserted		Removed	
Number	Date	Date	Initials	Date	Initials

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INTRODUCTION

1. General

A. The instructions in this manual supply the data necessary to do the maintenance functions together with the test, fault isolation, repair, and replacement of the defective parts.

B. This manual is divided into different parts:

(1) Title Page

(2) Transmittal Letter

(3) Highlights

(4) List of Effective Pages

(5) Table of Contents

(6) Temporary Revision & Service Bulletin Record

(7) Record of Revisions

(8) Record of Temporary Revisions

(9) Introduction

(10) Procedures & IPL Sections

C. Components that can be repaired have a different repair number for each specified repair. To find the repair number location of a component, look in the Repair-General procedure at the beginning of the REPAIR section. The Repair-General procedure also has an explanation of the True Position Dimension symbols used.

D. All dimensions, measures, quantities and weights included are in English units. When metric equivalents are given they will be in the parentheses that follow the English units.

E. The introduction to the Illustrated Parts List (IPL) shows how the IPL data is used.

F. Design changes, optional parts, configuration differences and Service Bulletin modifications may cause different part numbers. These part numbers are identified in the IPL with an alphabetical letter which is added to the end of the basic item number. This new item number is referred to as an alpha-variant. Throughout the manual, IPL basic item number references also apply to alpha-variants unless shown differently.

G. The tool reference numbers found in the individual procedures and in the Special Tools, Fixtures, and Equipment section are used to identify if a tool is a standard tool (STD-XXXX), a commercial tool (COM-XXXX), or a Special Tool (SPL-XXXX). This reference number is also used to distinguish between tools with similar names in the same procedure. These reference numbers are for use in the documentation only. They are not to be used for ordering tools.

THRUST REVERSER MANUAL DRIVE ASSEMBLY - DESCRIPTION AND OPERATION

1. Description

A. The manual drive assembly consists of an outer housing containing a clutch, shaft, shaft spring, sealing adapter, thrust washer, thrust cages, screw adapter and a spring housing with ten steel balls, plungers and springs. The clutch has a square drive for manual operation of the thrust reverser. The screw adapter is internally threaded to mate with a thrust reverser actuator.

2. Operation

A. When the shaft is depressed into the clutch, a 3/8 square drive can be inserted to manually operate the assembly. When the clutch is rotated, it drives the spring housing and shaft through the spring-loaded balls. Output torque at the square end of the shaft is 35-50 lb-in. If the shaft end is restrained, the clutch will ratchet. With the square end of the shaft unrestrained, maximum input torque at the clutch is 2 pound-inches.

3. Leading Particulars (approximate)

A. Length – 4 inches

B. Diameter – 2 inches

C. Weight – 1 pound

TESTING AND FAULT ISOLATION

1. General

A. This procedure has the data necessary to do a test of the mechanism after an overhaul or for fault isolation.

B. Refer to IPL Figure 1 for item numbers.

2. Test Equipment and Materials

NOTE: Equivalent substitutes may be used.

A. Tools/Equipment

NOTE: Equivalent substitutes may be used.

Reference	Description
SPL-8217	Test Equipment - Fan Duct Reverser, Manual Drive Assembly (Part #: B78012-1, Supplier: 81205)
SPL-8220	Support Assembly - Test Equipment, Fan Duct Reverser (B78012-2 is included in B78012-1)
SPL-8222	Fitting Assembly - Test Equipment, Fan Duct Reverser (B78012-4 is included in B78012-1)
SPL-8336	Block - Overhaul Equipment (-13 is included in B78013-10)

B. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
D00153	Fluid - Hydraulic, Erosion Arresting, Fire Resistant	BMS3-11 Type IV (interchange˜ able & intermixable with Type V)
D50036	Fluid - Hydraulic, Erosion Arresting, Fire Resistant (use at -65 to 275 Degree F)	BMS3-11, Type V (interchgable & intermixable with Type IV)
D50122	Fluid - Hydraulic, Skydrol	BMS3-11, Type IV or Type V

C. References

Reference	Title
SOPM 20-60-03	LUBRICANTS

D. Procedure

(1) Hydraulic Fluid – fluid, D00153, or fluid, D50036, or hydraulic fluid, D50122 BMS 3-11, Type IV (Ref SOPM 20-60-03)

(2) Manual Drive Test Equipment – test equipment, SPL-8217 B78012-1 (Consists of support assembly, SPL-8220 B78012-2 support, fitting assembly, SPL-8222 B78012-4 fitting, block, SPL-8336 B78012-13 torque wrench adapter, and ancillary bars)

E. Facility and Material

(1) Hydraulic Test Stand – Capable of supplying hydraulic fluid at temperature of 60-140°F and pressures of 0-4500 psi

(2) Torque wrench

3. Test

A. Tools/Equipment

NOTE: Equivalent substitutes may be used.

Reference	Description
SPL-8220	Support Assembly - Test Equipment, Fan Duct Reverser (B78012-2 is included in B78012-1)
SPL-8222	Fitting Assembly - Test Equipment, Fan Duct Reverser (B78012-4 is included in B78012-1)

B. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
D00153	Fluid - Hydraulic, Erosion Arresting, Fire Resistant	BMS3-11 Type IV (interchange˜able & intermixable with Type V)
D50036	Fluid - Hydraulic, Erosion Arresting, Fire Resistant (use at -65 to 275 Degree F)	BMS3-11, Type V (interchgable & intermixable with Type IV)
D50122	Fluid - Hydraulic, Skydrol	BMS3-11, Type IV or Type V

C. Procedure

(1) Install fitting assembly, SPL-8222 in manual drive assembly. Tighten fitting to 855-945 pound-inches.

(2) Connect hydraulic line to fitting.

(3) Proof Pressure

(a) Apply hydraulic pressure of 4500 psi and hold for 2 minutes. Check that there is no external leakage, permanent deformation or loosening of parts.

(b) Reduce hydraulic pressure to 5 psi and hold for 2 minutes. Check that there is no external leakage, permanent deformation or loosening of parts.

(4) Torque Output

(a) Install assembly in support assembly, SPL-8220.

(b) With square end of shaft (20A) restrained, apply torque to clutch (40A) until slippage occurs for approximately 50 revolutions in both directions. Then measure maximum output torque. The output torque must be 35-50 pound-inches.

(5) Torque Input

(a) With assembly installed in support assembly, SPL-8220, manually rotate clutch (40A) in CW and CCW directions with torque wrench with output unrestrained. Maximum input torque shall not exceed 2 pound-inches.

(6) Post Test

(a) Remove assembly from fixture.

(b) Mark or tag assembly with test date.

(c) Cap port with fluid, D00153, or fluid, D50036, or hydraulic fluid, D50122 resistant plug.

Table 101: Trouble Shooting Chart Figure

TROUBLE	PROBABLE CAUSE	CORRECTION
Leakage at shaft (20	Defective packings (15,50)	Disassemble and replace packings (TESTING AND FAULT ISOLATION, Paragraph 4.A.(1).)
Output torque less than 35 lb-in.	Gap between clutch (40A) and spring housing (85) too large	Disassemble and adjust gap by adding shims (25, 30, 35) (TESTING AND FAULT ISOLATION, Paragraph 4.A.(2).)
Output torque greater than 50 lb-in.	Gap between clutch (40A) and spring housing (85) too small	Disassemble and adjust gap by subtracting shims (25, 30, 35) (TESTING AND FAULT ISOLATION, Paragraph 4.A.(2).)
Input torque greater than 2 lb-in.	Defective thrust cage (80, 95)	Disassemble and replace cage (80, 95) (TESTING AND FAULT ISOLATION, Paragraph 4.A.(3).)

4. Corrective Procedures

A. Procedure

(1) Packing (15, 50) Replacement

(a) Disassemble parts per DISASSEMBLY, Paragraph 3.A.(1) thru DISASSEMBLY, Paragraph 3.A.(6) of DISASSEMBLY.

(b) Replace packings (15, 50) and rings (10, 45) if defective.

(c) Reassemble parts per ASSEMBLY and retest for leakage.

(2) Gap Adjustment

(a) Disassemble parts per. DISASSEMBLY, Paragraph 3.A.(1) thru DISASSEMBLY, Paragraph 3.A.(5) of DISASSEMBLY.

(b) Adjust gap by adding or subtracting shims (25, 30, 35). Install thickest shim against face of outer housing (105).

(c) Reassemble parts per ASSEMBLY and retest for leakage, torque output and torque input.

