TO: ALL HOLDERS OF NOSE GEAR STEERING ACTUATOR ASSEMBLY COMPONENT MAINTENANCE MANUAL 32-51-10

REVISION NO. 13 DATED JUL 01/03

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.

CHAPTER/SECTION AND PAGE NO.	DESCRIPTION OF CHANGE
CONTENTS 1	Added clarifications and updated callouts.
REPAIR-GEN 601-602	
REPAIR 1-1 602	
REPAIR 2-1 601	
REPAIR 2-2 601-602,605	
REPAIR 4-1 601	
REPAIR 5-1 601	
REPAIR 6-1 601	
REPAIR 7-1 601	
REPAIR 8-1 601-602	
REPAIR 9-1 601 701,703-704	
REPAIR 3-1 603	Changed a primer callout.

NOSE GEAR STEERING ACTUATOR ASSEMBLY

PART NUMBER 275T6221-1,-2,-3

COMPONENT MAINTENANCE MANUAL
WITH
ILLUSTRATED PARTS LIST

T21977

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

T21963

TEMPORARY REVISION AND SERVICE BULLETIN RECORD

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL
		MC B1290-001	JUL 10/82

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32-51-10		
TITLE PAGE		
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REVISION RECORD		
1	OCT 01/87	01
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TR & SB RECORD		
1	OCT 01/87	01
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LIST OF EFFECTIVE PAGES		
*1	JUL 01/03	01
THRU LAST PAGE		
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DISASSEMBLY		
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*601	JUL 01/03	01.1
*602	JUL 01/03	01.1
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*701	JUL 01/03	01.1
702	JAN 01/93	01.101
*703	JUL 01/03	01.1
*704	JUL 01/03	01.1
FITS AND CLEARANCES		
801	OCT 01/87	01
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804	BLANK	
SPECIAL TOOLS		
901	JUL 01/92	01.1
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1001	OCT 01/87	01
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1005	OCT 01/87	01
1006	JUL 01/92	01.1

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* = REVISED, ADDED OR DELETED

TABLE OF CONTENTS

*[1] Special instructions are not necessary. Use standard industry practices and the instructions in SOPM 20-30-03.

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. An asterisked flagnote *[ ] in place of the page number indicates that no special instructions are provided since the function can be performed using standard industry practices.

Throughout the manual IPL item number references include alpha-variants, unless otherwise stated.

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.

Verification:

Testing/TS
Disassembly
Assembly

NOSE GEAR STEERING ACTUATOR ASSEMBLY

DESCRIPTION AND OPERATION

1. The nose gear steering actuator assembly is a double acting, hydraulically operated unit consisting of a cylinder, trunnion, and transfer tube. The trunnion provides swivel mounting and hydraulic connection when installed on the nose gear. A rod end on the piston attaches to the nose gear shock strut. Applying hydraulic pressure to either side of the piston causes it to extend or retract, supplying force required to turn the nose gear.

2. Leading Particulars (Approximate)

   Length -- 20 inches (retracted)
   -- 31 inches (extended)
   Width -- 10.5 inches
   Operating medium -- BMS 3-11 Hydraulic Fluid
   Operating pressure -- 3000 psi
   Proof Pressure -- 4500 psi
   Weight -- 43 lbs (dry)
   47 lbs (wet)

TESTING/TROUBLE SHOOTING

1. Equipment and Materials

NOTE: Equivalent substitutes may be used.

A. Hydraulic test stand -- capable of supplying hydraulic fluid, BMS 3-11 at maximum flow rate of 5 gpm and at variable pressure from 0-4500 psi. Fluid must be filtered to 15 microns absolute.

B. Test fluid -- BMS 3-11

C. Test fitting -- A32052-1

D. Spanner wrench -- A32053-1

E. Test fixture -- A32072-1

2. Preparation for Test

A. Install actuator in test fixture A32072-1 and install test fitting A32052-1 in actuator.

WARNING: DO NOT APPLY COMPRESSED AIR TO PORTS AT ANY TIME. DO NOT CYCLE UNIT AT PROOF PRESSURE (4500 PSI).

B. Connect hydraulic hose to actuator.

C. Fill unit with hydraulic fluid by cycling piston 10 cycles or until all air bubbles disappear in discharged hydraulic fluid.

D. With piston fully extended, apply 3000 psi pressure to extend port and using spanner wrench A32053-1 tighten nut (30) to 280-350 lb-in.

3. Test (See Fig. 101, Trouble Shooting Chart, for probable cause and correction.)

A. With piston fully extended, apply a proof pressure of 4500 psi to the EXTEND port for a period of 2 minutes. There shall be no external leakage or permanent set.

B. Repeat step A with a pressure of 2 psi. There shall be no external leakage.

CAUTION: PISTON MUST BE FULLY RETRACTED BEFORE APPLYING PRESSURE TO RETRACT PORT.

C. With piston fully retracted, apply a proof pressure of 4500 psi to retract port for a period of 2 minutes. There shall be no external leakage or permanent set.

D. Repeat step C with a pressure of 2 psi. There shall be no external leakage.

E. Cycle the actuator through 25 full cycles.

(1) Maintain 2800-3000 psi in both the extend and retract ports when extending.

(2) Maintain 2800-3000 psi in the retract port and 100-200 psi in the extend port when retracting.

(3) Leakage at the rod end seal shall not exceed 2 drops.

F. Extend piston and apply 3000 psi pressure to extend port. Leakage from retract port shall not exceed 2 drops per minute. Reduce pressure to 100 psi. Leakage from retract port shall not exceed 2 drops per minute.

G. Retract piston and apply 3000 psi pressure to the retract port. Leakage from extend port shall not exceed 2 drops per minute. Reduce pressure to 100 psi. Leakage from extend port shall not exceed 2 drops per minute.

4. Post Test Procedures

A. Reduce pressure to zero. Disconnect hydraulic lines and drain all hydraulic fluid.

B. Install lockwire and apply sealant (Ref ASSEMBLY, par. 4.J., K., L.).

TROUBLE	PROBABLE CAUSE	CORRECTION
Leakage at rod seal exceeds 2 drops per 25 cycles	Defective or improperly installed seal (115) or packings (120,130) or hat seal (115A).	Disassemble and replace parts per par. 4.A., 4.B.
Binding or irregular movement	Defective cylinder (40), piston rod (65), or bushing (135). Contamination in cylinder.	Disassemble and replace parts per par. 4.A., 4.C., 4.D., 4.E. Disassemble and clean parts.

Trouble Shooting Chart
Figure 101

5. Corrective Procedures

A. Drain hydraulic fluid from actuator before disassembling.

B. Replacement of seal (115), packings (120, 130).

(1) Completely disassemble unit per DISASSEMBLY. Replace seal (115) and packings (120, 130) if required.

(2) Assemble parts per ASSEMBLY.

(3) Repeat test per par. 3.

C. Replacement of cylinder (40).

(1) Disassemble unit per DISASSEMBLY step 3.A. thru 3.C. Replace cylinder if defective.

(2) Assemble parts per ASSEMBLY step 4.F. and 4.G.

(3) Repeat test per par. 3.

D. Replacement of piston (65).

(1) Disassemble unit per DISASSEMBLY step 3.A. thru 3.F. Replace piston if defective.

(2) Assemble parts per ASSEMBLY step 4.B. thru 4.G.

(3) Repeat test per par. 3.

E. Replacement of bushing (135).

(1) Disassemble unit per DISASSEMBLY. Replace bushing if defective.

(2) Assemble parts per ASSEMBLY.

(3) Repeat test per par. 3.

DISASSEMBLY

NOTE: Refer to TESTING/TROUBLE SHOOTING to establish condition or probable cause of any malfunction and to determine extent of disassembly and repair.

1. Equipment

NOTE: Equivalent substitutes may be used.

A. A32072-1 -- Test fixture

B. A32040-7 -- Rod end torque adapter

C. A32050-1 -- Piston torque fixture

D. A32053-1 -- Retaining nut spanner wrench

E. F70312-27 -- Crowfoot wrench

2. Parts Replacement

NOTE: The following listed parts are recommended for replacement. Actual replacement may be based on in-service experience.

A. Lockwire, O-rings, seals, backup rings, lockwasher.

3. Disassembly (IPL Fig. 1)

A. Remove fasteners (20, 25) and remove retainer (15) from cylinder (40). Slide transfer tube (55) into trunnion (140) until it clears cylinder end.

B. Attach test fixture A32072-1 to cylinder (40) and using wrench A32053-1 back off nut (30), remove key (35). Unscrew cylinder (40) from trunnion (140) and slide cylinder off of piston (65). Remove tube (55) from trunnion.

CAUTION: BEARING (80) HALVES COMPRISE A MATCHED SET AND MUST BE KEPT TOGETHER TO ENSURE PROPER OPERATION AFTER ASSEMBLY.

C. Remove bearing (80) from rod end (85). Remove seal (60) from piston (65).

D. Pry lockwasher (100) from rod end (85).

E. Restrain piston (65) with torque fixture A32050-1, remove rod end (85) using torque adapter A32040-7 and withdraw piston rod from trunnion.

F. Using wrench F70312-27, remove nut (105), scraper (110), bushing (135), seal (115), packings (120, 130) and backup rings (125). Remove packing (75) and backup rings (70) from trunnion (140).

CHECK

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. Penetrant check per 20-20-02 -- Trunnion (140, IPL Fig. 1), bushing (135), retainer (15).

3. Magnetic particle check per 20-20-01 -- Cylinder (40), piston (65), nuts (30, 105), tube (55), rod end (95).

   NOTE: Remove urethane foam from piston (65) ID, if present, prior to magnetic particle check of piston (65) ID. See REPAIR 3-1 for instructions on removal of urethane foam.

