COMPONENT MAINTENANCE MANUAL WITH ILLUSTRATED PARTS LIST

(CFM56) STRUT DRUM CONTROL BOX ASSEMBLY

PART NUMBER 315A1016–1, –2, –3, –4

PUBLISHED BY BOEING COMMERCIAL AIRPLANES GROUP, SEATTLE, WASHINGTON, USA
A DIVISION OF THE BOEING COMPANY
PAGE DATE: Jul 01/2009

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COMPONENT MAINTENANCE MANUAL

Revision No. 19
Jul 01/2009

To: All holders of (CFM56) STRUT DRUM CONTROL BOX ASSEMBLY 76-11-14.

Attached is the current revision to this COMPONENT MAINTENANCE MANUAL

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Location of Change	Description of Change
	NO HIGHLIGHTS

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COMPONENT MAINTENANCE MANUAL

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

Subject/Page	Date	Subject/Page	Date	Subject/Page	Date
76-11-14 ILLUSTRATED PARTS LIST (cont)					
1012	Mar 01/2006				
1013	Mar 01/2006				
1014	Mar 01/2006				
1015	Mar 01/2006				
1016	Mar 01/2006				
1017	Mar 01/2006				
1018	Mar 01/2006				
1019	Mar 01/2006				
1020	BLANK				

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TEMPORARY REVISION AND SERVICE BULLETIN RECORD

BOEING SERVICE BULLETIN	BOEING TEMPORARY REVISION	OTHER DIRECTIVE	DATE OF INCORPORATION INTO MANUAL
		PRR 33359	DEC 05/83
		PRR 33417	DEC 05/83
		PRR 33850	DEC 05/85

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		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	
Date	Initials	Number	Date	Date	Initials

Temporary Revision		Inserted		Removed	
Number	Date	Date	Initials	Date	Initials

Temporary Revision		Inserted		Removed	
Date	Initials	Number	Date	Date	Initials

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.

STRUT DRUM CONTROL BOX ASSEMBLY - DESCRIPTION AND OPERATION

1. Description

A. The strut drum control box assembly is made up of the specific mechanical parts that follow:

(1) Two gear racks

(2) A throttle gear shaft

(3) Two feedback cam assemblies

(4) A feedback shaft

(5) Cable quadrant

B. The control box assembly limits the throttle movement during the thrust reverser deploy and stow cycle.

2. Operation

A. Rotation of the cable quadrant will rotate the throttle gear shaft located inside the assembly housing.

B. The throttle gear shaft will, in turn, move the rack along with the fuel control push/pull cable.

C. Feedback cables from the thrust reverser cause the two gear racks and the two feedback cam assemblies to rotate their position.

D. The cam surfaces on the cam assemblies touch the rollers on the throttle gear shaft, which in turn limits the movement of the throttle during the deploy and stow cycles.

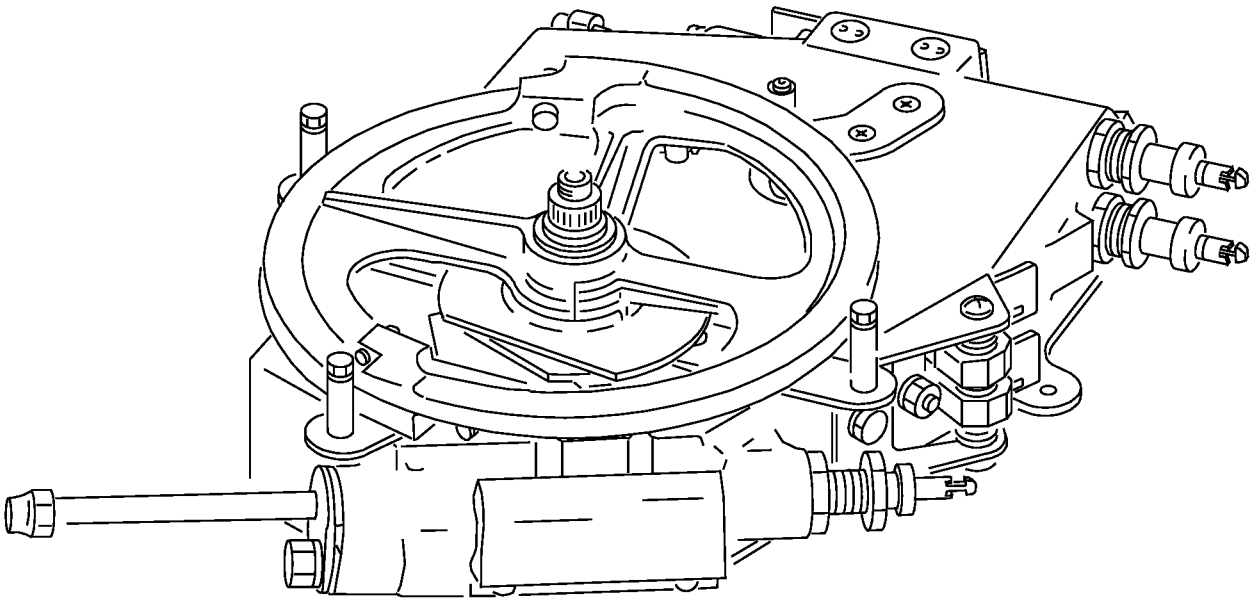
E. In the event of an accidental or an unwanted command of stow or deploy of the thrust reverser, the control box assembly will change the throttle to the idle position.

3. Leading Particulars (Approximate)

A. Length – 14 inches

B. Width – 11 inches

C. Height – 3 inches



315A1016-1 Thru -4 Strut Drum Control Box Assembly
Figure 1

(NOT APPLICABLE)

DISASSEMBLY

1. **General**

   A. This procedure contains the data necessary to disassemble the strut drum control box 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. **Parts Replacement**

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

   A. Shim (260)

   B. Lockwire

3. **Disassembly**

   A. Remove nut (5) and washer (10) and lift quadrant assemblies (15, 15A) or quadrant (15B, 15C) off of splined shaft.

      NOTE: Do not remove seal (20) or inserts (25) from quadrant (30, 30A) unless repair or replacement is necessary.

   B. Remove bolts (40, 65, 90, 115) and cable guard assemblies (35, 60, 85, 110) from control box (1).

      NOTE: Do not remove spacer (80) from fittings (70) unless repair or replacement is necessary.

      On 315A1016-3, -4 assemblies only: do not remove rivets (600), washers (605), spacers (610), or seals (590, 595) unless replacement is necessary.

   C. Remove spacers (55, 80, 105) from cable guard assemblies (35, 60, 85) by removing bolts (47, 97, 122), washers (49, 100, 125) and nuts (103, 128).

   D. Remove bolts (140), nut (145), and washers (150) and pull preload assembly (135) out of housing (510).

   E. Remove nut (160) and washer (165) and pull out screw (155).

   F. Remove spacer (175), spring (170) and lever assemblies (180, 195) from support (215).

      NOTE: Do not remove bushings (190, 205) from levers (185, 200) unless repair or replacement is required.

   G. Remove nut (160) and washer (165) and separate bumper (210) from lever assys (180, 195).

   H. Remove nut (220) and washer (225) from feedback shaft (325).

   I. Remove bolts (235, 240) and washers (245) and lift cover assembly (230) off of housing (505). Remove bearing (260) from cover (255).

      NOTE: Do not remove bushing (250) from cover (255) unless repair or replacement is necessary.

   J. Remove washer (265), shim (270), and thrust washer (275).

      NOTE: Measure and record thickness of shim (270) to facilitate reassembly.

K. Remove feedback cam assembly (280) from feedback shaft (325).

NOTE: Do not remove bushings (290, 295) from cam (285) unless repair or replacement is necessary.

L. Remove throttle gear shaft (300) from housing (510).

M. Remove feedback cam assembly (305) from feedback shaft (325).

NOTE: Do not remove bushings (315) from cam (310) unless repair or replacement is necessary.

N. Remove spacer (320) and feedback shaft (325) from housing (510).

O. Remove bolts (335) and retainer assembly (330) or retainer (330A) from housing (510).

NOTE: On assemblies 315A1016-1, -2 only: do not remove seal (345) from retainer (340) unless repair or replacement is necessary.

P. Remove bearing (350) from housing (510).

NOTE: Do not remove bearing housing (465) or bushing (515) from housing (510) unless repair or replacement is necessary.

Q. Remove cover (355) by removing screws (360, 365) and bushing (370).

R. Remove cover (375) by removing screws (380).

S. Remove nuts (395) and remove eccentric screws (385) and rollers (390).

T. Pull out racks (400A, 400B, 405).

U. Loosen retainers (420, 425) by removing screws (410) and washers (415).

V. Remove rack housings (435, 440), retainers (420, 425), and washers (430).

W. Remove cap nuts (445) from rack housings (435, 440).

NOTE: Cap nut (445) is used with rack housings 315A1032-1 and 315A1032-2 only.

X. Loosen jamnuts (450) and remove sleeves (455, 460).

Y. Remove bearings (495B) from throttle gear shaft (300) by removing nut (490), washer (500), and bolt (505).

CLEANING

1. General

A. This procedure has the data necessary to clean the strut drum control box 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 20-30-03	GENERAL CLEANING PROCEDURES

B. Procedure

(1) Use standard industry practices to clean all parts, and also refer to SOPM 20-30-03 for specific cleaning procedures.

NOTE: Do not solvent clean bearings (260, 350, 390, 495B).

(2) Clean all of the carbon graphite bearings (390) by dusting the surfaces with a clean, dry cloth.

NOTE: Do not solvent clean graphite bearings (390).

(3) Clean bearings (260, 350, 495) as given in the manufacturer's instructions.

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 the 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

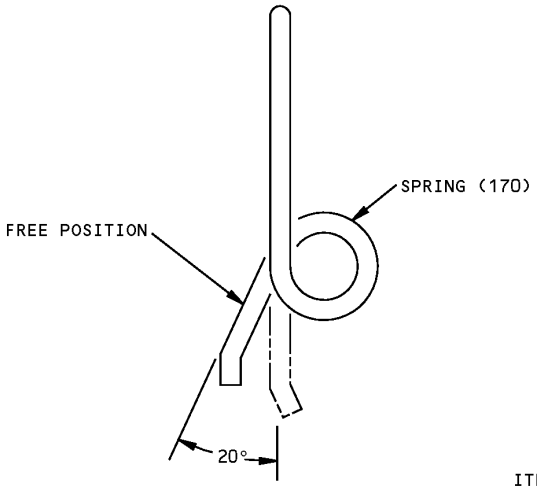
   (1) Do a visual inspection of all of the parts for defects in accordance with standard industry practices.

   NOTE: Refer to FITS AND CLEARANCES for design dimensions and wear limits.

   (2) Do a magnetic particle inspection as given in SOPM 20-20-01 – Shaft (300, 325), spacer (320), rack (400A, 400B, 405), rack housing (435, 440), rack housing assembly (435A, 440A), sleeve (460).

   (3) Do a dye penetrant inspection as given in SOPM 20-20-02 – Support (215), sleeve (455), housing (570).

   (4) Check spring (170) as shown in CHECK, Figure 501.



ITEM NUMBERS REFER TO IPL FIG. 1

DEFLECTION	TORQUE
20°	8–12 LB-IN

Spring Check
Figure 501

REPAIR

1. Contents

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

Table 601:

P/N	NAME	REPAIR
315A1020	HOUSING	1-1, 1-2
315A1021	COVER	2-1, 2-2
315A1022	QUADRANT	3-1
315A1025	LEVER	4-1
315A1030	CAM	5-1, 5-2
315A1061	RETAINER	6-1
315A1086	GUARD	7-1
- - - -	MISC PARTS REFINISH	8-1
315A1032	RACK HOUSING	9-1
315A1063	CAM SHAFT	10-1

2. Standard Practices

A. Refer to the following standard practices as applicable for details of procedures in REPAIRS 1-1 thru 8-1

- SOPM 20-10-04 Grinding of Chrome Plated Parts
- SOPM 20-30-02 Stripping of Protective Finishes
- SOPM 20-41-01 Decoding Table for Boeing Finish Codes
- SOPM 20-41-02 Application of Chemical and Solvent Resistant Finishes
- SOPM 20-42-03 Hard Chrome Plating
- SOPM 20-42-05 Bright Cadmium Plating
- SOPM 20-50-03 Bearing Installation and Retention
- SOPM 20-50-08 Application of Dry Lubricant

3. Materials

NOTE: If necessary, you can use an equivalent substitute.

A. sealant, A00160 – BMS 5-63 (SOPM 20-60-04)

B. Solid Film Lubricant – MIL-L-8937, Type 6 (SOPM 20-60-03)

C. primer, C00259 – BMS 10-11 Type 1 (SOPM 20-60-02)

D. Dry Film Lubricant – Sermetel 20 (SOPM 20-60-03)

E. adhesive, A00027 – Type 60 (SOPM 20-50-12)

F. grease, D00015 – BMS 3-24 (SOPM 20-60-03)

—	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 601

HOUSING ASSEMBLY - REPAIR 1-1

315A1020–1

1. General

A. This procedure has the data necessary to repair the strut drum control box housing assembly.

B. Refer to REPAIR-GENERAL for a list of Standard Practices.

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

D. Refer to the REPAIR-GENERAL, Figure 601 for the Standard True Position Dimensioning Symbols shown in the repair.

E. Refer to IPL Figure 1 for item numbers.

2. Bushing Replacement

NOTE: For repair of surfaces which may only specify restoration of initial finish, refer to Refinish instructions, (REPAIR 1-2, Figure 601).

A. Remove bushings (465, 515). Bushing (465) is not part of the housing assembly; but is included here for ease of repair.

B. Measure the hole diameter for bushing (515).

(1) If the diameter is larger than the design diameter as shown in REPAIR 1-2, Figure 601 for REPAIR 1-2, install an oversize bushing.

(2) Refer to REPAIR 1-2 for the bushing installation.

C. If the bushing hole diameter is within the design diameter limits, install bushing (515) with wet sealant, A00160.

NOTE: Refer to SOPM 20-50-03 for the installation and seal the flange with sealant, A00160.

D. Assemble the housing assembly (510) and the cover assembly (230) by installing bolts (235, 240) and washers (245).

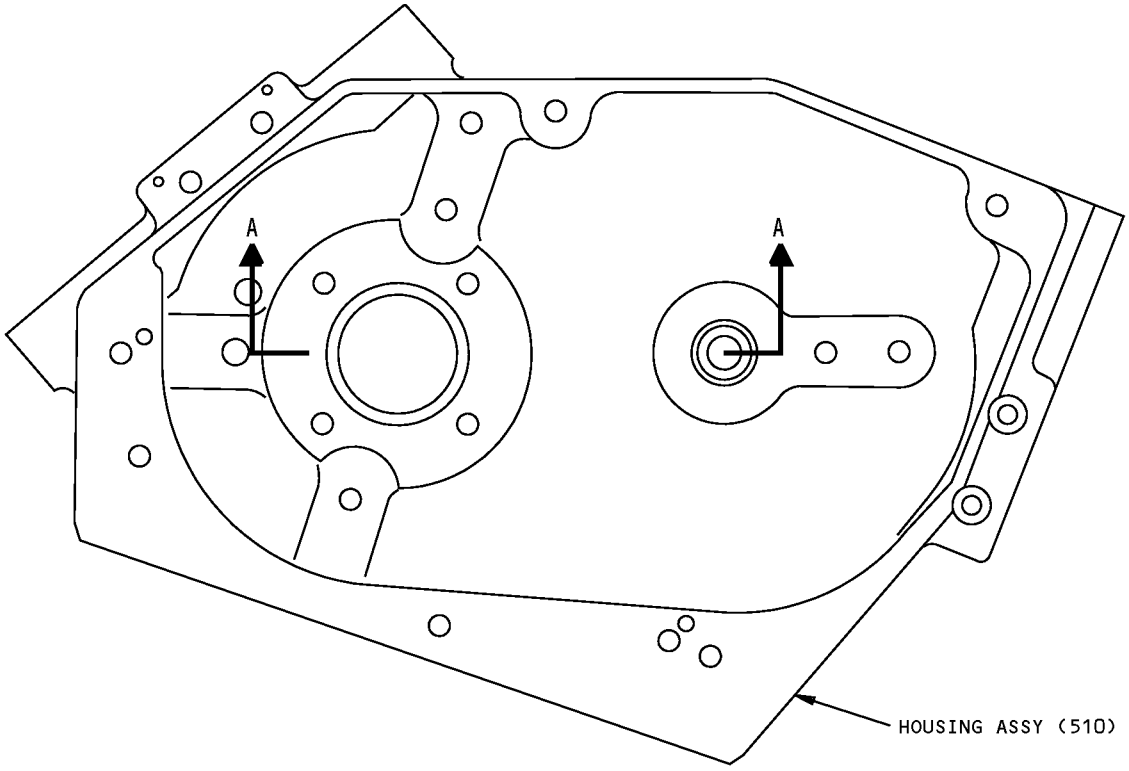
(1) Install bolts (235), at three places on the cover assembly (230) identified with an X.