(3) Thrust Cage (80, 95) Replacement

(a) Disassemble parts per DISASSEMBLY, Paragraph 3.A.(1) thru DISASSEMBLY, Paragraph 3.A.(5) of DISASSEMBLY

(b) Replace cage (80, 95) if defective.

(c) Reassemble parts per ASSEMBLY and retest for leakage, torque output and torque input.

DISASSEMBLY

1. General

A. This procedure has the data to disassemble the thrust reverser manual drive assembly.

B. Disassemble this component only as necessary to complete fault isolation, determine the serviceability of parts, perform required repairs, and restore the unit to serviceable condition.

C. Refer to IPL Figure 1 for item numbers.

2. Parts Replacement

NOTE: The following parts are recommended for replacement. Unless otherwise specified, actual replacement may be based on in-service experience.

A. Procedure

(1) Packings (15, 50)

(2) Retainers (55)

(3) Rings (10, 45)

3. Disassembly

A. Procedure

(1) Mount unit in support fixture B78012-2 and remove lockwire.

(2) Remove screw adapter (100), sealing adapter (5), thrust washers (90) and cage (95). Remove ring (10) and packing (15).

(3) Remove spring housing (85), balls (60), plungers (65) and springs (70).

(4) Remove shaft (20A) and spring (17).

(5) Remove clutch (40A), thrust washers (75), cage (80) and shims (25, 30, 35). Note thickness of shims for reference during assembly.

(6) Remove ring (45) and packing (50) from clutch (40A).

(7) Remove strap (110) and nameplate (115).

(8) Remove retainers (55) from housing (105).

(NOT APPLICABLE)

CHECK

1. General

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

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

C. Refer to IPL Figure 1 for item numbers.

2. Check

A. References

Reference	Title
SOPM 20-20-01	MAGNETIC PARTICLE INSPECTION
SOPM 20-20-02	PENETRANT METHODS OF INSPECTION

B. Procedure

(1) Check all parts for obvious defects in accordance with standard industry practices. Refer to FITS AND CLEARANCES for design dimensions and wear limits.

(2) Magnetic particle check per SOPM 20-20-01 the following parts:

(a) Adaptor (5, 100)

(b) Shaft (20A)

(c) Plunger (65)

(d) Spring (17, 70)

(3) Penetrant check per SOPM 20-20-02 the following parts:

(a) Clutch (40A)

(b) Housing (85, 105)

(4) Check spring (70).

(a) Compress spring to 0.83 inch and check that load is 6.0-7.4 lbs.

(b) No permanent set should result when spring is completely compressed (solid).

(5) Check spring (17).

(a) Compress spring to 1.19 inch and check that load is 5.0-5.6 lbs.

(b) No permanent set should result when spring is completely compressed (solid).

REPAIR

1. **Content**

   A. Repair, refinish and replacement procedures are included in separate repair sections as follows:

Table 601:

P/N	NAME	REPAIR
315A1877	HOUSING, OUTER	1-1
315A1887	SHAFT	2-1
BAC27DTR9	NAMEPLATE	3-1
- - -	MISC PARTS REFINISH	4-1
315A1886	CLUTCH	5-1
315A1888	PLUNGER	6-1
315A1892	SEALING ADAPTER	7-1

2. **Standard Practices**

   A. Refer to the following standard practices as applicable, for details of procedures in individual repairs.

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

      (2) SOPM 20-30-02 Stripping of Protective Finishes

      (3) SOPM 20-30-03 General Cleaning Procedures

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

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

      (6) SOPM 20-42-03 Hard Chrome Plating

      (7) SOPM 20-42-05 Bright Cadmium Plating

      (8) SOPM 20-43-01 Chromic Acid Anodizing

      (9) SOPM 20-50-02 Installation of Safetying Devices

      (10) SOPM 20-50-12 Application of Adhesives

      (11) SOPM 20-60-02 Finishing Materials

3. **Materials**

   NOTE: Equivalent substitutes may be used.

   A. Enamel – BMS 10-11, type II

   B. Primer – primer, C00259 BMS 10-11, type 1

   C. Adhesive – adhesive, A01070 Type 38

—	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] [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] OR 2.000 BSC	THEORETICALLY EXACT DIMENSION IS 2.000

True Position Dimensioning Symbols
Figure 601

4. Dimensioning Symbols

A. Standard True Position Dimensioning Symbols used in the applicable repair procedures are shown in REPAIR-GENERAL, Figure 602.

—	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)
Ø	DIAMETER
S Ø	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 WHICH 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
TIR	TOTAL INDICATOR READING

EXAMPLES

[— | 0.002]	STRAIGHT WITHIN 0.002
[⊥ | 0.002 | B]	PERPENDICULAR TO B WITHIN 0.002
[// | 0.002 | A]	PARALLEL TO 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 PLANE A
[⌓ | 0.020 | A]	SURFACES MUST LIE WITHIN PARALLEL BOUNDARIES 0.02 INCH APART AND EQUALLY DISPOSED ABOUT TRUE PROFILE
[◎ Ø 0.0005 | C]	CONCENTRIC TO C WITHIN 0.0005 DIAMETER
[⌯ | 0.010 | A]	SYMMETRICAL WITH A WITHIN 0.010
[∠ | 0.005 | A]	ANGULAR TOLERANCE 0.005 WITH A
[⌖ Ø 0.002 Ⓢ | B]	LOCATED AT TRUE POSITION WITHIN 0.002 DIA RELATIVE TO DATUM B, REGARDLESS OF FEATURE SIZE
[⊥ Ø 0.010 Ⓜ | A] [0.510 Ⓟ]	AXIS IS TOTALLY WITHIN A CYLINDER OF 0.010-INCH DIAMETER, PERPENDICULAR TO, AND EXTENDING 0.510-INCH ABOVE, DATUM A, MAXIMUM MATERIAL CONDITION
[2.000] OR 2.000 BSC	THEORETICALLY EXACT DIMENSION IS 2.000

NOTE: DATUM MAY APPEAR AT EITHER SIDE OF TOLERANCE FRAME [0.020 | A] [A | 0.020]

True Position Dimensioning Symbols
Figure 602

OUTER HOUSING - REPAIR 1-1

315A1877–2

1. General

A. This repair gives the data that is necessary to refinish the outer housing.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

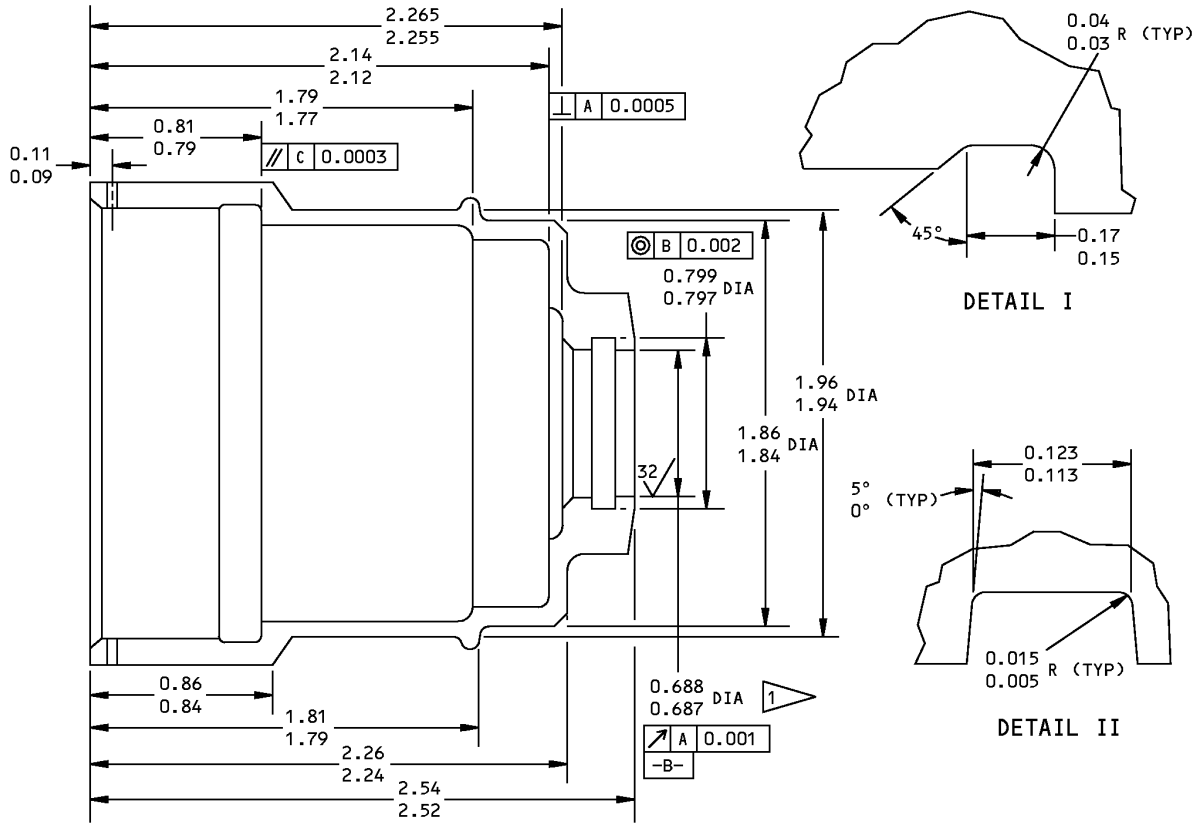
C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 602 for standard true position dimensioning symbols shown in the repair.

