COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST

MAIN LANDING GEAR DOWNLOCK ACTUATOR ASSEMBLY

PART NUMBER 273A2201–1

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COMPONENT MAINTENANCE MANUAL

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To: All holders of MAIN LANDING GEAR DOWNLOCK ACTUATOR ASSEMBLY 32-32-52.

Attached is the current revision to this COMPONENT MAINTENANCE MANUAL

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Location of Change	Description of Change
	NO HIGHLIGHTS

COMPONENT MAINTENANCE MANUAL

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

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TEMPORARY REVISION AND SERVICE BULLETIN RECORD

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL

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		Revision		Filed	
Number	Date	Date	Initials	Number	Date	Date	Initials

Revision		Filed		Revision		Filed	
Number	Date	Date	Initials	Number	Date	Date	Initials

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Temporary Revision		Inserted		Removed	
Number	Date	Date	Initials	Date	Initials

Temporary Revision		Inserted		Removed	
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Temporary Revision		Inserted		Removed	
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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.

MAIN LANDING GEAR DOWNLOCK ACTUATOR ASSEMBLY - DESCRIPTION AND OPERATION

1. Description

A. The main landing gear downlock actuator assembly is a hydraulic unit with a CRES piston, a CRES barrel assembly and a CRES rod end assembly.

2. Operation

A. The main landing gear downlock actuator keeps the downlock link in the lock position. This keeps the side strut in the straight and locked position. For gear retraction, the landing gear selector valve sends hydraulic pressure to the downlock actuator RETRACT port. The actuator will fold the downlock link to start the main landing gear retraction.

3. Leading Particulars (Approximate)

A. Length (retracted) – 12 inches

B. Width – 5 inches

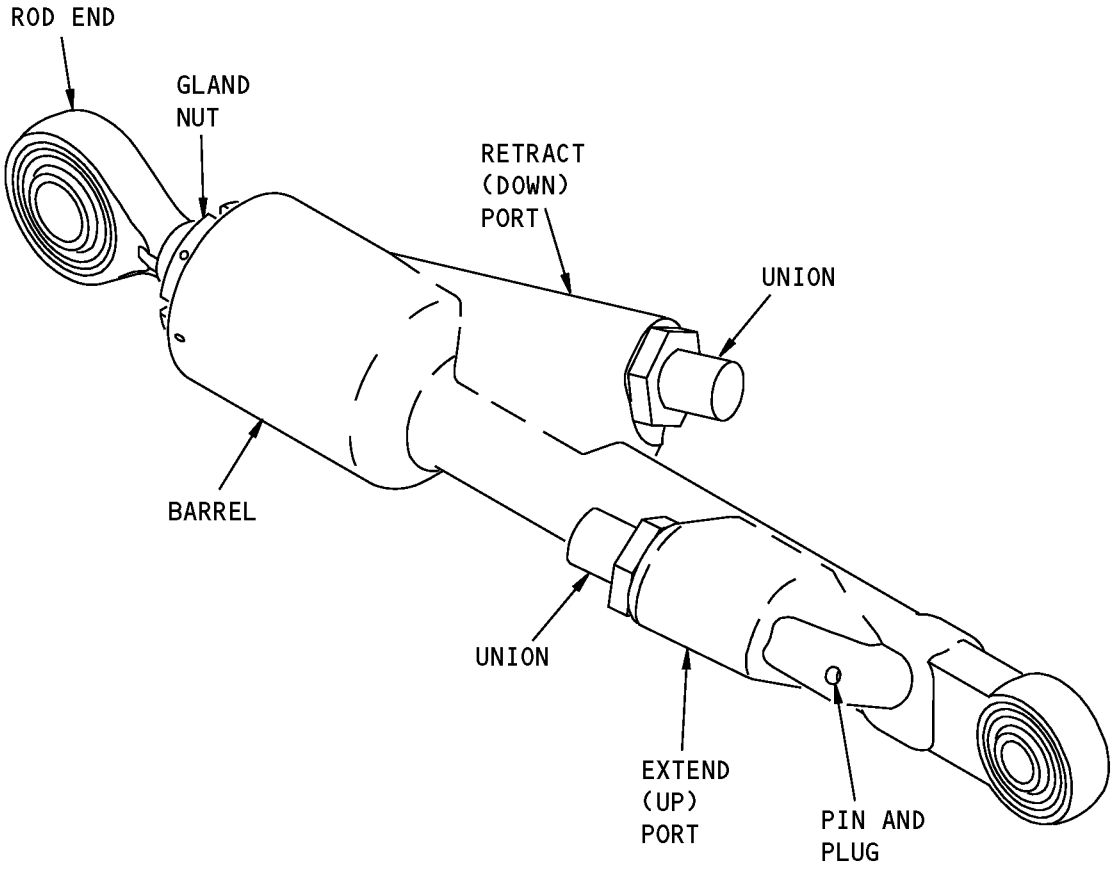
C. Height – 2 1/4 inches

D. Weight – 7 pounds

E. Pressure (proof) – 4500 psi

F. Pressure (operate) – 3000 psi

G. Fluid (operate) – BMS 3-11 hydraulic fluid fluid, D00153



Main Landing Gear Downlock Actuator Assembly
Figure 1

TESTING AND FAULT ISOLATION

1. General

A. This procedure tells how to do a test of the downlock actuator assembly after an overhaul or for fault isolation. There are three parts:

(1) Downlock Actuator Assembly Test

(a) External leakage

(b) Internal leakage

(c) Seal friction

(d) Extend rate

(e) Retract rate

(f) Proof pressure

(2) Fault Isolation

(3) Fault Correction

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. Downlock Actuator Test

A. Tools/Equipment

NOTE: Equivalent substitutes may be used.

Reference	Description
SPL-5403	Actuator Retainer Assembly (C32038-4 included in C32038-1 Eqpt) (Part #: C32038-4, Supplier: 81205)

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)

C. References

Reference	Title
SOPM 20-60-03	LUBRICANTS

D. General

(1) You will visually monitor the actuator for leaks and measure the rate of the piston.

E. Standard Tools and Equipment

(1) A hydraulic test stand with these requirements:

(a) Can operate with hydraulic fluid, D00153.

(b) Can operate in a range of 0-4600 psi.

(c) Hydraulic fluid, D00153 must be continuously filtered by a filter no larger than 15 micron absolute.

(d) Hydraulic fluid, D00153 is kept at 60-100°F.

F. Prepare for Test

(1) Install the actuator in the actuator retainer assy, SPL-5403 and hold them in a bench vise.

(2) Attach the hydraulic test stand lines to the ports.

(3) Fill the actuator with hydraulic fluid, D00153.

NOTE: The actuator must be full of hydraulic fluid, D00153 for each test.

(4) Remove all of the air from the actuator.

G. Procedure

WARNING: DO NOT APPLY AIR PRESSURE TO THE PORTS. THIS CAN CAUSE DAMAGE TO THE UNIT OR INJURY TO YOU.

NOTE: For lubricants, refer to SOPM 20-60-03.

(1) Do an external leakage test:

(a) Clean around gland nut (55) near seal (50) to help with leak detection.

(b) Check for external leakage:

1) Fully extend piston (70).

2) Apply 2-10 psi to the extend port and the retract port for 2 minutes.

3) Seal (50) can be moist, but a drop cannot start.

(c) Operate the actuator for 25 full cycles:

1) Fully retract piston (70).

2) Apply the minimum hydraulic pressure to the extend port that is necessary to move piston (70).

3) Increase the pressure to 3000-3200 psi when the actuator stops at the end of the piston travel.

4) Remove the pressure from the extend port.

5) Change the direction of hydraulic fluid, D00153.

NOTE: The actuator is in the fully extended position.

6) Apply the minimum hydraulic pressure to the retract port that is necessary to move piston (70).

7) Increase the pressure to 3000-3200 psi when the actuator stops at the end of the piston travel.

8) Remove the pressure from the retract port.

9) Do TESTING AND FAULT ISOLATION, Paragraph 2.G.(1)(c)1) thru TESTING AND FAULT ISOLATION, Paragraph 2.G.(1)(c)8) for 25 full cycles.

(d) After 25 cycles, do a visual check for leakage around seal (50):

1) The recommended leakage is zero.

2) The leakage limit for seal (50) is 1 drop every 25 cycles.

3) The leakage limit for packing (45) and rings (40) is zero.

(2) Do an internal leakage test:

(a) Fully extend piston (70).

(b) Remove the hydraulic line from the retract port.

(c) Apply 2900-3100 psi to the extend port for a minimum of 1 minute.

(d) Do a visual check for leakage from the open retract port:

1) The recommended leakage is zero.

2) The leakage limit is 1 cubic centimeter (cc) per minute.

(e) Remove the pressure from the extend port.

(f) Attach the hydraulic line to the retract port.

(g) Fully retract piston (70).

(h) Remove the hydraulic line from the extend port.

(i) Apply 2900-3100 psi to the retract port for a minimum of 1 minute.

(j) Do a visual check for leakage from the open extend port:

1) The recommended leakage is zero.

2) The leakage limit is 1 cc per minute.

(k) Remove the pressure from the retract port.

(l) Attach the hydraulic line to the extend port.

(3) Do a seal friction test:

(a) Fully retract piston (70).

(b) Apply no pressure to the retract port.

(c) With no load applied to piston (70), slowly increase the pressure to a maximum of 75 psi at the extend port:

1) Piston (70) must fully extend with a smooth and continuous movement.

(d) Remove the pressure applied to the extend port.

(e) Make sure piston (70) is fully extended.

(f) Apply no pressure to the extend port.

(g) With no load applied to piston (70), slowly increase the pressure to a maximum of 150 psi at the retract port:

1) Piston (70) must fully retract with a smooth and continuous movement.

(h) Remove the pressure applied to the retract port.