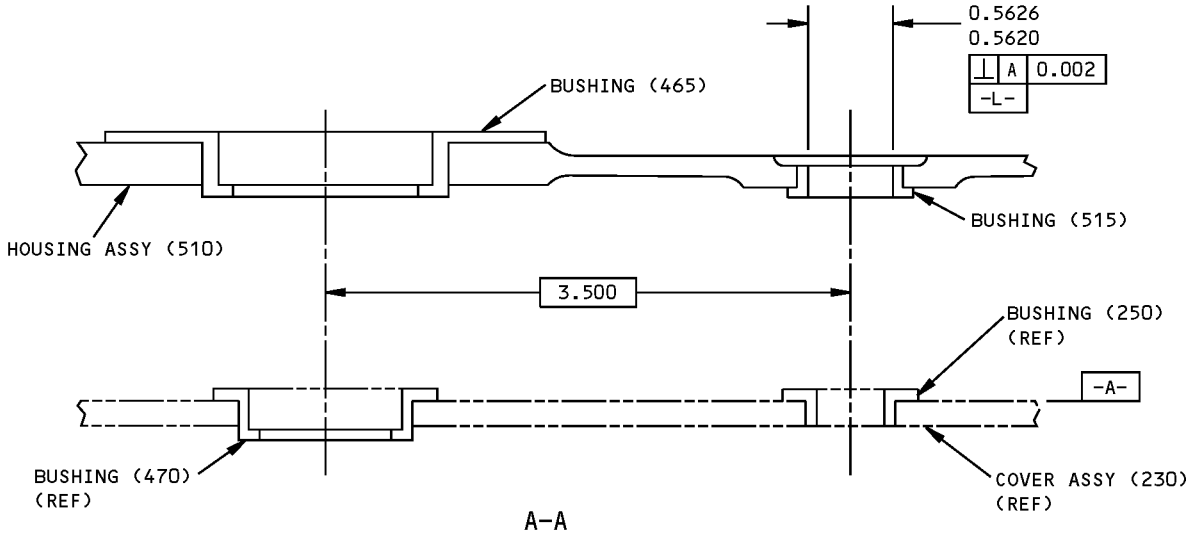
(2) Then machine the inside diameter and chamfer the bushing (515) to the dimensions shown in REPAIR 1-1, Figure 601.

E. Replace bushing (465).

NOTE: Refer to SOPM 20-50-03 for the bushing installation.

F. Disassemble the housing assembly (510) and the cover assembly (230) by removing bolts (235, 240) and washers (245).





ALL DIMENSIONS ARE IN INCHES

ITEM NUMBERS REFER TO IPL FIG. 1

315A1020-1 Housing Assembly Bushing Replacement
Figure 601

HOUSING - REPAIR 1-2

315A1020–2

1. General

A. This procedure has the data necessary to repair the strut drum control box housing.

B. Refer to REPAIR-GENERAL for a list of Standard Practices.

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

D. Refer to the REPAIR-GENERAL, Figure 601 for the Standard True Position Dimensioning Symbols shown in the repair.

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

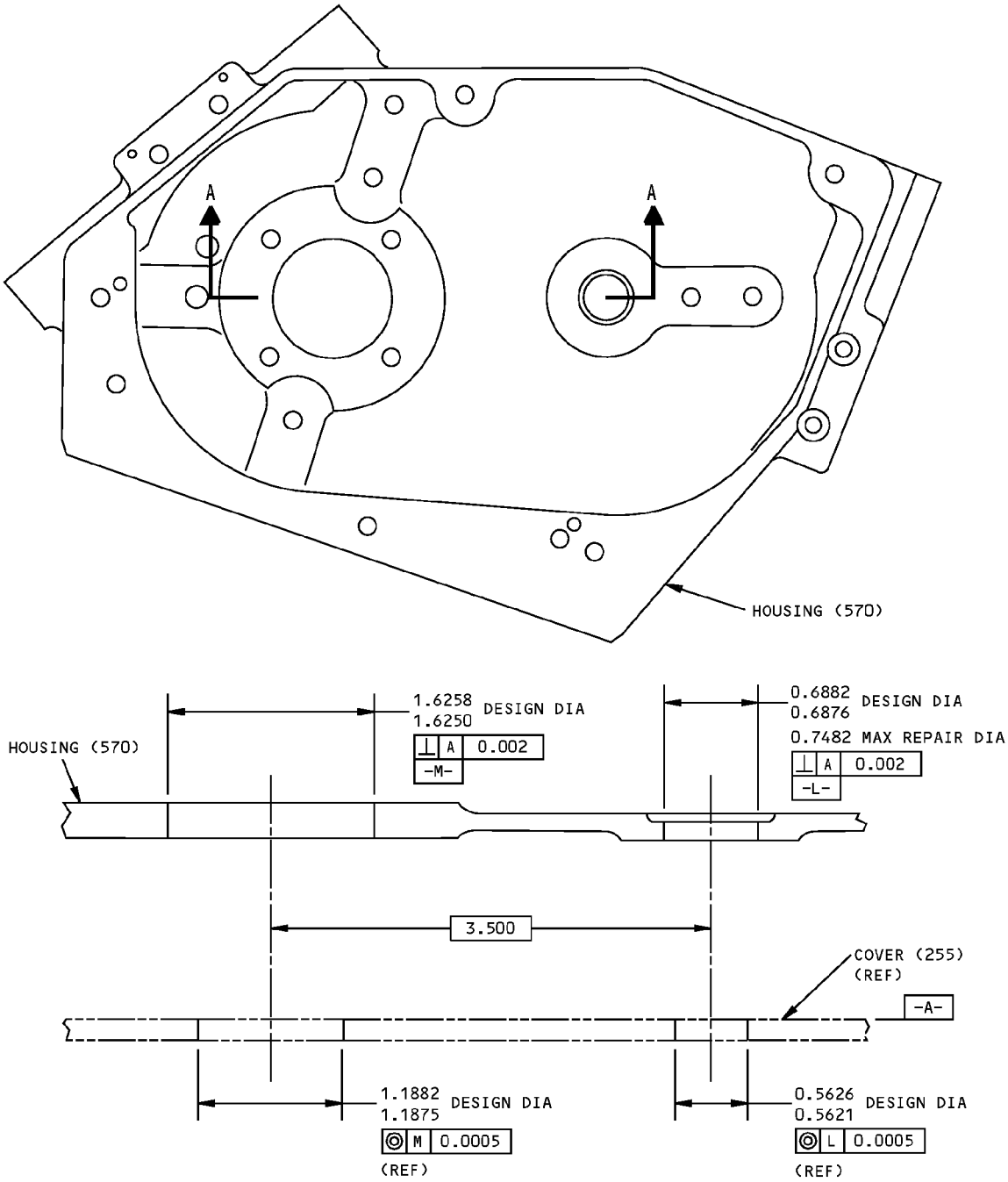
2. Installation of Oversize Bushing (REPAIR 1-2, Figure 601)

NOTE: For repair of surfaces which may only specify restoration of initial finish, refer to Refinish instructions, REPAIR 1-2, Figure 601.

A. Machine as necessry to the specified repair limits shown in REPAIR 1-2, Figure 601 to remove any defects.

B. Manufacture bushing (515) as shown in REPAIR 1-2, Figure 602.

C. Install the bushing as specified in REPAIR 1-1.



A-A

REFINISH:

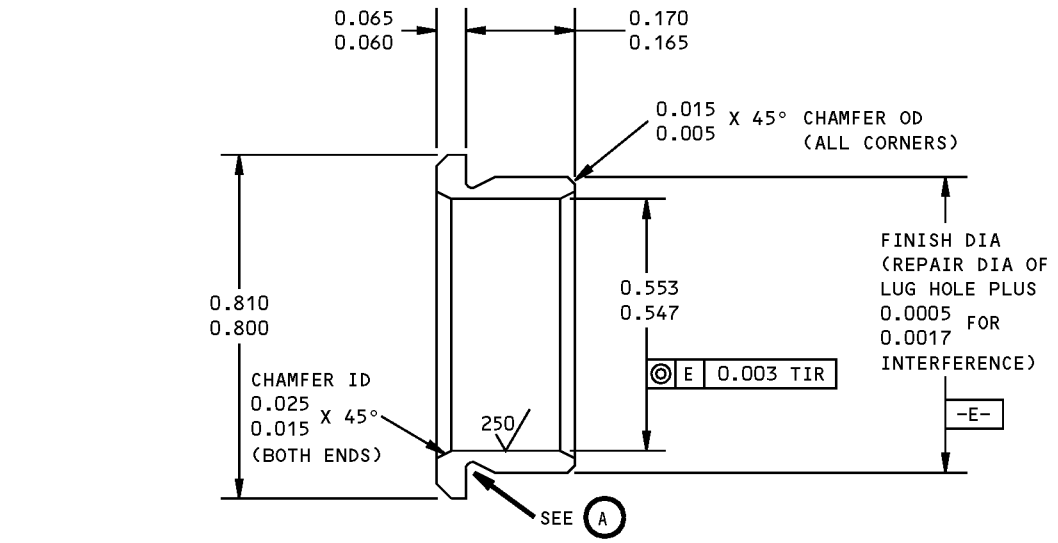
HOUSING (570) -- CHROMIC ACID ANODIZE (F-17.04) AND APPLY TWO COATS PRIMER BMS 10-11, TYPE 1 (F-20.03) ALL OVER EXCEPT NO PRIMER IN HOLES FOR BUSHINGS

MATERIAL: AL ALLOY

ALL DIMENSIONS ARE IN INCHES

ITEM NUMBERS REFER TO IPL FIG. 1

315A1020-2 Housing Repair
Figure 601



OPTIONAL UNDERCUTS

A

63 MACHINED SURFACES EXCEPT AS NOTED

ALL DIMENSIONS ARE IN INCHES

BREAK SHARP EDGES

CADMIUM PLATE (F-15.06) ALL OVER - OPT IN BORE

MATERIAL: AL-NI-BRZ PER AMS 4640

Oversize Bushing Details
Figure 602

COVER ASSEMBLY - REPAIR 2-1

315A1021–3

1. General

A. This procedure has the data necessary to repair the strut drum control box cover assembly.

B. Refer to REPAIR-GENERAL for a list of Standard Practices.

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

D. Refer to the REPAIR-GENERAL, Figure 601 for the Standard True Position Dimensioning Symbols shown in the repair.

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

2. Bushing Replacement (REPAIR 2-1, Figure 601)

NOTE: For repair of surfaces which may only specify restoration of initial finish, refer to Refinish instructions, REPAIR 2-1, Figure 601.

A. Remove bushings (250, 470).

NOTE: Bushing (470) is not part of the cover assembly, but is included here for ease of repair.

B. Measure the hole diameter for bushing (250, 470).

(1) If the diameter is larger than the design diameter as shown in REPAIR 2-1, Figure 601 for REPAIR 2-2, install an oversize bushing.

(2) Refer to REPAIR 2-2 for the bushing installation.

C. If the bushing hole diameter is within the design diameter limits, install bushings (250, 470) with wet sealant, A00160.

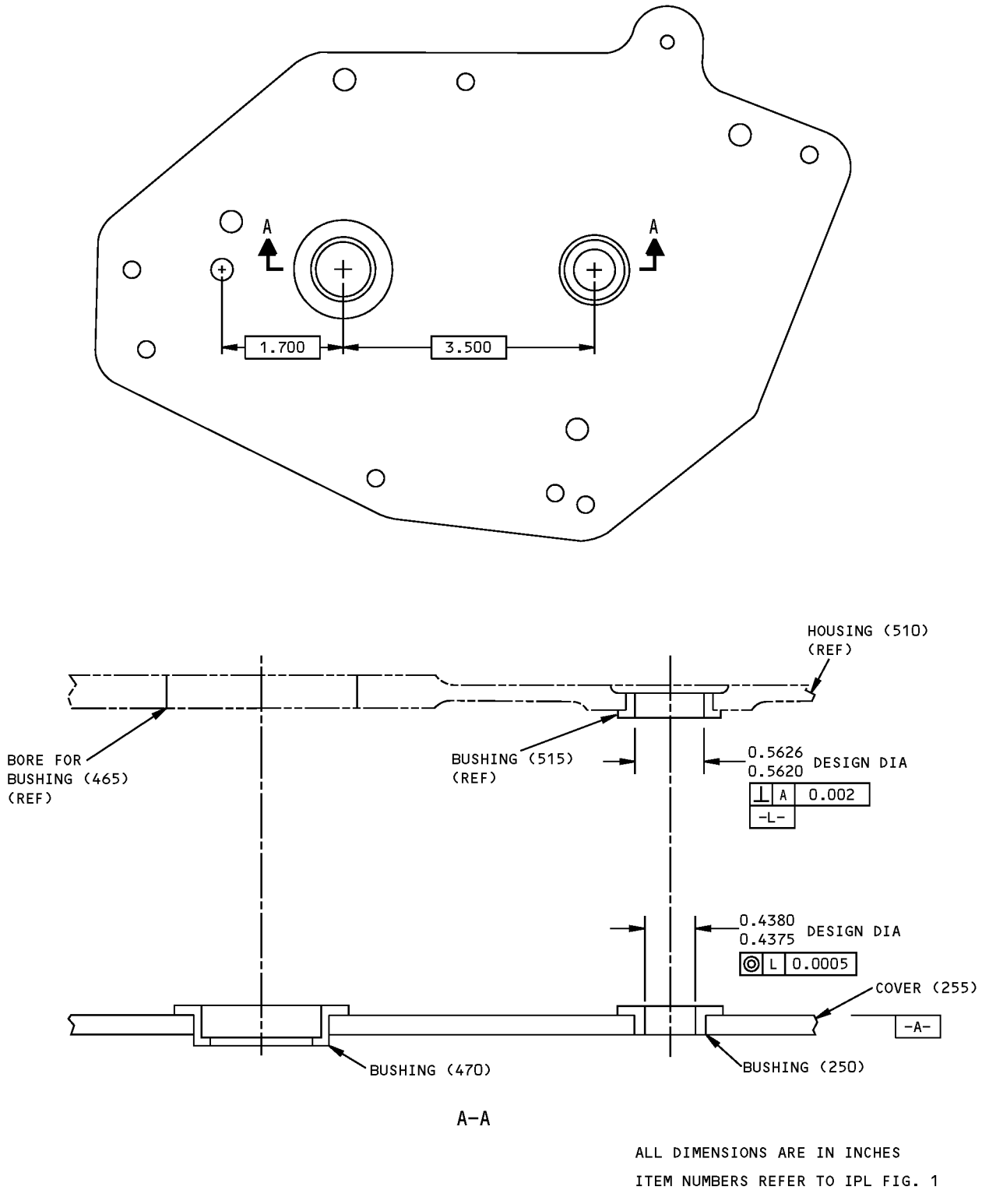
NOTE: Refer to SOPM 20-50-03 for the installation and seal the flange with sealant, A00160.

D. Assemble the housing assembly (510) and the cover assembly (230) by installing bolts (235, 240) and washers (245).

(1) Install bolts (235) at three places on the cover assembly (230) identified with an X.

(2) Then machine the inside diameter and chamfer the bushings (250, 470) to the dimensions shown in REPAIR 2-1, Figure 601.