REPAIR - GENERAL

1. Content

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

P/N	NAME	REPAIR
275T6222	CYLINDER	1-1
275T6223	TRUNNION	2-1, 2-2
275T6224	PISTON	3-1
275T6226	TRANSFER TUBE	4-1
275T6227	ROD END	5-1
275T6229	BUSHING	6-1
- - -	MISCELLANEOUS PARTS REFINISH	7-1
275T6221	ACTUATOR	8-1
BAC27THY1	NAMEPLATE	9-1

2. Standard Practices

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

20-10-01 Repair and Refinish of High Strength Steel Parts
20-10-03 Shot Peening
20-10-04 Grinding of Chrome Plated Parts
20-10-05 Application of Plasma Flame Sprayed Coatings
20-30-02 Stripping of Protective Finishes
20-30-03 General Cleaning Procedures
20-41-01 Decoding Table for Boeing Finish Codes
20-42-03 Hard Chrome Plating
20-43-05 Chromic Acid Anodizing
20-44-01 Application of Abrasion Resistant Finishes
20-50-03 Bearing and Bushing Replacement
20-50-12 Application of Adhesives
20-50-21 How to Install nameplate Straps and Seals
20-60-01 Cleaning Materials
20-60-02 Finishing Materials
20-60-04 Miscellaneous Materials

3. Materials

NOTE: Equivalent substitutes can be used.

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

B. Enamel -- BMS 10-60, Gray color 707 (SOPM 20-60-02)

C. Sealant -- BMS 5-26, MIL-G-8802 (SOPM 20-60-04)

D. Solvent (Trichloroethylene) -- BMS 11-6, Type 1 (SOPM 20-60-01)

E. Methylene Chloride -- MIL-C-6998 (SOPM 20-60-01)

F. Paint Stripper -- Turco 5351 (SOPM 20-60-01)

4. Dimensioning Symbols

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

CYLINDER - REPAIR 1-1

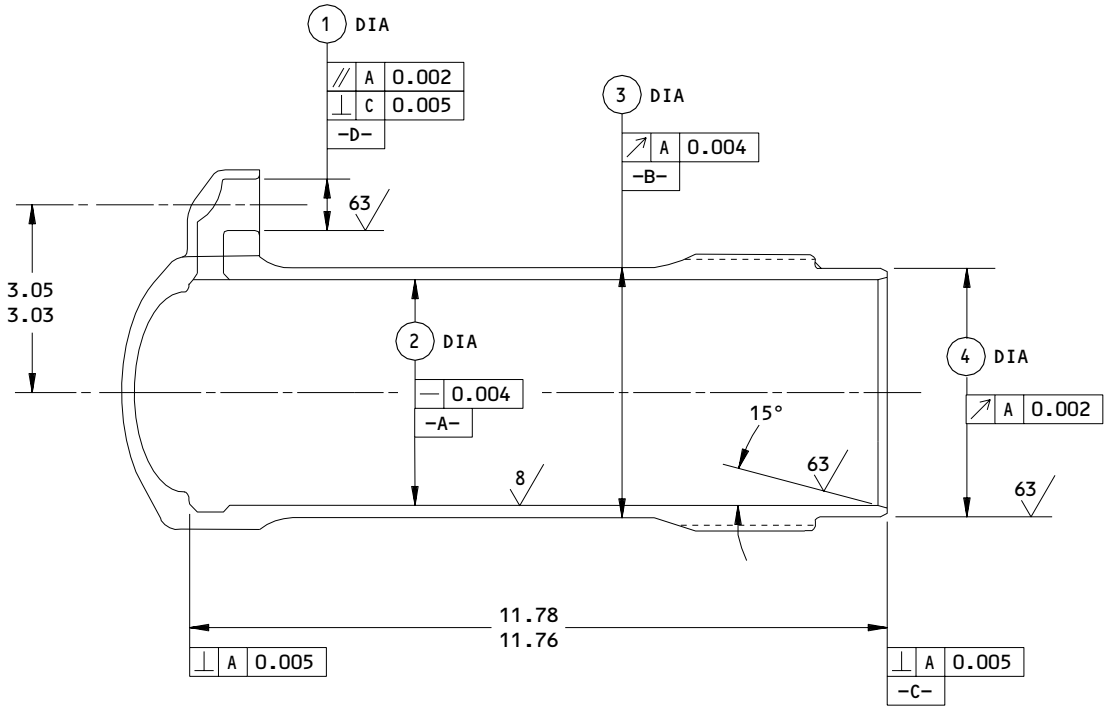
275T6222-1

NOTE: Refer to REPAIR-GEN for a list of applicable standard practices. For repair of surfaces which is only replacement of the original finish, refer to Refinish instructions, Fig. 601.

1. Bore (Fig. 601)

A. Machine as required, within repair limits, to remove defects.

B. Shot peen. Chrome plate. Grind to design dimensions and finish.



	1	2	3	4
DESIGN DIM	0.740 0.738	3.995 3.993	4.31 4.30	4.247 4.245
REPAIR LIMIT	———	4.023 1	———	———

REFINISH

CADMIUM PLATE (F-15.02) THREADS.
PASSIVATE (F-17.25, WHICH REPLACES F-17.09) ALL OTHER SURFACES.

1 LIMIT FOR CHROME PLATE BUILDUP AND GRINDING TO DESIGN DIMENSION AND FINISH.

REPAIR

REF 1

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

SHOT PEEN: 0.016-0.033 SHOT SIZE
0.010 A2 INTENSITY

MATERIAL: 15-5PH CRES, 180-200 KSI

ALL DIMENSIONS ARE IN INCHES

275T6222-1
Cylinder Repair and Refinish
Figure 601

157856

TRUNNION - REPAIR 2-1

275T6223-1, -4

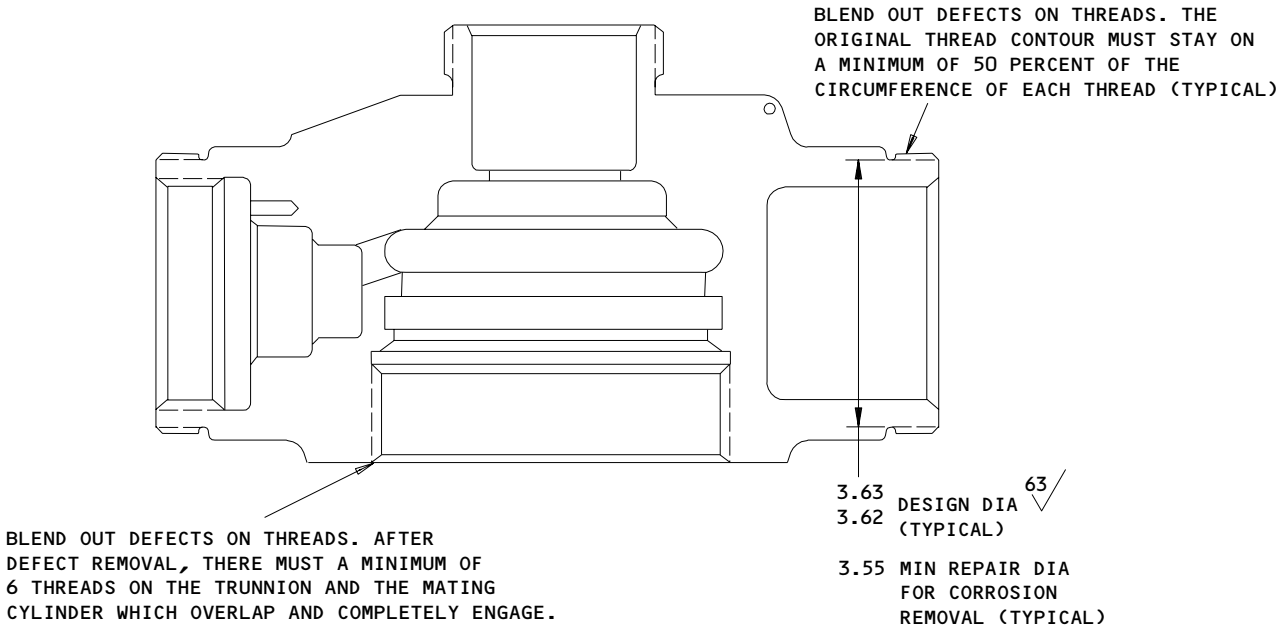
NOTE: Refer to REPAIR-GENERAL for a list of applicable standard practices. For repair of surfaces which is only replacement of the original finish, refer to Refinish instructions in REPAIR 2-2.

1. Threads (Fig. 601)

A. Machine the thread relief, as necessary, within repair limits.

B. Remove defects from the threads within repair limits with a abrasive cloth or fine tooth file.

C. Chemical treat the repaired surfaces. Apply two layers of BMS 10-11, type 1, primer to the thread reliefs and one layer of primer to the threads.



Trunnion Thread Repair
Figure 601

13241

TRUNNION - REPAIR 2-2

275T6223-1, -4

NOTE: Refer to REPAIR-GEN for a list of applicable standard practices. For repair of surfaces which is only replacement of the original finish, refer to Refinish instructions, Fig. 601.

1. OD Repair -- Diameters A, E (Fig. 601)

A. Method 1 -- Installation of Repair Sleeve

(1) Machine to repair limits shown to remove defects. Any remaining local corrosion pits or defects on the journal diameter must be totally removed by blending out defects to 63-microinch finish. Blend area to adjacent surface with a minimum radius of four times depth of material removed. Depth of blending must not be more than 0.030 inch below minimum repair diameter. Blended areas must not be more than 10% of total journal surface and any single blend is limited to 0.25 square inch. Chemical treat and apply primer as indicated.

(2) Make a repair sleeve per Fig. 602.

(3) Install the sleeve on the trunnion as follows:

(a) Cool the trunnion to -50° to -100°F and heat the sleeve to 200-210°F. Apply BMS 10-11, Type 1 primer to the trunnion and install the sleeve on trunnion while primer is wet.

(b) Machine the sleeve outside diameter to design dimensions and finish.

(4) Chemical treat and apply primer, sealant and enamel as indicated.