E. Refer to IPL Figure 1 for item numbers.

2. Refinish

A. Repair consists of restoration of original finish. Refer to Refinish instructions, REPAIR 1-1, Figure 601.



REFINISH

CHROMIC ACID ANODIZE (F-17.04) ALL OVER EXCEPT AS NOTED. APPLY ONE COAT BMS 10-11, TYPE 1, PRIMER (F-20.02) AND ONE COAT BMS 10-11, TYPE II, ENAMEL, COLOR 707 GRAY GLOSS (F-21.02) ON EXTERIOR SURFACES

1 HARD ANODIZE INDICATED DIAMETER (F-2.204, SEALED)

125 ALL MACHINED SURFACES EXCEPT AS NOTED

MATERIAL: AL ALLOY

ALL DIMENSIONS ARE IN INCHES

Housing Refinish Details
Figure 601

SHAFT - REPAIR 2-1

315A1887–4

1. General

A. This repair gives the data that is necessary to refinish the shaft.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 602 for standard true position dimensioning symbols shown in the repair.

E. Refer to IPL Figure 1 for item numbers.

2. Refinish

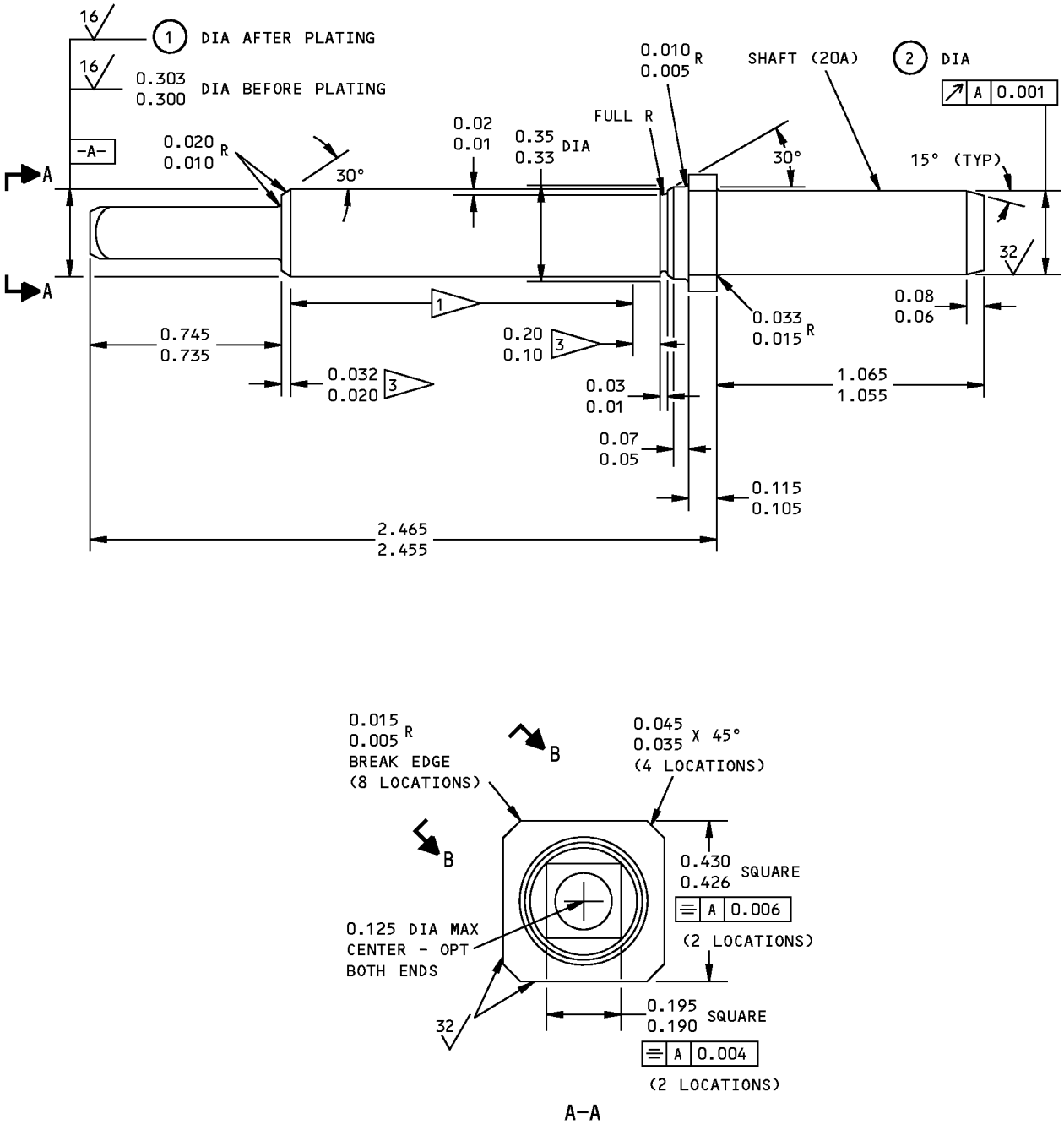
A. Repair consists of restoration of original finish. Refer to Refinish instructions REPAIR 2-1, Figure 601.

3. Plating Repair

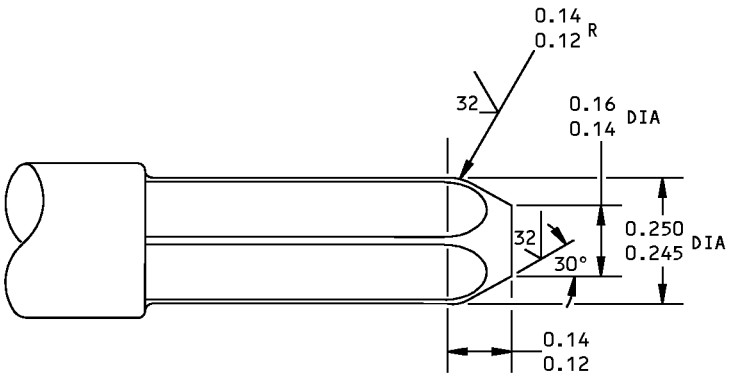
CAUTION: MACHINE ONLY THE DIAMETERS WITH REPAIR LIMITS AS SHOWN IN REPAIR 2-1, FIGURE 601.

A. Machine diameter of shaft (20A) as required to remove defects to the repair limit as shown in REPAIR 2-1, Figure 601.

B. Chrome plate and grind to design dimensions and finish.



315A1887-4 Shaft Refinish Details
Figure 601 (Sheet 1 of 2)



B–B
ROTATED 45° CCW

	1	2
DESIGN DIM	0.310 0.309	0.310 0.309
REPAIR LIMIT	0.279 2	0.278 2

REFINISH

PASSIVATE (F-17.09). APPLY THIN DENSE CHROME PLATE IN AREA NOTED PER 1

1 THIN DENSE CHROME PLATE (MINIMUM AHARDNESS ROCKWELL C67) IN NOTED AREA PER SOPM 20-42-03. PLATING RUNOUT ON TAPER IS PERMISSIBLE

2 CHROME PLATE (F-15.03)

3 CHROME PLATE RUNOUT

REPAIR

REF 2 3

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: 15-5 CRES (180-200 KSI)

ALL DIMENSIONS ARE IN INCHES

315A1887-4 Shaft Refinish Details
Figure 601 (Sheet 2 of 2)

NAMEPLATE - REPAIR 3-1

BAC27DTR–9

1. General

A. This repair gives the data that is necessary to refinish the nameplate.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

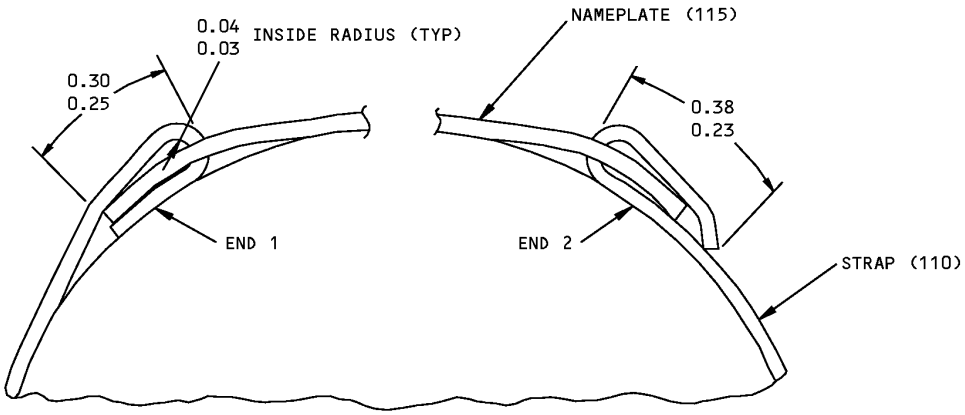
D. Refer to REPAIR-GENERAL, Figure 602 for standard true position dimensioning symbols shown in the repair.