(4) Do an extend time test:

(a) Fully retract piston (70).

(b) Let hydraulic fluid, D00153 flow freely from the retract port to a reservoir.

(c) Apply 550 psi of pressure to the extend port:

1) Keep a record of the piston position related to the time.

2) The extension time of piston (70) must be 2.5-3.5 seconds.

(d) Remove the pressure from the extend port.

(5) Do a retract time test:

(a) Fully extend piston (70).

(b) Let hydraulic fluid, D00153 flow freely from the extend port to a reservoir.

(c) Apply 550 psi of pressure to the retract port:

1) Keep a record of the piston position related to the time.

2) The retraction time of piston (70) must be 3.5-5.5 seconds.

(d) Remove the pressure from the retract port.

(6) Do a proof pressure test:

CAUTION: DO NOT EXTEND OR RETRACT THE PISTON AT PROOF PRESSURE (4400-4600 PSI).

(a) Fully retract piston (70).

(b) Apply 4400-4600 psi of pressure to the retract port for a minimum of 60 seconds.

(c) Make sure that there is no sign of external leakage or permanent damage to the actuator.

(d) Remove the pressure from the retract port.

(e) Fully extend piston (70).

(f) Apply 4400-4600 psi of pressure to the extend port for a minimum of 60 seconds.

(g) Make sure that there is no sign of external leakage or permanent damage to the actuator.

(h) Remove the pressure from the extend port.

(7) Make sure that the actuator has an extended length of 13.9650-14.0950 inches and a retracted length of 9.3350-9.4450 inches (TESTING AND FAULT ISOLATION, Figure 101).

(a) Fully retract piston (70).

(8) Remove the actuator from the actuator retainer assy, SPL-5403 after the test.

(9) Fill the unit with hydraulic fluid, D00153 and install the shipping caps.

3. Fault Isolation

A. Refer to TESTING AND FAULT ISOLATION, Table 101 for fault isolation.

Table 101: Fault Isolation Chart

TROUBLE	PROBABLE CAUSE	CORRECTIONS
Too much leakage at rod end assembly (15).	Defective scraper (35), rings (40), packing (45) or seal (50).	Disassemble and replace the parts as specified in TESTING AND FAULT ISOLATION, Paragraph 4.C.
Piston (70) does not move freely.	Defective piston (70), gland (60), barrel (105) or nut (55).	Disassemble and replace the parts as specified in TESTING AND FAULT ISOLATION, Paragraph 4.C. or TESTING AND FAULT ISOLATION, Paragraph 4.D.
Too much internal leakage.	Defective piston seal (65).	Disassemble and replace the parts as specified in TESTING AND FAULT ISOLATION, Paragraph 4.C.
Extend or retract rate too slow or too fast.	Defective restrictors (95A, 100A).	Disassemble and replace the restrictors (95A, 100A).
	Dirt or foreign material in the cylinder.	Disassemble and clean the parts.

4. Fault Correction

A. 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)

B. References

Reference	Title
SOPM 20-50-01	BOLT AND NUT INSTALLATION
SOPM 20-60-03	LUBRICANTS

C. Procedure

NOTE: For bolt and nut installation, refer to SOPM 20-50-01. For lubricants, refer to SOPM 20-60-03.

(1) Drain all hydraulic fluid, D00153 from the actuator.

(2) Replacement of scraper (35), rings (40), packing (45) and seal (50):

(a) Remove rod end assembly (15) and cup lockwasher (30) from piston (70).

(b) Remove nut (55) from barrel (105).

(c) Remove scraper (35), seal (50) and gland (60) with packing (45) and rings (40).

(d) Replace the parts as necessary.

(e) Install gland (60) with packing (45) and rings (40), seal (50) and scraper (35) on piston (70). Push these parts back into barrel (105).

(f) Install nut (55) in barrel (105). Install cup lockwasher (30) and rod end assembly (15) on piston (70) as specified in ASSEMBLY. Do the test again to see if the problem was corrected.

(3) Replacement of piston seal (65):

(a) Drain all hydraulic fluid, D00153 from the actuator.

(b) Remove rod end assembly (15) and cup lockwasher (30) from piston (70).

(c) Remove nut (55) from barrel (105).

(d) Remove piston (70) from barrel (105).

(e) Replace defective piston seal (65).

(f) Install piston (70) in barrel (105).

(g) Install nut (55) in barrel (105). Install cup lockwasher (30) and rod end assembly (15) on piston (70) as specified in ASSEMBLY. Do the test again to see if the problem was corrected.

D. Replacement of piston (70) or barrel (105):

NOTE: For bolt and nut installation, refer to SOPM 20-50-01. For lubricants, refer to SOPM 20-60-03.

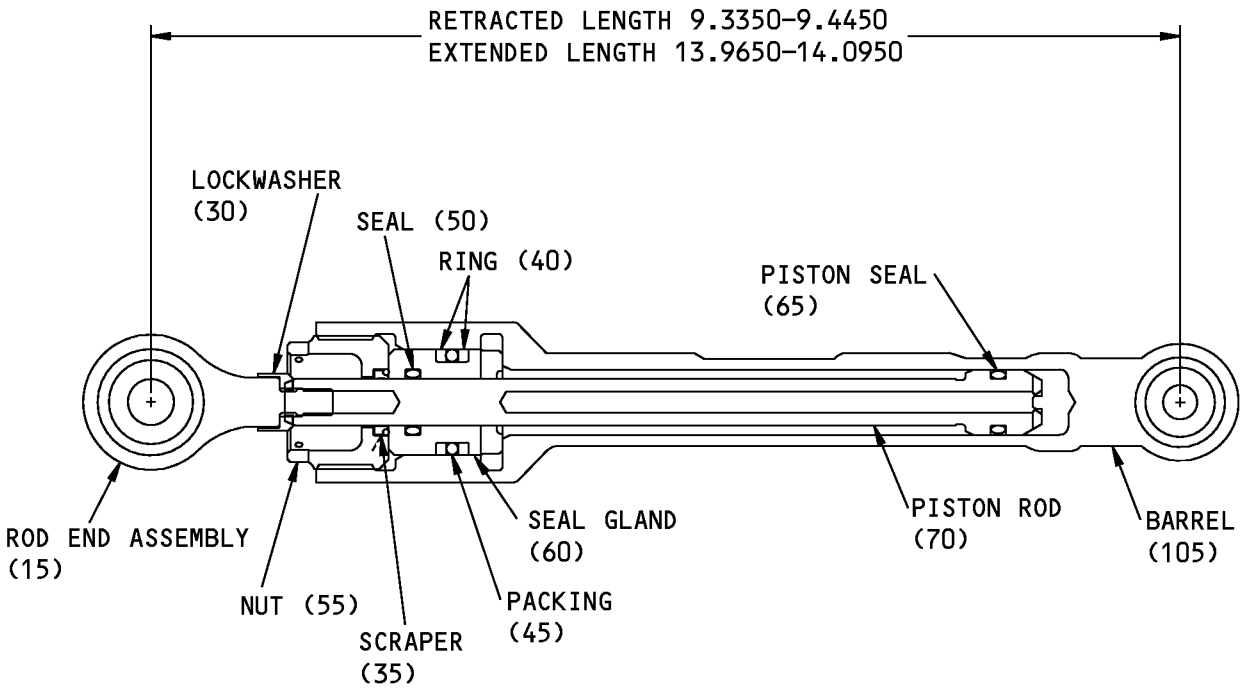
(1) Drain all hydraulic fluid, D00153 from the actuator.

(2) Disassemble the actuator (DISASSEMBLY).

(3) Replace the defective parts.

(4) Assemble the actuator (ASSEMBLY).

(5) Test as specified in TESTING AND FAULT ISOLATION, Paragraph 2.



ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

1498586 S0000272060_V1

Actuator Details
Figure 101

DISASSEMBLY

1. General

A. This procedure has the data necessary to disassemble the main landing gear downlock 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 the SOPM subjects identified in this procedure.

D. Refer to IPL Figure 1 for item numbers.

2. Disassembly

A. Special Tools

NOTE: Equivalent substitutes can be used.

(1) C32038-6 – Rod Retainer

(2) C32038-41 – Downlock Spanner

(3) C32038-43 – Rod End Wrench

B. Part Replacement

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

(1) Packings, O-rings and seals (10, 45, 50, 65)

(2) Scraper (35)

(3) Backup rings (40)

NOTE: Do not remove the pin (85), the plug (90) or the restrictors (95A, 100A) unless it is needed to stop a leak or to clean the area.

C. Procedure

(1) Use standard industry procedures and the steps shown below to disassemble this component.

(2) Install the actuator in the actuator retainer assy, SPL-5403 and hold this in a bench vise.

(3) Remove the piston rod (70) and the attached items from the barrel assembly (75):

(a) Remove the lockwire, G50347 from the nut (55) and the barrel assembly (75).

(b) With the spanner, carefully loosen the nut (55) until the gland (60) and the piston rod (70) will move out of the barrel assembly (75).

(4) Bend the flanges of the lockwasher (30) to release the rod end (15).

(5) Hold the rod end with the rod retainer. With the rod end wrench, remove the rod end (15) and the lockwasher (30) from the piston rod (70).

(6) Remove the nut (55), the scraper (35), the seal (50), the gland (60), and the piston seal (65) from the piston rod (70).

(7) Remove the unions (5) from the barrel assembly (75).

CLEANING

1. General

A. This procedure has the data to clean the main landing gear downlock actuator 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 item numbers.

2. Cleaning

A. References

Reference	Title
SOPM 20-30-01	CLEANING AND RELUBRICATING BEARINGS
SOPM 20-30-03	GENERAL CLEANING PROCEDURES

B. Procedure

(1) Clean the bearings (20, 80) as specified in SOPM 20-30-01.

(2) Clean the other parts by standard industry procedures and the instructions in SOPM 20-30-03.