B. Method 2 -- Buildup with Thermal Spray (Optional to Method 1)

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

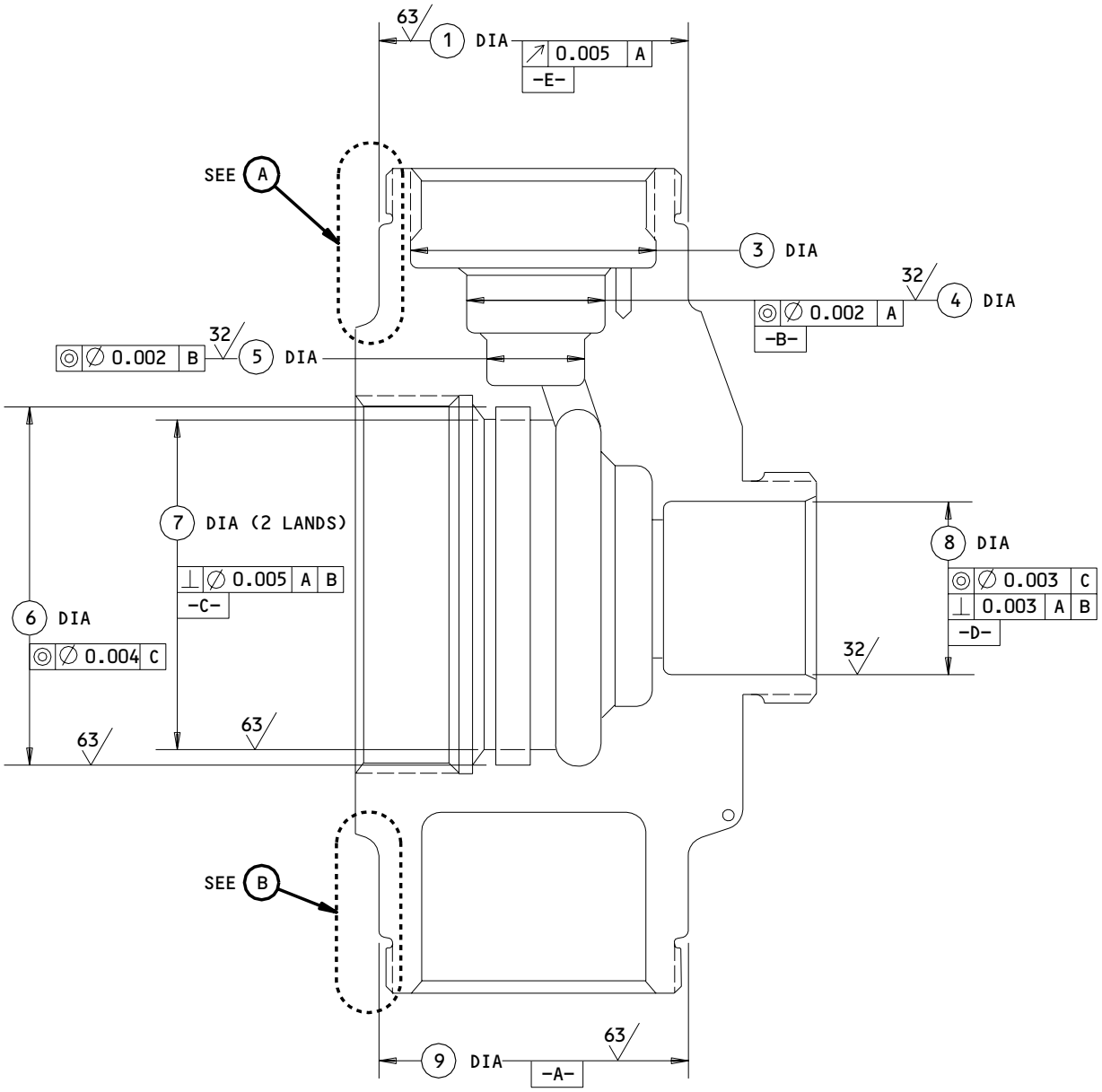
(2) Any pits not removed by step (1) must be totally removed by blending out to 63-microinch finish. Blend area to adjacent surface with a minimum radius of four times depth of material removed. Depth of blend must not be more than 0.032 inch below repair diameter of step (1). Not more than 50% of any one square inch of trunnion surface may be blended out below repair diameter of step (1).

(3) Shot peen as indicated.

(4) Build up with aluminum thermal spray, BMS 10-67, type 10 (SOPM 20-10-05).

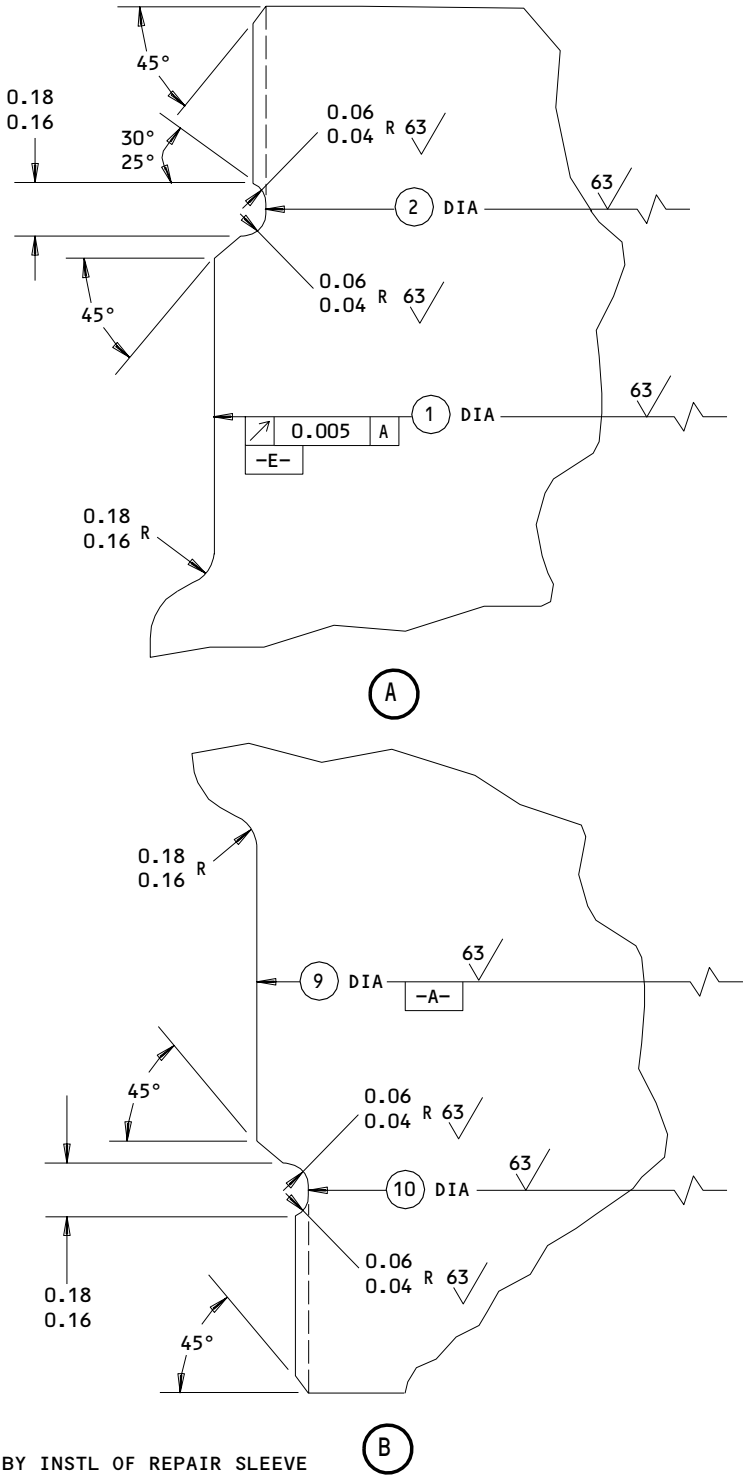
(5) Machine to design dimensions and finish.

(6) Chemical treat and apply one coat of primer, BMS 10-11, type 1 to repaired areas.



275T6223-1,-4
Trunnion Repair and Refinish
Figure 601 (Sheet 1)

157849

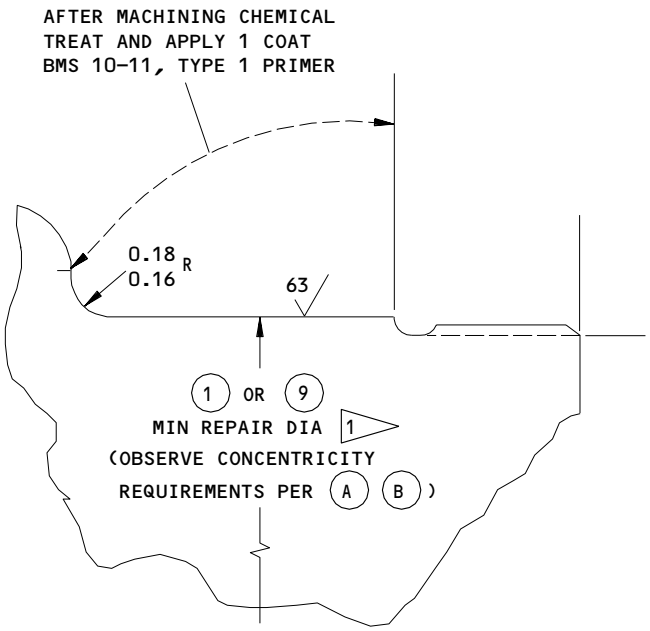


SEE (C) (D) FOR REPAIR BY INSTL OF REPAIR SLEEVE

SEE (E) FOR REPAIR BY PLASMA FLAME SPRAY BUILDUP

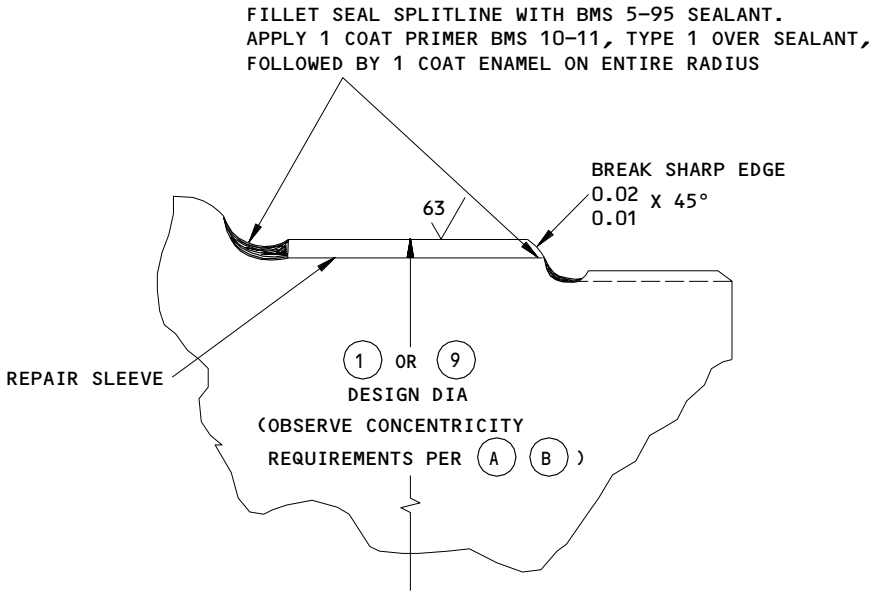
275T6223-1,-4
Trunnion Repair and Refinish
Figure 601 (Sheet 2)