E. Refer to IPL Figure 1 for item numbers.

2. Nameplate Replacement

A. Install new nameplate (115) and strap (110) per REPAIR 3-1, Figure 601.

B. Bond nameplate (115) per SOPM 20-50-12, adhesive, A01070.



NOTE: STRAP MAY BE USED ONLY ONCE. STRAP AND NAMEPLATE SHALL BE SNUG ON MOUNTING SURFACE.

1. FORM NAMEPLATE TO A RADIUS SLIGHTLY SMALLER THAN BARREL RADIUS.
2 DEFORM CORNERS OF NAMEPLATE SLIGHTLY TOWARDS MOUNTING SURFACE.
3. FORM BEND ON STRAP END 1, INSERT THRU HOLE IN NAMEPLATE AND FORM STRAP END TO COMPLY WITH DRAWING.
4. HOLD NAMEPLATE ON BARREL AND FEED STRAP THRU HOLE.
5. SLIGHTLY BEND STRAP END 2 WHILE APPLYING SUFFICIENT PULLING FORCE TO OBTAIN PRETENSION OF NAMEPLATE AND STRAP.
6. CUT STRAP END 2 TO CONFORM TO DIMENSION SHOWN.
7. WHILE MAINTAINING THE PRETENSION, USE SUITABLE TOOL TO MAKE FINAL BEND OF STRAP END 2 AND TO OBTAIN ADDITIONAL TENSION. USE CARE NOT TO TEAR NAMEPLATE HOLE BY OVERTENSION.
8. BEND STRAP END 2 DOWN OVER EDGE OF NAMEPLATE AND TAP WITH SUITABLE SOFT NOSED HAMMER.

ALL DIMENSIONS ARE IN INCHES

Nameplate Installation
Figure 601

MISCELLANEOUS PARTS REFINISH - REPAIR 4-1

1. General

A. This repair gives the data that is necessary to refinish the miscellaneous parts.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to IPL Figure 1 for item numbers.

2. Refinish

A. Repair of parts listed in REPAIR 4-1, Table 601 consists of restoration of the original finish.

Table 601: Refinish Details

IPL FIG. & ITEM	MATERIAL	FINISH
IPL Figure 1		
Shim (25, 30, 35)	301 CRES	Passivate (F-17.09).
Spring (17, 70)	17-7PH CRES	Passivate (F-17.09).
Adapter (100)	15-5PH CRES 150-170 ksi	Passivate (F-17.09). Cadmium plate exterior threads.
Strap (110)	Al alloy	No finish.

CLUTCH - REPAIR 5-1

315A1886–3

1. General

A. This repair gives the data that is necessary to refinish the clutch.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 602 for standard true position dimensioning symbols shown in the repair.

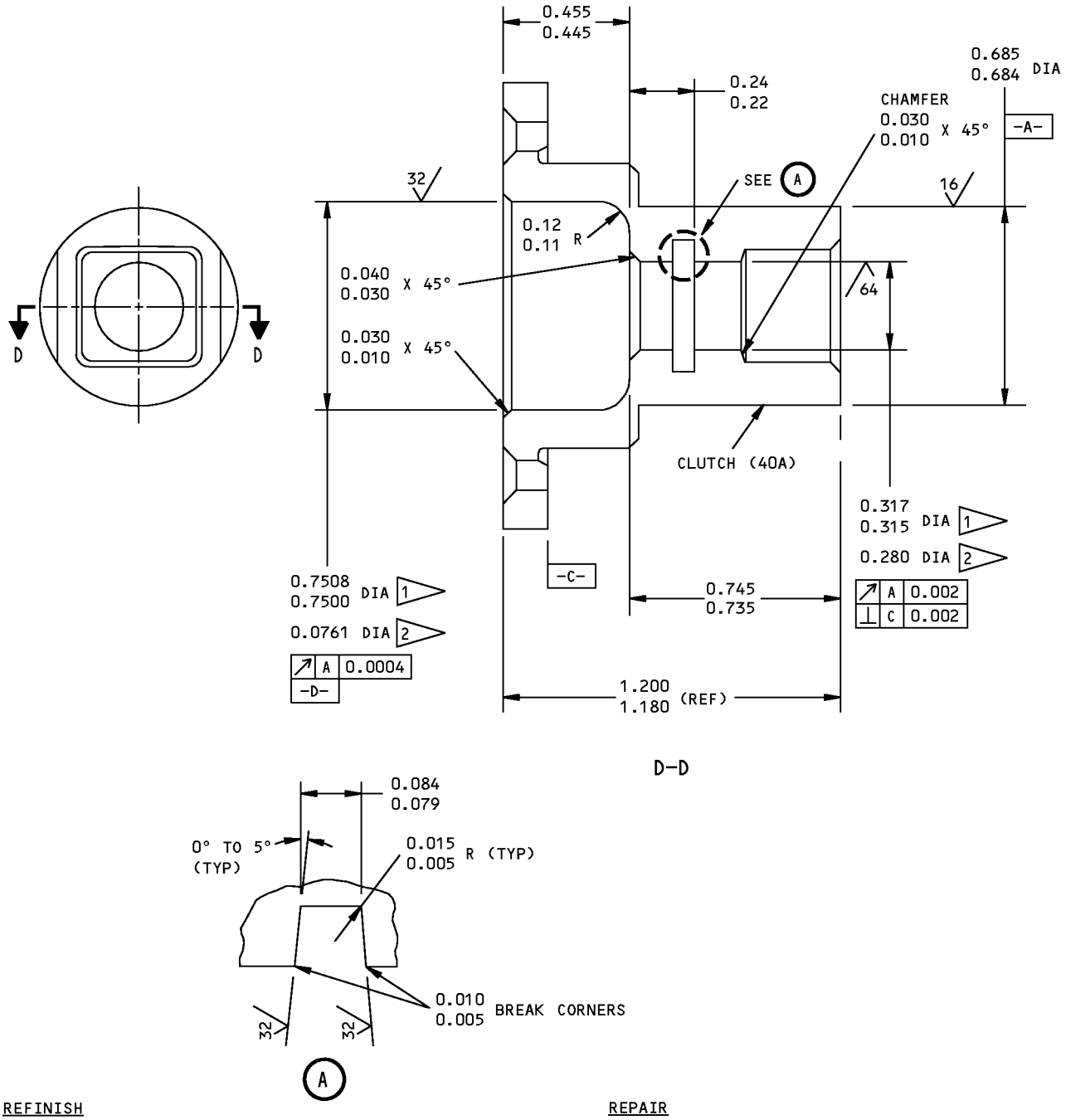
E. Refer to IPL Figure 1 for item numbers.

2. Plating Repair

CAUTION: MACHINE ONLY THE DIAMETERS WITH REPAIR LIMITS AS SHOWN IN REPAIR 5-1, FIGURE 601.

A. Machine diameter of clutch (40A) as required to remove defects to the repair limit as shown in REPAIR 5-1, Figure 601.

B. Chrome plate (F-15.03) and grind to the design dimensions and finish .



REFINISH

NO FINISH

1 DESIGN DIMENSION

2 REPAIR LIMIT

REPAIR

REF 1 2

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: AL-NI-BRZ

ALL DIMENSIONS ARE IN INCHES

315A1886-3 Clutch Repair Details
Figure 601

PLUNGER - REPAIR 6-1

315A1888–1

1. General

A. This repair gives the data that is necessary to refinish the plunger.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 602 for standard true position dimensioning symbols shown in the repair.