E. Disassemble the housing assembly (510) and the cover assembly (230) by removing bolts (235, 240) and washers (245).



315A1021-3 Cover Assembly Bushing Replacement
Figure 601

HOUSING - REPAIR 2-2

315A1021–4

1. General

A. This procedure has the data necessary to repair the strut drum control box housing.

B. Refer to REPAIR-GENERAL for a list of Standard Practices.

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

D. Refer to the REPAIR-GENERAL, Figure 601 for the Standard True Position Dimensioning Symbols shown in the repair.

E. Refer to IPL Figure 1 for item numbers.

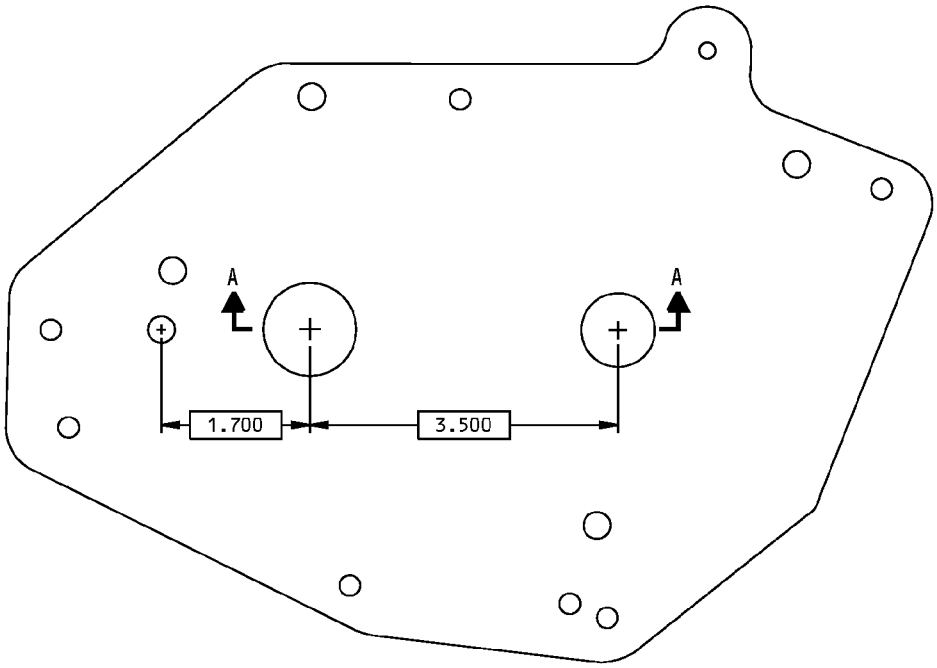
2. Installation of Oversize Bushings (REPAIR 2-2, Figure 601)

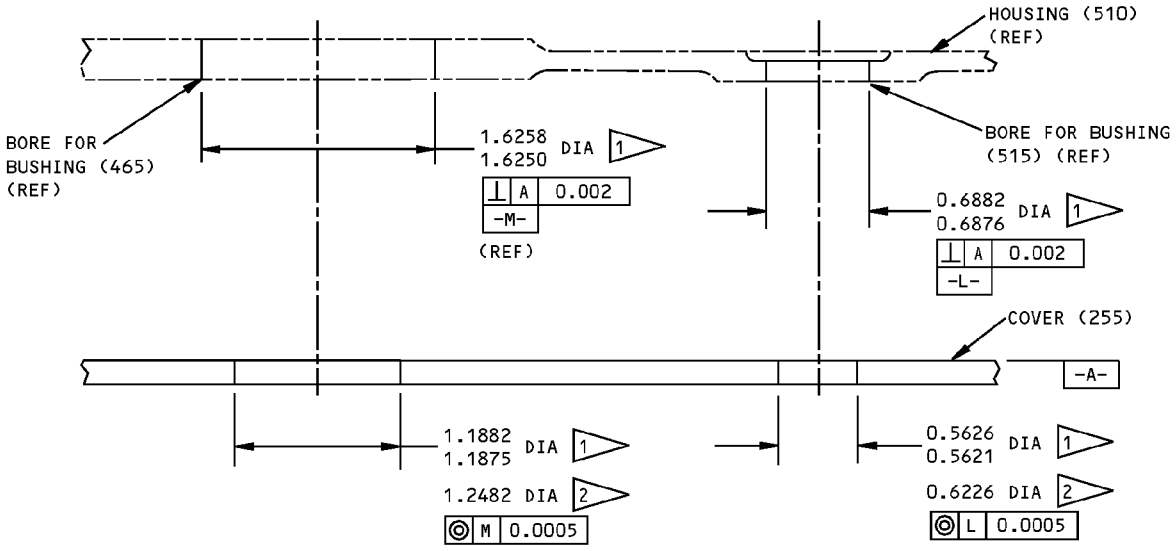
NOTE: For repair of surfaces which may only specify restoration of initial finish, refer to Refinish instructions, REPAIR 2-2, Figure 601.

A. Machine as necessary to the repair limits shown in REPAIR 2-2, Figure 601 to remove any defects.

B. Manufacture bushing (250) as shown in REPAIR 2-2, Figure 602 and bushing (470) as shown in REPAIR 2-2, Figure 603.

C. Install the bushings as shown in REPAIR 2-1.





A-A

REFINISH

COVER (255) -- CHEMICALLY TREAT AND APPLY
ONE COAT PRIMER, BMS 10-11, TYPE 1 (F-18.06)

1 DESIGN DIMENSION

2 MAXIMUM REPAIR LIMIT

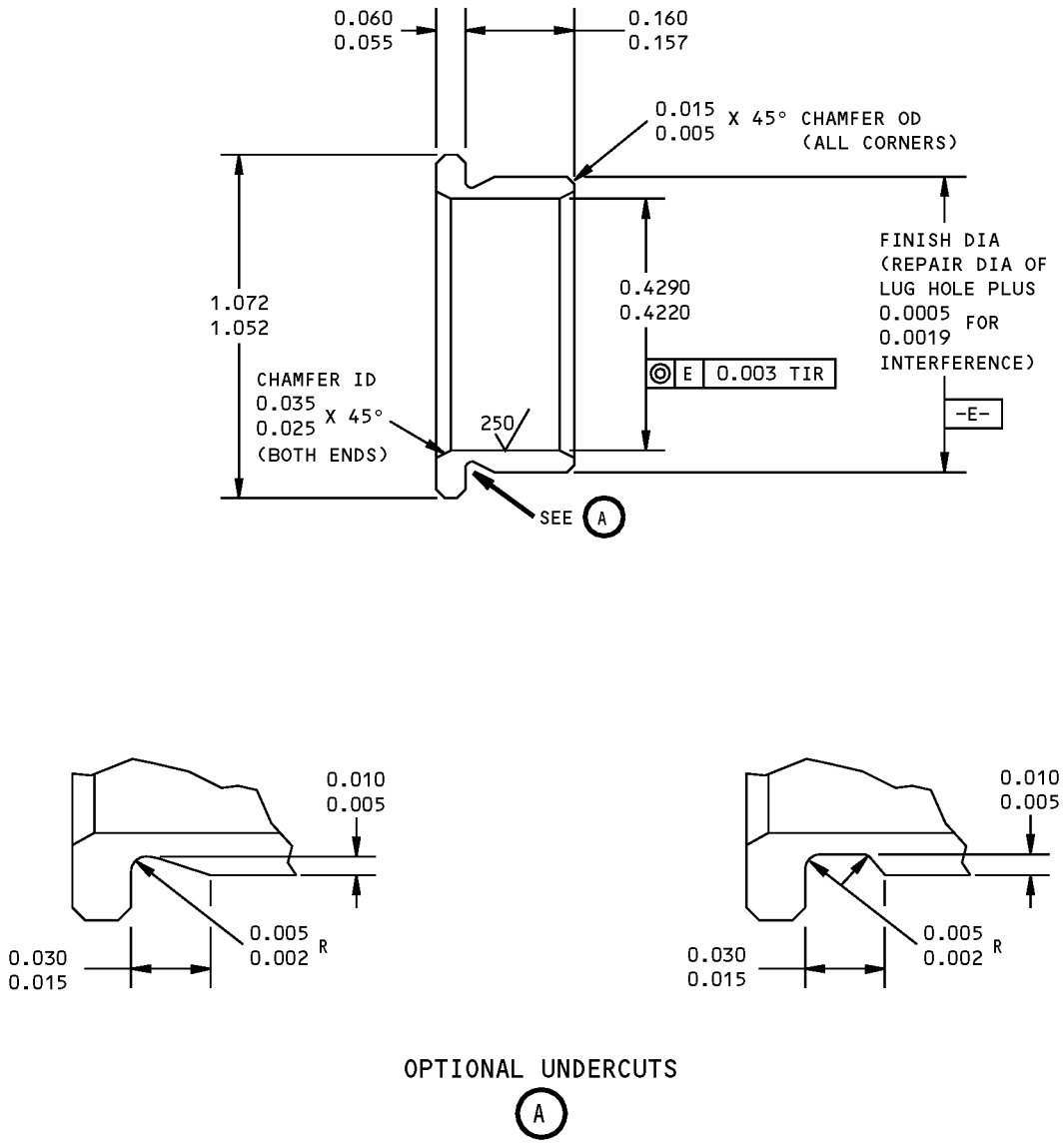
MATERIAL: AL ALLOY

ALL DIMENSIONS ARE IN INCHES

ITEM NUMBERS REFER TO IPL FIG. 1

315A1021-4

Cover Repair
Figure 601



OPTIONAL UNDERCUTS

A

63 MACHINED SURFACES EXCEPT AS NOTED

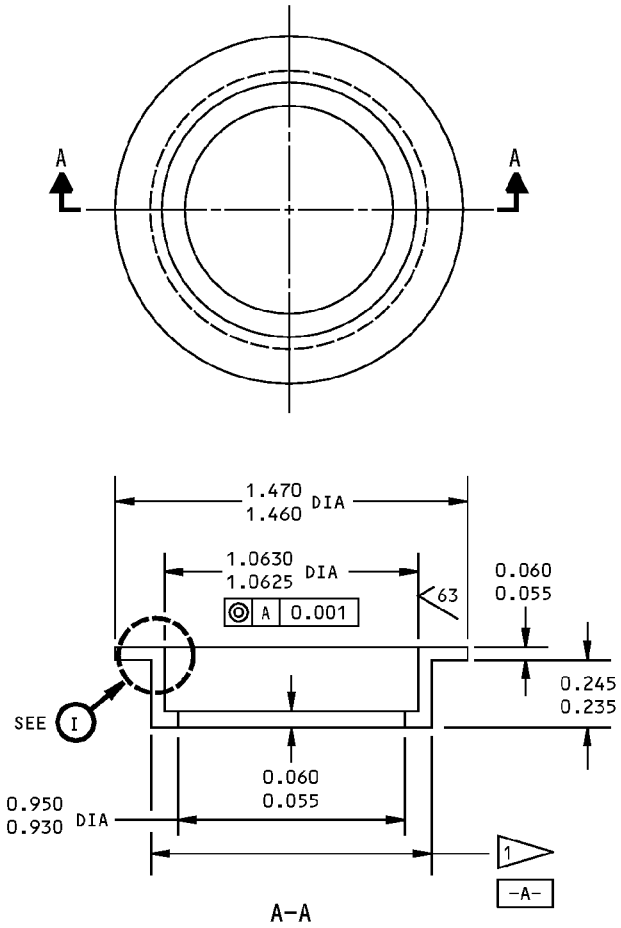
ALL DIMENSIONS ARE IN INCHES

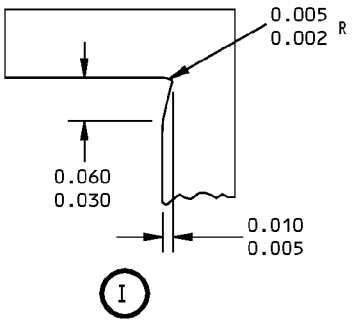
BREAK SHARP EDGES

CADMIUM PLATE (F-15.06) ALL OVER - OPT IN BORE

MATERIAL: AL-NI-BRZ PER AMS 4640

Oversize Bushing Details
Figure 602





1 FINAL BUSHING OUTSIDE DIA AFTER PLATING (REPAIR DIA OF COVER HOLE PLUS 0.0008-0.0023 INTERFERENCE)

125 MACHINED SURFACES EXCEPT AS NOTED

BREAK SHARP EDGES

CADMIUM PLATE (F-16.01) EXCEPT NO PRIMER IN INNER BORE HOLE

MATERIAL: CRES - 15-5PH

HEAT TREAT: 125-145 KSI

ALL DIMENSIONS ARE IN INCHES

ALL DIMENSIONS APPLY AFTER PLATING

Oversize Bushing Details
Figure 603

QUADRANT ASSEMBLY - REPAIR 3-1

315A1022–5, –7, –10

1. General

A. This procedure has the data necessary to repair the strut drum control box quadrant assembly.

B. Refer to REPAIR-GENERAL for a list of Standard Practices.

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

D. Refer to the REPAIR-GENERAL, Figure 601 for the Standard True Position Dimensioning Symbols shown in the repair.

E. Refer to IPL Figure 1 for item numbers.

2. Seal Replacement (REPAIR 3-1, Figure 601)

A. Remove seal (20).

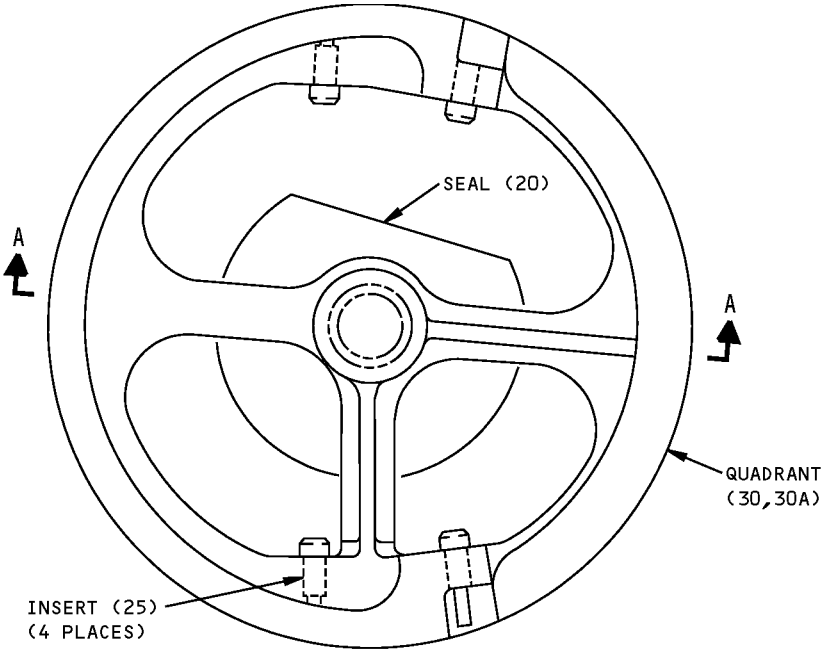
B. Bond new seal (20) to quadrant (30, 30A) in location shown in REPAIR 3-1, Figure 601.

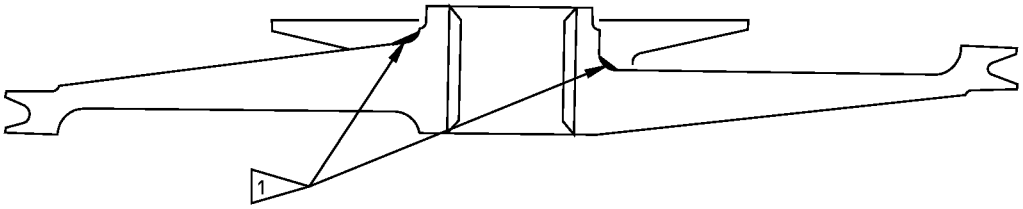
NOTE: Use adhesive, A50057 as given in SOPM 20-50-12.