CHECK

1. **General**
   A. This procedure has the data to find defects in the specified parts.
   B. Refer to FITS AND CLEARANCES for the design dimensions and wear limits.
   C. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.
   D. Refer to IPL Figure 1 for item numbers.
2. **Check**
   A. 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) Barrel (105)
         (b) Piston rod (70)
         (c) Rod end (25)
         (d) Cup lockwasher (30)
      (3) Do a penetrant check (SOPM 20-20-02) of these parts:
         (a) Nut (55)
         (b) Gland (60)

REPAIR

1. General

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

Table 601:

PART NUMBER	NAME	REPAIR
—	REFINISH OF OTHER PARTS	1-1
273A2202	BARREL ASSEMBLY	2-1, 2-2
273A2203	PISTON ROD	3-1
273A2204	ROD END ASSEMBLY	4-1, 4-2
273A2205	SEAL GLAND	5-1
273A2206	GLAND NUT	6-1
273A2207	DELETED	7-1
273A2508	NAMEPLATE	8-1

2. Dimensioning Symbols

A. Standard True Position Dimensioning Symbols used in the applicable repair procedures are shown in SOPM 20-00-00.

REFINISH OF OTHER PARTS - REPAIR 1-1

1. General

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

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. Refinish of Other Parts

A. References

Reference	Title
SOPM 20-30-02	STRIPPING OF PROTECTIVE FINISHES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-60-02	FINISHING MATERIALS

B. General

(1) Instructions for the repair of the parts listed in REPAIR 1-1, Table 601 is for replacement of the original finish.

C. Procedure

NOTE: For stripping of protective finishes, refer to SOPM 20-30-02. For decoding table for Boeing finish codes, refer to SOPM 20-41-01. For finishing materials, refer to SOPM 20-60-02.

(1) Refer to REPAIR 1-1, Table 601 for refinish details.

Table 601: Refinish Details

IPL FIG. & ITEM	MATERIAL	FINISH
IPL Fig. 1		
No parts currently applicable		

BARREL ASSEMBLY - REPAIR 2-1

273A2202–1

1. General

A. This procedure has the data to replace the bearing and other parts of the barrel assembly (75).

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. Parts Replacement

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
A00247	Sealant - Pressure And Environmental - Chromate Type	BMS 5-95
A00551	Sealant - Fuel Tank	BAC5010, Type 44 (BMS5-44, BMS5-45)

B. References

Reference	Title
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-50-03	BEARING AND BUSHING REPLACEMENT
SOPM 20-50-04	INSTALLATION OF PERMANENT PINS AND PLUGS IN DRILL PASSAGES
SOPM 20-60-04	MISCELLANEOUS MATERIALS

C. Procedure (REPAIR 2-1, Figure 601)

NOTE: For decoding table for Boeing finish codes, refer to SOPM 20-41-01. For miscellaneous materials, refer to SOPM 20-60-04.

(1) Replace the bearing (80).

(a) Remove the old bearing (80) from the barrel (105).

(b) Install a replacement bearing (80) with sealant, A00247 on the barrel (105) inner diameter and the bearing (80) outer diameter.

(c) Roller swage the bearing (80) (SOPM 20-50-03).

(2) Restrictors (95A, 100A).

(a) Remove the old restrictors (95A, 100A).

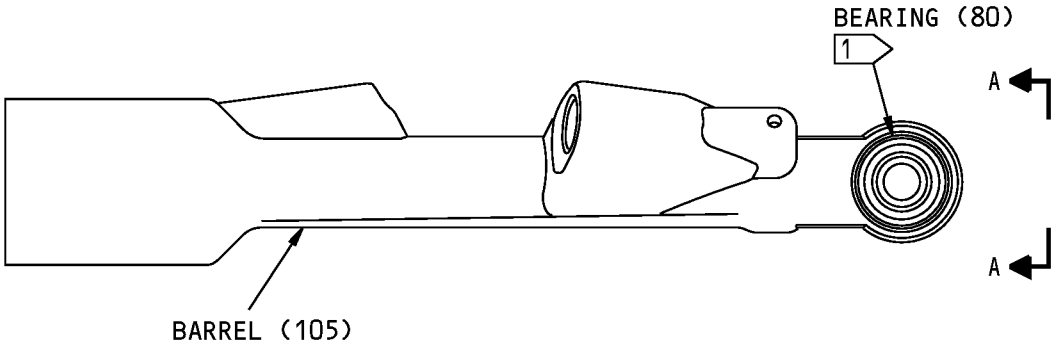
(b) Install the replacement restrictors (95A, 100A) (SOPM 20-50-04).

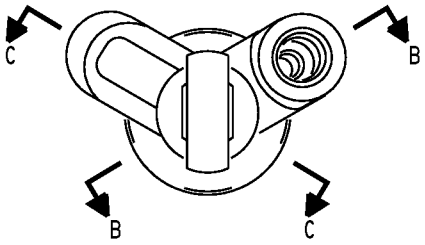
(3) Pin (85) and Plug (90).

(a) Remove the old pin (85) and plug (90).

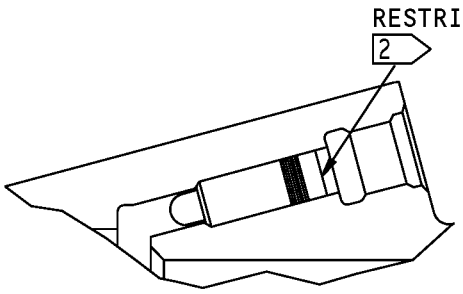
(b) Install replacement pin (85) and plug (90) (SOPM 20-50-04).

(c) Fill the space outside the pin (85) and the plug (90) with sealant, A00551.

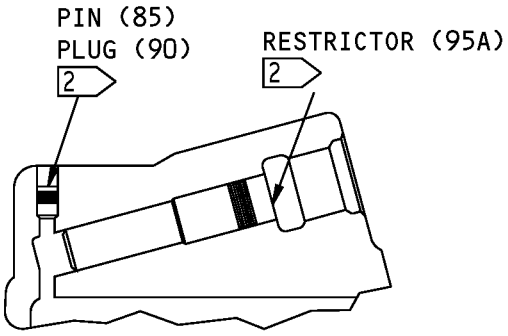




A–A



B–B



C–C

1 INSTALL THE BEARING (SOPM 20-50-03). ROLLER SWAGE THE TWO SIDES.

2 INSTALL THE RESTRICTOR, OR THE PLUG AND THE PIN, AS SHOWN IN SOPM 20-50-04.

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

273A2202-1 Barrel Assembly Bearing - Plug and Restrictor Replacement
Figure 601

BARREL - REPAIR 2-2

273A2202–2

1. General

A. This procedure has the data to repair and refinish the barrel (105).

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.

D. General repair details:

(1) Material: 15-5PH CRES, AMS5659, 180-200 KSI

2. Barrel Repair and Refinish

A. References

Reference	Title
SOPM 20-10-01	REPAIR AND REFINISH OF HIGH STRENGTH STEEL PARTS
SOPM 20-10-02	MACHINING OF ALLOY STEEL
SOPM 20-10-03	SHOT PEENING
SOPM 20-10-04	GRINDING OF CHROME PLATED PARTS
SOPM 20-20-01	MAGNETIC PARTICLE INSPECTION
SOPM 20-30-02	STRIPPING OF PROTECTIVE FINISHES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-42-03	HARD CHROME PLATING
SOPM 20-60-02	FINISHING MATERIALS

B. Procedure (REPAIR 2-2, Figure 601)

NOTE: For repair and refinish of high strength steel parts, refer to SOPM 20-10-01. For shot peening, refer to SOPM 20-10-03. For stripping of protective finishes, refer to SOPM 20-30-02. For decoding table for Boeing finish codes, refer to SOPM 20-41-01. For finishing materials, refer to SOPM 20-60-02.