157838



MACHINING FOR INSTALLATION OF REPAIR SLEEVE

C

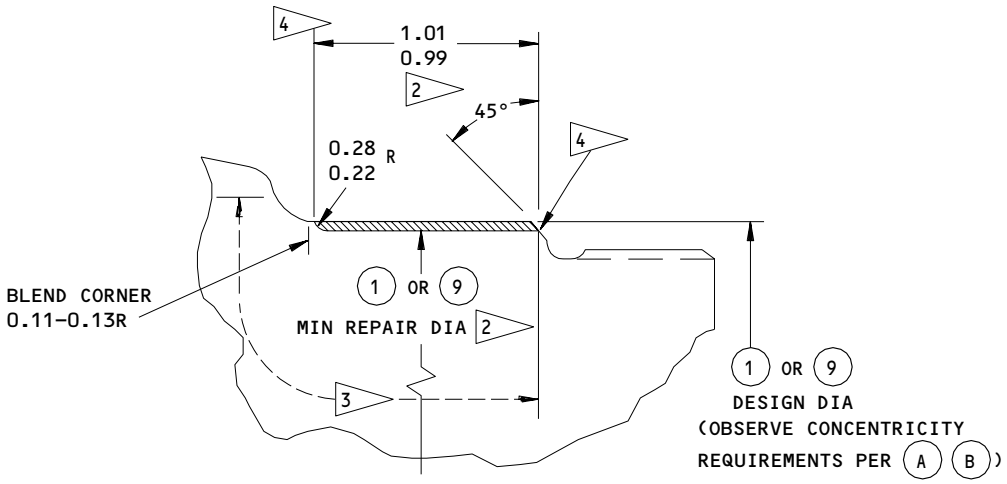


REPAIR SLEEVE INSTALLATION AND SEALANT APPLICATION

D

275T6223-1,-4
Trunnion Repair and Refinish
Figure 601 (Sheet 3)

157839



MACHINING FOR PLASMA FLAME SPRAY REPAIR

(E)

REFERENCE NUMBER	(1)	(2)	(3) 6	(3) 7	(4)	(5)	(6)	(7)	(8)
DESIGN DIMENSION	3.9985 3.9975	3.630 3.620	3.045 3.023	3.033 3.023	1.743 1.741	1.180 1.178	4.621 4.619	4.252 4.250	2.245 2.243
REPAIR LIMIT	3.8750 1 3.9775 2	3.550 5	---	---	---	---	---	---	---

REFERENCE NUMBER	(9)	(10)
DESIGN DIMENSION	3.9985 3.9975	3.630 3.620
REPAIR LIMIT	3.8750 1 3.9775 2	3.550 5

REFINISH

CHROMIC ACID ANODIZE (F-17.04)

1 LIMIT FOR INSTL OF REPAIR SLEEVE

2 LIMIT FOR PLASMA FLAME SPRAY BUILDUP

3 SHOT PEEN THIS AREA

4 SHOT PEEN OPTIONAL THIS AREA

5 LIMIT FOR CORROSION REMOVAL (REF REPAIR 1-1)

6 275T6223-1

7 275T6223-4

REPAIR

REF 1 2 5

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

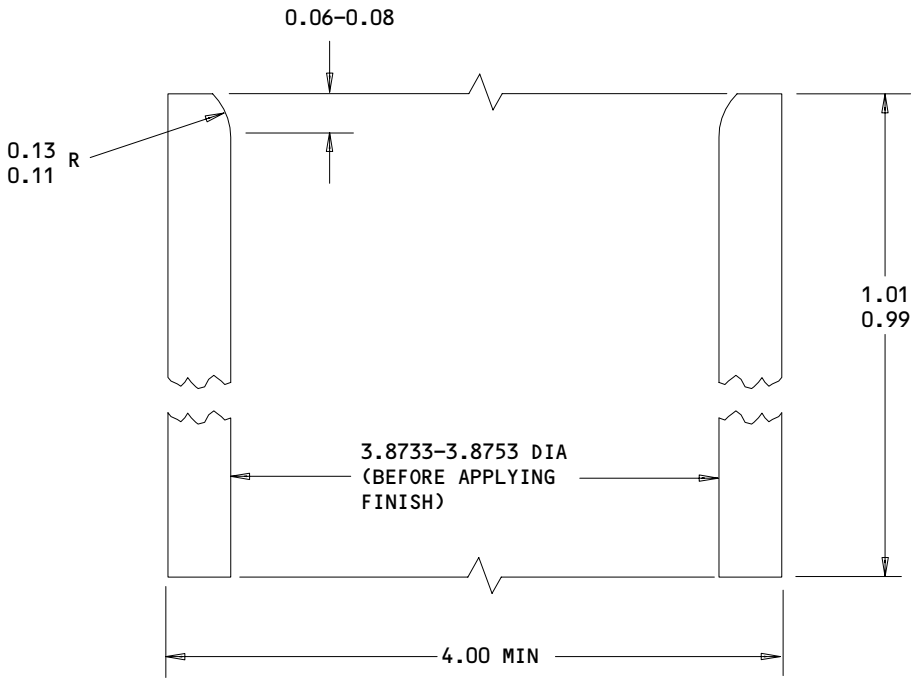
BLEND MACHINE RADII AND MISMATCH
BREAK SHARP EDGE 0.005–0.008
SMOOTH AND BLEND ALL GOUGES AND SCRATCHES
SHOT PEEN (SOPM 20-10-03) AREAS
NOTED BY 3 4
0.012–0.030 SHOT SIZE
0.010 A2 INTENSITY

MATERIAL: AL ALLOY

ALL DIMENSIONS ARE IN INCHES

275T6223-1,-4
Trunnion Repair and Refinish
Figure 601 (Sheet 4)

157851



MATERIAL: 6061-T6511 ALUMINUM ALLOY

ALL DIMENSIONS ARE IN INCHES

BREAK SHARP EDGES 0.005-0.008

125 ALL MACHINED SURFACES

AFTER MACHINING -
CHROMIC ACID ANODIZE FOLLOWED BY 1
COAT PRIMER, BMS 10-11, TYPE 1

Repair Sleeve Details
Figure 602

T21968

PISTON - REPAIR 3-1

275T6224-1, -3 thru -7

NOTE: Refer to REPAIR-GEN for a list of applicable standard practices. For repair of surfaces which is only replacement of the original finish, refer to Refinish instructions, Fig. 601.

1. OD Repair (Fig. 601)

   A. Machine as required within repair limits, to remove defects. If you machine the shank OD (Dia-A-), you must also machine the adjacent relief diameter as indicated.

   B. Shot peen as indicated.

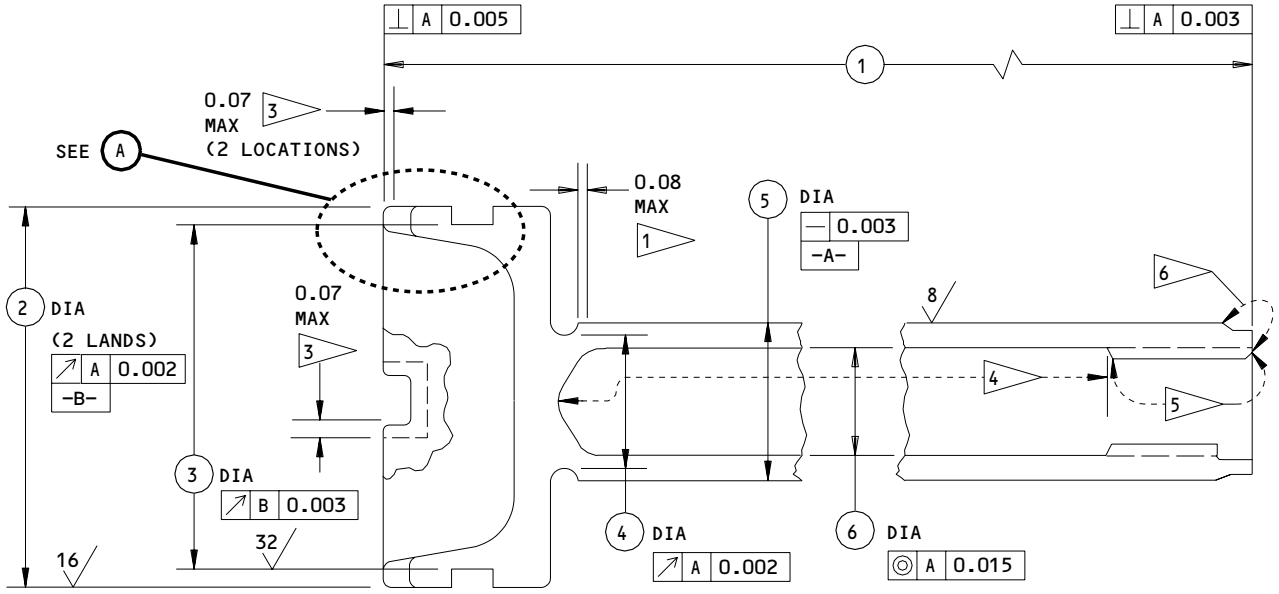
   C. Build up the indicated machined surfaces with chrome or nickel plate as applicable. Grind the chrome plate, and machine the nickel plate, to design dimensions and finish. (Machine, do not grind, the nickel plate.)