3. Insert Replacement

A. Remove insert (25).

B. Install new insert with wet primer, C00259.





A-A

REFINISH

QUADRANT (30,30A):
CHROMIC ACID ANODIZE (F-17.04) ALL OVER AND APPLY TWO COATS OF BMS 10-11, TYPE 1, PRIMER (F-20.03) EXCEPT OMIT PRIMER ON SPLINES AND IN HOLES

REPAIR

1 BOND SEAL (20) IN LOCATION SHOWN WITH TYPE 60 ADHESIVE

ITEM NUMBERS REFER TO IPL FIG. 1

315A1022-5,-7 Quadrant Assembly Repair
Figure 601

LEVER ASSEMBLY - REPAIR 4-1

315A1025–1, –2

1. General

A. This procedure has the data necessary to repair the strut drum control box lever assembly.

B. Refer to REPAIR-GENERAL for a list of Standard Practices.

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

D. Refer to the REPAIR-GENERAL, Figure 601 for the Standard True Position Dimensioning Symbols shown in the repair.

E. Refer to IPL Figure 1 for item numbers.

2. Bushing Replacement (REPAIR 4-1, Figure 601)

NOTE: For repair of surfaces which may only specify restoration of initial finish, refer to Refinish instructions, REPAIR 4-1, Figure 601.

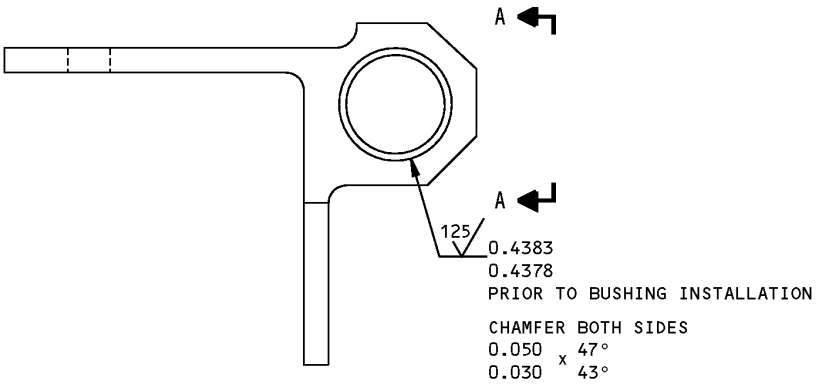
A. Remove bushings (190, 205).

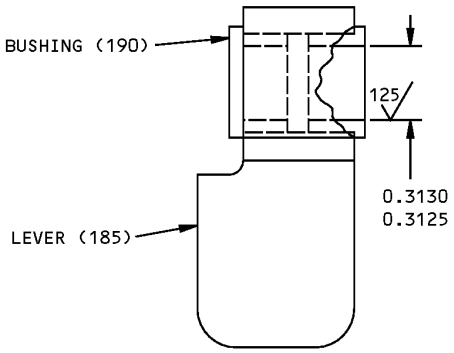
B. Install bushings (190, 205).

NOTE: Use the shrink-fit method as specified in SOPM 20-50-03 and wet sealant, A00160.

C. Machine the bushings as shown.

D. Fillet seal bushing flanges with sealant, A00160.





A–A

REFINISH

LEVER (185) ONLY:
CHROMIC ACID ANODIZE (F-17.04) ALL OVER AND
APPLY TWO COATS OF BMS 10-11, TYPE 1, PRIMER
(F-20.03) EXCEPT OMIT PRIMER IN BUSHING HOLE

MATERIAL: AL ALLOY

ALL DIMENSIONS ARE IN INCHES

ITEM NUMBERS REFER TO IPL FIG. 2

315A1025-1 SHOWN 315A1025-2 Lever Assembly Repair
Figure 601

CAM ASSEMBLY - REPAIR 5-1

315A1030–1, –2

1. General

A. This procedure has the data necessary to repair the strut drum control box cam assembly.

B. Refer to REPAIR-GENERAL for a list of Standard Practices.

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

D. Refer to the REPAIR-GENERAL, Figure 601 for the Standard True Position Dimensioning Symbols shown in the repair.

E. Refer to IPL Figure 1 for item numbers.

2. Bushing Replacement (REPAIR 5-1, Figure 601)

NOTE: For repair of surfaces which may only specify restoration of initial finish, refer to Refinish instructions, REPAIR 5-1, Figure 601.

A. Remove bushings (290, 295, 315).

B. Measure the hole diameter for bushing (290, 295, 315).

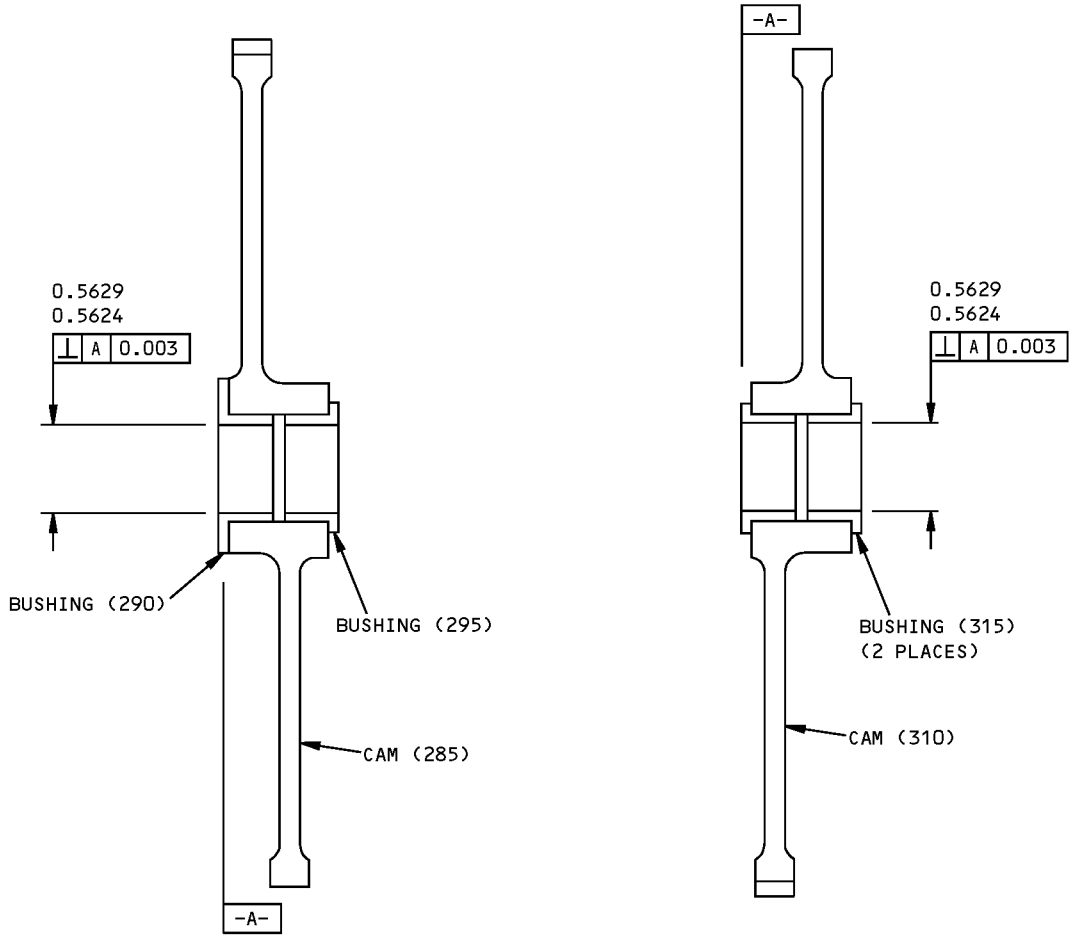
(1) If the diameter is larger than the design diameter as shown in REPAIR 5-1, Figure 601 for REPAIR 5-2, install an oversize bushing.

(2) Refer to REPAIR 5-2 for the installation procedure.

C. If the bushing hole diameter is within the design diameter limits, install bushings (290, 295, 319) with grease, D00015.

NOTE: Refer to SOPM 20-50-03 for installation.

D. Machine the inside diameter of the bushing to the dimensions shown in REPAIR 5-1, Figure 601 for REPAIR 5-1.



REFINISH

CAM (285,310):
PASSIVATE (F-17.09) ALL OVER AND APPLY DRY FILM LUBRICANT TO GEAR TEETH AFTER PASSIVATING AND MALCOMIZING

MATERIAL: 17-4PH CRES PER AMS 5443

63 ALL MACHINED SURFACES

GEAR TEETH MALCOMIZED (CASE HARDENED) TO 0.003-0.006 INCH

ALL DIMENSIONS ARE IN INCHES

ITEM NUMBERS REFER TO IPL FIG. 2

315A1030-1,-2

Cam Assembly Repair
Figure 601

CAM - REPAIR 5-2

315A1030–3, –4

1. General

A. This procedure has the data necessary to repair the strut drum control box cam.

B. Refer to REPAIR-GENERAL for a list of Standard Practices.

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

D. Refer to the REPAIR-GENERAL, Figure 601 for the Standard True Position Dimensioning Symbols shown in the repair.

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

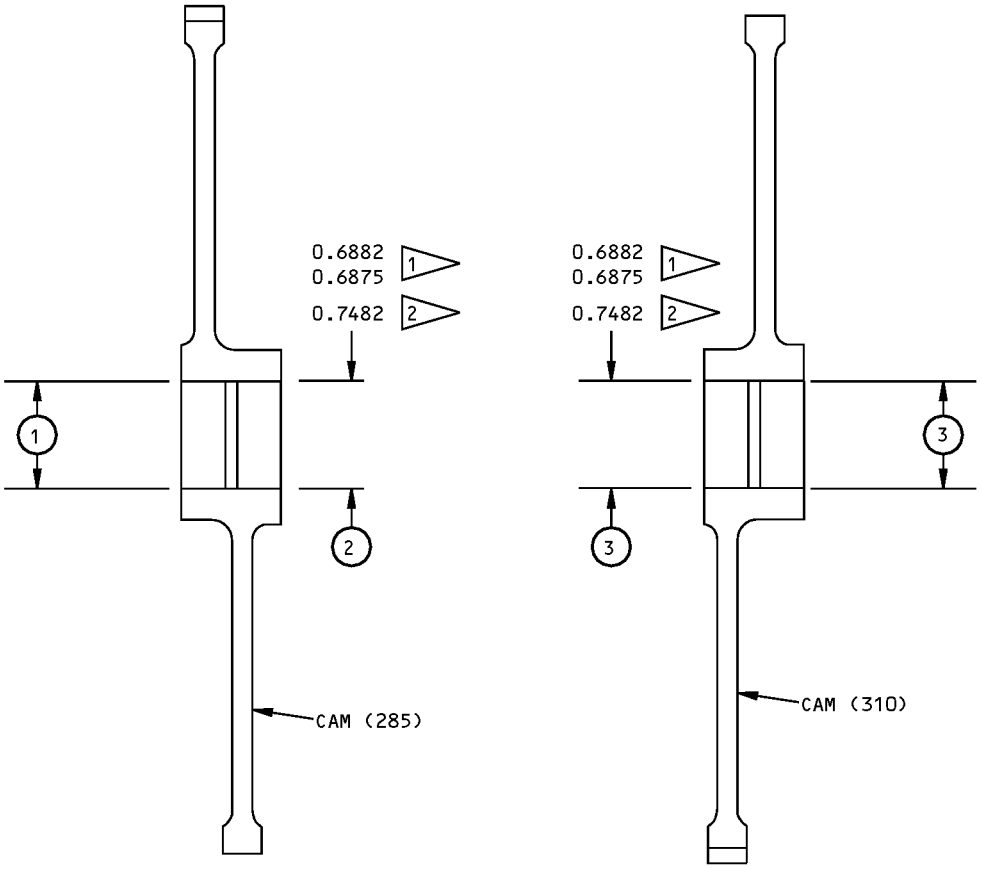
2. Installation of Oversize Bushings (REPAIR 5-2, Figure 601)

NOTE: For repair of surfaces which may only specify restoration of initial finish, refer to Refinish instructions, REPAIR 5-2, Figure 601.

A. Machine as necessary to the specified repair limits to remove any defects.

B. Manufacture bushings (290, 295, 315) as shown in REPAIR 5-2, Figure 602.

C. Install the new bushings as specified in REPAIR 5-1.



1 DESIGN DIMENSION
2 REPAIR LIMIT

MATERIAL: 17-4PH CRES PER AMS 5443

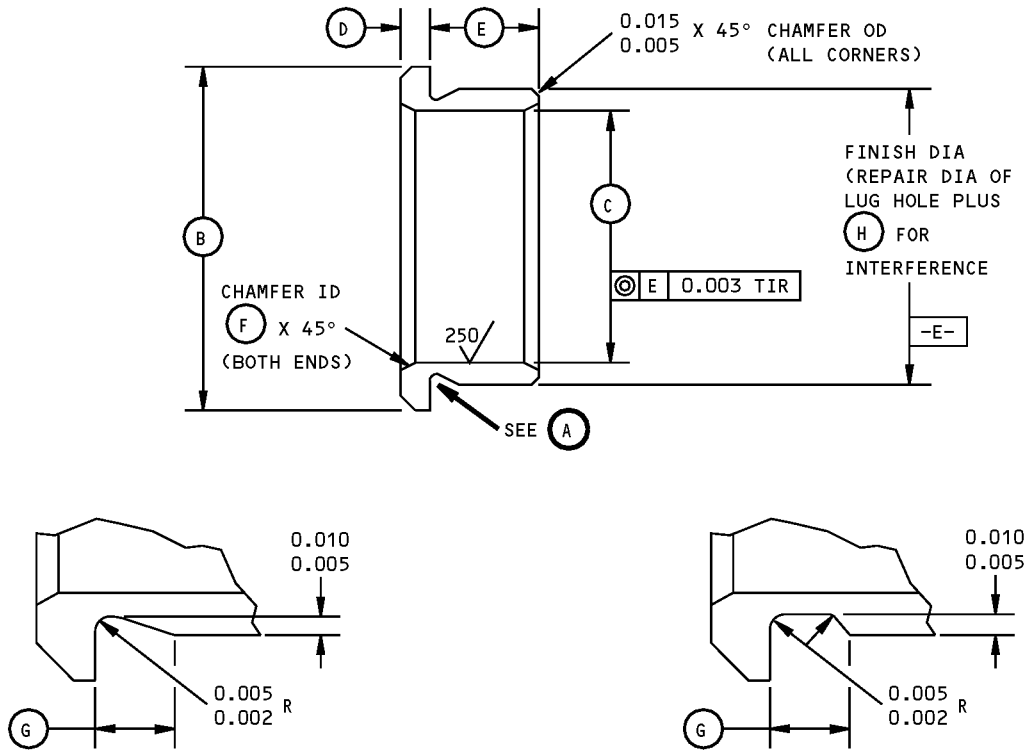
63 ALL MACHINED SURFACES

ALL DIMENSIONS ARE IN INCHES

ITEM NUMBERS REFER TO IPL FIG. 2

315A1030-3,-4

Cam Repair
Figure 601



OPTIONAL UNDERCUTS

A

LOCATION (FIG. 601)	B	C	D	E	F	G	H INTERFERENCE
1	1.198 1.178	0.5530 0.5460	0.060 0.055	0.300 0.297	0.035 0.025	0.060 0.030	0.0005- 0.0019
2	0.810 0.800	0.553 0.547	0.065 0.060	0.300 0.295	0.025 0.015	0.060 0.030	0.0005- 0.0019
3	0.810 0.800	0.553 0.547	0.065 0.060	0.300 0.295	0.025 0.015	0.060 0.030	0.0005- 0.0019

63 MACHINED SURFACES EXCEPT AS NOTED

ALL DIMENSIONS ARE IN INCHES

BREAK SHARP EDGES

CADMIUM PLATE (F-15.06) ALL OVER - OPT IN BORE

MATERIAL: AL-NI-BRZ PER AMS 4640

Oversize Bushing Details
Figure 602

RETAINER ASSEMBLY - REPAIR 6-1

315A1061–1

1. General

A. This procedure has the data necessary to repair the strut drum control box retainer assembly.

B. Refer to REPAIR-GENERAL for a list of Standard Practices.

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

D. Refer to the REPAIR-GENERAL, Figure 601 for the Standard True Position Dimensioning Symbols shown in the repair.

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

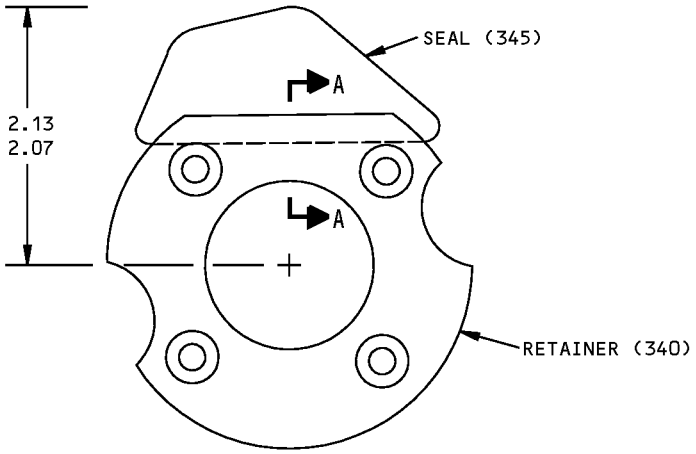
2. Seal Replacement (REPAIR 6-1, Figure 601)

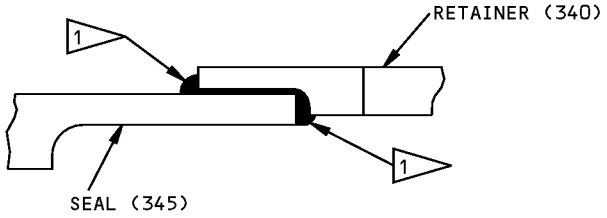
NOTE: For of surfaces which may only specify restoration of initial finish, refer to Refinish instructions, REPAIR 6-1, Figure 601.