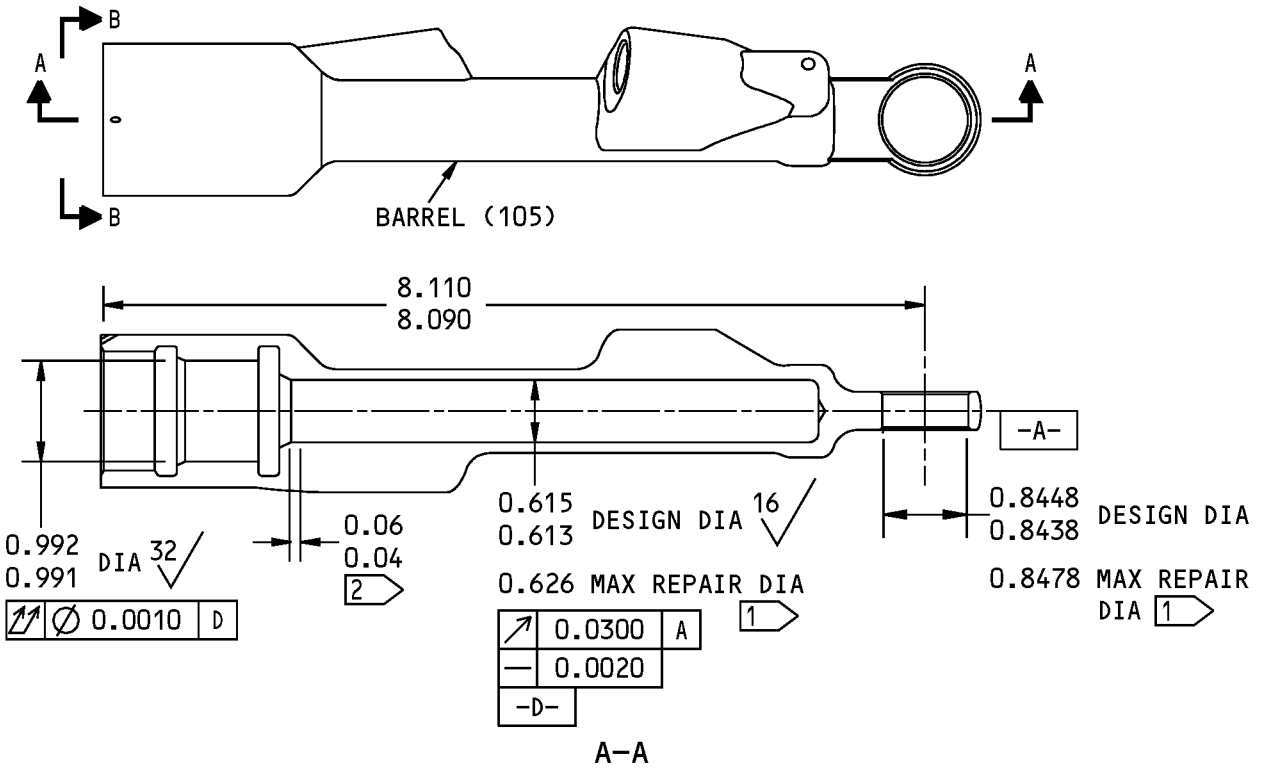
(1) Repair

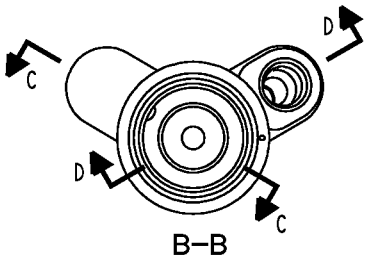
(a) Machine as required (SOPM 20-10-02), within repair limits, to remove defects.

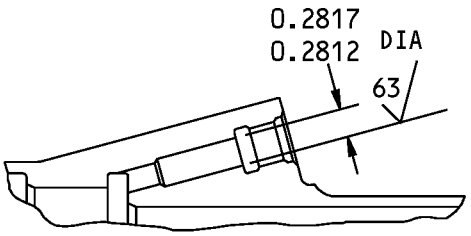
(b) Do a magnetic particle check (SOPM 20-20-01).

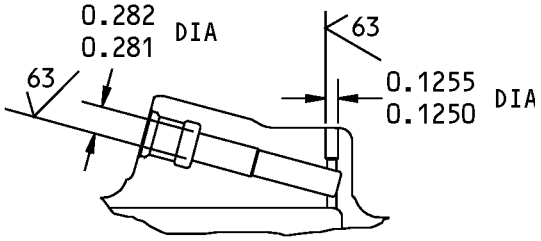
(c) Build up with chrome plate (SOPM 20-42-03) and grind as necessary (SOPM 20-10-04) to design dimensions and finish.

(2) Refinish – Passivate (F-17.25).









125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

1 LIMIT FOR CHROME PLATE BUILDUP (SOPM 20-42-03)

2 CHROME PLATE RUNOUT AREA

273A2202-2 Barrel Repair
Figure 601

PISTON ROD - REPAIR 3-1

273A2203–1

1. General

A. This procedure has the data to refinish the piston rod (70).

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

C. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard True Position Dimensioning Symbols shown in the repair.

D. Refer to IPL Figure 1 for item numbers.

E. General repair details:

(1) Material: 15-5PH CRES, AMS 5659, 180-200 ksi

(2) Shot peen: All surfaces, but not in the seal groove (SOPM 20-10-03)

(a) Intensity: 0.004-0.007A2

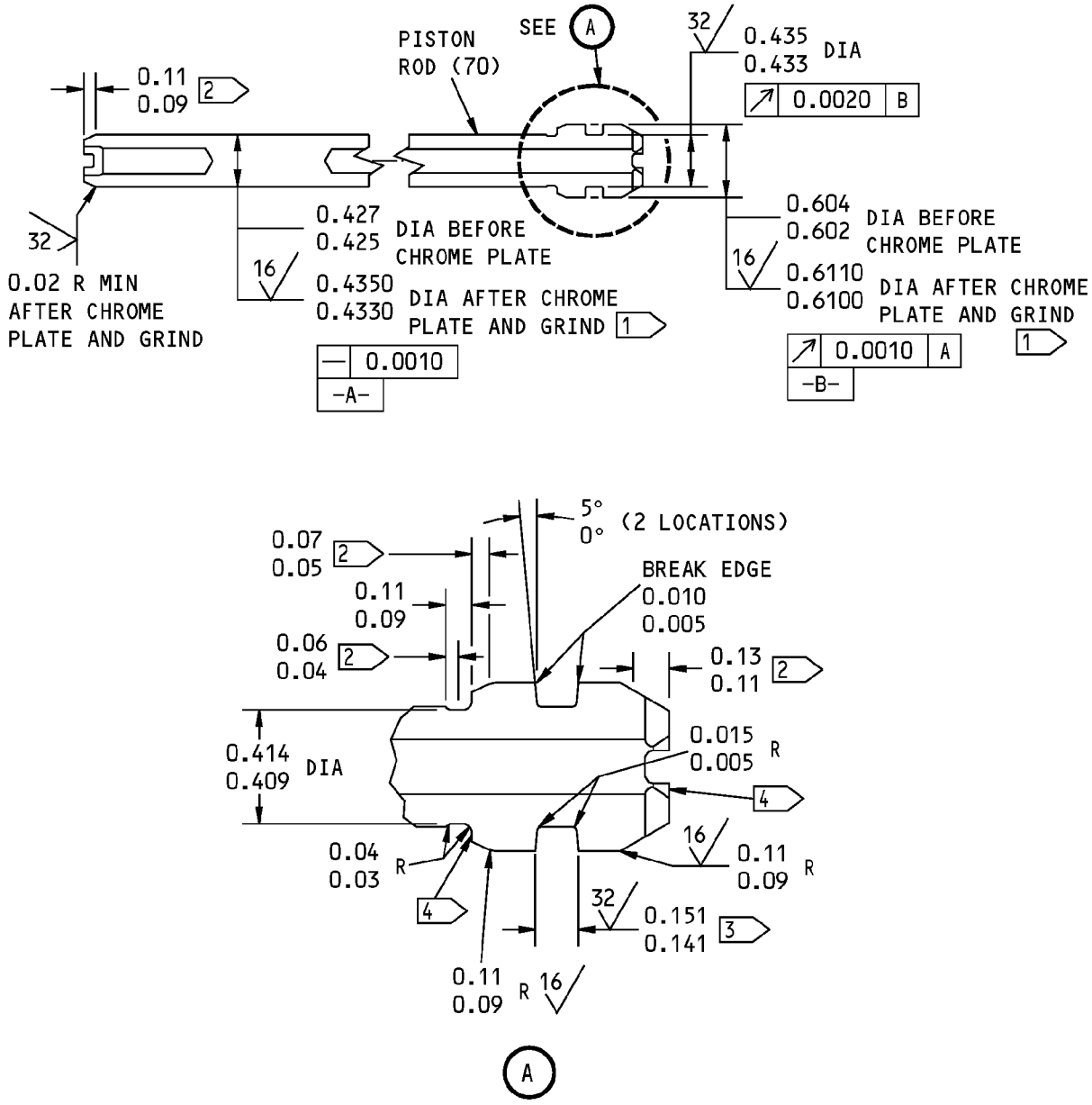
2. Piston Rod Refinish

A. Procedure (REPAIR 3-1, Figure 601)

NOTE: For repair and refinish of high strength steel parts, refer to SOPM 20-10-01. For the machining of alloy steel, refer to SOPM 20-10-02. For magnetic particle inspection, refer to SOPM 20-20-01. For stripping of protective finishes, refer to SOPM 20-30-02. For decoding table for Boeing finish codes, refer to SOPM 20-41-01. For finishing materials, refer to SOPM 20-60-02.

(1) Passivate (F-17.25).

(2) Chrome plate (F-15.34) (SOPM 20-42-03) and grind as shown (SOPM 20-10-04).



1 CHROME PLATE (F-15.34), 0.003-0.005 THICK

2 CHROME PLATE RUNOUT THIS AREA

3 NO CHROME PLATE OR SHOT PEEN IN SEAL GROOVE

4 NO CHROME PLATE IN THIS AREA

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

273A2203-1 Piston Rod Refinish
Figure 601

ROD END ASSEMBLY - REPAIR 4-1

273A2204–1

1. General

A. This procedure has the data to replace the bearing on the rod end assembly (15).

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. Bearing Replacement

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
A00247	Sealant - Pressure And Environmental - Chromate Type	BMS 5-95

B. References

Reference	Title
SOPM 20-30-02	STRIPPING OF PROTECTIVE FINISHES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-50-03	BEARING AND BUSHING REPLACEMENT
SOPM 20-60-04	MISCELLANEOUS MATERIALS

C. Procedure (REPAIR 4-1, Figure 601)

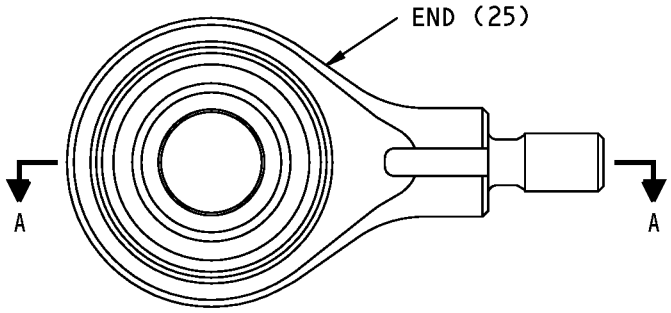
NOTE: For stripping of protective finishes, refer to SOPM 20-30-02. For decoding table for Boeing finish codes, refer to SOPM 20-41-01. For miscellaneous materials, refer to SOPM 20-60-04.