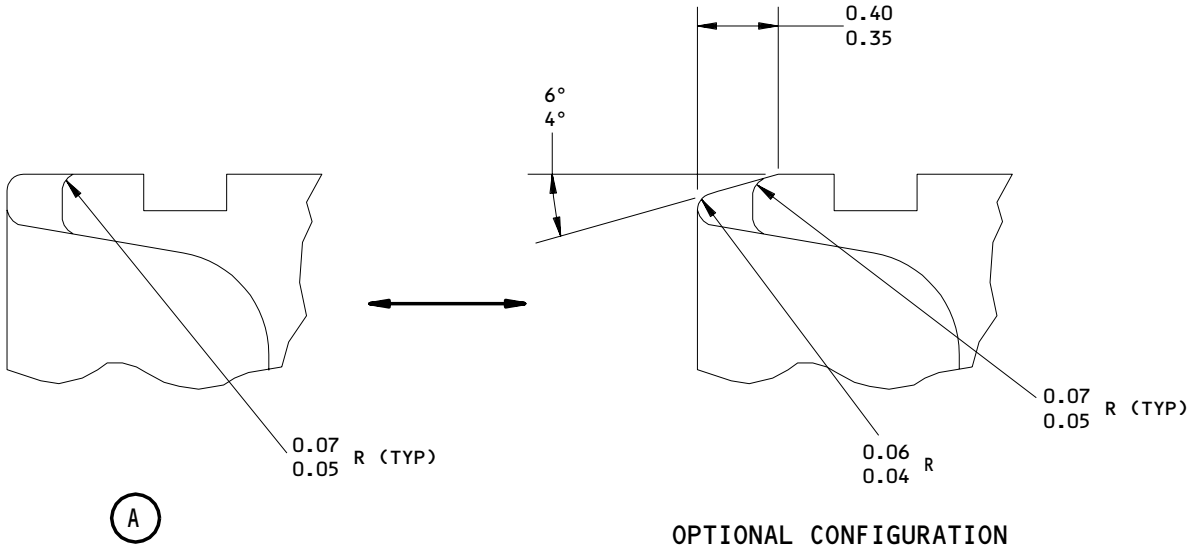
2. ID Repair (Fig. 601)

   CAUTION: WHEN YOU REMOVE THE URETHANE FOAM, DO NOT DAMAGE THE PISTON ID SURFACES. DAMAGE COULD GIVE INCORRECT RESULTS DURING MAGNETIC PARTICLE INSPECTION.

   A. If the ID has urethane foam in it, remove the foam. Soak the piston in methylene chloride or Turco 5351 paint stripper to soften the foam, then carefully scrape the foam out with a wooden scraper. Be careful not to damage the piston ID surfaces. Soak the piston and scrape out the foam until all the foam is removed.

   B. As an alternative to the above chemicals, you could mechanically remove the foam with a dry abrasive blast per SOPM 20-30-02 or machine the foam away, but you must be careful not to touch or damage the piston ID surfaces.





OPTIONAL CONFIGURATION

275T6224-1,-3 THRU -7
Piston Repair and Refinish
Figure 601 (Sheet 1)

	(1)	(2)	(3)	(4)	(5)	(6)
DESIGN DIM	15.66 15.64	3.990 3.988	3.621 3.619	1.611 1.609	1.623 1.621	1.16 1.14
REPAIR LIMIT	—	3.960 7	—	9	1.593 8	—

REFINISH

CHROME PLATE (F-15.04) DIA -A-, 0.003-0.005 THICK, WITH PLATING RUNOUT AS NOTED 1.

NICKEL PLATE (F-15.33) DIA -B-, 0.0015 THICK AFTER MACHINING 2. OBSERVE PLATING RUNOUT AS NOTED 3. NICKEL PLATE CAN ALSO RUNOUT IN GROOVE.

CADMIUM-TITANIUM PLATE AND APPLY PRIMER TO AREAS NOTED 4 5 6

1. CHROME PLATE RUNOUT
2. NOTE: THIS CHANGES ORIGINAL FINISH OF DIA -B- FROM CHROME PLATE TO NICKEL. THE CHROME PLATED DIA -B- CONFIG IS NOT RECOMMENDED
3. NICKEL PLATE RUNOUT
4. CADMIUM-TITANIUM PLATE (F-15.01) AND APPLY BMS 10-11, TYPE 1 PRIMER (F-20.03).
5. CADMIUM-TITANIUM PLATE (F-15.32)
6. CADMIUM-TITANIUM PLATE (F-15.01)

REPAIR

REF 7 8 9

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

BREAK ALL SHARP EDGES 0.08R

SHOT PEEN: 0.017-0.039 SHOT SIZE
0.016 A2 INTENSITY

MATERIAL: 4340M STEEL, 275-300 KSI

ALL DIMENSIONS ARE IN INCHES

7. LIMIT FOR SULFAMATE NICKEL PLATE BUILDUP (SOPM 20-42-09) AND MACHINE TO DESIGN DIMENSIONS AND FINISH, WITH PLATING RUN-OUT AS SHOWN.
8. LIMIT FOR CHROME PLATE BUILDUP (SOPM 20-42-03) AND MACHINE TO DESIGN DIMENSIONS AND FINISH, WITH PLATING RUN-OUT AS SHOWN
9. DIA (4) REPAIR LIMIT = DIA (5) REPAIR LIMIT MINUS 0.012. RESTORATION TO DESIGN DIMENSIONS NOT REQUIRED.

275T6224-1,-3 THRU -7
Piston Repair and Refinish
Figure 601 (Sheet 2)

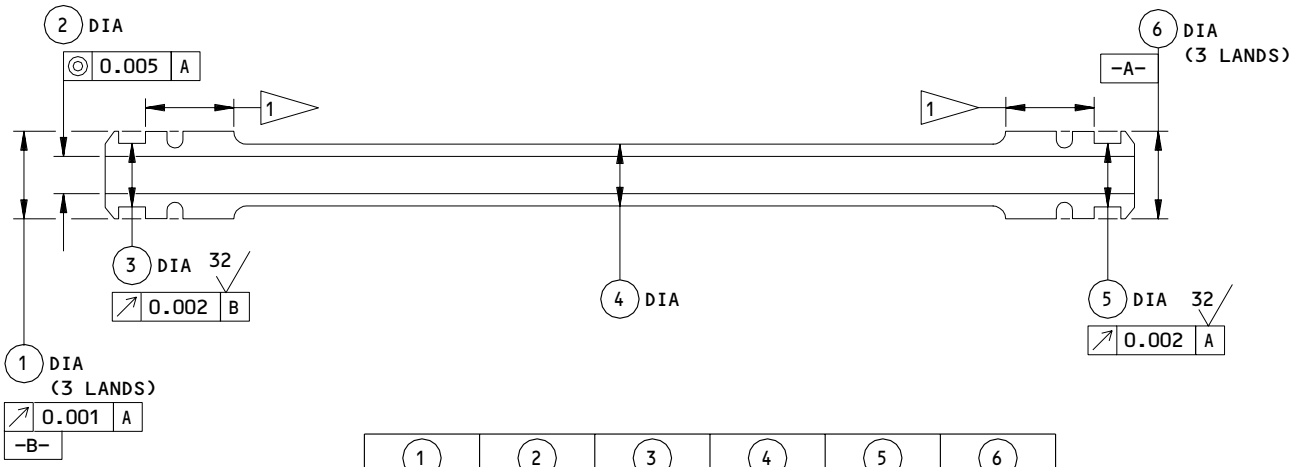
F15342

TRANSFER TUBE - REPAIR 4-1

275T6226-1

1. Plating Repair

A. Repair is only replacement of the original finish. Refer to Refinish instructions, Fig. 601. Refer to REPAIR-GEN for a list of applicable standard practices.



	1	2	3	4	5	6
DESIGN DIM	0.736 0.735	0.442 0.437	0.560 0.558	0.590 0.580	0.560 0.558	0.736 0.735
REPAIR LIMIT	——	——	——	——	——	——

REFINISH

1 CADMIUM PLATE (F-15.06) DIAS INDICATED, INCLUDING THE GROOVES

PASSIVATE (F-17.25, WHICH REPLACES F-17.09) OTHER AREAS

REPAIR

(SAME AS REFINISH)

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: 15-5PH CRES, 180-200 KSI

ALL DIMENSIONS ARE IN INCHES

275T6226-1
Transfer Tube Repair and Refinish
Figure 601

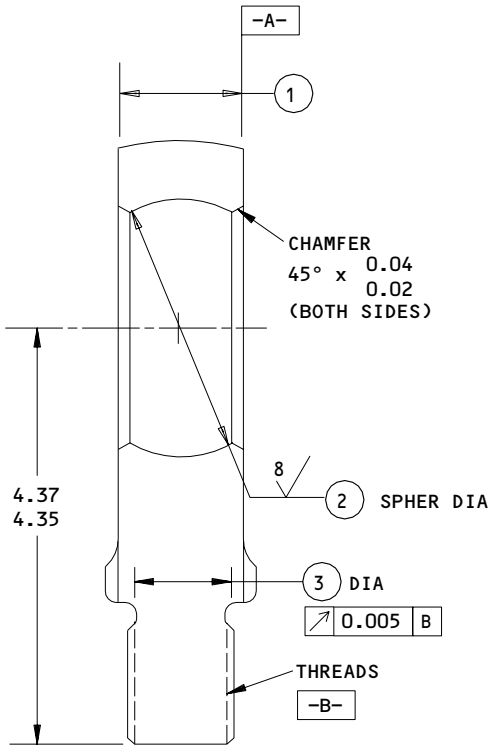
13243

ROD END - REPAIR 5-1

275T6227-2, -5, -8

1. Plating Repair

A. Repair is only replacement of the original finish. Refer to Refinish instructions, Fig. 601. Refer to REPAIR-GEN for a list of applicable standard practices.