A. Remove seal (345).

B. Bond new seal (345) to retainer (340) in the location shown in REPAIR 6-1, Figure 601

NOTE: Use adhesive, A50057 as given in SOPM 20-50-12.





A-A

REFINISH

RETAINER (340):
CHROMIC ACID ANODIZE (F-17.04) AND APPLY ONE COAT OF BMS 10-11, TYPE 1, PRIMER (F-20.02)

REPAIR

1 BOND SEAL (345) TO RETAINER (340) IN LOCATION SHOWN WITH TYPE 60 ADHESIVE PER 20-50-12

ALL DIMENSIONS ARE IN INCHES

ITEM NUMBERS REFER TO IPL FIG. 2

3155A1061-1 Retainer Assembly Repair
Figure 601

CABLE GUARD FITTING ASSEMBLY - REPAIR 7-1

315A1086–13

1. General

A. This procedure has the data necessary to repair the strut drum control box cable guard fitting assembly.

B. Refer to REPAIR-GENERAL for a list of Standard Practices.

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

D. Refer to IPL Figure 1 for item numbers.

2. Spacer Replacement

A. Drill out rivet (75) and remove the spacer.

B. Install the new spacer (80).

3. Fitting Refinish

A. Fitting (70) – Chromic acid anodize (F-17.04) and apply primer, C00259.

MISCELLANEOUS PARTS REFINISH - REPAIR 8-1

1. General

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

B. Refer to REPAIR-GENERAL for a list of Standard Practices.

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

D. Refer to IPL Figure 1 for item numbers.

2. Refinish Details

NOTE: For stripping of protective finishes, refer to SOPM 20-30-02. For general cleaning procedures, refer to SOPM 20-30-03. For the decoding table for Boeing finish codes, refer to SOPM 20-41-01. For finishing materials, refer to SOPM 20-60-02.

A. Repair of parts listed in REPAIR 8-1, Table 601 consists of restoration of initial finish.

Table 601: Refinish Details

IPL FIG. & ITEM	MATERIAL	FINISH
Fig. 1		
Spring (170)	17-7PH CRES wire	Passivate (F-17.09).
Support (215)	Al alloy	Chromic acid anodize (F-17.04) and apply primer, C00259 (F-20.03).
Shaft (300)	17-4PH CRES	Passivate (F-17.09). Cadmium plate splines (F-15.06). Apply solid film lubricant, D50092 to gear teeth.
Spacer (320)	15-5PH CRES 170-190 ksi	Cadmium plate (F-15.06).
Shaft (325)	15-5PH CRES 180-200 ksi	Passivate (F-17.09).
Cover (355,375)	Al alloy	Chemically treat and apply primer, C00259 (F-18.06).
Rack (400A,400B, 405)	15-5PH CRES 180-200 ksi	Passivate (F-17.09) and hard chrome plate ARMOLOY, (Armoloy of Philadel- phia, 1105 Miller Ave, Croydon PA) followed by Sermetel lubricant on gearteeth.
Retainer (420,425)	Al alloy	Chemically treat and apply primer, C00259 (F-18.06).
Housing (435,440)	15-5PH CRES	Cadmium plate (F-15.06).
Sleeve (455)	321/347 or 303 CRES	Cadmium plate (F-15.02).
Sleeve (460)	15-5PH CRES 125-145 ksi	Passivate (F-17.09).
Fitting (45,70,95)	Al alloy	Chromic acid anodize (F-17.04) and apply primer, C00259 (F-20.02).
Quadrant (15B,15C)	Al alloy	Chromic acid anodize (F-17.04) and apply primer, C00259(F-20.03) except omit primer, C00259 from splines and holes.

RACK HOUSING - REPAIR 9-1

315A1032–1, –2, –3, –4

1. General

A. This procedure has the data necessary to repair the strut drum control box rack housing assembly.

B. Refer to REPAIR-GENERAL for a list of Standard Practices.

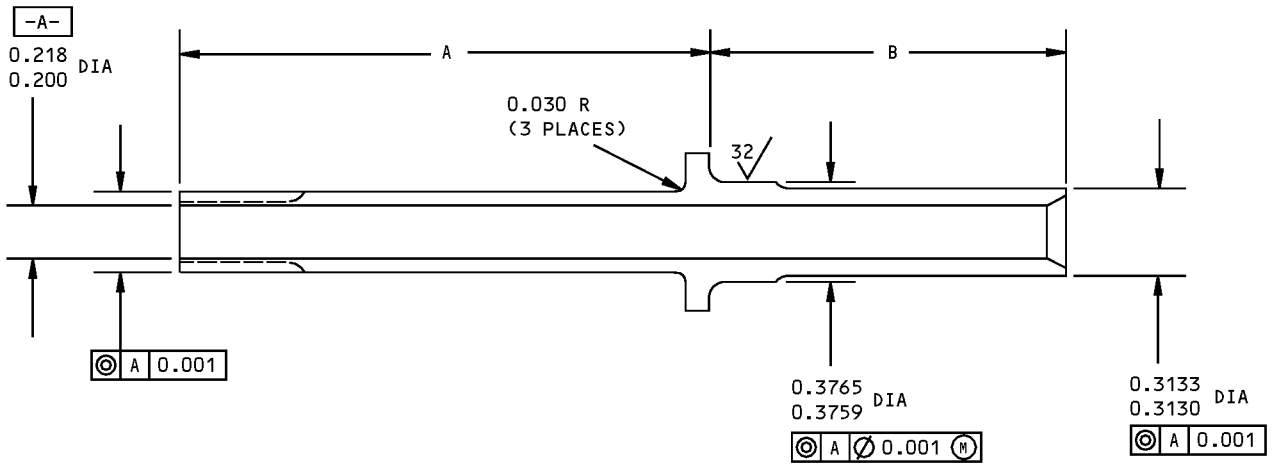
C. Refer to the Standard Overhaul Practice Manual (SOPM) for the SOPM subjects identified in this procedure.

D. Refer to IPL Figure 1 for item numbers.

2. Plating Repair

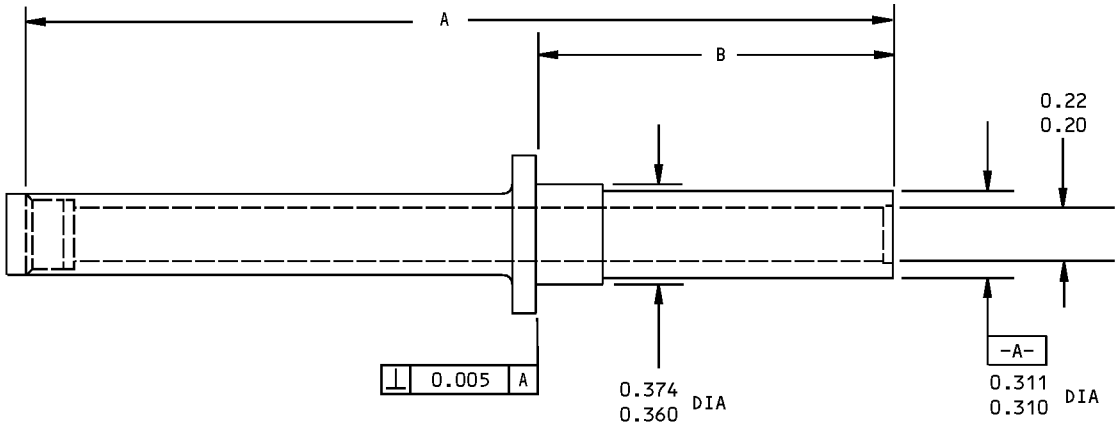
A. Procedure

NOTE: Repair consists of restoration of initial finish, refer to Refinish instructions, REPAIR 9-1, Figure 601.



	A	B
315A1032-1	3.750	1.850
315A1032-2	2.360	1.400

315A1032-1,-2



	A	B
315A1032-3	5.29	1.85
315A1032-4	3.87	1.40

315A1032-3,-4

REFINISH

CADMIUM PLATE (F-15.02)
0.0002-0.0004 IN. THICK.

DIMENSIONS APPLY AFTER PLATING

MATERIAL: 75-5PH CRES (315A1032-1,-2)
125-145 KSI (315A1032-1,-2)
304 CRES (315A1032-3,-4)

63 ALL MACHINED SURFACES EXCEPT AS NOTED

ALL DIMENSIONS ARE IN INCHES

Rack Housing Refinish
Figure 601

CAM SHAFT - REPAIR 10-1

315A1063–2

1. General

A. This procedure has the data necessary to repair the strut drum control box cam shaft.

B. Refer to REPAIR-GENERAL for a list of Standard Practices.

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

D. Refer to the REPAIR-GENERAL, Figure 601 for the Standard True Position Dimensioning Symbols shown in the repair.

E. Refer to IPL Figure 1 for item numbers.

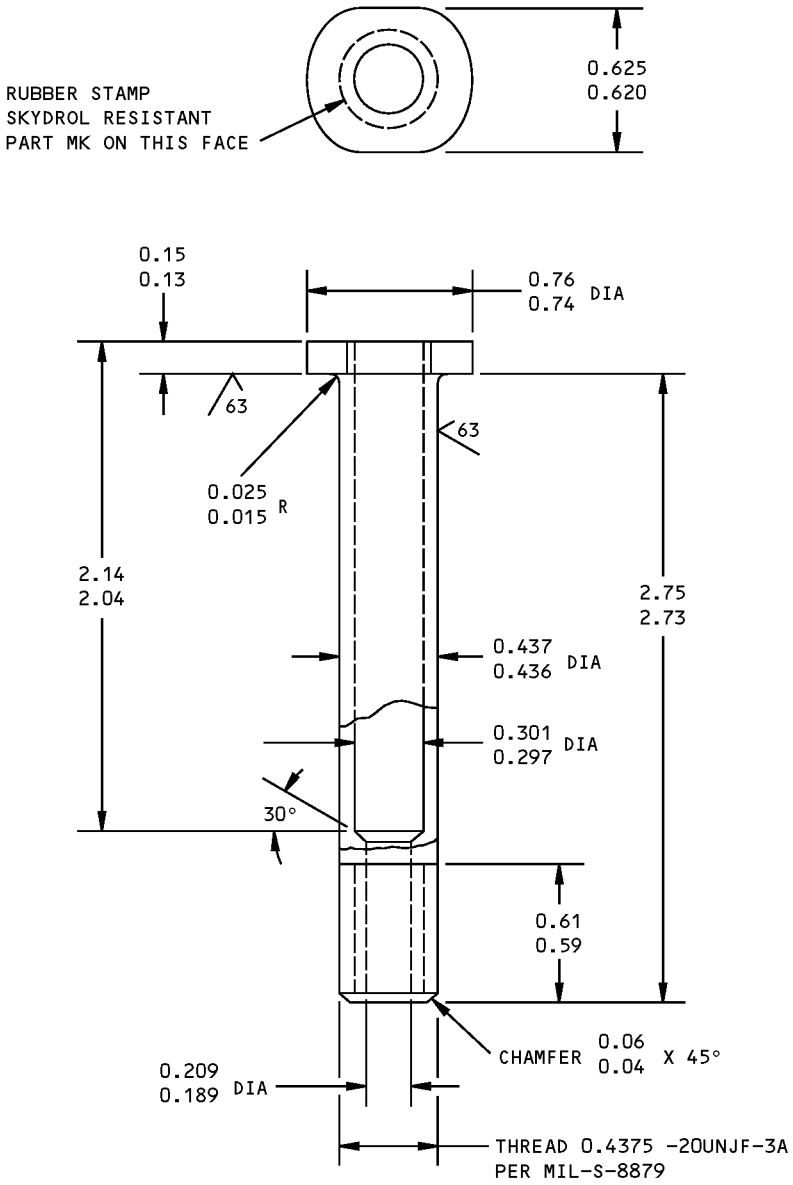
2. Shaft Diameter Repair

NOTE: For repair of surfaces which may only specify restoration of initial finish, refer to Refinish instructions, REPAIR 10-1, Figure 601.

A. Machine as necessary to the specified repair limits given to remove any defects.

B. Strip, chrome plate and the post plate grind the surface to design limits.

(1) The single plate thickness must be a minimum of 0.003 inch or a maximum of 0.010 inch after grinding the surface.



125 MACHINED SURFACES EXCEPT AS NOTED

BREAK SHARP EDGES

FINISH (F-17.09)

MATERIAL: CRES 15-5PH

HEAT TREAT: 180-200 KSI

ALL DIMENSIONS ARE IN INCHES

315A1063

Cam Shaft Repair
Figure 601

ASSEMBLY

1. **General**

   A. This procedure has the data to assemble the strut drum control box 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. **Equipment**

   NOTE: If necessary, you can use an equivalent substitute.

   A. rig pin, STD-4592 Rig pin – 0.311 to 0.312 diameter

3. **Assembly**

   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.

   NOTE: If cover assembly (230) or housing assembly (510) are replaced or repaired, machine inside diameters of bushings (250, 470, or 510) to dimensions shown in REPAIR 1-1 or REPAIR 2-12-1.

   A. Before machining bushing holes, assemble cover assembly (230) and housing assembly (510) by installing bolts (235, 240) and washers (245). Install bolts (235) at three places on cover assembly (230) identified with an X.

   B. Attach seals (590, 595), use rivets (600), washers (605), and spacers (610).

   C. Attach bearings (495B) to throttle gear shaft (300), use bolt (505), washer (500), and nut (490).

   D. Thread jamnut (450) on to sleeves (455, 460) and thread sleeves into housing (510). Do not fully tighten jamnut at this time.

   E. Slide retainers (420, 425) over rack housings (435, 440).

   F. Thread cap nuts (445) onto rack housings (435, 440).

      NOTE: Cap nut (445) is used with rack housing 315A1032-1 and 315A1032-2 only.

   G. Insert rack housings (435, 440) into housing (510).

   H. Using washer (430) under retainers (420, 425), attach retainers to housing (510) with screw (410) and washer (415).

   I. Insert racks into housing assembly (510).

   J. Insert rollers (390) into housing (510) and secure with eccentric screws (385) and nuts (395). To enable gear teeth to mesh easily with racks, adjust eccentric screws until racks are at farthest distance from gear centerlines.

   K. Install bearing (350) into bushing (465) with . Ensure that loading slot side of bearing faces interior of housing (510).

   L. Using bolts (335), attach retainer assembly (330) to housing (510).

   M. Attach support (215) to housing (510) with bolts (140), washers (150), and nut (145). Nut (145) is to be installed on outside of housing.

   N. Install spacer (320) over feedback shaft (325).

   O. Insert feedback shaft (325) with spacer (320) through housing (510).

   P. Install feedback cam assembly (305) on feedback shaft (325). Ensure that index mark on cam assembly is aligned with index mark on rack (400) (ASSEMBLY, Figure 701).