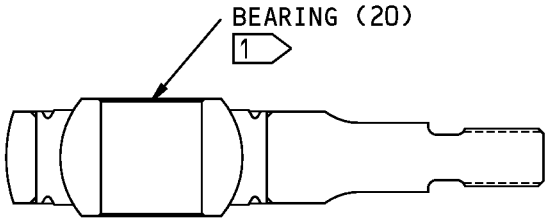
(1) Remove the bearing (20) from the rod end (25).

(2) If you find defects on rod end surfaces, refer to REPAIR 4-2 for repair instructions.

(3) Install the bearing with wet sealant, A00247 on the rod end (25) inner diameter and the bearing outer diameter.

(4) Roller swage (SOPM 20-50-03) the bearing on the two sides.





A–A

1 INSTALL THE BEARING (SOPM 20-50-03).
ROLLER SWAGE THE TWO SIDES.

273A2204-1 Rod End Assembly Bearing Replacement
Figure 601

ROD END ASSEMBLY - REPAIR 4-2

273A2204–2

1. General

A. This procedure has the data to repair and refinish the rod end (25).

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

C. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard True Position Dimensioning Symbols shown in the repair.

D. Refer to IPL Figure 1 for item numbers.

E. General repair details:

(1) Material: 15-5PH CRES, AMS 5659, 180-200 ksi

2. Rod End Repair and Refinish

A. References

Reference	Title
SOPM 20-10-04	GRINDING OF CHROME PLATED PARTS
SOPM 20-20-01	MAGNETIC PARTICLE INSPECTION
SOPM 20-30-02	STRIPPING OF PROTECTIVE FINISHES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-42-03	HARD CHROME PLATING
SOPM 20-60-02	FINISHING MATERIALS

B. Procedure (REPAIR 4-2, Figure 601)

NOTE: For stripping of protective finishes, refer to SOPM 20-30-02. For decoding table for Boeing finish codes, refer to SOPM 20-41-01. For finishing materials, refer to SOPM 20-60-02.

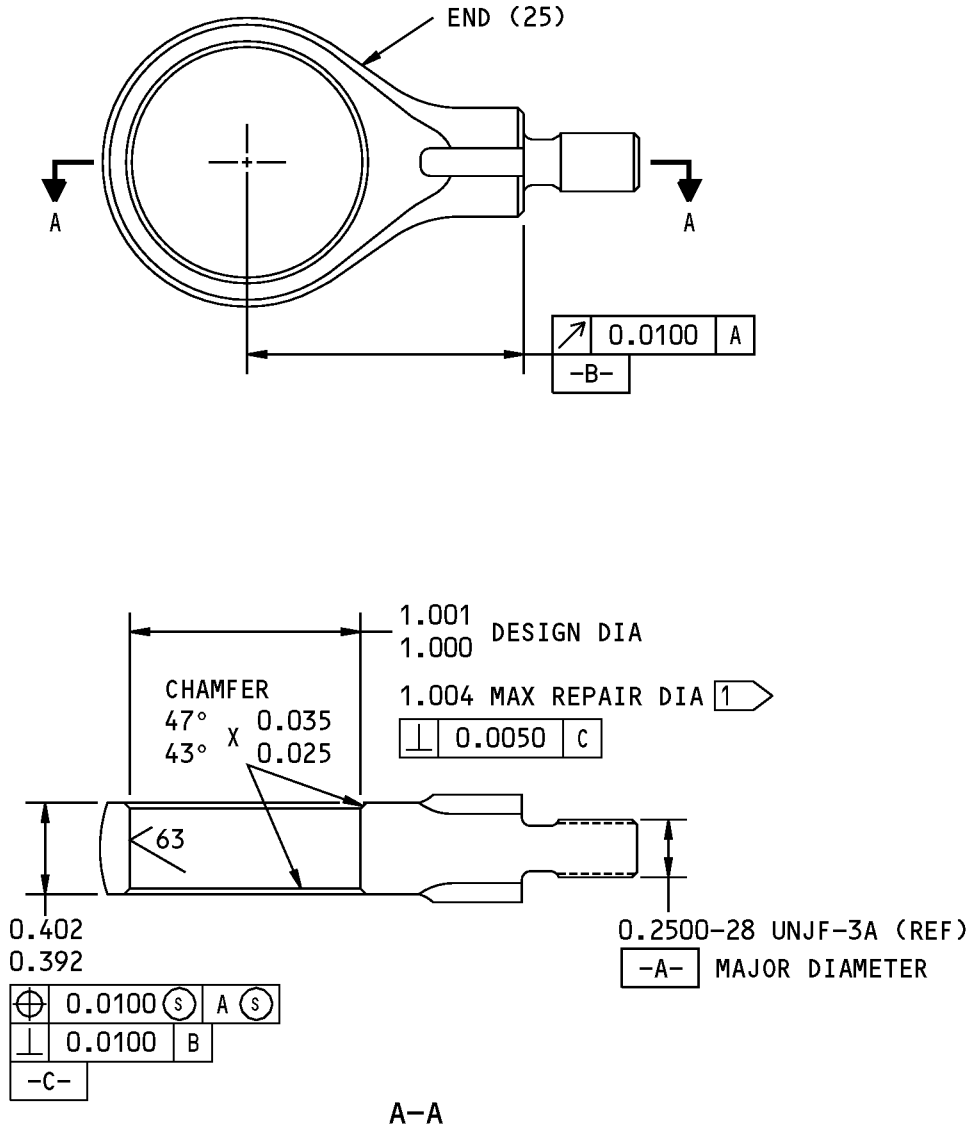
(1) Repair

(a) Machine as required, within repair limits, to remove defects.

(b) Do a magnetic particle check (SOPM 20-20-01).

(c) Build up with chrome plate (SOPM 20-42-03) and grind as necessary (SOPM 20-10-04).

(2) Refinish – Passivate (F-17.25).



125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

1 LIMIT FOR CHROME PLATE BUILDUP (SOPM 20-42-03)

273A2204-2 Rod End Repair
Figure 601

SEAL GLAND - REPAIR 5-1

273A2205–1

1. General

A. This procedure has the data to refinish the seal gland (60).

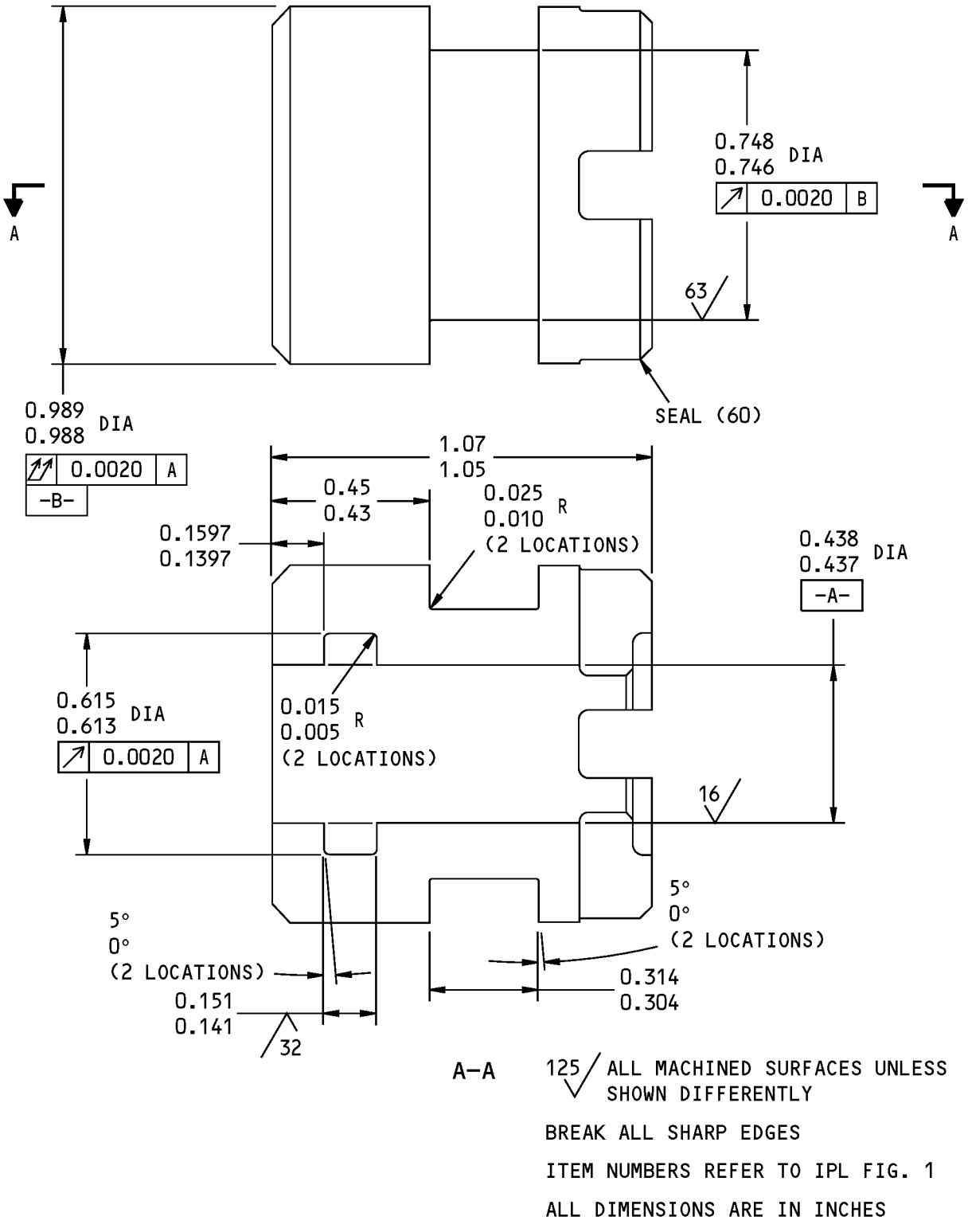
B. Refer to the Standard Overhaul Practices Manual (SOPM) for the SOPM subjects identified in this procedure.

C. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard True Position Dimensioning Symbols shown in the repair.

D. Refer to IPL Figure 1 for item numbers.

E. General repair details:

(1) Material: Aluminum-nickel-bronze, AMS 4640



273A2205-1 Seal Gland Repair
Figure 601

2. Seal Gland Refinish

A. References

Reference	Title
SOPM 20-30-02	STRIPPING OF PROTECTIVE FINISHES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-60-02	FINISHING MATERIALS

B. Procedure (REPAIR 5-1, Figure 601)

NOTE: For stripping of protective finishes, refer to SOPM 20-30-02. For decoding table for Boeing finish codes, refer to SOPM 20-41-01. For finishing materials, refer to SOPM 20-60-02.

(1) Apply no finish (F-25.01).

GLAND NUT - REPAIR 6-1

273A2206–1

1. General

A. This procedure has the data to repair and refinish the gland nut (55).

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

C. Refer to REPAIR-GENERAL, Paragraph 2. for the Standard True Position Dimensioning Symbols shown in the repair.

D. Refer to IPL Figure 1 for item numbers.

E. General repair details:

(1) Material: Aluminum-nickel-bronze, AMS4640

2. Gland Nut Refinish

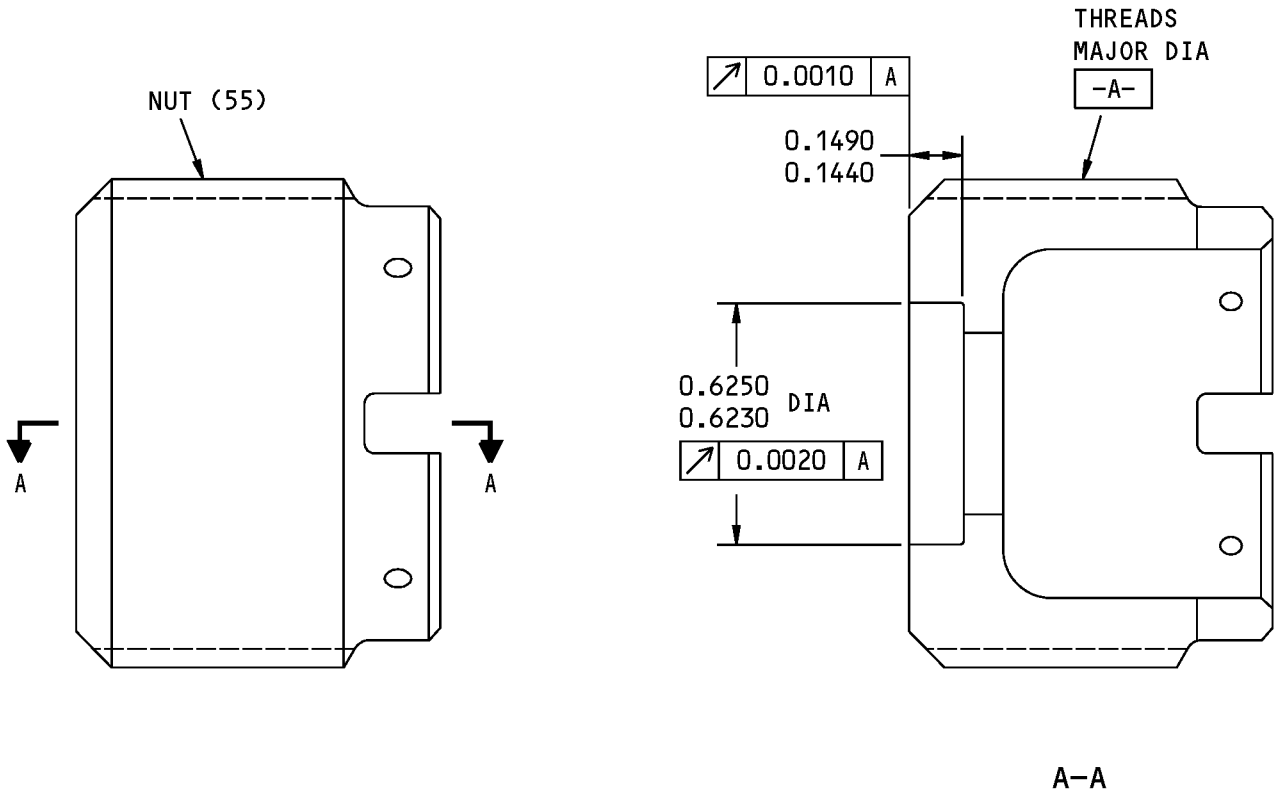
A. References

Reference	Title
SOPM 20-30-02	STRIPPING OF PROTECTIVE FINISHES
SOPM 20-41-01	DECODING TABLE FOR BOEING FINISH CODES
SOPM 20-60-02	FINISHING MATERIALS

B. Procedure (REPAIR 6-1, Figure 601)

NOTE: For stripping of protective finishes, refer to SOPM 20-30-02. For decoding table for Boeing finish codes, refer to SOPM 20-41-01. For finishing materials, refer to SOPM 20-60-02.

(1) Apply no finish (F-25.01).



125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES

ITEM NUMBERS REFER TO IPL FIG. 1

ALL DIMENSIONS ARE IN INCHES

273A2206-1 Gland Nut Repair
Figure 601

LOCKWASHER - REPAIR 7-1

273A2207–1

1. **Deleted**

   A.

2. **Deleted**

   A.

NAMEPLATE INSTALLATION - REPAIR 8-1

273A2508–2

1. General

A. This repair tells how to replace the nameplate (110).

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. Nameplate Replacement

A. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
A00551	Sealant - Fuel Tank	BAC5010, Type 44 (BMS5-44, BMS5-45)

B. References

Reference	Title
SOPM 20-50-21	HOW TO INSTALL NAMEPLATE STRAPS AND SEALS
SOPM 20-60-04	MISCELLANEOUS MATERIALS

C. Procedure

NOTE: For miscellaneous materials, refer to SOPM 20-60-04.

(1) Remove the old nameplate:

(2) If necessary, steel stamp the serial number and the part number on the replacement nameplate. Use the data on the old nameplate.

(3) Install a replacement nameplate on the barrel with a new strap (SOPM 20-50-21).

(4) Seal the edges of the nameplate and strap with sealant, A00551.

ASSEMBLY

1. General

A. This procedure has the data necessary to assemble the main landing gear downlock actuator 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 item numbers.

2. Assembly (ASSEMBLY, Figure 701)

A. Tools/Equipment

NOTE: Equivalent substitutes may be used.

Reference	Description
SPL-5403	Actuator Retainer Assembly (C32038-4 included in C32038-1 Eqpt) (Part #: C32038-4, Supplier: 81205)

B. Consumable Materials

NOTE: Equivalent substitutes may be used.

Reference	Description	Specification
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)
G01912	Lockwire - Monel (0.032 In. Dia.)	NASM20995N˜ C32 (QQ-N-281)

C. References

Reference	Title
SOPM 20-50-01	BOLT AND NUT INSTALLATION
SOPM 20-50-02	INSTALLATION OF SAFETYING DEVICES
SOPM 20-60-03	LUBRICANTS
SOPM 20-60-04	MISCELLANEOUS MATERIALS

D. Special tools and equipment

NOTE: Equivalent substitutes can be used.

(1) actuator retainer assy, SPL-5403 C32038-4 – Actuator Retainer

(2) C32038-6 – Rod Retainer

(3) C32038-41 – Downlock Spanner

(4) C32038-43 – Rod End Wrench

E. Procedure

NOTE: For bolt and nut installation, refer to SOPM 20-50-01. For lubricants, refer to SOPM 20-60-03. For miscellaneous materials, refer to SOPM 20-60-04.

(1) Use standard industry procedures and these steps.

(2) Install the barrel (105) in the actuator retainer assy, SPL-5403 and hold this in a bench vise.

(3) Install the piston seal (65) on the piston rod (70):

(a) Lubricate the piston seal (65) with fluid, D00153 or MCS 352B fluid, D00054.

(b) Install the piston seal (65) on the piston rod (70).

(4) Install the gland (60) on the piston rod (70).

(a) Lubricate the seal (50) with fluid, D00153 or MCS 352B fluid, D00054.

(b) Install the seal (50) in the gland (60).

(c) Lubricate the packing (45) with fluid, D00153 or MCS 352B fluid, D00054.

(d) Install the rings (40) and the packing (45) on the gland (60).

(e) Install the gland (60) on the piston rod (70).

(5) Install the nut (55) on the piston rod (70):

(a) Lubricate the scraper (35) with fluid, D00153 or MCS 352B fluid, D00054.

(b) Install the scraper (35) in the nut (55).

(c) Install the nut (55) on the piston rod (70).

(6) Install the lockwasher (30) on the rod end (25).

(7) Install the rod end (25) on the piston rod (70).

(8) Hold the piston rod (70), and the attached items, in the rod end retainer tool.

(9) With the rod end wrench, tighten the rod end (25) to 35 to 40 pound-inches.

(10) Break the flanges of the lockwasher (30) fully into the slots on the rod end (25) with a square punch. Make sure the breaks are complete.

(11) Remove the piston rod (70), and the attached items, from the retainer tool.

(12) Install the piston rod (70), and the attached items in the barrel (105).

(13) Tighten the nut (55) in the barrel by hand.

(14) Move the piston rod in and out by hand to make sure it moves freely.

(15) With the spanner wrench, tighten the nut (55) to 300-400 pound-inches.

(16) Lockwire the nut (55) to the barrel (105) by the double-twist method (SOPM 20-50-02) using lockwire, G01912.