	1	2	3
DESIGN DIM	1.317 1.307	2.6935 2.6920	1.005 0.995
REPAIR LIMIT	—	—	—

REFINISH

CHROME PLATE (F-15.03) DIA -A-, 0.0007-0.0010 THICK. OBSERVE PLATING RUNOUT PER 1. CADMIUM PLATE (F-15.02) THREADS -B-. PASSIVATE (F-17.25, WHICH REPLACES F-17.09) OTHER SURFACES

1 CHROME PLATE RUN OUT PERMITTED ON CHAMFER

REPAIR

(SAME AS REFINISH)

125 ALL MACHINED SURFACES UNLESS SHOWN DIFFERENTLY

MATERIAL: 15-5PH CRES, 180-200 KSI

SHOT PEEN: 0.016-0.033 SHOT SIZE
0.012 A2 INTENSITY

ALL DIMENSIONS ARE IN INCHES

275T6227-2,-5,-8
Rod End Repair and Refinish
Figure 601

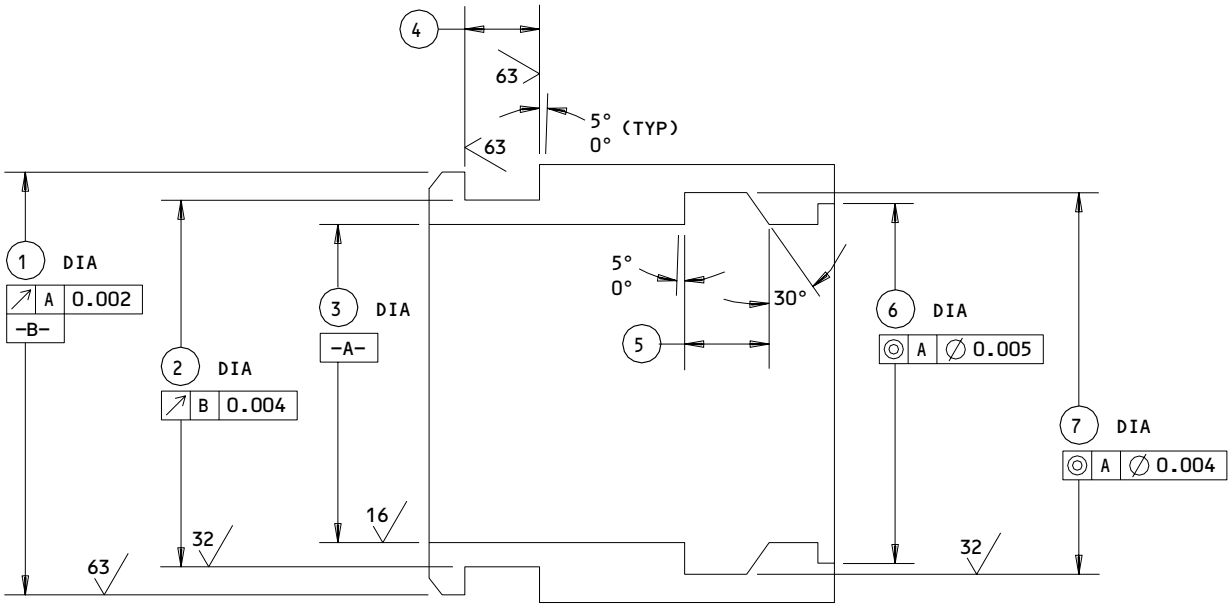
T21971

BUSHING - REPAIR 6-1

275T6229-1

1. Plating Repair (Fig. 601)

A. Repair is only replacement of the original finish. Refer to Refinish instructions, Fig. 601. Refer to REPAIR-GEN for a list of applicable standard practices.



	1	2	3	4	5	6	7
DESIGN DIM	2.240 2.239	1.871 1.869	1.627 1.625	0.434 0.424	0.434 0.424	1.931 1.927	1.997 1.995
REPAIR LIMIT	—	—	—	—	—	—	

REFINISH

CADMIUM PLATE (F-15.06) ALL OVER EXCEPT ON DIA -A-

REPAIR

(SAME AS REFINISH)

125 MACHINE FINISH EXCEPT AS NOTED

MATERIAL: AL-NI-BRZ PER AMS 4640 OR 4880

ALL DIMENSIONS ARE IN INCHES

275T6229-1
Bushing Refinish
Figure 601

T21974

MISCELLANEOUS PARTS REFINISH - REPAIR 7-1

1. Repair of these parts is only replacement of the original finish. Refer to REPAIR-GENERAL for a list of applicable standard practices.

IPL FIG. & ITEM	MATERIAL	FINISH
Fig. 1		
Nut (30)	15-5PH CRES, 180-200 ksi	Passivate (F-17.25, which replaces F-17.09).
Retainer (15)	302 CRES	Passivate (F-17.25, which replaces F-17.09).
Key (35)	4340 Steel, 150-170 ksi	Cadmium plate (F-15.06)
Nut (105)	15-5PH CRES, 180-200 ksi	Cadmium plate (F-15.06), but cadmium plate (F-15.02) on threads.

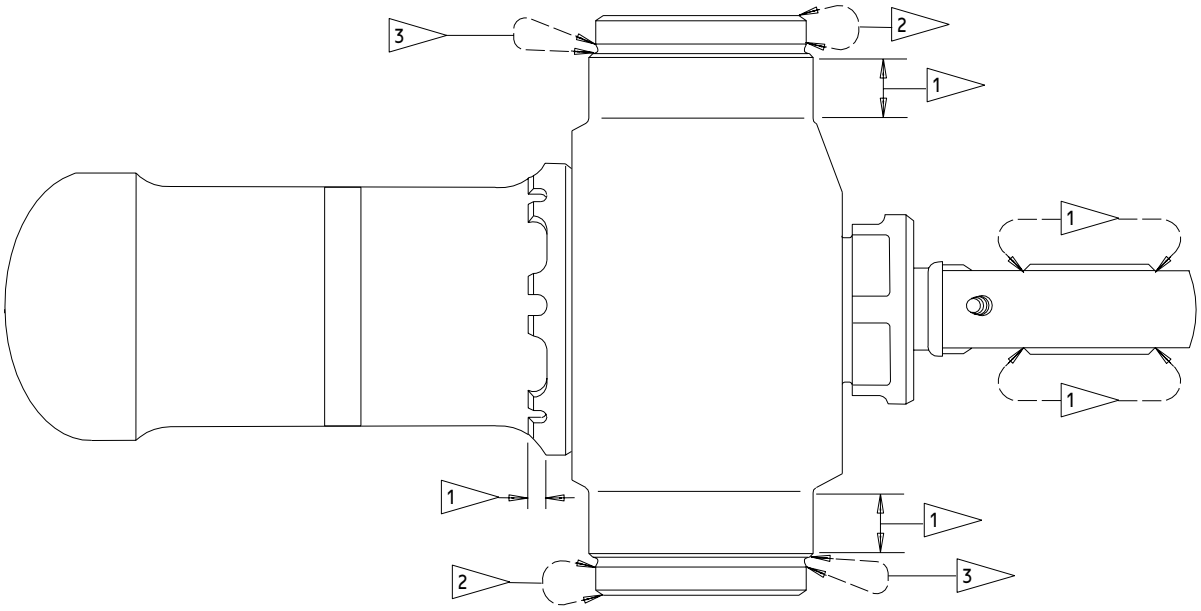
Refinish Details
Figure 601

ACTUATOR ASSEMBLY - REPAIR 8-1

275T6221

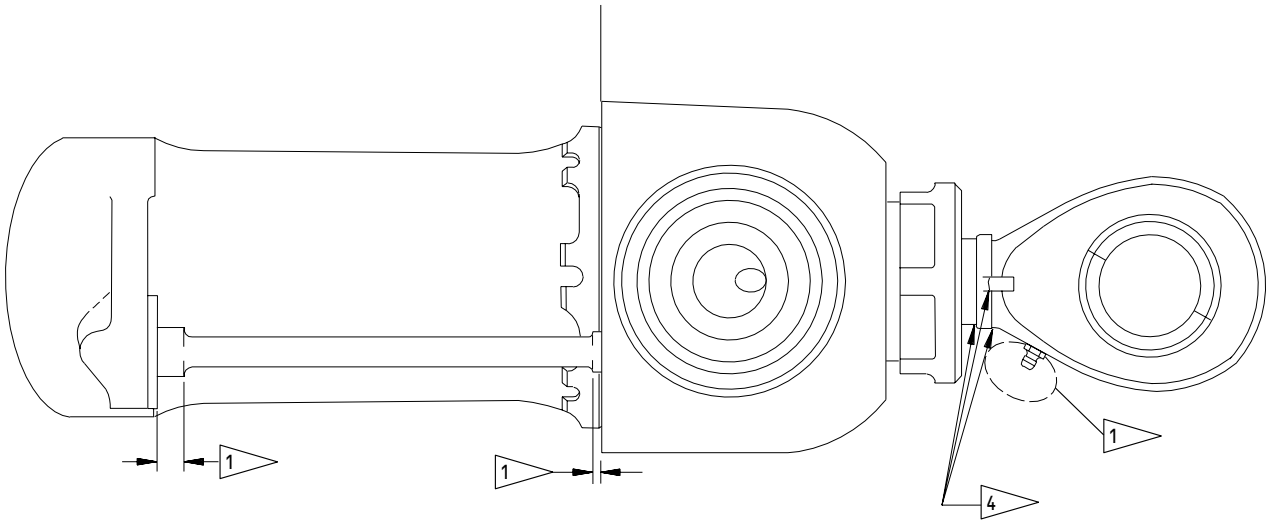
1. Topcoat Repair

A. Repair is only replacement of the original finish. Refer to Refinish instructions, Fig. 601. Refer to REPAIR-GEN for a list of applicable standard practices.



Actuator Refinish
Figure 601 (Sheet 1)

T21975



REFINISH

APPLY BMS 10-11, TYPE 1 PRIMER (F-20.02) AND APPLY BMS 10-60 ENAMEL (F-14.9813, WHICH REPLACES SRF-14.9813) ALL OVER UNLESS SHOWN BY 1 2 3 4

ALL DIMENSIONS ARE IN INCHES

1 NO PRIMER OR ENAMEL

2 WIPE THREADS WITH PRIMER (F-19.45).

3 APPLY BMS 10-11, TYPE 1 PRIMER (F-20.03) ON CHAMFER AND THREAD RELIEF.

4 APPLY BMS 5-26 OR MIL-S-8802 SEALANT AFTER APPLICATION OF PRIMER AND ENAMEL. PAINT THE SEALANT WITH BMS 10-60 ENAMEL.

275T6221

Actuator Refinish
Figure 601 (Sheet 2)

T21976

NAMEPLATE - REPAIR 9-1

BAC27THY1

1. Nameplate Replacement

NOTE: Refer to REPAIR-GEN for a list of applicable standard practices.

A. Steel stamp the serial number and assembly number on the replacement nameplate (5).

B. Bend the nameplate (5) to the curve of cylinder (40).

C. Install nameplate (5) on cylinder (40) with a new strap (10) (SOPM 20-50-21).

ASSEMBLY

1. Materials

NOTE: Equivalent substitutes can be used.