Q. Install bearing (260) on throttle gear shaft (300) with grease, D00015. Ensure that loading slot side of bearing faces away from interior of housing (510).

R. Install throttle gear shaft (300) into bearing (350). Ensure that index mark on throttle gear is aligned with index mark on rack (405) (ASSEMBLY, Figure 701).

S. Install feedback cam assembly (280) on feedback shaft (325). Ensure that index mark on cam assembly is aligned with index mark on rack (400) (ASSEMBLY, Figure 701).

T. Install thrust washer (275), shim (270), and washer (265).

U. Temporarily install cover assembly (230) and attach with bolt (235, 240) and washers (245). Use bolts (235) at three places on cover assembly (230) marked with an X.

V. Temporarily install washer (225) and nut (220) on feedback shaft (325). Tighten nut to 200-300 pound-inches.

W. Check end play of cam assemblies (280, 305). Adjust thickness of shim (270) to eliminate end play.

X. After thickness of shim (270) has been determined, securely fasten cover (230) to housing (510). Tighten nut (220) to 200-300 pound-inches.

Y. Attach bumpers (210) to lever assemblies (180, 195) using washer (165) and nut (160). Tighten nut to 150-200 pound-inches.

Z. Insert bumper ends of lever assemblies (180, 195) into housing (510) and align spring (170) and both lever assemblies (180, 195) in support (215).

AA. Lubricate outside diameter of spacer (175) with grease, D00015 and push through hole in support (215).

NOTE: Continue to insert spacer through spring (170), through lever assembly (180, 195) bushings, through spring (170) again, until spacer meets other side of support.

AB. Lubricate screw (155) with grease, D00015 and insert through support (215) and spacer (175).

(1) Secure with washer (165) and nut (160).

(2) Tighten nut to 150-200 pound-inches.

AC. Attach spacers (55, 80, 105, 130) to fittings (45, 70, 95, 120) with bolts (47, 97, 122), washers (49, 100, 125) and nuts (103, 128).

AD. Attach cable guard fitting assemblies (35, 60, 85, 110) to housing (510) using bolts (40, 65, 90, 115) respectively.

AE. Align missing tooth on quadrant assemblies (15, 15A) with missing tooth on throttle gear shaft (300).

(1) Coat threads of nut (5) with compound, B50080, and install washer (10) and nut (5) on throttle gear shaft (300).

(2) Tighten nut to 200-300 pound-inches.

AF. Adjust Racks (400A, 400B, 405)

(1) Rotate eccentric screws (385) clockwise and carefully engage rack and gear teeth.

(2) Rotate eccentric screws evenly so that racks remain parallel to rack bores as they are adjusted.

(3) Adjust eccentric screws until backlash is 0.002-0.004 inch between gear and rack. Backlash measurement is to be made with gear fixed and a 4- to 6-pound load applied to the rack in both directions.

(4) Ensure that rack moves freely and smoothly over its full range of travel.

(5) Tighten nuts (395) on eccentric screws to 20-25 pound-inches.

AG. Adjust end of sleeve (460) until it is 0.335-0.365 inch from rear of arrow head at rack (405) disconnect point (ASSEMBLY, Figure 701). Tighten jamnut (450).

AH. Insert rig pin into hole marked PT PWR. Verify that rear of arrow head at rack (405) disconnect point shall be 3.985-4.015 inches from tangent point hole in housing assembly (510) (ASSEMBLY, Figure 701).

AI. Move rig pin to hole marked IDLE. Verify that rear of arrow head at rack (405) disconnect point has moved to 4.935-4.965 inches from tangent point hole in housing assembly (510) (ASSEMBLY, Figure 701).

AJ. Adjust end of sleeves (455) until they are 0.335-0.365 inch from the rear of the arrow head at the disconnect point of racks (400A, 400B) (ASSEMBLY, Figure 701). Tighten jamnut (450).

AK. Move rig pin to hole marked T/R STOWED.

(1) Rear of arrow head at disconnect point of both racks (400A, 400B) shall be 4.585-4.615 inches from tangent point hole in housing assembly (510) (ASSEMBLY, Figure 701).

(2) Remove rig pin, STD-4592.

AL. With control box assembly in a horizontal position check that, for the entire range of travel, each rack can move without binding and that rollers (390) are free to rotate. The maximum force to move the rack shall not exceed 0.4 pounds.

AM. Lockwire jamnuts using lockwire, G01048, on sleeves (455, 460) to maintain adjustments. Use the double-twist method as given in SOPM 20-50-02.

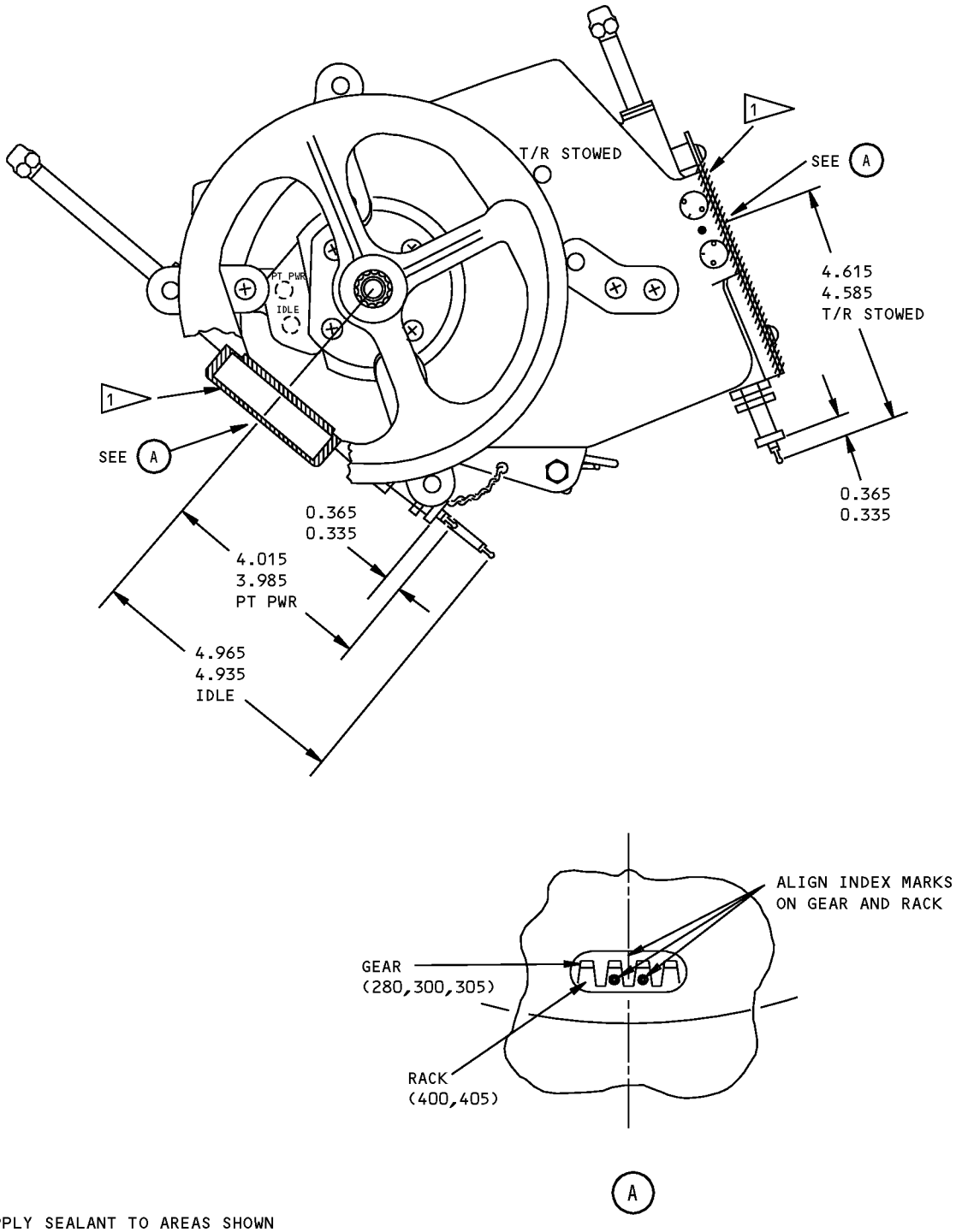
AN. Verify that all six nuts (395) on eccentric screws (385) are tightened to 25-50 pound-inches.

(1) Lockwire each pair of nuts (395) together using lockwire, G01048. Use the double-twist method as given in SOPM 20-50-02.

AO. Attach cover (355) to housing (510) with screws (360, 365) and bushing (370).

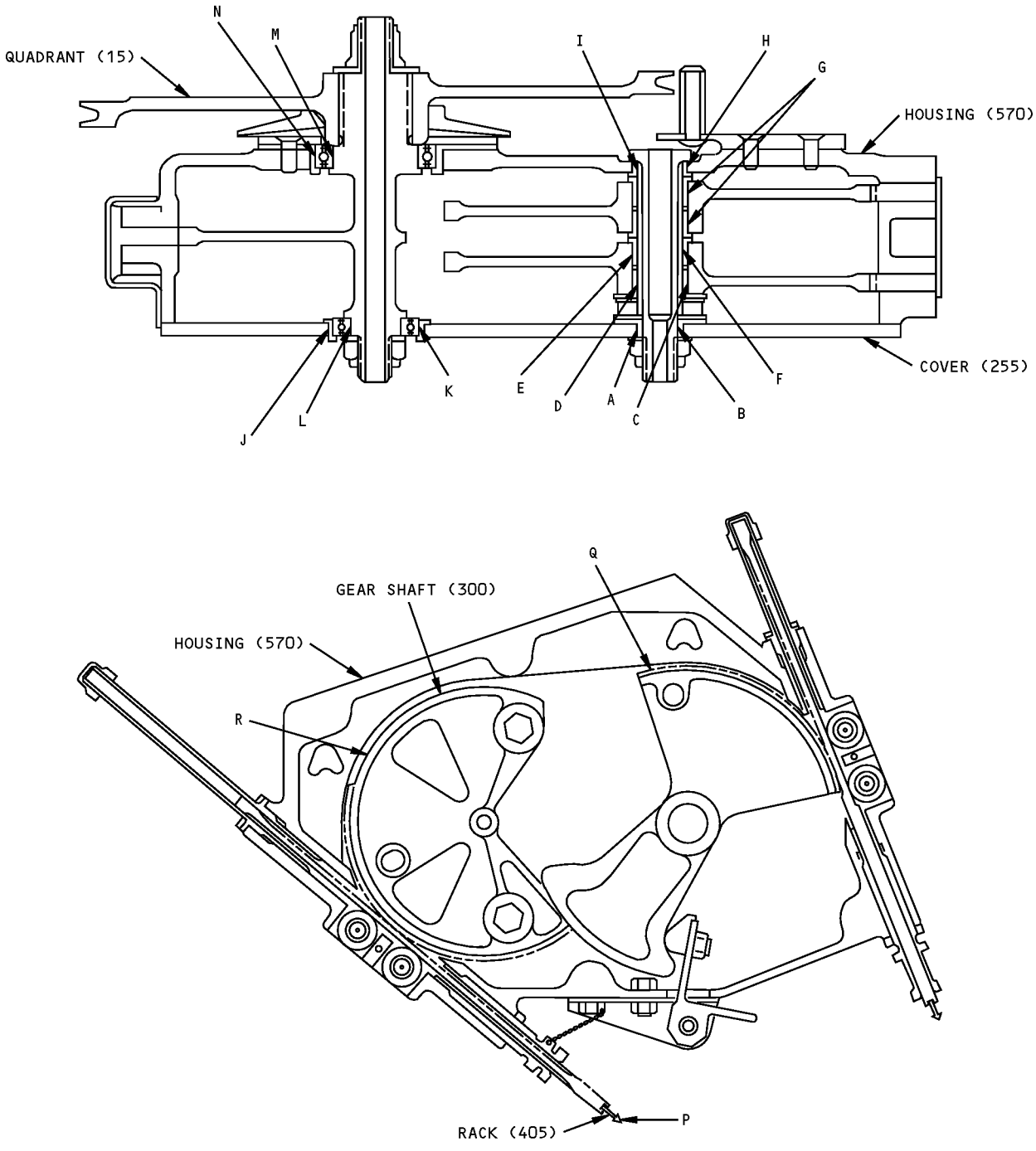
AP. Attach cover (375) to housing (510) with screws (380).

AQ. Seal areas on covers (355, 375) as shown in ASSEMBLY, Figure 701 with RTV730 sealant.



Assembly Details
Figure 701

FITS AND CLEARANCES



Fits and Clearances
Figure 801 (Sheet 1 of 3)

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 255 OD 250	0.5621 0.5631	0.5626 0.5638	-0.0005	-0.0017			0.0000
B	ID 250 OD 325	0.4375 0.4360	0.4380 0.4370	0.0005	0.0020	0.4347	0.4403	0.0033
C	ID 285 OD 290	0.6875 0.6882	0.6882 0.6892	-0.0000	-0.0017			0.0000
D	ID 290 OD 320	0.5624 0.5605	0.5629 0.5615	0.0009	0.0024	0.5590	0.5654	0.0039
E	ID 285 OD 295	0.6875 0.6887	0.6882 0.6893	-0.0005	-0.0018			0.0000
F	ID 295 OD 320	0.5624 0.5605	0.5629 0.5615	0.0009	0.0024	0.5590	0.5654	0.0039
G	ID 310 OD 315	0.6875 0.6887	0.6882 0.6893	-0.0005	-0.0018			0.0000
H	ID 570 OD 515	0.6876 0.6887	0.6882 0.6893	-0.0005	-0.0017			0.0000
I	ID 515 OD 320	0.5620 0.5605	0.5626 0.5615	0.0005	0.0021	0.5590	0.5651	0.0036
J	ID 255 OD 470	1.1875 1.1888	1.1882 1.1898	-0.0006	-0.0023			0.0000
K	ID 470 OD 260	1.0625 1.0615	1.0630 1.0625	0.0000	0.0015	1.0594	1.0661	0.0036
L	ID 260 OD 300	0.6243 0.6235	0.6257 0.6240	0.0003	0.0022	0.6219	0.6278	0.0038
M	ID 350 OD 300	1.0618 1.0610	1.0632 1.0615	0.0003	0.0022	1.0589	1.0658	0.0043

Fits and Clearances
Figure 801 (Sheet 2 of 3)

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	
N	ID 465 OD 350	1.5000 1.4990	1.5005 1.5000	0.0000	0.0015	1.4966	1.5039	0.0039
P	*[1] 405	0.1750	0.1765	▷6◁ ≤0.004		0.1530	▷6◁ 0.0160	
Q	*[2] 280	2.6894	2.6902			2.6839		
R	*[2] 300	2.4227	2.4235			2.4175		

NEGATIVE VALUES DENOTE INTERFERENCE FIT

ALL DIMENSIONS ARE IN INCHES

▷6◁ BACKLASH BETWEEN GEAR AND RACK

*[1] DIMENSION OVER 0.0576 DIA PIN

*[2] DIMENSION OVER 0.0576 DIA PIN AND TO CENTER OF SHAFT

Fits and Clearances
Figure 801 (Sheet 3 of 3)

(NOT APPLICABLE)

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
02758	NETWORKS ELECTRONIC CORP U S BEARING DIV 9750 DE SOTO AVENUE CHATSWORTH, CALIFORNIA 91311-4409 FORMERLY U S BEARING DIV NETWORKS ELEC CORP
21335	TIMKEN US CORPORATION DIV FAFNIR 336 MECHANIC STREET LEBANON, NH 03766-0267 FORMERLY FAFNIR BRG AND TEXTRON INC FAFNIR DIV IN NEW BRITAIN, CONNECTICUT ; FORMERLY TORRINGTON CO THE SPECIAL PRODUCTS DIV SUB OF THE INGERSOLL-RAND CO V8D210 FORMERLY TORRINGTON CO FAFNIR BEARING DIV IN TORRINGTON, CT
50632	KAMATICS CORP SUB OF KAMAN CORP 1335 BLUE HILLS ROAD BLOOMFIELD, CONNECTICUT 06002-1304
55231	TRIBON BEARING COMPANY 6200 HILLCREST DR CLEVELAND, OHIO 44125 FORMERLY PURE CARBON COMPANY V80894
60380	TORRINGTON CO BEARINGS DIV SUBSIDIARY OF INGERSOLL-RAND CORP 59 FIELD STREET PO BOX 1008 TORRINGTON, CONNECTICUT 06790-1008 FORMERLY TORRINGTON BEARING COMPANY
92563	MCGILL MFG CO INC BEARINGS DIV 909 LAFAYETTE STREET VALPARAISO, INDIANA 46383-4210