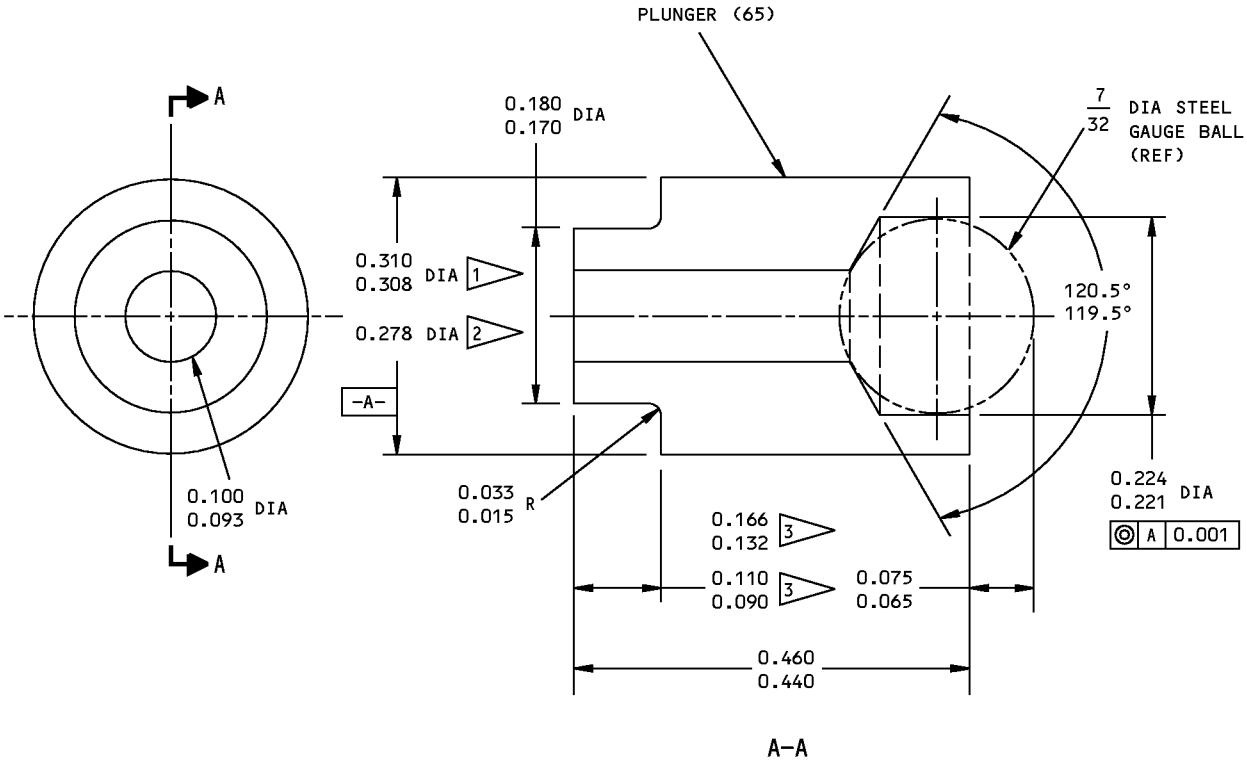
E. Refer to IPL Figure 1 for item numbers.

2. Plating Repair

CAUTION: MACHINE ONLY THE DIAMETERS WITH REPAIR LIMITS AS SHOWN IN REPAIR 6-1, FIGURE 601.

A. Machine diameter of plunger (65) as required to remove defects to the repair limit as shown in REPAIR 6-1, Figure 601.

B. Chrome plate (F-15.03) and grind to the design dimensions and finish.



REFINISH

PASSIVATE (F-17.09) ALL OVER

1 DESIGN DIMENSION

2 REPAIR LIMIT

3 THERE ARE TWO POSSIBLE CONFIGURATIONS WHICH ARE OPTIONAL TO EACH OTHER

REPAIR

REF 1 2

MATERIAL: 15-5PH CRES (180-200 KSI)

125 ALL MACHINED SURFACES

ALL DIMENSIONS ARE IN INCHES

315A1888-1 Plunger Repair Details
Figure 601

SEALING ADAPTER - REPAIR 7-1

315A1892–3

1. General

A. This repair gives the data that is necessary to refinish the sealing adapter.

B. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard Overhaul Practices Manual (SOPM) subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 3. for the description of the Material codes identified in this procedure.

D. Refer to REPAIR-GENERAL, Figure 602 for standard true position dimensioning symbols shown in the repair.

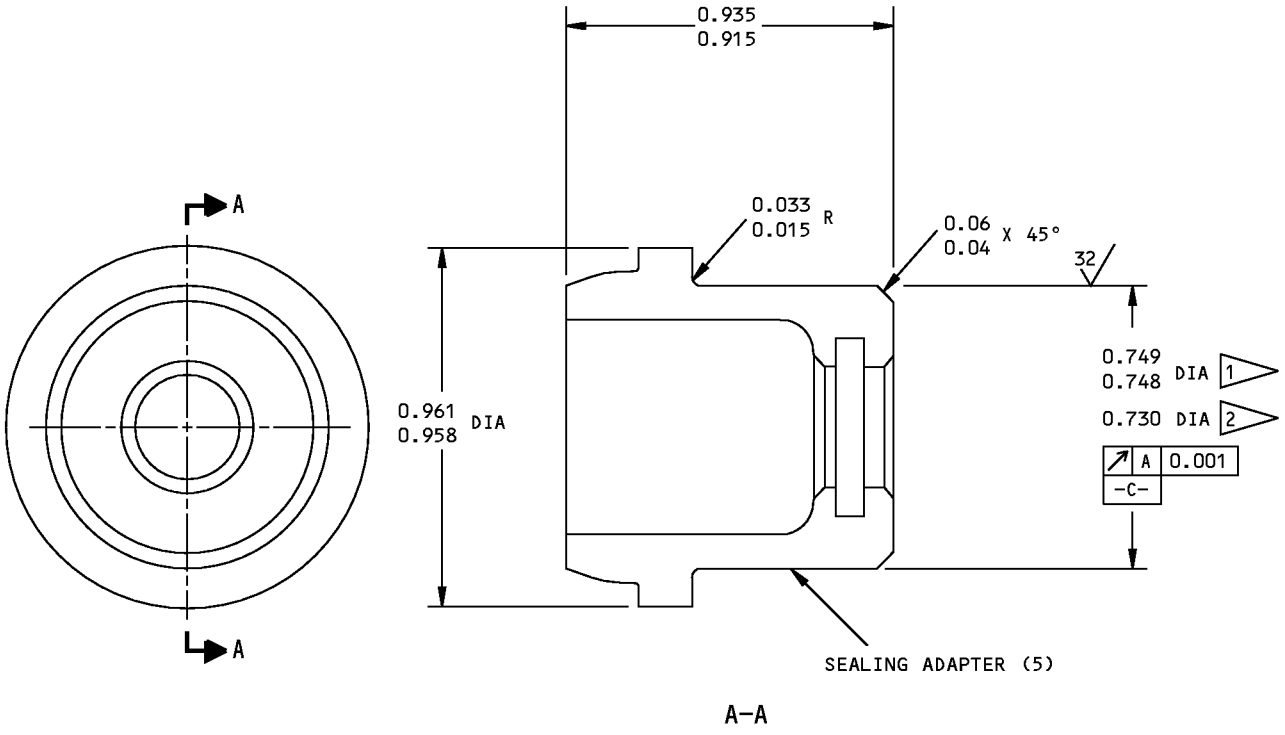
E. Refer to IPL Figure 1 for item numbers.

2. Plating Repair

CAUTION: MACHINE ONLY THE DIAMETERS WITH REPAIR LIMITS AS SHOWN IN REPAIR 7-1, FIGURE 601.

A. Machine diameter of sealing adapter (5) as required to remove defects to the repair limit as shown in REPAIR 7-1, Figure 601.