A. Grease -- BMS 3-33 or MIL-G-23827 (SOPM 20-60-03)

B. Lubricant -- BMS 3-11 Hydraulic Fluid (Assembly Lube MCS352 optional) (SOPM 20-60-03)

C. Sealant - BMS 5-26 (SOPM 20-60-04)

D. Lockwire -- MS20995NC32 (SOPM 20-60-04)

2. Equipment

NOTE: Equivalent substitutes can be used.

A. A32040-7 -- Rod end torque adapter

B. A32072-1 -- Test fixture

C. A32050-1 -- Piston torque fixture

D. A32053-1 -- Retaining nut spanner wrench

E. F70312-27 -- Crowfoot wrench

3. Lubrication

A. Apply a thin layer of grease to internal threads of nuts (30, 105), trunnion (140).

B. Apply a thin layer of lubricant to packings (50, 75, 120, 130) before installation.

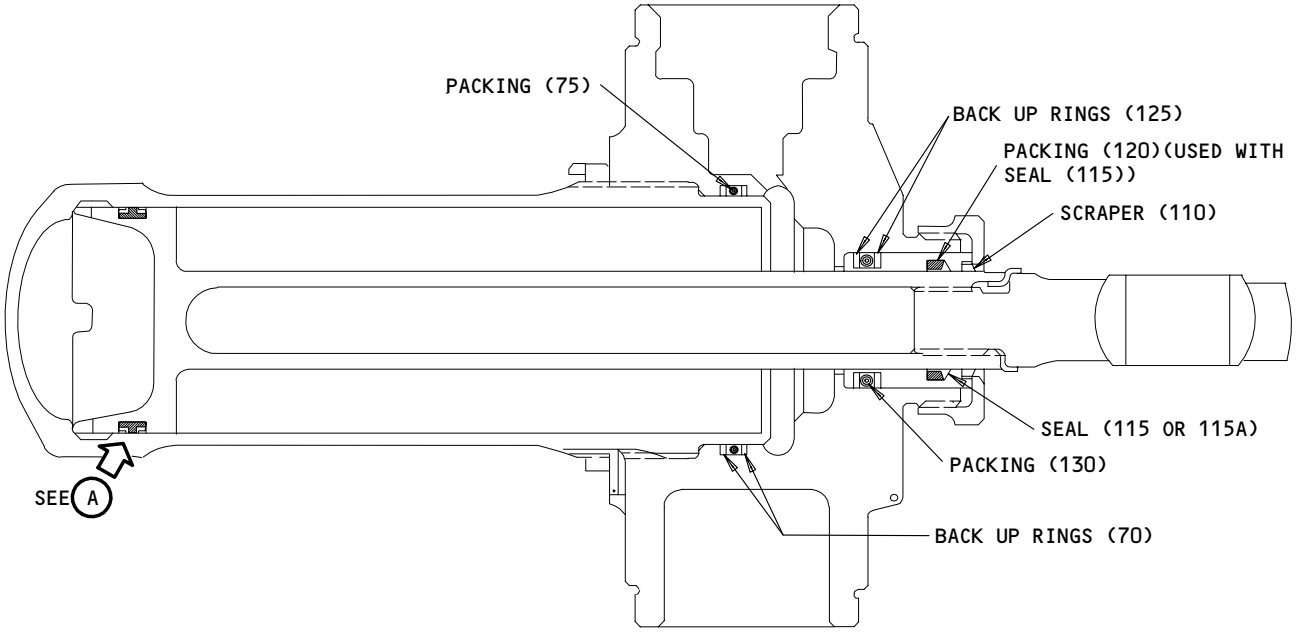
C. Apply a thick layer of grease to the ID of rod end (95) and OD of bearing (80) before installation.

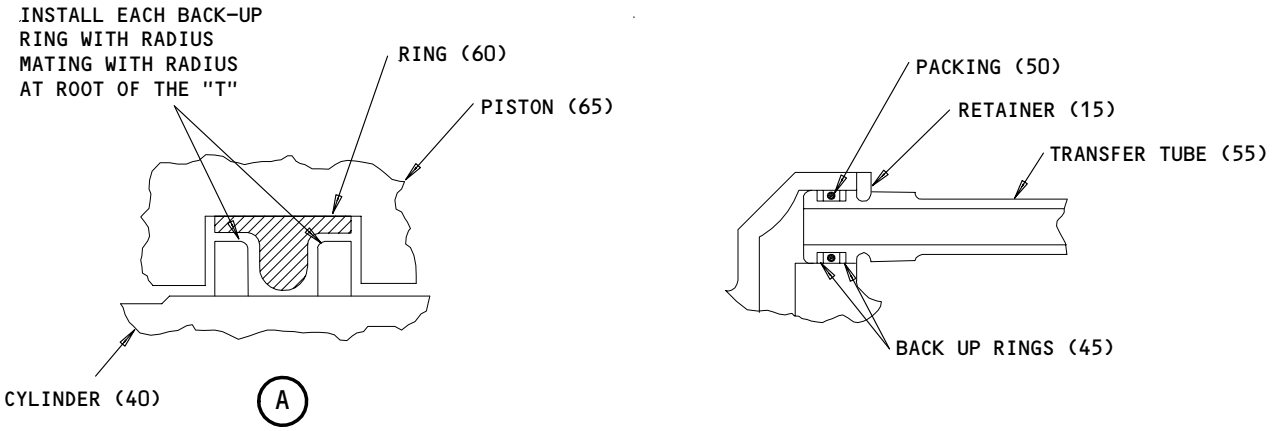
D. Fill piston (65) cavity with grease.

4. Assembly (IPL Fig. 1)

NOTE: For seal positions, refer to Fig. 701.

A. Install packings (120, 130), backup rings (125), seal (115) on bushing (135) and install bushing on trunnion (140).





TYPICAL BOTH ENDS

Seal Installation
Figure 701

B. Put piston rod (65) through trunnion (140). Install scraper (110).

C. Install nut (105) on the trunnion. With wrench F70312-27, tighten the nut to 500-600 lb-in.

D. Assemble rod end (85) on piston rod (65).

(1) Install piston (65) and trunnion (140) on piston torque fixture A32050-1.

(2) Apply a thin layer of grease to the threads and shoulder of rod end (85). Install rod end (85) and lockwasher (100) on piston (65). Tighten rod end to 100 lb-in. with torque adapter A32040-7.

(3) Make an alignment mark across the end of piston rod (65) and lockwasher (100).

(4) Tighten rod end (85) to 2140-2250 lb-in. with torque adapter A32040-7. Monitor the alignment mark to make sure that lockwasher (100) does not turn relative to piston rod (65). Any misalignment indicates that the tang on the lockwasher broke and the lockwasher must be replaced.

(5) Locally break the flange of lockwasher (100) into slot on rod end (85) with a 0.25 inch square punch. Use the slot farthest from the tab on the lockwasher. Make sure the break is complete.

E. Install packings (50, 75), backup rings (45, 70), seal (60) on trunnion (140), piston (65), transfer tube (55).

CAUTION: BEARING (80) HALVES MUST BE INSTALLED WITH THE MATING INDEX MARKS ALIGNED OR THE UNIT WILL NOT OPERATE CORRECTLY.

F. Align index marks on bearing (80) halves, then install bearing (80) on rod end (85) with grease.

G. Attach test fixture A32072-1 to cylinder (40) and turn nut (30) onto cylinder (40) with spanner wrench A32053-1. Put the nut approximately 3 inches from the end of the barrel. Push transfer tube (55) into trunnion (140) until it comes to the bottom. Turn the trunnion onto the cylinder until it comes to the bottom. Back off as required (360 degree maximum) to install key (35) and to put transfer tube (55) into cylinder. Do not tighten nut (30) at this time. Nut (30) will be tightened to final torque during the test.

H. Refer to REPAIR 8-1 for actuator refinish and sealant application.

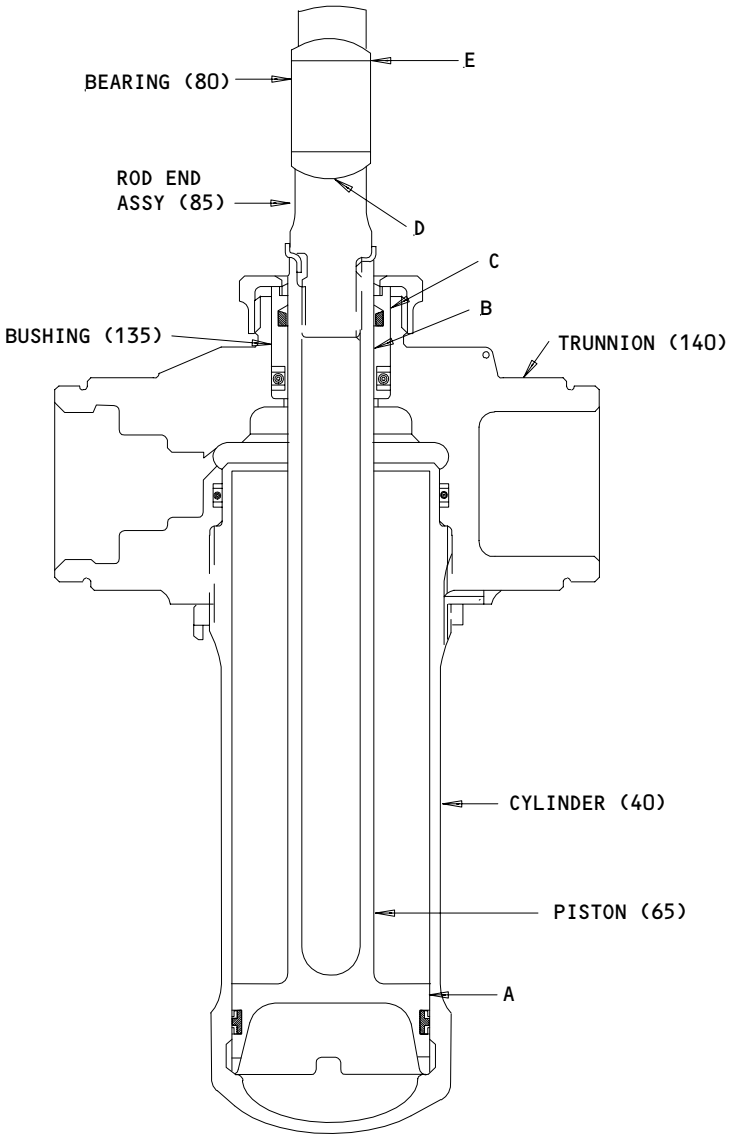
I. Do the test (Ref TESTING/TROUBLE SHOOTING).