NUMERICAL INDEX

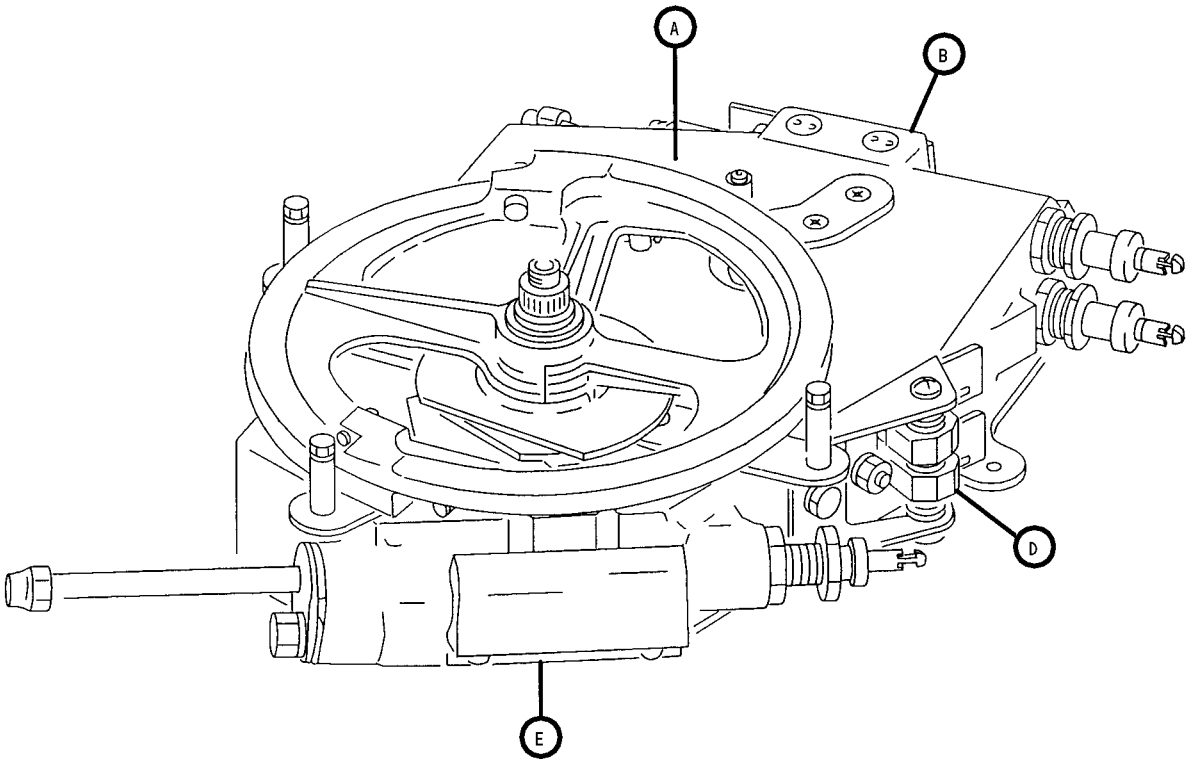
PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
10602-00		1	390	6
315A1011-1		1	375A	1
		1	375C	1
315A1011-2		1	355	1
315A1011-3		1	375	1
		1	375B	1
315A1016-1		1	1	RF
315A1016-2		1	1A	RF
315A1016-3		1	1B	RF
315A1016-4		1	1C	RF
315A1020-2		1	570	1
315A1020-3		1	510	1
315A1020-4		1	510A	1
315A1020-5		1	510B	1
315A1021-3		1	230	1
315A1021-4		1	255	1
315A1022-10		1	15E	1
315A1022-4		1	30A	1
315A1022-5		1	15	1
		1	15D	1
315A1022-6		1	30	1
315A1022-7		1	15A	1
315A1022-8		1	15B	1
315A1022-9		1	15C	1
315A1023-2		1	300	1
315A1024-1		1	135	1
315A1025-1		1	180	1
315A1025-2		1	195	1
315A1025-3		1	185	1
315A1025-4		1	200	1
315A1028-1		1	170	1
315A1029-1		1	210	2
315A1030-1		1	280	1
315A1030-2		1	305	1

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
315A1030-3		1	285	1
315A1030-4		1	310	1
315A1031-2		1	340	1
315A1031-3		1	330A	1
315A1032-1		1	435A	1
315A1032-2		1	440A	2
315A1032-3		1	435	1
315A1032-4		1	440	2
315A1032-5		1	436	1
315A1032-6		1	441	2
315A1032-7		1	437	1
		1	442	2
315A1032-8		1	438	1
		1	443	2
315A1033-1		1	425	1
315A1036-2		1	405	1
315A1036-4		1	400A	2
315A1036-5		1	400B	2
315A1036-6		1	405A	1
315A1041-2		1	320	1
315A1049-1		1	460	1
315A1052-1		1	10	1
315A1055-1		1	345	1
315A1055-2		1	20	4
315A1055-4		1	590	1
315A1055-5		1	595	1
315A1057-1		1	215	1
315A1061-1		1	330	1
315A1063-2		1	325	1
315A1064-1		1	465	1
315A1067-1		1	175	1
315A1071-1		1	275	1
315A1085-1		1	270	1
315A1086-11		1	110	1
315A1086-12		1	85	1

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
315A1086-13		1	60	1
315A1086-14		1	120	1
315A1086-15		1	95	1
315A1086-16		1	70	1
315A1087-1		1	470	1
315A1099-3		1	35	1
315A1099-4		1	45	1
315T1029-1		1	385	6
315T3028-2		1	420	1
315T4005-3		1	455	2
4AFC614		1	495B	4
AN960-10L		1	49	1
		1	100	1
		1	125	1
AN960-416		1	150	2
		1	245	5
AN960-416L		1	500	2
AN960-916		1	265	1
AN960C716L		1	225	2
AN960KD10L		1	415	2
AN960PD10		1	430	2
AN960XC10		1	165	3
ATF4		1	495B	4
B538DDA3257		1	260	1
B541DDA3257		1	350	1
BACB10ET04		1	495B	4
BACB10FU10		1	260A	1
BACB10FU17		1	350A	1
BACB28AA7B016		1	250	1
BACB28AA9B030		1	290	1
BACB28AM05B020A		1	190	2
		1	205	2
BACB28AM09B017A		1	515	1
BACB28AM09B030		1	295	1
		1	315	2

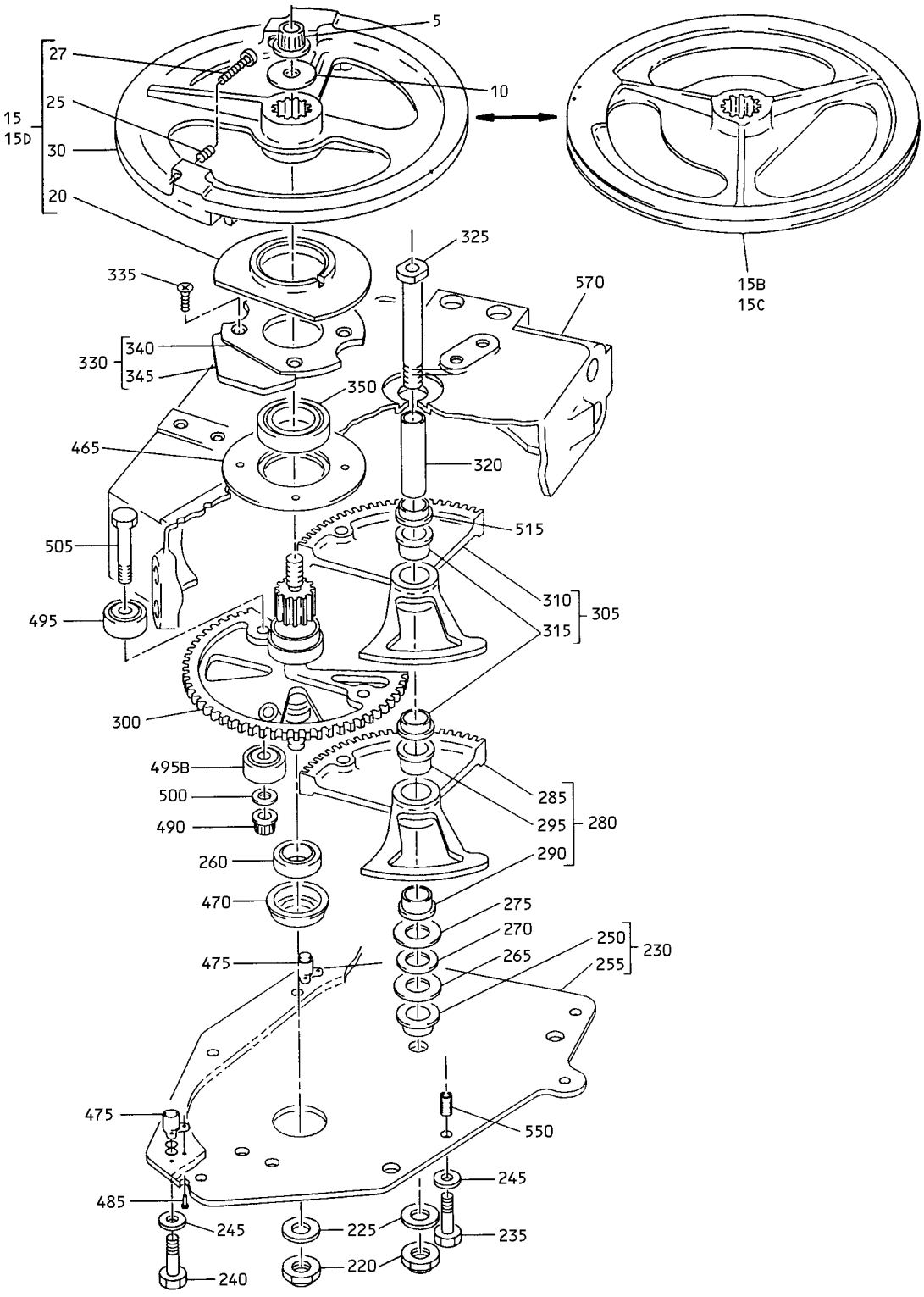
PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
BACB28Z3-040		1	370	1
BACB30FM6-27		1	575	1
BACB30LR3P2		1	40	2
		1	65	2
		1	90	2
		1	115	2
		1	335	1
BACC30M6		1	585	1
BACN10JB38CD		1	520	2
BACN10JC3		1	160	3
BACN10JC7CM		1	220	2
BACN10JP3BCD		1	475	2
BACN10JP4C		1	480	2
BACN10KB3F		1	51	1
BACN10R524L		1	445	3
BACR15BA3AD		1	53	2
		1	485	8
		1	525	4
BACR15BB5D8		1	600	2
BACR15BB6D		1	75	1
BACS12CK3-37		1	155	1
BACS12CK3U12		1	365	1
BACS12CK3U7		1	380	2
BACS12CK4U11		1	360	1
BACW10P39AL		1	605	2
KRP114804BT		1	390	6
MS21042-3		1	103	1
		1	128	1
MS21209F1-10P		1	530	12
MS21209F1-20P		1	25	4
MS21209F1-25		1	535	1
MS21209F1-25P		1	540	2
MS21209F4-25P		1	550	5
MS21209F4-30P		1	555	4
MS21209F7-25P		1	560	1

PART NUMBER	AIRLINE PART NUMBER	FIGURE	ITEM	UNITS PER ASSEMBLY
MS21209F7-30P		1	565	2
MS21209FR15P		1	545	1
MS21438-104G		1	495C	4
MSP4TL014		1	390	6
NAS1351-3-14		1	27	4
NAS1423-7		1	450	3
NAS1801-3-22		1	47	1
		1	97	1
		1	122	1
NAS1801-3-8		1	410	2
NAS1805-4		1	490	2
NAS1805-4N		1	145	1
NAS1805-7N		1	5	1
NAS42DD5-8		1	610	2
NAS42DD6-54		1	80	1
		1	130	1
NAS42DD6-58		1	55	1
		1	105	1
NAS42DD6-96		1	580	1
NAS5093C		1	395	6
NAS6704-2		1	140A	2
NAS6704-3		1	235A	3
NAS6704-5		1	240A	2
NAS6704D16		1	505	2
NAS6704L2		1	140	2
NAS6704L3		1	235	3
NAS6704L5		1	240	2
S302T001-214		1	390A	6
S315N166-1		1	390	6