B. Chrome plate (F-15.03) and grind to the design dimensions and finish.



A–A

REFINISH

PASSIVATE (F-17.09) ALL OVER

1 REPAIR DIMENSION

2 REPAIR LIMIT

REPAIR

REF 1 2

MATERIAL: 15-5PH CRES (150-170 KSI)

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

ALL DIMENSIONS ARE IN INCHES

315A1892-3 Sealing Adapter Repair Details
Figure 601

ASSEMBLY

1. General

A. This procedure contains the data necessary to assemble the main landing gear strut door assembly.

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

C. Refer to IPL Figure 1 for the item numbers.

2. Lubrication

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
D00013	Grease - Aircraft And Instrument Grease	MIL-PRF-23827 (NATO G-354) (Supersedes MIL-G-23827)
D00054	Fluid - Hydraulic Assembly Lubricant - MCS 352B (Formerly Monsanto MCS 352B)	
D00153	Fluid - Hydraulic, Erosion Arresting, Fire Resistant	BMS3-11 Type IV (interchange˜able & intermixable with Type V)
D50036	Fluid - Hydraulic, Erosion Arresting, Fire Resistant (use at -65 to 275 Degree F)	BMS3-11, Type V (interchgable & intermixable with Type IV)
D50122	Fluid - Hydraulic, Skydrol	BMS3-11, Type IV or Type V

B. Procedure

(1) Lightly lubricate O-ring packings with fluid, D00153, or fluid, D50036, or hydraulic fluid, D50122 or MCS 352B fluid, D00054.

(2) Lubricate thrust washers (75, 90), thrust cages (80, 95), spring (70), balls (60) and faces of clutch (40A) with grease, D00013.

3. Assembly

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
A00247	Sealant - Pressure And Environmental - Chromate Type	BMS 5-95
G02436	Lockwire - Monel (0.040 In. Dia.)	NASM20995N˜ C40

B. References

Reference	Title
SOPM 20-50-02	INSTALLATION OF SAFETYING DEVICES

C. Procedure

(1) Install retainers (55) in housing (105).

(2) Install ring (45) and packing (50) in clutch (40A).

(3) Install ring (10) and packing (15) in sealing adaptor (5).

(4) Install thrust washers (75), cage (80), shims (25, 30, 35) and clutch (40A) per ASSEMBLY, Figure 701.

NOTE: Use shims (25, 30, 35) with same thickness noted in disassembly to facilitate adjustment after testing. Install thickest shim against face of outer housing (105).

(5) Install spring (17) and shaft (20A) through clutch (40A).

(6) Install springs (70), plungers (65), balls (60) and housing (85) in outer housing (105) per ASSEMBLY, Figure 701.

(7) Install thrust washers (90), cage (95), screw adaptor (100) and sealing adaptor (5). Apply wet sealant, A00247 to male threads of screw adaptor (100). Tighten adaptor (100) to 15-20 pound-feet and install MS20995N40 or lockwire, G02436 using double twist method per SOPM 20-50-02.

(8) Cap port with plug.

(9) Test manual drive assembly (Ref TESTING AND FAULT ISOLATION).

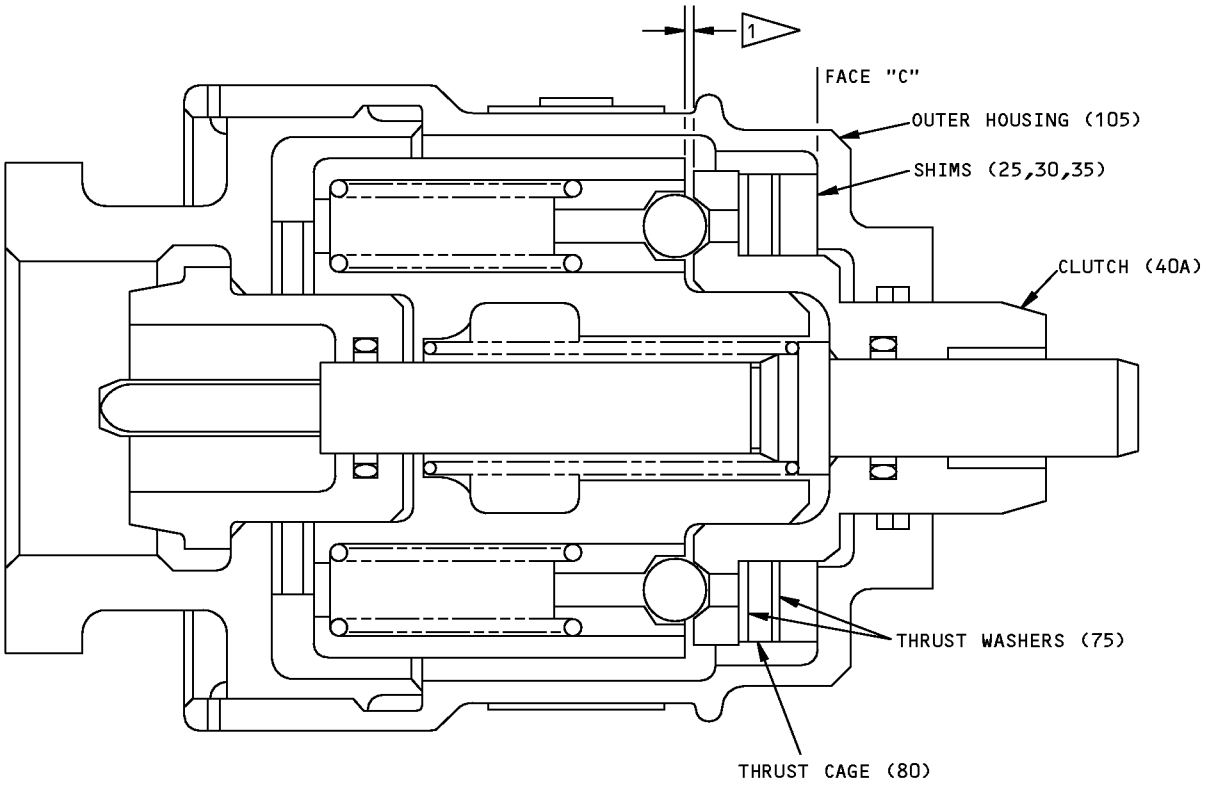
4. Storage

A. References

Reference	Title
SOPM 20-44-02	TEMPORARY PROTECTIVE COATINGS

B. Procedure

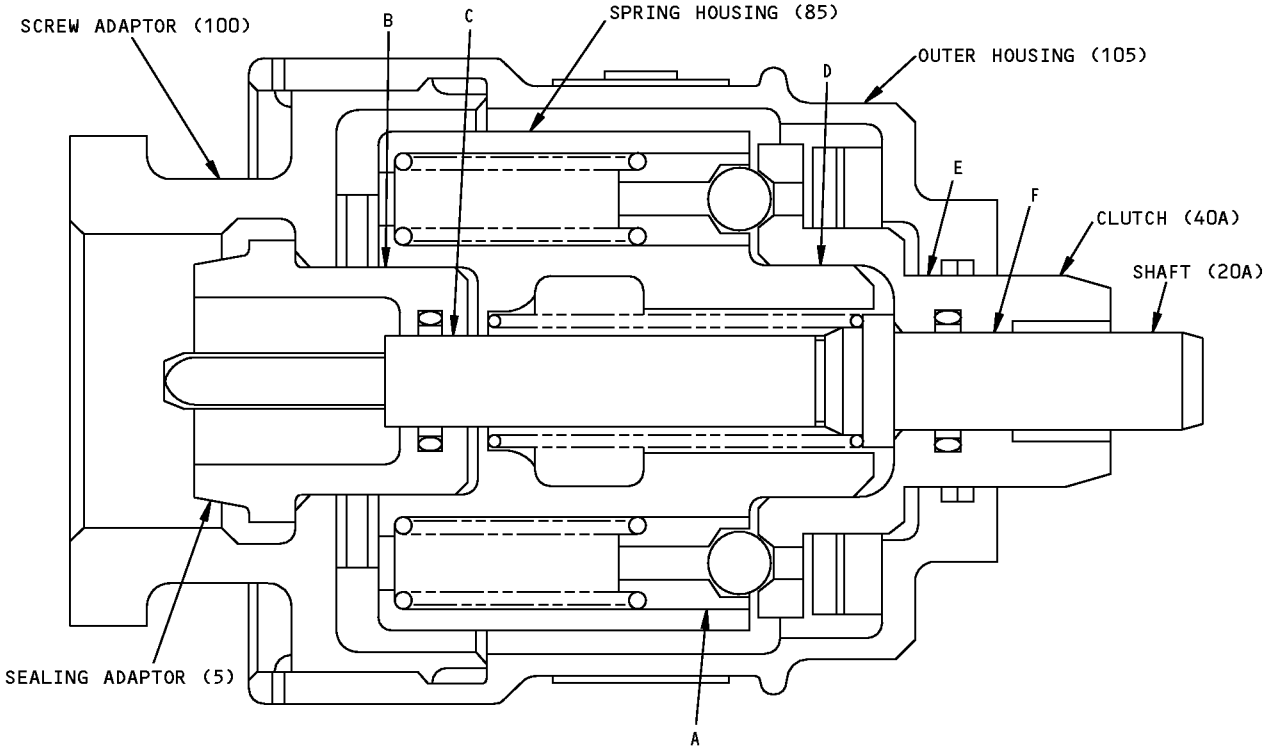
(1) Protect and store unit using standard industry practices and information contained in SOPM 20-44-02.