J. After the test, lockwire key (35) and nut (30) by the double-twist method (SOPM 20-50-02).

K. Apply a fillet of BMS 5-26 sealant to the splitlines between nut (30), key (35) and barrel (40).

L. Completely fill the unit with BMS 3-11 hydraulic fluid, then remove approximately 5 cubic inches of fluid. Seal the ports with hydraulic fluid resistant caps or plugs.

5. Give protection to the unit and put it away by standard industry practices and the instructions in SOPM 20-44-02.



Fits and Clearances
Figure 801 (Sheet 1)

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 40 OD 65	3.993 3.988	3.995 3.990	0.003	0.007			
B	ID 135 OD 65	1.625 1.621	1.627 1.623	0.002	0.006			
C	ID 140 OD 135	2.243 2.239	2.245 2.240	0.003	0.006			
D	ID 95 *[1] OD 80 *[1]	2.6920 2.6885	2.6935 2.6890	0.0030	0.0050			
E	ID 80	1.7495	1.7500					

*[1] SPHERICAL DIAMETER

ALL DIMENSIONS ARE IN INCHES

Fits and Clearances
Figure 801 (Sheet 2)

FOR TORQUE VALUES OF STANDARD FASTENERS, REFER TO 20-50-01			
ITEM NO. IPL FIG. 1	NAME	TORQUE	
		POUND-INCHES	POUND-FEET
105	NUT	500 - 600	
85	ROD END	2140 - 2250	
30	NUT	280 - 350 *[1]	
20	SCREW	65 - 90	

*[1] TIGHTEN WITH PISTON FULLY EXTENDED AND 3000 PSI PRESSURE APPLIED AT EXTEND PORT.

Torque Table
Figure 802

SPECIAL TOOLS, FIXTURES AND EQUIPMENT

NOTE: Equivalent substitutes may be used for listed items.

A. A32040-7 -- Rod end torque adapter

B. A32050-1 -- Piston torque fixture

C. A32052-1 -- Hydraulic test fitting

D. A32053-1 -- Retaining nut spanner wrench

E. A32072-1 -- Test fixture

F. F70312-27 -- Crowfoot wrench

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

02107 SPARTA MANUFACTURING COMPANY
PO BOX 449 5200 NORTH WOOSTER ROAD
DOVER, OHIO 44622

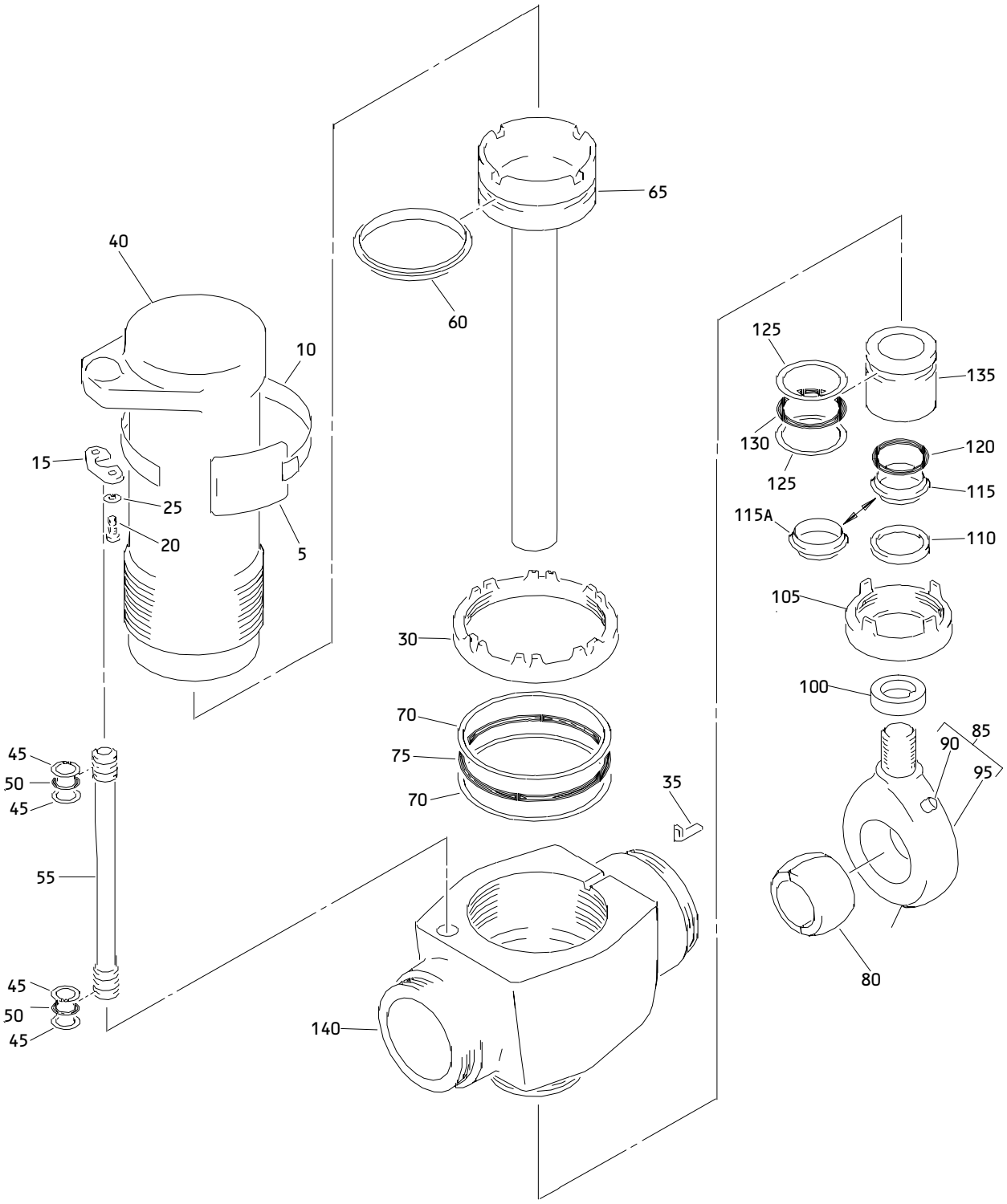
26303 OHIO AIRCRAFT SUPPLIES INC
717 HINDRY AVENUE
INGLEWOOD, CALIFORNIA 90301

26879 CORONADO PLASTICS INCORPORATED
11069 PENROSE AVENUE
SUN VALLEY, CALIFORNIA 91352

72902 GREENE TWEED AND CO INC
320 ELM AVENUE
NORTH WALES, PENNSYLVANIA 19454

94878 RAYBESTOS-MANHATTAN INC PACIFIC COAST DIV
1400 E. ORANGETHROPE
FULLERTON, CALIFORNIA 92631

97820 SHAMBAN W S AND CO
711 MITCHELL ROAD
NEWBURY PARK, CALIFORNIA 91320



Nose Gear Steering Actuator Assembly
Figure 1

T21978

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
-1	275T6221-1		ACTUATOR ASSY-NOSE GEAR STEERING	A	RF
-1A	275T6221-2		ACTUATOR ASSY-NOSE GEAR STEERING	B	RF
-1B	275T6221-3		ACTUATOR ASSY-NOSE GEAR STEERING	C	RF
5	BAC27THY1		.NAMEPLATE		1
10	69B80300-2		.STRAP		1
15	275T6230-1		.RETAINER- ATTACHING PARTS		1
20	NAS1351C4LB6		.SCREW		2
25	AN960XC416		.WASHER -------*-------		2
30	275T6225-1		.NUT		1
35	69B80038-1		.KEY		1
40	275T6222-1		.CYLINDER		1
45	MS28782-11		.RING-BACKUP		4
50	NAS1611-113		.PACKING		2
55	275T6226-1		.TUBE-TRANSFER		1
60	7342MT952T		.RING-GT (V72902)		1
65	275T6224-1		.PISTON- (OPT ITEM 65A)	A	1
-65A	275T6224-3		.PISTON- (OPT ITEM 65)	A	1
-65B	275T6224-4		.PISTON- (OPT ITEM 65C)	B	1
-65C	275T6224-5		.PISTON- (OPT ITEM 65B)	B	1
-65D	275T6224-6		.PISTON (OPT ITEM 65E)	C	1
-65E	275T6224-7		.PISTON (OPT ITEM 65D)	C	1
70	MS28782-50		.RING-BACKUP		2
75	NAS1611-347		.PACKING		1
80	270T0002-28		.BEARING		1
85	275T6227-1		.ROD END ASSY- (OPT ITEM 85A)	A	1

FIG. & ITEM	PART NO.	AIRLINE PART NUMBER	NOMENCLATURE 1234567	EFF CODE	QTY PER ASSY
01-					
85A	275T6227-4		.ROD END ASSY- (OPT ITEM 85)	A	1
-85B	275T6227-7		.ROD END ASSY	BC	1
90	MS15004-1		..FITTING-LUBE		1
95	275T6227-2		..ROD END- (USED ON ITEM 85)	A	1
-95A	275T6227-5		..ROD END- (USED ON ITEM 85A)	A	1
-95B	275T6227-8		..ROD END (USED ON ITEM 85B)	BC	1
100	66-12156-6		.LOCKWASHER-CUP		1
105	275T6228-1		.NUT-SEAL		1
110	BACS34A18A		.SCRAPER-		1
115	CSF11-326B		.SEAL- (V26879) (SPEC BACS11AA326A) (OPT FS100-326A (V02107)) (OPT RMS11-326A (V94878)) (OPT S12095-326-1 (V97820)) (OPT 2053-326A (V26303)) (USED WITH ITEM 120) (OPT TO ITEM 115A)		1
115A	S33555-326H99		.HATSEAL- (V97820) (OPT ITEM 115,120)		1
120	NAS1611-326		.PACKING- (USED WITH ITEM 115) (OPT TO ITEM 115A)		1
125	MS28782-31		.RING-BACKUP		2
130	NAS1611-328		.PACKING		1
135	275T6229-1		.BUSHING		1
140	275T6223-1		.TRUNNION- (PREF) (OPT ITEM 140A)		1
-140A	275T6223-4		.TRUNNION- (OPT ITEM 140)		1