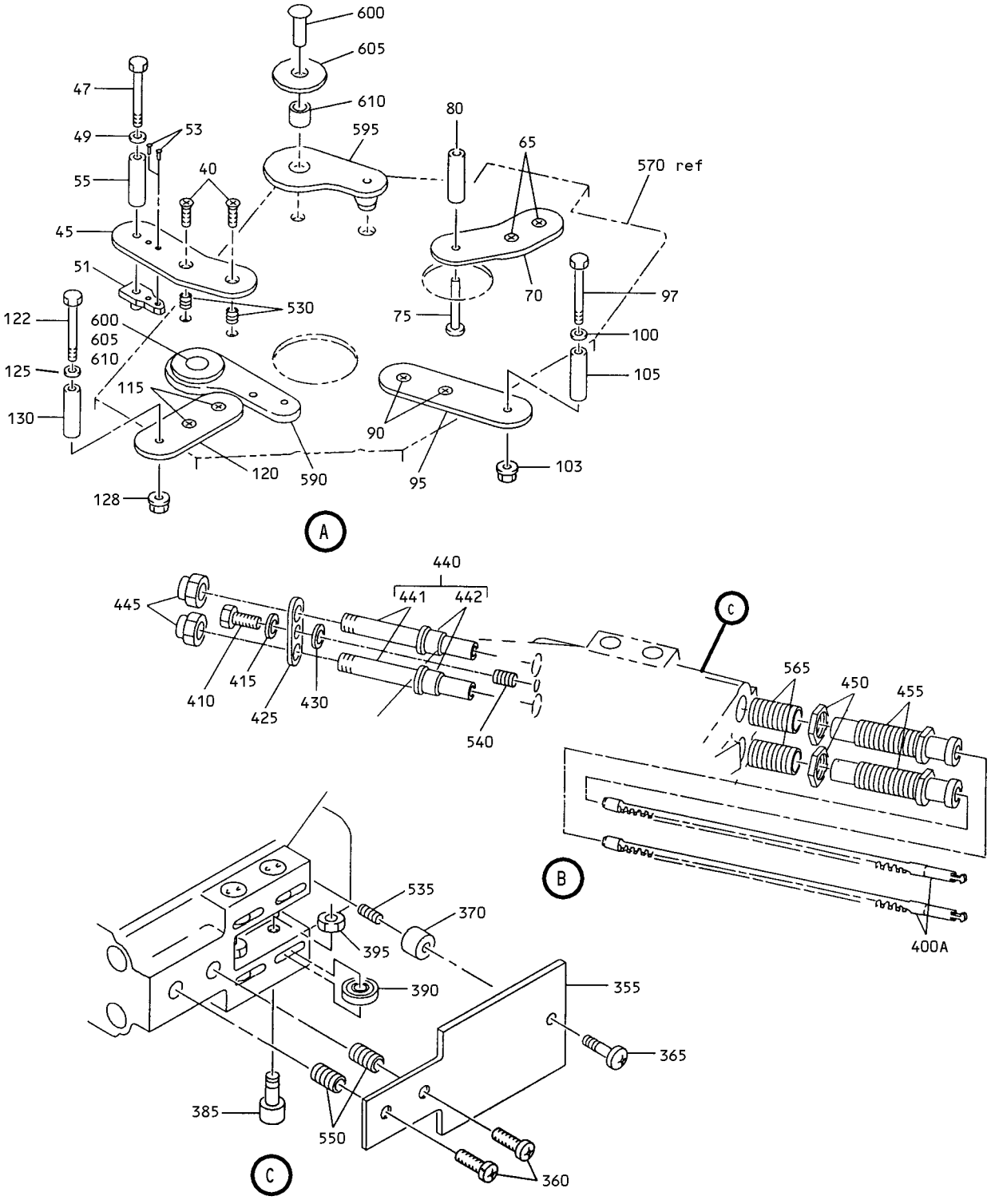


315A1016-1,-3 SHOWN

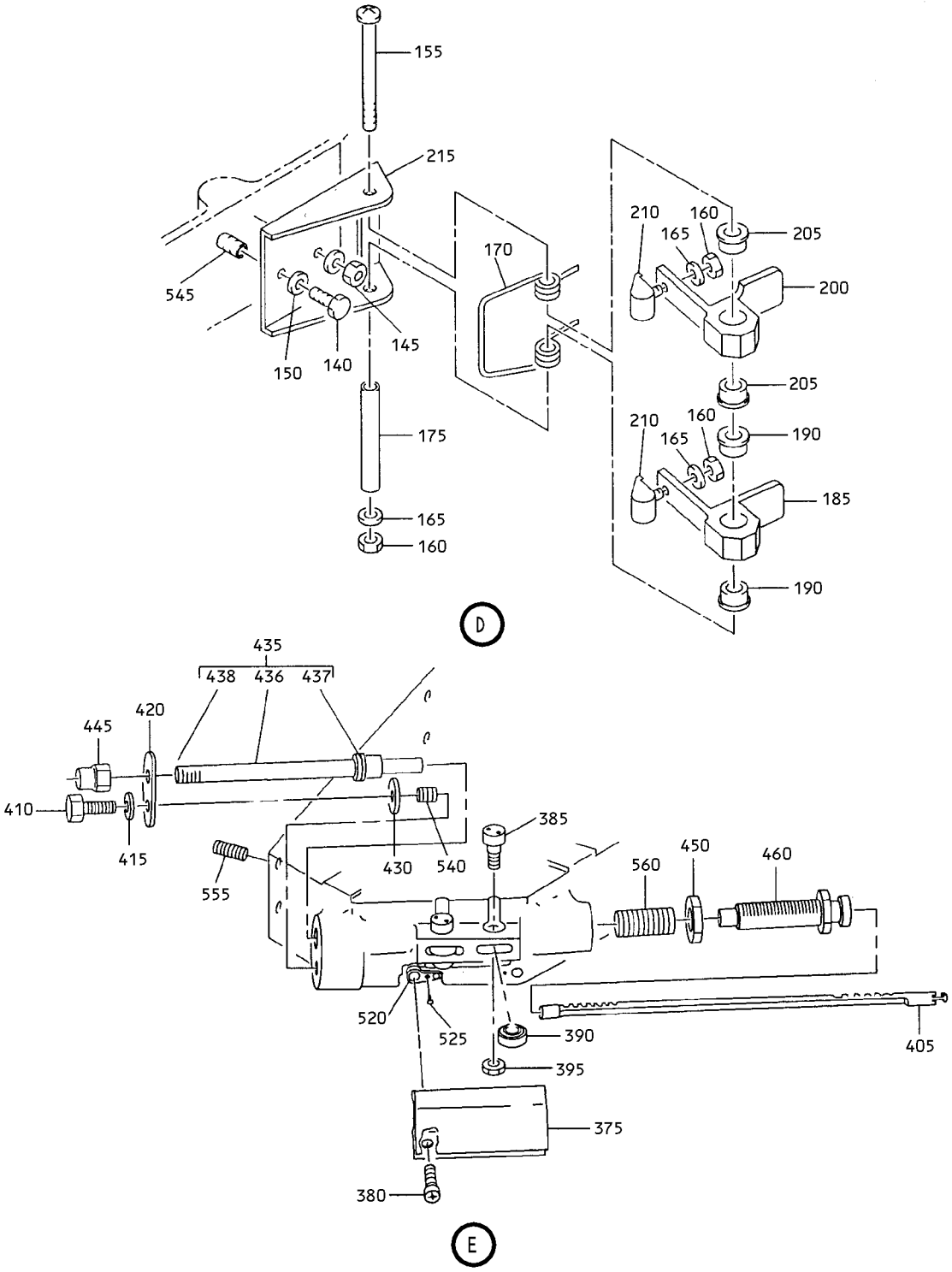
Strut Drum Control Box Assembly
IPL Figure 1 (Sheet 1 of 4)



Strut Drum Control Box Assembly
IPL Figure 1 (Sheet 2 of 4)



Strut Drum Control Box Assembly
IPL Figure 1 (Sheet 3 of 4)



Strut Drum Control Box Assembly
IPL Figure 1 (Sheet 4 of 4)

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
–1	315A1016-1		BOX ASSY-STRUT DRUM CONT	A	RF
–1A	315A1016-2		BOX ASSY-STRUT DRUM CONT	B	RF
–1B	315A1016-3		BOX ASSY-STRUT DRUM CONT	C	RF
–1C	315A1016-4		BOX ASSY-STRUT DRUM CONT	D	RF
5	NAS1805-7N		. NUT		1
10	315A1052-1		. WASHER		1
15	315A1022-5		. QUADRANT ASSY-THROTTLE (OPT ITEM 15A)	A	1
–15A	315A1022-7		. QUADRANT ASSY-THROTTLE (OPT ITEM 15, 15D, 15E)	A, C	1
15B	315A1022-8		. QUADRANT-THROTTLE (OPT ITEM 15C)	B, D	1
15C	315A1022-9		. QUADRANT-THROTTLE (OPT ITEM 15B)	B, D	1
15D	315A1022-5		. QUADRANT ASSY-THROTTLE (OPT ITEM 15A, 15E)	C	1
–15E	315A1022-10		. QUADRANT ASSY-THROTTLE (OPT ITEM 15A, 15D)	C	1
20	315A1055-2		. . SEAL (USED ON ITEM 15, 15A, 15E)		4
25	MS21209F1-20P		. . INSERT (USED ON ITEM 15, 15A, 15E)		4
27	NAS1351-3-14		. . SCREW (USED ON ITEM 15, 15A, 15E)		4
30	315A1022-6		. . QUADRANT-THROTTLE (USED ON ITEM 15)		1
–30A	315A1022-4		. . QUADRANT-THROTTLE (USED 0N ITEM 15A)		1
35	315A1099-3		. FITTING ASSY-CABLE GUARD		1
			ATTACHING PARTS		
40	BACB30LR3P2		. BOLT		2
			- - - - - - - * - - - - - - -		
45	315A1099-4		. . FITTING		1
47	NAS1801-3-22		. . BOLT		1

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
49	AN960-10L		. . WASHER		1
51	BACN10KB3F		. . NUTPLATE		1
53	BACR15BA3AD		. . RIVET		2
55	NAS42DD6-58		. . SPACER		1
60	315A1086-13		. FITTING ASSY-CABLE GUARD		1
			ATTACHING PARTS		
65	BACB30LR3P2		. BOLT		2
			- - - - - - - * - - - - - - -		
70	315A1086-16		. . FITTING		1
75	BACR15BB6D		. . RIVET		1
80	NAS42DD6-54		. . SPACER		1
85	315A1086-12		. FITTING ASSY-CABLE GUARD		1
			ATTACHING PARTS		
90	BACB30LR3P2		. BOLT		2
			- - - - - - - * - - - - - - -		
95	315A1086-15		. . FITTING		1
97	NAS1801-3-22		. . BOLT		1
100	AN960-10L		. . WASHER		1
103	MS21042-3		. . NUT		1
105	NAS42DD6-58		. . SPACER		1
110	315A1086-11		. FITTING ASSY-CABLE GUARD		1
			ATTACHING PARTS		
115	BACB30LR3P2		. BOLT		2
			- - - - - - - * - - - - - - -		
120	315A1086-14		. . FITTING		1
122	NAS1801-3-22		. . BOLT		1
125	AN960-10L		. . WASHER		1
128	MS21042-3		. . NUT		1
130	NAS42DD6-54		. . SPACER		1
135	315A1024-1		. PRELOAD ASSY		1

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
			ATTACHING PARTS		
140	NAS6704L2		. BOLT (OPT ITEM 140A)		2
–140A	NAS6704-2		. BOLT (OPT ITEM 140)		2
145	NAS1805-4N		. NUT		1
150	AN960-416		. WASHER		2
			- - - - - - - * - - - - - - -		
155	BACS12CK3-37		. . SCREW		1
160	BACN10JC3		. . NUT		3
165	AN960XC10		. . WASHER		3
170	315A1028-1		. . SPRING		1
175	315A1067-1		. . SPACER		1
180	315A1025-1		. . LEVER ASSY		1
185	315A1025-3		. . . LEVER		1
190	BACB28AM05~ B020A		. . . BUSHING		2
195	315A1025-2		. . LEVER ASSY		1
200	315A1025-4		. . . LEVER		1
205	BACB28AM05~ B020A		. . . BUSHING		2
210	315A1029-1		. . BUMPER		2
215	315A1057-1		. . SUPPORT		1
220	BACN10JC7CM		. NUT		2
225	AN960C716L		. WASHER		2
230	315A1021-3		. COVER ASSY		1
			ATTACHING PARTS		
235	NAS6704L3		. BOLT (OPT ITEM 235A)		3
–235A	NAS6704-3		. BOLT (OPT ITEM 235)		3
240	NAS6704L5		. BOLT (OPT ITEM 240A)		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–					
–240A	NAS6704-5		. BOLT (OPT ITEM 240)		2
245	AN960-416		. WASHER		5
			- - - - - - - * - - - - - - -		
250	BACB28AA7B016		. . BUSHING		1
255	315A1021-4		. . COVER		1
260	B538DDA3257		. BEARING (V21335) (OPT ITEM 260A)		1
–260A	BACB10FU10		. BEARING (OPT ITEM 260)		1
265	AN960-916		. WASHER		1
270	315A1085-1		. SHIM		1
275	315A1071-1		. WASHER-THRUST		1
280	315A1030-1		. CAM ASSY-FEEDBACK		1
285	315A1030-3		. . CAM		1
290	BACB28AA9B030		. . BUSHING		1
295	BACB28AM09B030		. . BUSHING		1
300	315A1023-2		. GEAR SHAFT-THROTTLE		1
305	315A1030-2		. CAM ASSY-FEEDBACK		1
310	315A1030-4		. . CAM		1
315	BACB28AM09B030		. . BUSHING		2
320	315A1041-2		. SPACER		1
325	315A1063-2		. SHAFT-FEEDBACK		1
330	315A1061-1		. RETAINER ASSY	A, B	1
–330A	315A1031-3		. RETAINER	C, D	1
			ATTACHING PARTS		
335	BACB30LR3P2		. BOLT		1
			- - - - - - - * - - - - - - -		
340	315A1031-2		. . RETAINER	A, B	1
345	315A1055-1		. . SEAL	A, B	1

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
350	B541DDA3257		. BEARING (V21335) (OPT ITEM 350A)		1
–350A	BACB10FU17		. BEARING (OPT ITEM 350)		1
355	315A1011-2		. COVER		1
360	BACS12CK4U11		. SCREW		1
365	BACS12CK3U12		. SCREW		1
370	BACB28Z3-040		. BUSHING		1
375	315A1011-3		. COVER (LIMITED USAGE) (OPT ITEM 375A)	A	1
–375A	315A1011-1		. COVER (LIMITED USAGE) (OPT ITEM 375)	A	1
–375B	315A1011-3		. COVER (OPT ITEM 375C)	B-D	1
–375C	315A1011-1		. COVER (OPT ITEM 375B)	B-D	1
380	BACS12CK3U7		. SCREW		2
385	315T1029-1		. SCREW-ECCENTRIC		6
390	MSP4TL014		. ROLLER (V02758) (SPEC S315N166-1) (OPT KRP114804BT (V50632)) (OPT 10602-00 (V55231)) (OPT ITEM 390A)		6
390A	S302T001-214		. ROLLER BEARING (OPT ITEM 390)		6
395	NAS5093C		. NUT		6
–400	315A1036-1		DELETED		
400A	315A1036-4		. RACK (OPT ITEM 400B)		2
–400B	315A1036-5		. RACK (OPT ITEM 400A)		2
405	315A1036-2		. RACK (OPT ITEM 405A)		1

–Item not Illustrated

FIG/ ITEM	PART NUMBER	AIRLINE PART NUMBER	NOMENCLATURE 1 2 3 4 5 6 7	USAGE CODE	UNITS PER ASSY
1–					
–405A	315A1036-6		. RACK (OPT ITEM 405)		1
410	NAS1801-3-8		. SCREW		2
415	AN960KD10L		. WASHER		2
420	315T3028-2		. RETAINER		1
425	315A1033-1		. RETAINER		1
430	AN960PD10		. WASHER		2
435	315A1032-3		. RACK HOUSING ASSY (OPT ITEM 435A WITH ITEM 445)		1
–435A	315A1032-1		. RACK HOUSING (OPT ITEM 435 WITH ITEM 445) (CAP NUT BACN10R524L IS USED WITH RACK HOUSINGS 315A1032-1 AND 315A1032-2 ONLY.)		1
436	315A1032-5		. . TUBE (USED ON ITEM 435)		1
437	315A1032-7		. . BUSHING (USED ON ITEM 435)		1
–438	315A1032-8		. . CAP (USED ON ITEM 435)		1
440	315A1032-4		. RACK HOUSING ASSY		2
–440A	315A1032-2		. RACK HOUSING (OPT ITEM 440 WITH ITEM 445) (CAP NUT BACN10R524L IS USED WITH RACK HOUSINGS 315A1032-1 AND 315A1032-2 ONLY.)		2
–441	315A1032-6		. . TUBE (USED ON ITEM 440)		2
–442	315A1032-7		. . BUSHING (USED ON ITEM 440)		2
–443	315A1032-8		. . CAP (USED ON ITEM 440)		2
445	BACN10R524L		. CAP NUT (CAP NUT BACN10R524L IS USED WITH RACK HOUSINGS 315A1032-1 AND 315A1032-2 ONLY.)		3
450	NAS1423-7		. JAMNUT		3
455	315T4005-3		. SLEEVE		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–					
460	315A1049-1		. SLEEVE		1
465	315A1064-1		. BUSHING		1
470	315A1087-1		. BUSHING		1
475	BACN10JP3BCD		. NUTPLATE		2
480	BACN10JP4C		. NUTPLATE		2
485	BACR15BA3AD		. RIVET		8
490	NAS1805-4		. NUT		2
495	ATF4LUBECODE93		DELETED		
–495A	4AFC614LJ		DELETED		
–495B	ATF4		. ROLLER BEARING ASSY (V60380) (SPEC BACB10ET04) (OPT 4AFC614 (V92563))		4
–495C	MS21438-104G		DETELED		
500	AN960-416L		. WASHER		2
505	NAS6704D16		. BOLT		2
510	315A1020-3		. HOUSING ASSY (OPT ITEM 510A)		1
510A	315A1020-4		. HOUSING ASSY (OPT ITEM 510)		1
510B	315A1020-5		. HOUSING ASSY (REPLACES ITEM 510A)	C, D	1
515	BACB28AM09˜ B017A		. . BUSHING		1
520	BACN10JB38CD		. . NUTPLATE		2
525	BACR15BA3AD		. . RIVET		4
530	MS21209F1-10P		. . INSERT		12
535	MS21209F1-25		. . INSERT		1
540	MS21209F1-25P		. . INSERT		2
545	MS21209FR15P		. . INSERT		1
550	MS21209F4-25P		. . INSERT		5
555	MS21209F4-30P		. . INSERT		4
560	MS21209F7-25P		. . INSERT		1
565	MS21209F7-30P		. . INSERT		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–					
570	315A1020-2		. . HOUSING		1
–575	BACB30FM6-27		. . BOLT	C, D	1
–580	NAS42DD6-96		. . SPACER	C, D	1
585	BACC30M6		. . COLLAR	C, D	1
590	315A1055-4		. SEAL	C, D	1
595	315A1055-5		. SEAL	C, D	1
600	BACR15BB5D8		. RIVET	C, D	2
605	BACW10P39AL		. WASHER	C, D	2
610	NAS42DD5-8		. SPACER	C, D	2

–Item not Illustrated