(17) Install the unions (5) and the packings (10) in the barrel (105):

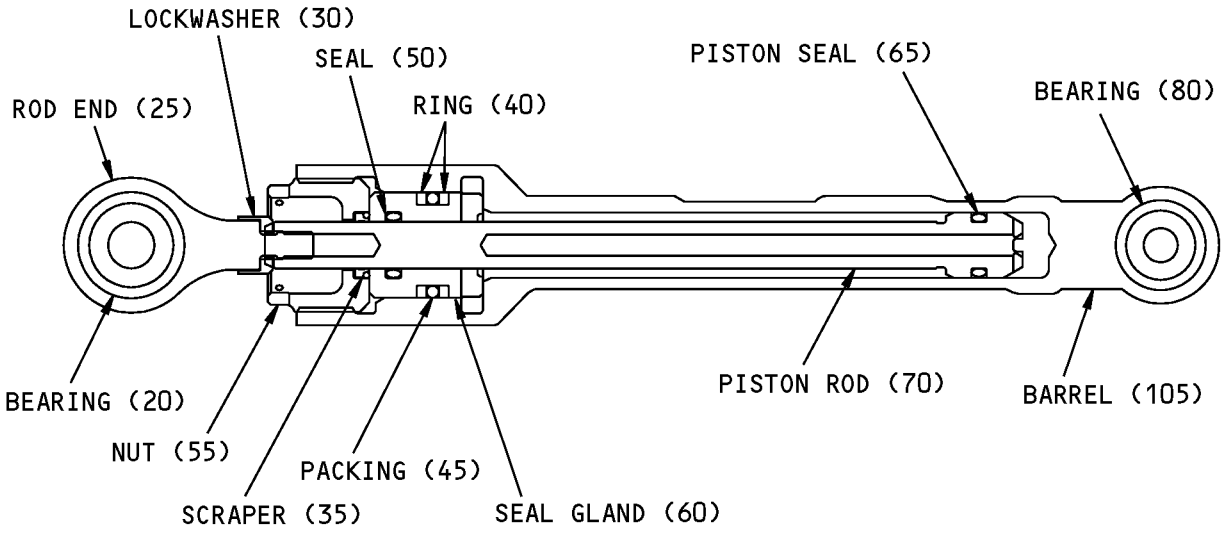
(a) Lubricate the packings (10) with fluid, D00153 or MCS 352B fluid, D00054.

(b) Install the packings (10) on the unions (5).

(c) Install the unions (5) in the barrel (105).

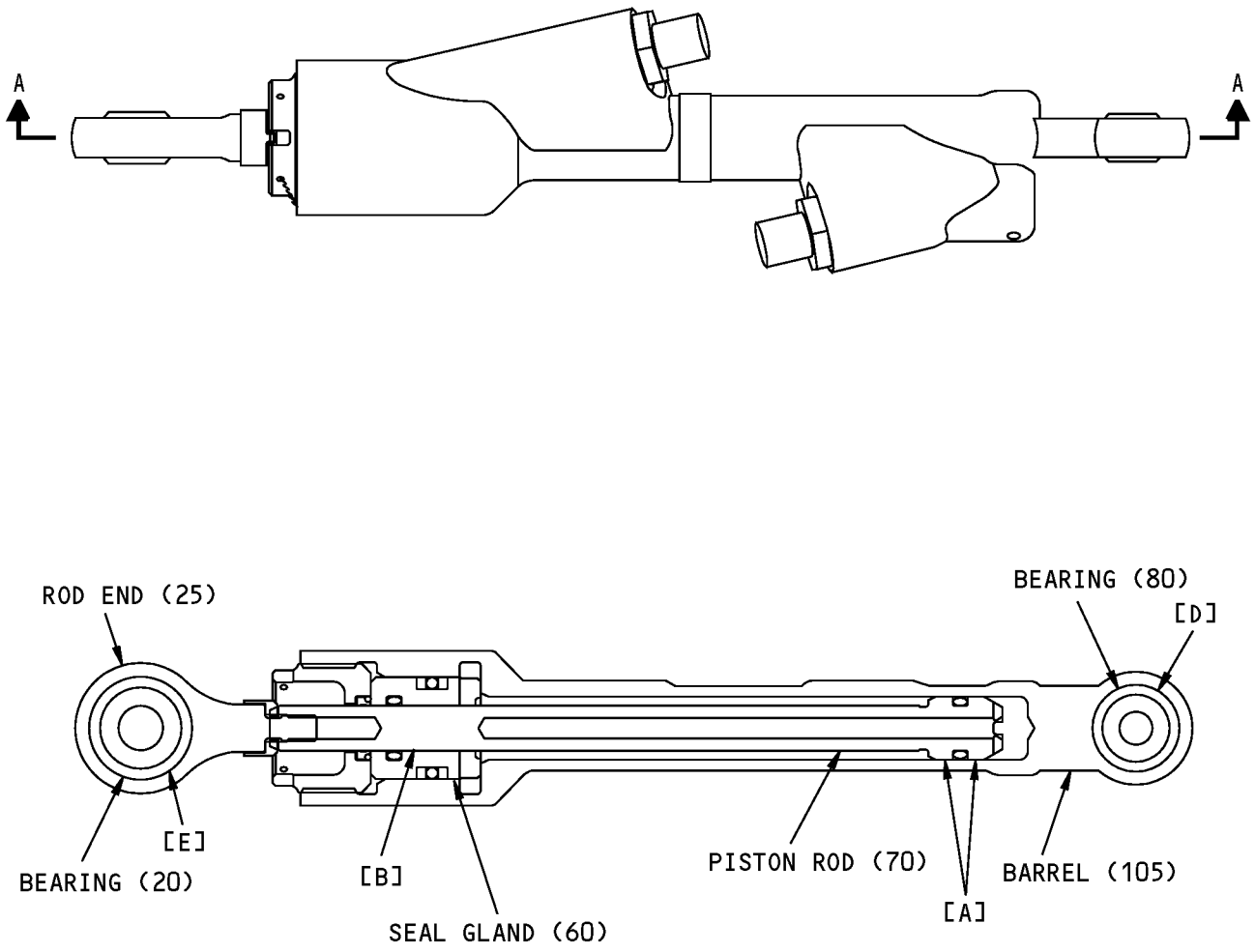
(18) Install the nameplate (110) (REPAIR 8-1) if it is necessary.

(19) Do the test of the actuator (TESTING AND FAULT ISOLATION).



ITEM NUMBERS REFER TO IPL FIG. 1

Assembly Details
Figure 701



A–A

Fits and Clearances
Figure 801 (Sheet 1 of 2)

REF LETTER	REF IPL FIG. 1, MATING ITEM NO.	DESIGN DIMENSION*				SERVICE WEAR LIMIT*		
		DIMENSION		ASSEMBLY CLEARANCE		DIMENSION		MAXIMUM CLEARANCE
		MIN	MAX	MIN	MAX	MIN	MAX	
[A]	ID 105	0.6130	0.6150	0.002	0.005		0.617	0.007
	OD 70	0.6100	0.6110			0.608		
[B]	ID 60	0.4370	0.4380	0.002	0.005		0.442	0.007
	OD 70	0.4330	0.4350			0.431		
[D]	ID 105	0.8438	0.8448	0.0000	0.0013		0.8478	0.0015
	OD 80	0.8435	0.8438			0.8435		
[E]	ID 25	1.0000	1.0010	0.0000	0.0015		1.0040	0.0015
	OD 20	0.9995	1.0000			0.9995		

* ALL DIMENSIONS ARE IN INCHES

Fits and Clearances
Figure 801 (Sheet 2 of 2)

REF IPL		NAME	TORQUE*	
FIG. NO.	ITEM NO.		POUND-INCHES	POUND-FEET
1	25	Rod End	35-40	
1	55	Nut	300-400	

* REFER TO SOPM 20-50-01 FOR TORQUE VALUES OF STANDARD FASTENERS.

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-5403	Actuator Retainer Assembly (C32038-4 included in C32038-1 Eqpt)	C32038-4	81205

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

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.