1 SHIM TO PROVIDE 0.025 NOMINAL GAP, THICKEST SHIM TO BE PLACED AGAINST FACE "C". THEN ADJUST GAP TO MEET TORQUE REQUIREMENTS (REF TESTING/TROUBLE SHOOTING) BY ADDING OR SUBTRACTING SHIMS

ALL DIMENSIONS ARE IN INCHES

Shim Installation
Figure 701



Fits and Clearances
Figure 801 (Sheet 1 of 2)

Ref Letter Fig.801	Mating Item No. IPL Fig.1	Design Dimension				Service Wear Limit		
		Dimension		Assembly Clearance		Dimension		Maximum Clearance
		Min	Max	Min	Max	Min	Max	
A	ID 85 OD 65	0.312 0.308	0.316 0.310	0.002	0.008	0.305	0.320	0.015
B	ID 85 OD 5	0.7500 0.7480	0.7507 0.7490	0.0010	0.0027	0.740	0.755	0.015
C	ID 5 OD 20A	0.312 0.309	0.313 0.310	0.002	0.004	0.306	0.317	0.011
D	ID 40A OD 85	0.7500 0.7487	0.7508 0.7492	0.0008	0.0021	0.740	0.755	0.015
E	ID 105 OD 40A	0.687 0.684	0.688 0.685	0.002	0.004	0.680	0.692	0.012
F	ID 40A OD 20A	0.315 0.309	0.317 0.310	0.005	0.008	0.306	0.320	0.014

ALL DIMENSIONS ARE IN INCHES

Fits and Clearances
Figure 801 (Sheet 2 of 2)

FOR TORQUE VALUES OF STANDARD FASTENERS, REFER TO 20-50-01			
ITEM NO. IPL FIG. 1	NAME	TORQUE	
		POUND-INCHES	POUND-FEET
100	ADAPTOR		15-20

Torque Table
Figure 802

SPECIAL TOOLS, FIXTURES, AND EQUIPMENT

1. General

A. This section lists the special tools, fixtures, and equipment necessary for maintenance.

NOTE: Equivalent substitutes may be used.

Special Tools

Reference	Description	Part Number	Supplier
SPL-8217	Test Equipment - Fan Duct Reverser, Manual Drive Assembly	B78012-1	81205
SPL-8220	Support Assembly - Test Equipment, Fan Duct Reverser (B78012-2 is included in B78012-1)		
SPL-8222	Fitting Assembly - Test Equipment, Fan Duct Reverser (B78012-4 is included in B78012-1)		
SPL-8336	Block - Overhaul Equipment (-13 is included in B78013-10)		

Tool Supplier Information

CAGE Code	Supplier Name	Supplier Address
81205	THE BOEING COMPANY	17930 INTERNATIONAL BLVD. SOUTH SEATAC, WA 98188-4321 Telephone: 206-662-6650 Facsimile: 206-662-7145

BOEING®

COMPONENT MAINTENANCE MANUAL

ILLUSTRATED PARTS LIST

1. Introduction

A. The Illustrated Parts List (IPL) contains an illustration and a list of component parts you can repair or replace. The Illustrated Parts Catalog (IPC) shows how to use the Boeing part number system.

B. This shows how parts are related: The relation of each item to its next higher assembly (NHA) is shown in the NOMENCLATURE column. Use the indenture system that follows:

1 2 3 4 5 6 7

. Assembly

. Attaching parts for assembly

. . Detail parts for assembly

. . Subassembly

. . Attaching parts for subassembly

. . . Detail parts for subassembly

. . . Sub-subassembly

. . . Attaching parts for subassembly

. . . . . Details parts for sub-subassembly

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

C. Each top assembly is given one use code letter (A, B, C, etc.) in the USAGE CODE column. All subsequent component parts in the list can have one or more of the use code letters to show effectivity to top assemblies. A component part without a use code applies to all top assemblies.

D. An alphabetical letter is added after the item number for optional parts, parts changed by a Service Bulletin, configuration differences (except left-handed and right-handed parts), last engineering releases, and parts added between item numbers in a sequence. The alphabetical letter will not be shown on the illustration for equivalent parts of the same part number.

E. Color-coded parts are identified with a single digit alpha following the dash number or with ''SP'' suffix. If the ''SP'' suffix is used, it represents consolidation of all color codes applicable for a given usage which are not separately listed. Orders for color-coded parts should include the registry number of the airplane for which the parts are ordered.

F. If a part number is 15 characters long but will not fit in the part number column, the part number will be displayed with a ''~'' at the end of the line and will be continued on the next line. The ''~'' denotes that the part number continues on the next line.

G. Parts changed by a Service Bulletin are shown by PRE SB XXXX and POST SB XXXX added to the NOMENCLATURE column.

(1) When a new top assembly is added by a Service Bulletin, PRE SB XXXX and POST SB XXXX will be added at the top assembly level only. The configuration differences at the detail part level are shown by use code letters.

(2) When the top assembly part number is not changed by the Service Bulletin, PRE SB XXXX and POST SB XXXX will be added at the detail level.

H. Interchangeable Parts

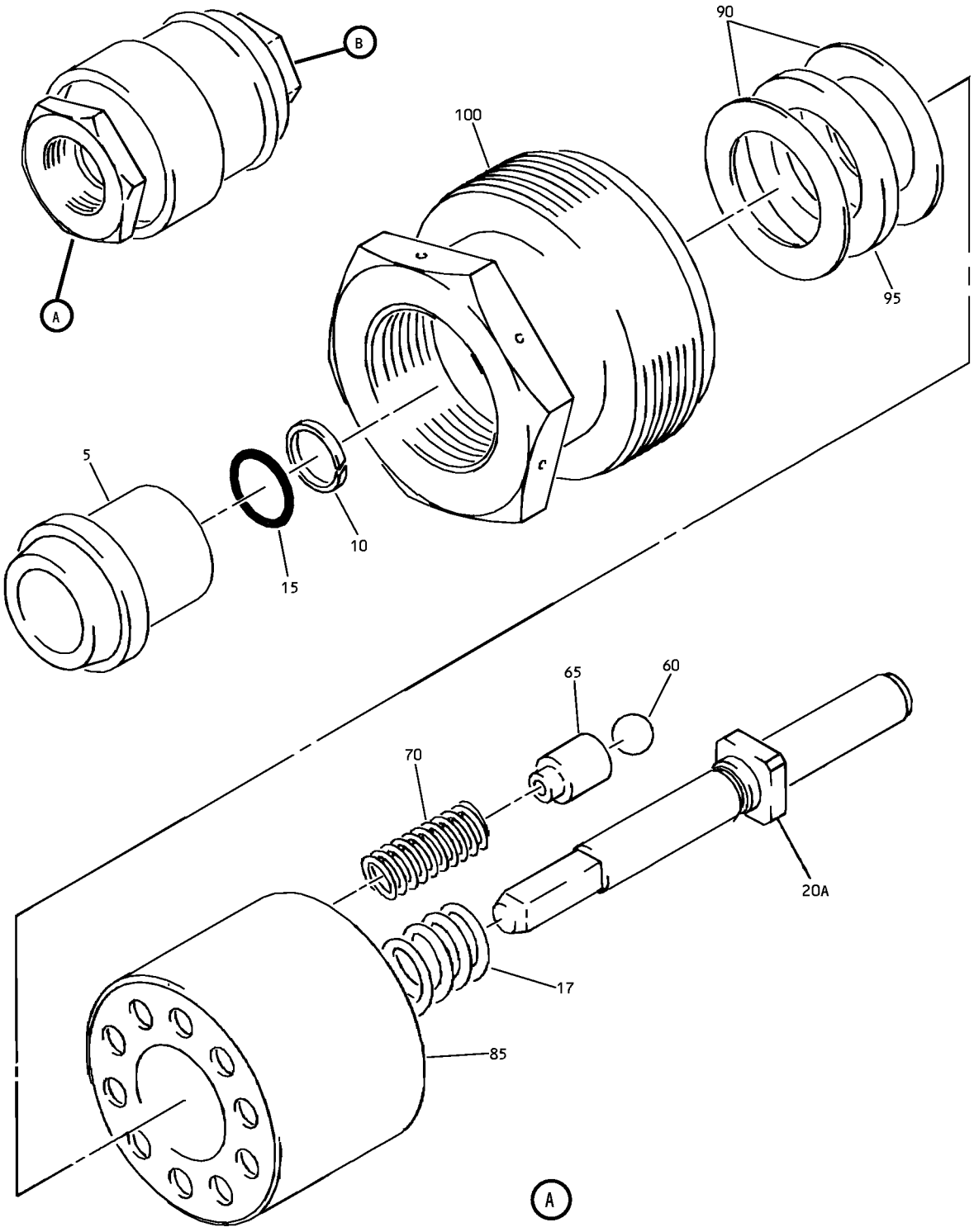
Optional (OPT)	The part is optional to and interchangeable with other parts that have the same item number.
Replaces, Replaced by and not interchangeable with (REPLACES, REPLACED BY AND NOT INTCHG/W)	The part replaces and is not interchangeable with the initial part.
Replaces, Replaced by (REPLACES, REPLACED BY)	The part replaces and is interchangeable with, or is an alternative to, the initial part.