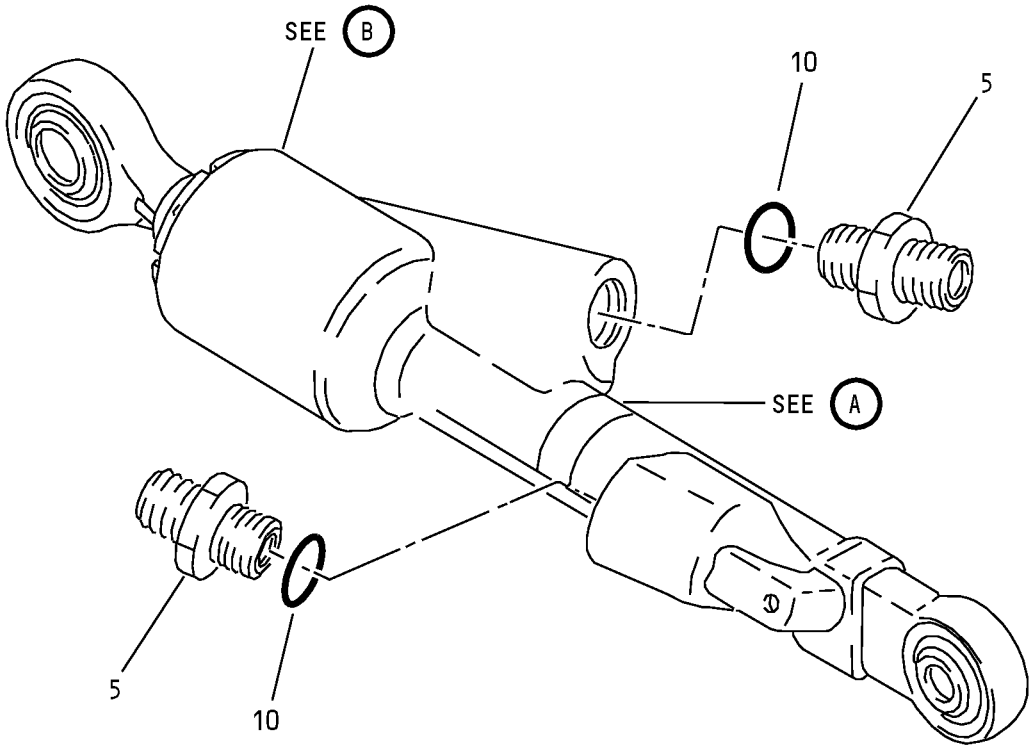
VENDOR CODES

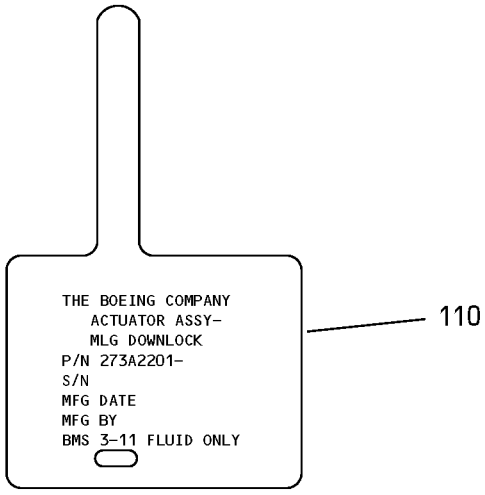
Code	Name
02107	FLOUROCARBON CO OHIO DIV DOVER, OHIO 44622 CANCELLED NO REPLACEMENT FORMERLY SPARTA MANUFACTURING CO
07128	TETRAFLUOR INC 2051 EAST MAPLE AVENUE EL SEGUNDO, CALIFORNIA 90245-5009 FORMERLY ROYAL IND TETRAFLUOR DIV V0667B ENGLEWOOD CALIF
09257	BUSAK AND SHAMBAN INC SEALS DIV 2531 BREMER DR PO BOX 176 FORT WAYNE, INDIANA 46801 FORMERLY SHAMBAN, W S AND CO
26303	GREENE TWEED IND INC ADVANTEC DIV 7101 PATTERSON DRIVE PO BOX 5037 GARDEN GROVE, CALIFORNIA 92645-5037 FORMERLY OHIO AIRCRAFT SUPPLIES INC IN INGLEWOOD, CALIFORNIA FORMERLY ADVANTEC DIV OF IFP INC, LOS ANGELES, CA V5P801
26879	CORONADO MFG INC 11069 PENROSE AVENUE SUN VALLEY, CALIFORNIA 90352-2722 FORMERLY CORONADO PLASTICS INC IN BURBANK, CALIFORNIA
50632	KAMATICS CORP SUB OF KAMAN CORP 1335 BLUE HILLS ROAD BLOOMFIELD, CONNECTICUT 06002-1304

Code	Name
92555	LEE COMPANY 2 PETTIPAUG ROAD PO BOX 424 WESTBROOK, CONNECTICUT 06498-1543
94878	RAYBESTOS-MANHATTAN INC PACIFIC COAST DIV FULLERTON, CALIFORNIA 92631 BUSINESS DISCONTINUED
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

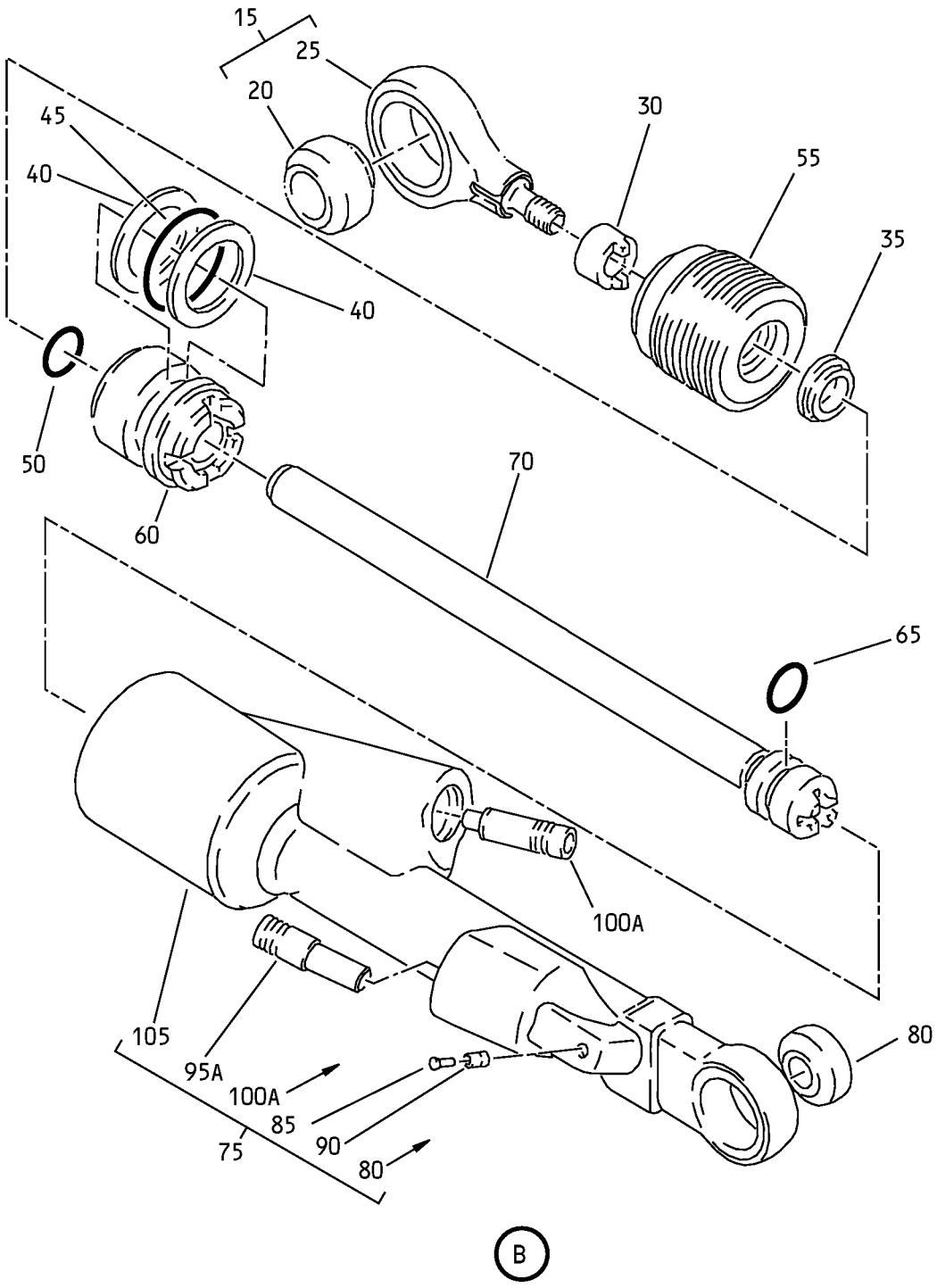
PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
2100-210		1	40	2
273A2201-1		1	1A	RF
273A2202-1		1	75	1
273A2202-2		1	105	1
273A2203-1		1	70	1
273A2204-1		1	15	1
273A2204-2		1	25	1
273A2205-1		1	60	1
273A2206-1		1	55	1
273A2207-1		1	30	1
273A2508-2		1	110	1
BACP20AX09		1	90	1
BACP20AX09P		1	85	1
BACR12BM210		1	40	2
C11236-210B		1	40	2
FCRA2810400D		1	100A	1
FCRX0505300B		1	95A	1
KSC276707BZ		1	20	1
KSC276805BZ		1	80	1
MS21902-4T		1	5	2
NAS1611-210		1	45	1
NAS1612-4		1	10	2
RMR12BM210		1	40	2
S30294-210-1		1	40	2
S30855-111H99		1	50	1
S32925-7-16H99		1	35	1
S34760-111H99N		1	65	1
STF800-210		1	40	2
TF450-210A		1	40	2





A

Main Landing Gear Downlock Actuator Assembly
IPL Figure 1 (Sheet 1 of 2)



Main Landing Gear Downlock Actuator 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–					
–1A	273A2201-1		DOWNLOCK ASSY-MLG ACTR		RF
5	MS21902-4T		. UNION		2
10	NAS1612-4		. PACKING		2
15	273A2204-1		. END ASSY-ROD		1
20	KSC276707BZ		. . BEARING (V50632)		1
25	273A2204-2		. . END		1
30	273A2207-1		. WASHER-LOCK		1
35	S32925-7-16H99		. SCRAPER (V09257)		1
40	C11236-210B		. RING (V26879) (SPEC BACR12BM210) (OPT RMR12BM210 (V94878)) (OPT STF800-210 (V02107)) (OPT S30294-210-1 (V97820)) (OPT TF450-210A (V07128)) (OPT 2100-210 (V26303))		2
45	NAS1611-210		. PACKING		1
50	S30855-111H99		. GLAND-SEAL (V09257)		1
55	273A2206-1		. NUT-GLAND		1
60	273A2205-1		. SEAL-GLAND		1
65	S34760-111H99N		. SEAL-PISTON (V09257)		1
70	273A2203-1		. ROD-PISTON		1
75	273A2202-1		. BARREL ASSY		1
80	KSC276805BZ		. . BEARING (V50632)		1
85	BACP20AX09P		. . PIN		1
90	BACP20AX09		. . PLUG		1
95	2R3722		DELETED		
95A	FCRX0505300B		. . RESTRICTOR-RELIEF (V92555)		1
100	6F3780		DELETED		

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
100A	FCRA2810400D		. . RESTRICTOR-CHECK (V92555)		1
105	273A2202-2		. . BARREL		1
110	273A2508-2		. NAMEPLATE		1

–Item not Illustrated