VENDOR CODES

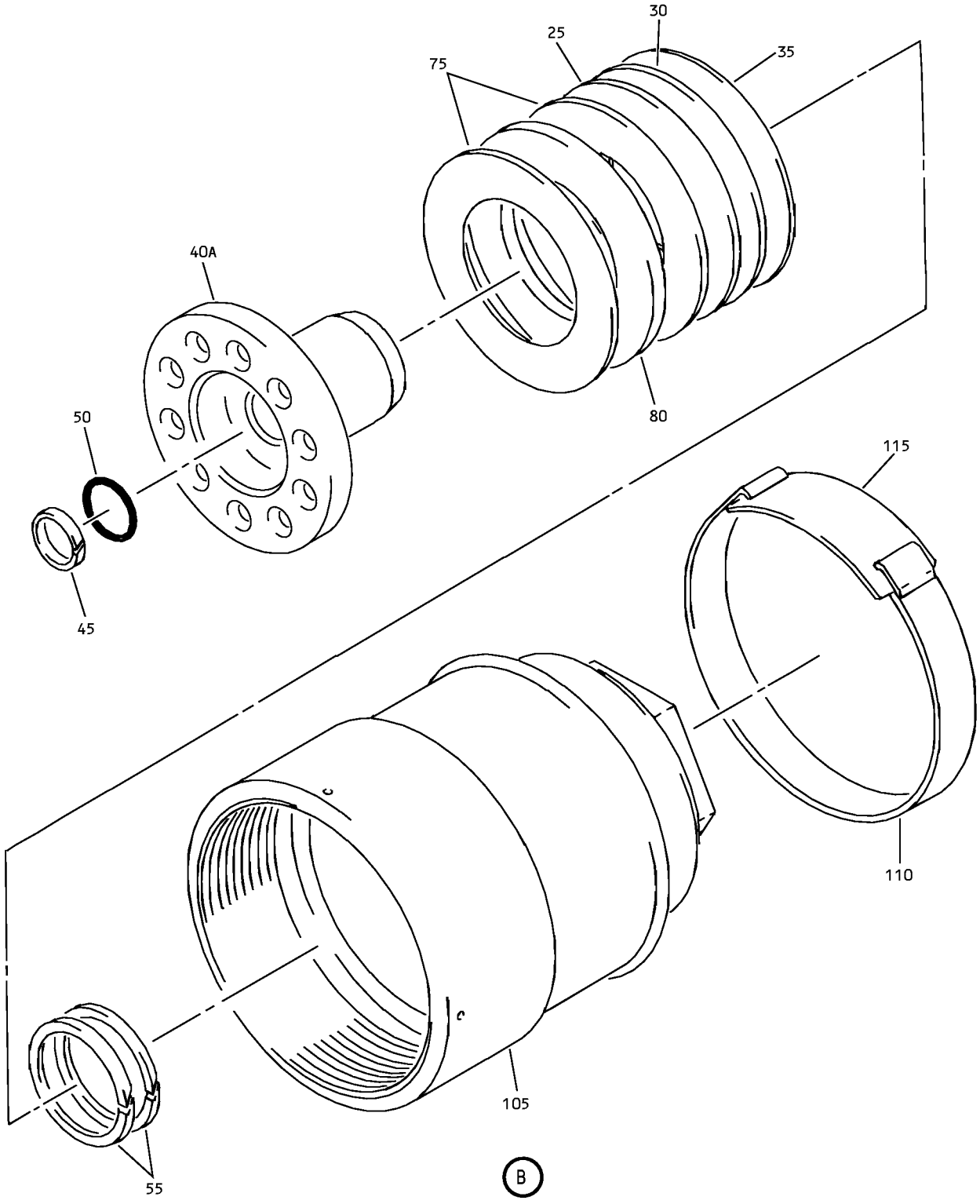
Code	Name
27737	INA BEARING COMPANY INC 1 INA DRIVE CHERAW, SOUTH CAROLINA 29520 FORMERLY FAFNIR INA NEEDLE ROLLER BEARING CO.
97820	BUSAK AND SHAMBAN INC BEARING DIV 711 MITCHELL ROAD PO BOX 665 NEWBURY PARK, CALIFORNIA 91320-2214 FORMERLY IN CULVER CITY, CALIF; FORMERLY SHAMBAN W S & CO

NUMERICAL INDEX

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
		1	01-	10
315A1803-2		1	1	RF
315A1835-6		1	25	AR
315A1835-7		1	30	AR
315A1835-8		1	35	AR
315A1836-2		1	110	1
315A1877-2		1	105	1
315A1878-2		1	100	1
315A1879-2		1	85	1
315A1885-1		1	17	1
315A1886-3		1	40A	1
315A1887-4		1	20A	1
315A1888-1		1	65	10
315A1889-1		1	70	10
315A1892-3		1	5	1
BAC27DTR9		1	115	1
MS19060-4813		1	60	10
MS28774-017		1	55	2
NAS1611-012		1	15	1
		1	50	1
S12066-011		1	10	1
		1	45	1
TC1220		1	95	1
TC1625		1	80	1
TWA1220		1	90	2
TWA1625		1	75	2



Thrust Reverser Manual Drive Assembly
IPL Figure 1 (Sheet 1 of 2)



Thrust Reverser Manual Drive Assembly
IPL Figure 1 (Sheet 2 of 2)

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
–1	315A1803-2		DRIVE ASSY-THRUST REVERSER MANUAL		RF
5	315A1892-3		. ADAPTOR-SEALING		1
10	S12066-011		. RING-GLYD (V97820)		1
15	NAS1611-012		. PACKING		1
17	315A1885-1		. SPRING-SHAFT		1
20	315A1887-3		DELETED		
20A	315A1887-4		. SHAFT		1
25	315A1835-6		. SHIM (MAKE FROM CRES SHEET AISI 301 1/2 HARD TO HARD MIL-S-5059 FINISH PASSIVE PER BAC 5751 TYPE II 0.060IN 1.62IN 1.62IN)		AR
30	315A1835-7		. SHIM (MAKE FROM CRES SHEET AISI 301 1/2 HARD TO HARD MIL-S-5059 FINISH PASSIVE PER BAC 5751 TYPE II 0.010IN 1.62IN 1.62IN)		AR
35	315A1835-8		. SHIM (MAKE FROM CRES SHEET AISI 301 1/2 HARD TO HARD MIL-S-5059 FINISH PASSIVE PER BAC 5751 TYPE II 0.005IN 1.62IN 1.62IN)		AR
40	315A1886-2		DELETED		
40A	315A1886-3		. CLUTCH		1
45	S12066-011		. RING-GLYD (V97820)		1
50	NAS1611-012		. PACKING		1
55	MS28774-017		. RETAINER		2
60	MS19060-4813		. BALL		10
65	315A1888-1		. PLUNGER		10
01-					
70	315A1889-1		. SPRING		10
75	TWA1625		. WASHER-THRUST (V27737)		2

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
80	TC1625		. CAGE-THRUST (V27737)		1
85	315A1879-2		. HOUSING-SPR		1
90	TWA1220		. WASHER-THRUST (V27737)		2
95	TC1220		. CAGE-THRUST (V27737)		1
100	315A1878-2		. ADAPTOR-SCREW		1
105	315A1877-2		. HOUSING-OUTER		1
110	315A1836-2		. STRAP-NAMEPLATE		1
115	BAC27DTR9		. NAMEPLATE		1

–Item not Illustrated